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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**Mechanical Directional Controls**

### Direct Acting Check Valves

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### Pressure Controls

#### Direct Acting Relief Valves

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#### Flow Controls

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Note: Aluminum bodies NOT durability rated for 4000 PSI (278 bar). Consult factory for body options.

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#### Flow Divider/Combiner Valves

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### Proportional Controls

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#### Direct Acting Proportional Pressure Reducing / Relieving Valves

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#### Logic Elements

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### 2 Way 2 Position Normally Closed Poppet Valves

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**SOFT SEAT**

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**Typical Schematic**

Typical application for the S2A is load holding and lowering in a Lift, Check and Dump circuit.

Typical application for the S2B is load holding and lowering when free flow in both directions is required to float the cylinder.

Typical application for the S2F is load holding and lowering of a cylinder in low pressure application where the soft seat gives better leakage control.

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  
800-999-7378
**MA-S2A Pilot Operated Poppet, 2 Way, Normally Closed**

**DESCRIPTION**
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

**OPERATION**
When de-energized the MA-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
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<tr>
<td>8</td>
<td>20</td>
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**VALVE SPECIFICATIONS**
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .13 lbs. (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements: 3-5 ft-lbs (4.1-6.8 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit (Buna): 21191000

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**DIMENSIONS**

```
1.10  [30.3]
      50  [12.7]
HEX NUT

1.90  [48.2]

.84  [21.4]  22  [5.6]

.88 [22.2] HEX

5/8-18 UNF 2A THREAD

SEE COIL DATA FOR TERMINATIONS
```

**ORDERING INFORMATION**

**MA-S2A**

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0
- Buna, Screen: A0
- Viton, Screen: W0

**BODIES**
- Blank: Without Body
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

**VOLTAGE**
- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC

- Double Lead: DL
- Deutsch on Leads DT04-2P: DT
- Metri-Pack on Leads: ML
- Packard on Leads: PL
- Weatherpack on Leads: WL
- Single Spade: SS
- Double Spade: DS
- DIN 43650 (Hirschman) – (AC&DC): HC
- Conduit Lead – (AC Only): CL

Approximate Coil Weight: .30 lbs. (.14 kg.)
HA-S2A Pilot Operated Poppet, 2 Way, Normally Closed

DESCRIPTION
“High Pressure” 7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with free reverse flow de-energized.

OPERATION
When de-energized the HA-S2A blocks flow from (1) to (2) and allows flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common termination, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
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Valve Specifications

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>5 GPM (19 LPM)</th>
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<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.14 lbs. (.06 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500003</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191000</td>
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</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PB-S2A Pilot Operated Poppet, 2 Way, Normally Closed

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the PB-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.20 lbs. (0.09 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191100

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

![Diagram showing dimensions](image)

**ORDERING INFORMATION**

<table>
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<tr>
<td>Viton Standard</td>
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<tr>
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<tr>
<td>Buna, Screen</td>
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<td>Buna, Screen, Override, Detent</td>
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**VOLTAGE**

- **B1**: 6 VDC
- **B2**: 12 VDC
- **B3**: 24 VDC
- **B4**: 48 VDC
- **B5**: 24 VAC
- **B6**: 120 VAC
- **B7**: 220 VAC
- **B8**: 440 VAC

**“P” COIL TERMINATION**

(All DC Except as Noted)

- **DL**: Double Lead
- **DT**: Deutsch on Leads DT04-2P
- **ML**: Metri-Pack on Leads
- **PL**: Packard on Leads
- **WL**: Weatherpack on Leads

- **SS**: Single Spade
- **DS**: Double Spade
- **HC**: DIN 43650 (Hirschman) – (AC & DC)
- **CL**: Conduit Lead – (AC Only)
- **DI**: Deutsch – Integral DT04-2P

**IMMERSION PROOF “P” TYPE**

- **IA**: “I” Coil AMP Superseal - Integral
- **ID**: “I” Coil Deutsch – Integral DT04-2P
- **IU**: “I” Coil AMP Jr. Timer - Integral
- **IM**: “I” Coil Metri-Pack – Integral

**Approximate Coil Weight**: .42 lbs (.19 kg.)

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
HB-S2A  Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the HB-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

MANUAL OVERRIDE OPTION: to override, turn the manual override screw counter-clockwise. To release, turn the manual override screw clockwise.

FEATURES
• Hardened parts for long life.
• Efficient wet-armature construction.
• Cartridges are voltage interchangeable.
• Manual override option.
• Industry common cavity.
• Utilized, molded coil design.
• Continuous duty rated solenoid.
• Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Nominal Flow
12 GPM (45 LPM)
Rated Operating Pressure
5000 PSI (350 bar)
Typical Internal Leakage
0-5 drops/min at 5000 PSI
(150 SSU) (350 bar)
Viscosity Range
36 to 3000 SSU (3 to 647 cSt)
Media Operating Temperature
-40° to 210° F (-40° to 100° C)
Range
BUNA seals
-4° to 250° F (-20° to 120° C)
VITON seals
Weight
.29 lbs. (.13 kg)
Operating Fluid Media
General Purpose Hydraulic Fluid
Cartridge Torque Requirements
35 ft-lbs (47 Nm)
Coil Nut Torque Requirements
4-6 ft-lbs (5.4-8.1 Nm)
Cavity
POWER 2W
Cavity Tools kit
40500005
Seal Kit
21191100

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

**“P” COIL TERMINATION**

- Body Weight: .39 lbs (.18 kg)
- Options:
  - Buna Standard
  - Viton Standard
  - Buna, Override
  - Viton, Override
- Voltage:
  - 06 VDC
  - 12 VDC
  - 24 VDC
  - 36 VDC
  - 48 VDC
  - 24 VAC
  - 120 VAC
  - 220 VAC
  - 440 VAC

**IMMERSION PROOF “I” TYPE**

- Body Weight: .39 lbs (.18 kg)
- Options:
  - Buna Standard
  - Viton Standard
  - Buna, Override
  - Viton, Override
- Voltage:
  - 06 VDC
  - 12 VDC
  - 24 VDC
  - 36 VDC
  - 48 VDC
  - 24 VAC
  - 120 VAC
  - 220 VAC
  - 440 VAC

**“J” COIL TERMINATION**

- Body Weight: .39 lbs (.18 kg)
- Options:
  - Buna Standard
  - Viton Standard
  - Buna, Override
  - Viton, Override
- Voltage:
  - 06 VDC
  - 12 VDC
  - 24 VDC
  - 36 VDC
  - 48 VDC
  - 24 VAC
  - 120 VAC
  - 220 VAC
  - 440 VAC

ORDERING INFORMATION

**HB - S2A**

- Standard Screw Override Knob
- Options:
  - Buna Standard: 00
  - Viton Standard: V0
  - Buna, Override: 0M
  - Viton, Override: VM
- Consult Factory for Body

**“P” COIL TERMINATION**

- Double Lead: DL
- Double Spade: DS
- DIN 43650 (Hirschman) - (AC & DC): HC
- Conduit Lead - (AC Only): CL
- Deutsch - Integral DT04-2P: DI

Approximate Coil Weight: .42 lbs / .19 kg

For Optional Coil Terminations See Coil Section

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-S2A Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the DE-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>35</td>
<td>25</td>
<td>75</td>
<td>45</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .27 lbs (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

WARNING: The specifications.application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

DE-S2A - - - -

OPTIONS

Bodies
Blank  Without Body
N  3/8 NPTF Ports
S  #8 SAE Ports

VOLTAGE

6 VDC
12 VDC
24 VDC
36 VDC
48 VDC
24 VAC
120 VAC
220 VAC
440 VAC

“D” COIL TERMINATION

(DC Except as Noted)

DL  Double Lead
DT  Deutsch on Leads DT04-2P
ML  Metri-Pack on Leads
PL  Packard on Leads
WL  Weatherpack on Leads

SS  Single Spade
DS  Double Spade
HC  DIN 34650 (Hirschman) – (AC & DC)
CL  Conduit Lead – (AC Only)
DI  Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs (.33 kg.)

Note: Use screen only if flow direction is from (1) to (2).

IMMERSION PROOF “D” TYPE

IA  “I” Coil AMP Superseal - Integral
ID  “I” Coil Deutsch – Integral DT04-2P
IJ  “I” Coil AMP Jr. Timer - Integral
IM  “I” Coil Metri-Pack – Integral
**HE-S2A Pilot Operated Poppet, 2 Way Normally Closed**

**DESCRIPTION**

“High Pressure” 10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

**OPERATION**

When de-energized the HE-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

![Symbol](image)

Uses “L” Coil.

**PERFORMANCE**

*Actual Test Data (Cartridge Only)*

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.39 lbs (.17 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>50 ft-lbs (67.8 Nm)</td>
</tr>
<tr>
<td>Coils Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

**ORDERING INFORMATION**

**HE-S2A**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard 00</td>
<td>Blank Without Body N</td>
<td>6 VDC 06</td>
</tr>
<tr>
<td>Viton Standard V0</td>
<td>3/8 NPTF Ports S</td>
<td>12 VDC 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 VDC 24</td>
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<td>36 VDC 36</td>
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<td>48 VAC 48</td>
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<td>2220 VAC 22</td>
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<tr>
<td></td>
<td></td>
<td>4440 VAC 44</td>
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**“L” COIL TERMINATION**

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<thead>
<tr>
<th>DL</th>
<th>DT</th>
<th>ML</th>
<th>PL</th>
<th>WL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Lead</td>
<td>Deutsch on Leads DT04-2P</td>
<td>Metri-Pack on Leads</td>
<td>Packard on Leads</td>
<td>Weatherpack on Leads</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “D” TYPE**

<table>
<thead>
<tr>
<th>IA</th>
<th>ID</th>
<th>IJ</th>
<th>IM</th>
</tr>
</thead>
</table>

**Note:** Aluminum, NOT durability rated for 4000 PSI. Consult factory options.

**Approximate Coil Weight:** .68 lbs. (.31 kg.)

---

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
TT-S2A Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
12 size, 1 1/16-12 thread, "Tecnord" series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the TT-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>10</td>
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<tr>
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<tr>
<td>40</td>
<td>8</td>
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</table>

<table>
<thead>
<tr>
<th>Pressure Drop (BAR)</th>
<th>Flow (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<tr>
<td>20</td>
<td>125</td>
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<tr>
<td>25</td>
<td>150</td>
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</table>

<table>
<thead>
<tr>
<th>Port 1 to 2 (eng)</th>
<th>Port 2 to 1 (de-eng)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
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<tr>
<td>20</td>
<td>20</td>
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VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>25 GPM (95 LPM)</th>
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</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>49 lbs. (22 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>TECNORD 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40560032</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191300</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com  800-999-7378

DIMENSIONS

ORDERING INFORMATION

TT-S2A - - -

OPTIONS
Buna, Standard 00  Blank
Viton, Standard V0  S
Buna, Override OM  #12 SAE Ports
Viton, Override VM
Buna, Screen A0
Viton, Screen W0
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1
Buna, Screen, Override, Detent B4
Viton, Screen, Override, Detent V4

VOLTAGE
5 VDC 06 6 VDC
12 VDC 12 12 VDC
24 VDC 24 24 VDC
36 VDC 36 36 VDC
48 VDC 48 48 VDC
24 VAC 25 24 VAC
120 VAC 11 120 VAC
220 VAC 22 220 VAC
440 VAC 44 440 VAC

VOLTAGE

BODIES
Without Body
#12 SAE Ports

“D” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IA “I” Coil AMP Superseal – Integral
ID “I” Coil Deutsch – Integral DT04-2P
IU “I” Coil AMP Jr. Timer – Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)
SJ-S2A Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the SJ-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricted flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>30 GPM (114 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.72 lbs. (.32 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500017</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191400</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
HJ-S2A Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
“High Pressure” 16 size, 1 5/16-12 thread, “Super” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow de-energized.

OPERATION
When de-energized the HJ-S2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restricted flow from (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Port 1 to 2 (eng)</th>
<th>Port 2 to 1 (de-eng)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pressure Drop (BAR)</th>
<th>Flow (Lpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
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<tr>
<td>10</td>
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<tr>
<td>25</td>
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</tr>
<tr>
<td>30</td>
<td>150</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Drop (psi)</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>5</td>
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<tr>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>30</td>
<td>150</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS

- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 4350 PSI (300 bar)
- Typical Internal Leakage: 0-10 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .72 lbs. (.32 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 115 ft-lbs (156 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191400

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**PB-S2B Pilot Operated Poppet, 2 Way Normally Closed**

### DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

### OPERATION
When de-energized the PB-S2B blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

### FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

### HYDRAULIC SYMBOL

![Hydraulic Symbol](image)

### PERFORMANCE
**Actual Test Data (Cartridge Only)**

**Valve Specifications**
- **Nominal Flow**: 8 GPM (30 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Typical Internal Leakage (150 SSU)**: 0-5 drops/min
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 20 lbs. (.09 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 25 ft-lbs (34 Nm)
- **Coil Nut Torque Requirements**: 4-6 ft-lbs (5.4-8.1 Nm)
- **Cavity**: POWER 2W
- **Cavity Form Tool (Finishing)**: 40500005
- **Seal Kit**: 21191100

**Flow vs. Pressure Drop**

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<tbody>
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<td>12</td>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
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<td>30</td>
<td>10</td>
</tr>
<tr>
<td>40</td>
<td>15</td>
</tr>
</tbody>
</table>

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**Contact Information**
- **Phone**: (815) 397-6628
- **Fax**: (815) 397-2526
- **E-mail**: delta@delta-power.com

**SHOP ONLINE at www.airlinehyd.com**
**DIMENSIONS**

**ORDERING INFORMATION**

**PB-S2B**

**OPTIONS**

- Buna Standard: 00
- Viton Standard: V0
- Buna, Override, Overtent: 0M
- Viton, Override, Overtent: VM
- Buna, Screen: A0
- Viton, Screen: W0

**BODIES**

- Blank: Without Body
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

**VOLTAGE**

- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 24 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

**“P” COIL TERMINATION**

(All DC Except as Noted)

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Parkard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

**IMMERSION PROOF “P” TYPE**

- IA: “I” Coil AMP Superseal - Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IU: “I” Coil AMP Jr. Timer - Integral
- IM: “I” Coil Metri-Pack - Integral

Approximate Coil Weight: .42 lbs/.19 kg.

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
SOLENOID OPERATED DIRECTIONAL CONTROLS

HB-S2B Pilot Operated, 2 Way Normally Closed with Free Reversed Flow

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

OPERATION
When de-energized the HB-S2B blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and from (2) to (1).

MANUAL OVERRIDE OPTION: to override, turn the manual override screw clockwise. To release, turn the manual override screw counter-clockwise.

FEATURES
• Hardened parts for long life.
• Efficient wet-armature construction.
• Cartridges are voltage interchangeable.
• Industry common cavity.
• Unitized, molded coil design.
• Continuous duty rated solenoid.
• Optional coil voltages and terminations.
• Manual override option.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (350 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min at 5000 PSI</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 210° F (-40° to 100° C)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Weight</td>
<td>.29 lbs. (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Tools kit</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
DIMENSIONS

“P” COIL TERMINATION

IMMERSION PROOF “I” TYPE

“J” COIL TERMINATION

ORDERING INFORMATION

HB - S2B

CONSULT FACTORY FOR BODY

OPTIONS

Buna Standard 00
Viton Standard V0
Buna, Override 0M
Viton, Override VM

VOLTAGE

06 06 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“P” COIL TERMINATION

IMMERSION PROOF “I” TYPE

“J” COIL TERMINATION

DELTA POWER COMPANY
4484 Boeing Drive - Rockford, IL 61109

Approximate Coil Weight: .42 lbs/.19 kg.

For Optional Coil Terminations See Coil Section

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Page 31
DE-S2B Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

OPERATION
When de-energized the DE-S2B acts as a check valve, allowing flow to pass from (2) to (1), while blocking flow from (1) to (2). When energized the valve opens allowing flow to pass from (1) to (2).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .27 lbs (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
DIMENSIONS

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

ORDERING INFORMATION

DE-S2B - - - -

OPTIONS
Buna Standard 00 Blank Without Body
Viton Standard V0 N 3/8 NPTF Ports
Buna, Override 0M S #8 SAE Ports
Viton, Override VM
Viton & Screen A0
Viton & Screen W0
Buna, Override, Non-dent B1 06 6 VDC
Viton, Override, Non-dent V1 12 12 VDC
Buna, Screen, Override, Non-dent B3 24 24 VDC
Buna, Screen, Override, Detent B4 36 36 VDC
Viton, Screen, Override, Non-dent V3 48 48 VDC
Viton, Screen, Override, Detent V4 25 24 VAC

Note: Use screen only if flow direction is from (1) to (2).

“D” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead SS Single Spade IA "I" Coil AMP Superseal - Integral
DT Deutsch on Leads DT04-2P DS Double Spade ID "I" Coil Deutsch – Integral DT04-2P
ML Metri-Pack on Leads HC DIN 43650 (Hirschman) – (AC & DC) IU "I" Coil AMP Jr. Timer - Integral
PL Packard on Leads CL Conduit Lead – (AC Only) IM "I" Coil Metri-Pack – Integral
WL Weatherpack on Leads DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs (.33 kg.)

IMMERSION PROOF “D” TYPE

IA "I" Coil AMP Superseal - Integral
ID "I" Coil Deutsch – Integral DT04-2P
IU "I" Coil AMP Jr. Timer - Integral
IM "I" Coil Metri-Pack – Integral

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HE-S2B Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
"High Pressure" 10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

OPERATION
When de-energized the HE-S2B acts as a check valve, allowing flow to pass from (2) to (1), while blocking flow from (1) to (2). When energized the valve opens allowing flow to pass from (1) to (2).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

USES "L" COIL.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 39 lbs. (.17 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 50 ft-lbs (67.8 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

HE-S2B

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body N
3/8 NPTF Ports S
#8 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VAC
25 25 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“L” COIL TERMINATION
(All DC Except as Noted)
DL Double Lead SS Single Spade IA “I” Coil AMP Superseal - Integral
DT Deutsch on Leads DT04-2P DS Double Spade ID “I” Coil Deutsch – Integral DT04-2P
ML Metri-Pack on Leads HC DIN 43650 (Hirschman) – (AC & DC) IJ “I” Coil AMP Jr. Timer - Integral
PL Packard on Leads CL Conduit Lead – (AC Only) IM “I” Coil Metri-Pack – Integral
WL Weatherpack on Leads DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .68 lbs. (.31 kg.)

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
**TT-S2B Pilot Operated Poppet, 2 Way Normally Closed**

**DESCRIPTION**
12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

**OPERATION**
When de-energized the TT-S2B blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and from (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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<th>Pressure Drop (PSI)</th>
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**VALVE SPECIFICATIONS**

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<thead>
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<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>25 GPM (95 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.49 lbs. (.22 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>TECNORD 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500032</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191300</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

TT-S2B - - -

OPTIONS
- Buna Standard 00 Blank
- Buna, Override 0M
- Viton Standard V0
- Viton, Override VM
- Viton & Screen W0
- Buna & Screen A0
- Buna, Screen, Override, Detent B4 36 36 VDC
- Viton, Screen, Override, Detent V4 24 24 VAC
- Buna, Screen, Override, Non-detent B3 36 36 VDC
- Viton, Screen, Override, Non-detent V3 48 48 VDC
- Buna, Override, Non-detent B1 06 6 VDC
- Viton, Override, Non-detent V1 12 12 VDC

BODIES
- #12 SAE Ports S

VOLTAGE
- 6 VDC
- 12 VDC
- 24 VDC
- 36 VDC
- 48 VDC
- 24 VAC
- 120 VAC
- 220 VAC
- 440 VAC

Note: Use screen only if flow direction is from (1) to (2).

“D” COIL TERMINATION

IMMERSION PROOF “D” TYPE

DL Double Lead SS Single Spade IA “I” Coil AMP Superseal - Integral
DT Deutsch on Leads DS Double Spade ID “I” Coil Deutsch – Integral DT04-2P
ML Metri-Pack on Leads HC DIN 43650 (Hirschman) – (AC & DC)
PL Packard on Leads CL Conduit Lead – (AC Only) IU “I” Coil AMP Jr. Timer - Integral
WL Weatherpack on Leads DI Deutsch – Integral DT04-2P IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
HT-S2B Pilot Operated Poppet, 2 Way Normally Closed

**DESCRIPTION**

"High pressure" 12 size, 1 1/16-12 thread, "Tecnord" series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

**OPERATION**

When de-energized the HT-S2B blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and from (2) to (1).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**

**Valve Specifications**

- **Nominal Flow**: 25 GPM (95 LPM)
- **Rated Operating Pressure**: 5000 PSI (345 bar)
- **Typical Internal Leakage**: 0-8 drops/min
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .94 lbs. (.43 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 70 ft-lbs (94.9 Nm)
- **Coil Nut Torque Requirements**: 5-7 ft-lbs (6.8-9.5 Nm)
- **Cavity**: TECNORD 2W
- **Cavity Form Tool (Finishing)**: 40500032
- **Seal Kit**: 21191301

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**DIMENSIONS**

![Diagram of dimensions]

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<td>[92.6]</td>
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**ORDERING INFORMATION**

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0
- Buna, Screen: A0
- Viton, Screen: W0

**BODIES**
- Blank: S
- Without Body: #12 SAE Ports

**VOLTAGE**
- 6 VDC: 06
- 12 VDC: 12
- 24 VDC: 24
- 36 VDC: 36
- 48 VDC: 48
- 24 VAC: 25
- 120 VAC: 11
- 220 VAC: 22

**"T" COIL TERMINATION**
- Double Lead: DL
- Deutsch on Leads: DT
- Metri-Pack on Leads: ML
- Packard on Leads: PL
- Weatherpak on Leads: WL
- Double Spade: DS
- DIN 43650 (Hirschman) – (AC/DC): HC

Approximate Coil Weight: .89 lbs/.41 kg.

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SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

SJ-S2B Pilot Operated Poppet, 2 Way Normally Closed

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, solenoid operated, 2 way normally closed, pilot operated poppet valve with reverse flow energized and de-energized.

OPERATION
When de-energized the SJ-S2B blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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<table>
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<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
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<tr>
<td>20</td>
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</tbody>
</table>

| Port 1 to 2 (eng) | Port 2 to 1 (eng) | Port 2 to 1 (de-eng) |

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Nominal Flow</td>
<td>30 GPM (114 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>0-10 drops/min</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>.72 lbs. (.32 kg)</td>
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<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
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<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
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<tr>
<td>Cavity</td>
<td>SUPER 2W</td>
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<td>Cavity Form Tool (Finishing)</td>
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<tr>
<td>Seal Kit</td>
<td>21191401</td>
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</tbody>
</table>

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Page 40
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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SHOP ONLINE at www.airlinehyd.com

800-999-7378

DIMENSIONS

ORDERING INFORMATION

SG-S2B - - - -

OPTIONS
Buna Standard 00 Blank Without Body
Viton Standard VO N 3/4 NPT Ports
Buna, Screen A0 S #12 SAE Ports
Viton, Screen W0
Buna, Override, Detent 0M
Viton, Override, Detent VM
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1
Buna, Screen, Override, Non-detent B3 06 6 VDC
Viton, Screen, Override, Non-detent B4 12 12 VDC
Buna, Screen, Override, Detent B3 24 24 VDC
Viton, Screen, Override, Detent B4 36 36 VDC

VOLTAGE
6 VDC
12 VDC
24 VDC
36 VDC
48 VDC
24 VAC
120 VAC
220 VAC
440 VAC

“D” COIL TERMINATION
(Double Lead
Deutsch on Leads DT04-2P
Metri-Pack on Leads
Packard on Leads
Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IMMERSION PROOF “D” TYPE
IA “I” Coil AMP Supereal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs (.33 kg.)
2 Way 2 Position Normally Closed Bi-Directional Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
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<tbody>
<tr>
<td>0.20</td>
<td>3000</td>
<td>0.76</td>
<td>207</td>
<td>MA-S2E</td>
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<tr>
<td>3</td>
<td>3000</td>
<td>11</td>
<td>207</td>
<td>PB-S2I</td>
<td>46</td>
</tr>
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<td>3000</td>
<td>15</td>
<td>207</td>
<td>DE-S2I</td>
<td>48</td>
</tr>
<tr>
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<td>45</td>
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<td>HB-S2L</td>
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<td>3000</td>
<td>45</td>
<td>207</td>
<td>DE-S2L</td>
<td>52</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the S2E, S2I, and S2L is where load holding in both directions is required.
MA-S2E Poppet, 2 Way, Normally Closed, Bi-directional

DESCRIPTION
7 size, 5/8-18 thread, "Mini" series, solenoid operated, 2 way normally closed, bi-directional poppet valve.

OPERATION
When de-energized the MA-S2E blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: .20 GPM (.76 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 0-10 drops/min
- (150 SSU) 0-10 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .18 lbs. (.08 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements: 3.5 ft-lbs (4.1-6.8 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit: 21191003

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SOLENOID OPERATED DIRECTIONAL CONTROLS

PB-S2i Direct Acting Poppet, 2 Way Double Lock Normally Closed

DESCRIPTION

8 size, 3/4-16 thread, "Power" series, solenoid operated, 2 way normally closed, bi-directional poppet valve.

OPERATION

When de-energized the PB S2i blocks flow from (1) to (2) and from (2) to (1). When energized the valve allows flow from (1) to (2) and from (2) to (1).

MANUAL OVERRIDE OPTION: to override, turn clockwise the manual override screw. To release, turn the manual override screw counter-clockwise.

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Utilized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

PERFORMANCE

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>DE-RATING OF PRESSURE VS. FLOW</th>
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<td>7</td>
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<table>
<thead>
<tr>
<th>VALVE SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
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<tr>
<td>Rated Operating Pressure</td>
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<tr>
<td>Typical Internal Leakage</td>
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<tr>
<td>Viscosity Range</td>
</tr>
<tr>
<td>Filtration</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
</tr>
<tr>
<td>Cavity</td>
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<tr>
<td>Cavity Tool</td>
</tr>
<tr>
<td>Seal Kit</td>
</tr>
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</table>

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**DIMENSIONS**

**“P” COIL TERMINATION**

**IMMERSION PROOF “I” TYPE**

**“J” COIL TERMINATION**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>PB - S2I</th>
<th>CONSULT FACTORY FOR BODY</th>
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</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td>-</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td>-</td>
</tr>
<tr>
<td>Buna Knob</td>
<td>OK</td>
<td>-</td>
</tr>
</tbody>
</table>

**VOLTAGE**

- 06: 06 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 24 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

**“P” COIL TERMINATION**

- Double Lead (All DC except as noted)
- Double Spade
- DIN 43650 (Hirschman) - (AC & DC)
- Conduit Lead - (AC Only)
- Deutsch - Integral DT04-2P

**IMMERSION PROOF “I” TYPE**

- “I” Coil AMP Superseal - Integral
- “I” Coil Deutsch - Integral DT04-2P
- “I” Coil AMP Jr. Time - Integral
- “I” Coil Metri-Pack - Integral

**“J” COIL TERMINATION**

- “J” Coil AMP Superseal - Integral
- “J” Coil Deutsch - Integral DT04-2P
- “J” Coil AMP Jr. Time - Integral
- “J” Coil Metri-Pack - Integral
- “J” Coil Double Lead
- “J” Coil DIN 43650 (Hirschman) - (AC & DC)

Approximate Coil Weight: .42 lbs/.19 kg.

For Optional Coil Terminations See Coil Section

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DE-S2I Poppet, 2 Way, Normally Closed, Bi-Directional**

**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, bi-directional poppet valve.

**OPERATION**

When de-energized the DE-S2I blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Higher pressure or higher flow capable, consult factory for options.
For Higher flow see DE-S2L.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
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<tr>
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<td>3 GPM (11 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>0-10 drops/min</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>.21 lbs. (.09 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

![DIMENSIONS Diagram](image)

**ORDERING INFORMATION**

<table>
<thead>
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<tbody>
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<td></td>
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<td>OM</td>
<td>S</td>
<td>#8 SAE Ports</td>
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<td>Viton, Override</td>
<td>VM</td>
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<td>Buna, Override, Knob</td>
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<td></td>
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<tr>
<td></td>
<td>Viton, Override, Knob</td>
<td>VK</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Buna, Screen</td>
<td>A0</td>
<td>06</td>
<td>6 VDC</td>
</tr>
<tr>
<td></td>
<td>Viton, Screen</td>
<td>W0</td>
<td>12</td>
<td>12 VDC</td>
</tr>
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<td></td>
<td>Buna, Screen, Override</td>
<td>B2</td>
<td>24</td>
<td>24 VDC</td>
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<tr>
<td></td>
<td>Viton, Screen, Override</td>
<td>V2</td>
<td>36</td>
<td>36 VDC</td>
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<tr>
<td></td>
<td>Buna, Screen, Override, Knob</td>
<td>B5</td>
<td>48</td>
<td>48 VDC</td>
</tr>
<tr>
<td></td>
<td>Viton, Screen, Override, Knob</td>
<td>V5</td>
<td>25</td>
<td>24 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>120 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>22</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>44</td>
<td>440 VAC</td>
</tr>
</tbody>
</table>

Note: Use screen only if flow direction is from (1) to (2).

**“D” COIL TERMINATION**

(All DC Except as Noted)

- DL: Double Lead
- DT: Deutsch on Leads, DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

**IMMERSION PROOF “D” TYPE**

- IA: “I” Coil AMP Superseal – Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IU: “I” Coil AMP Jr. Timer – Integral
- IM: “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .72 lbs. (.32 kg.)

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**HB-S2L Piloted Operated Poppet, 2 Way, Normally Closed, Bi-directional**

### DESCRIPTION

8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, bi-directional poppet valve.

### OPERATION

When de-energized the HB-S2L blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

### FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

### HYDRAULIC SYMBOL

![Symbol Diagram]

### PERFORMANCE

**Actual Test Data (Cartridge Only)**

![Performance Graph]

### VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (350 bar)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.26 lbs (.12 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Tools kit</td>
<td>405000005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191102</td>
</tr>
</tbody>
</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

DIMENSIONS

“P” COIL TERMINATION

IMMERSION PROOF “I” TYPE

“J” COIL TERMINATION

ORDERING INFORMATION

HB - S2L - - - CONSULT FACTORY FOR BODY

OPTIONS

Buna Standard 00
Viton Standard V0

VOLTAGE

06 06 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“P” COIL TERMINATION

“J” COIL TERMINATION

IMMERSION PROOF “I” TYPE

Approximate Coil Weight: .42 lbs/.19 kg.
For Optional Coil Terminations See Coil Section

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Page 51
**MA-S2F Pilot Operated Poppet, 2 Way, Normally Closed – Soft Seat**

**DESCRIPTION**
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally closed, pilot operated soft seat poppet valve with reverse flow de-energized.

**OPERATION**
When de-energized the MA-S2F blocks flow from (1) to (2) and allows free reverse flow from (2) to (1).

When energized the valve allows flow from (1) to (2) and restricts flow from (2) to (1).

**FEATURES**
- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Operational shift limit 2.5 GPM (9.5 LPM). For shifted flow performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Maximum Flow 2.5 GPM (9.5 LPM)
- Rated Operating Pressure 1500 PSI (103 bar)
- Typical Internal Leakage (150 SSU) Negligible
- Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
- Filtration ISO 18/16/13
- Media Operating Temperature Range 32° to 160° F (0° to 70° C)
- Weight .12 lbs. (.05 kg)
- Operating Fluid Media General Purpose Hydraulic Fluid
- Cartridge Torque Requirements 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements 3-5 ft-lbs (4.1-6.8 Nm)
- Cavity MINI 2W
- Cavity Form Tool (Finishing) 40500003
- Seal Kit 21191000

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800-999-7378
PB-S2F Pilot Operated Poppet, 2 Way Normally Closed – Soft Seat

DESCRIPTION
8 size, 3/4-16 thread, "Power" series, solenoid operated, 2 way normally closed, pilot operated soft seat poppet valve with reverse flow de-energized.

OPERATION
When de-energized the PB-S2F blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) and restrict flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL
Operational shift limit is 6 GPM.
For shifted performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

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<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<td>1</td>
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<td>12</td>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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<td>10</td>
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<td>15</td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
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</tr>
<tr>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
</tr>
</tbody>
</table>

| Port 1 to 2 (eng) Port 2 to 1 (de-eng) |

<table>
<thead>
<tr>
<th>VALVE SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
</tr>
<tr>
<td>Viscosity Range</td>
</tr>
<tr>
<td>Filtration</td>
</tr>
<tr>
<td>Media Operating</td>
</tr>
<tr>
<td>Temperature Range</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
</tr>
<tr>
<td>Cartridge Torque</td>
</tr>
<tr>
<td>Requirements</td>
</tr>
<tr>
<td>Cavity</td>
</tr>
<tr>
<td>Cavity Form Tool</td>
</tr>
<tr>
<td>(Finishing)</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
DE-S2F Pilot Operated Poppet, 2 Way Normally Closed – Soft Seat

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, pilot operated soft seat poppet valve with reverse flow de-energized.

OPERATION
When de-energized the DE-S2F blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized the valve allows flow from (1) to (2) but restricts reverse flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Operational shift limit 10 GPM (38 LPM). For shifted flow performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

![Performance Chart]

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>1000 PSI (69 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>Temperature Range: 32° to 160° F (0° to 70° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.25 lbs. (.11 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque</td>
<td>Requirements 30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque</td>
<td>Requirements 4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>4050000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
HA-S2P Poppet, 2 Way, Normally Closed

DESCRIPTION

OPERATION
When de-energized the HA-S2P blocks flow from (1) to (2). When energized the valve allows flow from (1) to (2).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 0.10 GPM (.38 LPM)
- Rated Operating Pressure: 5000 PSI (350 bar)
- Typical Internal Leakage: 0-10 drops/min (150 SSU)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 18 lbs. (.08 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements: 3-5 ft-lbs (4.1-6.8 Nm)
- Cavity: MINI
- Cavity Form Tool (Finishing): 40500058
- Seal Kit: 21191000

Great for pilot control, low leakage. Flow from port (2) to port (1) will happen once pressure is between 1000 and 2000 PSI.
**SOLENOID OPERATED DIRECTIONAL CONTROLS**

**Delta Power Company**

4484 Boeing Drive - Rockford, IL 61109

**DIMENSIONS**

![Diagram of solenoid directional control dimensions]

**HA-S2P**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>Blank</td>
<td>06 6 VDC</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>Without Body</td>
<td>12 12 VDC</td>
</tr>
<tr>
<td></td>
<td>#4 SAE Ports</td>
<td>24 24 VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 36 VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 48 VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 24 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 120 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22 220 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 440 VAC</td>
</tr>
</tbody>
</table>

**"M" COIL TERMINATION**

(All DC Except as Noted)
- Double Lead: DL
- Deutsch on Leads: DT
- Metri-Pack on Leads: ML
- Packard on Leads: PL
- Weatherpack on Leads: WL
- Single Spade: SS
- Double Spade: DS
- DIN 43650 (Hirschmann) – (AC&D): HC
- Conduit Lead – (AC only): CL

**WARNING**

DO NOT USE ALUMINUM HIGH PRESSURE (5000 PSI) PRODUCT

Approximate Coil Weight: .30 lbs./.14 kg.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herin). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
2 Way 2 Position Normally Closed Spool Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>3000</td>
<td>6</td>
<td>207</td>
<td>MA-S2G</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>4000</td>
<td>15</td>
<td>276</td>
<td>HA-S2G</td>
<td>66</td>
</tr>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>PB-S2G</td>
<td>68</td>
</tr>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>DE-S2G</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>4000</td>
<td>57</td>
<td>276</td>
<td>HE-S2G</td>
<td>72</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the S2G is locking or braking of a fluid motor.
**MA-S2G Direct Acting Spool, 2 Way, Normally Closed**

### DESCRIPTION

7 size, 5/8-18 thread, "Mini" series, solenoid operated, 2 way normally closed, spool valve.

### OPERATION

When de-energized the MA-S2G blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

### FEATURES

- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

### HYDRAULIC SYMBOL

For higher flow or pressure see HA-S2G.

### PERFORMANCE

**Actual Test Data (Cartridge Only)**

![Graph showing flow vs pressure drop for Port 1 to 2 (eng) and Port 2 to 1 (eng)]

### VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>1.5 GPM (6 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range (3 to 647 cSt)</td>
<td>36 to 3000 SSU</td>
</tr>
<tr>
<td>Filtration ISO 18/16/13</td>
<td></td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight (0.05 kg)</td>
<td>12 lbs.</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Weight (6.8 Nm)</td>
<td>3-5 ft-lbs (6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500003</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191002</td>
</tr>
</tbody>
</table>
DIMENSIONS

ORDERING INFORMATION

MA-S2G  

OPTIONS  
-  -  -  -

Bodies  
Blank  Without Body  
N  1/4 NPTF Ports  
S  #6 SAE Ports  

VOLTAGE  
06  6 VDC  
12  12 VDC  
24  24 VDC  
36  36 VDC  
48  48 VDC  
24  24 VAC  
11  120 VAC  
22  220 VAC  
44  440 VAC  

“M” COIL TERMINATION  
(All DC Except as Noted)

DL  Double Lead  
DT  Deutsch on Leads DT04-2P  
ML  Metri-Pack on Leads  
PL  Parkard on Leads  
WL  Weatherpack on Leads  

SS  Single Spade  
DS  Double Spade  
HC  DIN 43660 (Hirschmann) – (AC&DC)  
CL  Conduit Lead - (AC Only)  

Note: Use screen only if flow direction is from (1) to (2).

Approximate Coil Weight: .30 lbs/.14 kg.
HA-S2G Direct Acting Spool, 2 Way, Normally Closed

**DESCRIPTION**

"High Pressure" 7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally closed, spool valve with free reverse.

**OPERATION**

When de-energized the HA-S2G blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Operation shift limit 2 GPM (8 LPM).

For shifted performance consult chart.

**PERFORMANCE**

**Valve Specifications**

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
<td>4 GPM (15 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>8 cu in/min (131 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.14 lbs (.06 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500003</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191002</td>
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</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PB-S2G Direct Acting Spool, 2 Way, Normally Closed

**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally closed, spool valve.

**OPERATION**

When de-energized the PB-S2G blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Operational shift limit in 2 to 1 direction is 4 GPM. For shifted flow performance consult chart.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
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</thead>
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<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>30</td>
<td>0.2</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>60</td>
<td>1.4</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>90</td>
<td>2.9</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>120</td>
<td>3.9</td>
</tr>
</tbody>
</table>

---

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM) from (1) to (2)</td>
</tr>
<tr>
<td></td>
<td>4 GPM (15 LPM) from (2) to (1)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.19 lbs. (.09 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191102</td>
</tr>
</tbody>
</table>
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

DIMENSIONS

ORDERING INFORMATION

PB-S2G

OPTIONS

Buna Standard 00
Viton Standard V0
Buna, Override, Detent 0M
Viton, Override, Detent VM
Buna, Screen A0
Viton, Screen W0
Buna, Override, Nondetent B1
Viton, Override, Nondetent V1
Buna, Screen, Override, Nondetent B3
Viton, Screen, Override, Nondetent V3
Buna, Screen, Override, Detent B4
Viton, Screen, Override, Detent V4

BODIES

Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

VOLTAGE

6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

Note: Use screen only if flow direction is from (1) to (2).

“P” COIL TERMINATION

(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
PL Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P
IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IU “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

IMMERSION PROOF “P” TYPE

Approximate Coil Weight: .42 lbs (.19 kg.)
DE-S2G Direct Acting Spool, 2 Way Normally Closed

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, spool valve.

OPERATION
When de-energized the DE-S2G blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
• Hardened parts for long life.
• Efficient wet-armature construction.
• Cartridges are voltage interchangeable.
• Manual override option.
• Industry common cavity.
• Unitized, molded coil design.
• Continuous duty rated solenoid.
• Optional coil voltages and terminations.
• Optional "I" Coil: Weatherproof, Thermal Shock, Immersion Safe.

HYDRAULIC SYMBOL
Operational shift limit 8 GPM (30 LPM) and 5 GPM (19 LPM). For shifted flow performance consult chart. For higher flow or pressure see HE-S2G.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications
Nominal Flow 8 GPM (30 LPM) from (1) to (2) 5 GPM (19 LPM) from (2) to (1)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min)
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .26 lbs. (.12 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 30 ft-lbs (40.6 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity DELTA 2W
Cavity Form Tool (Finishing) 40500000
Seal Kit 21191202
## Warning

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### Dimensions

![Dimensions Diagram]

### Ordering Information

<table>
<thead>
<tr>
<th>DE-S2G</th>
<th>Options</th>
<th>Bodies</th>
<th>Voltage</th>
<th>Immersion Proof “D” Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna Standard</td>
<td>00 Blank</td>
<td>Without Body</td>
<td>IA “I” Coil AMP Superseal - Integral</td>
</tr>
<tr>
<td></td>
<td>Viton Standard</td>
<td>V0</td>
<td>3/8 NPTF Ports</td>
<td>ID “I” Coil Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td></td>
<td>Buna, Override</td>
<td>0M</td>
<td>#8 SAE Ports</td>
<td>U “I” Coil AMP Jr. Timer - Integral</td>
</tr>
<tr>
<td></td>
<td>Viton, Override</td>
<td>VM</td>
<td></td>
<td>IM “I” Coil Metri-Pack – Integral</td>
</tr>
<tr>
<td></td>
<td>Buna, Screen</td>
<td>A0</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Viton, Screen</td>
<td>W0</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Buna, Override, Non-detent</td>
<td>B1</td>
<td>6 VDC</td>
<td></td>
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<tr>
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<td>V1</td>
<td>12 VDC</td>
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<tr>
<td></td>
<td>Buna, Screen, Override, Non-detent</td>
<td>B3</td>
<td>24 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Viton, Screen, Override, Detent</td>
<td>B4</td>
<td>36 VDC</td>
<td></td>
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<tr>
<td></td>
<td>Buna, Screen, Override, Detent</td>
<td>V3</td>
<td>48 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Viton, Screen, Override, Detent</td>
<td>V4</td>
<td>24 VAC</td>
<td></td>
</tr>
</tbody>
</table>

Note: Use screen only if flow direction is from (1) to (2).

“D” Coil Termination

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>DL</th>
<th>Double Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
</tr>
<tr>
<td>SS</td>
<td>Single Spade</td>
</tr>
<tr>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>IA</td>
<td>“I” Coil AMP Superseal - Integral</td>
</tr>
<tr>
<td>ID</td>
<td>“I” Coil Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>U</td>
<td>“I” Coil AMP Jr. Timer - Integral</td>
</tr>
<tr>
<td>IM</td>
<td>“I” Coil Metri-Pack – Integral</td>
</tr>
</tbody>
</table>

Approximate Coil Weight: .74 lbs (.33 kg.)
HE-S2G Direct Acting Spool, 2-Way, Normally Closed

DESCRIPTION

OPERATION
When de-energized the HE-S2G blocks flow from (1) to (2) and (2) to (1). When energized the valve allows flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Uses “L” Coil.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM) from (1) to (2)</td>
</tr>
<tr>
<td>Max Operating Pressure</td>
<td>6 GPM (23 LPM) from (2) to (1)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td>8 cu in/min (131 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.39 lbs. (.17 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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DIGITAL PRESSURE

ORDERING INFORMATION

HE-S2G

OPTIONS

Bodies
Blank
Without Body
3/8 NPTF Ports
#8 SAE Ports

VOLTAGE

6 VDC
12 VDC
24 VDC
36 VDC
48 VAC
25 VAC
120 VAC
220 VAC
440 VAC

“L” COIL TERMINATION

(Double DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IMMERSON PROOF “L” TYPE

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .68 lbs. (.31 kg.)

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
**2 Way 2 Position Normally Open Poppet Valves**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3000</td>
<td>19</td>
<td>207</td>
<td>MA-S2C</td>
<td>76</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>PB-S2C</td>
<td>78</td>
</tr>
<tr>
<td>12</td>
<td>5000</td>
<td>45</td>
<td>350</td>
<td>HB-S2C</td>
<td>80</td>
</tr>
<tr>
<td>15</td>
<td>3500</td>
<td>57</td>
<td>241</td>
<td>DE-S2C</td>
<td>82</td>
</tr>
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<td>30</td>
<td>3000</td>
<td>114</td>
<td>207</td>
<td>TT-S2C</td>
<td>84</td>
</tr>
<tr>
<td>40</td>
<td>3000</td>
<td>151</td>
<td>207</td>
<td>SJ-S2C</td>
<td>86</td>
</tr>
<tr>
<td>10</td>
<td>4350</td>
<td>151</td>
<td>207</td>
<td>HJ-S2C</td>
<td>88</td>
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</table>

**SOFT SEAT**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>2000</td>
<td>30</td>
<td>138</td>
<td>PB-S2J</td>
<td>100</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the S2C is a pump unloading circuit when high flow and low pressure drop is required.

Typical application for the S2D is for when free flow is required in both directions to float the cylinder.

Typical application for the S2J is for low pressure applications where the soft seat gives better leakage control.
MA-S2C Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized.

OPERATION
When de-energized the MA-S2C allows flow from (1) to (2) and restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) and allows flow from (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL
Operational shift limit 5 GPM (19 LPM) from (1) to (2) energized. For shifted flow performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

![Performance Chart]

VALVE SPECIFICATIONS
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .14 lbs. (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements: 3-5 ft-lbs (4.1-6.8 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit (Buna): 21191001

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PB-S2C Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized.

OPERATION
When de-energized the PB-S2C allows flow from (1) to (2) and restricted flow from (2) to (1). When energized the valve blocks flow from (1) to (2) and allows flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION:
To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC Symbol

Unshifted limit 10 GPM (38 LPM) from (1) to (2) when deenergized. For shifted flow performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
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<td>0</td>
<td>0</td>
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<tr>
<td>4</td>
<td>5</td>
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<td>32</td>
<td>40</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>40</td>
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</tbody>
</table>

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>22 lbs. (.10 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
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SHOP ONLINE at www.airlinehyd.com 800-999-7378
**HB-S2C Pilot Operated Poppet, 2Way Normally Open**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, pilot operated poppet valve with reverse flow energized.

**OPERATION**
When de-energized the HB-S2C allows flow from (1) to (2) and restricted flow from (2) to (1). When energized the valve blocks flow from (1) to (2) and allows flow from (2) to (1).

**MANUAL OVERRIDE OPTION:** to override, turn the manual override screw clockwise. To release, turn the manual override screw counter-clockwise.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Manual override option.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (350 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min at 5000 PSI (350 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 210° F (-40° to 100° C) BUNA seals</td>
</tr>
<tr>
<td></td>
<td>-4° to 250° F (-20° to 120° C) VITON seals</td>
</tr>
<tr>
<td>Weight</td>
<td>.29 lbs. (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Tools kit</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

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Page 80  800-999-7378
DIMENSIONS

“P” COIL TERMINATION

IMMERSION PROOF “I” TYPE

“J” COIL TERMINATION

ORDERING INFORMATION

HB - S2C

CONSULT FACTORY FOR BODY

OPTIONS

Buna Standard 00
Viton Standard V0
Buna, Override, Knob 0K
Viton, Override, Knob VK

VOLTAGE

06 06 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“P” COIL TERMINATION

All DC Except as Noted

Double Lead DL
Double Spade DS
DIN 43650 (Hirschman) - (AC & DC) HC
Conduit Lead - (AC Only) CL
Deutsch - Integral DT04-2P DI

IMMERSION PROOF “I” TYPE

“I” Coil AMP Superseal - Integral IA
“I” Coil Deutsch - Integral DT04-2P ID
“I” Coil AMP Jr. Time - Integral IJ
“I” Coil Metri-Pack - Integral IM

“J” COIL TERMINATION

“J” Coil AMP Superseal - Integral JA
“J” Coil Deutsch - Integral DT04-2P JD
“J” Coil AMP Jr. Time - Integral JJ
“J” Coil Metri-Pack - Integral JM
“J” Coil Double Lead JL
“J” Coil DIN 43650 (Hirschman) JH

Approximate Coil Weight: .42 lbs/.19 kg.
For Optional Coil Terminations See Coil Section

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DE-S2C Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized.

OPERATION
When de-energized the DE-S2C allows flow to pass from (1) to (2), but restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION:
To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridges Only)

Valve Specifications
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.29 lbs. (.13 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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Page 82
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

DE-S2C

OPTIONS

Buna Standard 00
Viton Standard V0
Buna, Override 0M
Viton, Override VM
Buna, Override, Knob OK
Viton, Override, Knob VK
Buna, Screen A0
Viton, Screen W0
Buna, Screen, Override B2
Viton, Screen, Override V2
Buna, Screen, Override, Knob B5
Viton, Screen, Override, Knob V5

BODIES

Blank N
Without Body S
3/8 NPTF Ports #8 SAE Ports

VOLTAGE

6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

Note: Use screen only if flow direction is from (1) to (2).

“D” COIL TERMINATION

(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
MI Metri-Pack on Leads
PI Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschmann) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P
IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack - Integral

Approximate Coil Weight: .74 lbs/.33 kg.

SHOP ONLINE at www.airlinehyd.com

800-999-7378
DESCRIPTION
12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized.

OPERATION
When de-energized the TT-S2C allows flow to pass from (1) to (2), but restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, turn the manual override screw clockwise. To release turn the manual override screw counter-clockwise.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridges Only)

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<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<tr>
<th>VALVE SPECIFICATIONS</th>
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<tr>
<td>Nominal Flow</td>
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<td>Rated Operating Pressure</td>
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<td>Typical Internal Leakage (150 SSU)</td>
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<td>Cartridge Torque Requirements</td>
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<td>Coil Nut Torque Requirements</td>
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<td>Cavity</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
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<tr>
<td>Seal Kit</td>
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
SJ-S2C Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized.

OPERATION
When de-energized the SJ-S2C allows flow to pass from (1) to (2), but restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

FEATURES
• Hardened parts for long life.
• Efficient wet-armature construction.
• Cartridges are voltage interchangeable.
• Industry common cavity.
• Unitized, molded coil design.
• Continuous duty rated solenoid.
• Optional coil voltages and terminations.
• Optional "I" Coil: Weatherproof, Thermal Shock, Immersion Safe.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridges Only)

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VALVE SPECIFICATIONS
Nominal Flow 40 GPM (151 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 0-10 drops/min
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .74 lbs. (.33 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 90 ft-lbs (121 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity SUPER 2W
Cavity Form Tool (Finishing) 40500017
Seal Kit 21191400

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
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Approximate Coil Weight: .74 lbs/.33 kg.
HJ-S2C Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION

OPERATION
When de-energized the HJ-S2C allows flow to pass from (1) to (2), but restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armsature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridges Only)

<table>
<thead>
<tr>
<th>Flow (gpm)</th>
<th>Port 1 to 2 (de-eng)</th>
<th>Port 2 to 1 (eng)</th>
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| Nominal Flow | 40 GPM (151 LPM) |
| Rated Operating Pressure | 4350 PSI (300 bar) |
| Typical Internal Leakage (150 SSU) | 0-10 drops/min |
| Viscosity Range | 36 to 3000 SSU (3 to 647 cSt) |
| Filtration | ISO 18/16/13 |
| Media Operating Temperature Range | -40° to 250° F (-40° to 120° C) |
| Weight | 74 lbs. (33 kg) |
| Operating Fluid Media | General Purpose Hydraulic Fluid |
| Cartridge Torque Requirements | 115 ft-lbs (156 Nm) |
| Coil Nut Torque Requirements | 4-6 ft-lbs (5.4-8.1 Nm) |
| Cavity | SUPER 2W |
| Cavity Form Tool (Finishing) | 40500017 |
| Seal Kit | 21191400 |

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SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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DIMENSIONS

ORDERING INFORMATION

HJ-S2C

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
2/4 NPTF Ports S
#12 SAE Ports VS

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
22 120 VAC
44 220 VAC

“D” COIL TERMINATION
Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads MI
Packard on Leads PI
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
Din 43650 (Hirschmann) – (AC & DC) HC
Conduit Lead – (AC Only) CL
Deutsch – Integral DT04—2P DI

Note: Aluminum, NOT durability rated for 4350 PSI. Consult factory for options.

Approximate Coil Weight: .74 lbs/.33 kg.
PB-S2D Pilot Operated Poppet, 2 Way, Normally Open

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized and de-energized.

**OPERATION**
When de-energized the PB-S2D allows flow from (1) to (2) or (2) to (1). When energized the valve blocks flow from (1) to (2) and allows flow from (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Unshifted limit of 10 GPM (38 LPM) from (1) to (2) energized and from (2) to (1) de-energized. For shifted flow performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow 10 GPM (38 LPM)
- Rated Operating Pressure 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU) 0-5 drops/min
- Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
- Filtration ISO 18/16/13
- Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
- Weight .22 lbs. (.10 kg)
- Operating Fluid Media General Purpose Hydraulic Fluid
- Cartridge Torque 25 ft-lbs (34 Nm)
- Coil Nut Torque 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity POWER 2W
- Cavity Form Tool (Finishing) 40500005
- Seal Kit 21191100

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
HB-S2D  Pilot Operated Poppet, 2 Way Normally Open

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, pilot operated poppet valve with reverse flow energized and de-energized.

**OPERATION**
When de-energized the HB-S2D allows flow from (1) to (2) or from (2) to (1). When energized the valve blocks flow from (1) to (2) and allows flow from (2) to (1).

**MANUAL OVERRIDE OPTION:** to override, turn the manual override screw clockwise. To release, turn the manual override screw counter-clockwise.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Manual override option.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

![Performance Graph]

**VALVE SPECIFICATIONS**
- Nominal Flow: 12 GPM (45 LPM)
- Rated Operating Pressure: 5000 PSI (350 bar)
- Typical Internal Leakage: 0-5 drops/min at 5000 PSI (150 SSU) (35 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Media Operating Temperature: -40° to 210° F (-40° to 100° C)
- Media Operating Temperature Range: -4° to 250° F (-20° to 120° C)
- Weight: .29 lbs. (.13 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 35 ft-lbs (47 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 2W
- Cavity Tools kit: 40500005
- Seal Kit: 21191100

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

HB - S2D

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Override, Knob 0K
Viton, Override, Knob VK

CONSULT FACTORY FOR BODY

VOLTAGE
06 06 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

"P" COIL TERMINATION

IMMERSION PROOF "I" TYPE

"J" COIL TERMINATION

Approximate Coil Weight: .42 lbs/.19 kg.
For Optional Coil Terminations See Coil Section

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Delta Power Company
4484 Boeing Drive - Rockford, IL 61109
DE-S2D Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized and de-energized.

OPERATION
When de-energized the DE-S2D allows flow to pass from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION:
To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Flow vs Pressure Drop Graph]

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow (GPM)</td>
<td>15</td>
</tr>
<tr>
<td>Rated Operating Pressure (PSI)</td>
<td>3500</td>
</tr>
<tr>
<td>Typical Internal Leakage (SSU)</td>
<td>0-5</td>
</tr>
<tr>
<td>Viscosity Range (SSU)</td>
<td>36 to 3000</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°F to 250°F (3°C to 120°C)</td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>0.29</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

Approximate Coil Weight: .74 lbs/.33 kg.
TT-S2D Pilot Operated Poppet, 2 Way, Normally Open

DESCRIPTION
12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized and de-energized.

OPERATION
When de-energized the TT-S2D allows flow to pass from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, turn the manual override screw clockwise. To release turn the manual override screw counter-clockwise.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications
<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>30 GPM (114 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.51 lbs. (.23 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (4.5-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>TECNORD 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500032</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191300</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

MANUAL OVERRIDE

STANDARD

3.50 [88.9]
3.00 [76.2]
1.00 [25.4]
1.25 [31.7] HEX

1 1/16-12 UN-2A THREAD

SEE COIL DATA FOR TERMINATIONS

BODIES

Buna Standard 00
Viton Standard V0
Buna, Override, Knob OK
Viton, Override, Knob VK
Buna, Screen A0
Viton, Screen W0
Buna, Screen, Override, Knob B5
Viton, Screen, Override, Knob V5

VOLTAGE

6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 24
120 VAC 11
220 VAC 22
440 VAC 44

Note: Use screen only if flow direction is from (1) to (2).

“D” COIL TERMINATION

(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
MI Metri-Pack on Leads
PI Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschmann) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IMMERSION PROOF “D” TYPE

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack - Integral

BODY WEIGHT: 3.71 lbs [1.68 kg]

OPTIONS

BODIES

Blank Without Body
S #12 SAE Ports

ORDERING INFORMATION

TT-S2D

Note: Use screen only if flow direction is from (1) to (2).

Approximate Coil Weight: .74 lbs/.33 kg.
DESCRIPTION

16 size, 1 5/16-12 thread, “Super” series, solenoid operated, 2 way normally open, pilot operated poppet valve with free reverse flow energized and de-energized.

OPERATION

When de-energized the SJ-S2D allows flow to pass from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) but allows free reverse flow from (2) to (1).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>25</td>
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<td>100</td>
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<tr>
<td>125</td>
<td>50</td>
</tr>
<tr>
<td>150</td>
<td>60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.1</td>
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<tr>
<td>20</td>
<td>0.2</td>
</tr>
<tr>
<td>30</td>
<td>0.3</td>
</tr>
<tr>
<td>40</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Valve Specifications

- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 0-10 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
- Weight: 0.74 lbs (0.33 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191400

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, pilot operated soft seat poppet valve with free reverse flow energized.

**OPERATION**

When de-energized the PB-S2J allows flow from (1) to (2) and restricts flow from (2) to (1). When energized the valve blocks flow from (1) to (2) and allows free flow from (2) to (1).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, turn the manual override screw clockwise. To release turn the manual override screw counter-clockwise.

**FEATURES**

- Soft seat for ultra low leakage.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Unshifted limit 6 GPM (23 LPM) from (1) to (2) energized. For shifted flow performance consult chart.

**PERFORMANCE**

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
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<tr>
<td>10</td>
<td>15</td>
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<td>15</td>
<td>20</td>
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<tr>
<td>20</td>
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<tr>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
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<td>15</td>
<td>60</td>
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<tr>
<td>20</td>
<td>80</td>
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<tr>
<td>25</td>
<td>100</td>
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<tr>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>35</td>
<td>140</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>8 GPM (30 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>2000 PSI (138 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>Negligible</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-35°C to 200°F (-37°C to 93°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.21 lbs (.10 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

- **PB-S2J**
  - **OPTIONS**
    | Standard      | Blank   |
    | Buna, Override| V0      |
    | Viton, Override| VM     |
    | Buna, Screen  | A0      |
    | Viton, Screen | W0      |
    | Buna, Screen Override | B2 |
    | Viton, Screen Override | V2 |
  - **BOBIES**
    | Without Body | N       |
    | #6 SAE Ports | S       |
  - **VOLTAGE**
    | 6 VDC       | 06      |
    | 12 VDC      | 12      |
    | 24 VDC      | 24      |
    | 36 VDC      | 36      |
    | 48 VDC      | 48      |
    | 24 VAC      | 25      |
    | 120 VAC     | 11      |
    | 220 VAC     | 22      |
    | 440 VAC     | 44      |

**Note:** Use screen only if flow direction is from (1) to (2).

**“P” COIL TERMINATION**

| DL | Double Lead |
| DT | Deutsch on Leads DT04-2P |
| PL | Packard on Leads |
| WL | Weatherpack on Leads |
| SS | Single Spade |
| DS | Double Spade |
| HC | DIN 43650 (Hirschman) – (AC & DC) |
| CL | Conduit Lead – (AC Only) |
| DI | Deutsch – Integral DT04-2P |
| IA | “I” Coil AMP Superseal - Integral |
| ID | “I” Coil Deutsch – Integral DT04-2P |
| IU | “I” Coil AMP Jr, Timer - Integral |
| IM | “I” Coil Metri-Pack – Integral |

**Approximate Coil Weight:** .42 lbs. (.19 kg.)

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com  

SHOP ONLINE at www.airlinehyd.com
2 Way 2 Position Normally Open Spool Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3000</td>
<td>11</td>
<td>207</td>
<td>MA-S2H</td>
<td>104</td>
</tr>
<tr>
<td>3</td>
<td>4000</td>
<td>11</td>
<td>276</td>
<td>HA-S2H</td>
<td>106</td>
</tr>
<tr>
<td>5</td>
<td>3000</td>
<td>19</td>
<td>207</td>
<td>PB-S2H</td>
<td>108</td>
</tr>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>DE-S2H</td>
<td>110</td>
</tr>
<tr>
<td>8</td>
<td>4000</td>
<td>30</td>
<td>276</td>
<td>HE-S2H</td>
<td>112</td>
</tr>
<tr>
<td>6</td>
<td>1000</td>
<td>23</td>
<td>69</td>
<td>IE-S2H</td>
<td>660</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the S2H is a pump unloading valve.
MA-S2H Direct Acting Spool, 2 Way, Normally Open

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 2 way normally open, spool valve.

OPERATION
When de-energized the MA-S2H allows flow from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL
Valve is rated for shift and return from 1 to 2 only: 3 GPM, 3000 PSI. Max steady state flow 2 to 1: 3 GPM. HA-S2H should be specified where higher pressures or 2 to 1 shift operation is required.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Valve is rated for shift and return from 1 to 2 only: 3 GPM, 3000 PSI. Max steady state flow 2 to 1: 3 GPM. HA-S2H should be specified where higher pressures or 2 to 1 shift operation is required.

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
<td>3 GPM (11 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.12 lbs. (.05 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (40 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 2W</td>
</tr>
<tr>
<td>Cavity Form Tool</td>
<td>40500003</td>
</tr>
<tr>
<td>(Finishing)</td>
<td></td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191002</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
DIMENSIONS

ORDERING INFORMATION

MA-S2H - - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Screen A0
Viton, Screen W0

Note: Use screen only if flow direction is from (1) to (2).

"M" COIL TERMINATION
(All DC Except as Noted)
Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC&DC) HC
Conduit Lead – (AC Only) CL

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

Approximate Coil Weight: .30 lbs (.14 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
HA-S2H Direct Acting Spool, 2 Way, Normally Open

DESCRIPTION

OPERATION
When de-energized the HA-S2H allows flow from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Operational shift limit 2 GPM (8 LPM).

For shifted performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Maximum Flow 3 GPM (11 LPM)
Rated Operating Pressure 4000 PSI (276 bar)
Typical Internal Leakage (150 SSU) 8 cu in/min (131 ml/min)
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .14 lbs. (.06 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 15 ft-lbs (20 Nm)
Coil Nut Torque Requirements 3-5 ft-lbs (4.1-6.8 Nm)
Cavity MINI 2W
Cavity Form Tool (Finishing) 40500003
Seal Kit 21191002

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
PB-S2H Direct Acting Spool, 2 Way, Normally Open

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 2 way normally open, spool valve.

OPERATION
When de-energized the PB-S2H allows flow from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) and (2) to (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>5 GPM (19 LPM) from (1) to (2)</td>
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<tr>
<td></td>
<td>3 GPM (11 LPM) from (2) to (1)</td>
</tr>
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<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.19 lbs. (.09 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
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<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191102</td>
</tr>
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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
DE-S2H Direct Acting Spool, 2 Way, Normally Open

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally open, spool valve

OPERATION
When de-energized the DE-S2H allows flow from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) and (2) to (1).  

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

For higher pressure systems see HE-S2H

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<tr>
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<td>2</td>
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<tr>
<td>10</td>
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<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
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<tr>
<td>2</td>
<td>15</td>
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<td>4</td>
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<td>6</td>
<td>5</td>
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<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
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</tr>
</tbody>
</table>

Valve Specifications
- Nominal Flow: 8 GPM (30 LPM) from (1) to (2), 4 GPM (15 LPM) from (2) to (1)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .26 lbs. (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191202

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS
Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

DE-S2H - - - -

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 N 3/8 NPTF Ports
Buna, Override 0M S #8 SAE Ports
Viton, Override VM
Buna, Screen A0
Viton, Screen W0
Buna, Override, Non-detent B1 06 6 VDC
Viton, Override, Non-detent V1 12 12 VDC
Buna, Screen, Override, Non-detent B3 24 24 VDC
Viton, Screen, Override, Detent B4 36 36 VDC
Buna, Screen, Override, Non-detent V3 48 48 VDC
Viton, Screen, Override, Detent V4 25 24 VAC

Note: Use screen only if flow direction is from (1) to (2).

"D" COIL TERMINATION
(All DC Except as Noted)

DL Double Lead BS Single Spade IA "I" Coil AMP Superseal - Integral
DT Deutsch on Leads DT04-2P DS Double Spade ID "I" Coil Deutsch – Integral DT04-2P
ML Metri-Pack on Leads HC DIN 43650 (Hirschman) – (AC & DC) IU "I" Coil AMP Jr. Timer - Integral
PL Packard on Leads CL Conduit Lead – (AC Only) IM "I" Coil Metri-Pack – Integral
WL Weatherpack on Leads DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs/.33 kg.

IMMERSION PROOF "D" TYPE
IA "I" Coil AMP Superseal - Integral
ID "I" Coil Deutsch – Integral DT04-2P
IU "I" Coil AMP Jr. Timer - Integral
IM "I" Coil Metri-Pack – Integral

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
HE-S2H Direct Acting Spool, 2-Way, Normally Open

DESCRIPTION
“High Pressure” 10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally open, spool valve

OPERATION
When de-energized the HE-S2H allows flow from (1) to (2) and (2) to (1). When energized the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

USES "L" Coil.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
<td>8 GPM (30 LPM) from 1 to 2</td>
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<tr>
<td></td>
<td>4 GPM (15 LPM) from 2 to 1</td>
</tr>
<tr>
<td>Max Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>8 cu in/min (131 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.38 lbs (.17 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
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<tr>
<td>Seal Kit</td>
<td>21191202</td>
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</table>

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### WARNING

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**Phone:** (815) 397-6628  
**Fax:** (815) 397-2526  
**E-mail:** delta@delta-power.com

---

### DIMENSIONS

![Diagram of HE-S2H Electrical Dimensions]

### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
<th>IMMERSION PROOF “L” TYPE</th>
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<tr>
<td>Buna Standard</td>
<td>Blank</td>
<td>6 VDC</td>
<td>IA “I” Coil AMP Superseal - Integral</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>3/8 NPTF Ports</td>
<td>12 VDC</td>
<td>ID “I” Coil Deutsch – Integral DT04-2P</td>
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<tr>
<td></td>
<td>#8 SAE Ports</td>
<td>24 VDC</td>
<td>LJ “I” Coil AMP Jr. Timer - Integral</td>
</tr>
</tbody>
</table>

**“L” - COIL TERMINATION**  
(All DC Except as Noted)

- DL Double Lead  
- DT Deutsch on Leads DT04-2P  
- ML Metri-Pack on Leads  
- PL Packard on Leads  
- WL Weatherpack on Leads

- SS Single Spade  
- DS Double Spade  
- HC DIN 43650 (Hirschman) – (AC & DC)  
- CL Conduit Lead – (AC Only)  
- DI Deutsch – Integral DT04-2P

**Note:** Aluminum, NOT durability rated for 4000 PSI. Consult factory options.

**Approximate Coil Weight:** .68 lbs. (.31 kg.)

---

**Delta Power Company**  
4484 Boeing Drive - Rockford, IL 61109
3 Way 2 Position Spool Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
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<td>207</td>
<td>MC-S3A</td>
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<td>276</td>
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<td>11</td>
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<td>PP-S3A</td>
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<tr>
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<td>4000</td>
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<td>276</td>
<td>HF-S3A</td>
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<td>QF-S3A</td>
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<td>PP-S3B</td>
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<tr>
<td>8</td>
<td>3000</td>
<td>9.5</td>
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<td>PP-S3B</td>
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<td>15</td>
<td>103</td>
<td>DF-S3T</td>
<td>142</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for porting option 1 is to operate a spring loaded hydraulic clutch.
Typical application for porting option 2 is single acting cylinder control in a gravity lower circuit.
Typical application for porting option 3 is a selector valve for two different systems or functions.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
MC-S3A Direct Acting Spool, 3 Way 2 Position

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 3 way 2 position, spool valve.

OPERATION
When de-energized the MC-S3A blocks flow at (1) and allows flow from (3) to (2). When energized the valve allows flow from (1) to (3) and blocks flow at (2).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL
Operational shift limit 1 GPM (3.8 LPM) from (1) to (3) at 3000 PSI and 2 GPM (7.6 LPM) from (3) to (2) with no load.
For shifted flow performance consult chart.
For higher pressures or flows SEE HC-S3A

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Nominal Flow</td>
<td>1 GPM (3.8 LPM) from (1) to (3)</td>
</tr>
<tr>
<td></td>
<td>2 GPM (7.6 LPM) from (3) to (2)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.14 lbs (.06 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
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<tr>
<td>Coil Nut Torque Requirements</td>
<td>3.5 ft-lbs (4.1-6.8 Nm)</td>
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</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

MC-S3A

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Without Body Blank
1/4 NPTF Ports N
#6 SAE Ports S

VOLTAGE
6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

“M” COIL TERMINATION
(All DC Except as Noted)
Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC&DC) HC
Conduit Lead – (AC Only) CL

Approximate Coil Weight: .30 lbs/.14 kg.
**HC-S3A Direct Acting Spool, 3 Way 2 Position**

**DESCRIPTION**


**OPERATION**

When de-energized the HC-S3A blocks flow at (1) and allows flow from (3) to (2). When energized the valve allows flow from (1) to (3) and blocks flow at (2).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Flow limited at 1.5 GPM for flow at port (3)

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 2 GPM (8 LPM)
- **Rated Operating Pressure**: 4000 PSI (276 bar)
- **Typical Internal Leakage**: 8 cu in/min (131 ml/min)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .15 lbs. (.07 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 15 ft-lbs (20.3 Nm)
- **Coil Nut Torque Requirements**: 3-5 ft-lbs (4.1-6.8 Nm)
- **Cavity**: MINI 3W
- **Cavity Form Tool (Finishing)**: 40500004
- **Seal Kit**: 21191004

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS

DIMENSIONS

ORDERING INFORMATION

HC-S3A - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank
Without Body
1/4 NPTF Ports N
#6 SAE Ports S

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

"M" COIL TERMINATION
(All DC Except as Noted)
Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC & DC) HC
Conduit Lead – (AC Only) CL

Note: Aluminum, NOT durability rated for 4000 PSI. Consult factory for body options.

Approximate Coil Weight: .30 lbs/.14 kg.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
**PP-S3A Direct Acting Spool, 3 Way 2 Position**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 3 way 2 position, spool valve.

**OPERATION**
When de-energized the PP-S3A allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (1) to (3) and blocks flow at port (2).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Operational shift limit 3 GPM (11 LPM) from (1) to (3) at 3000 PSI (207 bar) and (3) to (2) with no load.
For shifted flow performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- **Nominal Flow** 3 GPM (11 LPM)
- **Rated Operating Pressure** 3000 PSI (207 bar)
- **Typical Internal Leakage** 5 cu in/min (82 ml/min)
- **Viscosity Range** 36 to 3000 SSU (3 to 647 cSt)
- **Filtration** ISO 18/16/13
- **Media Operating Temperature Range** -40° to 250° F (-40° to 120° C)
- **Weight** 23 lbs. (.10 kg)
- **Operating Fluid Media** General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements** 25 ft-lbs (34 Nm)
- **Coil Nut Torque Requirements** 4-6 ft-lbs (5.4-8.1 Nm)
- **Cavity** POWER 3W
- **Cavity Form Tool (Finishing)** 40500024
- **Seal Kit** 21191104

![Graph showing Flow (GPM) vs. Pressure Drop (PSI) and Flow (LPM) vs. Pressure Drop (BAR) for Port 1 to 3 (eng) and Port 3 to 2 (de-eng).]
### DIMENSIONS

![Diagram of solenoid operated directional controls](image)

#### ORDERING INFORMATION

**PP-S3A**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard 00 Blank Without Body</td>
<td>N 1/4 NPTF Ports</td>
<td></td>
</tr>
<tr>
<td>Viton Standard V0 S #8 SAE Ports</td>
<td>N 1/4 NPTF Ports</td>
<td></td>
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<tr>
<td>Buna, Override 0M N 1/4 NPTF Ports</td>
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<tr>
<td>Viton, Override VM S #8 SAE Ports</td>
<td>N 1/4 NPTF Ports</td>
<td></td>
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<tr>
<td>Buna, Screen A0 Blank Without Body</td>
<td>N 1/4 NPTF Ports</td>
<td></td>
</tr>
<tr>
<td>Viton, Screen W0 Blank Without Body</td>
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<td></td>
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<tr>
<td>Buna, Screen, Override, Detent B3 12 12 VDC</td>
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</tr>
<tr>
<td>Viton, Screen, Override, Detent B4 24 24 VDC</td>
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<tr>
<td>Viton, Screen, Override, Detent B3 12 12 VDC</td>
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<tr>
<td>Viton, Screen, Override, Detent B4 24 24 VDC</td>
<td>N 1/4 NPTF Ports</td>
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<tr>
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</tr>
<tr>
<td>Viton, Screen, Override, Detent V4 25 24 VAC</td>
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<td>N 1/4 NPTF Ports</td>
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<td>Viton, Screen, Override, Detent V4 25 24 VAC</td>
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</tr>
</tbody>
</table>

**“P” COIL TERMINATION**

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>DL</th>
<th>Double Lead</th>
<th>SS</th>
<th>Single Spade</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “P” TYPE**

| IA | “T” Coil AMP Superseal - Integral |
| ID | “T” Coil Deutsch – Integral DT04-2P |
| IJ | “T” Coil AMP Jr, Timer - Integral |
| IM | “T” Coil Metri-Pack – Integral |

Approximate Coil Weight: .42 lbs. (.19 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-5628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
SOLENOID OPERATED DIRECTIONAL CONTROLS

DF-S3A Direct Acting Spool, 3 Way 2 Position

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, solenoid operated, 3 way 2 position, spool valve.

OPERATION
When de-energized the DF-S3A allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (1) to (3) and blocks flow at port (2).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Common lift/lower valve where load holding is not required. For higher pressures see HF-S3A.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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</thead>
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<tr>
<td>40</td>
<td>20</td>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>5</td>
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<td>15</td>
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<tr>
<td>20</td>
<td>20</td>
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</tbody>
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Valve Specifications

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>10 GPM (38 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu/in per min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>28 lbs. (.12 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191210</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
SOLENOID OPERATED DIRECTIONAL CONTROLS

DIMENSIONS

MANUAL OVERRIDE

STANDARD

7/16-20 UNF 2A THREAD

1.83 [46.6]

SEE COIL DATA FOR TERMINATIONS

BODIES

Blank Without Body

V0 1/4 NPTF Ports

VM #6 SAE Ports

OPTIONS

Buna Standard 00

Viton Standard V0

Buna, Override OM

Viton, Override VM

Buna, Override, Non-detent B1

Viton, Override, Non-detent V1

Buna, Screen V0

Viton, Screen W0

Buna, Screen, Override, Non-detent B3

Viton, Screen, Override, Detent B4

Viton, Screen, Override, Non-detent V3

Viton, Screen, Override, Detent V4

VOLTAGE

6 VDC 06

12 VDC 12

24 VDC 24

36 VDC 36

48 VDC 48

24 VAC 25

120 VAC 11

220 VAC 22

440 VAC 44

Note: Use screen only if flow direction is from (1) to (3).

"D" COIL TERMINATION

(All DC Except as Noted)

DL Double Lead

DT Deutsch on Leads DT04-2P

ML Metri-Pack on Leads

PL Packard on Leads

WL Weatherpack on Leads

SS Single Spade

DS Double Spade

HC Din 43650 (Hirshman) - (AC & DC)

CL Conduit Lead – (AC Only)

DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs/.33 kg.

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

800-999-7378

SHOP ONLINE at www.airlinehyd.com
HF-S3A Direct Acting Spool, 3 Way 2 Position

DESCRIPTION

OPERATION
When de-energized the HF-S3A blocks flow at port (1) and allows flow from (3) to (2). When energized the valve allows flow from (1) to (3) and blocks flow at port (2).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

USES “L” Coil.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
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<td>20</td>
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<tr>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS

- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Typical Internal Leakage: 8 cu/in per min (131 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .40 lbs. (.18 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 35 ft-lbs (47.5 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191210

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

[Diagram showing dimensions and annotations, including hole sizes and lead terminations.]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00 Blank</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0 N 1/4 NPTF Ports</td>
</tr>
<tr>
<td></td>
<td>S #6 SAE Ports</td>
</tr>
</tbody>
</table>

**VOLTAGE**

- 06 6 VDC
- 12 12 VDC
- 24 24 VDC
- 36 36 VDC
- 48 48 VDC
- 25 24 VAC
- 11 120 VAC
- 22 220 VAC
- 44 440 VAC

**“L” COIL TERMINATION**

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>DL</th>
<th>Double Lead</th>
<th>SS</th>
<th>Single Spade</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “L” TYPE**

| IA  | “I” Coil AMP Superseal - Integral |
| ID  | “I” Coil Deutsch – Integral DT04-2P |
| IJ  | “I” Coil AMP Jr. Timer - Integral |
| IM  | “I” Coil Metri-Pack – Integral |

**Approximate Coil Weight:** .68 lbs/.31 kg.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
PP-S3B Direct Acting Spool, 3 Way 2 Position

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 3 way 2 position, selector spool valve.

OPERATION
When de-energized the PP-S3B allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (3) to (1) and blocks flow at port (2).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

This valve is great for transmission and brake applications, even with port (1) inlet, port (2) tank circuit orientations.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>2.5 GPM (9.5 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>23 lbs. (.10 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
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</tr>
<tr>
<td>Cartridge Torque Requirements</td>
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</tr>
<tr>
<td>Cavity</td>
<td>POWER 3W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500024</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191105</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

![Diagram of solenoid operated directional controls]

**ORDERING INFORMATION**

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<tr>
<th>PP-S3B</th>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
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<tbody>
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<td>Without Body</td>
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<tr>
<td></td>
<td>Viton Standard</td>
<td>N</td>
<td>1/4 NPTF Ports</td>
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<tr>
<td></td>
<td>Buna, Override</td>
<td>S</td>
<td>#6 SAE Ports</td>
</tr>
<tr>
<td></td>
<td>Viton, Override</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buna, Override, Non-detent</td>
<td>B1</td>
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</tr>
<tr>
<td>Viton, Override, Non-detent</td>
<td>V1</td>
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</tbody>
</table>

**"P" COIL TERMINATION**

*All DC Except as Noted*

<table>
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<tr>
<th>DL</th>
<th>Double Lead</th>
</tr>
</thead>
<tbody>
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<tbody>
<tr>
<td>DS</td>
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<tr>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
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<td>Conduit Lead – (AC Only)</td>
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<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF "P" TYPE**

| IA | "I" Coil AMP Superseal - Integral |
| ID | "I" Coil Deutsch – Integral DT04-2P |
| IJ | "I" Coil AMP Jr. Timer - Integral |
| IM | "I" Coil Metri-Pack – Integral |

Approximate Coil Weight: .42 lbs. (.19 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-5628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DF-S3B Direct Acting Spool, 3 Way 2 Position, Selector

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 3 way 2 position, selector spool valve.

**OPERATION**
When de-energized the DF-S3B allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (3) to (1) and blocks flow at port (2).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**
Trapped differentials above 1500 PSI from ports 2 to 1 can create shift issues near flow rating. (Differentials to 3000 psi from 1 to 2 are not an issue.)
For higher pressures consult HF-S3B.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu/in per min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .28 lbs. (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191210

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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Approximate Coil Weight: .74 lbs/.33 kg.

ORDERING INFORMATION

DF-S3B - - - - BODIES

OPTIONS

Buna Standard 00 Blank 06 6 VDC
Viton Standard V0 N 1/4 NPTF Ports
Buna, Override 0M S #6 SAE Ports
Viton, Override VM

VOLTAGE

Buna, screen A0
Viton, screen W0

Buna, Override, Non-detent B1 12 12 VDC
Viton, Override, Non-detent V1 12 12 VDC

Buna, Screen, Override, Detent B3 24 24 VDC
Buna, Screen, Override, Detent B4 36 36 VDC
Viton, Screen, Override, Detent V3 48 48 VDC
Viton, Screen, Override, Detent V4 25 24 VAC

Note: Use screen only if flow direction is from (1) to (2).

“D” COIL TERMINATION

(Double DC Except as Noted)

DL Double Leads SS Single Spade
DT Deutsch on Leads DT04-2P DS Double Spade
ML Metri-Pack on Leads HS Din 43650 (Hirshman) – (AC & DC)
PL Packard on Leads CL Conduit Lead – (AC Only)
WL Weatherpack on Leads DI Deutsch – Integral DT04-2P

IMMERSE PROOF “D” TYPE

IA “I” Coil AMP Superseal - Integral
ID “I” Coil - Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil - Metri-Pack - Integral
**HF-S3B Direct Acting Spool, 3 Way 2 Position, Selector**

**DESCRIPTION**

“High Pressure” 10 size, 7/8-14 thread, “Delta” series, solenoid operated, 3 way 2 position, selector spool valve.

**OPERATION**

When de-energized the HF-S3B allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (3) to (1) and blocks flow at port (2).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Optional “I” Coil: Weatherproof, Thermal Shock, Immersion Safe

**HYDRAULIC SYMBOL**

Uses “L” Coil.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>55</td>
<td>11</td>
<td>11</td>
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**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>8 cu/in per min (131 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.40 lbs (.18 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191210</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

- **SETOO NUT**
  - .75 [19.1] HEX
- **SEE COIL DATA FOR TERMINATIONS**
  - 1.83 [46.0]
- **7/8-14 UNF-2A THREAD**
  - 1.00 [25.4] HEX

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0

**VOLTAGE**
- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 24 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

**IMMERSION PROOF "L" TYPE**
- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

**OPTIONS**
- Blank: 00
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

**BODIES**
- Without Body: 00
- 1/4 NPTF Ports: N
- #6 SAE Ports: S

Note: aluminum, NOT durability rated for 4000 PSI. Consult factory for body options.

Approximate Coil Weight: .68 lbs/.31 kg.
PP-S3D Direct Acting Spool, 3 Way 2 Position

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 3 way 2 position spool valve.

OPERATION
When de-energized the PP-S3D allows flow from (2) to (1) and blocks flow at port (3). When energized the valve allows flow from (2) to (3) and blocks flow at port (1).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
• Hardened parts for long life.
• Efficient wet-armature construction.
• Cartridges are voltage interchangeable.
• Manual override option.
• Industry common cavity.
• Unitized, molded coil design.
• Continuous duty rated solenoid.
• Optional coil voltages and terminations.
• Optional "I" Coil: Weatherproof, Thermal Shock, Immersion Safe.

HYDRAULIC SYMBOL
Operational shift limit 3 GPM (11 LPM) from (2) or (3). Consult factory for flow in (1) that exceed 3 GPM.
For shifted flow performance consult chart.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Nominal Flow 3 GPM (11 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min)
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .22 lbs. (.10 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 25 ft-lbs (34 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity POWER 3W
Cavity Form Tool (Finishing) 40500024
Seal Kit 21191105

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SOLENOID OPERATED DIRECTIONAL CONTROLS
Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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DIMENSIONS

ORDERING INFORMATION

PP-S3D - - - -

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 N 1/4 NPTF Ports
Buna, Override 0M S #6 SAE Ports
Viton, Override VM
Buna, Screen A0
Viton, Screen W0
Buna, Override, Non-detent B1 06 6 VDC
Viton, Override, Non-detent V1 12 12 VDC
Buna, Screen, Override, Non-detent B3 24 24 VDC
Viton, Screen, Override, Detent B4 36 36 VDC
Buna, Screen, Override, Detent V3 48 48 VDC
Viton, Screen, Override, Detent V4 25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

Note: Use screen only if flow direction is from (1) to (2).

“P” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

IMMERSION PROOF “P” TYPE

Approximate Coil Weight: .42 lbs. (.19 kg.)

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800-999-7378
HU-S3E Direct Acting Spool, 3 Way 2 Position, High Pressure

**DESCRIPTION**
12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 3 way 2 position, spool valve.

**OPERATION**
When de-energized the HU-S3E allows flow from (2) to (1) and blocks flow at port (3). When energized the valve allows flow from (3) to (2) and blocks flow at port (1).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**
Common usage is inlet at port 3. See HU-S3F for port 2 or port 1 inlet.

**PERFORMANCE**

**VALVE SPECIFICATIONS**
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 5000 PSI (345 bar)
- Typical Internal Leakage: 8 cu in/min @ 3000 PSI
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250°F (-40° to 120°C)
- Weight: 1.01 lbs. (.46 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 70 ft-lbs (94.9 Nm)
- Coil Nut Torque Requirements: 5-7 ft-lbs (6.8-9.5 Nm)
- Cavity: TECNORD 3W
- Cavity Form Tool (Finishing): 40500034
- Seal Kit: 21191305

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
HU-S3F Direct Acting Spool, 3 Way 2 position, High Pressure

DESCRIPTION
12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 3 way 2 position, spool valve.

OPERATION
When de-energized the HU-S3F allows flow from (2) to (1) and blocks flow at port 3. When energized the valve allows flow from (2) to (3) and blocks flow at port (1).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Recommended usage is inlet at port 1 or 2. See HU-S3E for port 3 inlet.

PERFORMANCE

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (345 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>8 cu in/min @ 3000 PSI</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.01 lbs. (.46 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>5-7 ft-lbs (6.8-9.5 Nm) Maximum</td>
</tr>
<tr>
<td>Cavity</td>
<td>TECNORD 3W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
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<tr>
<td>Seal Kit</td>
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</table>

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SHOP ONLINE at www.airlinehydr.com  800-999-7378
HC-S3P Direct Acting Spool, 3 Way 2 Position, Pilot Control, Low Leakage

**DESCRIPTION**


**OPERATION**

When de-energized the HC-S3P blocks flow at (1) and allows flow from (3) to (2). When energized the valve allows flow from (1) to (3) and blocks flow at (2).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**PERFORMANCE**

**Actual Test Data (Cartridge Only)**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Nominal Flow</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>3 cu in/min (49 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.15 lbs. (.07 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500004</td>
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<tr>
<td>Seal Kit</td>
<td>21191004</td>
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</tbody>
</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

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4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

HC-S3P - - -

OPTIONS
Buna Standard - 00
Viton Standard V0

BODIES
Blank - N
1/4 NPTF Ports S
#6 SAE Ports

VOLTAGE
06 - 6 VDC
12 - 12 VDC
24 - 24 VDC
36 - 36 VDC
48 - 48 VDC
25 - 24 VAC
11 - 120 VAC
22 - 220 VAC
44 - 440 VAC

"M" COIL TERMINATION
(All DC Except as Noted)
Double Lead - DL
Deutsch on Leads - DT
Metri-Pack on Leads - ML
Packard on Leads - PL
Weatherpack on Leads - WL
Single Spade - SS
Double Spade - DS
DIN 43650 (Hirschman) – (AC&DC) - HC
Conduit Lead – (AC Only) - CL

Approximate Coil Weight: .30 lbs/.14 kg.

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
**DESCRIPTION**

7 size, 5/8-18 thread, "Mini" series, solenoid operated, 3 way 2 position, transmission & brake spool valve.

**OPERATION**

When de-energized the MC-S3T blocks flow at (1) and allows flow from (3) to (2). When energized the valve allows flow from (1) to (3) and blocks flow at (2).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

This valve is designed for transmission and brake applications. Consult factory for alternate low wattage coil options.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>4 GPM (15 LPM) from (1) to (3)</td>
</tr>
<tr>
<td></td>
<td>2 GPM (7.6 LPM) from (3) to (2)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>1500 PSI (103 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 20/18/15</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.14 lbs. (.06 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
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<tr>
<td>Cavity</td>
<td>MINI 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500004</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191006</td>
</tr>
</tbody>
</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

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DIMENSIONS

ORDERING INFORMATION

MC-S3T - - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

"M" TYPE COIL TERMINATION
(All DC Except as Noted)
Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC & DC) HC
Conduit Lead – (AC Only) CL

Approximate Coil Weight: .30 lbs/.14 kg.
DF-S3T Direct Acting Spool, 3 Way 2 Position, Transmission & Brake

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 3 way 2 position, transmission & brake spool valve.

OPERATION
When de-energized the DF-S3T allows flow from (3) to (2) and blocks flow at port (1). When energized the valve allows flow from (1) to (3) and blocks flow at port (2).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

Contamination Tolerant Product
This valve is designed for transmission and brake applications. Consult factory for alternate low wattage coil options.

PERFORMANCE
Actual Test Data (Cartridge Only)

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<tr>
<th>Flow (GPM)</th>
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<table>
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<td>30</td>
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</tr>
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</table>

| Port 1 to 3 (eng) | Port 3 to 2 (de-eng) |

VALVE SPECIFICATIONS
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 1500 PSI (103 bar)
- Typical Internal Leakage: 5 cu/in per min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .28 lbs. (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191204
**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company  
4484 Boeing Drive - Rockford, IL 61109

**DIMENSIONS**

MANUAL OVERRIDE

STANDARD

7/16-20 UNF 2A THREAD

1.58 [39.6]

.75 [19.1] HEX NUT

1.83 [46.0]

SEE COIL DATA FOR TERMINATIONS

SEMI-OVERRIDE

7/8-14 UNF 2A THREAD

1.81 [46.0]

2.50 [63.5]

2.28 [58.0]

1.37 [34.8]

1.25 [31.8]

1.50 [38.1]

.75 [19.1] HEX NUT

1.56 [39.6]

3.35 [85.1]

2.35 [59.6]

2.2 [56.0]

3.5 [88.9]

1.00 [25.4] HEX

63 [159.1]

63 [159.1]

62 [157.5]

13 [3.2]

2.25 [57.2]

2.50 [63.5]

5.5 [140.0]

11 [28.0]

22 [56.0]

44 [111.8]

BODY WEIGHT: .78 lb [35 kg]

**ORDERING INFORMATION**

**DF-S3T**

**OPTIONS**

- Buna Standard 00
- Viton Standard V0
- Buna, Override 0M
- Viton, Override VM
- Buna, Override, Non-detent B1
- Viton, Override, Non-detent V1
- Buna, Screen AO
- Viton, Screen VQ
- Buna, Screen, Override, Non-detent B3
- Viton, Screen, Override, Detent B4
- Buna, Screen, Override, Detent B4
- Viton, Screen, Override, Detent B4

**BODIES**

- Blank Without Body N
- 1/4 NPTF Ports S
- #6 SAE Ports S

**VOLTAGE**

- 5 VDC 06
- 12 VDC 12
- 24 VDC 24
- 36 VDC 36
- 48 VDC 48
- 24 VAC 24
- 120 VAC 11
- 220 VAC 22
- 440 VAC 44

**“D” COIL TERMINATION**

(All DC Except as Noted)

- DL Double Lead
- DT Deutsch on Leads DT04-2P
- ML Metri-Pack on Leads
- PL Packard on Leads
- WL Weatherpack on Leads
- SS Single Spade
- DS Double Spade
- HS Din 43650 (Hirshman) – (AC & DC)
- CL Conduit Leads – (AC Only)
- DI Deutsch – Integral DT04-2P

**IMMERSION PROOF “D” TYPE**

- IA “I” Coil AMP Superseal - Integral
- IM “I” Coil - Deutsch – Integral DT04-2P
- IJ “I” Coil AMP Jr. Timer - Integral
- IM “I” Coil - Metri-Pack - Integral

Approximate Coil Weight: .74 lbs/.33 kg.

Approximate Coil Weight: .74 lbs/.33 kg.
DESCRIPTION

8 size, 3/4-16 thread, “Power” series, solenoid operated, 3 way 2 position, selector spool valve.

OPERATION

When de-energized the PP-S3X allows flow from (2) to (3) and blocks flow at port (1). When energized the valve allows flow from (2) to (1) and blocks flow at port (3).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Operational shift limit 3 GPM (11 LPM) from port 2.
Not recommended for port 3 inlet cavity.
For shifted flow performance consult chart.

PERFORMANCE

Actual Test Data (Cartridge Only)

Valve Specifications

Nominal Flow: 3 GPM (11 LPM)
Rated Operating Pressure: 3000 PSI (207 bar)
Typical Internal Leakage: 5 cu in/min (82 ml/min)
Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
Filtration: ISO 18/16/13
Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
Weight: 23 lbs. (.10 kg)
Operating Fluid Media: General Purpose Hydraulic Fluid
Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
Cavity: POWER 3W
Cavity Form Tool (Finishing): 40500024
Seal Kit: 21191105

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**DIMENSIONS**

![Dimension Diagram]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>PP-S3X</th>
<th>.Options</th>
<th>Bodies</th>
<th>Voltage</th>
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<tbody>
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<td>Buna Standard 00 Blank Without Body</td>
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<td></td>
<td>Viton Standard V0</td>
<td>S #6 SAE Ports</td>
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<td></td>
<td>Viton, Override VM</td>
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<td>Buna, Screen A0</td>
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<td>36 VDC</td>
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<td>Buna, Screen, Override, Detent V3</td>
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<td></td>
<td>Viton, Screen, Override, Detent V4</td>
<td>25 24 VAC</td>
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Note: Use screen only if flow direction is from (1) to (2).

**“P” COIL TERMINATION**

(All DC Except as Noted)

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<td>Metri-Pack on Leads</td>
<td>Packard on Leads</td>
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<tr>
<td>SS</td>
<td>DS</td>
<td>HC</td>
<td>CL</td>
<td>DI</td>
</tr>
<tr>
<td>IA</td>
<td>ID</td>
<td>J</td>
<td>I</td>
<td>IM</td>
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Approximate Coil Weight: 0.42 lbs. (0.19 kg.)

**IMMERSION PROOF “P” TYPE**

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
### 4 Way 2 Position Spool Valves

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**Typical Schematic**

Typical application for the S4A, S4D, and S4F is directional motor or cylinder control.

Typical application for the S4B is directional motor or cylinder control in a parallel circuit.

Typical application for the S4C is directional motor or cylinder control in a series circuit.

Typical application for the S4E is motor control in a series/parallel circuit.

---

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MD-S4A Direct Acting Spool, 4 Way 2 Position

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 4 way 2 position, spool valve.

OPERATION
When de-energized the MD-S4A allows flow from (1) to (4) and (2) to (3). When energized the valve allows flow from (2) to (1) and (3) to (4).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Operational shift limit 1 GPM (3.8 LPM).
For shifted flow performance consult chart.
For higher pressures or flows see HD-S4A.

PERFORMANCE
Actual Test Data (Cartridge Only)

![Flow vs Pressure Graph]

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VALVE SPECIFICATIONS

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<th>Value</th>
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<tr>
<td>Maximum Flow</td>
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<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min) per path</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<td>Media Operating</td>
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<td>Temperature Range</td>
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<td>Coil Nut Torque</td>
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<td>Seal Kit</td>
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Page 149
**HD-S4A Direct Acting Spool, 4 Way 2 Position**

**DESCRIPTION**
"High Pressure" 7 size, 5/8-18 thread, "Mini" series, solenoid operated, 4 way 2 position spool valve.

**OPERATION**
When de-energized the HD-S4A allows flow from (1) to (4) and (2) to (3). When energized the valve allows flow from (2) to (1) and (3) to (4).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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<th>Port 2 to 3 (de-eng)</th>
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</thead>
</table>

<table>
<thead>
<tr>
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<td>2</td>
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<td>3</td>
<td>15</td>
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<td>4</td>
<td>20</td>
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<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>5</td>
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<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 1.5 GPM (6 LPM)
- **Rated Operating Pressure**: 4000 PSI (276 bar)
- **Typical Internal Leakage**: 8 cu in/min (131 ml/min) per path
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .16 lbs. (.07 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 15 ft-lbs (20 Nm)
- **Coil Nut Torque Requirements**: 3-5 ft-lbs (4.1-6.8 Nm)
- **Cavity**: MINI 4W
- **Cavity Form Tool (Finishing)**: 40500006
- **Seal Kit**: 21191008

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PQ-S4A Direct Acting Spool, 4 Way 2 Position

DESCRIPTION
8 size, 3/4-16 thread, "Power" series, solenoid operated, 4 way 2 position, spool valve.

OPERATION
When de-energized the PQ-S4A allows flow from (1) to (4) and from (2) to (3). When energized the valve allows flow from (2) to (1) and from (3) to (4).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Modes of shift operation to 6 GPM, Consult Factory.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Nominal Flow 4 GPM (15 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min) per path
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .24 lbs. (.11 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 25 ft-lbs (34 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity POWER 4W
Cavity Form Tool (Finishing) 40500029
Seal Kit 21191108

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
DG-S4A Direct Acting Spool, 4 Way 2 Position

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 2 position, side flow spool valve.

OPERATION
When de-energized the DG-S4A allows flow between (1) to (4) and (2) to (3). When energized the valve allows flow between (2) to (1) and (3) to (4).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

For higher pressures see HG-S4A.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications
- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage (150 SSU): 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .32 lbs. (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm) Maximum
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

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### WARNING

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**Phone:** (815) 397-6628  
**Fax:** (815) 397-2526  
**E-mail:** delta@delta-power.com

---

**DIMENSIONS**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
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<tbody>
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<td>1.38</td>
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</table>

**ORDERING INFORMATION**

**DG-S4A**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>Blank Without Body</td>
<td>06 6 VDC</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>N 1/4 NPTF Ports</td>
<td>12 12 VDC</td>
</tr>
<tr>
<td>Buna, Override</td>
<td>S #6 SAE Ports</td>
<td>24 24 VDC</td>
</tr>
<tr>
<td>Viton, Override</td>
<td></td>
<td>36 36 VDC</td>
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<tr>
<td>Buna, Override, Non-detent</td>
<td></td>
<td>48 48 VDC</td>
</tr>
<tr>
<td>Viton, Override, Non-detent</td>
<td></td>
<td>25 24 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 120 VAC</td>
</tr>
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<td></td>
<td>22 220 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 440 VAC</td>
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</tbody>
</table>

**“D” COIL TERMINATION**

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>Leads Type</th>
<th>Connector Type</th>
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<tbody>
<tr>
<td>DL Double Lead</td>
<td>SS Single Spade</td>
</tr>
<tr>
<td>DT Deutsch on Leads DT04-2P</td>
<td>DS Double Spade</td>
</tr>
<tr>
<td>ML Metri-Pack on Leads</td>
<td>HC DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>PL Packard on Leads</td>
<td>CL Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>WL Weatherpack on Leads</td>
<td>DI Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “D” TYPE**

<table>
<thead>
<tr>
<th>Type</th>
<th>Connector Type</th>
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<tbody>
<tr>
<td>IA “I” Coil AMP Superseal - Integral</td>
<td>IA</td>
</tr>
<tr>
<td>ID “I” Coil Deutsch – Integral DT04-2P</td>
<td>ID</td>
</tr>
<tr>
<td>IJ “I” Coil AMP Jr. Timer - Integral</td>
<td>IJ</td>
</tr>
<tr>
<td>IM “I” Coil Metri-Pack – Integral</td>
<td>IM</td>
</tr>
</tbody>
</table>

**Approximate Coil Weight:** .74 lbs (.33 kg.)

---

**SHOP ONLINE at www.airlinehyd.com**

**800-999-7378**
HG-S4A, Direct Acting Spool, 4 Way 2 Position, Criss Cross

DESCRIPTION


OPERATION

When de-energized the HG-S4A allows flow from (1) to (4) and from (2) to (3). When energized the valve allows flow from (2) to (1) and from (3) to (4).

FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Uses “L” Coil.

PERFORMANCE

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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</thead>
<tbody>
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<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

| Port 1 to 4 (de-eng) | Port 2 to 3 (de-eng) |

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>1</td>
<td>0</td>
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<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

| Port 2 to 1 (eng) | Port 3 to 4 (eng) |

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
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<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
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</table>

| Port 2 to 1 (eng) | Port 3 to 4 (eng) |

VALUE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>10 GPM (38 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>10 cu in/min (164 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.44 lbs. (.20 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing) 40500002</td>
<td></td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
### HV-S4A Direct Acting Spool, 4 Way 2 Position

**DESCRIPTION**

“High pressure” 12 size, 1 1/16-12 thread, "Tecnord" series, solenoid operated, 4 way 2 position, criss cross side flow spool valve.

**OPERATION**

When de-energized the HV-S4A allows flow from (1) to (4) and from (2) to (3). When energized the valve allows flow from (2) to (1) and from (3) to (4).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (345 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>8 cu in/min (131 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.07 lbs. (.48 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>5-7 ft-lbs (6.8-9.5Nm)</td>
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<tr>
<td>Cavity</td>
<td>TECNORD 4W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
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<tr>
<td>Seal Kit</td>
<td>21191309</td>
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</table>

**HYDRAULIC SYMBOL**

**PERFORMANCE**

![Graph showing performance data]

**FLOW ABOVE CURVE IS WITH HYDRAULIC OIL 150 SSU AT 100°F.**

<table>
<thead>
<tr>
<th>PORTING OPTIONS</th>
<th>FLOW (GPM)</th>
<th>FLOW (LPM)</th>
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<tr>
<td>2</td>
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<td>56.7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>30</td>
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</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

HV-S4A - - - -

OPTIONS
- Buna Standard 00
- Viton Standard V0

"T" COIL TERMINATION
(All DC Except as Noted)
- Double Lead DL
- Deutsch on Leads DT
- Metri-Pack on Leads ML
- Packard on Leads PL
- Weatherpack on Leads WL
- Double Spade DS
- DIN 43650 (Hirschman) – (AC & DC) HC

BODIES
- Blank S
- Without Body #10 SAE Ports

VOLTAGE
- 06 6 VDC
- 12 12 VDC
- 24 24 VDC
- 36 36 VDC
- 48 48 VDC
- 24 VAC
- 120 VAC
- 220 VAC

Approximate Coil Weight: .89 lbs/.41 kg.
MD-S4B Direct Acting Spool, 4 Way 2 Position, Closed Center

**DESCRIPTION**
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 4 way 2 position, closed center spool valve.

**OPERATION**
When de-energized the MD-S4B blocks flow at all ports. When energized the valve allows flow from (2) to (1) and (3) to (4).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Modes of shift operation to 3 GPM, Consult Factory. For higher pressures or flows see HD-S4B.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>1.5 GPM (6 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.15 lbs. (.07 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
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<tr>
<td>Cavity</td>
<td>MINI 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
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</tr>
<tr>
<td>Seal Kit</td>
<td>21191008</td>
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</table>

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### DIMENSIONS

![Diagram of solenoid control dimensions](image)

### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>MD-S4B - - - -</th>
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<tbody>
<tr>
<td>Buna Standard</td>
<td>00 Blank</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0 1/4 NPTF Ports</td>
</tr>
<tr>
<td>S #6 SAE Ports</td>
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</tr>
</tbody>
</table>

**“M” COIL TERMINATION**

*All DC Except as Noted*

- Double Lead: DL
- Deutsch on Leads DT04-2P: DT
- Metri-Pack on Leads: ML
- Packard on Leads: PL
- Weatherpack on Leads: WL
- Single Spade: SS
- Double Spade: DS
- DIN 43650 (Hirschman) – (AC&DC): HC
- Conduit Lead – (AC Only): CL

Approximate Coil Weight: .30 lbs/.14 kg.

### VOLTAGE

<table>
<thead>
<tr>
<th>Voltage</th>
<th>MD-S4B - - - -</th>
</tr>
</thead>
<tbody>
<tr>
<td>06 5 VDC</td>
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<tr>
<td>12 12 VDC</td>
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</tr>
<tr>
<td>24 24 VDC</td>
<td></td>
</tr>
<tr>
<td>36 36 VDC</td>
<td></td>
</tr>
<tr>
<td>48 48 VDC</td>
<td></td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**HD-S4B Direct Acting Spool, 4 Way 2 Position, Closed Center**

**DESCRIPTION**

**OPERATION**
When de-energized the HD-S4B blocks flow at all ports. When energized the valve allows flow from (2) to (1) and (3) to (4).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design (for most common terminations, see coil page).
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
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<tr>
<td>Maximum Flow</td>
<td>3 GPM (11 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>8 cu in/min (131 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.16 lbs. (.07 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>3-5 ft-lbs (4.1-6.8 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500006</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191008</td>
</tr>
</tbody>
</table>

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SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

HD-S4B

OPTIONS

Buna Standard 00
Viton Standard V0

BODIES

Blank N
1/4 NPTF Ports
#6 SAE Ports S

VOLTAGE

6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

“M” COIL TERMINATION
(All DC Except as Noted)

Double Lead DL
Deutsch on Leads DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC & DC) HC
Conduit Lead – (AC Only) CL

Approximate Coil Weight: .30 lbs/.14 kg.

Note: Aluminum, NOT durability rated for 4000 PSI. Consult factory for body options.

SHOP ONLINE at www.airlinehyd.com

800-999-7378
**DESCRIPTION**

8 size, 3/4 -16 thread, “Power” series, solenoid operated, 4 way 2 position, closed center spool valve.

**OPERATION**

When de-energized the PQ-S4B blocks flow at all ports. When energized the valve allows flow from (2) to (1) and from (3) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Modes of shift operation to 6 GPM, Consult Factory.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>4 GPM (15 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.24 lbs, (.11 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500029</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191108</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

PQ-S4B

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Override, Detent 0M
Viton, Override, Detent VM
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1

BODIES
Blank Without Body N 1/4 NPTF Ports
S #6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

IMMERSION PROOF "P" TYPE
IA "I" Coil AMP Superseal - Integral
ID "I" Coil Deutsch – Integral DT04-2P
IJ "I" Coil AMP Jr. Timer - Integral
IM "I" Coil Metri-Pack – Integral

"P" COIL TERMINATION
(Double DC Except as Noted)
DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .42 lbs (.19 kg.)

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

Page 165
**DG-S4B Direct Acting Spool, 4 Way 2 Position, Closed Center**

**DESCRIPTION**
10 size, 7/8 -14 thread, “Delta” series, solenoid operated, 4 way 2 position, closed center spool valve.

**OPERATION**
When de-energized the DG-S4B blocks flow at all ports. When energized the valve allows flow from (2) to (1) and (3) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

For higher pressures see HG-S4B.
Operational shift limit, 10 GPM.
For shift performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage (150 SSU): 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
- Weight: .32 lbs (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
## HG-S4B, Direct Acting Spool, 4 Way 2 Position

### DESCRIPTION

"High Pressure" 10 size, 7/8-14 thread, "Delta" series, solenoid operated, 4 way 2 position closed center spool valve.

### OPERATION

When de-energized the HG-S4B blocks flow at all ports. When energized the valve allows flow from (2) to (1) and from (3) to (4).

### FEATURES

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

### HYDRAULIC SYMBOL

![Hydraulic Symbol]

Uses "L" Coil

### PERFORMANCE

Actual Test Data (Cartridge Only)

![Graph showing flow vs pressure drop]

### VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>10 cu in/min (164 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.44 lbs. (.20 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 2 position, tandem center spool valve.

**OPERATION**
When de-energized the PQ-S4C allows flow between (2) and (4), blocks flow at (1) and (3). When energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>4 GPM (15 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>24 lbs. (11 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500029</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191108</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

PQ-S4C

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Override, Detent OM
Viton, Override, Detent VM
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1

BODIES
Blank Without Body N
#6 NPTF Ports S
#6 SAE Ports V

VOLTAGE
6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

“P” COIL TERMINATION
Double Lead DL
Deutsch on Leads DT04-2P DT
Metri-Pack on Leads ML
Packard on Leads PL
Weatherpack on Leads WL
Single Spade SS
Double Spade DS
DIN 43650 (Hirschman) – (AC & DC) HC
Conduit Lead – (AC Only) CL
Deutsch – Integral DT04-2P DI

IMMERSION PROOF “P” TYPE
“I” Coil AMP Superseal - Integral IA
“I” Coil Deutsch – Integral DT04-2P ID
“I” Coil AMP Jr. Timer - Integral IJ
“I” Coil Metri-Pack – Integral IM

Approximate Coil Weight: .42 lbs (.19 kg.)

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**DG-S4C Direct Acting Spool, 4 Way 2 Position, Tandem Center**

**DESCRIPTION**
10 size, 7/8 -14 thread, “Delta” series, solenoid operated, 4 way 2 position, tandem center spool valve.

**OPERATION**
When de-energized the DG-S4C allows flow between (2) and (4), and blocks flow at ports (1) and (3).
When energized the valve allows flow from (2) to (3) and (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

For higher pressures see HG-S4C.
Operational shift limit, 8 GPM.
For shift performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.31 lbs (.14 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

**ORDERING INFORMATION**

**DG-S4C**

**OPTIONS**
- Buna Standard
- Viton Standard
- Buna, Override
- Viton, Override
- Buna, Override, Non-detent
- Viton, Override, Non-detent

**BODIES**
- Blank: Without Body
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

**VOLTAGE**
- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 24 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

**“D” COIL TERMINATION**
*(All DC Except as Noted)*

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads

- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

**IMMERSION PROOF “D” TYPE**
- IA: “I” Coil AMP Superseal - Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IJ: “I” Coil AMP Jr. Timer - Integral
- IM: “I” Coil Metri-Pack – Integral

**Approximate Coil Weight**: .74 lbs/.33 kg.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
HG-S4C, Direct Acting Spool, 4 Way 2 Position, Tandem

DESCRIPTION
"High Pressure" 10 size, 7/8-14 thread, "Delta" series, solenoid operated, 4 way 2 position tandem center spool valve.

OPERATION
When de-energized the HG-S4C allows flow between (2) and (4) and blocks the flow at (1) and (3). When energized the valve allows flow from (2) to (3) and from (1) to (4).

FEATURES
- Hardened Parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

USES "L" COIL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>150</td>
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<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>

| Port 1 to 4 (eng) | Port 2 to 3 (eng) | Port 2 to 4 (de-eng) |

<table>
<thead>
<tr>
<th>Valve Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
</tr>
<tr>
<td>Viscosity Range</td>
</tr>
<tr>
<td>Filtration</td>
</tr>
<tr>
<td>Media Operating</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
</tr>
<tr>
<td>Cartridge Torque</td>
</tr>
<tr>
<td>Requirements</td>
</tr>
<tr>
<td>Cavity</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
</tr>
<tr>
<td>Seal Kit</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

![Diagram of SOLENOID OPERATED DIRECTIONAL CONTROLS](image)

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>HG-S4C</th>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna Standard 00</td>
<td>Blank Without Body N</td>
</tr>
<tr>
<td></td>
<td>Viton Standard V0</td>
<td>1/4 NPTF Ports S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#6 SAE Ports</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLTAGE</td>
<td>06 6 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 12 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 24 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36 36 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>48 48 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 24 VAC</td>
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<td></td>
<td>11 120 VAC</td>
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</tr>
<tr>
<td></td>
<td>22 220 VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>44 440 VAC</td>
<td></td>
</tr>
</tbody>
</table>

**“L” COIL TERMINATION**

(All DC Except as Noted)

- DL Double Lead
- DT Deutsch on Leads DT04-2P
- ML Metri-Pack on Leads
- PL Packard on Leads
- WL Weatherpack on Leads

- SS Single Spade
- DS Double Spade
- HC DIN 43650 (Hirshman) – (AC & DC)
- CL Conduit Lead – (AC Only)
- DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .68 lbs. (.31 kg.)

**IMMERSION PROOF “L” TYPE**

- IA "I" Coil AMP Superseal - Integral
- ID "I" Coil Deutsch – Integral DT04-2P
- IJ "I" Coil AMP Jr. Timer - Integral
- IM "I" Coil Metri-Pack – Integral

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
SOLENOID OPERATED DIRECTIONAL CONTROLS

PQ-S4D Direct Acting Spool, 4 Way 2 Position, Criss Cross

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 2 position, criss cross, bottom flow spool valve.

OPERATION
When de-energized the PQ-S4D allows flow from (3) to (2), and from (4) to (1). When energized the valve allows flow from (1) to (2) and from (4) to (3).

OPERATION OF MANUAL OVERRIDE OPTION: To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

Modes of shift operation to 3 GPM, Consult Factory.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Maximum Flow: 2.5 GPM (9 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.24 lbs. (.11 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (33.8 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 4W
- Cavity Form Tool (Finishing): 40500029
- Seal Kit: 21191108

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

Page 176
DIMENSIONS

ORDERING INFORMATION

PQ-S4D - - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Override, Detent 0M
Viton, Override, Detent VM
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1

BODIES
Blank Without Body N
1/4 NPTF Ports S
#6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“P” COIL TERMINATION
(AAll DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P
IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IU “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .42 lbs (.19 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DG-S4D Direct Acting Spool, 4 Way 2 Position, Criss Cross**

**DESCRIPTION**
10 size, 7/8 -14 thread, “Delta” series, solenoid operated, 4 way 2 position, criss cross, bottom flow spool valve.

**OPERATION**
When de-energized the DG-S4D allows flow from (4) to (1), and (3) to (2). When energized the valve allows flow from (4) to (3) and (1) to (2).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

For higher pressures see HG-S4D.
Operational shift limit, 6 GPM.
For shift performance consult chart.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.31 lbs (.14 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING:

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DIMENSIONS

![Image of dimensions diagram]

ORDERING INFORMATION

DG-S4D

OPTIONS

- Buna Standard
- Viton Standard
- Buna, Override
- Viton, Override
- Buna, Override, Non-detent
- Viton, Override, Non-detent

BODIES

- Blank
- 1/4 NPTF Ports
- #6 SAE Ports

VOLTAGE

- 5 VDC
- 12 VDC
- 24 VDC
- 36 VDC
- 48 VDC
- 24 VAC
- 120 VAC
- 220 VAC
- 440 VAC

“D” COIL TERMINATION

(All DC Except as Noted)

- Double Lead
- Deutsch on Leads DT04-2P
- Metri-Pack on Leads
- Packard on Leads
- Weatherpack on Leads
- Single Spade
- Double Spade
- DIN 43650 (Hirschman) – (AC & DC)
- Conduit Lead – (AC Only)
- Deutsch – Integral DT04-2P

IMMERSION PROOF “D” TYPE

- “T” Coil AMP Superseal - Integral
- “T” Coil Deutsch – Integral DT04-2P
- “T” Coil AMP Jr. Timer - Integral
- “T” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

WARNING:

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
**HG-S4D, Direct Acting Spool, 4 Way 2 Position, Bottom Flow**

**DESCRIPTION**

"High Pressure" 10 size, 7/8-14 thread, "Delta" series, solenoid operated, 4 way 2 position bottom flow spool valve.

**OPERATION**

When de-energized the HG-S4D allows flow from (4) to (1) and from (3) to (2). When energized the valve allows flow from (4) to (3) and from (1) to (2).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Uses "L" Coil

**PERFORMANCE**

*Actual Test Data (Cartridge Only)*

![Flow vs Pressure Drop Graph](image)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>10 cu in/min (164 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.43 lbs. (.20 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

```
.75 [19.1] HEX NUT

1.83 [46.6]

SEE COIL DATA FOR TERMINATIONS

1.00 [25.4] HEX

7/8-14 UNF-2A THREAD

2.63 [66.8]

.50 [12.7]

2.44 [61.9]
```

**ORDERING INFORMATION**

**HG-S4D**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th></th>
<th></th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td></td>
<td>Blank</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td></td>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>#6 SAE Ports</td>
</tr>
</tbody>
</table>

**VOLTAGE**

- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 24 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

**“L” COIL TERMINATION**

(All DC Except as Noted)

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

**IMMERSION PROOF “L” TYPE**

- IA: “I” Coil AMP Superseal - Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IJ: “I” Coil AMP Jr. Timer - Integral
- IM: “I” Coil Metri-Pack – Integral

**Approximate Coil Weight:** .68 lbs. (.31 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628
Fax: (815) 397-2526
E-mail: delta@delta-power.com
**DG-S4E Direct Acting Spool, 4 Way 2 Position, Series/Parallel**

**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 2 position, series/parallel spool valve.

**OPERATION**

When de-energized the DG-S4E allows flow from (2) and (1), and (3) to (4). When energized the valve allows flow (2) to (4) and blocks the flow at (1) and (3).

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

For higher pressures see HG-S4E. Operational shift limit, 6 GPM. For shift performance consult chart.

**PERFORMANCE**

*Actual Test Data (Cartridge Only)*

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path (150 SSU)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.31 lbs (.14 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>Delta 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

<table>
<thead>
<tr>
<th>Component</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>HEX NUT</td>
<td>.75 [19.1]</td>
</tr>
<tr>
<td>THREAD</td>
<td>7/16-20 UNF-2A</td>
</tr>
<tr>
<td>HEX</td>
<td>1.00 [25.4]</td>
</tr>
<tr>
<td>THREAD</td>
<td>7/8-14 UNF-2A</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**DG-S4E**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>Without Body</td>
<td>06 6 VDC</td>
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<tr>
<td>Buna Standard</td>
<td>00</td>
<td>12 12 VDC</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>N</td>
<td>24 24 VDC</td>
</tr>
<tr>
<td>Buna, Override</td>
<td>0M</td>
<td>36 36 VDC</td>
</tr>
<tr>
<td>Viton, Override</td>
<td>S</td>
<td>48 48 VDC</td>
</tr>
<tr>
<td>Buna, Override, Non-detent</td>
<td>B1</td>
<td>25 24 VAC</td>
</tr>
<tr>
<td>Viton, Override, Non-detent</td>
<td>V1</td>
<td>11 120 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22 220 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 440 VAC</td>
</tr>
</tbody>
</table>

**“D” COIL TERMINATION**

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>Lead Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL</td>
<td>Double Lead</td>
</tr>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
</tr>
<tr>
<td>SS</td>
<td>Single Spade</td>
</tr>
<tr>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “D” TYPE**

- IA: “I” Coil AMP Superseal - Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IJ: “I” Coil AMP Jr. Timer - Integral
- IM: “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
HG-S4E, Direct Acting Spool, 4 Way 2 Position, Series/Parallel

**DESCRIPTION**


**OPERATION**

When de-energized the HG-S4E allows flow from (1) to (2) and from (3) to (4). When energized the valve allows flow from (2) to (4) and blocks flow at (1) and (3).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol with注解](image)

**PERFORMANCE**

Actual Test Data (Cartridge Only)

- **Nominal Flow**: 8 GPM (30 LPM)
- **Rated Operating Pressure**: 4000 PSI (276 bar)
- **Typical Internal Leakage (150 SSU)**: 10 cu in/min (164 ml/min) per path
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .43 lbs (.20 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 35 ft-lbs (47.5 Nm)
- **Coil Nut Torque Requirements**: 4-6 ft-lbs (5.4-8.1 Nm)
- **Cavity**: DELTA 4W
- **Cavity Form Tool (Finishing)**: 40500002
- **Seal Kit**: 21191214

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
**HV-S4E Direct Acting Spool, 4 Way 2 Position, Series / Parallel**

**DESCRIPTION**

“High pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, solenoid operated, 4 way 2 position, series / parallel flow spool valve.

**OPERATION**

When de-energized the HV-S4E allows flow from (2) to (1) and from (3) to (4). When energized the valve allows flow from (2) to (4) and blocks flow at (1) to (3).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol](image)

**PERFORMANCE**

![Performance Graph](image)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM) From (2) to (4)</td>
</tr>
<tr>
<td></td>
<td>8 GPM (30 LPM) from (4) to (2)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (345 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>8 cu in/min (131 ml/min) per path</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Range</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>1.09 lbs. (.49 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (94.9 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>5-7 ft-lbs (6.8-9.5 Nm) Maximum</td>
</tr>
<tr>
<td>Cavity</td>
<td>TECNORD 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500035</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191309</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628          Fax: (815) 397-2526          E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

HV-S4E

OPTIONS
Buna Standard 00
Viton Standard V0

“T” COIL TERMINATION
(All DC Except as Noted)
Double Lead DL 06 6 VDC
Deutsch on Leads DT 12 12 VDC
Metri-Pack on Leads ML 24 24 VDC
Packard on Leads PL 36 36 VDC
Weatherpack on Leads WL 48 48 VDC
Double Spade DS 25 24 VAC
DIN 43650 (Hirschman) – (AC & DC) HC 11 120 VAC

BODIES
Blank S Without Body
#10 SAE Ports 4X

VOLTAGE

Approximate Coil Weight: .89 lbs/.41 kg.

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Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DG-S4F Direct Acting Spool, 4 Way 2 Position, Energized to Block**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 2 position, energized to block spool valve.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>When de-energized the DG-S4F allows flow from (2) and (1), and from (3) to (4). When energized the valve blocks flow at all ports.</td>
</tr>
</tbody>
</table>

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, pull knob out. On the detented version, after pulling knob out twist 180 degrees and release. The valve will remain in that position.

<table>
<thead>
<tr>
<th>FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hardened parts for long life.</td>
</tr>
<tr>
<td>• Efficient wet-armature construction.</td>
</tr>
<tr>
<td>• Cartridges are voltage interchangeable.</td>
</tr>
<tr>
<td>• Manual override option.</td>
</tr>
<tr>
<td>• Industry common cavity.</td>
</tr>
<tr>
<td>• Unitized, molded coil design.</td>
</tr>
<tr>
<td>• Continuous duty rated solenoid.</td>
</tr>
<tr>
<td>• Optional coil voltages and terminations.</td>
</tr>
</tbody>
</table>

**HYDRAULIC SYMBOL**

For higher pressures see HG-S4F.

Operational shift limit, 6 GPM.

For shift performance consult chart.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**Valve Specifications**

- **Nominal Flow** | 6 GPM (23 LPM) |
- **Rated Operating Pressure** | 3000 PSI (207 bar) |
- **Typical Internal Leakage** | 5 cu in/min (82 ml/min) per path (150 SSU) |
- **Viscosity Range** | 36 to 3000 SSU (3 to 647 cSt) |
- **Filtration** | ISO 18/16/13 |
- **Media Operating Temperature Range** | -40° to 250° F (-40° to 120° C) |
- **Weight** | 0.31 lbs (0.14 kg) |
- **Operating Fluid Media** | General Purpose Hydraulic Fluid |
- **Cartridge Torque Requirements** | 30 ft-lbs (40.6 Nm) |
- **Coil Nut Torque Requirements** | 4-6 ft-lbs (5.4-8.1 Nm) |
- **Cavity** | DELTA 4W |
- **Cavity Form Tool (Finishing)** | 40500002 |
- **Seal Kit** | 21191214 |

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Page 188
DIMENSIONS

MANUAL OVERRIDE

STANDARD

7/16-20 UNF-2A THREAD

3.35 [85.1]

2.31 [58.8]

.75 [19.1] HEX NUT

SEE COIL DATA FOR TERMINATIONS

1.83 [46.6]

1.56 [39.6]

7/8-14 UNF-2A

.22 [5.6]

2.44 [61.9]

.75 [19.1] HEX NUT

1.00 [25.4] HEX

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

DG-S4F - - -

OPTIONS

Bodies Blank Without Body
Buna Standard 00 1/4 NPTF Ports
Viton Standard V0 #6 SAE Ports
Buna, Override 0M
Viton, Override VM
Buna, Override, Non-detent B1
Viton, Override, Non-detent V1

VOLTAGE

06 5 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

"D" COIL TERMINATION

(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IMMERSSION PROOF "D" TYPE

IA "I" Coil AMP Superseal - Integral
ID "I" Coil Deutsch – Integral DT04-2P
IJ "I" Coil AMP Jr. Timer - Integral
IM "I" Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
HG-S4F, Direct Acting Spool, 4 Way 2 Position, Energized to Block

**DESCRIPTION**

"High Pressure” 10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 2 position energized to block spool valve.

**OPERATION**

When de-energized the HG-S4F allows flow from (2) to (1) and from (3) to (4). When energized the valve blocks flow at all ports.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Uses "L" Coil

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Flow vs. Pressure Drop Graph](image)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>10 cu in/min (164 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40°F to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.44 lbs (.20 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>35 ft-lbs (47.5 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
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<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

[Diagram with dimensions labeled]

ORDERING INFORMATION

HG-S4F

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
1/4 NPTF Ports S
#6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“L” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

IMMERSION PROOF “L” TYPE

Note: Aluminum, NOT durability rated for 4000 PSI. Consult factory for body options.

Approximate Coil Weight: .68 lbs. (.31 kg.)
### 4 Way 3 Position Spool Valves

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<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
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<tbody>
<tr>
<td>6</td>
<td>3000</td>
<td>23</td>
<td>207</td>
<td>PQ-S4M</td>
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<td>3</td>
<td>3000</td>
<td>11.3</td>
<td>207</td>
<td>VQ-S4M</td>
<td>196</td>
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<td>23</td>
<td>207</td>
<td>DG-S4M</td>
<td>198</td>
</tr>
<tr>
<td>5</td>
<td>3000</td>
<td>19</td>
<td>207</td>
<td>PQ-S4N</td>
<td>200</td>
</tr>
<tr>
<td>6</td>
<td>3000</td>
<td>23</td>
<td>207</td>
<td>DG-S4N</td>
<td>202</td>
</tr>
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<td>3</td>
<td>3000</td>
<td>11</td>
<td>207</td>
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<td>9.5</td>
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</tr>
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<td>207</td>
<td>PQ-S4O</td>
<td>208</td>
</tr>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>DG-S4O</td>
<td>210</td>
</tr>
<tr>
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<td>212</td>
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<td>PQ-S4P</td>
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<td>207</td>
<td>DG-S4P</td>
<td>216</td>
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<td>23</td>
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<td>PQ-S4Q</td>
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<tr>
<td>6</td>
<td>3000</td>
<td>23</td>
<td>207</td>
<td>DG-S4S</td>
<td>222</td>
</tr>
</tbody>
</table>

### Typical Schematic

Typical application for the S4O and S4T “Open Center” valve is a bi-directional fluid motor control with coasting.

Typical application for the S4Q and S4P “Closed Center” valve is a parallel circuit for cylinder control.

Typical application for the S4N and S4R “Tandem Center” valve is a series circuit with power beyond.

Typical application for the S4M “Figure Four” valve is coasting in a fluid motor control circuit.

Typical application for the S4S “Scotch Center” valve is to vent the pilot side of load holding application.
PQ-S4M Direct Acting Spool, 4 Way 3 Position, Motor Center

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, motor center spool valve.

**OPERATION**
When de-energized the PQ-S4M allows flow between (1), (3) and (4), blocks flow at (2). When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 42 lbs. (.19 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 4W
- Cavity Form Tool (Finishing): 40500029
- Seal Kit: 21191108

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
<thead>
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<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
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<tbody>
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<tr>
<td>10</td>
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<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>2</td>
<td>2</td>
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<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DIMENSIONS**

- **SEE COIL DATA FOR TERMINATIONS.**

**ORDERING INFORMATION**

- **PQ-S4M**
  - **OPTIONS**
    - Buna Standard: 00
    - Viton Standard: V0
    - Buna, Push only override: 0P
    - Viton, Push only override: VP

- **BODIES**
  - Blank: Without Body
  - N: 1/4 NPTF Ports
  - S: #6 SAE Ports

- **VOLTAGE**
  - 06: 6 VDC
  - 12: 12 VDC
  - 24: 24 VDC
  - 36: 36 VDC
  - 48: 48 VDC
  - 25: 24 VAC
  - 11: 120 VAC
  - 22: 220 VAC
  - 44: 440 VAC

- **“D” COIL TERMINATION**
  - (All DC Except as Noted)
    - DL: Double Lead
    - DT: Deutsch on Leads DT04-2P
    - ML: Metri-Pack on Leads
    - PL: Packard on Leads
    - WL: Weatherpack on Leads
    - SS: Single Spade
    - DS: Double Spade
    - HC: DIN 43650 (Hirschman) – (AC & DC)
    - CL: Conduit Lead – (AC Only)
    - DI: Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs. (.33 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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Fax: (815) 397-2526
E-mail: delta@delta-power.com

Page 195

SHOP ONLINE at www.airlinehyd.com

800-999-7378
VQ-S4M Direct Acting Spool, 4 Way 3 Position, Motor Center

DESCRIPTION
Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, motor center spool valve.

OPERATION
When de-energized the VQ-S4M allows flow between (1), (3) and (4), blocks flow at (2). When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

VALVE SPECIFICATIONS
Nominal Flow 3 GPM (11 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 10 cu in/min (163 ml/min) per path
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight 42 lbs (19 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 25 ft-lbs (34 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity POWER 4W
Cavity Form Tool (Finishing) 40500029
Seal Kit 21191108

PERFORMANCE
Actual Test Data (Cartridge Only)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
### Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th></th>
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<td>2.09 [53.2]</td>
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<td>.87 [22.1] HEX NUT</td>
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<tr>
<td>3/4-16 UNF 2A THREAD</td>
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SEE COIL DATA FOR TERMINATIONS.

### Ordering Information

**VQ-S4M**

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<thead>
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<th>OPTIONS</th>
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<tbody>
<tr>
<td>Boda Standard</td>
<td>00</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
</tr>
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<table>
<thead>
<tr>
<th>BODIES</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Blank Without Body</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td>S</td>
<td>#6 SAE Ports</td>
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</table>

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th></th>
</tr>
</thead>
<tbody>
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<td>06</td>
<td>6 VDC</td>
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<tr>
<td>12</td>
<td>12 VDC</td>
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<tr>
<td>24</td>
<td>24 VDC</td>
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<tr>
<td>36</td>
<td>36 VDC</td>
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<tr>
<td>48</td>
<td>48 VDC</td>
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<tr>
<td>25</td>
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<tr>
<td>11</td>
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</tr>
<tr>
<td>22</td>
<td>220 VAC</td>
</tr>
<tr>
<td>44</td>
<td>440 VAC</td>
</tr>
</tbody>
</table>

**“P” COIL TERMINATION**

*(All DC Except as Noted)*

- DL Double Lead
- DT Deutsch on Leads DT04-2P
- ML Metri-Pack on Leads
- PL Packard on Leads
- WL Weatherpack on Leads
- SS Single Spade
- DS Double Spade
- HC DIN 43650 (Hirschman) – (AC & DC)
- CL Conduit Lead – (AC Only)
- DI Deutsch – Integral DT04-2P

**IMMERSION PROOF “P” TYPE**

- IA “I” Coil AMP Superseal - Integral
- ID “I” Coil Deutsch – Integral DT04-2P
- IJ “I” Coil AMP Jr. Timer - Integral
- IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DG-S4M Direct Acting Spool, 4 Way 3 Position, Motor Center**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 3 position motor center spool valve.

**OPERATION**
When de-energized the DG-S4M block the flow at (2) and allows flow between (1), (3) and (4). When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Bi-Directional Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction, when pulled the valve shifts in the S1 direction.
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .51 lbs. (.23 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
DIMENSIONS

ORDERING INFORMATION

DG-S4M

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 N 1/4 NPTF Ports
Buna, Override 0M S #6 SAE Ports
Viton, Override VM
Buna, Push only override 0P
Viton, Push only override VP

BODIES

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“L” COIL TERMINATION

(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IMMERSSION PROOF “L” TYPE

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IU “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .68 lbs. (.31 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

Page 199

SHOP ONLINE at www.airlinehyd.com

800-999-7378
**PQ-S4N Direct Acting Spool, 4 Way 3 Position, Tandem Center**

**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, tandem center spool valve.

**OPERATION**

When de-energized the PQ-S4N allows flow between (2) and (4), blocks flow at (1) and (3). When outer coil (S1) is energized the valve allows flow from (2) to (3) and from (1) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (1) and from (3) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**

Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 5 GPM (19 LPM)
- **Rated Operating Pressure**: 3000 PSI (207 bar)
- **Typical Internal Leakage**
  - (150 SSU): 5 cu in/min (82 ml/min) per path
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .42 lbs. (.19 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 25 ft-lbs (34 Nm)
- **Coil Nut Torque Requirements**: 4-6 ft-lbs (5.4-8.1 Nm)
- **Cavity**: POWER 4W
- **Cavity Form Tool (Finishing)**: 40500029
- **Seal Kit**: 21191108

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**DIMENSIONS**

```
*PUSH ONLY* OVERRIDE

STANDARD

0.55 [14.2] HEX

1.83 [46.6]

5.98 [153.6] 4.38 [123.9]

65 [16.5]

57 [14.2] HEX

3/4-16 UNF 2A THREAD
```

```
63 [15.6]

1.25 [31.8]

1.56 [39.6]

28 [7.1] DIA MTG. HOLES

2X

25 [6.4]

1.15 [29.5]

6 [0.4]

59 [15.1]

1.72 [43.7]

2.75 [69.9]

2.25 [57.2]
```

**ORDERING INFORMATION**

**PQ-S4N**

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<tr>
<td>Viton Standard</td>
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<td>12 12 VDC</td>
</tr>
<tr>
<td>Buna, Push only override</td>
<td>N 1/4 NPTF Ports</td>
<td></td>
</tr>
<tr>
<td>Viton, Push only override</td>
<td>S #6 SAE Ports</td>
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```
Approximate Coil Weight: .74 lbs. (.33 kg.)
```

**“D” COIL TERMINATION**

(All DC Except as Noted)

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<tr>
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<tbody>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
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<td>PL</td>
<td>Packard on Leads</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
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<table>
<thead>
<tr>
<th>SS</th>
<th>Single Spade</th>
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<tbody>
<tr>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>HC</td>
<td>DIN 43650 (Hirchman) – (AC &amp; DC)</td>
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<tr>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
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**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DG-S4N Direct Acting Spool, 4 Way 3 Position, Tandem Center

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 3 position, tandem center spool valve.

OPERATION
When de-energized the DG-S4N allows flow between (2) and (4), and blocks flow at (1) and (3). When outer coil (S1) is energized the valve allows flow from (2) to (3) and from (1) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (1) and from (3) to (4).

OPERATION OF MANUAL OVERRIDE OPTION:
Bi-Directional Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction, when pulled the valve shifts in the S1 direction.
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override option.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
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<tr>
<th>Media Operating Temperature Range</th>
<th>-40° to 250° F (-40° to 120° C)</th>
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<tr>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
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<thead>
<tr>
<th>Port 2 to 4 (de-eng)</th>
<th>Port 1 to 4 (eng S1)</th>
<th>Port 2 to 3 (eng S1)</th>
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<tbody>
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<td>Pressure Drop (BAR)</td>
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<table>
<thead>
<tr>
<th>Port 2 to 1 (eng S2)</th>
<th>Port 3 to 4 (eng S2)</th>
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</thead>
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<td>30</td>
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</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**ORDERING INFORMATION**

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0
- Buna, Push only override: 0P
- Viton, Push only override: VP

**BODIES**
- Blank Without Body: N
- 1/4 NPTF Ports: S
- #6 SAE Ports: VP

**VOLTAGE**
- 6 VDC: 06
- 12 VDC: 12
- 24 VDC: 24
- 36 VDC: 36
- 48 VDC: 48
- 24 VAC: 25
- 120 VAC: 11
- 220 VAC: 22
- 440 VAC: 44

**“L” COIL TERMINATION**

- Double Lead: DL
- Deutsch on Leads DT04-2P: DT
- Metri-Pack on Leads: ML
- Packard on Leads: PL
- Weatherpack on Leads: WL
- Single Spade: SS
- Double Spade: DS
- DIN 43650 (Hirschman) – (AC & DC): HC
- Conduit Lead – (AC Only): CL
- Deutsch – Integral DT04-2P: DI

**IMMERSION PROOF “L” TYPE**
- "I" Coil AMP Superseal – Integral: IA
- "I" Coil Deutsch – Integral DT04-2P: ID
- "I" Coil AMP Jr. Timer – Integral: IJ
- "I" Coil Metri-Pack – Integral: IM

Approximate Coil Weight: .68 lbs. (.31 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, tandem center spool valve.

**OPERATION**

When de-energized the PQ-S4R allows flow between (2) and (4), ports (1) and (3) are blocked. When outer coil (S1) is energized the valve allows flow from (2) to (3) and from (1) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (1) and from (3) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**

Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.

- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**

Nominal Flow: 3 GPM (11 LPM)

Rated Operating Pressure: 3000 PSI (207 bar)

Typical Internal Leakage (150 SSU): 5 cu in/min (82 ml/min) per path

Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)

Filtration: ISO 18/16/13

Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)

Weight: .42 lbs. (.19 kg)

Operating Fluid Media: General Purpose Hydraulic Fluid

Cartridge Torque Requirements: 25 ft-lbs (34 Nm)

Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)

Cavity: POWER 4W

Cavity Form Tool (Finishing): 40500029

Seal Kit: 21191108

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
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<tbody>
<tr>
<td>Buna Standard</td>
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</table>

"P" COIL TERMINATION
(All DC Except as Noted)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>DL</td>
<td>Double Lead</td>
<td>SS</td>
</tr>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
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</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
<td>HC</td>
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<td>PL</td>
<td>Packard on Leads</td>
<td>CL</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
<td>DI</td>
</tr>
</tbody>
</table>

Approximate Coil Weight: .42 lbs. (.19 kg.)

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**VQ-S4R Direct Acting Spool, 4 Way 3 Position, Tandem Center**

**DESCRIPTION**
Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, tandem center spool valve

**OPERATION**
When de-energized the VQ-S4R allows flow between (2) and (4), ports (1) and (3) are blocked. When outer coil (S1) is energized the valve allows flow from (2) to (3) and from (1) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (1) and from (3) to (4).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override options.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 2.5 GPM (9.5 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 15 cu in/min (245 ml/min) per path (150 SSU)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .42 lbs. (.19 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 4W
- Cavity Form Tool (Finishing): 40500029
- Seal Kit: 21191108

**FLOW AND PRESSURE DROP GRAPHS**

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

VQ-S4R

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

"P" COIL TERMINATION
(All DC Except as Noted)
DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P
IA "I" Coil AMP Superseal – Integral
ID "I" Coil Deutsch – Integral DT04-2P
IJ "I" Coil AMP Jr. Timer – Integral
IM "I" Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs. (.33 kg.)

IMMERSION PROOF "P" TYPE
IA "I" Coil AMP Superseal - Integral
ID "I" Coil Deutsch – Integral DT04-2P
IJ "I" Coil AMP Jr. Timer - Integral
IM "I" Coil Metri-Pack – Integral

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DESCRIPTION
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, open center spool valve.

OPERATION
When de-energized the PQ-S4O allows flow to all ports, and pressures are relieved. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

OPERATION OF MANUAL OVERRIDE OPTION:
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.

VALVE SPECIFICATIONS
Nominal Flow 3 GPM (11 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min) per path
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight .42 lbs (.19 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 25 ft-lbs (33.9 Nm)
Coil Nut Torque Requirements 4-6 ft-lbs (5.4-8.1 Nm)
Cavity POWER 4W
Cavity Form Tool (Finishing) 40500029
Seal Kit 21191108

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

FLOW (GPM) versus PRESSURE DROP (PSI)

FLOW (LPM) versus PRESSURE DROP (PSI)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

![DIMENSIONS Diagram](image)

**ORDERING INFORMATION**

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<thead>
<tr>
<th>OPTIONS</th>
<th>BODY</th>
<th>VOLTAGE</th>
</tr>
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<td>Buna Standard</td>
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<td>Viton Standard</td>
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<td>Buna, Push only override</td>
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<td>24 VDC</td>
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**“P” COIL TERMINATION**

(All DC Except as Noted)

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

Approximate Coil Weight: .42 lbs. (.19 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

800-999-7378

Page 209
DG-S40 Direct Acting Spool, 4 Way 3 Position, Open Center

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 3 position, open center spool valve.

**OPERATION**
When de-energized the DG-S4O is open to all ports, all pressures are relieved. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Bi-Directional Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction, when pulled the valve shifts in the S1 direction.
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override options.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 50 lbs. (.23 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4 to 8.1 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com
**DIMENSIONS**

**ORDERING INFORMATION**

<table>
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<tr>
<th>OPTIONS</th>
<th>BODIES</th>
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<td>Viton, Push only override</td>
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**“L” COIL TERMINATION**

(All DC Except as Noted)

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<tr>
<th>DL Double Lead</th>
<th>SS Single Spade</th>
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<tr>
<td>DT Deutsch on Leads DT04-2P</td>
<td>DS Double Spade</td>
</tr>
<tr>
<td>ML Metri-Pack on Leads</td>
<td>HC DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>PL Packard on Leads</td>
<td>CL Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>WL Weatherpack on Leads</td>
<td>DI Deutsch – Integral DT04-2P</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF “L” TYPE**

| IA | "I" Coil AMP Superseal - Integral |
| ID | "I" Coil Deutsch – Integral DT04-2P |
| IJ | "I" Coil AMP Jr. Timer - Integral |
| IM | "I" Coil Metri-Pack – Integral |

**Approximate Coil Weight:** 68 lbs. (31 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**PQ-S4T Direct Acting Spool, 4 Way 3 Position, Open Center**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, open center spool valve.

**OPERATION**
When de-energized the PQ-S4T is open to all ports, all pressures are relieved. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 42 lbs. (.19 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1Nm)

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

PQ-S4T

OPTIONS

Bodies

Bodies

OPTIONS

Blank
Without Body

Bodies

V0
1/4 NPTF Ports

Bodies

Viton

N

Bodies

Viton

S

#6 SAE Ports

VOLTAGE

V0

VOLTAGE

S

VOLTAGE

06
6 VDC

VOLTAGE

12
12 VDC

VOLTAGE

24
24 VDC

VOLTAGE

36
36 VDC

VOLTAGE

48
48 VDC

VOLTAGE

25
24 VAC

VOLTAGE

22
220 VAC

VOLTAGE

11
120 VAC

VOLTAGE

44
440 VAC

“D” COIL TERMINATION

(All DC Except as Noted)

DL
Double Lead

SS
Single Spade

SS
Single Spade

DT
Deutsch on Leads DT04-2P

DS
Double Spade

DS
Double Spade

ML
Metri-Pack on Leads

HC
DIN 43650 (Hirschman) – (AC & DC)

HC
DIN 43650 (Hirschman) – (AC & DC)

PL
Packard on Leads

CL
Conduit Lead – (AC Only)

CL
Conduit Lead – (AC Only)

WL
Weatherpack on Leads

DI
Deutsch – Integral DT04-2P

DI
Deutsch – Integral DT04-2P

Approximate Coil Weight: .74 lbs. (.33 kg.)

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800-999-7378
**PQ-S4P Direct Acting Spool, 4 Way 3 Position, Closed Center**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, closed center spool valve.

**OPERATION**
When de-energized the PQ-S4P blocks flow at all ports. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Optional manual “push only” override.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 42 lbs. (.19 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 4W
- Cavity Form Tool (Finishing): 40500029
- Seal Kit: 21191108

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DG-S4P Direct Acting Spool, Closed Center, 4 Way 3 Position, Closed Center**

**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 3 position, closed center spool valve.

**OPERATION**

When de-energized the DG-S4P blocks flow at all ports. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**

Bi-Directional Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction, when pulled the valve shifts in the S1 direction.

Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override options.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**

<table>
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<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>53 lbs. (24 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque</td>
<td>30 ft-lbs (40.6 Nm)</td>
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<tr>
<td>Coil Nut Torque</td>
<td>4-6 ft-lbs (5.4 to 8.1 Nm)</td>
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<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
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<tr>
<td>Seal Kit</td>
<td>21191214</td>
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</tbody>
</table>

**PERFORMANCE**

**Actual Test Data (Cartridge Only)**

![Graphs showing flow rate and pressure drop for DG-S4P](image)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
### Dimensions

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<td>0P</td>
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<td>VITON, OVERRIDE</td>
<td>VP</td>
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**Body Weight:** 98 lbs (45 kg)

### Ordering Information

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<tr>
<td>Options</td>
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<tr>
<td>Bodies</td>
<td>-</td>
</tr>
<tr>
<td>Voltage</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Options

- Buna Standard
- Viton Standard
- Buna, Override
- Viton, Override
- Buna, Push only override
- Viton, Push only override

#### Bodies

- Blank without Body
- 1/4 NPTF Ports
- #6 SAE Ports

#### Voltage

- 6 VDC
- 12 VDC
- 24 VDC
- 36 VDC
- 48 VDC
- 24 VAC
- 120 VAC
- 220 VAC
- 440 VAC

#### "L" Coil Termination

- Double Lead
- Deutsch on Leads DT04-2P
- Metri-Pack on Leads
- Packard on Leads
- Weatherpack on Leads

- Single Spade
- Double Spade
- DIN 43650 (Hirschman) – (AC & DC)
- Conduit Lead – (AC Only)
- Deutsch – Integral DT04-2P

#### Immersion Proof "L" Type

- "I" Coil AMP Superseal - Integral
- "I" Coil Deutsch – Integral DT04-2P
- "I" Coil AMP Jr. Timer - Integral
- "I" Coil Metri-Pack – Integral

Approximate Coil Weight: 68 lbs (.31 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PQ-S4Q Direct Acting Spool, 4 Way 3 Position, Closed Center

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, solenoid operated, 4 way 3 position, closed center spool valve.

**OPERATION**
When de-energized the PQ-S4Q blocks flow to all ports. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Optional manual “push only” override.

**VALVE SPECIFICATIONS**
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 42 lbs. (.19 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: POWER 4W
- Cavity Form Tool (Finishing): 40500029
- Seal Kit: 21191108

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DESCRIPTION**

Low Profile 8 size, 3/4-16 thread, “Power” series, solenoid operated, 4W3P, closed center spool valve.

**OPERATION**

When de-energized the VQ-S4Q blocks flow to all ports. When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 3.5 GPM (13.2 LPM)
- **Rated Operating Pressure**: 3000 PSI (207 bar)
- **Typical Internal Leakage** (150 SSU): 10 cu in/min (163 ml/min) per path
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .42 lbs. (.19 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 25 ft-lbs (34 Nm)
- **Coil Nut Torque Requirements**: 4-6 ft-lbs (5.4-8.1 Nm)
- **Cavity**: POWER 4W
- **Cavity Form Tool (Finishing)**: 40500029
- **Seal Kit**: 21191108

**HYDRAULIC SYMBOL**

![Hydraulic Symbol]

**PERFORMANCE**

Actual Test Data (Cartridge Only)

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</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
1/4 NPTF Ports S
#6 SAE Ports

VOLTAGE
06 6 VDC
12 12 VDC
24 24 VDC
36 36 VDC
48 48 VDC
25 24 VAC
11 120 VAC
22 220 VAC
44 440 VAC

“P” COIL TERMINATION
(All DC Except as Noted)
DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IA “I” Coil AMP Superseal - Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer - Integral
IM “I” Coil Metri-Pack – Integral

IMMERSION PROOF “P” TYPE

Approximate Coil Weight: .42 lbs. (.19 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**DG-S4S Spool Operated, 4 Way 3 Position, Scotch Center**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 4 way 3 position, scotch center spool valve.

**OPERATION**
When de-energized the DG-S4S blocks flow at (1) and (2) and allows flow from (3) to (4). When outer coil (S1) is energized the valve allows flow from (2) to (1) and from (3) to (4). When inner coil (S2) is energized the valve allows flow from (2) to (3) and from (1) to (4).

**OPERATION OF MANUAL OVERRIDE OPTION:**
Bi-Directional Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction, when pulled the valve shifts in the S1 direction.
Push Only Override - Spring biased in neutral center position, when pushed the valve shifts in the S2 direction.

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Manual override options.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**VALVE SPECIFICATIONS**
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
- Weight: 62 lbs. (.28 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Coil Nut Torque Requirements: 4-6 ft-lbs (5.4-8.1 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

**HYDRAULIC SYMBOL**
![HYDRAULIC SYMBOL]

**PERFORMANCE**
Actual Test Data (Cartridge Only)

![PERFORMANCE GRAPH 1]

![PERFORMANCE GRAPH 2]
SOLENOID OPERATED DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

DIMENSIONS

ORDERING INFORMATION

DG-S4S - - - -

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 Without Body
Buna, Override 0M 1/4 NPTF Ports
Viton, Override VM #6 SAE Ports
Buna, Push only override 0P
Viton, Push only override VP

BODIES
Without Body N
#6 SAE Ports S

VOLTAGE
5 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

“L” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman) – (AC & DC)
CL Conduit Lead – (AC Only)
DI Deutsch – Integral DT04-2P

IA "I” Coil AMP Superseal - Integral
ID "I” Coil Deutsch – Integral DT04-2P
IJ "I” Coil AMP Jr. Timer - Integral
IM "I” Coil Metri-Pack – Integral

APPROXIMATE COIL WEIGHT: .68 lbs. (.31 kg.)

IMMERSION PROOF “L” TYPE

Immersion Proof “L” Type

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

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<tr>
<th>SECTION/Description</th>
<th>Pages</th>
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<tbody>
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<tr>
<td>Pilot to Open and Double PO Check Valves</td>
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<tr>
<td>Pilot to Close Check Valves</td>
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<td>Check Valves with Thermal Relief</td>
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<td>Rotary Valves</td>
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Direct Acting Check Valves

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Typical Schematic

Typical application for the CVA, CVB, CVC, CVR, and CVS is load holding in a lift, check, or dump circuit.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**MA-CVA Direct Acting Check Valve, Poppet**

**DESCRIPTION**

**OPERATION**
The MA-CVA allows flow passage from (2) to (1), while normally blocking oil flow from (1) to (2).

The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet.
- Industry common cavity.

**VALVE SPECIFICATIONS**
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.08 lbs. (.03 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit: 21191000

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**
Actual Test Data (Cartridge Only)

![Flow vs. Pressure Drop Graph](chart.png)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

- .87 HEX [22.2]
- .22 [5.6]
- .84 [21.4]
- 5/8-18 UNF 2A THREAD

**ORDERING INFORMATION**

**MA-CVA**

- **OPTIONS**
  - Buna Standard 00
  - Viton Standard V0
- **BODIES**
  - Blank Without Body N
  - 1/4 NPTF Ports S
  - #6 SAE Ports #

**CRACK PRESSURE**

- 0005 5 PSI
- 0020 20 PSI
- ± 10%

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**HB-CVA Direct Acting Check Valve, Poppet**

**DESCRIPTION**

“High Pressure” 8 size, 3/4-16 thread, “Power” series, direct acting check valve.

**OPERATION**

The HB-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a fully guided check poppet, which is spring-biased closed until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Hardened parts for long life and low leakage.
- Optional bias springs for back-pressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**

![Symbol](Image)

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Graph](Image)

**VALVE SPECIFICATIONS**

<table>
<thead>
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<td>Filtration</td>
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</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body N
S #6 SAE Ports

CRACK PRESSURE
0005 5 PSI
0010 10 PSI
0030 30 PSI
0070 70 PSI
± 10%

Note: Aluminum, NOT durability rated for 4350 PSI. Consult factory for options.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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DE-CVA Direct Acting Check Valve, Poppet

DESCRIPTION

OPERATION
The DE-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a fully guided check poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common poppet cavity.

HYDRAULIC SYMBOL

Drop-In pilot pistons can be used (except the 135 and 150 psi version) to create P.O. Check Valve Function, see the Hydraulic Integrated Circuits section (page 480) for details.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .15 lbs. (.07 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200
DIMENSIONS

ORDERING INFORMATION

DE-CVA - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank
Without Body N
3/8 NPTF Ports S
#8 SAE Ports

CRACK PRESSURE
0010 10 PSI
0035 35 PSI
0070 70 PSI
0100 100 PSI
0135 135 PSI
0150 150 PSI
± 10%

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**HE-CVA Direct Acting Check Valve, Poppet**

**DESCRIPTION**


**OPERATION**

The HE-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a fully guided check poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Drop-In pilot pistons can be used (except the 135 and 150 psi version) to create P.O. Check Valve Function, see the Hydraulic Integrated Circuits section (page 480) for details.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

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<td>50</td>
<td>10</td>
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<td>75</td>
<td>15</td>
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</tbody>
</table>

**VALVE SPECIFICATIONS**

- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 5000 PSI (345 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.23 lbs. (.56 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 50 ft-lbs (67.8 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

HE-CVA - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Consult Factory

WARNING
DO NOT USE ALUMINUM BODY
HIGH PRESSURE (5000 PSI) PRODUCT.

CRACK PRESSURE
0005 5 PSI
0010 10 PSI
0020 20 PSI
0035 35 PSI
0070 70 PSI
0090 90 PSI
0135 135 PSI
0150 150 PSI
± 10%

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DESCRIPTION
“High Pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, direct acting check valve.

OPERATION
The HT-CVA allows flow passage from (2) to (1), while normally blocking oil flow from (1) to (2).

The cartridge has a fully guided poppet, which is spring biased closed, until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

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Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

MECHANICAL DIRECTIONAL CONTROLS

DIMENSIONS

ORDERING INFORMATION

HT-CVA - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body S #12 SAE Ports

CRACK PRESSURE
0010 10 PSI
0030 30 PSI
0050 50 PSI ±10%

DIMENSIONS:

1.25 HEX [31.7]

.94 [23.9]

1.63 [41.4]

1 1/16-12 UN 2A THREAD

3.00 [76.2]

1.37 [34.8]

88 [22.2]

1.75 [44.5]

.17 [4.3]

3.09 [78.5]

3.92 [99.6]

1.03 [26.2]

2.25 [57.2]

.17 [4.3]

#12 SAE PORTS 2X

BODY WEIGHT: 3.71 lbs. [1.68 kg.]
SJ-CVA Direct Acting Check Valve, Poppet

DESCRIPTION

OPERATION
The SJ-CVA allows free flow from (2) to (1) and blocks flow from (1) to (2).

The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Flow vs. Pressure Drop Graph]

Valve Specifications
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .67 lbs. (.30 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity Form Tool (Finishing): 40500017
- Cavity: SUPER 2W
- Seal Kit: 21191400

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank
N 3/4 NPTF Ports
S #12 SAE Ports

CRACK PRESSURE
0005 5 PSI
0010 10 PSI
0030 30 PSI
0050 50 PSI
±10%

DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank
N 3/4 NPTF Ports
S #12 SAE Ports

CRACK PRESSURE
0005 5 PSI
0010 10 PSI
0030 30 PSI
0050 50 PSI
±10%

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
DE-CVB Direct Acting Check Valve, Ball

DESCRIPTION

OPERATION
The DE-CVB allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Hardened seat for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Industry common cavity.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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| Port 2 to 1 |

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.14 lbs. (.06 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191000</td>
</tr>
</tbody>
</table>

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
PB-CVC Direct Acting Check Valve, Guided Ball

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, direct acting check valve.

OPERATION
The PB-CVC allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a fully guided hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Hardened parts for long life and low leakage.
- Optional bias springs for back-pressure application flexibility.
- Fully guided ball assembly.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
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Port 2 to 1

<table>
<thead>
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<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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</thead>
<tbody>
<tr>
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Valve Specifications

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>10 GPM (38 LPM)</th>
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</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.10 lbs, (.05 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

PB-CVC - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank B
1/4 NPTF Ports N
#6 SAE Ports S

CRACK PRESSURE
0005 5 PSI
0020 20 PSI
0030 30 PSI
0050 50 PSI
± 10%

BODY WEIGHT: .39 lbs. [.18 kg.]
### DE-CVC Direct Acting Check Valve, Guided Ball

**DESCRIPTION**


**OPERATION**

The DE-CVC allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

The cartridge has a fully guided hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Hardened parts for long life and low leakage.
- Optional bias springs for back-pressure application flexibility.
- Fully guided ball assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**

```
  1  o  2
```

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Flow vs Pressure Drop Graph]

**VALVE SPECIFICATIONS**

- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .15 lbs. (.07 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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**DIMENSIONS**

- **DE-CVC**
  - Dimensions:
    - .22 [5.6]
    - 1.25 [31.7]
    - 7/8-14 UNF 2A THREAD

- **OPTIONS**
  - Buna Standard: 00
  - Viton Standard: V0

- **BODIES**
  - Blank: Without Body
  - N: 3/8 NPTF Ports
  - S: #8 SAE Ports

- **CRACK PRESSURE**
  - 0003: 3 PSI
  - 0005: 5 PSI
  - 0010: 10 PSI
  - 0020: 20 PSI
  - 0035: 35 PSI
  - 0050: 50 PSI
  - 0075: 75 PSI
  - 0095: 95 PSI
  - ± 10%

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DE-CVR Reverse Flow Check Valve, Poppet**

**DESCRIPTION**

**OPERATION**
The DE-CVR allows free flow (1) to (2) and blocks flow from (2) to (1).

**FEATURES**
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<table>
<thead>
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<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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<td>50</td>
<td>10</td>
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<tr>
<td>75</td>
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</tbody>
</table>

**VALVE SPECIFICATIONS**
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 0-5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191204

---

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
DIMENSIONS

MINIMUM .563 DIAMETER PREDRILL 1.53 DEEP REQUIRED.

ORDERING INFORMATION

DE-CVR - - -

OPTIONS
- Buna Standard 00
- Viton Standard V0

BODIES
- Blank 0005
- Without Body 0025
- 3/8 NPTF Ports N
- #8 SAE Ports S

CRACK PRESSURE
- 5 PSI 5 PSI
- ±10% 25 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
HT-CVR Reverse Flow Check Valve, Poppet

DESCRIPTION
“High Pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, reverse flow check valve.

OPERATION
The HT-CVR allows free flow from (1) to (2) and blocks flow from (2) to (1).

The cartridge has a fully guided poppet, which is spring biased closed, until sufficient pressure is applied at (1) to open to (2).

FEATURES
• Hardened parts for long life and low leakage.
• Industry common cavity.
• Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

- - 1 2

PERFORMANCE
Actual Test Data (Cartridge Only)

FLOW (GPM) vs. PRESSURE DROP (PSI)

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<th>Pressure Drop (PSI)</th>
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FLOW (LPM) vs. PRESSURE DROP (BAR)

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VALVE SPECIFICATIONS

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<tr>
<th>Specification</th>
<th>Specification Value</th>
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<tr>
<td>Nominal Flow</td>
<td>35 GPM (132 LPM)</td>
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<td>Rated Operating Pressure</td>
<td>5000 PSI (345 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>0-8 drops/min</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>70 ft-lbs (95 Nm)</td>
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<td>TECNORD 2W</td>
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<td>Cavity Form Tool (Finishing)</td>
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<td>Seal Kit</td>
<td>21191300</td>
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**ORDERING INFORMATION**

**HT-CVR**

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0

**BODIES**
- Blank: S
- Without Body: #12 SAE Ports

**CRACK PRESSURE**
- 0010: 10 PSI
- 0030: 30 PSI
- 0050: 50 PSI
- ± 10%

**DIMENSIONS**

BODY WEIGHT: 3.71 lbs. [1.68 kg.]
MA-CVS Direct Acting Check Valve, Soft Seat, Poppet

DESCRIPTION

OPERATION
The MA-CVS allows free flow (2) to (1) and blocks flow from (1) to (2).

The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open (1).

FEATURES
- Soft seat for ultra low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet.

HYDRAULIC SYMBOL

Drop-in Pilot Pistons are NOT recommended for this valve.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Nominal Flow</td>
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<td>Rated Operating Pressure</td>
<td>1500 PSI (103 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>Negligible (150 SSU)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>32° to 120° F (0° to 49° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.08 lbs. (.03 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
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<td>Cavity</td>
<td>MINI 2W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
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<tr>
<td>Seal Kit</td>
<td>21191000</td>
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</tbody>
</table>
DIMENSIONS

5/8-18 UNF 2A THREAD

.87 HEX [22.2]

.22 [5.6]

.84 [21.4]

CRACK PRESSURE

0005 5 PSI

0020 20 PSI ±10%

OPTIONS

Buna Standard 00

Blank N

Viton Standard V0

S

BODIES

Without Body

1/4 NPTF Ports

#6 SAE Ports

MA-CVS

ORDERING INFORMATION

BODY WEIGHT: .29 lbs. [.13 kg]
PB-CVS Direct Acting Check Valve, Soft Seat, Poppet

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, direct acting check valve, soft seat, poppet.

**OPERATION**
The PB-CVS allows free flow passage from (2) to (1), and blocks flow from (1) to (2).
The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**
- Soft seat for ultra low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Drop-in Pilot Pistons are NOT recommended for this valve.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: Negligible
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: 32° to 120° F (0° to 49° C)
- Weight: .09 lbs. (.04 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (33.9 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191100

---

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-CVS Direct Acting Check Valve, Soft Seat, Poppet

DESCRIPTION

OPERATION
The DE-CVS allows flow to pass from (2) to (1) and blocks flow from (1) to (2).
The cartridge has a fully guided check poppet, which is spring-biased closed until sufficient pressure is applied at (2) to open to (1).

FEATURES
- Soft seat for ultra low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

Drop-in pilot pistons are NOT recommended for this valve. If you would like to create P.O. Check Valve Function, please use the CVA valve and/or see the Hydraulic Integrated Circuits section (page 480) for details.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
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<table>
<thead>
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<th>Flow (GPM)</th>
<th>Pressure Drop (BAR)</th>
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</thead>
<tbody>
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<tr>
<td>15</td>
<td>15</td>
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</tbody>
</table>

Valve Specifications
- Nominal Flow: 10 GPM (38 LTR/M)
- Rated Operating Pressure: 1000 PSI (69 bar)
- Typical Internal Leakage (150 SSU): Negligible
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: 32° to 160° F (0° to 70° C)
- Weight: .14 lbs. (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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Page 254
**DIMENSIONS**

- 1.00 HEX [25.4]
- .22 [5.6]
- 1.25 [31.7]
- 7/8-14 UNF 2A THREAD

**ORDERING INFORMATION**

**DE-CVS**

**OPTIONS**
- Buna Standard 00
- Viton Standard V0

**BODIES**
- Blank Without Body N
- 3/8 NPTF Ports S
- #8 SAE Ports #8

**CRACK PRESSURE**
- 10 PSI 0010
- +/-15%

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
### Pilot To Open and Double PO Check Valves

<table>
<thead>
<tr>
<th>Pilot to Open Check Valves</th>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>3500</td>
<td>23</td>
<td>241</td>
<td>PP-CPB</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3500</td>
<td>30</td>
<td>241</td>
<td>DF-CPB</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>341</td>
<td>DF-CPC</td>
<td>262</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Double PO Check Valves</th>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>3000</td>
<td>11</td>
<td>207</td>
<td>MD-CDP</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3000</td>
<td>19</td>
<td>207</td>
<td>PQ-CDP</td>
<td>266</td>
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<tr>
<td></td>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>DG-CDP</td>
<td>268</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the CPB, CPC and CDP is load holding as shown.

![Typical Schematic Diagram]

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**PP-CPB Pilot Operated Check Valve, Guided Ball**

**DESCRIPTION**
8 size, 3/4-16 thread, "Power" series, pilot operated, ball check valve.

**OPERATION**
The PP-CPB allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
For sealed pilot piston consult factory.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LTR/M) 1 to 2</td>
</tr>
<tr>
<td></td>
<td>4 GPM (15 LTR/M) 2 to 1</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4:1</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.14 lbs. (.06 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500024</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191108</td>
</tr>
</tbody>
</table>

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MECHANICAL DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

DF-CPB Pilot Operated Check Valve, Guided Ball

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, pilot operated, ball check valve.

OPERATION
The DF-CPB allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

For sealed pilot piston consult factory.

0.030” to 0.060” diameter orifice recommended in the feed line to port #3

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Drop (PSI)</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Drop (BAR)</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

FREE FLOW 2 to 1   PILOTED OPEN 1 to 2

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LTR/M) 1 to 2</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4:1</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>19 lbs. (.09 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
</tr>
</tbody>
</table>

SHOULD ONLINE at www.airlinehyd.com
MECHANICAL DIRECTIONAL CONTROLS

DELTA POWER COMPANY
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

DF-CPB - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body N 3/8 NPTF Ports
SAE #6 Ports S

CRACK PRESSURE
0025 25 PSI ±10%

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800-999-7378
DF-CPC  Pilot To Open, Check Valve, Guided Ball

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, pilot to open, ball check valve.

OPERATION
The DF-CPC allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2).

The cartridge has a 2:1 pilot ratio, meaning that at least one half of the load pressure held at (1) is required at (3) to open the valve.

The check is spring biased to assure holding in static or no-load conditions.

FEATURES
• Hardened parts for long life.
• Industry common cavity.

HYDRAULIC SYMBOL

Special higher bias spring values available. Consult factory.
For sealed pilot piston consult factory.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
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<tr>
<td>8</td>
<td>20</td>
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<td>10</td>
<td>25</td>
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<tr>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>14</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>10</td>
<td>5</td>
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<td>10</td>
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<td>30</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>50</td>
<td>25</td>
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</table>

FREE Flow 2 to 1  Piloted Open 1 to 2

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>2:1</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.19 lbs. (.08 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard 00</td>
<td>blank Without Body</td>
</tr>
<tr>
<td>Viton Standard V0</td>
<td>1/4 NPTF Ports N</td>
</tr>
<tr>
<td></td>
<td>#6 SAE Ports S</td>
</tr>
</tbody>
</table>

**CRACK PRESSURE**

25 PSI
± 10%

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MD-CDP Double Pilot Operated Check Valve

**DESCRIPTION**


**OPERATION**

The MD-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and/or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports (4) or (1) respectively) to open the flow passage to allow flow from port (4) or (1) respectively.

The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>3 GPM (11 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0 - 5 drop / min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 16/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>10 lbs. (.04 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>MINI 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500006</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191010</td>
</tr>
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</table>

**HYDRAULIC SYMBOL**

Great for “in Cylinder” use Application

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**Pressure Drop - Piloted**

<table>
<thead>
<tr>
<th>Pressure Drop (PSI)</th>
<th>Flow (LPM)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

- Pressure drop, 2 to 1
- Pressure drop, 3 to 4

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DIMENSIONS

ORDERING INFORMATION

MD-CDP - - -

OPTIONS
U0 Urethane Standard

BODIES
Blank Without Body
N 1/4" NPTF PORT
S #6 SAE Ports

SPRING BIAS
0020 20 PSI

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SHOP ONLINE at www.airlinehyd.com
**PQ-CDP Double Pilot Operated Check Valve**

**DESCRIPTION**

8 size, 3/4" -16 thread, “Power” series, double pilot operated check valve.

**OPERATION**

The PQ-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and /or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports (4) or (1) respectively) to open the flow passage to allow flow from port (4) or (1) respectively.

The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>5 GPM (19 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0 - 5 drop / min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>12 lbs. (.05 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500029</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191112</td>
</tr>
</tbody>
</table>

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**HYDRAULIC SYMBOL**

Great for "in Cylinder " use Application

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**DIMENSIONS**

- **Urethane Standard**
- **Blank Without Body**
- **1/4" NPTF PORT**
- **#6 SAE Ports**
- **20 PSI**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>PQ-CDP</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTIONS</td>
<td>U0</td>
<td>BODIES</td>
<td>SPRING BIAS</td>
</tr>
<tr>
<td>Urethane Standard</td>
<td>Blank Without Body</td>
<td>20 PSI</td>
<td></td>
</tr>
<tr>
<td>N1/4&quot; NPTF PORT</td>
<td>S#6 SAE Ports</td>
<td>0020</td>
<td>20 PSI</td>
</tr>
</tbody>
</table>

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E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
DG-CDP Double Pilot Operated Check Valve

DESCRIPTION

OPERATION
The DG-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and /or (2) respectively.

The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports (ports 4 or 1 respectively) to open the flow passage to allow flow from port 4 or 1 respectively.

The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0 - 5 drop / min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°F to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.20 lbs (.09 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191216</td>
</tr>
</tbody>
</table>

HYDRAULIC SYMBOL

Great for "in Cylinder " use Application

PERFORMANCE

Actual Test Data (Cartridge Only)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Urethane Standard U0

BODIES
Blank Without Body N
1/4" NPTF PORT S
#6 SAE Ports

SPRING BIAS
20 PSI 0020

DIMENSIONS

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Pilot To Close Check Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DF-CPD</td>
<td>272</td>
</tr>
<tr>
<td>20</td>
<td>3500</td>
<td>76</td>
<td>241</td>
<td>SL-CPD</td>
<td>274</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the CPD is in a regenerative circuit such as a baler or refuse compactor. The valve allows flow from the rod end of the cylinder to regenerate with pump flow to increase cylinder speed.
DF-CPD Pilot to Close Check Valve, Guided Ball

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, pilot to close, ball check valve.

OPERATION
The DF-CPD allows free flow from (3) to (2), and blocks flow from (2) to (3). Flow will be blocked from (3) to (2) when sufficient pressure is applied at (1).

The cartridge has various “pilot ratios” (see options).
Example: 1/4 for 4:1 of the load pressure held at (3) is required at (1) to close the valve.

The check is spring biased to assure holding in static or no-load conditions.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Consult chart for flow operation of each model. Special higher bias spring values available. Consult factory.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Maximum Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 50 drops/min from (2) to (3) when port (1) is piloted
- Typical Internal Leakage (150 SSU): 5 drops/min from (3) to (2) when port (1) is piloted
- Pilot Ratio (see options)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 20 lbs. (.09 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191202

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna, 4:1 Ratio 04
Buna, 6:1 Ratio 06
Viton, 4:1 Ratio V4
Viton, 6:1 Ratio V6

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

CRACK PRESSURE
0015 15 PSI
0025 25 PSI
0050 50 PSI
0075 75 PSI
0100 100 PSI
± 10%

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
SL-CPD Pilot to Close Check Valve, Poppet

**DESCRIPTION**
16 size, 1 5/16-12 thread, “Super” series, pilot to close, poppet check valve.

**OPERATION**
The SL-CPD allows free flow from (3) to (2), and blocks flow from (2) to (3). Flow will be blocked from (3) to (2) when sufficient pressure is applied at (1).

The cartridge has a 2:1 pilot ratio, meaning that at least one half of the load pressure held at (3) is required at (1) to close the valve.

The check is spring biased to assure holding in static or no-load conditions.

**FEATURES**
- Hardened seat for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Special higher bias spring values available. Consult factory.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>20 GPM (76 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 drops/min</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>2:1</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.68 lbs. (.31 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 3WS</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500021</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191404</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

![Image of mechanical directional control dimensions](image)

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna, 2:1 Ratio</td>
<td>Blank</td>
</tr>
<tr>
<td>Viton, 2:1 Ratio</td>
<td>Without Body</td>
</tr>
<tr>
<td>02</td>
<td>#12 SAE Ports</td>
</tr>
<tr>
<td>V2</td>
<td></td>
</tr>
</tbody>
</table>

**CRACK PRESSURE**

- 0015: 15 PSI
- 0025: 25 PSI
- 0050: 50 PSI
- 0075: 75 PSI
- 0100: 100 PSI
- ± 10%

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Check Valves With Thermal Relief**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>4000</td>
<td>57</td>
<td>276</td>
<td>DE-CVT</td>
<td>278</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the CVT is a relief to protect system from damage due to thermal expansion on load holding circuits.
**DE-CVT Direct Acting Check Valve Thermal Relief, Poppet**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, direct acting check valve with thermal relief.

**OPERATION**
The DE-CVT allows free flow passage from (2) to (1), and blocks flow from (1) to (2).

If the pressure at (1) exceeds the thermal relief valve setting, a small amount of oil will be allowed to pass from (1) to (2), preventing cylinder damage from excessive pressure.

The cartridge has a fully guided poppet, which is spring biased closed until sufficient pressure is applied at (2) to open to (1).

**NOTE:** The relief valve feature is not intended for use in dynamic pressure limiting applications. Consult factory

**FEATURES**
- Hardened parts for long life.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common poppet cavity.

**HYDRAULIC SYMBOL**

Nominal flow rating is 15 GPM for free flow port (2) to (1). Consult chart for free flow differential pressure. Thermal relief is cyclic rated to 0.1 GPM. Port (1) to (2) chart demonstrates override characteristics for a typical thermal relief application.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range (36 to 3000 SSU (3 to 647 cSt))</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>.31 lbs. (.14 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Requirements</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity</td>
<td>405000000</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>21191200</td>
</tr>
<tr>
<td>Seal Kit</td>
<td><a href="mailto:delta@delta-power.com">delta@delta-power.com</a></td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

DE-CVT

OPTIONS

Buna Standard B
Viton Standard V

PRESSURE SETTING

<table>
<thead>
<tr>
<th>Pressure Setting</th>
<th>Code</th>
<th>Description</th>
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<tr>
<td>1000 PSI</td>
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<td>1</td>
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<tr>
<td>2000 PSI</td>
<td>2</td>
<td>0020</td>
</tr>
<tr>
<td>3000 PSI</td>
<td>3</td>
<td>0100</td>
</tr>
<tr>
<td>4000 PSI</td>
<td>4</td>
<td>± 10%</td>
</tr>
</tbody>
</table>

BODIES

Blank Without Body N
3/8 NPTF Ports S

WARNING: DO NOT USE ALUMINUM BODY.

HIGH PRESSURE (4000 PSI) PRODUCT

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
### 2 Way 2 Position Manual Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>PB-MCA</td>
<td>282</td>
</tr>
<tr>
<td>15</td>
<td>3500</td>
<td>57</td>
<td>241</td>
<td>DE-MCA</td>
<td>284</td>
</tr>
<tr>
<td>10</td>
<td>1500</td>
<td>38</td>
<td>103</td>
<td>DE-MCF</td>
<td>286</td>
</tr>
<tr>
<td>20</td>
<td>3500</td>
<td>76</td>
<td>241</td>
<td>DE-MCS</td>
<td>288</td>
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<td>20</td>
<td>3500</td>
<td>76</td>
<td>241</td>
<td>DE-MCB</td>
<td>290</td>
</tr>
<tr>
<td>8</td>
<td>3500</td>
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<td>241</td>
<td>PB-MCI</td>
<td>292</td>
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<tr>
<td>8</td>
<td>3500</td>
<td>30</td>
<td>241</td>
<td>PB-MCL</td>
<td>294</td>
</tr>
<tr>
<td>15</td>
<td>3500</td>
<td>57</td>
<td>241</td>
<td>DE-MCL</td>
<td>296</td>
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<tr>
<td>20</td>
<td>3000</td>
<td>76</td>
<td>207</td>
<td>DE-M2G</td>
<td>298</td>
</tr>
<tr>
<td>1</td>
<td>4000</td>
<td>4</td>
<td>276</td>
<td>HB-MCP</td>
<td>300</td>
</tr>
</tbody>
</table>

### Typical Schematic

Typical application for MCA, MCB, MCF, MCL, and MCS is an emergency lowering device.

Typical application for the MCI is a selector circuit when load holding is required in both directions.

Typical application for the M2G is adjustable speed control or full bypass of fluid motor.

Typical application for the MCP is a pilot dump valve.

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**PB-MCA Manual Poppet Valve, 2 Way Normally Closed, Pull Type**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, manual poppet, 2 way normally closed, pull type valve.

**OPERATION**
The PB-MCA blocks flow from (1) to (2) until an operator pulls the shaft outward.

The bias spring (see option page for pressure) allows for backpressure at (2) before the valve will open.

Note: Pressure at port (2) will act directly on the poppet and spring. Port (2) is intended to be a tank port only.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**

75 PSI bias provides comfortable effort where return line is near zero. 150 PSI option may be difficult to pull, if tank pressure is near zero.

Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LTR/M)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.21 lbs. (.10 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500005</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191100</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com
**DE-MCA Manual Poppet Valve, 2 Way Normally Closed, Pull Type**

### DESCRIPTION

### OPERATION
The DE-MCA blocks flow from (1) to (2) until an operator pulls the shaft outward.

The bias spring allows for backpressure at (2) before the valve will open (See option page for pressure).

Note: Pressure at port (2) will directly act on the poppet and spring. Port (2) is intended to be a tank port only.

### FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

### HYDRAULIC SYMBOL

65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero.

### PERFORMANCE
Actual Test Data (Cartridge Only)

![Graph showing flow vs. pressure drop for DE-MCA Manual Poppet Valve](Image)

### VALVE SPECIFICATIONS
- **Nominal Flow**: 15 GPM (57 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Typical Internal Leakage**: (150 SSU) 5 drops/min
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 18 lbs. (.08 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

Page 284
**DIMENSIONS**

![Dimensions Diagram]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>DE-MCA</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td>Blank Without Body</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td>N 3/8 NPTF Ports</td>
</tr>
<tr>
<td>Buna, Screen</td>
<td>A0</td>
<td>S #8 SAE Ports</td>
</tr>
<tr>
<td>Viton, Screen</td>
<td>W0</td>
<td></td>
</tr>
<tr>
<td>Buna, Knob</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>VK</td>
<td>SPRING BIAS PRESSURE</td>
</tr>
<tr>
<td>Buna, Knob, Screen</td>
<td>AK</td>
<td>65 PSI</td>
</tr>
<tr>
<td>Viton, Knob, Screen</td>
<td>WK</td>
<td>160 PSI</td>
</tr>
</tbody>
</table>

**NOTE:** Use screen only if flow direction is from (1) to (2).

**NOTE:** Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DE-MCF Manual Poppet Valve, 2 Way Normally Closed, Pull Type, Soft Seat**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, manual poppet valve, 2 way normally closed, pull type, soft seat.

**OPERATION**
The DE-MCF blocks flow from (1) to (2) until an operator pulls the shaft outward.
The bias spring allows for backpressure at (2) before the valve will open (See option page for pressure).
Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

**FEATURES**
- Soft seat for ultra low leakage.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Pressure above SPRING BIASE PRESSURE at port (2) may cause valve to self open.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 1500 PSI (103 bar)
- Typical Internal Leakage (150 SSU): Negligible
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: 32° to 160° F (0° to 70° C)
- Weight: .14 lbs (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
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Phone: (815) 397-6628       Fax: (815) 397-2526       E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com       800-999-7378
DE-MCS Manual Poppet Valve, 2 way Normally Closed, Pull Type, Corrosion Resistant

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, manual poppet valve, 2 way normally closed, pull type, corrosion resistant.

OPERATION
The DE-MCS blocks flow from (1) to (2) until an operator pulls the shaft outward.

The bias spring allows for backpressure at (2) before the valve will open (See option page for pressure).

Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

FEATURES
• Hardened parts for long life.
• Industry common cavity.
• Corrosion resistant.
• Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero.

Stainless Steel Shaft.

Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

PERFORMANCE
Actual Test Data (Cartidge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>15</td>
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<tr>
<td>25</td>
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<td>40</td>
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<td>50</td>
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<td>110</td>
<td>110</td>
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<tr>
<td>120</td>
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VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>20 GPM (76 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>75 lbs. (.34 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna Standard
- Viton Standard
- Buna, Screen
- Viton, Screen
- Buna, Knob
- Viton, Knob
- Buna, Knob, Screen
- Viton, Knob, Screen

BODIES
- Blank
- Without Body
- N
- 3/8 NPTF Ports
- S
- #8 SAE Ports

SPRING BIAS
- 65 PSI
- 160 PSI

NOTE: Use screen only if flow direction is from (1) to (2).

NOTE: Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
DE-MCB Manual Poppet Valve, 2 Way Normally Closed, Pull, Detent

DESCRIPTION

OPERATION
The DE-MCB blocks flow from (1) to (2) until an operator pulls the shaft outward.

The bias spring allows for backpressure at (2) before the valve will open (See option page for pressure).

Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

HYDRAULIC SYMBOL

65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero.

Pressure above SPRING BIASE PRESSURE at port (2) may cause valve to self open.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Flow (LPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
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<td>15</td>
<td>37.5</td>
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<td>3.5</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>75</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Port 2 to 1 (detent open)

VALVE SPECIFICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>20 GPM (76 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 300 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.28 lbs. (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

NOTE: Use screen only if flow direction is from (1) to (2).

NOTE: Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.
**PB-MCI Manual Poppet Valve, 2 Way Normally Closed, Push Type**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, manual poppet, 2 way normally closed, push type valve.

**OPERATION**
The PB-MCI blocks flow from (2) to (1) until sufficient force is applied to button to overcome spring bias and load force.

<table>
<thead>
<tr>
<th>Actuation Force Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pressure: 7 lbs.</td>
</tr>
<tr>
<td>Side Pressure: 7 + (P1 x .009)</td>
</tr>
<tr>
<td>Nose Pressure: 7 + (P1 x .076)</td>
</tr>
</tbody>
</table>

Note: (Ø.437) cavity predrill depth must be 1.312 minimum from spotface.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 8 GPM (30 LTR/M)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): Consult Factory
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 26 lbs. (.12 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191102

**FLOW (GPM)**

**FLOW (LPM)**

**PRESSURE DROP (PSI)**

**PRESSURE DROP (BAR)**

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**MECHANICAL DIRECTIONAL CONTROLS**

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-5628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

**DIMENSIONS**

![Mechanical Directional Control Diagram]

**ORDERING INFORMATION**

**PB-MCI**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>PB-MCI</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td>Blank</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td>N</td>
</tr>
<tr>
<td>Buna, Lever</td>
<td>0L</td>
<td>S</td>
</tr>
<tr>
<td>Viton, Lever</td>
<td>VL</td>
<td>#6 SAE Ports</td>
</tr>
<tr>
<td>Buna, Screen</td>
<td>A0</td>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td>Viton, Screen</td>
<td>W0</td>
<td>#6 SAE Ports</td>
</tr>
<tr>
<td>Buna, Screen, Lever</td>
<td>AL</td>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td>Viton, Screen, Lever</td>
<td>WL</td>
<td>#6 SAE Ports</td>
</tr>
</tbody>
</table>

**NOTE:** Use screen only if flow direction is from (1) to (2).

**BODY WEIGHT:** 39 lbs. [18 kg.]
PB-MCL Manual Poppet Valve, 2 Way Normally Closed, Pull Type, Lever

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, manual poppet, 2 way normally closed, pull type valve with lever.

OPERATION
The PB-MCL blocks flow from (1) to (2) until an operator pulls the handle upward.

The bias spring (see option page for pressure) allows for back-pressure at (2) before the valve will open.

Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL
Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
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<td>4</td>
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<td>6</td>
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<tr>
<td>8</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
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</thead>
<tbody>
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<td>0</td>
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<td>5</td>
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<td>10</td>
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<table>
<thead>
<tr>
<th>Valve Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
</tr>
<tr>
<td>Viscosity Range</td>
</tr>
<tr>
<td>Filtration</td>
</tr>
<tr>
<td>Media Operating</td>
</tr>
<tr>
<td>Temperature Range</td>
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<tr>
<td>Weight</td>
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<tr>
<td>Operating Fluid Media</td>
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<tr>
<td>Cartridge Torque</td>
</tr>
<tr>
<td>Cavity</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
</tr>
<tr>
<td>Seal Kit</td>
</tr>
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</table>

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SHOP ONLINE at www.airlinehyd.com
DIMENSIONS

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

PB-MCL

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Screen A0
Viton, Screen W0

BODIES
Blank Without Body
N 1/4 NPT PORTS
S #6 SAE PORTS

SPRING BIAS PRESSURE
0075 75 PSI
0150 150 PSI

NOTE: Use screen only if flow direction is from (1) to (2).

NOTE: Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.
MECHANICAL DIRECTIONAL CONTROLS

DELTA POWER COMPANY
4484 Boeing Drive - Rockford, IL 61109

DE-MCL NORMALLY CLOSED MANUAL, PULL VALVE

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, normally closed, manual pull valve

OPERATION
The DE-MCL blocks flow from (1) to (2) until an operator pulls the shaft outward.

The bias spring allows for backpressure at (2) before the valve will open (See option page for pressure).

Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened cage for long life.
- Industry common cavity

HYDRAULIC SYMBOL

Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 5 drops/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250°F (-40° to 120° C)
- Weight: 15 lbs. (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191201

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Page 296
MECHANICAL DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

DE-MCL - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Screen A0
Viton, Screen W0

BODY
Blank Without Body
N 3/8 NPTF Ports
S #8 SAE Ports

SPRING BIAS PRESSURE
0065 65 PSI
0160 165 PSI

NOTE: Use screen only if flow direction is from (1) to (2).

NOTE: Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
DE-M2G Manual Rotary Spool Valve, 2 Way Normally Closed

DESCRIPTION

OPERATION
The DE-M2G when rotated clockwise (fully closed position) blocks flow from (1) to (2) and (2) to (1). When rotated counterclockwise (fully open position), the cartridge allows flow from (1) to (2) and (2) to (1).

FEATURES
• Hardened parts for long life.
• Industry common cavity.

HYDRAULIC SYMBOL
May be used as a metering product. Valve has approximately 3.5 turns of adjustment from fully open to fully closed.

See Chart for fully open pressure drop.

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>20 GPM (76 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu/in per min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>27 lbs. (.12 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>405000000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

NOTE: Use screen only if flow direction is from (1) to (2).
**HB-MCP 2 Way Manual Valve, Normally Closed, Push Type**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, manual valve, 2 way normally closed, push type.

**OPERATION**
The HB-MCP blocks flow from (2) to (1) until an operator pushes the knob in allowing pressure at port #2 to drop to port #1 pressure.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Good as a pilot dump valve. Port #1 should be limited to < 500 PSI to allow actuation (50 lbs), Port #2 actuation load at 4000 PSI (50 lbs).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.2</td>
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</tr>
<tr>
<td>0.4</td>
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<td>0.6</td>
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<tr>
<td>0.8</td>
<td>20</td>
</tr>
<tr>
<td>1</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**
- Nominal Flow: 1 GPM (4 LPM)
- Max. Operating Pressure: 4000 PSI (276 bar)
- Typical Internal Leakage: 5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: 32° to 160° F (0° to 70° C)
- Weight: 14 lbs. (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191100

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
3 Way 2 Position Manual Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>3000</td>
<td>45</td>
<td>207</td>
<td>DF-M3A</td>
<td>304</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for a M3A depends on the porting used. The M3A can be used in a clutch application with porting option #1, for a single acting cylinder control with porting option #2, and for a selector application with porting option #3.
DF-M3A Manual Rotary Spool Valve, 3 Way 2 Position

DESCRIPTION

OPERATION
The DF-M3A when rotated fully to the clockwise position, the cartridge directs flow from (3) to (2) or (2) to (3) and blocks flow at (1).

When rotated fully to the counterclockwise position, the cartridge directs flow from (1) to (3) or (3) to (1) and blocks flow at (2).

All ports are closed in transition.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for pressure drop in both positions.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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VALVE SPECIFICATIONS

- Nominal Flow: 12 GPM (45 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .49 lbs. (.22 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191210

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
MECHANICAL DIRECTIONAL CONTROLS
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628        Fax: (815) 397-2526         E-mail: delta@delta-power.com

DIMENSIONS

ORDERING INFORMATION

DF-M3A - -

OPTIONS

Buna Standard 00  Blank
Viton Standard V0  N  1/4 NPTF Ports
Buna, Knob 0K  S  #6 SAE Ports
Viton Knob VK

BODIES
Without Body
1/4 NPTF Ports
#6 SAE Ports

BODY WEIGHT: 60 lbs [27 kg.]
4 Way 2 Position Manual Valves

<table>
<thead>
<tr>
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<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
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<td>207</td>
<td>DG-M4C</td>
<td>312</td>
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Typical Schematic

Typical application for the M4A is directional motor control.
Typical application for the M4B is directional cylinder control in a parallel circuit.
Typical application for the M4C is directional cylinder control in a series circuit.

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**DG-M4A Manual Spool Rotary Valve, 4 Way 2 Position, Criss Cross**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, manual rotary spool valve, 4 way 2 position, criss cross

**OPERATION**
The DG-M4A, when rotated fully to clockwise position, the cartridge directs flow between (2) to (3) and (1) to (4).

When rotated fully to counterclockwise position, the cartridge directs flow between (3) to (4) and (1) to (2).

All ports are closed in transition.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for pressure drop in both positions.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

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<th>Specification</th>
<th>Specification Value</th>
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<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
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<td>Rated Operating Pressure</td>
<td>8 GPM (30 LPM) from (2) to (3)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min) per path</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.32 lbs (.15 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
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<tr>
<td>Seal Kit</td>
<td>21191214</td>
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</tbody>
</table>

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DIMENSIONS

BODY WEIGHT: .99 lbs. [.45 kg.]

ORDERING INFORMATION

DG-M4A  -  -

OPTIONS
- Buna Standard 00  Blank
- Viton Standard V0  N  1/4 NPTF Ports
- Buna, Knob 0K  S  #6 SAE Ports
- Viton Knob VK

BODIES
- Without Body
DG-M4B Manual Rotary Spool Valve, 4 Way 2 Position, Closed Center

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, 4 way 2 position, manual rotary spool valve, closed center.

OPERATION
The DG-M4B when rotated fully to clockwise position, this valve blocks flow at all ports.

When rotated fully to counterclockwise position, the cartridge directs flow between (2) and (1), as well as (3) and (4).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions.

See chart for pressure drop.

PERFORMANCE
Actual Test Data (Cartridge Only)

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<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
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<th>Port 3 to 4</th>
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Valve Specifications

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<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min) per path</td>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
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**DIMENSIONS**

![Diagram of mechanical directional control](image)

**ORDERING INFORMATION**

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<th>OPTIONS</th>
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<td>Buna, Knob</td>
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<td>Viton Knob</td>
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**OPTIONS**
- Blank: Without Body
- 1/4 NPTF Ports: #6 SAE Ports

**DIMENSIONS**
- 5/32 SOCKET HEX: 1.50 [38.1]
- 3/8-24 UNF 2-A THREADS: 1.25 [31.7]
- 7/8-14 UNF 2A THREAD: 2.50 [63.4]
- 1/4-20 UNF 2A THREAD: 1.21 [30.7]
- .63 [15.9]
- .28 [7.1] DIA. MTG. HOLES 2X
- .12 [3.2]
- 2.25 [57.1]

**ORDERING INFORMATION**

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**OPTIONS**
- Blank: Without Body
- 1/4 NPTF Ports: #6 SAE Ports

**DIMENSIONS**
- 5/32 SOCKET HEX: 1.50 [38.1]
- 3/8-24 UNF 2-A THREADS: 1.25 [31.7]
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
DG-M4C Manual Rotary Spool Valve, 4 Way 2 Position, Tandem Center

DESCRIPTION

OPERATION
The DG-M4C when rotated fully to clockwise position, the cartridge allows flow from (2) to (4) and blocks flow at (1) and (3).

When rotated fully to total counterclockwise position, the cartridge allows flow between (2) and (3) and between (1) and (4).

All ports are closed in transition.

FEATURES
• Hardened parts for long life.
• Industry common cavity.

HYDRAULIC SYMBOL

May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions.
See chart for fully open and fully closed pressure drop.

PERFORMANCE
Actual Test Data (Cartridge Only)

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<tr>
<th>Operating Fluid Media</th>
<th>General Purpose Hydraulic Fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>52 lbs. (.23 kg)</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40°F to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min) per path</td>
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<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LPM)</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
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</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**Pilot To Shift Valves**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
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<tr>
<td>40</td>
<td>3500</td>
<td>154</td>
<td>241</td>
<td>SO-PTS</td>
<td>316</td>
</tr>
<tr>
<td>40</td>
<td>3500</td>
<td>154</td>
<td>241</td>
<td>SO-PTT</td>
<td>318</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the PTS is a high flow priority flow control.

Typical application for the PTT is a high flow selector valve.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SO-PTS Pilot to Shift, 3 Way Valve, Open Transition

DESCRIPTION
16 size, 1 5/16 -12 thread, “Super” series, pilot to shift, 3 way valve, open transition.

OPERATION
In neutral the SO-PTS allows flow between ports (3) and (4), port (2) is blocked.

With application of a remote pilot signal at (5), the valve’s spool shifts to allow flow between ports (2) and (3), while port (4) is blocked. During transition ports (2), (3), and (4) are open.

The spring chamber is vented to the tank through port (1). The vented spring chamber allows the valve to be fully pressurized at ports (2), (3), and (4) without affecting required pilot pressure.

Pressure at (1) will affect required pilot pressure.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

A rate limiting orifice less than .060” diameter is recommended at port 5.

PERFORMANCE
Actual Test Data (Cartridge Only)

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<thead>
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<th>Pressure Drop (PSI)</th>
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<td>200</td>
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<table>
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<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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<tr>
<td>75</td>
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<td>100</td>
<td>200</td>
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VALVE SPECIFICATIONS

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<tr>
<th>Nominal Flow</th>
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</thead>
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<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>10 cu in/min (164 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.11 lbs. (.50 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 5W SHORT</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500020</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191410</td>
</tr>
</tbody>
</table>

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ORDERING INFORMATION

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<tr>
<td>00</td>
<td>S</td>
<td>± 10%</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>0070</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DIMENSIONS


#12 SAE PORTS X4

BODY WEIGHT: 3.78 Lbs. / 1.62 Kg.
SO-PTT Pilot to Shift, 3 Way Valve, Closed Transition

**DESCRIPTION**
16 size, 1 5/16 -12 thread, “Super” series, pilot to shift, 3 way valve, closed transition.

**OPERATION**
In neutral the SO-PTT allows flow between ports (3) and (4), port (2) is blocked.

With application of a remote pilot signal at (5), the valve’s spool shifts to allow flow between ports (2) and (3), while port (4) is blocked. During transition all ports are closed.

The spring chamber is vented to the tank through port (1). The vented spring chamber allows the valve to be fully pressurized at ports (2), (3), and (4) without affecting required pilot pressure.

Pressure at (1) will affect required pilot pressure.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

A rate limiting orifice less than .060” diameter is recommended at port 5.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
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</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>10 cu in/min (164 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
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<td>Weight</td>
<td>1.08 lbs. (.49 kg)</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 5W SHORT</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500020</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191410</td>
</tr>
</tbody>
</table>

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Shuttle Valves

<table>
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<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3500</td>
<td>23</td>
<td>241</td>
<td>PP-CSB</td>
<td>322</td>
</tr>
<tr>
<td>8</td>
<td>3500</td>
<td>30</td>
<td>241</td>
<td>DF-CSB</td>
<td>324</td>
</tr>
</tbody>
</table>

Typical Schematic
Typical application for the CSB is load sense in a motor circuit with a spring loaded brake.
**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, shuttle valve.

**OPERATION**

The PP-CSB allows flow from the higher pressure of (1) or (3) to (2).

The valve is commonly used as a load sense to direct oil from the pressure side of a bidirectional hydraulic motor to a pressure released hydraulic brake.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol]

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Performance Graph]

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LTR/M)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>1 cu in/min (16 ml/min)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.16 lbs. (.07 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>POWER 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500024</td>
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<tr>
<td>Seal Kit</td>
<td>21191104</td>
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</table>

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
**DF-CSB Shuttle Valve**

**DESCRIPTION**
10 size, 7/8-14 thread, "Delta" series, shuttle valve.

**OPERATION**
The DF-CSB allows flow from the higher pressure of (1) or (3) to (2).

The valve is commonly used as a load sense to direct oil from the pressure side of a bidirectional hydraulic motor to a pressure-released hydraulic brake.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
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</tr>
<tr>
<td>Rated Operating Pressure</td>
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<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>1 cu in/min (16 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<td>Media Operating Temperature Range</td>
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<td>22 lbs. (.10 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
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<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>405000001</td>
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<tr>
<td>Seal Kit</td>
<td>21191206</td>
</tr>
</tbody>
</table>

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MECHANICAL DIRECTIONAL CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

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DIMENSIONS

ORDERING INFORMATION

DF-CSB - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Without Body Blank
1/4 NPTF Ports N
#6 SAE Ports S

Blank Leave this box blank

BODY WEIGHT: .76 lbs. [.35 kg.]
### Typical Schematic

Typical application for the MRA is an emergency by-pass flow in a closed loop system.

---

**Typical Schematic**

![Diagram of MRA](image)

---

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SJ-MRA Manual Rotary Spool Valve, 2 Way

DESCRIPTION

OPERATION
The SJ-MRA regulates flow from (1) to (2) or (2) to (1). Counter-clockwise Rotation of 90° adjusts valve from fully closed to fully open.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 15 cu in/min (246 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.13 lbs (.51 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191402

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**DIMENSIONS**

**ORDERING INFORMATION**

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<table>
<thead>
<tr>
<th>BODIES</th>
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<tbody>
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<td>3/4 NPTF Ports</td>
</tr>
<tr>
<td>#12 SAE Ports</td>
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</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
## SECTION/Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Pages</th>
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<tbody>
<tr>
<td>Direct Acting and Differential Area Relief Valves</td>
<td>333</td>
</tr>
<tr>
<td>Pilot Operated Relief Valves</td>
<td>359</td>
</tr>
<tr>
<td>Crossover Relief Valves</td>
<td>375</td>
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<tr>
<td>Pressure Compensated Regulator Valves</td>
<td>381</td>
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<tr>
<td>Pressure Reducing/Relieving Valves</td>
<td>405</td>
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<td>Sequence Valves</td>
<td>413</td>
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<td>Shut Down Valves</td>
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Direct Acting and Differential Area Relief Valves

Direct Acting Relief Valves

<table>
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<td>MA-RVA</td>
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<td>PB-RVA</td>
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<td>276</td>
<td>DE-RVA</td>
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<td>3500</td>
<td>23</td>
<td>241</td>
<td>PB-RWA</td>
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<td>276</td>
<td>DE-RWA</td>
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Differential Area Relief Valves

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<td>276</td>
<td>DE-RWD</td>
<td>356</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the RVA, RVD, RWA, RWD is to protect pump and system.
Typical application for the RCA and RCD is cross over relief to protect motor in both directions, where lowest possible price is desired.
DE-RCA Guided Ball, Direct Acting Relief Valve

DESCRIPTION

OPERATION
The DE-RCA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Installation Space Saving Product. Cannot be field adjusted. Not recommended for crossover relief valve applications, use DE-RWA

PERFORMANCE
Actual Test Data (Cartridge Only)

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VALUE SPECIFICATIONS
- Nominal Flow: 12 GPM (45 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 38 lbs. (.17 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
Warning: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
MA-RVA Direct Acting Relief Valve

DESCRIPTION

OPERATION
The MA-RVA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1)

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALUE SPECIFICATIONS
- Nominal Flow: 5 GPM (19 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .39 lbs. (.17kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit: 21191000

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
PB-RVA Direct Acting Relief Valve

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, direct acting relief valve.

OPERATION
The PB-RVA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

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VALVE SPECIFICATIONS
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 30 lbs. (.14 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191100

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628   Fax: (815) 397-2526   E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
warning: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

phone: (815) 397-6628  
fax: (815) 397-2526  
E-mail: delta@delta-power.com
**DE-RVA Direct Acting Relief Valve**

**DESCRIPTION**

**OPERATION**
The DE-RVA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALUE SPECIFICATIONS**

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<thead>
<tr>
<th>Parameter</th>
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<td>8 GPM (30 LPM) 3000 PSI</td>
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<tr>
<td>Rated Operating Pressure</td>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
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<td>Cartridge Torque Requirements</td>
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<td>Cavity</td>
<td>DELTA 2W</td>
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<tr>
<td>Cavity Form Tool (Finishing)</td>
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<td>21191200</td>
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</tbody>
</table>

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Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna Standard 00
- Viton Standard V0
- Buna, Knob 0K
- Viton, Knob VK

BODIES
- Blank N
- 3/8 NPTF Ports S
- #8 SAE Ports NK

PRESSURE RANGE/SETTING
- 1500 200 – 1500 PSI
- 3000 1500 – 3000 PSI
- 4000 2500 – 4000 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**PB-RWA Direct Acting Relief Valve**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, direct acting relief valve.

**OPERATION**
The PB-RWA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1)

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Nominal Flow</td>
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<tr>
<td>Rated Operating Pressure</td>
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</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
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<td>Operating Fluid Media</td>
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<td>POWER 2W</td>
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<td>Seal Kit</td>
<td>21191100</td>
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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-RWA Direct Acting Relief Valve

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, direct acting relief valve

OPERATION
The DE-RWA blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the poppet to open and allow metered flow from (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

For critical leakage applications consult factory.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

### VALVE SPECIFICATIONS
- **Nominal Flow**: 8 GPM (30 LPM)
- **Rated Operating Pressure**: 4000 PSI (276 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40°C to 250°C (-40° to 120° C)
- **Weight**: .51 lbs. (.23 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

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NOTE: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-RCD Differential Area Relief Valve

**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, differential area relief valve

**OPERATION**

The DE-RCD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Installation Space Saving Product.

Cannot be field adjusted.

Not recommended for crossover relief valve applications, use DE-RWD.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 15 GPM (57 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 0.37 lbs. (.17 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

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PB-RVD Differential Area Relief Valve

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, differential area relief valve.

OPERATION
The PB-RVD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Graph showing test data for PB-RVD Differential Area Relief Valve]

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VALVE SPECIFICATIONS
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .31 lbs. (.14 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)

Seal Kit: 21191100

Cavity Tool (Finishing): 40500005

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

PB-RVD - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

PRESSURE RANGE/SETTING
0800 100 - 800 PSI
2000 800 - 2000 PSI
3500 2000 - 3500 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DE-RVD Differential Area Relief Valve**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, differential area relief valve

**OPERATION**
The DE-RVD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol]

Low PSI/turn adjustment.
Good pressure vs. flow characteristic.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Performance Graph]

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Filtration</td>
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<td>Weight</td>
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**DIMENSIONS**

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**ORDERING INFORMATION**

DE-RVD - - -

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<td>Viton, Screen</td>
<td>3/8 NPTF Ports</td>
</tr>
<tr>
<td>Buna, Knob</td>
<td>S</td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>#8 SAE Ports</td>
</tr>
<tr>
<td>Buna, Knob, Screen</td>
<td>AK</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Use screen only if flow direction is from (1) to (2).
HE-RVD Differential Area Relief Valve

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, differential area relief valve

OPERATION
The HE-RVD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Good pressure vs. flow characteristic.

Recommended Return Line Pressure as shown on Performance Data Graph.

Undercut Cavity Recommended for Max. flows.
(Consult Factory for Details)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>40 GPM (151 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>5000 PSI (350 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.57 lbs. (.26 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>405000000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

HE-RVD  -  -  -

OPTIONS
  Buna Standard  00
  Viton Standard  V0
  Buna, Screen   A0
  Viton, Screen  W0
  Buna, Knob     0K
  Viton, Knob    VK
  Buna, Knob, Screen  AK
  Viton, Knob, Screen  WK

BODIES
  Blank Without Body
  N  3/8 NPTF Ports
  S  #8 SAE Ports

PRESSURE RANGE/SETTING
  5000  1000-5000 PSI

Note: Use screen only if flow direction is from (1) to (2).

Note: Aluminum, NOT durability rated for 4000 PSI. Consult factory options.

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**PB-RWD Differential Area Relief Valve**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, differential area relief valve.

**OPERATION**
The PB-RWD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .32 lbs. (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191100

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

<table>
<thead>
<tr>
<th>EXTERNAL ADJ.</th>
<th>INTERNAL ADJ. TAMPER PROOF</th>
<th>3/8-24 UNF 2A THREADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50 [38.1]</td>
<td>.87 HEX [22]</td>
<td></td>
</tr>
<tr>
<td>2.30 [58.4]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.54 [41.6]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.19 [4.8]</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Adj. W/Locknut Buna 00</td>
<td>Blank Without Body</td>
</tr>
<tr>
<td>External Adj. W/Locknut Viton V0</td>
<td>N 1/4 NPTF Ports</td>
</tr>
<tr>
<td>Buna, Knob 0K</td>
<td>S  #6 SAE Ports</td>
</tr>
<tr>
<td>Viton, Knob VK</td>
<td></td>
</tr>
<tr>
<td>Internal Adj. Buna 0I</td>
<td></td>
</tr>
<tr>
<td>Internal Adj. Viton VI</td>
<td></td>
</tr>
<tr>
<td>Tamper Proof Buna 0T</td>
<td></td>
</tr>
<tr>
<td>Tamper Proof Viton VT</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRESSURE RANGE/SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ext./Int. Adjustable</td>
</tr>
<tr>
<td>100 - 1000 PSI</td>
</tr>
<tr>
<td>500 – 3500 PSI</td>
</tr>
</tbody>
</table>

Tamper Proof
Fill in 4 Digit Pressure Setting
Example: 0500 – 500 PSI

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DE-RWD Differential Area Relief Valve

DESCRIPTION

OPERATION
The DE-RWD blocks flow from (1) to (2) until sufficient pressure is present at (1) to force the poppet to open and allow metered flow from (1) to (2).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Graph showing performance data]

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.55 lbs. (25 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Typical Schematic

Typical application for the RVP and RWP is to protect pump or system.

Typical application for the RWR and RVR, is to be used as counterbalance in a system where positive hydraulic locking is not required. In this schematic positive locking is done by using a P. O. check valve.
DE-RVP Pilot Operated Relief Valve

DESCRIPTION

OPERATION
The DE-RVP blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage open, allowing the main stage to shift, opening (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

| Port 2 to 1 | Port 2 to 1 |

VALVE SPECIFICATIONS
- Nominal Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .56 lbs (.25 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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### WARNING

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

---

#### DIMENSIONS

![Diagram of a pressure control device with dimensions labeled.

<table>
<thead>
<tr>
<th>1.50</th>
<th>1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>[38.1]</td>
<td>[25.4]</td>
</tr>
</tbody>
</table>

*Dimensions labeled.*

#### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>Blank</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>Without Body</td>
</tr>
<tr>
<td>Buna, Knob</td>
<td>3/8 NPTF Ports</td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>#8 SAE Ports</td>
</tr>
</tbody>
</table>

**DE-RVP**

**PRESSURE RANGE/SETTING**

100 – 4000 PSI
HT-RVP Pilot Operated Relief Valve

DESCRIPTION
12 size, 1 1/16-12 thread, “Tecnord” series, pilot operated relief valve.

OPERATION
The HT-RVP blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage off its seat, allowing the main stage spool to shift, opening (2) to (1).

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

Undercut cavity recommended for circuits above 2500 PSI where flows go to 30 GPM.

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS
- Nominal Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 5000 PSI (345 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.13 lbs. (.51 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 70 ft-lbs (95 Nm)
- Cavity: TECNORD 2W
- Cavity Form Tool (Finishing): 40500032
- Seal Kit: 21191300

PERFORMANCE
Actual Test Data (Cartridge Only)

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-RVR Pilot Operated Relief Valve, with Reverse Flow

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, pilot operated relief valve with reverse flow

**OPERATION**
The DE-RVR blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage open, allowing the main stage to shift, opening (2) to (1).

The relief flow path is from (2) to (1). Free reverse flow, from (1) to (2), occurs when the pressure at (1) is at least 10 PSI (.7 bar) higher than at port (2).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Consult Chart for flow capacity port 1 to 2

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**Valve Specifications**
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .56 lbs (.25 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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**DIMENSIONS**

- 1.50 [38.1]
- 1.00 [25.4]
- 3.25 [82.6]
- 1.25 [31.8]
- 1/2-20 UNF 2A THREADS
- 7/8-14 UNF 2A THREAD

**ORDERING INFORMATION**

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0
- Buna, Knob: 0K
- Viton, Knob: VK

**BODIES**
- Blank: Without Body
- N: 3/8 NPTF Ports
- S: #8 SAE Ports

**PRESSURE RANGE/SETTING**
- 100 – 4000 PSI

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SJ-RVR Pilot Operated Relief Valve, with Reverse Flow

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, pilot operated relief valve with reverse flow.

OPERATION
The SJ-RVR blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage off its seat, allowing the main stage spool to shift, opening (2) to (1).

The relief flow path is from (2) to (1). Reverse flow, from (1) to (2), occurs when the pressure at (1) is at least 30 PSI (2.1 bar) higher then at port (2).

The Cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

![Hydraulic Symbol]

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Standard Body</th>
<th>Flow (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Drop (PSI)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>1000</td>
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<tr>
<td>10</td>
<td>1500</td>
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<tr>
<td>15</td>
<td>2000</td>
</tr>
<tr>
<td>20</td>
<td>2500</td>
</tr>
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<table>
<thead>
<tr>
<th>Standard Body</th>
<th>Flow (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Drop (BAR)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
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<tr>
<td>10</td>
<td>150</td>
</tr>
<tr>
<td>15</td>
<td>200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port 2 to 1</th>
<th>Port 2 to 1</th>
<th>Port 1 to 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank PSI</td>
<td>Inlet PSI</td>
<td></td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628   Fax: (815) 397-2526   E-mail: delta@delta-power.com
DE-RWP Pilot Operated Relief Valve

DESCRIPTION

OPERATION
The DE-RWP blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage open, allowing the main stage to shift, opening (2) to (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Flow chart]

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>20</td>
<td>100</td>
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<tr>
<td>25</td>
<td>150</td>
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<tr>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>75</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>75</td>
<td>30</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .53 lbs. (.24 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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ORDERING INFORMATION

DE-RWP

OPTIONS
- Buna Standard 0O
- Viton Standard V0
- Buna, Knob 0K
- Viton, Knob VK
- Internally Adj. Buna 0I
- Internally Adj. Viton VI
- Tamper Proof Buna 0T
- Tamper Proof Viton VT

BODIES
- Blank Without Body N
- 3/8 NPTF Ports S
- #8 SAE Ports

PRESSURE RANGE/SETTING
- 1000 – 4000 PSI

Tamper Proof
- Fill in 4 Digit Pressure Setting
- Example: 0500 – 500 PSI
HE-RWP Rapid Response, Pilot Operated Relief Valve

DESCRIPTION

OPERATION
The HE-RWP blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage open, allowing the main stage to shift, opening (2) to (1).

FEATURES
- High pressure valve
- Hardened parts for long life.
- Industry common cavity.
- Rapid response to sudden pressure application
- Excellent regulation of pressure with flow (low override)

HYDRAULIC SYMBOL

This is a rapid response, high pressure relief valve with excellent high flow regulation.
(Consult factory for higher flow capacity cavity option)

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (gpm)</th>
<th>Pressure Drop (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (lpm)</th>
<th>Pressure Drop (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>37</td>
<td>50</td>
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<tr>
<td>74</td>
<td>100</td>
</tr>
<tr>
<td>111</td>
<td>150</td>
</tr>
<tr>
<td>148</td>
<td>200</td>
</tr>
</tbody>
</table>

Valve Specifications
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 5000 PSI (345 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .53 lbs. (.24 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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DIMENSIONS

ORDERING INFORMATION

HE-RWP - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK
Internally Adj. Buna 0I
Internally Adj. Viton VI
Tamper Proof Buna 0T
Tamper Proof Viton VT

BODIES
Consult Factory

WARNING
DO NOT USE ALUMINUM BODY
HIGH PRESSURE (5000 PSI) PRODUCT

PRESSURE RANGE/SETTING
1000 – 5000 PSI

Tamper Proof
Fill in 4 Digit Pressure Setting
Example: 1500 – 1500 PSI

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DE-RWR Pilot Operated Relief Valve, with Reverse Flow

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, pilot operated relief valve with reverse flow.

OPERATION
The DE-RWR blocks flow from (2) to (1) until sufficient pressure is present at (2) to force the pilot stage open, and allow metered flow from (2) to (1).

The relief flow path is from (2) to (1). Free reverse flow, from (1) to (2), occurs when the pressure at (1) is at least 10 PSI (.7 bar) higher than at port (2).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Consult chart for flow capacity (1) to (2).

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>5</td>
<td>50</td>
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<tr>
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<tr>
<td>15</td>
<td>150</td>
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<tr>
<td>20</td>
<td>200</td>
</tr>
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<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
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<tr>
<td>15</td>
<td>150</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.53 lbs (.24 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
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</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK
Internally Adj. Buna 0I
Internally Adj. Viton VI
Tamper Proof Buna 0T
Tamper Proof Viton VT

BODIES
Blank Without Body
N 3/8 NPTF Ports
S #8 SAE Ports

PRESSURE RANGE/SETTING
1000 – 4000 PSI

Tamper Proof
Fill in 4 Digit Pressure Setting
Example: 0500 – 500 PSI

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**Crossover Relief Valves**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>4000</td>
<td>57</td>
<td>276</td>
<td>DE-RVB</td>
<td>376</td>
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<tr>
<td>15</td>
<td>4000</td>
<td>57</td>
<td>276</td>
<td>DE-RVC</td>
<td>378</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the RVC is in a series circuit where a load on motor #2 causes back pressure on motor #1 and relief valve #1. Vent in port 2 of RV 1 allows spring to maintain proper load on motor #1 even though back pressure is present. Port 2 pressure into spring chamber to offset back pressure. Vent at port 2 causes .2 GPM flow from port 2 to port 1.

Typical application for the RVB is in a parallel circuit where the load on motor #2 does not cause back pressure on motor #1. Relief valve maintains differential pressure across motor because one side of motor always goes to tank.
**DE-RVB Crossover Relief Valve, For Parallel Circuits**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, crossover relief valve for parallel circuit applications

**OPERATION**
The DE-RVB is a direct-acting, cross over relief valve. When pressure at either port exceeds the nominal setting value, flow will be diverted to the opposite port.

Back pressure at either port will affect the nominal setting of the opposite port on a 1:1 basis.

For correlation purposes, pre-set value will be measured at port (2). Pressure at port (1) will not vary more than ±300 PSI from the port (2) value.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
The DE-RVB is designed for parallel circuit applications. For series circuits, use DE-RVC

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 15 GPM (57 LPM) FROM (2) TO (1)
- 20 GPM (76 LPM) FROM (1) TO (2)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .80 lbs. (.36 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191202

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DE-RVC Crossover Relief Valve, For Series Circuits

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, crossover relief valve for series circuit application

OPERATION
The DE-RVC is a direct-acting, cross over relief valve. When pressure at either port exceeds the nominal setting value, flow will be diverted to the opposite port.

Back pressure at either port will affect the nominal setting of the opposite port on a 1:1 basis.

For correlation purposes, pre-set value will be measured at port (2). Pressure at port (1) will not vary more than ±300 PSI from the port (2) value.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

PERFORMANCE
Actual Test Data (Cartridge Only)

HYDRAULIC SYMBOL
Tamper Proof
Adjustable

The DE-RVC is designed for series circuit applications with controlled leakage between ports (2) and (1).

For parallel circuits, use DE-RVB.

VALVE SPECIFICATIONS
Nominal Flow
15 GPM (57 LPM) FROM (2) TO (1)
20 GPM (76 LPM) FROM (1) TO (2)

Rated Operating Pressure
4000 PSI (276 bar)

Viscosity Range
36 to 3000 SSU (3 to 647 cSt)

Filtration
ISO 18/16/13

Media Operating Temperature Range
-40° to 250° F (-40° to 120° C)

Weight
.80 lbs. (.36 kg)

Operating Fluid Media
General Purpose Hydraulic Fluid

Cartridge Torque Requirements
30 ft-lbs (40.6 Nm)

Cavity
DELTA 2W

Cavity Form Tool (Finishing)
40500000

Seal Kit
21191202

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**DIMENSIONS**

![Diagram of DE-RVC dimensions]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>DE-RVC</th>
<th>BODIES</th>
<th>PRESSURE RANGE/SETTING</th>
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<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
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<td>Ext./Int. Adjustable</td>
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<tr>
<td>Viton Standard</td>
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<td>100 – 700 PSI</td>
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<td>Buna, Knob</td>
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<td>500 – 1800 PSI</td>
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<tr>
<td>Viton, Knob</td>
<td>VK</td>
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<td>1000 – 4000 PSI</td>
</tr>
<tr>
<td>Buna, Internal Adjust</td>
<td>0I</td>
<td>Without Body</td>
<td>Ext./Int. Adjustable</td>
</tr>
<tr>
<td>Viton, Internal Adjust</td>
<td>VI</td>
<td></td>
<td>100 – 700 PSI</td>
</tr>
<tr>
<td>Buna, Tamper Proof</td>
<td>0T</td>
<td>3/8 NPTF Ports</td>
<td>500 – 1800 PSI</td>
</tr>
<tr>
<td>Viton, Tamper Proof</td>
<td>VT</td>
<td>#8 SAE Ports</td>
<td>1000 – 4000 PSI</td>
</tr>
</tbody>
</table>

Tamper Proof
Fill in 4 Digit Pressure Setting
Example: 0500 – 500 PSI

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
Pressure Compensated Regulator Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3500</td>
<td>151</td>
<td>241</td>
<td>TR-PCA</td>
<td>382</td>
</tr>
<tr>
<td>40</td>
<td>3500</td>
<td>151</td>
<td>241</td>
<td>SL-PCA</td>
<td>384</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DG-PCB</td>
<td>386</td>
</tr>
<tr>
<td>40</td>
<td>3500</td>
<td>151</td>
<td>241</td>
<td>SL-PCB</td>
<td>388</td>
</tr>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>PP-PCC</td>
<td>390</td>
</tr>
<tr>
<td>20</td>
<td>3500</td>
<td>76</td>
<td>241</td>
<td>TR-PCC</td>
<td>392</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DF-PCE</td>
<td>394</td>
</tr>
<tr>
<td>40</td>
<td>3500</td>
<td>151</td>
<td>241</td>
<td>SL-PCE</td>
<td>396</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DF-PCR</td>
<td>398</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DF-PCS</td>
<td>400</td>
</tr>
<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>DF-PCT</td>
<td>402</td>
</tr>
</tbody>
</table>

Typical Schematics

These very flexible pressure compensator valves can regulate flow through many types of orifices: Electro-Proportional Orifices, Plate or Set Screw Orifices, Needle Valves &/or even across the pressure drop of other control valve(s). When using multiple compensating devices in the same circuit it is good practice to keep at least 50 PSID between their settings to reduce the likelihood of cross talking during dynamic events.
**TR-PCA Pressure Compensating Regulator Valve**

**DESCRIPTION**
12 size, 1 1/16-12 thread, “Tecnord” series, pressure compensating regulator valve.

**OPERATION**
The TR-PCA-0P with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1).

The valve’s spool maintains a constant differential pressure across an external orifice, thereby regulating the hydraulic flow rate across this external orifice. (see options table for pressure ranges)

When used with an orifice as described above, it functions as a priority type regulator, delivering pump flow first to the external orifice, then bypassing excess to (2). All ports may be fully pressurized.

The TR-PCA-0V with a dump valve and a pilot relief valve at (1) acts as main stage of a ventable relief valve.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Can be used as a logic element.

TR-PCA-0P is commonly used as a bypass flow regulator (90 and 150 PSI recommended).

TR-PCA-0V is commonly used as the main stage of a ventable relief valve (50 and 90 PSI recommended).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Seat Ratio: Area of Pilot is equal to the area at Port (3)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .54 lbs. (.24 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 70 ft-lbs (95 Nm)
- Cavity: TECNORD 3WS
- Cavity Form Tool (Finishing): 40500033
- Seal Kit: 21191306

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna, Pilot to Close  OP
Buna, Vent to Open    OV
Viton, Pilot to Close VP
Viton, Vent to Open   VV

BODIES
Blank           S
Without Body    #10 SAE Ports

SETTING
@ 1 GPM with Pilot Vented

0020    20 PSI
0050    50 PSI
0090    90 PSI
0150    150 PSI
0230    230 PSI
± 10%
**DESCRIPTION**

16 size, 1 5/16-12 thread, "Super" series, pressure compensating regulator valve.

**OPERATION**

The SL-PCA-0P with an external orifice between ports (3) and (1) maintains a constant flow rate across the external orifice, regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1).

The valve's spool maintains a constant differential pressure across the external orifice, thereby regulating the hydraulic flow rate across the external orifice. (see options table for pressure ranges)

When used with an orifice as described above, it functions as a priority type regulator, delivering pump flow first to the external orifice, then bypassing excess to (2). All ports may be fully pressurized.

The SL-PCA-0V with a dump valve and a pilot relief valve at (1) acts as main stage of a ventable relief valve.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Can be used as a logic element.

SL-PCA-0P is commonly used as a bypass flow regulator (100 PSI recommended).

SL-PCA-0V is commonly used as the main stage of a ventable relief valve (50 and 100 PSI recommended).

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Seat Ratio: Initially area of Pilot is 1.2 times the area at Port (3), then 1:1
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .70 lbs. (.32 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque: 90 ft-lbs (122 Nm)
- Requirements: Cavity SUPER 3WS
- Cavity Form Tool (Finishing): 40500021
- Seal Kit: 21191406

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna, Pilot to Close
- Buna, Vent to Open
- Viton, Pilot to Close
- Viton, Vent to Open
- Buna, Pilot to Close with Seals
- Buna, Vent to Open with Seals
- Viton, Pilot to Close with Seals
- Viton, Vent to Open with Seals

0P
0V
0P
0V
0B
0C
VB
VC

BODIES
- Blank
- Without Body
- #12 SAE Ports

S

AP SETTING
- @ 1 GPM with Pilot Vented

0020
0050
0100
0150

20 PSI
50 PSI
100 PSI
150 PSI

BODY WEIGHT: 1.89 lbs. [.86 kg.]

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**PRESSURE CONTROLS**

**DG-PCB Pressure Compensating Valve, Restrictive Type With By-pass**

**DESCRIPTION**


**OPERATION**

The DG-PCB allows pressure compensated or proportional flow from (1) to (2) regulated by the pressure differential across (1) and (4) with a bypass of (4) to (3).

The spring chamber is constantly connected at (1).

**FEATURES**

- Hardened parts for longer life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

DG-PCB is not intended for differential pressure more than 1500 PSI from (4) to (3). Consult Factory for abrupt pressure change applications that exceed 1500 PSI, for alternative products.

**PERFORMANCE**

**Actual Test Data (Cartridge Only with 150 PSI Spring)**

<table>
<thead>
<tr>
<th>Pressure @ Port 2 (BAR)</th>
<th>Regulated Flow @ Port 2 (GPM)</th>
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<td>10</td>
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<td>90</td>
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<tr>
<td>100</td>
<td>10.0</td>
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<table>
<thead>
<tr>
<th>Pressure @ Port 3 (BAR)</th>
<th>Flow (GPM)</th>
<th>Pressure @ Port 3 (BAR)</th>
<th>Flow (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
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<td>20</td>
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</tr>
<tr>
<td>20</td>
<td>2.0</td>
<td>30</td>
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</tr>
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<td>100</td>
<td>10.0</td>
</tr>
</tbody>
</table>

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**VALVE SPECIFICATIONS**

- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 38 lbs. (.17 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

**Value Specifications Chart**

<table>
<thead>
<tr>
<th>Pressure @ Port 2 (BAR)</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (GPM)</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

**Value Specifications Chart**

<table>
<thead>
<tr>
<th>Pressure @ Port 3 (BAR)</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (GPM)</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
DIMENSIONS

ORDERING INFORMATION

DG-PCB - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
Without Body
1/4 NPTF Ports S
#6 SAE Ports

PRESSURE DIFFERENTIAL

0150 150 PSI
0250 250 PSI

Differential Pressure Across
External Controlling Orifice

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SL-PCB Pressure Compensating Regulator Valve

DESCRIPTION

OPERATION
The SL-PCB-0P with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1).

The valve’s spool maintains a constant differential pressure across a internal orifice, thereby regulating the hydraulic flow rate from across this external orifice. (see options table for pressure ranges)

When used with an orifice as described above, it functions as a priority type regulator, delivering pump flow first to the external orifice, then bypassing excess to (2). All ports may be fully pressurized.

The SL-PCB-0V with a dump valve and a pilot relief valve at (1) acts as main stage of a ventable relief valve.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Can be used as a logic element.

SL-PCB-0P is commonly used as a bypass flow regulator (100 PSI recommended).

SL-PCB-0V is commonly used as the main stage of a ventable relief valve (50 and 100 PSI recommended).

PERFORMANCE
Actual Test Data (Cartridge Only)

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<th>Pressure @ Port 3 (PSI)</th>
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<th>Pressure @ Port 3 (BAR)</th>
<th>Flow (LPM)</th>
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<tr>
<th>Port 3 to 2 (Undercut Cavity)</th>
<th>Port 3 to 2 (Standard Cavity)</th>
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<tr>
<th>Port 3 to 2 (Undercut Cavity)</th>
<th>Port 3 to 2 (Standard Cavity)</th>
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</tbody>
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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, pressure compensating regulator valve (restrictive type).

**OPERATION**

The PP-PCC-00 with an external orifice beyond port (3) and sensed by port (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system downstream of (3), or in the inlet at (2) as long as pressure at (3) is above (1) by more then spring setting chosen and pump supply is in excess of demand.

The valve’s spool maintains a constant differential pressure across an external orifice, thereby regulating the hydraulic flow rate across this external orifice. (see options table for pressure ranges)

When used with an orifice as described above, it functions as a restrictive type regulator, delivering pump flow through the external orifice. All ports may be fully pressurized.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Can be used as a logic element

Fixed setting pressure reducing valve. For adjustable setting see PP-PCD.

**PP-PCC-00-0100** is recommended for regulated flows up to 4.0 GPM only.

**PP-PCC-00-0220** is recommended for regulated flows up to 8.0 GPM.

For fixed pressure reducing/relieving valve see PP-PCP

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Regulated Flow vs Inlet Pressure Graph]

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Ratio</td>
<td>Area of Pilot is equal to the area at Port (3)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>25 lbs. (.11 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque</td>
<td>25 ft-lbs (34 Nm)</td>
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<tr>
<td>Requirements</td>
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</tr>
<tr>
<td>Cavity</td>
<td>POWER 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500024</td>
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<tr>
<td>Seal Kit</td>
<td>21191111</td>
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</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna, Standard 00
- Viton, Standard V0
- *Urethane, Standard U0
- Buna, Screen A0
- Viton Screen W0
- Urethane, Screen Y0

BODIES
- Blank S
- Without Body #6 SAE Ports

Δ P SETTING
- 0100 100 PSI
- 0220 220 PSI

*Urethane seals are recommended when inlet pressures exceed 1500 PSI

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SHOP ONLINE at www.airlinehyd.com
**TR-PCC Pressure Compensating Regulator Valve – Restrictive Type**

**DESCRIPTION**
12 size, 1 1/16-12 thread, “Tecnord” series, pressure compensating regulator valve (restrictive type)

**OPERATION**
The TR-PCC with an external orifice beyond port (3) and sensed by port (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system downstream of (3), or in the inlet at (2) as long as pressure at (3) is greater than (1) by more than spring setting chosen and pump supply is in excess of demand.

The valve’s spool maintains a constant differential pressure across an external orifice, thereby regulating the hydraulic flow rate across this external orifice. (see table for pressure ranges)

When used with an orifice as described above, it functions as a restrictive type regulator, delivering pump flow through the external orifice. All ports may be fully pressurized.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

![Graph showing Regulated Flow vs Load Pressure at Port 1](image)

**HYDRAULIC SYMBOL**

Can be used as a logic element.

Fixed setting pressure reducing valve. For adjustable setting see TR-PCD.

**VALVE SPECIFICATIONS**
- Nominal Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Seat Ratio: Area of Pilot is equal to the area at Port (3)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 54 lbs. (.24 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 70 ft-lbs (95 Nm)
- Cavity: TECNORD 3WS
- Cavity Form Tool (Finishing): 40500033
- Seal Kit: 21191306

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**DIMENSIONS**

1.38 HEX [35.1]

.75 [19.0]

2.20 [55.6]

1 1/16-12 UNF 2A THREAD

2.30 [60.8]

1.50 [38.1]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>TR-PCC</th>
<th>OPTIONS</th>
<th>BODIES</th>
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<tr>
<td></td>
<td>Buna 00</td>
<td>Blank S</td>
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<tr>
<td></td>
<td>Viton V0</td>
<td>Without Body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#10 SAE Ports</td>
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</table>

**AP SETTING**

@ 1 GPM with Pilot Vented

<table>
<thead>
<tr>
<th>Code</th>
<th>Setting</th>
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<tbody>
<tr>
<td>0150</td>
<td>150 PSI</td>
</tr>
<tr>
<td>0300</td>
<td>300 PSI</td>
</tr>
</tbody>
</table>

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**DF-PCE Adjustable Pressure Compensating Valve, Bypass Type**

### DESCRIPTION

10 size, 7/8-14 thread, “Delta” series, spring adjustable pressure compensating valve, bypass type.

### OPERATION

The DF-PCE with an external orifice in parallel with ports (3) and (1) maintains a constant flow rate across the external orifice, regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is greater than (1).

The valve's spool maintains a constant differential pressure across an external orifice, thereby regulating the hydraulic flow rate across this external orifice. (see table for pressure ranges)

When used with an orifice as described above, it functions as a bypass type regulator, delivering pump flow through the external orifice.

### FEATURES

- Hardened parts for long life.
- Industry common cavity.

### HYDRAULIC SYMBOL

Can be used as an adjustable logic element.

Great as an adjustable pressure setting regulation device in brake, transmission & cooling systems, because the spring chamber is separately drained, the outlet can be used for lower pressure functions. For fixed version see DF-PCR-0P.

For higher spring differential pressure ranges consult factory.

### PERFORMANCE

Actual Test Data (Cartridge Only)

![Graph: 300 psi setting /Regulated Flow vs Inlet Pressure]

- **Nominal Flow**: 10 GPM (38 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Seat Ratio**: Area of Pilot is equal to the area at Port (3)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 52 lbs. (.23 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 3W
- **Cavity Form Tool (Finishing)**: 40500001
- **Seal Kit**: 21191210

### WARNING:

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DIMENSIONS

ORDERING INFORMATION

DF-PCE - - -

OPTIONS
- Buna Standard: 00
- Viton Standard: V0
- Buna, Knob: OK
- Viton, Knob: VK
- Buna, Internal Adjust: OI
- Viton, Internal Adjust: VI
- Buna, Tamper Proof: OT
- Viton, Tamper Proof: VT

BODIES
- Blank: Without Body
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

PRESSURE RANGE
- 100-300 PSI
- Differential Pressure Across External Controlling Orifice

TAMPER PROOF
- Fill in 4 Digit Pressure Setting
- Example: 0200 = 200 PSI

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
SL-PCE Adjustable Pressure Compensating Regulator Valve

DESCRIPTION

OPERATION
The SL-PCE with an external orifice in parallel with ports (3) and (1) maintains a constant flow rate across the external orifice, regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1).

The valve’s spool maintains a constant differential pressure across the external orifice, thereby regulating the hydraulic flow rate across the external orifice. (see options table for pressure ranges)

When used with an orifice as described above, it functions as a priority type regulator, delivering pump flow first to the external orifice, then bypassing excess to (2). All ports may be fully pressurized.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Can be used as an adjustable logic element.

Great as an adjustable pressure setting regulation device in brake, transmission & cooling systems. Because the spring chamber is separately drained, the outlet flow can be used for lower pressure functions. For fixed version see SL-PCA-0P.

For higher spring differential pressure ranges consult factory.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Seat Ratio: Area of pilot is equal to the area at Port (3)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.15 Lbs. (.52 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 3WS
- Cavity Form Tool (Finishing): 40500021
- Seal Kit: 21191406

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SL-PCE

OPTIONS
- Buna, Standard - 00
- Viton, Standard - V0
- Buna, Knob - 0K
- Viton, Knob - VK
- Buna, Internal Adjust - 0I
- Viton, Internal Adjust - VI
- Buna, Tamper Proof - 0T
- Viton, Tamper Proof - VT

BODIES
- Blank - S
- Without Body - #12 SAE Ports

PRESSURE RANGE/SETTING
- 50 – 300 PSI

TAMPERPROOF (fill in 4 digit pressure setting)
Example: 0200 = 200 PSI
**DF-PCR Pressure Compensating Regulator Valve**

**DESCRIPTION**

**OPERATION**
The DF-PCR-0P with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1).

The valve's spool maintains a constant differential pressure across an external orifice, thereby regulating the hydraulic flow rate from (3) to (2). (see options table for pressure ranges)

When used with an orifice as described above, as a priority type regulator, delivering pump flow first to (3), then bypassing excess to (2). All ports may be fully pressurized.

The DF-PCR-0V with a dump valve and a pilot relief valve at (1) acts as main stage of a ventable relief valve.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
Can be used as a logic element.

**DF-PCR-0P** is commonly used as a bypass flow regulator (80 PSI recommended).

**DF-PCR-0V** is commonly used as the main stage of a ventable relief valve (40 and 80 PSI recommended).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
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<tr>
<td>Nominal Flow</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Seat Ratio</td>
<td>Area of Pilot is equal to the area at Port (3)</td>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>.19 lbs. (.08 kg)</td>
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<td>Operating Fluid Media</td>
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<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
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<td>Cavity</td>
<td>DELTA 3W</td>
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<td>Cavity Form Tool (Finishing)</td>
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<td>21191206</td>
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**DF-PCS Pressure Compensating Valve, Restrictive Type**

**DESCRIPTION**

**OPERATION**
The DF-PCS allows pressure compensated flow from (1) to (2) regulated by the pressure present at (3).
The spring chamber is constantly vented at (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
Pressure compensator for flow control, typically used with an external orifice inline with port (1). Port (3) should sense upstream pressure of orifice.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
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<th>Flow (GPM)</th>
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**VALVE SPECIFICATIONS**

<table>
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<tr>
<th>Nominal Flow</th>
<th>10 GPM (38 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>5 cu in/min (82 ml/min) per path</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>35 lbs. (.16 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191210</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
Without Body S

PRESSURE DIFFERENTIAL
0150 150 PSI
0450 450 PSI

Differential Pressure Across External Controlling Orifice

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

BODY WEIGHT: .76 lbs [.35 kg.]
**DESCRIPTION**


**OPERATION**

The DF-PCT with an external orifice in front of port (1) allows pressure compensated flow from (1) to (2), regulated by the pressure present at (3).

The spring chamber is constantly vented at (1).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Can be used as an adjustable logic element.

For fixed version see DF-PCS.

For higher spring differential pressure ranges consult factory.

**PERFORMANCE**

Actual Test Data (Cartridge Only)

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**VALVE SPECIFICATIONS**

- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min) per path
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .60 lbs. (.27 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque: 30 ft-lbs (40.6 Nm)
- Requirements: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191210

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**DIMENSIONS**

![Diagram of pressure control dimensions]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>DF-PCT</th>
<th>OPTIONS</th>
<th>BODIES</th>
<th>PRESSURE RANGE</th>
<th>TAMPER PROOF</th>
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<td>Viton Standard</td>
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<tr>
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<td>Buna, Internal Adjust</td>
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<td>Viton, Internal Adjust</td>
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<td>Buna, Tamper Proof</td>
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Pressure Reducing/Relieving Valves

<table>
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<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
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<td>276</td>
<td>DF-PRP</td>
<td>406</td>
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<tr>
<td>20</td>
<td>3000</td>
<td>76</td>
<td>207</td>
<td>SK-PRP</td>
<td>408</td>
</tr>
<tr>
<td>10</td>
<td>4000</td>
<td>38</td>
<td>276</td>
<td>DF-PWP</td>
<td>410</td>
</tr>
</tbody>
</table>

Typical Schematic
Typical application for the PRP and PWP is multi-system pressure setting. System relief pressure must be greater than reduce pressure setting.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DF-PRP Pilot Operated, Pressure Reducing, Relieving Valve

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, pilot operated, pressure reducing, relieving valve

OPERATION
The DF-PRP in its steady state, allows flow to pass from (2) to (3), with the spring chamber constantly drained at (1).

When a pre-determined pressure is reached at (3), the spool shifts to restrict input flow at (2), thereby reducing (restricting) flow.

If valve and pressure at port (3) exceeds setting, spool shift to open passage at port (1), thereby regulating pressure at port (3) by relieving excess flow.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS
- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .59 lbs. (.27 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191206

PERFORMANCE
Actual Test Data (Cartridge Only)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628    Fax: (815) 397-2526    E-mail: delta@delta-power.com
**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>PRESSURE RANGE</th>
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<td>Viton Standard</td>
<td>Without Body</td>
<td>S</td>
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<tr>
<td>Buna, Knob</td>
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</tr>
<tr>
<td>Viton, Knob</td>
<td>#6 SAE Ports</td>
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</tbody>
</table>

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SK-PRP Pilot Operated Pressure Reducing, Relieving Valve

**DESCRIPTION**
16 size, 1 5/16-12 thread, “Super” series, pilot operated pressure reducing, relieving valve

**OPERATION**
The SK-PRP in its steady state, allows flow to pass from (2) to (3), with the spring chamber constantly drained at (1).

When a pre-determined pressure is reached at (3), the spool shifts to restrict input flow at (2), thereby reducing (restricting) flow.

If the valve and pressure at port (3) exceeds setting, spool shifts to open passage at port (1), thereby regulating pressure at (3) by relieving excess flow.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 500-3000 PSI (34-207 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.28 lbs. (.58 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 3W
- Cavity Form Tool (Finishing): 40500018
- Seal Kit: 21191406

**HYDRAULIC SYMBOL**
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com
**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, pilot operated pressure reducing, relieving valve

**OPERATION**

The DF-PWP in its steady state, allows flow to pass from (2) to (3), with the spring chamber constantly drained at (1).

When a pre-determined pressure is reached at (3), the spool shifts to restrict input flow at (2), thereby reducing (restricting) flow.

If valve and pressure at port (3) exceeds setting, spool shifts to open passage at port (1), thereby regulating pressure at port (3) by relieving excess flow.

The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

---

**HYDRAULIC SYMBOL**

![Hydraulic Symbol]

**VALVE SPECIFICATIONS**

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<tr>
<th>Specification</th>
<th>Value</th>
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<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<td>Filtration</td>
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<tr>
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<tr>
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<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
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<tr>
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<td>Seal Kit</td>
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**PERFORMANCE**

**Actual Test Data (Cartridge Only)**

![Performance Graphs]

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### DIMENSIONS

#### ORDERING INFORMATION

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<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>PRESSURE RANGE/SETTING</th>
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<td>Viton Standard</td>
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<td>100 – 4000 PSI</td>
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<td>Buna, Knob</td>
<td>S/#6 SAE Ports</td>
<td>Tamper Proof</td>
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<td>Viton, Knob</td>
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<tr>
<td>Tamper Proof Viton</td>
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</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  
800-999-7378
## Sequence Valves

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<td>207</td>
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<td>DG-PTO</td>
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<td>207</td>
<td>DF-PWE</td>
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<td>DF-PWI</td>
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<td>241</td>
<td>SL-PWB</td>
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</table>

### Typical Schematic

Typical application for the PSO or PSC sequence valve is for a high/low application like a log splitter where the spring chamber can be vented externally (spring chamber pressure directly adds to the pilot pressure required to shift the valve).

Typical application for the PWI sequence valve is for controlling the lip on a dock leveler.

Typical application for the PWE sequence valve is for a high/low pump in a positive traction circuit where the valve automatically shifts to low speed high torque mode.

Typical application for the PSI sequence valve is when starting against load where the spring chamber can be vented externally (spring chamber pressure directly adds to the pilot pressure required to shift the valve).

Typical application for the PSA sequence valve is a hydraulic brake release of a spring loaded single acting cylinder.

Typical application for the PSS hot oil shuttle is to divert fluid from the low pressure side of a closed loop hydrostatic transmission for cooling or filtering.
**DG-PSA Sequence Valve, 4 Way Normally Closed, External Pilot**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, 4 way external pilot sequence valve.

**OPERATION**
The DG-PSA in neutral (un-piloted), allows flow between (1) and (2) bi-directionally, while blocking at (3).

The spring chamber is constantly vented at (1).

On attainment of a predetermined pressure at (4), the cartridge shifts to close (1) to (2), while opening (2) to (3).

Note that the backpressure value at (1) must be added to the selected pressure setting to determine pilot pressure necessary to open valve.

**FEATURES**
- Optional spring ranges to 1500 PSI (103 bar).
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

.030 to .060 diameter orifice recommended beneath port (4).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
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<th>Value</th>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F ( -40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.63 lbs. (.28 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DIMENSIONS

EXTERNAL ADJ.
INTERNAL ADJ.
TAMPER PROOF

3/8-24 UNF
2A THREADS

1.00 [25.4] HEX

7/8-14 UNF 2A THREAD

ORDERING INFORMATION

DG-PSA

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob OK
Viton Knob VK
Buna, Internal Adjust 0I
Viton, Internal Adjust VI
Buna, Tamper Proof 0T 0425 50-425 PSI
Viton, Tamper Proof VT 1500 425-1500 PSI

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

PRESSURE RANGE

TAMPER PROOF
Fill in 4 Digit Pressure Setting
Example: 0500-500 PSI

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
DG-PSC Sequence Valve, 2 Way Normally Closed, External Pilot

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, 2 way normally closed sequence valve, external pilot

OPERATION
The DG-PSC in neutral (unpiloted), blocks flow between (3) and (2).

The spring chamber is constantly vented at (1).

On attainment of a predetermined pressure at (4), the cartridge shifts to allow flow from (3) to (2).

Note that the backpressure value at (1) must be added to the selected pressure setting to determine pilot pressure.

FEATURES
- Optional spring ranges to 1500 PSI (103 bar).
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Nominal Flow 10 GPM (38 LPM)
Rated Operating Pressure 3000 PSI (207 bar)
Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min)
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight 63 lbs. (.28 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 30 ft-lbs (40.6 Nm)
Cavity DELTA 4W
Cavity Form Tool (Finishing) 40500002
Seal Kit 21191214

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**DIMENSIONS**

![Diagram of pressure control dimensions with dimensions and features labeled.]

**ORDERING INFORMATION**

**DG-PSC**

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<tr>
<th>OPTIONS</th>
<th>BODIES</th>
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<tbody>
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<tr>
<td>Viton Standard</td>
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<td>425-1500 PSI</td>
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<tr>
<td>Buna, Knob</td>
<td>N</td>
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<td>Viton, Internal Adjust</td>
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<tr>
<td>Viton, Tamper Proof</td>
<td>VT</td>
<td>1500</td>
</tr>
</tbody>
</table>

**TAMPER PROOF**

Fill in 4 Digit Pressure Setting

Example: 0500-500PSI

---

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**DG-PSI Sequence Valve, 3 Way Normally Open, Internal Pilot**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, 3 way normally open internal pilot sequence valve

**OPERATION**
The DG-PSI in neutral (un-piloted), allows flow between (3) and (2) bi-directional, while blocking at (4).

The spring chamber is constantly vented at (1).

On attainment of a predetermined pressure at (4), the cartridge shifts to close (3) to (2), while opening (4) to (3).

Note that the backpressure value at (1) must be added to the selected pressure setting to determine pilot pressure necessary to open valve.

**FEATURES**
- Optional spring ranges to 1500 PSI (103 bar).
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol]

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 10 GPM (38 LTR/M)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage (150 SSU): 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .63 lbs. (.28 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

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DIMENSIONS

ORDERING INFORMATION

DG-PSI

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK
Buna, Internal Adjust 0I
Viton, Internal Adjust VI
Buna, Tamper Proof 0T 0425 50-425 PSI
Viton, Tamper Proof VT 1500 425-1500 PSI

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

PRESSURE RANGE

TAMPER PROOF
Fill in 4 Digit Pressure Setting
Example: 0500-500PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DG-PSO Sequence Valve, 2 Way Normally Open, External Pilot

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, 2 way normally open sequence valve, external pilot

**OPERATION**
The DG-PSO in neutral (un-piloted), allows flow between (3) and (2) bi-directionally.

The spring chamber is constantly vented at (1).

On attainment of a predetermined pressure at (4), the cartridge shifts to block flow from (3) to (2).

Note that the backpressure value at (1) must be added to the selected pressure setting to determine pilot pressure necessary to close valve.

**FEATURES**
- Optional spring ranges to 1500 PSI (103 bar).
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
Orifice .030 - .060 Dia. recommended beneath port (4).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow 10 GPM (38 LTR/M)
- Rated Operating Pressure 3000 PSI (207 bar)
- Typical Internal Leakage (150 SSU) 5 cu in/min (82 ml/min)
- Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
- Filtration ISO 18/16/13
- Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
- Weight .62 lbs. (.28 kg)
- Operating Fluid Media General Purpose Hydraulic Fluid
- Cartridge Torque Requirements 30 ft-lbs (40.6 Nm)
- Cavity DELTA 4W
- Cavity Form Tool (Finishing) 40500002
- Seal Kit 21191214

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DIMENSIONS

ORDERING INFORMATION

DG-PSO - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton Knob VK
Buna, Internal Adjust 0I
Viton, Internal Adjust VI
Buna, Tamper Proof 0T 0425 50-425 PSI
Viton, Tamper Proof VT 1500 425-1500 PSI

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

PRESSURE RANGE

TAMPER PROOF
Fill in 4 Digit Pressure Setting
Example: 0500-500PSI

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
**DG-PSS Hot Oil Shuttle Valve**

### DESCRIPTION

10 size, 7/8-14 thread, “Delta” series, hot oil shuttle valve

### OPERATION

The DG-PSS, with internal piloting at port (1) or (3), oil will flow from the port opposite of the port piloted to port (2), thus removing oil from the low-pressure side for cooling or filtration purposes.

The Valve is spring bias neutral, relying solely on the internal pilot pressure signal to shift to either side.

The DG-PSS is closed in transition.

### FEATURES

- Hardened parts for long life.
- Industry common cavity.

---

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**

Actual Test Data (Cartridge Only)

---

**VALVE SPECIFICATIONS**

- Nominal Flow: 12 GPM (45 LTR/M)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage (150 SSU): 5 cu/in per/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .34 lbs. (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191212

---

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DG-PTC Sequence Valve, Normally Open, External Pilot

DESCRIPTION

OPERATION
The DG-PTC allows flow at ports (3) and (2). On attainment of a predetermined pressure at port (4), the valve shifts to block flow from port (3) to (2).

Spring Chamber is constantly vented to port (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 10 GPM (38 LTR/M)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
- Weight: .39 lbs. (.18 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191108

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DG-PTO Sequence Valve, Normally Closed, External Pilot

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, external pilot, normally closed.

OPERATION
The DG-PTO blocks flow at ports (3) and (2). On attainment of a predetermined pressure at port (4), the valve shifts to allow flow from port (3) to (2).

Spring Chamber is constantly vented to port (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

.per0 to .060 diameter orifice recommended beneath port (4).

PERFORMANCE
Actual Test Data (Cartridge Only)

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VALVE SPECIFICATIONS

- Nominal Flow: 10 GPM (38 LTR/M)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 300 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 39 lbs. (.18 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191108

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DIMENSIONS

ORDERING INFORMATION

<table>
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BODY WEIGHT: .99 Lbs
**DF-PWE Sequence Valve, Normally Closed, External Pilot**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, external pilot normally closed, sequence valve.

**OPERATION**
The DF-PWE blocks flow at ports (2) and (1). On attainment of a predetermined pressure at (3) the valve shifts to allow flow from (1) to (2).

**FEATURES**
- Hardened parts for long life.
- Optional spring ranges to 1500 PSI (103 bar).
- Industry common Cavity.

**HYDRAULIC SYMBOL**

.030 to .060 diameter orifice recommended beneath port (3).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3000 PSI (207 bar)
- Typical Internal Leakage: 5 cu in/min (82 ml/min)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 57 lbs. (.26 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001
- Seal Kit: 21191206

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**DIMENSIONS**

EXTERNAL ADJ.

**INTERNAL ADJ**

TAMPER PROOF

3/8-24 UNF 2A THREADS

1.00 [25.4] HEX

7/8-14 UNF 2A THREAD

**ORDERING INFORMATION**

**DF-PWE**

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<thead>
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<td>Viton Standard</td>
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</tr>
<tr>
<td>Buna, Knob</td>
<td>N</td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>S</td>
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<td>Internal Adj. Buna</td>
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<td>Tamper Proof Viton</td>
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</table>

**PRESSURE RANGE**

Example: 0500-500PSI

**TAMPER PROOF**

Fill in 4 Digit Pressure Setting

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DF-PWI Sequence Valve, Internal Pilot And Drain**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, internal pilot and drain, sequence valve.

**OPERATION**
The DF-PWI blocks flow at (3) and allows flow from (2) to (1). On attainment of a predetermined pressure at (3) the valve shifts to allow flow from (3) to (2) and block flow at (1).

**FEATURES**
- Hardened parts for long life.
- Optional spring ranges to 1500 PSI (103 bar).
- Industry common Cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Value</th>
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<tbody>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Typical Internal Leakage</td>
<td>5 cu in/min (82 ml/min)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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<tr>
<td>Media Operating Temperature Range</td>
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<tr>
<td>Weight</td>
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<tr>
<td>Operating Fluid Media</td>
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<tr>
<td>Cartridge Torque Requirements</td>
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</tbody>
</table>

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Phone: (815) 397-5628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DIMENSIONS

EXTERIAL ADJ.

INTERNAL ADJ TAMPERS PROOF

3/8-24 UNF 2A THREANDS

1.00 [25.4] HEX

7/8-14 UNF 2A THREAD

BODIES

PF-PWI

OPTIONS

Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton Knob VK
Internal Adj. Buna 0I
Internal Adj. Viton VI
Tamper Proof Buna 0T
Tamper Proof Viton 0VT

BODIES

Blank Without Body
1/4 NPTF Ports N
#6 SAE Ports S

PRESSURE RANGE

Tamper Proof Fill in 4 Digit Pressure Setting
Example: 0500-500PSI

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**SL-PWA Sequence Valve, Normally Closed, Internal Pilot**

**DESCRIPTION**
16 size, 1 5/16-12 thread, “Super” series, internal pilot normally closed, sequence valve

**OPERATION**
The SL-PWA blocks flow from ports (3) to (2). On attainment of a predetermined pressure at (3) the valve shifts to allow flow from (3) to (2). Port (1) should be a tank line.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>40 GPM (151 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.15 Lbs. (.52 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 3WS</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500021</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191404</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>SL-PWA</th>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna, Standard</td>
<td>Blank</td>
</tr>
<tr>
<td></td>
<td>Viton, Standard</td>
<td>Without Body</td>
</tr>
<tr>
<td></td>
<td>Buna, Knob</td>
<td>#12 SAE Ports</td>
</tr>
<tr>
<td></td>
<td>Viton, Knob</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buna, Internal Adjust</td>
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<tr>
<td></td>
<td>Viton, Internal Adjust</td>
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</tr>
<tr>
<td></td>
<td>Buna, Tamper Proof</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Viton, Tamper Proof</td>
<td></td>
</tr>
</tbody>
</table>

**PRESSURE RANGE/SETTING**

500 – 3000 PSI

**TAMPERPROOF** (fill in 4 digit pressure setting)

Example: 2000 = 2000 PSI

---

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SL-PWB Sequence Valve, Normally Closed, Internal Pilot with Reverse Free Flow

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, internal pilot normally closed, sequence valve w/ reverse free flow

OPERATION
The SL-PWB blocks flow from ports (3) to (2). On attainment of a predetermined pressure at (3) the valve shifts to allow flow from (3) to (2). Port (1) should be a tank line.

Reverse flow from (2) to (3) occurs when the pressure at port (2) is at least 45 PSI (3.1 bar) higher than at port (3).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.15 Lbs. (.52 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 3WS
- Cavity Form Tool (Finishing): 40500021
- Seal Kit: 2119404

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

SL-PWB

OPTIONS
Buna, Standard 00
Viton, Standard V0
Buna, Knob VK
Viton, Knob VK
Buna, Internal Adjust 0I
Viton, Internal Adjust VI
Buna, Tamper Proof 0T
Viton, Tamper Proof VT

BODIES
Blank Without Body
S #12 SAE Ports

PRESSURE RANGE/SETTING
500 – 3000 PSI

TAMPERPROOF (fill in 4 digit pressure setting)
Example: 2000 = 2000 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
### Shut Down Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>4500</td>
<td>57</td>
<td>310</td>
<td>DE-PSD</td>
<td>438</td>
</tr>
</tbody>
</table>

#### Typical Schematic

Typical application for the PSD is a system protector, like a relief valve, but once this valve opens it will not reseat until the pressure at port 2 is drained off. This valve is not to be used as a load holding device.

---

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**DE-PSD Pressure Shut Down Valve**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, pressure shut down valve

**OPERATION**
The DE-PSD blocks flow from (2) to (1) until sufficient pressure is present at (2) to open the pilot, thereby forcing the spool to open and allowing flow from (2) to (1).

The valve stays open until the differential pressure from (2) to (1) decreases to less than 50 PSI (3.4 bar).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Usually the valve requires flow to be reduced to near zero before the valve will reset.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 15 GPM (57 LPM)
- Rated Operating Pressure: 4500 PSI (310 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .53 lbs. (.24 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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DIMENSIONS

ORDERING INFORMATION

DE-PSD - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK
Internally Adj. Buna 0I
Internally Adj. Viton VI 3000
Tamper Proof Buna OT 4500
Tamper Proof Viton VT

BODIES
Blank Without Body
N 3/8 NPTF Ports
S #8 SAE Ports

PRESSURE RANGE/SETTING
100 – 3000 PSI
3000 – 4500 PSI

TAMPER PROOF
Fill in 4 Digit Pressure Setting
Example: 0500-500 PSI

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
### Unloading Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
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<th>PAGE</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>4000</td>
<td>4</td>
<td>276</td>
<td>DF-PUV</td>
<td>442</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the PUV is for pump unloading in an accumulator system. When the PUV setting is reached, the PUV opens, venting the PCR valves pilot signal. This unloads the pump until accumulator system pressure drops to 80% of the PUV setting. The PUV closes which blocks the PCR pilot signal to recharge the accumulator and the cycle is repeated. NOTE: Max. PUV flow 1 GPM.

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DF-PUV Pilot Operated Unloading Valve

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, pilot operated unloading valve

**OPERATION**
The DF-PUV blocks all ports until pressure at port (2) exceeds pressure setting, or pressure at port (3) is above 80% of pressure setting.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Typical circuits require an orifice to be placed at ports (2) and (3).

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
<td>0.25</td>
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<table>
<thead>
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<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>0.05</td>
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</tr>
<tr>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>0.25</td>
<td>0</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**
- Nominal Flow: 1 GPM (3.8 LPM)
- Rated Operating Pressure: 4000 PSI (276 bar)
- Loading Pressure as % of Unloading Pressure: 80% (Ex. If the PUV cracks at 3000 PSI, it will reseat at 2400 PSI)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .60 lbs. (.27 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 3W
- Cavity Form Tool (Finishing): 40500001 (min. pre-drill .563 dia.)
- Seal Kit: 21191206

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### WARNING

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<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
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</thead>
<tbody>
<tr>
<td>Flow Restrictors, Adjustable (Needle Valves)</td>
<td>447</td>
</tr>
<tr>
<td>Pressure Compensated Flow Regulator Valves</td>
<td>465</td>
</tr>
<tr>
<td>Priority Flow Regulator Valves</td>
<td>483</td>
</tr>
<tr>
<td>Velocity Fuses</td>
<td>491</td>
</tr>
<tr>
<td>Flow Divider/Combiner Valves</td>
<td>495</td>
</tr>
</tbody>
</table>
**Needle Valves – Flow Restrictors**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
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<tbody>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>DE-FCH</td>
<td>448</td>
</tr>
<tr>
<td>6</td>
<td>3500</td>
<td>23</td>
<td>241</td>
<td>MA-NVA</td>
<td>450</td>
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<tr>
<td>6</td>
<td>3500</td>
<td>23</td>
<td>241</td>
<td>PB-NVA</td>
<td>452</td>
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<tr>
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<td>38</td>
<td>241</td>
<td>DE-NVA</td>
<td>454</td>
</tr>
<tr>
<td>35</td>
<td>5000</td>
<td>132</td>
<td>345</td>
<td>HT-NVA</td>
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<tr>
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<td>3500</td>
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<td>241</td>
<td>SJ-NVA</td>
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<tr>
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<td>3500</td>
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<td>PB-NVB</td>
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</tr>
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<td>3500</td>
<td>57</td>
<td>241</td>
<td>DE-NVB</td>
<td>462</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the NVA is to meter flow giving speed or full bypass control of a fluid motor.

Typical application for the FCH is to meter flow in one direction while allowing free flow in the opposite direction.
**DE-FCH Adjustable Flow Control Valve, Spool Type, Free Reverse Flow**

**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” adjustable needle flow control valve with free reverse flow.

**OPERATION**

The DE-FCH increases its orifice value from fully closed to fully open by turning screw counterclockwise. When adjusted open the valves regulates flow (1) to (2). When fully closed the valve restricts flow from (1) to (2).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol Image]

**PERFORMANCE**

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
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<td>30</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>45</td>
<td>25</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**

- Nominal Flow: 12 GPM (45 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .32 lbs. (.15 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

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DIMENSIONS

ORDERING INFORMATION

DE-FCH - - -

OPTIONS
- Buna Standard 00
- Viton Standard V0
- Buna, Knob 0K
- Viton, Knob VK
- Buna, Screen A0
- Viton, Screen W0
- Buna, Screen, Knob AK
- Viton, Screen, Knob WK

BODIES
- Blank Without Body
- N 3/8 NPT Ports
- S #8 SAE Ports

ADJUSTMENTS
- FINE Fine Adjustment
- STRD Standard Adjustment

NOTE: Use Screen Only if Flow Direction is From 1 to 2

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SHOP ONLINE at www.airlinehyd.com
MA-NVA Adjustable Flow Control Valve, Needle Type

DESCRIPTION
7 size, 5/8-18 thread, "Mini" series, needle flow control valve.

OPERATION
The MA-NVA adjusts from fully open to fully closed by turning adjusting screw clockwise. When adjusted open, the valve allows flow (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

![Graph showing flow vs. pressure drop]

VALVE SPECIFICATIONS

- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 24 lbs (.11 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Cavity: MINI 2W
- Cavity Form Tool (Finishing): 40500003
- Seal Kit: 21191202

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

![DIMENSIONS Diagram]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>MA-NVA</th>
<th>OPTIONS</th>
<th>MA-NVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td>Blank</td>
<td>00</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td>N 1/4 NPTF Ports</td>
<td>V0</td>
</tr>
<tr>
<td>Buna, Knob</td>
<td>0K</td>
<td>S #6 SAE Ports</td>
<td>0K</td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>VK</td>
<td></td>
<td>VK</td>
</tr>
</tbody>
</table>

**BODIES**

- Without Body
- 1/4 NPTF Ports
- #6 SAE Ports

**BODY WEIGHT**: 0.29 lbs. [0.13 kg]
PB-NVA Adjustable Flow Control Valve, Needle Type

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, needle flow control.

OPERATION
The PB-NVA adjusts from fully open to fully closed by turning adjusting screw clockwise. When adjusted open the valve allows flow from (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
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<td>0</td>
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<tr>
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<tr>
<td>25</td>
<td>5</td>
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<tr>
<td>30</td>
<td>6</td>
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</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
</tr>
<tr>
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<tr>
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<tr>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
</tr>
</tbody>
</table>

Valve Specifications
- Nominal Flow: 6 GPM (23 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .22 lbs. (.10 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 25 ft-lbs (34 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191102

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com
DIMENSIONS

ORDERING INFORMATION

PB-NVA

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 N 1/4 NPTF Ports
Buna, Knob 0K S #6 SAE Ports
Viton, Knob VK
Buna, Screen A0
Viton, Screen W0
Buna, Screen, Knob AK
Viton, Screen, Knob WK

BODIES
Without Body

NOTE: Use Screen Only if Flow Direction is From 1 to 2

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
**DE-NVA Adjustable Flow Control Valve, Needle Type, Fine Adjust**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series fine adjust needle flow control valve.

**OPERATION**
The DE-NVA adjusts from fully open to fully closed by turning adjusting screw counterclockwise. When adjusted open the valve allows flow (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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<th>Flow (GPM)</th>
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**VALVE SPECIFICATIONS**

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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>.19 lbs. (.09 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
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SHOP ONLINE at www.airlinehyd.com 800-999-7378
**HT-NVA Adjustable Flow Control Valve, Needle Type**

**DESCRIPTION**
“High Pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, needle flow control valve.

**OPERATION**
The HT-NVA adjusts from fully open to fully closed by turning adjusting screw clockwise. When adjusted open the valve allows flow (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

NOTE: Valves with the knob option are NOT to be adjusted under pressure.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
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<td>Filtration</td>
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</tr>
<tr>
<td>Media Operating Temperature</td>
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<td>Weight</td>
<td>.72 lbs. (.32 kg)</td>
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<td>Operating Fluid Media</td>
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<td>Cartridge Torque</td>
<td>70 ft-lbs (94.9 Nm)</td>
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<td>Cavity</td>
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<td>Cavity Form Tool (Finishing)</td>
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<td>21191302</td>
</tr>
</tbody>
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**Dimensions**

**Ordering Information**

<table>
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<tr>
<th>OPTIONS</th>
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<tbody>
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<td>Viton, Screen, Knob</td>
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</tr>
</tbody>
</table>

**Note:** Use Screen Only if Flow Direction is From 1 to 2

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SJ-NVA Adjustable Flow Control Valve, Needle Type

**DESCRIPTION**

**OPERATION**
The SJ-NVA adjusts from fully open to fully closed by turning the adjustment screw clockwise. When adjusted open the valves regulates flow (1) to (2) or (2) to (1). When fully closed the valve blocks flow from (1) to (2) or (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -35° to 200° F (-37.2° to 93.3° C)
- Weight: 0.83 lbs. (.37 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191402

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**PB-NVB Adjustable Flow Control Valve, Needle Type, Fine Adjust**

**DESCRIPTION**
8 size, 3/4-16 thread, “Power” series, fine adjust needle flow control.

**OPERATION**
The PB-NVB adjusts from fully open to fully closed by turning adjusting screw clockwise. When adjusted open the valve allows flow (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

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<td>4</td>
<td>15</td>
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<td>5</td>
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</table>

**VALVE SPECIFICATIONS**
- Nominal Flow: 3 GPM (11 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .13 lbs (.06 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: POWER 2W
- Cavity Form Tool (Finishing): 40500005
- Seal Kit: 21191102

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FLOW CONTROLS
Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

PB-NVB - -

OPTIONS
Buna Standard 00 Blank
Viton Standard V0 N
Buna, Knob 0K S
Viton, Knob VK
Buna, Screen A0
Viton, Screen W0
Buna, Screen, Knob AK
Viton, Screen, Knob WK

BODIES
Without Body
1/4 NPTF Ports
#6 SAE Ports

NOTE: Use Screen Only if Flow Direction is From 1 to 2
DE-NVB Adjustable Flow Control Valve, Coarse Adjust

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, course adjust needle flow control valve.

OPERATION
The DE-NVB adjusts from fully open to fully closed by turning adjusting screw clockwise. When adjusted open the valve allows flow (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

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<th>Flow (GPM)</th>
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<tr>
<td>Filtration</td>
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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
Pressure Compensated Flow Regulator Valves

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<th>GPM</th>
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<td>466</td>
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<td>15</td>
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<td>241</td>
<td>DE-FCB</td>
<td>476</td>
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<tr>
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<td>3500</td>
<td>30</td>
<td>241</td>
<td>DE-FCC</td>
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<td>3500</td>
<td>30</td>
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<td>DE-FCF</td>
<td>480</td>
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</tbody>
</table>

Typical Schematic

Typical application for the FCA, FCB, FCC, and the FCF is for motor speed control.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
MA-FCA Adjustable Flow Control Valve, Pressure Compensated

DESCRIPTION

OPERATION
The cartridge maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control differential spring load can be set to customer flow specification (see options for ranges).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential from (2) to (1) greater than 200 PSI with accurate flow maintenance from 200 to 3000 PSI (14 to 207 bar).

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the knob.

FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

Best stability is obtained with adjustment at highest flow.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Nominal Flow</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
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<tr>
<td>Weight</td>
<td>29 lbs. (.13 kg)</td>
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<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
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<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
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<td>Seal Kit</td>
<td>21191000</td>
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</table>

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FLOW CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

ORDERING INFORMATION

MA-FCA - - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK

BODIES
Blank Without Body
N 1/4 NPTF Ports
S #6 SAE Ports

FLOW
0.17 .08 - .17 GPM
00.5 .25 - .5 GPM
00.9 .5 - .9 GPM
01.5 .75 - 1.5 GPM
02.9 1.9 – 3.0 GPM

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SHOP ONLINE at www.airlinehyd.com 800-999-7378

Page 467
PB-FCA Adjustable Flow Control Valve, Pressure Compensated

DESCRIPTION
8 size, 3/4-16 thread, “Power” series, pressure compensated, flow control valve.

OPERATION
The cartridge maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control differential spring load can be set to customer flow specification (see options for ranges).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential from (2) to (1), greater than 200 PSI (14 bar), with accurate flow maintenance from 200 to 3500 PSI (14 to 241 bar).

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the knob.

FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

Best stability is obtained with adjustment at highest flow.

HYDRAULIC SYMBOL

PERFORMANCE
Actual Test Data (Cartridge Only)

Valve Specifications

<table>
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<th>Specification</th>
<th>Value</th>
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<td>Nominal Flow</td>
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<td>Rated Operating Pressure</td>
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<td>Viscosity Range</td>
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<tr>
<td>Filtration</td>
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</tr>
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<td>Weight</td>
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<td>General Purpose Hydraulic Fluid</td>
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<td>Cartridge Torque Requirements</td>
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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DE-FCA Adjustable Flow Control Valve, Pressure Compensated**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, pressure compensated, flow control valve.

**OPERATION**
The DE-FCA maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control (see options for ranges) differential spring load can be set to customer flow specification.

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice greater than 100 PSI (6.9 bar), with accurate flow maintenance from 100 to 3500 PSI (6.9 to 241 bar).

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the knob.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

**VALVE SPECIFICATIONS**
- **Max Flow**: 8 GPM (30 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 0.49 lbs. (.22 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna Standard: 00
- Viton Standard: V0
- Buna, Knob: 0K
- Viton, Knob: VK

BODIES
- Blank: Without Body
- N: 3/8 NPTF Ports
- S: #8 SAE Ports

FLOW
- 01.0: 0.5-1 GPM
- 02.0: 1-2 GPM
- 04.0: 2-4 GPM
- 08.0: 4-8 GPM

BODY WEIGHT: 47 lbs. [21 kg.]
HT-FCA Adjustable Flow Control Valve, Pressure Compensated

DESCRIPTION
“High Pressure” 12 size, 1 1/16 -12 thread, “Tecnord” series, pressure compensated, flow control valve.

OPERATION
The HT-FCA maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control orifice can be set to customer flow specification (see options for ranges).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice. Consult chart to see regulation at high and low adjustment settings.

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the adjustment screw.

FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

HYDRAULIC SYMBOL

"Fully Adjustable" Valve can adjust down to leakage flow.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Max Regulated Flow: 20 GPM (76 LPM)
- Rated Operating Pressure: 5000 PSI (345 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .73 lbs. (.33 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 70 ft-lbs (94.9 Nm)
- Cavity: TECNORD 2W
- Cavity Form Tool (Finishing): 40500032
- Seal Kit: 21191300

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FLOW CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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DIMENSIONS

ORDERING INFORMATION

HT-FCA - - -

OPTIONS
Buna Standard 00
Viton Standard V0
Buna, Knob 0K
Viton, Knob VK

BODIES
Blank S
Without Body Without Body
#12 SAE Ports

FLOW
0-20 GPM

Presets:
Example: 0015 – 15 GPM +/- 10%

Note: Aluminum NOT durability rated for 4000 PSI. Consult factory for options.

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SHOP ONLINE at www.airlinehyd.com

Page 473
**SJ-FCA Adjustable Flow Control Valve, Pressure Compensated**

**DESCRIPTION**

**OPERATION**
The SJ-FCA maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control orifice can be set to customer flow specification (see options for ranges).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice. Consult chart to see regulation at high and low adjustment settings.

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the adjustment knob.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

---

"Fully Adjustable," Valve can be adjusted down to leakage flow.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 25 GPM (95 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .89 lbs. (.40 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191400

---

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
FLOW CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

SJ-FCA -  -  -

OPTIONS
- External Adj. w/locknut Buna 00
- External Adj. w/locknut Viton V0
- Buna, Knob 0K
- Viton, Knob VK
- Internally Adj. Buna 0I
- Internally Adj. Viton VI
- Tamper Proof Buna 0T
- Tamper Proof Viton VT

BODIES
- Blank S
- Without Body N
- #12 SAE Ports 3/4 NPT Ports

FLOW SETTING

0-25 GPM

Preset & tamper Proof
Example: 0015 – 15 GPM +/- 10%

DIMENSIONS

WITH KNOB

TAMPER PROOF

3/8-24 UNF 2A THREADS

1.50 [38.1]
1.83 HEX [41.3]
9/32 SOCKET HEX

3.40 [86.3]
3.00 [76.2]
1.57 [39.8]

2.80 [71.1]
1.80 [45.7]
.97 [24.6]

2.44 [61.9]
.28 [7.1]
.96 [24.4]

3.00 [76.2]
1.00 [25.4]
2.00 [50.8]

1.22 [30.9]

BODY WEIGHT: 1.29 lbs [.59 kg]
**DE-FCB Fixed Flow Control Valve, Pressure Compensated**

**DESCRIPTION**
10 size, 7/8-14 thread, "Delta" series, fixed pressure compensated, flow control valve.

**OPERATION**
The DE-FCB maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice, in excess of the spring load. Consult chart for regulation performance.

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

**FEATURES**
- Industry common cavity.
- Hardened parts for long life.

**HYDRAULIC SYMBOL**
Low pressure drop version for low differential circuits.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Max Regulated Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .29 lbs. (.13kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191204

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna Standard
  00
- Viton Standard
  V0

BODIES
- Blank
  N
- Without Body
  S
- 3/8 NPT PORTS
- #8 SAE PORTS

FLOW SETTING
- 01.0: 1 GPM
- 02.0: 2 GPM
- 03.0: 3 GPM
- 04.0: 4 GPM
- 05.0: 5 GPM
- 06.0: 6 GPM
- 07.0: 7 GPM
- 08.0: 8 GPM
  +/- 15%

BODY WEIGHT: .47 lbs. [21kg]

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DE-FCC Adjustable Flow Control Valve, Pressure Compensated

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, pressure compensated, flow control valve.

**OPERATION**
The DE-FCC maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control orifice can be set to customer flow specification (see options for ranges).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice. Consult chart to see regulation at high and low adjustment settings.

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

The regulated flow increases from low to high with clockwise rotation of the knob.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Regulated Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.51 lbs. (.23 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

**HYDRAULIC SYMBOL**

![Diagram of DE-FCC Adjustable Flow Control Valve, Pressure Compensated]

**PERFORMANCE**
Actual Test Data (Cartridge Only)

![Graphs showing performance data]

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DE-FCF Fixed Flow Control Valve, Pressure Compensated**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, fixed pressure compensated, flow control valve.

**OPERATION**
The DE-FCF maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice, in excess of the spring load. Consult chart for regulation performance.

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
Best stability version for high differential circuits.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Pressure Drop (BAR)</th>
<th>Flow (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>0.5</td>
</tr>
<tr>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td>150</td>
<td>1.5</td>
</tr>
<tr>
<td>200</td>
<td>2.0</td>
</tr>
<tr>
<td>250</td>
<td>2.5</td>
</tr>
<tr>
<td>300</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Drop (PSI)</th>
<th>Flow (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>0.5</td>
</tr>
<tr>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td>150</td>
<td>1.5</td>
</tr>
<tr>
<td>200</td>
<td>2.0</td>
</tr>
<tr>
<td>250</td>
<td>2.5</td>
</tr>
<tr>
<td>300</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**
- Max Flow: 8 GPM (30 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 32 lbs (.14 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191204

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ORDERING INFORMATION

DE-FCF - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N
Without Body S
3/8 NPT PORTS
#8 SAE PORTS

FLOW SETTING
01.0 1 GPM
02.0 2 GPM
03.0 3 GPM
04.0 4 GPM
05.0 5 GPM
06.0 6 GPM
07.0 7 GPM
08.0 8 GPM
+/− 15%
Priority Flow Regulator Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>3000</td>
<td>38</td>
<td>207</td>
<td>DF-FCP</td>
<td>484</td>
</tr>
<tr>
<td>10</td>
<td>3000</td>
<td>38</td>
<td>207</td>
<td>DF-FCQ</td>
<td>486</td>
</tr>
<tr>
<td>25</td>
<td>3500</td>
<td>95</td>
<td>241</td>
<td>SK-FCQ</td>
<td>488</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the FCP and FCQ is priority flow to the main circuit with balance of flow to tank or power beyond.

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DF-FCP Fixed Priority Flow Control Valve

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, fixed priority flow control valve.

OPERATION
The DF-FCP allows pressure compensated flow from (3) to (1) regulated by the pressure present at (3). Excess flow bypasses out (2).

The spring chamber is constantly vented at (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.26 lbs. (.12 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Requirements</td>
<td></td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191206</td>
</tr>
</tbody>
</table>

PERFORMANCE
Actual Test Data (Cartridge Only)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

DF-FCP - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank N 1/4 NPTF Ports
V 0 6 SAE Ports

FLOW SETTING
01.0 1 GPM
02.0 2 GPM
03.0 3 GPM
04.0 4 GPM
05.0 5 GPM
06.0 6 GPM
07.0 7 GPM
08.0 8 GPM
09.0 9 GPM
10.0 10 GPM
+/- 15%

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DF-FCQ Adjustable Priority Flow Control Valve

DESCRIPTION

OPERATION
The DF-FCQ allows pressure compensated flow from (3) to (1) regulated by the pressure present at (3). Excess flow bypasses out (2).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

Test data shown on this sheet, for condition of port (2) to tank. Data on next page, for condition of port (3) to tank.

PERFORMANCE
Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>10 GPM (38 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.56 lbs. (.25 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191206</td>
</tr>
</tbody>
</table>

![Graphs showing performance data]
FLOW CONTROLS

DIMENSIONS

ORDERING INFORMATION

OPTIONS
- Buna Standard
- Viton Standard
- Buna, Knob
- Viton, Knob

BODIES
- Blank
- Without Body
- N
  - 1/4 NPTF Ports
- S
  - #6 SAE Ports

FLOW RANGE
- 2-05
  - 2 to 5 GPM
- 6-10
  - 6 to 10 GPM

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
SK-FCQ Adjustable Priority Flow Control Valve

DESCRIPTION

OPERATION
The SK-FCQ allows pressure compensated flow from (3) to (1) regulated by the pressure present at (3).
Excess flow bypasses out (2).

The spring chamber is constantly vented at (1).

FEATURES
- Hardened cage and spool for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Regulated Flow (GPM)</td>
<td>25</td>
</tr>
<tr>
<td>Rated Operating Pressure (PSI)</td>
<td>500-3000 (34-207bar)</td>
</tr>
<tr>
<td>Viscosity Range (SSU)</td>
<td>36 to 3000 (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>.96 (.44 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>SUPER 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500018</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191404</td>
</tr>
</tbody>
</table>

PERFORMANCE
Actual Test Data (Cartridge Only)

---

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
Velocity Fuses

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>3000</td>
<td>38</td>
<td>207</td>
<td>DE-CVF</td>
<td>492</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the CVF is to be mounted directly in the bottom of the cylinder and sized 1-2 GPM higher than the lowering speed. Therefore the load will not free fall in the event of line damage. Valve will not re-open until pressure is bled off of port #1.

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**DE-CVF Velocity Fuse**

**DESCRIPTION**


**OPERATION**

The DE-CVF allows flow to pass from (1) to (2). When velocity exceeds the flow setting the valve shifts and blocks flow from (1) to (2).

Valve acts like a fixed orifice when passing flow from (2) to (1).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

Curves identify pressure drop in port (2) to (1) direction (non-fuse). Fuse pressure drop is similar at fuse flow, until fuse takes effect (~75-100 PSID).

**PERFORMANCE**

Actual Test Data (Cartridge Only)

![Graph showing flow vs. pressure drop]

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 10 GPM (38 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 0.25 lbs. (.11 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

DE-CVF - - - BODIES

OPTIONS 00 0

Bodies
Blank Without Body
N 3/8 NPT PORTS
S #8 SAE PORTS

FLOW SETTING

<table>
<thead>
<tr>
<th>Setting</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.0</td>
<td>1 GPM</td>
</tr>
<tr>
<td>02.0</td>
<td>2 GPM</td>
</tr>
<tr>
<td>03.0</td>
<td>3 GPM</td>
</tr>
<tr>
<td>04.0</td>
<td>4 GPM</td>
</tr>
<tr>
<td>05.0</td>
<td>5 GPM</td>
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<td>06.0</td>
<td>6 GPM</td>
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<td>8 GPM</td>
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<tr>
<td>09.0</td>
<td>9 GPM</td>
</tr>
<tr>
<td>10.0</td>
<td>10 GPM</td>
</tr>
<tr>
<td>±10%</td>
<td>±10%</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Flow Divider/Combiner Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>DG-FDA</td>
<td>496</td>
</tr>
<tr>
<td>30</td>
<td>3500</td>
<td>114</td>
<td>241</td>
<td>SN-FDA</td>
<td>498</td>
</tr>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>DG-FDB</td>
<td>500</td>
</tr>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>DG-FDH</td>
<td>502</td>
</tr>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>241</td>
<td>DG-FDT</td>
<td>504</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the FDA, FDB, and FDH is to synchronize two independent cylinders or hydraulic motors in both directions.

Typical application for the FDT is to provide positive traction for vehicle transmissions. If one leg loses load, the valve insures flow to the other leg.

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**DG-FDA Flow Divider / Combiner Valve, Spool Type**

**DESCRIPTION**
10 size, 7/8-14 thread “Delta Series”, spool type, flow divider/combiner.

**OPERATION**
In the dividing mode, the DG-FDA will divert input flow from port (2) to ports (3) and (1), based on the ratio specified, regardless of operating pressure.

The DG-FDA will combine input flows from ports (3) and (1), to port (2) by the same ratio.

Should circuit operation result in a blockage of either (3) or (1), the opposite port may also close under certain conditions. Should this potential exist, consult the factory.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**DO NOT EXCEED MAXIMUM FLOW PER MODEL**
For higher accuracy flow ratio, use DG-FDH

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow</td>
<td>12 GPM (45 LPM)</td>
</tr>
<tr>
<td>Accuracy on Flow Splits</td>
<td>+/- 10% of Max. Rated Inlet Flow</td>
</tr>
<tr>
<td>Maximum Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>21 lbs (.10 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500002</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191214</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**SN-FDA Flow Divider / Combiner Valve, Spool Type**

**DESCRIPTION**
16 size, 1 5/16-12 thread “Super Series,” spool-type flow divider/combiner valve.

**OPERATION**
In the dividing mode, the SN-FDA will divert input flow from port (2) to ports (3) and (1), based on the ratio specified, regardless of operating pressure.

The SN-FDA will combine input flows from ports (3) and (1), to port (2) by same ratio.

Should circuit operation result in a blockage of either (3) or (1), the opposite port may also close under certain conditions. Should this potential exist, consult the factory.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 40 GPM (151 LPM)
- Accuracy on Flow Splits: +/- 10% of Max. Rated Inlet Flow
- Maximum Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .95 lbs. (.43 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Cavity: SUPER 4W
- Cavity Form Tool (Finishing): 40500019
- Seal Kit: 21191413

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**DG-FDB Flow Divider Valve, Spool Type**

**DESCRIPTION**
10 size, 7/8-14 thread “Delta Series”, spool type, flow divider.

**OPERATION**
The DG-FDB will divert input flow from port (2) to ports (3) and (1), based on the ratio specified, regardless of operating pressure.

Should circuit operation result in a blockage of either (3) or (1), the opposite port may also close under certain conditions. Should this potential exist, consult the factory.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**VALVE SPECIFICATIONS**
- Maximum Flow: 12 GPM (45 LPM)
- Accuracy on Flow Splits: +/- 10% of Max. Rated Inlet Flow
- Maximum Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .21 lbs. (.10 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
FLOW CONTROLS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ORDERING INFORMATION

DG-FDB - - - -

OPTIONS
Buna Standard 00
Viton Standard 0V

SPLITS 50 50-50
*Consult factory for Splits
Other than 50 - 50

BODIES
Blank Without Body
N 1/4 NPT Ports
S #6 SAE Ports

NOTE: Must Use 4-Way Body

INLET FLOW
03 2-3 GPM
06 3-6 GPM
09 6-9 GPM
12 9-12 GPM

BODY WEIGHT: .99 lbs [.45 kg]
**FLOW CONTROLS**

**DG-FDH Flow Divider / Combiner Valve, Spool Type**

**DESCRIPTION**

**OPERATION**
In the dividing mode, the DG-FDH will divert input flow from port (2) to ports (3) and (1), based on the ratio specified with a high degree of accuracy, regardless of operating pressure.

The DG-FDH will combine input flows from ports (3) and (1), to port (2) by the same ratio.

Should circuit operation result in a blockage of either (3) or (1), the opposite port may also close under certain conditions. Should this potential exist, consult the factory.

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**DO NOT EXCEED MAXIMUM FLOW PER MODEL**
The DG-FDH should be considered if the DG-FDA does not provide the required accuracy.

**HYDRAULIC SYMBOL**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Maximum Flow: 12 GPM (45 LPM)
- Accuracy on Flow Splits: +/- 4% of Max. Rated Inlet Flow
- Maximum Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40°F to 250°F (-40°C to 120°C)
- Weight: 21 lbs. (.10 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
DG-FDT Flow Divider / Combiner Valve, Spool Type

DESCRIPTION

10 size, 7/8-14 thread “Delta Series”, spool type, flow divider/combiner, positive traction valve.

OPERATION

In the dividing mode, the DG-FDT will divert input flow from port (2) to ports (3) and (1), based on the ratio specified, regardless of operating pressure.

The DG-FDT will combine input flows from ports (3) and (1).

Should circuit operation result in a blockage of either (3) or (1), the opposite port may also close under certain conditions. Should this potential exist, consult the factory.

FEATURES

- Hardened parts for long life.
- Industry common cavity.

DO NOT EXCEED MAXIMUM FLOW PER MODEL

Use where wheel slip (or “drag”) needs to be accomplished.

HYDRAULIC SYMBOL

![Hydraulic Symbol]

PERFORMANCE

Actual Test Data (Cartridge Only)

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

TRACTION FLOW W/ 1 LEG UNLOADED

2-3 GPM VALVE – 0.4 GPM
3-6 GPM VALVE – 0.7 GPM
6-9 GPM VALVE – 1.1 GPM
9-12 GPM VALVE – 1.5 GPM

VALVE SPECIFICATIONS

- Maximum Flow: 12 GPM (45 LPM)
- Accuracy on Flow Splits: +/- 10% of Max. Rated Inlet Flow
- Maximum Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.22 lbs. (0.10 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Cavity: DELTA 4W
- Cavity Form Tool (Finishing): 40500002
- Seal Kit: 21191214

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**DIMENSIONS**

![Dimension Diagram]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>INLET FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>Blank</td>
<td>2-3 GPM</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>1/4 NPT Ports</td>
<td>3-6 GPM</td>
</tr>
<tr>
<td>00</td>
<td>#6 SAE Ports</td>
<td>6-9 GPM</td>
</tr>
<tr>
<td>03</td>
<td>#6 SAE Ports</td>
<td>9-12 GPM</td>
</tr>
<tr>
<td>06</td>
<td>*Consult factory for Splits</td>
<td>Other than 50 - 50</td>
</tr>
<tr>
<td>09</td>
<td></td>
<td>2-3 GPM</td>
</tr>
<tr>
<td>12</td>
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<td>6-9 GPM</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>9-12 GPM</td>
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**NOTE:** Must Use 4-Way Body
<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2W Proportional Flow Regulator Valves</td>
<td>508</td>
</tr>
<tr>
<td>Proportional Pressure Reducing / Relieving Valves</td>
<td>527</td>
</tr>
<tr>
<td>Proportional Pressure Relief Valves</td>
<td>539</td>
</tr>
</tbody>
</table>
# PROPORTIONAL FLOW CONTROLS

## Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com

---

<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-way Normally Closed Proportional Flow Regulator Valves</td>
<td>511</td>
</tr>
<tr>
<td>2-way Normally Open Proportional Flow Regulator Valves</td>
<td>521</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com

---

800-999-7378
## 2-way Normally Closed Proportional Flow Regulator Valves

### Spool Type

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8</td>
<td>3500</td>
<td>22</td>
<td>245</td>
<td>EE-P2G-A</td>
<td>512</td>
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<tr>
<td>13.2</td>
<td>3500</td>
<td>50</td>
<td>245</td>
<td>EE-P2G-B</td>
<td>512</td>
</tr>
<tr>
<td>13.2</td>
<td>3500</td>
<td>50</td>
<td>245</td>
<td>EE-P2G-C</td>
<td>512</td>
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</tbody>
</table>

### Poppet Type

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<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
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<td>25</td>
<td>245</td>
<td>EB-P2A</td>
<td>514</td>
</tr>
<tr>
<td>4</td>
<td>3500</td>
<td>15</td>
<td>245</td>
<td>EE-P2A-A</td>
<td>516</td>
</tr>
<tr>
<td>8</td>
<td>3500</td>
<td>30</td>
<td>245</td>
<td>EE-P2A-B</td>
<td>516</td>
</tr>
<tr>
<td>12</td>
<td>3500</td>
<td>45</td>
<td>245</td>
<td>EE-P2A-C</td>
<td>516</td>
</tr>
<tr>
<td>17.2</td>
<td>3500</td>
<td>65</td>
<td>245</td>
<td>ET-P2A-A</td>
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<td>22.5</td>
<td>3500</td>
<td>85</td>
<td>245</td>
<td>ET-P2A-B</td>
<td>518</td>
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<tr>
<td>29</td>
<td>3500</td>
<td>110</td>
<td>245</td>
<td>ET-P2A-C</td>
<td>518</td>
</tr>
</tbody>
</table>
**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally closed, proportional flow control valve.

**OPERATION**
When de-energized the EE-P2G blocks flow at ports (1) and (2). When energized, the valve allows flow from (2) to (1). Flow is proportional to the current applied to the coil.

**OPERATION OF MANUAL OVERRIDE OPTION:** To override, turn the manual override screw clockwise. To release turn the manual override screw counter-clockwise.

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**
Curves are attained with compensator.

**PERFORMANCE**

**A** version - Flow (l/min) vs. Current (mA)
(12 V coil; Delta P = 14 bar; Toil = 40°C)

**B** version - Flow (l/min) vs. Current (mA)
(12 V coil; Delta P = 14 bar; Toil = 40°C)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow range</td>
<td>See curves for various versions</td>
</tr>
<tr>
<td>Max System Pressure</td>
<td>3500 PSI (245 bar)</td>
</tr>
<tr>
<td>Leakage</td>
<td>max 50 cc/min at 245 bar</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>+/- 3%</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 300 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.58 lbs. (.26 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>26 ft-lbs (35 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>2-3 ft-lbs (3-4 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Tools kit (form tool, reamer, tap)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

**COIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Current Supply Characteristics</td>
<td>PWM (Pulse Width Modulation)</td>
</tr>
<tr>
<td>Rated Current Range</td>
<td>200 – 1450 mA</td>
</tr>
<tr>
<td>PWM or Super-imposed Dither Frequency</td>
<td>100 - 150 Hz</td>
</tr>
<tr>
<td>Coil Resistance (12 Vdc)</td>
<td>7.2 Ohm +/- 5% at 68°F (20°C)</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
## PROPORTIONAL FLOW CONTROLS

### DIMENSIONS

**“C” version** - Flow (l/min) vs. Current (mA)

(12 V coil; Delta P = 14 bar; Toil = 40° C)

---

### ORDERING INFORMATION

**EE** - **P2G**

**OPTIONS**

- Buna, push type override (Standard)
- Buna, screw type override (Knob)
- Buna, screw type override (Grad. Knob)

**BODIES**

- Blank Without Body
- #8 SAE Ports

**VOLTAGE**

- 12 V DC
- 24 V DC

**“F” COIL TERMINATION**

- DIN 43650 (Hirschman)
- Deutsch-Integral DT04-2P
- AMP Jr. Timer

---

**NOTES:**

1) Flows refer to a 14 bar Delta P
2) For other seals, consult factory

---

Approximate Coil Weight: .47lbs. (.21 kg.)

---

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---

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
**EB - P2A**

**2 Way, Normally Closed, Proportional Flow Control Valve**

**DESCRIPTION**

8 size, 3/4-16 thread, solenoid operated, 2 way normally closed poppet style, proportional flow control valve.

**OPERATION**

When de-energized the EB-P2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1).
When energized, the valve allows flow from (1) to (2). Flow is proportional to current applied to the coil.
A compensator must be used to create a pressure compensated flow control function.

**FEATURES**

- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Curves are attained without pressure compensator. The valve can work with a pressure drop up to 200 bar.

**PERFORMANCE**

**Pressure Drop 1 to 2 with valve completely open**

**Flow (GPM)**

<table>
<thead>
<tr>
<th>Pressure Drop (Psi)</th>
<th>Flow (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>0.5</td>
</tr>
<tr>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>15</td>
<td>1.5</td>
</tr>
<tr>
<td>20</td>
<td>2.0</td>
</tr>
<tr>
<td>25</td>
<td>2.5</td>
</tr>
<tr>
<td>30</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Flow vs. Current at different Pressure Drop**

**Flow (GPM)**

<table>
<thead>
<tr>
<th>Current (Amps)</th>
<th>Flow (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>0.6</td>
<td>2.0</td>
</tr>
<tr>
<td>0.9</td>
<td>3.0</td>
</tr>
<tr>
<td>1.2</td>
<td>4.0</td>
</tr>
<tr>
<td>1.5</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Valve Specifications**

- **Flow range**: See curves
- **Max System Pressure**: 3500 PSI (245 bar)
- **Leakage**: 0 - 10 drops / min @245 bar
- **Hysteresis**: +/- 3%
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: 72 lbs. (32 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cardiﬁtage Torque Requirements**: 37 ft-lbs (50 Nm)
- **Coil Nut Torque Requirements**: 2-3 ft-lbs (3-4 Nm)
- **Cavity**: POWER 2W
- **Cavity Tools kit (form tool, reamer, tap)**: 40500005
- **Seal Kit**: 21191102

**Coil Specifications**

- **Current Supply Characteristics**: PWM
- **Rated Current Range**: 500 - 1450 mA
- **PWM or Super-imposed Dither Frequency**: 100 Hz
- **Coil Resistance (12 Vdc)**: 7.5 Ohm +/- 5% at 68°F (20°C)

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E-mail: delta@delta-power.com
DIMENSIONS

ORDERING INFORMATION

EB - P2A

OPTIONS
- Buna (Standard)
- Buna, screw type override (Knob)
- Buna, screw type override (Grad. Knob)

BODIES
- Blank S
- Without Body
- #8 SAE Ports

VOLTAGE
- 12 VDC
- 24 VDC

"F" COIL TERMINATION
- HC DIN 43650 (Hirschman)
- DI Deutsch-Integral DT04-2P
- JT AMP Jr. Timer

NOTES:
1) Flow refer to a 14 bar Delta P
2) For other seals, consult factory

Approximate Coil Weight: .47 lbs. (.21 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EE - P2A       2 Way, Normally Closed, Proportional Flow Control Valve

DESCRIPTION
10 size, 7/8-14 thread, solenoid operated, 2 way normally closed poppet style, proportional flow control valve.

OPERATION
When de-energized the EE-P2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1).
When energized, the valve allows flow from (1) to (2). Flow is proportional to current applied to the coil.
A compensator must be used to create a pressure compensated flow control function.

FEATURES
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Pressure Drop 1 to 2 with valve completely open

Flow vs. Current at different Pressure Drop

VALVE SPECIFICATIONS
Flow range
Max System Pressure
Leakage
Hysteresis
Viscosity Range
Filtration
Media Operating Temperature
Range
Weight
Operating Fluid Media
Cartridge Torque Requirements
Coil Nut Torque Requirements
Cavity
Cavity Tools kit (form tool, reamer, tap)
Seal Kit
COIL SPECIFICATIONS
Current Supply Characteristics
Rated Current Range
PWM or Super-imposed Dither
Frequency
Coil Resistance (12 Vdc)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com

Page 516
## Ordering Information

### Options
- **Buna Standard**
- Buna, screw type override (Knob) **BO** Up to 15 l/min
- Buna, screw type override (Grad. Knob) **BS** Up to 30 l/min
- Buna, screw type override (Grad. Knob) **BS** Up to 30 l/min
- Buna, screw type override (Grad. Knob) **BS** Up to 30 l/min

### BODIES
- Blank **S** Without Body
- #8 SAE Ports **S**

### Voltage
- 12 VDC **12**
- 24 VDC **24**

### "F" Coil Termination
- DIN 43650 (Hirschman) **HC**
- Deutsch-Integral DT04-2P **DI**
- AMP Jr. Timer **JT**

### Notes:
1. Flows refer to a 14 bar Delta P
2. For other seals, consult factory

---

**Approximate Coil Weight:** .47 lbs. (.21 kg.)
ET - P2A  2 Way, Normally Closed, Proportional Flow Control Valve

**DESCRIPTION**
12 size, 1 1/16-12 thread, solenoid operated, 2 way normally closed poppet style, proportional flow control valve.

**OPERATION**
When de-energized the ET-P2A blocks flow from (1) to (2) and allows reverse flow from (2) to (1). When energized, the valve allows flow from (1) to (2). Flow is proportional to current applied to the coil. A compensator must be used to create a pressure compensated flow control function.

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**

**VALVE SPECIFICATIONS**
- Flow range: See curves for various versions
- Max System Pressure: 3500 PSI (245 bar)
- Leakage: 0 - 10 drops / min @ 245 bar
- Hysteresis: +/- 3 %
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .72 lbs. (.32 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 37 ft-lbs (50 Nm)
- Coil Nut Torque Requirements: 2-3 ft-lbs (3-4 Nm)
- Cavity: TECNORD 2W
- Cavity Tools kit (form tool, reamer, tap): 40500000
- Seal Kit: 21191200

**COIL SPECIFICATIONS**
- Current Supply Characteristics: PWM
- Rated Current Range: 500 – 1450 mA
- PWM or Super-imposed Dither Frequency: 100 Hz
- Coil Resistance (12 Vdc): 7.5 Ohm +/- 5% at 68° F (20° C)

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DIMENSIONS

ORDERING INFORMATION

OPTIONS
Buna standard
Buna, screw type override (Knob)
Buna, screw type override (Grad. Knob)

BODIES
Blank
Without Body

VOLTAGE
12 VDC
24 VDC

"F" COIL TERMINATION
DIN 43650 (Hirschman)
Deutsch-Integral DT04-2P
AMP Jr. Timer

NOTES:
1) Flows refer to a 14 bar Delta P
2) For other seals, consult factory

Approximate Coil Weight: .47lbs. (.21 kg.)

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SHOP ONLINE at www.airlinehyd.com
### 2 Way Normally Open Proportional Flow Regulator Valves

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>3500</td>
<td>30</td>
<td>245</td>
<td>EE-P2H</td>
<td>522</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EE-P2H 2 Way, Normally Open, Proportional Flow Control Valve

DESCRIPTION
10 size, 7/8-14 thread, solenoid operated, 2 way normally open, proportional flow control valve.

OPERATION
When de-energized the EE-P2H allows flow from (1) to (2).
When fully energized, the valve blocks flow at port (1) and (2). Flow is proportional to current applied to the coil. A compensator must be used to create a pressure compensated flow control function.

OPERATION OF MANUAL OVERRIDE OPTION:
To override, turn the manual override screw clockwise.
To release turn the manual override screw counter-clockwise.

FEATURES
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE
Flow (l/min) vs. Current (mA)
(12 V coil; Delta P = 5, 14, 20 bar; Toil = 40°C)

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow range</td>
<td>See curve</td>
</tr>
<tr>
<td>Max System Pressure</td>
<td>3500 PSI (245 bar)</td>
</tr>
<tr>
<td>Leakage</td>
<td>max 100 cc/min at 245 bar</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>+/- 4%</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40°F to 250°F (-40 °C to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>58 lbs. (26 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>26 ft-lbs (35 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>2-3 ft-lbs (3-4 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA ZW</td>
</tr>
<tr>
<td>Cavity Tools Kit (form tool, reamer, tap)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

COIL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Supply Characteristics</td>
<td>PWM</td>
</tr>
<tr>
<td>Rated Current Range</td>
<td>0 – 1450 mA</td>
</tr>
<tr>
<td>PWM or Super-imposed Dither Frequency</td>
<td>100 - 150 Hz</td>
</tr>
<tr>
<td>Coil Resistance (12 Vdc)</td>
<td>7.5 Ohm +/- 5% at 68°F (20°C)</td>
</tr>
</tbody>
</table>

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ORDERING INFORMATION

<table>
<thead>
<tr>
<th>EE - P2H</th>
<th>OPTIONS</th>
<th>BODIES</th>
<th>VOLTAGE</th>
<th>&quot;F&quot; COIL TERMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0P</td>
<td>Blank</td>
<td>12</td>
<td>HC</td>
</tr>
<tr>
<td></td>
<td>0S</td>
<td>S</td>
<td>24</td>
<td>DI</td>
</tr>
<tr>
<td></td>
<td>0K</td>
<td>#8 SAE Ports</td>
<td></td>
<td>JT</td>
</tr>
</tbody>
</table>

NOTE: for other seals, consult factory

Approximate Coil Weight: .47lbs. (.21 kg.)
### PROPORTIONAL PRESSURE CONTROLS

**Delta Power Company**  
4484 Boeing Drive - Rockford, IL 61109

---

#### WARNING:
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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

---

<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
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<tbody>
<tr>
<td>Proportional Pressure Reducing / Relieving Valves</td>
<td>527</td>
</tr>
<tr>
<td>Proportional Pressure Relief Valves</td>
<td>539</td>
</tr>
</tbody>
</table>

---

SHOP ONLINE at [www.airlinehyd.com](http://www.airlinehyd.com)  
800-999-7378
# Proportional Pressure Reducing / Relieving Valves

## Direct Acting

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8</td>
<td>5000</td>
<td>3</td>
<td>345</td>
<td>IP-DAR-43C-H</td>
<td>528</td>
</tr>
<tr>
<td>0.8</td>
<td>700</td>
<td>3</td>
<td>50</td>
<td>IP-DAR-43C-L</td>
<td>528</td>
</tr>
</tbody>
</table>

## Pilot Operated

<table>
<thead>
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<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>500</td>
<td>8</td>
<td>35</td>
<td>EC-PRV</td>
<td>530</td>
</tr>
<tr>
<td>7.5</td>
<td>700</td>
<td>28</td>
<td>50</td>
<td>IP-PRZ-59</td>
<td>532</td>
</tr>
<tr>
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<td>450</td>
<td>30</td>
<td>27.5</td>
<td>EG-PRZ</td>
<td>534</td>
</tr>
<tr>
<td>30</td>
<td>450</td>
<td>114</td>
<td>27.5</td>
<td>ES-PRZ</td>
<td>536</td>
</tr>
</tbody>
</table>

## Typical Schematic

Typical application for the IP DAR 43 is the control of a metering spool on a directional valve.

![Typical Schematic](image)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DESCRIPTION**

Special cavity, slip-in style flange retained, direct acting proportional, pressure reducing/relieving valve.

**OPERATION**

The IP-DAR-43-C generates a variable pressure in response to a PWM (Pulse Width Modulated) current signal. With no current applied to the proportional solenoid, the inlet port 2 is blocked and the regulated port 3 is vented to port 1.

As current is increased, fluid pressure is proportionally controlled at the regulated port 3. On attainment of proportionally determined pressure at 3, the cartridge shifts to block flow at 2, thereby regulating pressure at 3. In this mode, the valve also will relieve 3 to 1 at a variable value over the set reducing pressure.

**FEATURES**

- Slip-in style
- Efficient wet-armature construction
- Integral waterproof coil
- Continuous duty rated solenoid

**HYDRAULIC SYMBOL**

Flanged retained product.

The coil is an integral part of the valve and is not serviceable.

Tank Pressure level above zero is additive to the valves expected reduced pressure value.

**PERFORMANCE**

Reduced pressure (bar) vs. current (mA)

(12 V and 24 V coil)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>1 GPM (3.8 LPM) @ 8 bar Delta P</td>
</tr>
<tr>
<td>Max Inlet Pressure &quot;H&quot; version</td>
<td>5000 PSI (350 bar)</td>
</tr>
<tr>
<td>Max Inlet Pressure &quot;L&quot; version</td>
<td>700 PSI (50 bar)</td>
</tr>
<tr>
<td>Controlled pressure range</td>
<td>0-25 bar / 0-30 bar (see graph)</td>
</tr>
<tr>
<td>Reduced pressure tolerance</td>
<td>+ / - 5%</td>
</tr>
<tr>
<td>Max. Back-pressure at T port</td>
<td>20 bar</td>
</tr>
<tr>
<td>Internal Leakage</td>
<td>15ml/min @ 500 PSI (35 bar) inlet</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 16/15 (ISO 4406)</td>
</tr>
<tr>
<td>Media Operating Temp. Range</td>
<td>-25°C / +90°C</td>
</tr>
<tr>
<td>Weight</td>
<td>54 lbs. (25 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cavity</td>
<td>T043</td>
</tr>
<tr>
<td>Cavity Tool Kit</td>
<td>K-T043</td>
</tr>
<tr>
<td>Flange mounting screws</td>
<td>M4x10 / torque 3ft-lbs (4 Nm)</td>
</tr>
<tr>
<td>Reduced pressure tolerance</td>
<td>+ / - 5%</td>
</tr>
<tr>
<td>Max. Back-pressure at T port</td>
<td>20 bar</td>
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<tr>
<td>Internal Leakage</td>
<td>15ml/min @ 500 PSI (35 bar) inlet</td>
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<td>Cavity Tool Kit</td>
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<tr>
<td>Flange mounting screws</td>
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</table>

**COIL SPECIFICATIONS**

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<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Supply Characteristics</td>
<td>PWM (Pulse Width Modulation)</td>
</tr>
<tr>
<td>Rated Current Range</td>
<td>200+1500 (12 V coil)</td>
</tr>
<tr>
<td>100+750 (24 V coil)</td>
<td></td>
</tr>
<tr>
<td>PWM or Super-imposed Dither Frequency</td>
<td>100 - 200 Hz</td>
</tr>
<tr>
<td>Coil Resistance (12 Vdc)</td>
<td>5.4 Ohm +/- 5% at 68°F (20°C)</td>
</tr>
<tr>
<td>Coil Resistance (24 Vdc)</td>
<td>22 Ohm +/- 5% at 68°F (20°C)</td>
</tr>
<tr>
<td>Max. Power consumption</td>
<td>12 Watt. (20°C)</td>
</tr>
<tr>
<td>Protection Degree</td>
<td>IP 67 according to IEC 529</td>
</tr>
<tr>
<td>Coil Termination</td>
<td>Deutsch-Integral DT04-2P Amp Junior Timer 84-9419</td>
</tr>
<tr>
<td>Color Connectors</td>
<td>Black</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

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Page 528

800-999-7378
### Dimensions

![Diagram of proportional pressure controls dimensions](image)

### Ordering Information

<table>
<thead>
<tr>
<th>IP - DAR - 43 - C</th>
<th>COIL TERMINATION</th>
<th>VOLTAGE</th>
<th>INLET PRESSURE</th>
<th>MAX. REGULATED PRESSURE</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AJ - Amp J. timer</td>
<td>1 - 12 Vdc</td>
<td>L - up to 700 PSI (50 bar)</td>
<td>1 - 25 bar</td>
<td>00 - HNBR standard</td>
</tr>
<tr>
<td></td>
<td>DT - Deutsch DT04</td>
<td>2 - 24 Vdc</td>
<td>H - up to 5000 PSI (350 bar)</td>
<td>2 - 30 bar</td>
<td>A0 - with filter</td>
</tr>
</tbody>
</table>

**NOTE:** screen (on inlet port): mesh 50 (300 μm)
EC-PRV 3 Way 2 Position, Proportional Pressure Reducing/Relieving Valve

**DESCRIPTION**
7 size, 5/8-18 thread, “Mini” series, solenoid operated, 3 way 2 position, proportional pressure reducing/relieving valve.

**OPERATION**
When de-energized the EC-PRV allows flow from (3) to (2) and blocks flow at (1).

As current is increased, fluid pressure is proportionally controlled at the regulated port 3. On attainment of proportionally determined pressure at 3, the cartridge shifts to block flow at 1, thereby regulating pressure at 3. In this mode, the valve also will relieve 3 to 2 at a variable value over the set reducing pressure.

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**
Other configurations for other pressure ranges available. Consult Factory for electrical signal recommendations.

Tank Pressure level above zero is additive to the valves expected reduced pressure value.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 2 GPM (8 LPM)
- Max Operating Pressure: 500 PSI (35 bar)
- Max Differential Pressure: 300 PSI (21 bar)
- Typical Hysteresis: 5%
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 18 lbs. (.08 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 15 ft-lbs (20.3 Nm)
- Coil Nut Torque Requirements: 3-5 ft-lbs (4.1-6.8 Nm)
- Cavity: MINI 3W
- Cavity Form Tool (Finishing): 40500004
- Seal Kit: 21191010

**COIL SPECIFICATIONS**
- Current Supply Characteristics: PWM (Pulse Width Modulation)
- Rated Current Range: 200-1200mA (12 Volt) 100-600mA (24 Volt)
- PWM or Superimposed Dither Frequency: 100-150 Hz
- Coil Resistance (12 VDC): 7.5 Ohm +/- 5% @ 68F (20C)
- Coil Resistance (24 VDC): 30.5 Ohm +/- 5% @ 68F (20C)

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
IP-PRZ-59-MP12  Pilot Operated Proportional, Pressure Reducing/Relieving, Slip-in type

DESCRIPTION
Special cavity, flange retained, slip-in proportional pressure reducing/relieving valve.

OPERATION
The IP-PRZ-59 generates a variable pressure in response to a PWM (Pulse Width Modulated) current signal. With no current applied to the proportional solenoid, the inlet port 3 is blocked and the regulated port 2 is vented to port 1.

As current is increased, fluid pressure is proportionally controlled at the regulated port 2. On attainment of proportionally determined pressure at 2, the cartridge shifts to block flow at 3, thereby regulating pressure at 2. In this mode, the valve also will relieve 2 to 1 at a variable value over the set reducing pressure.

FEATURES
• Economical slip-in style
• Integral waterproof coil
• Efficient wet-armature construction.
• Hardened parts for long life.

HYDRAULIC SYMBOL
Flanged Retained Product.
The coil (12 Vdc) is an integral part of the valve and is not serviceable.
Inlet pressure up to 50 bar.
Max regulated pressure can be increased up to 35 bar (factory preset)
Tank Pressure level above zero is additive to the valves expected reduced pressure value.

PERFORMANCE
Reduced pressure (bar) vs. current (mA)
(12 V coil, 24 bar inlet pressure)

VALVE SPECIFICATIONS
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>7.9 GPM (30 LPM)@ 3 bar</td>
</tr>
<tr>
<td>Max Inlet Pressure</td>
<td>700 PSI (50 bar)</td>
</tr>
<tr>
<td>Controlled pressure range</td>
<td>(see graph)</td>
</tr>
<tr>
<td>Max internal leakage</td>
<td>&lt; 500 cc/min @ 35 bar</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>5 to 5000 cSt</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/15/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-25°C / +85°C</td>
</tr>
<tr>
<td>Weight</td>
<td>.63 lbs .29 kg</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cavity</td>
<td>T059</td>
</tr>
<tr>
<td>Cavity tools Kit (form tool, reamer, tap)</td>
<td>K-T059</td>
</tr>
<tr>
<td>Flange mounting screws and torque</td>
<td>M6x10 / 4 ft-lbs (6 Nm)</td>
</tr>
</tbody>
</table>

COIL SPECIFICATIONS
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Supply Characteristics</td>
<td>PWM</td>
</tr>
<tr>
<td>Rated Current Range</td>
<td>100 – 900 mA</td>
</tr>
<tr>
<td>PWM or Super-imposed Dither Frequency</td>
<td>100 - 150 Hz</td>
</tr>
<tr>
<td>Min. Resistance (12 Vdc)</td>
<td>10 Ohm +/- 5% at 68 °F (20 °C)</td>
</tr>
<tr>
<td>Max. Power Consumption</td>
<td>14 Watt</td>
</tr>
<tr>
<td>Protection Degree</td>
<td>IP 67 according to IEC 529</td>
</tr>
<tr>
<td>Coil Termination</td>
<td>Amp Superseal 1.5 Series 282080-1 type</td>
</tr>
<tr>
<td>Connector Color</td>
<td>Green</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
PROPORTIONAL FLOW CONTROLS

DIMENSIONS

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00  Blank Without Body</td>
</tr>
<tr>
<td>Buna, Screen</td>
<td>A0  S #6 SAE Ports</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EG-PRZ 3 Way, Proportional Pressure Reducing Control Valve

**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, solenoid operated, proportional pressure reducing control valve

**OPERATION**

When de-energized the EG-PRZ allows flow from (2) to (1) and blocks flow at (3).

When energized, the cartridge’s spool lifts to open (3) to (2) and blocks flow at (1). Outlet pressure is proportional to current applied to the coil.

**FEATURES**

- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Note: Low Wattage coils are available. Consult Factory

**PERFORMANCE**

Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 8 GPM (30 LPM)
- **Max System Pressure**: 450 PSI (31 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Weight**: .38 lbs. (.17 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 12 ft-lbs (16.3 Nm)
- **Coil Nut Torque Requirements**: 4 - 6 ft-lbs (5.4 - 8.1 Nm)
- **Cavity**: DELTA 4W
- **Cavity Form Tool (Finishing)**: 40500002
- **Seal Kit**: 21191204

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Solenoid Operated Proportional Controls**

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

---

### Dimensions

- **.75 [19.1] HEX NUT**
- **1.25 [31.7]**
- **1.54 [39.1]**
- **2.65 [67.3]**
- **.22 [5.6]**
- **2.43 [61.6]**

**SEE COIL DATA FOR TERMINATIONS**

---

### Ordering Information

**EG-PRZ** - - -

**OPTIONS**
- Buna Standard: 00
- Viton Standard: V0

**BODIES**
- Blank: Without Body
- N: 1/4 NPTF Ports
- S: #6 SAE Ports

**VOLTAGE**
- 12: 12 VDC (.825 Amps Max.)
- 24: 24 VDC (.412 Amps Max.)

**“P” Coil Termination**

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (DC)
- DI: Deutsch – Integral DT04-2P
- IA: “I” Coil AMP Superseal - Integral
- ID: “I” Coil Deutsch – Integral DT04-2P
- IJ: “I” Coil AMP Jr. Timer - Integral
- IM: “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .42 lbs. (.19 kg.)

**Warning:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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---

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800-999-7378
**ES-PRZ Proportional Pressure Reducing Control Valve**

### DESCRIPTION
12 size, 1 1/16-12 thread, "Tecnord" series, solenoid operated, proportional pressure reducing control valve

### OPERATION
When de-energized the ES-PRZ allows flow from (2) to (1) and blocks flow at (3).

When energized, the cartridge’s spool lifts to open (3) to (2) and blocks flow at (1). Outlet pressure is proportional to current applied to the coil.

### FEATURES
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

### HYDRAULIC SYMBOL

Note: Low Wattage coils available. Consult Factory

### PERFORMANCE
Actual Test Data (Cartridge Only)

![Pressure vs Current Graph for ESPRZ at 300 psi inlet](image)

### VALVE SPECIFICATIONS
- **Nominal Flow**: 30 GPM (114 LPM)
- **Max System Pressure**: 450 PSI (31 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120 °C)
- **Weight**: 67 lbs. (.3 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 70 ft-lbs (94.9 Nm)
- **Coil Nut Torque Requirements**: 4 – 6 ft-lbs (5.4 – 8.1 Nm)
- **Cavity**: 40200043
- **Seal Kit**

---

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
Typical application for the PRD is for system pressure level control.

Typical Schematic

Typical application for the PRD is for system pressure level control.
**EE-PRD 2 Way, Normally Open, Proportional Relief Valve**

**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, solenoid operated, 2 way normally open, hydraulic relief valve.

**OPERATION**
The EE-PRD blocks flow from (2) to (1) until sufficient pressure is present at (2) to offset the electrically induced solenoid force.

Can be infinitely adjusted across a prescribed range using a variable electric input. Pressure output is proportional to DC current input. This valve is intended for use as a pressure limiting device in demanding applications.

With no current applied to the solenoid, the valve will free flow from (2) to (1) at approximately 100 PSI.

Note: Backpressure on port (1) becomes additive to the pressure setting at a 1:1 ratio.

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Uses “P” Power coil.

Consult Factory for I coil performance curves.

For best performance valve must be purged of air.
Locate below reservoir or add check valve to return.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>0-12 GPM (0-45 LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>0-12 GPM (0-45 LPM)</td>
</tr>
<tr>
<td>Operating Range</td>
<td>100-3000 PSI (3-207 bar)</td>
</tr>
<tr>
<td>Typical Hysteresis</td>
<td>5%</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.30 lbs. (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191202</td>
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</table>

**COIL SPECIFICATION**

<table>
<thead>
<tr>
<th>Current Supply Characteristics</th>
<th>PWM (Pulse Width Modulation) or Variable DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Current Range</td>
<td>00-1000mA (12Volt) 500mA (24 Volt)</td>
</tr>
<tr>
<td>PWM or Superimposed Dither Frequency</td>
<td>200 Hz or Higher</td>
</tr>
<tr>
<td>Coil Resistance (12 VDC)</td>
<td>7.5 Ohm +/- 5% @ 68F (20C)</td>
</tr>
<tr>
<td>Coil Resistance (24 VDC)</td>
<td>30.5 Ohm +/- 5% @ 68F (20C)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

EE-PRD - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Blank Without Body
N 3/8 NPT Ports
S #8 SAE Ports

VOLTAGE
12 12 VDC
24 24 VDC

“P” COIL TERMINATION

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads

SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschman)
DI Deutsch – Integral DT04-2P

Approximate Coil Weight: .42 lbs. (.19 kg.)

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
Typical Schematic

Typical application for the PLA, PLB, and PLC is on a circuit as bi-directional pilot operated 2 way valve with either vent to open or pilot to close from an external source.
SL-PLA Super Series, Logic Valve

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, logic valve

OPERATION
The SL-PLA with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1). Used for basic blocking applications.

HYDRAULIC SYMBOL

FEATURES
- Hardened parts for long life.
- Industry common cavity.

For bidirectional applications see SL-PLC. For metering see SL-PCA or SL-PCB.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .69 lbs. (.31 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs. (122 Nm)
- Cavity: SUPER 3WS
- Cavity Form Tool (Finishing): 40500021
- Seal Kit: 21191409
- Seat Ratio: Area of the pilot is 1.2 times the area of the seat at Port 3.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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**DIMENSIONS**

<table>
<thead>
<tr>
<th>1.63 [41.3]</th>
<th>HEX</th>
</tr>
</thead>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
<th>PRESSURE SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Pilot to Close</td>
<td>Blank (S)</td>
<td>0020 20 PSI</td>
</tr>
<tr>
<td>Buna Vent to Open</td>
<td>Without Body (#12 SAE Ports)</td>
<td>0050 50 PSI</td>
</tr>
<tr>
<td>Viton Pilot to Close</td>
<td></td>
<td>0100 100 PSI</td>
</tr>
<tr>
<td>Viton Vent to Open</td>
<td></td>
<td>0150 150 PSI</td>
</tr>
<tr>
<td>Buna Pilot to Close w/seals</td>
<td>0B</td>
<td></td>
</tr>
<tr>
<td>Buna Vent to Open w/seals</td>
<td>OC 0C</td>
<td></td>
</tr>
<tr>
<td>Viton Pilot to Close w/seals</td>
<td>VB 0B</td>
<td></td>
</tr>
<tr>
<td>Viton Vent to Open w/seals</td>
<td>VC 0C</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628       Fax: (815) 397-2526       E-mail: delta@delta-power.com
SL-PLB Super Series, Logic Valve

DESCRIPTION
16 size, 1 5/16-12 thread, “Super” series, logic valve

OPERATION
The SL-PLB with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1). Used for basic blocking applications.

HYDRAULIC SYMBOL

FEATURES
- Hardened parts for long life.
- Industry common cavity.

For bidirectional applications see SL-PLC. For metering see SLPCA or SL-PCB.

PERFORMANCE
Actual Test Data (Cartridge Only)

VALVE SPECIFICATIONS
Nominal Flow 40 GPM (151 LPM)
Rated Operating Pressure 3500 PSI (241 bar)
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration ISO 18/16/13
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Weight 69 lbs, (.31 kg)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Torque Requirements 90 ft-lbs (122 Nm)
Cavity SUPER 3WS
Cavity Form Tool (Finishing) 40500021
Seal Kit 21191409
Seat Ratio Area of the Pilot is 1.5 times the area of the seat at Port 3

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

ORDERING INFORMATION

SL-PLB

OPTIONS
- Buna Pilot to Close: 0P
- Buna Vent to Open: 0V
- Viton Pilot to Close: VP
- Viton Vent to Open: VV
- Buna Pilot to Close w/seals: 0B
- Buna Vent to Open w/seals: 0C
- Viton Pilot to Close w/seals: VB
- Viton Vent to Open w/seals: VC

BODIES
- Blank: S
- Without Body: #12 SAE Ports

PRESSURE SETTING
- 0020: 20 PSI
- 0050: 50 PSI
- 0100: 100 PSI
- 0150: 150 PSI

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**SL-PLC Super Series, Logic Valve**

**DESCRIPTION**
16 size, 1 5/16-12 thread, “Super” series, logic valve

**OPERATION**
The SL-PLC with an orifice between ports (3) and (1) maintains a constant flow rate from (3) regardless of load pressure changes in the system upstream of (3), or in the bypass leg at (2) as long as pressure at (2) is less than (1). Used for basic bidirectional blocking applications.

**HYDRAULIC SYMBOL**

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

For metering see SL-PCA or SL-PCB.

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**
- Nominal Flow: 40 GPM (151 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: .65 lbs. (.29 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs. (122 Nm)
- Cavity: SUPER 3WS
- Cavity Form Tool (Finishing): 40500021
- Seal Kit: 21191409
- Seat Ratio: Area of the Pilot is 2 times the area of the seat at Port 3

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

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Page 550  
800-999-7378
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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DIMENSIONS

ORDERING INFORMATION

SL-PLC - - -

OPTIONS
Buna Pilot to Close 0P
Viton Pilot to Close VP
Buna Pilot to Close w/seals 0B
Viton Pilot to Close w/seals VB

BODIES
Blank S
Without Body #12 SAE Ports

PRESSURE SETTING
0020 20 PSI
0050 50 PSI
0100 100 PSI
0150 150 PSI
<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Series Single Pilot Operated Check Valve</td>
<td>554</td>
</tr>
<tr>
<td>Mini Series Double Pilot Operated Check Valve</td>
<td>556</td>
</tr>
<tr>
<td>Power Series Single Pilot Operated Check Valve</td>
<td>558</td>
</tr>
<tr>
<td>Power Series Double Pilot Operated Check Valve</td>
<td>560</td>
</tr>
<tr>
<td>Delta Series Single Pilot Operated Check Valve</td>
<td>562</td>
</tr>
<tr>
<td>Delta Series Double Pilot Operated Check Valve</td>
<td>564</td>
</tr>
<tr>
<td>Delta Series Double Pilot Operated Check Valve with Thermal Relief</td>
<td>566</td>
</tr>
<tr>
<td>Super Series Single Pilot Operated Check Valve</td>
<td>568</td>
</tr>
<tr>
<td>Super Series Double Pilot Operated Check Valve</td>
<td>570</td>
</tr>
</tbody>
</table>

*Continued Next Page…*

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**MS-POC Single Pilot Operated Check Valve**

**DESCRIPTION**
7 size, 5/8-18 thread, "Mini" series, pilot operated check valve.

**OPERATION**
The MS-POC allows flow to pass from (V) to (C) and blocks flow from (C) to (V). When pilot pressure is applied to pilot port the valve allows flow from (C) to (V).

The valve has a 6.7:1 pilot ratio, so at least .149 of the load pressure is required at the (PILOT) port to open the flow passage to allow flow from ports (C).

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosion protection.

**TYPICAL SCHEMATIC**

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>5 GPM (19 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>6.7:1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.7 lbs. (.30 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .28 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A MA-CVA

ORDERING INFORMATION

MS-POC - - -

OPTIONS
Buna Standard
Viton Standard

BODIES
1/4 NPTF Ports
#4 SAE Ports

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**PS-POC Single Pilot Operated Check Valve**

**DESCRIPTION**
8 size, 3/4-16 thread, "Power" series, pilot operated check valve.

**OPERATION**
The PS-POC allows flow to pass from (V) to (C) and blocks flow from (C) to (V). When pilot pressure is applied to pilot port the valve allows flow from (C) to (V).

The valve has a 4:1 pilot ratio, so at least .250 of the load pressure is required at the (PILOT) port to open the flow passage to allow flow from ports (C).

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**HYDRAULIC SYMBOL**

**TYPICAL SCHEMATIC**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4:1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.0 lbs. (.45 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .28 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A PB-CVC

ORDERING INFORMATION

PS-POC - - -

OPTIONS
Buna Standard B N
Viton Standard V S

BODIES
1/4 NPTF Ports
#6 SAE Ports

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**DS-POC Single Pilot Operated Check Valve**

**DESCRIPTION**

**OPERATION**
The DS-POC allows flow to pass from (V) to (C) and blocks flow from (C) to (V). When pilot pressure is applied to pilot port the valve allows flow from (C) to (V).

The valve has a 4:1 pilot ratio, so at least .250 of the load pressure is required at the (PILOT) port to open the flow passage to allow flow from ports (C).

The check is spring-biased at 90 psi (6.2 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**TYPICAL SCHEMATIC**

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4:1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.1 lbs. (.50 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>90 PSI (6.2 bar)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .28 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A DE-CVA

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>DS-POC</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>B</td>
<td>3/8 NPTF Ports</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V</td>
<td>#8 SAE Ports</td>
</tr>
</tbody>
</table>

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SS-POC Single Pilot Operated Check Valve

DESCRIPTION

OPERATION
The SS-POC allows flow to pass from (V) to (C) and blocks flow from (C) to (V). When pilot pressure is applied to pilot port the valve allows flow from (C) to (V).

The valve has a 3.7:1 pilot ratio, so at least .270 of the load pressure is required at the (PILOT) port to open the flow passage to allow flow from ports (C).

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

FEATURES
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

TYPICAL SCHEMATIC

HYDRAULIC SYMBOL

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>40 GPM (151 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>3.7 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>4.3 lbs. (2.0 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

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### DIMENSIONS

SAE PORTS SHOWN
MTG: HOLES ARE .41 Dia.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A SJ-CVA

### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>SS-POC</th>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna Standard</td>
<td>#12 SAE Ports</td>
</tr>
<tr>
<td></td>
<td>Viton Standard</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
MD-POC  Double Pilot Operated Check Valve

DESCRIPTION

OPERATION
The MD-POC allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly.

The valve has a 6.7:1 pilot ratio, so at least .141 of the load pressure at port (C1) or (C2) is required at the pilot lines (ports (V2) or (V1) respectively to open the flow passage to allow flow from ports (C1) or (C2) respectively.

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

FEATURES
- Hardened internal parts for long life.
- Anodized aluminum body for corrosion protection.

TYPICAL SCHEMATIC

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>5 GPM (19 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>6.7 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.92 lbs (.42kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>15 ft-lbs (20.3 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .28 DIA.
NOTE: DIMENSIONS IN BRACKETS ARE MILLIMETERS
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A MA-CVA

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MD-POC</th>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B N V S</td>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#4 SAE Ports</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
**PD-POC Double Pilot Operated Check Valve**

**DESCRIPTION**

8 size, 3/4-16 thread, “Power” series, double pilot operated check valve.

**OPERATION**

The PD-POC allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly.

The valve has a 4:1 pilot ratio, so at least .250 of the load pressure at port (C1) or (C2) is required at the pilot lines (ports (V2) or (V1) respectively to open the flow passage to allow flow from ports (C1) or (C2) respectively.

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

**FEATURES**

- Hardened internal parts for long life.
- Anodized aluminum body for corrosion protection.

**TYPICAL SCHEMATIC**

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.2 lbs. (.53kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>25 ft-lbs (34 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .28 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A PB-CVC

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>B</th>
<th>N</th>
<th>V</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viton Standard</td>
<td></td>
<td></td>
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</table>

<table>
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<tr>
<th>BODIES</th>
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</thead>
<tbody>
<tr>
<td>1/4 NPTF Ports</td>
</tr>
<tr>
<td>#6 SAE Ports</td>
</tr>
</tbody>
</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DD-POC Double Pilot Operated Check Valve

**DESCRIPTION**

**OPERATION**
The DD-POC allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly.

The valve has a 4:1 pilot ratio, so at least .250 of the load pressure at port (C1) or (C2) is required at the pilot lines (ports (V2) or (V1) respectively to open the flow passage to allow flow from ports (C1) or (C2) respectively.

The check is spring-biased at 90 psi (6.2 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**TYPICAL SCHEMATIC**

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.5 lbs. (.63 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>90 PSI (6.2 bar)</td>
</tr>
</tbody>
</table>

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
HYDRAULIC INTEGRATED CIRCUITS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .26 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A DE-CVA

ORDERING INFORMATION

| OPTIONS   |  | BODIES       |
|-----------|  |             |
| Buna Standard | B | 3/8 NPTF Ports |
| Viton Standard | V | #8 SAE Ports  |
**SD-POC Double Pilot Operated Check Valve**

**DESCRIPTION**

**OPERATION**
The SD-POC allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly.

The valve has a 3.7:1 pilot ratio, so at least .267 of the load pressure at port (C1) or (C2) is required at the pilot lines (ports (V2) or (V1) respectively to open the flow passage to allow flow from ports (C1) or (C2) respectively.

The check is spring-biased at 50 psi (3.4 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**TYPICAL SCHEMATIC**
![Typical application for this valve is load holding when pump is off.]

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>40 GPM (151 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>3.7 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>6.0 lbs. (2.7kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>90 ft-lbs (122 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

SAE PORTS SHOWN
MTG. HOLES ARE .1 DIA.
O-RINGS ARE STANDARD ON PISTON ASSEMBLY
CHECK VALVE USED IS A SJ-CVA

ORDERING INFORMATION

SD-POC - - -

OPTIONS
Buna Standard B
Viton Standard V

BODIES
#12 SAE Ports S

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DESCRIPTION**
10 size, 7/8-14 thread, “Delta” series, double pilot operated check valve with thermal relief valve.

**OPERATION**
The DD-POT allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly. Also “C2 port is protected by thermal relief.

The valve has a 4:1 pilot ratio, so at least .250 of the load pressure at port (C1) or (C2) is required at the pilot lines (ports (V2) or (V1) respectively to open the flow passage to allow flow from ports (C1) or (C2) respectively.

The check is spring-biased at 90 psi (6.2 bar) to assure holding in static or no-load conditions.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**TYPICAL SCHEMATIC**

**HYDRAULIC SYMBOL**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>4 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.4 lbs. (.63 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>90 PSI (6.2 bar)</td>
</tr>
</tbody>
</table>

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
**Pre-Engineered Circuit, Option Model A**

**DESCRIPTION**
Pre-engineered circuit, option model A

**OPERATION**
See options chart for specific operation

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Options Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Options Chart for Pressure Range</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
## OPTIONS CHART

### VALVE 1
- LOAD HOLDING SOLENOID OPERATED
  - 1 2 3A
- CIRCUIT AA
  - (12 GPM NOMINAL)

### VALVE 2
- LIFT CIRCUIT WITH RELIEF
  - 1 2
  - CIRCUIT AE
  - (15 GPM NOMINAL)

### RELIEF VALVE W/ ADJUSTABLE PRESSURE COMPENSATED FLOW CONTROL
- RELIEF VALVE W/ FLOW CONTROL
  - 1 2
  - CIRCUIT AB
  - (5 GPM NOMINAL)

### UNLOADING WITH FIXED PRESSURE COMPENSATED FLOW CONTROL
- UNLOADING WITH FLOW CONTROL
  - 1 2
  - CIRCUIT AC
  - (5 GPM NOMINAL)

### SPEED CONTROL
- CIRCUIT AD
  - (15 GPM NOMINAL)

### ORDERING INFORMATION

#### CIRCUITS
<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>Buna Standard</td>
</tr>
<tr>
<td>AB</td>
<td>Viton Standard</td>
</tr>
<tr>
<td>AC</td>
<td>Manual Override</td>
</tr>
<tr>
<td>AD</td>
<td>01 0.5-1 GPM 02 20-500 PSI</td>
</tr>
<tr>
<td>AE</td>
<td>01 0.5-1 GPM 02 20-500 PSI</td>
</tr>
<tr>
<td>AF</td>
<td>01 0.5-1 GPM 02 20-500 PSI</td>
</tr>
<tr>
<td>AG</td>
<td>01 0.5-1 GPM 02 20-500 PSI</td>
</tr>
<tr>
<td>AH</td>
<td>01 0.5-1 GPM 02 20-500 PSI</td>
</tr>
<tr>
<td>&quot;D&quot; COIL TERMINATION (All DC Except as Noted)</td>
<td></td>
</tr>
<tr>
<td>DL</td>
<td>Double Lead</td>
</tr>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
</tr>
<tr>
<td>SS</td>
<td>Single Spade</td>
</tr>
<tr>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>IA</td>
<td>&quot;T&quot; Coil AMP Superseal - Integral</td>
</tr>
<tr>
<td>ID</td>
<td>&quot;T&quot; Coil Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>IJ</td>
<td>&quot;T&quot; Coil AMP Jr. Timer - Integral</td>
</tr>
<tr>
<td>IM</td>
<td>&quot;T&quot; Coil Metri-Pack – Integral</td>
</tr>
</tbody>
</table>

#### FLOW
<table>
<thead>
<tr>
<th>PRESSURE</th>
<th>FLOW</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>5-1 GPM</td>
<td>0M 6 VDC</td>
</tr>
<tr>
<td>02</td>
<td>20-500 PSI</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>1-2 GPM</td>
<td>12 12 VDC</td>
</tr>
<tr>
<td>04</td>
<td>1500-3000 PSI</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>2-4 GPM</td>
<td>24 24 VDC</td>
</tr>
<tr>
<td>06</td>
<td>30 1500-3000 PSI</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>3-4 GPM</td>
<td>36 36 VDC</td>
</tr>
<tr>
<td>08</td>
<td>40 2500-4000 PSI</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>4-8 GPM</td>
<td>48 48 VDC</td>
</tr>
<tr>
<td>10</td>
<td>40 2500-4000 PSI</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>120 VAC</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>2500-4000 PSI</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>220 VAC</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>25 25 VAC</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>30 1500-3000 PSI</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>440 VAC</td>
<td></td>
</tr>
</tbody>
</table>

### VALVE 1
- FLOW CONTROL RELIEF VALVE
  - CIRCUIT AH
  - (12 GPM NOMINAL)

### VALVE 2
- RELIEF VALVE
  - CIRCUIT AF
  - (5 GPM NOMINAL)

### FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

#### Approximate Coil Weight: .74 lbs (.33 kg.)

#### WARNING
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**Pre-Engineered Circuit, Option Model B***

**BASE BODY - 20200002 = #8 SAE**

**DESCRIPTION**
Pre-engineered circuit, option model B*

**OPERATION**
See options chart for specific operation

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (48 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>BODY WEIGHT</td>
<td>1.2 lbs. [.54 kg.]</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

![Dimensional Diagram]

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OPTIONS CHART

ORDERING INFORMATION

*CIRCUITS*  BA  BB  BC
*OPTIONS*  00  02  04  08  11  12  22  24  32  36  44
*VOLTAGE*  01  02  03  04  05  06  07  08  09  10  11
*FLOW*  01  02  03  04  05  06  07  08  09  10  11
*PRESSURE*  01  02  03  04  05  06  07  08  09  10  11
*LIFT, CHECK, & DUMP*  CIRCUIT BA
*CIRCUIT BC*
*START UP CIRCUIT*  CIRCUIT BB

“D” COIL TERMINATION
(All DC Except as Noted)

- DL Double Lead
- DT Deutsch on Leads DT04-2P
- ML Metri-Pack on Leads
- PL Packard on Leads
- WL Weatherpack on Leads
- SS Single Spade
- DS Double Spade
- HC DIN 43650 (Hirschman) – (AC & DC)
- CL Conduit Lead – (AC Only)
- DI Deutsch – Integral DT04-2P
- IA “I” Coil Deutsch – Integral
- ID “I” Coil AMP Jr. Timer - Integral
- IA “I” Coil AMP Supereal - Integral
- IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs (.33 kg.)

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
Pre-Engineered Circuit, Option Model C*

DESCRIPTION
Pre-engineered circuit, option model C*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Options Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Options Chart for Pressure Ranges</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

BODY WEIGHT: .83 lbs [.37 kg.]

DIMENSIONS

![Dimensions Diagram]

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OPTIONS CHART

ORDERING INFORMATION

CIRCUITS
- CA
- CB
- CC
- CD
- CE
- CF

OPTIONS
- 00
- 01
- 02
- 03
- 04
- 06
- 08
- 11
- 12
- 22
- 44

FLOW
- 01
- 02
- 04
- 06
- 08

PRESSURE
- 01
- 02
- 03
- 04

VOLTAGE
- 06
- 12
- 24
- 36
- 48

“D” COIL TERMINATION
(All DC Except as Noted)
- DL
- DT
- ML
- PL
- WL
- SS
- DS

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

Approximate Coil Weight: 74 lbs (.33 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Pre-Engineered Circuit, Option Model D*

DESCRIPTION
Pre-engineered circuit, option model D*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Options Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Options Chart for Pressure Ranges</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

BODY WEIGHT: .83 lbs. [.37 kg.]

NOTE:
THIS ASSEMBLY WILL MOUNT ON WHITE "RS"; EATON "H.S.& T"; SAUER DANFOSS "DH & DS"; AND PARKER "TC" "MOTORS"
**OPTIONS CHART**

### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>OPTIONS</th>
<th>FLOW</th>
<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td></td>
<td>00</td>
<td>0-1 GPM</td>
</tr>
<tr>
<td>DB</td>
<td>Buna Standard</td>
<td>01</td>
<td>20-50 PSI</td>
</tr>
<tr>
<td>DC</td>
<td>Viton Standard</td>
<td>02</td>
<td>1-2 GPM</td>
</tr>
<tr>
<td>DD</td>
<td>Manual Override</td>
<td>06</td>
<td>0.5-1 GPM</td>
</tr>
<tr>
<td>DF</td>
<td></td>
<td>02</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td>DE</td>
<td></td>
<td>03</td>
<td>2-4 GPM</td>
</tr>
</tbody>
</table>

- **DA**: Double Lead
- **DB**: Deutsch on Leads DT04-2P
- **DC**: Metri-Pack on Leads
- **DD**: Packard on Leads
- **DE**: Weatherpack on Leads
- **DF**: Single Spade
- **DI**: Double Spade

### VALVE 1

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>FLOW</th>
<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01</td>
<td>0-1 GPM</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>20-50 PSI</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>0.5-1 GPM</td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td></td>
<td>06</td>
<td>0.5-1 GPM</td>
</tr>
</tbody>
</table>

- **V0**: DIN 43650 (Hirschman) – (AC & DC)
- **V1**: Conduit Lead – (AC Only)
- **V2**: Deutsch – Integral DT04-2P
- **V3**: Immersion Proof “D” Type
- **V4**: “I” Coil AMP Superseal – Integral
- **V5**: “I” Coil Deutsch – Integral DT04-2P
- **V6**: “I” Coil AMP Jr. Timer – Integral
- **V7**: “I” Coil Metri-Pack – Integral

**Approximate Coil Weight**: .74 lbs (.33 kg.)

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**Pre-Engineered Circuit, Option Model E**

**DESCRIPTION**
Pre-engineered circuit, option model E*

**OPERATION**
See options chart for specific operation

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Options Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

![Dimensions Diagram](image)

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
## OPTIONS CHART

### DUAL SPEED CIRCUIT

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Voltage</th>
<th>Flow</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>6 VDC</td>
<td>5-1 GPM</td>
<td>0-500 PSI</td>
</tr>
<tr>
<td>EB</td>
<td>12 VDC</td>
<td>1-2 GPM</td>
<td>500-1500 PSI</td>
</tr>
<tr>
<td>EC</td>
<td>24 VDC</td>
<td>2-4 GPM</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>ED</td>
<td>36 VDC</td>
<td>4-8 GPM</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>EE</td>
<td>48 VDC</td>
<td>4-8 GPM</td>
<td>2500-4000 PSI</td>
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</tbody>
</table>

### PRESSURE COM P. FLOW CONTROL & CHECK VALVE

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Voltage</th>
<th>Flow</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EB</td>
<td>120 VAC</td>
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<td>0-500 PSI</td>
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<tr>
<td>EC</td>
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<tr>
<td>EG</td>
<td>440 VAC</td>
<td>4-8 GPM</td>
<td>2500-4000 PSI</td>
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### DUAL SPEED CIRCUIT

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<thead>
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<th>Pressure</th>
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<tbody>
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<td>5-1 GPM</td>
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<tr>
<td>EE</td>
<td>48 VDC</td>
<td>4-8 GPM</td>
<td>2500-4000 PSI</td>
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### ADJUSTABLE RELIEF & CHECK VALVE

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<tr>
<td>EC</td>
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<td>1-2 GPM</td>
<td>500-1500 PSI</td>
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<tr>
<td>EG</td>
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<td>4-8 GPM</td>
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### DUAL SPEED CIRCUIT

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Voltage</th>
<th>Flow</th>
<th>Pressure</th>
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<tr>
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<td>6 VDC</td>
<td>5-1 GPM</td>
<td>0-500 PSI</td>
</tr>
<tr>
<td>EB</td>
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<tr>
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<td>2-4 GPM</td>
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<tr>
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<td>EE</td>
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<tr>
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<tr>
<td>EG</td>
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<tr>
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<tr>
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<td>1-2 GPM</td>
<td>500-1500 PSI</td>
</tr>
<tr>
<td>EG</td>
<td>440 VAC</td>
<td>4-8 GPM</td>
<td>2500-4000 PSI</td>
</tr>
</tbody>
</table>

## ORDERING INFORMATION

**CIRCUITS**

- **EA**
- **EB**
- **EC**
- **ED**
- **EF**
- **EG**

**OPTIONS**

- **EA**
  - Buna Standard
  - Viton Standard
  - Manual Override

**VOLTAGE**

- **EA**
  - 0V: 6 VDC
  - 06: 12 VDC
  - 12: 24 VDC
  - 24: 36 VDC
  - 36: 48 VDC
  - 48: 60 VDC
  - 60: 120 VAC
  - 11: 220 VAC
  - 22: 440 VAC

**FLOW**

- **EA**
  - 01: 5-1 GPM
  - 02: 1-2 GPM
  - 04: 2-4 GPM
  - 08: 4-8 GPM

**PRESSURE**

- **EA**
  - 01: 5-1 GPM
  - 02: 1-2 GPM
  - 04: 2-4 GPM
  - 08: 4-8 GPM

**FLOW CONTROL RELIEF VALVE**

- **EA**
  - 01: 1.5-1 GPM
  - 02: 2-4 GPM
  - 04: 4-8 GPM
  - 08: 8-12 GPM

**FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY**

**APPROXIMATE COIL WEIGHT:** 0.74 lbs (0.33 kg.)

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**Phone:** (815) 397-6628  **Fax:** (815) 397-2526  **E-mail:** delta@delta-power.com

**SHOP ONLINE at www.airlinehyd.com**
Pre-Engineered Circuit, Option Model F*

**DESCRIPTION**
Pre-engineered circuit, option model F*

**OPERATION**
See typical schematic for specific operation.

**VALVE SPECIFICATIONS**
- **Nominal Flow**: 9 GPM (34 LPM)
- **Rated Operating Pressure**: 50-1500 PSI (4-103 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: 30 micron nominal
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Size**: Delta Series 7/8-14 Thread
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)

**DIMENSIONS**

---

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DUAL SEQUENCE VALVE MANIFOLD AUTOMATICALLY CONTROLS THE SEQUENCING OF TWO CYLINDERS.

CIRCUIT FA

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>FA</th>
<th>OPTIONS</th>
<th>04</th>
<th>VALVE 1 PRESSURE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Buna Standard</td>
<td>04</td>
<td>50-425 PSI</td>
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<tr>
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<td></td>
<td>Viton Standard</td>
<td>15</td>
<td>400-1500 PSI</td>
</tr>
</tbody>
</table>

|          |    | 04 | 50-425 |
|          |    | 15 | 400-1500 PSI |

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Pre-Engineered Circuit, Option Model G*

DESCRIPTION
Pre-engineered circuit, option model G*

OPERATION
See typical schematic for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°F to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6Nm)</td>
</tr>
</tbody>
</table>

DIMENSIONS

[Diagram of the valve dimensions is shown here.]
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

TYPICAL SCHEMATIC

USED TO RECTIFY BI-DIRECTIONAL FLOW IN CYLINDER LINE FOR USE WITH MONO-DIRECTIONAL COMPONENTS, I.E. FLOW METER, FILTER, OIL COOLER.

CIRCUIT GA  RECTIFIER CIRCUIT

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>GA</th>
<th>OPTIONS</th>
<th>CRACK PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>00 Buna Standard V0 Viton Standard</td>
<td>10 PSI</td>
</tr>
</tbody>
</table>

SHAPI ONLINE at www.airlinehyd.com  800-999-7378
HYDRAULIC INTEGRATED CIRCUITS

Pre-Engineered Circuit, Option Model H*

DESCRIPTION
Pre-engineered circuit, option model H*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
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</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

DIMENSIONS

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
## OPTIONS CHART

### CIRCUITS

- **HA**
  - HA6
  - HA12
  - HA24
- **HB**
  - HB36
  - HB48

### OPTIONS

- Buna Standard: 00
- Viton Standard: V0
- Buna, Override: 0M

### VOLTAGE

- 06: 6 VDC
- 12: 12 VDC
- 24: 24 VDC
- 36: 36 VDC
- 48: 48 VDC
- 25: 25 VAC
- 11: 120 VAC
- 22: 220 VAC
- 44: 440 VAC

### "D" COIL TERMINATIONS

- DL: Double Lead
- DT: Deutsch on Leads DT04-2P
- ML: Metri-Pack on Leads
- PL: Packard on Leads
- WL: Weatherpack on Leads
- SS: Single Spade
- DS: Double Spade
- HC: DIN 43650 (Hirschman) – (AC & DC)
- CL: Conduit Lead – (AC Only)
- DI: Deutsch – Integral DT04-2P

### EMMERSION PROOF "D" TYPE

- IA: "I" Coil AMP Superseal - Integral
- ID: "I" Coil Deutsch – Integral DT04-2P
- IJ: "I" Coil AMP Jr. Timer - Integral
- IM: "I" Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

## WARNING

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Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
Pre-Engineered Circuit, Option Model I*

**DESCRIPTION**
Pre-engineered circuit, option model I*

**OPERATION**
See model options for specific operation (back)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Nominal Flow</td>
<td>12 GPM (45 LPM)</td>
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<tr>
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<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
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<td>Filtration</td>
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<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td></td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
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<tr>
<td>Cartridge Torque</td>
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</tr>
<tr>
<td>Requirements</td>
<td></td>
</tr>
<tr>
<td>Coil Torque Nut</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Requirements</td>
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</table>

**DIMENSIONS**

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## OPTIONS CHART

### CIRCUITS

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<th>PRESSURE</th>
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<td></td>
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<td>04</td>
<td>2-4 GPM</td>
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<td>06</td>
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<td>40</td>
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<tr>
<td></td>
<td>08</td>
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### CIRCUITS

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<td>5-1 GPM</td>
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<tr>
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<td>20-500 PSI</td>
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<td>IA</td>
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<td>5-1 GPM</td>
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<td>IB</td>
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</tr>
<tr>
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<td>04</td>
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</tr>
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<td>40</td>
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<tr>
<td>II</td>
<td>II</td>
<td>08</td>
<td>2500-4000 PSI</td>
</tr>
</tbody>
</table>

### "D" COIL TERMINATION

(All DC Except as Noted)

| DL | Double Lead | HC | DIN 43650 (Hirshman) – (AC & DC) |
|    |             |    | Conduit Lead – (AC Only)        |
| DT | Deutsch on Leads DT04-2P | CL | Deutsch – Integral DT04-2P |
| ML | Metri-Pack on Leads | DI | IMMERSION PROOF "D" TYPE |
| PL | Packard on Leads | IA | "1" Coil AMP Superseal - Integral |
| WL | Weatherpack on Leads | ID | "1" Coil Deutsch – Integral DT04-2P |
| SS | Single Spade | IJ | "1" Coil AMP Jr. Timer - Integral |
| DS | Double Spade | IM | "1" Coil Metri-Pack – Integral |

Approximate Coil Weight: 0.74 lbs (0.33 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DESCRIPTION
Pre-engineered circuit, option model J*

OPERATION
See typical schematic for specific operation.

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F ( -40° to 120° C )</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

DIMENSIONS

[Diagram of Pre-Engineered Circuit, Option Model J*]

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**HYDRAULIC INTEGRATED CIRCUITS**

**Delta Power Company**
4484 Boeing Drive - Rockford, IL 61109

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

**TYPICAL SCHEMATIC**

**4W 3P TANDEM CENTER**

```
A
\(\text{S4C}\)  \(V\)  \(P\)
B
\(\text{S4C}\)  \(V\)  \(T\)
```

**CIRCUIT JA**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>CIRCUITS</th>
<th>JA</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna Standard</td>
<td>00</td>
<td></td>
<td>6 VDC</td>
</tr>
<tr>
<td>Viton Standard</td>
<td>V0</td>
<td></td>
<td>12 VDC</td>
</tr>
<tr>
<td>Buna, Override</td>
<td>0M</td>
<td></td>
<td>24 VDC</td>
</tr>
<tr>
<td>36</td>
<td>36 VDC</td>
<td></td>
<td>36 VDC</td>
</tr>
<tr>
<td>48</td>
<td>48 VDC</td>
<td></td>
<td>48 VDC</td>
</tr>
<tr>
<td>25</td>
<td>25 VAC</td>
<td></td>
<td>25 VAC</td>
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<td>11</td>
<td>120 VAC</td>
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<td>120 VAC</td>
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<td>22</td>
<td>220 VAC</td>
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<td>220 VAC</td>
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<tr>
<td>44</td>
<td>440 VAC</td>
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<td>440 VAC</td>
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**"D" COIL TERMINATIONS**

(All DC Except as Noted)

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL</td>
<td>Double Lead</td>
</tr>
<tr>
<td>DT</td>
<td>Deutsch on Leads DT04-2P</td>
</tr>
<tr>
<td>ML</td>
<td>Metri-Pack on Leads</td>
</tr>
<tr>
<td>PL</td>
<td>Packard on Leads</td>
</tr>
<tr>
<td>WL</td>
<td>Weatherpack on Leads</td>
</tr>
<tr>
<td>SS</td>
<td>Single Spade</td>
</tr>
<tr>
<td>DS</td>
<td>Double Spade</td>
</tr>
<tr>
<td>HC</td>
<td>DIN 43650 (Hirschman) – (AC &amp; DC)</td>
</tr>
<tr>
<td>CL</td>
<td>Conduit Lead – (AC Only)</td>
</tr>
<tr>
<td>DI</td>
<td>Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>IA</td>
<td>&quot;I&quot; Coil AMP Supereal – Integral</td>
</tr>
<tr>
<td>ID</td>
<td>&quot;I&quot; Coil Deutsch – Integral DT04-2P</td>
</tr>
<tr>
<td>IJ</td>
<td>&quot;I&quot; Coil AMP Jr. Timer - Integral</td>
</tr>
<tr>
<td>IM</td>
<td>&quot;I&quot; Coil Metri-Pack – Integral</td>
</tr>
</tbody>
</table>

**IMMERSION PROOF "D" TYPE**

Approximate Coil Weight: .74 lbs/.33 kg.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
Pre-Engineered Circuit, Option Model K*

DESCRIPTION
Pre-engineered circuit, option model K*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Options Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Options Chart for Pressure Range</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread.</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

BODY WEIGHT: 1.50 lbs. [.68 kg.]

DIMENSIONS

![Dimension Diagram]

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OPTIONS CHART

**VALVE 2**

<table>
<thead>
<tr>
<th>OPTION</th>
<th>FLOW</th>
<th>PRESSURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA</td>
<td>12 GPM</td>
<td>3500 PSI</td>
</tr>
<tr>
<td>KB</td>
<td>Buna Standard</td>
<td>00</td>
</tr>
<tr>
<td>KC</td>
<td>Viton Standard</td>
<td>V0</td>
</tr>
<tr>
<td>KD</td>
<td>Manual Override</td>
<td>OM</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>02</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>04</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>08</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>24</td>
</tr>
<tr>
<td>KE</td>
<td>220 VAC</td>
<td></td>
</tr>
<tr>
<td>KE</td>
<td>440 VAC</td>
<td></td>
</tr>
</tbody>
</table>

**FLOW CONTROL RELIEF VALVE**

<table>
<thead>
<tr>
<th>FLOW</th>
<th>PRESSURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>20-500 PSI</td>
</tr>
<tr>
<td>04</td>
<td>200-1500 PSI</td>
</tr>
<tr>
<td>08</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>40</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>40</td>
<td>2500-4000 PSI</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

**VALVE 1**

<table>
<thead>
<tr>
<th>OPTION</th>
<th>FLOW</th>
<th>PRESSURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA</td>
<td>12 GPM</td>
<td>3500 PSI</td>
</tr>
<tr>
<td>KB</td>
<td>Buna Standard</td>
<td>00</td>
</tr>
<tr>
<td>KC</td>
<td>Viton Standard</td>
<td>V0</td>
</tr>
<tr>
<td>KD</td>
<td>Manual Override</td>
<td>OM</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>02</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>04</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>08</td>
</tr>
<tr>
<td>KE</td>
<td>12 VDC</td>
<td>24</td>
</tr>
<tr>
<td>KE</td>
<td>220 VAC</td>
<td></td>
</tr>
<tr>
<td>KE</td>
<td>440 VAC</td>
<td></td>
</tr>
</tbody>
</table>

**FLOW CONTROL RELIEF VALVE**

<table>
<thead>
<tr>
<th>FLOW</th>
<th>PRESSURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>20-500 PSI</td>
</tr>
<tr>
<td>04</td>
<td>200-1500 PSI</td>
</tr>
<tr>
<td>08</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>40</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>40</td>
<td>2500-4000 PSI</td>
</tr>
</tbody>
</table>

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

Approximate Coil Weight: .74 lbs (.33 kg.)

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**Pre-Engineered Circuit, Option Model L**

**BASE BODY - 20200012 = #6 SAE**

**DESCRIPTION**
Pre-engineered circuit, option model L

**OPERATION**
See typical schematic for specific operation.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (60 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Options Chart for Pressure Range</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Special Series M20X1.5-H6 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

**BODY WEIGHT**: 1.80 lbs. [.82 kg.]

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
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Approximate Coil Weight: .74 lbs (.33 kg.)

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY
**Pre-Engineered Circuit, Option Model M**

**BASE BODY - 20200013 = #6 SAE**

**DESCRIPTION**

Pre-engineered circuit, option model M*

**OPERATION**

See typical schematic for specific operation.

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 12 GPM (45 LPM)
- **Rated Operating Pressure**: 3500 PSI (241 bar)
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: 30 micron nominal
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Ratio**: 4 : 1
- **Cartridge Size**: M20 X 1.5
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)

**DIMENSIONS**

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Pre-Engineered Circuit, Option Model N*

BASE BODY - 20200014 = #6 SAE

BODY WEIGHT: 1.09 lbs. [.49 kg.]

DESCRIPTION
Pre-engineered circuit, option model N*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS
Nominal Flow See Options Chart for Flow Range
Rated Operating Pressure See Options Chart for Pressure Range
Viscosity Range 36 to 3000 SSU (3 to 647 cSt)
Filtration 30 micron nominal
Media Operating Temperature Range -40° to 250° F (-40° to 120° C)
Operating Fluid Media General Purpose Hydraulic Fluid
Cartridge Size Delta Series 7/8-14 Thread.
Cartridge Torque Requirements 30 ft-lbs (40.6 Nm)
Coil Torque Nut Requirements 4-6 ft lbs. (5.4-8.1 Nm)

DIMENSIONS

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
### OPTIONS CHART

#### VELOCITY FUSE

<table>
<thead>
<tr>
<th>CIRCUIT</th>
<th>FLOW</th>
<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>1 GPM</td>
<td>20-500 PSI</td>
</tr>
<tr>
<td>NB</td>
<td>2 GPM</td>
<td>250-1500 PSI</td>
</tr>
<tr>
<td>NC</td>
<td>3 GPM</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>ND</td>
<td>4 GPM</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>NE</td>
<td>5 GPM</td>
<td>4500-6000 PSI</td>
</tr>
</tbody>
</table>

#### NEEDLE VALVE

<table>
<thead>
<tr>
<th>CIRCUIT</th>
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<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>1 GPM</td>
<td>20-500 PSI</td>
</tr>
<tr>
<td>NB</td>
<td>2 GPM</td>
<td>250-1500 PSI</td>
</tr>
<tr>
<td>NC</td>
<td>3 GPM</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>ND</td>
<td>4 GPM</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>NE</td>
<td>5 GPM</td>
<td>4500-6000 PSI</td>
</tr>
</tbody>
</table>

#### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>OPTIONS</th>
<th>FLOW</th>
<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>00</td>
<td>01</td>
<td>20-500 PSI</td>
</tr>
<tr>
<td>NB</td>
<td>01</td>
<td>02</td>
<td>250-1500 PSI</td>
</tr>
<tr>
<td>NC</td>
<td>02</td>
<td>03</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>ND</td>
<td>03</td>
<td>04</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>NE</td>
<td>04</td>
<td>05</td>
<td>4500-6000 PSI</td>
</tr>
</tbody>
</table>

#### Flow Control

<table>
<thead>
<tr>
<th>CIRCUIT</th>
<th>FLOW</th>
<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
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<td>20-500 PSI</td>
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<tr>
<td>NB</td>
<td>02</td>
<td>250-1500 PSI</td>
</tr>
<tr>
<td>NC</td>
<td>03</td>
<td>1500-3000 PSI</td>
</tr>
<tr>
<td>ND</td>
<td>04</td>
<td>2500-4000 PSI</td>
</tr>
<tr>
<td>NE</td>
<td>05</td>
<td>4500-6000 PSI</td>
</tr>
</tbody>
</table>

**D** COIL TERMINATION

(All DC Except as Noted)

- DL Double Lead
- DT Deutsch on Leads DT04-2P
- ML Metri-Pack on Leads
- PL Packard on Leads
- WL Weatherpack on Leads
- SS Single Spade
- DS Double Spade
- HC DIN 43650 (Hirschman) – (AC & DC)
- CL Conduit Lead – (AC Only)
- DI Deutsch – Integral DT04-2P
- IA "I" Coil AMP Supersize - Integral
- ID "I" Coil Deutsch – Integral DT04-2P
- IJ "I" Coil AMP Jr. Timer - Integral
- IM "I" Coil Metri-Pack – Integral

Approximate Coil Weight: 74 lbs./33 kg.

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Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  
800-999-7378
**DESCRIPTION**
Pre-engineered circuit, option model O*

**OPERATION**
See options chart for specific operation

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>M20 X 1.5</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

BODY WEIGHT: 1.09 lbs. [.49 kg.]

---

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CIRCUIT OA

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>OPTIONS</th>
<th>PRESSURE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA</td>
<td>00</td>
<td>400 – 1500 PSI</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>1500 – 4000 PSI</td>
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<tr>
<td>CIRCUITS</td>
<td>V0</td>
<td>400 – 1500 PSI</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>1500 – 4000 PSI</td>
</tr>
</tbody>
</table>

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY
**Pre-Engineered Circuit, Option Model P**

**DESCRIPTION**
Pre-engineered circuit, option model P*

**OPERATION**
See options chart for specific operation (back)

**VALVE SPECIFICATIONS**
- **Nominal Flow**: See Options Chart for Flow Range
- **Rated Operating Pressure**: See Options Chart for Pressure Range
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: 30 micron nominal
- **Media Operating Temperature Range**: -40° to 250° F (-40° to 120° C)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Size**: Delta Series 7/8-14 Thread
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Coil Torque Nut Requirements**: 4-6 ft-lbs. (5.4-8.1 Nm)

**DIMENSIONS**

**WARNING**: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
## OPTIONS CHART

### Order Information

<table>
<thead>
<tr>
<th>CIRCUITS</th>
<th>PA</th>
<th>OPTIONS</th>
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</thead>
<tbody>
<tr>
<td>PB</td>
<td>Buna Standard</td>
<td>00</td>
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<tr>
<td>PC</td>
<td>Viton Standard</td>
<td>V0</td>
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<tr>
<td>PD</td>
<td>Manual Override</td>
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### Valve 1

<table>
<thead>
<tr>
<th>FLOW</th>
<th>PRESSURE</th>
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<tbody>
<tr>
<td>01</td>
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<tr>
<td>02</td>
<td>1-2 GPM</td>
</tr>
<tr>
<td>04</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td>08</td>
<td>4-8 GPM</td>
</tr>
</tbody>
</table>

### Valve 2

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</tr>
<tr>
<td>02</td>
<td>1-2 GPM</td>
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<td>04</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td>08</td>
<td>4-8 GPM</td>
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### Valve 3

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</tr>
<tr>
<td>02</td>
<td>1-2 GPM</td>
</tr>
<tr>
<td>04</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td>08</td>
<td>4-8 GPM</td>
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</table>

### Valve 4

<table>
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<th>PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>.5-1 GPM</td>
</tr>
<tr>
<td>02</td>
<td>1-2 GPM</td>
</tr>
<tr>
<td>04</td>
<td>2-4 GPM</td>
</tr>
<tr>
<td>08</td>
<td>4-8 GPM</td>
</tr>
</tbody>
</table>

**“D” COIL TERMINATION**  
(All DC Except as Noted)  
- DL: Double Lead  
- DT: Deutsch on Leads DT04-2P  
- ML: Metri-Pack on Leads  
- PL: Packard on Leads  
- WL: Weatherpack on Leads  
- SS: Single Spade  
- DS: Double Spade  
- HC: DIN 43650 (Hirschman) – (AC & DC)  
- CL: Conduit Lead – (AC Only)  
- DI: Deutsch – Integral DT04-2P  
- IA: "I” Coil AMP Superseal - Integral  
- ID: "I” Coil Deutsch – Integral DT04-2P  
- LJ: "I” Coil AMP Jr. Timer - Integral  
- IM: "I” Coil Metri-Pack – Integral  

**Approximate Coil Weight:** .74 lbs (.33 kg.)

---

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E-mail: delta@delta-power.com

Page 603
**Pre-Engineered Circuit, Option Model Q***

**DESCRIPTION**
Pre-engineered circuit, option model Q*

**OPERATION**
See typical schematic for specific operation

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>8 GPM (30 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>400-3500 PSI (28-241 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td></td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread.</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>4-6 ft-lbs. (5.4-8.1 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

![Dimensions Diagram](image)

**BODY WEIGHT:** 1.50 lbs. [.68 kg.]

---

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**Pre-Engineered Circuit, Option Model R***

**DESCRIPTION**
Pre-engineered circuit, option model R*

**OPERATION**
See typical schematic for specific operation.

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>15 GPM (57 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>4000 PSI (276 bar)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°C to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread.</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

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HYDRAULIC INTEGRATED CIRCUITS

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

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ORDERING INFORMATION

CIRCUITS OPTIONS
RA 00
- Buna Standard
- Viton Standard

PRESSURE RANGE
100 – 4000 PSI

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

Page 607

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Pre-Engineered Circuit, Option Model S*

BASE BODY - 20200020 = #8 SAE

DESCRIPTION
Pre-engineered circuit, option model S*

OPERATION
See options chart for specific operation

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>See Option Chart for Flow Range</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>See Option Chart for Pressure Range</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Size</td>
<td>Delta Series 7/8-14 Thread</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Coil Torque Nut Requirements</td>
<td>6 ft-lbs. (8.1 Nm)</td>
</tr>
</tbody>
</table>

BODY WEIGHT: 1.2 lbs. [.54 kg.]

DIMENSIONS

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OPTIONS CHART

10 GPM NOMINAL

VALVE 1

C1 C2

CROSS OVER RELIEF

C1

C2

V1 V2

10 GPM NOMINAL

VALVE 2

C1 C2

V1 V2

CIRCUIT SC

10 GPM NOMINAL

MOWER BREAKAWAY

C1 C2

V1 V2

CIRCUIT SC

10 GPM NOMINAL

CIRCUIT SA

UNLOADING & RELIEF

C1 C2

V1 V2

S2C

CIRCUIT SB

ORDERING INFORMATION

FLOW CONTROL

FLOW

PRESSURE

5-1 GPM

15-1500 PSI

1-2 GPM

1500-3000 PSI

2-4 GPM

2500-4000 PSI

4/6 GPM

RELIANCE VALVE

FLOW

PRESSURE

.5-1 GPM

15-1500 PSI

1-2 GPM

1500-3000 PSI

2-4 GPM

2500-4000 PSI

4-8 GPM

RELIANCE VALVE

VOLTAGE

06 6 VDC

12 12 VDC

24 24 VDC

36 36 VDC

48 48 VDC

25 25 VAC

11 120 VAC

22 220 VAC

44 440 VAC

FLOW CONTROL

FOR SPECIAL PRESET VALUES ON VALVES, CONSULT FACTORY

“D” COIL TERMINATION

(All DC Except as Noted)

DL Double Lead

DT Deutsch on Leads DT04-2P

ML Metri-Pack on Leads

PL Packard on Leads

WL Weatherpack on Leads

SS Single Spade

DS Double Spade

HC DIN 43650 (Hirschman) – (AC & DC)

CL Conduit Lead – (AC Only)

DI Deutsch – Integral DT04-2P

IMMERSION PROOF “D” TYPE

IA “1” Coil AMP Superseal – Integral

ID “1” Coil Deutsch – Integral DT04-2P

IJ “1” Coil AMP Jr. Timer – Integral

IM “1” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs (.33 kg.)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Pre-Engineered Circuit, Option Model TA**

**DESCRIPTION**

**OPERATION**
The TA allows flow to pass from (V1) to (C1) and (V2) to (C2). The valve blocks flow from (C1) to (V1) and from (C2) to (V2). Blocked flow is released when pilot pressure is applied to port opposite valve (V1) and/or port (V2) accordingly.

**FEATURES**
- Hardened internal parts for long life.
- Anodized aluminum body for corrosive protection.

**TYPICAL SCHEMATIC**

**PERFORMANCE**
Actual Test Data (Cartridge Only)

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
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<tbody>
<tr>
<td>Nominal Flow</td>
<td>20 GPM (76 LPM)</td>
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<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-5 drops min</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>30 micron nominal</td>
</tr>
<tr>
<td>Pilot Ratio</td>
<td>3.7 : 1</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>4.3 lbs. (2.0 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cartridge Crack Pressure</td>
<td>50 PSI (3.4 bar)</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

CIRCUITS TA OPTIONS
Buna Standard 00
Viton Standard V0

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
### SECTION/Description

<table>
<thead>
<tr>
<th>SECTION/Description</th>
<th>Pages</th>
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<tbody>
<tr>
<td>Counterbalance Valves</td>
<td>615</td>
</tr>
<tr>
<td>In-Line Valves</td>
<td>619</td>
</tr>
<tr>
<td>Motorized Valves</td>
<td>629</td>
</tr>
<tr>
<td>Hand Pumps</td>
<td>637</td>
</tr>
<tr>
<td>Selector Valves</td>
<td>647</td>
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<tr>
<td>Transmission “Low Pressure” Solenoid Valves</td>
<td>651</td>
</tr>
<tr>
<td>Unitized Valves</td>
<td>659</td>
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</table>

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Counterbalance Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
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<tbody>
<tr>
<td>15</td>
<td>4000</td>
<td>57</td>
<td>276</td>
<td>QS-CBS</td>
<td>616</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application is for CBS is to counterbalance a load in a load holding circuit.
QS-CBS Counterbalance Valve, 3:1 Ratio

DESCRIPTION
M20 X 1.5 thread, counterbalance valve, 3:1 ratio.

OPERATION
The QS-CBS check valve allows free flow from the directional valve (2) to the load (1) while a direct-acting, pilot-assisted relief valve controls flow from port 3 to port 2. Pilot assist at port 1 lowers the effective setting of the relief valve at a rate determined by the pilot ratio (3:1).

FEATURES
- Hardened parts for long life.
- Industry common metric cavity.

PERFORMANCE

<table>
<thead>
<tr>
<th>PRESSURE DROP</th>
<th>BAR</th>
<th>PSI</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.4</td>
<td>50</td>
<td>350</td>
</tr>
<tr>
<td>6.9</td>
<td>150</td>
<td>1050</td>
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<tr>
<td>10.3</td>
<td>200</td>
<td>1400</td>
</tr>
<tr>
<td>13.8</td>
<td>250</td>
<td>1800</td>
</tr>
<tr>
<td>17.2</td>
<td>300</td>
<td>2200</td>
</tr>
<tr>
<td>20.7</td>
<td>350</td>
<td>2600</td>
</tr>
<tr>
<td>24.1</td>
<td>400</td>
<td>3000</td>
</tr>
<tr>
<td>27.6</td>
<td>450</td>
<td>3400</td>
</tr>
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FLOW ABOVE CURVE IS WITH HYDRAULIC OIL 150 SSU AT 100°F.

<table>
<thead>
<tr>
<th>GPM LPM</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
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</thead>
<tbody>
<tr>
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<td>20</td>
<td>24</td>
<td>28</td>
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<td>40</td>
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<td>52</td>
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<table>
<thead>
<tr>
<th>VALVE SPECIFICATIONS</th>
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<tr>
<td>Nominal Flow</td>
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<td>Rated Operating Pressure</td>
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<tr>
<td>Typical Internal Leakage</td>
</tr>
<tr>
<td>Viscosity Range</td>
</tr>
<tr>
<td>Filtration</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
</tr>
<tr>
<td>Cavity</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
</tr>
<tr>
<td>Seal Kit</td>
</tr>
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</table>

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ORDERING INFORMATION

<table>
<thead>
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<th>OPTIONS</th>
<th>BODIES</th>
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<tbody>
<tr>
<td>Buna Standard 00</td>
<td>Blank N</td>
</tr>
<tr>
<td>Without Body ½ NPT Ports</td>
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PRESSURE RANGE/SETTING

<table>
<thead>
<tr>
<th>1500</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 – 1500 PSI</td>
<td>1000 – 4000 PSI</td>
</tr>
</tbody>
</table>
In-Line Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3000</td>
<td>30</td>
<td>207</td>
<td>IM-CVA</td>
<td>620</td>
</tr>
<tr>
<td>6</td>
<td>3000</td>
<td>23</td>
<td>207</td>
<td>IM-CVF-11</td>
<td>622</td>
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<tr>
<td>6</td>
<td>3000</td>
<td>23</td>
<td>207</td>
<td>IM-CVF-13</td>
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<tr>
<td>10</td>
<td>3500</td>
<td>38</td>
<td>241</td>
<td>IM-CSB</td>
<td>626</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application is the CVA is load holding in a lift, check and dump circuit.
Typical application for the CVF is mounted directly in the bottom of a cylinder and sized 1-2 GPM higher than the lowering speed. Therefore the load will not free fall in the event of line damage. Valve will not re-open until pressure is bled off port (1).
Typical application for the CSB is load sense with motor circuit with a spring loaded brake.
IM-CVA Inline Check Valve

DESCRIPTION
#8 SAE, inline check valve.

OPERATION
The IM-CVA allows flow from (2) to (1), while normally blocking oil flow from (1) to (2).

The valve has a guided check ball, which is spring-biased closed until sufficient pressure is applied at (2) to open to (1).

FEATURES

HYDRAULIC SYMBOL

PERFORMANCE

VALUE SPECIFICATIONS
Nominal Flow  8 GPM (30 LPM)
Rated Operating Pressure  3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)  0-5 drops/min
Viscosity Range  36 to 3000 SSU (3 to 647 cSt)
Filtration  ISO 18/16/13
Media Operating Temperature Range  -40° to 250° F (-40° to 120° C)
Weight  .53 lbs. (.24 kg)
Operating Fluid Media  General Purpose Hydraulic Fluid

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**DIMENSIONS**

- **3.37** [85.7]
- **1.00** [25.4]

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>CRACK PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>00 0005 0025 0050 0075</td>
</tr>
<tr>
<td></td>
<td>5 PSI 25 PSI 50 PSI 75 PSI</td>
</tr>
</tbody>
</table>

### WARNING

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

SHOP ONLINE at [www.airlinehyd.com](http://www.airlinehyd.com)  
800-999-7378
**IM-CVF-11 Inline Velocity Fuse**

**DESCRIPTION**
3/8 NPTF thread, inline velocity fuse.

**OPERATION**
The IM-CVF-11 allows flow to pass between (1) and (2). When oil velocity from (1) to (2) exceeds the flow setting, the valve shifts and blocks flow from (1) to (2).

**FEATURES**

**HYDRAULIC SYMBOL**

**PERFORMANCE**

<table>
<thead>
<tr>
<th>FLOW</th>
<th>LPM</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**
- Nominal Flow Max.: 6 GPM (23 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Typical Internal Leakage (150 SSU): 0 – 5 drops/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 0.18 lbs. (.08 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid

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**IM-CVF-13 Inline Velocity Fuse**

**DESCRIPTION**
3/8 NPTF (1) and #6 3/8 JIC (2) thread, inline velocity fuse.

**OPERATION**
The IM-CVF-13 allows flow to pass between (1) and (2). When oil velocity from (1) to (2) exceeds the flow setting, the valve shifts and blocks flow from (1) to (2).

**FEATURES**

**HYDRAULIC SYMBOL**

**PERFORMANCE**

<table>
<thead>
<tr>
<th>FLOW</th>
<th>LPM</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>6</td>
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<tr>
<td>20</td>
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<tr>
<td>16</td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow Max.</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>0 – 5 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.16 lbs. (.07 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
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DIMENSIONS

3/8 NPTF PORT

2.00
[50.8]

#6 3/8 JIC

.75
[19.0] HEX

ORDERING INFORMATION

IM-CVF - 13 -

FLOW SETTINGS

01.0  1 GPM
02.0  2 GPM
03.0  3 GPM
04.0  4 GPM
05.0  5 GPM
06.0  6 GPM

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
**IM-CSB Inline Shuttle Valve**

**DESCRIPTION**

#6 SAE, inline shuttle valve.

**OPERATION**

The IM-CSB allows flow from the higher pressure of (1) or (3) to (2).

The valve is commonly used as a load sense to direct oil from the pressure side of a bidirectional hydraulic motor to a pressure released hydraulic brake.

**FEATURES**

- Hardened parts for long life.

---

**HYDRAULIC SYMBOL**

---

**PERFORMANCE**

<table>
<thead>
<tr>
<th>PRESSURE DROP</th>
<th>BAR</th>
<th>PSI</th>
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</thead>
<tbody>
<tr>
<td>13.8</td>
<td>200</td>
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</tr>
<tr>
<td>10.3</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>6.9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

---

**VALVE SPECIFICATIONS**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>10 GPM (38 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3500 PSI (241 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>(150 SSU) 1 cu in/min (16 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°F to 250°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.28 lbs. (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
</tbody>
</table>

---

**FLOW**

ABOVE CURVE IS WITH HYDRAULIC OIL 150 SSU AT 100°F.

---

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DIMENSIONS

ORDERING INFORMATION

IM-CSB  -

- Buna Standard  00
- Viton Standard  V0

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Motorized Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>3500</td>
<td>57</td>
<td>241</td>
<td>AE-NVA</td>
<td>630</td>
</tr>
<tr>
<td>25</td>
<td>3500</td>
<td>95</td>
<td>241</td>
<td>AJ-FCA</td>
<td>632</td>
</tr>
<tr>
<td>25</td>
<td>3500</td>
<td>95</td>
<td>241</td>
<td>AK-FCQ</td>
<td>634</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the NVA is to adjust metered flow to control speed or full bypass of a fluid motor or cylinder. Typical application for the FCA and FCQ is to adjust pressure compensated flow to control speed of a fluid motor or cylinder.
AE-NVA Motorized Needle Flow Control Valve

**DESCRIPTION**
10 size, 7/8-14 thread, "Delta" series, motorized needle flow control valve.

**OPERATION**
The AE-NVA can be adjusted to any position between fully open and fully closed by applying electrical power to the motor.

The amount of valve opening does not change unless the electric motor is activated. When adjusted open, the valve allows flow from (1) to (2) and (2) to (1). When fully closed the valve blocks flow from (1) to (2) and (2) to (1).

**FEATURES**
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**
Product when adjusted fully closed does not close to zero flow. (.5 to 1 GPM @ 200 PSI)

**VALVE SPECIFICATIONS**
- Nominal Flow: 10 GPM (38 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 1.68 lbs. (.76 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 30 ft-lbs (40.6 Nm)
- Travel Time at Rated Voltage: 10-12 sec Min to Max Setting
- Power Requirements: 5 Watts
- Allowable Input Voltage: 80% - 120% of Rated
- Cavity: DELTA 2W
- Cavity Form Tool (Finishing): 40500000
- Seal Kit: 21191200

**PERFORMANCE**

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
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<tr>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
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<tr>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>35</td>
<td>70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow (LPM)</th>
<th>Pressure Drop (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
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<tr>
<td>10</td>
<td>20</td>
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<td>25</td>
<td>50</td>
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<tr>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>35</td>
<td>70</td>
</tr>
</tbody>
</table>

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DIMENSIONS

ORDERING INFORMATION

AE-NVA

OPTIONS
Buna Standard 00

TERMINATION
Dual Lead, 22" Long DL 12

VOLTAGE
12 VDC

BODIES
Blank N
Without Body 3/8 NPT Ports

#8 SAE Ports 2X

BODY WEIGHT: 47 lb [21 kg]

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SHOP ONLINE at www.airlinehyd.com 800-999-7378
AJ-FCA Motorized Adjustable Pressure Compensated Flow Control

DESCRIPTION

OPERATION
The AJ-FCA maintains a constant flow rate out of (1) regardless of load pressure changes in the circuit downstream of (1).

The adjustable control orifice can be set to customer flow specification. (see options for ranges)

The valve begins to respond to load changes when the flow through the valve creates a pressure differential across the control orifice greater than 100 PSI (6.9 bar), with accurate flow maintenance from 100 to 3500 PSI (6.9 to 240 bar).

Reverse flow (1) to (2) returns through the control orifice and is non-compensated.

FEATURES
- Hardened parts for long life.
- Industry common cavity.
- Fine low-torque adjustment.

Note: When used as a bypass flow control in applications. Where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

HYDRAULIC SYMBOL

PERFORMANCE

Valve Specifications
- Nominal Flow: 25 GPM (95 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 2.12 lbs. (.96 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cartridge Torque Requirements: 90 ft-lbs (122 Nm)
- Flow Range: 0.25 to 25 GPM
- Travel Time at Rated Voltage: 18 sec Min to Max Setting
- Power Requirements: 5 Watts
- Allowable Input Voltage: 80% to 120% of Rated
- Cavity: SUPER 2W
- Cavity Form Tool (Finishing): 40500017
- Seal Kit: 21191400

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**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>AJ-FCA</th>
<th>OPTIONS</th>
<th>TERMINATION</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna Standard 00</td>
<td>Dual Lead, 22&quot; Long DL</td>
<td>12 VDC 12</td>
</tr>
</tbody>
</table>

**BODIES**

- Blank Without Body
- N 3/4 NPT Ports
- S #12 SAE Ports

**BODY WEIGHT:** 1.29 lbs. [0.59kg]
AK-FCQ Motorized Adjustable Priority Flow Control Valve

DESCRIPTION

OPERATION
The AK-FCQ allows pressure compensated flow from (3) to (1) regulated by the pressure present at (3). Excess flow bypasses out (2).

The spring chamber is constantly vented at (1).

FEATURES
- Hardened parts for long life.
- Industry common cavity.

HYDRAULIC SYMBOL

VALVE SPECIFICATIONS
- Max Regulated Flow: 25 GPM (95 LPM)
- Rated Operating Pressure: 3500 PSI (241 bar)
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -40° to 250° F (-40° to 120° C)
- Weight: 2.34 lbs. (1.06 kg)

Note: When used as a bypass flow control in applications. Where the priority flow port will be blocked by external valving, bypass pressure drop will increase unless a small amount of leakage is provided for the priority port. Consult factory.

PERFORMANCE

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Hand Pumps

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>500</td>
<td>--</td>
<td>34</td>
<td>DE-HPA</td>
<td>638</td>
</tr>
<tr>
<td>--</td>
<td>2000</td>
<td>--</td>
<td>138</td>
<td>DE-HPB</td>
<td>640</td>
</tr>
<tr>
<td>--</td>
<td>500</td>
<td>--</td>
<td>34</td>
<td>DE-HPC</td>
<td>642</td>
</tr>
<tr>
<td>--</td>
<td>2000</td>
<td>--</td>
<td>138</td>
<td>DE-HPD</td>
<td>644</td>
</tr>
</tbody>
</table>

Typical Schematic

Typical application for the HPA, HPB, HPC, and HPD is to supply pressure to release brake pressure for towing.
**DE-HPA Hand Pump**

**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, cartridge type, plunger hand pump.

**OPERATION**

The DE-HPA hand pump when pulled primes thru Port (1) and when pushed pressurizes outlet port (2).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**

This product is not intended as a load holding device.

**PERFORMANCE**

<table>
<thead>
<tr>
<th>PRESSURE</th>
<th>BAR</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8.6</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>17.2</td>
<td>250</td>
<td>375</td>
</tr>
<tr>
<td>25.9</td>
<td>375</td>
<td>500</td>
</tr>
</tbody>
</table>

**Valve Specifications**

- **Nominal Flow**: .35 cu in/stroke
- **Rated Operating Pressure**: 500 PSI (34 bar)
- **Typical Internal Leakage (150 SSU)**: 0-10 drops/min
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -40° to 250°F (-40° to 120° C)
- **Weight**: .57 lbs. (.26 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cartridge Torque Requirements**: 30 ft-lbs (40.6 Nm)
- **Cavity**: DELTA 2W
- **Cavity Form Tool (Finishing)**: 40500000
- **Seal Kit**: 21191200

**Force Above Curve Is With Hydraulic Oil 150 SSU at 100°f.**
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-HPB Hand Pump

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, screw in, cartridge type, hand pump.

OPERATION
The DE-HPB hand pump when pipe handle is lifted, primes thru port (1) and when pushed provides flow pressure to outlet port (2).

FEATURES
- Large displacement per stroke.
- Industry common cavity.

HYDRAULIC SYMBOL
This product is not intended as a load holding device.
Linkage is not to be removed.
24” handle not supplied.

PERFORMANCE

<table>
<thead>
<tr>
<th>Force (lbs)</th>
<th>Pressure (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
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</tr>
<tr>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>Pressure (BAR)</th>
<th>Force (kg)</th>
</tr>
</thead>
<tbody>
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<td>55</td>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Force (in²)</th>
<th>Pump Effective Area</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>20</td>
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<tr>
<td>120</td>
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</tr>
<tr>
<td>140</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>.39 cu in/stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>(150 SSU) 0 – 10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.5 lbs. (69 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com 800-999-7378
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
DE-HPC Hand Pump

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, cartridge type, plunger hand pump.

OPERATION
The DE-HPC hand pump when pulled primes thru Port (2) and when pushed provide flow pressure to outlet port (1).

FEATURES
• Small profile.
• Industry common cavity.
• Large displacement per stroke.

HYDRAULIC SYMBOL

This product is not intended as a load holding device.

PERFORMANCE

<table>
<thead>
<tr>
<th>Force (LBS)</th>
<th>Pressure (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>60</td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Force (kg)</th>
<th>Pressure (BAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
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<td>15</td>
<td>10.5</td>
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<td>20</td>
<td>14</td>
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<tr>
<td>25</td>
<td>17.5</td>
</tr>
<tr>
<td>30</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>.35 cu in/stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>500 PSI (34 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0 - 10 drops/min</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.57 lbs (.26 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

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**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna, Knob</td>
<td>Without Body</td>
</tr>
<tr>
<td>Viton, Knob</td>
<td>3/8 NPTF Ports</td>
</tr>
<tr>
<td></td>
<td>#8 SAE Ports</td>
</tr>
</tbody>
</table>

*DE-HPC*
DE-HPD Hand Pump

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series, cartridge type, hand pump.

OPERATION
The DE-HPD hand pump when pipe handle is lifted, primes thru port (2) and when pushed provides flow pressure to outlet port (1).

FEATURES
- Large displacement per stroke.
- Industry common cavity.

PERFORMANCE

<table>
<thead>
<tr>
<th>Force (LBS)</th>
<th>Pressure (PSI)</th>
<th>Pump Effective Area .44 in²</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>2000</td>
</tr>
<tr>
<td>10</td>
<td>500</td>
<td>1500</td>
</tr>
<tr>
<td>20</td>
<td>1000</td>
<td>1000</td>
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<tr>
<td>30</td>
<td>1500</td>
<td>500</td>
</tr>
<tr>
<td>40</td>
<td>2000</td>
<td>0</td>
</tr>
</tbody>
</table>

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Nominal Flow</th>
<th>.39 cu in/stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>0-10 drops per min</td>
</tr>
<tr>
<td>(150 SSU)</td>
<td></td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.5 lbs. (.69 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40.6 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 2W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500000</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191200</td>
</tr>
</tbody>
</table>

This product is not intended as a load holding device.

Linkage is not to be removed.

24” handle not supplied.
WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Typical Schematic

Typical application for the MRS is to manually select flow path between cylinders. Valve is closed center with all ports blocked in center position.
QS-MRS Rotary Selector Valve

DESCRIPTION
6 port rotary selector valve.

OPERATION
The QS-MRS when rotated counter-clockwise allows flow from (A) to (B) & (D) to (E) and blocks (C) & (F). When rotated clockwise, the valve directs flow from (C) to (B) & (F) to (E) and block flow at (A) & (D).

FEATURES
May be used as metering product.
All ports closed in transition.
See chart for fully open and fully closed pressure drop.

PERFORMANCE

HYDRAULIC SYMBOL

May be used as metering product.
All ports closed in transition.
See chart for fully open and fully closed pressure drop.

Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>25 GPM (95 LTR/M)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>3000 PSI (207 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>1 cu in/min (16 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250° F (-40° to 120° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>3.42 lbs (1.55 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
</tbody>
</table>
DIMENSIONS

ORDERING INFORMATION

QS-MRS - -

OPTIONS
Buna Standard 00 N
Viton Standard V0 S

BODY
1/2" NPT PORTS 6X
#8 SAE
Transmission “Low Pressure” Solenoid Valves

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1000</td>
<td>23</td>
<td>69</td>
<td>QF-S3A</td>
<td>652</td>
</tr>
<tr>
<td>6</td>
<td>1000</td>
<td>23</td>
<td>69</td>
<td>QF-S3D</td>
<td>654</td>
</tr>
<tr>
<td>5</td>
<td>1000</td>
<td>20</td>
<td>69</td>
<td>QG-S4A</td>
<td>656</td>
</tr>
</tbody>
</table>

Typical Schematic
Typical application for the S3A and the S3D is in a clutch or transmission application.
Typical application for the S4A is in a transmission or braking application.
QF-S3A Direct Acting Spool, 3 Way 2 Position

DESCRIPTION
10 size, 7/8-14 thread, "Delta" series, solenoid operated, 3 way 2 position, spool valve.

OPERATION
When de-energized the QF-S3A allows flow between (2) and (3) and blocks flow at port (1). When energized the valve allows flow between (1) and (3) and blocks flow at port (2).

FEATURES
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

HYDRAULIC SYMBOL

PERFORMANCE

VALVE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>1000 PSI (70 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>3 cu in/min (49 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40°F to 200°F (-40°C to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>30 lbs (.14 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191210</td>
</tr>
</tbody>
</table>

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**DIMENSIONS**

- SPECIAL APPLICATION VALVES
- Delta Power Company
- 4484 Boeing Drive - Rockford, IL 61109

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<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>ORDERING INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.56 [39.6]</td>
<td><strong>OPTIONS</strong></td>
</tr>
<tr>
<td>.75 [19.1]</td>
<td>Buna Standard 00</td>
</tr>
<tr>
<td>HEX NUT</td>
<td>Viton Standard V0</td>
</tr>
</tbody>
</table>

- **BODIES**
  - Blank Without Body N
  - 1/4 NPTF Ports S
  - #8 SAE Ports

- **VOLTAGE**
  - 6 VDC 06
  - 12 VDC 12
  - 24 VDC 24
  - 36 VDC 36
  - 48 VDC 48
  - 24 VAC 25
  - 120 VAC 11
  - 220 VAC 22
  - 440 VAC 44

- **“D” COIL TERMINATION**
  - (All DC Except as Noted)
  - DL Double Lead
  - DT Deutsch on Leads DT04-2P
  - ML Metri-Pack on Leads
  - PL Packard on Leads
  - WL Weatherpack on Leads

- **SS Single Spade**
- **DS Double Spade**
- **HC DIN 43650 (Hirschman) – (AC & DC)**
- **CL Conduit Lead – (AC Only)**
- **DI Deutsch – Integral DT04-2P**

- **IMMERSION PROOF “D” TYPE**
  - IA “I” Coil AMP Superseal - Integral
  - ID “I” Coil Deutsch – Integral DT04-2P
  - IJ “I” Coil AMP Jr. Timer - Integral
  - IM “I” Coil Metri-Pack - Integral

**APPROXIMATE COIL WEIGHT**: .74 lbs/.33 kg.

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**Fax**: (815) 397-2526
**E-mail**: delta@delta-power.com

**Delta Power Company**
4484 Boeing Drive - Rockford, IL 61109

**Page 653**

800-999-7378
**DESCRIPTION**

10 size, 7/8-14 thread, “Delta” series, solenoid operated, 3 way 2 position, spool valve.

**OPERATION**

When de-energized the QF-S3D allows flow between (1) and (3) and blocks flow at port (2). When energized the valve allows flow between (2) and (3) and blocks flow at port (1).

**FEATURES**

- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

![Hydraulic Symbol](image)

**PERFORMANCE**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>6 GPM (23 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>1000 PSI (70 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage</td>
<td>3 cu in/min (49 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-35° to 200° F (-37.2° to 93.3° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>30 lbs (.13 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DEBTA 3W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500001</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191210</td>
</tr>
</tbody>
</table>
DIMENSIONS

SPECIAL APPLICATION VALVES

DELTA POWER COMPANY
4484 BOEING DRIVE - ROCKFORD, IL 61109

DIMENSIONS

SEE COIL DATA FOR TERMINATIONS

ORDERING INFORMATION

QF-S3D

OPTIONS

BODIES

Blank

V0

00

1/4 NPTF Ports

#6 SAE Ports

VOLTAGE

6 VDC

12 VDC

24 VDC

36 VDC

48 VDC

24 VAC

120 VAC

220 VAC

440 VAC

“D” COIL TERMINATION

(DC Except as Noted)

DOUBLE LEAD

DS Double Spade

CL Conduit Lead – (AC Only)

DI Deutsch – Integral DT04-2P

“T” COIL AMP Superseal – Integral

“T” Coil Deutsch – Integral DT04-2P

“T” Coil AMP Jr. Timer – Integral

“T” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

IMMERSION PROOF “D” TYPE

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SHOP ONLINE at www.airlinehyd.com

800-999-7378
QG-S4A Direct Acting Spool, 4 Way 2 Position

**DESCRIPTION**
10 size, 7/8 -14 thread, “Delta” series, solenoid operated, 4 way 2 position spool valve.

**OPERATION**
When de-energized the QG-S4A allows flow from (1) to (4) and from (2) to (3). When energized the valve allows flow from (2) to (1) and from (3) to (4).

**FEATURES**
- Hardened parts for long life.
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Industry common cavity.
- Unitized, molded coil design.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**
Intended for transmission and brake applications.

**PERFORMANCE**

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Flow</td>
<td>5 GPM (19 LPM)</td>
</tr>
<tr>
<td>Rated Operating Pressure</td>
<td>1000 PSI (70 bar)</td>
</tr>
<tr>
<td>Typical Internal Leakage (150 SSU)</td>
<td>3 cu in/min (49 ml/min)</td>
</tr>
<tr>
<td>Viscosity Range</td>
<td>36 to 3000 SSU (3 to 647 cSt)</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
</tr>
<tr>
<td>Media Operating Temperature Range</td>
<td>-40° to 250°F (-40° to 120°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.00 lbs. (.44 kg)</td>
</tr>
<tr>
<td>Operating Fluid Media</td>
<td>General Purpose Hydraulic Fluid</td>
</tr>
<tr>
<td>Cartridge Torque Requirements</td>
<td>30 ft-lbs (40 Nm)</td>
</tr>
<tr>
<td>Coil Nut Torque Requirements</td>
<td>4-6 ft-lbs (5.4-8.1 Nm)</td>
</tr>
<tr>
<td>Cavity</td>
<td>DELTA 4W</td>
</tr>
<tr>
<td>Cavity Form Tool (Finishing)</td>
<td>40500035</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>21191309</td>
</tr>
</tbody>
</table>

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SPECIAL APPLICATION VALVES

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

DIMENSIONS

3.32 [84.8]
4.75 [120.7]
2.44 [61.9]
7/8-14 UNF 2A THREAD
1.00 [25.4] HEX
SEE COIL DATA FOR TERMINATIONS

2.32 [58.8]
22 [5.6]

1.84 [46.0]
1.56 [39.6]
.75 [19.1] HEX

ORDERING INFORMATION

QG-S4A - - - -

OPTIONS
Buna Standard 00
Viton Standard V0

BODIES
Without Body
1/4 NPTF Ports N
#6 SAE Ports S

VOLTAGE
6 VDC 06
12 VDC 12
24 VDC 24
36 VDC 36
48 VDC 48
24 VAC 25
120 VAC 11
220 VAC 22
440 VAC 44

“I” COIL TERMINATION
(All DC Except as Noted)

DL Double Lead
DT Deutsch on Leads DT04-2P
ML Metri-Pack on Leads
PL Packard on Leads
WL Weatherpack on Leads
SS Single Spade
DS Double Spade
HC DIN 43650 (Hirschmann) – (AC & DC)
CL Conduit Lead (AC Only)
DI Deutsch – Integral DT04-2P
IA “I” Coil AMP Superseal – Integral
ID “I” Coil Deutsch – Integral DT04-2P
IJ “I” Coil AMP Jr. Timer – Integral
IM “I” Coil Metri-Pack – Integral

Approximate Coil Weight: .74 lbs/.33 kg.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Unitized Valves**

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
<th>LPM</th>
<th>BAR</th>
<th>MODEL</th>
<th>PAGE</th>
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<td>6</td>
<td>1000</td>
<td>23</td>
<td>70</td>
<td>IE-S2H-56-MP12-A</td>
<td>660</td>
</tr>
<tr>
<td>6</td>
<td>1000</td>
<td>23</td>
<td>70</td>
<td>IF-S3A-57-MP12-A</td>
<td>662</td>
</tr>
<tr>
<td>6</td>
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<td>23</td>
<td>70</td>
<td>IF-S3D-57-MP12-A</td>
<td>664</td>
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<tr>
<td>5.3</td>
<td>1000</td>
<td>20</td>
<td>70</td>
<td>IG-S4A-58-MP12-A</td>
<td>666</td>
</tr>
</tbody>
</table>

**Typical Schematic**

Typical application for the IE-S2H-56-MP123-A is a pump unloading valve.
Typical application for the IF-S3A and S3D-57-MP12-A is to operate a spring loaded hydraulic clutch.
Typical application for the IG-S4A-58-MP12-A is directional motor or cylinder control.

**DESCRIPTION**
Special series, solenoid operated, 2 way normally open, transmission and brake spool type flanged retained hydraulic valve.

**OPERATION**
When de-energized the IE-S2H-56-MP12-A allows flow from (2) to (1) and (1) to (2). When energized the valve blocks flow at both ports.

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized valve/coil.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**

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**VALVE SPECIFICATIONS**
- Nominal Flow: 6 GPM (23 LPM)
- Max Operating Pressure: 1000 PSI (70 bar)
- Typical Internal Leakage: 50 ml/min
- Viscosity Range: 36 to 3000 SSU (3 to 647 cSt)
- Filtration: ISO 18/16/13
- Media Operating Temperature Range: -35° to 200°F (-37.2° to 93.3°C)
- Weight: 73 lbs. (.33 kg)
- Operating Fluid Media: General Purpose Hydraulic Fluid
- Cavity: Special
- Cavity Form Tool (Finishing): T056
- Seal Kit: Special

**COIL SPECIFICATIONS**
- Nominal Operating Voltage: 12 VDC +/- 5%
- Pull-in Voltage: 8.5 VDC at 212°F (100°C)
- Peak Voltage: 25 VDC for 5 min at 50°F (10°C)
- Operating Temperature Range: -40° to 230°F (-40° to 110°C)
- Coil Resistance: 7.3 ohms +/- 5% at 68°F (20°C)
- Coating: Black

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ORDERING INFORMATION

IE-S2H-56-MP12-A

**DESCRIPTION**
Special series, solenoid operated, 3 way normally open, transmission and brake spool type flanged retained hydraulic valve.

**OPERATION**
When de-energized the IF-S3A-57-MP12-A allows flow from (2) to (3) and (3) to (2), and blocks flow at (1). When energized the valve allows flow from (1) to (3) and blocks flow at port (2).

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized valve/coil.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

**PERFORMANCE**

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Above curve with hydraulic oil 150 SSU at 100°F

**VALVE SPECIFICATIONS**

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<tr>
<td>Filtration</td>
<td>ISO 18/16/13</td>
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**COIL SPECIFICATIONS**

<table>
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<tr>
<td>Nominal Operating Voltage</td>
<td>12 VDC +/- 5%</td>
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<tr>
<td>Pull-in Voltage</td>
<td>8.5 VDC at 212°F (100°C)</td>
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<td>Peak Voltage</td>
<td>25 VDC for 5 min at 50°F (10°C)</td>
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<td>Operating Temperature Range</td>
<td>-40°F to 230°F (-40°C to 110°C)</td>
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<tr>
<td>Coil Resistance</td>
<td>7.3 ohms +/- 5% at 68°F (20°C)</td>
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<td>Coil Termination</td>
<td>Amp Superseal - Intergral</td>
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<tr>
<td>Connector Color</td>
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DIMENSIONS

ORDERING INFORMATION

IF-S3A-57-MP12-A

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**DESCRIPTION**
Special series, solenoid operated, 3 way 2 position, transmission and brake spool type flanged retained hydraulic valve.

**OPERATION**
When de-energized the IF-S3D-57-MP12-A allows flow from (1) to (3) and (3) to (1), and blocks flow at (2). When energized the valve allows flow from (3) to (2) and (2) to (3) blocks flow at port (1).

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized valve/coil.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Note: Consult Factory for Valve retention options. Flanged Retained Product.

**PERFORMANCE**

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</table>

Above curve with hydraulic oil 150 SSU at 100°F

**VALVE SPECIFICATIONS**

- **Nominal Flow**: 6 GPM (23 LPM)
- **Max Operating Pressure**: 1000 PSI (70 bar)
- **Typical Internal Leakage**: 50 ml/min
- **Viscosity Range**: 36 to 3000 SSU (3 to 647 cSt)
- **Filtration**: ISO 18/16/13
- **Media Operating Temperature Range**: -35°F to 200°F (-37.2°C to 93.3°C)
- **Weight**: 75 lbs. (34 kg)
- **Operating Fluid Media**: General Purpose Hydraulic Fluid
- **Cavity**: Special
- **Cavity Form Tool (Finishing)**: T057
- **Seal Kit**: Special

**COIL SPECIFICATIONS**

- **Nominal Operating Voltage**: 12 VDC +/- 5%
- **Pull-in Voltage**: 8.5 VDC at 212°F (100°C)
- **Peak Voltage**: 25 VDC for 5 min at 50°F (10°C)
- **Operating Temperature Range**: -40°F to 250°F (-40°C to 110°C)
- **Coil Resistance**: 7.3 ohms +/- 5% at 68°F (20°C)
- **Coil Termination**: Amp Superseal - Intergal
- **Connector Color**: Black

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**DESCRIPTION**
Special series, solenoid operated, 4 way 2 position, transmission spool type, flanged retained hydraulic valve.

**OPERATION**
When de-energized the IG-S4A-58-MP12-A allows flow from (2) to (3) and from (1) to (4). When energized the valve allows flow from (2) to (1) and from (3) to (4).

**FEATURES**
- Efficient wet-armature construction.
- Cartridges are voltage interchangeable.
- Unitized valve/coil.
- Continuous duty rated solenoid.
- Optional coil voltages and terminations.

**HYDRAULIC SYMBOL**

Note: Consult Factory for Valve retention options. Flanged Retained Product.

**PERFORMANCE**

**VALVE SPECIFICATIONS**

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<td>Viscosity Range</td>
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<td>Filtration</td>
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<td>Media Operating Temperature</td>
<td>-35° to 200° F (-37.2° to 93.3° C)</td>
</tr>
<tr>
<td>Weight</td>
<td>.75 lbs. (.34 kg)</td>
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<tr>
<td>Operating Fluid Media</td>
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**COIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Nominal Operating Voltage</td>
<td>12 VDC +/- 5%</td>
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<tr>
<td>Pull-in Voltage</td>
<td>8.5 VDC at 212°F (100°C)</td>
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<tr>
<td>Peak Voltage</td>
<td>25 VDC for 5 min at 50°F (10°C)</td>
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<td>Operating Temperature Range</td>
<td>-40° to 230°F (-40° to 110°C)</td>
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<td>Coil Resistance</td>
<td>7.3 ohms +/- 5% at 68°F (20°C)</td>
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<tr>
<td>Coil Termination</td>
<td>Amp Superseal - Integral</td>
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<tr>
<td>Connector Color</td>
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**DIMENSIONS**

**ORDERING INFORMATION**

IG-S4A-58-MP12-A

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SHOP ONLINE at www.airlinehyd.com  800-999-7378
### SECTION/Description

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<thead>
<tr>
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<td>Valve Bodies</td>
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<tr>
<td>Cavity Plugs</td>
<td>672</td>
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<tr>
<td>Manual Override Options</td>
<td>677</td>
</tr>
<tr>
<td>Piston Assemblies</td>
<td>679</td>
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<tr>
<td>Standard Knob Assemblies</td>
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## Standard Bodies

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**THE FOLLOWING BODIES ARE NON-STANDARD PORT SIZES, CONTACT FACTORY FOR PRICE AND AVAILABILITY**

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Phone: (815) 397-6628        Fax: (815) 397-2526        E-mail: delta@delta-power.com
**Mini Series Cavity Plugs**

**NOTE:** DIMENSIONS IN BRACKETS ARE MILLIMETERS

### ORDERING INFORMATION

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Delta Series Cavity Plugs**

**NOTE: DIMENSIONS IN BRACKETS ARE MILLIMETERS**

---

**2W 2P CAVITY PLUG**

1.00 HEX

1.250 [31.75]

0.622 [15.80]

0.619 [15.72]

---

**3W 2P CAVITY PLUG**

1.00 HEX

1.812 [46.02]

0.622 [15.80]

0.619 [15.72]

---

**4W 2P CAVITY PLUG**

1.00 HEX

2.438 [61.93]

0.622 [15.80]

0.619 [15.72]

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Tecnord Series Cavity Plugs

NOTE: DIMENSIONS IN BRACKETS ARE MILLIMETERS

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Phone: (815) 397-6628    Fax: (815) 397-2526    E-mail: delta@delta-power.com
Super Series Cavity Plugs

NOTE: DIMENSIONS IN BRACKETS ARE MILLIMETERS

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Manual Override Options

Pull Type Manual Override Option
Standard override option for pull type solenoid valves.

This override is offered with or without the detent option.

With detent option, pull and rotate 180 degrees, when released the override will remain in that position.
To return to the normal operating position,
Rotate knob 180 degrees and release.

Without the detent option, knob must be pulled and held to maintain override position.

Push Type Manual Override Option
Standard push type override option used for 4W3P valves.

To activate override option, push knob and Hold, when released, the valve returns to normal operation position.

Note: override option only functions in the push (S1 coil) direction.

This override option is intended for emergency use only and is not intended for continuous duty operation.

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**Manual Override Options**

### Rotary Type Manual Override Option

Standard rotary override option for normally open valves.

This override option is offered with or without a knob.

To activate override option, fully rotate using a flat tip screwdriver or the knob in a clockwise direction.

To de-activate override, fully rotate using a flat tip screwdriver or the knob in a counter clockwise direction.

Note: Not rotating override fully in either direction will result in partial shifting of valve.

**WARNING:** Over torque of manual override could result in valve damage.

---

**NOTE:** Rotary Pull Type Manual Override Option (Pull type Valves-Reference Models HB-S2A & HB-S2B)

Because HB-S2A & HB-S2B are Pull type Valves, “fully in” is the normal state and “fully out” is “fully shifted” state so opposite of what is shown in image.”
Pilot Piston Assemblies

### DESCRIPTION
These pistons are used in a manifold to create pilot operated valve assemblies, such as pilot operated checks.

### FEATURES
- O-rings on piston are optional.
- One piece design or pressed fit dowel pins
- Single or double pilot piston options.

### PISTON SPECIFICATIONS

<table>
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<th>SEAT DIAMETER</th>
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<td>4:1:1</td>
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### PILOT PIN OPTIONS

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### CAVEITY INFORMATION

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com
### Standard Knob Assemblies

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<td>Torque Specifications</td>
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<td>Valve Mnemonic Codes</td>
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### Cavity Data

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Mini 2W

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series

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**Mini 3W**

**DESCRIPTION**
7 size, 5/8-18 thread, “Mini” series

**NOTES:**
1. CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #4050004.
2. ALL MACHINED SURFACES TO BE 32\(\sqrt{\text{R}}\) FINISH OR BETTER, EXCLUDING THREADS.
3. IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IM Properly MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.
4. PORT ZONE IS Ø.213 MAXIMUM AT PORT #1 ONLY FOR HIGH PRESSURE SERIES MINI VALVES (HA-***-**).

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Mini 4W

DESCRIPTION
7 size, 5/8-18 thread, “Mini” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500006.
2.) ALL MACHINED SURFACES TO BE 32 FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Power 2W

DESCRIPTION
8 size, 3/4-16 thread, “Power” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500005.
2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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DESCRIPTION
8 size, 3/4-16 thread, “Power” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500024.
2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.
ENGINEERING DATA

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109

Power 4W

DESCRIPTION
8 size, 3/4-16 thread, “Power” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH
DELTA FORM TOOL #40500029.
2.) ALL MACHINED SURFACES TO BE
FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE
CAVITIES MEET ALL DIMENSIONAL AND
QUALITY STANDARDS OF CONCENTRICITY AND
PERPENDICULARITY. THREADS MUST BE
PERPENDICULAR TO THE SPOTFACE SURFACE.
SPOTFACE MUST CLEAN UP TO FULL DIAMETER.
IMPROPERLY MACHINED CAVITIES CAN LEAD TO
CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Delta 2W

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500000.
2.) ALL MACHINED SURFACES TO BE 32\( ^\circ \) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

Page 690
**Delta 2WS**

**DESCRIPTION**
10 size, 7/8-14 thread, Special “Delta” series

---

**NOTES:**
1. CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500028.
2. ALL MACHINED SURFACES TO BE \( \approx \) FINISH OR BETTER, EXCLUDING THREADS.
3. IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

---

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Delta 3W

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500001.

2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.

3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Delta 4W

DESCRIPTION
10 size, 7/8-14 thread, “Delta” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500002.
2.) ALL MACHINED SURFACES TO BE \( \frac{3}{8} \) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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**DESCRIPTION**

12 Size, 1 1/16-12 thread “Tecnord” series

---

**NOTES:**

1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500032.

2.) ALL MACHINED SURFACES TO BE 32\(°\) FINISH OR BETTER, EXCLUDING THREADS.

3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

---

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### Tecnord 3WS

**DESCRIPTION**

12 Size, 1 1/16-12 thread “Tecnord” series

#### TECHNICAL DATA

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**NOTES:**

1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500033.

2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.

3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

Page 695
**TECNORD 3W**

**DESCRIPTION**
12 Size, 1 1/16-12 thread “TECNORD” series

---

**NOTES:**

1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500034.

2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.

3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Page 696
**Tecnord 4W**

**DESCRIPTION**
12 Size, 1 1/16-12 thread “Tecnord” series

**NOTES:**
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500035.
2.) ALL MACHINED SURFACES TO BE \(32\) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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**Tecnord 5WS**

**DESCRIPTION**
12 Size, 1/16-12 thread "Tecnord" series

**NOTES:**
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500037.
2.) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Super 2W

DESCRIPTION
16 Size, 1 5/16-12 thread "Super" series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500017.
2.) ALL MACHINED SURFACES TO BE 32\(\frac{\text{\textdegree}}{\text{\textdegree}}\) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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**Super 3WS**

**DESCRIPTION**
16 Size, 1 5/16-12 thread “Super” series

---

**NOTES:**
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500021.
2.) ALL MACHINED SURFACES TO BE \(32^\circ\) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

---

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Super 3W

DESCRIPTION
16 Size, 1 5/16-12 thread “Super” series

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Fax: (815) 397-2526  
E-mail: delta@delta-power.com

NOTES:
1) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500018.
2) ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.
3) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.
**Super 4W**

**DESCRIPTION**
16 Size, 1 5/16-12 thread “Super” series

**NOTES:**
1. CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500019.
2. ALL MACHINED SURFACES TO BE FINISH OR BETTER, EXCLUDING THREADS.
3. IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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Phone: (815) 397-6628        Fax: (815) 397-2526        E-mail: delta@delta-power.com
**Super 5W**

**DESCRIPTION**
16 Size, 1 5/16-12 thread “Super” series

---

**NOTES:**
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500038.
2.) ALL MACHINED SURFACES TO BE 32\(^\circ\) FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.

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QS SPECIAL 3W

DESCRIPTION
METRIC M20-1.5-H6 Thread “Special” series

NOTES:
1.) CAVITY CAN BE MACHINED WITH DELTA FORM TOOL #40500012.
2.) ALL MACHINED SURFACES TO BE 32/$\pi$ FINISH OR BETTER, EXCLUDING THREADS.
3.) IT IS VERY IMPORTANT THAT VALVE CAVITIES MEET ALL DIMENSIONAL AND QUALITY STANDARDS OF CONCENTRICITY AND PERPENDICULARITY. THREADS MUST BE PERPENDICULAR TO THE SPOTFACE SURFACE. SPOTFACE MUST CLEAN UP TO FULL DIAMETER. IMPROPERLY MACHINED CAVITIES CAN LEAD TO CARTRIDGE MALFUNCTION AND/OR FAILURE FROM DISTORTION.
STANDARD COILS

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IMMERSION PROOF “I” COILS

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Standard Proportional “F” Type Coils (Tecnord)

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Standard “M” Type Coils

FEATURES:
- 13/32” I.D.
- Numerous terminals and voltages.
- Heavy gauge color coded lead wire.

**Standard “M” Type Coils (DIN #43650 Form B GM) (A.C. ON LY)**

**MARK DATE CODE**
- MDL
- MSS
- MCL
- MDS

**MARK VOLTAGE**
- MDL [23.1] .91
- MSS [9.7] .38
- MCL [10.2] .40
- MDS [9.7] .38

**VOLTAGE**
- PART NO.
- MARKED ON COIL INSIDE OF HOUSING

**MARKING ON COIL INSIDE OF HOUSING**
- VOLTS
- MARK
- PART NO.

**ORDERING INFORMATION**

**1: BASIC MODEL NO.**
- ALL COILS DC VOLTAGE EXCEPT AS NOTED

**2: TERMINATION**
- SINGLE LEAD
- DOUBLE LEAD
- DOUBLE SPADE

**3: VOLTAGE**
- 6VDC
- 12VDC
- 24VDC
- 36VDC
- 48VDC
- 24VAC
- 110VAC
- 125VAC
- 220VAC
- 440VAC

**FEB. 2005**
**REV G**
**APPROXIMATE COIL WEIGHT**: 24 lbs./11 kg.
**APPROXIMATE COIL CAN, BTM, & NUT ASSEMBLY WEIGHT**: 33 lbs./15 kg.

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
Standard “M” Type Coils

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Specifications:

Wattage: 20 watts nominal.
Duty Rating: Continuous duty ±10% rated voltage at 70 °F (21°C) ambient.
Intermittent duty for higher ambient temperature.
Minimum Current for Actuation: 80% of rated current at room temperature.
Magnet Wire Class: N for all voltages.
Temperature Range: -40°F (-40°C) to 392°F (200°C)
Lead Wires: 18 gauge, 22"-24" long, 600 volt rating, with strain relief.
Encapsulating Material: Glass filled polyester, resistant to moisture, caustic solutions, fungus and vibration. Material temperature range is -40 °F (-40°C) to 392°F (200°C).

Note: Delta Power A.C. Coils incorporate integrally molded full wave rectifiers which are rated for reverse voltage peaks of 1000 volts maximum.
A.C. Coils are rated 50/60 HZ.
* Optimum operating voltage noted.

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Standard “P” Type Coils

FEATURES:
One piece water resistant encapsulated design.
Numerous terminals and voltages.
Coil interchangeability with Delta Series and Super Series valves.
Heavy gauge color coded lead wire.
Reversible coil (can be installed on cartridges in both directions with equal efficiency.)

NOTE:
1.) FOR COIL SELECTION IN EXTREME CONDITIONS, PLEASE LOOK AT OUR "I" COIL LINE OF ENVIRONMENTAL COILS.
2.) FOR PB-S2I, HB-S2C & HB-S2D USE NUT 36202090.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>1. BASIC MODEL NO.</th>
<th>2. TERMINATION</th>
<th>3. VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL - Double Lead</td>
<td></td>
<td>06 -6VDC</td>
</tr>
<tr>
<td>DT - Deutsch on Leads DT04-2P</td>
<td>12 -12VDC</td>
<td></td>
</tr>
<tr>
<td>DI - Deutsch- Integral DT04-3P</td>
<td>24 -24VDC</td>
<td></td>
</tr>
<tr>
<td>ML - Merti-Pack on Leads (12152000)</td>
<td>36 -36VDC</td>
<td></td>
</tr>
<tr>
<td>MI - Merti-Pack - Integral (12152000)</td>
<td>48 -48VDC</td>
<td></td>
</tr>
<tr>
<td>PL - Packard on Leads (150 Series)</td>
<td>25 -24VAC</td>
<td></td>
</tr>
<tr>
<td>WL - Weatherpack on Leads (120/0072)</td>
<td>11 -110VAC</td>
<td></td>
</tr>
<tr>
<td>SS - Single Spade</td>
<td>13 -125VAC</td>
<td></td>
</tr>
<tr>
<td>DS - Double Spade</td>
<td>22 -220VAC</td>
<td></td>
</tr>
<tr>
<td>HC - DIN 43560 (Hirschman) - (AC/DC)</td>
<td>23 -250VAC</td>
<td></td>
</tr>
<tr>
<td>CL - Conduit Lead - (AC ONLY)</td>
<td>44 -440VAC</td>
<td></td>
</tr>
</tbody>
</table>

19V/WATT STD. COIL

FEB. 2005
REV H

(ALLOILS DC VOLTAGE EXCEPT AS NOTED)
APPROXIMATE COIL ASSEMBLY WEIGHT: .72 lbs/.32 kg

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-5628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

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Page 710
Standard “P” Type Coils

Coil Model Numbers:

<table>
<thead>
<tr>
<th>Description</th>
<th>POL</th>
<th>PSL</th>
<th>PDS</th>
<th>PSS</th>
<th>PHC</th>
<th>PCL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.78</td>
<td>.78</td>
<td>.78</td>
<td>.78</td>
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<td></td>
<td></td>
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<td>.92</td>
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<td>.19</td>
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<tr>
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<td>.17</td>
<td>.17</td>
<td>.17</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.10</td>
<td>.10</td>
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</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td>.08</td>
<td>.08</td>
<td>.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td>.05</td>
<td>.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications:

Wattage: 19 watts nominal.
Duty Rating: Continuous duty ±10% rated voltage at 120°F (49°C) ambient.
Minimum Current for Actuation: 80% of rated current at room temperature.
Magnet Wire Class: N for all voltages.
Temperature Range: -40°F (-40°C) to 392°F (200°C)
Lead Wires: 18 gauge, 24” long, 600 volt rating, with strain relief.
Encapsulating Material: Glass filled polyester, resistant to moisture, caustic solutions, fungus and vibrations. Temperature range is -40° (-40°C) to 392°F (200°C).
Color Identification: Black

Delta Power A.C. Coils incorporate integrally molded full wave rectifiers which are rated for reverse voltage peaks of 1000 volts maximum.
A.C. Coils are rated 50/60 HZ.
* Optimum operating voltage noted.
Conduit connectors on A.C. coils have a maximum torque spec of 5 Ft. Lbs.
Arc Suppression Diode Available

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
"P" Type "J" Coils

**DESCRIPTION**

1/2 inch (13mm) I.D Coil.

**FEATURES**

One piece encapsulated design that is:
- Weatherproof. (When applied with o-rings.)
- No external metal shell.

**COIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wattage</td>
<td>21 Watts Nominal</td>
</tr>
<tr>
<td>Duty Rating</td>
<td>Continuous Duty +/- 10% rated voltage at 120°F (49°C) ambient</td>
</tr>
<tr>
<td>Min Current for Actuation</td>
<td>80% of rated current at room temp.</td>
</tr>
<tr>
<td>Magnet Wire Class</td>
<td>H or Better for all voltages</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40°F to 392°F (-40°C to 200°C)</td>
</tr>
<tr>
<td>Encapsulation Material</td>
<td>Thermo-Plastic, resistant to moisture, caustic solutions, fungus, and vibrations</td>
</tr>
</tbody>
</table>

**TERMINATIONS**

- **P**
- **TERMINATIONS**
- AMP Superseal - Integral
- Deutsch – Integral DT04-2P
- AMP Jr. Timer - Integral
- Metri-Pack - Integral
- DIN 43650 (Hirschman)

**VOLTAGE**

- JA 12 VDC / 1.75 Amp
- JD 24 VDC / .875 Amp

**Approximate Coil Weight:** .43 lbs. (.19 kg.)

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628
Fax: (815) 397-2526
E-mail: delta@delta-power.com
Standard “D” Type Coils

FEATURES:
- One piece water resistant encapsulated design.
- Numerous terminals and voltages.
- Heavy gauge color coded lead wire.
- Each coil is reversible (can be installed on cartridges in both directions with equal efficiency.)

NOTE:
FOR COIL SELECTION IN EXTREME CONDITIONS, PLEASE LOOK AT OUR "I" COIL LINE OF ENVIRONMENTAL COILS

ORDERING INFORMATION
1:BASIC MODEL NO.  2: TERMINATION  3: VOLTAGE
D-Type One Piece Encapsulated Coil
- DL - Double Lead
- DT - Deutsch on Leads DT04-6P
- Di - Deutsch - Integral DT04-6P
- ML - Metri-Pack on Leads (12162000)
- MI - Metri-Pack - Integral (12162000)
- PL - Packard on Leads (150 Series)
- WL - Weatherpack on Leads (12010972)
- SS - Single Spade
- DS - Double Spade
- HC - DIN 43650 (Hirschman) - (AC/DC)
- CL - Conduit Lead - (AC ONLY)
- 22 WATT STD. COIL

ORDERING INFORMATION
- DD - Double Lead
- DMI - Deutsch on Leads DT04-2P
- DDL - Integral DT04-2P

VOLTAGE
- 6VDC
- 12VDC
- 24VDC
- 36VDC
- 48VDC
- 24VAC
- 48VDC
- 24VAC
- 110VAC
- 125VAC
- 220VAC
- 6VDC
- 12VDC
- 24VAC
- 220VAC
- 250VAC
- 440VAC

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

Delta Power Company
4484 Boeing Drive - Rockford, IL 61109
Standard “D” Type Coils

Coil Model Numbers:

<table>
<thead>
<tr>
<th>Termination</th>
<th>DDL</th>
<th>DSL</th>
<th>DDS</th>
<th>DSS</th>
<th>DHC</th>
<th>DCL</th>
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</thead>
<tbody>
<tr>
<td>Description</td>
<td>Double Lead</td>
<td>Single Lead</td>
<td>Double Spade</td>
<td>Single Spade</td>
<td>Hirschmann Connector</td>
<td>Double Lead Conduit</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>6VDC 3.7</td>
<td>6VDC 3.7</td>
<td>6VDC 3.7</td>
<td>6VDC 3.7</td>
<td>6VDC 3.7</td>
<td>ORANGE</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>YELLOW</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>24VDC .90</td>
<td>24VDC .90</td>
<td>24VDC .90</td>
<td>24VDC .90</td>
<td>24VDC .90</td>
<td>BLUE</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>36VDC .62</td>
<td>36VDC .62</td>
<td>36VDC .62</td>
<td>36VDC .62</td>
<td>36VDC .62</td>
<td>GREEN</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>48VDC .47</td>
<td>48VDC .47</td>
<td>48VDC .47</td>
<td>48VDC .47</td>
<td>48VDC .47</td>
<td>BROWN</td>
</tr>
</tbody>
</table>

Specifications:

- Wattage: 22 watts nominal.
- Duty Rating: Continuous duty ±10% rated voltage at 120°F (49°C) ambient.
- Minimum Current for Actuation: 80% of rated current at room temperature.
- Magnet Wire Class: N for all voltages.
- Temperature Range: -40°F (-40°C) to 392°F (200°C).
- Lead Wires: 18 gauge, 24" long, 600 volt rating, with strain relief.
- Encapsulating Material: Glass filled polyester, resistant to moisture, caustic solutions, fungus and vibrations. Material temperature range is -40°F (-40°C) to 392°F (200°C).
- Color Identification: Black

Note: Delta Power A.C. Coils incorporate integrally molded full wave rectifiers which are rated for reverse voltage peaks of 1000 volts maximum.
- A.C. Coils are rated 50/60 Hz.
- * Optimum operating voltage noted.
- Conduit connectors on A.C. coils have a maximum torque spec of 5 Ft Lbs.
- Arc Suppression Diode Available

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com
**Standard “L” Type Coils**

**FEATURES:**
- One piece water resistant encapsulated design.
- Numerous terminals and voltages.
- Heavy gauge color coded lead wire.
- Each coil is reversible (can be installed on cartridges in both directions with equal efficiency.)

**NOTE:**
FOR COIL SELECTION IN EXTREME CONDITIONS, PLEASE LOOK AT OUR "I" COIL LINE OF ENVIRONMENTAL COILS

**STANDARD COIL DATA**
L-Type coil 5/8" I.D.

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>1: BASIC MODEL NO.</th>
<th>2: TERMINATION</th>
<th>3: VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Type One Piece Encapsulated Coil</td>
<td>DL - Double Lead</td>
<td>06 -6VDC</td>
</tr>
<tr>
<td></td>
<td>DT - Deutsch on Leads DT04-2P</td>
<td>12 -12VDC</td>
</tr>
<tr>
<td></td>
<td>DI - Deutsch - Integral DT04-2P</td>
<td>24 -24VDC</td>
</tr>
<tr>
<td></td>
<td>ML - Metri-Pack on Leads (12162000)</td>
<td>36 -36VDC</td>
</tr>
<tr>
<td></td>
<td>MI - Metri-Pack - Integral (12162000)</td>
<td>48 -48VDC</td>
</tr>
<tr>
<td></td>
<td>PL - Packard on Leads (150 Series)</td>
<td>25 -24VAC</td>
</tr>
<tr>
<td></td>
<td>WL - Weatherpack on Leads (1201072)</td>
<td>11 -110VAC</td>
</tr>
<tr>
<td></td>
<td>LS - Single Spade</td>
<td>13 -125VAC</td>
</tr>
<tr>
<td></td>
<td>DS - Double Spade</td>
<td>22 -220VAC</td>
</tr>
<tr>
<td></td>
<td>HC - DIN 43650 (Hirschman) - (AC/DC)</td>
<td>23 -250VAC</td>
</tr>
<tr>
<td></td>
<td>CL - Cordull Lead - (AC ONLY)</td>
<td>44 -440VAC</td>
</tr>
</tbody>
</table>

ALL COILS DC VOLTAGE EXCEPT AS NOTED

(ALL COILS DC VOLTAGE EXCEPT AS NOTED)

APPROXIMATE COIL ASSEMBLY WEIGHT: 0.63 lbs./0.29 kg.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628 Fax: (815) 397-2526 E-mail: delta@delta-power.com

Phone: 800-999-7378

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**Standard “L” Type Coils**

### Coil Model Numbers:

<table>
<thead>
<tr>
<th>Termination</th>
<th>LDL</th>
<th>LDS</th>
<th>LHC</th>
<th>LCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Double Lead</td>
<td>Double Spade</td>
<td>Hirschmann Connector</td>
<td>Double Lead Conduit</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>12VDC 1.8</td>
<td>YELLOW</td>
</tr>
<tr>
<td>Voltage Amp</td>
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<td>24VDC .9</td>
<td>24VDC .9</td>
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<tr>
<td>Voltage Amp</td>
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<td></td>
<td></td>
<td>GREEN</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>BROWN</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>BLUE/BLACK</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>110VAC .16</td>
<td>110VAC .16</td>
<td>RED/WHITE</td>
<td>* 100VAC 115VAC</td>
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<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>115VAC 130VAC</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>220VAC .08</td>
<td>220VAC .08</td>
<td>BLACK/WHITE</td>
<td>* 200VAC 230VAC</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>225VAC 260VAC</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>VIOLET/WHITE</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td></td>
<td></td>
<td></td>
<td>VIOLET</td>
</tr>
</tbody>
</table>

Data in this chart reflects current usage. Additional terminations, connections and suppression devices are available. Consult the factory for special applications.

### Specifications:

- **Wattage:** 22 watts nominal.
- **Duty Rating:** Continuous duty ±10% rated voltage at 120°F (49°C) ambient.
- **Minimum Current for Actuation:** 80% of rated current at room temperature.
- **Magnet Wire Class:** N for all voltages.
- **Temperature Range:** -40°F (-40°C) to 392°F (200°C).
- **Lead Wires:** 18 gauge, 24" long, 600 volt rating, with strain relief.
- **Encapsulating Material:** Glass filled polyester, resistant to moisture, caustic solutions, fungus and vibrations. Material temperature range is -40°F (-40°C) to 392°F (200°C).
- **Color Identification:** Black

**Note:** Delta Power A.C. Coils incorporate integrally molded full wave rectifiers which are rated for reverse voltage peaks of 1000 volts maximum.

A.C. Coils are rated 50/60 HZ.

* Optimum operating voltage noted.

Conduit connectors on A.C. coils have a maximum torque spec of 5 Ft. Lbs.

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
Standard “T” Type Coils

FEATURES:
One piece water resistant encapsulated design.
Numerous terminals and voltages.
Each coil is not reversible.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>TERMINATION</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDL</td>
<td>DT</td>
<td>06</td>
</tr>
<tr>
<td>TDS</td>
<td>DL</td>
<td>12</td>
</tr>
<tr>
<td>THC</td>
<td>WC</td>
<td>24</td>
</tr>
</tbody>
</table>

WHEN ORDERING FILL IN ALL BOXES

1: BASIC MODEL NO.
2: TERMINATION
3: VOLTAGE

FEB. 2005
REV H

APPROXIMATE COIL ASSEMBLY WEIGHT: .90 lbs./.41 kg.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

800-999-7378

SHOP ONLINE at www.airlinehyd.com
### Standard “T” Type Coils

<table>
<thead>
<tr>
<th>Description</th>
<th>TDL</th>
<th>TDS</th>
<th>THC</th>
<th>Lead Wire Color</th>
<th>AC Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Amp</td>
<td>12VDC 2.33</td>
<td>12VDC 2.33</td>
<td>12VDC 2.33</td>
<td>BLACK</td>
<td>25VAC 1.75</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>24VDC 1.17</td>
<td>24VDC 1.17</td>
<td>24VDC 1.17</td>
<td>RED</td>
<td>120VAC .31</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>36VDC .78</td>
<td>36VDC .78</td>
<td>36VDC .78</td>
<td>BLUE</td>
<td>240VAC .15</td>
</tr>
<tr>
<td>Voltage Amp</td>
<td>48VDC .58</td>
<td>48VDC .58</td>
<td>48VDC .58</td>
<td>GREEN</td>
<td></td>
</tr>
</tbody>
</table>
**Immersion Proof “P” Type “I” Coils**

**DESCRIPTION**
1/2 inch (13mm) I.D. Short Immersion Proof Coil.

**FEATURES**
One piece encapsulated design that is:
- Weatherproof.
- Immersion proof.
- Thermal shock / dunk tested.
- No external metal shell.

**COIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Wattage</th>
<th>20 Watts Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty Rating</td>
<td>Continuous Duty +/- 10% rated voltage at 120° F (49° C) ambient</td>
</tr>
<tr>
<td>Min Current for Actuation</td>
<td>80% of rated current at room temp.</td>
</tr>
<tr>
<td>Magnet Wire Class</td>
<td>H or Better for all voltages</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40° to 392° F (-40° to 200° C)</td>
</tr>
<tr>
<td>Encapsulation Material</td>
<td>Thermo-Plastic, resistant to moisture, caustic solutions, fungus, and vibrations</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>TERMINATIONS</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP Superseal - Integral</td>
<td>IA 12 12 VDC / 1.6 Amp Yellow Lettering</td>
</tr>
<tr>
<td>Deutsch – Integral DT04-2P</td>
<td>ID 24 24 VDC / .80 Amp Blue Lettering</td>
</tr>
<tr>
<td>AMP Jr. Timer - Integral</td>
<td>IJ</td>
</tr>
<tr>
<td>Metri-Pack - Integral</td>
<td>IM</td>
</tr>
</tbody>
</table>

**NOTE:** Pull type valves require nut 36202073 in lieu of standard nut. Push type valves require nut 36202071 in lieu of standard nut, except for PB-S2I, HB-S2C & HB- S2D use nut 36202090.

Approximate Coil Weight: .43 lbs. (.19 kg.)

**Patent Pending**

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**Immersion Proof “D” Type “I” Coils**

**DESCRIPTION**
1/2 inch (13mm) I.D. Immersion Proof Coil.

**FEATURES**
One piece encapsulated design that is:
- Weatherproof.
- Immersion proof.
- Thermal shock / dunk tested.
- No external metal shell.

**COIL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Wattage</th>
<th>24 Watts Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty Rating</td>
<td>Continuous Duty +/- 10% rated voltage at 70°F (21°C) ambient</td>
</tr>
<tr>
<td>Min Current for Actuation</td>
<td>90% of rated current at room temp.</td>
</tr>
<tr>
<td>Magnet Wire Class</td>
<td>H or Better for all voltages</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40° to 392°F (-40° to 200°C)</td>
</tr>
<tr>
<td>Encapsulation Material</td>
<td>Thermo-Plastic, resistant to moisture, caustic solutions, fungus, and vibrations</td>
</tr>
</tbody>
</table>

**TERMINATIONS**

<table>
<thead>
<tr>
<th>TERMINATIONS</th>
<th>VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP Superseal - Integral</td>
<td>IA 12 12 VDC / 2.0 Amp Yellow Lettering</td>
</tr>
<tr>
<td>Deutsch – Integral DT04-2P</td>
<td>ID 24 24 VDC / 1.0 Amp Blue Lettering</td>
</tr>
<tr>
<td>AMP Jr. Timer - Integral</td>
<td>IJ</td>
</tr>
<tr>
<td>Metri-Pack - Integral</td>
<td>IM</td>
</tr>
</tbody>
</table>

**NOTE:** Pull type valves require nut 36202073 in lieu of standard nut. Push type valves require nut 36202071 in lieu of standard nut.

Approximate Coil Weight: .49 lbs. (.22 kg.)

**Patent Pending**

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Immersion Proof “L” Type "I” Coils

DESCRIPTION
5/8 inch (16mm) I.D. Immersion Proof Coil.

FEATURES
One piece encapsulated design that is:
- Weatherproof.
- Immersion proof.
- Thermal shock / dunk tested.
- No external metal shell.

COIL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Wattage</th>
<th>26 Watts Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty Rating</td>
<td>Continuous Duty +/- 10% rated</td>
</tr>
<tr>
<td>Min Current for Actuation</td>
<td>80% of rated current at room temp.</td>
</tr>
<tr>
<td>Magnet Wire Class</td>
<td>H or Better for all voltages</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40° to 392° F (-40° to 200° C)</td>
</tr>
<tr>
<td>Encapsulation Material</td>
<td>Thermo-Plastic, resistant to moisture, caustic solutions, fungus, and vibrations</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>TERMINATIONS</th>
<th>VOLTAJE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP Superseal - Integral</td>
<td>IA 12 12 VDC / 2.2 Amp Yellow Lettering</td>
</tr>
<tr>
<td>Deutsch – Integral DT04-2P</td>
<td>ID 24 24 VDC / 1.1 Amp Blue Lettering</td>
</tr>
<tr>
<td>AMP Jr. Timer - Integral</td>
<td>IJ</td>
</tr>
<tr>
<td>Metri-Pack - Integral</td>
<td>IM</td>
</tr>
</tbody>
</table>

NOTE: Pull type valves require nut 36202073 in lieu of standard nut.
Push type valves require nut 36202071 in lieu of standard nut.

Approximate Coil Weight: .49 lbs. (.22 kg.)

Patent Pending

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ENGINEERING DATA

Standard “F” Type Coils

Features:

One piece water resistant encapsulated design.

Numerous terminals and voltages available

Internal arc suppression diodes available on request

Color identification: metallic envelope

<table>
<thead>
<tr>
<th>1 MODEL</th>
<th>2 TERMINATION</th>
<th>3 VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F (proportional coil type)</td>
<td>HC - DIN 43650 (Hirschmann)</td>
<td>12 – 12 VDC</td>
</tr>
<tr>
<td></td>
<td>DI - Deutsch – Integral DT04-2P</td>
<td>24 – 24 VDC</td>
</tr>
<tr>
<td></td>
<td>JT - Amp Junior Timer</td>
<td>22 – 220 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>without internal rectifier (for HC termination only)</td>
</tr>
</tbody>
</table>

Ordering information:

F - ** - **
Standard “F” Proportional Type Coils

<table>
<thead>
<tr>
<th>Termination Description</th>
<th>FHC</th>
<th>FDI</th>
<th>FJT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschmann connector</td>
<td></td>
<td>Deutsch Integral</td>
<td>Amp Junior Timer</td>
</tr>
<tr>
<td>Voltage / Amp</td>
<td>12 V / 1,66 A</td>
<td>12 V / 1,66 A</td>
<td>12 V / 1,66 A</td>
</tr>
<tr>
<td>Voltage / Amp</td>
<td>24 V / 0,83 A</td>
<td>24 V / 0,83 A</td>
<td>24 V / 0,83 A</td>
</tr>
<tr>
<td>Voltage / Amp</td>
<td>220 VAC rectified / 0,10 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications:

Wattage: 20 Watts nominal

Duty rating: continuous duty +/- 10% rated voltage at 120 °F (49 °C) ambient.

Minimum current for actuation: 80% of rated current at room temperature.

Magnet wire insulation: class H (200 °C)

Heat insulation: class H (180° C)

Ambient temperature range: - 30 °C - + 60 ° C

Protection degree: IP 65 (with connector and suitable seals)

Lead wires: 600 Volt rating, with strain relief

Encapsulating material: glass filled polyester, resistant to moisture, caustic solutions, fungus and vibration.

Metallic parts protected against oxidation.

**AC coils do not include the rectifier, supply voltage must be externally rectified**

Approximate coil weight: .49 lbs / .22 Kg
General Cartridge Valve Installation Notes

**CARTRIDGES**

Inspect the cartridge to assure there is no external contaminant present.

Check O-rings and back-up rings to assure they are intact and in the correct position. The O-rings should always be toward the high pressure port or between doubled back-up rings on bi-directional applications.

**COILS**

It is sometimes easier to remove the coil from the cartridge valve to install terminations or make connections with conduit, etc. If this is the case, reinstall the coil by tightening the coil nut to 4-6 ft lbs per spec sheet.

CAUTION: DO NOT OVER TORQUE
Tube will be stretched and damaged, causing valve to fail.

**VALVE BODIES**

Check the cartridge brochure to assure correct plumbing.

Inspect the cavity for burrs and any irregular machining which would damage O-rings at assembly.

Shims may be required behind the block for panel mounting.

**ASSEMBLY**

Dip the cartridge in clean oil before installing.

Screw the cartridge in by hand until the top O-ring is touching the manifold, then wrench tighten to the proper torque specification given below.

**TORQUE SPECIFICATIONS**

**Final Cartridge Tightening**

<table>
<thead>
<tr>
<th>Series</th>
<th>Torques</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8 MINI</td>
<td>10-15 ft-lbs</td>
</tr>
<tr>
<td>3/4 POWER</td>
<td>20-25 ft-lbs</td>
</tr>
<tr>
<td>7/8 DELTA</td>
<td>25-30 ft lbs</td>
</tr>
<tr>
<td>1 1/16 TECNORD</td>
<td>60-70 ft-lbs</td>
</tr>
<tr>
<td>1 5/16 SUPER</td>
<td>80-90 ft-lbs</td>
</tr>
</tbody>
</table>

**Adjusting Holding Parts:**

<table>
<thead>
<tr>
<th>Part</th>
<th>Torques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nut</td>
<td>3-5 ft-lbs</td>
</tr>
<tr>
<td>Knob</td>
<td>3-5 ft-lbs</td>
</tr>
<tr>
<td>Cap</td>
<td>2-3 ft-lbs</td>
</tr>
</tbody>
</table>

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**CAD Insertion Codes - 2D**

### MECHANICAL VALVES

The insertion codes for mechanical valves are based on the first seven digits of the valve mnemonic code number. The eighth digit represents the direction of the view.

**INSERTION CODES**

<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>View codes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARVA0KE</td>
<td>E = End (top) view</td>
</tr>
<tr>
<td></td>
<td>F = Fron or back view</td>
</tr>
<tr>
<td></td>
<td>S = Side view</td>
</tr>
</tbody>
</table>

Mnemonic option codes:

- 0 = no visible options
- K = Knob
- I = Internal adjustment
- T = Tamper proof

**View codes:**

- E = End (top) view
- F = Front or back view
- S = Side view

### SOLENOID VALVES

**COIL VIEWS**

**Code**

- **D**: Double Lead
- **L**: Single Lead
- **M**: Double Spade
- **A**: Single Spade
- **P**: Delta Post
- **S**: Single Post
- **C**: Hirschmann Lead
- **H**: Hirschmann Lead
- **D**: Conduit Lead
- **O**: Deutsch Integral Connector
- **L**: Integral Amp Jr.
- **T**: Integral Metri-Pack

**Connector code:**

- *****: Standard
- **+**: Tamper proof
- **I**: Internal adjustment
- **0**: No visible options

**Series code:**

- **0**: Normally Open
- **1**: Normally Closed
- **2**: Power
- **3**: Power w/ "I" Coil
- **4**: Bisc-Directional
- **5**: Delta
- **6**: Delta w/ "I" Coil
- **7**: Tecnord
- **8**: Super
- **9**: High Pressure

**View code:**

- **E**: End (top)
- **F**: Front
- **R**: Right
- **L**: Left
- **S**: Super

**Example**

- **CD**: Power
- **PP**: Delta

### MANUAL OVERRIDES

**Code**

- **F**: Normally Closed
- **D**: Normally Open
- **P**: Bisc-Directional
- **B**: Bi-directional

**Example**

- **CD**: Power
- **PP**: Delta

### NORMALLY OPEN VALVE COIL NUTS

**F-NUT**: Mini Series Nut

**S-NUT**: Power, Delta, Tecnord, and Super Series Nut

**F-NUT**: Power, Delta, and Tecnord

**S-NUT**: Immersion Coil Nuts

### HYDRAULIC SYMBOLS

- **C**: Third, fourth, and fifth digits of mnemonic.
- **V**: CVA
- **S**: S2A

---

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**CAD Insertion Codes -2D**

**CAVITIES**

View code:  
E = End (top)  
S = Side  
H = Hidden (side)  

Last four digits of form tool P/N.

**PORTS**

Port code:  
S = SAE  
N = NPT  

View code:  
E = End (top)  
S = Side  
H = Hidden (side)  

**SAE SIZES AVAILABLE**

#2 SAE  
#3 SAE  
#4 SAE  
#5 SAE  
#6 SAE

**NPT SIZES AVAILABLE**

1/16" NPT  
1/8" NPT  
1/4" NPT  
3/8" NPT  
1/2" NPT

**PLUGS**

**SAE PLUGS**

Size code:  
1 2 S  

View code:  
S = Side  
E = End (top)  

**NPT PLUGS**

Size code:  
3 4 E  

View code:  
S = Side  
E = End (top)

**CAVITY PLUGS**

Series code:  
M = Mini  
P = Power  
D = Delta  
T = Tecnord  
S = Super  

View code:  
F = Front  
S = Side  
E = End (top)

**SIZES AVAILABLE**

SAE:  
#2 SAE  
#3 SAE  
#4 SAE  
#5 SAE  
#6 SAE

NPT:  
1/16" NPT  
1/8" NPT  
1/4" NPT  
3/8" NPT  
1/2" NPT

**BODIES**

Series code:  
M = Mini  
P = Power  
D = Delta  
T = Tecnord  
S = Super  

Port code:  
S = SAE  
N = NPT  

Style code:  
2W = two way  
3W = three way  
4W = four way  
5W = five way

**CONSULT FACTORY FOR FORMAT AVAILABILITY**

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**CAD Insertion Codes -3D**

**CARTRIDGE VALVES**

**COILS**

**COIL NUTS**

**BODIES**

**CAVITY PLUGS**

---

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Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**Valve Mnemonic Code**

First letter is the valve Series.
- **M** = MINI (5/8")
- **P** = POWER (3/4")
- **D** = DELTA (7/8")
- **T** = TECNORD (1 1/16")
- **S** = SUPER (1 5/16")

The second letter is the cavity.

<table>
<thead>
<tr>
<th>MINI</th>
<th>POWER</th>
<th>DELTA</th>
<th>TECNORD</th>
<th>SUPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Way</td>
<td>A</td>
<td>B</td>
<td>E</td>
<td>T</td>
</tr>
<tr>
<td>3 Way</td>
<td>C</td>
<td>P</td>
<td>F</td>
<td>U</td>
</tr>
<tr>
<td>3 Way Short</td>
<td></td>
<td></td>
<td></td>
<td>R</td>
</tr>
<tr>
<td>4 Way</td>
<td>D</td>
<td>Q</td>
<td>G</td>
<td>V</td>
</tr>
<tr>
<td>5 Way Short</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5 Way</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The third letter is the type of valve.
- **M** = INLINE
- **I** = INLET
- **R** = RELIEF
- **C** = CHECK & LOAD HOLDING
- **N** = NEEDLE
- **F** = FLOW CONTROL

The third, fourth, and fifth characters combined describe the valve function. It is these characters that are stamped on the valve.

**EXAMPLES:**
- S2A = SOLENOID 2 WAY POPPET
- S3A = SOLENOID 3 WAY SPOOL
- S4A = SOLENOID 4 WAY CRISS SPOOL
- RVA = RELIEF DIRECT ACTING
- MCB = MAN NC DETENT

The sixth and seventh characters combined cover the o-ring, screen, override, knob, and other options.

**EXAMPLE:**
- 00 = STANDARD DEFAULT CONFIGURATION
- VK = VITON O-RINGS, KNOB ADJUSTMENT
- B3 = BUNA, SCREEN, OVERRIDE NONDETENT

The eighth through eleventh characters describe the solenoid, flow range, or pressure range. Pressure or flow is specified as a range or a particular setting.

| DELINE | SPARE | 1500 | 3 GPM | MAX FLOW
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DL12</td>
<td>12VDC</td>
<td>0005</td>
<td>5 PSI</td>
<td>CRACK</td>
</tr>
<tr>
<td>DS24</td>
<td>24VDC</td>
<td>1500</td>
<td>1500</td>
<td>MAX PRESS</td>
</tr>
<tr>
<td>HC24</td>
<td>24VDC</td>
<td>03.0</td>
<td>3 GPM</td>
<td>MAX FLOW</td>
</tr>
<tr>
<td>CL11</td>
<td>120VAC</td>
<td>6-10</td>
<td>6-10</td>
<td>GPM FLOW</td>
</tr>
</tbody>
</table>

The final character is the body port style.
- **N** = NPT
- **S** = SAE

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<table>
<thead>
<tr>
<th>Section / Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCE TABLE</td>
<td>732</td>
</tr>
<tr>
<td>PWM DRIVERS</td>
<td>733</td>
</tr>
<tr>
<td>MACHINE MANAGEMENT SYSTEMS</td>
<td>749</td>
</tr>
<tr>
<td>FINGERTIP PROPORTIONAL CONTROL LEVER AND SWITCHES</td>
<td>763</td>
</tr>
<tr>
<td>HEAVY DUTY MULTI-AXIS JOYSTICKS</td>
<td>779</td>
</tr>
<tr>
<td>ERGONOMIC GRIPS</td>
<td>794</td>
</tr>
</tbody>
</table>

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### Reference Table

#### Setting by Trimmers
- Total Number of Outputs: 1
- PWM Outputs: 1 (NOT simultaneous)
- Analog Outputs: 1
- High Side Power Outputs: 1 (max 3.5 A)
- Low Side Power Outputs: 1 (max 5 A)
- Signal Digital Outputs: 1
- Total Number of Inputs: 1
- Analog Inputs: 1
- Optoisolated Digital Inputs: 1
- Digital Inputs: 1
- Power Supply Range: 8.5-30 V

<table>
<thead>
<tr>
<th>Tecnord P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWM card, 1 coil, 1 channel</td>
<td>PWM card 1 coil, 1 channel</td>
</tr>
<tr>
<td>PWM card, 2 coils, 1 channel</td>
<td>PWM card 2 coils, 1 channel</td>
</tr>
<tr>
<td>PWM card, 2 coils, 2 channels (factory preset)</td>
<td>PWM card 2 coils, 2 channels</td>
</tr>
<tr>
<td>PWM card, 3 coils, 4 channels (programmable)</td>
<td>PWM card 3 coils, 4 channels</td>
</tr>
</tbody>
</table>

#### Setting by PC
- Total Number of Outputs: 1
- PWM Outputs: 2 (max 2 simultaneous)
- Analog Outputs: 8
- High Side Power Outputs: 8 (max 5 A)
- Low Side Power Outputs: 8 (max 3.5 A)
- Signal Digital Outputs: 8
- Total Number of Inputs: 8
- Analog Inputs: 8
- Optoisolated Digital Inputs: 8
- Digital Inputs: 8
- Power Supply Range: 8-32 V

<table>
<thead>
<tr>
<th>Tecnord P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-PWM-A1-MPC1-H</td>
<td>PWM card 1 coil, 1 channel</td>
</tr>
<tr>
<td>EC-PWM-A2-MPC1-H</td>
<td>PWM card 2 coils, 1 channel</td>
</tr>
<tr>
<td>EC-PWM-A4-MPC2-H</td>
<td>PWM card 4 coils, 2 channels</td>
</tr>
<tr>
<td>EC-PWM-08-MPC4-H</td>
<td>PWM card 8 coils, 4 channels</td>
</tr>
</tbody>
</table>

#### Setting by Console
- Total Number of Outputs: 9
- PWM Outputs: 6 (max 3.5 A)
- Analog Outputs: 16 (0-5 V)
- High Side Power Outputs: 1 (max 3.5 A)
- Low Side Power Outputs: 2
- Signal Digital Outputs: 16 (max 700 mA)
- Total Number of Inputs: 10
- Analog Inputs: 16 (0-5 V)
- Optoisolated Digital Inputs: 2
- Digital Inputs: 2
- Power Supply Range: 8-32 V

<table>
<thead>
<tr>
<th>Tecnord P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-MMS-1012-H</td>
<td>MMS 10 inputs, 12 outputs</td>
</tr>
<tr>
<td>EC-MMS-0516-HE</td>
<td>MMS 5 inputs, 16 outputs</td>
</tr>
<tr>
<td>EC-MMS-2020-HE</td>
<td>MMS 20 inputs, 20 outputs</td>
</tr>
<tr>
<td>EC-MMS-4820-HE</td>
<td>MMS 48 inputs, 20 outputs</td>
</tr>
<tr>
<td>EC-MMS-6252-HE</td>
<td>MMS 62 inputs, 52 outputs (main unit)</td>
</tr>
<tr>
<td>EC-MMS-1521-HE</td>
<td>MMS 15 inputs, 21 outputs (main unit)</td>
</tr>
</tbody>
</table>

#### Setting by Switches
- Total Number of Outputs: 8-12
- PWM Outputs: 8 (max 4 simultaneous)
- Analog Outputs: 52
- High Side Power Outputs: 12 (3 A max)
- Low Side Power Outputs: 12 (3 A max)
- Signal Digital Outputs: 16 (max 700 mA)
- Total Number of Inputs: 21
- Analog Inputs: 16 (0-5 V)
- Optoisolated Digital Inputs: 2
- Digital Inputs: 2
- Power Supply Range: 8-32 V

<table>
<thead>
<tr>
<th>Tecnord P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-PWM-P8-MPC4-H</td>
<td>PWM card 8 coils, 4 channels (programmable)</td>
</tr>
<tr>
<td>EC-MMS-1024-HE</td>
<td>MMS 10 inputs, 24 outputs (coding card)</td>
</tr>
</tbody>
</table>

#### Connection for Display
- CANbus Interface: RS485
- RS232 (interface needed)

#### Power Supply Range
- 8.5-30 V
- 8-32 V
- 9-30 V
- 9-30 V
- 9-30 V
- 8.5-30 V
- 8.5-40 V
- 8.5-40 V
- 8-32 V

#### Machine Management Systems
- EC-MMS-1012-H
- EC-MMS-0516-HE
- EC-MMS-2020-HE
- EC-MMS-4820-HE
- EC-MMS-6252-HE
- EC-MMS-1521-HE

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SHOP ONLINE at www.airlinehyd.com

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### PWM Driver

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-PWM-A1-MPC1-P 1 PWM output for single solenoid valve wire connection</td>
<td>734</td>
</tr>
<tr>
<td>EC-PWM-A1-MPC1-D 1 PWM output for single solenoid valve din plug for coil mounting</td>
<td>736</td>
</tr>
<tr>
<td>EC-PWM-A1-MPC1-E 1 PWM output for 1 single solenoid valve male DIN plug connection</td>
<td>738</td>
</tr>
<tr>
<td>EC-PWM-A2-MPC1-* 1 PWM output for 1 dual solenoid valve wire connection</td>
<td>740</td>
</tr>
<tr>
<td>EC-PWM-P4-MPC2-H 2 PWM outputs for 2 dual solenoid valves programmable</td>
<td>742</td>
</tr>
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<td>EC-PWM-08-MPC4-H 4 PWM outputs for 4 dual solenoid valves fixed settings</td>
<td>744</td>
</tr>
<tr>
<td>EC-PWM-P8-MPC4-H 4 PWM outputs for 4 dual solenoid valves programmable</td>
<td>746</td>
</tr>
</tbody>
</table>
EC-PWM-A1-MPC1-P  PWM Driver

DESCRIPTION
Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION
The EC-PWM-A1-MPC1-P proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (Pulse Width Modulated) current proportional to the input signal. An auxiliary power supply (+5 V) is provided as a reference for the command signal.

Adjustments of “Imin/Imax”, “Ramp time”, “Deadband” and “Dither” can be carried out directly from a key-pad integrated on the front panel.

Mounting option: panel-mounting style with INPUT/OUTPUT multi-core sheated cable.

FEATURES
• The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
• The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
• Power supply line is protected against reversed polarity and load dump.
• Input is protected against short circuits to GND and power supply.
• Output is protected against short circuits, over-current and over-temperature.
• The EC-PWM-A1-MPC1 is completely potted.
• Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS
- Operating voltage: 8.5 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 50 kΩ
- Analog input signals available: 0 ÷ 5 V
  0 ÷ 10 V
  0 ÷ 20 mA
- Typical ctrl pot resistance: 2 ÷ 47 kΩ
- Current output range (PWM): 100 ÷ 3000 mA
- PWM dither frequency: 55 ÷ 200 Hz (adjustable)
- Ramp time: 0.05 ÷ 5 s (adjustable)
- Max. current from auxiliary +5 V: 15 mA

APPLICATIONS
• Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and fine-metering control of electro-hydraulic functions.
**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

**EC-PWM-A1-MPC1-P  PWM Driver**

**CIRCUIT BOARD PINOUT - WIRING DIAGRAM**

*Wiring Colours*

- **Blue** +Battery
- **Brown** -Battery (GND)
- **Red** Command signal supply (+5 V)
- **Yellow** Command signal in
- **Gray** Command signal GND
- **White** Proportional coil output
- **Green** Proportional coil current feedback line
- **Pink** Spare / Not used

*Note*

A 5A fuse must be inserted on the BLUE wire connecting the PWM driver to the power source.

**ADJUSTMENTS**

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:
- **Imin** (minimum output current)
- **Imax** (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

**APPLICATION EXAMPLE**

Remote operation of a proportional flow control valve from single axis/unidirectional control lever incorporating a rotary potentiometer and a center/power-off switch for the energization of an auxiliary solenoid-operated dump valve.

**ORDERING INFORMATION**

A = Adjustable  
**EC-PWM-A1-MPC1-P**  
P = Panel mounting

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<th>Part numbers</th>
<th>Version</th>
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<td>23.0409.045</td>
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<td>23.0409.136</td>
<td>0-20 mA</td>
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**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-A1-MPC1-D  PWM Driver

DESCRIPTION
Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION
The EC-PWM-A1-MPC1-D proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (Pulse Width Modulated) current proportional to the input signal. An auxiliary power supply (+5 V) is provided as a reference for the command signal. Adjustments of "Imin/Imax", "Ramp time", "Deadband" and "Dither" can be carried out directly from a key-pad integrated on the front panel.

Mounting option: female DIN 43650 socket on valve’s side and sheated exit cable to connect to power source and remote control devices.

FEATURES
- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Power supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and power supply.
- Output is protected against short circuits, over-current and over-temperature.
- The EC-PWM-A1-MPC1 is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS
- Operating voltage: 8.5 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 50 kΩ
- Analog input signals available: 0 ÷ 5 V
- Typical ctrl pot resistance: 2 ÷ 47 kΩ
- Current output range (PWM): 100 ÷ 3000 mA
- PWM dither frequency: 55 ÷ 200 Hz (adjustable)
- Ramp time: 0.05 ÷ 5 s (adjustable)
- Max. current from auxiliary +5 V: 15 mA

APPLICATIONS
- Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and precise-metering control of electro-hydraulic functions.
**Power supply wiring colours**
- Blue (+) Positive from power source
- Yellow/Green (-) Negative from (GND)

**Remote potentiometer wiring colours**
- Black Command signal supply (+5 V)
- Brown Command signal in

**Proportional valve connector pins**
1. Proportional coil output
2. Proportional coil current feedback line

**Note**
A 5A fuse must be inserted on the BLUE wire connecting the PWM driver to the power source.

**ADJUSTMENTS**
The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:
- \( I_{\text{min}} \) (minimum output current)
- \( I_{\text{max}} \) (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

**APPLICATION EXAMPLE**
Remote operation of a proportional flow control valve from single axis/unidirectional control lever incorporating a rotary potentiometer and a center/power-off switch.

**ORDERING INFORMATION**

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<th>Part numbers</th>
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<td>23.0409.048</td>
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<tr>
<td>23.0409.065</td>
<td>0-10 V</td>
</tr>
<tr>
<td>23.0409.077</td>
<td>0-20 mA</td>
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</table>
DESCRIPTION

Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION

The EC-PWM-A1-MPC1-E proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (Pulse Width Modulated) current proportional to the input signal. An auxiliary power supply (+5 V) is provided as a reference for the command signal. Adjustments of “Imin/Imax”, “Ramp time”, “Deadband” and “Dither” can be carried out directly from a key-pad integrated on the front panel.

Mounting option: female DIN 43650 socket on valve’s side and male DIN 43650 plug to connect to power source and remote control devices.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Power supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and power supply.
- Output is protected against short circuits, over-current and over-temperature.
- The EC-PWM-A1-MPC1 is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS

- Operating voltage: 8.5 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 50 kΩ
- Analog input signals available: 0 ÷ 5 V
  - 0 ÷ 10 V
  - 0 ÷ 20 mA
- Typical ctrl pot resistance: 2 ÷ 47 kΩ
- Current output range (PWM): 100 ÷ 3000 mA
- PWM dither frequency: 55 ÷ 200 Hz (adjustable)
- Ramp time: 0.05 ÷ 5 s (adjustable)
- Max. current from auxiliary +5 V: 15 mA

APPLICATIONS

- Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and fine-metering control of electro-hydraulic functions.

DIMENSIONS

- A socket connector type DIN 43650 (to proportional valve)
- B plug connector type DIN 43650 (from voltage supply and remote potentiometer)

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-A1-MPC1-E  PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Viewed from B

1: VBATT
2: GND
3: SIGNAL
4: +5 V

Viewed from A

1 = A/prop. coil
2 = B/prop. coil

A (to valve)

B (from voltage supply and remote potentiometer)

ADJUSTMENTS

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

- Imín (minimum output current)
- Imáx (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

APPLICATION EXAMPLE

Remote operation of a proportional flow control valve from single axis/unidirectional control lever incorporating a rotary potentiometer.

ORDERING INFORMATION

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<th>Part numbers</th>
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<tr>
<td>23.0409.047</td>
<td>0-10 V</td>
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<td>23.0409.137</td>
<td>0-20 mA</td>
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</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**EC-PWM-A2-MPC1-* PWM Driver**

**DESCRIPTION**
Microprocessor-based PWM electronic driver for remote control of a dual-coil proportional solenoid valve.

**OPERATION**
The EC-PWM-A2-MPC1 proportional valve driver supplies a double solenoid with a PWM (Pulse Width Modulated) current proportional to the input signal from a potentiometer, PLC or other control systems.

Proportional valve A is controlled with an input command signal varying from 2.5 to 4.5 Volt.

Proportional valve B is controlled with an input command signal varying from 2.5 to 0.5 Volt. An auxiliary on-off type solenoid can be energised anytime the input signal goes out of the 2.25-2.75 V range.

**FEATURES**
- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity.
- Input is protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-A2 circuit is potted inside a plastic enclosure suitable for panel mounting by means of 2 set screws.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

**SPECIFICATIONS**
- Operating voltage: 8 ÷ 32 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 68
- Input impedance: 40 kΩ
- Analog input signals: 0.5 - 2.5 - 4.5 vdc
- Typical ctrl pot resistance: 2 ÷ 10 kΩ
- Current output range (PWM): 100 ÷ 1500 mA
- Current on-off output: max 1800 mA
- PWM dither frequency: 100 Hz
- Resolution: 10 bits
- DT04-8P Deutsch connector (male contacts)

**APPLICATIONS**
- 12 vdc and 24 vdc systems.
- Remote control of proportional valves.
- Field-adjustable applications.
- Control of a proportional bi-directional valve with a venting valve.

**DIMENSIONS**

---

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WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-P4-MPC2-H  PWM Driver

DESCRIPTION
Microprocessor-based PWM driver for remote control of 2 dual-coil proportional solenoid valves.

OPERATION
The EC-PWM-P4-MPC2-H proportional valve driver supplies up to two dual-coil proportional valves with PWM (Pulse Width Modulated) current proportional to input signals coming from potentiometers, PLC or other control systems.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-P4-MPC2-H is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS

- Operating voltage: 9 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 100 kΩ
- Analog inputs: 4 x 0-5 V
- Typical ctrl pot resistance: 1 ÷ 10 kΩ
- Digital inputs: analog inputs can be used as digital
- Resolution: 10 bit
- PWM outputs channels: 2 x dual-coil proportional valves
- Current output range (PWM): 100 ÷ 1500 mA (3 A version available)
- PWM dither frequency: 75 ÷ 250 Hz (adjustable)
- On-off digital output: 1 (1500 mA)

APPLICATIONS

- Specifically designed for applications requiring accurate adjustments and calibrations.
- 12 vdc and 24 vdc systems.
- Remote control of non-feedback proportional valves.
- Control of a proportional bi-directional valve with a venting valve.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-P4-MPC2-H  PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Adjustments can be effected via RS232 serial line to modify the following work parameters:
- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

Ordering information for the configuration kit:
20.1001.026 RS232 interface card including PC configuration software tool on CD.

APPLICATION EXAMPLE

Proportional regulation of 2 dual-coil valves with 1 bi-directional joystick.

ORDERING INFORMATION

EC-PWM-P4-MPC2-H

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<th>Part numbers</th>
<th>Version</th>
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<tr>
<td>23.0409.238</td>
<td>3 A</td>
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</table>

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-08-MPC4-H  PWM Driver

DESCRIPTION
Microprocessor-based PWM driver for remote control of 4 dual-coil proportional solenoid valves.

OPERATION
The EC-PWM-08-MPC4 proportional valve driver supplies up to four dual-coil proportional solenoid valves with PWM (Pulse Width Modulated) current proportional to the input signals coming from potentiometers, PLC or other control systems.
PWM currents are factory pre-set and cannot be adjusted.

FEATURES
• The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
• The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
• Supply line is protected against reversed polarity and load dump.
• Inputs are protected against short circuits to GND and supply.
• Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
• The EC-PWM-08-MPC4-H is completely potted.
• Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS
• Operating voltage: 9 ÷ 30 vdc
• Max current consumption: 100 mA (no load applied)
• Operating temperature: -40°C / +100°C
• Degree of protection: IP 67
• Input impedance: 100 kΩ
• Analog inputs: 6 x 0-5 V
• Typical ctrl pot resistance: 1 + 10 kΩ
• Digital inputs: 2 x PNP (Active High)
• Resolution: 10 bit
• PWM outputs channels: 4 x dual-coil proportional valves
• Current output range (PWM): 100 ÷ 1500 mA
• PWM dither frequency: 75 ÷ 250 Hz
(factoy pre-set, standard 100 Hz)

APPLICATIONS
• Specifically designed for applications with factory-set working parameters and requiring no field-adjustments.
• 12 vdc and 24 vdc systems.
• Remote control of proportional valves.
• Control of a 4 functions proportional bi-directional system.
EC-PWM-08-MPC4-H  PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: framatome SICMA2

A
1  EV4A PROP. COIL OUTPUT FEEDBACK (-)
2  EV4B PROP. COIL OUTPUT FEEDBACK (-)
3  EV3A PROP. COIL OUTPUT FEEDBACK (-)
4  EV3B PROP. COIL OUTPUT FEEDBACK (-)
5  ANALOG INPUT FOR FUNCTION 4 (TO DRIVE EV4A/B)
6  ANALOG INPUT FOR FUNCTION 3 (TO DRIVE EV3A/B)
7  ANALOG INPUT FOR FUNCTION 1 (TO DRIVE EV1A/B)
8  COMMON COMMAND FOR EV1A/B (+)
B
1  +V (POWER SUPPLY)
2  ANALOG INPUT - SPARE
3  ANALOG INPUT - SPARE
4  ANALOG INPUT FOR FUNCTION 2 (TO DRIVE EV2A/B)
5  ANALOG INPUT - SPARE
6  COMMON COMMAND FOR FOR EV2A/B (+)
7  COMMON COMMAND FOR EV4A/B (+)
8  COMMON COMMAND FOR EV3A/B (+)
C
1  -V (POWER SUPPLY - GND)
2  +5 VDC EXTERNAL SUPPLY VOLTAGE
3  DIGITAL INPUT - SPARE
4  DIGITAL INPUT - SPARE
5  EV1A PROP. COIL OUTPUT FEEDBACK (-)
6  EV1B PROP. COIL OUTPUT FEEDBACK (-)
7  EV2A PROP. COIL OUTPUT FEEDBACK (-)
8  EV2B PROP. COIL OUTPUT FEEDBACK (-)

ADJUSTMENTS

Factory pre-set for:
- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

Factory pre-set values for the standard version p/n 23.0409.170:
- Imin = 100 mA
- Imax = 1500 mA
- Ramp-up/-down time = 0 sec
- Dither frequency = 100 Hz

APPLICATION EXAMPLE

Proportional regulation of 4 dual-coil valves with 4 bi-directional control levers.

ORDERING INFORMATION

EC-PWM-08-MPC4-H

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<thead>
<tr>
<th>Part numbers</th>
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<tbody>
<tr>
<td>23.0409.170</td>
<td>1.5 A</td>
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0 = factory pre-set
H = potted plastic Housing

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**EC-PWM-P8-MPC4-H**  
**PWM Driver**

**DESCRIPTION**
Microprocessor-based PWM driver for remote control of 4 dual-coil proportional solenoid valves.

**OPERATION**
The EC-PWM-P8-MPC4 proportional valve driver supplies up to four dual-coil proportional solenoid valves with PWM (Pulse Width Modulated) current proportional to the input signals coming from potentiometers, PLC or other control systems. The control characteristics (Imin/Imax, ramps, deadbands, dither) are configurable via PC connected with a RS232 serial line to a configuration kit and PC interface of Tecnord supply.

**FEATURES**
- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-P8-MPC4-H is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

**SPECIFICATIONS**
- Operating voltage: 9 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 100 kΩ
- Analog inputs: 8 x 0-5 V
- Typical ctrl pot resistance: 1 ÷ 10 kΩ
- Digital inputs: analog inputs can be used as digital
- Resolution: 10 bit
- PWM outputs channels: 4 x dual-coil proportional valves
- Current output range (PWM): 100 ÷ 1500 mA (3 A version available)
- PWM dither frequency: 75 ÷ 250 Hz (adjustable)

**APPLICATIONS**
- Specifically designed for applications requiring accurate adjustments and calibrations.
- 12 vdc and 24 vdc systems.
- Remote control of non-feedback proportional valves.
- Control of a proportional bi-directional valve with a venting valve.

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**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-PWM-P8-MPC4-H  PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Adjustments can be effected via RS232 serial line to modify the following work parameters:
- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

Ordering information for the configuration kit:
20.1001.026 RS232 interface card including PC configuration software tool on CD.

USB / RS232 interface available on request.

APPLICATION EXAMPLE

Proportional regulation of 4 dual-coil valves with 2 bi-directional joysticks.

ORDERING INFORMATION

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<tr>
<td>23.0409.071</td>
<td>3 A</td>
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</tbody>
</table>

EC-PWM-P8-MPC4-H

P = Programmable
H = potted plastic Housing

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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### Machine Management Systems

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<td>EC-MMS-2020-H</td>
<td>20 inputs, 20 outputs RS232 / RS 485 interface</td>
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<td>EC-MMS-1521-H</td>
<td>15 inputs, 21 outputs CANbus interface</td>
<td>754</td>
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<tr>
<td>EC-MMS-4820-H</td>
<td>48 inputs, 20 outputs RS 485 / CANbus interface</td>
<td>756</td>
</tr>
<tr>
<td>EC-MMS-0516-H</td>
<td>5 inputs, 16 outputs Deutsch connection / RS 485 interface</td>
<td>758</td>
</tr>
<tr>
<td>EC-MMS-6252-H</td>
<td>62 inputs, 52 output RS485 / CANbus interface</td>
<td>760</td>
</tr>
</tbody>
</table>
**EC-MMS-1012-H  Machine Management System**

**DESCRIPTION**
Digital MMS (Machine Management System) with built-in advanced safety and fault detection features for integrated control of mobile equipment functions.

**OPERATION**
10 inputs and 12 outputs are managed by this small-size unit. PWM current outputs are field-adjustable and their setting is stored in an EEPROM memory. Parameters can be loaded via software from a standard PC connected with a RS232 serial line.

It can be used as a stand-alone controller for both meter-in systems (up to 5 functions) and bi-directional proportional systems (up to 4 functions). Additional output for a safety venting valve is available.

**FEATURES**
- Supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and power supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 3-wires RS232 serial interface.
- Auxiliary +5 V supply for control devices (e.g. potentiometers).
- Performance level c capability according to ISO 13849, due to high reliability of components and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

**SPECIFICATIONS**
- Operating voltage: 9 ÷ 30 vdc
- Max current consumption: 100 mA (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 100 kΩ
- Analog inputs (10 bits): 8 (0-5 V)
- Typical ctrl pot resistance: 1 ÷ 10 kΩ
- Digital inputs: 2
- High side power outputs: 12 (3.5 A max)
- Inputs for current feedback: 4
- Current output range (PWM): 100 ÷ 1500 mA
- PWM dither frequency: 60 ÷ 200 Hz

**APPLICATIONS**
- 12 vdc and 24 vdc systems.
- Remote control of non-feedback proportional and on-off valves.
- Specifically designed for applications requiring accurate adjustments and calibrations.
- Control of up to 4 proportional bi-directional valves plus a venting valve and additional 3 auxiliary outputs.
- Control of up to 5 functions in meter-in configuration (10 on-off valves plus 1 proportional valve and 1 venting valve).
**EC-MMS-1012-H**  
**Machine Management System**

**CIRCUIT BOARD PINOUT - WIRING DIAGRAM** (reference: meter-in layout)

### Adjustments

Adjustments can be effected via RS232 serial line to modify the following work parameters:
- \( I_{\text{min}} \) (minimum output current)
- \( I_{\text{max}} \) (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency

Ordering information for the configuration kit:  
20.1001.026 RS232 interface card including PC configuration software tool on CD.

USB / RS232 interface available on request.

### Application Example

![Application Diagram]

### Ordering Information

**EC-MMS-1012-H**  
1012 = 10 inputs - 12 outputs  
\( H \) = potted plastic Housing for panel mounting

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

---

Phone: (815) 397-6628  
Fax: (815) 397-2526  
E-mail: delta@delta-power.com
EC-MMS-2020-H  Machine Management System

DESCRIPTION
Digital MMS (Machine Management System) with built-in advanced safety and fault detection features for integrated control of mobile equipment functions.

OPERATION
20 inputs and 20 outputs are managed by this small-size unit.
Analog outputs are field-adjustable and their setting is stored in an EEPROM memory and can be loaded via software from a standard PC connected through an RS232 serial line.

It can be used as a stand-alone controller or in conjunction with other MMS electronic units like Tecnord’s Mod. MMS-4820.

FEATURES
- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 3-wires RS232 serial interface and 2-wires RS485 serial interface.
- Especially designed to drive up to 6 electro-hydraulic proportional actuators Tecnord type MLT-FD4/5.
- Auxiliary +5 V supply for control devices (e.g. potentiometers).
- Performance level c capability according to ISO 13849, due to high reliability of components and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS
- Operating voltage: 8.5 ÷ 30 vdc
- Max current consumption: 0.5 A (no load applied)
- Operating temperature: -25°C / +85°C
- Degree of protection: IP 67
- Input impedance: 100 kΩ
- Analog inputs (10 bits): 8 (0-5 V)
- Typical ctrl pot resistance: 1 ÷ 10 kΩ
- Digital inputs: 12
- High side power outputs: 14 (3.5 A max)
- Max current load on all outputs: 10 A
- Analog outputs: 6 (0-5 V)

APPLICATIONS
- 12 vdc and 24 vdc systems.
- Closed loop systems with electro-hydraulic proportional actuators.
- General purpose applications requiring field-adjustments.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines where rotating joints or cable are installed.
**CIRCUIT BOARD PINOUT - WIRING DIAGRAM**

Connector type: framatome SICMA2

<table>
<thead>
<tr>
<th>J1</th>
<th></th>
<th>J2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 ANALOG IN 2</td>
<td>1 OUT 0</td>
</tr>
<tr>
<td></td>
<td>2 ANALOG IN 5</td>
<td>2 OUT 1</td>
</tr>
<tr>
<td></td>
<td>3 DIGITAL IN 0</td>
<td>3 OUT 2</td>
</tr>
<tr>
<td></td>
<td>4 DIGITAL IN 2</td>
<td>4 OUT 3</td>
</tr>
<tr>
<td></td>
<td>5 DIGITAL IN 4</td>
<td>5 OUT 4</td>
</tr>
<tr>
<td></td>
<td>6 DIGITAL IN 7</td>
<td>6 OUT 5</td>
</tr>
<tr>
<td></td>
<td>7 DIGITAL IN 9</td>
<td>7 ANALOG OUT 4</td>
</tr>
<tr>
<td></td>
<td>8 RS232 TX</td>
<td>8 -V (POWER SUPPLY - GND)</td>
</tr>
<tr>
<td>B</td>
<td>1 ANALOG IN 1</td>
<td>1 OUT 7</td>
</tr>
<tr>
<td></td>
<td>2 ANALOG IN 4</td>
<td>2 RS485 BUS-</td>
</tr>
<tr>
<td></td>
<td>3 ANALOG IN 7</td>
<td>3 ANALOG OUT 0</td>
</tr>
<tr>
<td></td>
<td>4 DIGITAL IN 1</td>
<td>4 RS485 BUS+</td>
</tr>
<tr>
<td></td>
<td>5 DIGITAL IN 3</td>
<td>5 ANALOG OUT 2</td>
</tr>
<tr>
<td></td>
<td>6 DIGITAL IN 6</td>
<td>6 ANALOG OUT 1</td>
</tr>
<tr>
<td></td>
<td>7 DIGITAL IN 8</td>
<td>7 ANALOG OUT 5</td>
</tr>
<tr>
<td></td>
<td>8 RS232 RX</td>
<td>8 +V (POWER SUPPLY)</td>
</tr>
<tr>
<td>C</td>
<td>1 ANALOG IN 0</td>
<td>1 OUT 6</td>
</tr>
<tr>
<td></td>
<td>2 ANALOG IN 3</td>
<td>2 OUT 9</td>
</tr>
<tr>
<td></td>
<td>3 ANALOG IN 6</td>
<td>3 OUT 8</td>
</tr>
<tr>
<td></td>
<td>4 5V EXT</td>
<td>4 OUT 11</td>
</tr>
<tr>
<td></td>
<td>5 RS232 GND</td>
<td>5 OUT 10</td>
</tr>
<tr>
<td></td>
<td>6 DIGITAL IN 5</td>
<td>6 OUT 13</td>
</tr>
<tr>
<td></td>
<td>7 DIGITAL IN 10</td>
<td>7 OUT 12</td>
</tr>
<tr>
<td></td>
<td>8 DIGITAL IN 11</td>
<td>8 ANALOG OUT 3</td>
</tr>
</tbody>
</table>

**ADJUSTMENTS**

Adjustments can be effected via RS232 serial line to modify the following work parameters:
- Vmin (minimum output voltage)
- Vmax (maximum output voltage)
- Ramp-up time
- Ramp-down time

Ask for: PC configuration electronic units calibration tool (see page 42).

**APPLICATION EXAMPLE**

Electro-hydraulic multi-function system requiring individual calibration of each semi-function to meet specific working or safety-related conditions.

**ORDERING INFORMATION**

EC-MMS-2020-H

2020 = 20 inputs - 20 outputs

H = potted plastic Housing for panel mounting

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-MMS-1521-H  Machine Management System Controller

DESCRIPTION
MMS (Machine Management System) controller in rugged aluminum enclosure dual microprocessor, CANbus, built-in safety and fault-detection features for integrated control of complex functions in mobile equipment applications.

OPERATION
It is normally used as the main control unit in a complete management system. Two microprocessors and advanced diagnostics for safety applications. The EC-MMS-1521 comes with an aluminium casing, a silicon rubber gasket and connectors, designed to ensure power dissipation, robustness and tightness required in severe environment conditions. Software download available.

FEATURES
• Robust aluminum enclosure.
• Power supply is protected against reversed polarity (external fuse required) and overvoltage.
• Inputs are protected against short circuits to GND and power supply.
• Outputs protected against short circuits, over-current and over-temperature.
• 2 CANbus connections.
• PWM drivers with current feedback.
• +5 V auxiliary power supply for external control devices.
• Performance level d capability according to ISO 13849, thanks to redundant microcontroller and embedded diagnostics.
• Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).
• Reserved power supply pins for safety power outputs.
• Optional add-on inclinometer.
• Optional real time clock for data logging.

SPECIFICATIONS
• Operating voltage: 8 ± 32 vdc
• Max. current consumption: < 400 mA (no load applied)
• Operating temperature: -40°C / +105°C
• Degree of protection: IP 69
• Analog inputs (16 bits): 3 (0-5 V)
• Analog inputs (10 bits): 8 (0-5 V)
• Digital (frequency) inputs: 4
• High side power outputs: 18 (6 if PWM outputs are used)
• Low side power outputs (LS): 2
• PWM outputs with current feedback (3A): 12
• Analog voltage outputs (0-5 V): 1
• Pins selectable as power OUT or digital IN: 6
• Inputs with SW selectable pull-up: 4
• CANbus lines: 2 (ISO 11898, CAN 2.0A/B)
• Available bus speed: up to 1 Mbit/s

APPLICATIONS
• Main ECU for aerial platforms, cranes, telehandlers, agriculture vehicles.
• 12 vdc and 24 vdc systems.
• Two or more MMS boards can be interconnected through the CANbus line.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com

SHOP ONLINE at www.airlinehyd.com  800-999-7378
**EC-MMS-1521-H** Machine Management System Controller

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

<table>
<thead>
<tr>
<th>Connector type: framatome SICMA2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>J3 (GREY)</strong></td>
</tr>
<tr>
<td>A 1 VHS4</td>
</tr>
<tr>
<td>2 OUT_PWM7</td>
</tr>
<tr>
<td>3 OUT_PWM2</td>
</tr>
<tr>
<td>4 OUT_PWM3</td>
</tr>
<tr>
<td>5 DIG INT 1</td>
</tr>
<tr>
<td>6 DIG INT 0</td>
</tr>
<tr>
<td>7 OUT_PWM4</td>
</tr>
<tr>
<td>8 VHS3</td>
</tr>
<tr>
<td><strong>J4 (BLACK)</strong></td>
</tr>
<tr>
<td>A 1 OUT 4</td>
</tr>
<tr>
<td>2 OUT 5</td>
</tr>
<tr>
<td>3 OUT 0</td>
</tr>
<tr>
<td>4 OUT 1</td>
</tr>
<tr>
<td>5 OUT_PWM8</td>
</tr>
<tr>
<td>6 OUT_PWM9</td>
</tr>
<tr>
<td>7 OUT_PWM10</td>
</tr>
<tr>
<td>8 +V (POWER SUPPLY)</td>
</tr>
</tbody>
</table>

**ADJUSTMENTS**

Adjustments can be effected via CANbus interface to modify the following work parameters:
- $I_{\text{min}}$ (minimum output current)
- $I_{\text{max}}$ (maximum output current)
- Ramp-up time
- Ramp-down time

**APPLICATION EXAMPLE**

Electric motor variable RPM control

<table>
<thead>
<tr>
<th>Mast</th>
<th>Reach</th>
<th>Tilt 1</th>
<th>Tilt 2</th>
<th>Side Shift 1</th>
<th>Side Shift 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>J2</td>
<td>J3</td>
<td>J4</td>
<td>J5</td>
<td>J6</td>
</tr>
</tbody>
</table>

Forklift control system.

**ORDERING INFORMATION**

EC-MMS-1521-H

1521 = 15 inputs - 21 outputs

$H$ = aluminium Housing

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

Phone: (815) 397-6628  Fax: (815) 397-2526  E-mail: delta@delta-power.com
**DESCRIPTION**

MMS (Machine Management System) coding card with CANbus and RS485 interface and built-in advanced safety and fault-detection features for integrated control of mobile equipment functions.

**OPERATION**

The MMS-4820 can be lodged inside any remote control box or panel to make command signals compatible with CANbus networks or RS485 serial lines.

It can be used as a stand-alone controller for Tecnord’s Multidrom MLT/FD5 CANbus-configured electro-hydraulic proportional actuators.

It can be used as a remote coding card for RS485 serial line connection to other MMS electronic units like Tecnord’s Mod. MMS-2020.

**FEATURES**

- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 2-wires CANbus or RS485 serial interface.
- Performance level d capability according to ISO 13849, thanks to microprocessor redundancy.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).
- Auxiliary +5 V supply for control devices (e.g. potentiometers).

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage:</td>
<td>8.5 + 40 vdc</td>
</tr>
<tr>
<td>Max current consumption:</td>
<td>0.5 A (no load applied)</td>
</tr>
<tr>
<td>Operating temperature:</td>
<td>-25°C / +85°C</td>
</tr>
<tr>
<td>Degree of protection:</td>
<td>IP 54</td>
</tr>
<tr>
<td>Input impedance:</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Analog inputs (10 bits):</td>
<td>16 (0-5 V)</td>
</tr>
<tr>
<td>Typical ctrl pot resistance:</td>
<td>1 ÷ 10 kΩ</td>
</tr>
<tr>
<td>Digital inputs:</td>
<td>32</td>
</tr>
<tr>
<td>High side power outputs:</td>
<td>4 (3.5 A max)</td>
</tr>
<tr>
<td>Max current load on all outputs:</td>
<td>5 A</td>
</tr>
<tr>
<td>High side signal outputs:</td>
<td>16 (0.7 A max)</td>
</tr>
<tr>
<td>Inputs for current feedback:</td>
<td>1</td>
</tr>
<tr>
<td>Current output range (PWM):</td>
<td>100 ÷ 1500 mA</td>
</tr>
<tr>
<td>PWM dither frequency:</td>
<td>60 ÷ 200 Hz (adjustable)</td>
</tr>
</tbody>
</table>

**APPLICATIONS**

- 12 vdc and 24 vdc systems.
- Control panel management.
- Field-adjustable applications.
- Closed loop systems with electro-hydraulic digital actuators.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines or CANbus where rotating joints or cable reels are installed.
**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

**Phone:** (815) 397-6628  
**Fax:** (815) 397-2526  
**E-mail:** delta@delta-power.com

---

**EC-MMS-4820-H  Machine Management System**

**CIRCUIT BOARD PINOUT - WIRING DIAGRAM**

Connector type: Molex MINIFIT

**Adjustments**

Adjustments through RS485 serial line and CANbus interface.

Ask for: PC configuration electronic units calibration tool (see page 42).

**Application Example**

Electro-hydraulic system with MLT digital actuators controlled via 2-wires CANbus line.

**Ordering Information**

EC-MMS-4820-H  

4820 = 48 inputs - 20 outputs  

H = potted plastic Housing for panel mounting

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**EC-MMS-0516-H  Machine Management System**

**DESCRIPTION**

MMS (Machine Management System) controller with built-in advanced safety and fault-detection features to be used as a remote de-coding card for RS485 serial line connection to other MMS electronic units. Tecnord’s main use is as radio receiver for combined on-off and proportional control.

**OPERATION**

The MMS-0516 is provided with display and push-buttons to configure the control characteristics (Imin/Imax, ramps, deadbands, dither) of its PWM output channel. It can be used as a stand-alone controller for meter-in applications where a single PWM channel and various on-off outputs are required or in conjunction with other MMS electronic units like Tecnord's Mod. MMS-4820. Auxiliary safety microprocessor as option.

**FEATURES**

- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 2-wires RS485 serial interface.
- The current in the solenoid is independent of change in the coil resistance and in supply voltage variations.
- Performance level c capability according to ISO 13849, due to high reliability of components and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>8.5 ÷ 30 vdc</td>
</tr>
<tr>
<td>Max current consumption</td>
<td>0.2 A (no load applied)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25°C / +85°C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 65 (with housing)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Analog inputs (10 bits)</td>
<td>1 (0-5 V)</td>
</tr>
<tr>
<td>Typical ctrl pot resistance</td>
<td>1 ÷ 10 kΩ</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>4 (2 if 16 outputs are used)</td>
</tr>
<tr>
<td>High side power outputs</td>
<td>16 (3.5 A max)</td>
</tr>
<tr>
<td>Max current load on all outputs</td>
<td>10 A</td>
</tr>
<tr>
<td>Inputs for current feedback</td>
<td>1</td>
</tr>
<tr>
<td>Current output range (PWM)</td>
<td>100 ÷ 1500 mA</td>
</tr>
<tr>
<td>PWM dither frequency</td>
<td>60 ÷ 200 Hz</td>
</tr>
</tbody>
</table>

**APPLICATIONS**

- 12 vdc and 24 vdc systems.
- For hand held terminal cable/radio applications.
- Field-adjustable applications.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines where rotating joints or cable reels are installed.
EC-MMS-0516-H  Machine Management System

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: Deutsch - EEC-325-4B

Adjustments through integrated display and pushbuttons possible after removing the electronic board from inside the enclosure.

APPLICATION EXAMPLE

MMS-0516 connected to a portable control unit through a RS485 line Radio connection as option.

ORDERING INFORMATION

EC-MMS-0516-H

0516 = 5 inputs - 16 outputs

H = potted plastic Housing for panel mounting

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
EC-MMS-6252-H  Machine Management System Controller

DESCRIPTION
MMS (Machine Management System) controller with built-in advanced safety and fault-detection features for integrated control of a high number of functions in mobile equipment applications.

OPERATION
It is normally used as the main control unit in a complete machine management system. Two microprocessors and advanced diagnostics for safety applications. CANbus communication. Serial connection for software download.

FEATURES
- Robust metal enclosure and complete potting.
- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- Dual microprocessor for advanced diagnostics capability.
- Optional add-on inclinometer.
- +5 V auxiliary power supply for external control devices.
- Performance level d capability according to ISO 13849, thanks to redundant microcontroller and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS
- Operating voltage:  8.5 ÷ 32 vdc
- Max current consumption:  400 mA (no load applied)
- Operating temperature:  -25°C / +85°C
- Degree of protection:  IP 67
- Input impedance:  100 kΩ
- Analog inputs (10 bits):  16 (0-5 V)
  6 (0-20 mA)
- Typical ctrl pot resistance:  1 ÷ 10 kΩ
- High side power outputs:  8 (5 A max)
  28 (3.5 A max)
- High side signal outputs:  10 (0.7 A max)
- Digital inputs:  40
- Max current load on all outputs:  16 A
- Inputs for current feedback:  4
- Current output range (PWM):  100 ÷ 1600 mA
- Analog voltage outputs:  6 (0-5 V)

APPLICATIONS
- 12 vdc and 24 vdc systems.
- Main ECU for aerial platforms, cranes, telehandlers, agric. machines.
- Field-adjustable applications.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines or CANbus.

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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DIMENSIONS
Stainless steel enclosure completely potted.
**EC-MMS-6252-H**  
*Machine Management System Controller*

**CIRCUIT BOARD PINOUT - WIRING DIAGRAM**

<table>
<thead>
<tr>
<th>Main Connectors type</th>
<th>SICMA2/DCS1 (56 poles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary connector type</td>
<td>SICMA2 (24 poles)</td>
</tr>
<tr>
<td>PC connector type</td>
<td>DB15 female</td>
</tr>
</tbody>
</table>

- **J3**
  - 1 CAN BUS
  - 4 ANALOG INPUTS (0÷20 MA)
  - 8 ANALOG INPUTS (0÷6 V)
  - 24 ANALOG INPUTS
  - 10 DIGITAL OUTPUTS (0.7 A)
  - 1 RS485
  - +5 V AUX
  - +VBATT
  - 2 GND

- **J4**
  - 2 CAN BUS
  - 2 ANALOG INPUTS (0÷20 MA)
  - 2 ANALOG INPUTS (0÷5 V)
  - 16 DIGITAL INPUTS
  - 18 DIGITAL OUTPUTS (3.5 A)
  - 8 DIGITAL OUTPUTS (5 A)
  - 4 CURRENT FEEDBACKS
  - 2 GND

For wiring schematics consult factory.

**ADJUSTMENTS**

Adjustment of working parameters can be effected: via RS232 serial line or via CAN bus interface.

**APPLICATION EXAMPLE**

**ORDERING INFORMATION**

- **EC-MMS-6252-H**
  - 6252 = 62 inputs - 52 output
  - H = stainless steel Housing

Two configuration available:
- Standard (2 main connectors)
- Full (all connectors)
### Fingertip Proportional Control Levers and Switches

<table>
<thead>
<tr>
<th>Description</th>
<th>Technical information page</th>
<th>Ordering information page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTC proportional control lever</td>
<td>764</td>
<td>767</td>
</tr>
<tr>
<td>FTH contactless proportional control lever</td>
<td>768</td>
<td>770</td>
</tr>
<tr>
<td>JLP proportional control lever</td>
<td>771</td>
<td>773</td>
</tr>
<tr>
<td>FPR proportional roller switch</td>
<td>774</td>
<td>777</td>
</tr>
<tr>
<td>PRS proportional rocker switch</td>
<td>776</td>
<td>777</td>
</tr>
</tbody>
</table>
**Finger Point Proportional Control Lever**

### FEATURES
- Single axis / uni-directional.
- 3-pins rotary potentiometer.
- Optional enable switch.

### MECHANICAL SPECIFICATIONS
- Lever deflection angle: 50° ±1°
- Electrical angle: 50° ±1°
- Operating temperature range: -25°C / +80°C
- Protection class: IP 65 (above panel)
- Life: 3 million cycles

### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>3-pins rotary potentiometer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical power rating:</td>
</tr>
<tr>
<td>Ohmic resistance:</td>
</tr>
<tr>
<td>/ A = 50% of Vin</td>
</tr>
<tr>
<td>/ D = 90% of Vin</td>
</tr>
<tr>
<td>Max. operating input voltage (Vin):</td>
</tr>
<tr>
<td>Min. load impedance on pin 2 (signal):</td>
</tr>
<tr>
<td>Max. operating current on pin 2:</td>
</tr>
<tr>
<td>Output voltage:</td>
</tr>
<tr>
<td>Linearity (resistive track):</td>
</tr>
<tr>
<td>Connection type:</td>
</tr>
<tr>
<td>0 = solder type (no connector)</td>
</tr>
<tr>
<td>1 = AMP Modu I / 4 poles connector (mating connector kit included)</td>
</tr>
</tbody>
</table>

Neutral position switch (electromechanical type)
- Contact: silver plated (solder type)
- Max. operating input voltage: 48 V or ±24 V
- Max. operating current: 1.5 A / inductive
- Neutral position switch threshold angle: +4°
- Protection class: IP 55 (IP 67 available on request)

### POTENTIOMETER & SWITCHES OPTIONS

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentiometer</td>
<td>S = 50% Vin</td>
</tr>
<tr>
<td>3-pin pot</td>
<td>A (Std)</td>
</tr>
<tr>
<td>3-pin pot &amp; enable switch</td>
<td>B (Std)</td>
</tr>
<tr>
<td></td>
<td>S = 90% Vin</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

### ELECTRICAL CONNECTIONS

![Electrical connections diagram]

**OVERALL DIMENSIONS**

Shown with paddle type grip. Small cylindrical grip
KC type also available, with optional dead man push button.

**PANEL CUTOUT**

**OUTPUT SIGNAL CONTROL CHARACTERISTIC**

![Output signal control characteristic graph]

>> ORDERING INFORMATION: see page 764
**FTC-L2S  Fingertip Proportional Control Lever**

**FEATURES**
- Single axis / bi-directional.
- 3-pins rotary potentiometers.
- Optional center / power-off or bi-directional switches.

**MECHANICAL SPECIFICATIONS**
- Lever deflection angle: ±25° ±1°
- Electrical angle: ±25° ±1°
- Operating temperature range: -25°C / +80°C
- Protection class: IP 65 (above panel)
- Life: 3 million cycles

**ELECTRICAL SPECIFICATIONS**
- 3-pins rotary potentiometer
  - Electrical power rating: 0.25 W @ 25°C
  - Ohmic resistance: / A = 50% of Vin 1 kΩ ±20%
    / D = 90% of Vin 5 kΩ ±20%
  - Max. operating input voltage (Vin): 48 V or ±24 V
  - Min. load impedance on pin 2 (signal): 50 kΩ
  - Max. operating current on pin 2: 1 mA
  - Output voltage: see graph
  - Linearity (resistive track): 2% or better
  - Connection type: 0 = solder type (no connector)
    1 = AMP Modu I/4 poles connector (mating connector kit included)

**Center / bi-directional switches (electromechanical type)**
- Contacts: silver plated (solder type)
- Max. operating input voltage: 48 V or ±24 V
- Max. operating current: 1.5 A/inductive
- Neutral position switch threshold angle: +4°
- Protection class: IP 55

**POTENTIOMETER & SWITCHES OPTIONS**

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentiometer</td>
<td></td>
</tr>
<tr>
<td>S = 50% Vin</td>
<td>A</td>
</tr>
<tr>
<td>S = 90% Vin</td>
<td>D</td>
</tr>
<tr>
<td>3-pin potentiometer</td>
<td></td>
</tr>
<tr>
<td>3-pin pot &amp; center switch</td>
<td>B (Std)</td>
</tr>
<tr>
<td>3-pin pot &amp; bi-directional switch</td>
<td>C</td>
</tr>
</tbody>
</table>

**ELECTRICAL CONNECTIONS**

- Potentiometer
- Same schematic for MA, MB (bi-directional switches) or MC (center switch)

**OVERALL DIMENSIONS**

Shown with paddle type grip. Small cylindrical grip KC type also available, with optional dead man push button.

**PANEL CUT-OUT**

**OUTPUT SIGNAL CONTROL CHARACTERISTIC**

3-pins potentiometer configuration

---

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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SHOP ONLINE at www.airlinehyd.com
**FTC-L2S Fingertip Proportional Control Lever**

**FEATURES**
- Single axis / bi-directional.
- 4-pins rotary potentiometer.
- Optional center / power-off or bi-directional switches.

**MECHANICAL SPECIFICATIONS**
- Lever deflection angle: ± 25° ± 1°
- Electrical angle: ± 25° ± 1°
- Operating temperature range: -25°C / +80°C
- Protection class: IP 65 (above panel)
- Life: 3 million cycles

**ELECTRICAL SPECIFICATIONS**

3-pins rotary potentiometer
- Electrical power rating: 0.25 W @ 25°C
- Ohmic resistance: / G = 40% of Vin
  - 1 kΩ ± 20%
  - 5 kΩ ± 20%
- Max. operating input voltage (Vin): 48 V or ±24 V
- Min. load impedance on pin 2 (signal): 50 kΩ
- Max. operating current on pin 2: 1 mA
- Output voltage: see graph
- Linearity (resistive track): 2% or better
- Connection type: 0 = solder type (no connector)
  - 1 = AMP Modu IF 4 poles connector (mating connector kit included)

Center / bi-directional switches (electromechanical type)
- Contacts: silver plated (solder type)
- Max. operating input voltage: 48 V or ±24 V
- Max. operating current: 1.5 A/inductive
- Neutral position switch threshold angle: +4°
- Protection class: IP 55 (IP 67 available on request)

<table>
<thead>
<tr>
<th>POTENTIOMETER &amp; SWITCHES OPTIONS</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>S = 40% Vin</td>
</tr>
<tr>
<td>4-pin potentiometer</td>
<td>G</td>
</tr>
<tr>
<td>4-pin pot &amp; center switch</td>
<td>H</td>
</tr>
<tr>
<td>4-pin pot &amp; bi-directional switchs</td>
<td>I</td>
</tr>
<tr>
<td>4-pin pot &amp; bi-dir. switches &amp; center switch</td>
<td>None</td>
</tr>
</tbody>
</table>

**OVERALL DIMENSIONS**

![Overall Dimensions Diagram]

Shown with paddle type grip. Small cylindrical grip KC type also available, with optional dead man push button.

**PANEL CUT-OUT**

![Panel Cut-Out Diagram]

**OUTPUT SIGNAL CONTROL CHARACTERISTIC**

![Output Signal Characteristic Graph]

4-pins potentiometer configuration

**ELECTRICAL CONNECTIONS**

![Electrical Connections Diagram]

Same schematic for MA, MB (bi-directional switches) or MC (center switch)

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SHOP ONLINE at www.airlinehyd.com
FTH-L1S Contactless Fingertip Proportional Control Lever

FEATURES

- Single axis / uni-directional.
- Contactless, hall effect sensor.
- Optional “out of neutral” switch.
- Optional dual sensor (redundant).

MECHANICAL SPECIFICATIONS

- Lever deflection angle: 50° ±1°
- Electrical angle: 50° ±1°
- Operating temperature range: -25°C / +80°C
- Protection class: IP 67
- Life: > 3 million cycles (without switch)
- Connector: molex CGRID/SL, 7 male pins

ELECTRICAL SPECIFICATIONS

Linear, hall-effect sensor

- Power supply voltage: 8 ÷ 32 vdc
- Current consumption: < 15 mA (30 mA with 2 sensors)
- Output signal in neutral: < 0.1 V
- Output signal range: 0.5 V ÷ 4.5 V
- Tolerance on output signal: ±0.1 V
- Linearity: < 2%
- Max. output current: 1 mA
- Directional switch operating voltage: < 48 vdc
- Directional switch max. current: 1 A

Neutral position switch (electromechanical type)

- Contacts: silver plated (solder type)
- Max. operating input voltage: 48 V or ±24 V
- Max. operating current: 1 A
- Neutral position switch threshold angle: 7°
- Protection class: IP 67

ELECTRICAL CONNECTIONS

(HS1: optional)

PANEL CUT-OUT AND MOUNTING

>> ORDERING INFORMATION: see page 765

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described herein. Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
FTH-L2S  Contactless Fingertip Proportional Control Lever

FEATURES

- Single axis / bi-directional.
- Contactless, hall effect sensor.
- Optional “out of neutral” switch.
- Optional dual sensor (redundant).

MECHANICAL SPECIFICATIONS

- Lever deflection angle: ±25° ±1°
- Electrical angle: ±25° ±1°
- Operating temperature range: -25°C / +85°C
- Protection class: IP 67
- Life: > 3 million cycles (without switch)
- Connector: molex CGRID/SL, 7 male pins

ELECTRICAL SPECIFICATIONS

Linear, hall-effect sensor

- Power supply voltage: 8 ÷ 32 vdc
- Current consumption: < 15 mA (30 mA with 2 sensors)
- Output signal in neutral: 2.50 V ±0.1 V
- Output signal range: 0.5 V + 4.5 V
- Tolerance on output signal: ±0.1 V
- Linearity: < 2%
- Max. output current: 1 mA
- Directional switch operating voltage: < 48 vdc
- Directional switch max. current: 1 A

Neutral position switch (electromechanical type)

- Contacts: silver plated (solder type)
- Max. operating input voltage: 48 V or ±24 V
- Max. operating current: 1 A
- Neutral position switch threshold angle: 7°
- Protection class: IP 67

ELECTRICAL CONNECTIONS

(HS1: optional)

OVERALL DIMENSIONS

OUTPUT SIGNAL CONTROL CHARACTERISTIC

ORDERING INFORMATION:

see page 765
### FTH Contactless Proportional Control Lever

**Ordering Information**

<table>
<thead>
<tr>
<th>JOYSTICK FAMILY &amp; TYPE</th>
<th>MAIN BODY CONFIGURATION</th>
<th>NUMBER OF CHANNELS</th>
<th>TYPE OF GRIP</th>
<th>MICROSWITCH</th>
<th>CONNECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTH</td>
<td>L1S Single axis, uni-directional</td>
<td>SN Single channel</td>
<td>IPH</td>
<td>00 None</td>
<td>G Molex CGRID 7 poles</td>
</tr>
<tr>
<td></td>
<td>L2S Single axis, bi-directional</td>
<td>TW Twin Channel</td>
<td>PL</td>
<td>01 Center switch</td>
<td></td>
</tr>
</tbody>
</table>

- **Connectors:**
  - G Molex CGRID 7 poles
  - Molex connector

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
ELECTRONIC PRODUCTS

JLP-L2S  Fingertip Proportional Control Lever

FEATURES
- Single axis / bi-directional, panel mounting style.
- 3 & 4-pins potentiometer configuration.
- Bi-directional switches.

MECHANICAL SPECIFICATIONS
- Lever deflection angle: ±32° ±1°
- Electrical angle: ±30° ±1°
- Operating temperature range: -25°C / +85°C
- Protection class: IP 65 (above panel)
- Life: 3 million cycles
- Fixing screws included: 2 - M4x16

ELECTRICAL SPECIFICATIONS

Potentiometer
- Electrical power rating: 0.25 W @ 25°C
- Ohmic resistance: / A = 50% of Vin 8 kΩ ±20%
  / Q = 80% of Vin 5 kΩ ±20%
  / R = 100% of Vin 4 kΩ ±20%
- Max. operating input voltage (Vin): 48 V or ±24 V
- Min. load impedance on pin 5 (signal): 50 kΩ
- Max. operating current on pin 5: 1 mA
- Output voltage: see graph
- Linearity (resistive track): 2% or better

Directional switches
- Typical track resistance: 150 Ohm
- Max. operating input voltage: 48 V or ±24 V
- Min. load impedance on pins 2&3: 50 kΩ
- Max. operating current on pins 2&3: 1 mA
- Directional switches threshold angle: ±4°
- Connector type: Mod. D Dubox  P.N. 76382.407 wiring
  Mod. G Molex  C-Grid P.N. 50-57-9407

POTENTIOMETER & SWITCHES OPTIONS

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S = 80% Vin</td>
<td>Q</td>
</tr>
<tr>
<td>S = 100% Vin</td>
<td>R</td>
</tr>
<tr>
<td>S = 50% Vin</td>
<td>C</td>
</tr>
</tbody>
</table>

ELECTRICAL CONNECTIONS

OVERALL DIMENSIONS

PANEL CUT-OUT

OUTPUT SIGNAL CONTROL CHARACTERISTIC

ORDERING INFORMATION: see page 766
JLP-L2S Twin Channel Fingertip Proportional Control Lever

FEATURES
- Single axis / bi-directional, panel mounting style.
- Twin channel potentiometer joystick.
- Redundancy on the 100% of the stroke.

MECHANICAL SPECIFICATIONS
- Lever deflection angle: ±32° ±1°
- Electrical angle: ±30° ±1°
- Operating temperature range: -25°C / +85°C
- Protection class: IP 65 (above panel)
- Life: 3 million cycles
- Fixing screws included: 2 - M4x16

ELECTRICAL SPECIFICATIONS
Potentiometer
- Electrical power rating: 0.25 W @ 25°C
- Total resistance between pin 1 and 3: 2 kΩ ±20%
- Nominal voltage supply (Vin): 10 V
- Tolerance between track 1 and 2: ± 4% of Vcc
- Output voltage: see graph
- Load resistance: 100 kΩ - nominal
- 50 kΩ - minimum
- Linearity (resistive track): 2% or better

POTENTIOMETER & SWITCHES OPTIONS
Output signal   S = 60% Vin
3 pins potentiometer   V

CONNECTOR TYPE: AMP JPT P.N. 929505-1

ELECTRICAL CONNECTIONS (pinout)

OVERALL DIMENSIONS

OUTDOOR SIGNAL CONTROL CHARACTERISTIC

>> ORDERING INFORMATION: see page 766
JLP Proportional Control Lever  

Ordering Information

**JLP Family & Type**
- JLP

**Y, Z Axis Control Configuration**
- L2S Single axis, bi-directional

**Output Connector**
- D: 7 pins, dubox male connector (mod. 968647 - R version)
- E: 4 pins, Amp. J male connector (mod. 968646 - N version only)
- G: 7 pins, molex C-grid/SI male connector (mod. VM402 - ND interface)

**Type of Grip**
- Paddle

**Main Body Configuration**
- L2S

**Dimensions & Ratings**
- 3 to 4 pins analog resistive track
- 25% to 75% signal
- 0% to 100% signal

**Connectors**
- D: 7 pins, dubox male connector (mod. 968647)
- E: 4 pins, Amp. J male connector (mod. 968646)
- G: 7 pins, molex C-grid/SI male connector (mod. VM402 - ND)

**Additional Information**
- JLP Proportional Control Lever
- 0 - IP
- 0 - IP
- 0 - IP

**WARNING:** The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.
**FPR  Proportional Roller Switch with Hall Effect Sensor**

**FEATURES**
- Mini proportional roller switch with optimum ergonomic design for panel-mounting.
- High performance hall effect sensor circuitry.
- Twin channel configuration for redundancy.

**MECHANICAL SPECIFICATIONS**
- Rotation angle: ±30°
- Body material: acetal resin / teflon compound
- Colours available: yellow, grey, blue, green
- Rubber gaiter material: EPDM / 35-45 shore - A
- Operating temperature range: -25°C / +85°C
- Environmental protection: IP 68 (above panel)
- Life: > 5.000.000 cycles

**ELECTRICAL SPECIFICATIONS**
- Signal output @ rest: 2.5 vdc ±0.1 V
- Supply voltage:
  - H - Version = 8 ÷ 32 vdc
  - 0 - Version = 5 vdc ±5%
- Full output signal range: 0.5 - 4.5 V, ±0.2 V
- Current consumption at rest: SNCH (S1 only) 15 mA
  - TWCH (S1/S2) 25 mA
- Rated output current: 1 mA
- Connection type:
  - Wiring leads: coloured flat cable 100 mm
  - Connector: molex Mini 4 poles P.N. 5559-4P
  - Deutsch 3 poles P.N. DTO4-3P

**ELECTRICAL CONNECTIONS**
- FPR - L2S - SNCH (single chan.)
  1. Yellow: +5 vdc
  2. Orange: (-) ground
  3. Red: output 1 (S1)
  4. Brown: not used
- FPR - L2S - TWCH (twin chan.)
  1. Yellow: +5 vdc
  2. Orange: (-) ground
  3. Red: output 1 (S1)
  4. Brown: output 1 (S2)

**OVERALL DIMENSIONS**

**OUTPUT SIGNAL CONTROL CHARACTERISTIC**

**FPR - L2S - SNCH (single channel)**

**FPR - L2S - TWCH (twin channel)**

>> ORDERING INFORMATION: see page 767
FPR-PWM  Proportional Roller Switch with PWM Driver

FEATURES

- Mini proportional roller switch with optimum ergonomic design for panel-mounting.
- High performance hall effect sensor circuitry.
- PWM electronic driver integrated into the roller for remote control of a dual-coil proportional solenoid valve.

MECHANICAL SPECIFICATIONS

- Rotation angle: ±30°
- Main body material: acetal resin / tellon compound
- Colours available: yellow, grey, blue
- Rubber gaiter material: EPDM / 35-45 shore - A
- Operating temperature range: -25°C / +85°C
- Environmental protection: IP 68 (above panel)
- Life: > 5,000,000 cycles

ELECTRICAL SPECIFICATIONS

- Supply voltage: 8 ÷ 32 vdc
- Current consumption with no load: 100 mA
- PWM dither frequency: 100 Hz
- Connection type: GLX 0.5 sqmm
- Wire length: 700 mm
- Current output range (PWM): 100 ÷ 1500 mA @ 12 vdc

ELECTRICAL CONNECTIONS

(1) Red: +Battery
(2) Black: -Battery (GND)
(3) Orange: PWM Valve A+
(4) Gray: PWM Valve B+
(5) White: PWM A- / B- (common)
(6) not used

OVERALL DIMENSIONS

PWM OUTPUT CHARACTERISTIC EXAMPLE

The following values are factory set:
- Imin (minimum output current)
- Imax (maximum output current)
- Dither

APPLICATION EXAMPLE

Ordering code: 23.0409.160
(Imin = 200mA, Imax = 1500mA, PWM = 100Hz)

>> ORDERING INFORMATION: see page 767
**PRS  Proportional Rocker Switch**

**FEATURES**
- Optimum ergonomic design for panel-mounting.
- 3 & 4 pins potentiometer configuration.
- Bi-directional switches.
- High performance resistive track.

**MECHANICAL SPECIFICATIONS**
- Rotation angle: ±20°
- Main body material: acetal resin / teflon compound
- Rubber gaiter material (black colour): EPDM / 35-45 shore - A
- Operating temperature range: -25°C / +85°C
- Environmental protection: IP 66 (above panel)
- Life: > 1,000,000 cycles

**ELECTRICAL SPECIFICATIONS**
- Potentiometer configuration: 3 & 4 pins w/bi-dir. switches
- Electrical power rating: 0.5 W @ 25°C
- Ohmic resistance: 5 kΩ ±20%
- Max. operating input voltage (Vin): 48 V or ±24 V
- Min. load impedance on pin 5 (signal): 50 kΩ
- Rated output current: 1 mA
- Min resistive load on bi-dir. switched outputs: 50 kΩ
- Output voltage: see graph
- Linearity (resistive track): 2% or better
- Prewired exit cable: 250 mm

**POTENTIOMETER & SWITCHES OPTIONS**

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-4-pins pot &amp; bi-directional switches</td>
<td>S = 75% Vin</td>
</tr>
</tbody>
</table>

**ELECTRICAL CONNECTIONS**

![Schematic Diagram]

**OVERALL DIMENSIONS**

![Overall Dimensions Diagram]

**OUTPUT SIGNAL CONTROL CHARACTERISTIC**

![Output Signal Graph]

**>> ORDERING INFORMATION: see page 767**
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**JOYSTICK FAMILY & TYPE**

**FPR**: Mini proportional
- Hall effect
- Roller switch

**FPR-PWM**: Mini Proportional (with PWM driver)
- Hall effect
- Roller switch

**PRS**: Mini Proportional
- Roller switch

**MAIN BODY CONFIGURATION**

**FPR** - L2S - Single axis, bi-directional

**FPR-PWM** - L2S - Single axis, bi-directional

**FPR** - L2S - Single axis, bi-directional

**NUMBER OF CHANNELS**

**SN**: Single channel
**TW**: Twin channel

**FPR-PWM** - L2S - Single channel for dual coil proportional valve

**POWER SUPPLY RANGE**

**0**: 5 VDC ±5%
**H**: 8-32 VDC of power supply

**FPR** - L2S - 8-32 VDC of power supply

**FPR-PWM** - L2S - 8-32 VDC of power supply

**BODY COLOUR**

- None
- Yellow
- Grey
- Blue
- Green

**CONNECTION**

- None
- Flying leads
- Molex Mini 4 poles
- Deutsch DT04-3P

**Y-Y AXIS CONTROL CONFIGURATION**

- **P**: Pot & bi-directional switches
- **T**: Pot & bi-directional switches

**354-pin analog tracks**

- **5 KΩ 12% - 88% signal**
- **3.75 KΩ 0% - 100% signal**

**TYPE OF GRIP ON TOP**

- **L**: Rubber protection and mini-paddle

**ORDERING INFORMATION**

**FPR** - L2S - _ _ CH - _ _ - _

**FPR-PWM** - L2S - _ _ CH - _ _ - _

**PRS** - L2S - _ _ - _ - L
## Heavy Duty Multi-Axis Joysticks

<table>
<thead>
<tr>
<th>Description</th>
<th>Technical information page</th>
<th>Ordering information page</th>
</tr>
</thead>
<tbody>
<tr>
<td>JMF Type (potentiometric joystick body)</td>
<td>780</td>
<td>784</td>
</tr>
<tr>
<td>JHM Type (hall effect joystick body)</td>
<td>785</td>
<td>793</td>
</tr>
</tbody>
</table>

**Note:**
1. The joystick base does not include the grip.
2. The joystick base includes the rubber gaither.
**FEATURES**

The JMF potentiometric joystick controller has been designed for use in mobile and industrial field application. The potentiometer in use, available with 3 or 4-pins configuration, grants precision and a long working life. When coupled with an M range of ergonomic multi-function handles, up to 5 proportional axes and 9 on-off push buttons can be integrated in the same joystick. Power directional switches are available.

**MECHANICAL SPECIFICATIONS**

- Lever deflection angle: ±25° ±1°
- Electrical angle: ±25° ±1°
- Operating temperature range: -25°C / +80°C
- Protection class (above panel): up to IP 67, depending on grip
- Life: 3 million cycles

**AVAILABLE JOYSTICK MOVEMENTS**

- *Option L1S* Single axis control / Uni-directional
- *Option L2S* Single axis control / Bi-directional
- Option L4C Cross axis control / Bi-directional
- Option L4D Multi axis control / Bi-directional

* friction lock option available for L1S and L2S

**POTENTIOMETER & SWITCHES OPTIONS (Y-Y and X-X Axis)**

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-pins pot</td>
<td>A</td>
</tr>
<tr>
<td>3-pins pot &amp; bi-directional switches</td>
<td>C</td>
</tr>
</tbody>
</table>

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<th>Reference codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-pins pot</td>
<td>G</td>
</tr>
<tr>
<td>4-pins pot &amp; bi-directional switches</td>
<td>I</td>
</tr>
</tbody>
</table>

**AVAILABLE JOYSTICK MOVEMENTS**

- *Option L1S* Single axis control / Uni-directional
- *Option L2S* Single axis control / Bi-directional
- Option L4C Cross axis control / Bi-directional
- Option L4D Multi axis control / Bi-directional

* friction lock option available for L1S and L2S

**PANEL CUT-OUT AND MOUNTING**

Shown with IC grip
JMF  Heavy Duty Multi-Axis Potentiometric Joystick (joystick base only)

ELECTRICAL SPECIFICATIONS

**Directional switches (electromechanical type)**
- Contacts: silver plated
- Max. operating input voltage: 125/250 Vac
- Max. operating current: 16 A (5 A on request)*
- Pot. connector type: 0 = None (solder type) 1 = AMP Modu I/4 poles
- Neutral position switch threshold angle: ±10° (±5° on request)*
- Protection class: IP 55 (specials available on request)

**Rotary potentiometer**
- Electrical power rating: 0.25 W @ 25°C
- Ohmic resistance: / A = 50% of Vin 1 kΩ ±20%
  (3-pins version) / D = 90% of Vin 5 kΩ ±20%
  (4-pins version) / G = 40% of Vin 10 kΩ ±20%
  (4-pins version) / L = 100% of Vin 5 kΩ ±20%
- Max. operating input voltage (Vin): 48 V or ±24 V
- Min. load impedance on pin 2 (signal): 50 kΩ
- Max. operating current on pin 2: 1 mA
- Output voltage: see graphs
- Linearity (resistive track): 2% or better
- Protection class: IP 67

**ELECTRICAL CONNECTIONS (for solder type connector)**

3-pins potentiometer

4-pins potentiometer

Directional switches (see pinout on switch)

**OUTPUT SIGNAL**

**CONTROL CHARACTERISTICS**

**AVAILABLE GRIPS:** see page 798

**ORDERING INFORMATION:** see page 780

WARNING: The specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

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ELECTRONIC PRODUCTS

TECNORD
a Delta Power Company

JMF Heavy Duty Multi-Axis Potentiometric Joystick

JMF joystick with grips - configuration examples with overall dimensions

JMF base with IL handle
Complete code: JMF-L4C/NN-IL 0000

JMF base with IC handle
Complete code: JMF-L4C/NN-IC 0200

JMF base with IE type handle
Complete code: JMF-L4C/NN-IE A3P9 0000

JMF base with IE type handle
Complete code: JMF-L4C/NN-IE A1P9 1PRS
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---

**JMF Heavy Duty Multi-Axis Potentiometric Joystick**

**JMF joystick with grips - configuration examples with overall dimensions**

**JMF base with MS type handle**
Complete code: **JMF-L4C/NN-MS A6P9 R3P9**

**JMF base with MS type handle**
Complete code: **JMF-L4C/NN-MS A2P9 2FPR R1P9**

**JMF base with MG type handle**
Complete code: **JMF-L4C/NN-MG A4P9 R1P9**

**JMF base with MG type handle**
Complete code: **JMF-L4C/NN-MG A2P9 1FPR R1P9**
### JMF Heavy Duty Multi-Axis Joystick

**Ordering Information**

<table>
<thead>
<tr>
<th>Joystick Family &amp; Type</th>
<th>Main Base Configuration</th>
<th>Y/Y Axes Control Config.</th>
<th>Type of Grip</th>
<th>Pot. Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>JMF</td>
<td>L1SF</td>
<td>Only pot &amp; switches on Y/X axis</td>
<td>Cylindrical knob</td>
<td>Flying leads 25 cm length</td>
</tr>
<tr>
<td></td>
<td>L2S</td>
<td>Only pot &amp; switches on Y/X axis</td>
<td>Cylindrical</td>
<td>14-pole electronic board on potentiometer AMP MOD U connector mating kit included</td>
</tr>
<tr>
<td></td>
<td>L3S</td>
<td>Only pot &amp; switches on Y/X axis</td>
<td>Multi-function</td>
<td>4-pins rotary potentiometer</td>
</tr>
<tr>
<td></td>
<td>L4C</td>
<td>Only pot &amp; switches on Y/X axis</td>
<td>Multi-function</td>
<td>3-pins rotary potentiometer</td>
</tr>
<tr>
<td></td>
<td>L4D</td>
<td>Only pot &amp; switches on Y/X axis</td>
<td>Multi-function</td>
<td>4-pins rotary potentiometer</td>
</tr>
</tbody>
</table>

- **L1SF**: Single axis, uni-directional with friction lock
- **L2S**: Single axis, bi-directional
- **L3S**: Single axis, bi-directional with friction lock
- **L4C**: Dual axes, cross movement
- **L4D**: Dual axes, all diagonals

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**FEATURES**

The JHM joystick controller has been designed for use in mobile and industrial Field applications. The use of the hall effect sensor, which eliminates any contact between moving electrical parts, improves overall resolution, precision and life. A complete line of built-in electronic drivers, generating on-off, proportional and CANbus control signals, guarantees the highest controllability of any type of electro-hydraulic system.

When coupled with an ergonomic multi-function handle of the M range, up to 5 proportional axes and 9 on-off push buttons can be integrated in the same joystick. As further option, the JHM is also available with a magnetic position detent on the Y - or X - axis.

**MECHANICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main body material</td>
<td>aluminium</td>
</tr>
<tr>
<td>Boot material</td>
<td>NBR / Shore 50 - UV proof</td>
</tr>
<tr>
<td>Lever deflection angle</td>
<td>±22° ±1°</td>
</tr>
<tr>
<td>Electrical angle</td>
<td>±22° ±1°</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-25°C / +80°C</td>
</tr>
<tr>
<td>Protection class (above panel)</td>
<td>up to IP 67, depending on grip</td>
</tr>
<tr>
<td>Life</td>
<td>&gt; 5 million cycles</td>
</tr>
</tbody>
</table>

**ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td>hall effect contactless technology</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>ANL version = 5 vdc ±5%</td>
</tr>
<tr>
<td></td>
<td>other versions = 8 + 32 vdc</td>
</tr>
<tr>
<td>Current consumption @ rest</td>
<td>25 mA (sensor only)</td>
</tr>
<tr>
<td>Connector type</td>
<td>Deutsch DT04-12P</td>
</tr>
<tr>
<td></td>
<td>other types available on request</td>
</tr>
<tr>
<td>Output signal configuration</td>
<td>see next pages for all versions</td>
</tr>
</tbody>
</table>

**AVAILABLE JOYSTICK MOVEMENTS**

- **Option L2S**: Single axis control / Bi-directional
- **Option L4C**: Cross axis control / Bi-directional
- **Option L4D**: Multi axis control / Bi-directional

**AVAILABLE GRIPS**: see page 798

**ORDERING INFORMATION**: see page 781
JHM  Heavy Duty Multi-Axis Hall Effect Joystick (joystick base only)

**ANL & ANH VERSIONS**
*(basic version)*
- Current consumption @ rest:  $< 25 \text{ mA (sensor only)}$
- Supply voltage:  ANL - version = 5 vdc ±5%  
  ANH - version = 8 ± 32 vdc
- Signal output @ rest:  2.5 vdc ±0.2 V
- Output signal range:  0.5 + 4.5 V ±0.2 V (see graph)
- Rated output current:  1 mA
- Protections (ANH version): overvoltage and reversed polarity

**AVS VERSION**
*(center tap output signal with digital directional signals)*
- Current consumption @ rest:  $< 150 \text{ mA (without external load)}$
- Supply voltage (Vin):  8 ± 32 vdc
- Signal output @ rest:  0 V
- Output signal range:  0 + 5 V ±0.2 V (see graph)
- Rated output current:  1 mA

(MA and MB signals on graph)
- Digital directional outputs on both axes:  0 / Vin (0.7 A max)
- Digital directional outputs switching angle:  between 2° and 5°
**JHM** Heavy Duty Multi-Axis Hall Effect Joystick (joystick base only)

**TCN VERSION** (1 PWM output in combination with up to 5 on-off outputs)

- Supply voltage: 8 - 32 vdc
- Current consumption @ rest: < 250 mA
- PWM output: 1 x single proportional solenoid valves
- Current output range (PWM): 100 to 1600 mA (3 A available on request)
- Dither frequency: 60 to 250 Hz (100 Hz factory preset)
- Adjustable ramp time: 0.05 to 5 s
- Power digital outputs: 5 (3.5 A)
- Adjustments: via PC, RS232 serial line connection, using the Tecnord calibration and configuration tool (see picture below)

**OUTPUT SIGNAL CONTROL CURVE**

![Lever deflection angle vs. EV direction](image)

- Imin and digital outputs activation: between 2° and 5°

**ADJUSTABLE PARAMETERS**

The following parameters are adjustable via RS232 serial line by means of a specific calibration and configuration tool.

By use of the configuration window:
- Operation mode.
- Deadman push button enable.
- Joystick functions: axes reverse and enable, virtual cross movement.
- Setpoint selection (for 360° movement only).
- Output assignment on-off auxiliary valves.

By use of the calibration window:
- Operating parameters: Imin, Imax, Ramps.

**APPLICATION EXAMPLE**

(Shown with MS grip)

![Application example diagram](image)
JHM  Heavy Duty Multi-Axis Hall Effect Joystick (joystick base only)

PWM VERSION (2 PWM output channels)

- Supply voltage: 8 ± 32 vdc
- Current consumption @ rest: 250 mA
- PWM output: 2 x dual proportional solenoid valves
- Current output range (PWM): 100 to 1600 mA (3 A available on request)
- Dither frequency: 60 to 250 Hz (100 Hz factory preset)
- Adjustable ramp time: 0.05 to 5 s
- Power digital outputs: 2 (3.5 A)
- Adjustments: via PC, RS232 serial line connection, using the Tecnord calibration and configuration tool (see picture below)

Notes:
1) 3rd axis available using FPR-PWM roller switch - Imax = 1.5 A
2) the base height is 60 mm instead of the standard 46 mm

OUTPUT SIGNAL CONTROL CURVE

- Imin and venting valve activation: between 2° and 5°

ADJUSTABLE PARAMETERS

The following parameters are adjustable via RS232 serial line by means of a specific calibration and configuration tool.

By use of the configuration window:
- Operation mode.
- Deadman push button enable.
- Joystick functions: axes reverse and enable, virtual cross movement.
- Setpoint selection (for 360° movement only).
- Output assignment on-off auxiliary valves.

By use of the calibration window:
- Operating parameters: Imin, Imax, Ramps.
JHM  Heavy Duty Multi-Axis Hall Effect Joystick (joystick base only)

MLT VERSION (output adjustable signal for closed loop proportional actuators)

- Supply voltage: 8 – 32 vdc
- Current consumption @ rest: 250 mA
- Analog outputs: 4
- Output signal range: linear signal 0.9 – 4.1 V
  2 + 6 V or ratiometric output available on request
- Rated output current: 15 mA
- Power digital outputs: 4 (0.7 A)
- Digital inputs available: 2
- Adjustments: via RS232 serial line

APPLICATION EXAMPLE

(Shown with MS grip)

OUTPUT SIGNAL CONTROL CURVE

- Vmin and venting valve activation: between 2° and 5°

ADJUSTABLE PARAMETERS

The following parameters are adjustable via RS232 serial line by means of a specific calibration and configuration tool.

By use of the configuration window:
- Operation mode.
- Deadman push button enable.
- Joystick functions: axes reverse and enable, virtual cross movement.
- Setpoint selection (for 360° movement only).
- Output assignement on-off auxiliary valves.

By use of the calibration window:
- Operating parameters: Imin, Imax, Ramp up, Ramp down.

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JHM  Heavy Duty Multi-Axis Hall Effect Joystick (joystick base only)

CANBUS VERSION (with interface for CANbus line)

- Supply voltage: 8 - 32 vdc
- Current consumption @ rest: < 250 mA
- Physical layer: ISO 11898, 250 Kbit/s
- Protocol: J1939/ CANopen
- Connector type: Deutsch DT04-4

With CANbus link, following signals can be managed on the multifunctional grip:
- 4 digital outputs 0.7A (LEDs, detent coils, buzzers, etc).
- 6 analog voltage input 0-5 V (proportional rollers and mini-joysticks).
- 6 digital inputs (push buttons, toggles, etc).

ADJUSTABLE PARAMETERS

The following parameters are adjustable via RS232 serial line by means of a specific calibration and configuration tool and an hardware interface device (see picture).

By use of the configuration window:
- Node ID
JHM Heavy Duty Multi-Axis Hall Effect Joystick

**JHM joystick with grips - configuration examples with overall dimensions**

**JHM base with IL handle**
Complete code: JHM-L4D/ANH-IL 0000

**JHM base with IC handle**
Complete code: JHM-L4D/ANH-IC 0200

**JHM base with IE type handle**
Complete code: JHM-L4D/ANH-IE A4P9 0000

**JMF base with IE type handle**
Complete code: JHM-L4D/ANH-IE A1P9 1PRS

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**ELECTRONIC PRODUCTS**

**TECNORD**

a Delta Power Company

**JHM Heavy Duty Multi-Axis Hall Effect Joystick**

*JHM joystick with grips - configuration examples with overall dimensions*

- **JHM base with MS type handle**
  - Complete code: **JHM L4D/ANH-MS A6P9 R3P9**

- **JHM base with MS type handle**
  - Complete code: **JHM L4D/ANH-MS A2P9 2FPR R1P9**

- **JHM base with MG type handle**
  - Complete code: **JHM L4D/ANH-MG A4P9 R1P9**

- **JHM base with MG type handle**
  - Complete code: **JHM L4D/ANH-MG A2P9 1FPR 0000**

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### JHM Heavy Duty Multi-Axis Joystick

#### Ordering Information

| Main Base Configuration | JOYSTICK FAMILY & TYPE | JHM Heavy Duty / Multi-axis joystick controller with hall effect type | L2S | Single axis, bi-directional
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L4C</td>
<td>Dual axes, cross movement</td>
<td>U4D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Grip</th>
<th>IL</th>
<th>Cylindrical knob</th>
<th>IC</th>
<th>Cylindrical</th>
<th>IE</th>
<th>Multi-function ergonomic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IE</td>
<td>Multi-function ergonomic symmetric</td>
<td>MG</td>
<td>Multi-function ergonomic right hand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POT, CONNECTOR TYPE</th>
<th>3 Flying leads 25 cm length</th>
<th>4 Male connector, 12 poles, Deutsch DT04, 15 cm cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRIP CONFIGURATION</td>
<td>Refer to grip ordering information for push-buttons &amp; proportional controls on grips</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YY / XX AXES CONTROL CONFIG.</th>
<th>ANL</th>
<th>Analog signal 0.5-2.5-4.5 VDC, power supply range = 5 VDC ±5%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANH</td>
<td>Analog signal 0.5-2.5-4.5 VDC, power supply range = 8-32 VDC</td>
</tr>
<tr>
<td></td>
<td>AVS</td>
<td>Center tap output signal with digital directional signals</td>
</tr>
<tr>
<td></td>
<td>TCN</td>
<td>1 PWM output in combination with up to 4 on-off channels</td>
</tr>
<tr>
<td></td>
<td>PWM</td>
<td>Pulse with modulation current output factory preset or set via PC</td>
</tr>
<tr>
<td></td>
<td>MLT</td>
<td>Adjustable output signal for closed loop prop. actuators</td>
</tr>
<tr>
<td></td>
<td>CAN</td>
<td>CANbus version for connection to CANbus line J1939 protocol</td>
</tr>
</tbody>
</table>

#### Grip Configuration

Refer to the grip ordering information for axes (push-buttons & proportional controls on grips).

<table>
<thead>
<tr>
<th>POT CONNECTOR TYPE</th>
<th>3 Flying leads 25 cm length</th>
<th>4 Male connector, 12 poles, Deutsch DT04, 15 cm cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRIP CONFIGURATION</td>
<td>Refer to grip ordering information for push-buttons &amp; proportional controls on grips</td>
<td></td>
</tr>
</tbody>
</table>

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### Ergonomic Grips

<table>
<thead>
<tr>
<th>Description</th>
<th>Technical information page</th>
<th>Ordering information page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL type (cylindrical knob)</td>
<td>795</td>
<td>797</td>
</tr>
<tr>
<td>IC type (cylindrical)</td>
<td>795</td>
<td>797</td>
</tr>
<tr>
<td>IE type (ergonomic, gear type, multi-functions)</td>
<td>796</td>
<td>797</td>
</tr>
<tr>
<td>MS type (ergonomic, symmetric, multi-functions)</td>
<td>798</td>
<td>801</td>
</tr>
<tr>
<td>MG type (ergonomic, right hand, multi-functions)</td>
<td>802</td>
<td>805</td>
</tr>
</tbody>
</table>

**Note:**
1. Ergonomic grips can be used as standalone devices.
2. Grips do not include rubber gaiter and retainer ring, which must be ordered separately.
### IL - CYLINDRICAL KNOB

**MECHANICAL SPECIFICATIONS**
- Body material: bakelite
- Colour: black
- Operating temperature range: -20°C / +60°C
- Connecting hub: female thread / M14 x 1.5

**ELECTRICAL SPECIFICATIONS**
- Prewired exit cable: 250 mm
- Insulating cable material: PVC

#### TOP PUSH BUTTON
- Rated amperage: 3 A inductive
- Life: > 100,000 cycles
- Protection class: IP 64

---

### IC - CYLINDRICAL GRIP

**MECHANICAL SPECIFICATIONS**
- Body material: nylon
- Bottom rubber material: neoprene
- Colour: black
- Operating temperature range: -20°C / +60°C
- Connecting hub: female thread / M14 x 1.5

**ELECTRICAL SPECIFICATIONS**
- Prewired exit cable: 250 mm
- Insulating cable material: PVC

#### PUSH BUTTON AND ROCKER SWITCH
- Contacts: silver plated
- Rated amperage: 16 A / 250 vac
- 3 A / 24 vdc
- Electrical life: > 100,000 cycles
- Mechanical life: > 3,000,000 cycles
- Protection class: IP 54

---

**OVERALL DIMENSIONS**

- IL-0000: No push button
- IL-0100: Top push button (No circuit)
- IC-0000: No push button
- IC-0100: Top push button (No circuit)
- IC-0200: Top rocker switch

---

**ORDERING INFORMATION:** see page 795
### IE  Multi-Function Ergonomic Grip

#### MECHANICAL SPECIFICATIONS
- Material: thermoplastic
- Colour: black
- Operating temperature range: -25°C / +85°C
- Connecting hub: female thread / M10 x 1.5
- Protection class: IP 65 (plain grip)

#### ELECTRICAL SPECIFICATIONS
- Prewired exit cable: 250 mm

#### FEATURES
- Multi-functions ergonomic grip gear type with on-off and proportional switches.
- Easy adaptability to existing joystick control lever.

#### OVERALL DIMENSIONS

![Diagram of the grip](image)

#### CONFIGURATION EXAMPLES

<table>
<thead>
<tr>
<th></th>
<th>D-man P/B</th>
<th>Rear P/B</th>
<th>Rear PRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE-0000-0000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IE-A000-0000</td>
<td>yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IE-A1P9-0000</td>
<td>yes</td>
<td>1xP9</td>
<td>0</td>
</tr>
<tr>
<td>IE-A2P9-0000</td>
<td>yes</td>
<td>2xP9</td>
<td>0</td>
</tr>
<tr>
<td>IE-A3P9-0000</td>
<td>yes</td>
<td>3xP9</td>
<td>0</td>
</tr>
<tr>
<td>IE-0000-1PRS</td>
<td>0</td>
<td>0</td>
<td>1xPRS</td>
</tr>
<tr>
<td>IE-A1P9-1PRS</td>
<td>yes</td>
<td>1xP9</td>
<td>1xPRS</td>
</tr>
<tr>
<td>IE-0000-1FPR</td>
<td>yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IE-A1P9-1FPR</td>
<td>yes</td>
<td>1xFPR</td>
<td>1xFPR</td>
</tr>
</tbody>
</table>

**>> ORDERING INFORMATION:** see page 795

---

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### IL / IC / IE Grips Ordering Information

#### IL / Cylindrical knob
- **Type of Grip**: IL
- **Push Buttons on Grip**:
  - 0000: No push button
  - 0100: Top normally open push button

#### IC / Cylindrical grip
- **Type of Grip**: IC
- **Push Buttons on Grip**:
  - 0000: No push button
  - 0100: Top normally open push button
  - 0200: Top rocker switch

#### IE / Ergonomic
- **Type of Grip**: IE
- **Analog Controls on Grip**:
  - 0000: No control
  - PRS: Proportional rocker switch
  - FPR: Proportional roller switch
- **Dead Man PB**:
  - 0: No dead man
  - A: Right side
  - B: Left side
  - Red colour
- **NBR of PB**:
  - n = 0-3
- **NBR of CONTROL**:
  - n = 0-1
- **On-off Controls on Grip**:
  - 00: No control
  - P9: up to 3 A inductive
- **Analog Controls**
  - n = 0-1

---

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**MS  Multi-Function Ergonomic Symmetric Grip**

**FEATURES**
- Optimum ergonomic design.
- High performance switches.

**MECHANICAL SPECIFICATIONS**
- Material: thermoplastic
- Colour: black
- Operating temperature range: -25°C / +85°C
- Protection class: IP 65 with plain grip (IP 67 with special assembly on request) IP 54 with dead man trigger option
- Connecting hub: female thread / M14 x 1.5

**ELECTRICAL SPECIFICATIONS**
- Prewired exit cable: 250 mm

**A - Dead man push button**
- Rated amperage: up to 3 A inductive
- Protection class (microswitch): IP 67

**P9 - Push buttons**
- Operational life: > 100,000 cycles
- Rated amperage: up to 5 A resistive up to 3 A inductive
- Protection class: IP 64 (IP 68 available)
- Available colours: red, blue, yellow, black, green, white
- Button and bezel material: thermoplastic
- Contacts: gold plated silver alloy

**OVERALL DIMENSIONS**

**CONFIGURATION EXAMPLES**

<table>
<thead>
<tr>
<th>Mod.</th>
<th>D-man P/B</th>
<th>Front P/B</th>
<th>Rear P/B</th>
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<td>MS-A1P9-0000-0000</td>
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- FPR - Proportional roller
  - Output signal: 3-pins connection hall effect contactless sensor
- PRS - Proportional rocker switch
  - Output signal: 3-pins resistive pot 4-pins center tap

**OVERALL DIMENSIONS**
- Mod. MS-A2P9-2FPR-F1P9

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MS Multi-Function Ergonomic Symmetric Grip

**FEATURES**
- Optimum ergonomic design.
- Internal PWM driver.

**MECHANICAL SPECIFICATIONS**
- Material: thermoplastic
- Colour: black
- Operating temperature range: -25°C / +85°C
- Protection class: IP 65 with plain grip (IP 67 with special assembly on request) IP 54 with dead man trigger option
- Connecting hub: female thread / M14 x 1.5

**ELECTRICAL SPECIFICATIONS**
- Prewired exit cable: 250 mm
- A - Dead man push button
  - Rated amperage: up to 3 A inductive
  - Protection class (microswitch): IP 67
- P9 - Push buttons
  - Operational life: > 100.000 cycles
  - Rated amperage: up to 5 A resistive
  - up to 3 A inductive
  - Protection class: IP 64 (IP 68 available)
  - Available colours: red, blue, yellow, black, green, white
  - Button and bezel material: thermoplastic
  - Contacts: gold plated silver alloy
  
**FPR - Proportional roller**
- Output signal: 3-pins connection hall effect contactless sensor

**OVERALL DIMENSIONS**

![Overall Dimensions Diagram]

**PWM - Pulse width modulated output current driver for a dual coil proportional valve**
- Supply voltage: 8-32 Volt
- Max. current draw: 100 mA
- Current output range: factory set btw 0 and 1500 mA
- PWM dither frequency: 100 Hz
- Operating temperature range: -25°C / +85°C

**CONFIGURATION EXAMPLES**

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### MG Multi-Function Ergonomic Symmetric Grip

#### FEATURES
- Optimum ergonomic design.
- High performance switches.

#### MECHANICAL SPECIFICATIONS
- **Material:** thermoplastic
- **Colour:** black
- **Operating temperature range:** -25°C / +85°C
- **Protection class:**
  - IP 65 with plain grip
  - IP 67 with special assembly on request
  - IP 54 with dead man trigger option
- **Connecting hub:** female thread / M14 x 1.5

#### ELECTRICAL SPECIFICATIONS
- **Prewired exit cable:** 250 mm
- **A - Dead man push button**
  - Rated amperage: up to 3 A inductive
  - Protection class (microswitch): IP 67
- **P9 - Push buttons**
  - Operational life: up to 100,000 cycles
  - Rated amperage: up to 5 A resistive, up to 3 A inductive
  - Protection class: IP 64 (IP 68 available)
  - Available colours: red, blue, yellow, black, green, white
  - Button and bezel material: thermoplastic
  - Contacts: gold plated silver alloy

#### OVERALL DIMENSIONS

![Dimensions diagram](Image)

#### CONFIGURATION EXAMPLES

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ELECTRONIC PRODUCTS

MG Multi-Function Ergonomic Right Hand Grip

FEATURES
- Optimum ergonomic design.
- High performance switches.

MECHANICAL SPECIFICATIONS
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- Protection class: IP 65 with plain grip
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ELECTRICAL SPECIFICATIONS
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- Rated amperage: up to 3 A inductive
- Protection class (microswitch): IP 67

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  up to 3 A inductive
- Protection class: IP 64 (IP 68 available)
- Available colours: red, blue, yellow, black,
  green, white
- Button and bezel material: thermoplastic
- Contacts: gold plated silver alloy

FPR - Proportional roller
- Output signal: see FPR data sheet
  3-pins connection
  hall effect contactless sensor

PRS - Proportional rocker switch
- Output signal: see PRS data sheet
  3-pins resistive pot
  4-pins center tap

OVERALL DIMENSIONS

CONFIGURATION EXAMPLES

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<tr>
<th>MG-01P9-1FPR-0000</th>
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<th>Front P/B</th>
<th>Front FPR</th>
<th>Rear P/B</th>
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