Load-sensing control block in mono and sandwich plate design

Model M4-12

Nominal size 12
Unit series 2X
Nominal pressure 350 bar (pump side)
Nominal pressure 420 bar (actuator side)
Maximum flow
- Pump side: 200 l/min for central inlet element
  150 l/min for lateral inlet element
- Actuator side: 130 l/min with pressure compensator and load holding function

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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Types of operation cover B</td>
<td>35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Features

System:
- Load pressure-independent flow control
  - Open center for fixed displacement pump
  - Closed center for variable displacement pump

Type:
- Sandwich plate design
  - Inlet element
  - Up to 10 directional valve elements
  - End element

Types of operation
- Mechanical:
  - Handle-operated lever
  - Tongue
- Hydraulic
- Electrohydraulic (on/off, proportional)
- Electrohydraulic with on-board electronics (EPM2)

Flow
- Load pressure compensated
- High repeatability
- Low hysteresis
- Adjustable via stroke limitation (not available with mechanical operated sections)

Pressure relief function
- Inlet element:
  - Pilot-operated pressure relief valve
- Directional valve element / actuator ports
  - Compact shock valves with feed function

LS pressure relief function
- Adjustable for each actuator port
- External pressure adjustment for each actuator port possible
- Electro-proportional per section

Areas of application
- Truck applications
- Drilling machinery
- Forestry machines
- Large-size and telescopic forklifts
- Mining applications
- Cranes
- Construction machines
- Lifting platforms
- Heavy load vehicles
- Ship engineering
- Municipal vehicles
- Stationary applications

Function

Control block M4-12
The directional valves are proportional valves according to the load-sensing principle.

Actuator control
The flow direction and magnitude of flow reaching the actuator ports (A or B) is determined by the main spool (2).
Pressure reducing valves (9) control the position of the main spool (2). The level of electric current at the pressure reducing valve determines the level of pilot pressure in the spring chambers (8) and therefore also the stroke of the main spool (P → A; P → B).

The pressure difference at the main spool (2), and consequently the flow to the actuator, is maintained constant via the pressure compensator (3).

Load pressure compensation
Pressure changes at the actuators or at the pump are compensated by the pressure compensator (3). The flow to the actuator remains constant even if the load varies.

Flow limitation
The maximum flow can be set mechanically and individually via stroke limitations (6).

Pressure relief function
The LS pressure as per actuator port can be adjusted internally via the LS pressure relief valves (4) or externally via the LS ports MA, MB.

Shock valves with combined feed function (5) protect the actuator ports A and B from pressure peaks.

The highest load pressure is signaled to the pump via the LS line and the integrated shuttle valves (7).
Cross-section

1 Housing
2 Main spool
3 Pressure compensator
4 LS pressure relief valves
5.1 Shock valve with feed function
5.2 Plug screw
6.1 A side stroke limitation
6.2 B side stroke limitation
7 LS shuttle valve
8 Spring chamber
9.1 Pressure reducing valve (pilot valve “a”)
9.2 Pressure reducing valve (pilot valve “b”)
10 Compression spring
11 Handle-operated lever
12 Cover A
13 Cover B

Connections:
P Pump
A, B Actuator
T Tank
X Pilot oil supply
Y Tank, depressurized
LS Load-sensing (LS)
M_A, M_B External LS ports
# Technical data

*Note!*

The technical data were determined with a viscosity of \( \nu = 32 \text{ mm}^2/\text{s} \) (HLP46: 50 °C).

---

## General

<table>
<thead>
<tr>
<th>Installation position</th>
<th>Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of connection</td>
<td>SAE J1626 or ISO 11926-1</td>
</tr>
</tbody>
</table>

### Mass

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet element</td>
<td>Closed center J</td>
</tr>
<tr>
<td></td>
<td>kg 4.3</td>
</tr>
<tr>
<td>Open center P</td>
<td>kg 6.0</td>
</tr>
<tr>
<td>Central inlet element</td>
<td>Closed center JZ</td>
</tr>
<tr>
<td></td>
<td>kg 8.4</td>
</tr>
</tbody>
</table>

### Directional valve element

<table>
<thead>
<tr>
<th>Operation</th>
<th>Mechanical</th>
<th>Hydraulic</th>
<th>El.-hydraulic</th>
<th>with EPM2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess weight of handle-operated lever</td>
<td>kg 0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End element</td>
<td>kg 2.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hydraulic fluid and ambient temperature range

\( \theta \) °C –20 to +80

### Painting

Consult factory

## Hydraulic

### max. flow at port

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>A, B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( q_{V_{\text{max}}} ) l/min 200 with central inlet element</td>
<td>( q_{V_{\text{max}}} ) l/min 150 with lateral inlet element</td>
</tr>
</tbody>
</table>

|                      | \( q_{V_{\text{max}}} \) l/min 140 |

### Nominal pressure

|                      | \( p_{\text{nom}} \) bar 350 (400 on inquiry) |

### max. operating pressure at port

|                      | \( p_{\text{max}} \) bar 350 (400 on inquiry) |

|                      | \( p_{\text{max}} \) bar 420 |
|                      | \( p_{\text{max}} \) bar 330 |
|                      | \( p_{\text{max}} \) bar 30, or 20 for purely mechanic model |
|                      | \( p_{\text{max}} \) Depressurized to the tank |

### max. pilot pressure at port

|                      | \( p_{\text{ctrl}} \) bar 35 |

|                      | \( p_{\text{ctrl}} \) bar 35 |

### Pilot pressure range

|                      | Hydraulic \( p_{\text{ctrl}} \) bar 8.5 to 22.5 |
|                      | Electrohydraulic \( p_{\text{ctrl}} \) bar 6.5 to 17.2 |

### Required control \( \Delta p \) at the control block

|                      | Versions S; C \( p \) bar 18 |

### Recommended hydraulic pilot control units

TH 6 characteristic curve 97, see RE 64552

### LS pressure relief function (adjustment ranges)

50 to 149; 150 to 330 (selected in the factory)

### Hydraulic fluid

Mineral oil (HL, HLP) according to DIN 51524, other hydraulic fluids, such as HEES (synthetic esters) according to VDMA 24568 as well as hydraulic fluids as specified under RE 90221, on inquiry

### Viscosity range

\( \nu \) mm²/s 10 to 380

### Maximum permitted degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)

Class 20/18/15, for this we recommend a filter with a minimum retention rate of \( \beta_{10} \geq 75 \)

## Electrical

### Electrical pilot control valves

FTWE 2 K.; see RE 58007 ¹)

FTDRE 2 K.; see RE 58032 ¹)

### Recommended amplifiers

(further control options on inquiry)

RA 1-0/10; 1 axis, see RE 95230

RA 2-1/10; 4 to 6 axes, see RE 95230

Control units RC see RE 95200

### On-board electronics (EPM2)

Data from page 49; see also RE 64815-B

1) Plug-in connectors are not included in the scope of supply and need to be ordered separately, see page 34.

2) Projected

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¹) Note!

You can find more information on using the hydraulic products of Bosch Rexroth in our publication “Hydraulic valves for mobile applications – General information,” RE 64020-B1.
Modular structure: Control block with lateral inlet element

Control blocks of the series M4-12 have a modular structure. They can be combined without problems for the specific application.

1 Inlet element
   A: Open center “P”
   B: Closed center “J”

2 Directional valve elements
   2.1 LS pressure relief function
   2.2 Secondary valves
   2.3 Operation cover “A”
       A: Mechanical operation “A”
       B: Hydraulic operation “H”
       C: Electrohydraulic operation “W”
       D: Electrohydraulic operation with on-board electronics EPM2 “CBA”

2.4 Operation cover “B”
   A: Mechanical operation “Z”
   B: Standard cover “—”
   C: Mechanical operation “K” with handle-operated lever

2.5 Electro-proportional LS pressure relief function

3 End element
   A: with LS unloading “LA”
   B: with LS port “LZ”
Modular structure: Control block with lateral inlet element

1 Central inlet element “JZ”

2 Directional valve elements
   2.1 LS pressure relief function
   2.2 Secondary valves
   2.3 Operation cover “A”
       A: Mechanical operation “A”
       B: Hydraulic operation “H”
       C: Electrohydraulic operation “W”
       D: Electrohydraulic operation with on-board electronics EPM2 “CBA”

2.4 Operation cover “B”
   A: Mechanical operation “Z”
   B: Standard cover “–”
   C: Mechanical operation “K” with handle-operated lever

2.5 Electro-proportional LS pressure relief function

3 End element
   A: Diversion plate “LU”
   B: with LS unloading “LA”
   C: with LS port “LZ”
### Order details

<table>
<thead>
<tr>
<th>Short code</th>
<th>Inlet element</th>
<th>Directional valve element</th>
<th>End element</th>
<th>Additional details</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4–12 – 2X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of directional valves = 1 to 20 ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal size = 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit series 20 to 29 (unchanged installation and connection dimensions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandwich plate design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral</td>
<td>= J</td>
<td>= P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>= JZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central for M4-12/15</td>
<td>= JK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed center</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open center</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>without primary pressure relief valve</td>
<td>= Q</td>
<td>(not for open center)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with primary pressure relief valve</td>
<td>= ...</td>
<td>(pressure information in bar, 3-digit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>without primary pressure relief valve</td>
<td>= Z</td>
<td>(cannot be retrofitted, only in combination with JZ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot oil supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with internal pilot oil supply</td>
<td>= Y</td>
<td>for external pilot oil supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with LS shut-off (only in combination with J, P)</td>
<td>= A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional valve element</td>
<td>Order details, see page 8 and 9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| End element | | | |
|-------------|---------------|-------------------|
| End element without ports, with internal LS unloading | = LA | |
| End element LA with additional P and T port | = LAPT |
| End element with LS port, without internal LS unloading | = LZ | |
| End element LZ with additional P and T port | = LZPT | |
| End element for use with central inlet element | = LU |

| FKM seals | = V |
| Connections per SAE J1626 or ISO 11926-1 | = 19 |

<table>
<thead>
<tr>
<th>Supply voltage and plug-in connector ²</th>
<th>Supply voltage 24 V</th>
<th>Supply voltage 12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Timer 2-pin (AMP)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>DT04-2P (German)</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Further details in the clear text

**Short code**

Complete control blocks are defined according to type key.

The order text is for detailing the technical features and requirements.

The order text is used by the Rexroth sales department to derive a short code as well as a material number.

See page 10.

¹ Max. 10 elements

² Information required only for electrohydraulic operation and electroproportional pressure relief function.

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Note!
Plug-in connectors are not included in the scope of supply and need to be ordered separately; see page 34.
Order details for directional valve element

Pressure compensator
with pressure compensator, with load holding function = S
without pressure compensator, with load holding function (not in combination with PM) = C
without pressure compensator, without load holding function = Q

LS valve
with LS pressure relief valve (pressure information in bar, 3-digit) (no Z possible) = ...
with LS-DB (pressure relief function) plug screw (no Z possible) = Q Q
with LS unloading plug = B B
without LS pressure relief valve (LS-DB cannot be retrofitted) (no M possible) = Z Z

Housing with measuring ports = M
Housing without measuring ports = Z
Housing for change-over axis 1) (possible in combination with ZUZ only) = U
Housing for electroproportional or switchable pressure relief function 2) = K
  –210 bar, decreasing characteristic curve 2) = L
  –210 bar, rising characteristic curve 2) = J
  –350 bar, decreasing characteristic curve 2) = R
  –350 bar, rising characteristic curve 2) = N

Spool symbol
E spool = E
J spool = J
Q spool = Q
Spool with regeneration function = R
Plunger cylinder as actuator = P
Float position spool = W
Float position spool = Y

Flow in l/min, 3-digit, e. g. 070-070; actuator ports “A” and “B” = ...
Spool with pressure function T, only in connection with E, J or Q spool 3) = ...

1) Rating by Technical Sales.
2) Detailed information in plain text, see data starting on page 22; see also data sheet RE 18139.
3) At request only. Rating by Technical Sales.
Order details for directional valve element

Further information in the clear text

**Secondary valves**
- Flange surface ³)
- Shock/Feed valve, adjustable
- Plug screw (secondary valves can be retrofitted)
- Shock/Feed valve, non-adjustable
- SAE – 12 without secondary valve (cannot be retrofitted)

**Operation B side cover**
- Standard cover

<table>
<thead>
<tr>
<th>Position of handle-operated lever</th>
<th>without Handle-operated lever</th>
</tr>
</thead>
<tbody>
<tr>
<td>60°</td>
<td>0°</td>
</tr>
<tr>
<td>K</td>
<td>L</td>
</tr>
<tr>
<td>N</td>
<td>O</td>
</tr>
</tbody>
</table>

Handle-operated lever following
Handle-operated lever, non-following

see notes on page 42

**Operation A side cover**
- Mechanical
- Hydraulic

<table>
<thead>
<tr>
<th>Encapsulated, spring centered</th>
<th>Purely mechanical ⁵)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring centered</td>
<td>Detent in</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>M</td>
<td>A</td>
</tr>
</tbody>
</table>

**Standard**
- with damping orifice, both sides
- with measuring ports, both sides
- with damping orifice, with measuring ports, both sides
- Orifice + check valve for hydraulic superposition³)

<table>
<thead>
<tr>
<th>Electrohydrodynamically proportional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrohydraulically switchable</td>
</tr>
</tbody>
</table>

**Supply voltage and plug-in connector**
- Supply voltage 24 V
- Supply voltage 12 V

Supply voltage and plug-in connector ⁶)
- Junior Timer 2-pin (AMP)
- DT04-2P (Deutsch)
- 1 3
- 8 9

**Actuator port “A”**

**Actuator port “B”**

**Actuator port “C”**

**Actuator port “D”**

---

³) At request only. Rating by Technical Sales.

⁴) Further ordering codes according to operating instructions RE 64815-B. Consult factory.

The supply includes daisy chain cabling.

⁵) Not available aluminum-free.

⁶) Information required only for electrohydraulic operation and electroproportional pressure relief function.

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= Standard product range (M4 configurator)

Note! Plug-in connectors are not included in the scope of supply and need to be ordered separately; see also page 34.
Designation of M4-12 valves; type code

Complete control blocks are to be defined in accordance with the type code. The ordering text is used to collate the technical features and requirements.

The Bosch Rexroth Sales Organization derives a short code as well as a material number on the basis of the ordering text.

Preferred variants were defined by the Bosch Rexroth organization for the assembly of M4-12 valves worldwide.

Certain versions are not provided for assembly outside the central production location Augsfeld.

Please see data sheet RA 64 278 for the designation of all component codes.

Supplement the designation by your unit/factory number according to ZN 01215.

Example

<table>
<thead>
<tr>
<th>Control block no.</th>
<th>Series</th>
<th>No. of directional valve elements</th>
<th>Bethlehem</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4 – 1234 – 00</td>
<td>3M4-12</td>
<td>7871</td>
<td></td>
</tr>
</tbody>
</table>
Order example closed center with lateral inlet element and change-over axis

Example:
- 3-fold control block
- Variable displacement pump $q_{v_{\text{max}}} = 150 \text{ l/m}$

Directional valve number, inlet element
- Closed Center with lateral primary pressure relief valve, set to 250 bar, internal pilot oil supply

1. Spool axis
- with pressure compensator, with load holding function
- without LS pressure relief valve bore
- Spool symbol J, flow in A and B 100 l/min
- Types of operation:
  - Electrohydraulically proportional
  - Junior Timer 2-pin (AMP) 24 V
  - without secondary valves (cannot be retrofitted)

2. Spool axis
- without pressure compensator, change-over axis
- without LS pressure relief valve bore
- Housing for change-over axis
- Spool symbol J, flow in C 65 l/min, 90 l/min for internal actuators
- Types of operation:
  - Electrohydraulically switchable
  - Junior Timer 2-pin (AMP) 24 V
  - without secondary valves (cannot be retrofitted)

3. Spool axis
- with pressure compensator, load holding function
- with LS pressure relief valve for actuator port A 180 bar, Actuator port B closed
- Spool symbol J, flow in A and B 85 l/min
- Types of operation:
  - Overriding handle-operated lever (following)
  - Secondary valves: Pressure relief/feed valves, actuator port A and B 350 bar (non-adjustable)

End element, additional information
- with internal LS unloading, FKM seals, SAE threaded connections

Ordering codes:

1. Spool axis
   S Z Z Z J 100-100 W2 1 — Z Z

2. Spool axis
   Z Z U Z J 065-090 W4 1 — Z Z

3. Spool axis
   S 180 M Q J 085-085 CBA K H350 H350

End element
   LA V 19
Order example closed center for central inlet with primary valve

Example:
- 2-fold control block
- Fixed displacement pump \( q_{\text{V, max}} = 200 \text{ l/min} \)

Directional valve number, end element
- Diversion plate

1. Spool axis
- with pressure compensator, with load holding function
- without LS pressure relief valves (cannot be retrofitted)
- Spool symbol E, flow in A and B 100 l/min
- Types of operation: Electrohydraulically proportional with measuring ports on both sides
- Junior Timer 2-pin (AMP) 24 V
- Actuation with handle-operated lever (following)
- Secondary valve bores closed

Inlet element
- Central Closed Center with primary pressure relief valve, set to 300 bar
- with internal pilot oil supply

2. Spool axis
- with pressure compensator, with load holding function
- with LS pressure relief valves, actuator port A 270 bar, actuator port B 300 bar
- with electroprop. pressure relief function, pressure relief function, 210 bar (decreasing characteristic curve)
- Spool symbol E, flow in A and B 90 l/min
- Types of operation: Digital OBE
- Overriding handle-operated lever (following)
- Secondary valve bores closed

End element, additional information
- with internal LS unloading, FKM seals, SAE threaded connection

Ordering codes:

1. Spool axis
- Central Closed Center with primary pressure relief valve, set to 300 bar
- with internal pilot oil supply

2. Spool axis
- with pressure compensator, with load holding function
- with LS pressure relief valves, actuator port A 270 bar, actuator port B 300 bar
- with electroprop. pressure relief function, pressure relief function, 210 bar (decreasing characteristic curve)
- Spool symbol E, flow in A and B 90 l/min
- Types of operation: Digital OBE
- Overriding handle-operated lever (following)
- Secondary valve bores closed

End element
- with internal LS unloading, FKM seals, SAE threaded connection
Order example closed center with combined inlet element

Example:
- 3-fold control block
- Fixed displacement pump \( q_{v max} = 200 \text{ l/min} \)

Directional valve number, end element
- Diversion plate

1. Spool axis
   M4-15
   - with pressure compensator, without load holding function
   - with LS pressure relief valve,
     actuator port A 230 bar,
     actuator port B unloaded
   - Spool symbol E,
   - Flow in A 190 l/min, flow in B 0 l/min,
     connection closed
   - Types of operation: Digital OBE
   - Overriding handle-operated lever (following)
   - Secondary valve bores closed

Inlet element
M4-12/15
- Central inlet element for M4-12/M4-15
- Primary pressure relief valve, set to 280 bar
- with integrated pilot oil supply

2. and 3. spool axis
   M4-12
   - with pressure compensator, with load holding function
   - with LS pressure relief valves,
     actuator port A 180 bar,
     actuator port B 120 bar
   - Spool symbol E
   - Flow in A and B 90 l/min
   - Types of operation: Digital OBE
   - without secondary valve bores

End element
M4-12
- with internal LS unloading, FKM seals,
  SAE threaded connection

Ordering codes:

1. Spool axis
   T 230MB E 190-000 CBA K Q Q

Inlet element
   JK 280 Y

2. Spool axis
   S 180M120 E 090-090 CBA – Z Z

3. Spool axis
   S 180M120 E 090-090 CBA – Z Z

End element
   LA V 19
Inlet elements: Closed Center (J) for sandwich plate design

Without primary pressure relief valve, for external pilot oil supply

Ordering code:

\[
M4 - 12 - 2X / J \text{ Q X}
\]

Short description
– For variable displacement pumps up to 150 l/min

 Without primary pressure relief valve, with internal pilot oil supply

Ordering code:

\[
M4 - 12 - 2X / J \text{ Q Y}
\]

Short description
– For variable displacement pumps up to 150 l/min

With primary pressure relief valve, for external pilot oil supply

Ordering code:

\[
M4 - 12 - 2X / J \text{ ... X}
\]

Short description
– For variable displacement pumps up to 150 l/min
– Pressure information in bar after J ... required (3-digit)

With primary pressure relief valve, with internal pilot oil supply

Ordering code:

\[
M4 - 12 - 2X / J \text{ ... Y}
\]

Short description
– For variable displacement pumps up to 150 l/min
– Pressure information in bar after J ... required (3-digit)

Pilot oil supply (Y)
– Pressure relief function 45 bar
– Pilot pressure max. 30 + 5 bar

⚠️ Attention!
In case of internal pilot oil supply, the X connection can also be used to lead way pilot oil for other actuators. However, this may affect the switching times at the M4-12. Consult Technical Sales regarding possible effects.

In case of external pilot oil supply the “X” connection is not closed in general. It needs to be closed when not in use (e.g. in case of hydraulic control “H”).
Central inlet elements Close Center (JZ) for sandwich plate design

Without primary pressure relief valve, for external pilot oil supply

Ordering code:

\[ \text{M4} - 12 - 2X / \text{JZ} Q X \]

Short description
- For variable displacement pumps up to 200 l/min

Without primary pressure relief valve, with internal pilot oil supply

Ordering code:

\[ \text{M4} - 12 - 2X / \text{JZ} Q Y \]

Short description
- For variable displacement pumps up to 200 l/min

With primary pressure relief valve, for external pilot oil supply

Ordering code:

\[ \text{M4} - 12 - 2X / \text{JZ} \ldots X \]

Short description
- For variable displacement pumps up to 200 l/min
- Pressure information in bar behind JZ... required (3-digit)

With primary pressure relief valve, with internal pilot oil supply

Ordering code:

\[ \text{M4} - 12 - 2X / \text{JZ} \ldots Y \]

Short description
- For variable displacement pumps up to 200 l/min
- Pressure information in bar behind JZ... required (3-digit)
Central inlet elements Close Center (JZ) for sandwich plate design

Without primary pressure relief valve, with internal pilot oil supply

Ordering code:
M4-12-2X-JZ-Z-Y

Short description
- For variable displacement pumps up to 200 l/min
- Primary pressure relief valve cannot be retrofitted

Without primary pressure relief valve, for external pilot oil supply

Ordering code:
M4-12-2X-JZ-Z-X

Short description
- For variable displacement pumps up to 200 l/min
- Primary pressure relief valve cannot be retrofitted
Central inlet elements Close Center (JK) for sandwich plate design

For the connection of direction valve elements of sizes 12 and 15
Without primary pressure relief valve, with internal pilot oil supply

Ordering code:

M4 15/12 2X JK Q Y

Short description
– For variable displacement pumps up to 200 l/min

For the connection of direction valve elements of sizes 12 and 15
With primary pressure relief valve, with internal pilot oil supply

Ordering code:

M4 15/12 2X JK … Y

Short description
– For variable displacement pumps up to 200 l/min
– Pressure information in bar behind JK… required (3-digit)
Inlet elements: Open Center (P) for sandwich plate design

With primary pressure relief valve, for external pilot oil supply

Ordering code:

M4 – 12 – 2X / P ... X

Short description
- For fixed displacement pumps up to 150 l/min
- Pressure information in bar after P ... required (3-digit)

With primary pressure relief valve, for internal pilot oil supply

Ordering code:

M4 – 12 – 2X / P ... Y

Short description
- For fixed displacement pumps up to 150 l/min
- Pressure information in bar after P ... required (3-digit)
Directional valve elements: Pressure compensator

In the central position of the main spool, there is no connection from P to the actuator ports A and B. In this operating state, the pressure compensator spool (1) is moved to the left against the spring (2) by the pump pressure.

When the main spool (3) is operated (= metering orifice), the LS pressure reaches the spring chamber (4) and moves the pressure compensator spool to the right into the control position. The flow is kept constant even in case of parallel operation of actuators with different load pressures.

The pressure compensator “S” boasts a load holding function. This function is not free of leak oil.

In its standard version it is equipped with one ring (5). The number of the rings inserted depends on the required flow.

### Pressure compensator spool variants

<table>
<thead>
<tr>
<th>Ordering code</th>
<th>Short description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>with pressure compensator with load holding function</td>
<td>![Symbol]</td>
</tr>
<tr>
<td></td>
<td>max. flow 130 l/min</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>without pressure compensator with load holding function</td>
<td>![Symbol]</td>
</tr>
<tr>
<td></td>
<td>max. flow 140 l/min</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>without pressure compensator without load holding function</td>
<td>![Symbol]</td>
</tr>
<tr>
<td></td>
<td>max. flow 140 l/min</td>
<td></td>
</tr>
</tbody>
</table>

1) The load holding function is not free of leak oil.
Characteristics
Reduction of the actuator flow through LS pressure relief function
Minimum setting: 50 bar
Maximum setting: 330 bar

With LS pressure relief valve and LS plug screw
Ordering code:
S ... M Q J ... - ... W2 1 - H... H...

Short description
- Pressure information in bar for actuator port A (3-digit)
- Plug screw for actuation port B
- For the,QM version, the LS pressure relief function can be retrofitted at the directional valve element.
- The LS pressure can be influenced externally via the ports MA and MB. These ports can also be used as measuring ports.

With LS pressure relief valve and Unloading plugs
Ordering code:
S ... M B E ... - 000 W2 1 - H... Q

Short description
- Pressure information in bar for actuator port A (3-digit)
- Unloading plug for actuator port B
- e.g. for cylinders with one-sided operation

Note!
Please consult Technical Sales.
Directional valve elements: LS pressure relief function

Without LS pressure relief valves

Ordering code:

| S | Z | Z | J | …… | W2 | 1 | – | H | … | H |

Short description
- LS-DB cannot be retrofitted
- Housing without measuring ports
- Max. flow of internal actuators 90 l/min
Directional valve elements: LS pressure relief function

Electroproportional / hydraulically switchable pressure relief function

Short description

Differentiation between:
1. Type KBPS – electrohydraulically proportional
2. Type MH2DAD and Type KBPS
3. Type KKDE – electrohydraulically switchable
4. Porting pattern KBPS and cover plate
5. Housing KBPS and plug

The exact description of the valve is to be clear text as follows.

1. Electroproportional pressure relief valve Type KBPS
   (see also data sheet RE 18139-04; RE 18139-05)

   **Standard product range:**
   
<table>
<thead>
<tr>
<th>S</th>
<th>L</th>
<th>J</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>KBPSL8BA</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>J</td>
<td>J</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td></td>
<td>KBPSL8AA</td>
</tr>
<tr>
<td>S</td>
<td>R</td>
<td>J</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td></td>
<td>KBPSR8BA</td>
</tr>
<tr>
<td>S</td>
<td>N</td>
<td>J</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td></td>
<td>KBPSR8AA</td>
</tr>
</tbody>
</table>

   **Extension program, such as:**
   
   | S  | K  | J  | H  | H  | H  |   | KBPSH8BA -033 |

2. Pressure cut-off valve, type MH2DAD, and electroproportional pressure relief valve, type KBPS
   (see also data sheet RE 64586; RE 18139-04; RE 18139-05)

   | S  | K  | J  | H  | H  | H  |   | MH2DAD+KBPSH8BA |
Directional valve elements: LS pressure relief function

Pressure control through electroproportional
LS pressure relief function

<table>
<thead>
<tr>
<th>Pressure in the main connection 1 in bar</th>
<th>Falling characteristic curve</th>
<th>Rising characteristic curve</th>
<th>Addition SO no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 bar KBPSC8BA</td>
<td>KBPSC8AA</td>
<td></td>
<td>-033</td>
</tr>
<tr>
<td>100 bar KBPSF8BA</td>
<td>KBPSF8AA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 bar KBPSH8BA</td>
<td>KBPSH8AA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210 bar KBPSL88A (2)</td>
<td>KBPSL88A (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 bar KBPSN88A</td>
<td>KBPSN88A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>315 bar KBPS88AA</td>
<td>KBPS88AA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350 bar KBPSR88A (1)</td>
<td>KBPSR88AA (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>420 bar KBPST88A</td>
<td>KBPST88A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- = Standard product range

Technical data KBPS (see also RE 18139-04)

<table>
<thead>
<tr>
<th>Electrical</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage V</td>
<td>12 DC</td>
</tr>
<tr>
<td>Maximum control current mA</td>
<td>max. nominal current 1,760 mA</td>
</tr>
<tr>
<td>Coil resistance Ω</td>
<td>Cold value with 20°C</td>
</tr>
<tr>
<td></td>
<td>max. hot value</td>
</tr>
<tr>
<td>Duty cycle %</td>
<td>100 1)</td>
</tr>
<tr>
<td>Maximum coil temperature °C</td>
<td>150</td>
</tr>
<tr>
<td>Protection type acc. to VDE 0470-1 (DIN EN 60529), DIN 40050-9</td>
<td>Version “K4”</td>
</tr>
<tr>
<td></td>
<td>Version “C4”</td>
</tr>
<tr>
<td></td>
<td>Version “K40”</td>
</tr>
</tbody>
</table>

1) If use > 2,000 m via NN, we recommend consulting the manufacturer.
2) Due to the surface temperatures of solenoid coils, the standards EN 563 and EN 982 must be adhered to!
Directional valve elements: LS pressure relief function

3. 2/2 directional spool valve type KKDE

![Diagram of KKDE valve]

<table>
<thead>
<tr>
<th>De-energized open</th>
<th>De-energized closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>KKDER8PA</td>
<td>KKDER8NA</td>
</tr>
</tbody>
</table>

De-energized open: KKDER8PA
De-energized closed: KKDER8NA

Technical data KKDE (see also RD 18136-08)

<table>
<thead>
<tr>
<th>Electrical</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of voltage</td>
<td>Direct voltage</td>
</tr>
<tr>
<td>Supply voltage V</td>
<td>12 DC</td>
</tr>
<tr>
<td>Voltage tolerance and ambient temperature</td>
<td>See characteristic curve RE 18136-08 page 5</td>
</tr>
<tr>
<td>Power consumption Ω</td>
<td>22</td>
</tr>
<tr>
<td>Duty cycle %</td>
<td>See characteristic curve RE 18136-08 page 5</td>
</tr>
<tr>
<td>Maximum coil temperature °C</td>
<td>150</td>
</tr>
<tr>
<td>Switching time according to ISO 6403 (solenoid horizontal)</td>
<td>≤ 80 ms</td>
</tr>
<tr>
<td>Maximum switching frequency cy/h</td>
<td>15,000</td>
</tr>
<tr>
<td>Protection type acc. to VDE 0470-1 (DIN EN 60529), DIN 40050-9</td>
<td>Version “K4”</td>
</tr>
<tr>
<td></td>
<td>Version “C4”</td>
</tr>
<tr>
<td></td>
<td>Version “K40”</td>
</tr>
</tbody>
</table>

1) If use > 2000 m via NN, we recommend consulting the manufacturer.

2) Due to the surface temperatures of the solenoid coils, the European standards EN 563 and EN 982 must be adhered to!

Note!
Consumer pressure does not become depressurized!

4. Porting pattern KBPS and cover plate

![Diagram of KBPS porting pattern]

| S ... K ... J ...-... H - H... H... A |

5. Housing KBPS and plug

![Diagram of KBPS housing and plug]

| S ... K ... J ...-... H - H... H... Q |

At the electrical connection “K4”, the protective earth conductor (PE ) must be connected correctly.
# Directional valve elements: Main spool

## Main spool variants

<table>
<thead>
<tr>
<th>Ordering code</th>
<th>Main use</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow information in l/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E ... - ...</strong></td>
<td>Hydro cylinder as actuator</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td><strong>J ... - ...</strong></td>
<td>Hydro motors as actuator</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
</tbody>
</table>
| **Q ... - ...** | Application with defined residual opening \((A/B \to T)\)  
Actuator port unloaded in neutral position | ![Symbol](image) |
| **R ... - ...** | Regeneration function \((P, B \to A)\) | ![Symbol](image) |
| **W ... - ...** | Float position | ![Symbol](image) |
| **Y ... - ...** | Float position | ![Symbol](image) |
| **P ... - ...** | Plunger cylinder as actuator | ![Symbol](image) |
| **(E, J, Q) ... T ...** | Spool with pressure function | ![Symbol](image) |
Directional valve elements: Main spool

Spool characteristic curves (symmetric spools)

- Electrohydraulic operation
- Hydraulic operation
- Digital on-board electronics (EPM2)

- Flow in l/min
- Nominal flow
- Current in amperes
- Command value in digits (steps)
- Pilot pressure in bar
- (24 V actuation)
- (12 V actuation)
### Directional valve elements: Flow

#### Symmetric spools

<table>
<thead>
<tr>
<th>Spool type</th>
<th>Pressure compensator</th>
<th>Flow in l/min (spool characteristic curve see page 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E, J, Q</td>
<td>S</td>
<td>130–130 (1) 100–100 073–073 052–052 034–034 023–023 014–014 007–007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>120–120 (2) 085–085 (4) 065–065 (5) 045–045 (6) 030–030 (7) 020–020 (8) 012–012 (9) 006–006 (10)</td>
</tr>
</tbody>
</table>

#### Asymmetric spools

<table>
<thead>
<tr>
<th>Spool type</th>
<th>Pressure compensator</th>
<th>Flow in l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>E, J, Q</td>
<td>S</td>
<td>100–073 100–052 052–034 034–023 023–014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>070–057 070–038 038–026 026–017 017–010</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>115–090 115–063 063–042 042–028 028–017</td>
</tr>
</tbody>
</table>

#### Float position, regeneration and plunger spools

<table>
<thead>
<tr>
<th>Spool type</th>
<th>Pressure compensator</th>
<th>Nominal flow in l/min (more on inquiry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>S</td>
<td>016–016 065–040 075–045</td>
</tr>
<tr>
<td>Y</td>
<td>S</td>
<td>065–045 085–085 085–100 030–030</td>
</tr>
<tr>
<td>R</td>
<td>S</td>
<td>130–101 085–030 065–025</td>
</tr>
<tr>
<td>P</td>
<td>S</td>
<td>140–000</td>
</tr>
</tbody>
</table>


![Note!](image)

Please consult Technical Sales.

**Example:**

- Spool type J
- Pressure compensator S
- Command value: $Q_{\text{Actuator}} = 90$ l/min

**Solution:**

- $\rightarrow$ 85 liter spool + 2 washers = 100 l/min
- $\rightarrow$ Set 90 liters via stroke limitation.

**Note!**

Position directional valve elements with maximum flow as close as possible to the inlet element.
Directional valve elements: Types of operation Cover A – mechanical

Purely mechanical (non-encapsulated) with tongue

Ordering code:

S Z Z Z J ... ... A Z Z Z

Short description

- Mechanical operation of the main spool. In case of non-operation centering in central position by springs

Purely mechanical (non-encapsulated) with handle-operated lever and detent

Ordering code:

S ... M ... J ... ... B1 N H ... H ...

Short description

- Mechanical operation of the main spool. In case of non-operation centering in central position by springs

Note!

Handle-operated lever setting, please consult Technical Sales.

Mechanical (encapsulated)

Ordering code:

S ... M ... J ... ... M K H ... H ...

Short description

- Mechanical operation of the main spool. In case of non-operation centering in central position by springs
- All handle-operated lever position options are available (K, L, M etc.) comp. also type key on page 10

1) Following handle-operated lever
2) Non-following handle-operated lever
Directional valve elements: Types of operation Cover A – hydraulic

Hydraulic

Ordering code:

S ... M ... J ...-... H - H... H...

Short description

- Recommended hydraulic pilot control units:
  Type TH 6 curve 97 according to RE 64555
Directional valve elements: Types of operation Cover A – electrohydraulically on/off

Electrohydraulically on/off

Ordering code:  
S ... M ... J ... -... W4 1 – H... H...

Short description  
- On/off valves, type FTWE 2 K according to RE 58007

Electrohydraulically on/off with damping orifice on both sides

Ordering code:  
S ... M ... J ... -... W5 3 – H... H...

Short description  
- On/off valves, type FTWE 2 K according to RE 58007

Electrohydraulically on/off with measuring ports on both sides

Ordering code:  
S ... M ... J ... -... W6 3 – H... H...

Short description  
- On/off valves, type FTWE 2 K according to RE 58007
Directional valve elements: Types of operation Cover A – electrohydraulically on/off

Electrohydraulically on/off with damping orifice, with measuring ports on both sides

Ordering code:

\[ S \ldots M \ldots J \ldots \ldots W7 \ldots H \ldots H \ldots \]

Short description

- On/off valves, type FTWE 2 K according to RE 58007

---

**Technical data FTWE 2K** (see also RE 58007)

<table>
<thead>
<tr>
<th>Electrical</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of voltage</td>
<td>Direct voltage</td>
<td></td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>V 12 24</td>
<td></td>
</tr>
<tr>
<td>Power consumption at 20°C</td>
<td>W 14.4 14.4</td>
<td></td>
</tr>
<tr>
<td>Coil resistance R20</td>
<td>Ω 10 40</td>
<td></td>
</tr>
<tr>
<td>Duty cycle</td>
<td>% 100</td>
<td></td>
</tr>
<tr>
<td>Switching time</td>
<td>±on ms 20</td>
<td></td>
</tr>
<tr>
<td>Protection type according to DIN 40050-9</td>
<td>– Solenoid IP 69K</td>
<td></td>
</tr>
<tr>
<td>– Electrical connection</td>
<td>C4 K40 IP 69K 1)</td>
<td></td>
</tr>
<tr>
<td>Switching frequency</td>
<td>Hz 5</td>
<td></td>
</tr>
</tbody>
</table>

1) Recommended plug-in connector see page 34.
Directional valve elements: Types of operation Cover A – electrohydraulically proportional

Electrohydraulically proportional with handle-operated lever (encapsulated)

Ordering code:

\[
\text{S} \ldots \text{M} \ldots \text{J} \ldots \ldots \text{W2} \ 1 \  \text{K} \ldots \  \text{H}\ldots \text{H}\ldots
\]

Short description

– Proportional pressure reducing valve
  Type FTDRE 2 K according to RE 58032

Safety notes!

1) Following handle-operated lever: Electrohydraulic operation can be overruled by mechanical operation. The handle-operated lever is connected directly with the main spool and follows the spool movement in case of electrohydraulic control.

2) Non-following handle-operated lever: The handle-operated lever is connected with the main spool via a coupling. When the main spool is in central position, the handle-operated lever can be detented. Thus, it does not follow the movement of the spool in case of electrohydraulic operation.

Electrohydraulically proportional with measuring ports on both sides

Ordering code:

\[
\text{S} \ldots \text{M} \ldots \text{J} \ldots \ldots \text{W8} \ 9 \ldots \  \text{H}\ldots \text{H}\ldots
\]

Short description

– Proportional pressure reducing valve, type FTDRE 2 K according to RE 58032
Directional valve elements: Types of operation Cover A – electrohydraulically proportional

Technical data FTDRE 2K (see also RE 58032)

<table>
<thead>
<tr>
<th>Electrical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of voltage</td>
<td>Direct voltage</td>
</tr>
<tr>
<td>Nominal voltage of the amplifier</td>
<td>V 12 24</td>
</tr>
<tr>
<td>Maximum control current</td>
<td>A 1.8 0.8</td>
</tr>
<tr>
<td>Coil resistance (20 °C)</td>
<td>Ω 2.4 12</td>
</tr>
<tr>
<td>Duty cycle (with amplifier)</td>
<td>% 100</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>See ordering codes</td>
</tr>
<tr>
<td>Protection type according to DIN 40050-9</td>
<td>– Solenoid IP 69K</td>
</tr>
<tr>
<td></td>
<td>– Electrical connection C4 IP 69K 1) K40 IP 69K 1)</td>
</tr>
<tr>
<td>PWM frequency (recommended) 1)</td>
<td>Hz 150</td>
</tr>
</tbody>
</table>

1) The PWM frequency is to be optimized depending on the individual application. In this regard, the operating temperature must be taken into account. Recommended plug-in connector see page 34.

Directional valve elements: Types of operation Cover A – on-board electronics

Electronic pilot module

Ordering code:

S ... M ... J ...-... CBA - H... H...

Short description

- Digital interface, standard see RE 64815-B
- Recommended connections see page 50.
Directional valve elements: Voltage supply and plugs

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Junior Timer 2-pin (AMP)</th>
<th>DT04-2P (Deutsch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>12 V</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

This information is required only in case of electrohydraulic operation and / or electroproportional pressure relief function.

**Recommended plug-in connector for connector type Junior Timer 2-pin (AMP)**

Plug-in connector for FTDRE… and FTWE… protection type IP 69K

**Material number: R900313533**

For a litz wire cross-section of 0.5 to 1 mm² and for an insulation diameter of the individual seals of 1.2 to 2.1 mm.

**Material number: R901022127**

For a litz wire cross-section of 0.5 to 1 mm² and for an insulation diameter of the individual seals of 2.2 to 3 mm.

**Recommended plug-in connector for connector type Deutsch (K40)**

Plug-in connector for FTDRE… and FTWE… protection type IP 69K

**Material number: R900733451**

For AWG 14-16 wire cross-section and outer single wire diameter of 1.35 to 3.05 mm².

**Material number: R901017847**

For AWG 16-18 wire cross-section and outer single wire diameter of 1.35 to 3.05 mm².

See also data sheet RE 08006.

⚠️ **Note!**

Plug-in connectors are not included in the scope of supply and must be ordered separately.
Directional valve elements: Types of operation Cover B

**Mechanical – Non-encapsulated operation (purely mechanical)**

<table>
<thead>
<tr>
<th>Spring centered + Tongue</th>
<th>Spring centered + Tongue with lever</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Z</td>
<td>A N</td>
</tr>
<tr>
<td>B1 Z</td>
<td>B1 N</td>
</tr>
<tr>
<td>B2 Z</td>
<td>B2 N</td>
</tr>
<tr>
<td>B4 Z</td>
<td>B4 N</td>
</tr>
</tbody>
</table>

Operating force:
Tongue < 250 N (spool axis)

**Mechanical – encapsulated operation**

**Standard lever**

- Revolving
  - K
- Non-revolving
  - N

**Clamping piece with lever**

- Revolving
  - B 1 B1 1 F 1 D1 1 D 1
  - B 2 B1 2 F 2 D1 2 D 2
  - B 3 B1 3 F 3 D1 3 D 3
  - G 1 G1 1 H 1 J1 1 J 1
  - G 2 G1 2 H 2 J1 2 J 2
  - G 3 G1 3 H 3 J1 3 J 3

Operating force (at the handle-operated lever):
- Mechanical < 20 N
- Hydraulic, handle-operated lever override < 50 N
- Electrohydraulic, handle-operated lever override < 70 N

Further handle-operated lever options (aluminum-free) on inquiry.
Directional valve elements: Secondary valves

Shock/feed valve, non-adjustable

Ordering code:

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>J</th>
<th>W2</th>
<th>H100</th>
<th>H150</th>
</tr>
</thead>
</table>

Short description

- Non-adjustable shock/feed valve
- Pressure information in bar behind H ... required (3-digit)

Example: H100, H150

H100: Shock/feed valve, set to 100 bar for actuator port A
H150: Shock/feed valve, set to 150 bar for actuator port B

Note!

Suitable only to reduce pressure peaks, not to be used as pressure relief valve!

Preferred pressure settings for shock valves with feed function

<table>
<thead>
<tr>
<th>Pressure setting in bar in the actuator ports A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>H050 = 50 bar</td>
</tr>
<tr>
<td>H063 = 63 bar</td>
</tr>
<tr>
<td>H080 = 80 bar</td>
</tr>
<tr>
<td>H100 = 100 bar</td>
</tr>
<tr>
<td>H125 = 125 bar</td>
</tr>
</tbody>
</table>

Note!

Shock valves have a fixed setting!

Shock/Feed valves, adjustable

Ordering code:

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>J</th>
<th>W2</th>
<th>Q</th>
<th>A</th>
</tr>
</thead>
</table>

Short description

- Adjustable shock/feed valve
- Pressure information in bar behind A ... required (3-digit)

Example: QA200

Q: Plug screw for actuator side A
A200: Shock/feed valve, set to 200 bar for actuator port B

The directional valve is ready for retroactive fitting of secondary valves.

Note!

Suitable only to reduce pressure peaks, not to be used as pressure relief valve!

Adjustable pressure levels in bar in the actuator ports A and B

| 10 – 70 | 201 – 270 |
| 71 – 120 | 271 – 320 |
| 121 – 200 | 321 – 380 |
Directional valve valve elements: Secondary valves

Without secondary valves

Ordering code:

[S ... M ... J ... W21 - Z Z]

Short description

– Secondary valves cannot be retrofitted
– Actuator port SAE – 12

Without secondary valves, with flange surface

Ordering code:

[S ... M ... J ... W21 - F F ...]

Short description

– Secondary valves cannot be retrofitted
– Information on the flange valves in clear text

Note!

Dimensioning of the flanged installation housing with screwable valves by Technical Sales.
### Directional valve elements: Housing options that can be ordered

<table>
<thead>
<tr>
<th>Standard</th>
<th>Without LS pressure relief valves (LS-DB cannot be retrofitted)</th>
<th>With secondary valve option (can be retrofitted) SAE – 10</th>
<th>Without secondary valve options (cannot be retrofitted) SAE – 12</th>
<th>Flange surface</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZZZ</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>With 2 LS pressure relief valves (pressure info in bar, 3-digit)</td>
<td>...M...</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>With LS pressure relief valves (pressure info in bar, 3-digit) Housing for electroproportional or switchable pressure relief function</td>
<td>...K...</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Without LS pressure relief valves (LS-DB cannot be retrofitted)</th>
<th>ZZZ</th>
<th>●</th>
<th>●</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With 2 LS pressure relief valves (pressure info in bar, 3-digit)</td>
<td>...M...</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
End elements

End element with LS unloading
Ordering code: LA

End element with LS port
Ordering code: LZ
Short description
– LS unloading must be ensured externally

End element LA with additional P and T port
Ordering code: LAPT

End element LZ with additional P and T port
Ordering code: LZPT
Short description
– LS unloading must be ensured externally

End element to be combined with central inlet element

End element for use with central inlet element
Ordering code: M4 12 2X LU

Adapter plate for ED valves from BROC
Use only on inquiry!
Ordering code: LC
Short description:
– Type key for flange-mounted ED valves according to RIE 00159

⚠️ Attention!
Rating by Technical Sales
# Dimensions: Line connections

## Inlet element, lateral

<table>
<thead>
<tr>
<th>Connection</th>
<th>Closed center</th>
<th>Open center</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>1-1/16 – 12 UNF</td>
<td>1-1/16 – 12 UNF</td>
</tr>
<tr>
<td>T</td>
<td>1-1/16 – 12 UNF</td>
<td>1-5/16 – 12 UNF</td>
</tr>
<tr>
<td>LS</td>
<td>9/16 – 18 UNF</td>
<td>9/16 – 18 UNF</td>
</tr>
<tr>
<td>X, Y</td>
<td>9/16 – 18 UNF</td>
<td>9/16 – 18 UNF</td>
</tr>
<tr>
<td>M</td>
<td>9/16 – 18 UNF</td>
<td>9/16 – 18 UNF</td>
</tr>
</tbody>
</table>

## Directional valve element

<table>
<thead>
<tr>
<th>Connection</th>
<th>with secondary valves</th>
<th>without secondary valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>7/8 – 14 UNF</td>
<td>1-1/16 – 12 UNF</td>
</tr>
<tr>
<td>a, b</td>
<td>7/16 – 20 UNF</td>
<td>7/16 – 20 UNF</td>
</tr>
<tr>
<td>MA, MB</td>
<td>7/16 – 20 UNF</td>
<td>G 1/8</td>
</tr>
<tr>
<td>Ma, Mb</td>
<td>G 1/8</td>
<td></td>
</tr>
</tbody>
</table>

## End element

<table>
<thead>
<tr>
<th>Connection</th>
<th>LSZ</th>
<th>P, T</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSZ</td>
<td>9/16 – 18 UNF</td>
<td>1-1/16 – 12 UNF</td>
</tr>
<tr>
<td>LAPT, LZPT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Connections according to SAE J1626 or ISO 11926-1**

**Fastening screws M10**

**according to EN ISO 4762 or EN ISO 4014:**

<table>
<thead>
<tr>
<th>Property class:</th>
<th>8.8</th>
<th>10.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastening torque:</td>
<td>41 ± 2 Nm</td>
<td>60 ± 3 Nm</td>
</tr>
</tbody>
</table>

**Abbreviations:**

- **P** = Pump
- **A, B** = Actuator
- **a, b** = Pilot line
- **T** = Tank
- **X** = Pilot oil supply
- **Y** = Tank, depressurized
- **LS** = Load-sensing (LS)
- **LSZ** = LS carry over
- **M, MP** = Pump measuring port
- **MA, MB** = LS pressure measuring ports
- **Ma, Mb** = Pilot pressure measuring ports

**Fastening torque:**

- M10 screws: 41 ± 2 Nm, 60 ± 3 Nm
Dimensions: Inlet elements

Lateral inlet element J...Y

Lateral inlet element P...Y

Central inlet element JZ

Central inlet element JK
Dimensions: Directional valve elements

Housing with secondary valve bore, actuator port SAE – 10
Ordering code:

... A... A... ...
... H... H... ...
... Q Q ...

Dimensions: Operation

Purely mechanical operation with tongue
Ordering code:

... A Z ...

Cover A  Cover B

Purely mechanical operation with tongue and lever
Ordering code:

... . N ...

Cover A  Cover B
Dimensions: Operation

Mechanical / hydraulic operation with standard cover

Ordering code:

- \[ \ldots \text{M} - \ldots \]
- \[ \ldots \text{H} - \ldots \]

Electrohydraulic operation

Ordering code:

- \[ \ldots \text{W} . \ldots \]

Electronic pilot module EPM2 with handle-operated lever

Ordering code:

- \[ \ldots \text{C . A K} \ldots \]
Dimensions: End elements

Ordering code: LA

Ordering code: LZ

Ordering code: LAPT

Ordering code: LZPT

Ordering code: LU
Dimensions: Control block Closed Center with lateral inlet element

(according to the order example of page 11, dimensions in mm)

1 Type plate
2 Inlet element J...Y “Closed Center”
3 Directional valve elements
4 End element LA
5.1 Control cover W (side A) for electrohydraulic operation
5.2 Control cover CBA (side A) with electronic pilot module (EPM2)
6.1 Control cover standard (side B)
6.2 Control cover K (side B)
7 Stroke limitation
8 Secondary valves
9 Tie rod
10 Fastening screw thread 4 x M10; 15 deep
Dimensions: Control block Open Center with lateral inlet element

(according to the order example of page 12, dimensions in mm)

1 Type plate
2 Inlet element P...Y
   “Open Center”
3 Directional valve elements
4 End element LZPT
5.1 Control cover A (side A) for mechanical operation
5.2 Control cover H (side A) for hydraulic operation
5.3 Control cover W (side A) for electrohydraulic operation
6.1 Purely mechanical operation with tongue (side B)
6.2 Control cover standard (side B)
   Control cover X (side B)
7 Stroke limitation
8 Secondary valves
9 Tie rod
10 Fastening screw thread
   4 x M10; 15 deep
Dimensions: Control block Closed Center with central inlet element

(according to the order example of page 13, dimensions in mm)

1 Type plate
2 Central inlet element JZ “Closed Center”
3 Directional valve elements
4 End element LA
5 Diversion plate LU
6.1 Control cover W (side A) for electrohydraulic operation
6.2 Control cover CBA (side A) with electronic pilot module (EPM2)
7 Control cover K (side B)
8 Stroke limitation
9 Electroproportional pressure relief valve, type KBPS
10 Tie rod
11 Fastening screw thread 4 x M10; 15 deep
Dimensions: Control block Closed Center with combined inlet element

(according to the order example of page 15, dimensions in mm)

1 Type plate
2 Central inlet element JK...
   “Closed Center”
3.1 Directional valve element M4-15
3.2 Directional valve element M4-12
4.1 End element LA
4.2 Diversion plate LU
5 Control cover CBA (side A) with electronic pilot module (EPM2)
6.1 Control cover K (side B)
6.2 Control cover standard (side B)
7 Stroke limitation
8 Tie rod
9 Fastening screw thread
   4 x M10; 15 deep
On-board electronics: Electronic pilot module (EPM)

**Function**

The electronic pilot module controls the flow at the control block M4-12 by means of an analog or digital electrical signal.

An analog (voltage or PWM signal) or digital (CAN bus) input signal is converted by the pilot module into a pilot pressure via two electrohydraulic pressure reducing valves.

In case of an analog input signal, each pilot module is connected individually to the control electronics of the machine.

In case of CAN bus actuation, it is possible to loop the electrical connection to the next pilot module via a second plug-in connection (daisy chain cabling). The complete valve control block is then connected to the control of the machine via the 4-pin plug of the first pilot module.

The electrical connection is realized via a 4-pin plug of type Bosch Kompakt 1.

It is also possible to connect further CAN bus stations at the output to the last pilot module (see also RE 64815-B).

**Features**

Time functions (ramp functions), the form and gradient of characteristic curves can be parameterized and changed directly during the operating cycle via the CAN bus.

Various diagnosis functions allow to monitor the fault-free operation of the pilot module.

The following elements are monitored in the basic version:

- Correct reception of a valid command value signal
- Stability of the connection with the command value encoder
- Adherence to the defined limits of supply voltage
- Function of the pilot valves (short circuit, cable break)

Malfunctions are indicated in the form of an error code (flashing code) via an LED that can be seen from the outside.

With the analog module, there is a relay output available as error indicator.

With the CAN bus variant, the error code is transferred to the control in the status telegram of the pilot module and can then be analyzed by the control.

- Reduced cabling effort with CAN wiring through daisy chain
- Controlled output stages with superimposed dither
- Processor-independent watchdog

**Electronic pilot module – parameterization specifications**

You can find the form for the parameterization specifications in the data sheet RE 64815-02. Its purpose is to set the electronic pilot module according to the requirements of the client on delivery.
Electronic pilot module: Pin assignment

**Pin assignment at the Bosch Kompakt plug-in connector**

Connection via Bosch Kompakt plug coding 1.

The second Bosch Kompakt plug, coding 2, can be used in conjunction with CAN control to establish a connection to the next module or to another CAN station.

**Note!**
Connecting cables and plugs are not included in the scope of supply and must be ordered separately (see also page 51).

**Attention!**
Please observe the safety notes of the operating instructions RE 64815-B at all times.

- Bosch Rexroth warrants the correct functioning of the unit as described in the operating instructions RE 64815-B. With this unit, Bosch Rexroth declines any warranty for the safe operation of the machine or plant of which this unit is a part.
# Electronic pilot module: Accessories

<table>
<thead>
<tr>
<th>Material number</th>
<th>Type</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daisy chain cable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R917002581</td>
<td>Cable</td>
<td>For the connection of two pilot modules (standard)</td>
<td>190 mm</td>
</tr>
<tr>
<td>R917002599</td>
<td>Cable</td>
<td>For the connection of two pilot modules</td>
<td>240 mm</td>
</tr>
<tr>
<td>R917002628</td>
<td>Cable</td>
<td>For the connection of two pilot modules via central inlet</td>
<td>370 mm</td>
</tr>
<tr>
<td><strong>Special cable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R9017005332</td>
<td>Cable</td>
<td>with two plug-in connectors, coding 1 (black) 90°</td>
<td></td>
</tr>
<tr>
<td>R917005333</td>
<td>Cable</td>
<td>with two plug-in connectors, coding 2 (gray) 90°</td>
<td></td>
</tr>
<tr>
<td><strong>Connecting cable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R917002724</td>
<td>Cable</td>
<td>with one plug-in connector, coding 1 (black)</td>
<td>4,000 mm</td>
</tr>
<tr>
<td>R917004484</td>
<td>Cable</td>
<td>with one plug-in connector, coding 2 (gray)</td>
<td>4,000 mm</td>
</tr>
<tr>
<td><strong>Plug-in connectors and plug-in connector kits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R917005459</td>
<td>Plug-in connector</td>
<td>Coding 1 (black), dummy plug</td>
<td></td>
</tr>
<tr>
<td>R917002627</td>
<td>Plug-in connector</td>
<td>Coding 2 (gray), dummy plug</td>
<td></td>
</tr>
<tr>
<td>R917005458</td>
<td>Plug-in connector</td>
<td>Coding 1 (black), dummy plug with integrated final resistance</td>
<td></td>
</tr>
<tr>
<td>R917004605</td>
<td>Plug-in connector</td>
<td>Coding 2 (gray), dummy plug with integrated final resistance</td>
<td></td>
</tr>
<tr>
<td>R900785606</td>
<td>Plug-in connector kit</td>
<td>Bosch Kompakt coding 1 (black)</td>
<td></td>
</tr>
<tr>
<td>R900785607</td>
<td>Plug-in connector kit</td>
<td>Bosch Kompakt coding 2 (gray)</td>
<td></td>
</tr>
</tbody>
</table>
Notes