Description
HYDAC diaphragm accumulators utilize the compressibility of a gas (nitrogen) in storing hydraulic energy. The gas is required because fluids are practically incompressible and thus, cannot store energy by themselves. The diaphragm is utilized to separate the gas and the fluid sides of the accumulator.

The diaphragm accumulator functions by drawing in fluid from the hydraulic circuit when the pressure increases and, thus, compresses the gas. It returns this energy to the circuit as the pressure decreases by the expansion of the gas.

A poppet is incorporated into the diaphragm to prevent its extrusion through the fluid port.

HYDAC manufactures two types of diaphragm accumulators:
- welded (non-repairable)
- threaded (repairable)

These have been successfully applied to both industrial and mobile applications for energy storage, maintaining pressure, leakage compensation, and vehicle hydraulic systems (e.g., brake and suspension).

Construction
Both types of diaphragm accumulators have the same basic construction. The difference is in the shell. The welded version has a shell that is electron-beam welded, and therefore cannot be repaired. The threaded type has a shell made up of two halves (top and bottom) which are held together by a threaded locking ring.

Diaphragm Materials
Not all fluids are compatible with every elastomer at all temperatures. Therefore, HYDAC offers the following choice of elastomers:
- NBR (Standard Nitrile)
- LT-NBR (Low Temperature Nitrile)
- ECO (Epichlorohydrin)
- IIR (Butyl)
- FPM (Fluorelastomer)
- others (available upon request)

To determine which material is appropriate...

ALWAYS REFER TO FLUID MANUFACTURER’S RECOMMENDATION

Corrosion Protection
For use with certain aggressive or corrosive fluids, or in a corrosive environment, HYDAC offers protective coatings and corrosion resistant materials (i.e., stainless steel) for the accumulator parts that come in contact with the fluid, or are exposed to the hostile environment.

Mounting Position
Diaphragm accumulators by design may be mounted in any position. In systems where contamination is a problem, we recommend a vertical mount with fluid port oriented downward.

System Mounting
HYDAC diaphragm accumulators are designed to be screwed directly onto the system. We also recommend the use of our mounting components, which are detailed on page 43, to minimize risk of failure due to system vibrations.

Applications
Some common applications of diaphragm accumulators are:
- Agricultural Machinery & Equipment
- Forestry Equipment
- Machine Tools
- Mining Machinery & Equipment
- Mobile & Construction Equipment
- Off-Road Equipment

For specific examples of applications using diaphragm accumulators, please see page 52.
## Model Code

### Series

| SBO XXX = Diaphragm Accumulator (XXX = series designation) |
| (see tables on following pages for most common series and size selections) |

### Size

| Size (in Liters, see tables on dimension pages to follow) |
| 0.075 = 0.075 Liters |
| …see tables on following pages for complete list of sizes, and which versions they are available in |
| 3.5 = 3.5 Liters |

### Shell Construction and Gas Port Design

| E1 = Welded Construction, rechargeable, HYDAC Gas Valve Version 1 (M 28 x 1.5) |
| E2 = Welded Construction, factory precharged and sealed, (not rechargeable) |
| (Not available on SBO330 or on any accumulator larger than 1.4 liters) |
| E4 = Welded Construction, rechargeable, HYDAC Gas Valve Version 4 (BVI-ISO 4570) |
| A6 = Threaded Construction, rechargeable, HYDAC Gas Valve Version 1 (M 28 x 1.5) |

### Material Code

Depending on Application

| 112 = Standard for oil service (mineral oil) |

### Fluid Port

| 1 = Carbon steel |
| 3 = Stainless steel |
| 4 = Chemically plated carbon steel (ONLY WETTED SURFACES for water service) |
| 6 = Low temperature carbon steel (< -20°F) |

### Shell

| 0 = Synthetic coated carbon steel (internal & external for water service) |
| 1 = Carbon steel |
| 2 = Chemically plated carbon steel (internal & external for water service) |
| 4 = Stainless steel (please note: MAWP decreases for most stainless models - see tables) |
| 6 = Low temperature carbon steel (< -20°F) |

### Diaphragm Compound

| Compound |
| Oper. Temp Range |
| Typical Fluids |

| 2 = NBR (Buna N) |
| 3 = ECO (Hydrin) |
| 4 = IIR (Butyl) |
| 5 = LT (Buna) |
| 6 = FPM (fluoro-elastomer) |
| 7 = Others (available on request) |

### Country of Installation

| S = USA |
| (for other countries see page 2 for proper code designation) |

### Maximum Working Pressure in bar

| (see tables on dimension pages to follow) |
| 100 = 1500 psi |
| 140 = 2000 psi |
| 200 = 3000 psi |
| 210 = 3000 psi |
| 250 = 3600 psi |
| 300 = 4700 psi |
| 400 = 5800 psi |
| 450 = 6500 psi |
| 500 = 7200 psi |
| 750 = 10000 psi |

### Fluid Port Connection

| AK = BSP connection |
| AB = Male / Female combination connection |
| CK = Standard SAE connection |
| (other fluid ports available upon request — consult factory) |

### Gas Precharge Pressure (P₀) in bar

| (always required for E2 model gas valve) |
| ### = 3 digits |

---

Model Codes containing RED selections are non-standard items — Contact HYDAC for information and availability

Not all combinations are available
### Dimensions

**Non-Repairable Welded Diaphragm Accumulators**

**Version E1**

- **Diaphragm Accumulators**
- Not available on SBO330 or on any accumulator larger than 1.4 liters.

**Version E2**

**Version E4**

<table>
<thead>
<tr>
<th>Series</th>
<th>Max. $P_1/P_0$</th>
<th>Size (liters)</th>
<th>Effective Gas Vol in³</th>
<th>MAWP psi/bar</th>
<th>Weight</th>
<th>$\phi D$</th>
<th>CK (SAE)</th>
<th>F Thread</th>
<th>AK (ISO 228)</th>
<th>AB (ISO 228)</th>
<th>AB (DIN 13)</th>
<th>K (hex)</th>
<th>Q gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBO 250</td>
<td>8 : 1</td>
<td>0.075</td>
<td>5</td>
<td>3600 (250)</td>
<td>1.5 (0.7)</td>
<td>2.68 (68)</td>
<td>2.52 (64)</td>
<td>9/16-18 UNF</td>
<td>G 1/2</td>
<td>N/A</td>
<td>N/A</td>
<td>1.18 (30)</td>
<td>10</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>0.16</td>
<td>10</td>
<td>2600/(180)³</td>
<td>1.8 (0.8)</td>
<td>3.15 (80)</td>
<td>2.91 (74)</td>
<td>9/16-18 UNF</td>
<td>G 1/2</td>
<td>N/A</td>
<td>N/A</td>
<td>1.18 (30)</td>
<td>10</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>0.32</td>
<td>20</td>
<td>2400/(160)³</td>
<td>2.9 (1.3)</td>
<td>3.66 (93)</td>
<td>3.66 (93)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>N/A</td>
<td>N/A</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>0.5</td>
<td>30</td>
<td>3000 (210)</td>
<td>3.7 (1.7)</td>
<td>4.35 (124)</td>
<td>4.13 (105)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>N/A</td>
<td>N/A</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 330</td>
<td>8 : 1</td>
<td>0.6</td>
<td>36</td>
<td>4700 (330)</td>
<td>7.3 (3.3)</td>
<td>5.04 (128)</td>
<td>4.53 (115)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>0.75</td>
<td>45</td>
<td>2000/(140)³</td>
<td>6.2 (2.8)</td>
<td>4.88 (124)</td>
<td>4.76 (121)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 330</td>
<td>8 : 1</td>
<td>0.75</td>
<td>45</td>
<td>4700 (330)</td>
<td>8.9 (4.0)</td>
<td>4.78 (122)</td>
<td>4.96 (126)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 200</td>
<td>8 : 1</td>
<td>1</td>
<td>60</td>
<td>3000 (210)</td>
<td>7.9 (3.6)</td>
<td>5.39 (137)</td>
<td>5.35 (136)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 140</td>
<td>8 : 1</td>
<td>1.4</td>
<td>85</td>
<td>2000 (140)</td>
<td>8.6 (3.9)</td>
<td>5.91 (150)</td>
<td>5.71 (145)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>1.4</td>
<td>85</td>
<td>3000 (210)</td>
<td>11.9 (5.4)</td>
<td>6.14 (156)</td>
<td>5.91 (150)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 330</td>
<td>8 : 1</td>
<td>1.4</td>
<td>85</td>
<td>4700 (330)</td>
<td>16.6 (7.5)</td>
<td>6.33 (160)</td>
<td>6.1 (155)</td>
<td>3/4-16 UNF</td>
<td>G 1/2</td>
<td>G 1/2</td>
<td>M33 x 1.5</td>
<td>1.42 (36)</td>
<td>25</td>
</tr>
<tr>
<td>SBO 100</td>
<td>8 : 1</td>
<td>2</td>
<td>120</td>
<td>1500/(100)³</td>
<td>8.8 (4.0)</td>
<td>6.57 (167)</td>
<td>6.30 (160)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
<tr>
<td>SBO 210</td>
<td>8 : 1</td>
<td>2</td>
<td>120</td>
<td>3000 (210)</td>
<td>14.6 (6.6)</td>
<td>6.81 (173)</td>
<td>6.57 (167)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
<tr>
<td>SBO 330</td>
<td>8 : 1</td>
<td>2</td>
<td>120</td>
<td>4700 (330)</td>
<td>17.7 (8.0)</td>
<td>7.12 (180)</td>
<td>6.77 (172)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
<tr>
<td>SBO 210</td>
<td>4 : 1</td>
<td>2.8</td>
<td>170</td>
<td>3000 (210)</td>
<td>18.0 (8.2)</td>
<td>8.94 (227)</td>
<td>6.57 (167)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
<tr>
<td>SBO 250</td>
<td>4 : 1</td>
<td>3.5</td>
<td>230</td>
<td>3000 (210)</td>
<td>24.6 (11.2)</td>
<td>11.14 (283)</td>
<td>6.69 (170)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
<tr>
<td>SBO 330</td>
<td>4 : 1</td>
<td>3.5</td>
<td>230</td>
<td>4700 (330)</td>
<td>30.6 (13.8)</td>
<td>10.78 (274)</td>
<td>6.77 (172)</td>
<td>1 1/16-12 UNF</td>
<td>G 3/4</td>
<td>G 3/4</td>
<td>M45 x 1.5</td>
<td>1.81 (46)</td>
<td>40</td>
</tr>
</tbody>
</table>

Dimensions are for general information only, all critical dimensions should be verified. Dimensions are in inches/(mm) and lbs/(kg).

1) Stainless steel version for chemical, water, and oil service.
### Repairable Threaded Diaphragm Accumulators

**Dimensions are for general information only. All critical dimensions should be verified.**

- Dimensions are in inches/(mm) and lbs/(kg)
- 1) Only available in stainless steel construction

#### Series: SBO 500
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 0.1
- **Effective Gas Vol in ft³:** 6
- **MAWP psi/(bar):** 7200 (500)
- **Wt. A:** 4.2 (1.9)
- **Wt. B:** 4.33 (1.18)
- **Ø D:** 3.74 (95)
- **Thread F:** 3/4-16 G 1/2
- **SAE:** 1.26 (68)
- **BSPP:** 2.68 (68)
- **K:** 0.87 (22)
- **L:** 1.38 (35)
- **N:** 25

#### Series: SBO 500
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 0.25
- **Effective Gas Vol in ft³:** 15
- **MAWP psi/(bar):** 5000/(350)²
- **Wt. A:** 8.6 (3.9)
- **Wt. B:** 5.04 (128)
- **Ø D:** 4.53 (115)
- **Thread F:** 3/4-16 G 1/2
- **SAE:** 1.42 (36)
- **BSPP:** 3.62 (92)
- **K:** 0.71 (18)
- **L:** 2.17 (55)
- **N:** 25

#### Series: SBO 750
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 0.25
- **Effective Gas Vol in ft³:** 15
- **MAWP psi/(bar):** 8700/(600)²
- **Wt. A:** 19.8 (9.0)
- **Wt. B:** 5.35 (136)
- **Ø D:** 6.02 (153)
- **Thread F:** 3/4-16 G 1/2
- **SAE:** 1.42 (36)
- **BSPP:** 4.49 (114)
- **K:** 0.59 (15)
- **L:** 2.48 (63)
- **N:** 25

#### Series: SBO 450
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 0.6
- **Effective Gas Vol in ft³:** 36
- **MAWP psi/(bar):** 3600/(250)²
- **Wt. A:** 12.6 (5.7)
- **Wt. B:** 6.69 (170)
- **Ø D:** 5.51 (140)
- **Thread F:** 3/4-16 G 1/2
- **SAE:** 1.61 (41)
- **BSPP:** 4.53 (115)
- **K:** 1.77 (45)
- **L:** 2.24 (57)
- **N:** 25

#### Series: SBO 210
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 1.3
- **Effective Gas Vol in ft³:** 80
- **MAWP psi/(bar):** 3000 (210)
- **Wt. A:** 18.7 (8.5)
- **Wt. B:** 7.48 (190)
- **Ø D:** 6.69 (170)
- **Thread F:** 3/4-16 G 1/2
- **SAE:** 1.26 (32)
- **BSPP:** 5.71 (145)
- **K:** 2.24 (57)
- **L:** 2.17 (55)
- **N:** 25

#### Series: SBO 400
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 1.3
- **Effective Gas Vol in ft³:** 80
- **MAWP psi/(bar):** 5800 (400)
- **Wt. A:** 24.7 (11.2)
- **Wt. B:** 7.75 (197)
- **Ø D:** 7.91 (201)
- **Thread F:** 3/4-16 G 3/4
- **SAE:** 1.97 (50)
- **BSPP:** 6.30 (160)
- **K:** 1.97 (50)
- **L:** 2.56 (65)
- **N:** 25

#### Series: SBO 250
- **Max. ΔP/P<sub surpass</sub>:** 10 : 1
- **Size (liters):** 2
- **Effective Gas Vol in ft³:** 120
- **MAWP psi/(bar):** 2600/(180)²
- **Wt. A:** 25.1 (11.4)
- **Wt. B:** 8.93 (227)
- **Ø D:** 7.91 (201)
- **Thread F:** 1 1/16-12 G 3/4
- **SAE:** 1.61 (41)
- **BSPP:** 6.61 (168)
- **K:** 2.44 (62)
- **L:** 2.52 (64)
- **N:** 40

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**Accumulator Catalog**

HYDAC