HYDRAULIC BRAKE SYSTEM

- **Tank**
- **Pump**
- **Accumulators** store energy for power off braking
- **Emergency / Parking brake valve** controls the SAHR brake to provide emergency and parking brake functions.
- **Auxiliaries**
- **Emergency / Parking brake valve**
- **SAHR (Spring Applied, Hydraulics Release brake)**
- **Accumulator charging valve** ensures the pressure is available in the accumulator(s) to operate the brake(s).
- **Service braking valve** provides HASR brake control to provide dynamic brake functions.
- **HASR (Hydraulic Applied Spring Release)**
- **FRONT**
- **REAR**
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### INSTALLATION ..........................................................................................................................................................73
Methodology :
This document is intended for manufacturers of machines that incorporate Poclain Hydraulics products. It describes the technical characteristics of Poclain Hydraulics products and specifies installation conditions that will ensure optimum operation.
This document includes important comments concerning safety. They are indicated in the following way:

- Safety comment.

This document also includes essential operating instructions for the product and general information. These are indicated in the following way:

- Essential instructions.
- General information .
- Information on the model code.
- Weight of component without oil.
- Volume of oil.
- Units.
- Tightening torque.
- Screws.
- Information intended for Poclain-Hydraulics personnel.

The views in this document are created using metric standards.
The dimensional data is given in mm and in inches (inches are between brackets and italic)
Applications
The VB-002 reverse modulator is a mechanically-controlled, three-way, graduated release pressure reducing valve. The VB-002 valve is used for the precision dosing of the output pressure (at X) proportionally to the control stroke. It is controlled via a lever or pedal. The lever is usually used to control the parking brake (spring applied hydraulic release brake). The pedal is usually used for inching control.

Operation
When the control is idle, the output pressure (at X) is limited to the preset pressure of the valve, irrespective of the supply pressure. When the lever or pedal is activated, the output pressure (at X) falls in proportion to the angular position of the control.

- **Lever control:**
  - When the lever is in its maximum position (locked), the output pressure (at X) is zero. The control lever can be unlocked using the pushbutton (horizontal lever) or the collar (vertical lever).

- **Pedal control:**
  - When the pedal is fully depressed, the output pressure (at X) is zero.
Overall dimensions of VB-002 brake valve

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar [PSI]</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>M14 x 1.5</td>
<td>Input</td>
</tr>
<tr>
<td>X</td>
<td>M12 x 1.5</td>
<td>Output</td>
</tr>
<tr>
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<td>Tank</td>
</tr>
<tr>
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<td></td>
<td>1.3 [2.87]</td>
</tr>
<tr>
<td>T</td>
<td>M12 x 1.5</td>
<td>Parking brake pressure</td>
</tr>
<tr>
<td>MX*</td>
<td></td>
<td>switch</td>
</tr>
</tbody>
</table>

*: Option
Mechanical controls with standard valve orientation

[Diagram of horizontal lever]

[Diagram of vertical lever]
Floor mount pedal
ratio = 4

Lockable pedal
ratio = 4.5

Non-slip rubber pedal
Non-slip aluminum pedal

Hydraulic diagram and characteristic curve
Estimated maximum actuator forces

- Max. traction on T-rod for valve only: $F_a = 1030 \text{ N (299 lbf)}$
- Floor mount pedal: $F_b = F_a/5$
- Lockable pedal: $F_b = F_a/5$
- Horizontal lever: $F_b = F_a/8$
- Vertical lever: $F_b = F_a/7$

To calculate the actuator forces for your mechanical control: please contact your Poclain Hydraulics Application Engineer.

Control

- Without pedal or lever: 0
- Floor mount pedal:
  - Smooth: A
  - Aluminum non-slip: B
  - Rubber non-slip: C
- Lockable pedal:
  - Aluminum non-slip: E
  - Rubber non-slip: F
- Locking lever:
  - Horizontal: M
  - Vertical (up to 30 bar): N

Pressure switch (Max. 42 V)

- Without: 0
- On MX (parking brake pressure): 4

Parking brake pressure

- 10 bar [145 PSI]: 2
- 20 bar [290 PSI]: 3
- 30 bar [435 PSI]: A
- 40 bar [580 PSI]: 4
- 60 bar [870 PSI]: 5
- 100 bar [1450 PSI]: 7

Electrical connection

- Without: 0
- AMP (6.3 x 0.8): 5

Hydraulic connection

- ISO 9974-1 (metric fittings): 4
- ISO 11926-1 (SAE J514 fittings with O-ring): A

Options (See page 71)

- Special calibration*: 1
- Special port*: 2
- Non-standard component*: 3
- Mechanical control adapter*: 4
- Improved watertightness: A
- Circuit Pressurization*: B
- Ports oriented to the right (East): E
- Ports oriented to the left (West): W

* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The VB-00E is a reverse modulating electrically or electrically/manually operated brake valve for Spring Applied Hydraulically Released (SAHR) brake. The VB-00E brake valve is a 3-way / 2-position electro-valve and includes a pressure reducing valve as well as a selector.

Operation
When the valve is not operated, the output pressure (X) is limited to the preset max pressure of the valve independently from the input pressure.

The VB-00E has two principles of operation:

1. Electric actuation
   VB-00E has a fixed output pressure preset by the pressure reducing valve. When the VB-00E is not actuated (understand the electric control = 0) the output (X) is directly connected to the tank (T) and provide a pressure equal to zero. The SAHR brake is applied. When the VB-00E is electrically actuated (electric control =1) the output (X) is connected to the output of the pressure reducing valve: the VB-00E provides the preset fixed pressure. The SAHR brake is released.

2. Electric with mechanical actuation
   In this configuration, the pressure reducing valve provides an output pressure proportional to the mechanical command position. When the VB-00E is not actuated (understand the electric control = 0) the output (X) is directly connected to the tank (T) and provide a pressure equal to 0. The SAHR brake is applied. When the VB-00E is electrically actuated (electric control =1) the output (X) is connected to the output of the pressure reducing valve. Therefore, the VB-00E supplies a precise output pressure inversely proportional to the mechanical command stroke: the output pressure (X) decreases from a max preset pressure (control released, brake released) to 0 (control actuated, brake applied).
Overall dimensions of VB-00E brake valve

Floor cutout, valve only
View from above

Connections

<table>
<thead>
<tr>
<th>Connection</th>
<th>Max. pressure bar</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
<td>Input</td>
</tr>
<tr>
<td>X</td>
<td>See parking brake pressure page 8</td>
<td>Output</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>Tank</td>
</tr>
<tr>
<td>MX*</td>
<td>M12 x 1.5</td>
<td>Parking brake pressure switch</td>
</tr>
</tbody>
</table>

* : Option

Function

- Input
- Output
- Tank
- Parking brake pressure switch

Max. pressure bar

<table>
<thead>
<tr>
<th>Connection</th>
<th>Max. pressure bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
</tr>
<tr>
<td>X</td>
<td>See parking brake pressure page 8</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
</tr>
<tr>
<td>MX*</td>
<td>M12 x 1.5</td>
</tr>
</tbody>
</table>

Connection

<table>
<thead>
<tr>
<th>Connection</th>
<th>Max. pressure bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
</tr>
<tr>
<td>X</td>
<td>See parking brake pressure page 8</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
</tr>
<tr>
<td>MX*</td>
<td>M12 x 1.5</td>
</tr>
</tbody>
</table>

Function

- Input
- Output
- Tank
- Parking brake pressure switch

Max. pressure bar

- Input: 210 [3 046] bar
- Output: See parking brake pressure page 8 bar
- Tank: 1 [14.5] bar
- Parking brake pressure switch: M12 x 1.5 bar

Connections

- Input: M14 x 1.5
- Output: M14 x 1.5 or 9/16 - 18 UNF
- Tank: M12 x 1.5
- Parking brake pressure switch: M12 x 1.5
Mechanical controls with standard valve orientation

Horizontal lever

Vertical lever

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VB-00E
Hydraulic diagram and characteristic curve

Electric actuation

Output pressure

Electric with mechanical actuation

Output pressure

Angular displacement of pedals or levers

Estimated maximum actuator forces

- Max. traction on T-rod for valve only
- Standard pedal
- Lockable pedal
- Horizontal lever
- Vertical lever

To calculate the actuator forces for your mechanical control: please contact your Poclain Hydraulics Application Engineer.

Model code

```
 T F P Q C R S
V B 0 0 E 0 0 - - -
```

Parking brake pressure

- 10 bar [145 PSI] 2
- 20 bar [290 PSI] 3
- 30 bar [435 PSI] A
- 40 bar [580 PSI] 4
- 60 bar [870 PSI] 5
- 100 bar [1450 PSI] 7

Control

- Without lever
- Actuation not possible; fixed calibration S
- Locking lever Horizontal M
- Vertical (upto 30 bar) N

Pressure switch (42 V max.)

- Without
- On MX (parking brake pressure) 4

Electrical connection

- Bare wire 1
- Packard 2
- Deutsch 3
- Hirschmann 4
- AMP 5

Supply voltage

- T2 V DC (max. amp. 1.5 A) 1
- 24 V DC (max. amp. 0.8 A) 2

Hydraulic connection

- ISO 9974-1 (metric fittings) 4
- ISO 11926-1 (SAE J514 fittings with O-ring) A

Options (See page 71)

- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- Mechanical control adapter* 4
- Improved watertightness A
- Ports oriented to the right (East) E
- Ports oriented to the left (West) W

* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The VB-010 modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve. The VB-010 valve is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking.

In a braking circuit, VB-010 is usually associated with the VB-100 single-circuit accumulator charging valve (or a VB-200 dual-circuit accumulator charging valve if the VB-010 is also associated with a VB-002 emergency / parking brake valve).

Operation
When the pedal is at rest (‘up’ position), the output pressure (at F) is zero and the brake receptors are connected to the tank (F to T).

When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespective of the supply pressure.
Overall dimensions of VB-010 brake valve

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar [bar]</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 210 [3 046]</td>
<td>M14 x 1.5</td>
<td>Input</td>
</tr>
<tr>
<td>F 120 [1 740] (1)</td>
<td>9/16 - 18 UNF</td>
<td>Output</td>
</tr>
<tr>
<td>T 1 [14,5]</td>
<td>2 x M6</td>
<td>Tank</td>
</tr>
<tr>
<td>MF*</td>
<td>M10 x 1</td>
<td>Service brake pressure switch 1.3 [2.87]</td>
</tr>
</tbody>
</table>

(1) : Higher pressure: please contact us
* : Option
Mechanical control with standard valve orientation

Floor mount pedal

Wall mount pedal
Hydraulic diagram and characteristic curve

Estimated maximum actuator forces according to output pressure

- Force on pedal (Fa): \( Fa (\text{daN}) \approx 0.5 \times \text{max. output pressure (bar)} + 5 \)
- Force on pedal (Fb): \( Fb (\text{daN}) \approx \frac{Fa}{6} \)

To obtain the forces in lbf, convert the final result.

Model Code

Operating pressure
- 20 bar [290 PSI]
- 30 bar [435 PSI]
- 40 bar [580 PSI]
- 60 bar [870 PSI]
- 80 bar [1160 PSI]
- 100 bar [1450 PSI]
- 120 bar [1740 PSI]

Control
- without pedal
- Floor mount pedal: Smooth A, Aluminum non-slip B, Rubber non-slip C
- 4" Wall mount pedal: Non-slip metal K, Rubber non-slip L
- 8" Wall mount pedal: Non-slip metal J

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.

Options (See page 71)
- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- Mechanical control adapter* 4
- Dual-slope spring mechanism* 7
- Pressure sensor 8
- Pedal back abutment 9
- Improved watertightness* A
- Circuit Pressurization* B
- Ports oriented to the right (East) E
- Ports oriented to the front (North) N
- Ports oriented to the back (South) S
- Ports oriented to the left (West) W

* Please ask us
The VB-020 service brake valve (VB-0E0 and VB-0F0) is a mechanically-controlled, three-way, graduated release double pressure reducing valve. The VB-020 (VB-0E0 and VB-0F0) valve provides precisely controlled output pressures (at F1 and F2) proportional to the pedal stroke and therefore to the force applied to the pedal. This provides the feeling of braking. In a braking circuit, VB-020 (VB-0E0 and VB-0F0) is usually associated with the VB-200 dual-circuit accumulator charging valve.

**Operation**

When the pedal is at rest (‘up’ position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T).

When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. The output pressures (at F1 and F2) can be equal or different according to a ratio F2/F1 = 0.64 (VB-0E0) or 0.44 (VB-0F0).

When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressures of the valve irrespective of the supply pressure.

The pressures at F1 and F2 are strictly independent. A failure in one of the circuits does not affect the operation of the other circuit.

---

**Applications**
The VB-020 service brake valve (VB-0E0 and VB-0F0) is a mechanically-controlled, three-way, graduated release double pressure reducing valve. The VB-020 (VB-0E0 and VB-0F0) valve provides precisely controlled output pressures (at F1 and F2) proportional to the pedal stroke and therefore to the force applied to the pedal. This provides the feeling of braking. In a braking circuit, VB-020 (VB-0E0 and VB-0F0) is usually associated with the VB-200 dual-circuit accumulator charging valve.
Overall dimensions of VB-020 brake valve

Connections

<table>
<thead>
<tr>
<th></th>
<th>Max. pressure bar [psi]</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 - P2</td>
<td>210 [3 046]</td>
<td>M14 x 1.5</td>
<td>Input</td>
</tr>
<tr>
<td>F1 - F2</td>
<td>120 [1 740]</td>
<td>M10 x 1</td>
<td>Output</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>9/16 - 18 UNF</td>
<td>Tank</td>
</tr>
<tr>
<td>MF1*</td>
<td>M10 x 1 (VB020)</td>
<td>Service brake pressure switch</td>
<td></td>
</tr>
<tr>
<td>MF2*</td>
<td>M12 x 1.5 (VB0E0)</td>
<td>Service brake pressure switch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M14 x 1.5 (VB0F0)</td>
<td>Service brake pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) : Higher pressure: please contact us
* : Option

Floor cutout, valve only View from above

(PSI) kg [lbs]

2.8 [6.17]
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Mechanical Control

Hydraulic diagram and characteristic curves

Output pressure

Angular displacement

Floor mount pedal

Wall mount pedal
Estimated maximum actuator forces according to output pressure

- Force on pedal (Fa)
- Force on pedal (Fb)

\[ Fa (\text{daN}) = \text{max. output pressure (bar)} + 27 \]
\[ Fb (\text{daN}) = \frac{Fa}{5} \]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Number

Service brake
- Dual circuit with \( F2/F1 = 1 \)
- Dual circuit with \( F2/F1 = 0.64 \)
- Dual circuit with \( F2/F1 = 0.44 \)

Operating pressure
- 30 bar [435 PSI]
- 40 bar [580 PSI]
- 60 bar [870 PSI]
- 80 bar [1160 PSI]
- 100 bar [1450 PSI]
- 120 bar [1740 PSI]

Control
- Without pedal
- Floor mount pedal
- Wall mount pedal 4"
- Wall mount pedal 8"

Pressure switch (Max. 42 V)
- Without
- On MF or MF2 (service brake pressure)

Electrical connection
- Without
- AMP (6.3 x 0.8)

Hydraulic connection
- ISO 9974 -1 (metric fittings)
- ISO11926 -1 (SAE J514 fittings with O-ring)

Options (See page 71)
- Special calibration*
- Special port*
- Non-standard component*
- Mechanical control adapter*
- Dual-slope spring mechanism*
- Pressure sensor
- Pedal back abutment
- Circuit Pressurization*
- Ports oriented to the right (East)
- Ports oriented to the front (North)
- Ports oriented to the back (South)
- Ports oriented to the left (West)

* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
**Applications**

The VB-012 brake control is a single-circuit braking assembly that combines:

- The VB-002 emergency / parking brake valve, which supplies an output pressure to control the automotive pump (inching).
- The VB-010 service brake valve, which supplies a pressure to control the service braking.

**Operation**

The VB-012 valve controls two independent pressures via a pedal. One pressure is for automotive pump control, and the other is for service braking control.

When the operator presses the pedal, VB-012 supplies a pressure inversely proportional to the angular displacement of the pedal to control the hydraulic pump.

If more braking is required, the operator continues to press the pedal.

VB-012 then supplies an output pressure to the service brake in proportion to the angular displacement of the pedal.
Mechanical control with standard valve orientation

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar (PSI)</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
<td>Input</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>Tank</td>
</tr>
<tr>
<td>F</td>
<td>120 [1 740]</td>
<td>Service braking</td>
</tr>
<tr>
<td>X</td>
<td>20 [290,1] (1)</td>
<td>Inching control</td>
</tr>
<tr>
<td>MF*</td>
<td>M10 x 1</td>
<td>Service braking pressure switch</td>
</tr>
<tr>
<td>MX*</td>
<td>M12 x 1.5</td>
<td>Inching control pressure switch</td>
</tr>
</tbody>
</table>

(1) : Higher pressures: please contact us
* : Options
Hydraulic diagram and characteristic curve

For different configurations, please consult your Poclain Hydraulics Application Engineer.

To calculate the actuator forces for your mechanical control: please contact your Poclain Hydraulics Application Engineer.

This valve is always sold with a mechanical control.
### Operating pressure

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Bar</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
<td>435</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>580</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>870</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
<td>1160</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>1450</td>
</tr>
<tr>
<td>120</td>
<td>120</td>
<td>1740</td>
</tr>
</tbody>
</table>

### Inching

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Bar</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>145</td>
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<tr>
<td>20</td>
<td>20</td>
<td>290</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>435</td>
</tr>
</tbody>
</table>

### Control

- **Floor mount pedal**
  - Smooth: A
  - Aluminum non-slip: B
  - Rubber non-slip: C

### Pressure switch (Max. 42 V)

- Without: 0
- On MF (service brake pressure): 2
- On MX (inching): 4
- On MF and MX: B

### Electrical connection

- Without: 0
- AMP (6.3 x 0.8): 5

### Hydraulic connection

- ISO 9974-1 (metric fittings): 4
- ISO 11926-1 (SAE J514 fittings with O-ring): A

### Options

- Special calibration*: 1
- Special port*: 2
- Non-standard component*: 3
- Dual-slope spring mechanism*: 7
- Pressure sensor*: 8
- Improved watertightness*: A
- Circuit Pressurization*: B
- Ports oriented to the right (East)*: E
- Ports oriented to the front (North)*: N
- Ports oriented to the back (South)*: S
- Ports oriented to the left (West)*: W

*Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
**Applications**

The VB-022 brake control is a dual-circuit braking assembly combining:

- The VB-002 emergency / parking brake valve, which provides an output pressure to control the automotive pump (inching).
- The VB-020 service brake valve, which provides two output pressures, F1 and F2, for independent braking circuits.

Output pressures F1 and F2 can be equal (VB-022) or different according to a ratio $F2/F1 = 0.64$ (VB-0E2) or 0.44 (VB-0F2).

**Operation**

VB-022 controls three independent pressures via a pedal. One pressure controls the automotive pump, and the other two pressures control the service braking.

- **Two-step braking:**

  *When the operator presses the pedal*, the VB-022 supplies a pressure that is inversely proportional to the angular displacement of the pedal, to control the hydraulic pump. If more braking is required, the operator continues to press the pedal. VB-022 then supplies an output pressure to the service brakes in proportion to the angular displacement of the pedal.

- **Simultaneous braking:**

  VB-022, VB-0E2 and VB-0F2 simultaneously control the pump (hydrostatic braking) and the service braking (mechanical braking) for more aggressive dynamic braking.

The pressures at F1 and F2 are strictly independent. A failure in one of the circuits does not affect the operation of the other circuit.
Mechanical control with standard valve orientation

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar [PSI]</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>M14 x 1.5</td>
<td>Input</td>
</tr>
<tr>
<td>P1 - P2</td>
<td>M14 x 1.5</td>
<td>Tank</td>
</tr>
<tr>
<td>1</td>
<td>9/16” 18 UNF</td>
<td>Service braking</td>
</tr>
<tr>
<td>120</td>
<td>M14 x 1.5</td>
<td>Inching control</td>
</tr>
<tr>
<td>X</td>
<td>M10 x 1</td>
<td>Service braking pressure switch</td>
</tr>
<tr>
<td>MF1*</td>
<td>M10 x 1</td>
<td>Service braking pressure switch</td>
</tr>
<tr>
<td>MF2*</td>
<td>M12 x 1.5 (VB0F2)</td>
<td>Service braking pressure switch</td>
</tr>
<tr>
<td>MX*</td>
<td>M12 x 1.5</td>
<td>Inching control pressure switch</td>
</tr>
</tbody>
</table>

(1) : Higher pressures: please contact us
* : Option
Hydraulic diagram and characteristic curves

To calculate the actuator forces for your mechanical control: please contact your Poclain Hydraulics Application Engineer.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.
Model Code

Service brake
- Dual circuit with $F_2/F_1 = 1$
- Dual circuit with $F_2/F_1 = 0.64$
- Dual circuit with $F_2/F_1 = 0.44$

Operating pressure
- 40 bar [580 PSI]
- 60 bar [870 PSI]
- 80 bar [1160 PSI]
- 100 bar [1450 PSI]
- 120 bar [1740 PSI]

Inching
- 10 bar [145 PSI]
- 20 bar [290 PSI]
- 30 bar [435 PSI]

Control
- Floor mount pedal
  - Smooth
  - Aluminum non-slip
  - Rubber non-slip

Options (See page 71)
- Special calibration*
- Special port*
- Non-standard component*
- Dual-slope spring mechanism*
- Pressure sensor
- Circuit Pressurization*
- Ports oriented to the right (East)*
- Ports oriented to the front (North)*
- Ports oriented to the back (South)*
- Ports oriented to the left (West)*

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.

* Please ask us.

Pressure switch (Max. 42 V)
- Without
- On MF (service brake pressure)
- On MX (inching pressure)
- On MF and MX

Electrical connection
- Without
- AMP (6.3 x 0.8)

Hydraulic connection
- ISO 9974-1 (metric fittings)
- ISO11926-1 (SAE J514 fittings with O-ring)

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The VB-0B0 valve is a braking assembly that provides dynamic braking and steering-assist braking. VB-0B0 is actuated by two pedals, and supplies two independent brakes. The VB-0B0 valve combines the following components in a single unit:
• A pressure reducer that supplies an output pressure proportional to the pedal stroke.
• Two circuit selectors, each one associated with one of the pedals of the VB-0B0.

Operation
VB-0B0 performs two types of braking:
- Left/right directional braking in work mode,
- Braking with equal power distribution in road mode.

• Work mode:
VB-0B0 provides steering assistance for turning. In work mode, the two pedals (not supply) are actuated independently. When the operator depresses either pedal, the pressure reducer and the selector associated with this pedal are actuated. VB-0B0 supplies a graduated release braking pressure exclusively to the service brakes associated with this pedal.
• Road mode:
In road mode, the two pedals are mechanically linked. When the operator depresses one pedal, the other one is driven, and so both selectors are actuated together. The VB-0B0 valve supplies an identical pressure to both brakes, proportional to the stroke of the pedals.
Overall dimensions of VB-0B0 braking valve

Connections

<table>
<thead>
<tr>
<th>According to version</th>
<th>Max. pressure bar [PSI]</th>
<th>Connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
<td>M14 x 1.5</td>
<td>Input</td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>M12 x 1.5</td>
<td>Tank</td>
</tr>
<tr>
<td>F1</td>
<td>120 [1 740]</td>
<td>M12 x 1.5</td>
<td>Left and/or right brake output</td>
</tr>
<tr>
<td>F2</td>
<td></td>
<td>M10 x 1</td>
<td>Auxiliary brake output (optional)</td>
</tr>
<tr>
<td>FR (*)</td>
<td></td>
<td>M10 x 1</td>
<td>Service braking pressure</td>
</tr>
<tr>
<td>MF</td>
<td></td>
<td>M6</td>
<td></td>
</tr>
</tbody>
</table>

(*) FR = F1 & F2. FR gives a braking pressure if both pedals are actuated (e.g., FR can be used to control a trailer brake valve). For further information, please contact us.
Hydraulic diagrams and characteristic curve

Estimated maximum actuator forces according to output pressure

<table>
<thead>
<tr>
<th>Force (Fs) on the pair (PS + PRV) (daN)</th>
<th>0</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 x max. output pressure (bar) + 67.443</td>
<td>1.63 x max. output pressure (bar) + 67.443</td>
<td>3.04 x max. output pressure (bar) + 67.443</td>
<td></td>
</tr>
<tr>
<td>Force (Fa) on all pedals (daN)</td>
<td>0.5 x max. output pressure (bar) + 112.404</td>
<td>2.76 x max. output pressure (bar) + 112.404</td>
<td>5.58 x max. output pressure (bar) + 112.404</td>
</tr>
</tbody>
</table>

To obtain the forces in lbf, convert the final result.
Model Code

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Operating pressure
- 30 bar [435 PSI] 3
- 40 bar [580 PSI] 4
- 60 bar [870 PSI] 5
- 80 bar [1160 PSI] 6
- 100 bar [1450 PSI] 7
- 120 bar [1740 PSI] 8

Control
- Control without force feedback 0
- Control with force feedback DN12 DN18

Pressure switch (Max. 42 V)
- Without 0
- On MF (service brake pressure) 2

Electrical connection
- Without 0
- AMP (6.3 x 0.8) 5

Hydraulic connection
- ISO 9974-1 (metric fittings) 4
- ISO11926-1 (SAE J514 fittings with O-ring) A

Options (See page 71)
- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- Dual-slope spring mechanism* 7
- Pressure sensor 8
- Improved watertightness* A
- Circuit Pressurization* B

* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The VB-100 accumulator charging valve charges the accumulator(s) of a braking circuit and maintains its (their) pressure while supplying an auxiliary circuit.
In a braking circuit, valve VB-100 is associated with the VB-010 single-circuit service brake valve (or the VB-002 emergency / parking brake valve).

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator.
When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).
Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve again charges the accumulator until it reaches cut-out pressure, and so on.
Overall dimensions of VB-100 (45 l/min) accumulator charging valve

Connections

<table>
<thead>
<tr>
<th></th>
<th>Max. pressure bar [psi]</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (1) bar [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3 046]</td>
<td>M18 x 1.5 or 3/4 - 16 UNF</td>
<td>Input</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Cut-out pressure</td>
<td></td>
<td>Auxiliary circuit</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>M14 x 1.5 or 9/16 - 18 UNF</td>
<td>Tank</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Cut-out pressure</td>
<td></td>
<td>Service braking accumulator</td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td>1/4 BSPP</td>
<td></td>
<td>Accumulator min. pressure switch</td>
<td>2.2 [4.8]</td>
</tr>
<tr>
<td>LS*</td>
<td>M14 x 1.5 or 9/16 - 18 UNF</td>
<td></td>
<td>Load sensing</td>
<td>10 [145]</td>
</tr>
<tr>
<td>MS*</td>
<td>M12 x 1.5</td>
<td></td>
<td>Pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) Loss of head (P to S) given at a flow rate (Q = 30 l/min, 8 GPM)

* : Option

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25/09/2009
Hydraulic diagram

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

Cut-in/Cut-out range
- 110 - 130 bar [1595 - 1885 PSI] 3
- 120 - 140 bar [1740 - 2031 PSI] 4
- 135 - 160 bar [1958 - 2321 PSI] 5
- 180 - 190 bar [2321 - 2756 PSI] 6
- 170 - 200 bar [2466 - 2901 PSI] 7
- 180 - 210 bar [2611 - 3046 PSI] 8

Flow rate to auxiliaries (P to S)
- 45 l/min [12 GPM] 4

Flow rate to accumulator (P to A)
- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

Pressure switch (Max. 42 V)
- without 0
- on MA (accumulator min. pressure) 1
- on MS (auxiliary) 3
- on MA and MS 6

Electrical connection
- without 0
- AMP (6.3 X 0.8) 5

Hydraulic connection
- ISO 9974-1 (metric fittings) 4
- ISO11926-1 (SAE J514 fittings with O-ring) A

Options (See page 71)
- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- LS Port 5
- MS Port C
- MS + LS Port D

* Please ask us
Applications
The VB-100 accumulator charging valve charges the accumulator(s) of a braking circuit and maintains its (their) pressure while supplying an auxiliary circuit. In a braking circuit, valve VB-100 is associated with the VB-010 single-circuit service brake valve (or the VB-002 emergency / parking brake valve).

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return). Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve again charges the accumulator until it reaches cut-out pressure, and so on.
Overall dimensions of VB-100 (120 l/min) accumulator charging valve

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar [PSI]</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (1) bar [PSI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>M18 x 1.5</td>
<td>Input</td>
<td>210 [3046]</td>
</tr>
<tr>
<td>S</td>
<td>M14 x 1.5</td>
<td>Auxiliary circuit</td>
<td>22 [340]</td>
</tr>
<tr>
<td>T</td>
<td>M14 x 1.5</td>
<td>Tank</td>
<td>1 [14.5]</td>
</tr>
<tr>
<td>A</td>
<td>M14 x 1.5</td>
<td>Service braking accumulator</td>
<td>2.2 [4.8]</td>
</tr>
<tr>
<td>MA*</td>
<td>M12 x 1.5</td>
<td>Accumulator min. pressure switch</td>
<td>4 [58]</td>
</tr>
<tr>
<td>LS*</td>
<td>M14 x 1.5</td>
<td>Load sensing</td>
<td>15 [2.5]</td>
</tr>
<tr>
<td>MS*</td>
<td>M12 x 1.5</td>
<td>MS Pressure switch</td>
<td>15 [2.5]</td>
</tr>
</tbody>
</table>

(1) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)
* : Options
Hydraulic diagram

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

Cut-in/Cut-out range
110 - 130 bar [1595 - 1885 PSI] 3
120 - 140 bar [1740 - 2031 PSI] 4
135 - 160 bar [1958 - 2321 PSI] 5
160 - 190 bar [2321 - 2756 PSI] 6
170 - 200 bar [2466 - 2901 PSI] 7
180 - 210 bar [2611 - 3046 PSI] 8

Flow rate to auxiliaries (P to S)
120 l/min [32 GPM] 6

Flow rate to accumulator (P to A)
2.75 l/min [0.73 GPM] 1
8 l/min [2.11 GPM] 2
15 l/min [3.96 GPM] 3

Pressure switch (Max. 42 V)
without 0
on MA (accumulator min. pressure) 1
on MS (auxiliary) 3
on MA and MS 6

Electrical connection
without 0
AMP* (6.3 X 0.8) 5

Hydraulic connection
ISO 9974-1 (metric fittings) 4
ISO11926-1 (SAE J514 fittings with O-ring) A

Options (See page 71)
Special calibration* 1
Special port* 2
Non-standard component* 3
LS Port 5
MS Port C
MS + LS Port D

* Please ask us
**Applications**

The VB-200 accumulator charging valve charges the accumulators of a braking circuit and maintains their pressure while supplying an auxiliary circuit. In a braking circuit, valve VB-200 is associated with the VB-020 dual-circuit service brake valve (or the VB-010 single-circuit service brake valve and the VB-002 emergency/parking brake valve).

**Operation**

During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulators. When the accumulators reach maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return). Each time the operator actuates the pedal, the pressure in the accumulators drops. When minimum (cut-in) pressure is reached in at least one accumulator, the valve recharges the accumulators to cut-out pressure, and so on.

When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator.
Overall dimensions of VB-200 (45 l/min) accumulators charging valve

Connections

<table>
<thead>
<tr>
<th>Connection</th>
<th>Function</th>
<th>Max. pressure</th>
<th>Loss of head (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Input</td>
<td>210 [3046]</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Auxiliary circuit</td>
<td>3/4 - 16 UNF</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Tank</td>
<td>1 [14.5]</td>
<td></td>
</tr>
<tr>
<td>A1 - A2</td>
<td>Service braking accumulator</td>
<td>M14 x 1.5 or 9/16 - 18 UNF</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Parking brake connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td>Accumulator min. pressure switch</td>
<td>1/4 BSPP</td>
<td></td>
</tr>
<tr>
<td>LS*</td>
<td>Load sensing</td>
<td>M14 x 1.5 or 9/16 - 18 UNF</td>
<td></td>
</tr>
<tr>
<td>MS*</td>
<td>MS Pressure switch</td>
<td>M12 x 1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 [8.8]</td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulators.
(2) Loss of head (P to S) given at a flow rate (Q = 30 l/min, 8 GPM)
* : Options
Hydraulic diagram

Isolating ball valves

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

Cut-in/Cut-out range

<table>
<thead>
<tr>
<th>Range</th>
<th>PSI</th>
</tr>
</thead>
</table>
| 110 - 130 bar        | 1595 - 1885 | 3
| 120 - 140 bar        | 1740 - 2031 | 4
| 135 - 160 bar        | 1958 - 2321 | 5
| 160 - 190 bar        | 2321 - 2756 | 6
| 170 - 200 bar        | 2466 - 2901 | 7
| 180 - 210 bar        | 2611 - 3046 | 8

Flow rate to auxiliaries (P to S)

- 45 l/min [12 GPM]
- 38 l/min [10.5 GPM]
- 27 l/min [7 GPM]

Flow rate to accumulator (P to A)

- 2.75 l/min [0.73 GPM]
- 8 l/min [2.11 GPM]
- 15 l/min [3.96 GPM]

Pressure switch (Max. 42 V)

- without: 0
- on MA (accumulator min. pressure): 1
- on MS (auxiliary): 3
- on MA and MS: 6

Electrical connection

- without: 0
- AMP (6.3 x 0.8): 5

Hydraulic connection

- ISO 9974-1 (metric fittings): 4
- ISO 11926-1 (SAE J514 fittings with O-ring): A

Options (See page 71)

- Special calibration*: 1
- Special port*: 2
- Non-standard component*: 3
- LS Port: 5
- Isolating ball valves: 6
- MS Port: C
- MS + LS Port: D

* Please ask us
Applications
The VB-200 accumulator charging valve charges the accumulators of a braking circuit and maintains their pressure while supplying an auxiliary circuit.
In a braking circuit, valve VB-200 is associated with the VB-020 dual-circuit service brake valve (or the VB-010 single-circuit service brake valve and the VB-002 emergency / parking brake valve).

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulators. When the accumulators reach maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).
Each time the operator actuates the pedal, the pressure in the accumulators drops. When minimum (cut-in) pressure is reached in at least one accumulator, the valve recharges the accumulators to cut-out pressure, and so on.
When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator.
Overall dimensions of VB-200 (120 l/min) accumulators charging valve

Connections

<table>
<thead>
<tr>
<th>Connection</th>
<th>Max. pressure bar [psi]</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (2) bar [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>210 [3046]</td>
<td>M18 x 1.5</td>
<td>Input</td>
<td>4 [58]</td>
</tr>
<tr>
<td>S</td>
<td>Cut-out pressure</td>
<td>M14 x 1.5</td>
<td>Auxiliary circuit</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>1 [14.5]</td>
<td>9/16 - 18 UNF</td>
<td>Tank</td>
<td></td>
</tr>
<tr>
<td>A1 - A2</td>
<td>M14 x 1.5 or 9/16 - 18 UNF</td>
<td>Service braking accumulator</td>
<td>Parking brake connection</td>
<td>4 [58]</td>
</tr>
<tr>
<td>B3</td>
<td>Cut-out pressure</td>
<td>1/4 BSPP</td>
<td>Accumulator min. pressure switch</td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td>1/4 BSPP</td>
<td>M14 x 1.5</td>
<td>Load sensing</td>
<td></td>
</tr>
<tr>
<td>LS*</td>
<td>9/16 - 18 UNF</td>
<td>M12 x 1.5</td>
<td>MS Pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulators.
(2) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)
* :Options
Hydraulic diagram

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

Cut-in/Cut-out range

- 110 - 130 bar [1595 - 1885 PSI] 3
- 120 - 140 bar [1740 - 2031 PSI] 4
- 135 - 160 bar [1958 - 2321 PSI] 5
- 160 - 190 bar [2321 - 2756 PSI] 6
- 170 - 200 bar [2466 - 2901 PSI] 7
- 180 - 210 bar [2611 - 3046 PSI] 8

Flow rate to auxiliaries (P to S)
120 l/min [32 GPM] 6

Flow rate to accumulator (P to A)
- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

Pressure switch (Max. 42 V)
- without 0
- on MA (accumulator min. pressure) 1
- on MS (auxiliary) 3
- on MA and MS 6

Electrical connection
- without 0
- AMP (6.3 x 0.8) 5

Hydraulic connection
- ISO 9974-1 (metric fittings) 4
- ISO 11926-1 (SAE J514 fittings with O-ring) A

Options (See page 71)
- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- LS Port 5
- MS Port C
- MS + LS Port D
* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
**Applications**
The VB-110 braking assembly contains the following components in a single manifold:
- A single-circuit accumulator charging valve,
- A mechanically controlled single-circuit service brake valve.
The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

**Operation**
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).

Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on.

The modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve. It is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest (‘up’ position), the output pressure (at F) is zero and the brake receptors are connected to the tank (F to T).

When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespective of the supply pressure.

**VB-110**
- Service brake valve
- Accumulator charging valve
- 45 l/min [12 GPM]
- Single-circuit
Overall dimensions of VB-110 (45 l/min) brake valve

Connections

<table>
<thead>
<tr>
<th>Connection</th>
<th>Function</th>
<th>Max. pressure bar [psi]</th>
<th>Connection</th>
<th>Loss of head (3) bar [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Input</td>
<td>210 [3 046]</td>
<td>M18 x 1.5</td>
<td>5 [12.8]</td>
</tr>
<tr>
<td>S</td>
<td>Cut-out pressure</td>
<td>1 [14.5]</td>
<td>3/4&quot; - 16 UNF</td>
<td>10 [145]</td>
</tr>
<tr>
<td>T</td>
<td>Tank</td>
<td>120 [1 740] (2)</td>
<td>M14 x 1.5</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Service braking</td>
<td></td>
<td>9/16&quot; - 18 UNF</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Service braking accumulator</td>
<td></td>
<td>M14 x 1.5</td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td>Accumulator min. pressure switch</td>
<td>1/4&quot; BSPP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MF*</td>
<td>Service pressure switch</td>
<td>M10 x 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS*</td>
<td>Load sensing</td>
<td>M14 x 1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS*</td>
<td>MS pressure switch</td>
<td>M12 x 1.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulator.
(2) Higher pressure: contact us.
(3) Loss of head (P to S) given at a flow rate (Q = 30 l/min, 8 GPM)
* Option
POCLAIN HYDRAULICS VB-110 (45 l/min)

Mechanical Controls

Hydraulic diagram and characteristic curve

Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa)
  \[ Fa \ (\text{daN}) = 0.5 \times \text{max. output pressure (bar)} + 35 \]
- Force on pedal (Fb)
  \[ F_b \ (\text{daN}) = \frac{F_a}{5} \]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.
**Model Code**

```
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>B</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**Cut-in/Cut-out range**
- 110 - 130 bar [1595 - 1885 PSI] 3
- 120 - 140 bar [1740 - 2031 PSI] 4
- 135 - 160 bar [1958 - 2321 PSI] 5
- 160 - 190 bar [2321 - 2756 PSI] 6
- 170 - 200 bar [2466 - 2901 PSI] 7
- 180 - 210 bar [2611 - 3046 PSI] 8

**Operating pressure**
- 40 bar [580 PSI] 4
- 60 bar [870 PSI] 5
- 80 bar [1160 PSI] 6
- 100 bar [1450 PSI] 7
- 120 bar [1740 PSI] 8

**Flow rate to auxiliaries (P to S)**
- 45 l/min [12 GPM]

**Flow rate to accumulator (P to A)**
- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

**Flow rate to auxiliaries (P to S)**
- 45 l/min [12 GPM]

**Flow rate to accumulator (P to A)**
- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.

**Pressure switch (Max. 42 V)**
- Without pedal 0
- Floor mount pedal
  - Aluminum non-slip A
  - Rubber non-slip B
  - Smooth C
- Lockable pedal
  - Aluminum non-slip E
  - Rubber non-slip F

**Electrical connection**
- Without 0
- AMP (6.3 x 0.8) 5

**Hydraulic connection**
- ISO 9974-1 (metric fittings) 4
- ISO 11926-1 (SAE J514 fittings with O-ring) A

**Options**
- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- Mechanical control adapter* 4
- LS Port 5
- Dual-slope spring mechanism* 7
- Pressure sensor 8
- Pedal back abutment 9
- Circuit Pressurization* B
- MS Port 6
- MS + LS Port D

* Please ask us
**Applications**
The VB-110 braking assembly contains the following components in a single manifold:
- A single-circuit accumulator charging valve,
- A mechanically controlled single-circuit service brake valve.
The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

**Operation**
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).

Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on.

The modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve. It is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking.

When the pedal is at rest (‘up’ position), the output pressure (at F) is zero and the brake receptors are connected to the tank (F to T).

When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespective of the supply pressure.
Overall dimensions of VB-110 (120 l/min) brake valve

Connections

<table>
<thead>
<tr>
<th>Max. pressure bar</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (3) bar [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>M18 x 1.5</td>
<td>Input</td>
<td>210 [3046]</td>
</tr>
<tr>
<td>S</td>
<td>3/4&quot; - 16 UNF</td>
<td>Auxiliary circuit</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>M14 x 1.5</td>
<td>Tank</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Service braking accumulator</td>
<td>Service braking/accumulator</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>M10 x 1</td>
<td>Service pressure switch</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>1/4&quot; BSPP</td>
<td>Accumulator min. pressure switch</td>
<td></td>
</tr>
<tr>
<td>MF</td>
<td>M12 x 1.5</td>
<td>MS pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulator.
(2) Higher pressure: contact us.
(3) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)

* Option
Mechanical Controls

Hydraulic diagram and characteristic curve

Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa)
  \[ Fa \ (\text{daN}) = 0.5 \times \text{max. output pressure (bar)} + 27 \]
- Force on pedal (Fb)
  \[ Fb \ (\text{daN}) = \frac{Fa}{5} \]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.
### Model Code

<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
<th>P</th>
<th>Q</th>
<th>C</th>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Cut-in/Cut-out range

- **110 - 130 bar [1595 - 1885 PSI]**
- **120 - 140 bar [1740 - 2031 PSI]**
- **135 - 160 bar [1958 - 2321 PSI]**
- **160 - 190 bar [2321 - 2756 PSI]**
- **170 - 200 bar [2466 - 2901 PSI]**
- **180 - 210 bar [2611 - 3046 PSI]**

### Operating pressure

- **40 bar [580 PSI]**
- **60 bar [870 PSI]**
- **80 bar [1160 PSI]**
- **100 bar [1450 PSI]**
- **120 bar [1740 PSI]**

### Flow rate to auxiliaries (P to S)

- **120 l/min [32 GPM]**

### Flow rate to accumulator (P to A)

- **2.75 l/min [0.73 GPM]**
- **8 l/min [2.11 GPM]**
- **15 l/min [3.96 GPM]**

### Control

- **Without pedal**
- **Floor mount pedal**
  - Smooth
  - Aluminum non-slip
  - Rubber non-slip
- **Lockable pedal**
  - Smooth
  - Aluminum non-slip
  - Rubber non-slip

### Pressure switch (Max. 42 V)

- **Without**
- **On MA (accumulator min. pressure)**
- **On MF (service brake)**
- **On MS (auxiliary)**
- **On MA and MF**
- **On MA and MS**
- **On MA, MF and MS**

### Electrical connection

- **Without**
- **AMP (6.3 x 0.8)**

### Hydraulic connection

- **ISO 9974-1 (metric fittings)**
- **ISO 11926-1 (SAE J514 fittings with O-ring)**

### Options (See page 71)

- **Special calibration**
- **Special port**
- **Non-standard component**
- **Mechanical control adapter**
- **LS Port**
- **Dual-slope spring mechanism**
- **Pressure sensor**
- **Pedal back abutment**
- **Circuit Pressurization**
- **MS Port**
- **MS + LS Port**

---

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The Poclain Hydraulics VB-220 braking assembly contains the following components in a single manifold:
- A dual-circuit accumulator charging valve,
- A mechanically controlled dual-circuit service brake valve,
- Two isolating valves for the braking circuits.

The output pressures (at F1 and F2), for the braking circuits, can be equal or different according to a ratio $F2/F1 = 0.64$ (VB-2E0) or 0.44 (VB-2F0).

The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).

Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on. The service brake valve is a mechanically-controlled, three-way, graduated release dual pressure reducing valve. It is used for the precision dosing of the output pressures (at F1 and F2) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest ('up' position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T).

When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressure of the valve irrespective of the supply pressure. When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator.
Overall dimensions of VB-220 (45 l/min) brake valve

Connections

<table>
<thead>
<tr>
<th>Connection</th>
<th>Function</th>
<th>Max. pressure bar [psi]</th>
<th>Loss of head (3) bar [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Input</td>
<td>210 [3 046]</td>
<td>6 [132]</td>
</tr>
<tr>
<td>S</td>
<td>Cut-out pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Tank</td>
<td>1 [14.5]</td>
<td>10 [145]</td>
</tr>
<tr>
<td>F1 - F2</td>
<td>Service braking</td>
<td>120 [1 740] (2)</td>
<td></td>
</tr>
<tr>
<td>A1 - A2</td>
<td>Service braking accumulator</td>
<td>M14 x 1.5</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Parking brake connection</td>
<td>68 [1 012]</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>Accumulator min. pressure switch</td>
<td>1/4 BSPP</td>
<td></td>
</tr>
<tr>
<td>MF1</td>
<td>Service pressure switch</td>
<td>M10 x 1</td>
<td></td>
</tr>
<tr>
<td>MF2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS*</td>
<td>Load sensing</td>
<td>M14 x 1.5</td>
<td></td>
</tr>
<tr>
<td>MS*</td>
<td>MS pressure switch</td>
<td>M12 x 1.5</td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulator.
(2) Higher pressure: contact us
(3) Loss of head (P to S) given at a flow rate (Q = 30 l/min, 8 GPM)
* Option
POCLAIN HYDRAULICS

VB-220 (45 l/min)

Mechanical Controls

Hydraulic diagram and characteristic curve

Floor cutout

Floor mount pedal

Lockable pedal

Output pressure

Angular displacement

VB220

Pedal stroke

VB2E0

VB2F0

Full power brake

Emergency / Parking brake

Service brake + inching

Steering assist brake

Accumulator charging

Options

Installation

25/09/2009
Estimated max. actuator force as a function of output pressure

\[ \text{Fa (daN)} = 0.5 \times \text{max. output pressure (bar)} + 35 \]
\[ \text{Fb (daN)} = \frac{\text{Fa}}{5} \]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
<th>P</th>
<th>Q</th>
<th>C</th>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>B</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Control

- Without pedal: 0
- Floor mount pedal: Smooth A, Aluminum non-slip B, Rubber non-slip C
- Lockable pedal: Smooth D, Aluminum non-slip E, Rubber non-slip F

Pressure switch (Max. 42 V)

- Without: 0
- On MA (accumulator min. pressure): 1
- On MF (“Stop” light): 2
- On MS (auxiliary): 3
- On MX (parking brake): 4
- On MA and MF: 5
- On MA and MS: 6
- On MA, MF and MS: 7

Electrical connection

- Without: 0
- AMP (6.3 x 0.8): 5

Hydraulic connection

- ISO 9974-1 (metric fittings): 4
- ISO 11926-1 (SAE J514 fittings with O-ring): A

Options (See page 71)

- Special calibration*: 1
- Special port*: 2
- Non-standard component*: 3
- Mechanical control adapter*: 4
- LS Port: 5
- Isolating ball valves: 6
- Dual-slope spring mechanism*: 7
- Pressure sensor: 8
- Pedal back abutment: 9
- Circuit Pressurization*: B
- MS Port: C
- MS + LS Port: D

* Please ask us

For other operating pressures, please consult your Poclain Hydraulics Sales Engineer.
Applications
The Poclain Hydraulics VB-220 braking assembly contains the following components in a single manifold:
• A dual-circuit accumulator charging valve,
• A mechanically controlled dual-circuit service brake valve,
• Two isolating valves for the braking circuits.
The output pressures (at F1 and F2), for the braking circuits, can be equal or different according to a ratio F2/F1 = 0.64 (VB-2E0) or 0.44 (VB-2F0).

The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).
Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on.

The service brake valve is a mechanically-controlled, three-way, graduated release dual pressure reducing valve. It is used for the precision dosing of the output pressures (at F1 and F2) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest (‘up’ position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T).
When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressure of the valve irrespective of the supply pressure. When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator.
Overall dimensions of VB-220 (120 l/min) brake valve

Connections

<table>
<thead>
<tr>
<th>Max. pressure</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 210 [3046]</td>
<td>M18 x 1.5</td>
<td>Input</td>
<td>6 [13.2]</td>
</tr>
<tr>
<td>S 1 [14.5]</td>
<td>M14 x 1.5</td>
<td>Auxiliary circuit</td>
<td>4 [58]</td>
</tr>
<tr>
<td>T 120 [1740]</td>
<td>M14 x 1.5</td>
<td>Service braking</td>
<td></td>
</tr>
<tr>
<td>F1 - F2</td>
<td>9/16 - 18 UNF</td>
<td>Parking brake connection</td>
<td></td>
</tr>
<tr>
<td>A1 - A2</td>
<td>M12 x 1.5 (VB2F0)</td>
<td>Service braking accumulator</td>
<td></td>
</tr>
<tr>
<td>B3*</td>
<td>1/4 BSPP</td>
<td>Accumulator min. pressure switch</td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td>M10 x 1</td>
<td>Service pressure switch</td>
<td></td>
</tr>
<tr>
<td>MF1*</td>
<td>M10 x 1</td>
<td>Service pressure switch</td>
<td></td>
</tr>
<tr>
<td>MF2*</td>
<td>M14 x 1 (VB220)</td>
<td>Service pressure switch</td>
<td></td>
</tr>
<tr>
<td>LS*</td>
<td>M14 x 1.5</td>
<td>Load sensing</td>
<td></td>
</tr>
<tr>
<td>MS*</td>
<td>M12 x 1.5</td>
<td>MS pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulator.
(2) Higher pressure: contact us.
(3) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)
*Option
Mechanical Controls

Floor mount pedal

Hydraulic diagram and characteristic curves
Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa)
- Force on pedal (Fb)

\[
\begin{align*}
Fa (daN) & = 0.5 \times \text{max. output pressure (bar)} + 35 \\
Fb (daN) & = \frac{Fa}{5}
\end{align*}
\]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

Cut-in/Cut-out range

- 110 - 130 bar [1595 - 1885 PSI] 3
- 120 - 140 bar [1740 - 2031 PSI] 4
- 135 - 160 bar [1958 - 2321 PSI] 5
- 160 - 190 bar [2321 - 2756 PSI] 6
- 170 - 200 bar [2466 - 2901 PSI] 7
- 180 - 210 bar [2611 - 3046 PSI] 8

Operating pressure

- 30 bar [435 PSI] 3
- 40 bar [580 PSI] 4
- 60 bar [870 PSI] 5
- 80 bar [1160 PSI] 6
- 100 bar [1450 PSI] 7
- 120 bar [1740 PSI] 8

Flow rate to auxiliaries (P to S)

- 120 l/min [32 GPM] 6

Flow rate to accumulator (P to A)

- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

Control

- Without pedal
- Smooth
- Floor mount pedal
- Aluminum non-slip
- Rubber non-slip

Pressure switch (Max. 42 V)

- Without
- On MA (accumulator min. pressure)
- On MF ("Stop" light)
- On MS (auxiliary)
- On MX (parking brake)
- On MA and MF
- On MA and MS
- On MA, MF and MS

Electrical connection

- Without
- AMP (6.3 x 0.8)

Hydraulic connection

- ISO 9974-1 (metric fittings)
- ISO11926-1 (SAE J514 fittings with O-rings)

Options (See page 71)

- Special calibration
- Special port
- Non-standard component
- Mechanical control adapter
- LS Port
- Dual-slope spring mechanism
- Pressure sensor
- Pedal back abutment
- Circuit Pressurization
- MS Port
- MS + LS Port

* Please ask us
Applications
The Poclain Hydraulics VB-22E braking assembly contains the following components in a single manifold:
• A dual-circuit accumulator charging valve,
• A mechanically controlled dual-circuit service brake valve,
• An electrically controlled parking brake valve,
• Two isolating valves for the braking circuits.
The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

Operation
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulators. When the accumulators reach maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).
Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached in at least one accumulator, the valve recharges the accumulators to cut-out pressure, and so on.
The service brake valve is a mechanically-controlled, three-way, graduated release dual pressure reducing valve. It is used for the precision dosing of the output pressures (at F1 and F2) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest ('up' position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T). When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressure of the valve irrespective of the supply pressure.
When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator. The parking brake valve has on/off solenoid control.
**Overall dimensions of VB-22E (45 l/min) brake valve**

![Diagram of VB-22E brake valve]

**Connections**

<table>
<thead>
<tr>
<th>Max. pressure</th>
<th>Connection</th>
<th>Function</th>
<th>Loss of head (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 210 [3046]</td>
<td>M18 x 1.5</td>
<td>Input</td>
<td>8 [17.6]</td>
</tr>
<tr>
<td>S Cut-out pressure</td>
<td>M14 x 1.5</td>
<td>Auxiliary circuit</td>
<td>10 [145]</td>
</tr>
<tr>
<td>T 1 [14.5]</td>
<td></td>
<td>Tank</td>
<td></td>
</tr>
<tr>
<td>F1 - F2 120 [1740] (2)</td>
<td>M14 x 1.5</td>
<td>Service braking</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>M14 x 1.5</td>
<td>Parking brake</td>
<td></td>
</tr>
<tr>
<td>A1 - A2 Cut-out pressure</td>
<td>M14 x 1.5</td>
<td>Service braking accumulator</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>1/4 BSPP</td>
<td>Parking brake connection</td>
<td></td>
</tr>
<tr>
<td>MA* 1/4 BSPP</td>
<td>M10 x 1</td>
<td>Accumulator min. pressure switch</td>
<td></td>
</tr>
<tr>
<td>MF2*</td>
<td>M14 x 1.5</td>
<td>Service brake pressure switch</td>
<td></td>
</tr>
<tr>
<td>MX* 1/4 BSPP</td>
<td></td>
<td>Parking brake pressure switch</td>
<td></td>
</tr>
<tr>
<td>LS* M14 x 1.5</td>
<td></td>
<td>Load sensing</td>
<td></td>
</tr>
<tr>
<td>MS* M12 x 1.5</td>
<td></td>
<td>MS pressure switch</td>
<td></td>
</tr>
</tbody>
</table>

(1) Or max. allowable pressure for the accumulator.
(2) Higher pressure: contact us.
(3) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)
*Option

---

**Footnotes**

- Or max. allowable pressure for the accumulator.
- Higher pressure: contact us.
- Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)

---

*Option
POCLAIN HYDRAULICS VB-22E (45 l/min)

Mechanical Controls

Hydraulic diagram and characteristic curve
Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa)
- Force on pedal (Fb)

\[
Fa (\text{daN}) = 0.5 \times \text{max. output pressure (bar)} + 35 \\
Fb (\text{daN}) = 5 \times Fa
\]

To obtain the forces in lbf, convert the final result.

For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics Application Engineer.

Model Code

<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
<th>P</th>
<th>Q</th>
<th>C</th>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>B</td>
<td>2</td>
<td>2</td>
<td>E</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Cut-in/Cut-out range

- 110 - 130 bar [1595 - 1885 PSI] 3
- 120 - 140 bar [1740 - 2031 PSI] 4
- 135 - 160 bar [1968 - 2321 PSI] 5
- 160 - 190 bar [2321 - 2756 PSI] 6
- 170 - 200 bar [2466 - 2901 PSI] 7
- 180 - 210 bar [2611 - 3056 PSI] 8

Operating pressure

- 30 bar [435 PSI] 3
- 40 bar [580 PSI] 4
- 60 bar [870 PSI] 5
- 80 bar [1160 PSI] 6
- 100 bar [1450 PSI] 7
- 120 bar [1740 PSI] 8

Parking brake pressure

- \( P_3 = P_1 \)

Flow rate to auxiliaries (P to S)

- 45 l/min [12 GPM]

Flow rate to accumulator (P to A)

- 2.75 l/min [0.73 GPM] 1
- 8 l/min [2.11 GPM] 2
- 15 l/min [3.96 GPM] 3

Control

- Without pedal or lever 0
- Floor mount pedal
  - Smooth A
  - Aluminum non-slip B
  - Rubber non-slip C
- Lockable pedal
  - Smooth D
  - Aluminum non-slip E
  - Rubber non-slip F

Pressure switch (Max. 42 V)

- Without 0
- On MA (accumulator min. pressure) 1
- On MF (service brake) 2
- On MS (auxiliary) 3
- On MX (parking brake) 4
- On MA and MF 5
- On MA and MS 6
- On MA, MF and MS 7
- On MA, MF and MX 8
- On MA, MF, MS and MX 9

Electrical connection (solenoid valve)

- Bare wires 1
- Packard 2
- Deutsch 3
- Hirschmann 4
- AMP 5

Electrical connection (solenoid valve)

- 12 V CC 1
- 24 V CC 2

Hydraulic connection

- ISO 9974-1 (metric fittings) 4
- ISO11926-1 (SAE J514 fittings with O-rings) A

Options (See page 71)

- Special calibration* 1
- Special port* 2
- Non-standard component* 3
- Mechanical control adapter* 4
- LS Port 5
- Isolating ball valves 6
- Two-slope spring mechanism* 7
- Pressure sensor 8
- Pedal back abutment 9
- Circuit Pressurization* B
- MS Port C
- MS + LS Port D

* Please ask us
**OPTIONS**

1. **Special calibration**
   Pressure (braking, pressure switch, etc.) or specific flow rate.

2. **Special port**
   Without changing the standard of the other ports.

3. **Non-standard component**
   Installation of a non-standard component (potentiometric sensor, special pressure switch, etc.)

4. **Mechanical control adapter**

5. **LS Port**
   The Load Sensing port (M14 x 1.5 or 9/16" - 18 UNF) is created on request on the standard valve body.

6. **Isolating ball valves**
   In the event of failure of one of the braking circuits, this function acts in a similar way to isolating spool valves by keeping an energy reserve in the accumulator of the non-faulty circuit (limited reserve in the accumulator) and does not maintain pressure in the S line when a circuit has failed (if the steering is fed by the S port of the valve, choose spool valves).

Example of a VB-200 assembly:

7. **Two-slope spring mechanism**
   For certain applications, the braking sensation, the ergonomics of the pedal board, and the overall behavior of the braked vehicle require a special braking curve. The first part, with its gradual slope, provides gentle, progressive braking to slow the vehicle. The second part, with a steeper slope, provides a braking finish that is progressive but firmer, for emergency braking. According to the shape of the pedal, the user's impression can be similar to a master cylinder. Please ask us about the available pressures.

8. **Pressure sensor**
   The sensor (refer to mobile electronics catalog No. A01888C) is installed on the MF port (single-circuit valves) or the MF1 port (dual-circuit valve). It sends a pressure signal to the electronic circuit in the form of an electrical signal that is proportional to the pressure. It can also replace the MF pressure switch in its stop light control function.
9 Pedal back abutment
Prevents the pedal from tilting backward when the floor is inclined.

A Improved watertightness
There is a version of the spring mechanism with internal drainage via the brake tank return line for applications in harsh conditions (high humidity, exposed valve, etc.). It is mandatory for open-cabin applications.

Please use extreme care when washing the Brake Valve with a High-Pressure Cleaner. We recommend staying at least 40 cm away from the bonnet of the Brake Valve to avoid water infiltration in the valve.

B Circuit Pressurization

C MS Port
The MS port (12 x 1.5) is added on request to the standard valve body. It is normally used for the installation of the MS pressure switch.

D MS + LS Port
See Options 5 and C.

E N S W Orientation of the mechanical control with respect to the ports

E: Ports oriented to the right (East)
N: Ports oriented to the front (North)
S: Ports oriented to the back (South)
W: Ports oriented to the left (West).

The installation orientation is defined by the relative position of the valve ports with respect to the conventional direction of operation of a classic vehicle, assuming that the mechanical controls are oriented as follows when idle:

Pedal: Top of pedal towards the front of the vehicle
Horizontal lever: Button towards the front of the vehicle
Vertical lever: Ball towards the front of the vehicle.
POCLAIN HYDRAULICS

INSTALLATION

Warnings

Before Installation

Take all necessary safety precautions (people and machines) and comply with safety regulations in effect.

Confirm that mobile equipment is immobilized.

Confirm that the hydraulic system’s energy generator (motor) is stopped and electrical power is disconnected.

Lay out a safety perimeter.

Do not perform work on a hydraulic system that is hot or under pressure (discharge the accumulators).

Oil that is hot or under pressure can cause serious burns and infection. Consult a physician in case of accident.

Never heat hydraulic fluid which can ignite at high temperature. Some solvents are also inflammable.

Do not smoke while working on the system.

The valves are intended to operate in closed cabins. For applications in harsh conditions (severe weather, marine environment, etc.), please consult your Poclain Hydraulics Application Engineer.

The immediate vicinity of the machine should be declared a security zone. Observe all regulations regarding personnel safety.
General Information

Component Identification

A: Model Code:
e.g., VB-220-580-00-C4-504-0000
B: Poclain Hydraulics Catalog Number
e.g., R04943301D
C: Customer Catalog Number
(on request)
D: Serial Number WW/YY
   WW : Week of manufacture
   YY : Year of manufacture
This number is supplemented by a serial number that is marked by cold heading on the valve body.

Delivery
Valves are delivered in individual bags.

Painted black.

With protected openings (Plastic/metallic plugs or plates with joints for the flanges, sealing them).

Storage
The valves are supplied in bags. If they are to be stored, leave them in the bags. If this is not possible, the valves should be kept in a dry location and protected from dust.

Storage Interval
Depending on the interval and storage conditions, it is necessary to protect the internal components of the hydraulic parts. These operations must be performed before storing components or before stopping use of the machine.

<table>
<thead>
<tr>
<th>Climate</th>
<th>Storage interval (months)</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperate</td>
<td></td>
<td>A - No specific precaution; only check the proper mounting of the plugs and covers.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>B - Fill up with hydraulic fluid</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>C - Rinse with storage fluid</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>D - Fill up with storage fluid</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Tropical</td>
<td></td>
<td>A - No specific precaution; only check the proper mounting of the plugs and covers.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>B - Fill up with hydraulic fluid</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>C - Rinse with storage fluid</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>D - Fill up with storage fluid</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

Storage areas must not be open (without a roof). The valves must not be laid on the ground.

Paint
- Use paints compatible with the existing base coat.
- The Poclain Hydraulics components (like any mechanical component) can rust. They must be effectively and regularly protected according to the environment where they are used. During installation, any trace of rust must be eliminated before painting the machine.

Primer Specifications

<table>
<thead>
<tr>
<th>Number</th>
<th>Color</th>
<th>Brilliance</th>
<th>Saline mist</th>
<th>Adhesion</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAL 9005</td>
<td>Black</td>
<td>40%</td>
<td>&gt; 400 h</td>
<td>0</td>
<td>HB</td>
</tr>
</tbody>
</table>

These specifications vary with the supplier, but meet these minima. For more information, consult your Poclain Hydraulic’s application engineer.
Circuits

Checking Connections

Piping and Connections
The different components of the hydraulic circuit (tank, pumps, distributors, filters, sinks, etc.) are connected together by rigid piping or flexible hoses.

Suggested connection: Screwed Connections

Comply with the connection directions given by the manufacturers for each part: function and marking of the ports, types of connections, diameters, types of lines (flexible or rigid), etc.

Rigid Tubes
For high-pressure pipes, only use unwelded cold-drawn steel pipes.

Take the following precautions for making up the tubes:
• After cutting to length, cold bending and crimping, the tubes must be carefully deburred, rinsed with oil and blown before connection.
• After welding or bending, the tubes must be etched (solution based on sulfuric acid) then rinsed with oil and neutralized (solution based on sodium hydroxide).
• The connections, threaded plugs, etc. must be deburred and cleaned before assembly.
• If assembly is not done immediately, seal the ports with plugs.

Flexible Tubes
Only use flexible tubes with crimped ends.

Avoid contacts likely to break down the flexible tubes. As needed protect them with armor.

Avoid kinks. Observe the minimum radius of curvature.

The tube’s interior diameter must be greater than or equal to the diameter of the connection openings of the components.

Connection

Check the compatibility of the types of connections between the tubes and the motor’s ports. If they are not compatible, use adapter fittings.

Ensure that the class of fitting is suitable for the operating pressure.
Bleed
To bleed your braking system, refer to the brake manufacturer's recommendations.

Rinse the brakes pilot circuit before connection.

Oils
Fluid Selection

General Recommendations
Poclain Hydraulics recommends the use of hydraulic fluids defined by the ISO 12922 and ISO 6743-4 standards. For temperate climates, the following types are recommended:
- HM 46 or HM 48 for fixed installations.
- HV 46 or HV 68 for mobile installations.
- HEES 46 for mobile installations.

These specifications correspond to category 91H of the CETOP standard, parts 1, 2 and 3 of the DIN 51524 standard, and grades VG32, VG 46 and VG68 of the ISO 6743-4 standards.

It is also possible to use ATF, HD, HFB, HFC or HFD type hydraulic fluid upon Poclain Hydraulics specific approval of the components' operating conditions.

Standardized designations for the fluids
- **HM**: Mineral fluids having specific antioxidant, anticorrosion and antiwear properties (HLP equivalent to DIN 51524 parts 1 and 2).
- **HV**: HM mineral fluids providing improved temperature and viscosity properties (DIN 51524 part 3).
- **HEES**: Biodegradable fluids based on organic esters.

Class 32 (ISO VG 32): Viscosity of 32 cSt at 40°C.
Class 46 (ISO VG 46): Viscosity of 46 cSt at 40°C.
Class 68 (ISO VG 68): Viscosity of 68 cSt at 40°C.

Viscosity must always be between 9 and 500 cSt. If not, check the appropriateness of the cooling circuit, the design, or the grade of oil.

For all applications outside these limits, please consult your Poclain Hydraulics Application Engineer.
Extract of the NF ISO 11 158 Standard

<table>
<thead>
<tr>
<th>HM Category</th>
<th>Viscosity Grade</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematic viscosity at 40°</td>
<td>ISO 3104</td>
<td>19.8 24.2 28.8 to 35.2 41.4 50.6 61.2 to 74.8 90 110</td>
</tr>
<tr>
<td>Minimum viscosity index (a)</td>
<td>ISO 2909</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Acidity index, maximum (b)</td>
<td>ISO 6618</td>
<td>(c) (c) (c) (c) (c) (c)</td>
</tr>
<tr>
<td>Water content, maximum</td>
<td>ASTM D 1744</td>
<td>500</td>
</tr>
<tr>
<td>Flash point</td>
<td>Cleveland in open-cup, min.</td>
<td>ISO 2592</td>
</tr>
<tr>
<td>Foaming at 24°C, max.</td>
<td>ISO 6247</td>
<td>150/0 75/0 150/0 75/0 150/0 75/0 150/0 75/0</td>
</tr>
<tr>
<td>Deaeration at 50°C, maximum</td>
<td>ISO 9120</td>
<td>5 5 10 13 21</td>
</tr>
<tr>
<td>Copper blade corrosion at 100°C, 3 h maximum</td>
<td>ISO 2160</td>
<td>2 2 2 2 2</td>
</tr>
<tr>
<td>Anti-rust power, method A</td>
<td>ISO 7120</td>
<td>Pass Pass Pass Pass Pass</td>
</tr>
<tr>
<td>Anti-wear property, FZG A/8, 3/90, minimum</td>
<td>DIN 51354-2</td>
<td>(e) 10 10 10 10</td>
</tr>
<tr>
<td>Flow point, maximum</td>
<td>ISO 3016</td>
<td>-18 -15 -12 -12 -12</td>
</tr>
<tr>
<td>Aptitude to separate from water:</td>
<td>ISO 6614</td>
<td>30 30 30 30 30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HV Category</th>
<th>Viscosity Grade</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematic viscosity at 40°</td>
<td>ISO 3104</td>
<td>19.8 24.2 28.8 to 35.2 41.4 50.6 61.2 to 74.8 90 110</td>
</tr>
<tr>
<td>Minimum viscosity index (a)</td>
<td>ISO 2909</td>
<td>130 130 130 130 130 130</td>
</tr>
<tr>
<td>Acidity index, maximum (b)</td>
<td>ISO 6618</td>
<td>(c) (c) (c) (c) (c) (c)</td>
</tr>
<tr>
<td>Water content, maximum</td>
<td>ASTM D 1744</td>
<td>500</td>
</tr>
<tr>
<td>Flash point</td>
<td>Cleveland in open-cup, min.</td>
<td>ISO 2592</td>
</tr>
<tr>
<td>Foaming at 24°C, max.</td>
<td>ISO 6247</td>
<td>150/0 75/0 150/0 75/0 150/0 75/0 150/0 75/0</td>
</tr>
<tr>
<td>Deaeration at 50°C, maximum</td>
<td>ISO 9120</td>
<td>7 7 12 12 20</td>
</tr>
<tr>
<td>Copper blade corrosion at 100°C, 3 h maximum</td>
<td>ISO 2160</td>
<td>2 2 2 2 2</td>
</tr>
<tr>
<td>Anti-rust power, method A</td>
<td>ISO 7120</td>
<td>Pass Pass Pass Pass Pass</td>
</tr>
<tr>
<td>Anti-wear property, FZG A/8, 3/90, minimum</td>
<td>DIN 51354-2</td>
<td>(e) 10 10 10 10</td>
</tr>
<tr>
<td>Flow point, maximum</td>
<td>ISO 3016</td>
<td>-42 -36 -36 -30 -21</td>
</tr>
<tr>
<td>Aptitude to separate from water:</td>
<td>ISO 6614</td>
<td>(c) (c) (c) (c) (c)</td>
</tr>
</tbody>
</table>

(a) These limits should only be taken into consideration for fluids made from hydrocracked or hydro-isomerized mineral oils.
(b) Both base fluids and additives contribute to the initial acidity index.
(c) The behavior criteria or the values of properties must be the subject of negotiation between the supplier and the end user.
(d) The DIN 51777-2 standard applies in cases where interference caused by certain chemical compounds must be avoided. Free bases, oxidizing or reducing agents, mercaptans, some nitrogenous products or other products that react with iodine interfere.
(e) Not applicable to ISO 22 viscosity grade.
Extract of the ISO 15 380 Standard

<table>
<thead>
<tr>
<th>Tests</th>
<th>Test Methods or Standards</th>
<th>HM Category</th>
<th>HV Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Viscosity Grade</td>
<td>Units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Kinematic viscosity at 40°C</td>
<td>ISO 3104</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minimum viscosity index (a)</td>
<td>ISO 2909</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acidity index, maximum (b)</td>
<td>ISO 6618</td>
<td>(c)</td>
<td>(c)</td>
</tr>
<tr>
<td>Water content, maximum</td>
<td>ASTM D 1744 DIN 51777-1</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Flash point, Cleveland in open-cup, min., 93°C max.</td>
<td>ISO 2592 DIN 51777-2</td>
<td>165</td>
<td>175</td>
</tr>
<tr>
<td>Foaming at 24°C, max.</td>
<td>ISO 6247</td>
<td>750/750</td>
<td>750/750</td>
</tr>
<tr>
<td>Deaeration at 50°C, maximum</td>
<td>ISO 9120</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Copper blade corrosion at 100°C, 3 h maximum</td>
<td>ISO 2160</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Anti-rust power, method A</td>
<td>ISO 7120</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Anti-wear property, FZG A/8, 3/90, minimum</td>
<td>DIN 51354-2</td>
<td>(e)</td>
<td>10</td>
</tr>
<tr>
<td>Flow point, maximum</td>
<td>ISO 3016</td>
<td>-21</td>
<td>-18</td>
</tr>
<tr>
<td>Aptitude to separate from water:</td>
<td>ISO 6614</td>
<td>(c)</td>
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</tbody>
</table>

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(e) Not applicable to ISO 22 viscosity grade.

Temperature and Viscosity

The best performance is obtained by having the system operate in the regimes shaded gray.
Zone A
Zone of maximum efficiency.
In this zone, temperature variations have a weak effect on the response time, efficiency and life expectancy of the components.
Poclain Hydraulics components can operate at all speeds, pressures and powers specified in their technical documentation.

Zone B
High speeds can lead to vibrations and drops in mechanical efficiency. The booster pump can cavitate if the intake conditions are too tight but without risk for the system as long as the pump remains boosted.
The Poclain Hydraulics components can operate at the pressures specified in their documentation but it is not advisable to use the pumps at full displacement.
In a translation circuit, a rapid rise in the pump speed from zone B is allowed, but ordering the translation when the temperature has reached zone A is recommended.

Zone C
The efficiency is less and the use of effective antiwear additives is required.
The Poclain hydraulics components can temporarily operate at a power under 20 to 50% of that stated in the technical documentation, or during 20% of the operating time at the stated power.

Zone D
The stated restrictions for zone B likewise apply to zone D.
Further, the pumps must startup at low speed and no displacement. They must not be used in their normal operating conditions as long as the booster pressure has not stabilized and the hydraulic fluid temperature in the reservoir has not come up to zone B.

Zone E
The efficiency is reduced and the risk of wear on the pump and hydraulic fluid is increased.
The system can operate in zone E at low-pressure and during short periods.
The temperature of the hydraulic fluid in the power circuit must not be more than 10°C above the temperature of the hydraulic fluid in the reservoir, and must not be more than 20°C warmer than the hydraulic fluid in the components’ cases.
Water Content
The ISO 12922 standard calls for a water content $\leq 0.05\%$.
Poclain Hydraulics components tolerate up to 0.1%.

Checking Water Content

Visual Inspection
• The oil appears cloudy once it has a water concentration greater than or equal to 1%.

We suggest two possible verification methods:

1- Quick Elementary Check

• The "crackle test."

<table>
<thead>
<tr>
<th>Step</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Make a small cup using household aluminum foil.</td>
<td>Put a drop of oil to test in the bottom of the cup.</td>
<td>Heat it by placing it over a flame using tongs.</td>
</tr>
</tbody>
</table>

Step 4

If bubbles appear, the water content of the fluid exceeds 0.05%.

If bubbles do not appear, the water content in the fluid is less than 0.05%.

2- Laboratory analysis
To determine the exact water content of the fluid, we recommend a laboratory analysis.

Poclain Hydraulics performs laboratory analyses of water content in fluids. Contact us for further information.

Decontamination and Filtration

The life of hydraulic components is lengthened when the contamination level is low.
The hydraulic fluid must be maintained at ISO standard 4406-1999 decontamination level 18/16/13 (class 7 from NAS 1638) using a filter.

Braking circuit example:

Consult manufacturer’s instructions for components (filters, pumps, valves, etc.).

The recommended intake filter size is four-time state of the booster pump.

New fluid is generally of lower quality than our requirements. Poclain Hydraulics asks its customers to fill or adjust the levels in the reservoirs in a clean environment using a pump and filter.

Return line
It is ESSENTIAL to connect the valve return line directly to the tank.

Any counterpressure on the return line can cause premature brake wear without any use of the pedal.

Accumulators
- Select accumulators whose maximum allowable pressure is compatible with the valve pressures.
- Accumulator charging valve: any pressure on S (higher than the cut-out pressure) ends up in the accumulator(s) of the braking circuit.
Mounting

The mounting is defined for each valve type, and depends on the type of mechanical control selected.

When the valve is installed, the pedal must not be obstructed during its stroke.

The valve bodies must never touch other components (min. clearance 5 mm [0.20 in]).

Recommended screw torques:

<table>
<thead>
<tr>
<th>Screws and Bolts</th>
<th>Nominal Dimension</th>
<th>C HC</th>
<th>Normal Spaced Threads</th>
<th>Nominal Dimension</th>
<th>Connectors</th>
<th>Nominal Dimension</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8,8 N.m [lb.ft]</td>
<td>10,9 N.m [lb.ft]</td>
<td>12,9 N.m [lb.ft]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M10</td>
<td>49 [36]</td>
<td>69 [51]</td>
<td>83 [61]</td>
<td></td>
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<td></td>
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<tr>
<td>M12</td>
<td>86 [63]</td>
<td>120 [89]</td>
<td>145 [107]</td>
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<tr>
<td>M14</td>
<td>135 [100]</td>
<td>190 [140]</td>
<td>230 [170]</td>
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<tr>
<td>M18</td>
<td>290 [214]</td>
<td>405 [299]</td>
<td>485 [358]</td>
<td></td>
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<tr>
<td>M20</td>
<td>410 [303]</td>
<td>580 [428]</td>
<td>690 [509]</td>
<td></td>
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<td></td>
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<tr>
<td>M24</td>
<td>710 [524]</td>
<td>1000 [738]</td>
<td>1200 [886]</td>
<td></td>
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</tr>
</tbody>
</table>

(BP): Low Pressure
(HP): High Pressure
**Company Information**

<table>
<thead>
<tr>
<th>A1</th>
<th>Company name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contact / Title:</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>A2</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phone:</td>
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</table>

**Commercial Information**

<table>
<thead>
<tr>
<th>B1</th>
<th>Type of machine: Name / Model:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>B2</th>
<th>Estimated annual production:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>B3</th>
<th>Estimated prototype date: Estimated date of production:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>B4</th>
<th>Type of business</th>
</tr>
</thead>
</table>

**Vehicle Specification**

<table>
<thead>
<tr>
<th>C1</th>
<th>Countries of use:</th>
</tr>
</thead>
</table>

| C2 | Maximum speed (Km/h or mph): |

| C3 | Empty weight front (Kg or lbs): Max. weight front (Kg or lbs): |

**Hydraulic Brake Circuit Specification**

Please attach your hydraulic circuit diagram of the braking system and all drawings available and useful to the installation.

<table>
<thead>
<tr>
<th>D1</th>
<th>Service brake</th>
</tr>
</thead>
</table>

| D2 | Parking brake |

| D3 | Accumulator Charging Valves (ACV) |

| D4 | Pump flow (L/min or gpm): |

| D5 | Pump speed (tr/min or rpm): |

| D6 | Available pressure from pump or pump pressure relief valve (bar or psi): |

| D7 | Other components supplied by the same pump |

| D8 | Accumulator calculation requested |

| D9 | Total service brake actuation volume requirements per braked axle (cm³ or in³): |

**Remarks**

Send by fax: 33/(0)3 44 20 88 49

E-mail: valves@poclain-hydraulics.com
Thirteen subsidiaries and a worldwide network of more than 150 distributors and partners...