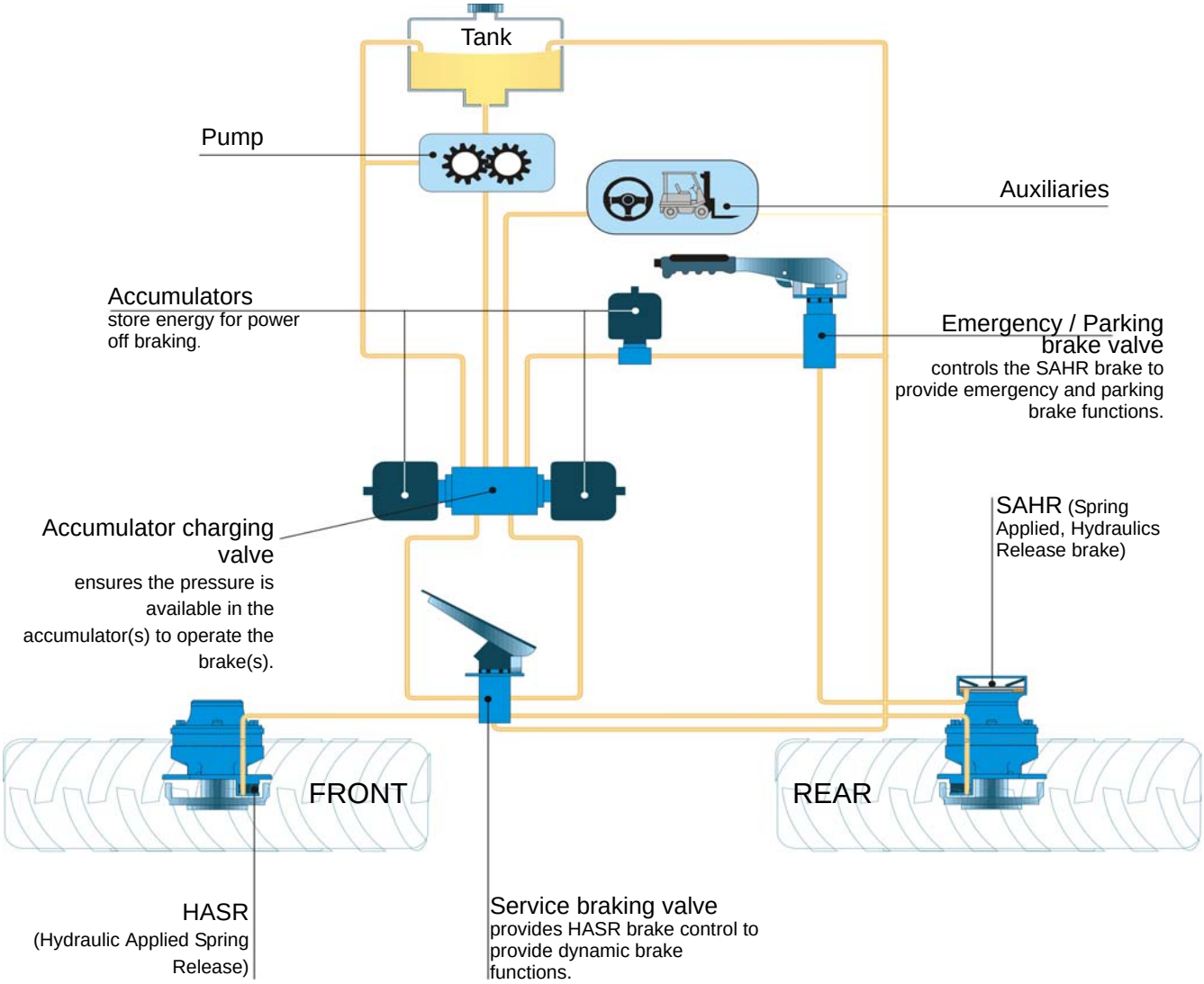
# VB
## BRAKE VALVES

TECHNICAL CATALOG

POCLAIN Hydraulics

# HYDRAULIC BRAKE SYSTEM



# CONTENTS

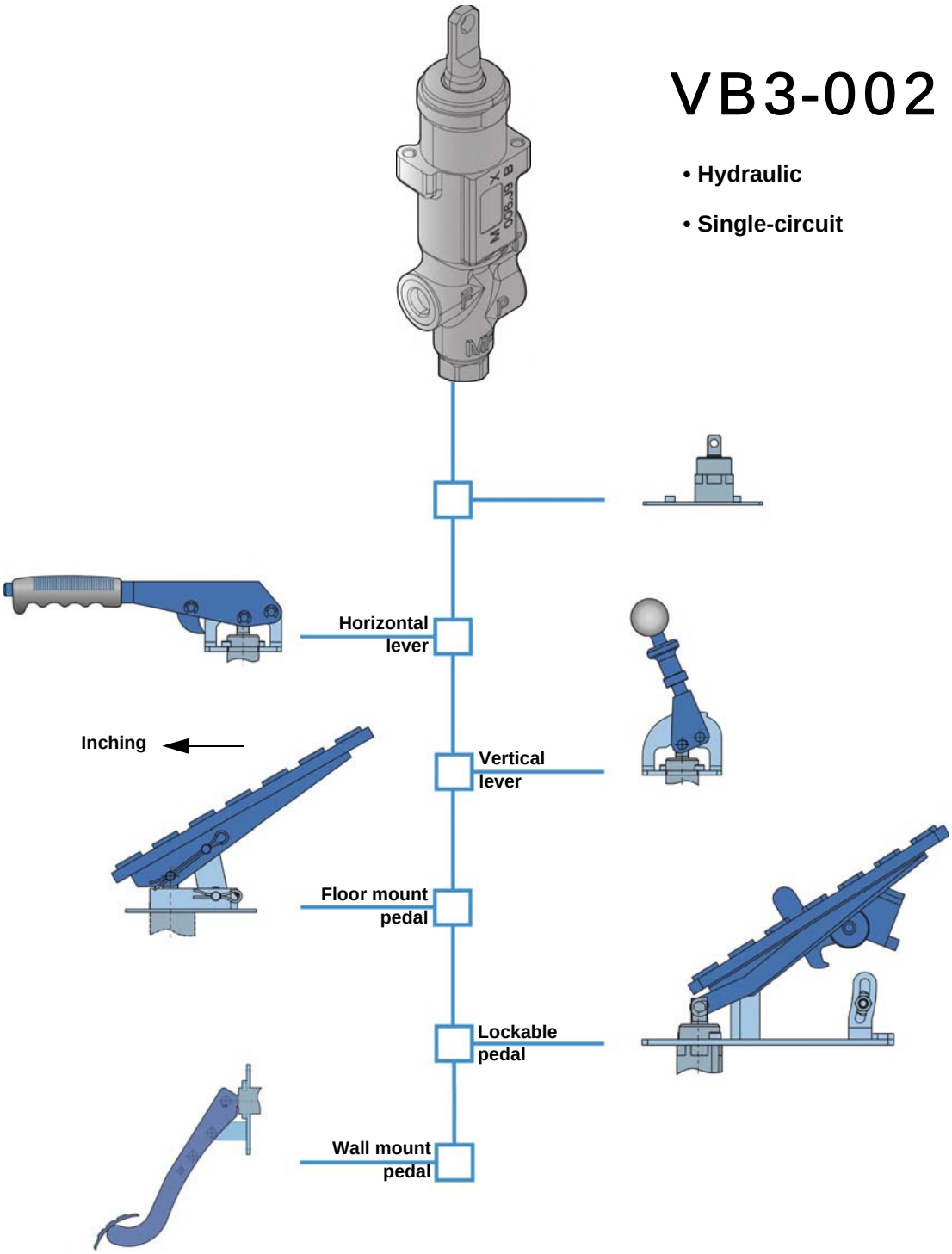
**Methodology :**
This document is intended for manufacturers of machines that incorporate Poclain Hydraulics products. It describes the technical characteristics of Poclain Hydraulics products and specifies installation conditions that will ensure optimum operation.
This document includes important 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 number.** |
|  | **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 given in brackets in italic)




**Applications**

VB3-002 reverse modulator is a mechanically-controlled, three-way, graduated release pressure reducing valve.

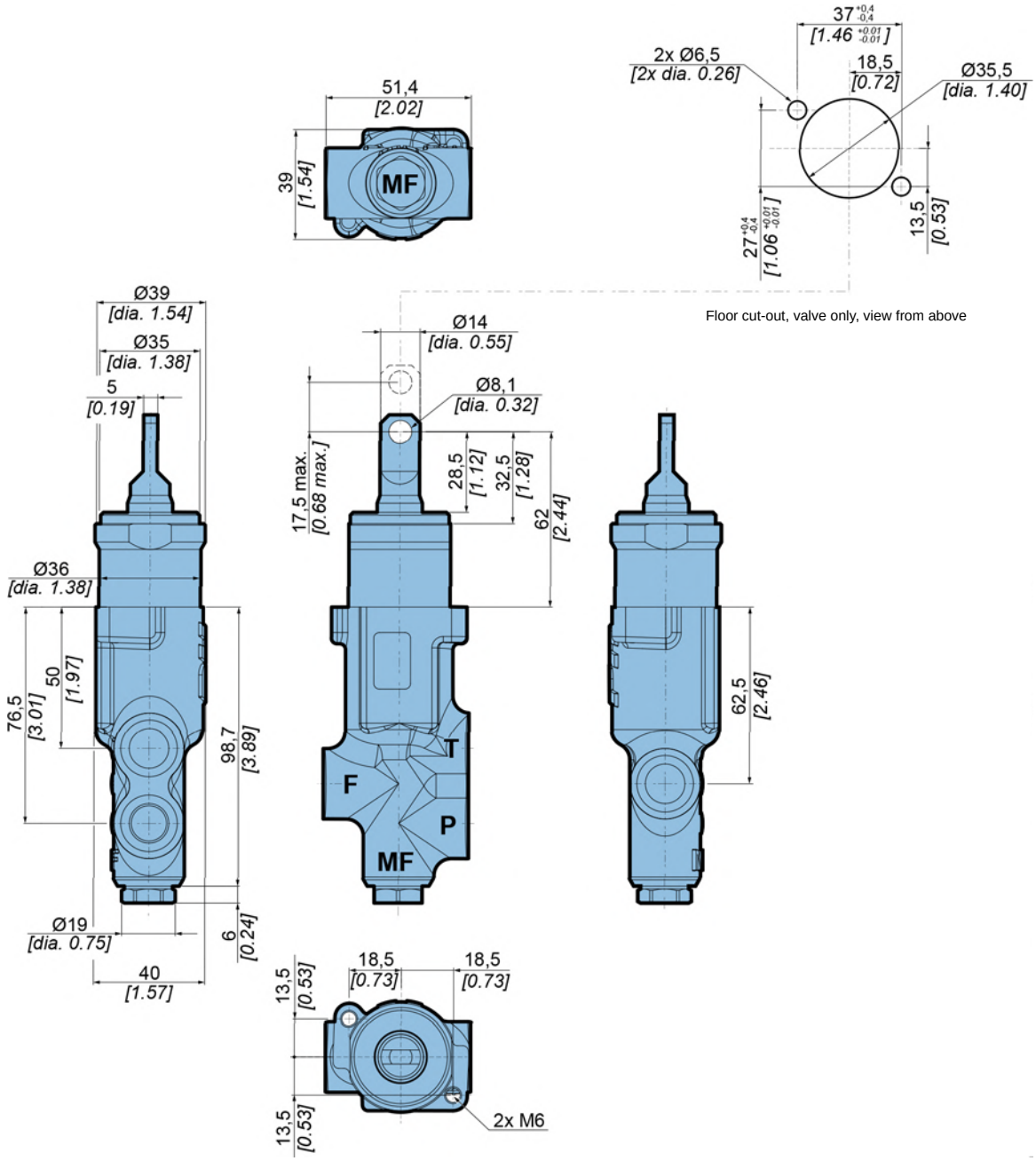
VB3-002 valve is used for precision dosing of the output pressure (at F) proportionally to the control stroke. It is controlled via lever or pedal. Lever is usually used for controling the parking brake (spring applied hydraulic release brake). Pedal is usually used for inching control.

**Operation**

When the control is idle, the output pressure (at F) is limited to the preset pressure of the valve, irrespectively of the supply pressure. When the lever or pedal is activated, the output pressure (at F) 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 F) 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 F) is zero.

## Overall dimensions of VB3-002 brake valve




## Connections

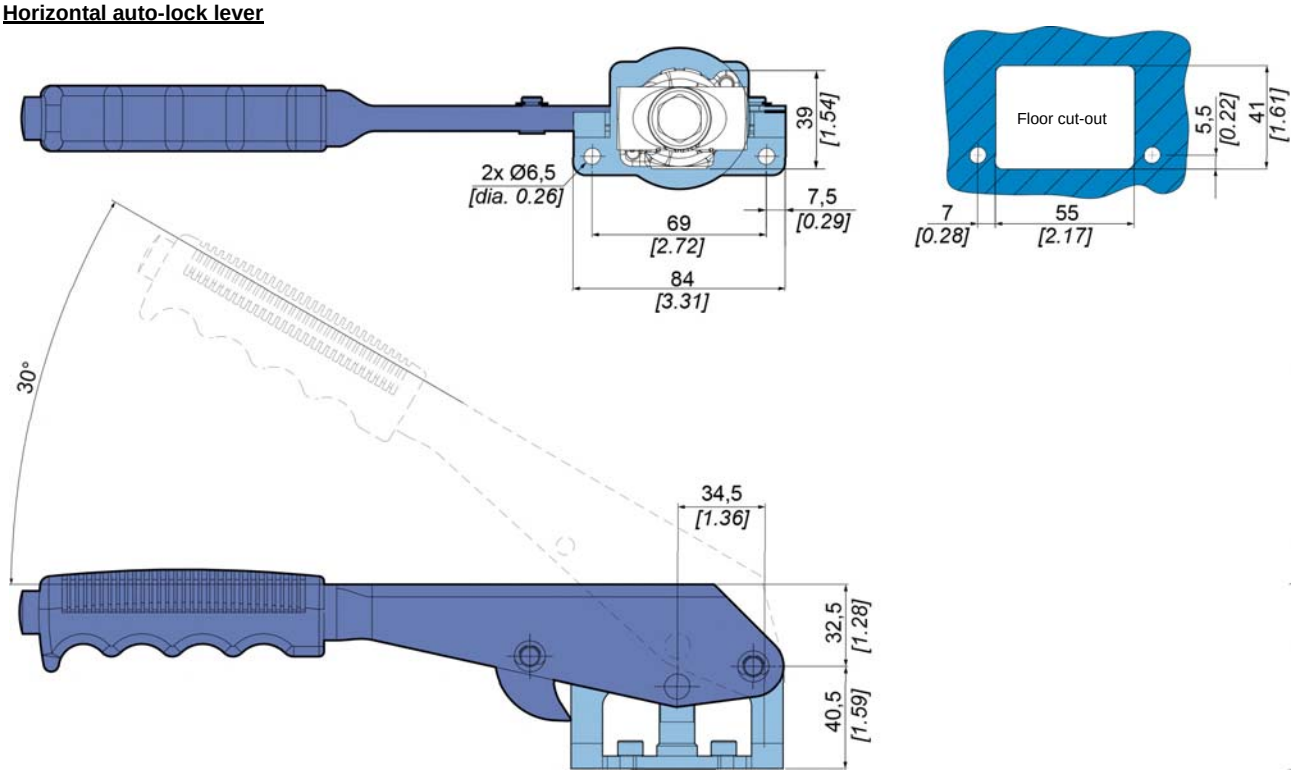
| Port | Max. pressure bar *[PSI]* | Connection ** | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5<br>9/16-18 UNF-2B<br>1/4 | Input | 0,9 *[1.98]* |
| **F** | See parking brake pressure (page 9) | | Output | |
| **T** | 1 *[14.5]* | | Tank | |
| **MF *** | | M10x1<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B | Parking brake pressure switch | |

* Option

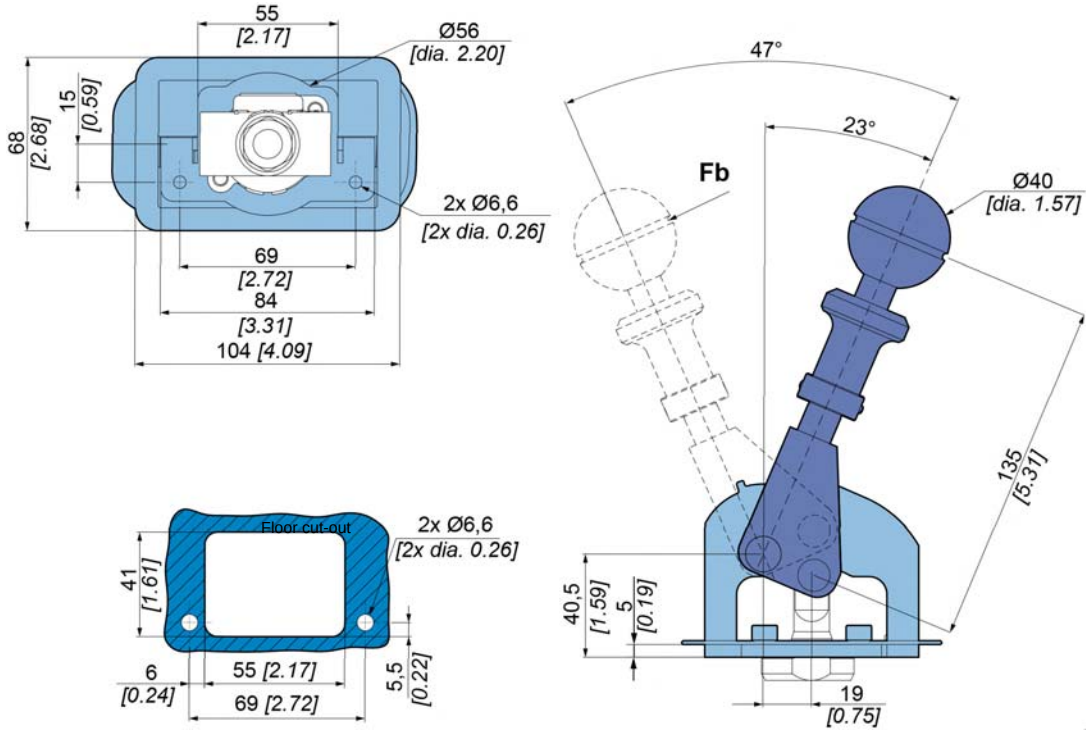
** Seat type: N (narrow) for ISO 1179-1 (BSPP + spot face » ports) and ISO 6149 (metric + cone » ports).

## Mechanical controls with standard valve orientation

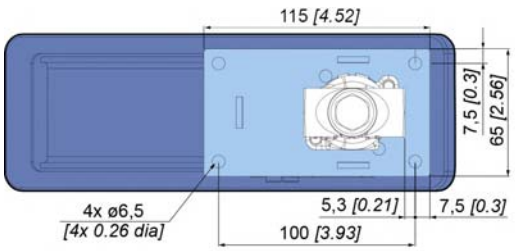
**Horizontal auto-lock lever**

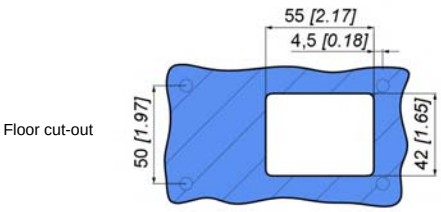


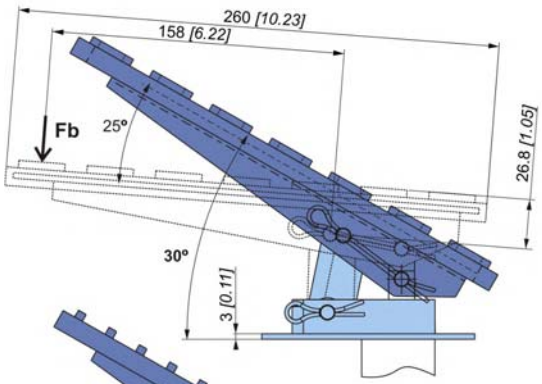

**Vertical auto-lock lever**



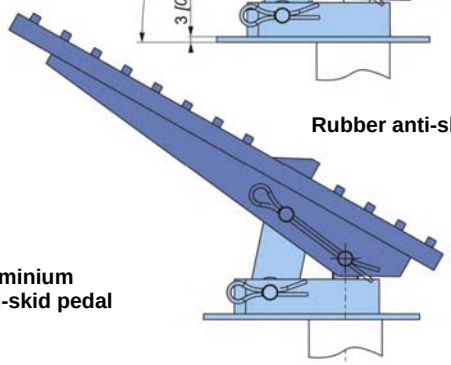
**Floor mount pedal**
**ratio = 4**



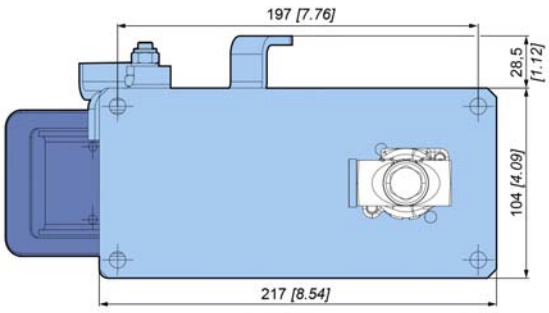



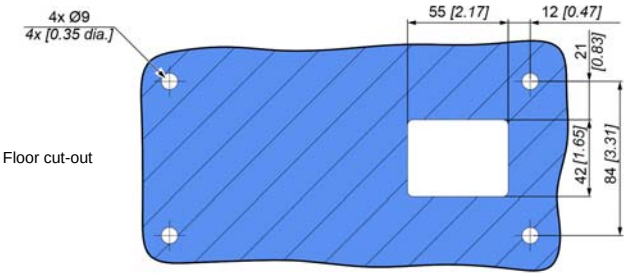

**Rubber anti-skid pedal**

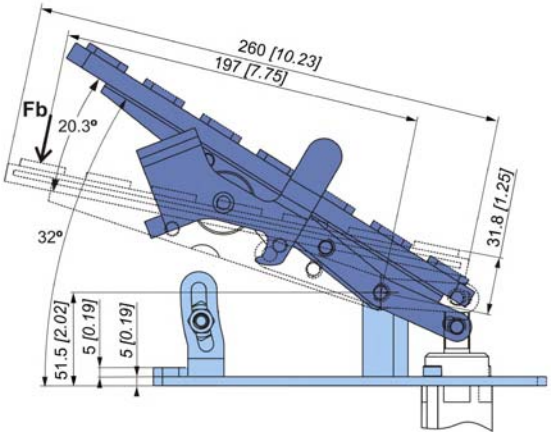


**Aluminium anti-skid pedal**

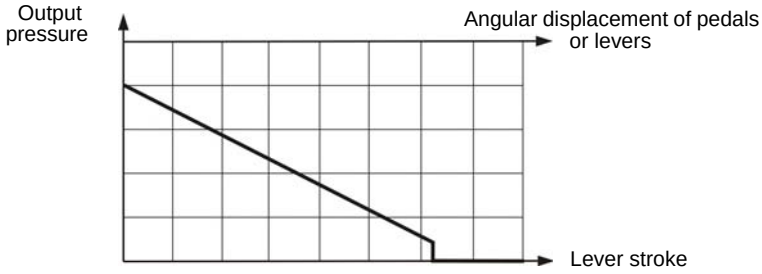
**Lockable pedal**
**ratio = 4.5**

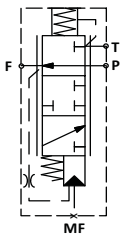



## Hydraulic diagram and characteristic curve




## Estimated maximum actuator forces

| | |
|---|---|
| • Max. traction on T-rod for valve only | : Fa ≈ 1 030 N *[299 lbf]* |
| • Floor mount pedal | : Fb ≈ Fa/5 |
| • Lockable pedal | : Fb ≈ Fa/5 |
| • Horizontal lever | : Fb ≈ Fa/8 |
| • Vertical lever | : Fb ≈ Fa/7 |

**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 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| V | B | 3 | – 0 | 0 | 2 | – | | | – 0 | 0 | – | | | – | | | | |

### P3 - Parking brake pressure

| | |
|---|---|
| Without | **0** |
| 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** |
| 80 bar *[1 160 PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |
| 125 bar *[1 812 PSI]* | **T** |
| 130 bar *[1 885 PSI]* | **U** |
| 135 bar *[1 957 PSI]* | **V** |
| 140 bar *[2 030 PSI]* | **9** |
| 145 bar *[2 102 PSI]* | **W** |
| 150 bar *[2 175 PSI]* | **B** |

### P4 - Pressure curve shape

| | |
|---|---|
| Linear | **1** |
| Bi-linear | **2** |

### C1 - Control

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Rubber anti-skid (lockable) | **F** |
| 8” Wall mount pedal | Aluminium anti-skid (casted) | **I** |
| 4” Wall mount pedal | Aluminium anti-skid (casted) | **R** |
| | Rubber anti-skid (sheet metal) | **L** |
| Locking lever | Horizontal (auto-lock) | **M** |
| | Vertical (auto-lock) up to 30 bar *[435 PSI]* * | **N** |
| | Vertical (manual lock) | **P** |

* For other operating pressures, please consult your Poclain Hydraulics application engineer.

### C2 - Pressure switch **

| | | |
|---|---|---|
| Without | | **0** |
| MF | 1x parking control | **4** |

### R1 - Electrical connection

| | |
|---|---|
| Without | **0** |
| Bare wire | **1** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |
| AMP Superseal | **6** |

### R2 - Voltage

| | |
|---|---|
| Without | **0** |
| 12V DC | **1** |
| 24V DC | **2** |

### R3 - Hydraulic connection

| | | |
|---|---|---|
| Without | | **0** |
| ISO 1179-1 (BSPP + spot face » ports) | G1/4 | **3** |
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | **4** |
| ISO 6149 (metric + cone » ports) | M14x1.5 | **8** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

### S1 - S4 Options (See page 79)

| | |
|---|---|
| Without | **0** |
| Special calibration | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization * | **B** |
| Additional check valve | **C** |
| Special painting | **D** |
| Pedal position sensor | **F** |
| Lever with rubber protection | **H** |
| Customized name plate | **P** |
| Horizontal valve/pedal position (line back of the valve » top of pedal) | **L** |
| Horizontal valve/pedal position (with line back of the valve » top of pedal) | **M** |

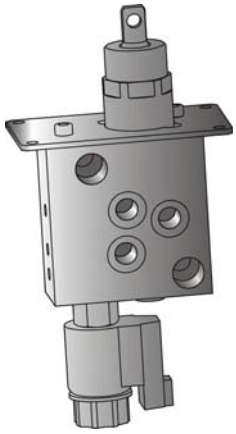
* Consult your Poclain Hydraulics application engineer.

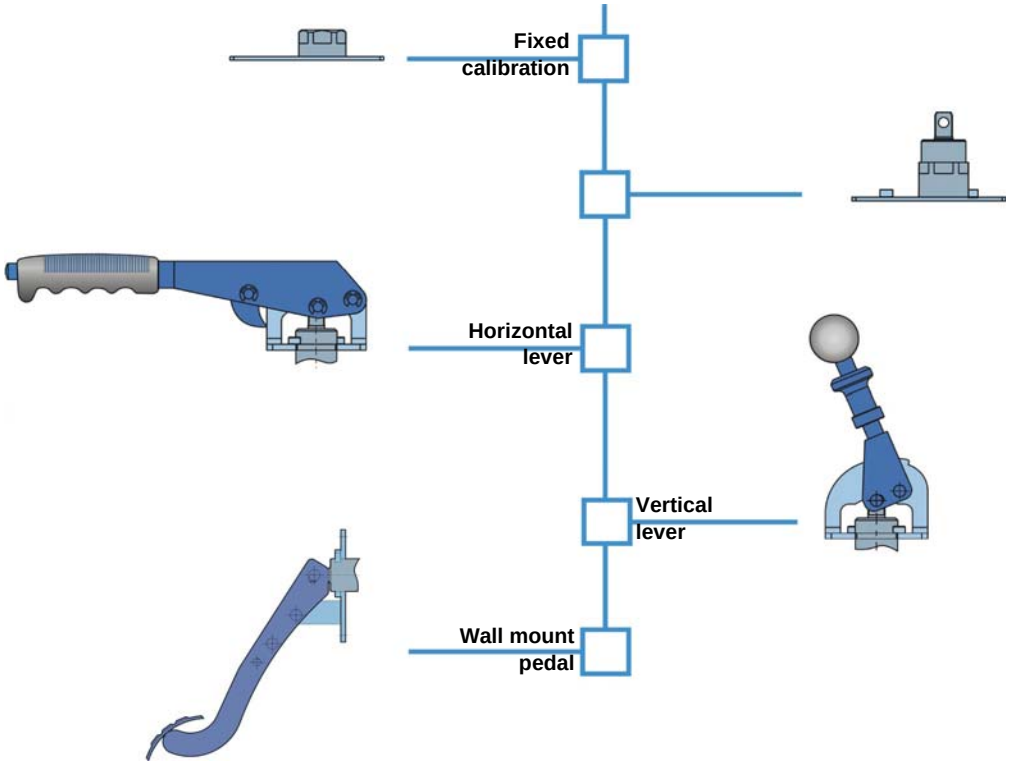
** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

# VB-00E

- **Electro-hydraulic**
- **Single-circuit**






**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 selector.

**Operation**

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

VB-00E has two principles of operation:

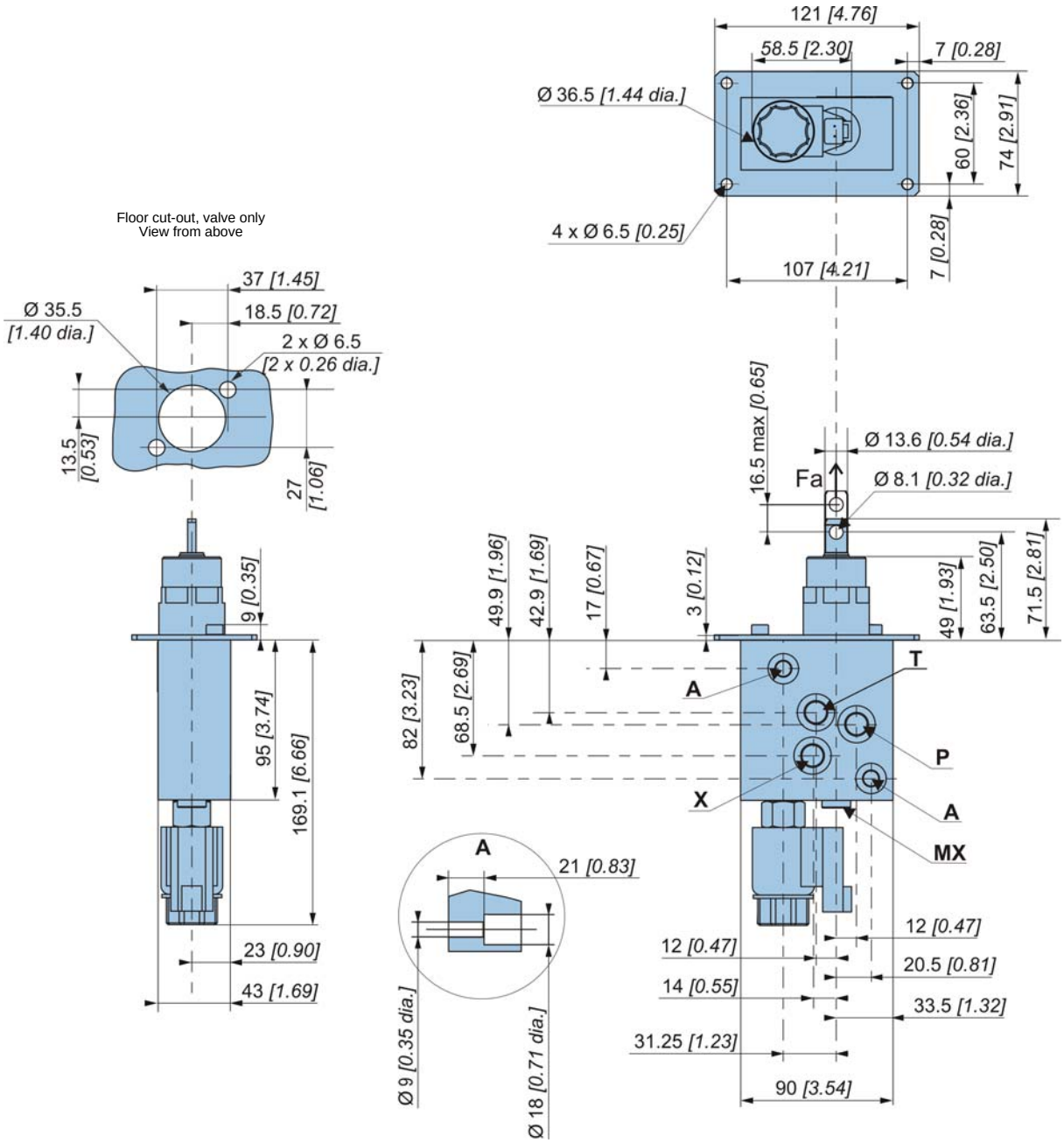
**1. Electric actuation**

VB-00E has fixed output pressure preset by the pressure reducing valve. When the VB-00E is not actuated (when electric control =0) the output (X) is directly connected to the tank (T) and provide a pressure equal to zero. SAHR brake is applied. When VB-00E is electrically actuated (electric control =1) the output (X) is connected to the output of the pressure reducing valve: VB-00E provides the preset fixed pressure. 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 VB-00E is not actuated (when electric control=0) the output (X) is directly connected to the tank (T) and provide a pressure equal to 0; SAHR brake is applied.
When is electrically actuated (when electric control=1) the output (X) is connected to the output of the pressure reducing valve. Therefore, VB-00E supplies a precise output pressure inversely proportional to the mechanical command stroke: the output pressure (X) decreases from the max. preset pressure (control released, brake released) to 0 (control actuated, brake applied).

## Overall dimensions of VB-00E brake valve



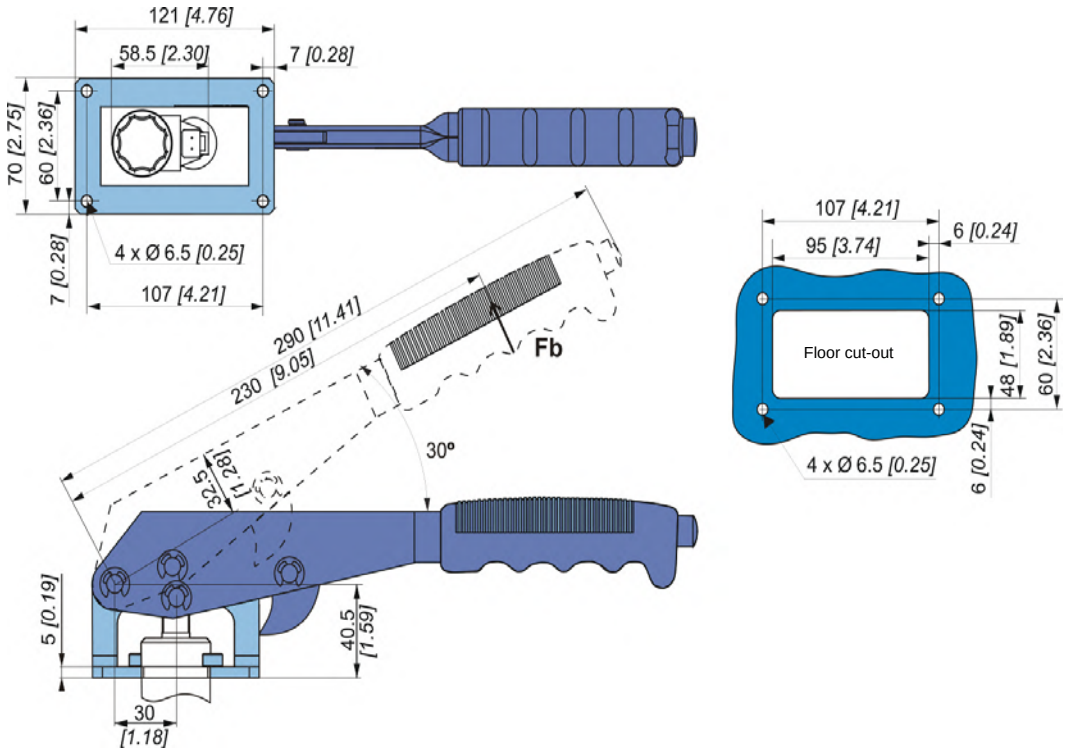

## Connections

| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 210 *[3 046]* | M14x1.5 9/16-18 UNF-2B | Input | 3 *[6.61]* |
| **X** | See parking brake pressure (page 15) | | Output | |
| **T** | 1 *[14.5]* | | Tank | |
| **MX *** | | M12x1.5 | Parking brake pressure switch | |

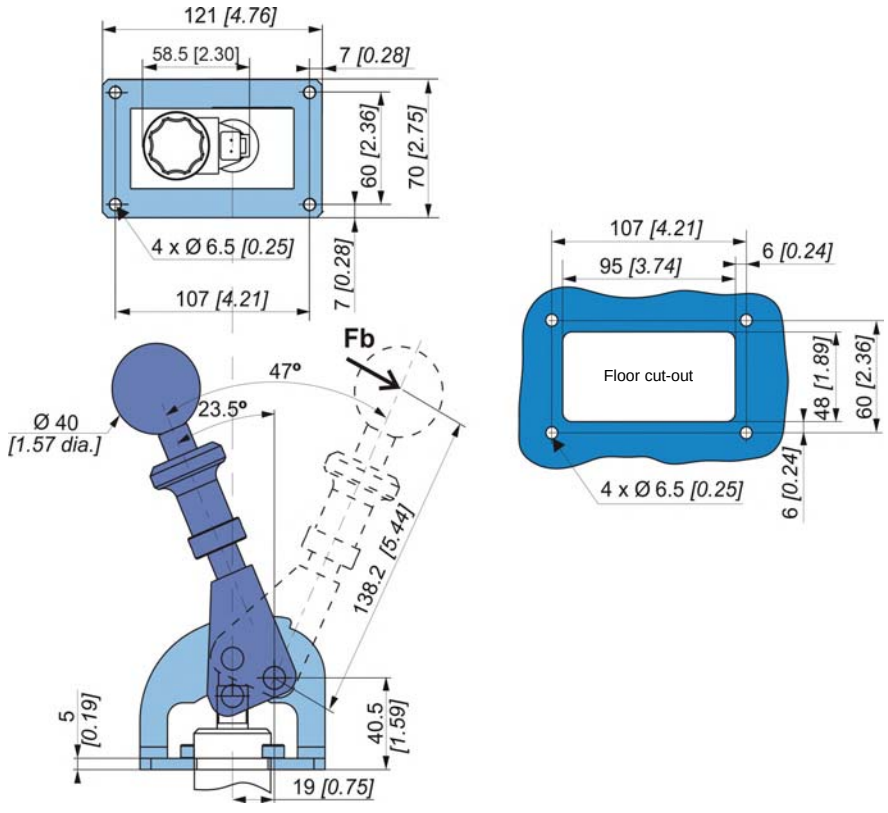
* Option

## Mechanical controls with standard valve orientation

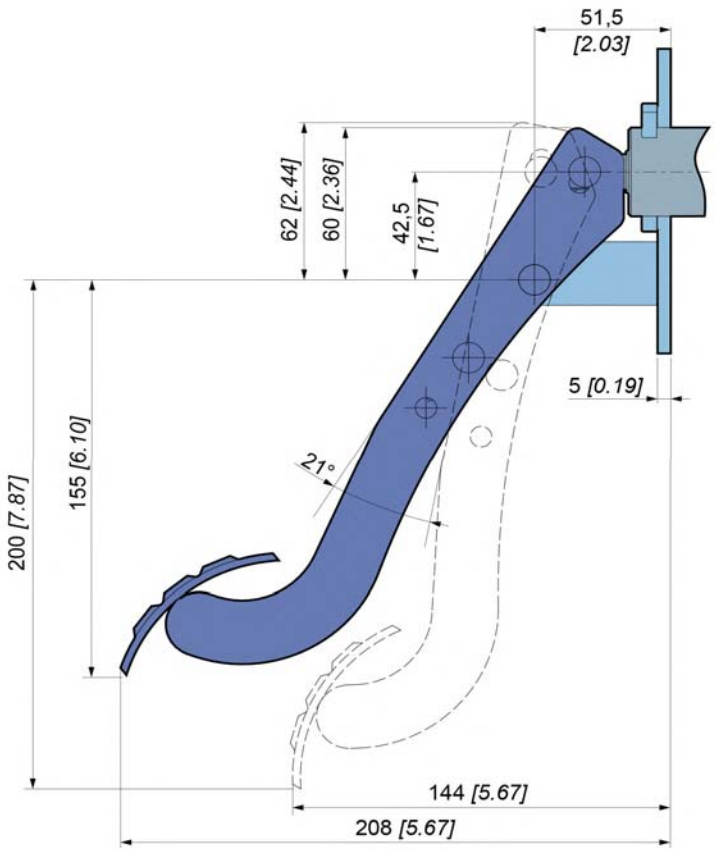
**Horizontal lever**

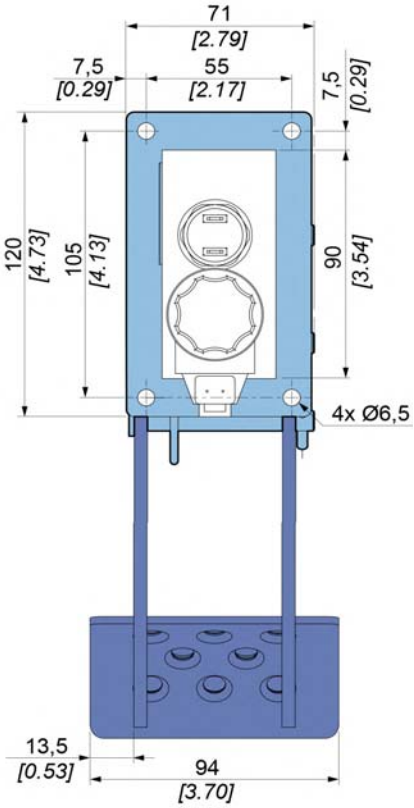


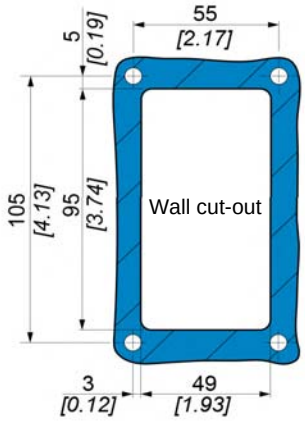

**Vertical lever**



**Wall mount pedal**

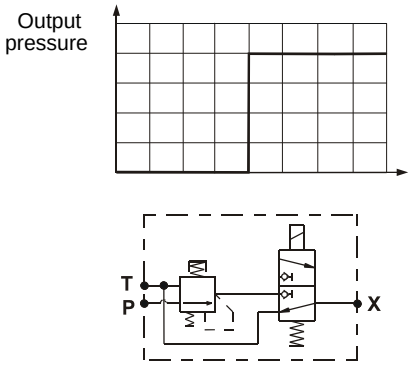


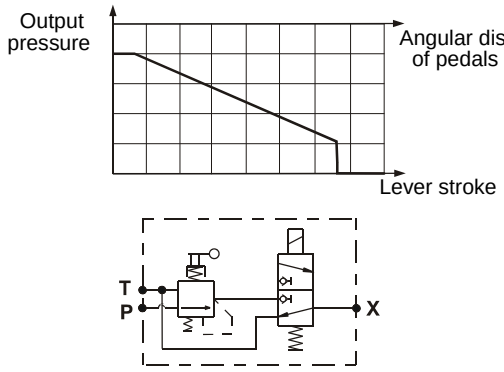



## Hydraulic diagram and characteristic curve

**Electric actuation**




**Electric with mechanical actuation**




## Estimated maximum actuator forces

- Max. traction on T-rod for valve only : Fa ≈1 030 N *[299 lbf]*
- Standard pedal : Fb ≈Fa/5
- Lockable pedal : Fb ≈Fa/5
- Horizontal lever : Fb ≈Fa/8
- Vertical lever : Fb ≈Fa/7

**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 |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | – 0 0 E | – 0 0 | – 0 0 | – | – | – |

**P3 - 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 *[1 450 PSI]* | **7** |

**C1 - Control**

| | | |
|---|---|---|
| Without lever | | **0** |
| Actuation not possible; fixed calibration | | **S** |
| Locking lever | Horizontal | **M** |
| | Vertical (up to 30 bar *[435 PSI]*) | **N** |
| Pedal | Wall mounted | **K** |

**C2 - Pressure switch****

| | |
|---|---|
| Without | **0** |
| On MX (parking brake pressure) | **4** |

**For other operating pressures, please consult your Poclain Hydraulics application engineer.**

**Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**R1 - Electrical connection**

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

**R2 - Supply voltage**

| | |
|---|---|
| 12 V DC (max. amp. 1.5 A) | **1** |
| 24 V DC (max. amp. 0.8 A) | **2** |

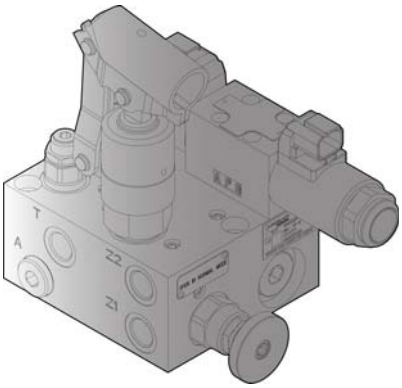
**R3 - Hydraulic connection**

| | | |
|---|---|---|
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | **4** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

**S1 - S4 Options** (See page 79)

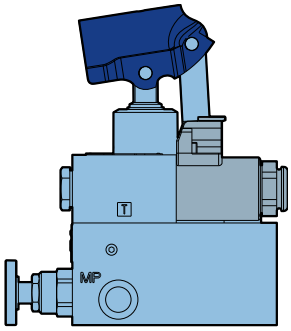
| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| Improved watertightness | **A** |
| Ports oriented to the right (east) | **E** |
| Ports oriented to the left (west) | **W** |

* Please consult your Poclain Hydraulics application engineer.

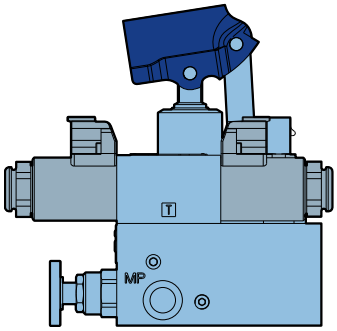


# VB-00M

- **Electric and manual park brake management**
- **2015/68 compliant**
- **Dual circuit**




**Single solenoid**




**Dual solenoid**

**Applications**

The VB-00M is fail-safe park brake management valve, designed to comply with the EU regulation 2015/68 for self-propelled AG machine equipped with spring applied hydraulically released (SAHR) park brake.
It is an electrical ON/OFF valve with manual hand pump to release the park brake and tow the machine in case of breakdown.

**Operation**

The VB-00M has two principles of operation:

**1. Electric actuation (normal operation)**

The VB-00M is operated by two solenoids with a spool detent assembly. It allows the change of spool position applying a short-time pulse. A pulse on “a” solenoid will release the park brake and a pulse on “b” solenoid will apply the brake.
The valve is also available with single solenoid.

**2. Manual actuation (vehicle breakdown event)**

Release of the brakes is achieved manually by pumping. Lock nut of the tap should be loosen and then fully closed. This allows towing a machine to the desired place for service. Tap needs to be kept opened to apply the brake and lock nut tightened. After the service the machine can be used normally again.

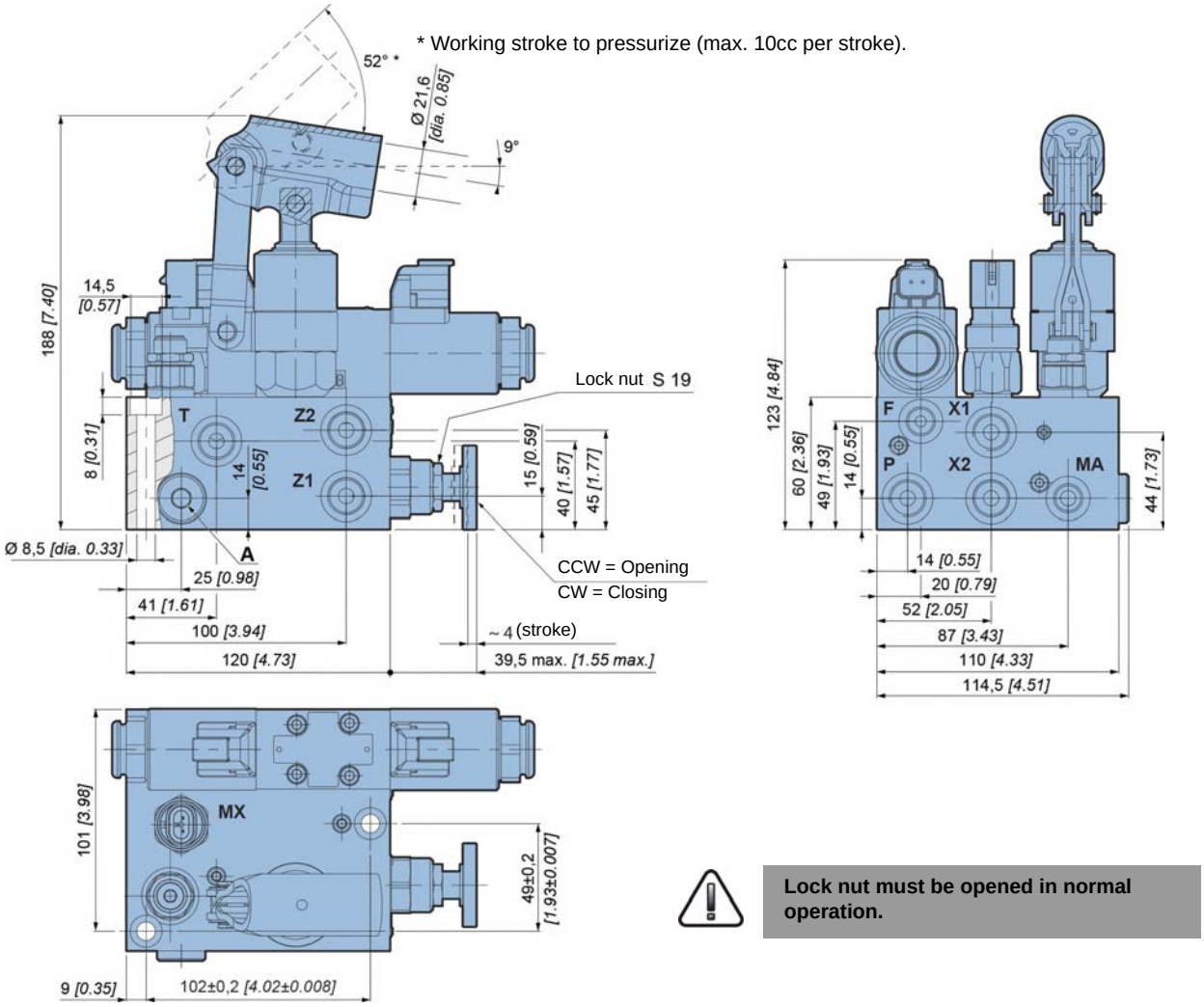
**Do not remove rubber film placed over lever of the manual pump in normal operation. Remove it only in case of vehicle breakdown event.**

**Dedicated software**

The VB-00M is meant to be used with an ECU to achieve the right level of safety and be compliant with the 2015/68 regulation. The valve management “software component” is available with the Poclain Hydraulics range of ECU.

**See technical catalogue N° A51874K for further information.**

## Overall dimensions of VB-00M brake valve




**Lock nut must be opened in normal operation.**

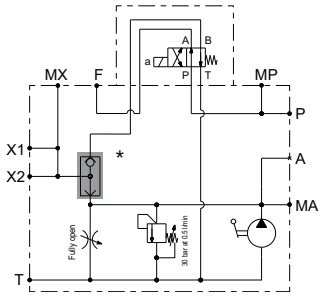
## Connections

| Port | Max. pressure bar *[PSI]* | Connection ISO 1179-1 | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 625]* | G 3/8 | Pressure supply | 3,8 *[8.38]* (single solenoid) or 4,3 *[9.48]* (dual solenoid) |
| **A** | 207 *[3 000]* | | Accumulator (optional) | |
| **X1** | 250 *[3 625]* | | Park brake circuit 1 | |
| **X2** | | | Park brake circuit 2 | |
| **Z1** | 207 *[3 000]* | | Park brake circuit 1 via an external shuttle valve | |
| **Z2** | | | Park brake circuit 2 via an external shuttle valve | |
| **MP** | 250 *[3 625]* | | Pressure supply measurement port or Accumulator (optional) | |
| **T** | 3 *[43.5]* | | Drain line | |
| **MA** | 207 *[3 000]* | G 1/4 | Auxiliary release pressure measurement point | |
| **F** | 250 *[3 625]* | | Flushing | |
| **MX** | | | Pressure switch 100 bar *[1 450 PSI]*, normally open | |

## Hydraulic schemes

**Standard piloting, max. 30 bar *[435 PSI]* SAHR brake**

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 0 0 M | 0 0 A | 3 0 | T 0 | 6 1 3 | C 0 0 0 |



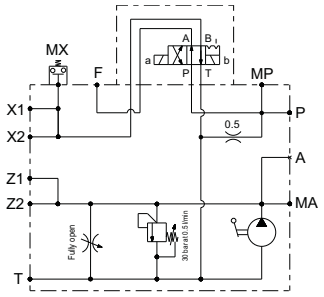

**Port P** is connected to the charge pump.

**Ports X1/X2** are connected to the park brake.

* Integrated shuttle valve

**2015/68 compliant, max. 30 bar *[435 PSI]* SAHR brake**

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 0 0 M | 0 0 A | 3 S | U 4 | 6 1 3 | 0 0 0 0 |




**Port P** is connected to the charge pump.

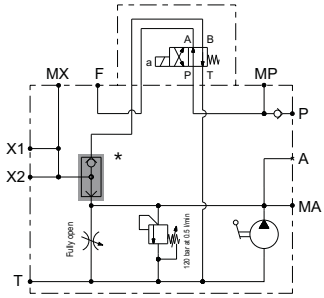
**Ports Z1/Z2** are connected to the park brake via a shuttle valve installed next to it.

**Ports X1/X2** are connected to the park brake.

12V pulse on **"a"** solenoid to release,
pulse on **"b"** solenoid to apply the park brake.

**Standard piloting, max. 120 bar *[1 740 PSI]* SAHR brake**

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 0 0 M | 0 0 8 | 3 0 | T 0 | 6 1 3 | 6 C 0 0 |



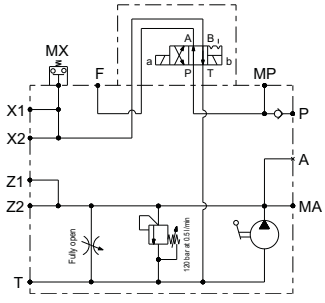

**Port P** is connected to the auxiliary pump.

**Ports X1/X2** feeds a PR3 pressure reducing valve that feeds the park brake.

* Integrated shuttle valve

**2015/68 compliant, max. 120 bar *[1 740 PSI]* SAHR brake**

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 0 0 M | 0 0 8 | 3 0 | U 4 | 6 1 3 | 6 0 0 0 |




**Port P** is connected to the pump.

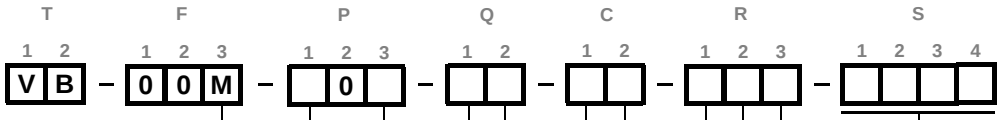
**Ports Z1/Z2** are connected to the park brake via a shuttle valve installed next to it.

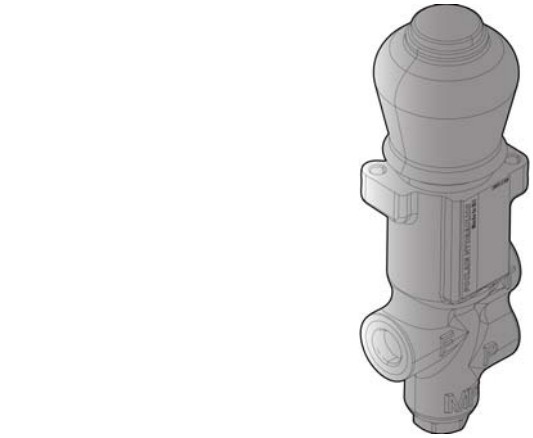
**Ports X1/X2** feeds a VB3-002 pressure modulating valve that feeds the park brake.

**Port MP** is connected to an accumulator.

12V pulse on **"a"** solenoid to release,
pulse on **"b"** solenoid to apply the park brake.

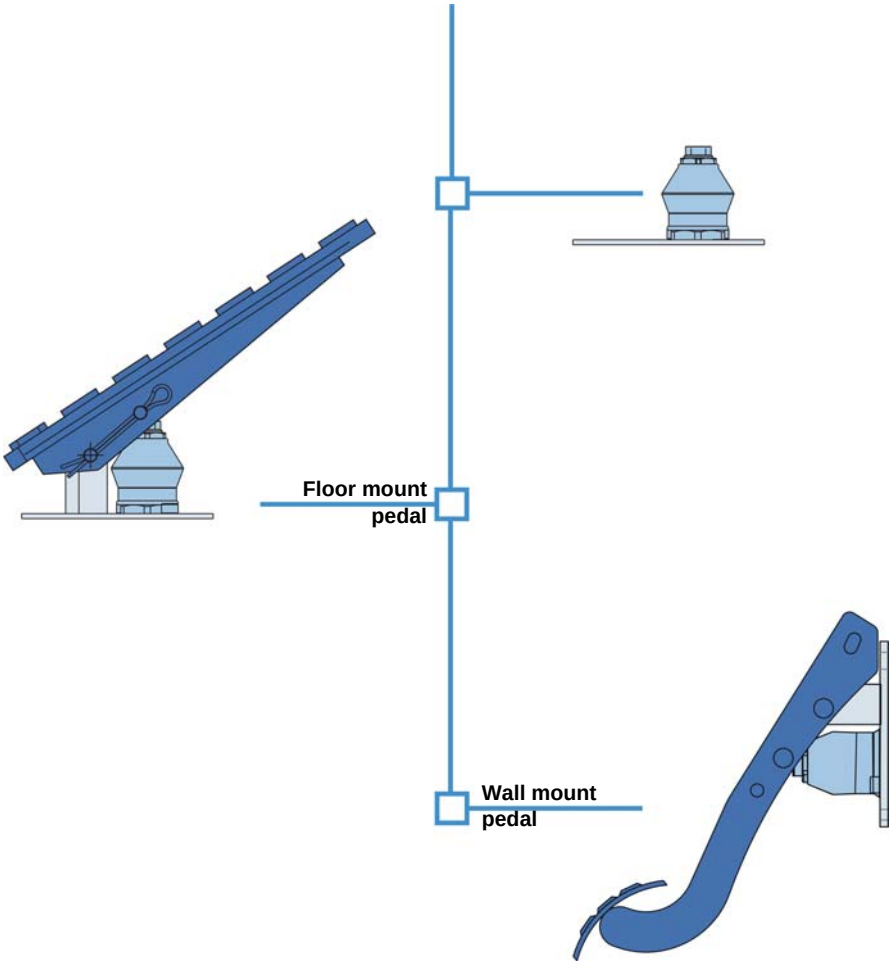
## Model code


T F P Q C R S
1 2 1 2 3 1 2 3 1 2 1 2 1 2 3 1 2 3 4
V B – 0 0 M – 0 –
F3 - Parking brake control
Electric + manual hand pump M
P1 - Back pressure
Without 0
4 bar [58 PSI] D
P3 - Max. operating pressure
30 bar [435 PSI] A
120 bar [1 740 PSI] 8
Q1 - Max. flow (P to F)
20 l/min [5.28 GPM] 3
Q2 - Restrictor on port P
Without 0
0,5 mm [0.02 in] S
C1 - Control
Single solenoid + spring T
Dual solenoid + mechanical lock U
C2 - Pressure switch
Without 0
On MX 4
R1 - Electrical connection
Without 0
Deutsch + AMP superseal 6
R2 - Supply voltage
12 V DC 1
24 V DC 2
R3 - Hydraulic connection
ISO 1179-1
(BSPP + spot face » ports) 3
S1 - S4 Options (See page 79)
Without option 0
Specific setting or flow 1
Specific port 2
Customized components 3
Additional check valve 6
Customized name plate (ID) P
Shuttle valve C
Special painting D



# VB3-010

- **Single-circuit**




**Applications**

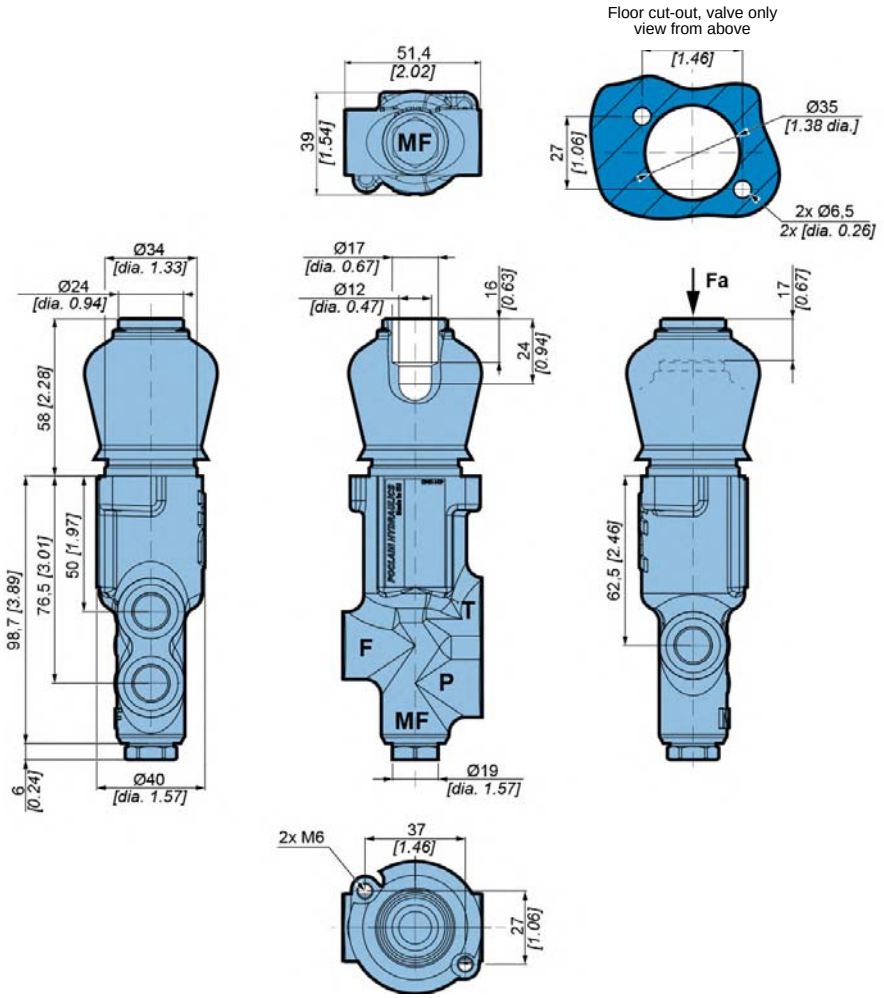
VB3-010 modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve.
VB3-010 valve is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking.
In a braking circuit, VB3-010 is usually associated with the VB-100 single-circuit accumulator charging valve (or a VB-200 dual-circuit accumulator charging valve if VB3-010 is also associated with a VB3-002 emergency / parking brake valve).

**Operation**

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

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

## Overall dimensions of VB3-010 brake valve



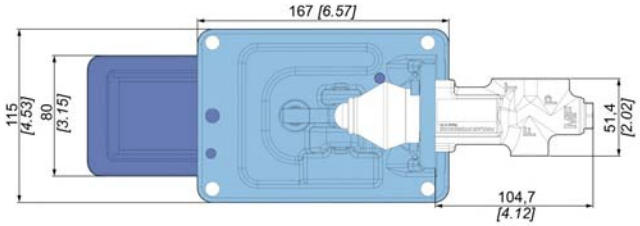

## Connections

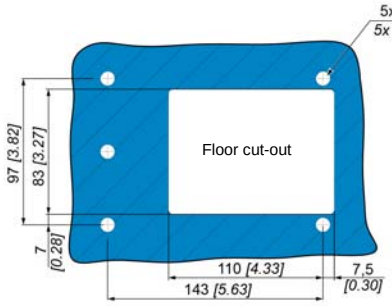
| Port | Max. pressure bar *[PSI]* | Connection *** | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5<br>9/16-18 UNF-2B<br>G1/4 | Input | 1 *[2.20]* |
| **F** | 120 *[1 740]* | | Output | |
| **T *** | 1 *[14.5]* | | Tank | |
| **MF **** | | M10x1<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B | Service brake pressure switch | |

***** Available upon request = T > 3bar, design available to protect line (pressure peaks) and as consequence increased time to release brake, F -> T flow limitation.
****** Option
******* Seat type: N (narrow) for ISO 1179-1 (BSPP + spot face » ports) and ISO 6149 (metric + cone » ports).

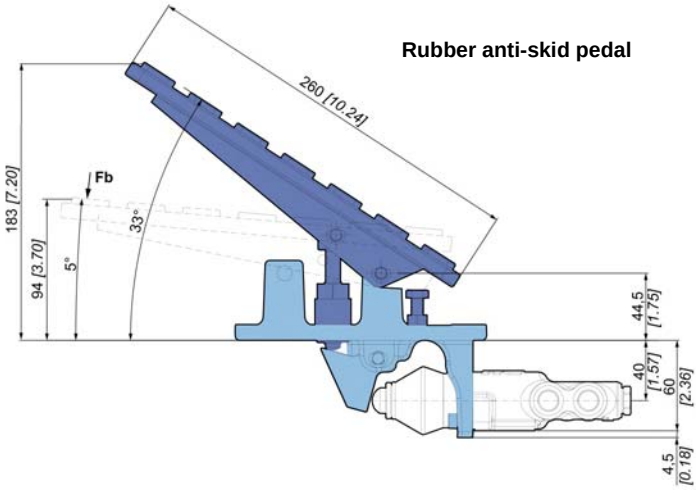
## Horizontal valve mechanical control

**Floor mount pedal**

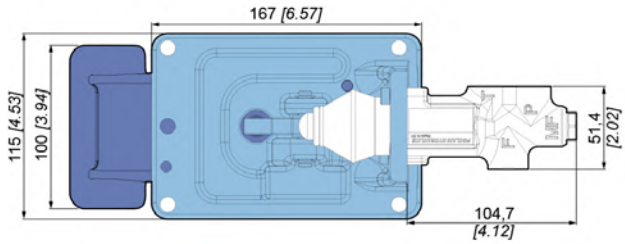


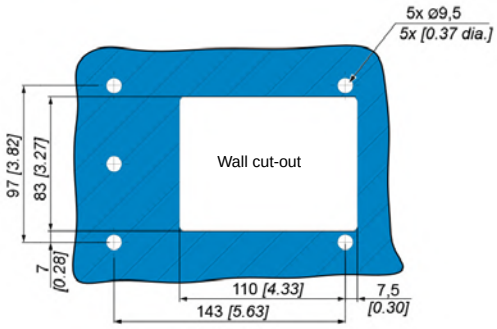



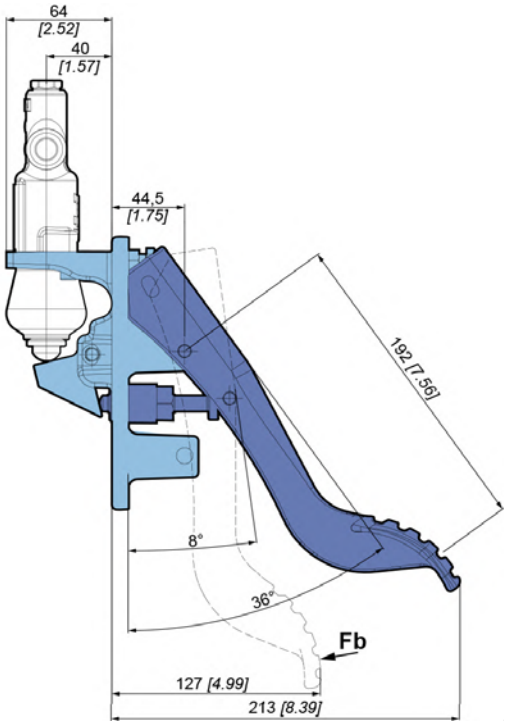

**Rubber anti-skid pedal**




**Wall mount pedal**

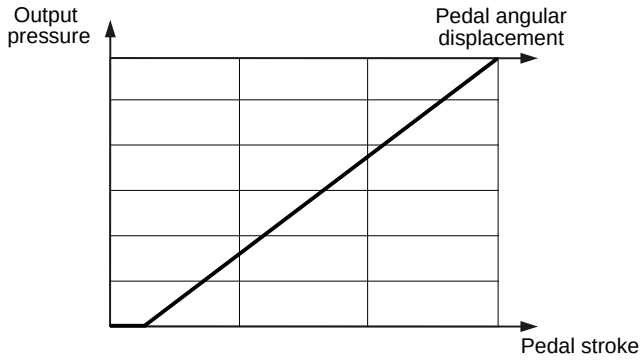


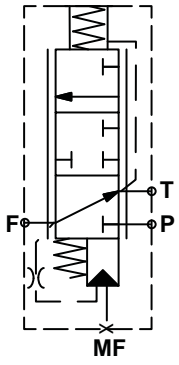




**Aluminium anti-skid (casted) pedal**

## Hydraulic diagram and characteristic curve




## Estimated maximum actuator forces according to output pressure

- Force on pedal (Fa): Fa (daN) ≈0.5 x max. output pressure (bar) + 5
- Force on pedal (Fb): Fb (daN) ≈Fa/6

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

## Model Code

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 3 | 1 2 3 | 1 2 3 4 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B 3 | – 0 1 0 | – 0 0 | – 0 0 | – | – 0 | – |

### P2 - Service brake pressure

| | |
|---|---|
| Without | 0 |
| 10 bar *[145 PSI]* | 1 |
| 15 bar *[217 PSI]* | D |
| 20 bar *[290 PSI]* | 2 |
| 25 bar *[362 PSI]* | E |
| 30 bar *[435 PSI]* | 3 |
| 35 bar *[507 PSI]* | F |
| 40 bar *[580 PSI]* | 4 |
| 45 bar *[652 PSI]* | G |
| 50 bar *[725 PSI]* | H |
| 55 bar *[797 PSI]* | J |
| 60 bar *[870 PSI]* | 5 |
| 65 bar *[942 PSI]* | K |
| 70 bar *[1 015 PSI]* | A |
| 75 bar *[1 087 PSI]* | L |
| 80 bar *[1 160 PSI]* | 6 |
| 85 bar *[1 232 PSI]* | M |
| 90 bar *[1 305 PSI]* | N |
| 95 bar *[1 377 PSI]* | P |
| 100 bar *[1 450 PSI]* | 7 |
| 105 bar *[1 522 PSI]* | Q |
| 110 bar *[1 595 PSI]* | R |
| 115 bar *[1 667 PSI]* | S |
| 120 bar *[1 740 PSI]* | 8 |
| 125 bar *[1 812 PSI]* | T |
| 130 bar *[1 885 PSI]* | U |
| 135 bar *[1 957 PSI]* | V |
| 140 bar *[2 030 PSI]* | 9 |
| 145 bar *[2 102 PSI]* | W |
| 150 bar *[2 175 PSI]* | B |
| 155 bar *[2 247 PSI]* | Z |
| 160 bar *[2 320 PSI]* | C |

For other operating pressures, please consult your Poclain Hydraulics application engineer.

### P4 - Pressure curve shape

| | |
|---|---|
| Linear | 1 |
| Bi-linear | 2 |

### C1 - Control **

| | | |
|---|---|---|
| Without pedal | | 0 |
| Floor mount pedal | Plain | A |
| | Metal anti-skid | B |
| | Rubber anti-skid | C |
| | Plain (lockable) | D |
| | Metal anti-skid (lockable) | E |
| | Rubber anti-skid (lockable) | F |
| | Rubber anti-skid (auto-lock) | G |
| 4” Wall mount pedal | Aluminium anti-skid (casted) | R |
| | Rubber anti-skid (sheet metal) | L |
| | Metal anti-skid (sheet metal) | K |
| 8” Wall mount pedal | Aluminium anti-skid (casted) | I |
| | Metal anti-skid (sheet metal) | J |

### C2 - Pressure switch

| | | |
|---|---|---|
| Without | | 0 |
| Without and MF ready | | 1 |
| On MF | 1x service control | 2 |

### R1 - Electrical connection

| | |
|---|---|
| Without | 0 |
| Bare wire | 1 |
| Deutsch | 3 |
| AMP (6.3 x 0.8) | 5 |
| AMP Superseal | 6 |

### R3 - Hydraulic connection

| | | |
|---|---|---|
| Without | | 0 |
| ISO 1179-1 (BSPP + spot face » ports) | G1/4 | 3 |
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | 4 |
| ISO 6149 (metric + cone » ports) | M14x1.5 | 8 |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18-UNF-2B | A |

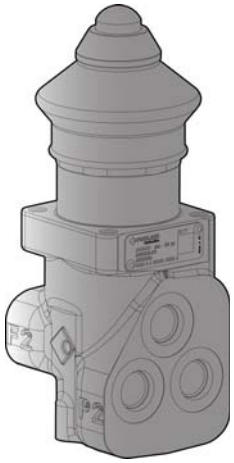
### S1 - S4 Options (See page 79)

| | |
|---|---|
| Without | 0 |
| Special calibration | 1 |
| Specific port * | 2 |
| Customized component * | 3 |
| Mechanical control adaptation * | 4 |
| Pressure sensor | 8 |
| Pedal back abutment | 9 |
| Circuit pressurization * | B |
| Special painting | D |
| Pedal position sensor | F |
| Lever with rubber protection | H |
| Customized name plate | P |
| Horizontal valve/pedal position (line back of the valve » top of pedal) | L |
| Horizontal valve/pedal position (with line back of the valve » top of pedal) | M |

* Please consult your Poclain Hydraulics application engineer.

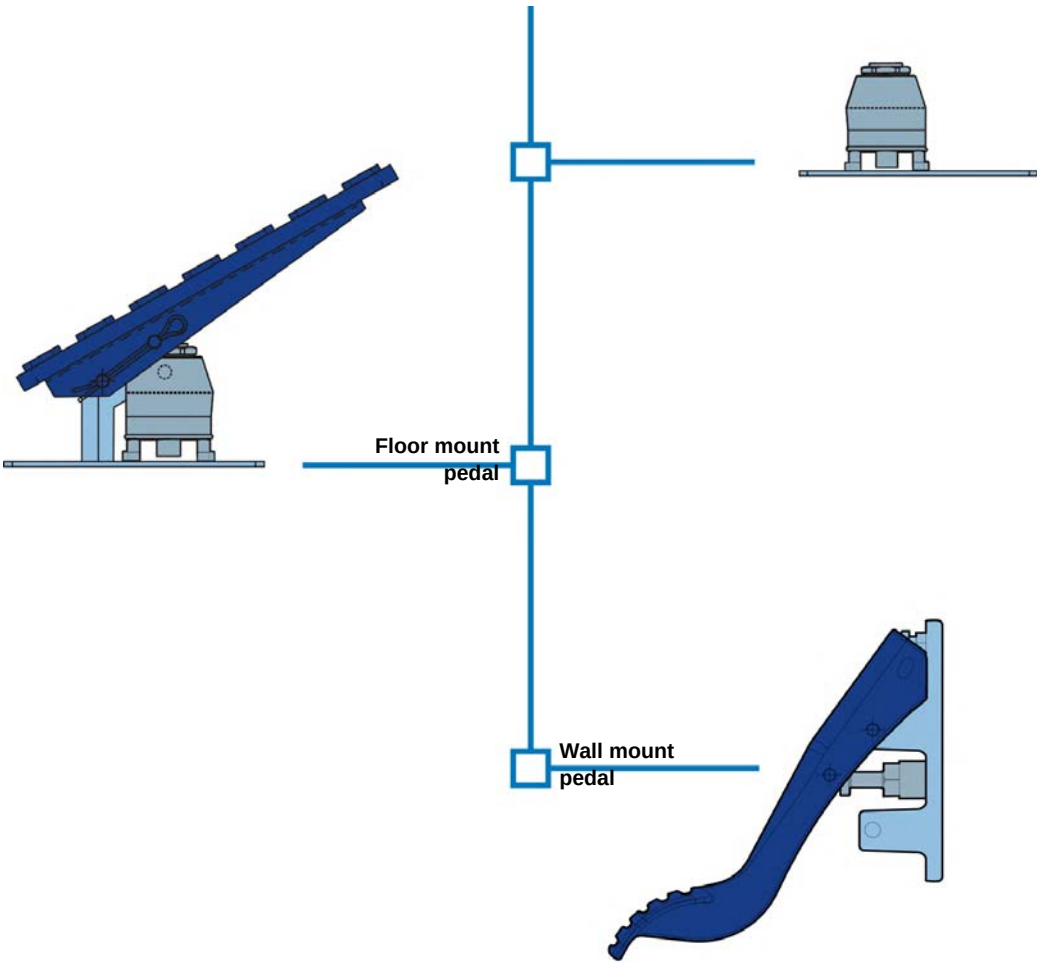
** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |



# VB3-020

- **Dual-circuit**



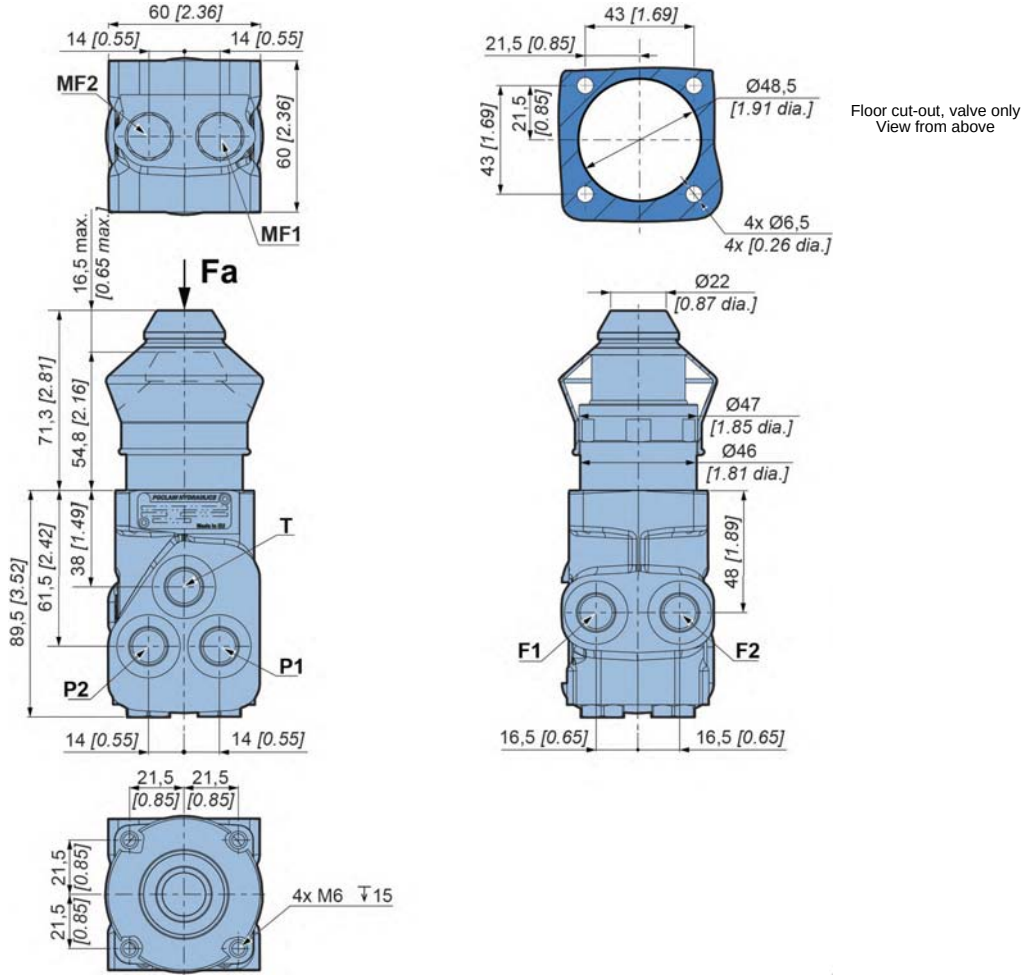

**Applications**

VB3-020 service brake valve (VB-0E0 and VB-0F0) is a mechanically-controlled, three-way, graduated release double pressure reducing valve.
VB3-020 (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,VB3-020 (VB-0E0 and VB-0F0) is usually associated with VB-200 dual-circuit accumulator charging valve.

**Operation**

When 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 pedal is depressed, output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. 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 pedal is fully depressed, output pressures (at F1 and F2) are limited to the preset pressures of the valve irrespective of the supply pressure.
Pressures at F1 and F2 are strictly independent. A failure in one of the circuits does not affect the operation of the other circuit.

## Overall dimensions of VB3-020 brake valve - small ports

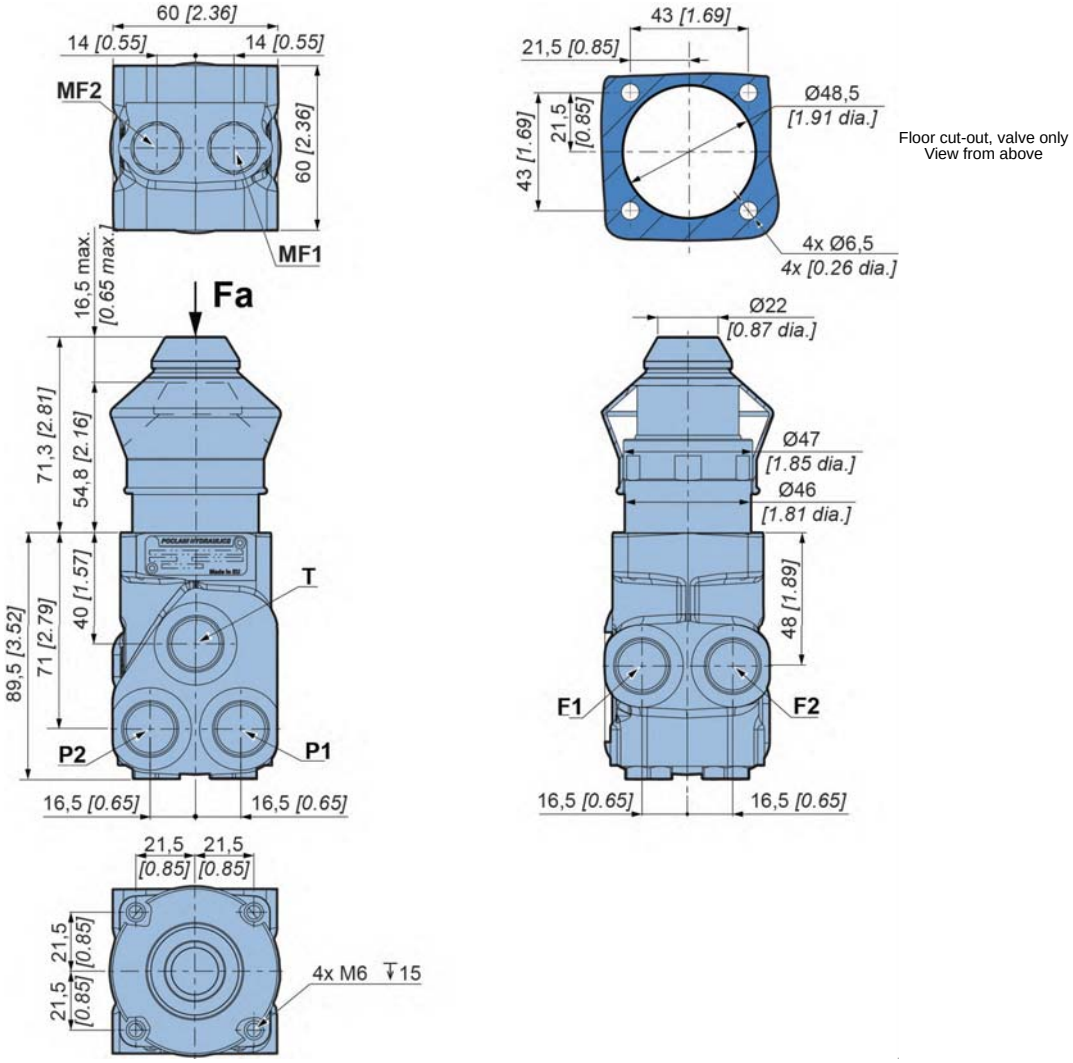



## Connections

| Port | Max. pressure bar *[PSI]* | Connection ** | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P1-P2** | 250 *[3 626]* | M14x1.5<br>G1/4 | Input | |
| **F1-F1** | 160 *[2 288]* | 9/16-18 UNF-2B<br>M18x1.5 | Output | |
| **T *** | 3 *[43.5]* ** | G3/8<br>3/4-16 UNF-2B | Tank | |
| **MF1 ***** | | M10x1<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B (VB3-020) | Service brake pressure switch | 2 *[4.41]* |
| **MF2 ***** | | M10x1 (VB3-020)<br>M12x1.5 (VB3-020, VB3-0E0)<br>M14x1.5 (VB3-0F0)<br>G1/4 (VB3-020)<br>7/16-20 UNF-2B (VB3-020) | Service brake pressure switch | |

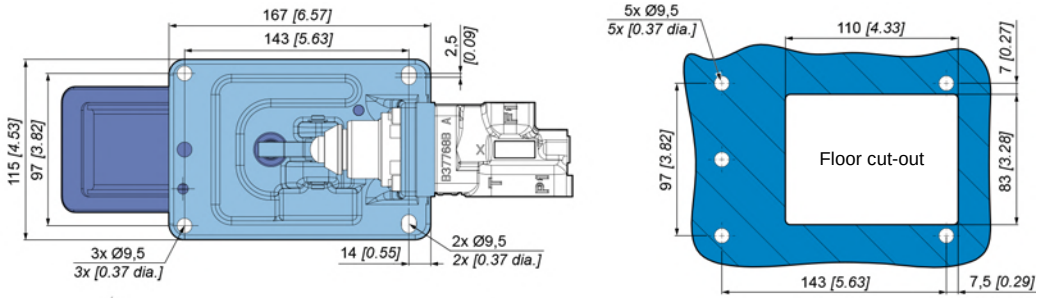
* Available upon request = T > 3bar, design available to protect line (pressure peaks) and as consequence increased time to release brake, F -> T flow limitation. Please consult your Poclain Hydraulics application engineer for higher pressure value.
** Seat type: N (narrow) for ISO 1179-1 (BSPP + spot face » ports) and ISO 6149 (metric + cone » ports).
*** Option

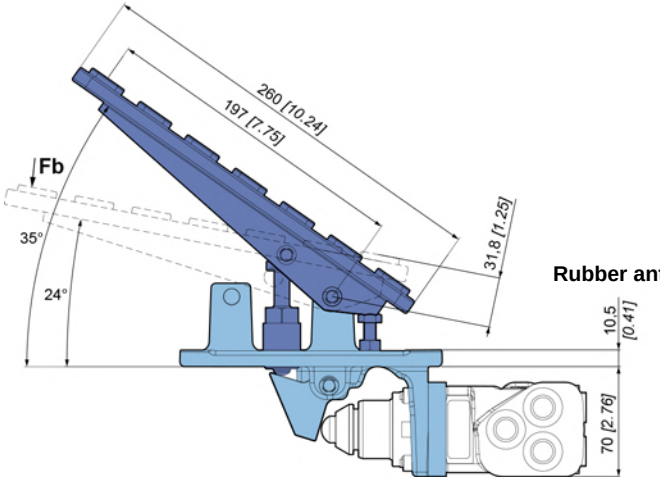
## Overall dimensions of VB3-020 brake valve - big ports



## Mechanical Control

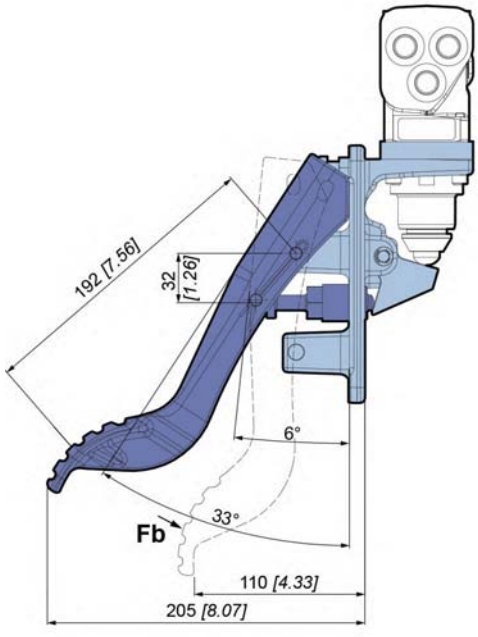
**Floor mount pedal**



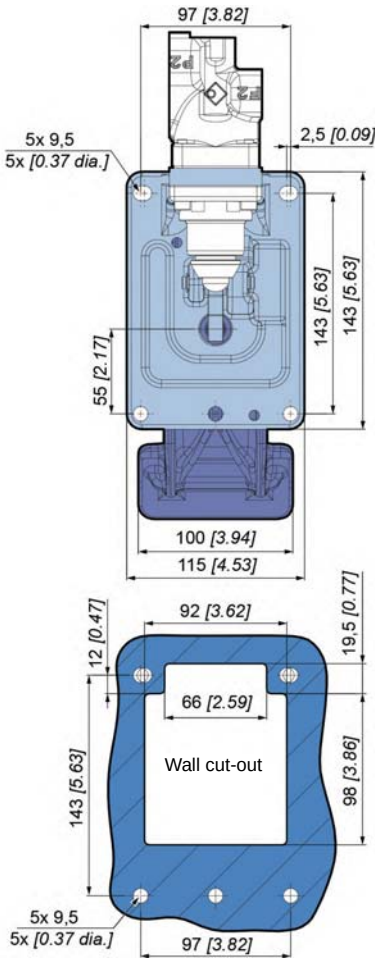




**Rubber anti-skid pedal**

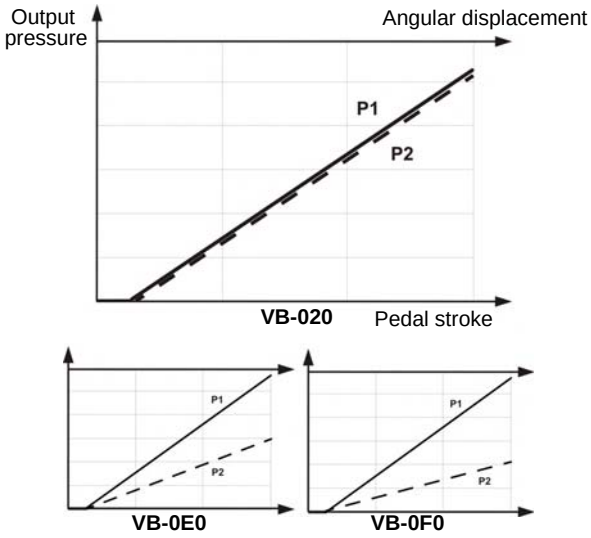
**Wall mount pedal 4”**

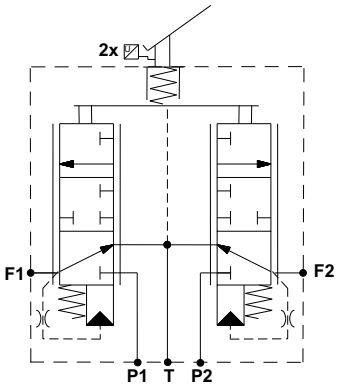



**Aluminium anti-skid (casted) pedal**



## Hydraulic diagram and characteristic curves




## Estimated maximum actuator forces according to output pressure

- Force on pedal (Fa) : Fa (daN) ≈ max. output pressure (bar) + 27
- Force on pedal (Fb) : Fb (daN) ≈ 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

| T | F | | P | | | Q | C | R | | S | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| V | B | 3 | – 0 | | 0 | – 0 | | 0 | – 0 | 0 | – | | | – | |

**F2 - Service brake**

| | |
|---|---|
| Dual circuit with F2/F1 = 1 | **2** |
| Dual circuit with F2/F1 = 0.64 | **E** |
| Dual circuit with F2/F1 = 0.44 | **F** |

**P2 - Service brake pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 35 bar *[507 PSI]* | **F** |
| 40 bar *[580 PSI]* | **4** |
| 45 bar *[652 PSI]* | **G** |
| 50 bar *[725 PSI]* | **H** |
| 55 bar *[797 PSI]* | **J** |
| 60 bar *[870 PSI]* | **5** |
| 65 bar *[942 PSI]* | **K** |
| 70 bar *[1 015 PSI]* | **A** |
| 75 bar *[1 087 PSI]* | **L** |
| 80 bar *[1 160 PSI]* | **6** |
| 85 bar *[1 232 PSI]* | **M** |
| 90 bar *[1 305 PSI]* | **N** |
| 95 bar *[1 377 PSI]* | **P** |
| 100 bar *[1 450 PSI]* | **7** |
| 105 bar *[1 522 PSI]* | **Q** |
| 110 bar *[1 595 PSI]* | **R** |
| 115 bar *[1 667 PSI]* | **S** |
| 120 bar *[1 740 PSI]* | **8** |
| 125 bar *[1 812 PSI]* | **T** |
| 130 bar *[1 885 PSI]* | **U** |
| 135 bar *[1 957 PSI]* | **V** |
| 140 bar *[2 030 PSI]* | **9** |
| 145 bar *[2 102 PSI]* | **W** |
| 150 bar *[2 175 PSI]* | **B** |
| 155 bar *[2 247 PSI]* | **Z** |
| 160 bar *[2 320 PSI]* | **C** |

For other operating pressures, please consult your Poclain Hydraulics application engineer.

**P4 - Pressure curve shape**

| | |
|---|---|
| Linear | **1** |
| Bi-linear | **2** |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (lockable) | **F** |
| | Rubber anti-skid (auto-lock) | **G** |
| Wall mount pedal 4” | Aluminium anti-skid (casted) | **R** |
| | Metal anti-skid (sheet metal) | **K** |
| | Rubber anti-skid (sheet metal) | **L** |
| Wall mount pedal 8” | Aluminium anti-skid (casted) | **I** |
| | Metal anti-skid (sheet metal) | **J** |

**C2 - Pressure switch ****

| | | |
|---|---|---|
| Without | | **0** |
| Without and MF port ready | | **1** |
| On MF or MF2 | 1x service control | **2** |
| MF1 and MF2 | 2x service control | **3** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Bare wire | **1** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |
| AMP Superseal | **6** |

**R3 - Hydraulic connection**

| | | |
|---|---|---|
| Without | | **0** |
| ISO 1179-1 (BSPP + spot face » ports) | G1/4 | **3** |
| | G3/8 | **B** |
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | **4** |
| | M18x1.5 | **C** |
| ISO 6149 (metric + cone » ports) | M14x1.5 | **8** |
| | M18x1.5 | **D** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |
| | 3/4-16 UNF-2B | **E** |

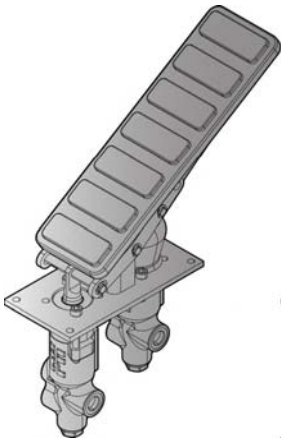
**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Without | **0** |
| Special calibration | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization * | **B** |
| Special painting | **D** |
| Pedal position sensor | **F** |
| Lever with rubber protection | **H** |
| Customized name plate | **P** |
| Horizontal valve/pedal position (line back of the valve » top of pedal) | **L** |
| Horizontal valve/pedal position (with line back of the valve » top of pedal) | **M** |

* Please consult your Poclain Hydraulics application engineer.

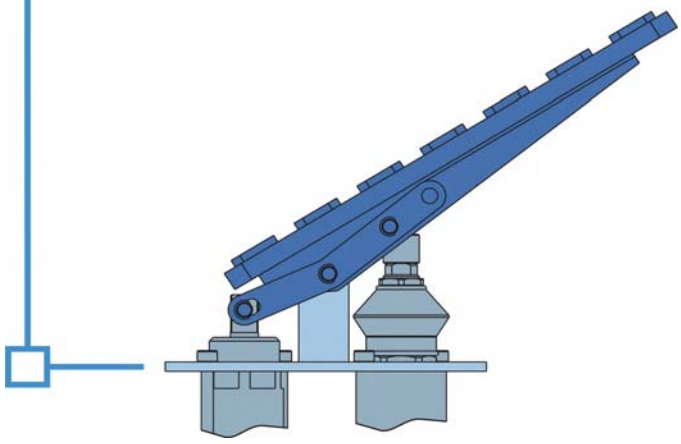
** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |



# VB3-012

- **Combination VB3-002 + VB3-010**
- **Single-circuit**



VB3-002 characteristics

VB3-010 characteristics

**Applications**

VB3-012 brake control is a single-circuit braking assembly that combines:

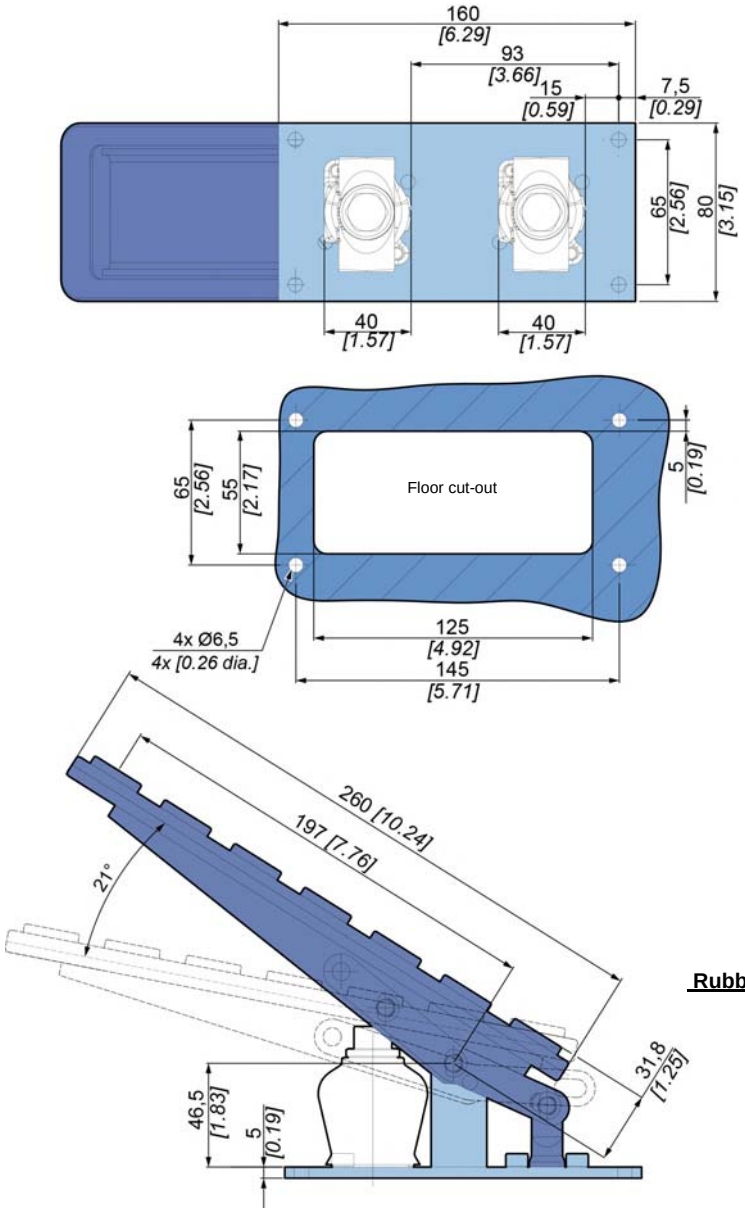
- VB3-002 emergency / parking brake valve, which supplies an output pressure to control the automotive pump (inching),
- VB3-010 service brake valve, which supplies a pressure to control the service braking.

**Operation**

VB3-012 valve controls two independent pressures via a pedal. One pressure is for automotive pump control, and the other is for service braking control.

When operator presses pedal, VB3-012 supplies a pressure inversely proportional to the angular displacement of pedal to control the hydraulic pump.
If more braking is required, operator continues to press the pedal. VB3-012 then supplies an output pressure to the service brake in proportion to the angular displacement of the pedal.

## Mechanical control with standard valve orientation




**Rubber anti-skid pedal**

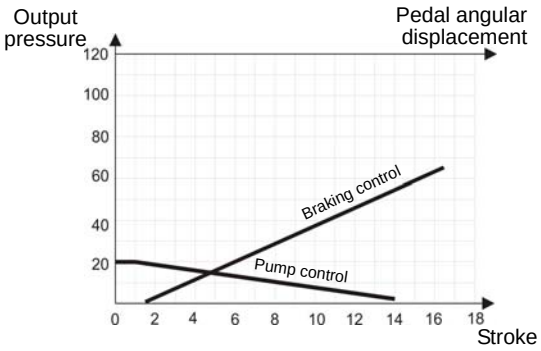
## Connections

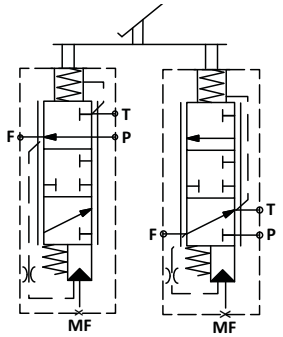
| Port | Max. pressure bar *[PSI]* | Connection ** | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5<br>9/16-18 UNF-2B<br>G1/4 | Input | 3,5 *[7.72]* |
| **T** | 1 *[14.5]* | | Tank | |
| **F (VB3-010)** | 120 *[1 740]* | | Service braking | |
| **F (VB3-002)** | 20 *[290.1]* | | Inching control | |
| **MF (VB3-010) *** | | M10x1.5<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B | Service braking pressure switch | |
| **MF (VB3-002) *** | | | Inching control pressure switch | |

***** Option

** Seat type: N (narrow) for ISO 1179-1 (BSPP + spot face » ports) and ISO 6149 (metric + cone » ports).

## Hydraulic diagram and characteristic curve




VB3-002 VB3-010

**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.**

## Model Code

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 3 | 1 2 3 | 1 2 3 4 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B 3 | – 0 1 2 | – 0 | – 0 0 | – | – | – |

**P2 - Operating pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 35 bar *[507 PSI]* | **F** |
| 40 bar *[580 PSI]* | **4** |
| 45 bar *[652 PSI]* | **G** |
| 50 bar *[725 PSI]* | **H** |
| 55 bar *[797 PSI]* | **J** |
| 60 bar *[870 PSI]* | **5** |
| 65 bar *[942 PSI]* | **K** |
| 70 bar *[1 015 PSI]* | **A** |
| 75 bar *[1 087 PSI]* | **L** |
| 80 bar *[1 160 PSI]* | **6** |
| 85 bar *[1 232 PSI]* | **M** |
| 90 bar *[1 305 PSI]* | **N** |
| 95 bar *[1 377 PSI]* | **P** |
| 100 bar *[1 450 PSI]* | **7** |
| 105 bar *[1 522 PSI]* | **Q** |
| 110 bar *[1 595 PSI]* | **R** |
| 115 bar *[1 667 PSI]* | **S** |
| 120 bar *[1 740 PSI]* | **8** |
| 125 bar *[1 812 PSI]* | **T** |
| 130 bar *[1 885 PSI]* | **U** |
| 135 bar *[1 957 PSI]* | **V** |
| 140 bar *[2 030 PSI]* | **9** |
| 145 bar *[2 102 PSI]* | **W** |
| 150 bar *[2 175 PSI]* | **B** |
| 155 bar *[2 247 PSI]* | **Z** |
| 160 bar *[2 320 PSI]* | **C** |

For other operating pressures, please consult your Poclain Hydraulics application engineer.

**P3 - Inching**

| | |
|---|---|
| 10 bar *[145 PSI]* | **2** |
| 20 bar *[290 PSI]* | **3** |
| 30 bar *[435 PSI]* | **A** |

**P4 - Pressure curve shape**

| | |
|---|---|
| Linear | **1** |
| Bi-linear | **2** |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (manual lock) | **F** |
| | Rubber anti-skid (auto-lock) | **G** |
| 4” Wall mount pedal | Aluminium anti-skid (casted) | **R** |
| | Rubber anti-skid (sheet metal) | **L** |
| | Metal anti-skid (sheet metal) | **K** |
| 8” Wall mount pedal | Aluminium anti-skid (casted) | **I** |
| | Metal anti-skid (sheet metal) | **J** |

**C2 - Pressure control ****

| | | |
|---|---|---|
| Without | | **0** |
| Without & MF port ready | | **1** |
| MF; MF1; MF2 | 1x service brake | **2** |
| MF | 1x inching control | **4** |
| MF and MF | | **A** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Bare wire | **1** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |
| AMP Superseal | **6** |

**R2 - Voltage**

| | |
|---|---|
| Without | **0** |
| 12V DC | **1** |
| 24V DC | **2** |

**R3 - Hydraulic connection**

| | | |
|---|---|---|
| Without | | **0** |
| ISO 1179-1 (BSPP + spot face » ports) | G1/4 | **3** |
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | **4** |
| ISO 6149 (metric + cone » ports) | M14x1.5 | **8** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

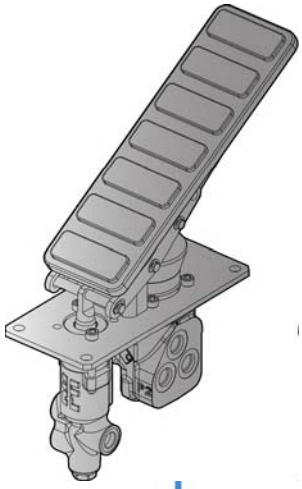
**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Without | **0** |
| Special calibration | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization * | **B** |
| Pedal position sensor | **F** |
| Lever with rubber protection | **H** |
| Customized name plate | **P** |
| Special painting | **D** |
| Horizontal valve/pedal position (line back of the valve » top of pedal) | **L** |
| Horizontal valve/pedal position (with line back of the valve » top of pedal) | **M** |

* Please consult your Poclain Hydraulics application engineer.

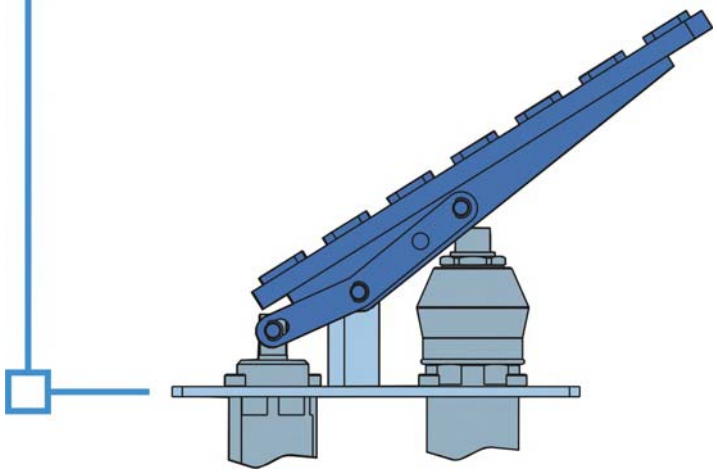
** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |



# VB3-022

- **Combination of VB3-002 and VB3-020**
- **Dual-circuit**



VB3-002 characteristics

VB3-020 characteristics

**Applications**

VB3-022 brake control is a dual-circuit braking assembly combining:

- VB3-002 emergency / parking brake valve, which provides an output pressure to control the automotive pump (inching),
- VB3-020 service brake valve, which provides two output pressures, F1 and F2, for independent braking circuits.

Output pressures F1 and F2 can be equal (VB3-022) or different according to a ratio F2/F1 = 0.64 (VB3-0E2) or 0.44 (VB3-0F2).

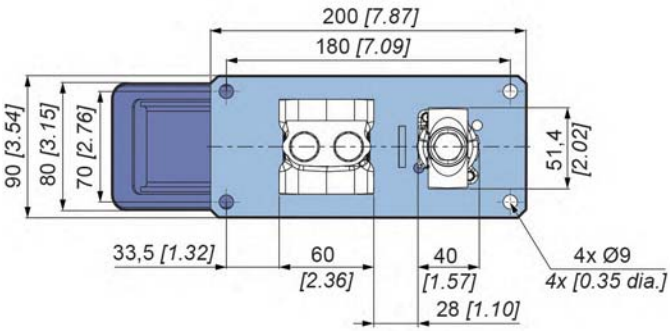
**Operation**

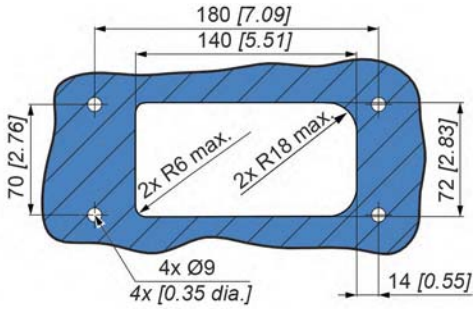
VB3-022 controls three independent pressures via a pedal. One pressure controls the automotive pump, and the other two pressures control the service braking.

- **Two-step braking:**
  When the operator presses the pedal, VB3-022 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:**
  VB3-022, VB3-0E2 and VB3-0F2 simultaneously control the pump (hydrostatic braking) and the service braking (mechanical braking) for more aggressive dynamic braking.

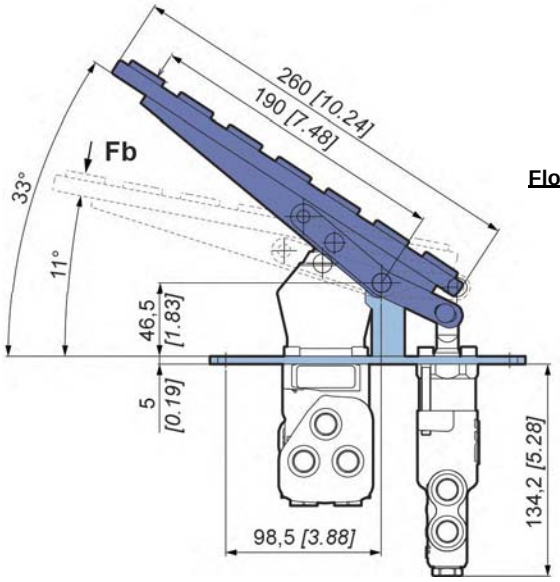
Pressures at F1 and F2 are strictly independent. A failure in one of the circuits does not affect the operation of the other circuit.

## Mechanical control with standard valve orientation




Floor cut-out



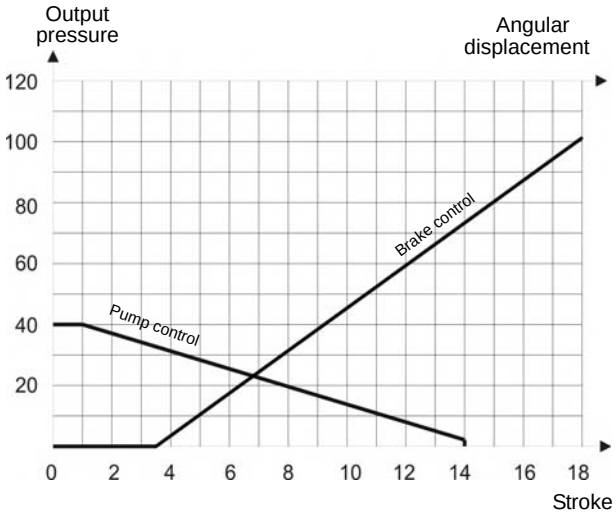

**Floor mount pedal**

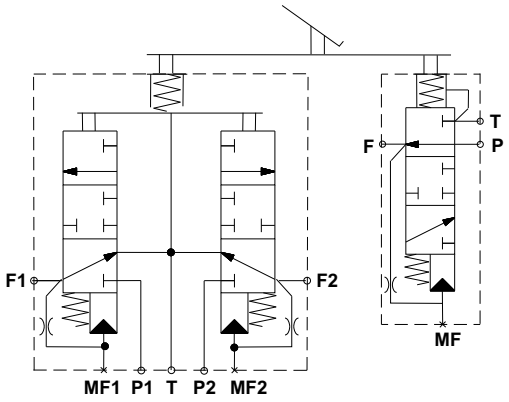
## Connections

| Port | Max. pressure bar *[PSI]* | Connection *** | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5<br>9/16-18 UNF-2B<br>G1/4 | Input | 4,9 *[10.8]* |
| **P1 - P2** | | | | |
| **T** | 1 *[14.5]* | | Tank | |
| **F1 - F2** | 150 *[2 145]* | | Service braking | |
| **X** | 20 *[290.1]* * | | Inching control | |
| **MF1 **** | | M10x1<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B (VB3-022) | Service braking pressure switch | |
| **MF2 **** | | M10x1 (VB3-022)<br>M12x1.5 (VB3-022, VB3-0E2)<br>M14x1.5 (VB3-0F2)<br>G1/4 (VB3-022)<br>7/16-20 UNF-2B (VB3-022) | Service braking pressure switch | |
| **MF **** | | M10x1<br>M12x1.5<br>G1/4<br>7/16-20 UNF-2B (VB3-022) | Inching control pressure switch | |

* Please consult your Poclain Hydraulics application engineer for higher pressure option.
** Option
*** Seat type: N (narrow) for ISO 1179-1 (BSPP + spot face » ports) and ISO 6149 (metric + cone » ports).

## 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

| T | | | F | | | P | | | | Q | | C | | R | | | S | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| V | B | 3 | – | 0 | | 2 | – | 0 | | | | – | 0 | 0 | – | | | – | | | |

**F2 - Service brake**

| | |
|---|---|
| Dual circuit with F2/F1 = 1 | **2** |
| Dual circuit with F2/F1 = 0.64 | **E** |
| Dual circuit with F2/F1 = 0.44 | **F** |

**P2 - Service brake 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** |
| 125 bar *[1 812 PSI]* | **T** |
| 130 bar *[1 885 PSI]* | **U** |
| 135 bar *[1 957 PSI]* | **V** |
| 140 bar *[2 030 PSI]* | **9** |
| 145 bar *[2 102 PSI]* | **W** |
| 150 bar *[2 175 PSI]* | **B** |
| 155 bar *[2 247 PSI]* | **Z** |
| 160 bar *[2 320 PSI]* | **C** |

For other operating pressures, please consult your Poclain Hydraulics application engineer.

**P3 - Inching pressure**

| | |
|---|---|
| 10 bar *[145 PSI]* | **2** |
| 20 bar *[290 PSI]* | **3** |
| 30 bar *[435 PSI]* | **A** |

**P4 - Pressure curve shape**

| | |
|---|---|
| Linear | **1** |
| Bi-linear | **2** |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (manual lock) | **F** |
| | Rubber anti-skid (auto-lock) | **G** |
| 4” Wall mount pedal | Aluminium anti-skid (casted) | **R** |
| | Rubber anti-skid (sheet metal) | **L** |
| | Metal anti-skid (sheet metal) | **K** |
| 8” Wall mount pedal | Aluminium anti-skid (casted) | **I** |
| | Metal anti-skid (sheet metal) | **J** |

** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C2 - Pressure switch ****

| | | |
|---|---|---|
| Without | | **0** |
| Without & MF port ready | | **1** |
| MF; MF1; MF2 | 1x service brake | **2** |
| MF1 & MF2 | 2x service brake | **3** |
| MF | 1x inching control | **4** |
| MF & MF1 (MF2) | | **B** |
| MF& MF1 & MF2 | | **C** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |
| AMP Superseal | **6** |

**R3 - Hydraulic connection**

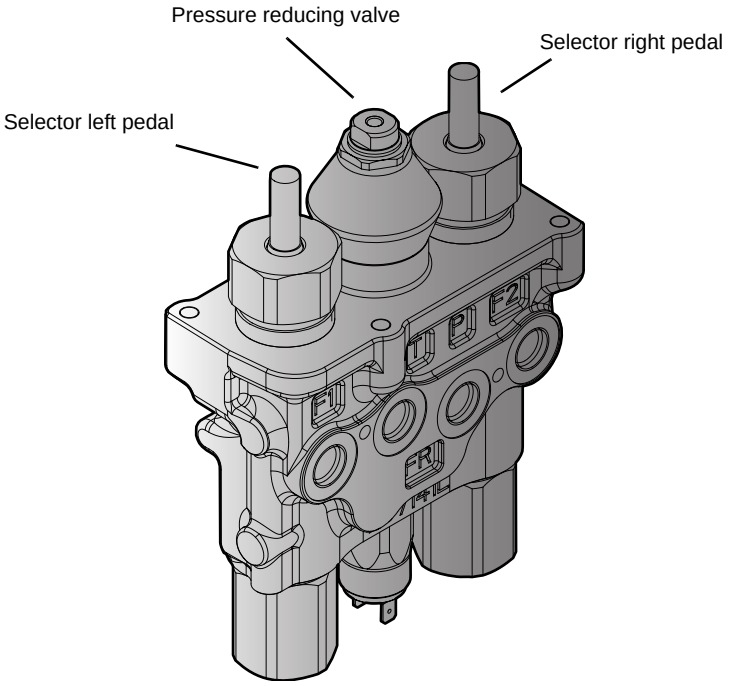
| | | |
|---|---|---|
| Without | | **0** |
| ISO 1179-1 (BSPP + spot face » ports) | G1/4 | **3** |
| | G3/8 | **B** |
| ISO 9974-1 (metric + spot face » ports) | M14x1.5 | **4** |
| | M18x1.5 | **C** |
| ISO 6149 (metric + cone » ports) | M14x1.5 | **8** |
| | M18x1.5 | **D** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |
| | 3/4-16 UNF-2B | **E** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Without | **0** |
| Special calibration | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization * | **B** |
| Pedal position sensor | **F** |
| Lever with rubber protection | **H** |
| Customized name plate | **P** |
| Special painting | **D** |
| Horizontal valve/pedal position (line back of the valve » top of pedal) | **L** |
| Horizontal valve/pedal position (with line back of the valve » top of pedal) | **M** |

* Please consult your Poclain Hydraulics application engineer.

# VB-0B0




**Applications**

VB-0B0 valve is a single circuit brake valve that provides dynamic service braking in road mode and steering-assist braking in field mode.

VB-0B0 is actuated by two pedals, and supplies two independent brakes on rear axle. 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 field mode.
- Braking with equal power distribution in road mode.

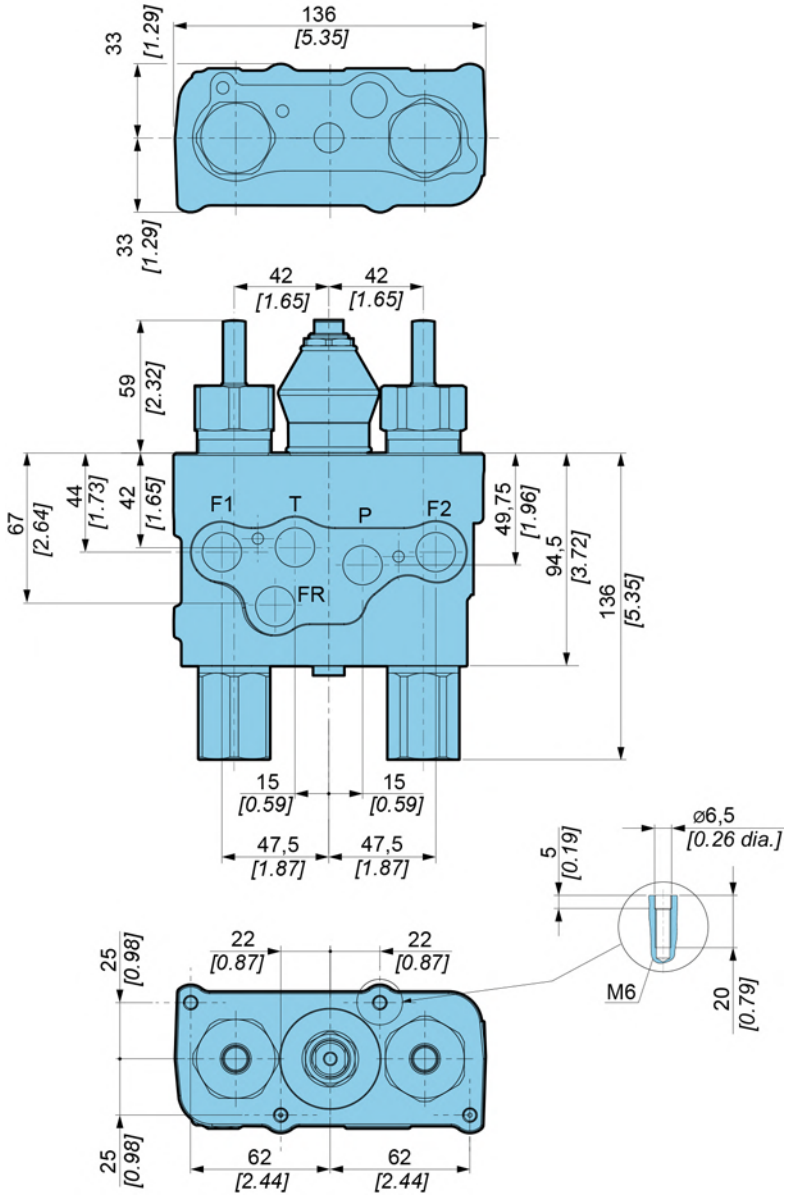
**• Off-road mode:**

VB-0B0 provides steering assistance for turning. In an off-road mode, the two pedals are actuated independently. When 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 a 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 with auxiliary brake output (trailer brake signal - port FR)

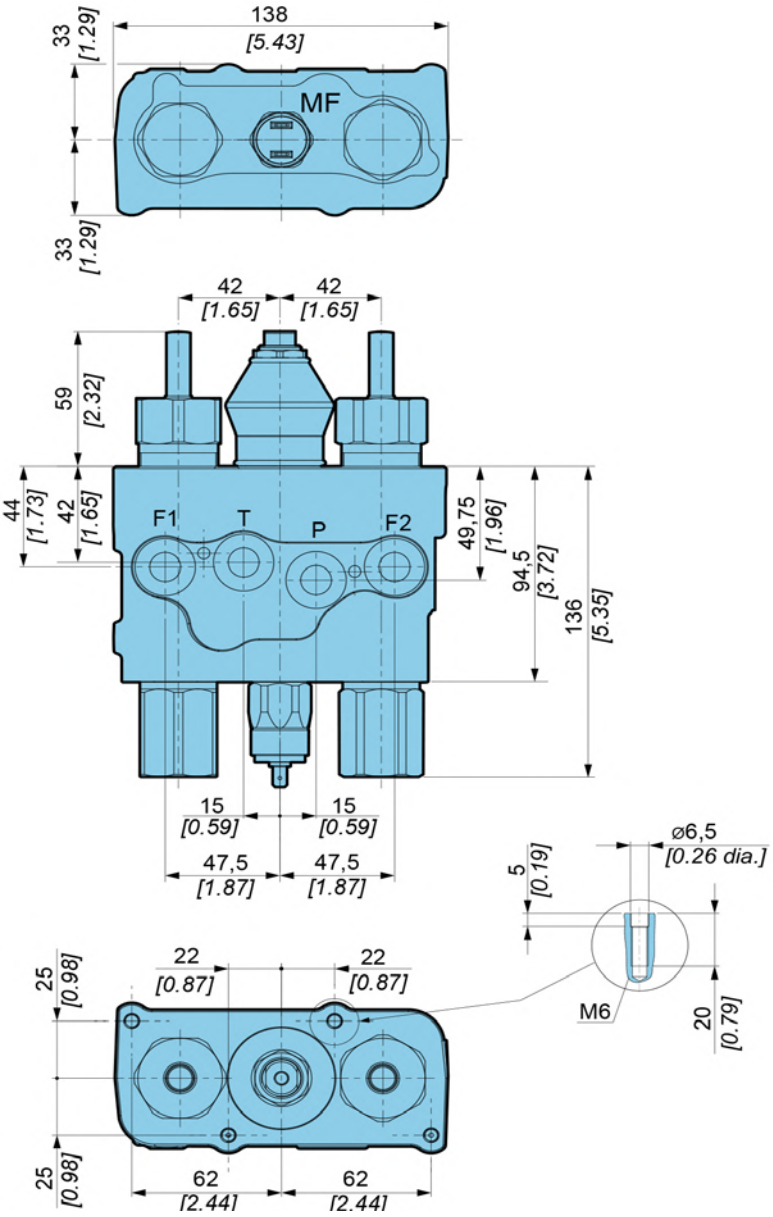



## Connections

| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5 9/16-18 UNF-2B | Input | 5 *[11.02]* |
| **T** | 10 *[145]* | | Tank | |
| **F1** | 120 *[1 740]* | | Left and/or right brake output | |
| **F2** | | | Right and/or left brake output | |
| **FR *** | | M12x1.5 1/2-20 UNF-2B | Auxiliary brake output (optional) | |
| **MF** | | M10x1 | Service braking pressure | |

***** 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 your Poclain Hydraulics application engineer.

## Overall dimensions of VB-0B0 braking valve without auxiliary brake output (trailer brake signal - port FR)

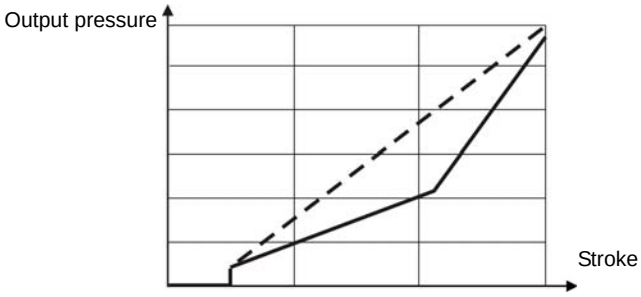


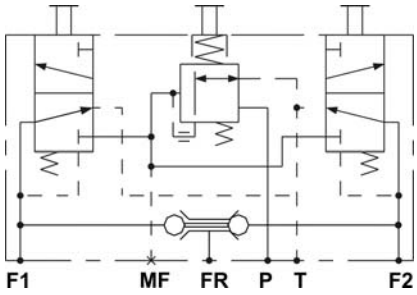

## Connections

| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* |
|---|---|---|---|---|
| **P** | 250 *[3 626]* | M14x1.5 9/16-18 UNF-2B | Input | 4,8 *[10.58]* |
| **T** | 10 *[145]* | | Tank | |
| **F1** | 120 *[1 740]* | | Left and/or right brake output | |
| **F2** | | | Right and/or left brake output | |
| **MF** | | M10x1 | Service braking pressure | |

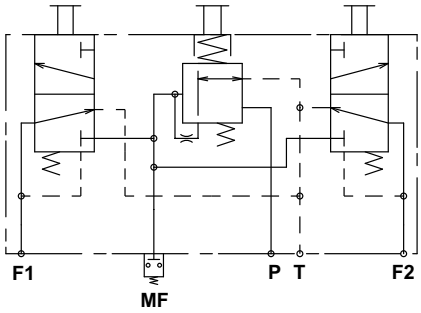
For further information, please consult your Poclain Hydraulics application engineer.

## Hydraulic diagram and characteristic curve



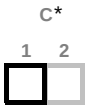




VB-0B0 valve with force feedback and logic output port FR = F1&F2.

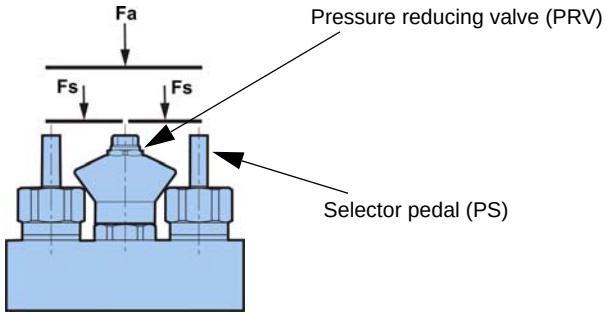



VB-0B0 valve with force feedback and no trailer brake signal FR.

## Estimated maximum actuator forces according to output pressure




| | | 1, G | 2, H |
|---|---|---|---|
| Field mode (Fs) | (daN) | 1.63 x max. output pressure (bar) + 67.443 | 3.04 x max. output pressure (bar) + 67.443 |
| Road mode (Fa) | (daN) | 2.76 x max. output pressure (bar) + 112.404 | 5.58 x max. output pressure (bar) + 112.404 |




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

* see next page, model code, section C

## Model Code

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

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | – 0 B 0 | – 0 0 | – 0 0 | – | – 0 | – |

**P2 - Operating pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 40 bar *[580PSI]* | **4** |
| 60 bar *[870 PSI]* | **5** |
| 80 bar *[1 160PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |

**For other operating pressures, please consult your Poclain Hydraulics application engineer.**

** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C1 - Control**

| | | |
|---|---|---|
| Control with force feedback | DN12 cast | **1** |
| | DN12 block | **G** |
| | DN18 cast | **2** |
| | DN18 block | **H** |

**C2 - Pressure switch ****

| | |
|---|---|
| Without | **0** |
| On MF (service brake pressure) | **2** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |

**R3 - Hydraulic connection**

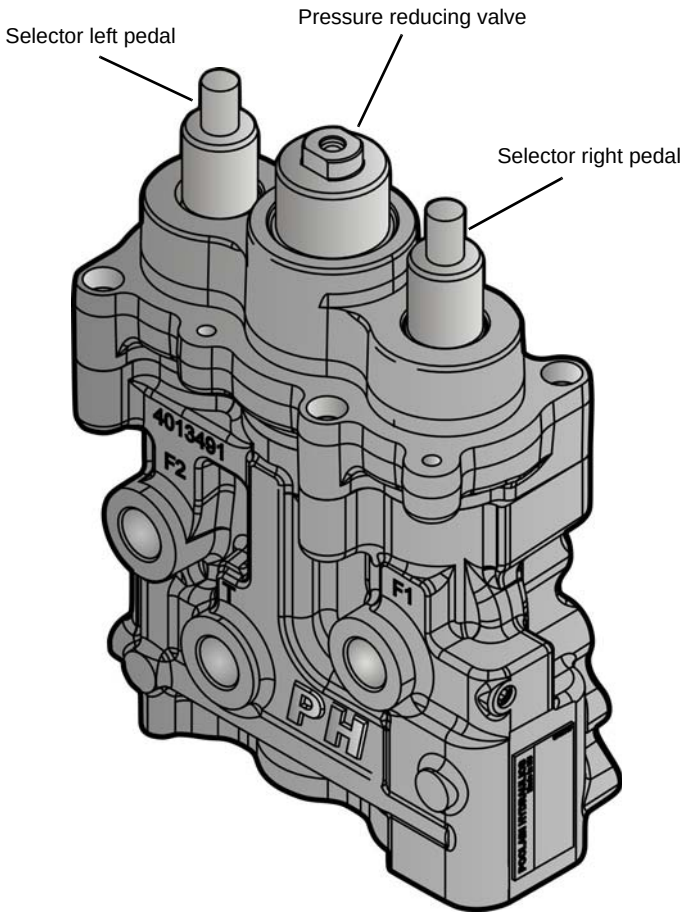
| | |
|---|---|
| ISO 9974-1 (metric + spot face » ports) | **4** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | **A** |

**S1 -S4 Options** (See page 79)

| | |
|---|---|
| Special calibration* | **1** |
| Specific port* | **2** |
| Customized component * | **3** |
| Dual-slope spring mechanism * | **7** |
| Pressure sensor | **8** |
| Improved watertightness * | **A** |
| Circuit pressurization * | **B** |

* Please ask your Poclain Hydraulics application engineer.

# VB-0D0




**Applications**

VB-0D0 valve is a double circuit brake valve that provides dynamic service braking in road mode and steering-assist braking in field mode.
Standard VB-0D0 product has dual slope characteristic and improved watertightness.
VB-0D0 is actuated by two pedals, and supplies three independent brakes (two on the rear axle and one in the front axle).
The VB-0D0 valve combines the following components in a single unit:

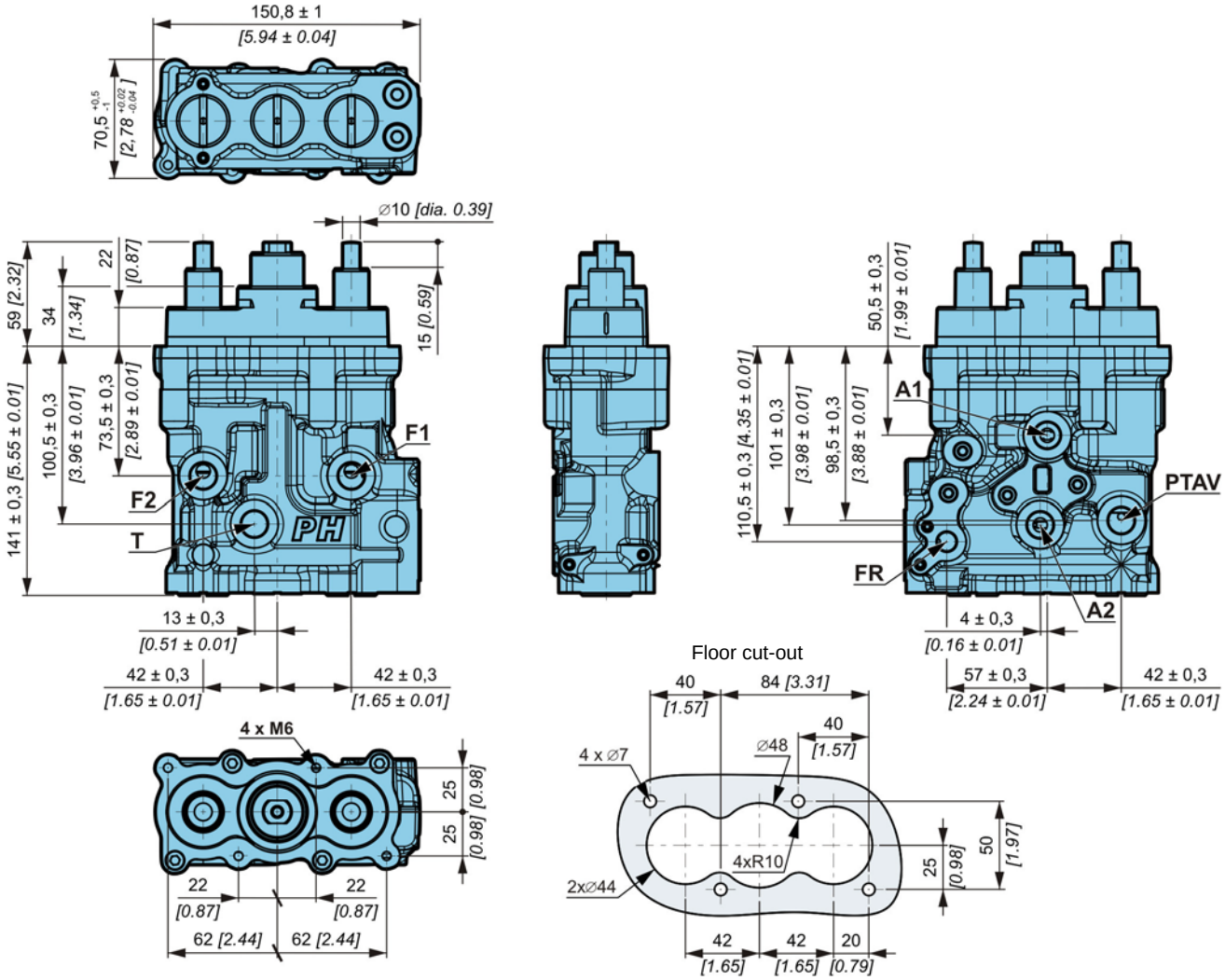
- A pressure reducer that supplie an output pressure proportional to the pedal stroke.
- Two circuit selectors, each one associated with one of the pedals of the VB-0D0.

**Operation**

VB-0D0 performs two types of braking:

- **Off-road mode:**
  VB-0D0 provides steering assistance for turning. In off-road mode, the two pedals are actuated independently. When the operator depresses either pedal, the pressure reducer and the selector associated with this pedal are actuated. VB-0D0 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-0D0 valve supplies an identical pressure to all brakes, proportional to the stroke of the pedals.

## Overall dimensions of VB-0D0 braking valve

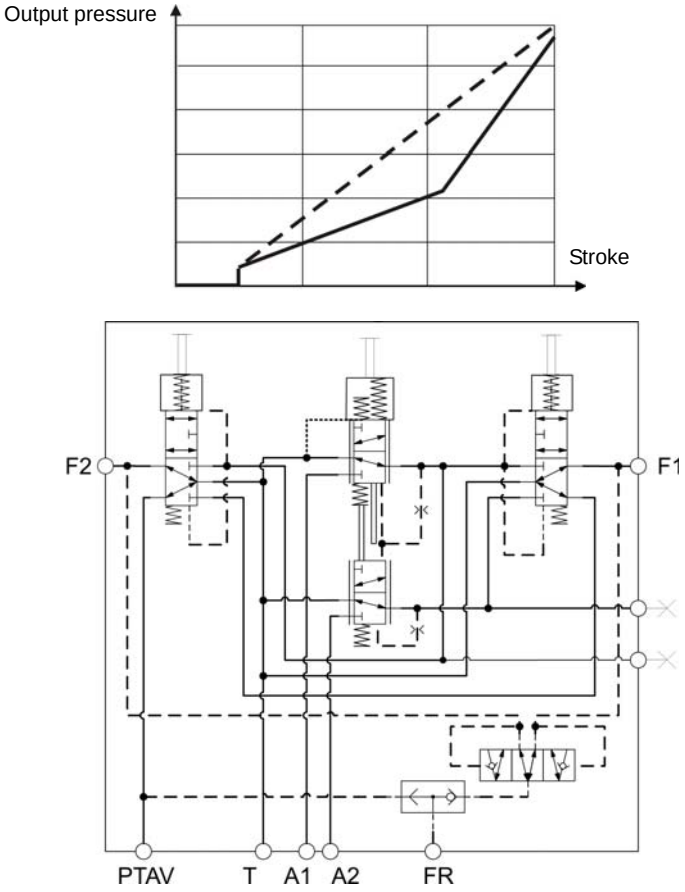



## Connections

| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* |
|---|---|---|---|---|
| **A1** | 125 *[1 813]* | M16x1.5 3/4-16 UNF-2B | Rear axle supply | 7,1 *[15.7]* |
| **A2** | | | Front axle supply | |
| **T** | 15 *[217.6]* | | Tank | |
| **F1** | 125 *[1 813]* | | Rear axle F1 braking | |
| **F2** | | | Rear axle F2 braking | |
| **FR *** | | M12x1.5 1/2-20 UNF-2B | Auxiliary brake output (optional) | |
| **PTAV** | | M16x1.5 3/4-16 UNF-2B | Front axle brake output | |

***** 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 your Poclain Hydraulics application engineer.

## Hydraulic diagram and characteristic curve

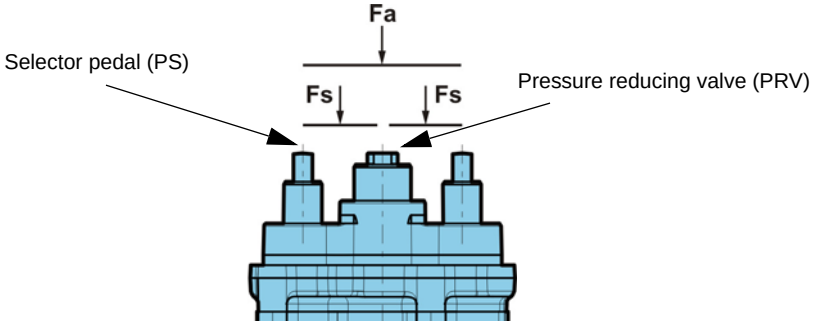



## Estimated maximum actuator forces according to output pressure

C

1 2

| | | Z |
|---|---|---|
| Field mode (Fs) | (daN) | 4.27 x max. output pressure (bar) + 28.5 |
| Road mode (Fa) | (daN) | 7.41 x max. output pressure (bar) + 54.5 |




**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.**

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 0 D 0 | 0 0 | 0 0 | | 0 | |

**P2 - Operating pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 40 bar *[580PSI]* | **4** |
| 60 bar *[870 PSI]* | **5** |
| 80 bar *[1 160PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |

**For other operating pressures, please consult your Poclain Hydraulics application engineer.**

****** Limitations

| | | |
|---|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms | |
| Current | min. 100 mA to assure contact | |
| | max. 4 A for Resistor load | |
| | max. 2,5 A for Inductive load | |
| Voltage | max. 42 V | |

**C1 - Control**

| | | |
|---|---|---|
| Control without force feedback | | **0** |
| Control with force feedback | DN20 | **Z** |

**C2 - Pressure switch ****

| | |
|---|---|
| Without | **0** |
| On MF (service brake pressure) | **2** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |

**R3 - Hydraulic connection**

| | |
|---|---|
| ISO 9974-1 (metric + spot face » ports) | **4** |
| ISO 11926-1 (SAE J514 fittings with O-ring) | **A** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Pressure sensor | **8** |
| Circuit pressurization * | **B** |

* Please consult your Poclain Hydraulics application engineer.

# VB-100

- **Accumulator charging**
- **Single-circuit**

**FLOW TYPES:**

- **45 l/min *[12 GPM]***
- **120 l/min *[32 GPM]***

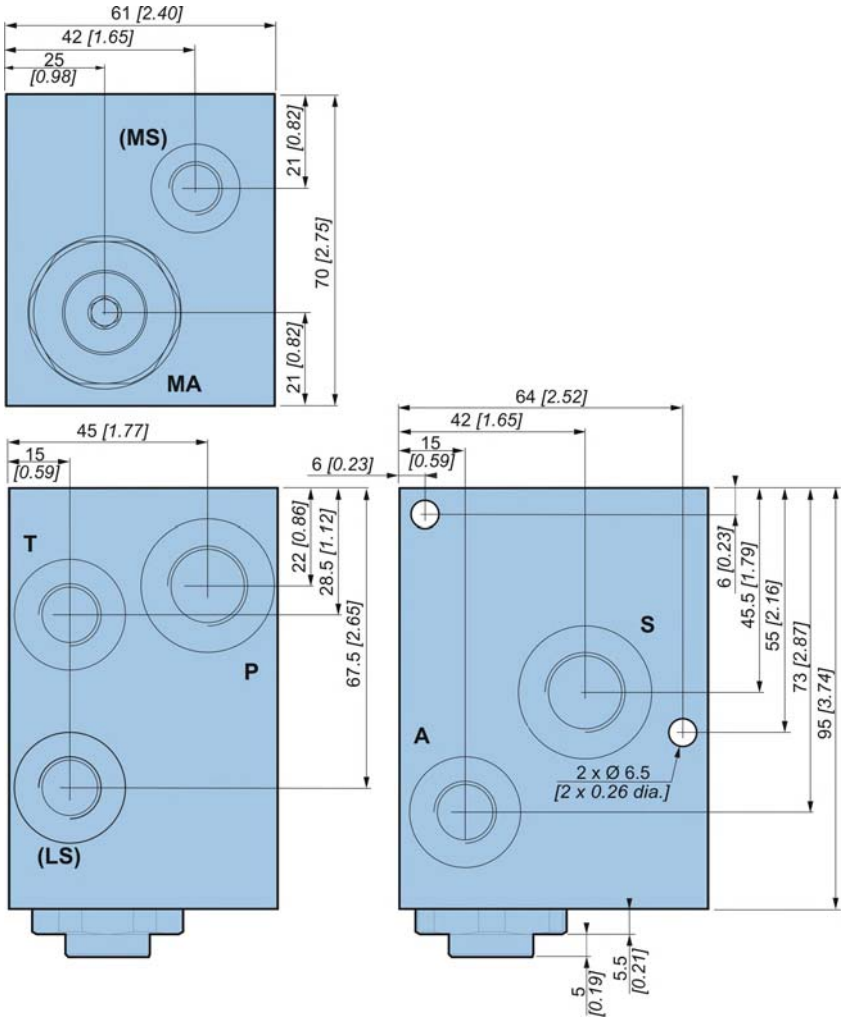
**Applications**

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

## Overall dimensions of VB-100 (45 l/min) accumulator charging valve

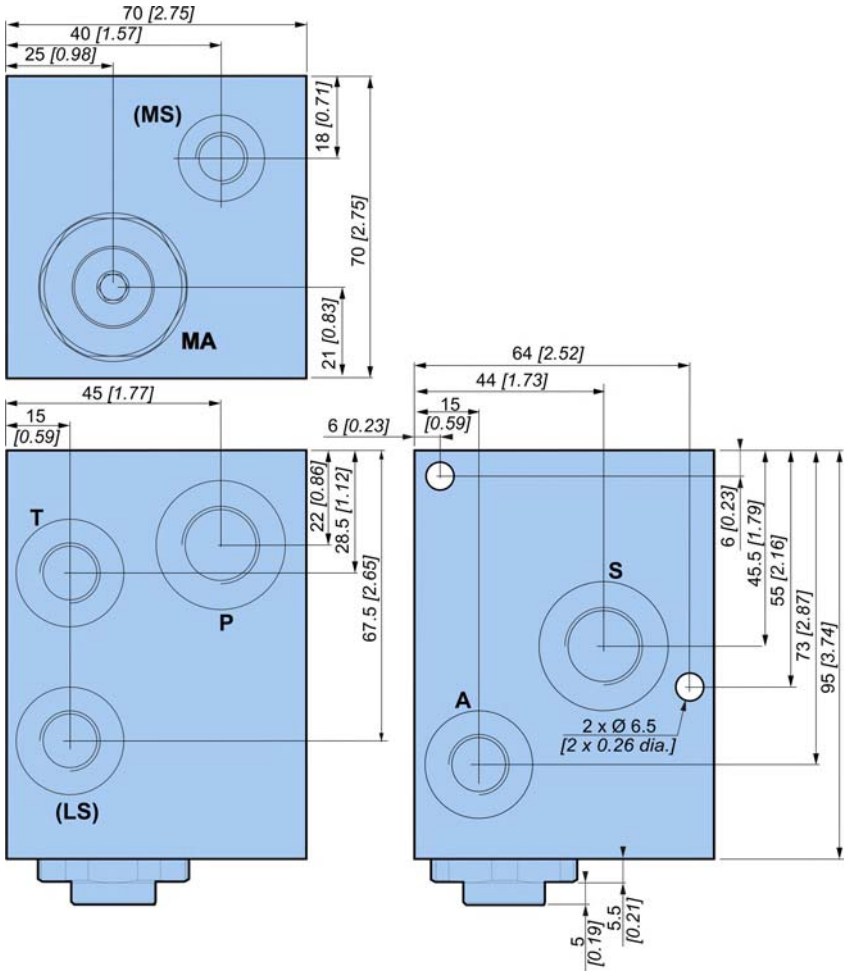



## Connections

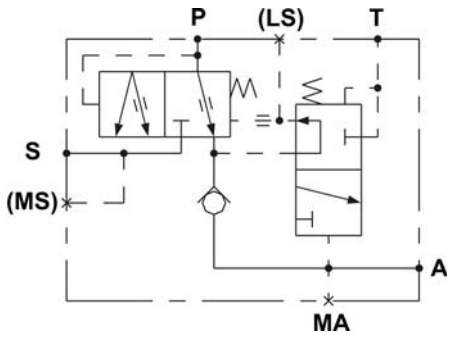
| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* | Loss of head * bar *[PSI]* |
|---|---|---|---|---|---|
| **P** | 250 *[3 626]* | M18x1.5 3/4-16 UNF-2B | Input | 2,2 *[4.8]* | 45 l/min 10 *[145]* |
| **S** | Cut-out pressure | | Auxiliary circuit | | |
| **T** | 1 *[14.5]* | M14x1.5 9/16-18 UNF-2B | Tank | | |
| **A** | Cut-out pressure | | Service braking accumulator | | |
| **MA **** | | 1/4 BSPP | Accumulator min. pressure switch | | 120 l/min 4 *[58]* |
| **LS **** | | M14x1.5 9/16-18 UNF-2B | Load sensing | | |
| **MS **** | | M12x1.5 | Pressure switch | | |

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

## Overall dimensions of VB-100 (120 l/min) accumulator charging valve

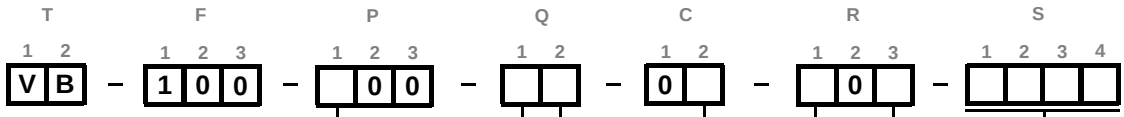



## Hydraulic diagram




**For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics application engineer.**

## Model Code




**P1 - Cut-in / Cut-out range**

| | |
|---|---|
| 110 - 130 bar *[1 595 - 1 885 PSI]* | **3** |
| 120 - 140 bar *[1 740 - 2 031 PSI]* | **4** |
| 135 - 160 bar *[1 958 - 2 321 PSI]* | **5** |
| 160 - 190 bar *[2 321 - 2 756 PSI]* | **6** |
| 170 - 200 bar *[2 466 - 2 901 PSI]* | **7** |
| 180 - 210 bar *[2 611 - 3 046 PSI]* | **8** |

**Q1 - Flow rate to auxiliaries (P to S)**

| | |
|---|---|
| 45 l/min *[12 GPM]* | **4** |
| 120 l/min *[32 GPM]* | **6** |

**Q2 - 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** |

****** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C2 - Pressure switch ****

| | |
|---|---|
| Without | **0** |
| On MA (accumulator min. pressure) | **1** |
| On MS (auxiliary) | **3** |
| On MA and MS | **6** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 X 0.8) | **5** |

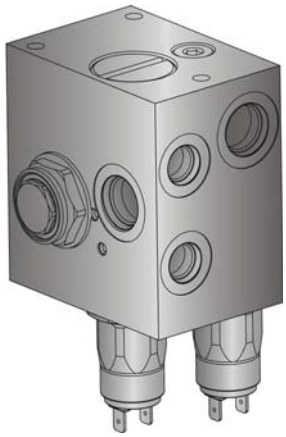
**R3 - Hydraulic connection**

| | | |
|---|---|---|
| ISO 9974-1 (BSPP + spot face » ports) | M14x1.5 | **4** |
| ISO 11 926-1<br>(SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| LS Port | **5** |
| MS Port | **C** |
| MS + LS Port | **D** |

* Please consult your Poclain Hydraulic application engineer.



# VB-200

- **Accumulator charging**
- **Dual-circuit**

**FLOW TYPES:**

- **45 l/min *[12 GPM]***
- **120 l/min *[32 GPM]***

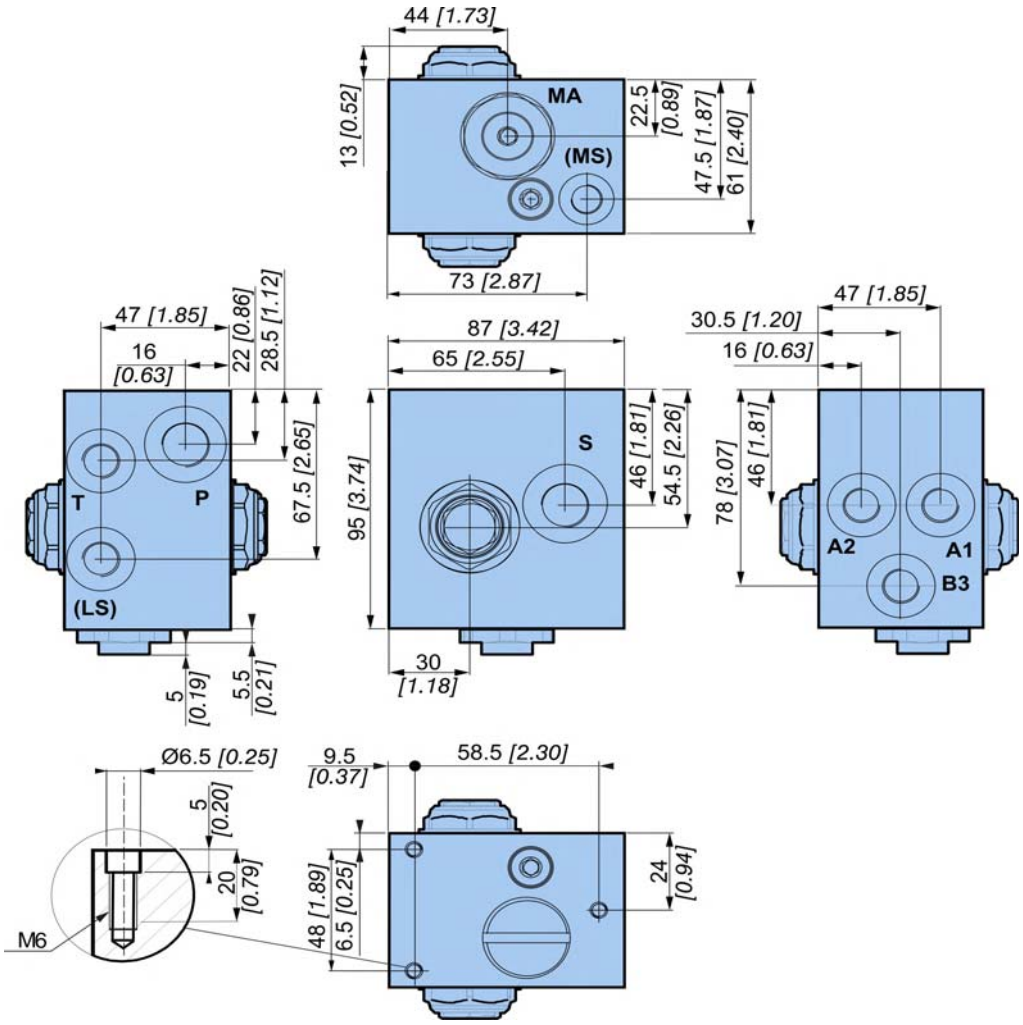
**Applications**

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).
When 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.
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

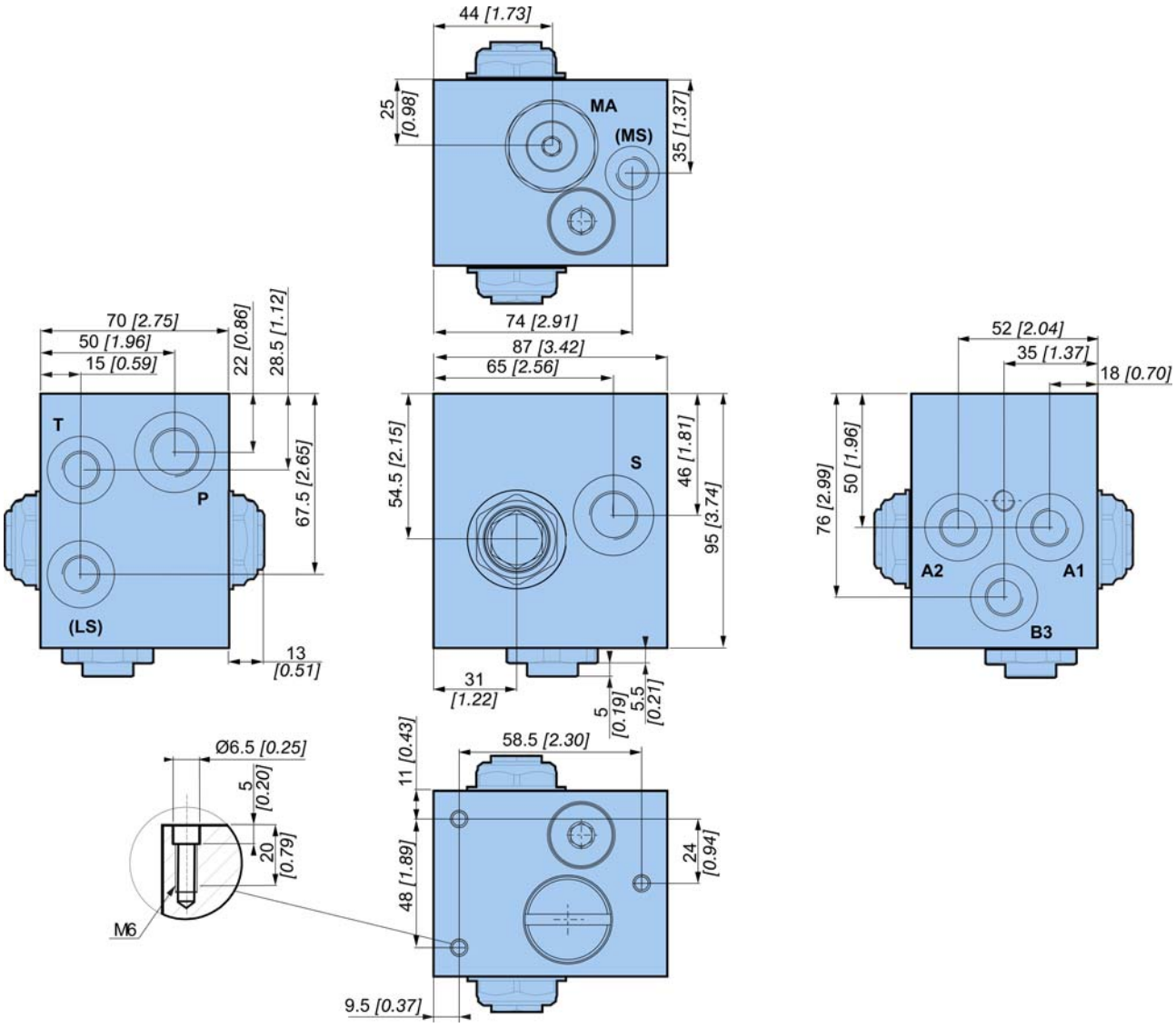



## Connections

| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* | Loss of head * bar *[PSI]* |
|---|---|---|---|---|---|
| **P** | 250 *[3 626]* | M18x1.5 3/4-16 UNF-2B | Input | 4 *[8.8]* | 45 l/min 10 *[145]* |
| **S** | Cut-out pressure | | Auxiliary circuit | | |
| **T** | 1 *[14.5]* | M14x1.5 9/16-18 UNF-2B | Tank | | |
| **A** | Cut-out pressure ** | | Service braking accumulator | | |
| **MA ***** | | 1/4 BSPP | Accumulator min. pressure switch | | 120 l/min 4 *[58]* |
| **LS ***** | | M14x1.5 9/16-18 UNF-2B | Load sensing | | |
| **MS ***** | | M12x1.5 | Pressure switch | | |

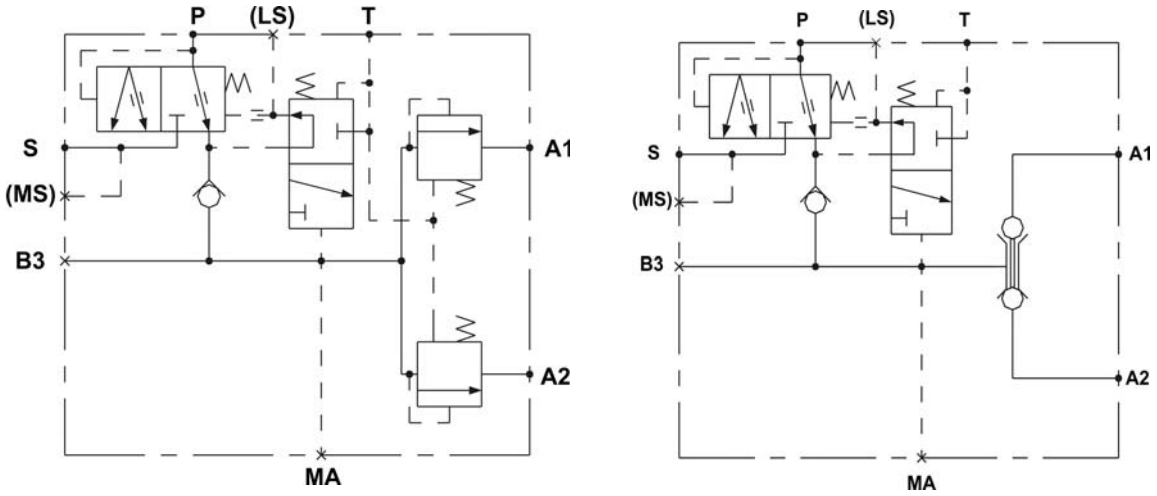
***** Loss of head (P to S) is given at a flow rate (Q = 30l/min, 8 GPM)
** Or max. allowable pressure for the accumulator.
*** Options

## Overall dimensions of VB-200 (120 l/min) accumulators charging valve




## Hydraulic diagram

**Isolating ball valves**



**For information concerning special operating conditions (environment, temperatures, etc.), please contact your Poclain Hydraulics application engineer.**

## Model Code

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 2 0 0 | 0 0 | | 0 | 0 | |

**P1 - Cut-in/Cut-out range**

| | |
|---|---|
| 110 - 130 bar *[1 595 - 1 885 PSI]* | **3** |
| 120 - 140 bar *[1 740 - 2 031 PSI]* | **4** |
| 135 - 160 bar *[1 958 - 2 321 PSI]* | **5** |
| 160 - 190 bar *[2 321 - 2 756 PSI]* | **6** |
| 170 - 200 bar *[2 466 - 2 901 PSI]* | **7** |
| 180 - 210 bar *[2 611 - 3 046 PSI]* | **8** |

**Q1 - Flow rate to auxiliaries (P to S)**

| | |
|---|---|
| 45 l/min *[12 GPM]* | **4** |
| 120 l/min *[32 GPM]* | **6** |

**Q2 - 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** |

****** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C2 - Pressure switch ****

| | |
|---|---|
| Without | **0** |
| On MA (accumulator min. pressure) | **1** |
| On MS (auxiliary) | **3** |
| On MA and MS | **6** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |

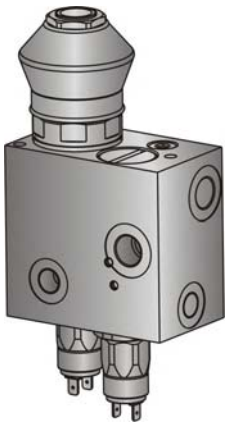
**R3 - Hydraulic connection**

| | | |
|---|---|---|
| ISO 9974-1 (BSPP + spot face » ports) | M14x1.5 | **4** |
| ISO11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| LS Port | **5** |
| Isolating ball valves | **6** |
| MS Port | **C** |
| MS + LS Port | **D** |

* Please consult your Poclain Hydraulics application engineer.

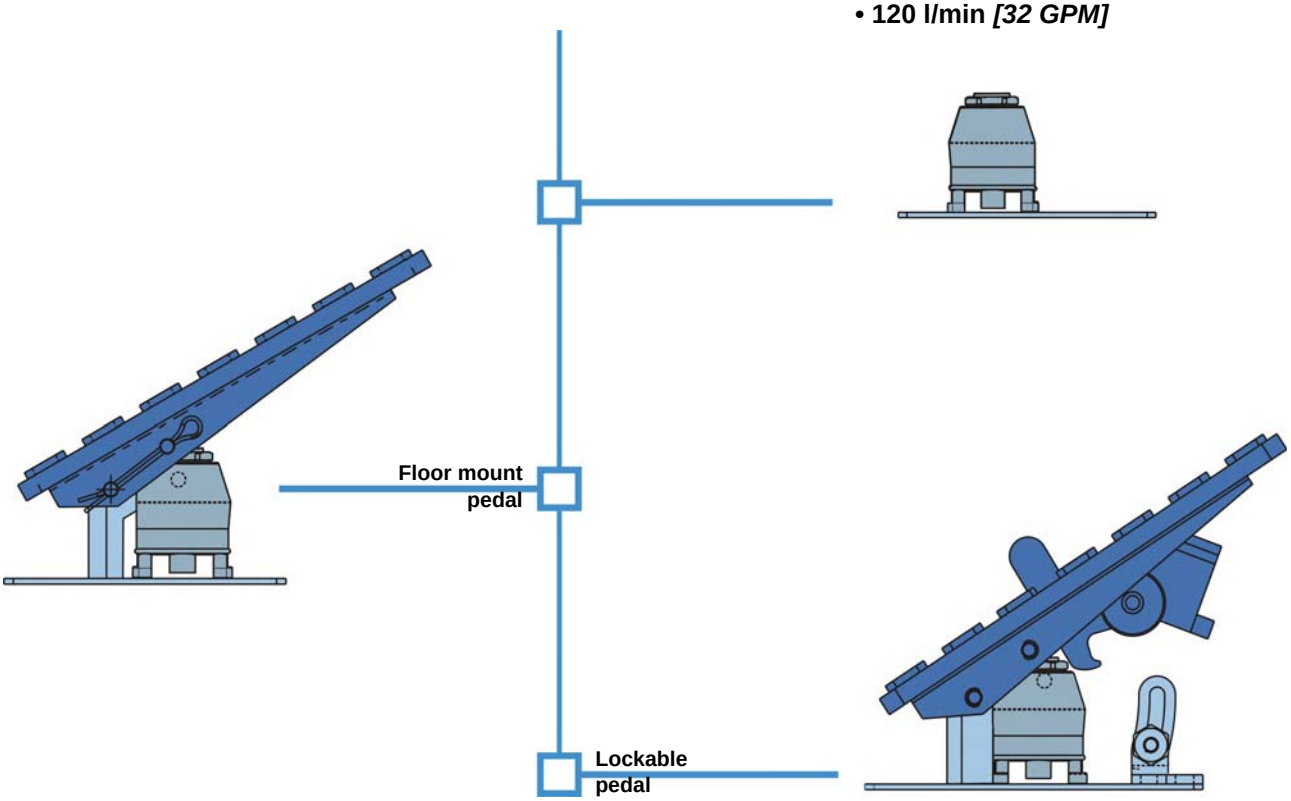


# VB-110

- **Service brake valve**
- **Accumulator charging valve**
- **Single-circuit**

**FLOW TYPES**

- **45 l/min *[12 GPM]***
- **120 l/min *[32 GPM]***




**Applications**

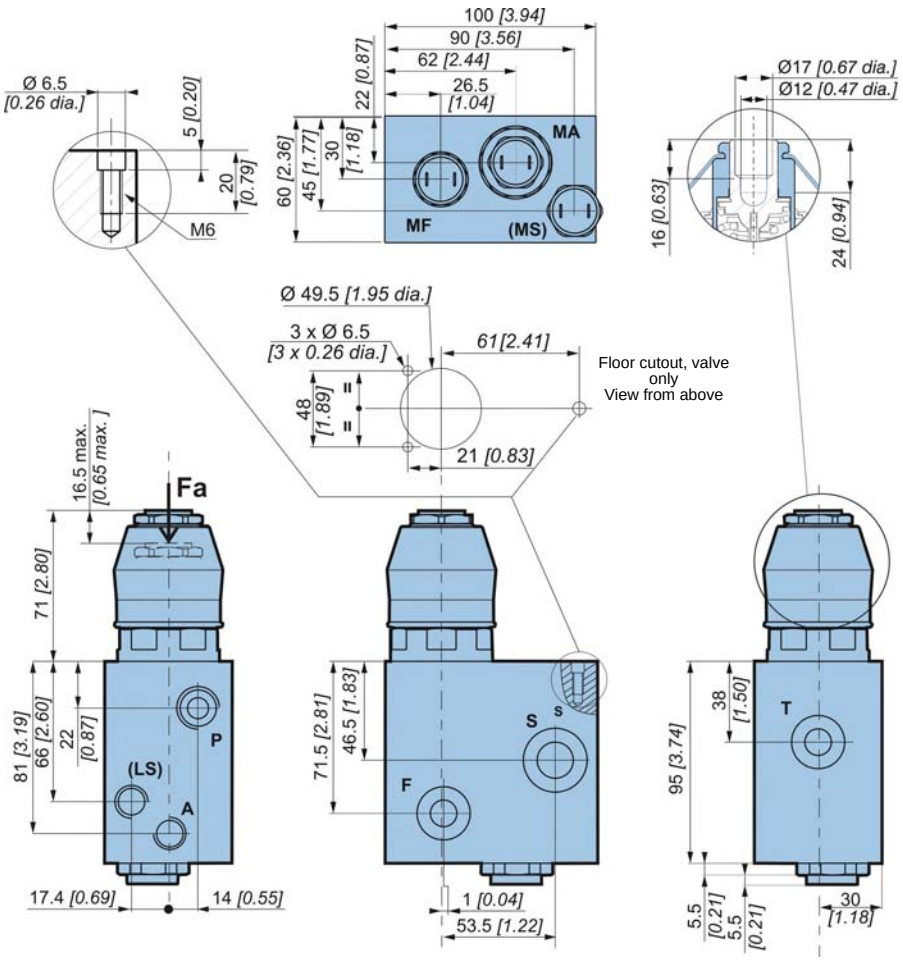
VB-110 modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve.
VB-110 braking assembly contains the following components in a single manifold:

• 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, a built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).
When 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.
VB-110 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 pedal is at rest ('up' position), the output pressure (at F) is zero and brake receptors are connected to the tank (F to T).
When pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal.
When pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespectively of the supply pressure.

## Overall dimensions of VB-110 (45 l/min) brake valve

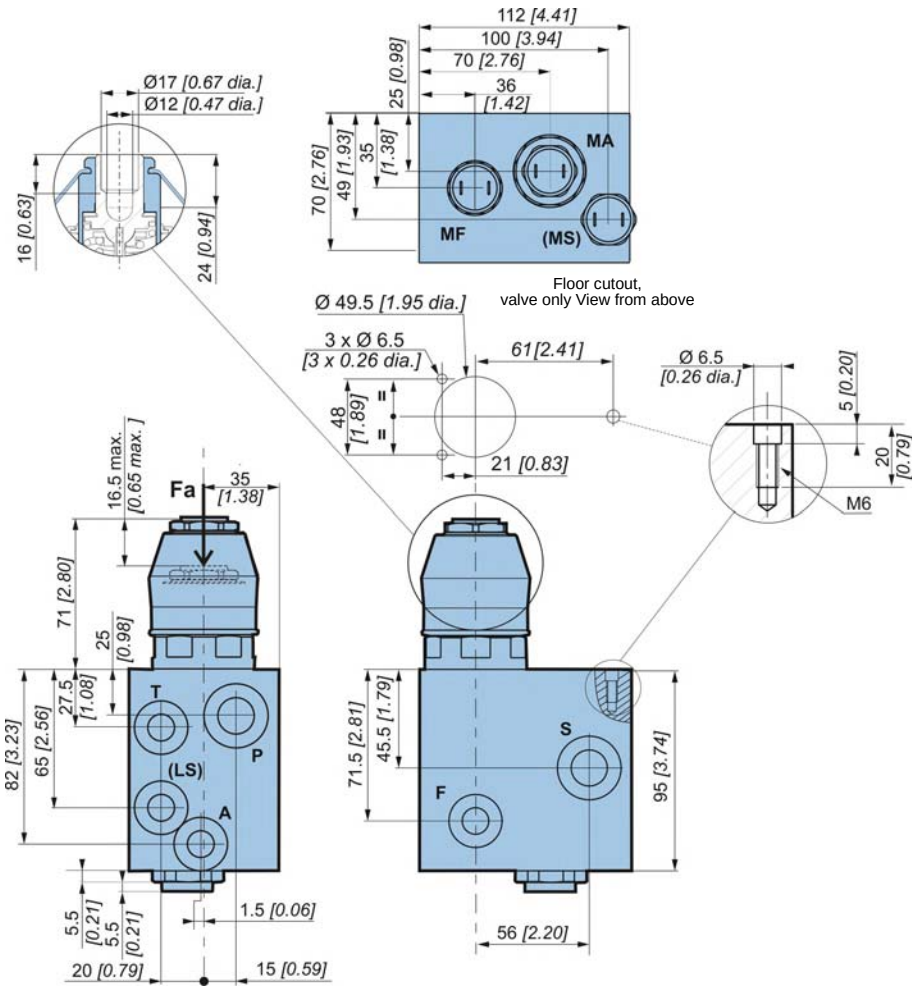



## Connections

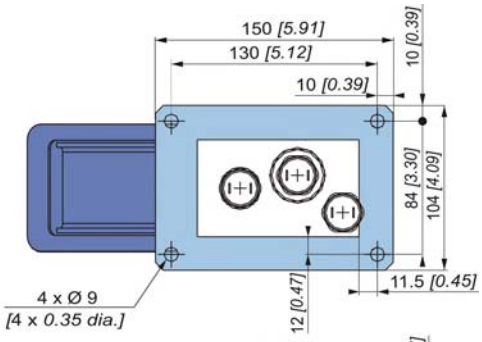
| Port | Max. presure bar *[PSI]* | Connection | Function | kg *[lbs]* | Loss of head (P to S) * bar *[PSI]* |
|---|---|---|---|---|---|
| **P** | 250 *[3 626]* | M18x1.5 3/4-16 UNF-2B | Input | 5 *[12.8]* | **VB-110 (45 l/min)** 10 *[145]* at Q=30l/min *[8 GPM]* |
| **S** | Cut-out pressure | | Auxiliary circuit | | |
| **T** | 1 *[14.5]* | M14x1.5 9/16-18 UNF-2B | Tank | | |
| **F** | 120 *[1 740]* * | | Service braking | | |
| **A** | Cut-out pressure ** | | Service braking accumulator | | |
| **MA ***** | | 1/4 BSPP | Accumulator min. pressure switch | | **VB 110 (120 l/min)** 4 *[58]* at Q=60l/min *[16 GPM]* |
| **MF ***** | | | Service braking switch | | |
| **LS ***** | | M14x1.5 9/16-18 UNF-2B | Load sensing | | |
| **MS ***** | | M12x1.5 | MS pressure switch | | |

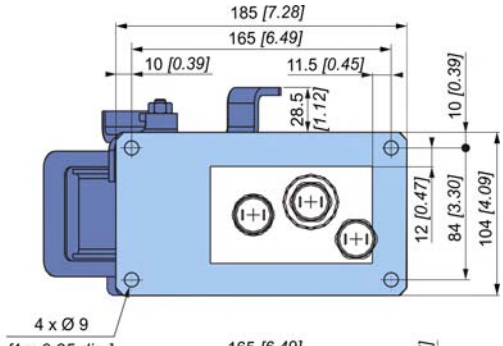
* Please consult your Poclain Hydraulics application engineer for higher pressure option.
** Or max. allowable pressure.
*** Option

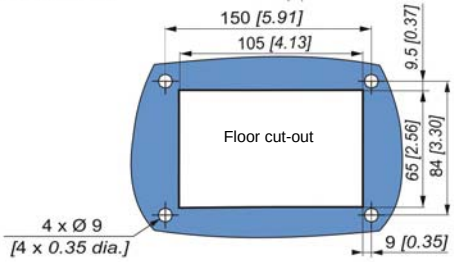
## Overall dimensions of VB-110 (120 l/min) brake valve

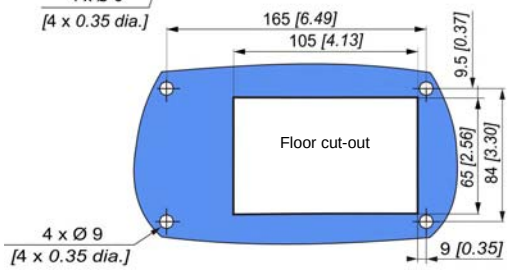


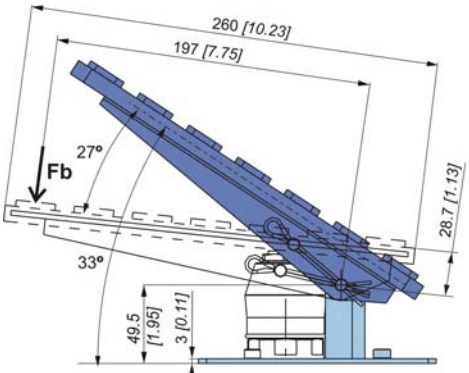
## Mechanical Controls



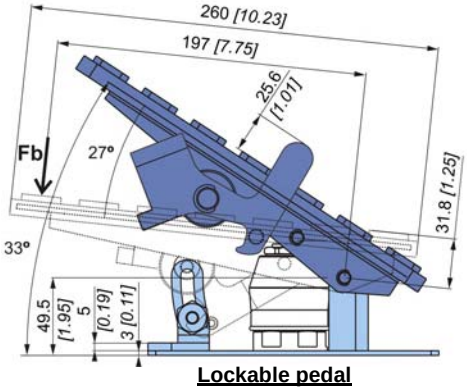



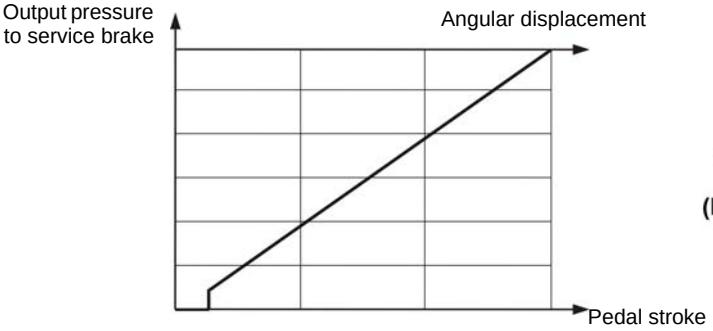



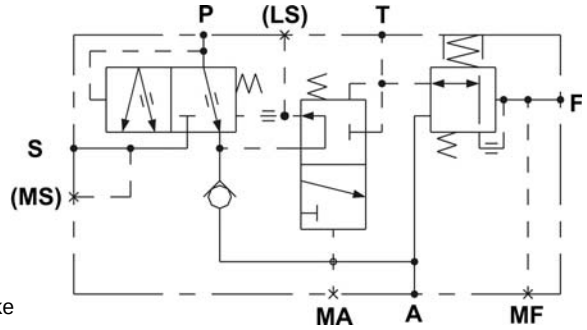

**Floor mount pedal**




**Lockable pedal**

## Hydraulic diagram and characteristic curve




## Estimated max. actuator force as a function of output pressure

| | | |
|---|---|---|
| • Force on pedal (Fa) (45l/min) | : | Fa (daN) ≈0.5 x max. output pressure (bar) + 35 |
| • Force on pedal (Fa) (120 l/min) | : | Fa (daN) ≈0.5 x max. output pressure (bar) + 27 |
| • Force on pedal (Fb) | : | Fb (daN) ≈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

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 1 1 0 | | | | 0 | |

**P1 - Cut-in / Cut-out range**

| | |
|---|---|
| 110 - 130 bar *[1 595 - 1 885 PSI]* | **3** |
| 120 - 140 bar *[1 740 - 2 031 PSI]* | **4** |
| 135 - 160 bar *[1 958 - 2 321 PSI]* | **5** |
| 160 - 190 bar *[2 321 - 2 756 PSI]* | **6** |
| 170 - 200 bar *[2 466 - 2 901 PSI]* | **7** |
| 180 - 210 bar *[2 611 - 3 046 PSI]* | **8** |

**P2 - Operating pressure**

| | |
|---|---|
| 40 bar *[580 PSI]* | **4** |
| 60 bar *[870 PSI]* | **5** |
| 80 bar *[1 160 PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |

**Q1 - Flow rate to auxiliaries (P to S)**

| | |
|---|---|
| 45 l/min *[12 GPM]* | **4** |
| 120 l/min *[32 GPM]* | **6** |

**Q2 - 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 application engineer.**

****** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (manual lock) | **F** |

**C2 - Pressure switch ****

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

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |

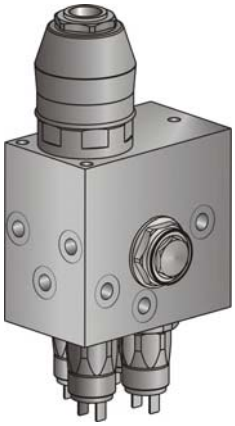
**R3 - Hydraulic connection**

| | | |
|---|---|---|
| ISO 9974-1 (BSPP + spot face » ports) | M14x1.5 | **4** |
| ISO11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| LS Port | **5** |
| Dual-slope spring mechanism * | **7** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization* | **B** |
| MS Port | **C** |
| MS + LS Port | **D** |

* Please consult your Poclain Hydraulics application engineer.

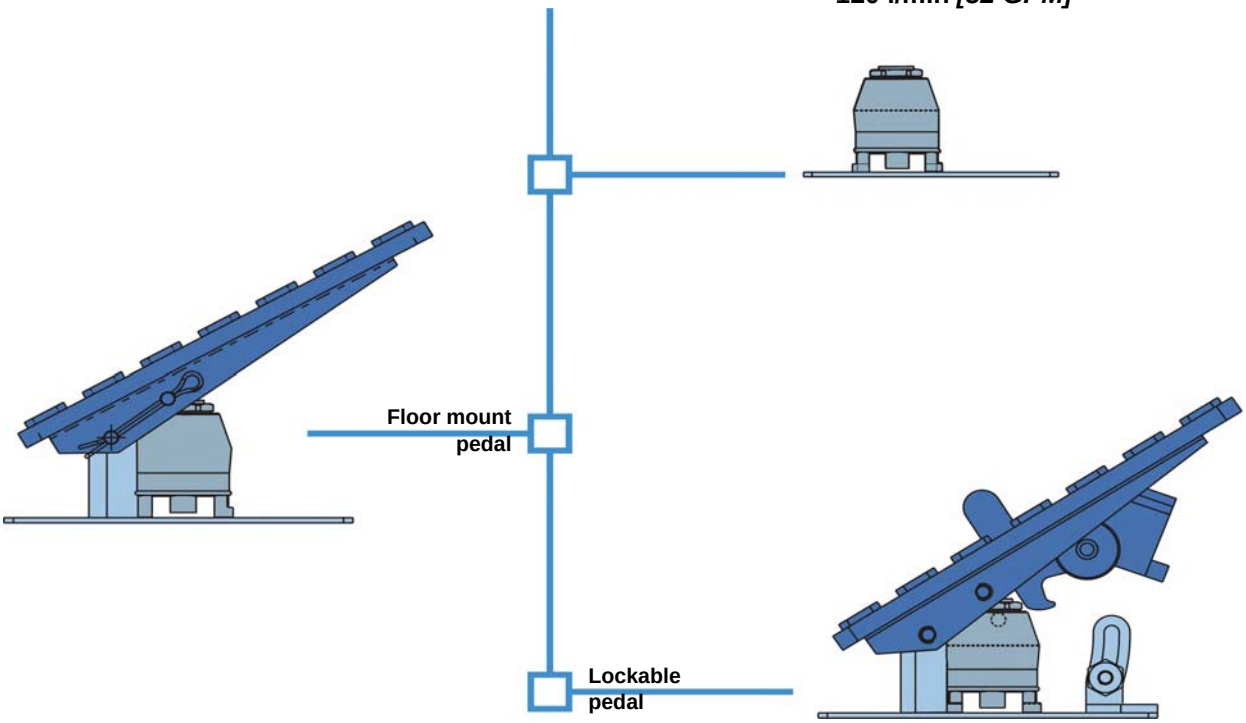


# VB-220

- **Service brake valve**
- **Accumulator charging valve**
- **Dual-circuit**

**FLOW TYPES**

- **45 l/min *[12 GPM]***
- **120 l/min *[32 GPM]***




**Applications**

VB-220 service brake valve is a mechanically-controlled, three way, graduated release dual pressure reducing valve.
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.

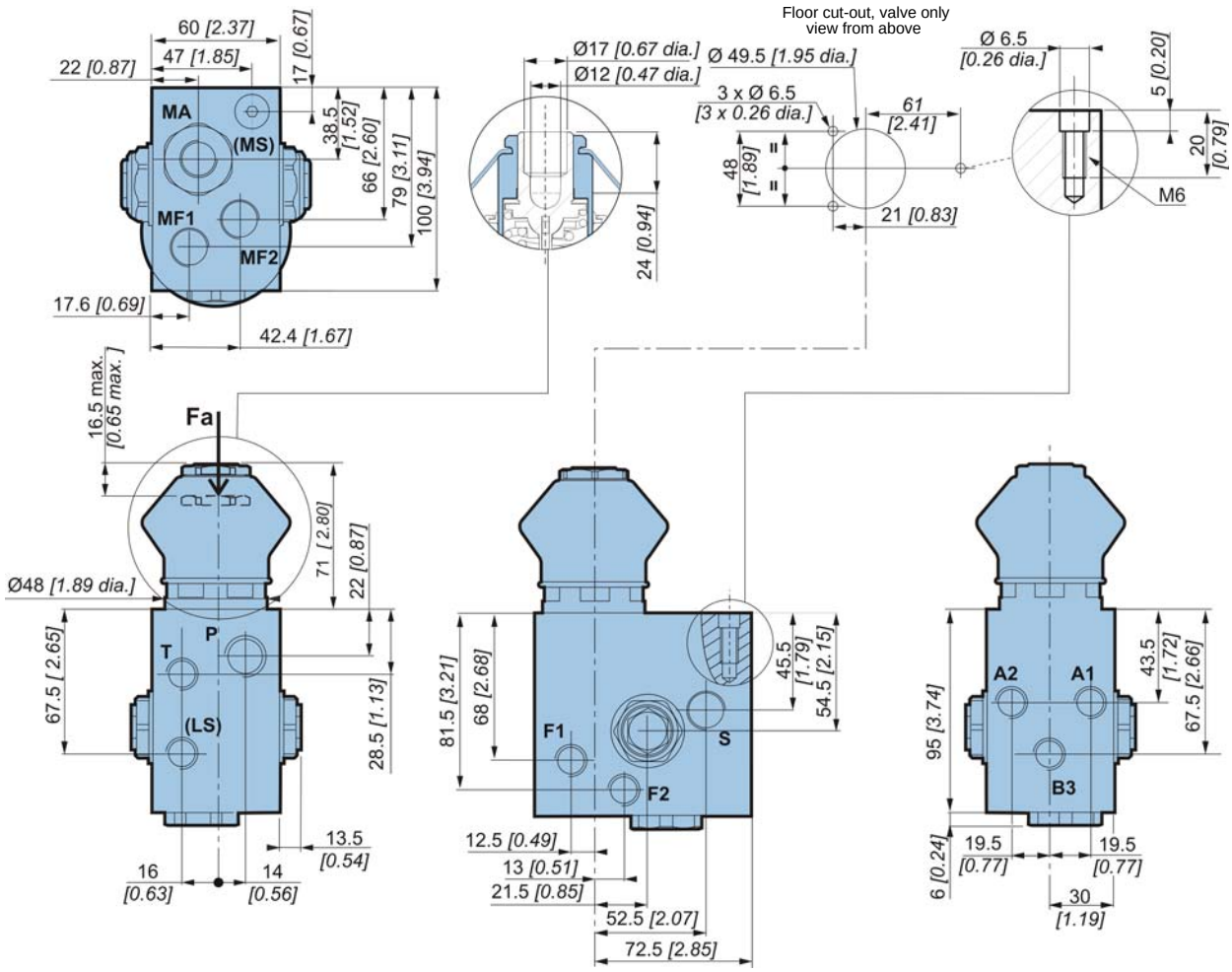
The output pressures (at F1 and F2), for the braking circuits, can be equal or different according to a ratio F2/F1 = 0.64 (VB-2E0) or 0.44 (VB-2F0).

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).
When 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. 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 a 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 (45l/min) brake valve**

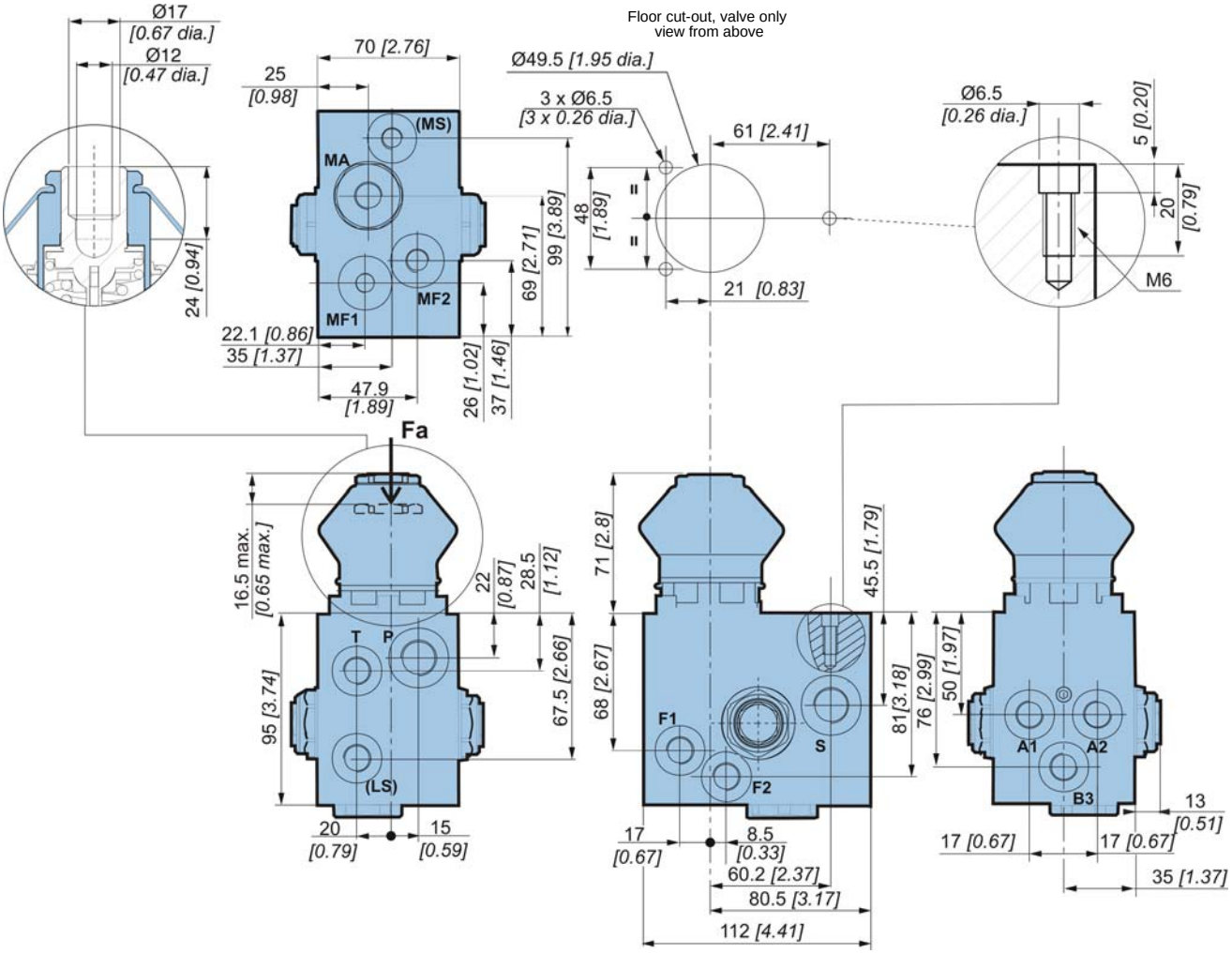



## Connections

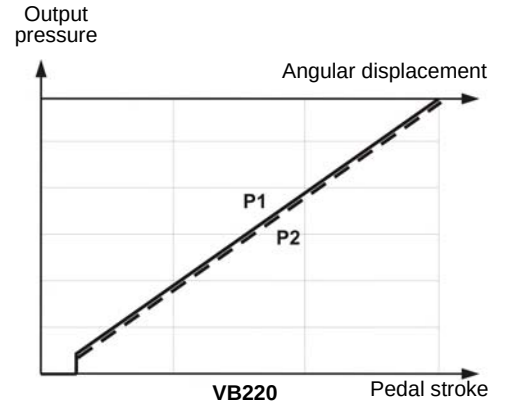
| Port | Max. pressure bar *[PSI]* | Connection | | Function | kg *[lbs]* | Loss of head (P to S) bar *[PSI]* |
|---|---|---|---|---|---|---|
| | | VB-220 (45l/min) | VB-220 (120 l/min) | | | |
| **P** | 250 *[3 626]* | M18x1.5 | M18x1.5<br>3/4-16 UNF-2B | Input | **VB-110 (45l/min)**<br>4,7 *[10.3]* | **VB-110 (45 l/min)**<br>10 *[145]*<br>at Q=30l/min *[8 GPM]* |
| **S** | Cut-out pressure | | | Auxiliary circuit | | |
| **T** | 1 *[14.5]* | M14x1.5 | M14x1.5<br>9/16-18 UNF-2B | Tank | | |
| **F1 - F2** | 120 *[1 740]* * | | | Service braking | | |
| **A1 - A2** | Cut-out pressure ** | | | Service braking accumulator | | |
| **B3** | | | | Parking brake connection | | |
| **MA** | | 1/4 BSPP | 1/4 BSPP | Accumulator min. pressure switch | **VB-110 (120l/min)**<br>6 *[13.2]* | **VB-110 (120 l/min)**<br>4 *[58]*<br>at Q=60l/min *[16 GPM]* |
| **MF1** | | M10x1 | M10x1<br>M10x1 (VB-220)<br>M12x1 (VB-2E0)<br>M14x1 (VB-2F0) | Service pressure switch | | |
| **MF2** | | | | | | |
| **LS ***** | | M14x1.5 | M14x1.5<br>9/16-18 UNF-2B | Load sensing | | |
| **MS ***** | | M12x1.5 | M12x1.5 | MS pressure switch | | |

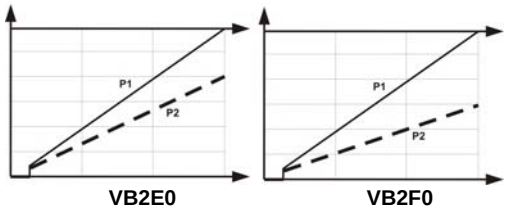
* Please consult your Poclain Hydraulics application engineer for higher pressure option.
** Or max. allowable pressure for the accumulator.
*** Option

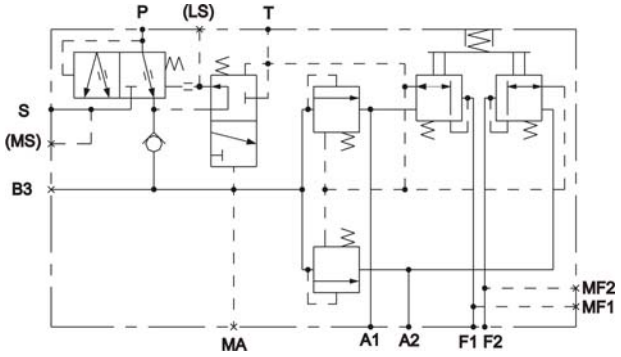
## Overall dimensions of VB-220 (120 l/min) brake valve



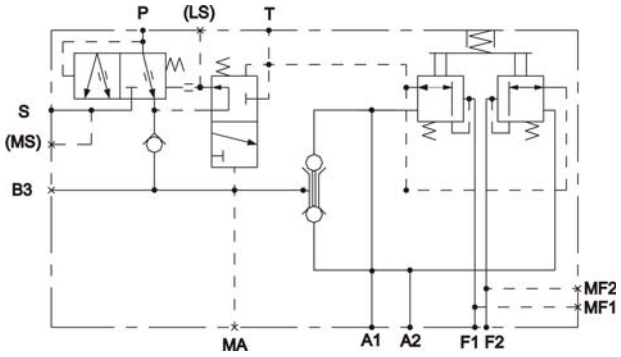

## Hydraulic diagram and characteristic curves



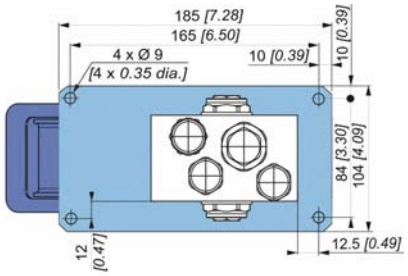



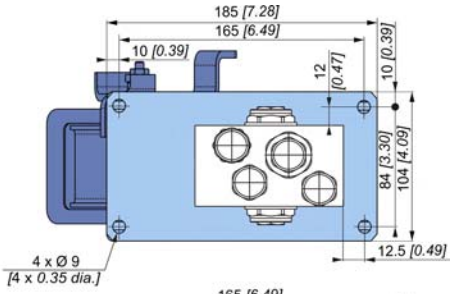



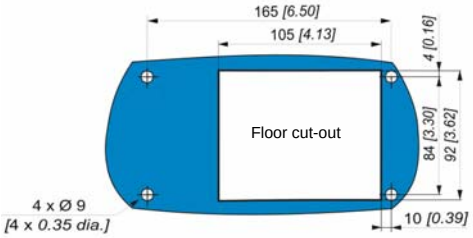

**Isolating ball valves**

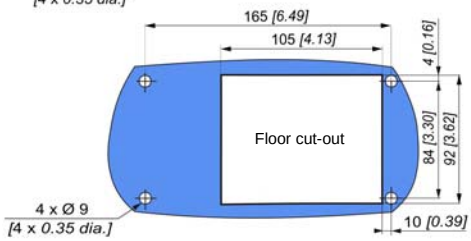


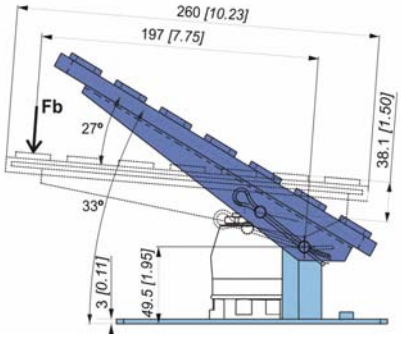
## Mechanical controls: 45l/min



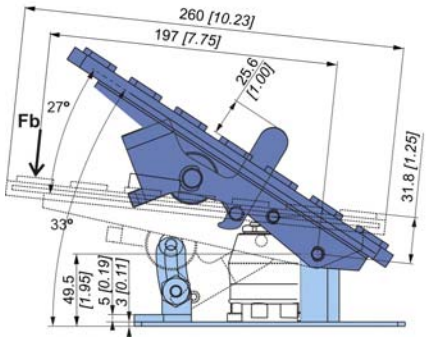



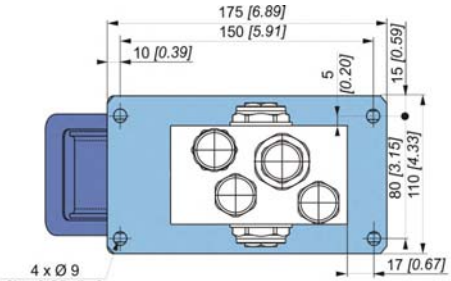



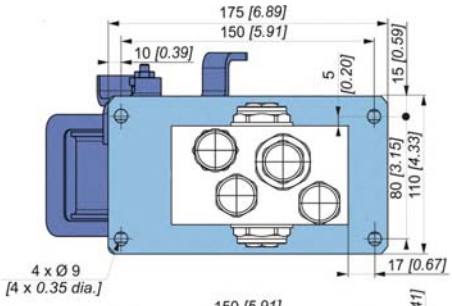

**Floor mount pedal**

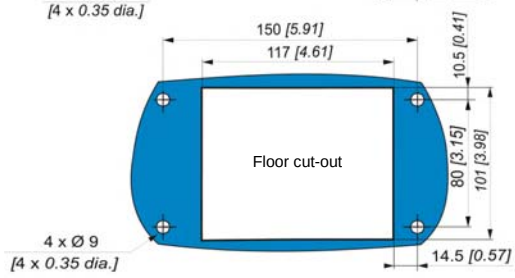


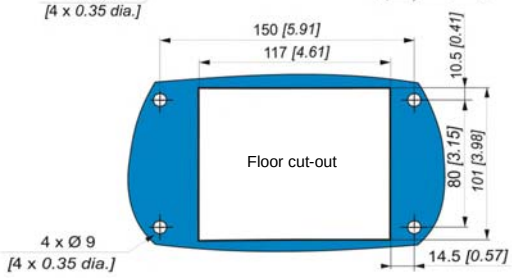

**Lockable pedal**

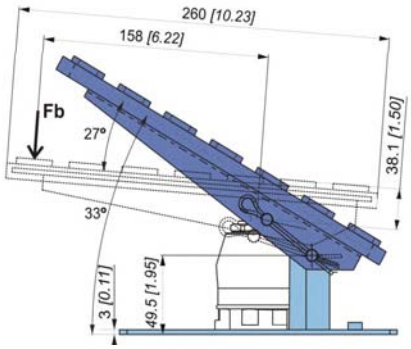
## Mechanical controls: 120l/min



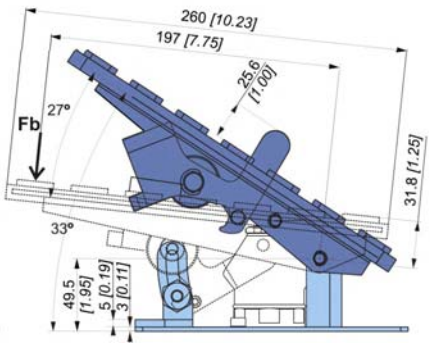




**Floor mount pedal**




**Lockable pedal**

## Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa) : Fa (daN) ≈0.5 x max. output pressure (bar) + 35
- Force on pedal (Fb) : Fb (daN) ≈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

| T | F | | P | | | Q | | C | | R | | | S | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| V | B | – | 2 | | 0 | – | | | 0 | – | | | – | | 0 | – | | |

**F2 - Service brake**

| | |
|---|---|
| Dual circuit with ratio F2/F1 = 1 | **2** |
| Dual circuit with ratio F2 /F1 = 0.64 | **E** |
| Dual circuit with ratio F2/ F1 = 0.44 | **F** |

**P1 - Cut-in / Cut-out range**

| | |
|---|---|
| 110 - 130 bar *[1 595 - 1 885 PSI]* | **3** |
| 120 - 140 bar *[1 740 - 2 031 PSI]* | **4** |
| 135 - 160 bar *[1 958 - 2 321 PSI]* | **5** |
| 160 - 190 bar *[2 321 - 2 756 PSI]* | **6** |
| 170 - 200 bar *[2 466 - 2 901 PSI]* | **7** |
| 180 - 210 bar *[2 611 - 3 046 PSI]* | **8** |

**P2 - Operating pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 40 bar *[580 PSI]* | **4** |
| 60 bar *[870 PSI]* | **5** |
| 80 bar *[1 160 PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |

**Q1 - Flow rate to auxiliaries (P to S)**

| | |
|---|---|
| 45 l/min *[12 GPM]* | **4** |
| 120 l/min *[32 GPM]* | **6** |

**Q2 - 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 application engineer.**

****** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (manual lock) | **F** |

**C2 - Pressure switch ****

| | |
|---|---|
| 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** |

**R1 - Electrical connection**

| | |
|---|---|
| Without | **0** |
| Deutsch | **3** |
| AMP (6.3 x 0.8) | **5** |

**R3 - Hydraulic connection**

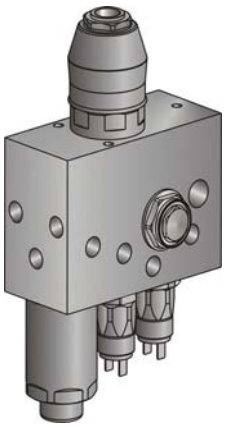
| | | |
|---|---|---|
| ISO 9974-1 (BSPP + spot face » ports) | M14x1.5 | **4** |
| ISO11926-1 (SAE J514 fittings with O-ring) | 9/16-18 UNF-2B | **A** |

**S1 - S4 Options** (See page 79)

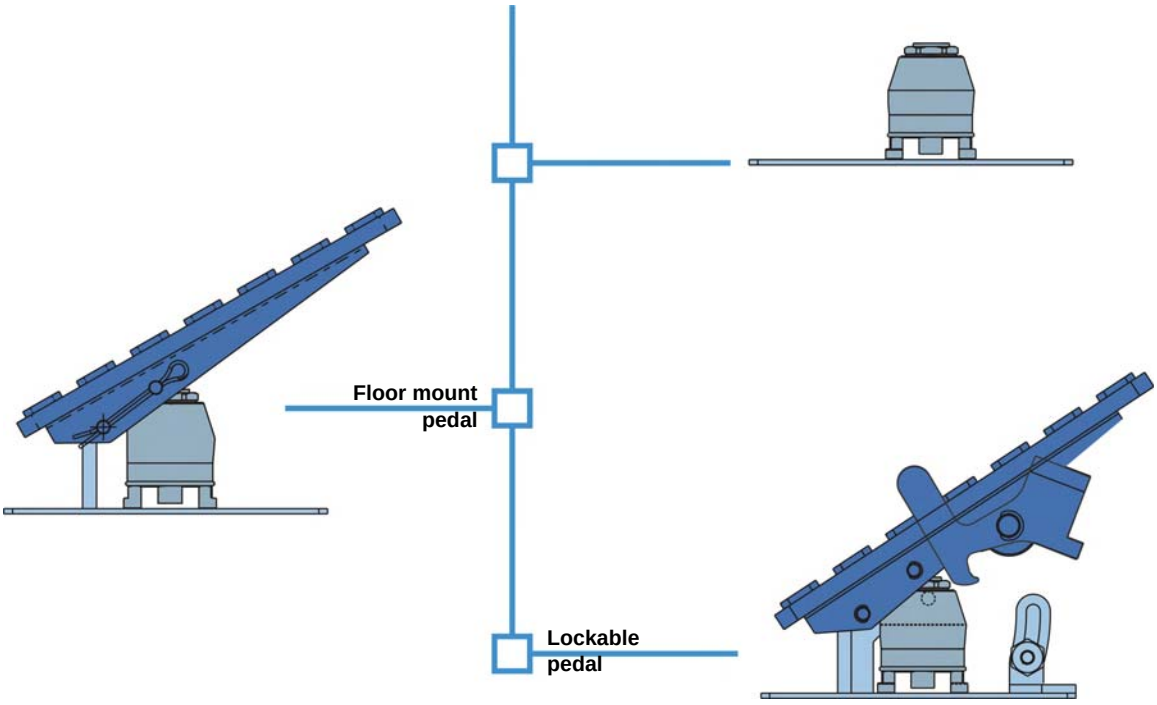
| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **4** |
| LS Port | **5** |
| Isolating ball valves | **6** |
| Dual-slope spring mechanism * | **7** |
| Pressure sensor | **8** |
| Pedal back abutment | **9** |
| Circuit pressurization * | **B** |
| MS Port | **C** |
| MS + LS Port | **D** |

* Please consult your Poclain Hydraulics application engineer.

# VB-22E



- **Parking brake valve**
- **Service brake valve**
- **Accumulators charging valve**
- **45 l/min *[12 GPM]***
- **Dual-circuit**




**Applications**

The service brake valve is a mechanically-controlled, three-way, graduated release dual pressure reducing valve. VB-22E braking assembly contains the following components in a single manifold:

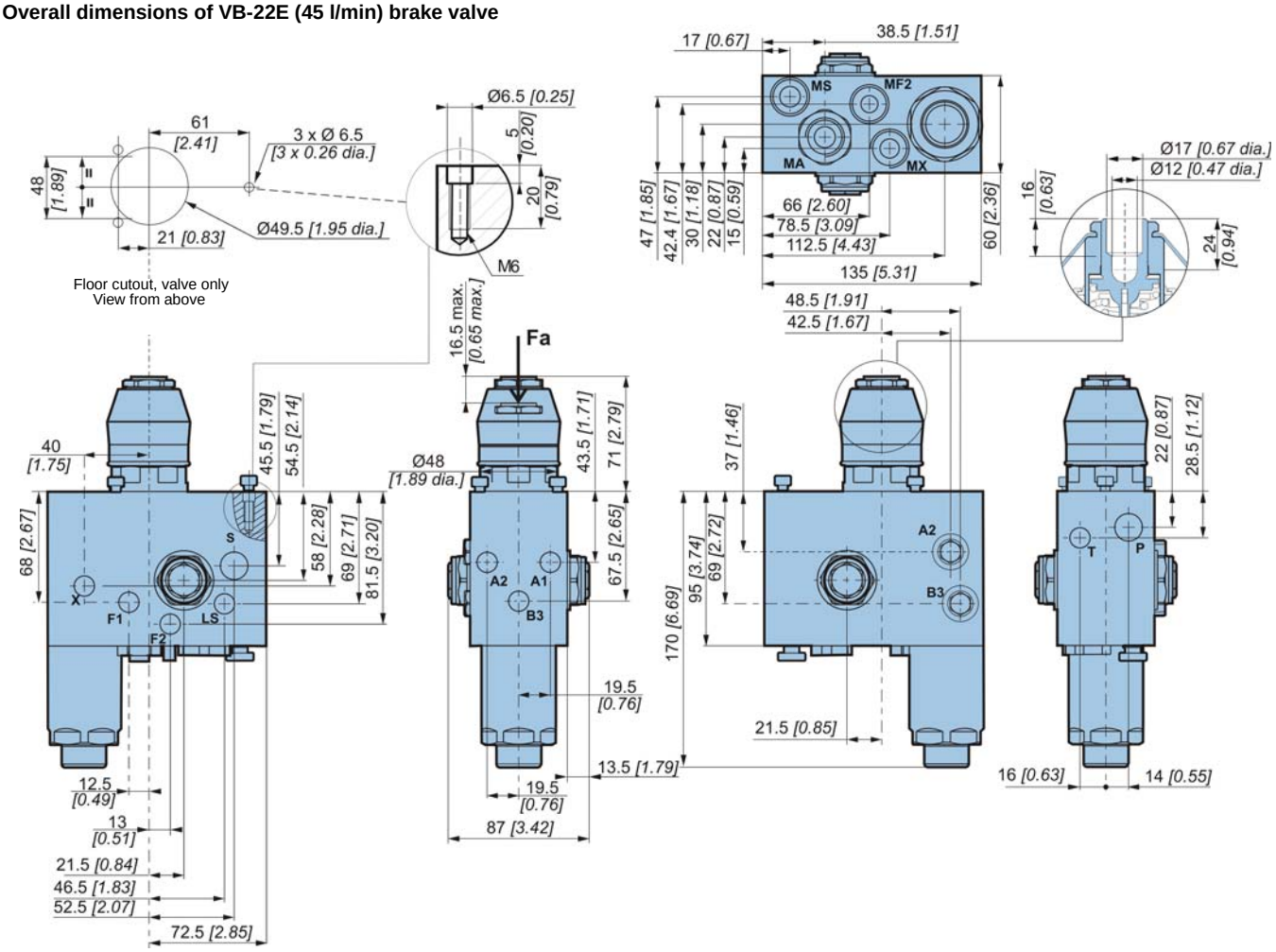
- A dual-circuit accumulator charging valve,
- A mechanically controlled dual-circuit service brake valve,
- An electrically controlled parking brake valve,
- Two isolating valves for the braking circuits.

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.
VB-22E 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**



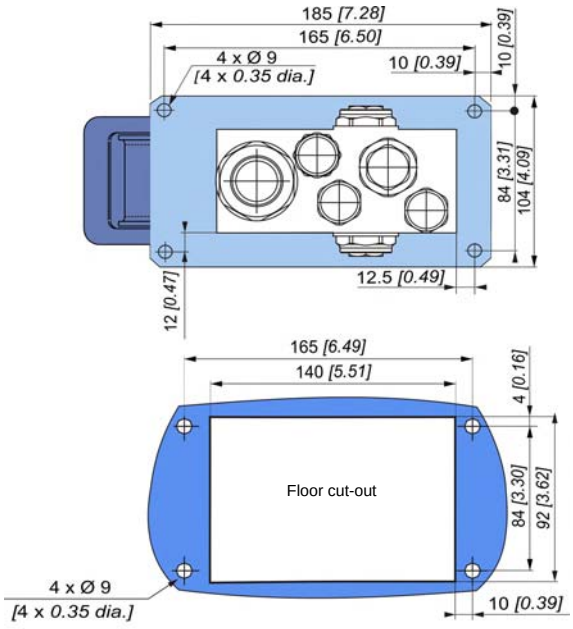

## Connections

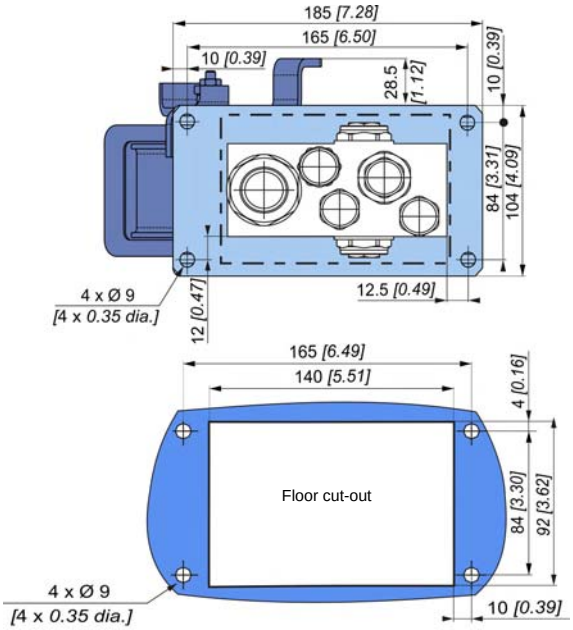
| Port | Max. pressure bar *[PSI]* | Connection | Function | kg *[lbs]* | Loss of head (P to S) bar *[PSI]* |
|---|---|---|---|---|---|
| **P** | 210 *[3 046]* | M18x1.5 | Input | 8 *[17.6]* | 10 *[145]* |
| **S** | Cut-out pressure | | Auxiliary circuit | | |
| **T** | 1 *[14.5]* | M14x1.5 | Tank | | |
| **F1 - F2** | 120 *[1 740]* * | | Service braking | | |
| **X** | Cut-out pressure ** | | Parking brake | | |
| **A1 - A2** | | | Service braking accumulator | | |
| **B3** | | | Parking brake connection | | |
| **MA** | | 1/4 BSPP | Accumulator min. pressure switch | | |
| **MF2** | | M10x1 | Service brake pressure switch | | |
| **MX** | | 1/4 BSPP | Parking brake pressure switch | | |
| **LS** | | M14x1.5 | Load sensing | | |
| **MS** | | M12x1.5 | MS pressure switch | | |

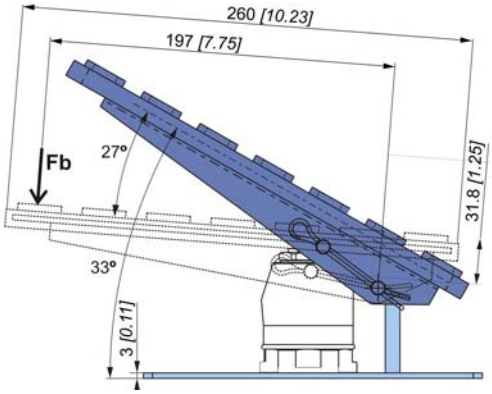
* Please consult your Poclain Hydraulics application engineer for higher pressure option.
** Or max. allowable pressure for the accumulator.
*** Option

## Connections

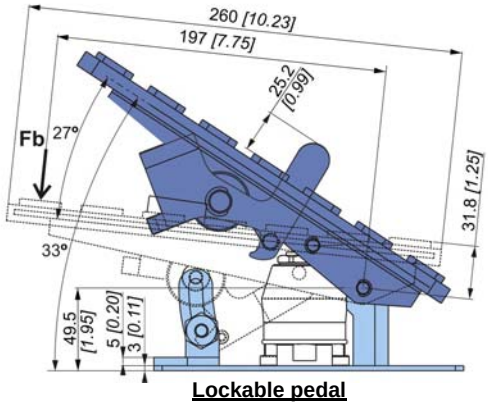
## Mechanical Controls



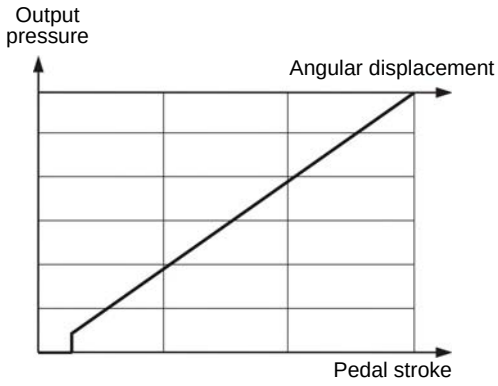



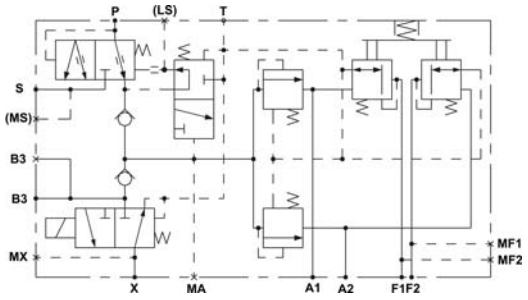

**Floor mount pedal**



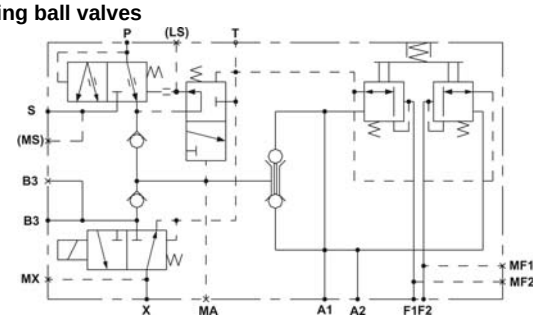

**Lockable pedal**

## Hydraulic diagram and characteristic curve




**Isolating ball valves**



## Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa) : Fa (daN) ≈0.5 x max. output pressure (bar) + 35
- Force on pedal (Fb) : Fa (daN) ≈5 x 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

| T | F | P | Q | C | R | S |
|---|---|---|---|---|---|---|
| 1 2 | 1 2 3 | 1 2 3 | 1 2 | 1 2 | 1 2 3 | 1 2 3 4 |
| V B | 2 2 E | | 4 | | | |

**P1 - Cut-in / Cut-out range**

| | |
|---|---|
| 110 - 130 bar *[1 595 - 1 885 PSI]* | **3** |
| 120 - 140 bar *[1 740 - 2 031 PSI]* | **4** |
| 135 - 160 bar *[1 958 - 2 321 PSI]* | **5** |
| 160 - 190 bar *[2 321 - 2 756 PSI]* | **6** |
| 170 - 200 bar *[2 466 - 2 901 PSI]* | **7** |
| 180 - 210 bar *[2 611 - 3 056 PSI]* | **8** |

**P2 - Operating pressure**

| | |
|---|---|
| 30 bar *[435 PSI]* | **3** |
| 40 bar *[580 PSI]* | **4** |
| 60 bar *[870 PSI]* | **5** |
| 80 bar *[1 160 PSI]* | **6** |
| 100 bar *[1 450 PSI]* | **7** |
| 120 bar *[1 740 PSI]* | **8** |

**P3 - Parking brake pressure**

| | |
|---|---|
| P3 = P1 | **9** |

**Q1 - Flow rate to auxiliaries (P to S)**

| | |
|---|---|
| 45 l/min *[12 GPM]* | **4** |

**Q2 - 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** |

**C1 - Control**

| | | |
|---|---|---|
| Without pedal or lever | | **0** |
| Floor mount pedal | Plain | **A** |
| | Metal anti-skid | **B** |
| | Rubber anti-skid | **C** |
| | Plain (lockable) | **D** |
| | Metal anti-skid (lockable) | **E** |
| | Rubber anti-skid (lockable) | **F** |

****** Limitations

| | |
|---|---|
| Pressure rise | < 1 bar *[14.5 PSI]* / ms |
| Current | min. 100 mA to assure contact |
| | max. 4 A for Resistor load |
| | max. 2,5 A for Inductive load |
| Voltage | max. 42 V |

**C2 - Pressure switch ****

| | |
|---|---|
| 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** |

**R1 - Electrical connection (solenoid valve)**

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

**R2 - Electrical connection (solenoid valve)**

| | |
|---|---|
| 12 V CC | **1** |
| 24 V CC | **2** |

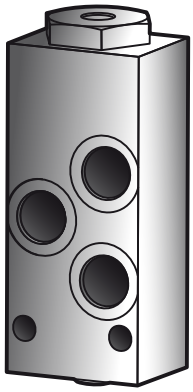
**R3 - Hydraulic connection**

| | | |
|---|---|---|
| ISO 9974-1 (BSPP + spot face » ports) | M14x1.5 | **4** |

**S1 - S4 Options** (See page 79)

| | |
|---|---|
| Special calibration * | **1** |
| Specific port * | **2** |
| Customized component * | **3** |
| Mechanical control adaptation * | **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 consult your Poclain Hydraulics application engineer.



# VS

- **70 l/min *[18.5 GPM]***
- **Simple and Dual circuit (Single VS valve per line)**

**Applications**

VS Valve is designed for applications with long brake lines or very large brake cylinder volume, requiring high flow 70 l/min *[18.5 GPM]*.

VS Valve is a 3-way valve with an external hydraulic control. It supplies and drains high volume brakes by connecting accumulator to service brakes on large machines.

Main use: braking systems.

**Operation**

VS valve is normally used with full power brake as "Relay Valve" and with parking brake as "Quick Return Valve".

VS as Relay Valve:
Control pressure (F1 & F2) is supplied to the VS valve proportionaly to brake pedal angle on full power brake valve (VB-220). VS relay valve provides high flow directly from the accumulators (A1 & A2) to the brakes, proportional to the control pressure, i.e. directly proportional to the pedal position. The braking is progressive. As soon as brake pedal is released, VS transfers oil from brakes to the tank (T).

- External hydraulic pilot.
- Located between the accumulator(s) and the brake(s).
- Controlled and used with a modulating brake valve.

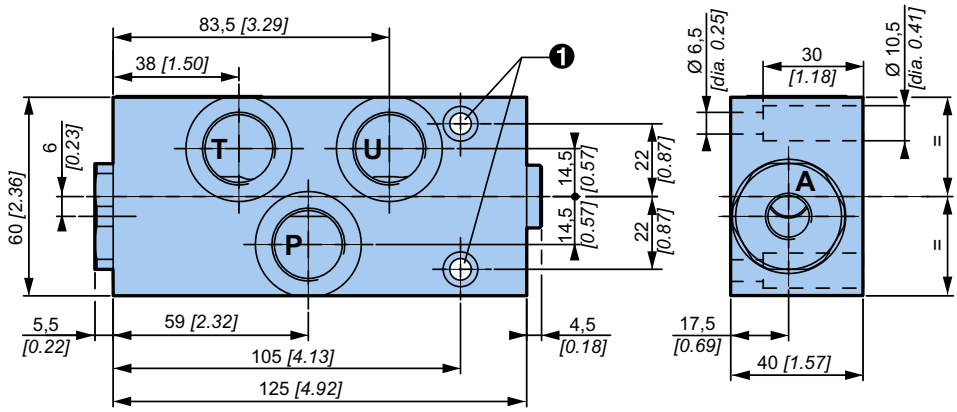
VS as Quick Return Valve:
The VS quick return valve transfers the flow coming from the brakes to the tank (T) proportional to the control pressure, i.e. directly proportional to the SAHR actuation. The braking is progressive.

- Internal hydraulic pilot.
- Located between the Spring Applied Hydraulically Released (SAHR) brake(s) and the tank.
- Controlled by and used with VB-002.

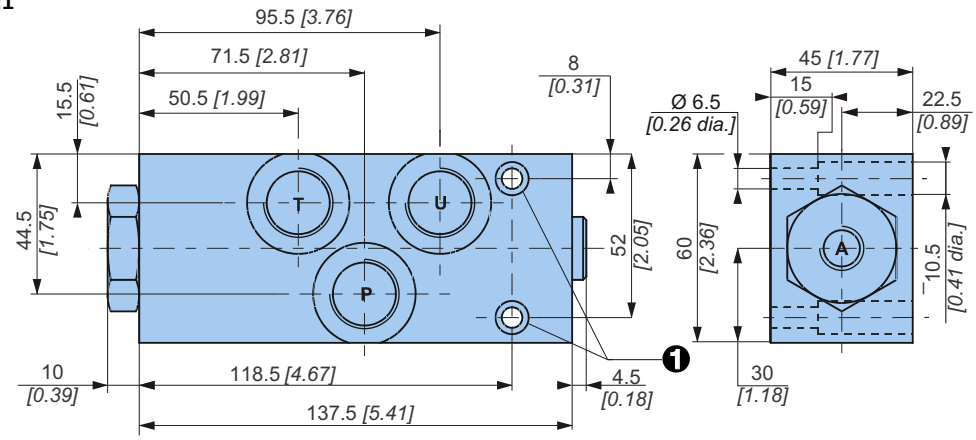
| **Commercial Description** | **VS-VALVE RELAIS 70 L/min V2** | | |
|---|---|---|---|
| **Control pressure (A) / Output (U) ratio** | 1:1 | 4:1 | 1:1,7 |
| **Part number** | R00260000J<br>R00260001K | A16052X | A29073B |
| **Compatibility** | | Braking circuits | |

## Overall dimensions of VS Relay valve

**Ratio 1:1**




**Ratio 1:1,7 and 4:1**




## Installation

**Chassis mounting**

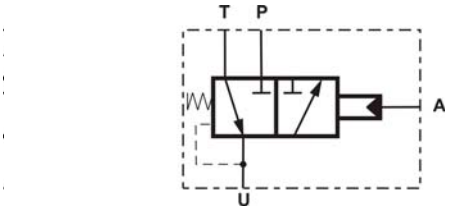
| **Ref.** | | **Quantity** | **Class** | **N.m *[lb.ft]* ± 10 %** (as per standard DIN 912) |
|---|---|---|---|---|
| 1 | M6 | 2 | 8.8 | 10 *[7.4]* |

## Connections

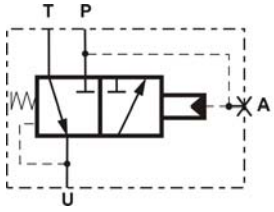
| **Port** | **Max. pressure** bar *[PSI]* | **Connection** | **Function** | kg *[lbs]* | |
|---|---|---|---|---|---|
| **P** | 210 *[3 046]* | M22x1.5 | Input | 1 *[2.20]* | Ratio 1:1 |
| **U** | 210 *[3 046]* | | Output | | |
| **A** | 210 *[3 046]* | M14x1.5 | Control pressure | 2,5 *[5.5]* | Ratio 1:1,7<br>Ratio 4:1 |
| **T** | 1 *[14.5]* | M22x1.5 | Tank | | |

## Hydraulic diagram and characteristic curve

P/N: R00260001J
A16052X
A29073B

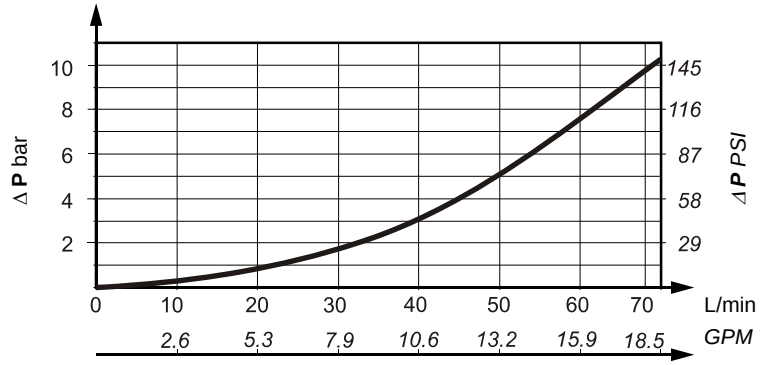



P/N: R00260001K

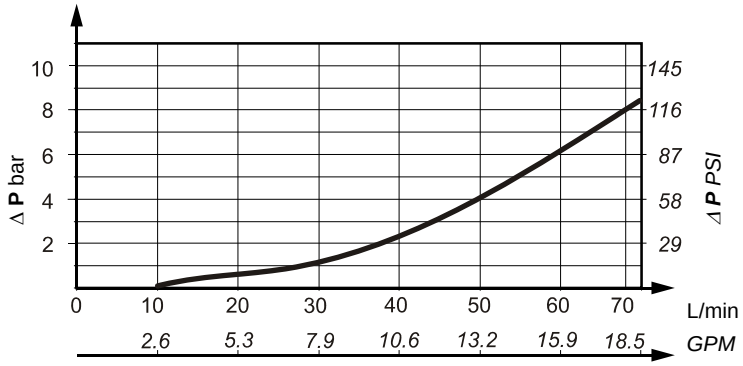



### Pressure drop

Pressure drop U ⇨T




Pressure drop P ⇨ U



# OPTIONS

| T | | F | | | P | | | Q | | C | | R | | | S | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| V | B | – | | | – | | | – | | – | | – | | | – | | | |

## 1 Special calibration

Pressure (braking, pressure switch, etc.) or specific flow rate.

## 2 Specific port

Without changing the standard of the other ports.

## 3 Customized component

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

## 4 Mechanical control adaptation

**Please contact your Poclain Hydraulics application engineer for further information on Options 1 through 4.**

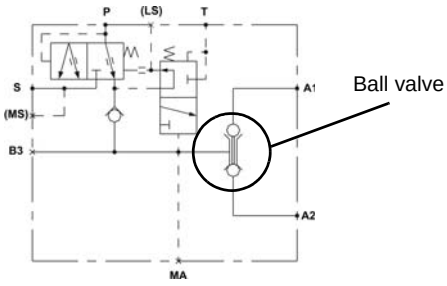
## 5 LS Port (for VB-100, VB-200, VB-110 and VB-220)

The Load Sensing port (M14x1.5 or 9/16-18 UNF-2B) is created on request on the standard valve body.

## 6 Isolating ball valves (for VB-100, VB-200, VB-110, VB-220)

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).

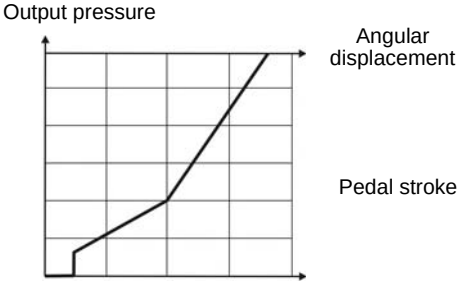
Example of a VB-200 assembly:




## 6 Additional check valve (for VB-00M)

## 7 Two-slope spring mechanism (for VB-0B0 and VB-0D0)

For certain applications, the braking sensation, the ergonomics of the pedal board, and the overall performance 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.

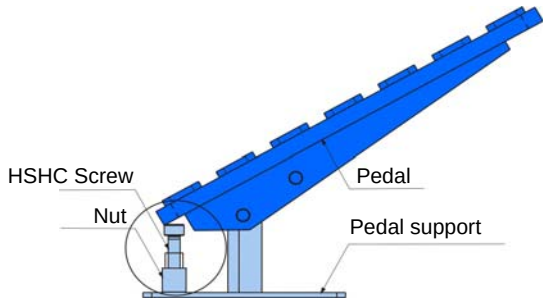



## 8 Pressure sensor

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 (for VB only. At VB3 this is standard and not an option.)

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 40cm away from the bonnet of the Brake valve to avoid water infiltration in the valve.**

## B Circuit pressurization

## C MS Port (for VB-100, VB-200, VB-110 and VB-220)

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.

## C Additional check valve (for VB3-002)

## C Shuttle valve (for VB-00M)

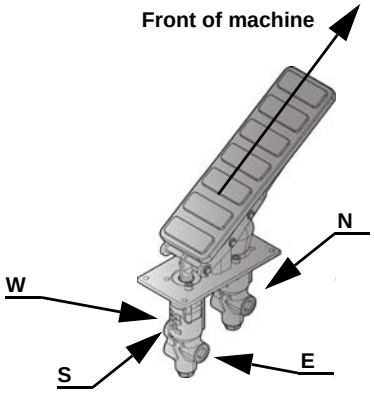
## D MS + LS Port

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).

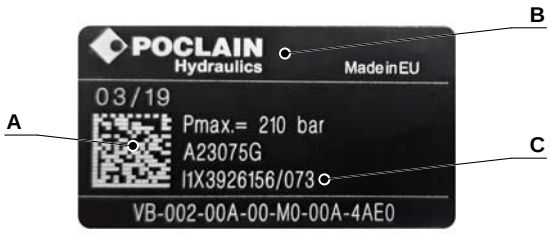
The installation orientation is defined by the relative position of the valve ports with respect to the conventional direction of operation of a classic vehicle, assuming that the mechanical controls are oriented as follows when idle:
Pedal: Top of pedal towards the front of the vehicle
Horizontal lever: Button towards the front of the vehicle
Vertical lever: Ball towards the front of the vehicle.




## F Pedal position sensor

## H Lever with rubber protection

## P Customized name plate




**A:** Customized QR code
**B:** Your company logotype
**C:** Your product ID (upon request)

## L Horizontal valve/pedal position

Line back of the valve to top of pedal

## M Horizontal valve/pedal position

Line back of the valve to top of pedal

# 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.

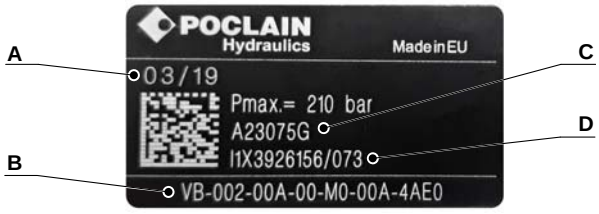
Do not smoke while working on the system.

**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**: 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.

**B:** Model code:
e.g. VB-002-00A-00-M0-00A-4AE0

**C:** Poclain Hydraulics catalog number
e.g. A23075G

**D:** Customer catalog number (on request)

### 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.

| | Storage interval (months) | | | |
|---|---|---|---|---|
| Climate | 3 | 6 | 12 | 18 |
| Temperate | **A** | **B** | **C** | **C** |
| Tropical | **B** | **C** | **D** | **D** |
| | **C** | **D** | **D** | **D** |

Legend
**A** - No specific precaution; only check the proper mounting of the plugs and covers.
**B** - Fill up with hydraulic fluid
**C** - Rinse with storage fluid
**D** - Fill up with storage fluid.

**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

| Number | Color | Brilliance ISO 2813 | Saline mist ISO 9227 | Adhesion ISO 2409 | Hardness ASTM D3363 |
|---|---|---|---|---|---|
| RAL 9005 | Black | 40% | > 400 h | 0 | HB |

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

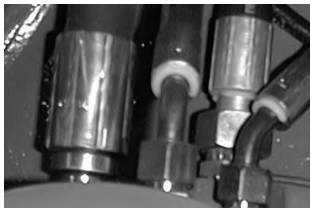
## Circuits

### 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.

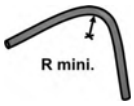
**Flexible Tubes**
Only use flexible tubes with crimped ends.

Avoid contacts likely to break down the flexible tubes.

As needed protect them with armor.

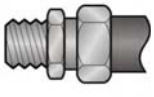
Avoid kinks.

Observe the minimum radius of curvature.

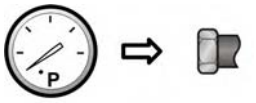


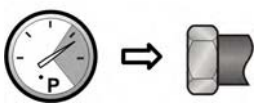

**The tube's interior diameter must be greater than or equal to the diameter of the connection openings of the components.**

### 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**

| Tests | Test Methods or Standards | HM Category Viscosity Grade 22 | 32 | 46 | 68 | 100 | Units |
|---|---|---|---|---|---|---|---|
| Kinematic viscosity at 40° | ISO 3104 | 19.8 to 24.2 | 28.8 to 35.2 | 41.4 to 50.6 | 61.2 to 74.8 | 90 to 110 | mm² / s |
| Minimum viscosity index (a) | ISO 2909 | - | - | - | - | - | 1 |
| Acidity index, maximum (b) | ISO 6618 | (c) | (c) | (c) | (c) | (c) | mg KOH / g |
| Water content, maximum | ASTM D 1744 DIN 51777-1 DIN 51777-2 (d) | 500 | 500 | 500 | 500 | 500 | mg / kg |
| Flash point Cleveland in open-cup, min. | ISO 2592 | 140 | 160 | 180 | 180 | 180 | °C |
| Foaming at 24°C, max. 93°C, max. | ISO 6247 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | ml |
| Deaeration at 50°C, maximum | ISO 9120 | 5 | 5 | 10 | 13 | 21 | min |
| Copper blade corrosion at 100°C, 3 h maximum | ISO 2160 | 2 | 2 | 2 | 2 | 2 | Grading |
| Anti-rust power, method A | ISO 7120 | Pass | Pass | Pass | Pass | Pass | |
| Anti-wear property, FZG A/8, 3/90, minimum | DIN 51354-2 | (e) | 10 | 10 | 10 | 10 | Deterioration Level |
| Flow point, maximum | ISO 3016 | -18 | -15 | -12 | -12 | -12 | °C |
| Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max. | ISO 6614 | 30 | 30 | 30 | 30 | | min |

| Tests | Test Methods or Standards | HV Category Viscosity Grade 22 | 32 | 46 | 68 | 100 | Units |
|---|---|---|---|---|---|---|---|
| Kinematic viscosity at 40° | ISO 3104 | 19.8 to 24.2 | 28.8 to 35.2 | 41.4 to 50.6 | 61.2 to 74.8 | 90 to 110 | mm² / s |
| Minimum viscosity index (a) | ISO 2909 | 130 | 130 | 130 | 130 | 130 | 1 |
| Acidity index, maximum (b) | ISO 6618 | (c) | (c) | (c) | (c) | (c) | mg KOH / g |
| Water content, maximum | ASTM D 1744 DIN 51777-1 DIN 51777-2 (d) | 500 | 500 | 500 | 500 | 500 | mg / kg |
| Flash point Cleveland in open-cup, min. | ISO 2592 | 140 | 160 | 180 | 180 | 180 | °C |
| Foaming at 24°C, max. 93°C, max. | ISO 6247 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | 150/0 75/0 | ml |
| Deaeration at 50°C, maximum | ISO 9120 | 7 | 7 | 12 | 12 | 20 | |
| Copper blade corrosion at 100°C, 3 h maximum | ISO 2160 | 2 | 2 | 2 | 2 | 2 | Grading |
| Anti-rust power, method A | ISO 7120 | Pass | Pass | Pass | Pass | Pass | |
| Anti-wear property, FZG A/8, 3/90, minimum | DIN 51354-2 | (e) | 10 | 10 | 10 | 10 | Deterioration Level |
| Flow point, maximum | ISO 3016 | -42 | -36 | -36 | -30 | -21 | °C |
| Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max. | ISO 6614 | (c) | (c) | (c) | (c) | (c) | |

(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 performance 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**

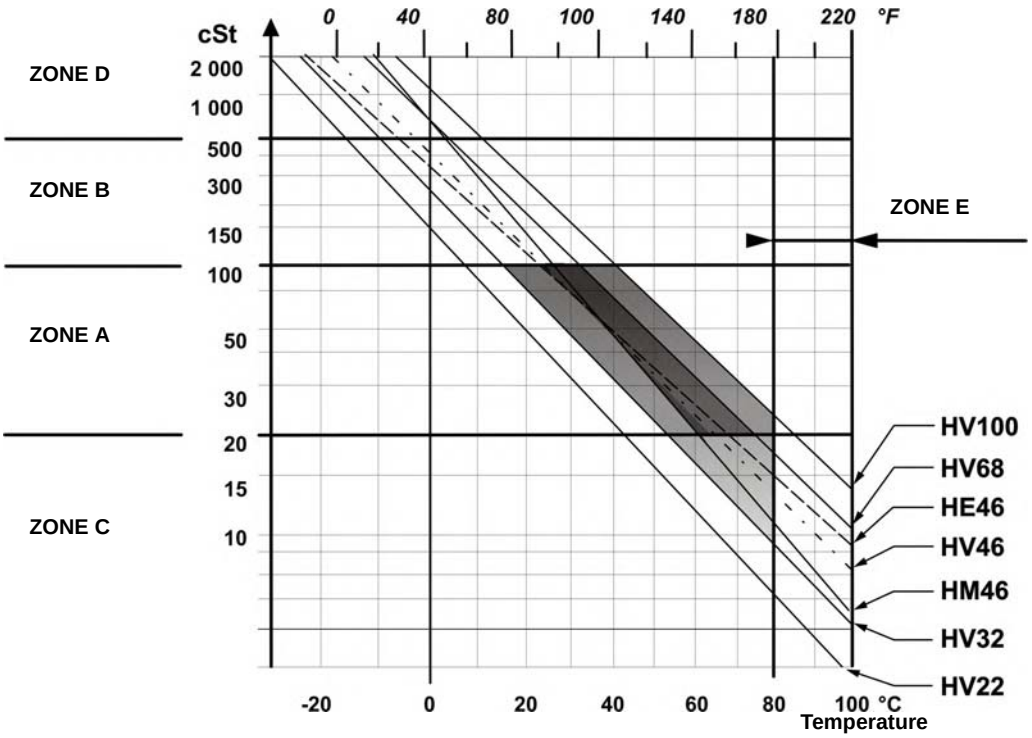
| Tests | Test Methods or Standards | HM Category Viscosity Grade 22 | 32 | 46 | 68 | Units |
|---|---|---|---|---|---|---|
| Kinematic viscosity at 40° | ISO 3104 | 19.8 to 24.2 | 28.8 to 35.2 | 41.4 to 50.6 | 61.2 to 74.8 | mm² / s |
| Minimum viscosity index (a) | ISO 2909 | - | - | - | - | |
| Acidity index, maximum (b) | ISO 6618 | (c) | (c) | (c) | (c) | mg KOH / g |
| Water content, maximum | ASTM D 1744<br>DIN 51777-1<br>DIN 51777-2 (d) | 1000 | 1000 | 1000 | 1000 | mg / kg |
| Flash point<br>Cleveland in open-cup, min. | ISO 2592 | 165 | 175 | 185 | 195 | °C |
| Foaming at 24°C, max.<br>93°C, max. | ISO 6247 | 150/0<br>75/0 | 150/0<br>75/0 | 150/0<br>75/0 | 150/0<br>75/0 | ml |
| Deaeration at 50°C, maximum | ISO 9120 | 7 | 7 | 10 | 10 | min |
| Copper blade corrosion at 100°C, 3 h maximum | ISO 2160 | 2 | 2 | 2 | 2 | Grading |
| Anti-rust power, method A | ISO 7120 | Pass | Pass | Pass | Pass | |
| Anti-wear property,<br>FZG A/8, 3/90, minimum | DIN 51354-2 | (e) | 10 | 10 | 10 | Deterioration Level |
| Flow point, maximum | ISO 3016 | -21 | -18 | -15 | -12 | °C |
| Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max. | ISO 6614 | (c) | (c) | (c) | (c) | min |

| Tests | Test Methods or Standards | HV Category Viscosity Grade 22 | 32 | 46 | 68 | Units |
|---|---|---|---|---|---|---|
| Kinematic viscosity at 40° | ISO 3104 | 19.8 to 24.2 | 28.8 to 35.2 | 41.4 to 50.6 | 61.2 to 74.8 | mm² / s |
| Minimum viscosity index (a) | ISO 2909 | - | - | - | - | 1 |
| Acidity index, maximum (b) | ISO 6618 | (c) | (c) | (c) | (c) | mg KOH / g |
| Water content, maximum | ASTM D 1744<br>DIN 51777-1<br>DIN 51777-2 (d) | 1000 | 1000 | 1000 | 1000 | mg / kg |
| Flash point<br>Cleveland in open-cup, min. | ISO 2592 | 165 | 175 | 185 | 195 | °C |
| Foaming at 24°C, max.<br>93°C, max. | ISO 6247 | 150/0<br>75/0 | 150/0<br>75/0 | 150/0<br>75/0 | 150/0<br>75/0 | ml |
| Deaeration at 50°C, maximum | ISO 9120 | 7 | 7 | 10 | 10 | min |
| Copper blade corrosion at 100°C, 3 h maximum | ISO 2160 | 2 | 2 | 2 | 2 | Grading |
| Anti-rust power, method A | ISO 7120 | Pass | Pass | Pass | Pass | |
| Anti-wear property,<br>FZG A/8, 3/90, minimum | DIN 51354-2 | (e) | 10 | 10 | 10 | Deterioration Level |
| Flow point, maximum | ISO 3016 | (c) | (c) | (c) | (c) | °C |
| Aptitude to separate from water: Time needed to obtain 3 ml of emulsion at 54°C, max. | ISO 6614 | (c) | (c) | (c) | (c) | min |

(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 performance 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.

**Temperature and Viscosity**

The best performance is obtained by having the system operate in the regimes shaded gray.




| | |
|---|---|
| **Zone A** | Zone of maximum efficiency.<br>In this zone, temperature variations have a weak effect on the response time, efficiency and life expectancy of the components.<br>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.<br>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.<br>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.<br>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.<br>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.<br>The system can operate in zone E at low-pressure and during short periods.<br>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 ≤ 0.05%.

Poclain Hydraulics components tolerate up to 0.1%.

**Checking Water Content**

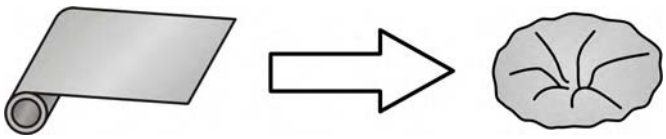
**Visual Inspection**

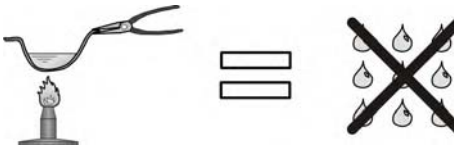
- The oil appears cloudy once it has a water concentration greater than or equal to 1%.

**We suggest two possible verification methods:**

**1- Quick Elementary Check**

- The “crackle test.”

| Step | 1 | 2 | 3 |
|---|---|---|---|
| Action | Make a small cup using household aluminum foil.  | Put a drop of oil to test in the bottom of the cup.  | Heat it by placing it over a flame using tongs.  |

| Step | 4 | |
|---|---|---|
| Action |  | 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.

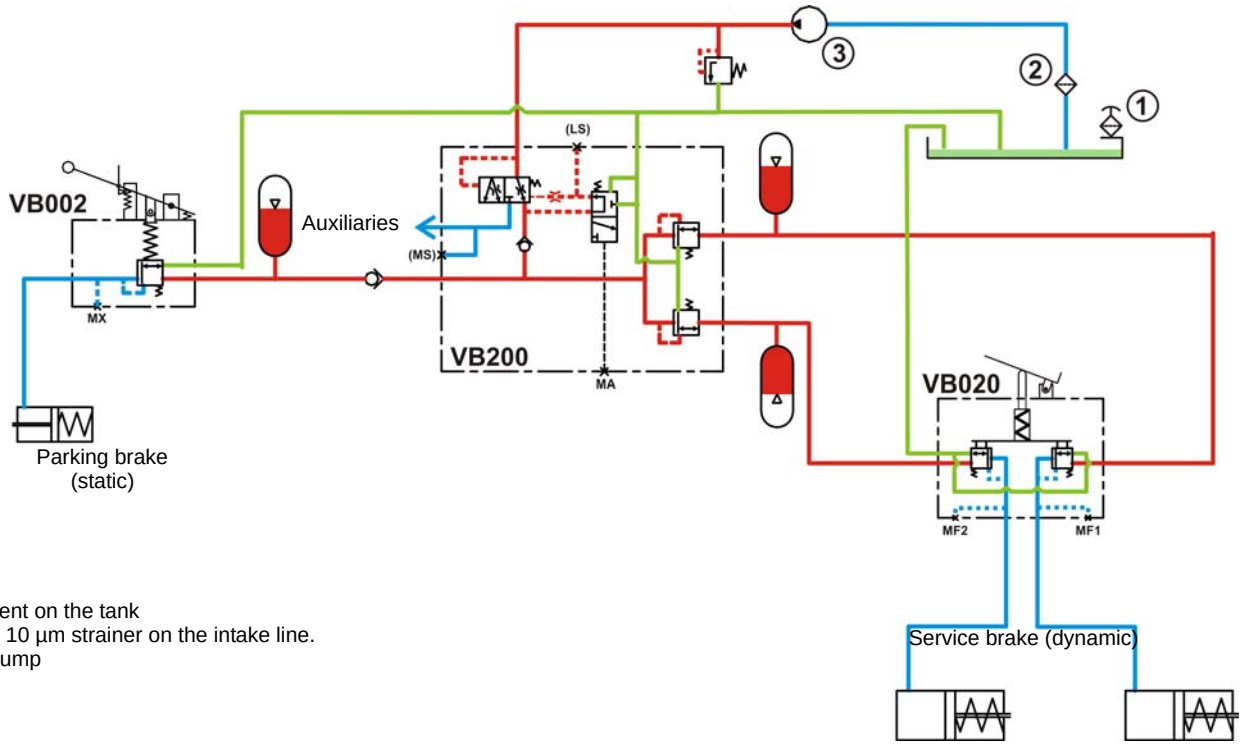
**Poclain Hydraulics performs laboratory analyses of water content in fluids. Contact us for further information.**

**Decontamination and Filtration**

It is highly advised that the hydraulic fluid is maintained at ISO standard 4406-1999 decontamination level 18/16/13 (class 7 from NAS 1638) with using a filter, in order to prevent from function degradation in time.
Max. allowed 19/17/14 (class 8 from NAS 1638) is acceptable for normal functioning of the valve, in order to assure long lasting and safe functioning of the valve during complete life time. As a consequence, internal leakage rate increase may appear in the end of life time of the valve, but without any impact on function of the valve.

**The life of hydraulic components is lengthened when the contamination level is low.**

**Braking circuit example:**




**1** - Vent on the tank
**2** - A 10 µm strainer on the intake line.
**3** - Pump

**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:

| Screws and Bolts | | Nominal Dimension | Quality Class 8,8 N.m *[lb.ft]* | 10,9 N.m *[lb.ft]* | 12,9 N.m *[lb.ft]* |
|---|---|---|---|---|---|
| Normal Spaced Threads | **C HC** | M6 | 10 *[7]* | 14 *[10]* | 17 *[13]* |
| | | M8 | 24 *[18]* | 35 *[26]* | 41 *[30]* |
| | | M10 | 49 *[36]* | 69 *[51]* | 83 *[61]* |
| | | M12 | 86 *[63]* | 120 *[89]* | 145 *[107]* |
| | | M14 | 135 *[100]* | 190 *[140]* | 230 *[170]* |
| | | M16 | 210 *[155]* | 295 *[218]* | 355 *[262]* |
| | | M18 | 290 *[214]* | 405 *[299]* | 485 *[358]* |
| | | M20 | 410 *[303]* | 580 *[428]* | 690 *[509]* |
| | | M22 | 550 *[406]* | 780 *[576]* | 930 *[686]* |
| | | M24 | 710 *[524]* | 1000 *[738]* | 1200 *[886]* |

**Connection**

| Connectors  | Nominal Dimension  | Tightening Torque  N.m *[lb.ft]* |
|---|---|---|
| | M10 x 1 | 45 *[33]* |
| | M12 x 1 | 45 *[33]* |
| | M12 x 1.5 | 45 *[33]* |
| | M14 x 1.5 | 45 *[33]* |
| | M16 x 1.5 | 60 *[44]* |
| | M18 x 1.5 | 70 *[52]* |
| | M22 x 1.5 | 100 *[74]* |
| | M27 x 2 | 200 *[148]* |
| | Ø 13 | 30 *[22]* |
| | Ø 17 | 55 *[41]* |
| | Ø 21 (BP) | 100 *[74]* |
| | Ø 21 (HP) | 160 *[118]* |
| | Ø 27 | 200 *[148]* |
| | 1"1/16 - 12 UNF | 170 *[125]* |
| | 3/4" - 16 UNF | 70 *[52]* |
| | 9/16" - 18 UNF | 35 *[26]* |
| | 7/8" - 14 UNF | 100 *[74]* |

(BP) : Low Pressure
(HP) : High Pressure

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