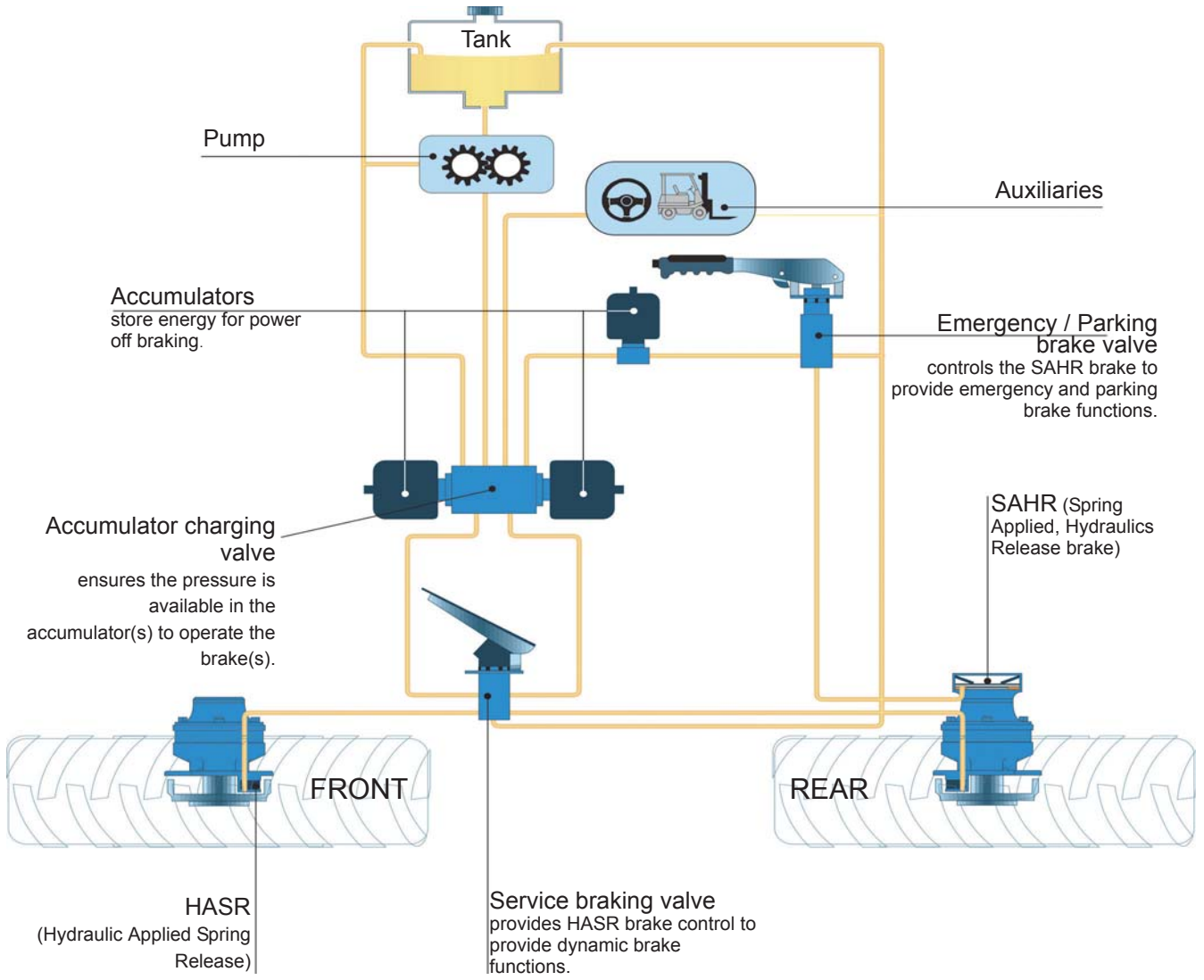


# VB BRAKE VALVES

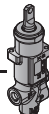


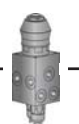
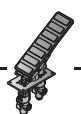

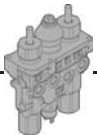
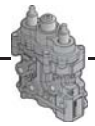








T E C H N I C A L   C A T A L O G

# HYDRAULIC BRAKE SYSTEM



# CONTENTS

			Valves	Page	
<b>Emergency / Parking brake valves</b>	Hydraulic		VB3-002	5	
	Electrohydraulic		VB-00E	11	
<b>Service brake valves</b>	Single circuit		VB3-010	17	
	Dual circuit		VB-020	23	
<b>Service brake valves + inching</b>	Single circuit		VB3-012	27	
	Dual circuit		VB-022	31	
<b>Steering assist brake valves</b>	Single circuit		VB-0B0	35	
	Dual circuit		VB-0D0	41	
<b>Accumulator charging valves</b>	Single circuit		45 L/min	VB-100	45
			120 L/min	VB-100	49
	Dual circuit		45 L/min	VB-200	53
			120 L/min	VB-200	57
<b>Full power brake valves</b>	Single circuit		• Service brake • Accumulator charging 45 L/min	VB-110	61
			• Service brake • Accumulator charging 120 L/min	VB-110	65
	Dual circuit		• Service brake • Accumulator charging 45 L/min	VB-220	69
			• Service brake • Accumulator charging 120 L/min	VB-220	73
	Dual circuit		• Parking brake • Service brake • Accumulator charging 45 L/min	VB-22E	77
	<b>Relay valve</b>			VS	81
<b>OPTIONS</b>				85	
<b>INSTALLATION</b>				87	

**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. Information on the model code.**



**Weight of component without oil.**



**Volume of oil.**



**Units.**



**Tightening torque.**



**Screws.**

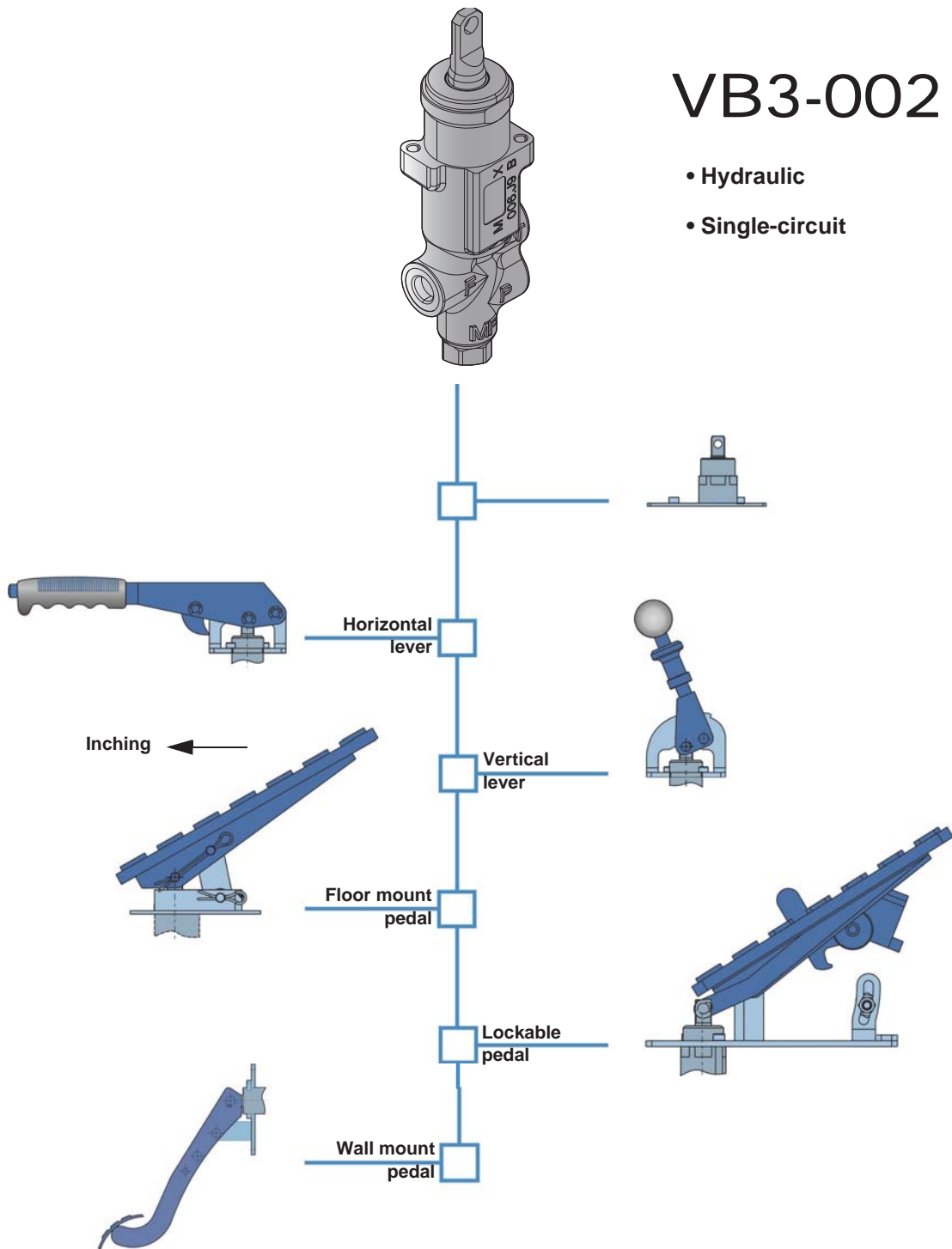


**Information intended for Poclain-Hydraulics personnel.**

The views in this document are created using metric standards.

The dimensional data is given in mm and in inches (inches are between brackets and italic)





# VB3-002

- Hydraulic
- Single-circuit

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

Full power  
brake

Relay Valve

Options

Installation

**Applications**

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

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

**Operation**

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

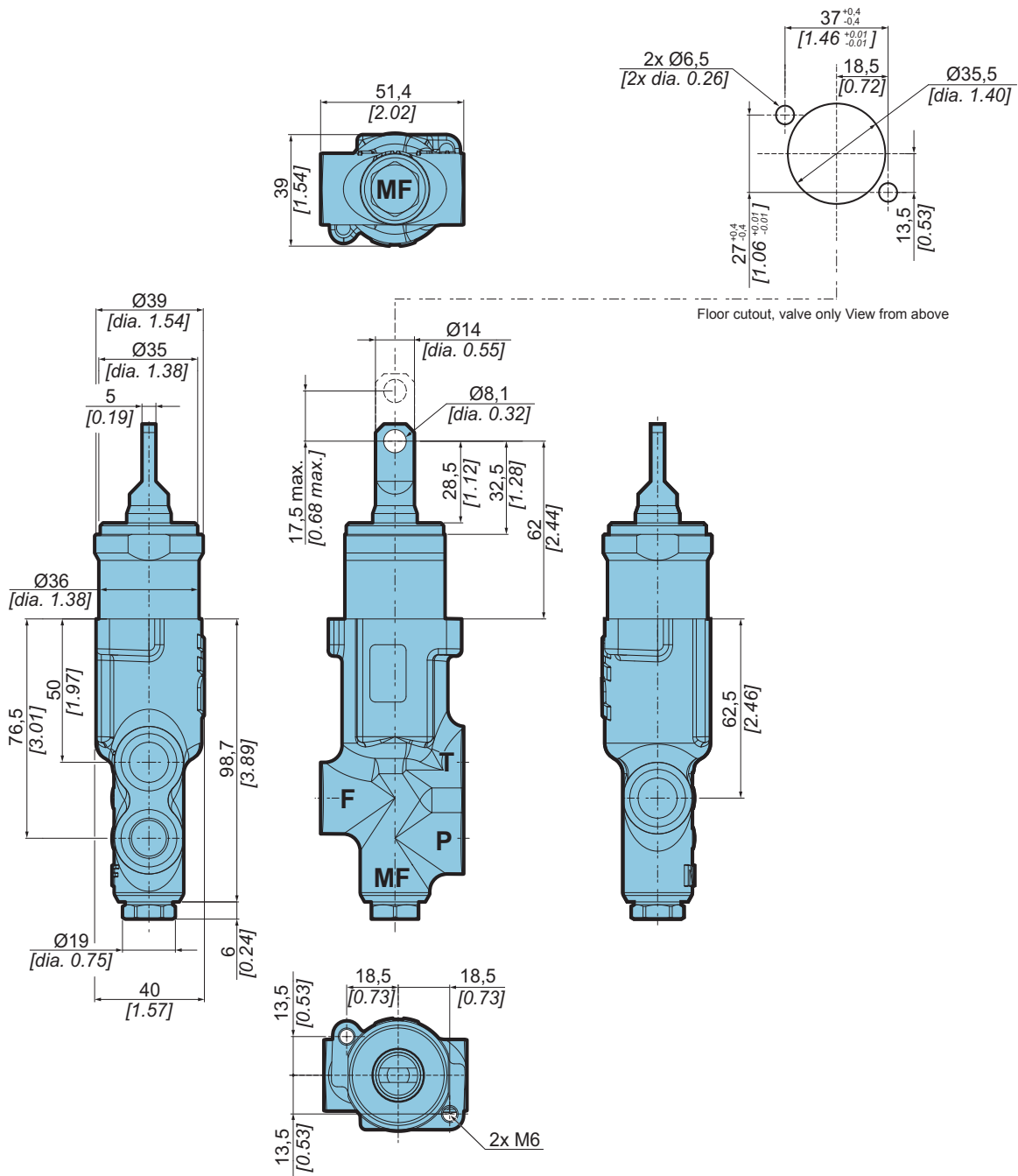
•**Lever control:**

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



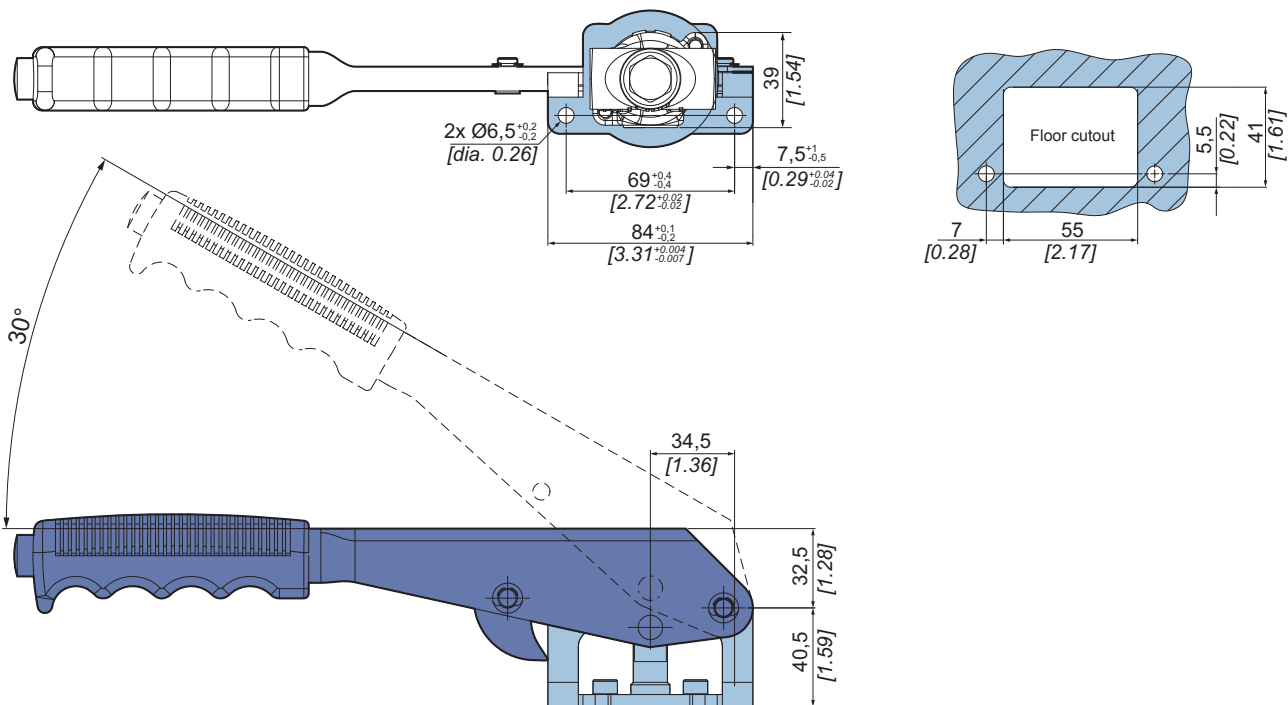
Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]
P	250 [3 626]	M14 x 1.5	Input	
F	See parking brake pressure, page 9	or 9/16 - 18 UNF	Output	
T	1 [14,5]	or G 1/4"	Tank	
MF*		M10 x 1	Parking brake pressure switch	

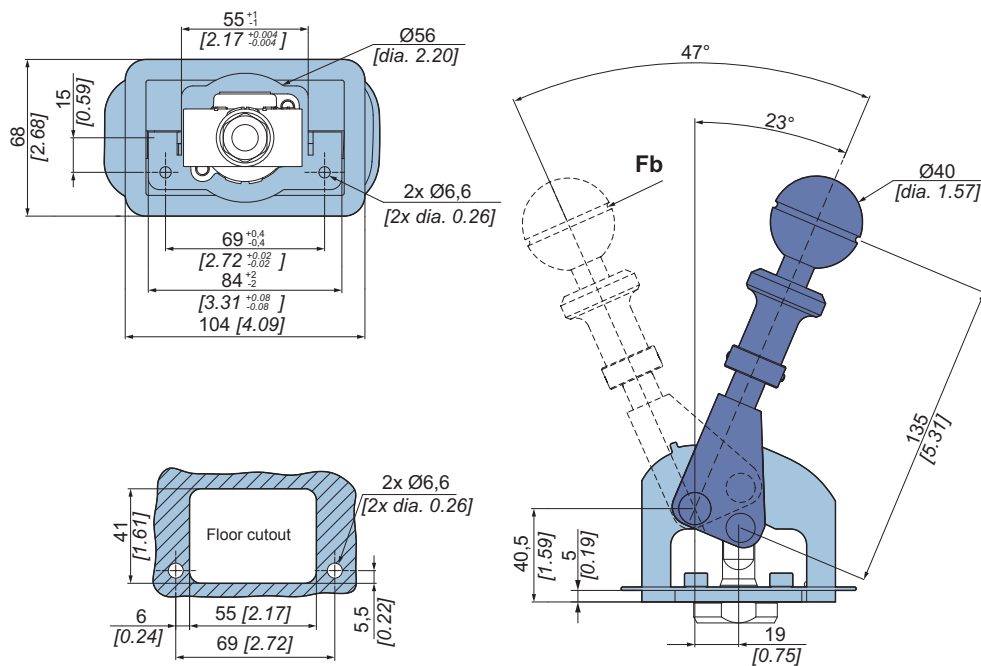
\* : Option

Mechanical controls with standard valve orientation

Horizontal lever



Vertical lever



Emergency /  
Parking brake

Service brake

Service brake  
+ inching

Steering assist  
brake

Accumulator  
charging

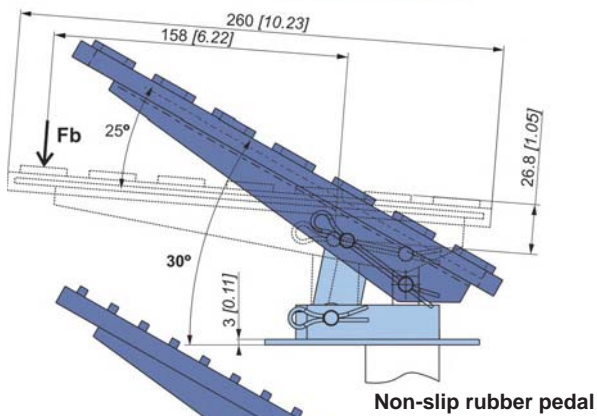
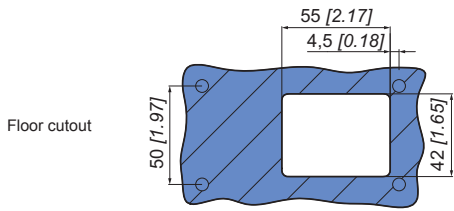
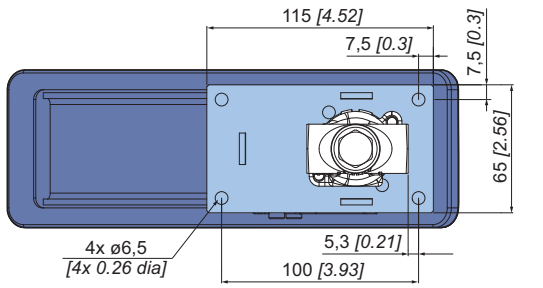
Full power  
brake

Relay Valve

Options

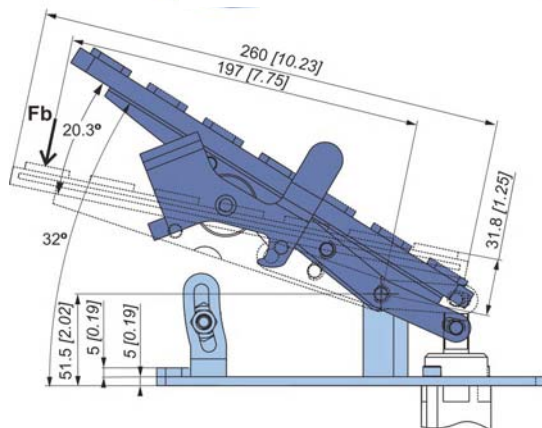
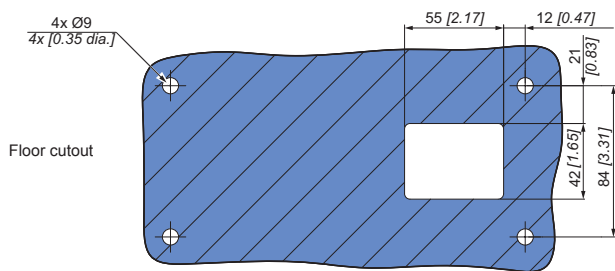
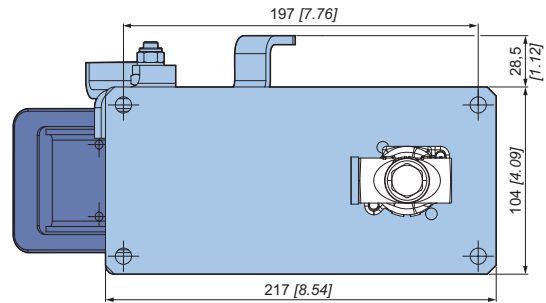
Installation

**Floor mount pedal**  
ratio = 4

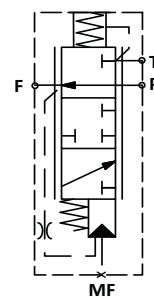
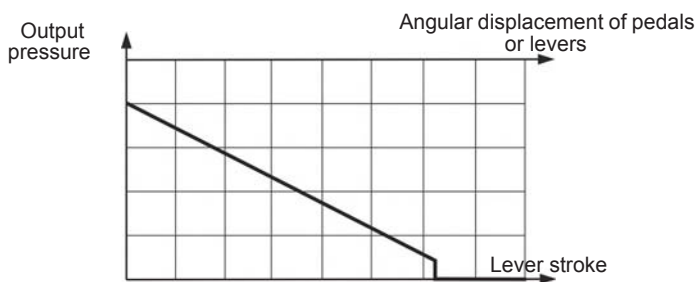


**Non-slip rubber pedal**  
**Non-slip aluminum pedal**

**Lockable pedal**  
ratio = 4.5



**Hydraulic diagram and characteristic curve**





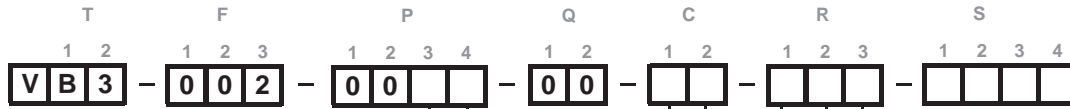
**Estimated maximum actuator forces**

- Max. traction on T-rod for valve only :  $F_a \approx 1\ 030\ N$  [299 lbf]
- Floor mount pedal :  $F_b \approx F_a/5$
- Lockable pedal :  $F_b \approx F_a/5$
- Horizontal lever :  $F_b \approx F_a/8$
- Vertical lever :  $F_b \approx F_a/7$



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

Model Code



**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

**Pressure curve shape**

Linear	1
Bi-linear	2

**Control**

Without pedal or lever		0
	Fix pressure setting	S
	Plain	A
Floor mount pedal	Metal Anti-skid	B
	Rubber Anti-skid	C
Wall mount pedal	Rubber 4" Anti-skid	L
Locking lever	Horizontal	M
	Vertical (up to 30 bar [435 PSI])	N*



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

**Pressure switch\*\***

Without	0
On MF (Parking)	4

**Electrical connection**

Without	0
Bare wire	1
Deutsch	3
AMP (6.3 x 0.8)	5

**Voltage**

Without	0
12V DC	1
24V DC	2

**Hydraulic connection**

Without	0
ISO 11926-1 (BSPP + spot face » ports)	3
ISO 9974-1 (metric + spot face » ports)	4
ISO 6149 (metric + cone » ports)	8
ISO 11926-1 (SAE J514 with O-ring seal)	A

**Options (See page 85)**

Without	0
Special setting or flow	1
Specific port*	2
Non-standard component*	3
Mechanical control adapter*	4
Pressure sensor	8
Circuit Pressurization*	B
Lever with rubber protection	H
Customized name plate	P

\* Please ask us

**\*\*Limitations**

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

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

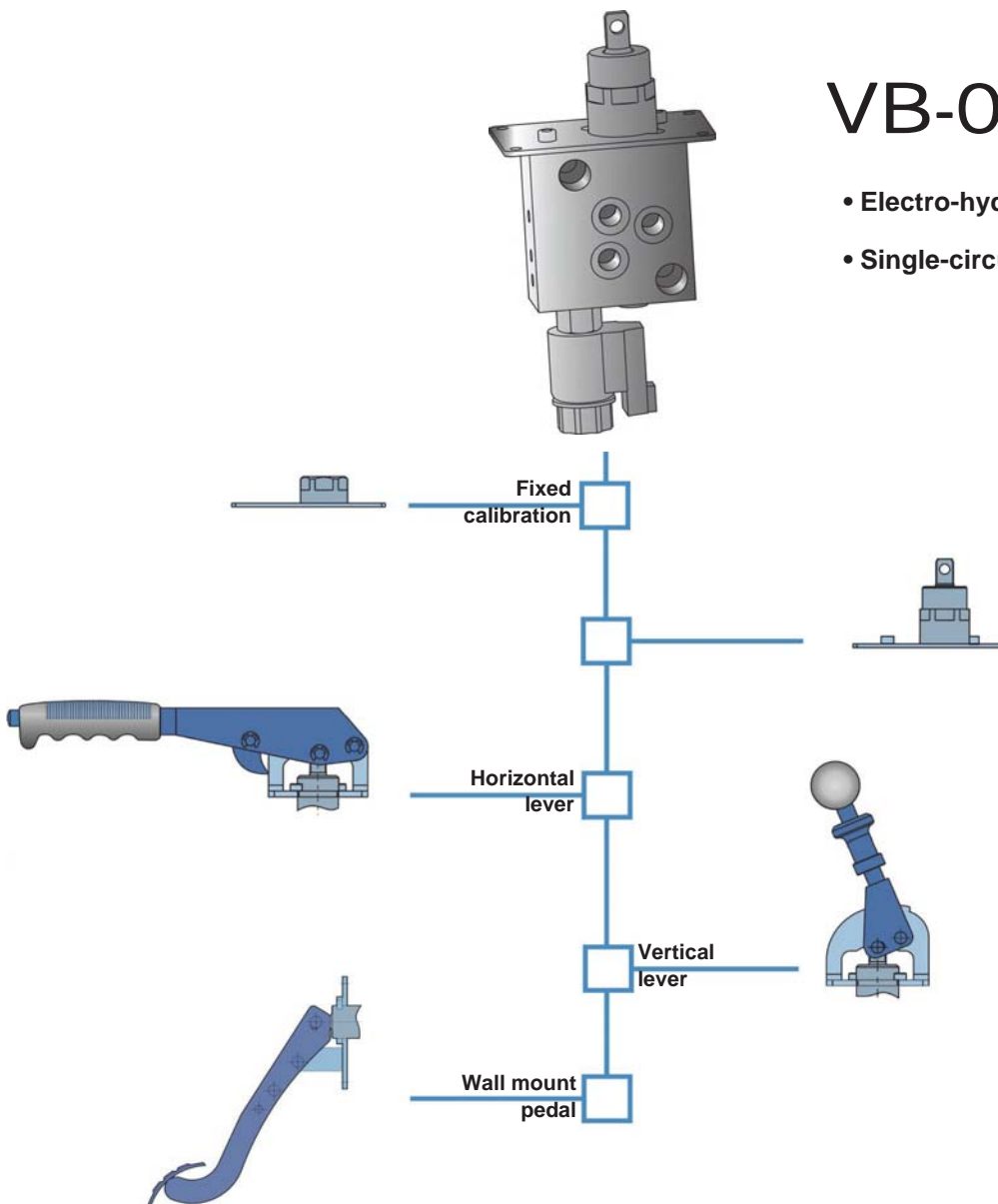
Options

Installation



# 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 a selector.

**Operation**

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

The VB-00E has two principles of operation:

1. Electric actuation

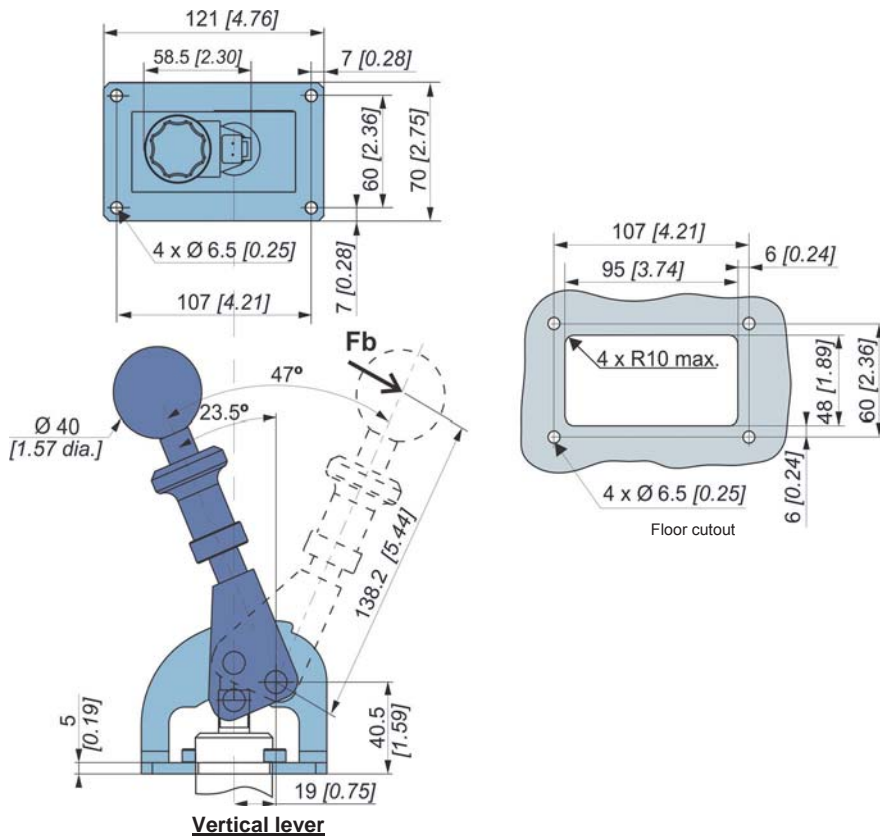
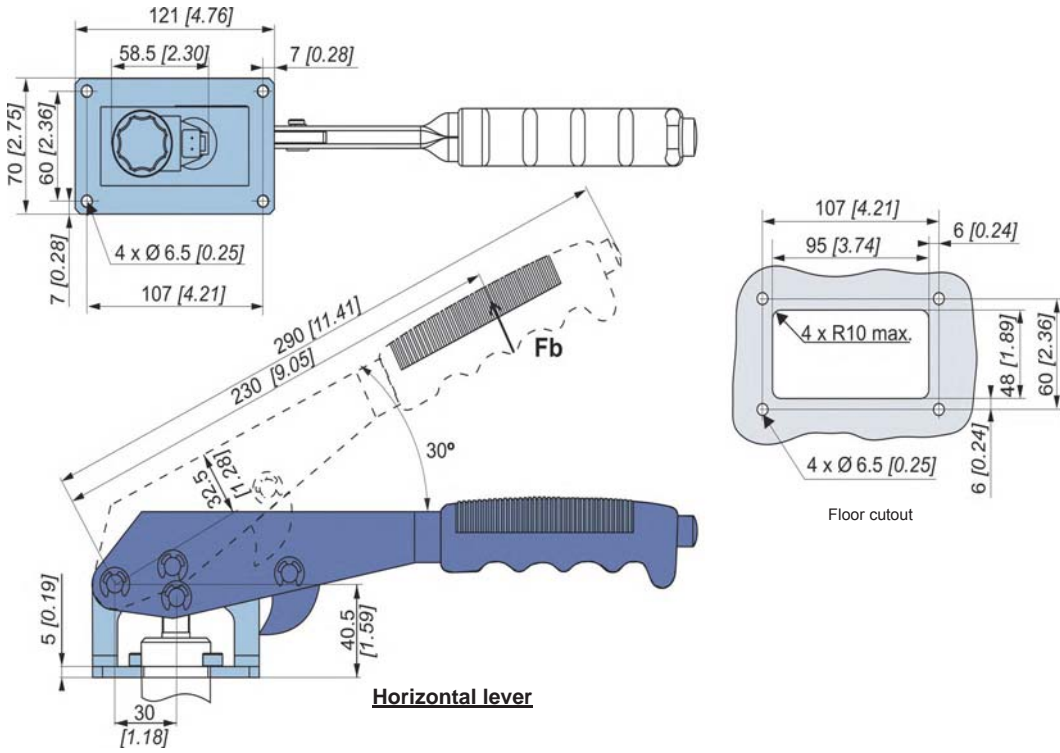
VB-00E has a fixed output pressure preset by the pressure reducing valve. When the VB-00E is not actuated (understand the electric control = 0) the output (X) is directly connected to the tank (T) and provide a pressure equal to zero. The SAHR brake is applied. When the VB-00E is electrically actuated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

2. Electric with mechanical actuation

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



Mechanical controls with standard valve orientation



Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

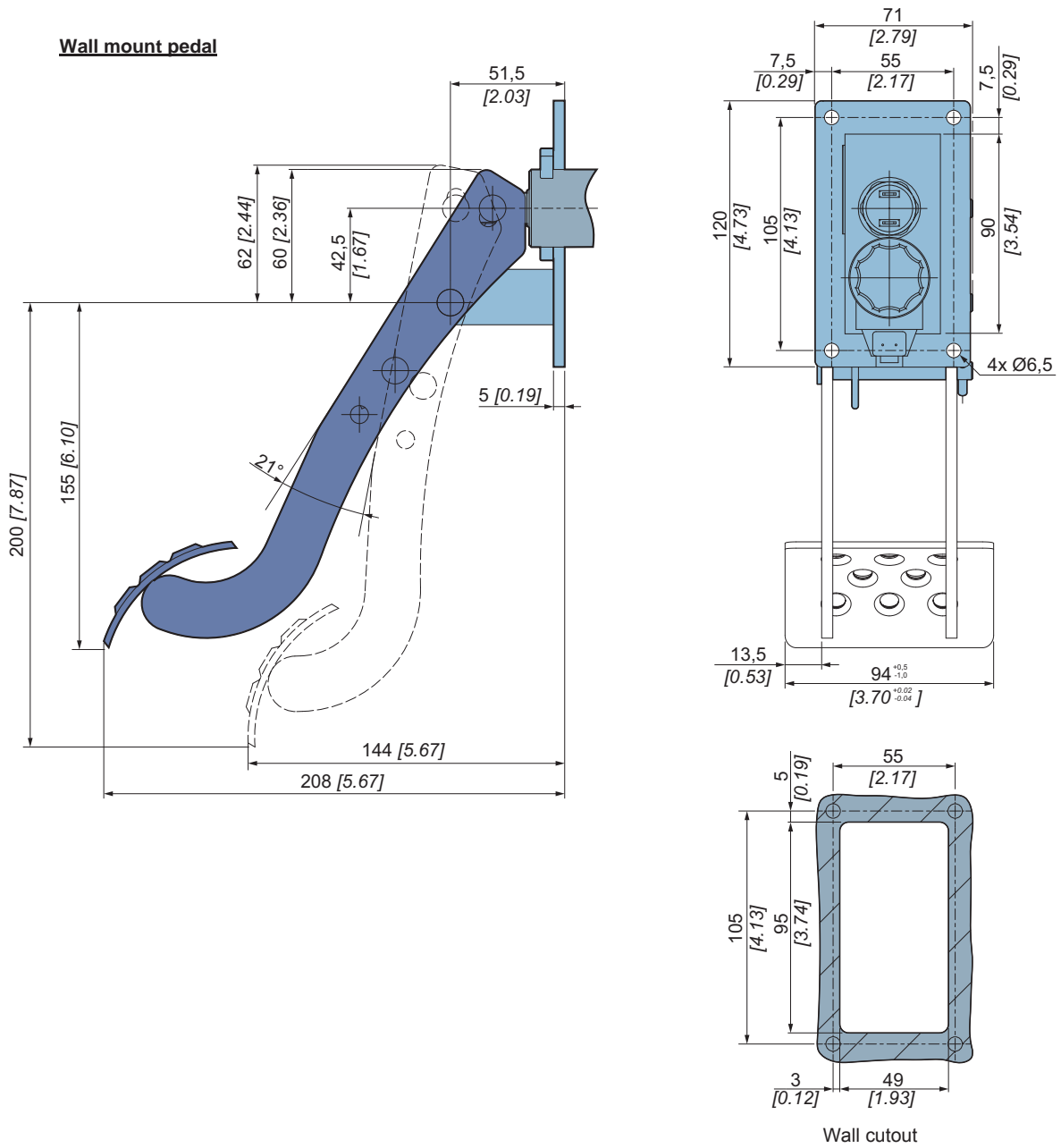
Full power  
brake

Relay Valve

Options

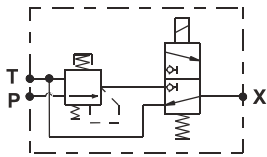
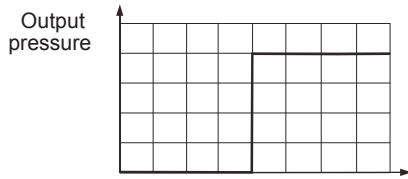
Installation

**Wall mount pedal**

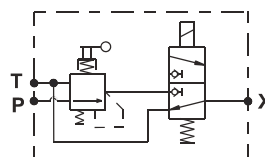
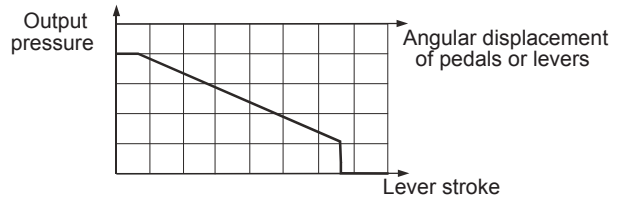


Hydraulic diagram and characteristic curve

Electric actuation



Electric with mechanical actuation



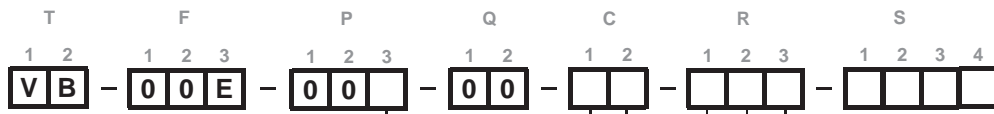
Estimated maximum actuator forces

- Max. traction on T-rod for valve only :  $F_a \approx 1\ 030\ N\ [299\ lbf]$
- Standard pedal :  $F_b \approx F_a/5$
- Lockable pedal :  $F_b \approx F_a/5$
- Horizontal lever :  $F_b \approx F_a/8$
- Vertical lever :  $F_b \approx F_a/7$



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

Model code



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

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

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

Electrical connection

Bare wire	1
Packard	2
Deutsch	3
Hirschmann	4
AMP	5

Supply voltage

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

Hydraulic connection

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

Options (See page 85)

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

\* Please ask us

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

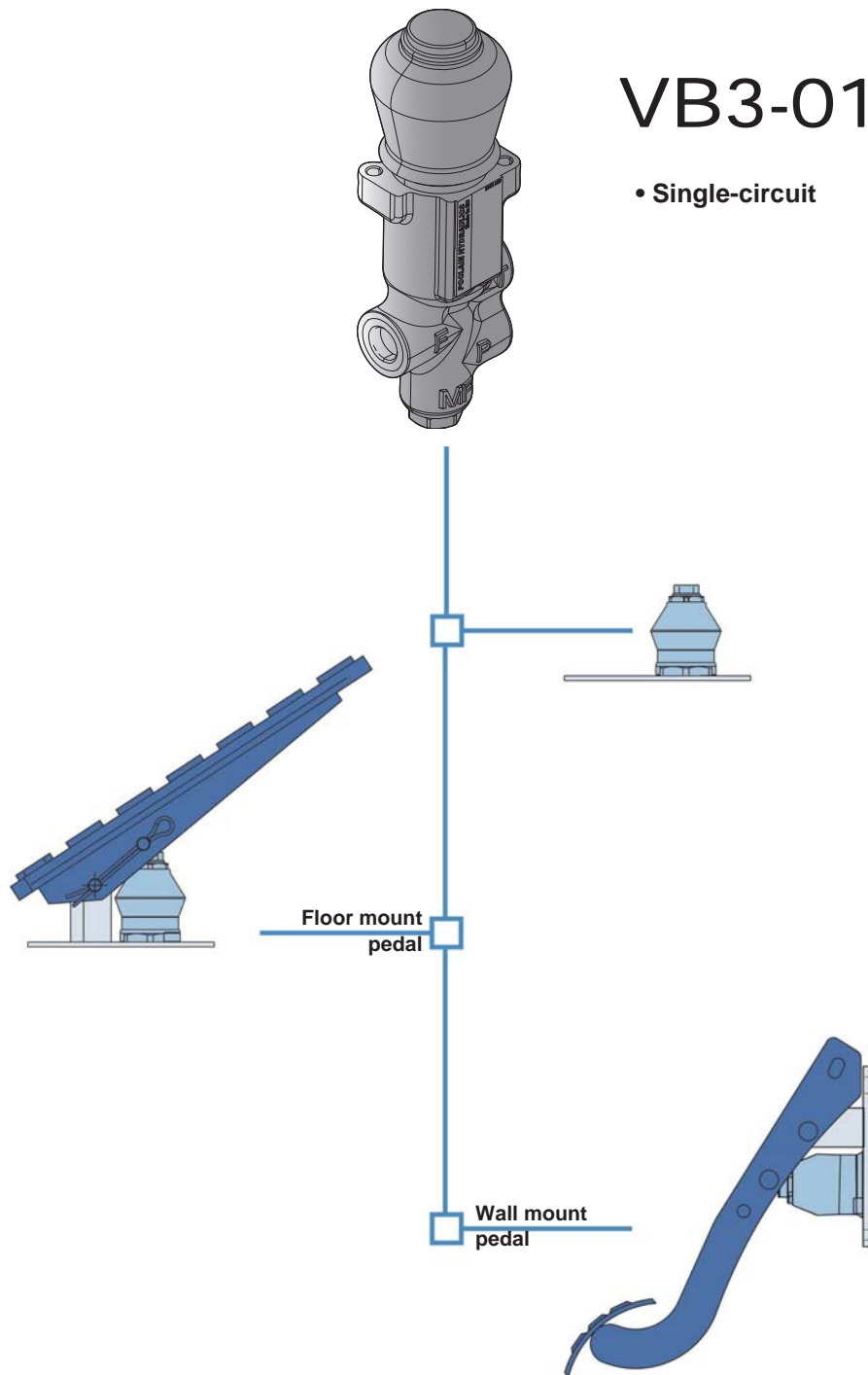
Relay Valve

Options

Installation







# VB3-010

• Single-circuit

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

Full power  
brake

Relay Valve

Options

Installation

**Applications**

The VB3-010 modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve.

The 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 the VB3-010 is also associated with a VB3-002 emergency / parking brake valve).

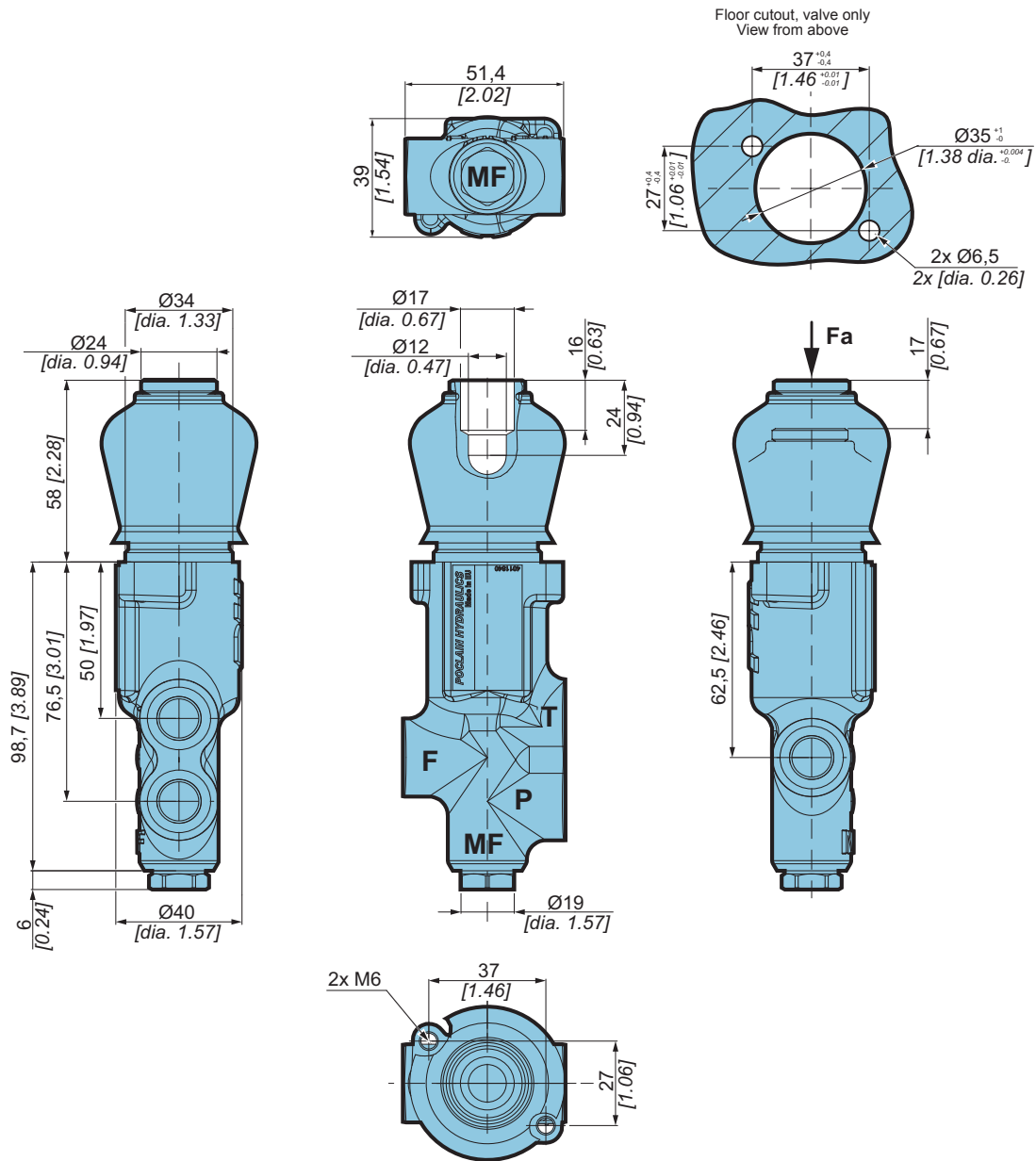
**Operation**

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

When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal.

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

**Overall dimensions of VB3-010 brake valve**



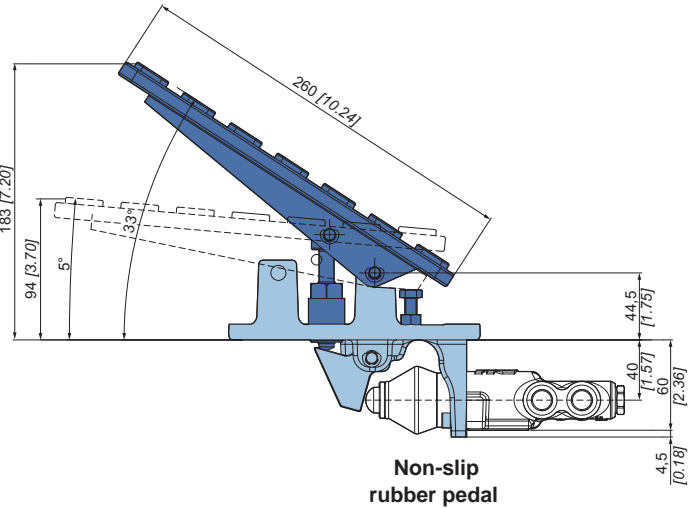
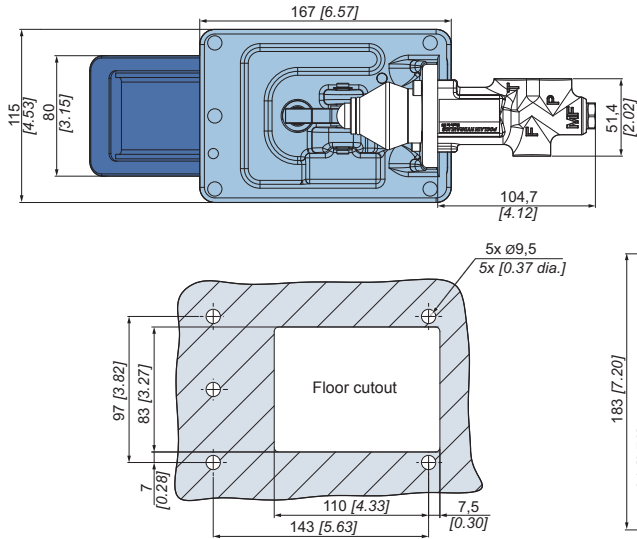
**Connections**

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]
P	250 [3 626]	M14 x 1.5	Input	1 [2.20]
F	120 [1 740]	or 9/16 - 18 UNF	Output	
T	1 [14.5]	or G1/4	Tank	
MF*		M10 x 1	Service brake pressure switch	

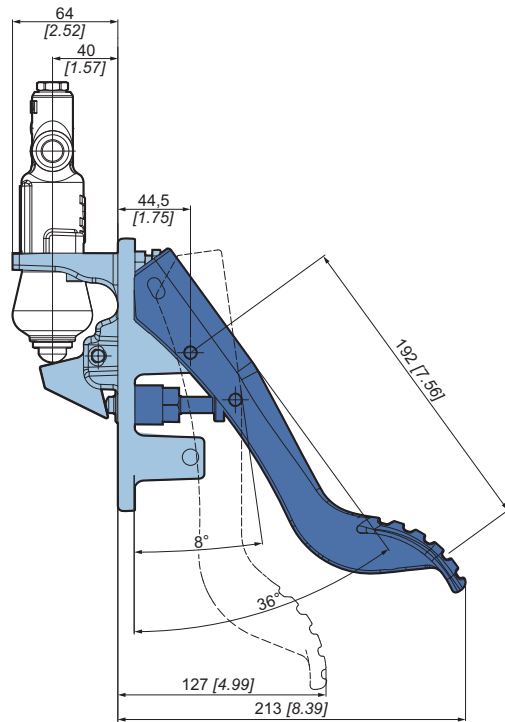
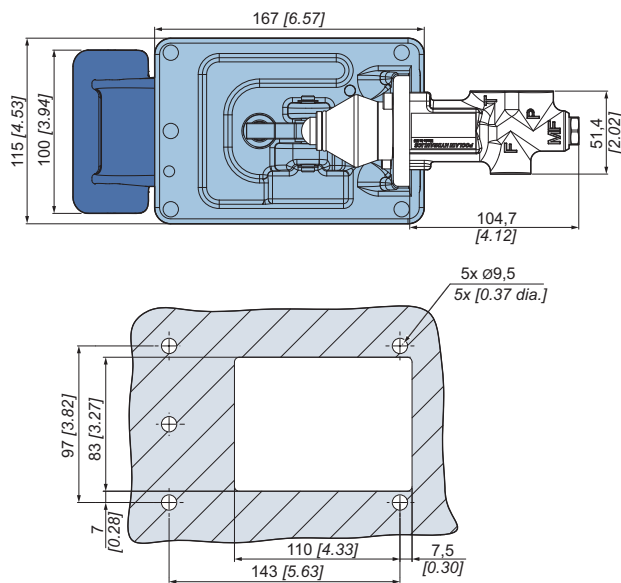
\* : Option

Horizontal valve mechanical control

**Floor mount pedal**



**Wall mount pedal**



Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

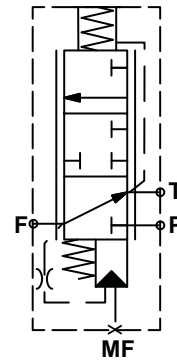
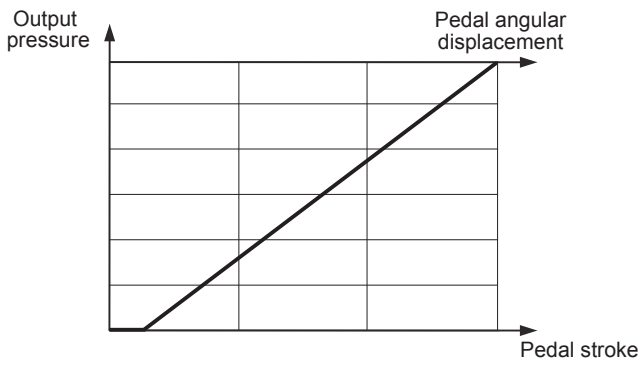
Full power  
brake

Relay Valve

Options

Installation

**Hydraulic diagram and characteristic curve**



**Estimated maximum actuator forces according to output pressure**

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



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

**Model Code**



**Operating pressure**

Without	0
10 bar [145 PSI]	1
20 bar [290 PSI]	2
30 bar [435 PSI]	3
40 bar [580 PSI]	4
50 bar [725 PSI]	H
60 bar [870 PSI]	5
70 bar [1 015 PSI]	A
80 bar [1 160 PSI]	6
90 bar [1 305 PSI]	N
100 bar [1 450 PSI]	7
110 bar [1 595 PSI]	R
120 bar [1 740 PSI]	8



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

**Pressure curve shape**

Linear	1
Bi-linear	2

**Control\*\***

Without pedal	0
Plain	A
Metal anti-skid	B
Rubber anti-skid	C
Plain (lockable)	D
Metal anti-skid (lockable)	E
Rubber anti-skid (lockable)	F
Aluminium anti-skid (casted)	R
4" Wall mount pedal	
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

**Pressure switch**

Without	0
On MF (Stoptlights)	2

**Electrical connection**

Without	0
Bare wire	1
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

Without	0
ISO 1179-1 (BSPP + spot face » ports)	3
ISO 9974-1 (metric + spot face » ports)	4
ISO 6149 (metric + cone » ports)	8
ISO 11926-1 (SAE J514 fittings with O-ring)	A

**Options (See page 85)**

Without	0
Special setting or flow	1
Specific port*	2
Non-standard component*	3
Mechanical control adapter*	4
Pressure sensor	8
Pedal back abutment	9
Circuit Pressurization*	B
Pedal position sensor	F
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 ask us

**\*\*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

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

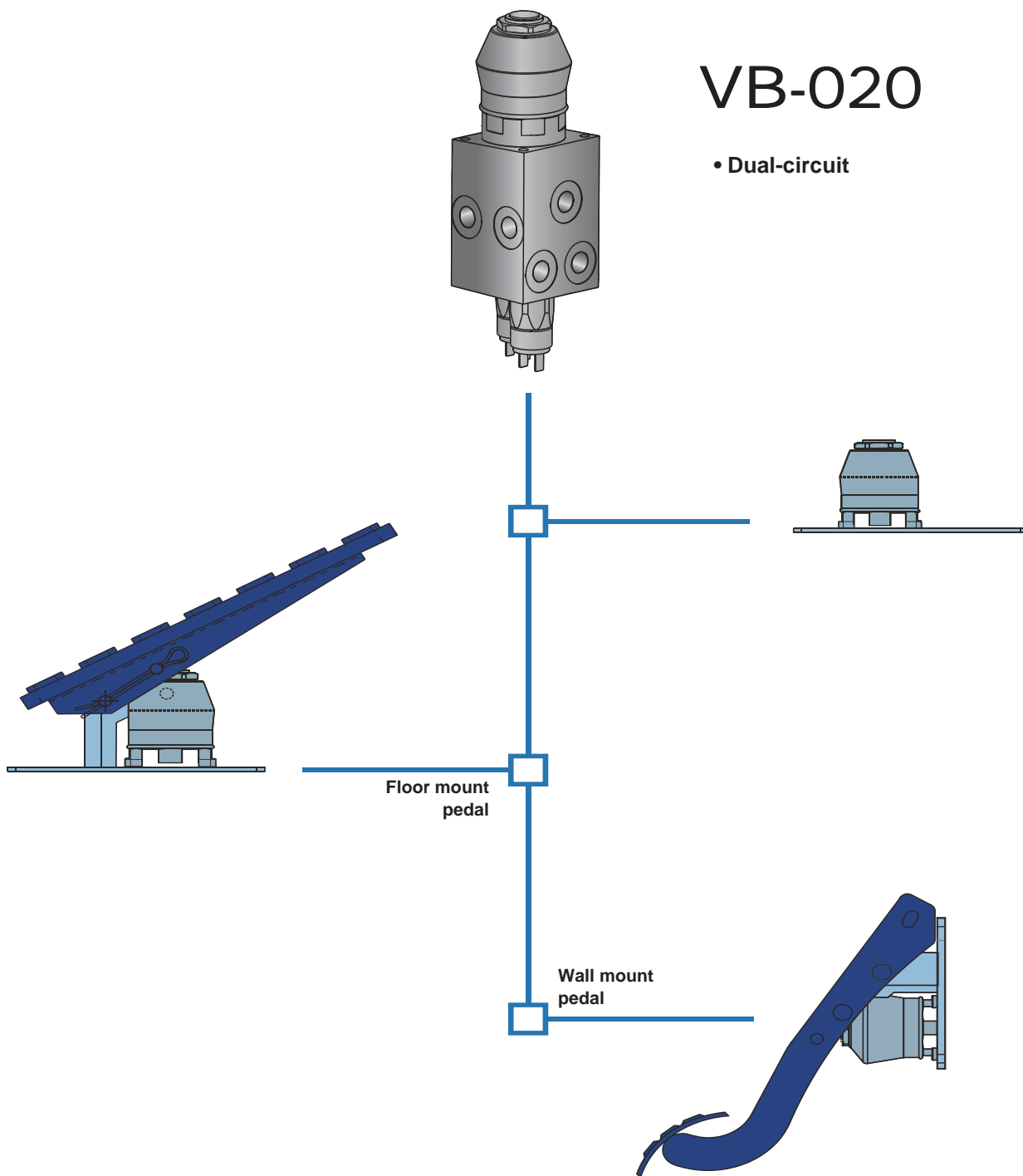
Full power  
brake

Relay Valve

Options

Installation





# VB-020

• Dual-circuit

**Applications**

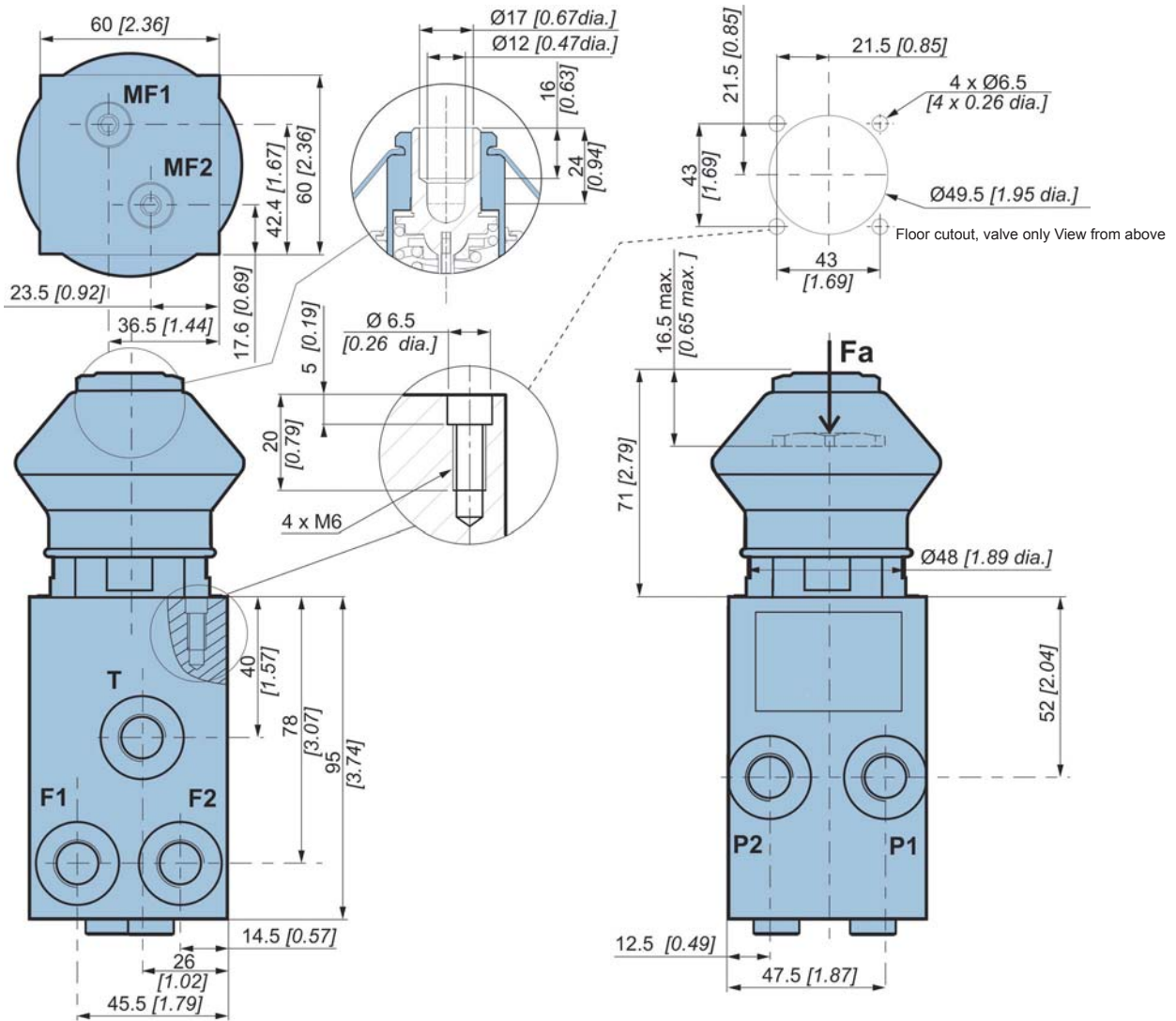
The VB-020 service brake valve (VB-0E0 and VB-0F0) is a mechanically-controlled, three-way, graduated release double pressure reducing valve.  
 The VB-020 (VB-0E0 and VB-0F0) valve provides precisely controlled output pressures (at F1 and F2) proportional to the pedal stroke and therefore to the force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

**Operation**

When the pedal is at rest ('up' position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T).  
 When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. The output pressures (at F1 and F2) can be equal or different according to a ratio  $F2/F1 = 0.64$  (VB-0E0) or  $0.44$  (VB-0F0).  
 When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressures of the valve irrespective of the supply pressure.  
 The pressures at F1 and F2 are strictly independent. A failure in one of the circuits does not affect the operation of the other circuit.

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

Overall dimensions of VB-020 brake valve



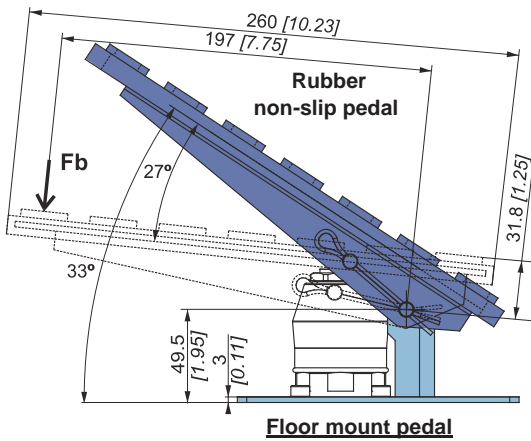
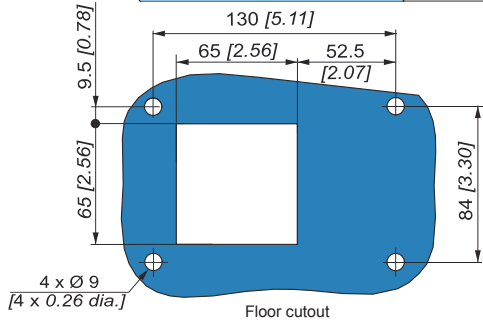
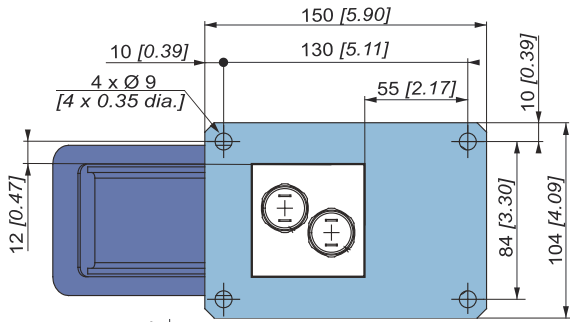
Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]
P1 - P2	210 [3 046]		Input	
F1 - F2	120 [1 740] (1)	M14 x 1.5 or	Output	
T	1 [14,5]	9/16 - 18 UNF	Tank	
MF1*		M10 x 1	Service brake pressure switch	2,8 [6.17]
MF2*		M10 x 1 (VB020) M12 x 1.5 (VB0E0) M14 x 1.5 (VB0F0)	Service brake pressure switch	

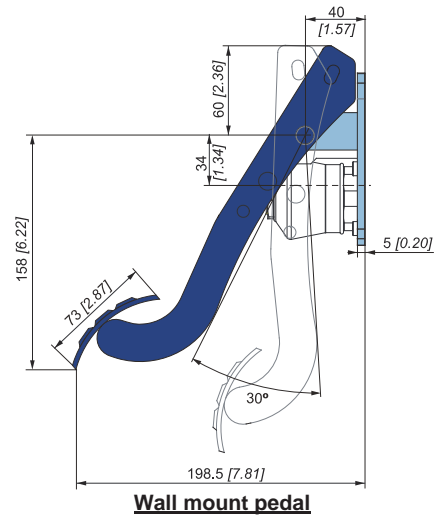
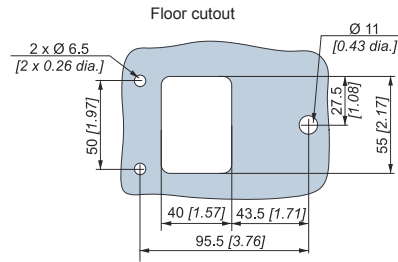
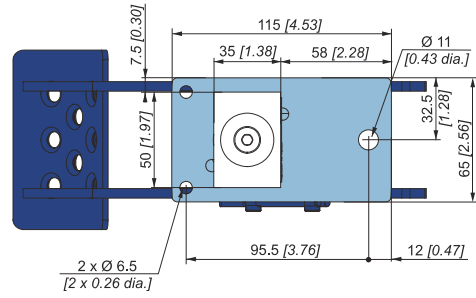
(1) : Higher pressure: please contact us  
 \* : Option



Mechanical Control

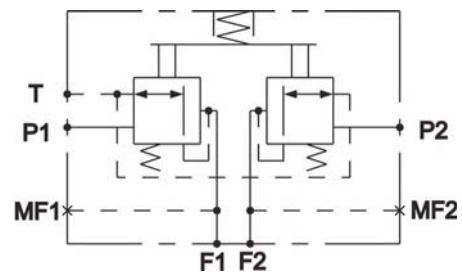
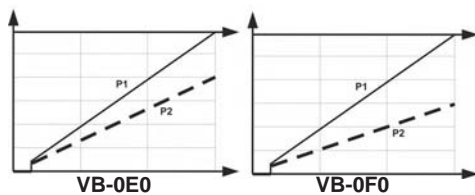
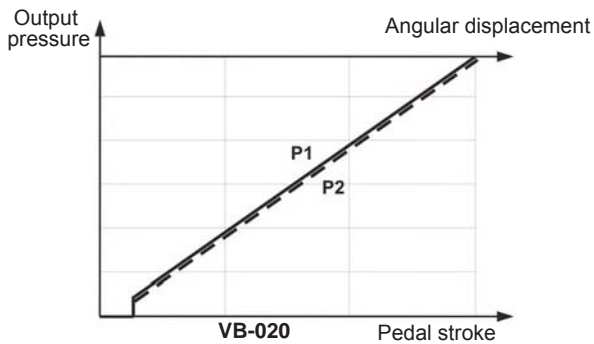


Floor mount pedal



Wall mount pedal

Hydraulic diagram and characteristic curves



Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation

**Estimated maximum actuator forces according to output pressure**

- Force on pedal (Fa) :  $F_a \text{ (daN)} \approx \text{max. output pressure (bar)} + 27$
- Force on pedal (Fb) :  $F_b \text{ (daN)} \approx F_a/5$

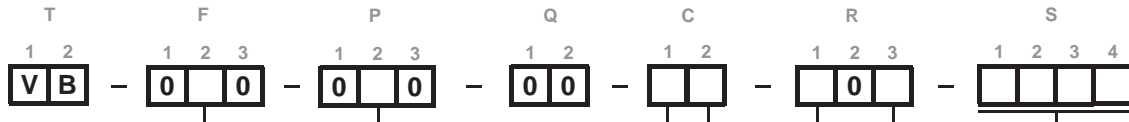


To obtain the forces in lbf, convert the final result.



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

**Model Number**



**Service brake**

Dual circuit with $F_2/F_1 = 1$	<b>2</b>
Dual circuit with $F_2/F_1 = 0.64$	<b>E</b>
Dual circuit with $F_2/F_1 = 0.44$	<b>F</b>

**Operating pressure**

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

**Control**

Without pedal		<b>0</b>
	Smooth	<b>A</b>
Floor mount pedal	Aluminum non-slip	<b>B</b>
	Rubber non-slip	<b>C</b>
Wall mount pedal 4"	Non-slip metal	<b>K</b>
	Rubber non-slip	<b>L</b>
Wall mount pedal 8"	Non-slip metal	<b>J</b>

**Pressure switch\*\***

Without	<b>0</b>
On MF or MF2 (service brake pressure)	<b>2</b>

**Electrical connection**

Without	<b>0</b>
Deutsch	<b>3</b>
AMP (6.3 x 0.8)	<b>5</b>

**Hydraulic connection**

ISO 9974 -1 (metric fittings)	<b>4</b>
ISO11926 -1 (SAE J514 fittings with O-ring)	<b>A</b>

**Options (See page 85)**

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

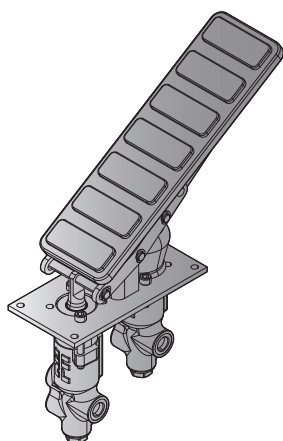
\* Please ask us



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

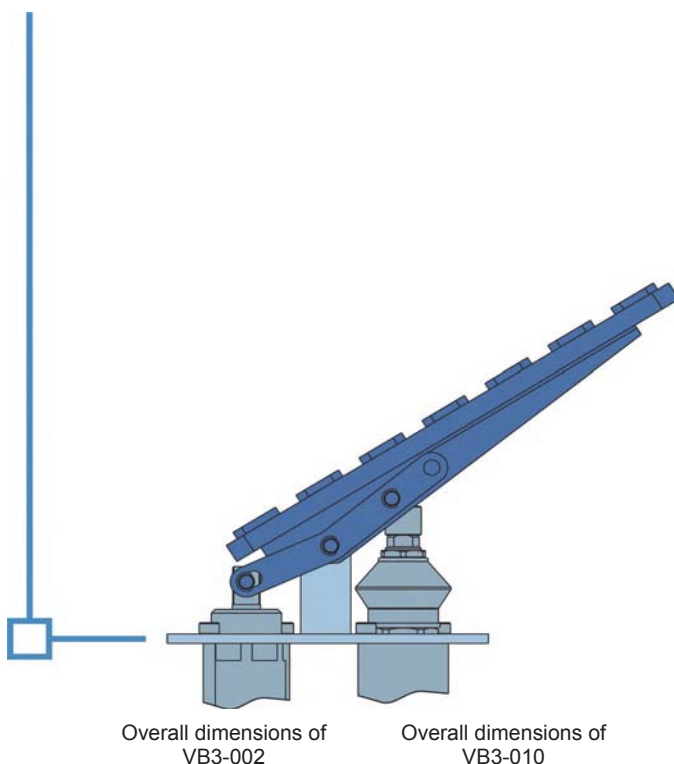
**\*\*Limitations**

Pressure rise	$< 1 \text{ bar [14.5 PSI]} / \text{ms}$
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



Overall dimensions of VB3-002

Overall dimensions of VB3-010

**Applications**

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

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

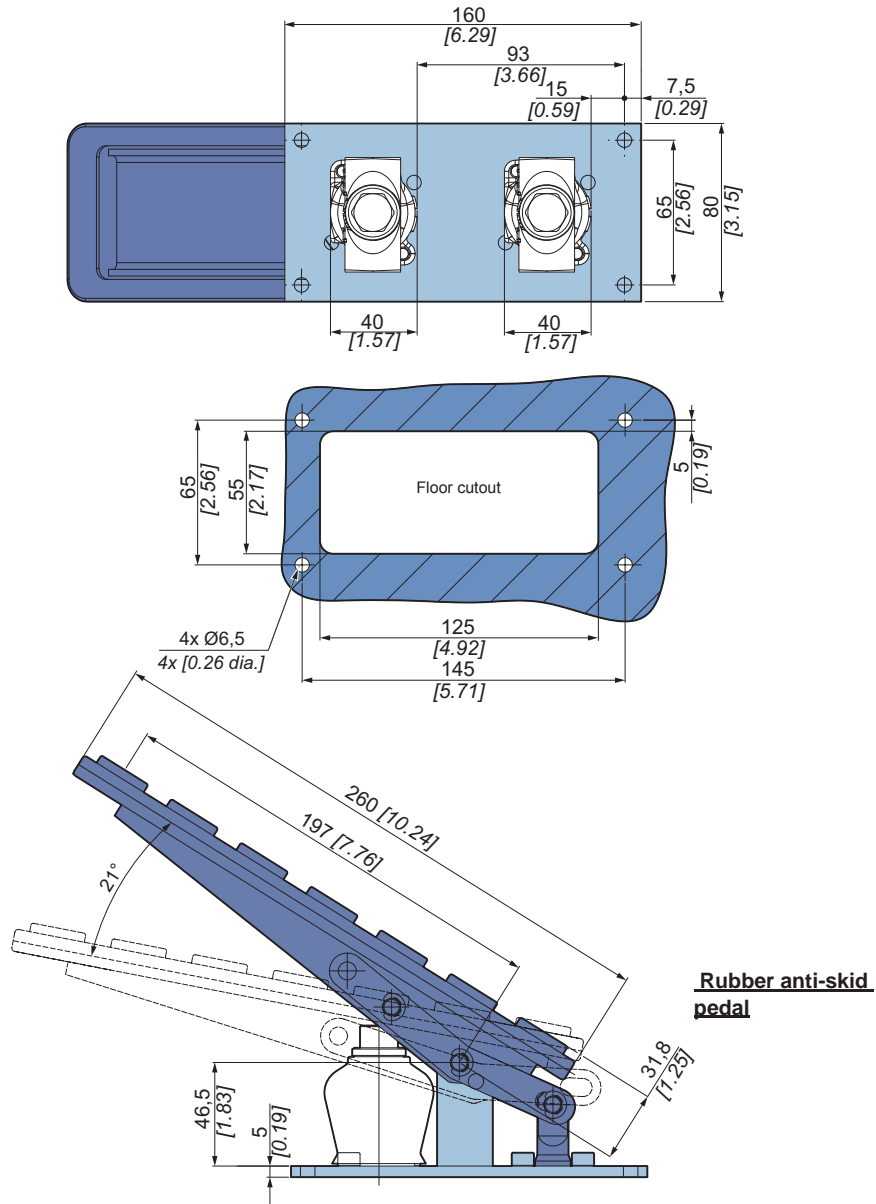
**Operation**

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

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**Mechanical control with standard valve orientation**

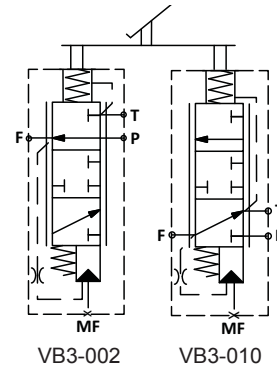
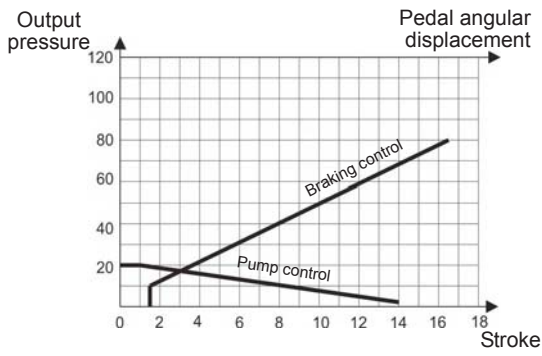


**Connections**

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]
P	250 [3 626]	M14 x 1.5	Input	3,5 [7,72]
T	1 [14,5]	or	Tank	
F (VB3-010)	120 [1 740]	9/16-18 UNF	Service braking	
F (VB3-002)	20 [290,1]	or	Inching control	
MF (VB3-010)*		M10 x 1	Service braking pressure switch	
MF (VB3-002)*		M10 x 1	Inching control pressure switch	

\* : Option

Hydraulic diagram and characteristic curve



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



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



This valve is always sold with a mechanical control.

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

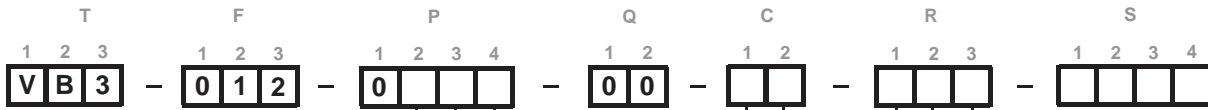
Full power  
brake

Relay Valve

Options

Installation

**Model Code**



**Operating pressure**

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

**Inching**

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

**Pressure curve shape**

Linear	1
Bi-linear	2

**Control**

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

**Pressure switch \*\***

Without	0
On MF (VB3-010)	2
On MF (VB3-002)	4
On MF (VB3-010) and MF (VB3-002)	B

**Electrical connection**

Without	0
Bare wire	1
Deutsch	3
AMP (6.3 x 0.8)	5

**Voltage**

Without	0
12V DC	1
24V DC	2

**Hydraulic connection**

Without	0
ISO 11926-1 (BSPP + spot face » ports)	3
ISO 9974-1 (metric + spot face » ports)	4
ISO 6149 (metric + cone » ports)	8
ISO 11926-1 (SAE J514 with O-ring seal)	A



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

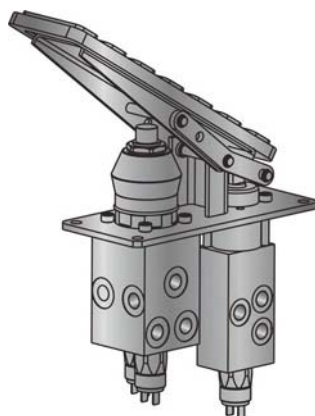
**\*\* Limitations**

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

**Options (See page 85)**

Without	0
Special setting or flow	1
Specific port*	2
Non-standard component*	3
Mechanical control adapter*	4
Pressure sensor	8
Pedal back abutment	9
Circuit Pressurization*	B
Pedal position sensor	F
Customized name plate	P

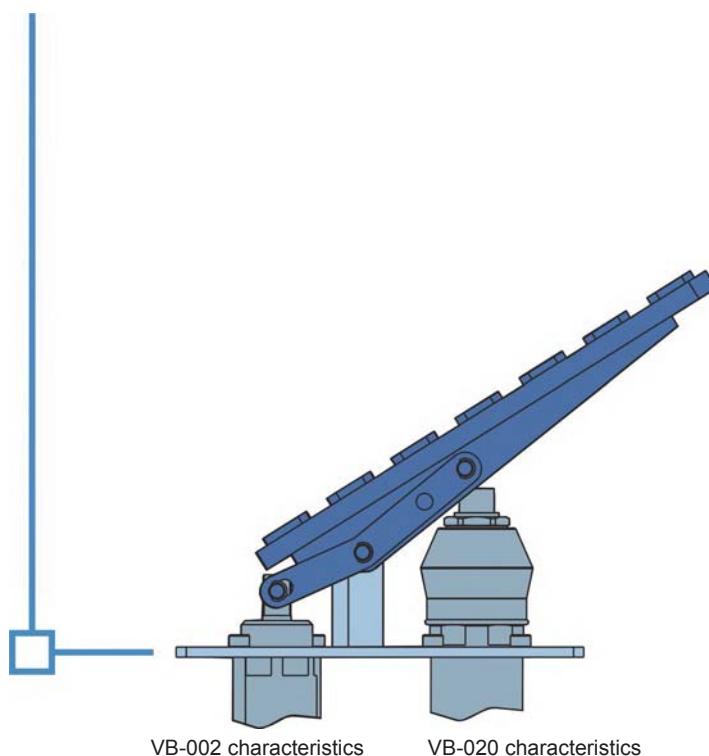
\* Please ask us



# VB-022

- Combination of VB-002 + VB-020
- Dual-circuit
- VB3-002 can be used for VB-022\*

\*For more information please contact your Poclain Hydraulics application engineer.



VB-002 characteristics

VB-020 characteristics

### Applications

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

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

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

### Operation

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

#### • Two-step braking:

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

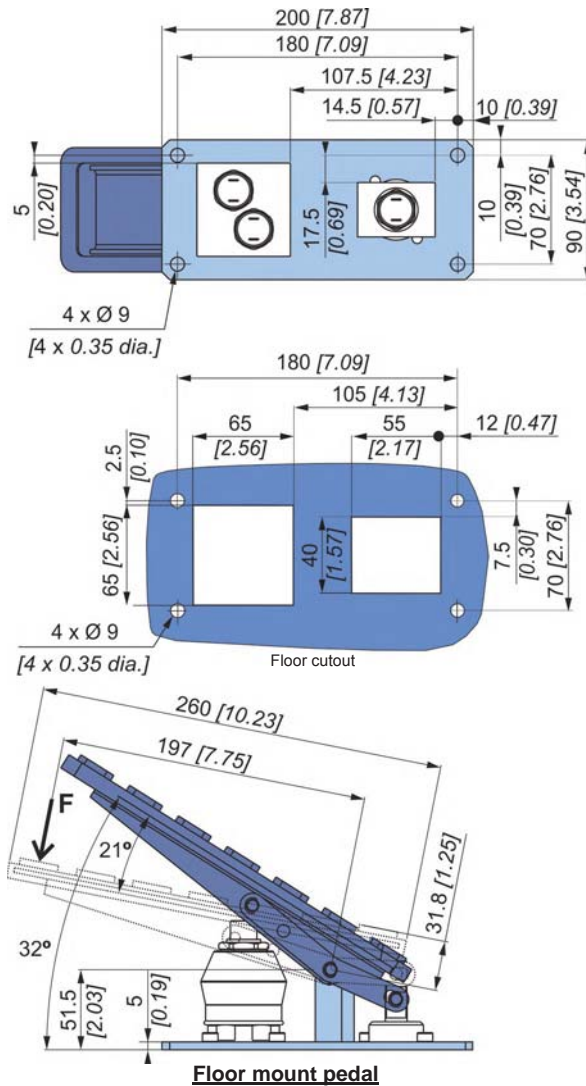
#### • Simultaneous braking:

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


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

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**Mechanical control with standard valve orientation**



**Connections**

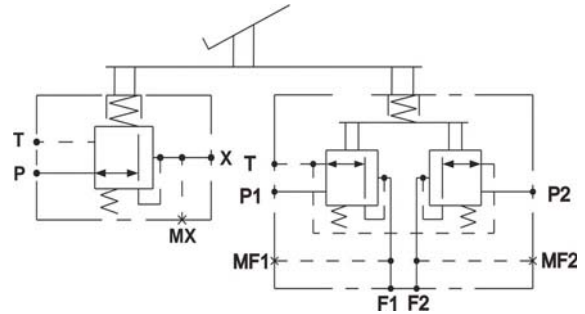
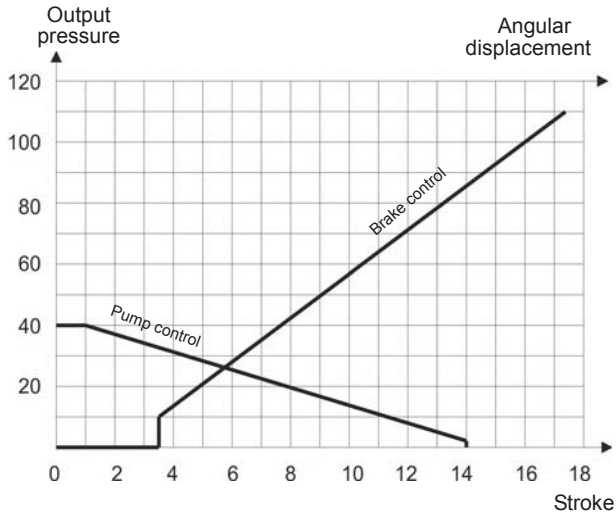
	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]
P	210 [3 046]	M14 x 1.5 or 9/16" 18 UNF	Input	
P1 - P2			Tank	
T	1 [14,5]	M10 x 1	Service braking	
F1 - F2	120 [1 740]		Inching control	
X	20 [290,1] (1)	M10 x 1 (VB022) M12 x 1.5 (VB0E2) M14 x 1.5 (VB0F2)	Service braking pressure switch	
MF1*			Service braking pressure switch	
MF2*		M12 x 1.5	Inching control pressure switch	
MX*				

(1) : Higher pressures: please contact us

\* : Option



Hydraulic diagram and characteristic curves



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



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

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

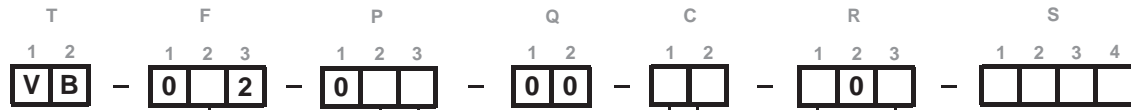
Full power brake

Relay Valve

Options

Installation

**Model Code**



**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

**Operating pressure**

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

**Inching**

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

**Control**

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



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

**Pressure switch \*\***

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

**Electrical connection**

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

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

**Options (See page 85)**

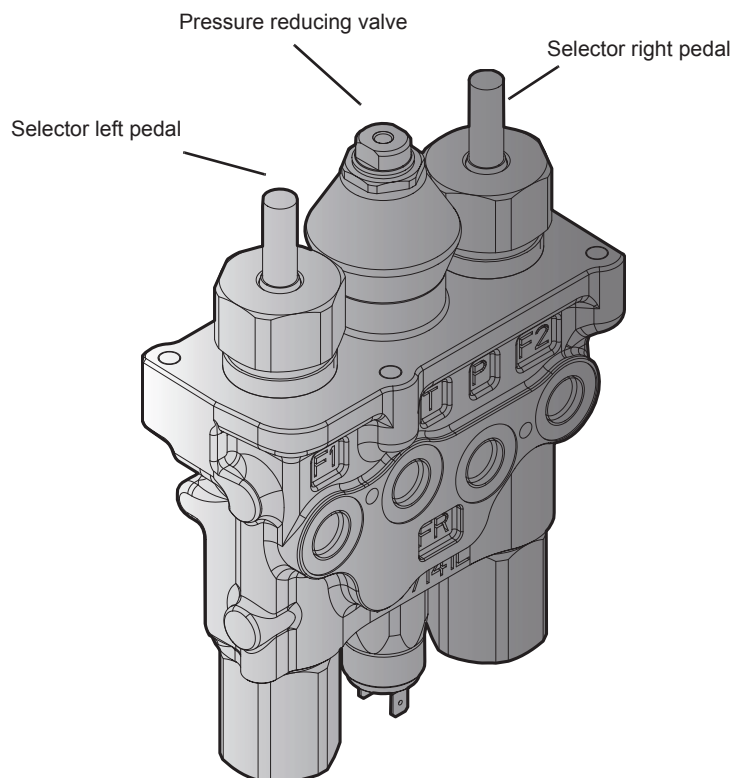
Special calibration*	1
Special port*	2
Non-standard component*	3
Dual-slope spring mechanism*	7
Pressure sensor	8
Circuit Pressurization*	B
Ports oriented to the right (East)*	E
Ports oriented to the front (North)*	N
Ports oriented to the back (South)*	S
Ports oriented to the left (West)*	W

\* Please ask us

**\*\* 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-0B0



## Applications

The 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.

### • Field mode:

VB-0B0 provides steering assistance for turning. In field 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-0B0 supplies a graduated release braking pressure exclusively to the service brakes associated with this pedal.

### • Road mode:

In road mode, the two pedals are mechanically linked. When the operator depresses one pedal, the other one is driven, and so both selectors are actuated together. The VB-0B0 valve supplies an identical pressure to both brakes, proportional to the stroke of the pedals.

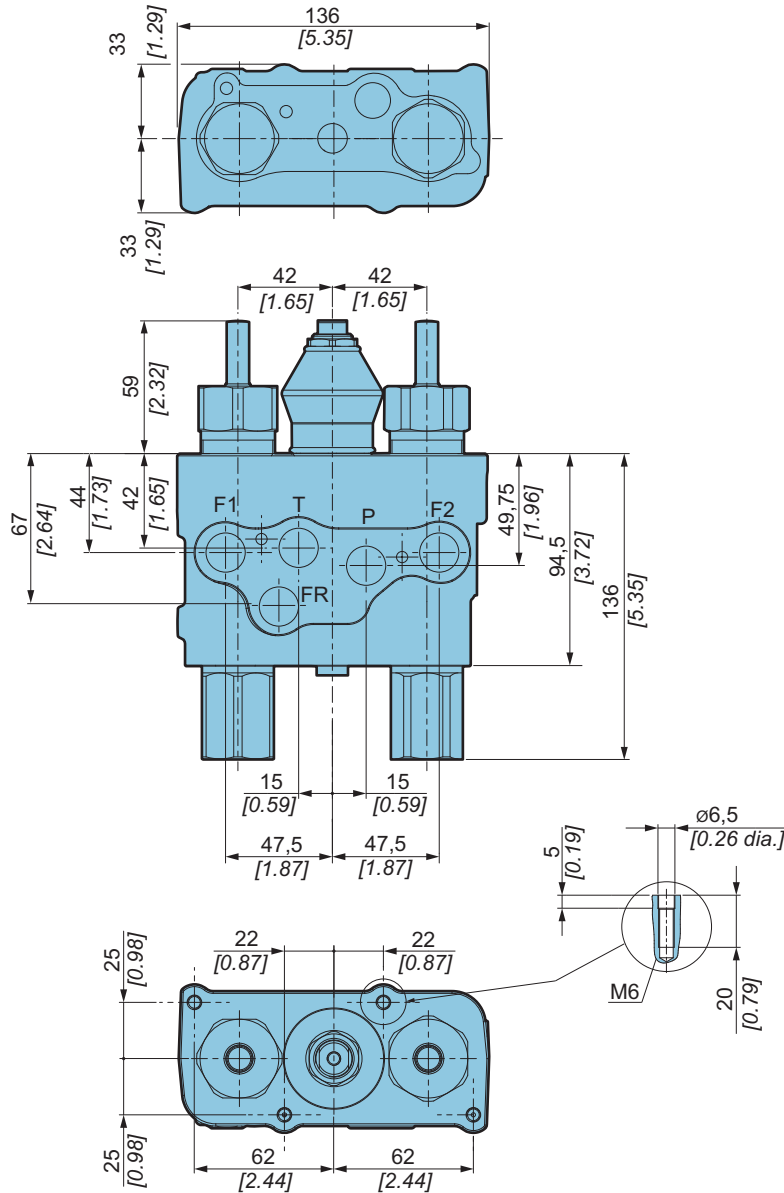
Emergency /  
Parking brakeService  
brakeService brake  
+ inchingSteering  
assist brakeAccumulator  
chargingFull power  
brake

Relay Valve

Options

Installation

Overall dimensions of VB-0B0 braking valve

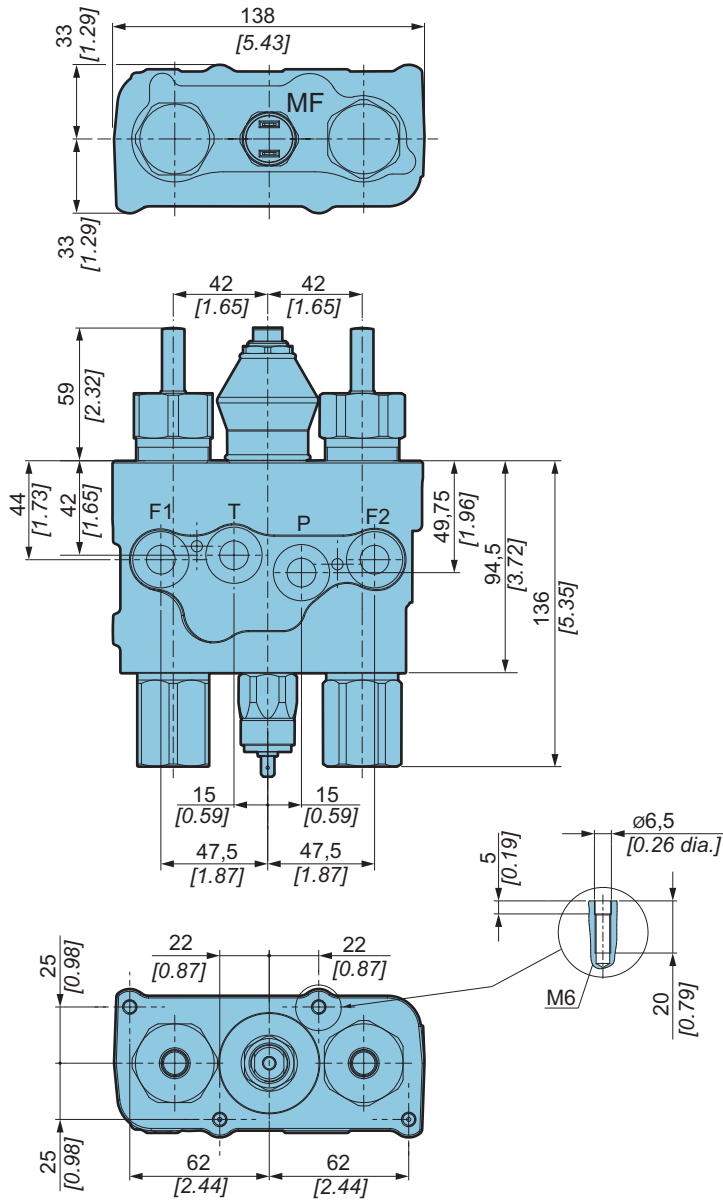


Connections

	Max. pressure bar [PSI]	Connection	Function	
According to version	P	250 [3 626]	Input	5 [11.02]
	T	10 [145,0]	Tank	
	F1	120 [1 740]	Left and/or right brake output	
	F2		Right and/or left brake output	
	FR (*)	M12 x 1.5 or 1/2" 20 UNF	Auxiliary brake output (optional)	
MF	-	M10 x 1	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



Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]	
According to version	P	250 [3 626]	Input	4,8 [10.58]	
	T	10 [145,0]	Tank		
	F1	120 [1 740]	9/16" 18 UNF		Left and/or right brake output
	F2		Right and/or left brake output		
	MF	-	M10 x 1		Service braking pressure

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

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

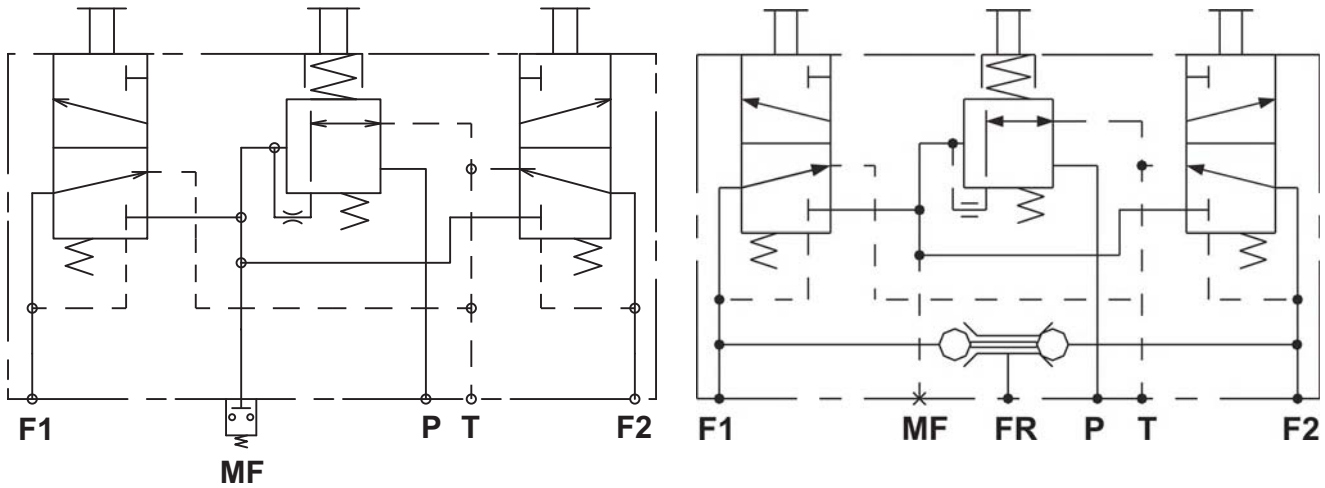
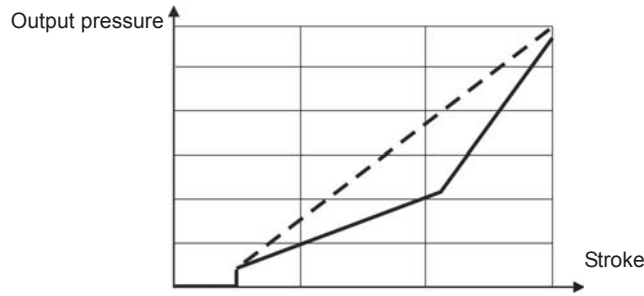
Full power brake

Relay Valve

Options

Installation

Hydraulic diagram and characteristic curve



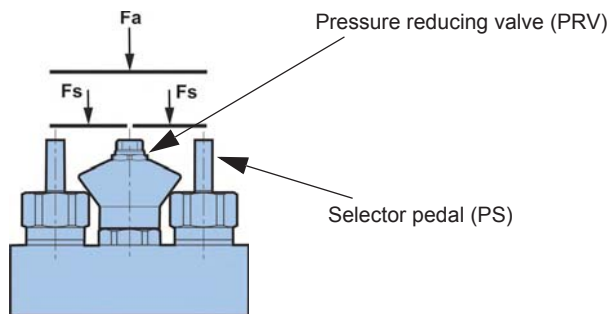
VB-0B0 valve with force feedback and no trailer brake signal FR.

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

Estimated maximum actuator forces according to output pressure

C\*  
1 2

		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



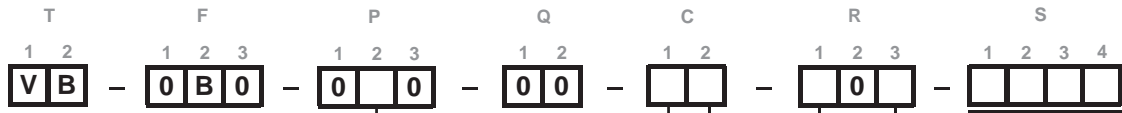
To obtain the forces in lbf, convert the final result.

\* see next page, model code, section C

Model Code



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



Operating pressure

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



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

\*\* Limitations

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

Control

DN12 cast	1
DN12 block	G
DN18 cast	2
DN18 block	H

Pressure switch \*\*

Without	0
On MF (service brake pressure)	2

Electrical connection

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

Hydraulic connection

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

Options (See page 85)

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

\* Please ask your Poclairn Hydraulics application engineer.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

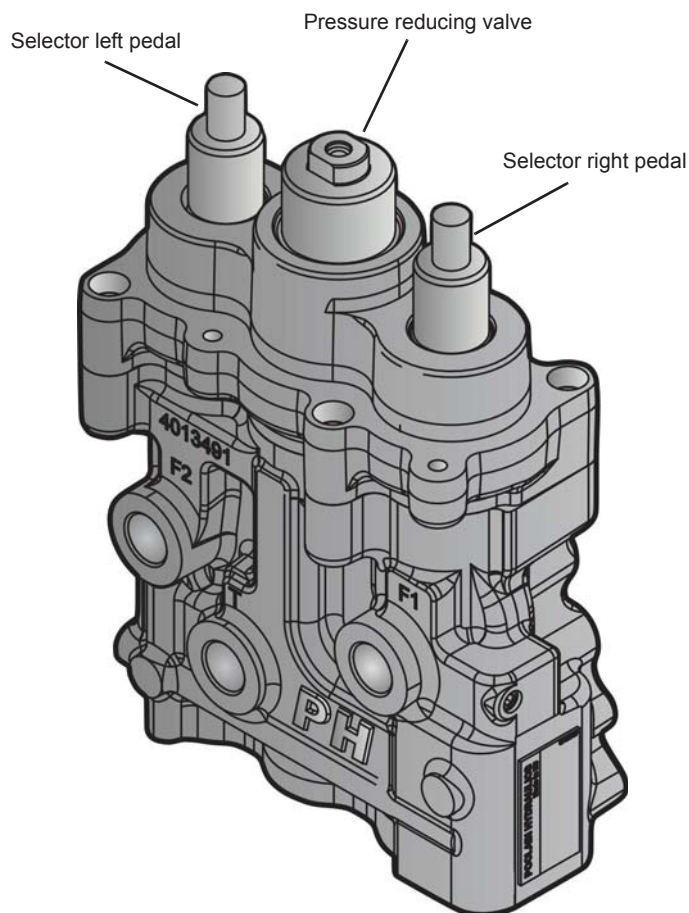
Options

Installation





# VB-0D0



## Applications

The 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 reducers that supply 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:

- Left/right directional braking in field mode.
- Braking with equal power distribution in road mode.

### • Field mode:

VB-0D0 provides steering assistance for turning. In field mode, the two pedals are actuated independently. When the operator depresses either pedal, the pressure reducers 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.

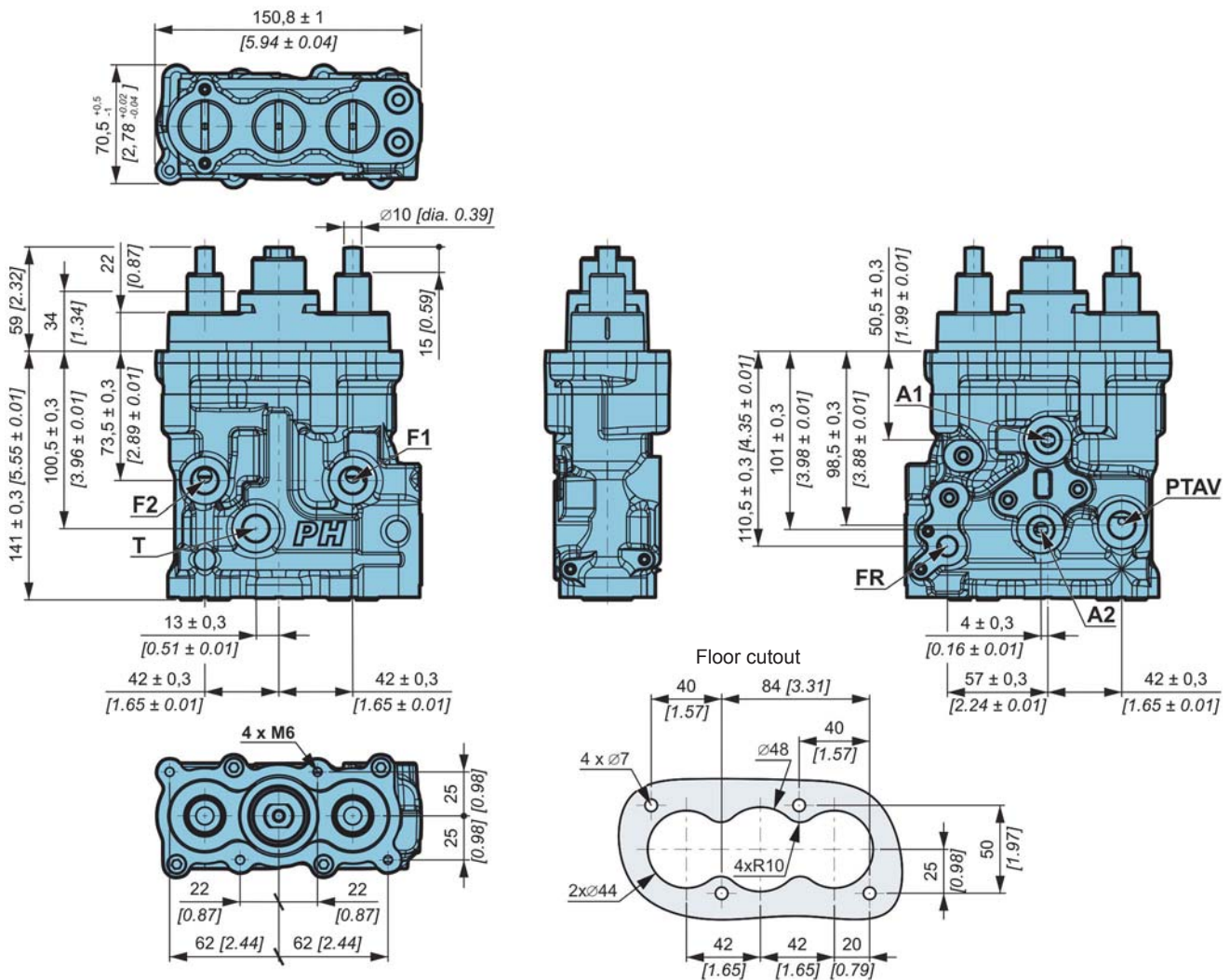
Emergency /  
Parking brakeService  
brakeService brake  
+ inchingSteering  
assist brakeAccumulator  
chargingFull power  
brake

Relay Valve

Options

Installation

Overall dimensions of VB-0D0 braking valve

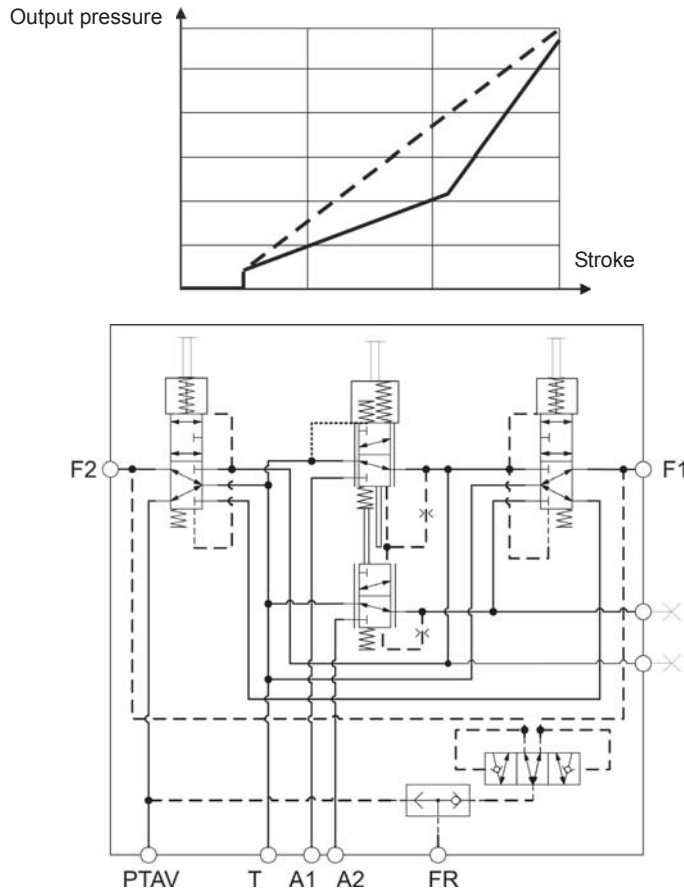


Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lb]	
According to version	A1	M16 x 1.5 or 3/4" 16 UNF	Rear axle supply	7.1 [15.7]	
	A2		Front axle supply		
	T		Tank		
	F1		Rear axle F1 braking		
	F2		Rear axle F2 braking		
	FR (*)		M12 x 1.5 or 1/2" 20 UNF		Auxiliary brake output (optional)
	PTAV		M16 x 1.5 or 3/4" 16 UNF		Front axle brake output

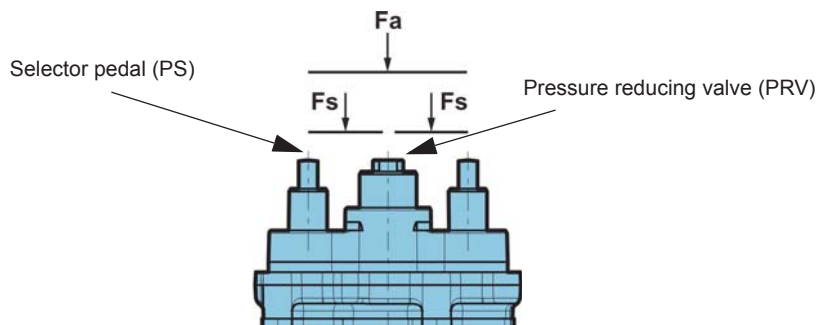
(\*) FR = F1 & F2. FR gives a braking pressure if both pedals are actuated (e.g., FR can be used to control a trailer brake valve). For further information, please contact us.

Hydraulic diagram and characteristic curve



Estimated maximum actuator forces according to output pressure

		C	
		1	2
		<b>Z</b>	
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.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

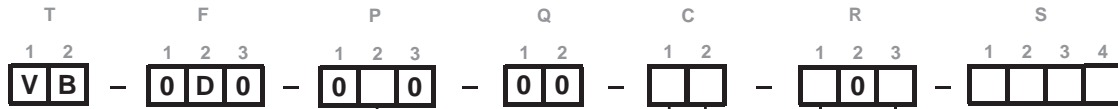
Options

Installation

Model Code



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



Operating pressure

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



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

Control

Control without force feedback	0
Control with force feedback DN20	Z

Pressure switch \*\*

Without	0
On MF (service brake pressure)	2

Electrical connection

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

Hydraulic connection

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

Options (See page 85)

Special calibration*	1
Special port*	2
Non-standard component*	3
Pressure sensor	8
Circuit Pressurization*	B

\* Please ask us



# VB-100

- 45 l/min [12 GPM]
- Single-circuit

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

Full power  
brake

Relay Valve

Options

Installation

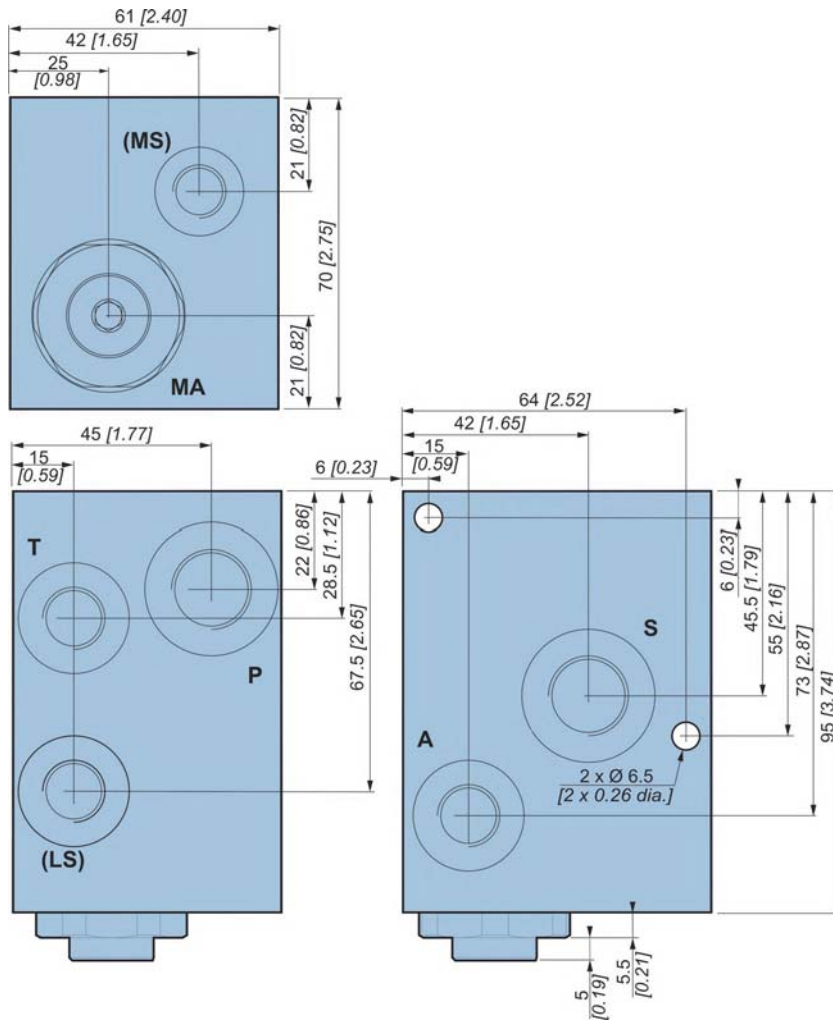
**Applications**

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


**Operation**

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

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



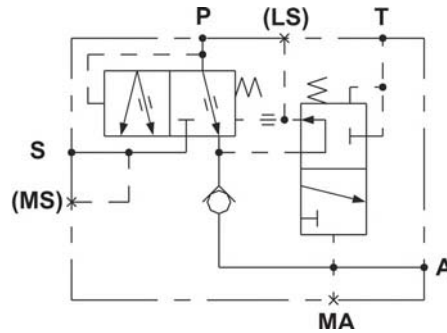
Connections

	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (1) bar [PSI]
P	210 [3 046]	M18 x 1.5	Input	2,2 [4.8]	10 [145]
S	Cut-out pressure	or 3/4 - 16 UNF	Auxiliary circuit		
T	1 [14,5]	M14 x 1.5	Tank		
A	Cut-out pressure	or 9/16 - 18 UNF	Service braking accumulator		
MA*		1/4 BSPP	Accumulator min. pressure switch		
LS*		M14 x 1.5 or 9/16 - 18 UNF	Load sensing		
MS*		M12 x 1.5	Pressure switch		

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

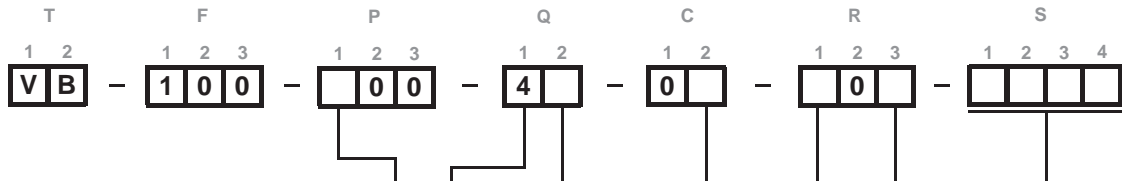
\* : Option

Hydraulic diagram



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

Model Code



Cut-in/Cut-out range

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

Flow rate to auxiliaries (P to S)

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

Flow rate to accumulator (P to A)

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

\*\* Limitations

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

Pressure switch \*\*

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

Electrical connection

without	0
Deutsch	3
AMP (6.3 X 0.8)	5

Hydraulic connection

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

Options (See page 85)

Special calibration*	1
Special port*	2
Non-standard component*	3
LS Port	5
MS Port	C
MS + LS Port	D

\* Please ask us

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation







# VB-100

- 120 l/min [32 GPM]
- Single-circuit

Emergency /  
Parking brakeService  
brakeService brake  
+ inchingSteering  
assist brakeAccumulator  
chargingFull power  
brake

Relay Valve

Options

Installation

### Applications

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

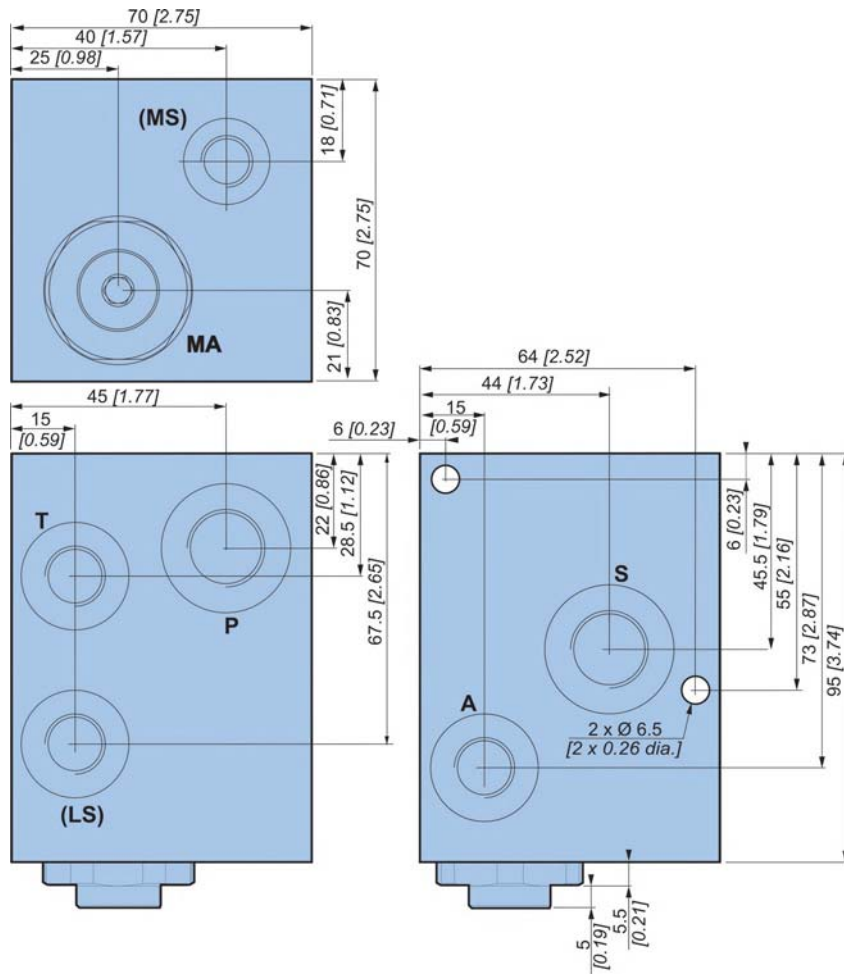
### Operation

During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator.

When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).

Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve again charges the accumulator until it reaches cut-out pressure, and so on.

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



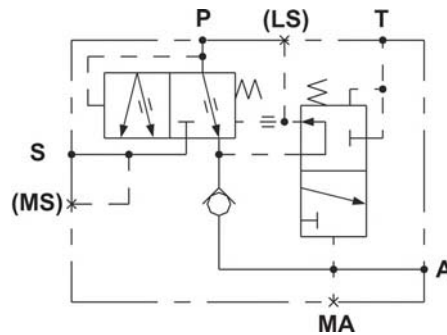
Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]	Loss of head (1) bar [PSI]
P	210 [3 046]	M18 x 1.5 or	Input	2,2 [4.8]	4 [58]
S	Cut-out pressure	3/4 - 16 UNF	Auxiliary circuit		
T	1 [14,5]	M14 x 1.5	Tank		
A	Cut-out pressure	or 9/16 - 18 UNF	Service braking accumulator		
MA*		1/4 BSPP	Accumulator min. pressure switch		
LS*		M14 x 1.5 or	Load sensing		
MS*		9/16 - 18 UNF	MS Pressure switch		
		M12 x 1.5			

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

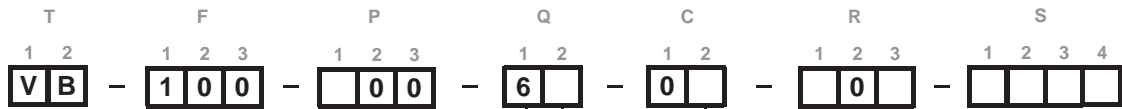
\* : Options

Hydraulic diagram



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

Model Code



Cut-in/Cut-out range

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

Flow rate to auxiliaries (P to S)

120 l/min [32 GPM]	6
--------------------	---

Flow rate to accumulator (P to A)

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

\*\* 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

Pressure switch \*\*

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

Electrical connection

without	0
Deutsch	3
AMP (6.3 X 0.8)	5

Hydraulic connection

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

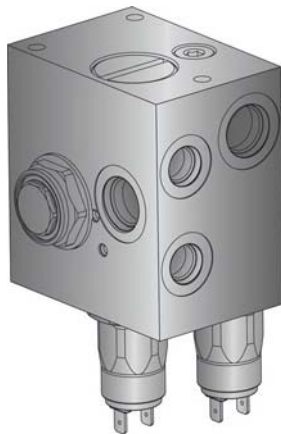
Options (See page 85)

Special calibration*	1
Special port*	2
Non-standard component*	3
LS Port	5
MS Port	C
MS + LS Port	D

\* Please ask us

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation





## VB-200

- 45 l/min [12 GPM]
- Dual-circuit

Emergency /  
Parking brakeService  
brakeService brake  
+ inchingSteering  
assist brakeAccumulator  
chargingFull power  
brake

Relay Valve

Options

Installation

### Applications

The VB-200 accumulator charging valve charges the accumulators of a braking circuit and maintains their pressure while supplying an auxiliary circuit.

In a braking circuit, valve VB-200 is associated with the VB-020 dual-circuit service brake valve (or the VB-010 single-circuit service brake valve and the VB-002 emergency / parking brake valve).

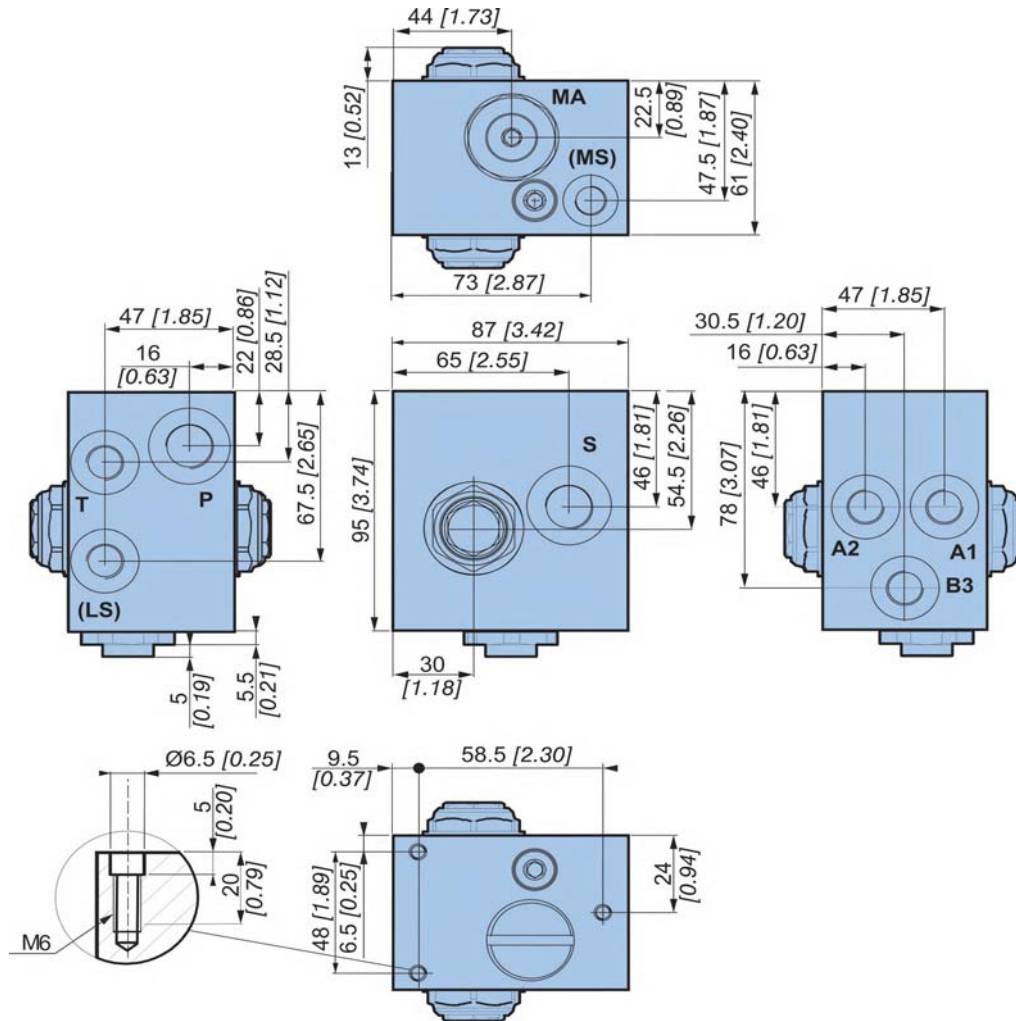
### Operation

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

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

When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator.

Overall dimensions of VB-200 (45 l/min) accumulators charging valve

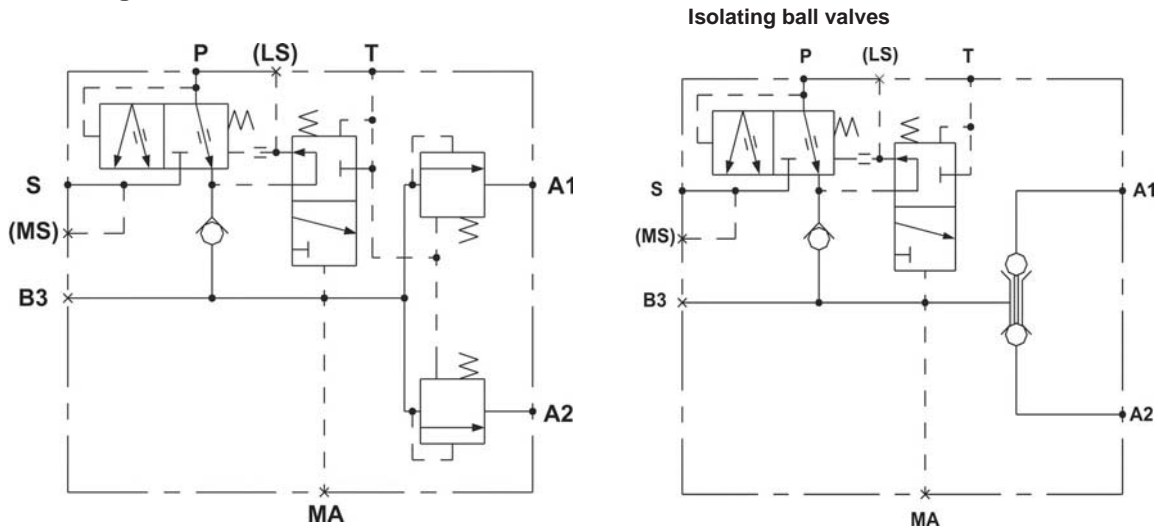


Connections

	Max. pressure bar [PSI]	Connection	Function	kg [lbs]	Loss of head (2) bar [PSI]
P	210 [3 046]	M18 x 1.5 or 3/4 - 16 UNF	Input	4 [8.8]	10 [145]
S	Cut-out pressure		Auxiliary circuit		
T	1 [14.5]		Tank		
A1 - A2	Cut-out pressure (1)	M14 x 1.5 or 9/16 - 18 UNF	Service braking accumulator		
B3			Parking brake connection		
MA*		1/4 BSPP	Accumulator min. pressure switch		
LS*		M14 x 1.5 or 9/16 - 18 UNF	Load sensing		
MS*		M12 x 1.5	MS Pressure switch		

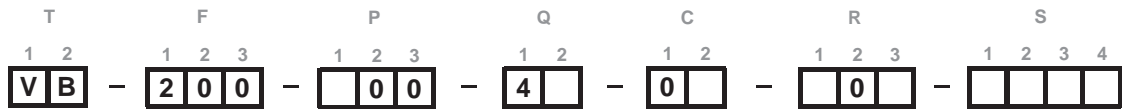
(1) Or max. allowable pressure for the accumulators.  
 (2) Loss of head (P to S) given at a flow rate (Q = 30 l/min, 8 GPM)  
 \* :Options

Hydraulic diagram



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

Model Code



Cut-in/Cut-out range

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

Flow rate to auxiliaries (P to S)

45 l/min [12 GPM] 4

Flow rate to accumulator (P to A)

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

\*\* Limitations

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

Pressure switch \*\*

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

Electrical connection

without	0
Deutsch	3
AMP (6.3 x 0.8)	5

Hydraulic connection

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

Options (See page 85)

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

\* Please ask us

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

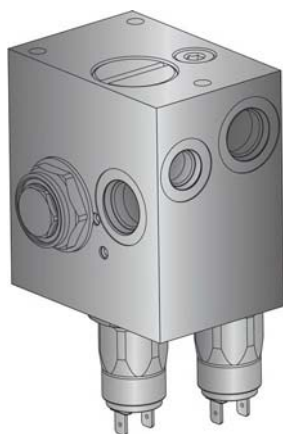
Relay Valve

Options

Installation







# VB-200

- 120 l/min [32 GPM]
- Dual-circuit

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging**
- Full power brake
- Relay Valve
- Options
- Installation

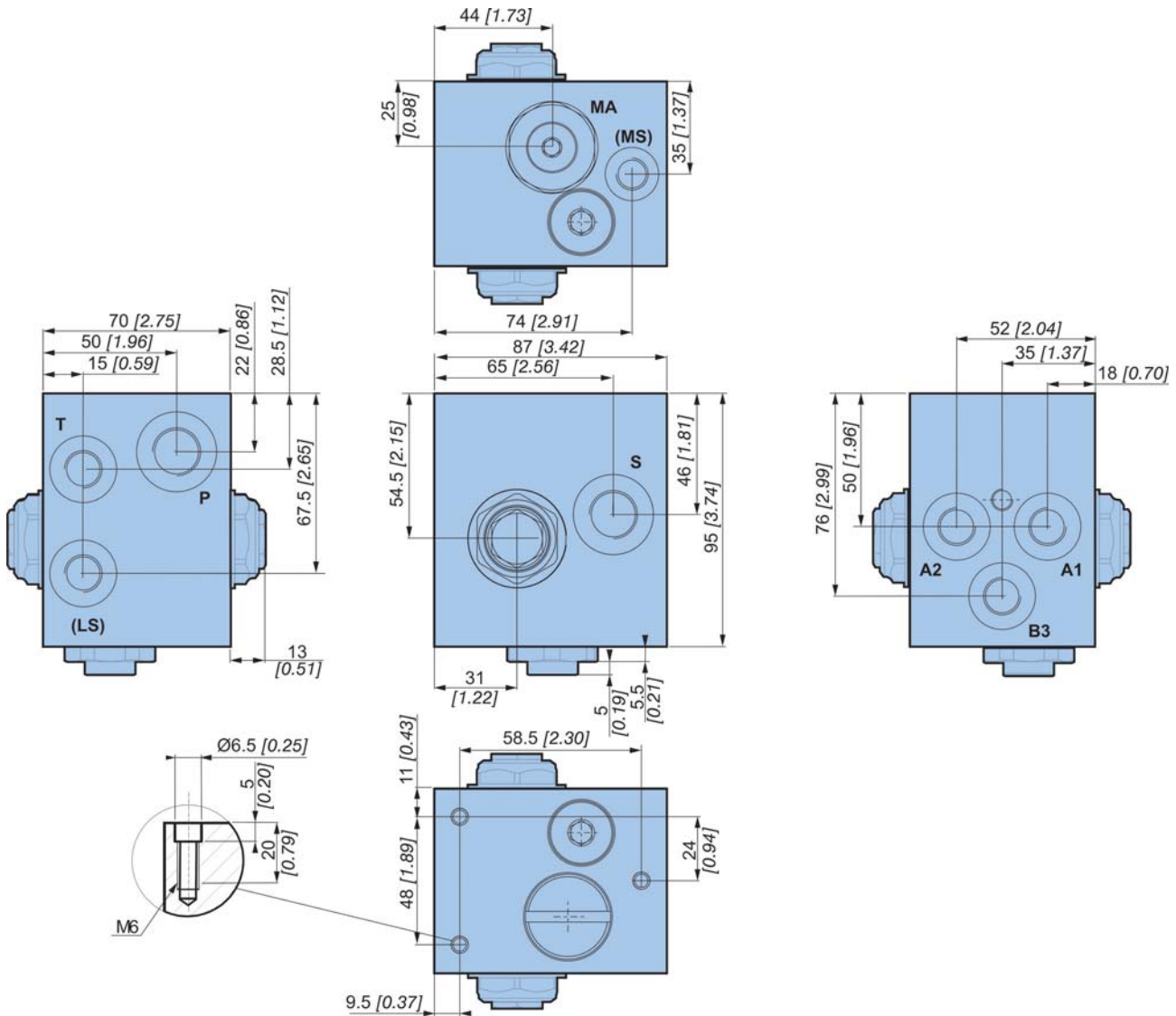
**Applications**

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


**Operation**

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

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



Connections

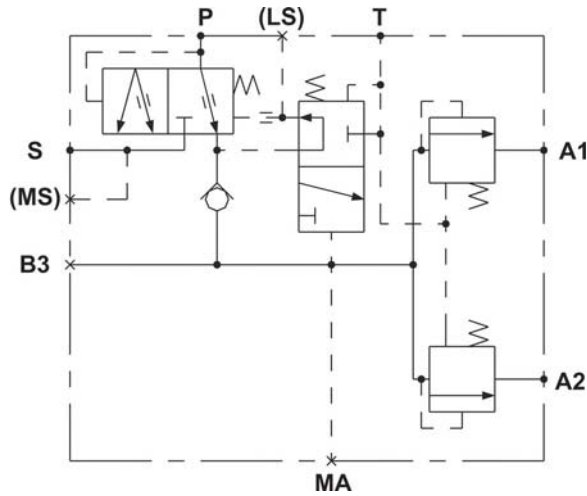
	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (2) bar [PSI]
P	210 [3 046]	M18 x 1.5 or 3/4 - 16 UNF	Input	4 [8.8]	4 [58]
S	Cut-out pressure		Auxiliary circuit		
T	1 [14,5]		Tank		
A1 - A2	Cut-out pressure (1)	M14 x 1.5 or 9/16 - 18 UNF	Service braking accumulator		
B3			Parking brake connection		
MA*		1/4 BSPP	Accumulator min. pressure switch		
LS*		M14 x 1.5 or 9/16 - 18 UNF	Load sensing		
MS*		M12 x 1.5	MS Pressure switch		

(1) Or max. allowable pressure for the accumulators.

(2) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)

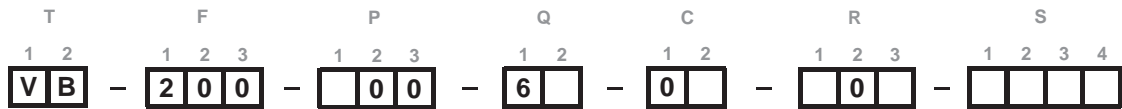
\* :Options

Hydraulic diagram



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

Model Code



Cut-in/Cut-out range

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

Flow rate to auxiliaries (P to S)

120 l/min [32 GPM] 6

Flow rate to accumulator (P to A)

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

Pressure switch \*\*

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

Electrical connection

without	0
Deutsch	3
AMP (6.3 X 0.8)	5

Hydraulic connection

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



For other operating pressures, please consult your Poclairn 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

Options (See page 85)

Special calibration*	1
Special port*	2
Non-standard component*	3
LS Port	5
MS Port	C
MS + LS Port	D

\* Please ask us

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

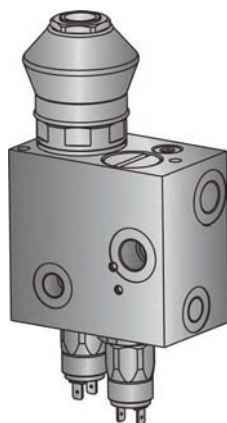
Full power brake

Relay Valve

Options

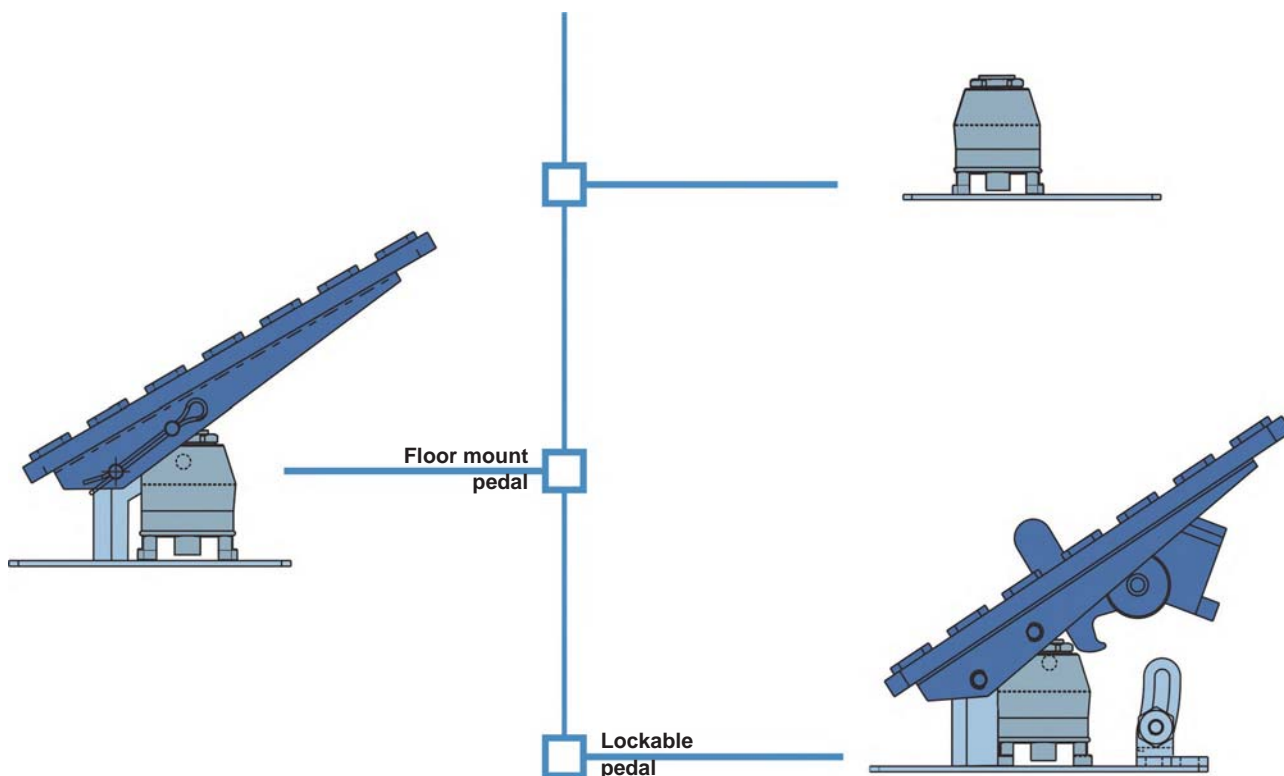
Installation





# VB-110

- Service brake valve
- Accumulator charging valve
- 45 l/min [12 GPM]
- Single-circuit



- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**Applications**

The VB-110 braking assembly contains the following components in a single manifold:

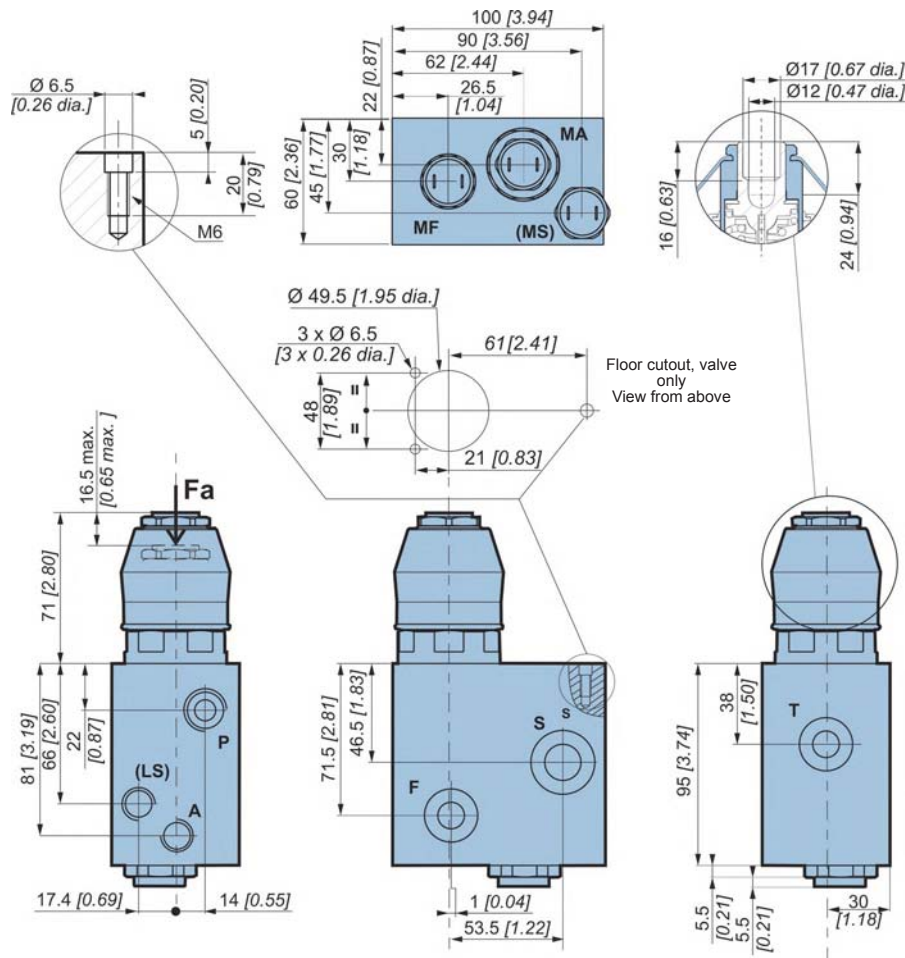
- A single-circuit accumulator charging valve,
- A mechanically controlled single-circuit service brake valve.

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


**Operation**

During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return). Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on. The modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve. It is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest ('up' position), the output pressure (at F) is zero and the brake receptors are connected to the tank (F to T). When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespective of the supply pressure.

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

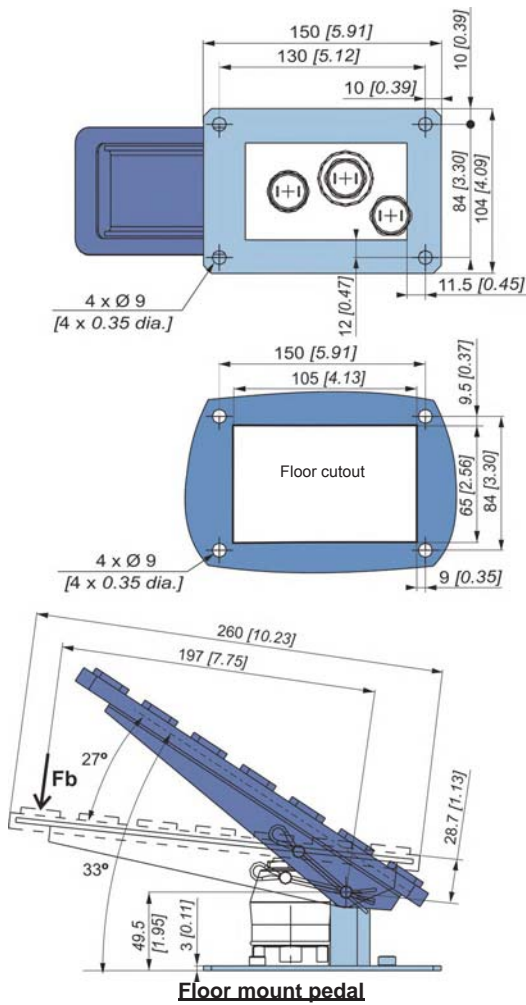


Connections

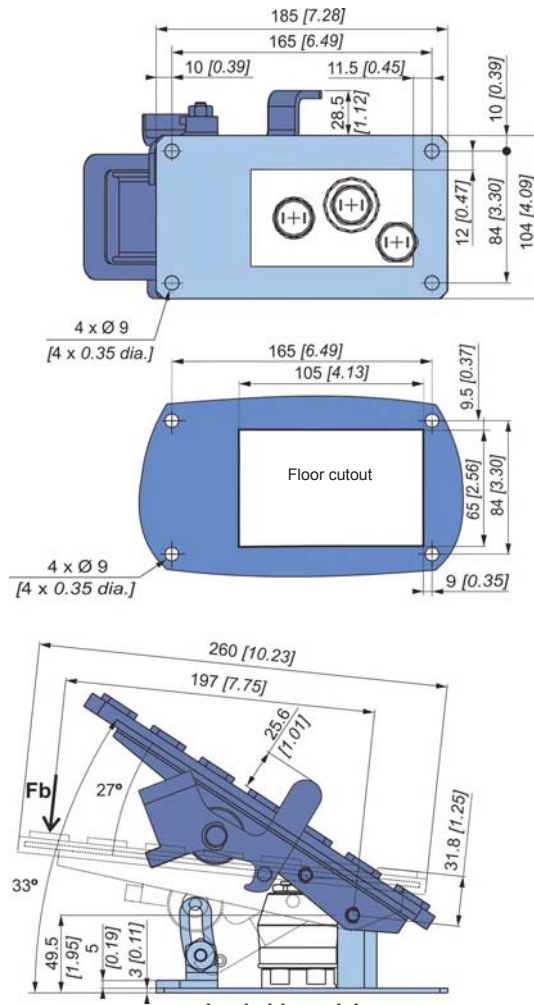
	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (3) bar [PSI]
P	210 [3 046]	M18 x 1.5 or	Input	5 [12.8]	10 [145]
S	Cut-out pressure	3/4" - 16 UNF	Auxiliary circuit		
T	1 [14,5]		Tank		
F	120 [1 740] (2)	M 14 x 1.5 or	Service braking		
A	Cut-out pressure (1)	9/16" - 18 UNF	Service braking accumulator		
MA*		1/4" BSPP	Accumulator min. pressure switch		
MF*		M10 x 1	Service pressure switch		
LS*		M 14 x 1.5 or	Load sensing		
MS*		M12 x 1.5	MS pressure switch		

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

Mechanical Controls

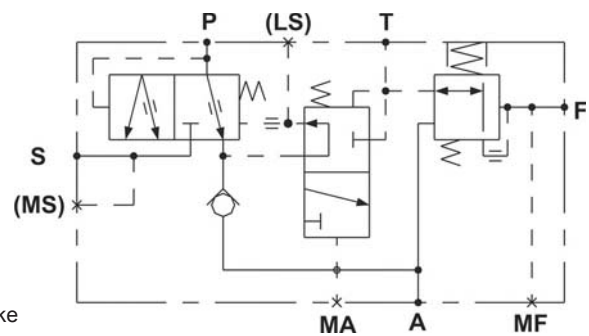
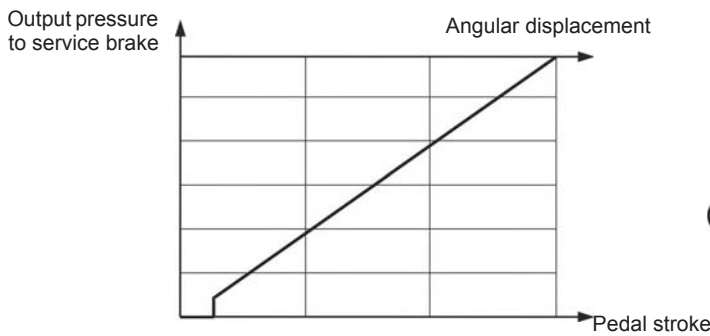


Floor mount pedal



Lockable pedal

Hydraulic diagram and characteristic curve



Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa) : Fa (daN)  $\approx 0.5 \times$  max. output pressure (bar) + 35
- Force on pedal (Fb) : Fb (daN)  $\approx Fa/5$



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.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

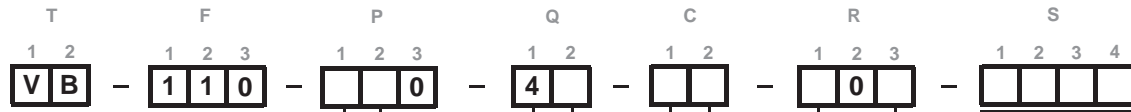
Full power brake

Relay Valve

Options

Installation

**Model Code**



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

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

**Operating pressure**

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

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

45 l/min [12 GPM]	4
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**Flow rate to accumulator (P to A)**

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

**Control**

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

**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

**Electrical connection**

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

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

**Options (See page 85)**

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

\* Please ask us

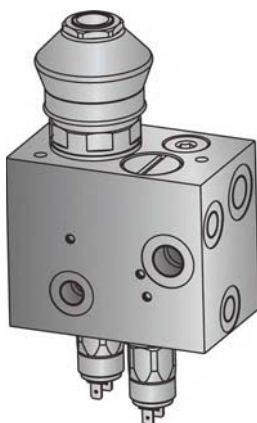


**For other operating pressures, please consult your Poclain Hydraulics application engineer.**

**\*\* Limitations**

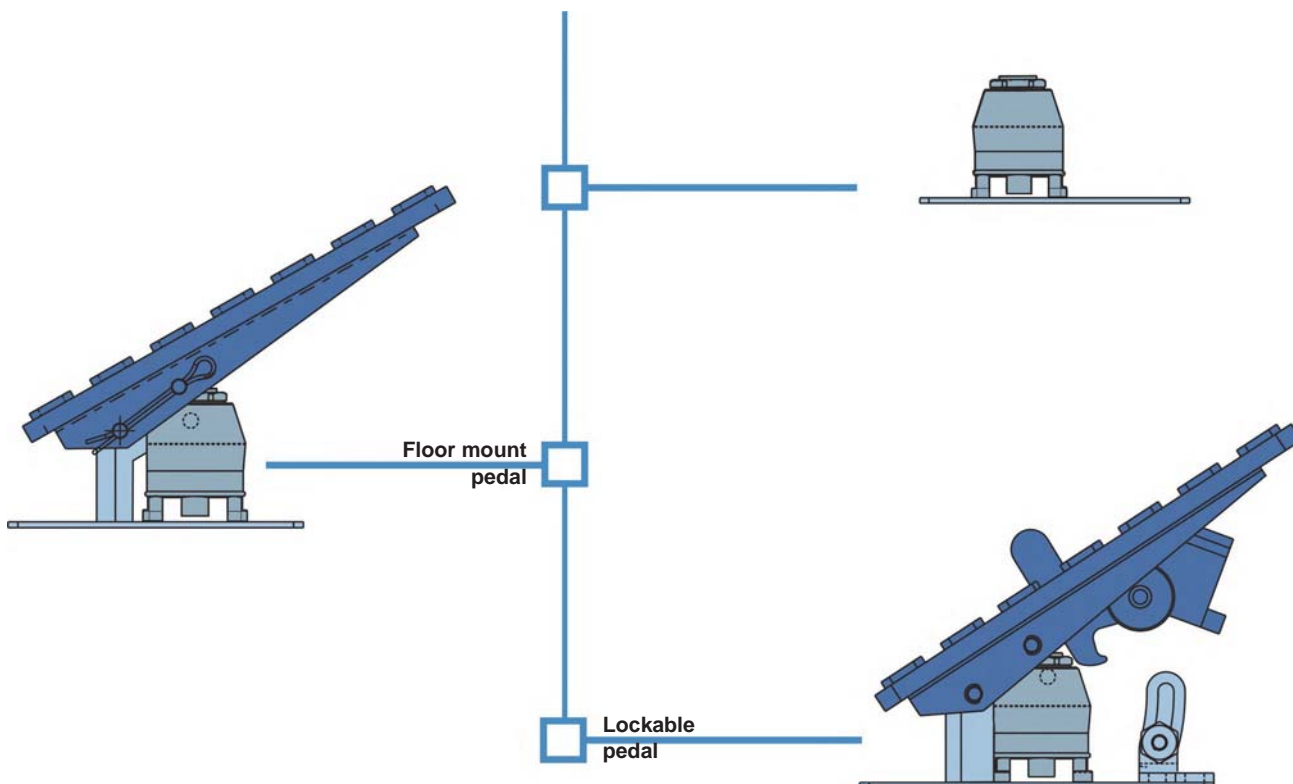
Pressure rise	< 1 bar [14.5 PSI] / ms min. 100 mA to assure contact
Current	max. 4 A for Resistor load max. 2,5 A for Inductive load
Voltage	max. 42 V





# VB-110

- Service brake valve
- Accumulator charging valve
- 120 l/min [32 GPM]
- Single-circuit



**Applications**

The VB-110 braking assembly contains the following components in a single manifold:

- A single-circuit accumulator charging valve,
- A mechanically controlled single-circuit service brake valve.

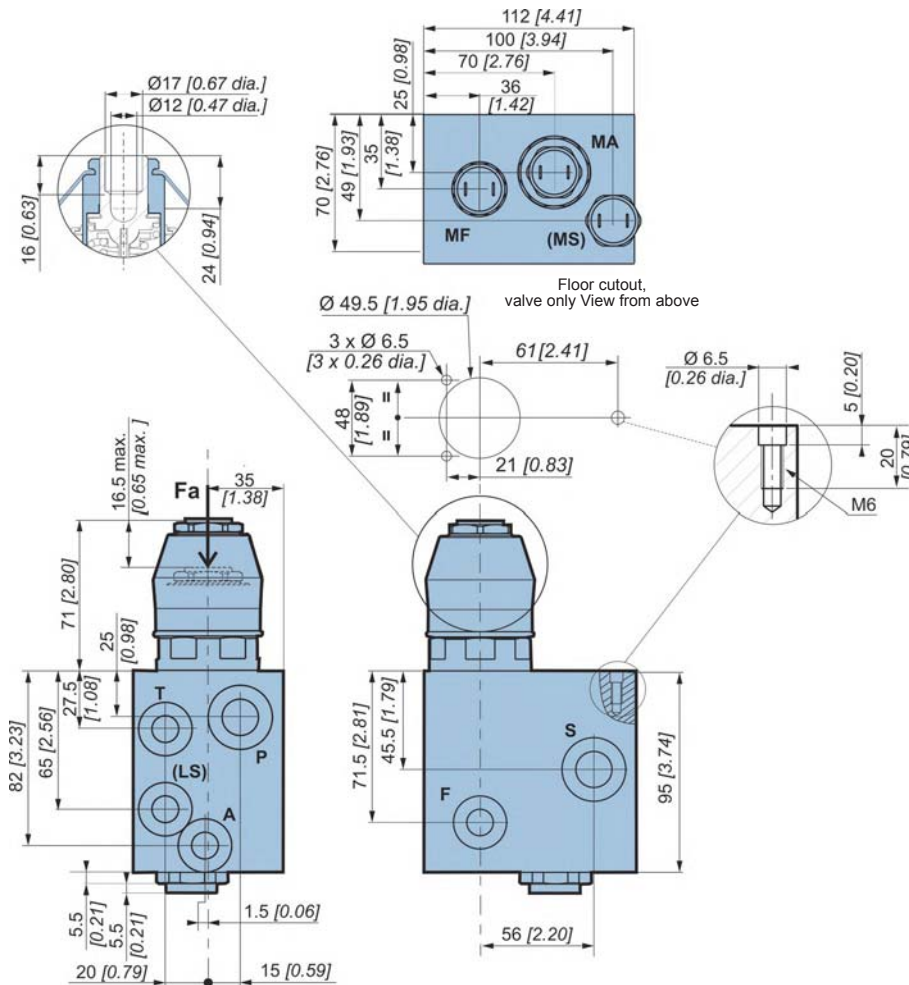
The incorporation of these functions in a compact unit reduces the risk of leaks and makes the overall size more compact.

**Operation**


During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return). Each time the operator actuates the pedal, the pressure in the accumulator drops. When minimum (cut-in) pressure is reached, the valve recharges the accumulator to cut-out pressure, and so on. The modulating brake valve is a mechanically-controlled, three-way, graduated release pressure reducing valve. It is used for the precision dosing of the output pressure (at F) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest ('up' position), the output pressure (at F) is zero and the brake receptors are connected to the tank (F to T). When the pedal is depressed, the output pressure (at F) increases proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressure (at F) is limited to the preset pressure of the valve irrespective of the supply pressure.

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

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

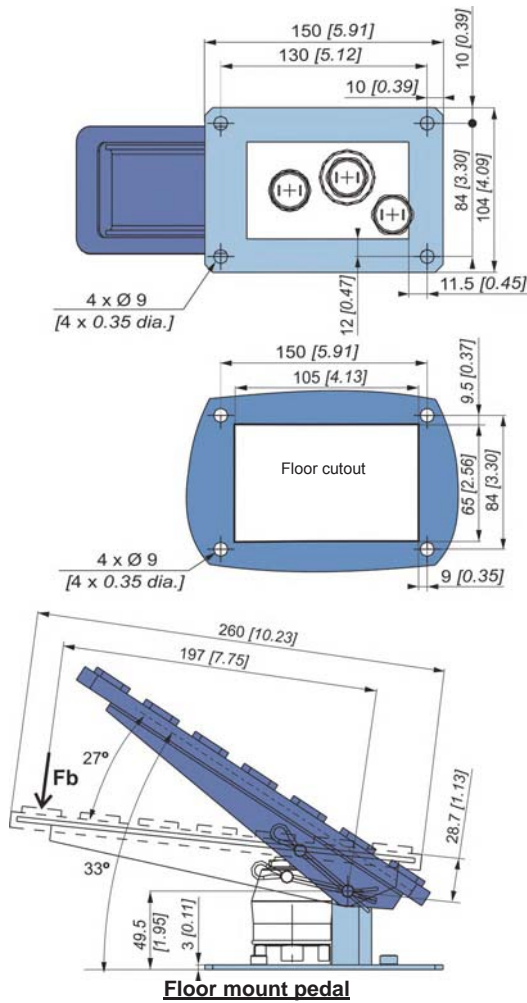


Connections

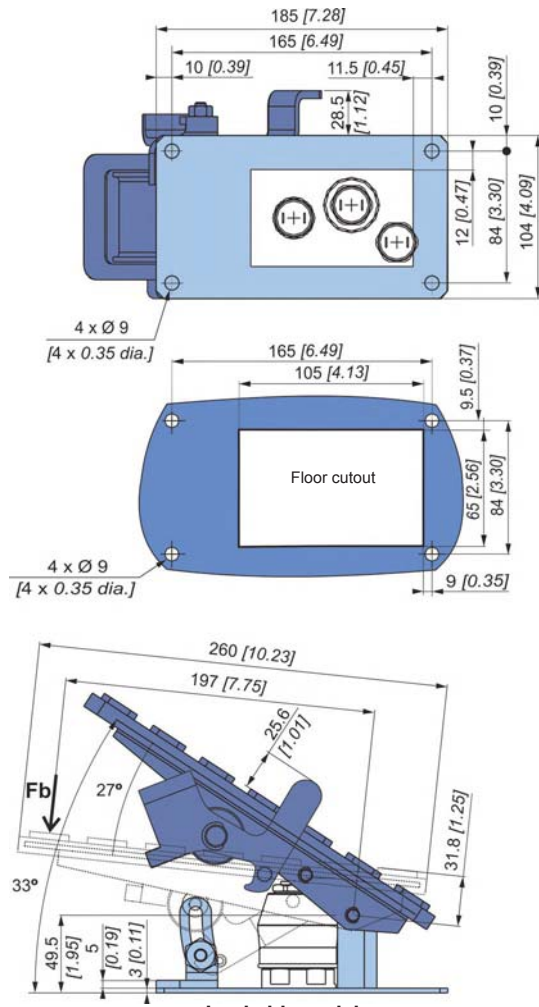
	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (3) bar [PSI]
P	210 [3 046]	M18 x 1.5 or	Input	5 [12.8]	4 [58]
S	Cut-out pressure	3/4" - 16 UNF	Auxiliary circuit		
T	1 [14,5]	M 14 x 1.5 or	Tank		
F	120 [1 740] (2)	9/16" - 18 UNF	Service braking		
A	Cut-out pressure(1)	1/4" BSPP	Service braking accumulator		
MA		M10 x 1	Accumulator min. pressure switch		
MF		M 14 x 1.5 or	Service pressure switch		
LS*		9/16" - 18 UNF	Load sensing		
MS*		M12 x 1.5	MS pressure switch		

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

Mechanical Controls

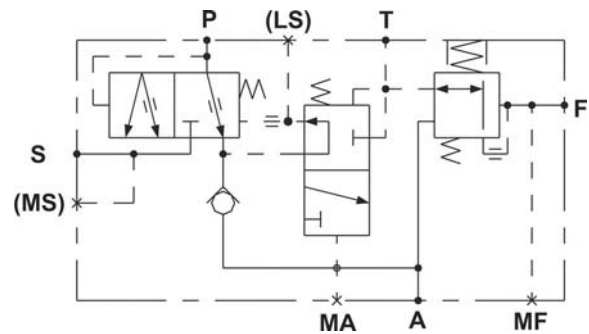
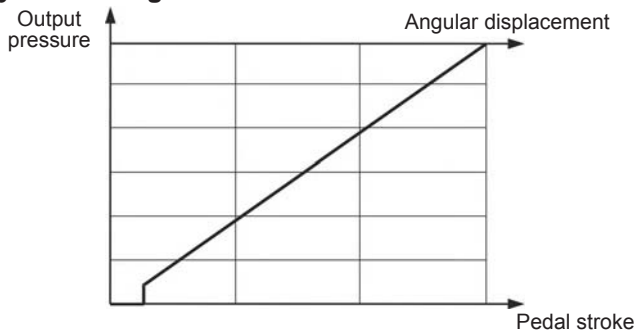


Floor mount pedal



Lockable pedal

Hydraulic diagram and characteristic curve



Estimated max. actuator force as a function of output pressure

- Force on pedal (Fa) :  $F_a \text{ (daN)} \approx 0.5 \times \text{max. output pressure (bar)} + 27$
- Force on pedal (Fb) :  $F_b \text{ (daN)} \approx F_a/5$



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



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

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

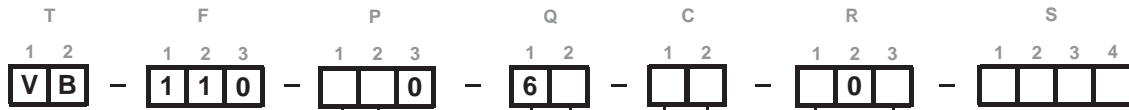
Full power brake

Relay Valve

Options

Installation

**Model Code**



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

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

**Operating pressure**

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

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

120 l/min [32 GPM]	6
--------------------	---

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

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

**Control**

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

**Pressure switch \*\***

Without	0
On MA (accumulator min. pressure)	1
On MF (service brake)	2
On MS (auxiliary)	3
On MA and MF	5
On MA and MS	6
On MA, MF and MS	7

**Electrical connection**

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

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

**Options (See page 85)**

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

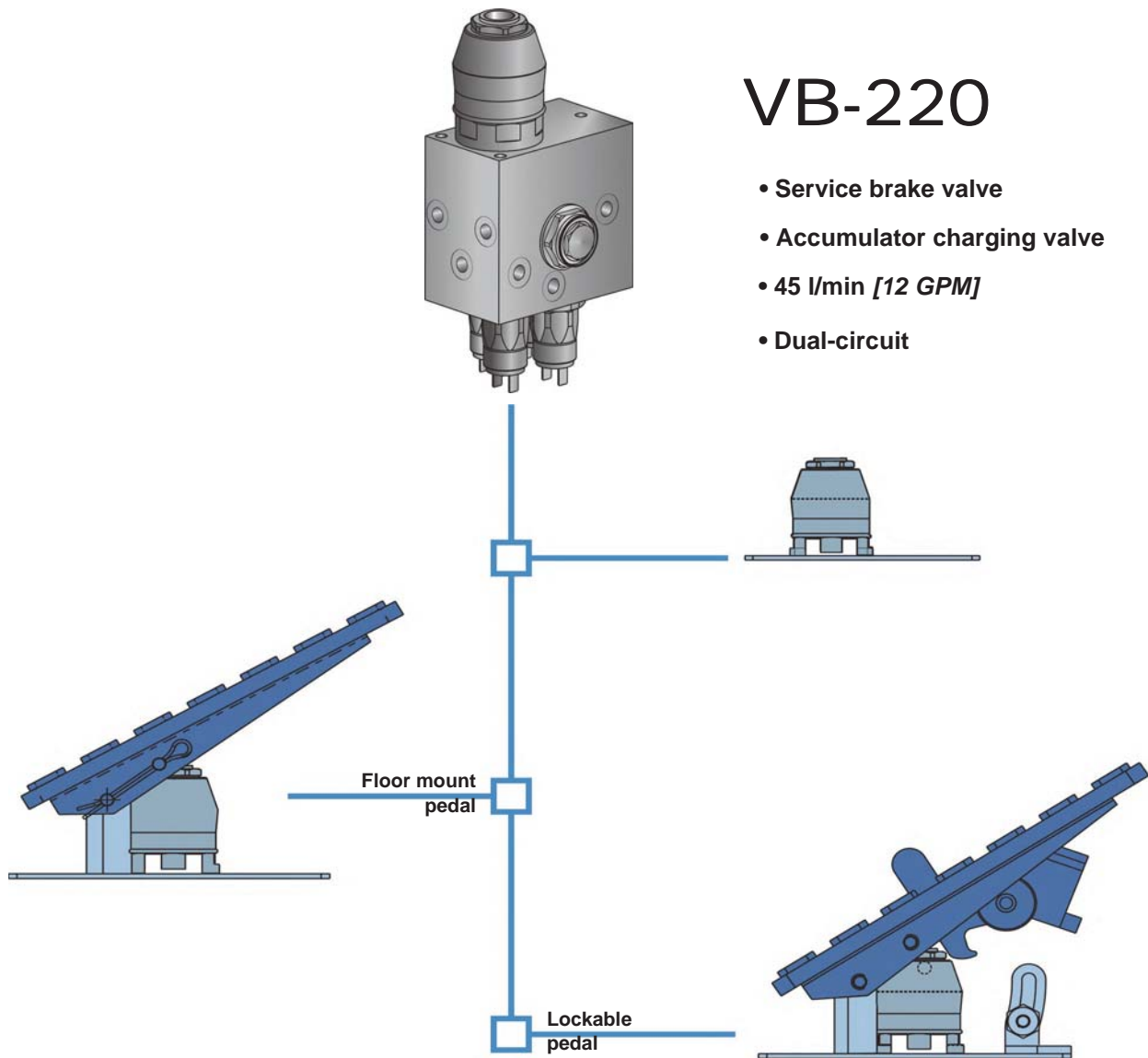
\* Please ask us



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

**\*\* Limitations**

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



# VB-220

- Service brake valve
- Accumulator charging valve
- 45 l/min [12 GPM]
- Dual-circuit

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**Applications**

The Poclain Hydraulics VB-220 braking assembly contains the following components in a single manifold:

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

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

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

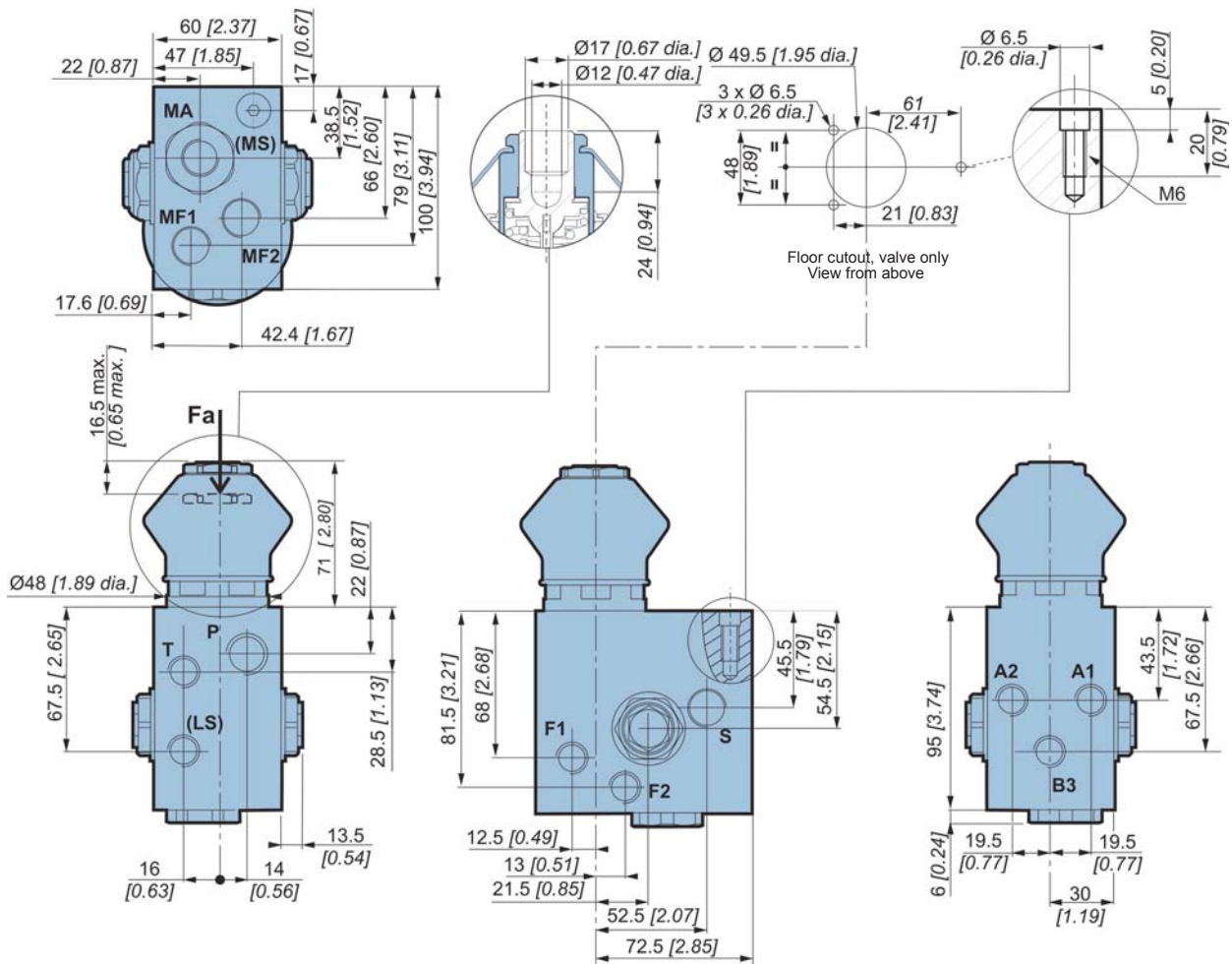
**Operation**

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


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

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

Overall dimensions of VB-220 (45 l/min) brake valve

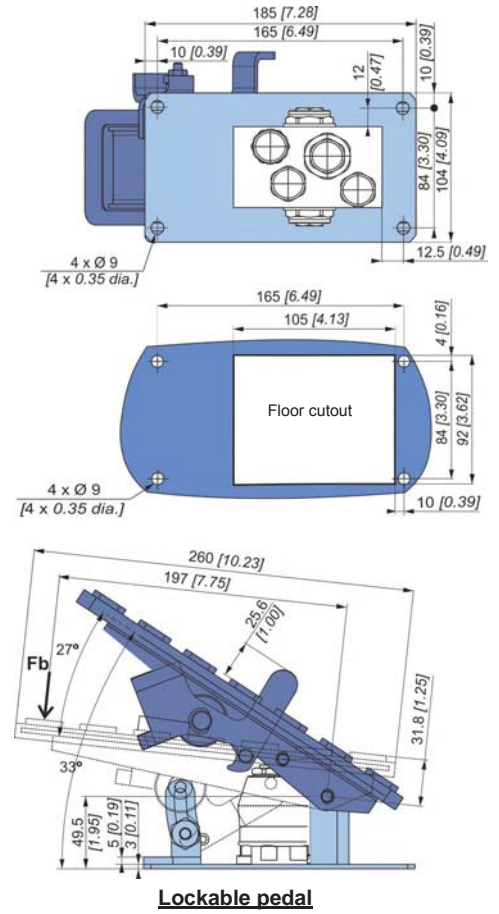
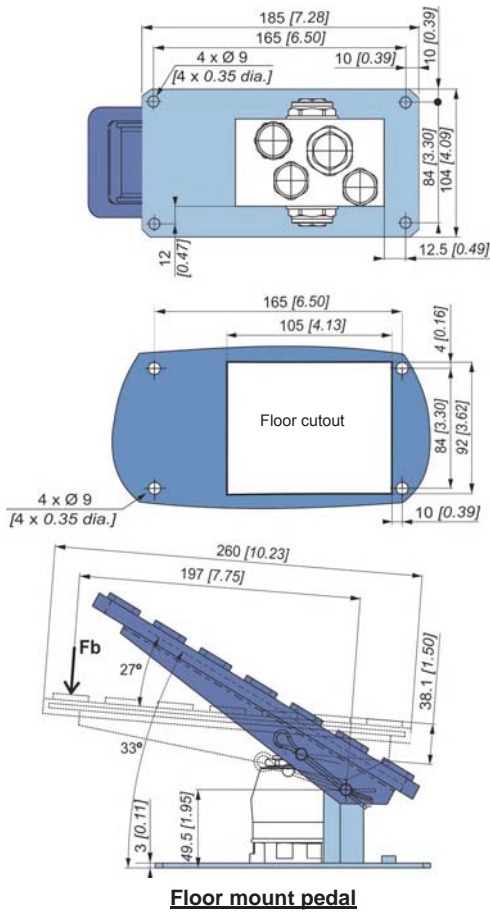


Connections

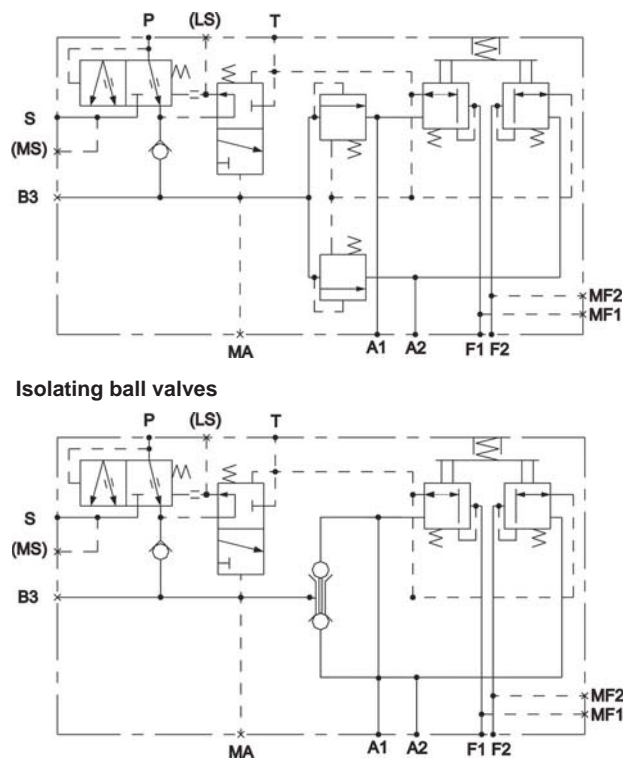
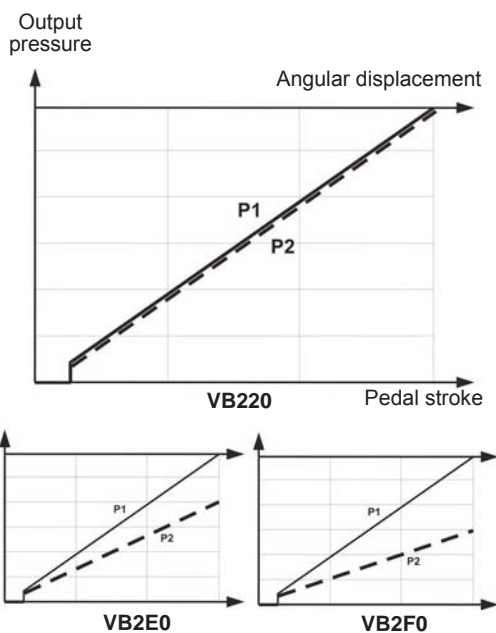
	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (3) bar [PSI]
P	210 [3 046]	M18 x 1.5	Input	6 [13.2]	10 [145]
S	Cut-out pressure		Auxiliary circuit		
T	1 [14.5]	M14 x 1.5	Tank		
F1 - F2	120 [1 740] (2)		Service braking		
A1 - A2	Cut-out pressure (1)		Service braking accumulator		
B3			Parking brake connection		
MA		1/4 BSPP	Accumulator min. pressure switch		
MF1		M10 x 1	Service pressure switch		
MF2					
LS*		M14 x 1.5	Load sensing		
MS*		M12 x 1.5	MS pressure switch		

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

Mechanical Controls



Hydraulic diagram and characteristic curve



Emergency / Parking brake
Service brake
Service brake + inching
Steering assist brake
Accumulator charging
Full power brake
Relay Valve
Options
Installation

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

- Force on pedal (Fa) : Fa (daN)  $\approx 0.5 \times$  max. output pressure (bar) + 35
- Force on pedal (Fb) : Fb (daN)  $\approx Fa/5$

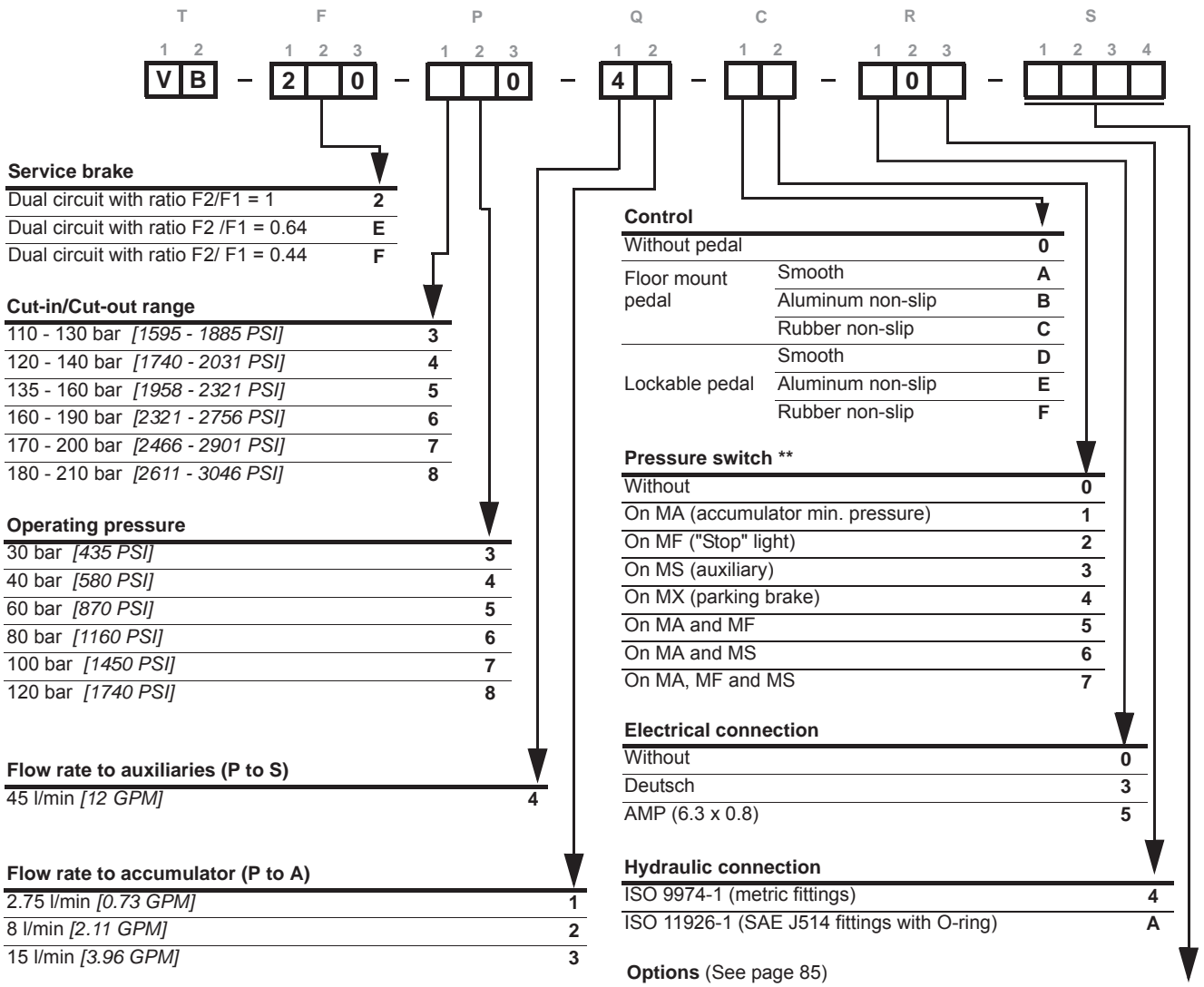


To obtain the forces in lbf, convert the final result.



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

**Model Code**



**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

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

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

**Operating pressure**

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

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

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

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

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

**Control**

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

**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

**Electrical connection**

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

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

**Options (See page 85)**

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

\* Please ask us

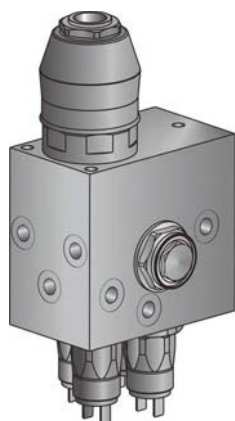


For other operating pressures, please consult your Poclain Hydraulics application engineer.

**\*\* Limitations**

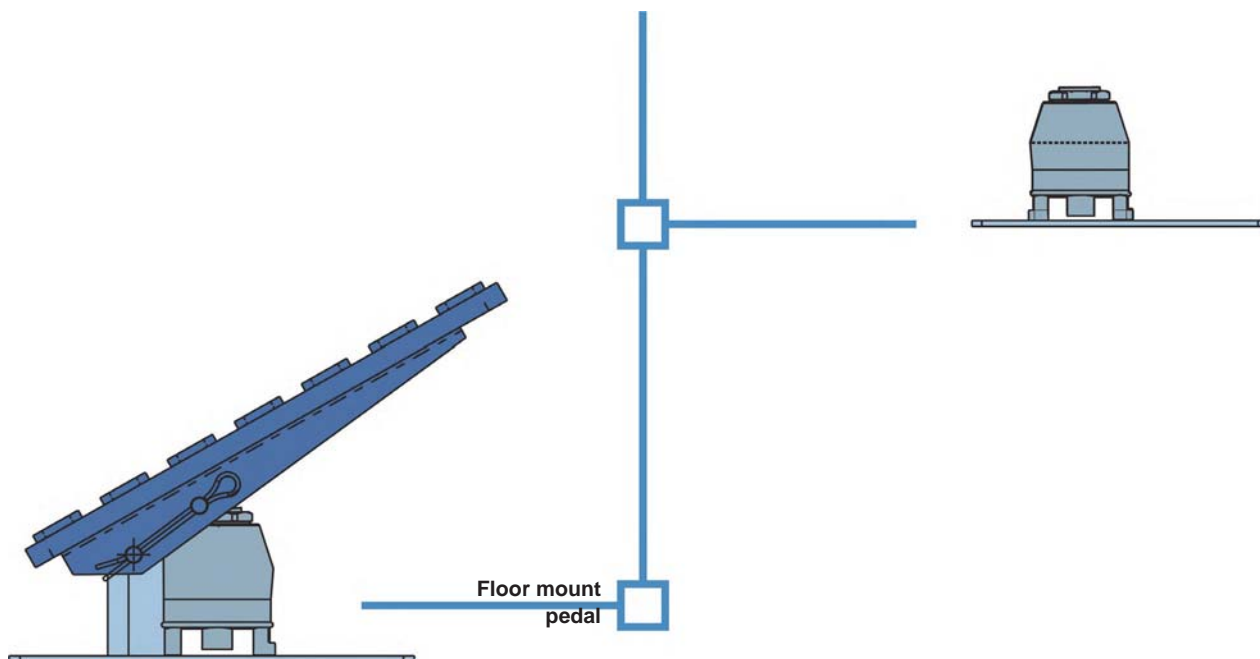
Pressure rise	< 1 bar [14.5 PSI] / ms
Current	min. 100 mA to assure contact max. 4 A for Resistor load max. 2,5 A for Inductive load
Voltage	max. 42 V





# VB-220

- Service brake valve
- Accumulator charging valve
- 120 l/min [32 GPM]
- Dual-circuit



### Applications

The Poclain Hydraulics VB-220 braking assembly contains the following components in a single manifold:

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

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

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

### Operation

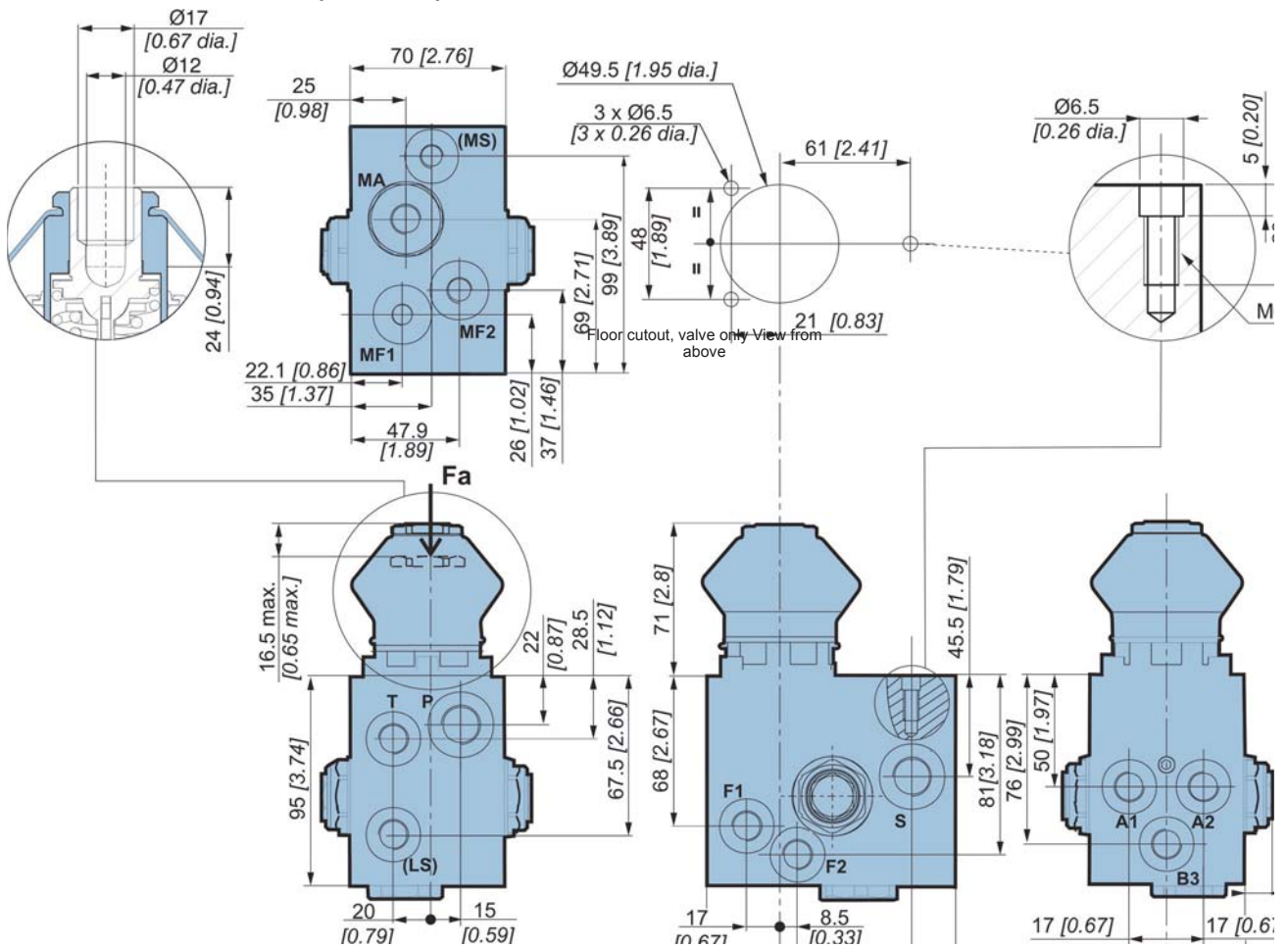
During the accumulator charging phase, the built-in divider taps a constant flow from the valve supply flow and diverts it to the accumulator. When the accumulator reaches maximum (cut-out) pressure, charging stops, and the entire supply flow is directed to output S (auxiliary circuit or tank return).

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


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

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

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

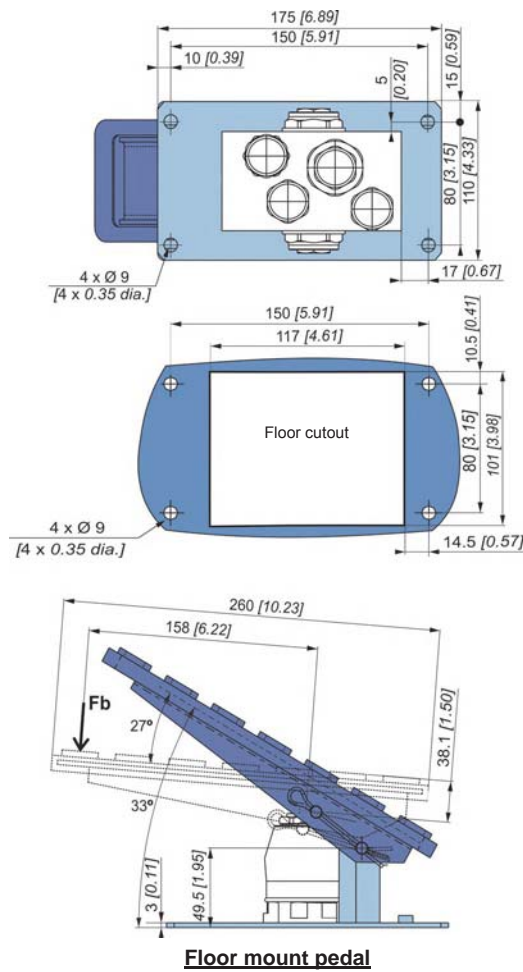


Connections

	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (3) bar [PSI]
P	210 [3 046]	M18 x 1.5	Input	6 [13.2]	4 [58]
S	Cut-out pressure	3/4 - 16 UNF	Auxiliary circuit		
T	1 [14,5]	M14 x 1.5	Tank		
F1 - F2	120 [1 740] (2)	M14 x 1.5	Service braking		
A1 - A2	Cut-out pressure (1)	or	Service braking accumulator		
B3*		9/16 - 18 UNF	Parking brake connection		
MA*		1/4 BSPP	Accumulator min. pressure switch		
MF1*		M10 x 1	Service pressure switch		
MF2*		M10 x 1 (VB220) M12 x 1 (VB2E0) M14 x 1 (VB2F0)	Service pressure switch		
LS*		M14 x 1.5 or 9/16 - 18 UNF	Load sensing		
MS*		M12 x 1.5	MS pressure switch		

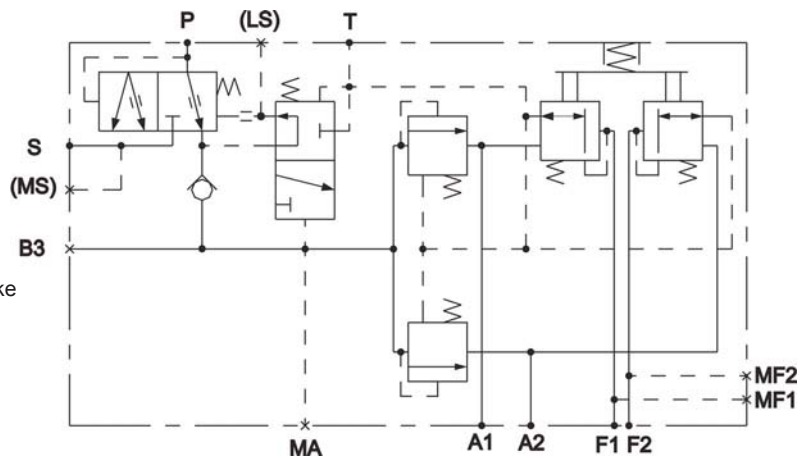
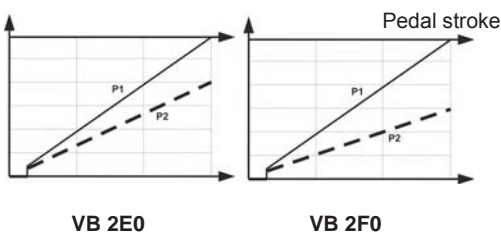
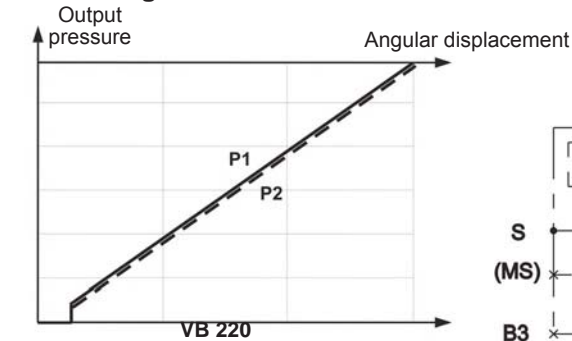
(1) Or max. allowable pressure for the accumulator.  
 (2) Higher pressure: contact us.  
 (3) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)  
 \*Option

Mechanical Controls



Floor mount pedal

Hydraulic diagram and characteristic curves



Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation

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

- Force on pedal (Fa) : Fa (daN)  $\approx 0.5 \times$  max. output pressure (bar) + 35
- Force on pedal (Fb) : Fb (daN)  $\approx Fa/5$

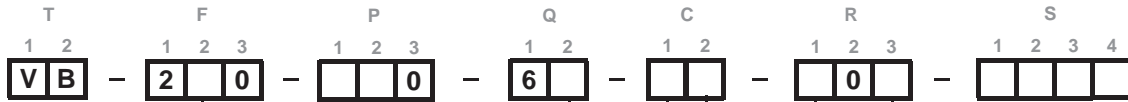


To obtain the forces in lbf, convert the final result.



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

**Model Code**



**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

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

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

**Operating pressure**

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

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

120 l/min [32 GPM]	6
--------------------	---

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

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

**Control**

Without pedal	0
Smooth	A
Floor mount pedal Aluminum non-slip	B
Rubber non-slip	C

**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

**Electrical connection**

Without	0
Deutsch	3
AMP (6.3 x 0.8)	5

**Hydraulic connection**

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

**Options (See page 85)**

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

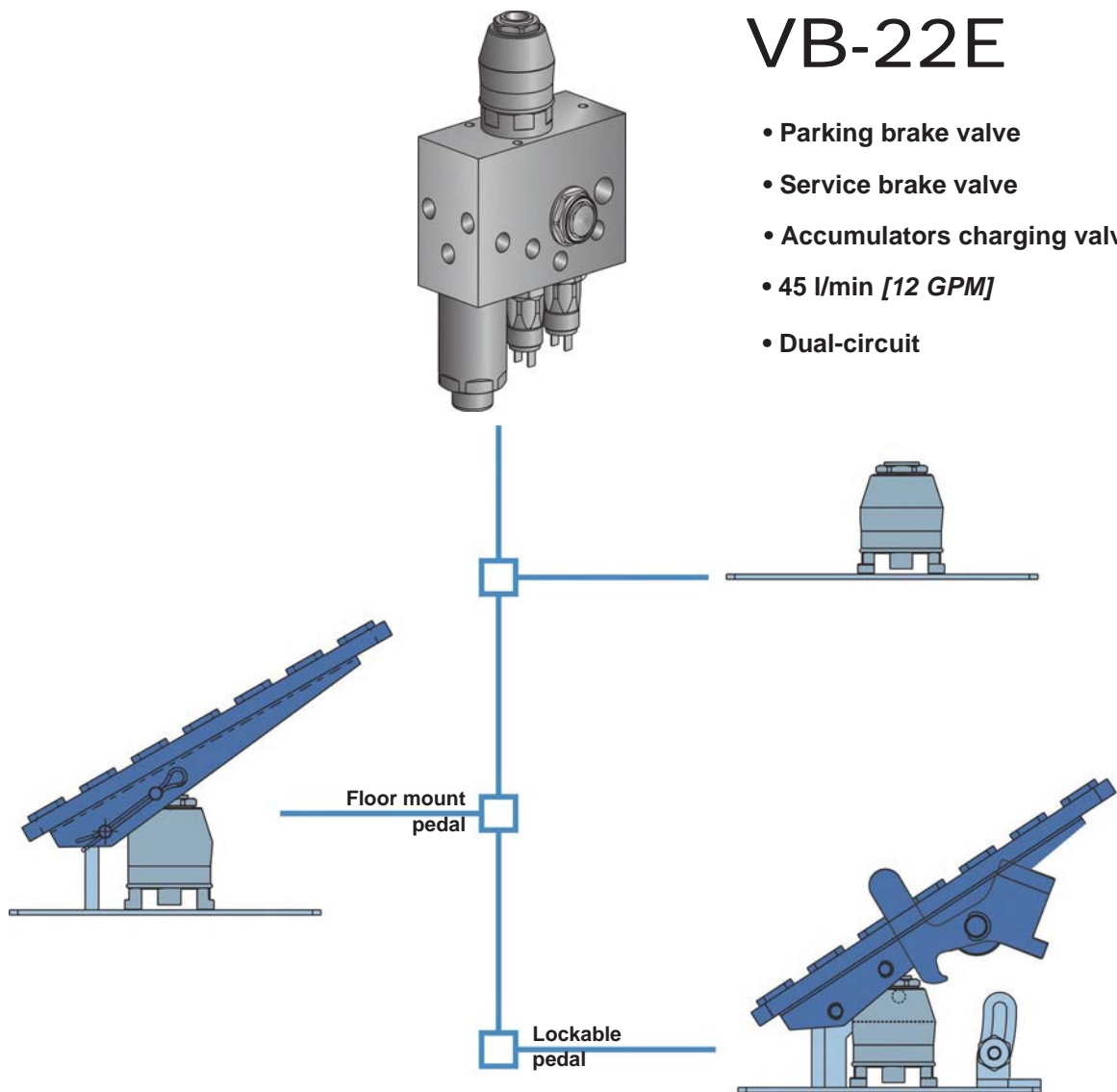
\* Please ask us



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



# VB-22E

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

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**Applications**

The Poclain Hydraulics VB-22E braking assembly contains the following components in a single manifold:

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

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

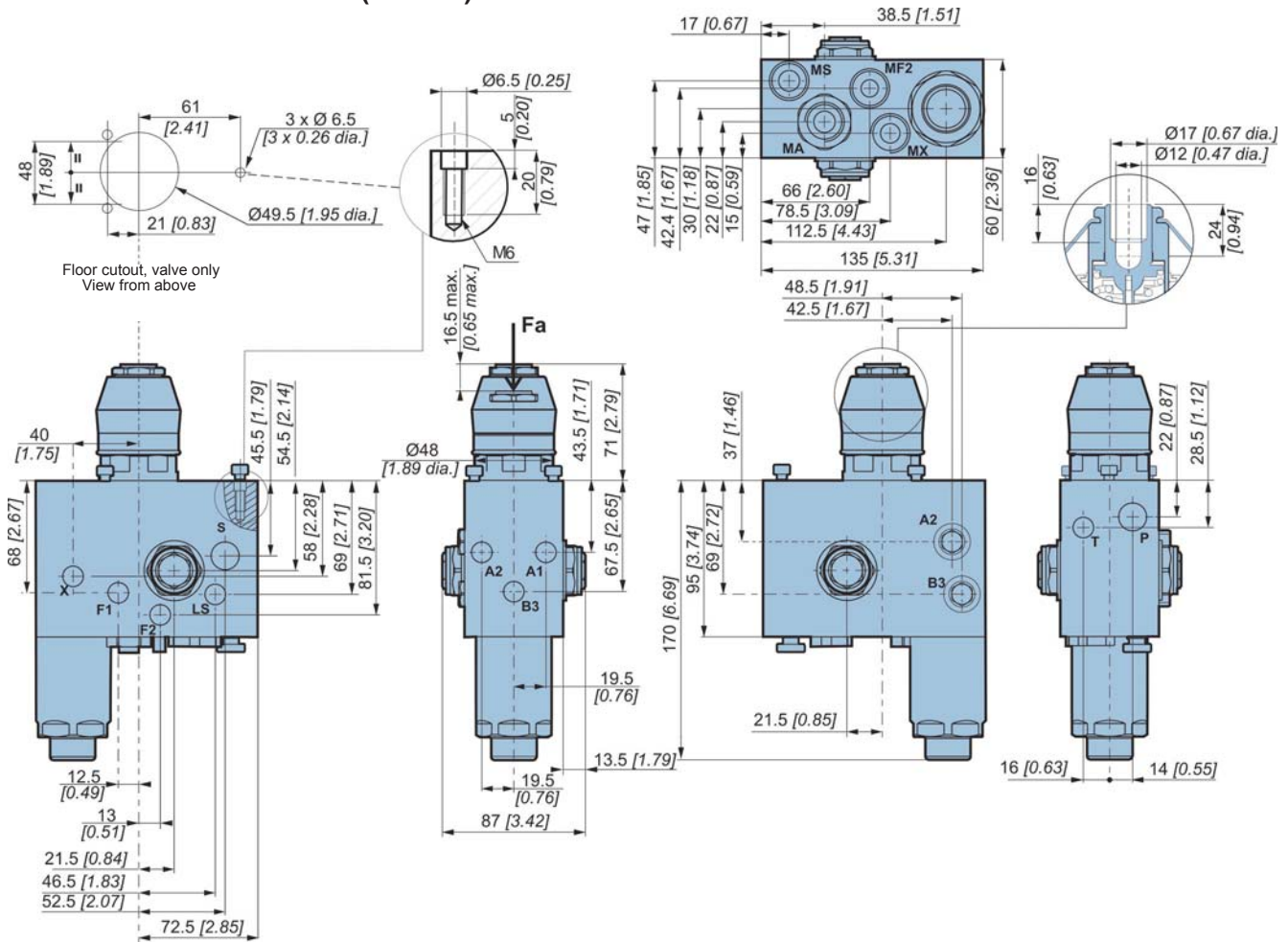
**Operation**

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


The service brake valve is a mechanically-controlled, three-way, graduated release dual pressure reducing valve. It is used for the precision dosing of the output pressures (at F1 and F2) proportionally to the angular displacement of the pedal, and therefore to the force applied to the pedal. This provides the feeling of braking. When the pedal is at rest ('up' position), the output pressures (at F1 and F2) are zero and the brake receptors are connected to the tank (F1 and F2 to T). When the pedal is depressed, the output pressures (at F1 and F2) increase proportionally to the angular displacement of the pedal. When the pedal is fully depressed, the output pressures (at F1 and F2) are limited to the preset pressure of the valve irrespective of the supply pressure.

When a failure occurs in one of the braking circuits, the other circuit is immediately isolated by its safety valve. The circuit that remains operative can then be used as an emergency brake thanks to the energy stored in its accumulator. The parking brake valve has on/off solenoid control.

Overall dimensions of VB-22E (45 l/min) brake valve



Connections

	Max. pressure bar [PSI]	Connection	Function	 kg [lbs]	Loss of head (3) bar [PSI]
P	210 [3 046]	M18 x 1.5	Input	8 [17.6]	10 [145]
S	Cut-out pressure		Auxiliary circuit		
T	1 [14,5]	M14 x 1.5	Tank		
F1 - F2	120 [1 740] (2)		Service braking		
X	Cut-out pressure (1)		Parking brake		
A1 - A2			Service braking accumulator		
B3		Parking brake connection			
MA*		1/4 BSPP	Accumulator min. pressure switch		
MF2*		M10 x 1	Service brake pressure switch		
MX*		1/4 BSPP	Parking brake pressure switch		
LS*		M14 x 1.5	Load sensing		
MS*		M12 x 1.5	MS pressure switch		

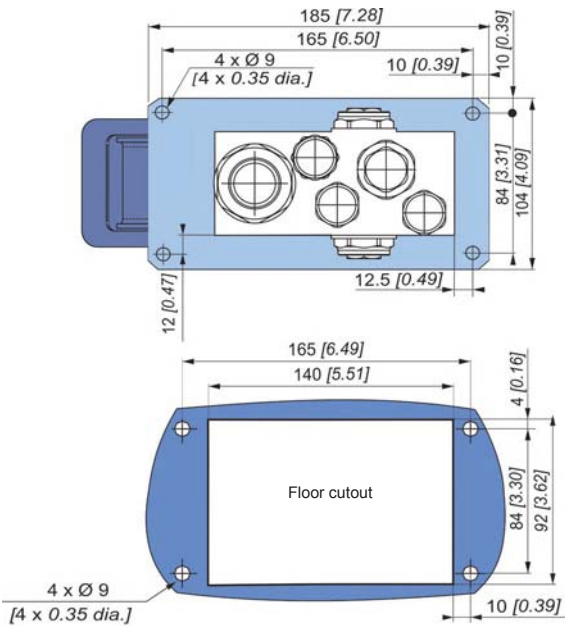
(1) Or max. allowable pressure for the accumulator.

(2) Higher pressure: contact us.

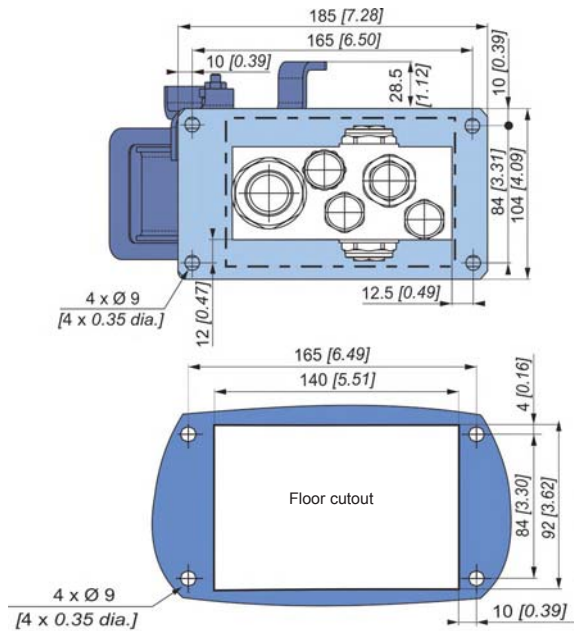
(3) Loss of head (P to S) given at a flow rate (Q = 60 l/min, 16 GPM)

\*Option

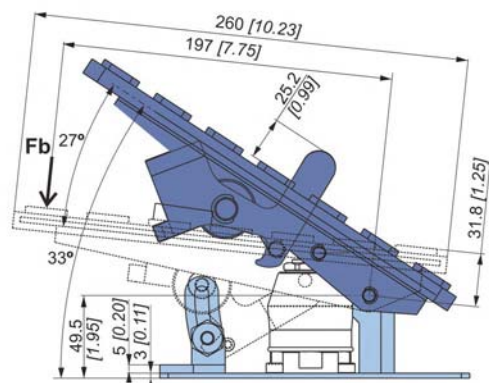
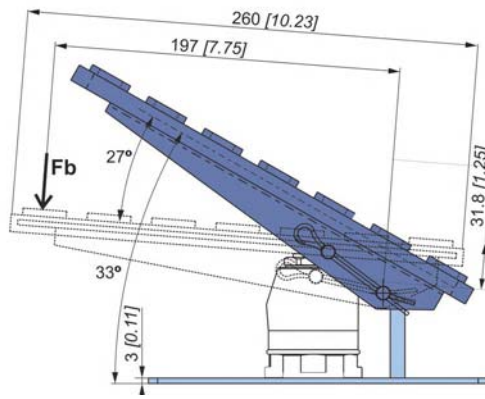
Mechanical Controls



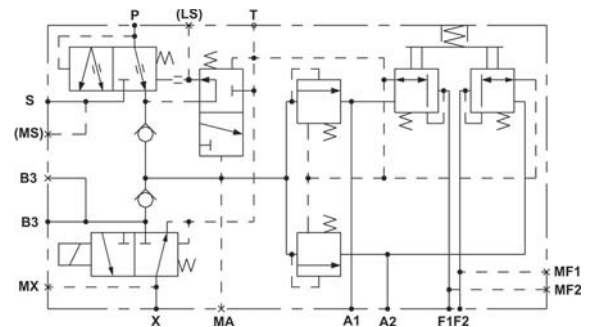
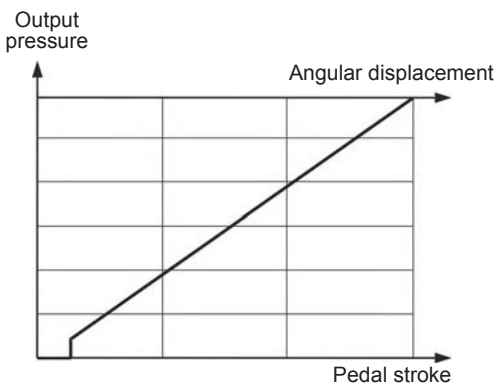
Floor mount pedal



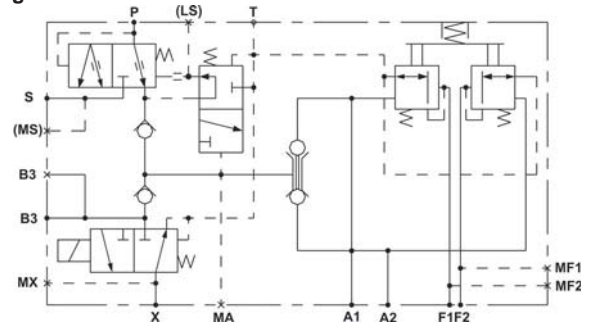
Lockable pedal



Hydraulic diagram and characteristic curve



Isolating ball valves



Emergency / Parking brake
Service brake
Service brake + inching
Steering assist brake
Accumulator charging
Full power brake
Relay Valve
Options
Installation

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

- Force on pedal (Fa) : Fa (daN)  $\approx 0.5 \times$  max. output pressure (bar) + 35
- Force on pedal (Fb) : Fa (daN)  $\approx 5 \times$  Fa

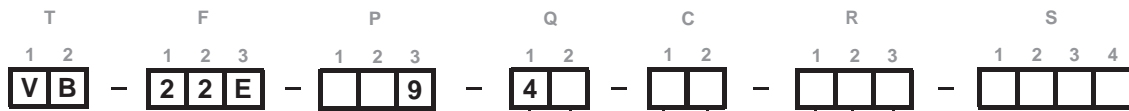


To obtain the forces in lbf, convert the final result.



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

**Model Code**



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

110 - 130 bar [1595 - 1885 PSI]	3
120 - 140 bar [1740 - 2031 PSI]	4
135 - 160 bar [1958 - 2321 PSI]	5
160 - 190 bar [2321 - 2756 PSI]	6
170 - 200 bar [2466 - 2901 PSI]	7
180 - 210 bar [2611 - 3056 PSI]	8

**Operating pressure**

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

**Parking brake pressure**

P3 = P1	9
---------	---

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

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

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

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

**Control**

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

**\*\* Limitations**

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

**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

**Electrical connection (solenoid valve)**

Bare wires	1
Packard	2
Deutsch	3
Hirschmann	4
AMP	5

**Electrical connection (solenoid valve)**

12 V CC	1
24 V CC	2

**Hydraulic connection**

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

**Options (See page 85)**

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

\* Please ask us





# 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 proportionally 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.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

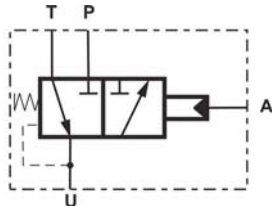
Options

Installation

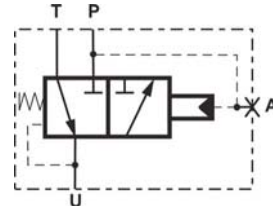


Hydraulic diagram and characteristic curve

P/N: R00260001J  
A16052X  
A29073B

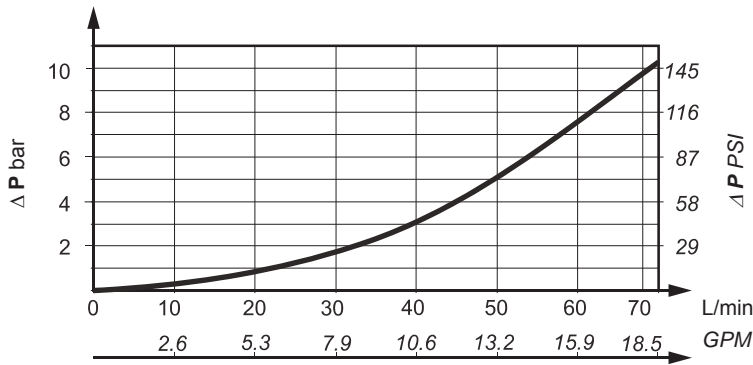


P/N: R00260001K

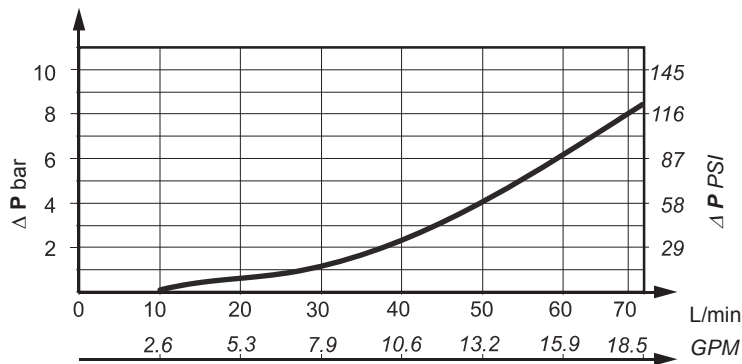


Pressure drop

Pressure drop U → T



Pressure drop P → U



Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation



# OPTIONS



## 1 Special calibration

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

## 2 Special port

Without changing the standard of the other ports.

## 3 Non-standard component

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

## 4 Mechanical control adapter



Please contact your Poclain Hydraulics Application Engineer for further information on Options 1 through 4.

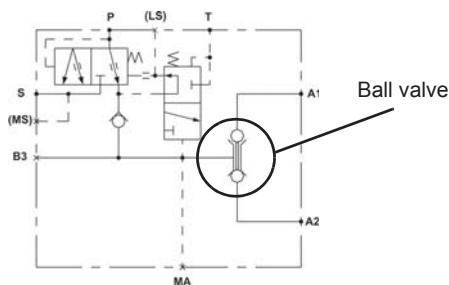
## 5 LS Port

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

## 6 Isolating ball valves

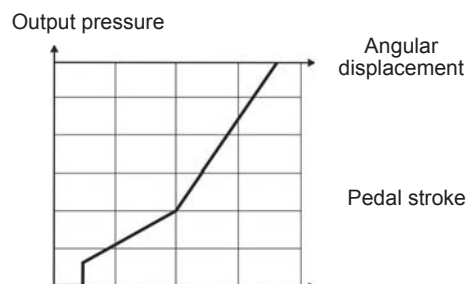
In the event of failure of one of the braking circuits, this function acts in a similar way to isolating spool valves by keeping an energy reserve in the accumulator of the non-faulty circuit (limited reserve in the accumulator) and does not maintain pressure in the S line when a circuit has failed (if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

Example of a VB-200 assembly:



## 7 Two-slope spring mechanism

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



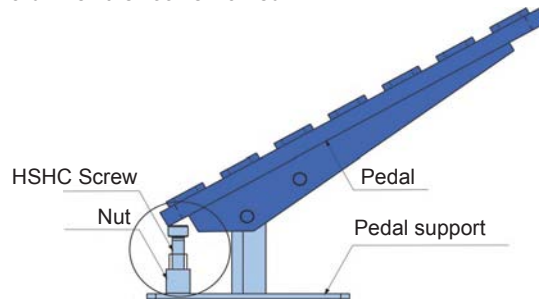
## 8 Pressure sensor

The sensor (refer to mobile electronics catalog No. A01888C) is installed on the MF port (single-circuit valves) or the MF1 port (dual-circuit valve). It sends a pressure signal to the electronic circuit in the form of an electrical signal that is proportional to the pressure. It can also replace the MF pressure switch in its stop light control function.

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

**9 Pedal back abutment**

Prevents the pedal from tilting backward when the floor is inclined.



**A Improved watertightness**

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



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

**B Circuit Pressurization**

**C MS Port**

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

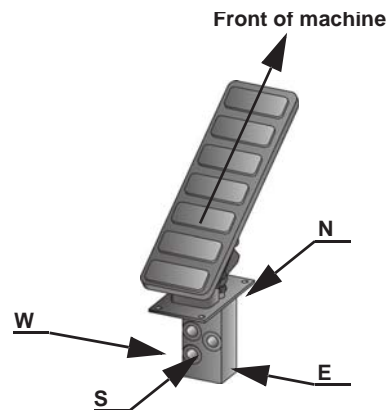
**D MS + LS Port**

See Options 5 and C.

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

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

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



**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.**

Emergency /  
Parking brake

Service  
brake

Service brake  
+ inching

Steering  
assist brake

Accumulator  
charging

Full power  
brake

Relay Valve

Options

Installation

**General Information**

**Component Identification**



- A: Model Code:  
e.g., VB-220-580-00-C4-504-0000
- B: Poclain Hydraulics Catalog Number  
e.g., R04943301D
- C: Customer Catalog Number  
(on request)
- D: Serial Number WW/YY  
WW : Week of manufacture  
YY : Year of manufacture

This number is supplemented by a serial number that is marked by cold heading on the valve body.

**Delivery**

Valves are delivered in individual bags.



Painted black.



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

**Storage**

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

**Storage Interval**

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

Climate	Storage interval (months)			
	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	Saline mist	Adhesion	Hardness
RAL 9005	Black	ISO 2813 40%	ISO 9227 > 400 h	ISO 2409 0	ASTM D3363 HB



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



**Circuits**

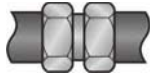
**Checking Connections**



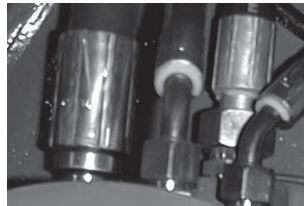
**Piping and Connections**

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.

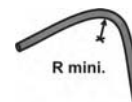
As needed protect them with armor.



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.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation

## 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					Units
		Viscosity Grade					
		22	32	46	68	100	
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 to 35.2	41.4 50.6	61.2 to 74.8	90 110	mm <sup>2</sup> / 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					Units
		Viscosity Grade					
		22	32	46	68	100	
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 to 35.2	41.4 50.6	61.2 to 74.8	90 110	mm <sup>2</sup> / 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 behavior criteria or the values of properties must be the subject of negotiation between the supplier and the end user.
- (d) The DIN 51777-2 standard applies in cases where interference caused by certain chemical compounds must be avoided. Free bases, oxidizing or reducing agents, mercaptans, some nitrogenous products or other products that react with iodine interfere.
- (e) Not applicable to ISO 22 viscosity grade.

Emergency / Parking brake  
 Service brake  
 Service brake + inching  
 Steering assist brake  
 Accumulator charging  
 Full power brake  
 Relay Valve  
 Options  
 Installation

## Extract of the ISO 15 380 Standard

Tests	Test Methods or Standards	HM Category				Units
		Viscosity Grade				
		22	32	46	68	
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 to 35.2	41.4 50.6	61.2 to 74.8	mm <sup>2</sup> / 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 DIN 51777-1 DIN 51777-2 (d)	1000	1000	1000	1000	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	165	175	185	195	°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	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, 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				Units
		Viscosity Grade				
		22	32	46	68	
Kinematic viscosity at 40°	ISO 3104	19.8 24.2	28.8 to 35.2	41.4 50.6	61.2 to 74.8	mm <sup>2</sup> / 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 DIN 51777-1 DIN 51777-2 (d)	1000	1000	1000	1000	mg / kg
Flash point Cleveland in open-cup, min.	ISO 2592	165	175	185	195	°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	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, 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.

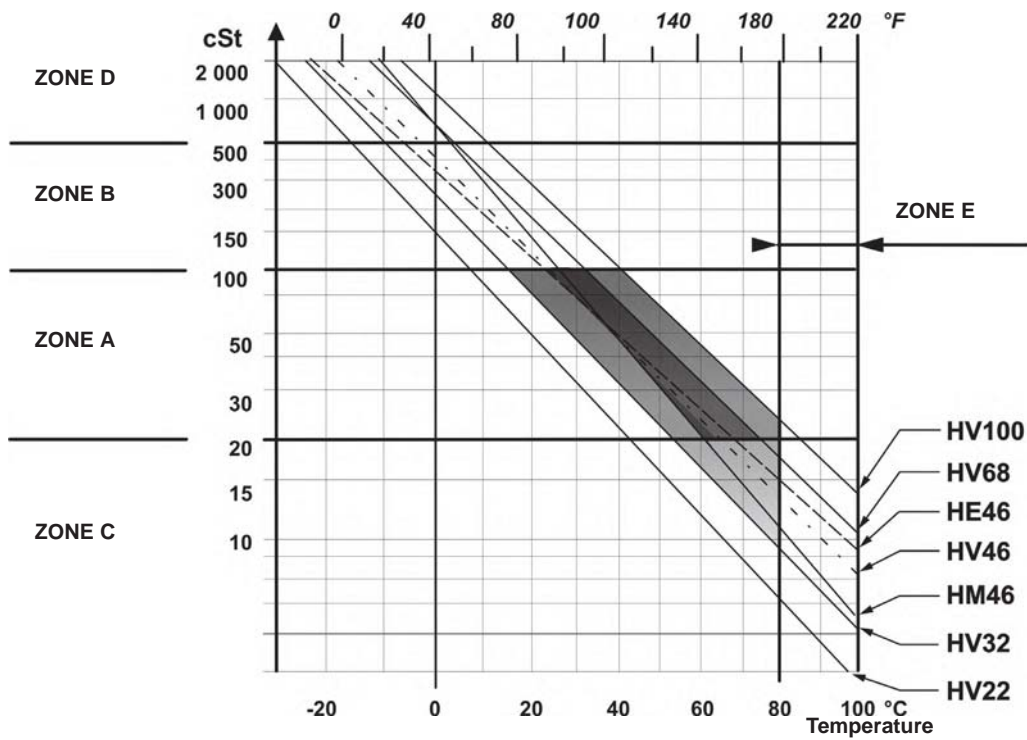
(c) The behavior criteria or the values of properties must be the subject of negotiation between the supplier and the end user.

(d) The DIN 51777-2 standard applies in cases where interference caused by certain chemical compounds must be avoided. Free bases, oxidizing or reducing agents, mercaptans, some nitrogenous products or other products that react with iodine interfere.

(e) Not applicable to ISO 22 viscosity grade.

## Temperature and Viscosity

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



<b>Zone A</b>	Zone of maximum efficiency. In this zone, temperature variations have a weak effect on the response time, efficiency and life expectancy of the components. Poclairn Hydraulics components can operate at all speeds, pressures and powers specified in their technical documentation.
<b>Zone B</b>	High speeds can lead to vibrations and drops in mechanical efficiency. The booster pump can cavitate if the intake conditions are too tight but without risk for the system as long as the pump remains boosted. The Poclairn Hydraulics components can operate at the pressures specified in their documentation but it is not advisable to use the pumps at full displacement. In a translation circuit, a rapid rise in the pump speed from zone B is allowed, but ordering the translation when the temperature has reached zone A is recommended.
<b>Zone C</b>	The efficiency is less and the use of effective antiwear additives is required. The Poclairn 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.
<b>Zone D</b>	The stated restrictions for zone B likewise apply to zone D. Further, the pumps must startup at low speed and no displacement. They must not be used in their normal operating conditions as long as the booster pressure has not stabilized and the hydraulic fluid temperature in the reservoir has not come up to zone B.
<b>Zone E</b>	The efficiency is reduced and the risk of wear on the pump and hydraulic fluid is increased. The system can operate in zone E at low-pressure and during short periods. The temperature of the hydraulic fluid in the power circuit must not be more than 10°C above the temperature of the hydraulic fluid in the reservoir, and must not be more than 20°C warmer than the hydraulic fluid in the components' cases.

Emergency / Parking brake

Service brake

Service brake + inching

Steering assist brake

Accumulator charging

Full power brake

Relay Valve

Options

Installation

**Water Content**

The ISO 12922 standard calls for a water content  $\leq 0.05\%$ .

Poclain Hydraulics components tolerate up to 0.1%.

**Checking Water Content**



**Visual Inspection**

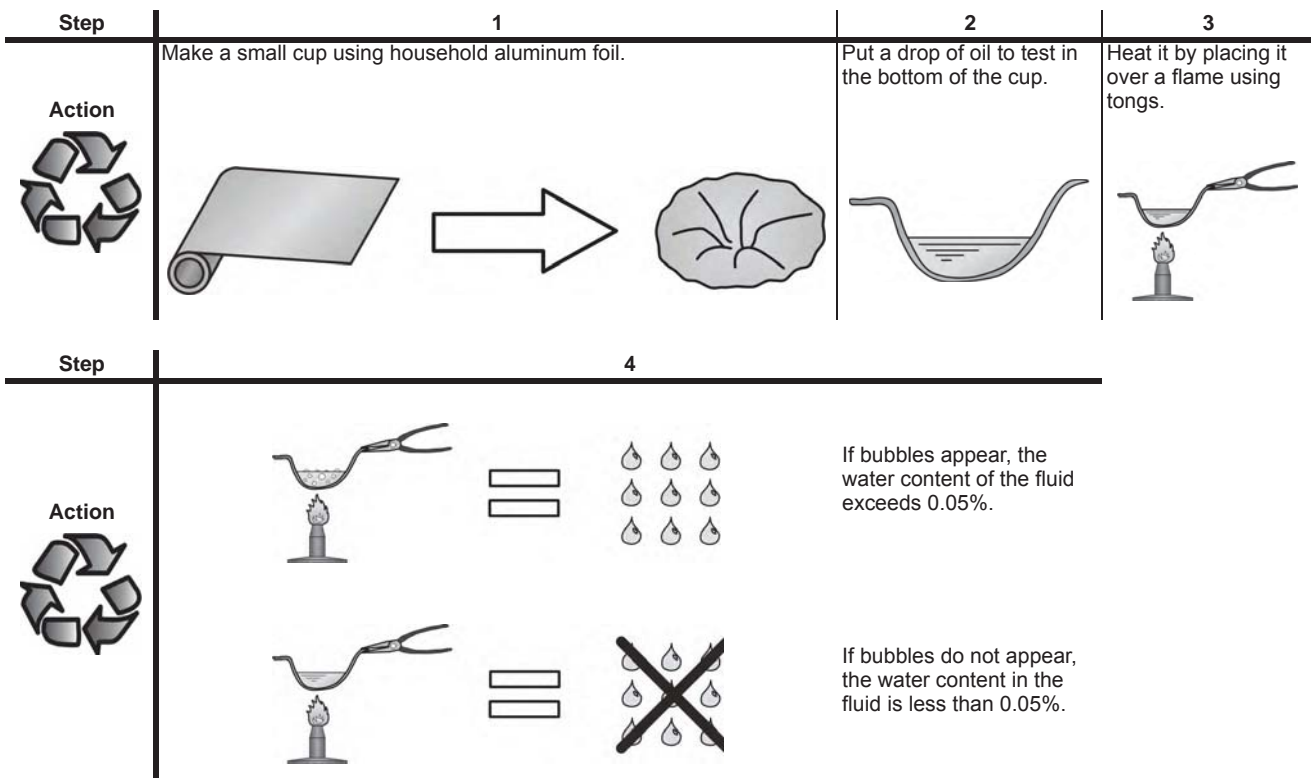
- The oil appears cloudy once it has a water concentration greater than or equal to 1%.

We suggest two possible verification methods:

**1- Quick Elementary Check**



- The "crackle test."



**2- Laboratory analysis**

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



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

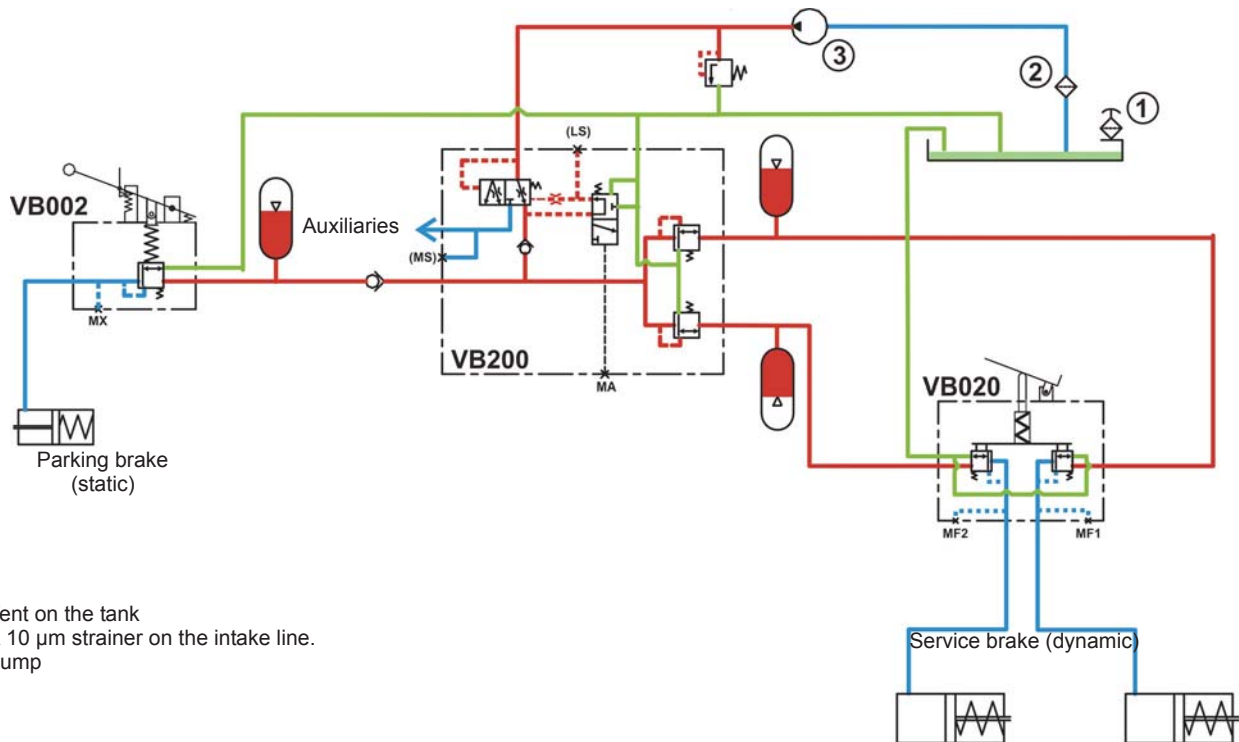
**Decontamination and Filtration**



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

The hydraulic fluid must be maintained at ISO standard 4406 -1999 decontamination level 18/16/13 (class 7 from NAS 1638) using a filter.

**Braking circuit example:**



- 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.

- Emergency / Parking brake
- Service brake
- Service brake + inching
- Steering assist brake
- Accumulator charging
- Full power brake
- Relay Valve
- Options
- Installation

## 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 <b>C HC</b>	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



**Company information**

<b>A1</b>	Company name..... Contact / Title.....
<b>A2</b>	Address..... ..... Phone.....

**Commercial Information**

<b>B1</b>	Type of machine..... Name / Model.....
<b>B2</b>	Estimated annual production.....
<b>B3</b>	Estimated prototype date ...../...../..... Estimated date of production ...../...../.....
<b>B4</b>	Type of business <input type="checkbox"/> New application <input type="checkbox"/> Replacement: current supplier..... Product P / N.....

**Vehicle Specification**

<b>C1</b>	Countries of use..... Braking standards and regulations.....
<b>C2</b>	Maximum speed (Km/h or mph) .....
<b>C3</b>	Empty weight front (Kg or lbs) ..... Max. weight front (Kg or lbs).....

**Hydraulic brake circuit specification**

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

<b>D1</b>	Service brake <input type="checkbox"/> Single circuit <input type="checkbox"/> Dual circuit Max. service brake pressure (bar or psi)..... Pressure ratio between front and rear axle <input type="checkbox"/> 1 <input type="checkbox"/> 0.64 <input type="checkbox"/> 0.44
<b>D2</b>	Parking brake <input type="checkbox"/> On-Off valve <input type="checkbox"/> Modulating valve <input type="checkbox"/> Without Max. parking brake pressure bar / psi .....
<b>D3</b>	Accumulator Charging Valves (ACV) <input type="checkbox"/> No <input type="checkbox"/> Yes Cut-in / Cut-out pressure (bar or psi)..... Load sensing port required on ACV <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D4</b>	Pump flow (L/min or gpm) Low idle..... High idle.....
<b>D5</b>	Pump speed (tr/min or rpm) Low idle..... High idle..... Pump displacement (cm <sup>3</sup> or in <sup>3</sup> ).....
<b>D6</b>	Available pressure from pump or pump pressure relief valve (bar or psi) .....
<b>D7</b>	Other components supplied by the same pump <input type="checkbox"/> Steering <input type="checkbox"/> Auxiliaries (type of component) ..... Required auxiliary flow (L/min or gpm) ..... Required priority: <input type="checkbox"/> Priority brakes <input type="checkbox"/> Priority steering
<b>D8</b>	Accumulator calculation requested <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D9</b>	Total service brake actuation volume requirements per braked axle (cm <sup>3</sup> or in <sup>3</sup> ) <input type="checkbox"/> Front axle..... <input type="checkbox"/> Rear axle.....

**Remarks**

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*Poclain Hydraulics reserves the right to make any modifications it deems necessary to the products described in this document without prior notification. The information contained in this document must be confirmed by Poclain Hydraulics before any order is submitted.*

*Illustrations are not binding.*

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 27/03/2017

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