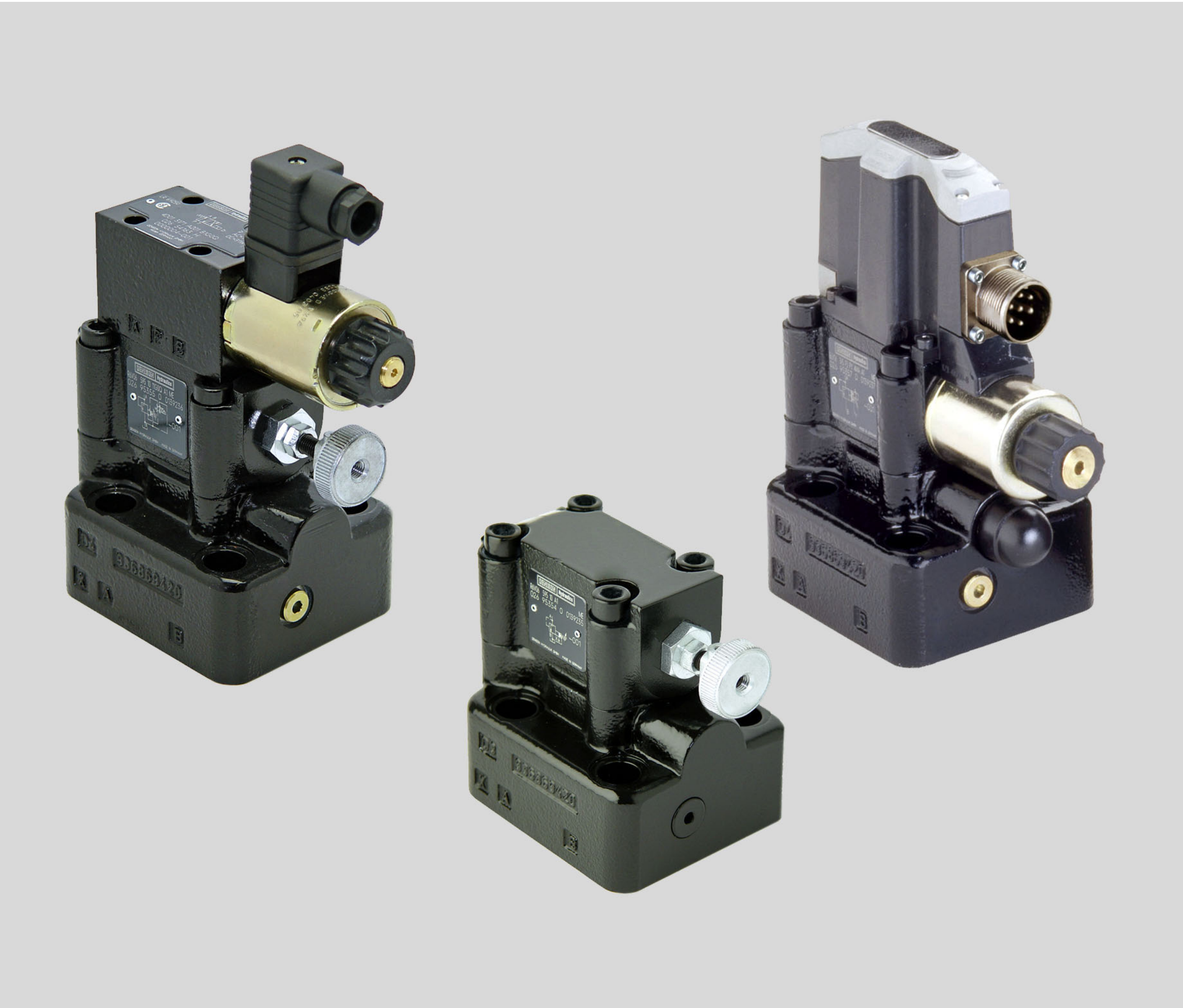
DENISON HYDRAULICS
Pressure Relief Valve R6V

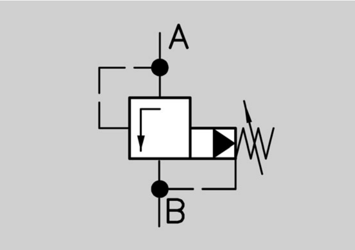


Publ. 3-EN 2950-A

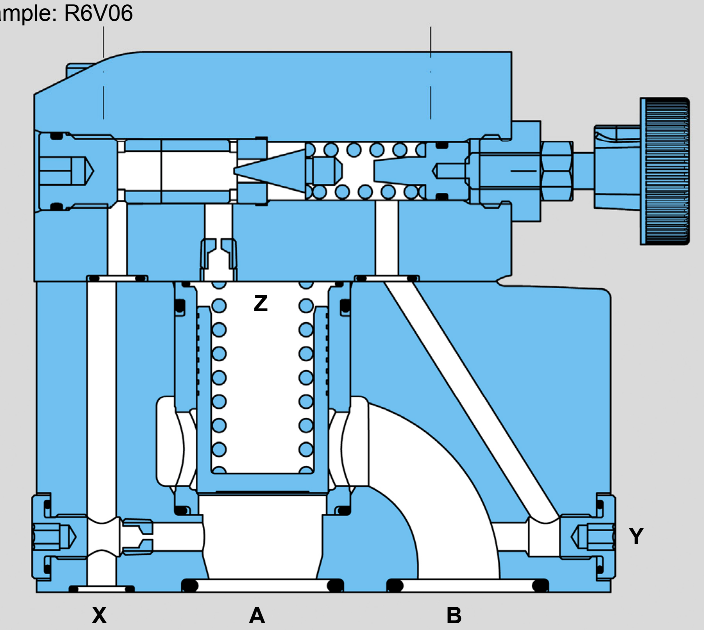
FEATURES

- **High Performance:** R6V valves are designed for a maximum pressure of 350 bar and a flow capacity up to 650 l/min.
- **Sensitive Control:** The DENISON poppet design delivers the minimum possible friction, superior hysteresis and optimum response to changes in operating conditions.
- **Wide Selection:** The R6V series of pilot operated pressure relief valves is available with mechanical and proportional adjustment, with external or onboard electronics and with a vent function for circulation at minimum pressure.
- **Standardized Mounting:** Mounting configurations for R6V Pressure Controls are in accordance with international standards, and conform to ISO 6264 (DIN 24340 Form E).

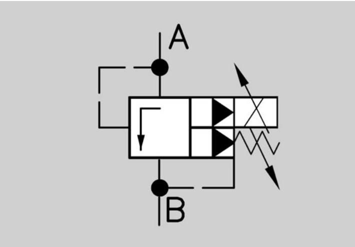
SYMBOL



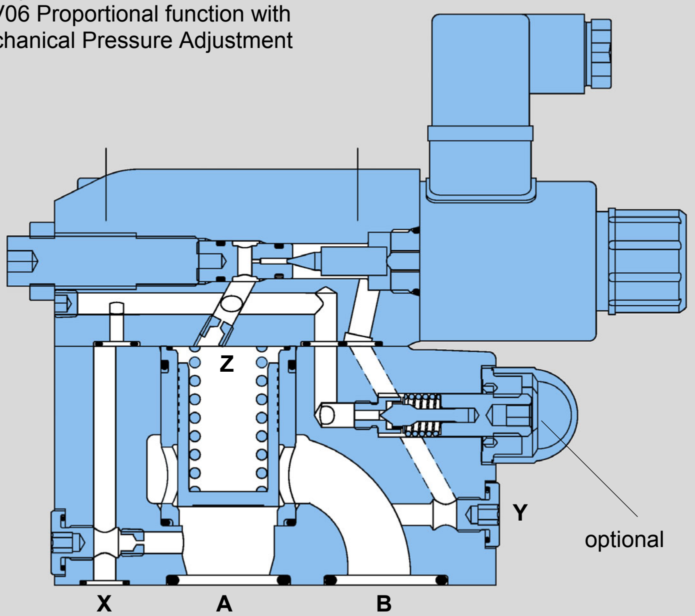
Example: R6V06



SYMBOL



Example:
R6V06 Proportional function with
Mechanical Pressure Adjustment



GENERAL

Denison R6V pressure relief valves are pilot operated controls consisting of two sections. A high flow poppet type seat valve as main stage and a mechanical or proportional pilot stage.
The mechanical version can optionally be supplied with a vent function (vent valve 4D01) to allow circulation at minimum pressure.
The proportional version is available with external or onboard electronics. The connector is a 6-pole+PE type conform to DIN 43563 – standard for most valves with onboard electronics. A mechanical maximum pressure stage is optional.

OPERATION

The system pressure in Port A is applied, via an orifice in X, to the pilot valve, the proportional valve (where present), and to the top surface of the main poppet. The hydraulically balanced main poppet is held against the seat by the main spring. In this state there is no flow through the valve.

The adjusted spring force acting on the pilot cone determines the relief pressure. If the pressure in Port A exceeds the set point, the pilot cone is lifted from its seat, releasing a small pilot flow to tank.[1)]

The flow through the control orifice in X creates a pressure drop which limits the pressure at the top of the main poppet to the set point.

The higher system pressure in Port A now lifts the main poppet off its seat and allows flow to Port B.

In the resulting float position only enough flow is passed from Port A to Port B to maintain the inlet pressure in Port A at the set point.

When the pressure in Port A falls below the set point, the hydraulic balance on the main poppet is restored. The main spring then forces the main poppet to close.

The pilot drain chamber/proportional drain chamber is normally connected to Port B. Alternative external drain through the Y-port is available.

[1)] The proportional function varies the pressure applied to the top of the main poppet, in proportion to the current input to the solenoid.
The setting of the optional mechanical stage determines the maximum pressure and should be approximately 10% higher than the max. adjustable pressure of the proportional section.

TECHNICAL DATA

GENERAL	● Type of unit	Pilot operated pressure relief
	● Design	Poppet type
	● Type of mounting	Subplate mounting conform to ISO 6264/DIN 24 340 Form E
	● Port sizes	3/8", 1", 1¼"
	● Mounting position	optional
	● Direction of flow	A → B
	● Ambient temperature range	- 20°C . . . + 50°C
	● Suitability for special working conditions	Consult DENISON
HYDRAULIC CHARACTERISTICS	● Operating pressure range	
	- inlet (port A)	0 . . . 350 bar
	- outlet (port B)	0 . . . 350 bar (for >30 bar Y must be external)
	- port X	0 . . . 350 bar
	- port Y	0 . . . 30 bar
	● Pressure setting range	p_{min} . . . 350 bar (see page 7)
	● Max. flow	220 l/min, R6V03 (3/8") 500 l/min, R6V06 (1") 650 l/min, R6V10 (1¼")
	● Fluid	Petroleum base anti-wear fluids (covered by DENISON HF-0 and HF-2 specification). Such as mineral oil according to DIN 51524/25. Maximum catalogue ratings and performance data are based on operation with these fluids.
	● Fluid temperature range	- 20°C . . . + 80°C
	● Viscosity range	10 . . . 650 cSt
	● Recommended operating viscosity	30 cSt
	● Contamination level	Max. permissible contamination level according to NAS 1638 Class 8 (Class 9 for 15 micron and smaller) or ISO 17/14
TYPE OF ADJUSTMENT	**Manual**	Hand wheel, set screw
	Electric (vent valve 4D01)	by solenoid
	● Nominal voltage	Refer to ordering code (see page 5)
	● Permissible voltage difference	+ 5 % . . . – 10 %
	● Max. coil temperature (temperature class H)	+ 180°C
	● Type of current	Alternating current (AC) Direct current (DC)
	● Input power	31 W (for DC)
	● Holding	78 VA (for AC)
	● Inrush	264 VA (for AC)
	● Relative operating period	100 %
	● Type of protection	IP 65
	Electric proportional	
	● Max. coil temperature (temperature class H)	+ 180°C
	● Type of protection (DIN 40050)	IP 65
	● Relative operating period	100 %
	● Maximum current	2500 mA
	● Coil resistance at 20°C	4 Ω

omit for version without vent- or proportional funktion

Model Number: **R6V** .. – . . . – . . – .. – ... – **A** . –

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12]

[1] **Series**
R6V= Pressure Relief Valve

[2] **Size**
03 = 3/8″
06 = 1″
10 = 1 1/4″

[3] **Max. Pressure**
5 = 350 bar

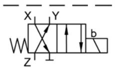
[4] **Body Mounting**
7 = Y port SAE-4 (7/16"-20 UNF)
9 = Y port G 1/8"

[5] **Pressure Setting Range**
1= 105 bar
3 = 210 bar
5 = 350 bar

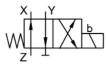
[6] **Type of Control**
1 = Hand knob 32 mm dia. (standard)
3 = Acorn nut with lead seal
4 = Adjusting device with key lock

[7] **Drain Line**
0 = internal
2 = external out main body (Y port)

[8] **Vent Valve Function**
09 = with manual override
10 = without manual override } Solenoid de-energized: open to tank; Solenoid energized: vent line blocked



11 = with manual override
12 = without manual override } Solenoid de-energized: vent line blocked; Solenoid energized: open to tank



[9] **Solenoid Voltage and Current**

AC		DC	
W01 = 115 V / 60 Hz	AC	G0R = 12 V	DC
W02 = 230 V / 60 Hz		G0Q = 24 V	
W06 = 115 V / 50 Hz		G0H = 48 V	
W07 = 230 V / 50 Hz			

[10] **Design Letter**

[11] **Seal Class**
1 = NBR (Buna N) Standard
5 = FPM (Viton®)

[12] **Modifications**
VFM = Soft shift spool for vent function, medium shifting time } DC only
VFS = Soft shift spool for vent function, slow shifting time } DC only
BI1 = Dual Pressure Valve with 7 ... 105 bar low pressure range*
BI3 = Dual Pressure Valve with 7 ... 210 bar (140 bar for AC) low pressure range*
* High pressure range determined under [5].

Model Number: **R6V .. – . . . – . . – .. – ... – A . –**

1 **Series**
R6V= Pressure Relief Valve

2 **Size**
03 = 3/8″
06 = 1″
10 = 1 1/4″

3 **Max. Pressure**
5 = 350 bar

4 **Body Mounting**
7 = Y port SAE-4 (7/16"-20UNF)
9 = Y port G 1/8"

5 **Pressure Setting Range**
0 = 50 bar
1= 105 bar
3 = 210 bar
5 = 350 bar

6 **Type of Control**
P = Electric Proportional Pressure Control

7 **Drain Line**
0 = internal
2 = external out main body (Y port)

8 **Proportional Function**
PS = Proportional function without mechanical adjustment - external electronics
P2 = Proportional function with mechanical adjustment - external electronics
PN = Proportional function without mechanical adjustment - onboard electronics
PM = Proportional function with mechanical adjustment - onboard electronics

9 **Command Signal / Solenoid Voltage**
4MA = 4 .. 20 mA } command signal for valves
10V = 0 ... 10 V } with onboard electronics

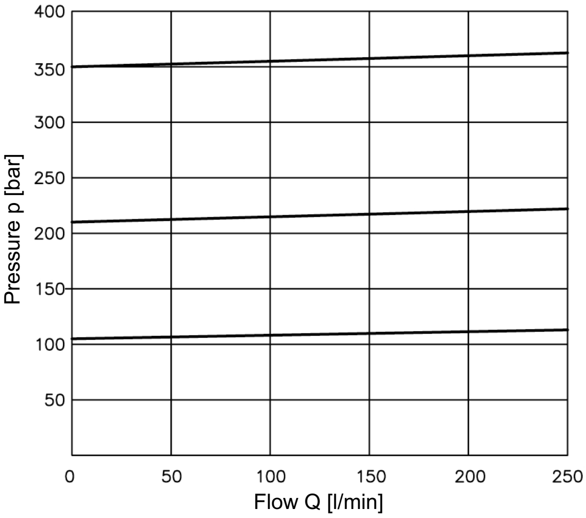
G0R = 12 V solenoid voltage for valves with external electronics

10 **Design Letter**

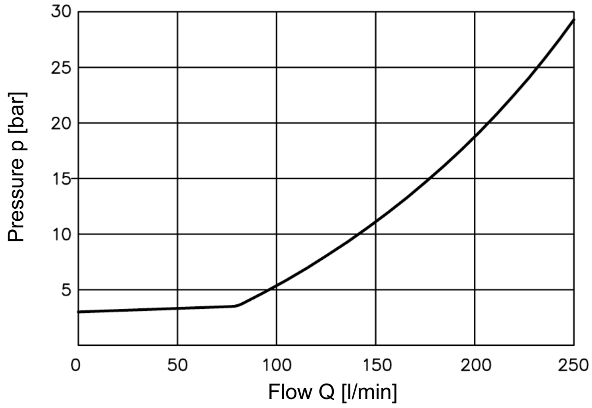
11 **Seal Class**
1 = NBR (Buna N) Standard
5 = FPM (Viton®)

12 **Modifications**

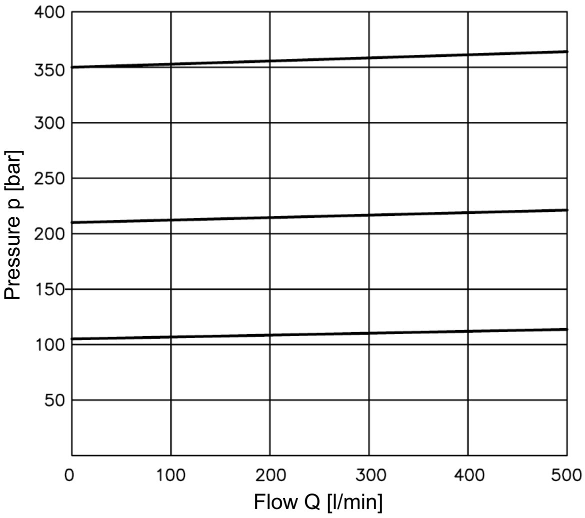
R6V03 Standard



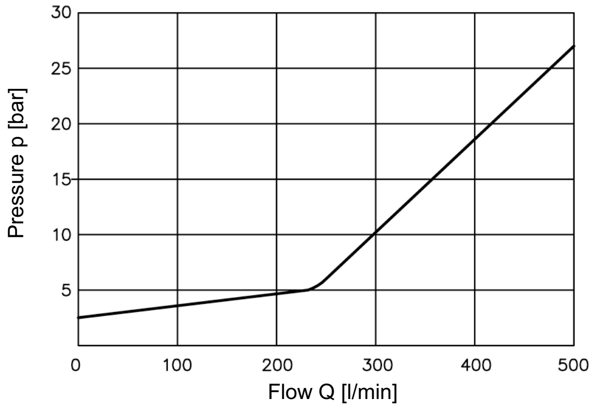
Minimum pressure curves



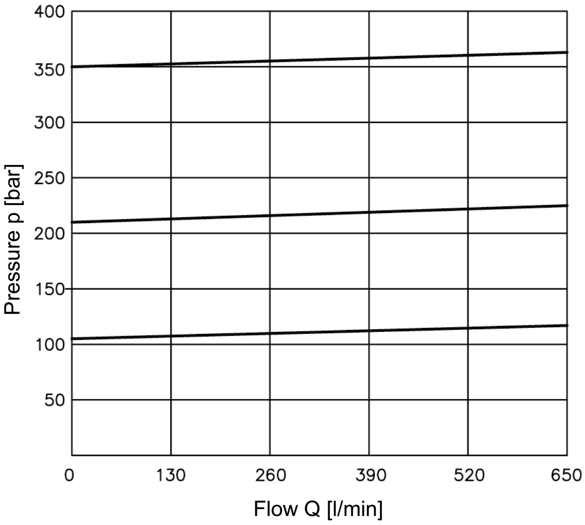
R6V06 Standard



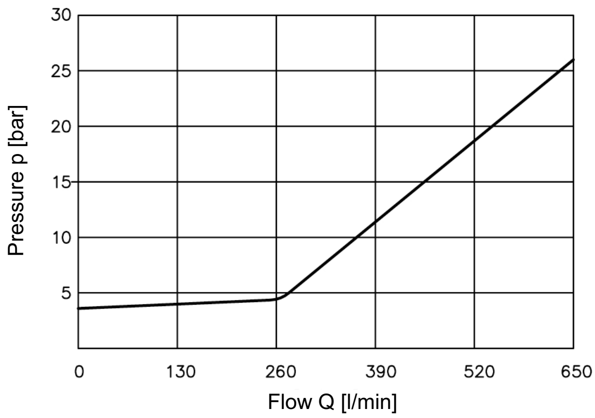
Minimum pressure curves



R6V10 Standard

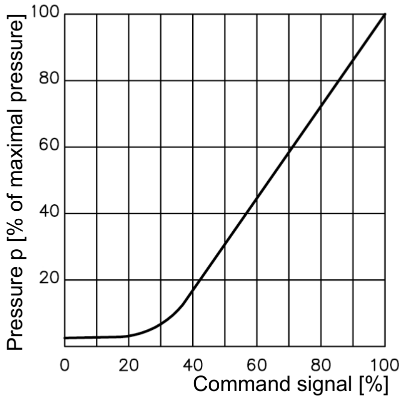


Minimum pressure curves



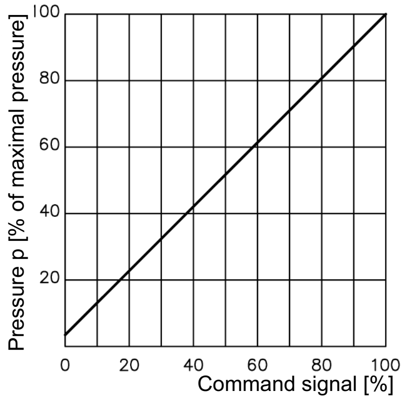
External electronics

Signal/pressure curve



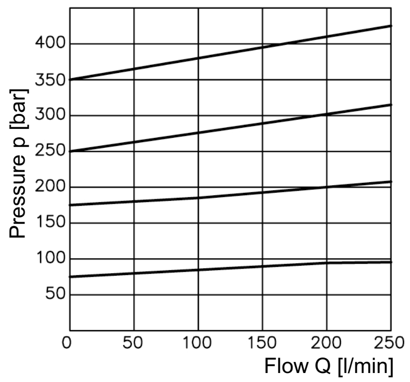
Onboard electronics with linearisation

Signal/pressure curve

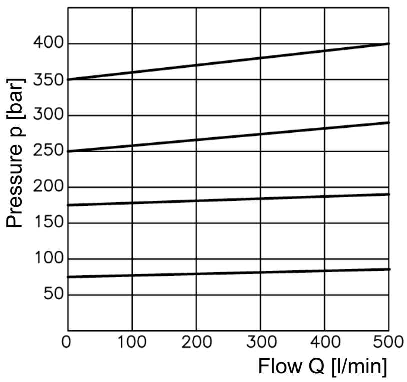


P/Q performance curves [1)]

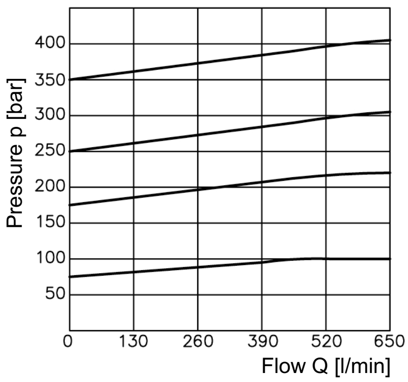
R6V03 P2 / P2 OBE



R6V06 P2 / P2 OBE

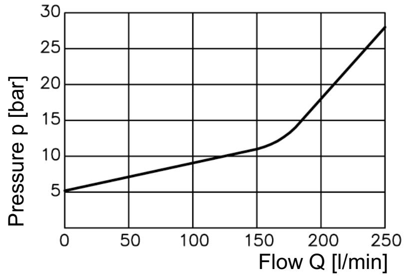


R6V10 P2 / P2 OBE

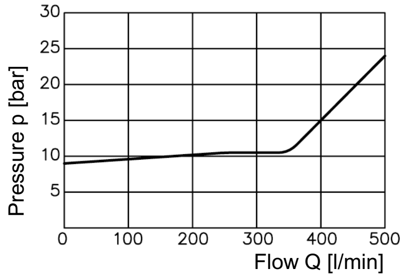


Minimum pressure curves [1)]

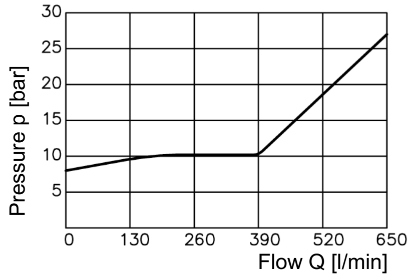
R6V03 P2 / P2 OBE



R6V06 P2 / P2 OBE

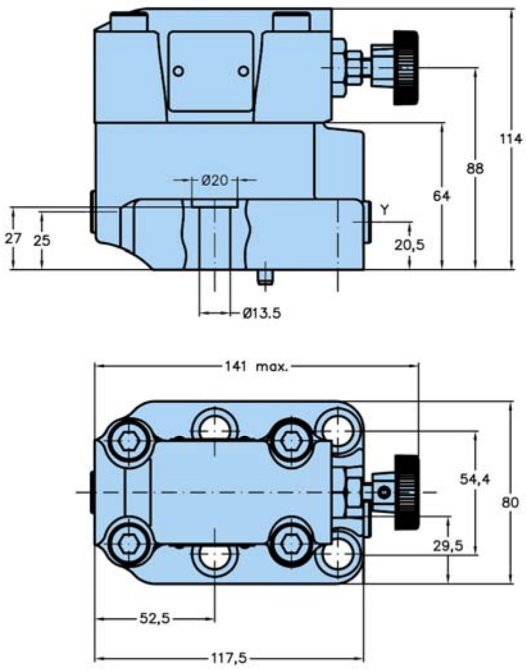


R6V10 P2 / P2 OBE



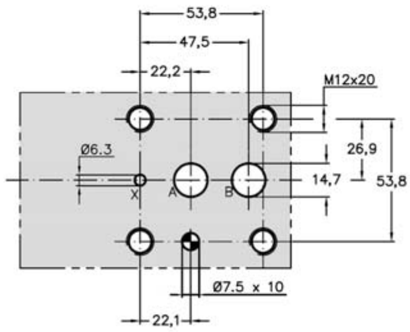
[1)] The performance curves are measured with external drain.
For internal drain the tank pressure has to be added to curve.

Weight: 4.5 kg



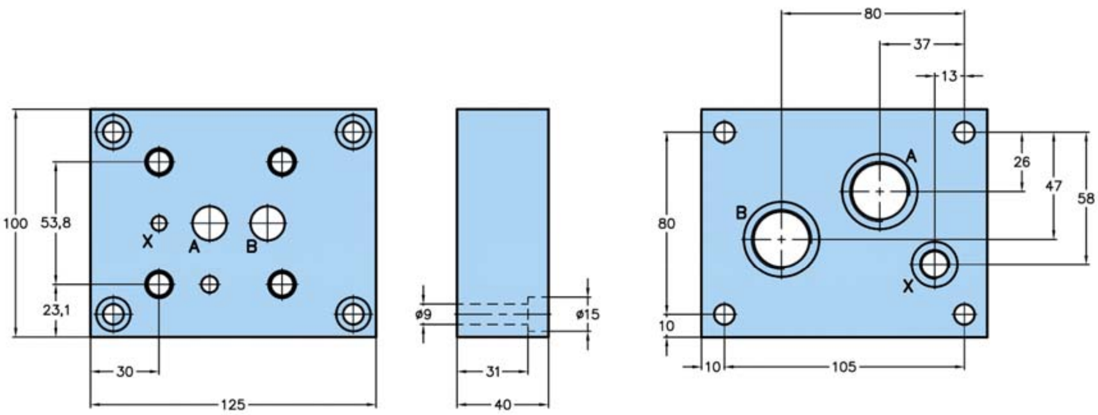
Ports	Function
A	Pressure (inlet)
B	Tank (outlet)
X	Remote control or Vent connection
Y	External drain

Block mounting face
Flatness 0.01 mm / 100 mm length
Surface finish CLA 1.27 µm



SUBPLATE

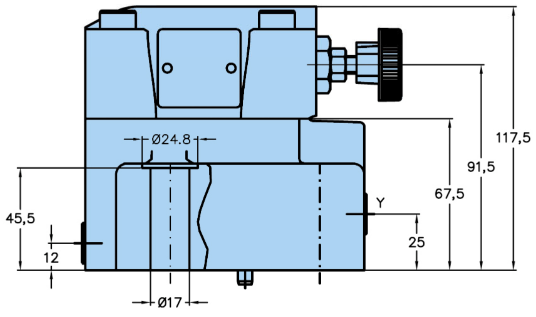
Weight: 3.9 kg

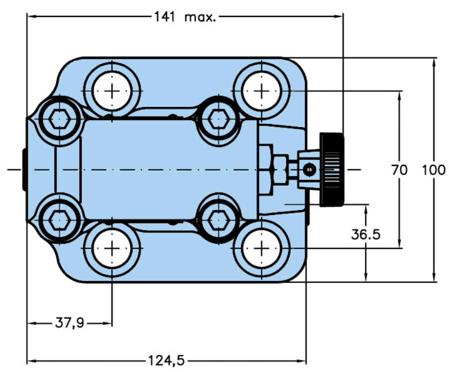


Model No.	Order No.	Port sizes		4 Mounting screws* (Torque … Nm)		
		A + B	X	Dimensions	Order No.	min. tensile strenght
SS-B-08-G-150	S26-98590-0	G 3/4	G 1/4	M12x45 DIN912-12.9	361-12254-8	115 Nm

* Mounting screws are included in subplate order.
For valves ordered without subplate, mounting screws must be ordered separately.

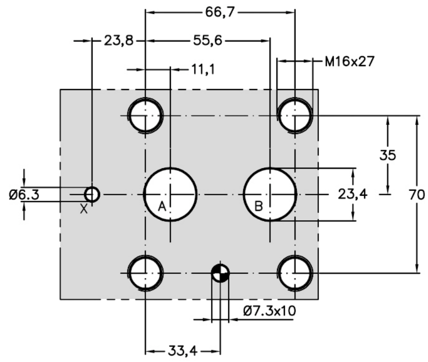
Weight: 5.8 kg





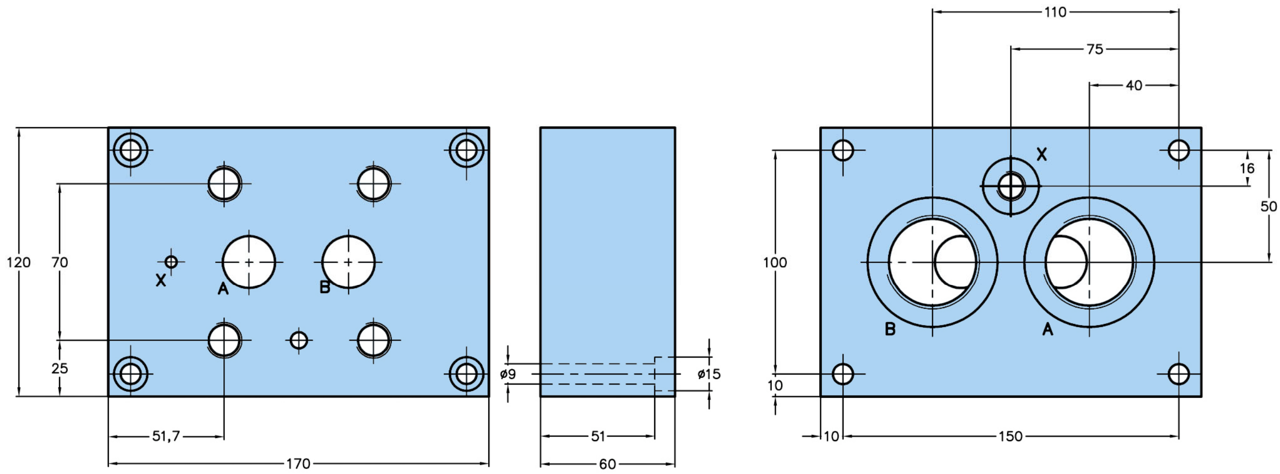
Ports	Function
A	Pressure (inlet)
B	Tank (outlet)
X	Remote control or Vent connection
Y	External drain

Block mounting face
Flatness 0.01 mm / 100 mm length
Surface finish CLA 1.27 µm



SUBPLATE

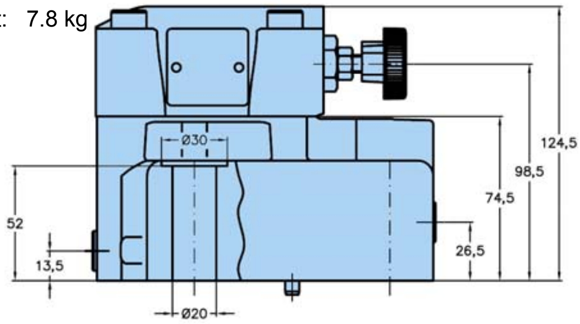
Weight: 8.0 kg



Model No.	Order No.	Port sizes		4 Mounting screws* (Torque … Nm)		
		A + B	X	Dimensions	Order No.	min. tensile strenght
SS-B-16-G-151	S26-98591-0	G1 1/4	G 1/4	M16x65 DIN912-12.9	361-14294-8	281 Nm

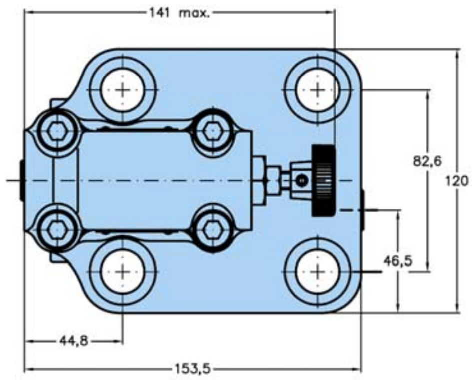
* Mounting screws are included in subplate order.
For valves ordered without subplate, mounting screws must be ordered separately.

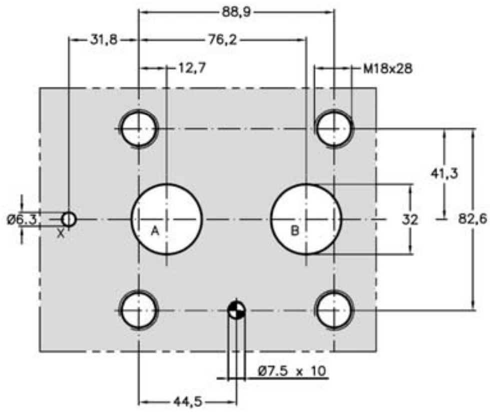
Weight: 7.8 kg



Ports	Function
A	Pressure (inlet)
B	Tank (outlet)
X	Remote control or Vent connection
Y	External drain

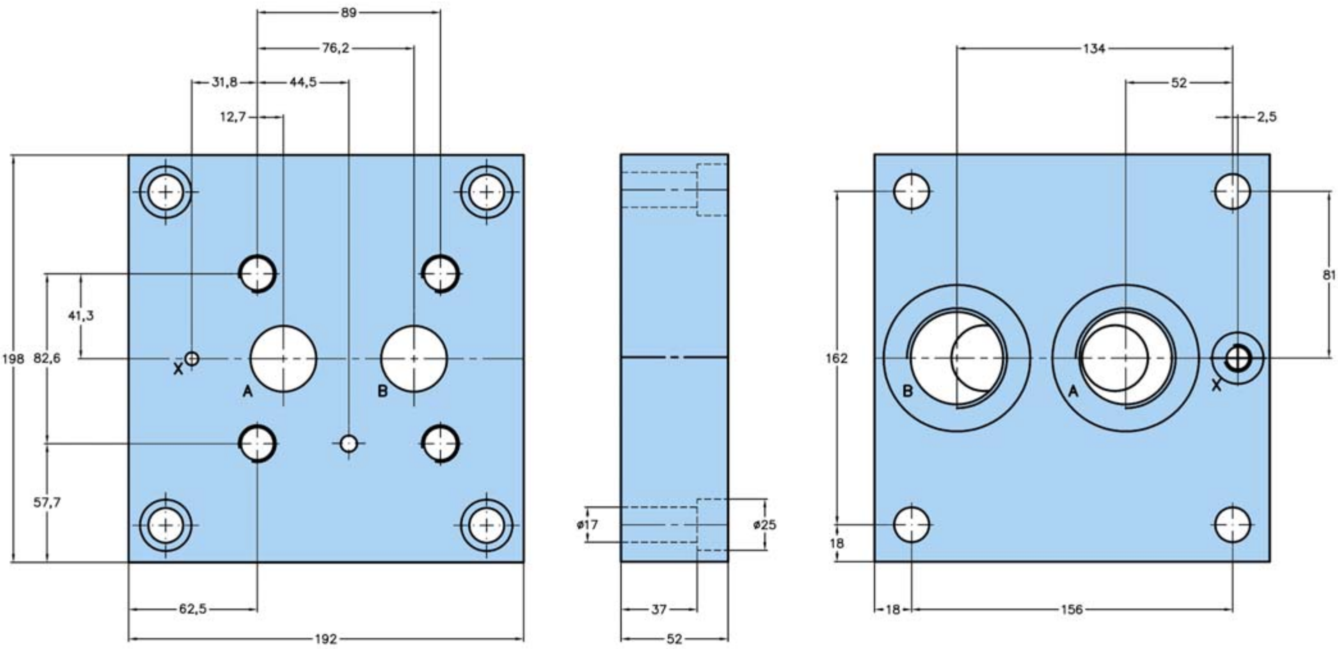
Block mounting face
Flatness 0.01 mm / 100 mm length
Surface finish CLA 1.27 µm





SUBPLATE

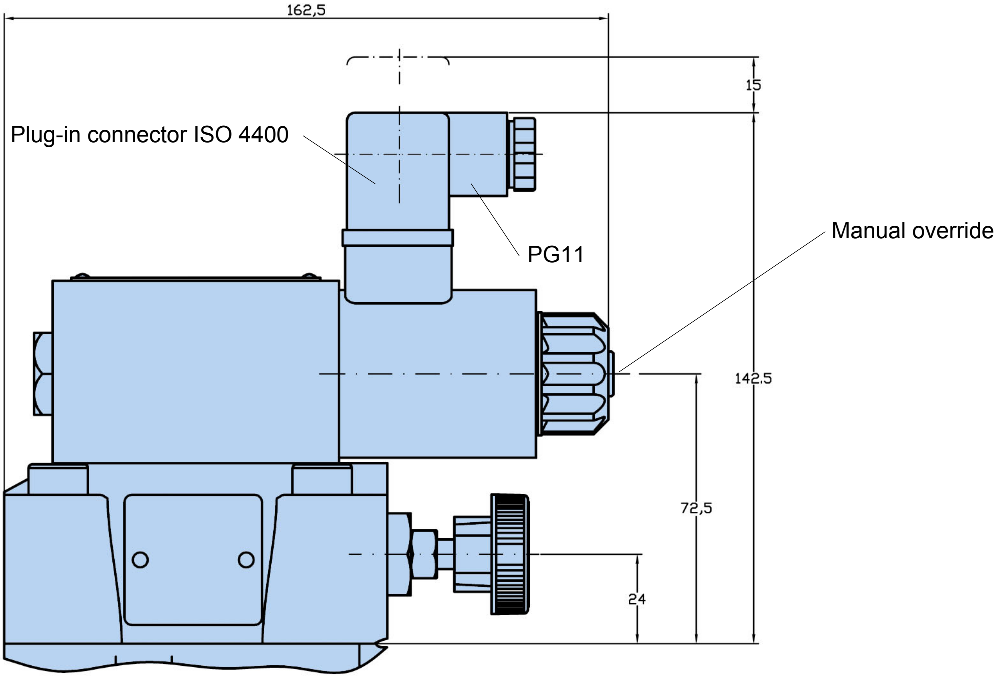
Weight: 18.6 kg



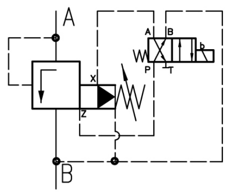
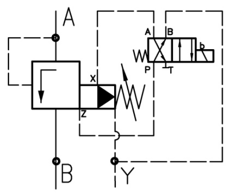
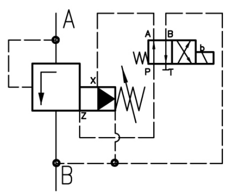
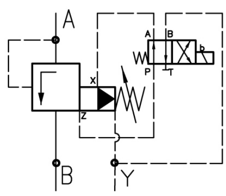
Model No.	Order No.	Port sizes		4 Mounting screws* (Torque … Nm)		
		A + B	X	Dimensions	Order No.	min. tensile strenght
SS-B-24-G-152	S26-38592-0	G 1 1/2	G 1/4	M18x75 DIN912-12.9	361-15314-8	398 Nm

* Mounting screws are included in subplate order.
For valves ordered without subplate, mounting screws must be ordered separately.

Weight (4D01): 1.4 kg

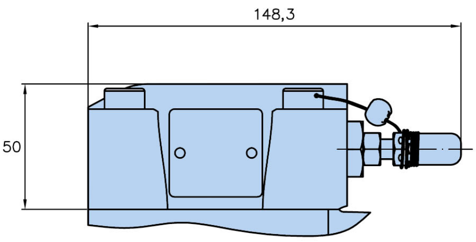


SYMBOLS

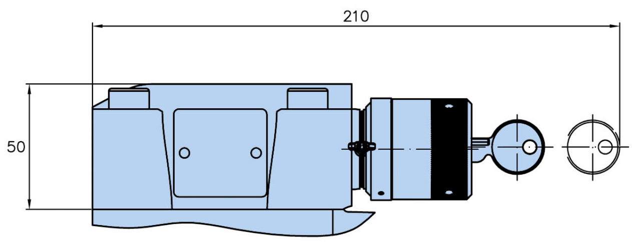
Code	Internally drained	Externally drained
09/10		
11/12		

ADDITIONAL TYPES OF CONTROL

TYPE OF CONTROL-CODE 3
Acorn nut with seal

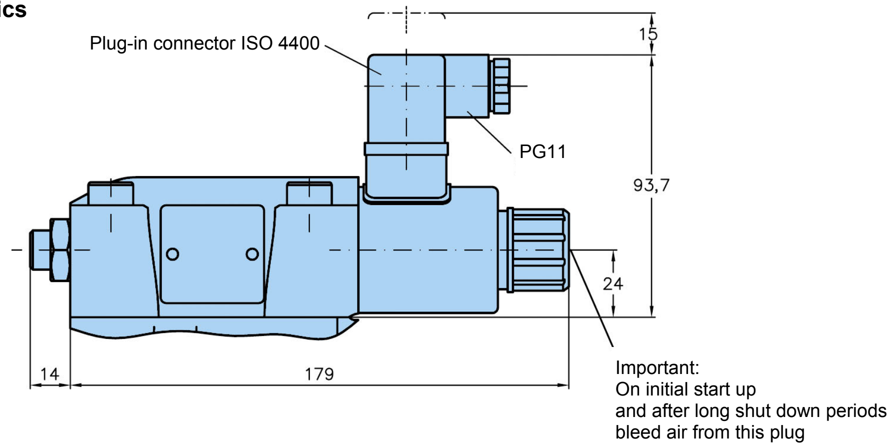


TYPE OF CONTROL-CODE 4
Adjusting device with key lock.
Key must be ordered separately,
Order-no. 700-70619-8



Version with external electronics

Weight: size 03 = 5.2 kg
size 06 = 6.4 kg
size 10 = 8.3 kg



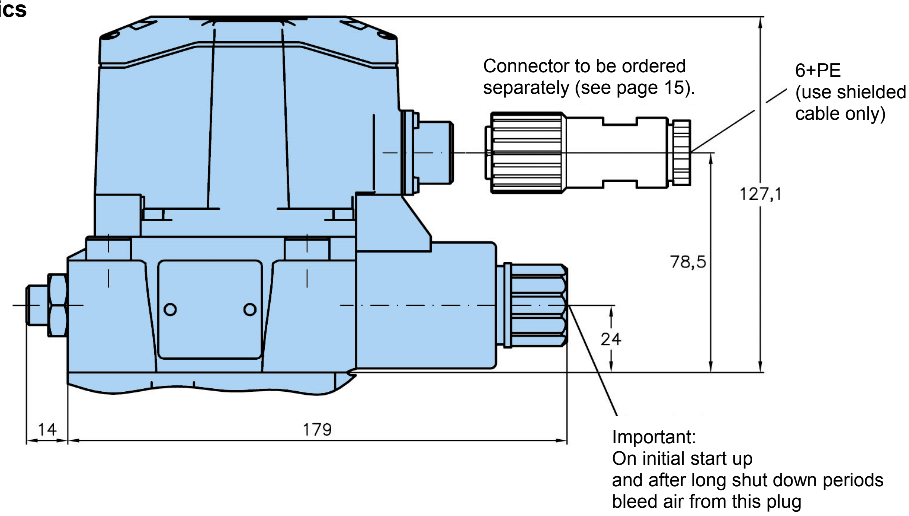
Recommended Proportional Amplifier

Digital, E-Module
PCD00-A-400 (see catalogue PARKER HY11-2500)

Analogue, Euro Card
EC01 A1O, Order no. 701-00600-8 (see catalogue DENISON 9-EN 6010)

Version with onboard electronics

Weight: size 03 = 5.4 kg
size 06 = 6.6 kg
size 10 = 8.5 kg



Example: R6V06…P2

The proportional amplifier located on top of the valve is specially adapted to control proportional pressure relief valves type R6V. The pressure versus command signal characteristic is electronically linearized (see curves page 8).

The amplifier has a reverse polarity protection and one short circuit protected WM-output stage with max. current limit.

Electronics for two different types of command signals are available – see ordering code on page 6 and below.

The ramp up/down potentiometers can be adjusted after removing the top.

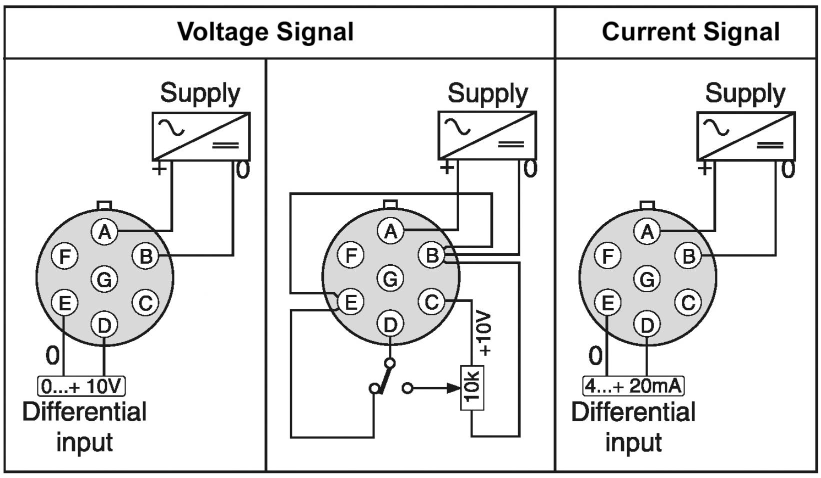
The valves in combination with the electronics are factory set and sealed.

The main board is equipped with a diagnostic LED to display the operational conditions.

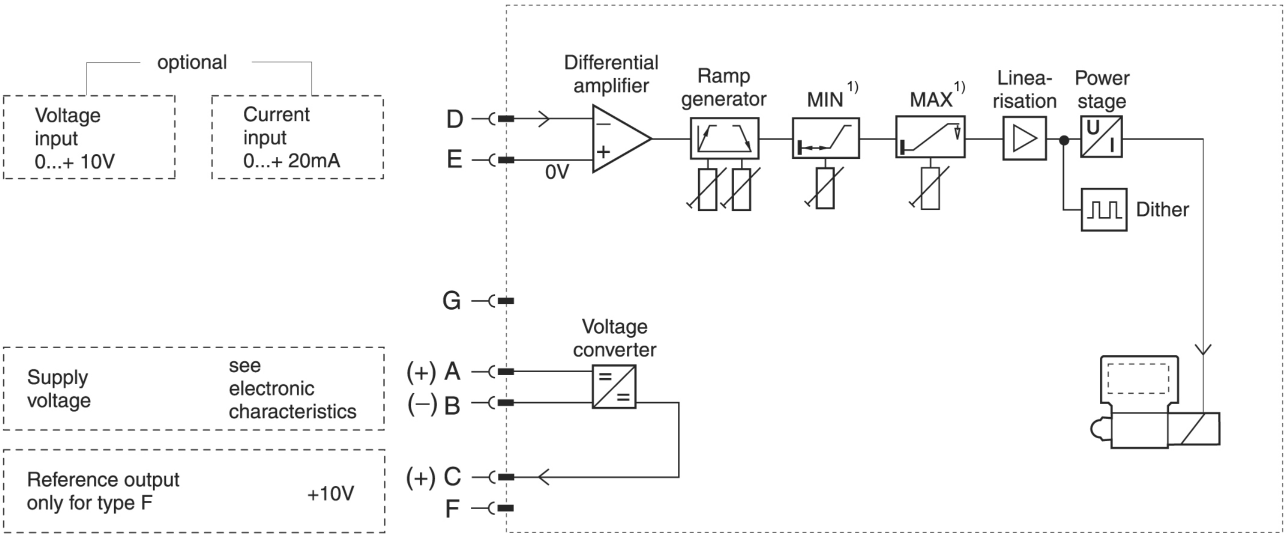
Characteristics – Proportional Amplifiers

• Supply voltage	
– nominal	24 V DC
– smoothed battery voltage	18…32 V DC
• Reference voltage from amplifier	± 10 V (± 0.5%) @ 10 mA stabilised
• Current consumption I_{nom} approx.	2.0 A at 100% command signal (140 mA quiescent)
• Short circuit protection	for the solenoid
• Command signals	0...+10 V, 200 kΩ input impedance (Pin 2)
	4...20 mA, 100 Ω input impedance (Pin 2)
	(4...20 mA command = 0...100% current at the solenoid)
• Potentiometer for	
– ramp up	up to 10s ± 20% (1...50 V/s)
– ramp down	up to 10s ± 20% (1...50 V/s)
• PWM	190 Hz ± 10%
• Diagnostic LED	green: power on + solenoid de-energised (command signal setting zero)
	yellow: power on + solenoid energised (with increasing command signal)
• Wiring	due to EMC shielded cables are required

Connector wiring diagram



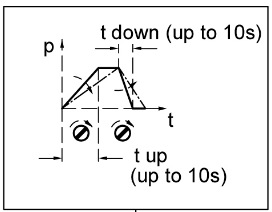
Block diagram

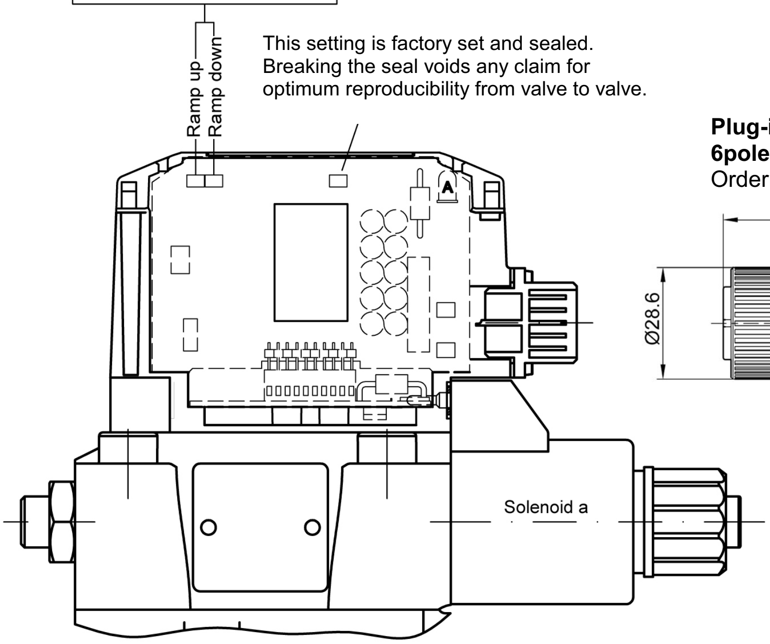


1) This setting is factory set and sealed.
Breaking the seal voids any claim for optimum reproducibility from valve to valve.

Details of potentiometers and connector

Ramp





This setting is factory set and sealed.
Breaking the seal voids any claim for optimum reproducibility from valve to valve.

Plug-in Connector
6pole+PE type conform to ISO 43563
Ordering No. 167-01127-8