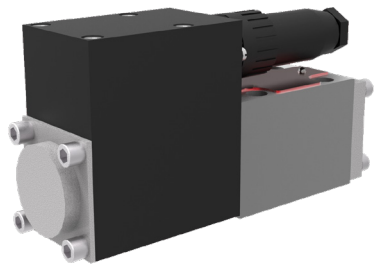
Proportional directional valve with linear motor and displacement transducer

PRL2

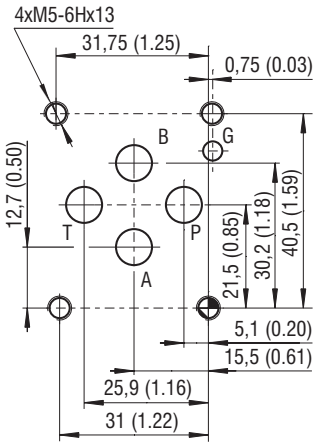
Size 06 (D03) • Q_{max} 63 l/min (17 GPM) • p_{max} 350 bar (5100 PSI)



Technical Features

- Proportional directional control valve with high response speed to a change of command signal
- Built-in spool position sensor reduces hysteresis below 1%
- The valve is suitable for continuous control of flow rate or pressure (as a pilot valve) depending on the command signal
- It is designed to control hydraulic cylinders and rotational hydraulic motors
- High reliablity of designed parts
- Valve requires the same cleanliness level of working fluid as the standard valves
- Direct spool control improves the overall dynamics of the valve and reduces dependace on operating pressure
- Connecting diagram size 06 according to standards ISO 4401 and DIN 24340 (CETOP 03)
- In the standard version, the valve housing is phosphated for basic surface corrosion protection and as preparation for painting. Steel parts are zinc-coated for 240 h salt spray protection acc. to ISO 9227

ISO 4401-03-02-0-05



Ports P, A, B, T - max ∅7.5 mm (0.29 in)

Technical Data

Valve size		06 (D03)			
Max. operating pressure	bar (PSI)	350 (5080)			
Rated flow at Δp = 70 bar	l/min (GPM)	3.2 (0.85)	16 (4.23)	32 (8.45)	63 (16.6)
Rated flow at Δp = 10 bar	l/min (GPM)	1.1 (0.29)	6.3 (1.66)	12.5 (3.30)	25 (6.60)
Max. current coil for 24 V	A	2.6			
Sensor output signal	V DC	0 - 2			
Hysteresis	%	< 1			
Threshold	%	< 0.5			
Fluid temperature range	°C (°F)	-30 ... +80 (-22 ... +176)			
Ambient temperature, max.	°C (°F)	-30 ... +50 (-22 ... +122)			
Weight	kg (lbs)	2.3 (5.07)			

Flow losses in l/min		Spool lap			
(at input pressure 100 bar, viscosity 32 $mm^2.s^{-1}$ and middle position of spool)					
		0	1	2	3
PRL2-06-03-.-24	l/min	< 0.8	< 0.2	< 0.2	< 2.0
PRL2-06-16-.-24		< 1.5	< 0.2	< 0.2	-
PRL2-06-32-.-24		< 1.5	< 0.2	< 0.2	-
PRL2-06-63-.-24		< 1.5	< 0.2	< 0.2	-

	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 06
Subplates	DP-04 (06, 10)	Size 06
Spare parts	SP_8010	

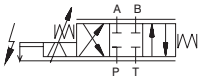
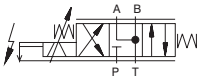
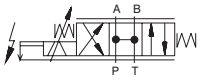
Functional Description

The PRL2 proportional directional control valve is designed for continuous remote control of rotational hydromotors and hydraulic cylinders in mobile and stationary applications. Direct spool operation by linear motor and robust design increase valve function reliability and reduce the required cleanliness of the working fluid. The hydraulic part consists of a cast-iron body with a fitted spool. The control part consists of a linear motor.
The armature of the linear motor is centred by springs and the working gaps are premagnetized in opposite directions by permanent rare earth magnets. When the coil is energized, the armature with spool moves from the middle position. Spool position and volumetric flow are proportional to the control current. The moving direction of the spool and flow direction depend on current flow direction. In the event of supply voltage disconnection or cable failure the motor armature with the spool moves back to the basic middle position. The actual spool position is sensed by the built-in inductive position sensor. The sensor signal is processed by an integrated electronic unit, which allows an adjustment of zero and amplification of the feedback signal, which is led to the controller of the electronic control unit. The closed loop regulation with feedback significantly reduces the hysteresis to below 1%. Although the PRL2 proportional directional control valve is primarily designed for control of both flow direction and volume (size), it can be used for pressure control as a pilot valve for proportional directional control valves of larger sizes. Due to their dynamic properties the PRL2 proportional directional control valves are used for control of closed loop control systems.
An external electronic control unit (EL8) can be used to control the valve.
Although the PRL2 proportional directional control valve is primarily designed for control of both flow direction and volume (size) it can be used for pressure control as a control stage for larger size valves. Due to their dymnamic properties and low hysteresis (< 1 %) the PRL2 propotional directional control valves are used for control of open and closed circuits.

Electronic EL8

The EL8 is a multifunctional DIN rail mounted electronic control unit for control of proportional hydralic valves with one or two solenoids in an open or closed loop, normally with spool position feeback.

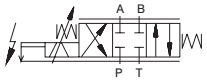
Spool connection symbols

Type	Z11	Y11	H11
Symbol			

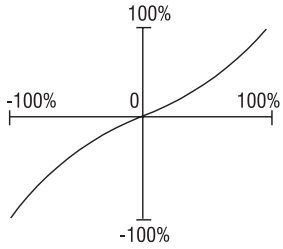
Performance curves at ν = 32 mm²/s (156 SUS) and t = 40 °C (104 °F)

Flow characteristics

Spool lap 0

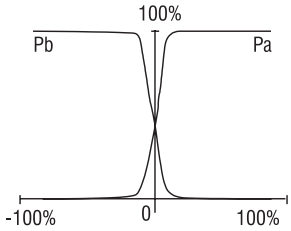


Q [l/min] / Command signal [%]



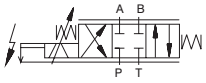
Pressure characteristics

P_A, P_B [bar] / Command signal[%]

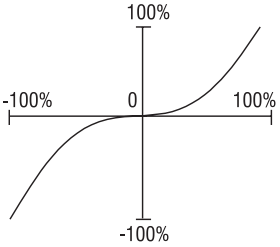


Flow characteristics

Spool lap 1

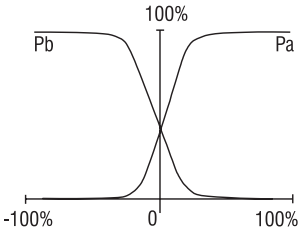


Q [l/min] / Command signal[%]

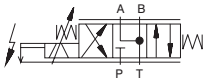


Pressure characteristics

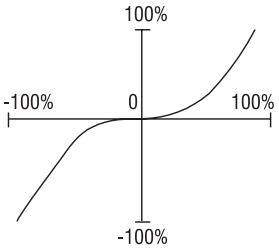
P_A, P_B [bar] / Command signal[%]



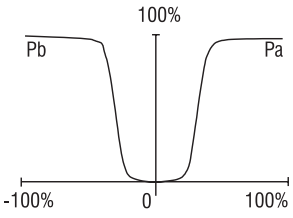
Spool lap 2



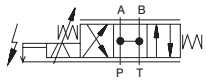
Q [l/min] / Command signal[%]



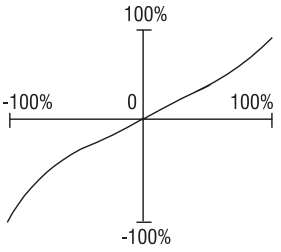
P_A, P_B [bar] / Command signal[%]



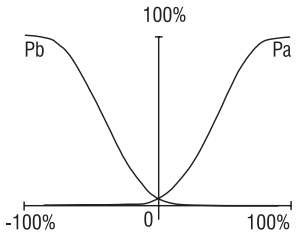
Spool lap 3



Q [l/min] / Command signal[%]



P_A, P_B [bar] / Command signal[%]



Ordering Code

PRL2-06-□-□-□-□

Proportional directional valve with linear motor and displacement transducer

Nominal size
ISO 4401-03-02-0-05,
DIN 24340 (CETOP 03), size 06

Nominal flow in l/min at the pressure difference at the valve

Δp 70	(1015)	Δp 10	(145)	[bar (PSI)]	
3,2	(0.8)	1,1	(0.29)	[l/min (GPM)]	**03**
16	(4.2)	6,3	(1.7)	[l/min (GPM)]	**16**
32	(8.5)	12,5	(3.3)	[l/min (GPM)]	**32**
63	(16.6)	25,0	(6.6)	[l/min (GPM)]	**63**

Spool lap

„Z" zero	**0**
„Z" 25 % overlap	**1**
„Y" 25 % overlap	**2**
„Y" pressure valve (only Q_n 03)	**3**

Connector

KA	AMPHENOL T 3105 101
KM	MIL EN175201-804

Nominal supply voltage of the control electronic

24	24 V DC (22.4 - 27.5)

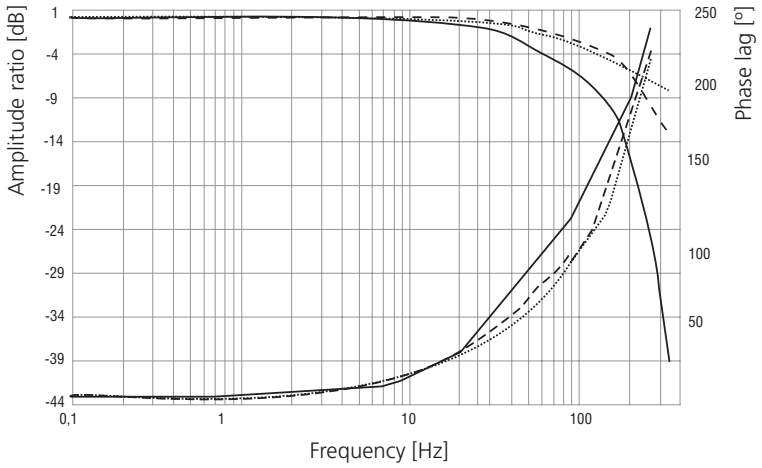
	Spool lap			
	0	1	2	3
PRL2-06-03-.-24	●	●	●	●
PRL2-06-16-.-24	●	●	●	
PRL2-06-32-.-24	❍	❍	❍	
PRL2-06-63-.-24	❍	❍	❍	

● common types
❍ restricted max. parameters, consultation with the manufacturer necessary. Additional flow rates delivered by request.

Frequency response

PRL2-06-16-0-24

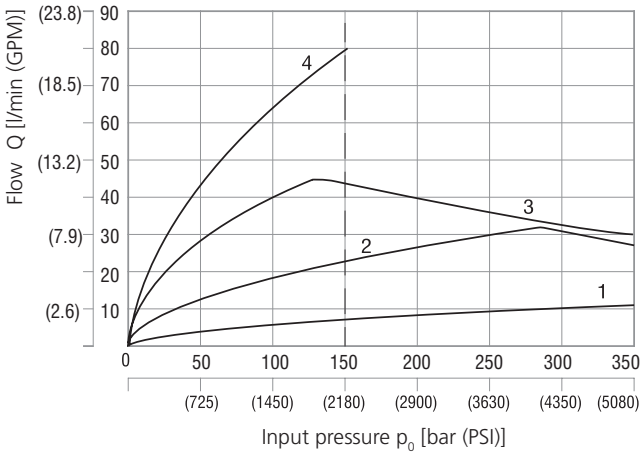
signal ±10 % ……..
signal ±25 % – – – – –
signal ±100 % ——



Characteristics measured at ν = 32 mm²/s (156 SUS) and t = 40 °C (104 °F)

Power characteristics: flow direction P → A / B → T or P → B / A → T

For nominal flow rates: 3,2; 16; 32; 63

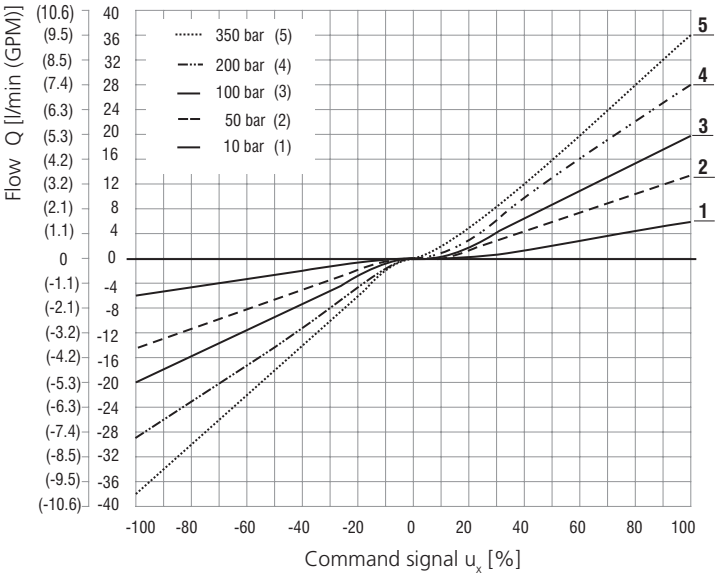


Current through solenoid coil 24V, 100 % command signal

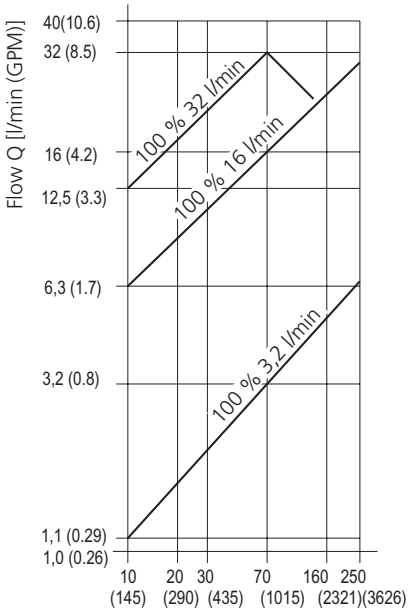
1	PRL2-06-03-.-24	max. 350 bar (5080 PSI)
2	PRL2-06-16-.-24	
3	PRL2-06-32-.-24	
4	PRL2-06-63-.-24	max. 150 bar (2180 PSI)

Flow characteristics: flow direction P → A / B → T or P → B / A → T

PRL2-06-16-0-24



Pressure drop for nominal flow rates:: 3,2; 16; 32



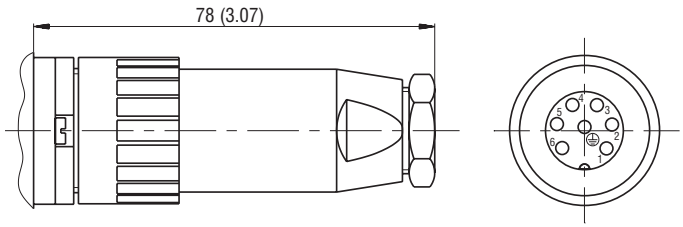
Δp = valve pressure differential (input pressure p_0 minus load pressure p_1)

1	Δp = 10 bar (145 PSI)
2	p_0 = 50 bar (725 PSI)
3	p_0 = 100 bar (1450 PSI)
4	p_0 = 200 bar (2900 PSI)
5	p_0 = 350 bar (5076 PSI)

Electrical connection in v millimeters (in)

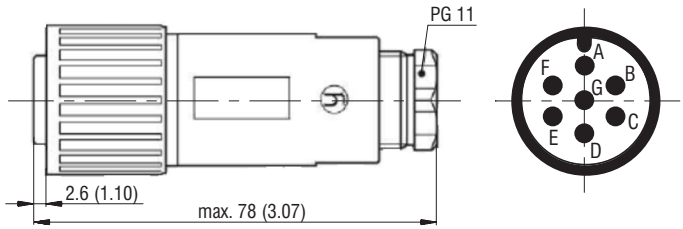
Connector socket AMPHENOL T 3105 101 DIN 43 563-BF6-3/PG 11
6-core cable 2 x 1 + 4 x 0.15

The connector must be ordered separately or as part of the cable - see order table



Version	Ordering number
Connector AMPHENOL T3105 101	16031300
Connector/connection cable PRL2 - 2 m	16031400
Connector/connection cable PRL2 - 3 m	16031500
Connector/connection cable PRL2 - 5 m	23143300
Connector/connection cable PRL2 - 10 m	23143400
Connector/connection cable PRL2 - 15 m	23143600
Connector wiring	
Signal	Contact - conductor colour
Output from inverting sensor	1 - black
Output from non-inverting sensor	2 - green
Power supply sensor 24 V	3 - red
Power supply sensor 0 V	4 - white + shading
Input 1 for linear motor PRL2 (+)	5 - bright white
Input 2 for linear motor PRL2 (-)	6 - bright red

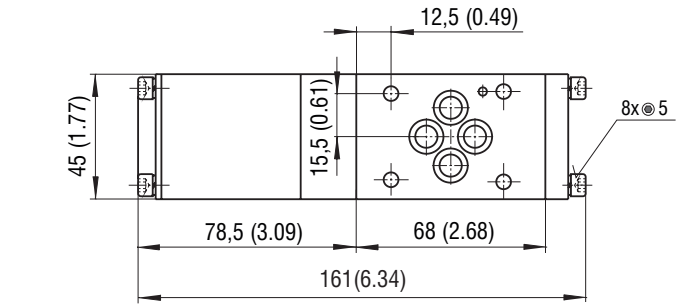
Connector socket MIL EN 175201-804 / PG 11

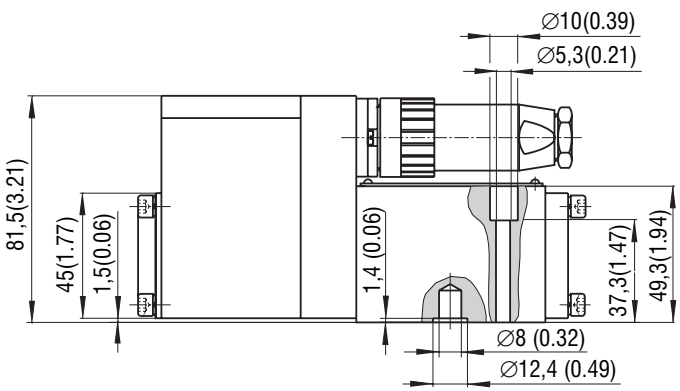


Version	Ordering number
Connector MIL EN 175201-804	40375000
Connector wiring	
Signal	Contact
Power supply sensor 24 V DC	A
Power supply sensor 0 V	B
Output from inverting sensor	C
Input 1 for linear motor PRL2 (+)	D
Input 2 for linear motor PRL2 (-)	E
Output from non-inverting sensor	F
Unused	G

Dimensions in millimeters (in)

PRL2-06-..-.-..





Mounting screws 8.9+1 Nm (6.6+0.7 lbf.ft)
M5 x 45 DIN 912-10.9