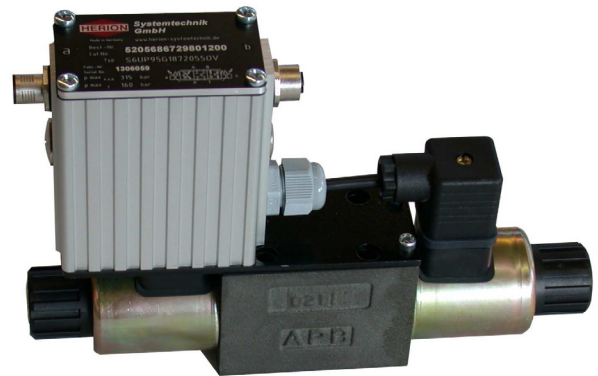


Proportional directional control valves nominal size 6
 directly controlled with integrated digital electronics
 Interface to DIN 24 340 and ISO 4401 (CETOP03)
 PN [p_{max.}] = 315 bar

- Speed and direction control according to setpoint input
- Program control, remote control
- Spring-centred, robust design
- Low-cost system solution
- Analogous interface for setpoint
- Quick and easy parametrization via PC with operating software (USB adaption)



Parameters

General parameters

Designation:
 Direct-controlled proportional directional control valve nominal size 6 with integrated digital electronics

Symbol:
 see device set-up or type key

Design:
 Spool valve

Mounting method:
 Flange mounting

Cable connection:
 Subplate

Installation position:
 preferably horizontal

Mass of directional valve:
 [kg]: 3.0

Mass of the associated subplate:
 G 1/4 [kg]: 0.7
 G 3/8 [kg]: 1

Mass of the associated pressure balance 6015190:
 [kg]: 1.0

Ambient temperature range ϑ_u [°C]:
 0 to +50

Nominal size:
 6

Hydraulic parameters

Operating pressure range
 $p_{e,max}$ [bar]
 for connection P, A, B:
 up to 315
 for connection T:
 up to 160

Pressuring fluid temperature
 ϑ_u max. [°C]:
 +70

Viscosity: ν [mm²/s]:
 12 to 500

Flow rate Q_{max} [l/min]:
 See characteristic curves

Hysteresis [%]:
 < 5%

Responsiveness [%]:
 < 1%

Reversal error [%]:
 < 1%

Oil cleanliness class according to ISO 4406: 20/18/15

Zero flow for Δp 100 bar (without pressure balance)
 [cm³/min]:
 < 30

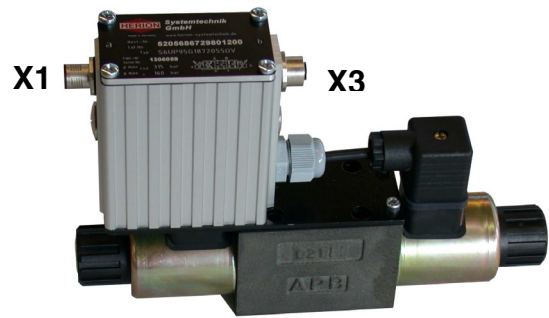
Additional parameters

Regulating times approx. [ms]:
 0%..100%: 35
 100%..0%: 70

On-time ED_{ret} [%]:
 100

Protection class for solenoid and electrical connection according to DIN 40050:
 IP 65 (with mounted plug)

Connection assignment



X1 (energy supply, setpoint)

| | | | |
|---------------------|------------------|-----------------|--------------------------------|
| <p>8-pin</p> | Supply voltage | 1 | +24 VDC (18 V to 30 V power) * |
| | Supply voltage | 2 | +24 VDC (18 V to 30 V power) * |
| | Supply voltage | 3 | 0 V (Power) * |
| | Supply voltage | 4 | 0 V (Power) * |
| | Reference output | 5 | Reference output +10.0 V |
| | Setpoint input | 6 | Analogue GND |
| | | 7** | 0 ... ±10 V |
| | | | 0 mA ... 20 mA |
| | | | 10 mA ... ±10 mA |
| | | | 4 mA ... 20 mA |
| | | 12 mA ... ±8 mA | |
| | | 5 V ±5 V | |
| Protective earth | 8 | PE | |

* For current load > 2 A, all connections 1 – 4 must be used

** Factory-provided in the parameterization for 0 ... ±10 V set

X3 (RS232 interface)

| | | | |
|---------------------|-----------------|---|------|
| <p>5-pin</p> | | 1 | n.c. |
| | | 2 | n.c. |
| | | 3 | GND |
| | RS232 Interface | 4 | TxD |
| | RS232 Interface | 5 | RxD |

Digital electronics/drive card

| | | | | |
|--|--|---|---|---|
| Supply voltage [V DC]: 24 (18 ... 30) Ripple < 10% | Emitted interference: EN 61000-6-3:2007 + A1:2011 and EN 61000-6-4: 2007 + A1: 2011 | Setpoint input signals: Signal | Wire break Monitoring | Interface RS232 via 5-pin M12x1 plug on the aluminium casing X3 (adapter cable to USB, see accessories) |
| Max. power consumption [VA]: 50 | Ambient temperature range θ_u [°C]: 0 to +50 | 0 ... ±10 V 0 mA ... 20 mA 10 mA ... ±10 mA 4 mA ... 20 mA 4 mA ... 20 mA 12 mA ... ±8 mA 12 mA ... ±8 mA 5 V ±5 V | *1 --- without with without with without with --- | |
| EMC guidelines for fault- free operation: EN 61000-6-2:2005 and EN61000-4-2 | Storage temperature [°C]: -20 to +60 | | | |

*1 if activated

Construction

The proportional directional control valves nominal size 6 are built according to the 5-chamber system and are designed as spool valves. The valve is proportionally solenoid-operated and is controlled directly. The solenoids are controlled via digital control electronics.

Application

The proportional directional control valve can be used for the directional and speed control of hydraulic cylinders and hydraulic engines and is used where an expensive servo-valve is too costly and a normal directional valve does not suffice in terms of function. Due to the steadily controllable signal, the various movements can be easily and very precisely moved via the electric remote control.

Mounting

The devices are attached to the subplates with screws and sealed with O-rings.

Hydraulic cable connection

Subplate, interface to DIN 24 340-A 6 and ISO 4401-AB-03-4-A.

Integrated electronics

The inserted digital amplifier card is characterised by the latest technology. The circuit board meets all applicable standards for the EMC. This ensures a high interference resistance and low interference emissions. The system properties are essentially determined by the software and include sufficient power reserves to also take future developments and care measures into account.

Completely digitalised amplifier and controller with the advantages:

- No potentiometer on the card
- No setting of jumpers required
- All necessary settings/parametrizations via RS232 interface
- Safety for the user when setting
- Use of a modern 16 bit μ C

- Flash EPROM for easy software update for adaptations and extensions without replacing the EPROM (download from PC via RS232)
- Using a watchdog and reset module results in a high level of reliability and safety

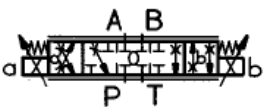
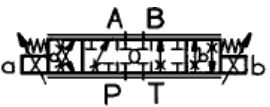
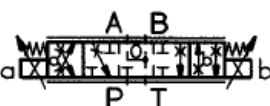
Functionality when using the RS232 interface:

- Changing individual parameters "on the fly" without controller interruption or interferences

Proportional directional control valves nominal size 6

Device set-up (standard versions)

S6UP (proportional directional control valve nominal size 6, controlled)

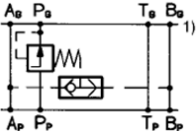
| Symbol | Symbol no. | Q _{Nom.} at Δp 10 bar | Code | Type | Order number |
|---|------------|--------------------------------|------|--------------------|---------------------|
|  | 187 | 12 l/min | 040 | S6UP95G187 040 50V | 5205686.7298.012.00 |
| | 187 | 30 l/min | 041 | S6UP95G187 041 50V | 5205702.7298.012.00 |
|  | 212 | 12 l/min | 040 | S6UP95G212 040 50V | 5205703.7298.012.00 |
| | 212 | 30 l/min | 041 | S6UP95G212 041 50V | 5205704.7298.012.00 |
|  | 233 | 12 l/min | 040 | S6UP95G233 040 50V | 5205705.7298.012.00 |
| | 233 | 30 l/min | 041 | S6UP95G233 041 50V | 5205706.7298.012.00 |

Other designs available on request

Subplate

| Designation | Comment | Type | Order number |
|-------------|---------------------------------|--------------------|--------------|
| G1/4 | Dimensional drawing, see page 9 | P S 6 G2 024 2 0 0 | 1065173 |
| G3/8 | Dimensional drawing, see page 9 | P S 6 G3 001 2 0 0 | 1065183 |

Pressure balance

| Symbol | Comment | Order number |
|---|--|--------------|
|  | <p>The combination of a proportional directional valve and pressure balance results in a proportional current regulation valve. This means: When using a pressure maintenance valve, the set volume flow remains nearly constant, even with varying pressure (see volume flow consistency characteristic curve). Dimensional drawing, see page 8</p> | 6015190 |

Fastening screws

| Designation | Comment | Order number |
|---|--|--------------|
| Cylinder head screws (M5x30) DIN 912-10.9 | Without pressure balance | 0700387 |
| Cylinder head screws (M5x70) DIN 912-10.9 | In conjunction with pressure balance 6015190 | 0662315 |

Order

The devices are characterised by the type. The ordering code indicates the composition of the type designation. Standard versions are included in the device line-up. It is advantageous to indicate the order number in addition to the type designation for these standard versions. Other device versions can be compiled by means of type combinations. When ordering from the factory, these devices then receive an order number that is evident from the order confirmation.

O-rings are included in the scope of delivery for flange mounting devices.

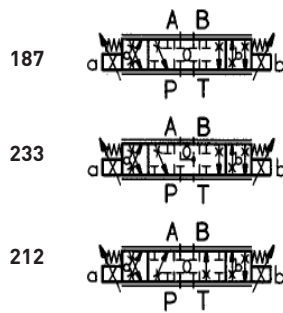
The connection plate, pressure balance, mounting screw, cable plug must be ordered separately (see accessories).

Ordering code

Proportional valve

| | | | | | | | | | |
|---|---|----|----|---|-----|-----|---|---|---|
| S | 6 | UP | 95 | G | ... | ... | 5 | 0 | V |
| | | | | | 1 | 2 | 3 | | 4 |

1 Symbol:



[other symbols by request]

- 2 Code: **040** (see characteristic curves)
041 – (see characteristic curves)
- 3 Design status: **5**
- 4 Sealing material: **V** – FKM (e.g. Viton)

Subplate

| | | | | | | | | |
|---|---|---|---|-----|-----|---|---|---|
| P | S | 6 | G | ... | ... | 2 | 0 | 0 |
| | | | | 1 | 2 | | | |

- 1 Pipe: **2** – G 1/4 (internal thread according to
3 – G 3/8 DIN ISO 228/1)
- 2 Code: **024** – G 1/4
001 – G 3/8

Ordering example

4/3-directional valve nominal size 6,
 Symbol 187, code 040
 and associated subplate G1/4 and
 pressure balance 6015190

Directional valve:

Type designation:
 S6 UP 95 G 187 040 5 0 V
 Order no.:
5205686.7298.012.00

Connection plate:

Type designation:
 P S 6 G 2 024 2 0 0
 Order no.:
1065173

Pressure balance:

Order no.:
6015190

Fastening screws:

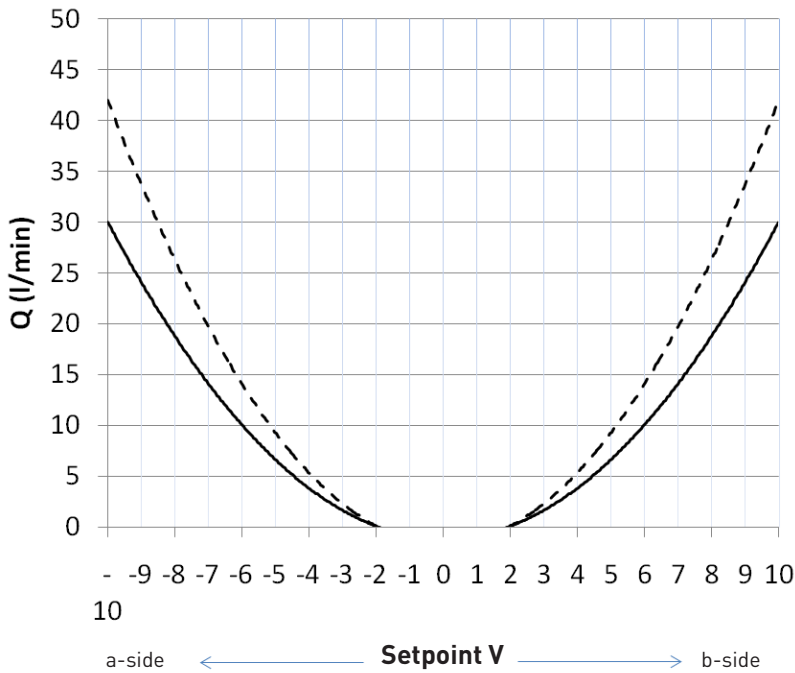
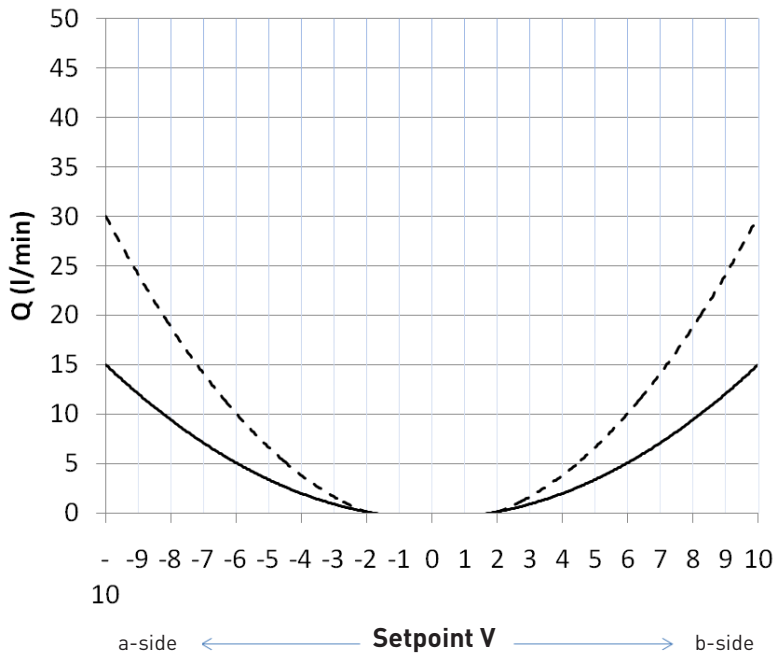
[4 pieces required]
 Cylinder head screw:
 (M 5 x 70 DIN 912-10.9)
 Order no.:
0662315

Proportional directional control valves nominal size 6

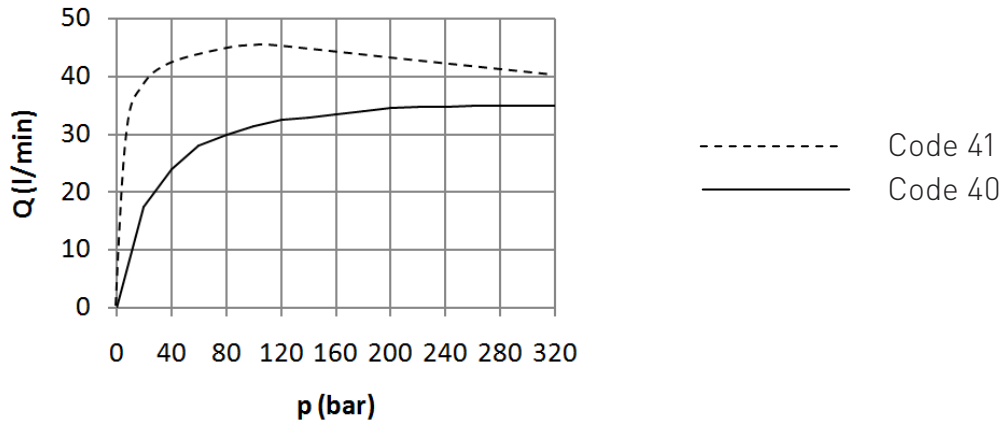
Characteristic curve S6UP without or with pressure balance 6015190

(quasi-static 0V → +10V or 0V → -10V setpoint)

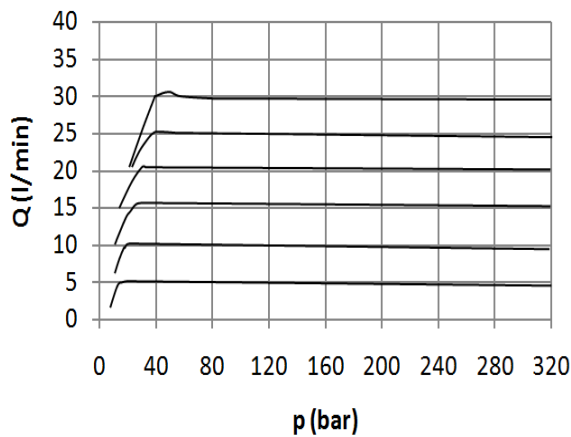
∅u: 40°C, v: 46 mm²/s



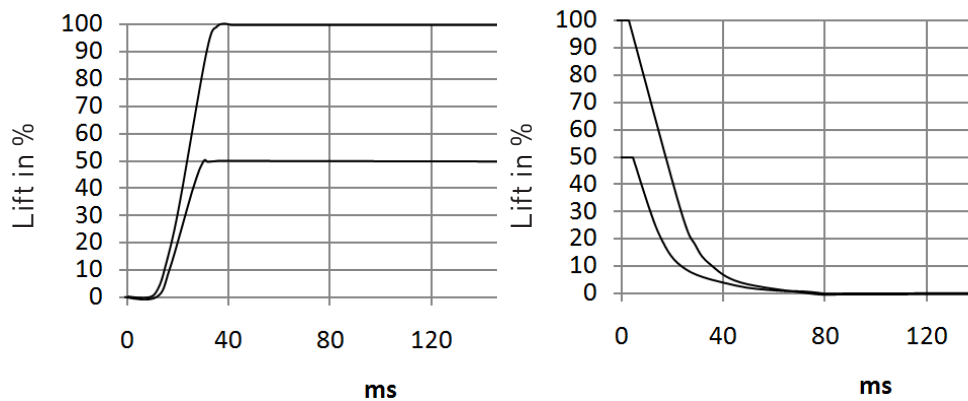
Power limit S6UP at 100% opening, without pressure balance



Volume flow consistency S6UP with pressure balance 6015190

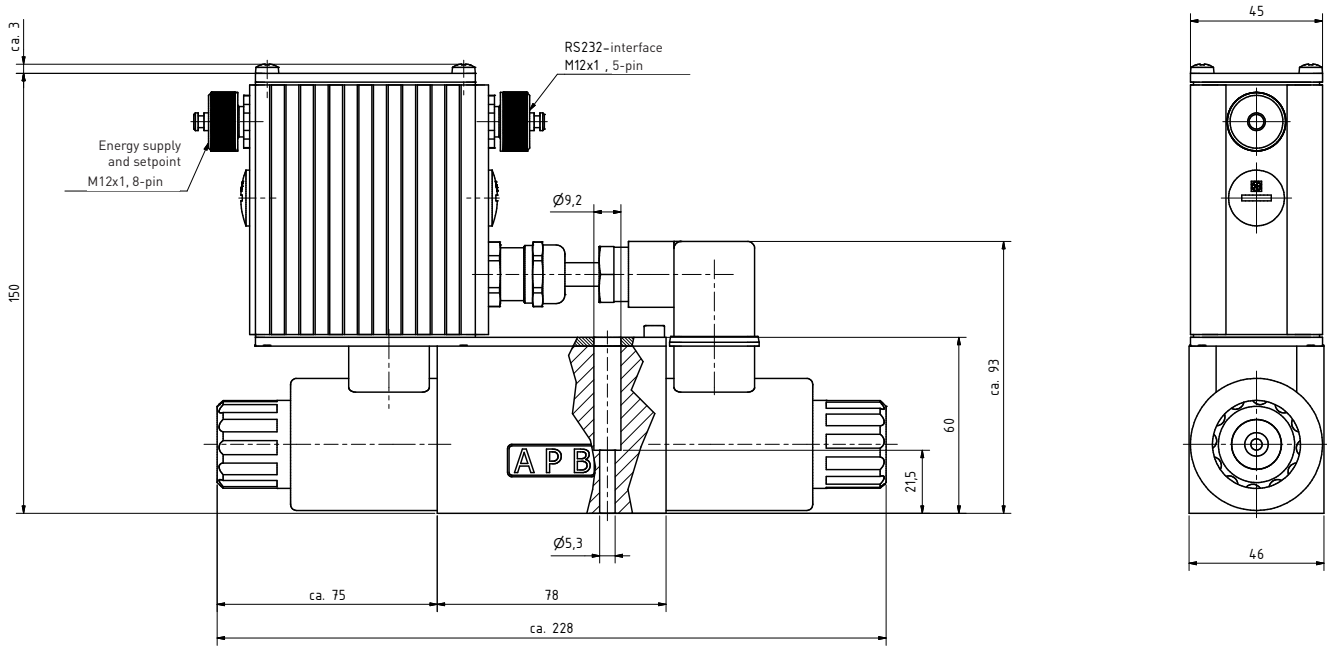
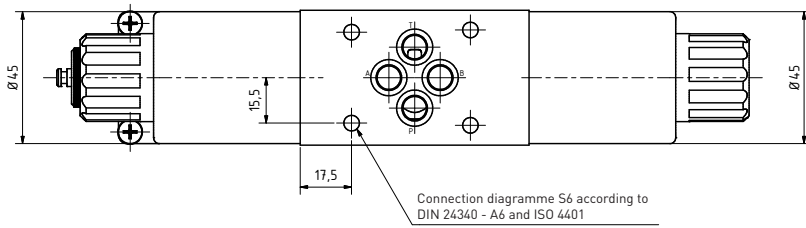


Step response S6UP without pressure balance (for Δp 100 bar)

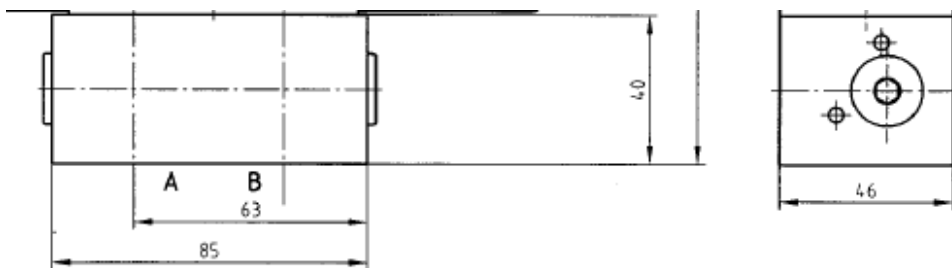


Dimensional drawings

Directional valves



Pressure balance 6015190

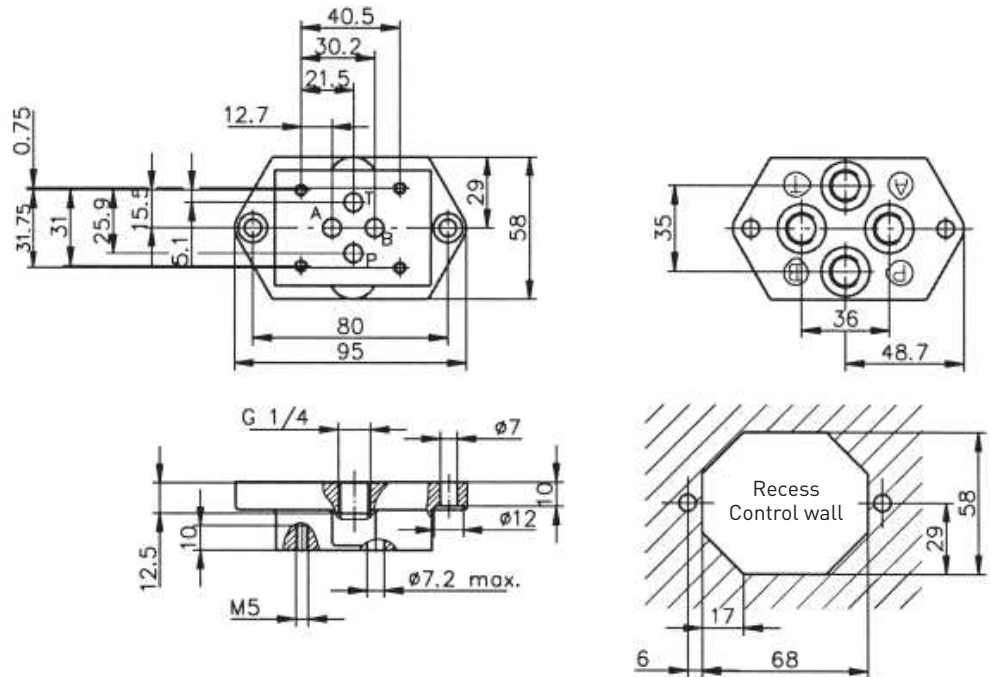


Proportional directional control valves nominal size 6

Connection plates with interface to DIN 24 340-A 6 and ISO 4401-AB-03-4-A

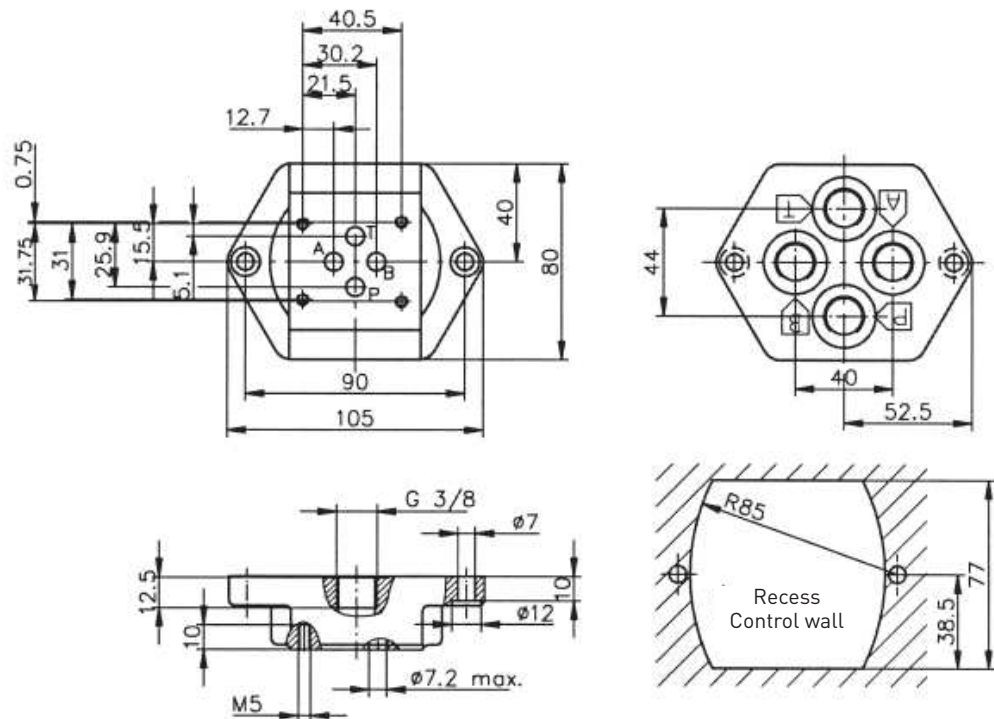
G 1/4

Type: P S 6 G 024 2 0 0
Order no.: 1065173



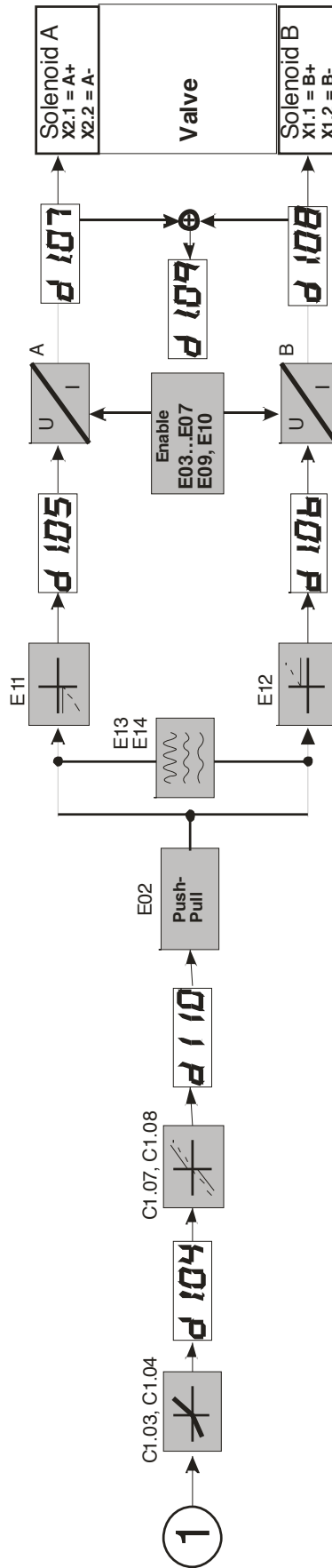
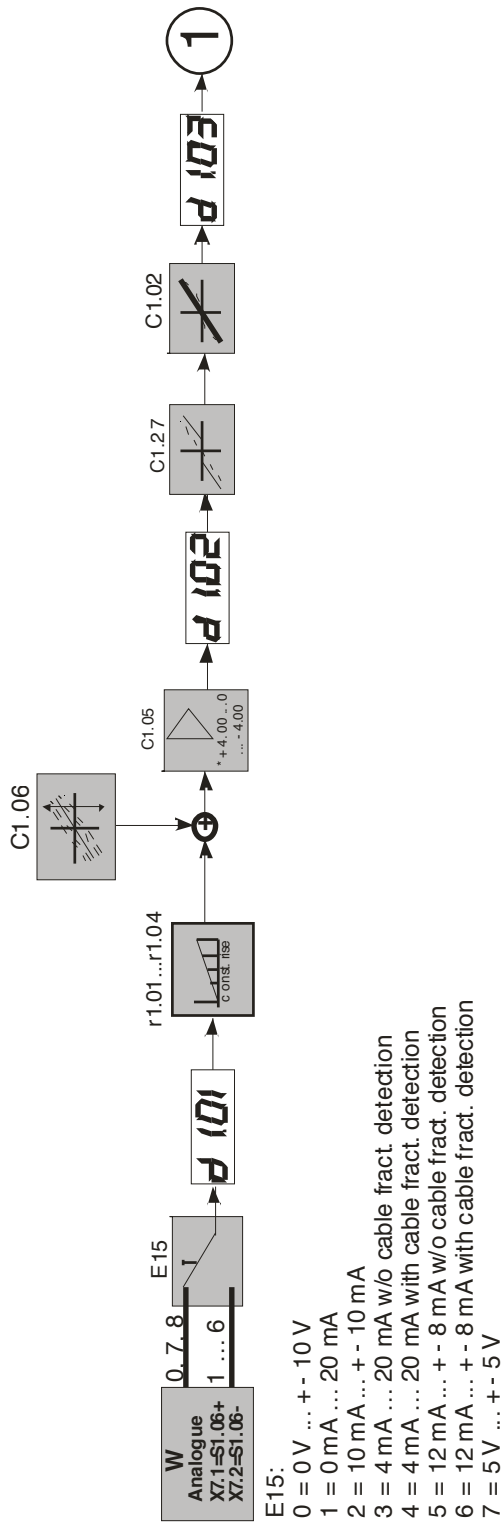
G 3/8

Type: P S 6 G 3 001 2 0 0
Order no.: 1065183



Software structure diagrams

Mode 1; controlled, one valve



Complete parameter list

| Extended Parameters: basic settings | | | | | | |
|-------------------------------------|--|------|-------|-------|--------|---|
| | Function | Unit | Step | Min | Max | Code |
| E00 | Operating mode Set to 1 at the factory | | 1 | 1 | 6 | 1 = regulated; one valve |
| E02 | Push-Pull operation | | | off | 1 | off = off 1 = active |
| E03 | Solenoid selection Set to 1.6A at the factory, no changes made | | | 0.800 | 2.700 | 1 = 0.800 = 0.8 A 2 = 1.100 = 1.1 A 3 = 1.300 = 1.3 A 4 = 1.600 = 1.6 A 5 = 2.400 = 2.4 A 6 = 2.700 = 2.7 A |
| E04 | Excite P-component of the current controller | | 0001 | 0000 | 9999 | |
| E05 | Excite I-component of the current controller | | 0001 | 0000 | 9999 | |
| E06 | Excite P-component of the current controller | | 0001 | 0000 | 9999 | |
| E07 | Excite I-component of the current controller | | 0001 | 0000 | 9999 | |
| E09 | Time delay release | s | 0.001 | 0.000 | 9.999 | |
| E10 | Solenoid current adjustment | | 00.01 | 00.50 | 01.10 | Variable adjustment of the max. current |
| E11 | Bias current | V | 0.001 | 0.000 | +3.000 | 3,000 V = 30% of the solenoid current |
| E12 | Bias current | V | 0.001 | 0.000 | +3.000 | |
| E13 | Dither amplitude | V | 0.001 | 0.000 | +3.000 | |
| E14 | Dither frequency | Hz | 0001 | 0001 | 0300 | |
| E15 | Signal definition for setpoint Set to 0 =±10 V at the factory | | 1 | 0 | 7 | 0 = ±10 V 1 = 0 mA .. 20 mA (o.D) 2 = 10 mA .. ±10 mA (m.D) 3 = 4 mA .. 20 mA (o.D) 4 = 4 mA .. 20 mA (m.D) 5 = 12 mA .. ±8 mA (o.D) 6 = 12 mA .. ±8 mA (m.D) 7 = 5 V ±10 V (without wire break monitoring o.D.) (with wire break monitoring, m.D.) |
| E25 | Enable / disable release | | | | | off = amplifier off 1 = amplifier active |

Proportional directional control valves nominal size 6

Complete parameter list

| Controller Parameters Controller settings for branch 1 | | | | | | |
|---|-------------------------------|------|-------|--------|--------|---------------------------------|
| | Function | Unit | Step | Min | Max | Code |
| C1.02 | Characteristic curve | | 1 | 0 | 5 | off = linear 1 ... 5 = curve |
| C1.03 | Amplification A | V/V | 00.01 | 00.00 | 02.00 | |
| C1.04 | Amplification B | V/V | 00.01 | 00.00 | 02.00 | |
| C1.05 | Setpoint sign / amplification | | | -4 | +4 | |
| C1.06 | Offset setpoint | V | 0.001 | -9.999 | +9.999 | |
| C1.07 | Dead zone compensation A | V | 0.001 | 0.000 | +9.999 | 9.999 max. solenoid current |
| C1.08 | Dead zone compensation B | V | 0.001 | 0.000 | +9.999 | |
| C1.27 | Hysteresis setpoint | V | 0.001 | 0.000 | +9.999 | |

| Ramp parameters for branch 1 | | | | | | Code |
|-------------------------------------|-----------------|------|------|-------|-------|------|
| | Function | Unit | Step | Min | Max | |
| r1.01 | Ramp from 0 → - | s | 0.01 | 00.00 | 39.50 | |
| r1.02 | Ramp from - → 0 | s | 0.01 | 00.00 | 39.50 | |
| r1.03 | Ramp from 0 → + | s | 0.01 | 00.00 | 39.50 | |
| r1.04 | Ramp from + → 0 | s | 0.01 | 00.00 | 39.50 | |

| Display parameters for branch 1 | | | | | |
|--|--|------|-------|--------|--------|
| | Function | Unit | Step | Min | Max |
| d1.01 | Display sum for all analogue setpoints | V | 0.001 | -9.999 | +9.999 |
| d1.02 | Sum of all analogue setpoints after ramp | V | 0.001 | -9.999 | +9.999 |
| d1.03 | Setpoint according to linearisation | V | 0.001 | -9.999 | +9.999 |
| d1.04 | Setpoint according to amplification adjustment | V | 0.001 | -9.999 | +9.999 |
| d1.05 | Control for solenoid A | | 0.001 | -9.999 | +9.999 |
| d1.06 | Control for solenoid B | | 0.001 | -9.999 | +9.999 |
| d1.07 | Solenoid current A | A | 0.001 | 0.000 | 5.000 |
| d1.08 | Solenoid current B | A | 0.001 | 0.000 | 5.000 |
| d1.09 | Total current for solenoid A + B | A | 0.001 | 0.000 | 5.000 |
| d1.10 | Reference variable | V | 0.001 | -9.999 | +9.999 |

Accessories



| Designation | Description | Order number |
|--------------------------|---|--------------|
| 1 HSTool | Parametrization software. Parametrization, storage and documentation of the setting. Available in German and English. | 5150024 |
| 2 Cable plug for X3 | USB connection cable for communication between PC and integrated electronics for interface RS232, with approx. 5 metre cable. | 0618852 |
| 3 Cable plug for X1 | 8-pin round plug M12x1 for energy supply and setpoint | 0618853 |
| 4 O-ring spare part kit: | Consists of 4 x O-rings | 0701728 |

Seals available only as spare parts kit.
Repairs may only be carried out by the manufacturer or by authorised specialised personnel.

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