

Directional control valves DN 16 indirectly actuated, spool type valve Interface to DIN 24 340 and ISO 4401 PN [p_{max.}] = 350 bar

**Damped; facilitates smooth shifting
partially throttled ensures smooth
change over**

Low volume design

High power density

**Electrical, pneumatic and
hydraulic operation**



Technical data nach VDI 3267

General parameters

Designation:
Directional control valve

Symbol:
See type key

Design:
Spool-type valve

Type of mounting:
Flange

Line connection:
Subplate

Line connection:
any

Weight of valve with:
1 actuator [kg]: 9.7
2 actuators [kg]: 10.3

Weight of subplate:
G 3/4 [kg]: 9.0
G 1 [kg]: 9.0

Weight of non-return valve
double-throttle [kg]:
1.7

Ambient temperature range
 ϑ_u [°C]:
-20 to +50

Size:
DN 16

Hydraulic parameters

Operating pressure
p [bar]
X = extern: 350
at port P, A, B:
X = intern: 350
at port T:
X = extern: 350
Y = intern: 160

Control pressure p_{st} [bar]²⁾:
¹⁾ 8,5 to 350

Control volume V_{st} [cm³]:
Symbol 019, 020: 8.4
Symbol 008, 009: 4.2
Symbol 013: 4.9

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

Viscosity range: ν [mm²/s]:
12 to 500

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

Electrical parameters

Actuation:
VH

Switching times³⁾
Pilotventil [ms]:
t_e: 50
t_a: 30

Number of switchings/h,
approx.:
15000

Rated voltage connector input
U_N [V]:
Standard voltages:
24 DC 230 AC 40...60 Hz
+5%/-10% +5%/-10%

Special voltages on request

Power consumption
P₂₀ [W]:
31

Duty cycle [%]:
100

Degree of protection for
solenoid and electrical
connection to DIN 40050:
IP 65

Electrical connection:
See type key

- ¹⁾ V_{st} min 10 bar for symbol 013
²⁾ For symbols 011 and 013 the control
pressure is achieved by the
precharge cartridge valve in P.
³⁾ The main valve switching time is
dependant on the control oil supply.

Type survey (standard versions)

| ¹⁾ Simplified main and pilot valve symbol | Symbol-No. | Overlap | Voltage | Type | Cat. No. |
|--|------------|---------|---------|-------------------------------|---------------------------|
| | 020 | + | VDC 24V | S 16 VH 17 10 G 020 001 6 0 0 | 5205590.7234.02400 |
| | | | VAC 230 | S 16 VH 17 11 G 020 001 6 0 0 | 5205591.7234.20500 |
| | 019 | + | VDC 24V | S 16 VH 17 10 G 019 001 6 M 0 | 5205594.7234.02400 |
| | | | VAC 230 | S 16 VH 17 11 G 019 001 6 M 0 | 5205595.7234.20500 |
| | 008 | + | VDC 24V | S 16 VH 17 10 G 008 001 6 0 0 | 5205598.7234.02400 |
| | | | VAC 230 | S 16 VH 17 11 G 008 001 6 0 0 | 5205599.7234.20500 |
| | 009 | + | VDC 24V | S 16 VH 19 10 G 009 001 6 0 0 | 5205601.7234.02400 |
| | | | VAC 230 | S 16 VH 19 11 G 009 001 6 0 0 | 5205602.7234.20500 |
| | 013 | - | VDC 24V | S 16 VH 17 10 G 013 001 6 R 0 | 5205607.7234.02400 |
| | | | VAC 230 | S 16 VH 17 11 G 013 001 6 R 0 | 5205608.7234.20500 |
| | 013 | - | VDC 24V | S 16 VH 19 10 G 013 001 6 R 0 | 5205609.7234.02400 |
| | | | VAC 230 | S 16 VH 19 11 G 013 001 6 R 0 | 5205610.7234.20500 |

¹⁾ Symbols are shown in operation type: electro-hydraulic
with control type: 17

Connecting plate

| | Type | Cat. No. |
|-------|---------------------|----------------|
| G 3/4 | PS 16 G 5 001 2 0 0 | 1065186 |
| G 1 | PS 16 G 6 001 2 0 0 | 1065187 |

Ordering

The units are designated by their type number. The composition of this number can be drawn from the type code. The standard versions are listed in the type survey. When ordering any of the standard versions, please state type number as well as catalog number to preclude possible misinterpretations. Further valve versions can be composed via combination of types - order numbers on request.

Flanged valves are provided with O-rings and mounting screws. Subplate must be ordered separately.

Type key

Directional control valve

| | | | | | | | | | |
|----------|-----------|-----|-----|-----|----------|-----|-------------|-----|-----|
| S | 16 | ... | ... | ... | G | ... | 0016 | ... | ... |
| | | 1 | 2 | 3 | | 4 | | 5 | 6 |

- 1 Actuation: **VH** – DC-type solenoid, pressure-tight, with manual override
Y – Hydraulic





2 Control type:

| | Pilot | Control oil-inlet X | Control oil-outlet Y | Timed settings |
|------------|-------|---------------------|------------------------|----------------|
| 17- | S 6 | internal | external | none |
| 18- | S 6 | external | external | none |
| 19- | S 6 | internal | external | available |
| 20- | S 6 | external | external | available |
| 21- | S 6 | internal | internal | none |
| 22- | S 6 | external | internal | none |
| 23- | S 6 | internal | internal | available |
| 24- | S 6 | external | internal | available |
| 28- | - | external | external ¹⁾ | none |
| 29- | - | external | external ¹⁾ | available |

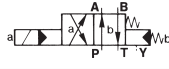
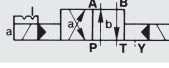



with timed settings: double-throttle non-return valve is available for hydraulic directly operated valves as an intermediate plate

¹⁾ Y = control oil supply

3 Electrical connection:

- 00-** Operation without electrical connection
- 10-**  PG 11 socket according to DIN 43650 mounted on solenoid
- 11-**  PG 11 socket according to DIN 43650 mounted on solenoid with integrated rectifier
- 12-**  PG 11 socket according to DIN 43650 mounted on solenoid with integrated rectifier signal indicator mounted on socket
- 13-**  PG 11 socket according to DIN 43650 mounted on solenoid, signal indicator mounted on socket

4 Symbol:

| Symbol | Symbol No. | Overlap |
|--|-------------------|---------|
|  | 020 | + |
|  | 019 ¹⁾ | + |
|  | 008 | + |
|  | 009 | + |
|  | 013 ²⁾ | - |

For the symbols shown: Solenoid operated valve with control pattern 17

¹⁾ Locking not possible with hydraulic and direct pneumatic operation.

²⁾ Control patterns 17, 19, 21 and 23 are only possible in conjunction with symbol 013 with a precharge cartridge valve in P.

- 5 Additional data: **O** – Standard design
M – mechanical detent of the pilot valve
R – Pilot cartridge in port P ²⁾ (main valve)
- 6 Sealing material: **O** – Perbunan
V – Viton

Subplate

| | | | | | | | | |
|----------|----------|-----------|----------|-----|------------|-----|----------|----------|
| P | S | 16 | G | ... | 001 | ... | 0 | 0 |
| | | | | 1 | | 2 | | |

- 1 Line connection: **5** – G 3/4 (internal thread)
6 – G 1 to DIN ISO 228/1)
- 2 Engineering version: **2**

Directional control valves DN 16

Ordering example

4/3-way NG 16 directional valve, pilot operated; AC 230V 50 Hz, Electrical connection: Connector with rectifier on solenoid, symbol 008, internal control oil flow, external control oil return, with G 3/4" subplate.

Directional control valve:

Type No.:
S 16 VH 17 11 G 008 001 6 0 0
Cat. No.:
5205599.7234.20500

4/3-way NG 16 directional valve, pilot operated; DC 24V; Electrical connection: Connector with rectifier on solenoid, symbol 008, internal control oil flow, external control oil return, with G 3/4" subplate.

Directional control valve:

Type No.:
S 16 VH 17 10 G 008 001 6 0 0
Cat. No.:
5205598.7234.02400

Subplate:

Type No.:
P S 16 G 5 001 2 0 0
Cat. No.:
1065186

Design

The S 16 type valves are spool type valves available in 4/2- and 4/3-way designs. The valves can be used as 2- or 3-way designs by closing the appropriate ports.

Actuation

Pilot operated valves are preferably operated by solenoids. The auxiliary manual operation is only effective when control pressure is available. Directly operated versions are available for hydraulic and pneumatic operation.

Mounting

The units are bolted on subplates and sealed by O-rings.

Line connection

Subplate, interface to DIN 24 340-A16 and ISO 4401-AD-07-4-A.

Control modes

Control type: 17

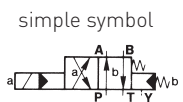
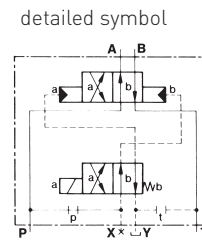
Internal control oil feed:

Port "X" in subplate closed.
Port "p" in main valve opened.

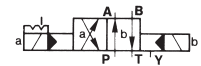
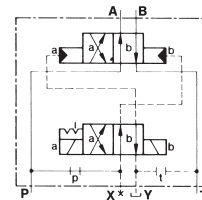
External control oil feed:

Connector for control oil return in "Y" in subplate. Port "t" in main valve closed.

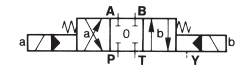
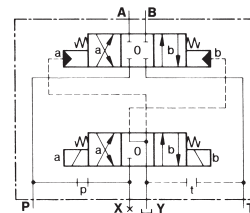
**4/2-
Control
valve
020**



**4/2-
Control
valve
019**



**4/3-
Control
valve
008**



Control type: 18

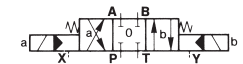
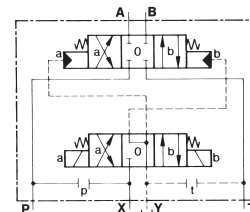
External control oil feed:

Connector for control oil return in "X" in subplate.
Port "p" in main valve closed.

External control oil return:

Connector for control oil return in "Y" in subplate.
Port "t" in main valve closed.

**4/3-
Directional
control valve
008**



Control type: 19

Switching time settings:

The switching times of the main valve can be influenced by a double throttle non-return valve, which throttles the control oil supply.

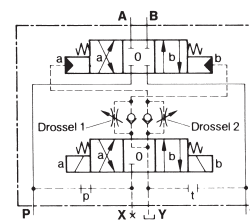
The switching times are changed with the following settings:

Throttle 1: from 0 to a
from b to 0

Throttle 2: from 0 to b
from a to 0

Internal control oil flow
External control oil return

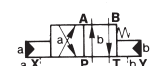
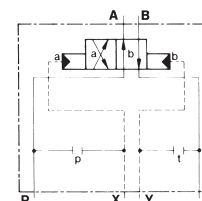
**4/3-
Control
valve
008**



Control type: 28

Direct hydraulic operation.
Control oil feed "X" and "Y" in the subplate.

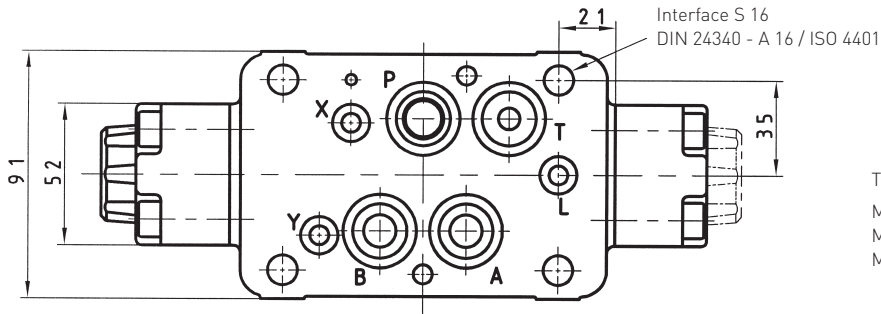
**4/2-
Control
valve
020**



Directional control valves DN 16

Dimensional drawings

Directional valve: See subplate dimensioned drawing for the dimensions of the connection layout.

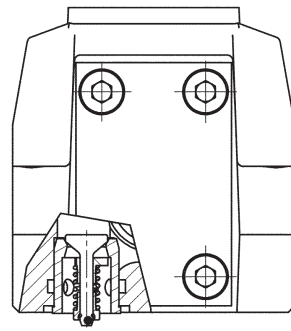
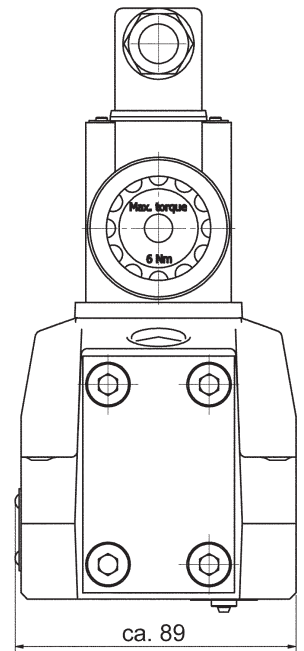
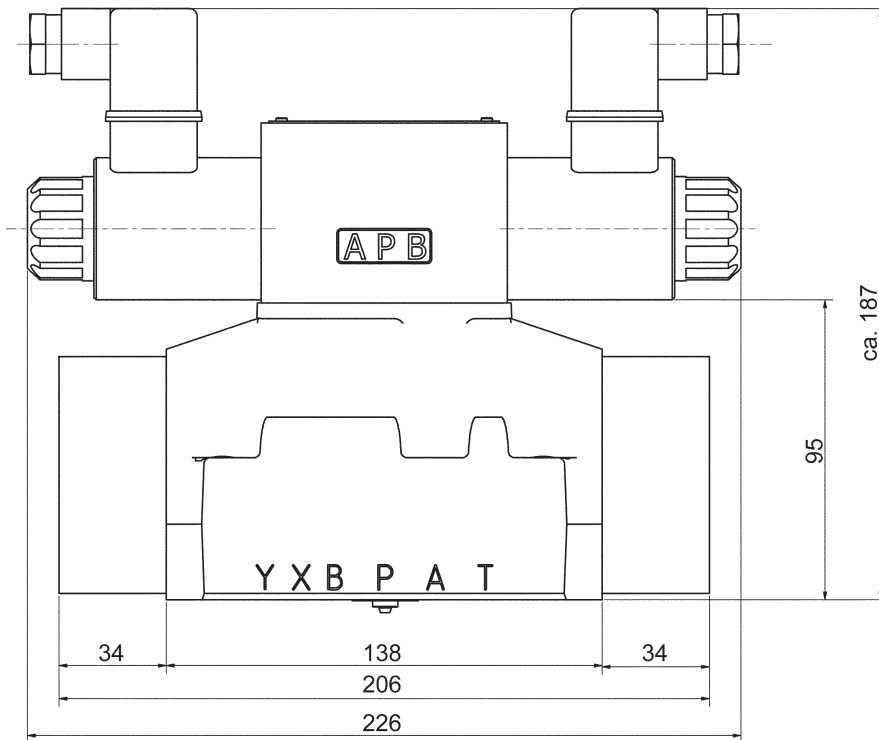


Tightening torque:

M 15 DIN 912 - 10.9 = 7.6 Nm

M 16 DIN 912 - 10.9 = 13 Nm

M 10 DIN 912 - 10.9 = 6.2 Nm

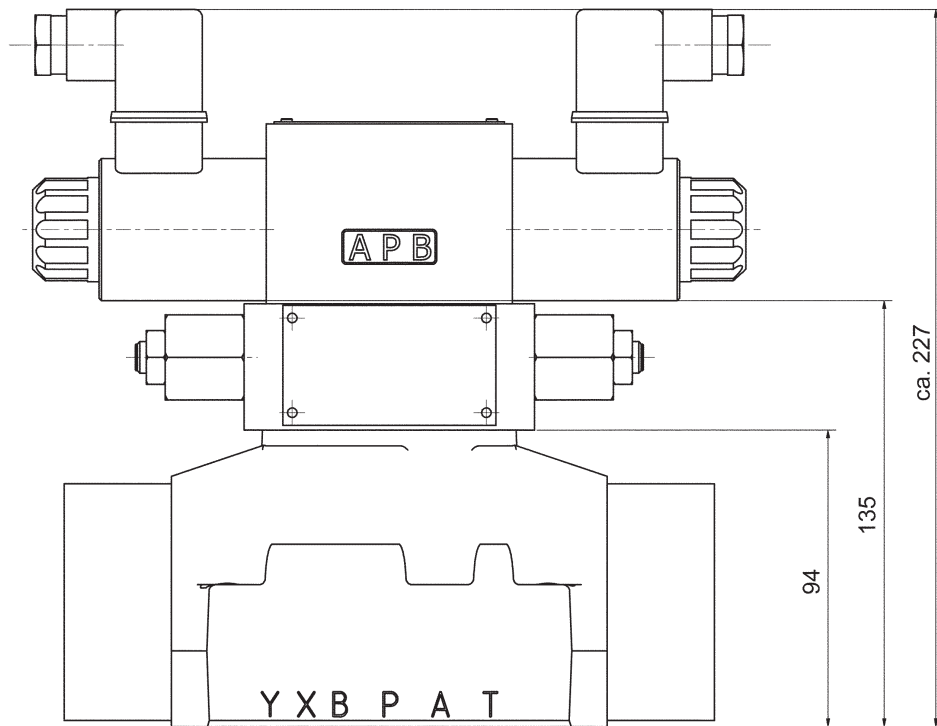


Pilot valve in connection P
(depends on symbol and control type)

Dimensional drawings

Switching times set
by double throttle
non-return valve
MU 2 S6 ...

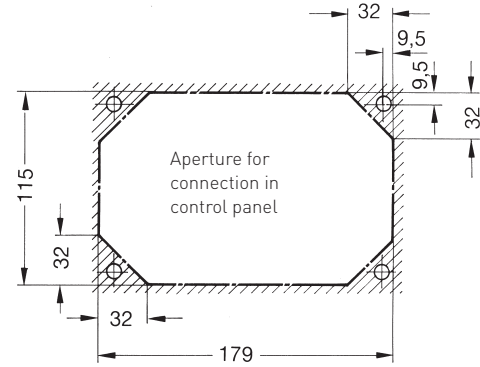
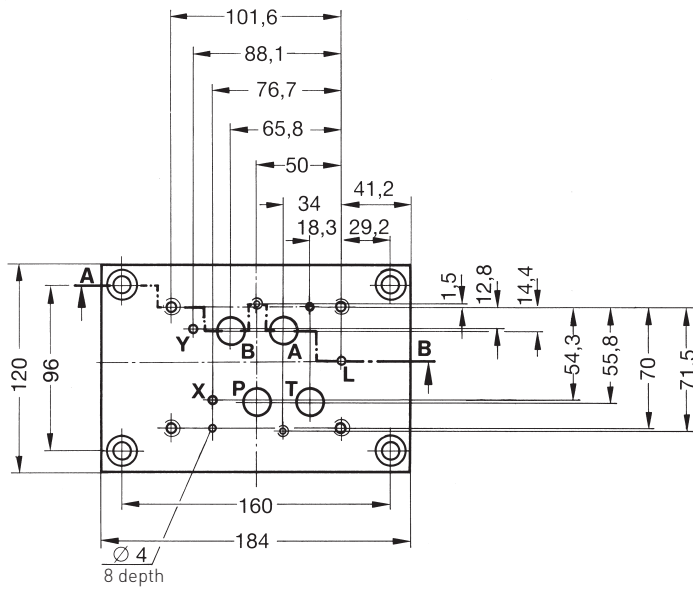
Control type
19, 20, 23, 24, 29



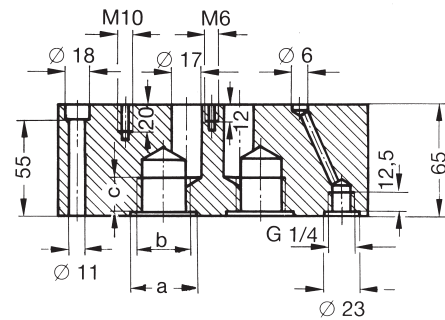
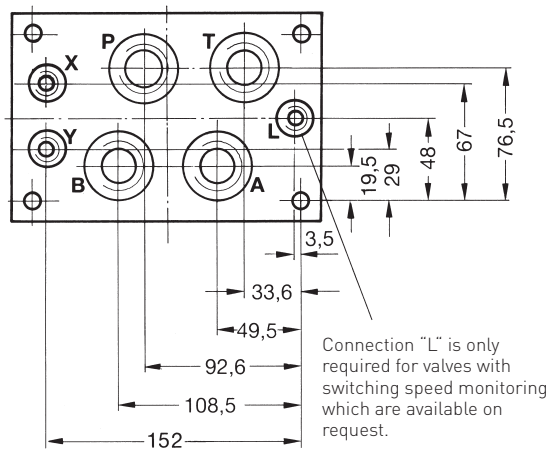
Directional control valves DN 16

Dimensional drawings

Subplate with interface according to DIN 24 340-A 16 and ISO 4401-AD-07-4-A

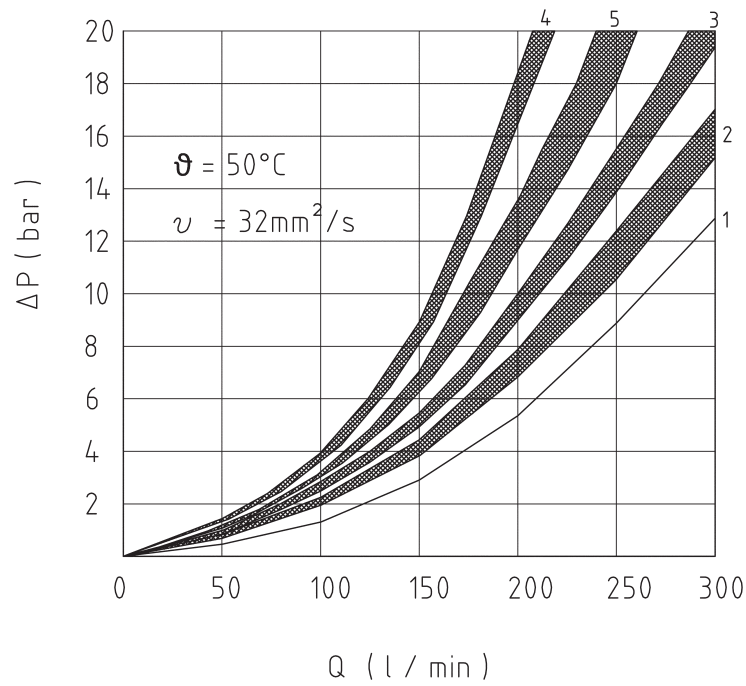


Section A-B



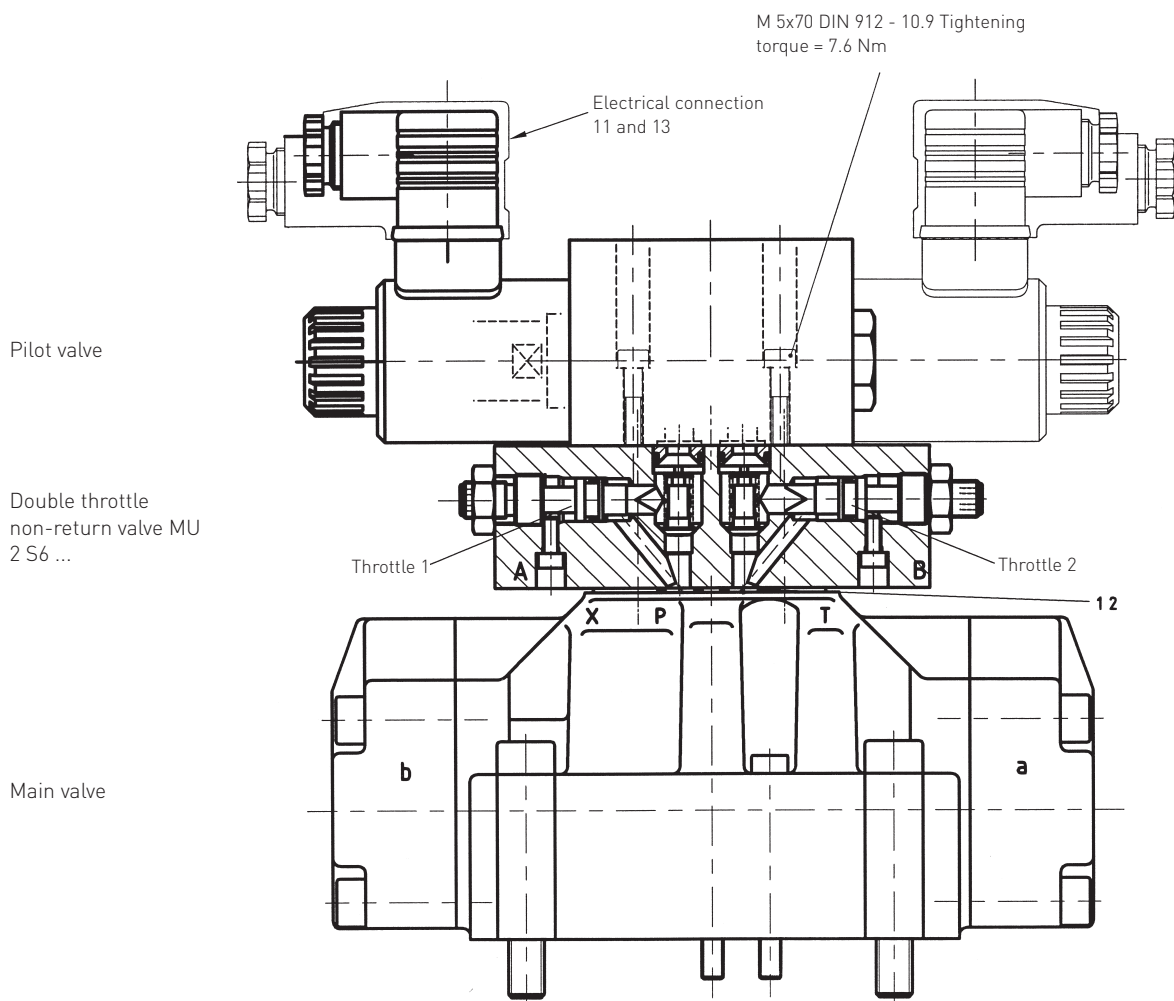
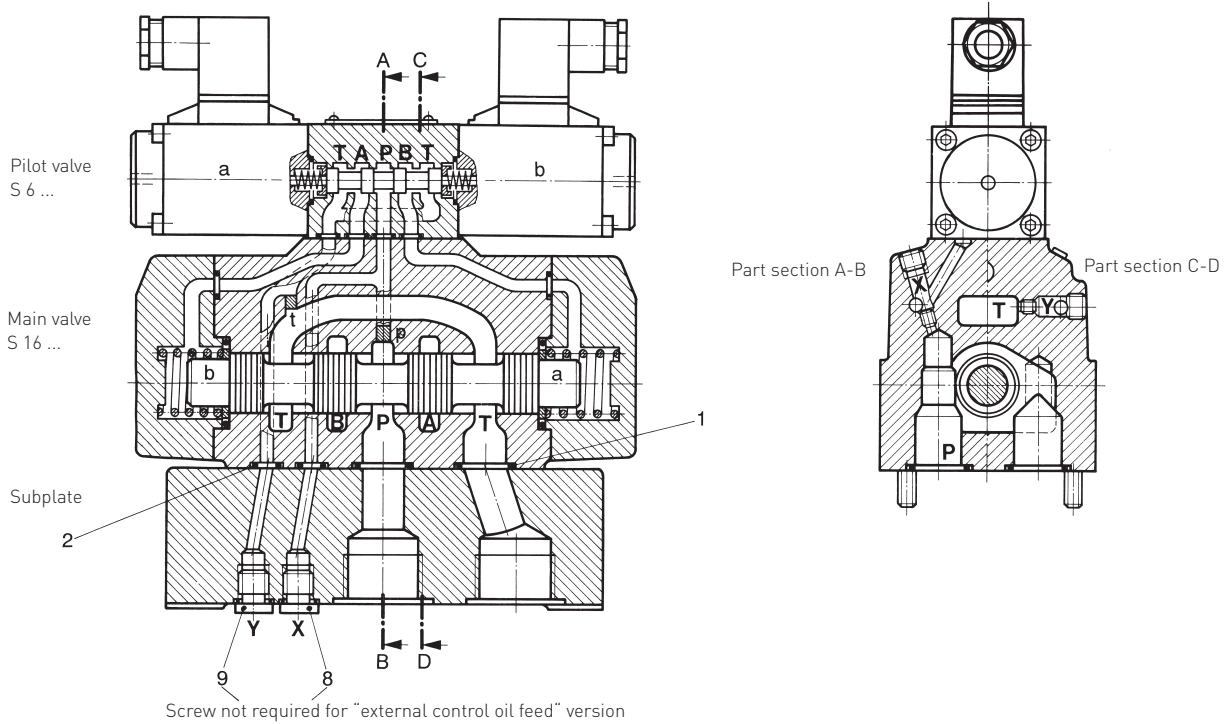
| Cat. No. | a | b | c |
|-----------|-------|------------------|------|
| 10 651 86 | G 3/4 | $\varnothing 41$ | 16,5 |
| 10 651 81 | G 1 | $\varnothing 47$ | 18,5 |

Characteristic curves

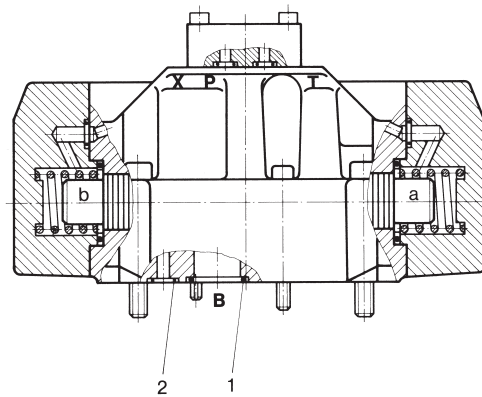


| Symbol | P-A | P-B | A-T | B-T | P-T |
|---------------|-----|-----|-----|-----|-----|
| 020, 019, 008 | 5 | 5 | 5 | 4 | - |
| 013 | 1 | 2 | 3 | 5 | 4 |
| 009 | 2 | 3 | 3 | 5 | - |

Spare parts drawings



Spare parts drawings



Spare parts (pieces)

| Part | Description | S 16 VH S 16 ... | S 16 VH ... S 16 ... with double throttle non-return valve | S 16 Y 2800 | Cat. No. |
|------|---|---------------------|---|--|----------------|
| 1 | O-ring (21.9 x 2.62) | 4 | 4 | 4 | 0701292 |
| 2 | O-ring (10 x 2) | 2 | 2 | 2 | 0659116 |
| 10 | ¹¹ Pilot valve complete | | | | |
| 11 | Double throttle non-return valve complete | - | 1 | - | 1065506 |
| 11 | Connecting valve plate complete | - | - | 1 ^(P→B) 1 ^(A→T) | 2840093 |

| | | | | |
|------------------------------------|--|---------------------|--------------------------------------|--------------------------------------|
| ¹¹ Pilot valve complete | For 2-position valves with spring return | = 1 off or 1 off | S6VH10G02000110V S6SH11G02000110V | 5203541.7234.024 5204082.7234.209 |
| | For 2-position valves with locking | = 1 off or 1 off | S6VH10G0190011MV S6VH11G0190011MV | 5203942.7234.024 5204089.7234.205 |
| | For 3-position valves with spring return to central 0 position | = 1 off or 1 off | S6VH10G00900110V S6SH11G00900110V | 5203940.7234.024 5204093.7234.203 |

See 7501292 for spare parts for NG 6 pilot valve.

HERION Systemtechnik GmbH

Untere Talstraße 65
71263 Weil der Stadt
Tel.: +49 (0) 7033/3018-0
Fax: +49 (0) 7033/3018-10
info@herion-systemtechnik.de
www.herion-systemtechnik.de

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HERION Systemtechnik Sales Partners

China

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155, Jiangjun Road, Jiangning Economical & Technical
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Tel.: +86-25-52785915
E-Mail: info@estun.com
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Japan

Riken Optech Corporation
2-6-9, Higashi Ohi, Shinagawa-ku,
Tokyo 140-8533
Tel.: +81 3 34748602
E-Mail: contact@rikenoptech.com
www.rikenoptech.com

Korea

CHUNGWOO CO., LTD.
416-4 Dokjeongri
Janganmyun Hwaseongsi
Kyungkido, Korea
Tel.: +82 (0)31 351-5340
E-Mail: blueox2@unitel.co.kr
www.chungwooco.co.kr

Spain

EUROTECH SYSTEMS, S.L.
Av. Can LLuch, 25
08690 SANTA COLOMA DE CERVELLO
Tel.: +34 93 634 0101
E-Mail: eurotech@eurotechsys.com
www.eurotechsys.com

South Africa

Ernest Lowe ELCO
Pneumatic & Hydraulic Automation Solutions
6, Skew Road, Boksburg North 1459,
Gauteng, South Africa
Tel.: +27 (11) 898-6600
E-Mail: corporate@elco.co.za
www.elco.co.za

Taiwan

Full Life Trading Co., Ltd.
16F-4, No.2, Jian Ba Rd. Chung Ho City
Taipei County, Taiwan 23562
Tel.: +886-2-82261860
E-Mail: sales-dept@fulllifetrading.com
www.fulllifetrading.com

Turkey

Power Pnomatik Proses A. Ş
Necatibey Cad. No:44/2
Karaköy
Ystanbul 34420
Tel.: +90 212 2938870
E-Mail: info@powerpnomatik.com
www.powerpnomatik.com