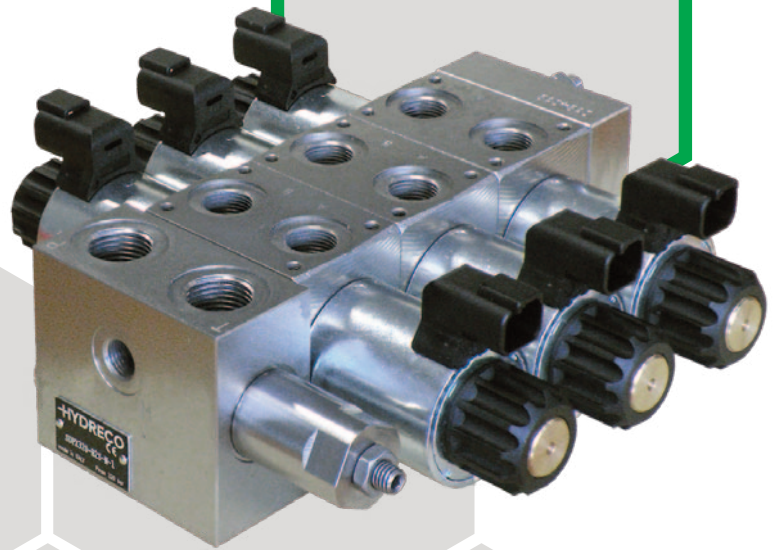


# SD\*

## SECTIONAL DIRECTIONAL VALVE

SDL	280 bar	40 l/min
SDM	320 bar	50 l/min
SDS	320 bar	60 l/min



**INTRODUCTION**

SDL, SDM and SDS are sectional directional control valves. They can be assembled in parallel with up to 10 working sections. The same components allow creating series circuits by inserting plugs in order to modify the oil path.

Working elements are available in two thicknesses with working ports 3/8" BSP, 1/2" BSP, SAE-06 or SAE-08 threads.

Specific components for series circuits are available upon request.

**FLUIDS**

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

Using fluids at temperatures higher than 80 °C (180 °F) causes the accelerated degradation of seals as well as the fluid physical and chemical properties.

From a safety standpoint, temperatures above 55 °C (130 °F) are not recommended.

**SDL OPERATING PARAMETERS**

<b>MAXIMUM OPERATING PRESSURE</b>	P - A - B ports	280 bar	4000 psi
	P1 and P2 ports	280 bar	4000 psi
<b>FLOW CAPACITY</b>	parallel	40 l/min	10.6 gpm
	series	40 l/min	10.6 gpm

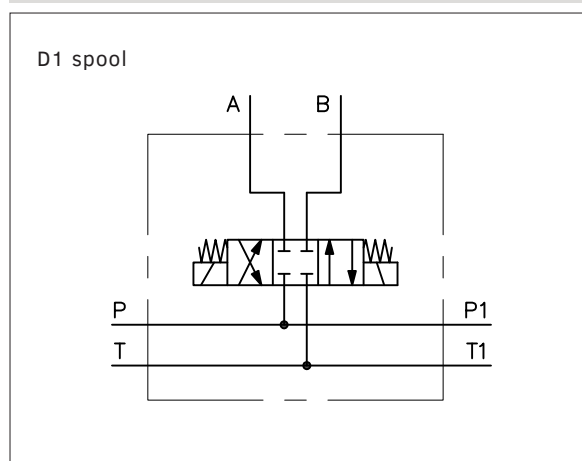
**SDM OPERATING PARAMETERS**

<b>MAXIMUM OPERATING PRESSURE</b>	P - A - B ports	320 bar	4600 psi
	P1 and P2 ports	250 bar	3600 psi
<b>FLOW CAPACITY</b>	parallel	50 l/min	13.2 gpm
	series	40 l/min	10.6 gpm

**SDS OPERATING PARAMETERS**

<b>MAXIMUM OPERATING PRESSURE</b>	P - A - B ports	320 bar	4600 psi
	P1 and P2 ports	250 bar	3600 psi
<b>FLOW CAPACITY</b>	parallel	60 l/min	15.9 gpm
	series	50 l/min	13.2 gpm

**WORKING SECTION HYDRAULIC SYMBOL**



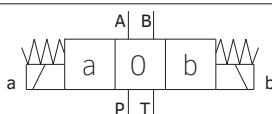
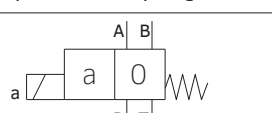
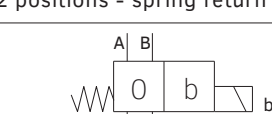
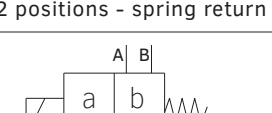
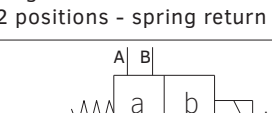
<b>STEP RESPONSE</b>	0 → 100%	25 ms	
	100 → 0%	75 ms	
<b>VOLTAGE</b>		12V DC 24V DC 28V DC 48V DC	
<b>RANGE TEMPERATURES:</b>	ambient	-20 to +60 °C	-4 to +140 °F
	fluid	-20 to +82 °C	-4 to +180 °F
<b>FLUID VISCOSITY</b>	range	10 - 400 cSt	60 - 1900 SUS
	recommended	25 cSt	120 SUS
<b>FLUID CONTAMINATION</b>		ISO 4406:1999 class 18/16/13	

# SD ■ - ■ ■ ■ - ■ ■ ■ - ■ ■ ■ - 1

design mark

MAX FLOWRATE	
L	40 l/min
M	50 l/min
S	60 l/min

PORTS SIZE	
B15	3/8" BSPP
S15	9/16 - 18 UNF
B2	1/2" BSPP (SDS only)
S2	3/4"-16 UNF (SDS only)

FUNCTION	
<b>D</b>	 <p>double solenoid 3 positions - spring centred</p>
<b>A</b>	 <p>single solenoid at side A 2 positions - spring return</p>
<b>B</b>	 <p>single solenoid at side B 2 positions - spring return</p>
<b>TA</b>	 <p>single solenoid at side A 2 positions - spring return</p>
<b>TB</b>	 <p>single solenoid at side B 2 positions - spring return</p>

SEAL	
N	NBR
V	Viton

COIL	
see availability table below	
K1	DIN 43650
K7	DT04-2P 'deutsch'
WK1	DIN 43650 zinc-nickel plated
WK7	DT04-2P 'deutsch' zinc-nickel plated
WK7D	DT04-2P 'deutsch' zinc-nickel plated with diode
K2	AMP Junior

VOLTAGE	
D12	12 V DC solenoid
D24	24 V DC solenoid
D28	28 V DC solenoid
D48	48 V DC solenoid
D00	without coil

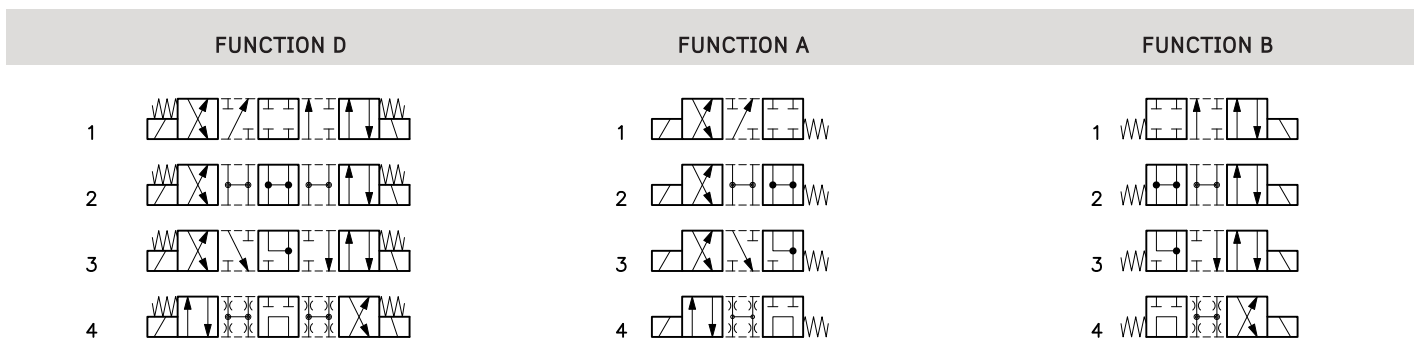
MANUAL OVERRIDE	
M	built-in with the tube, pin standard for SDM and SDS (not available for SDL)
B	built-in with the tube, boot protected (standard for SDL)
L	hand lever
K	knob, turning

SPOOL	
see table at page 4	

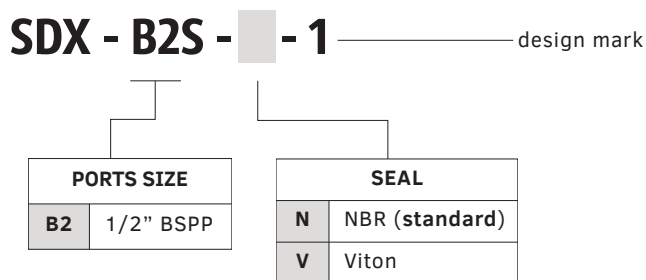
CODE EXAMPLES:	
SDL - B15D1 - D12K7 - NB - 1	
SDS - S2D4 - D12K7 - NM - 1	

	COILS AVAILABILITY											
	SDL			SDM			SDS					
	K1	K2	K7	K1	K2	K7	K1	K2	K7	WK1	WK7	WK7D
D12	■	■	■	■	□	■	■	□	■	■	■	■
D24	■	■	■	■	□	■	■	□	■	■	■	■
D28	■	-	-	-	-	-	■	-	-	-	-	-
D48	■	-	-	-	-	-	■	-	-	-	-	-

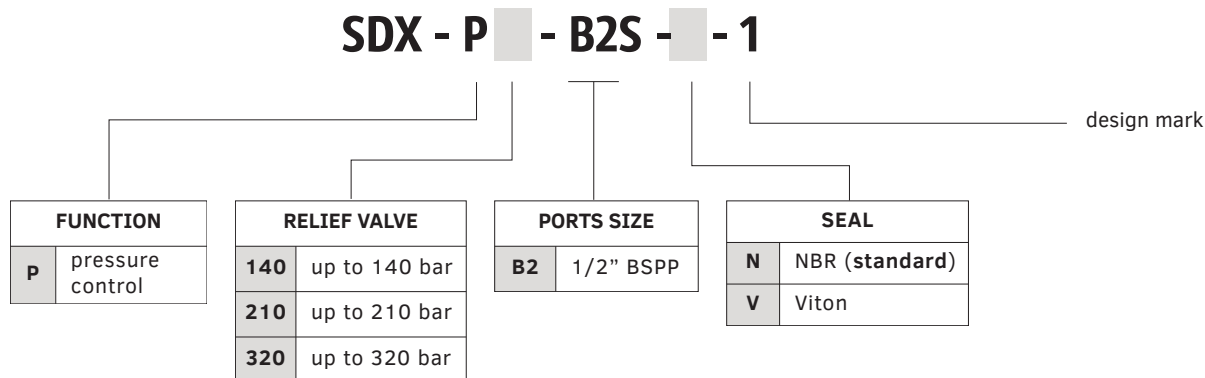
■ available  
□ upon request



INLET SECTIONS: BASIC

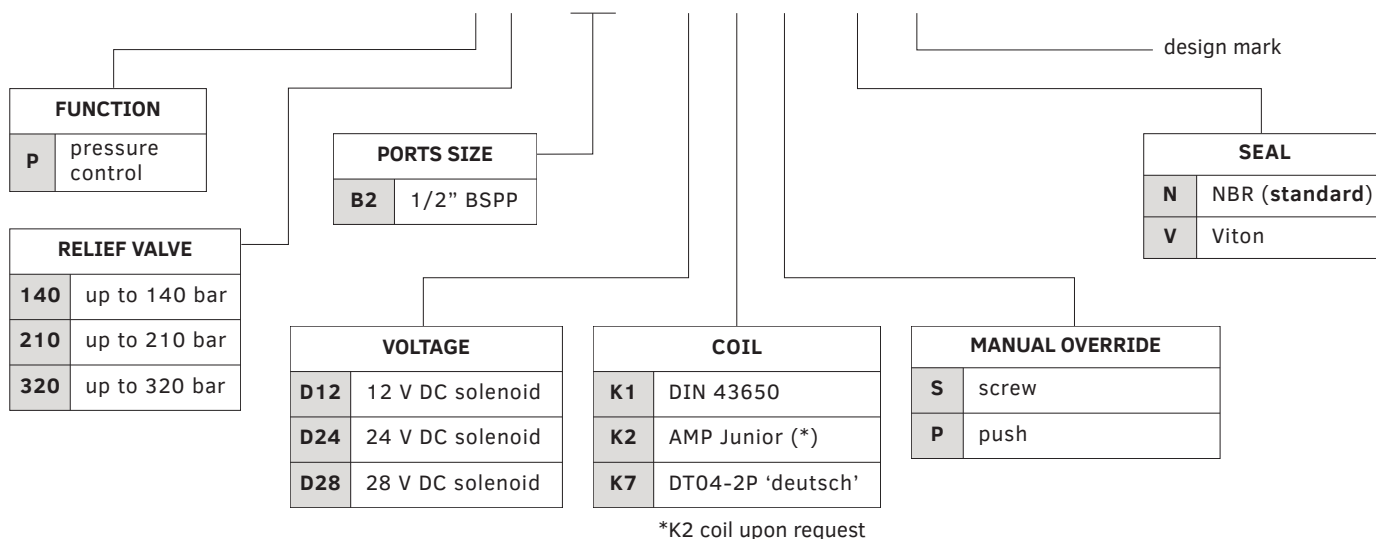


INLET SECTIONS: PRESSURE CONTROL



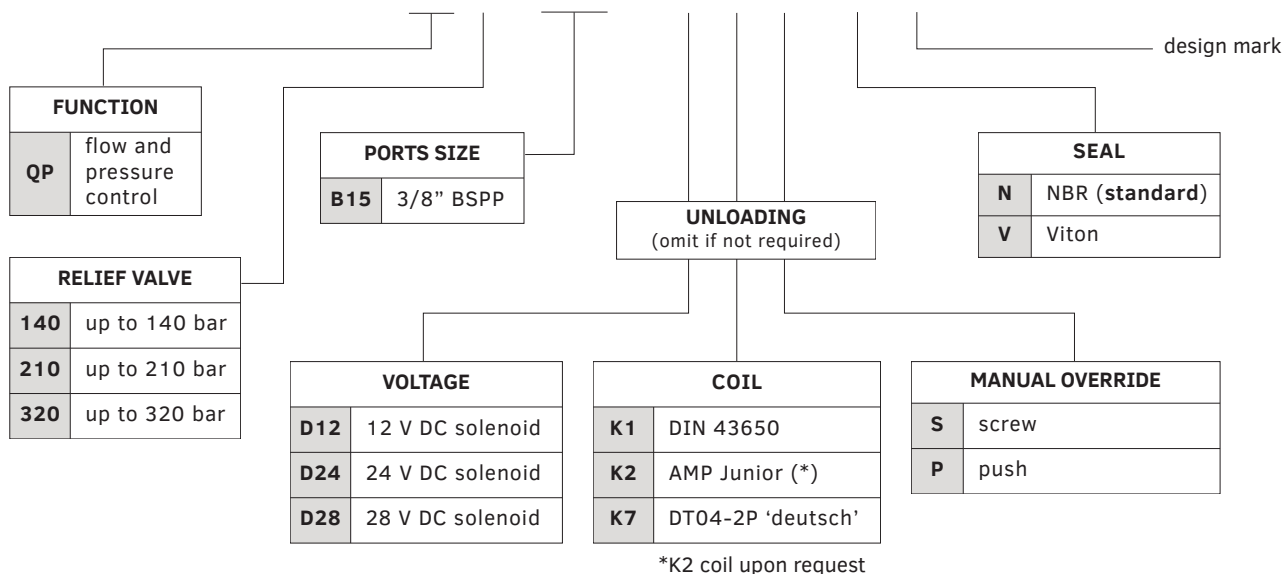
INLET SECTION: PRESSURE CONTROL WITH UNLOADING VALVE

**SDX - P - B2S - - - -1**



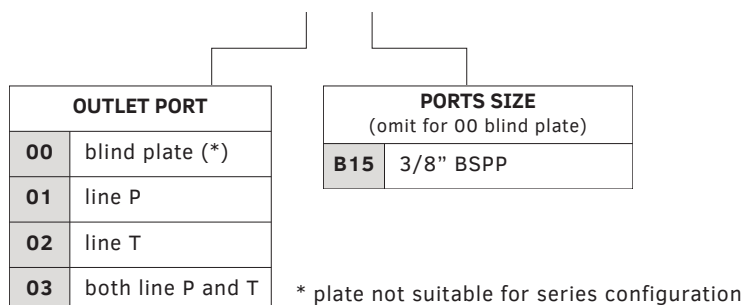
INLET SECTION: FLOW AND PRESSURE CONTROL WITH OR WITHOUT UNLOADING VALVE

**SDX - QP - B15S - - - -1**



OUTLET SECTIONS

**SDX - - S -1** ————— design mark



ASSEMBLED VALVE

**SD** ■ - ■ ■ ■ - ■ ■ ■ - ■ ■ - **H** ■

Project code (5 digits)  
assigned by Hydreco

MAX FLOWRATE	
<b>L</b>	40 l/min
<b>M</b>	50 l/min
<b>S</b>	60 l/min

SEAL	
<b>N</b>	NBR
<b>V</b>	Viton

CIRCUIT TYPE	
<b>P</b>	parallel
<b>S</b>	series, by plugs

SLICES
No. of directional valves

VOLTAGE	
<b>D12</b>	12 V DC solenoid
<b>D24</b>	24 V DC solenoid
<b>D28</b>	28 V DC solenoid
<b>D48</b>	48 V DC solenoid
<b>D00</b>	without coil

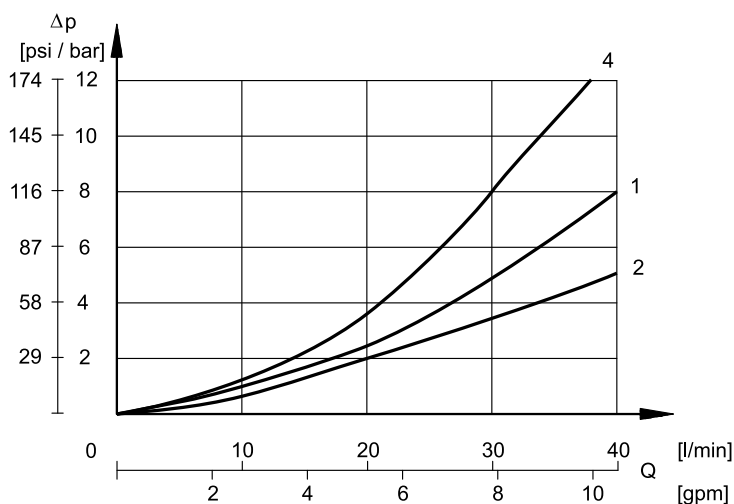
COIL	
see availability table below	
<b>K1</b>	DIN 43650
<b>K7</b>	DT04-2P 'deutsch'
<b>WK1</b>	DIN 43650 zinc-nickel plated
<b>WK7</b>	DT04-2P 'deutsch' zinc-nickel plated
<b>WK7D</b>	DT04-2P 'deutsch' zinc-nickel plated with diode
<b>K2</b>	AMP Junior (upon request)

PORTS SIZE	
<b>B15</b>	3/8" BSPP
<b>S15</b>	9/16 - 18 UNF
<b>B2</b>	1/2" BSPP (SDS only)
<b>S2</b>	3/4"-16 UNF (SDS only)

**CODE EXAMPLE:**

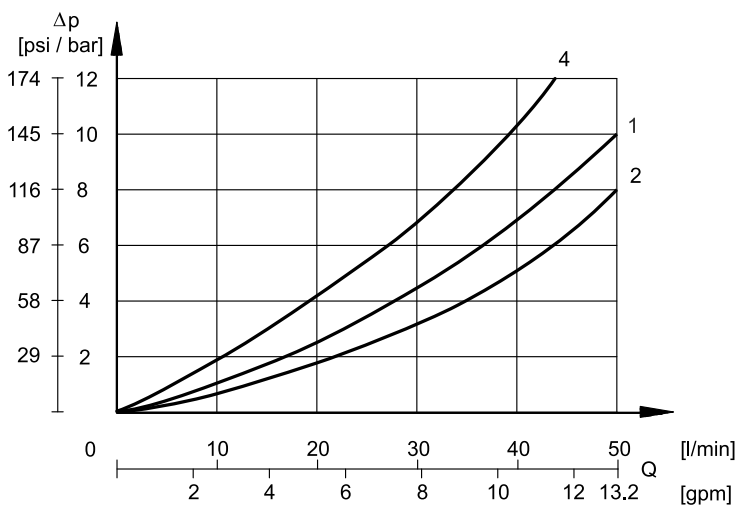
SDL - P4B15 - D12K7 - N - H20520

**SDL PRESSURE DROPS  $\Delta p$ -Q**



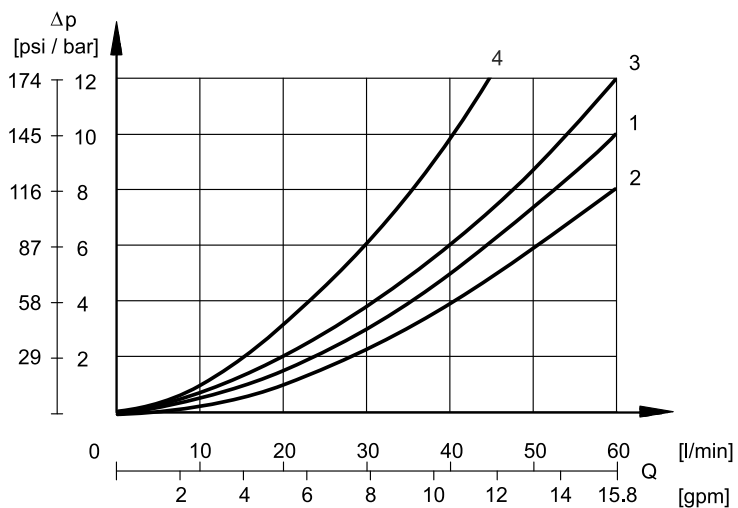
TYPE	CURVE				
	P→A	P→B	A→T	B→T	P→T
D1, A1, B1	1	1	1	1	-
D2, A2, B2	2	2	2	2	2
D3, A3, B3	1	1	2	2	-
D4, A4, B4	4	4	4	4	1
TA1, TB1	1	1	1	1	-
TA2, TB2	1	1	1	1	-

**SDM PRESSURE DROPS  $\Delta p$ -Q**



TYPE	CURVE				
	P→A	P→B	A→T	B→T	P→T
D1, A1, B1	1	1	1	1	-
D2, A2, B2	2	2	2	2	2
D3, A3, B3	1	1	2	2	-
D4, A4, B4	4	4	4	4	1
TA1, TB1	2	2	2	2	-
TA2, TB2	1	1	1	1	-

**SDS PRESSURE DROPS  $\Delta p$ -Q**



SPOOL TYPE	CURVE				
	P→A	P→B	A→T	B→T	P→T
D1, A1, B1	1	1	3	3	-
D2, A2, B2	2	2	1	1	2
D3, A3, B3	3	3	2	2	-
D4, A4, B4	4	4	4	4	1
TA1, TB1	3	3	3	3	-
TA2, TB2					

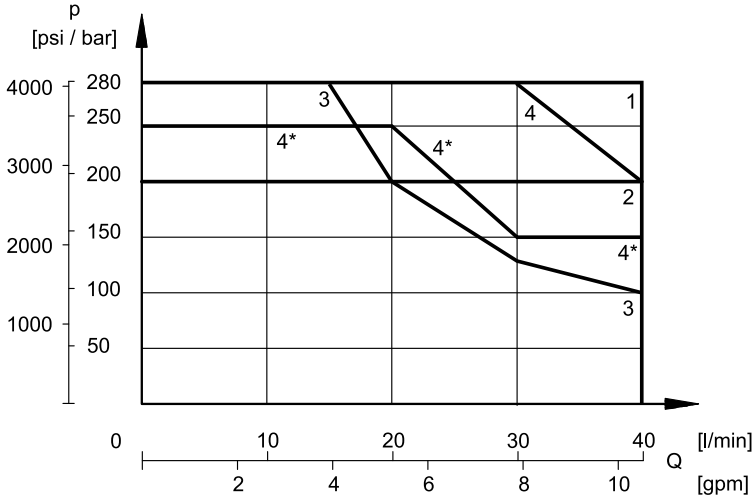
The curves define the flow rate operating fields according to the valve pressure. The values have been obtained according to ISO 6403 standards, with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

Values obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

**NOTE:** The reverse flow condition occurs in series circuits made with elements for parallel connection and plugs, in even-position elements only.

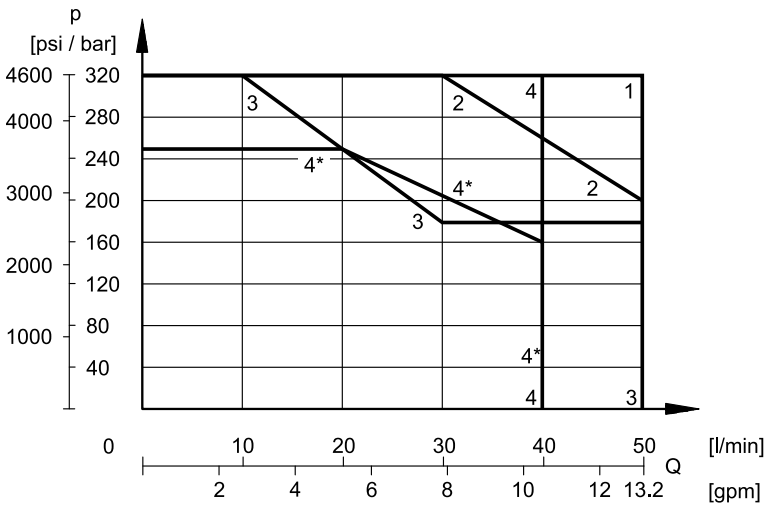
Look at the hydraulic diagram at page 22.

**SDL PERFORMANCE CURVES**



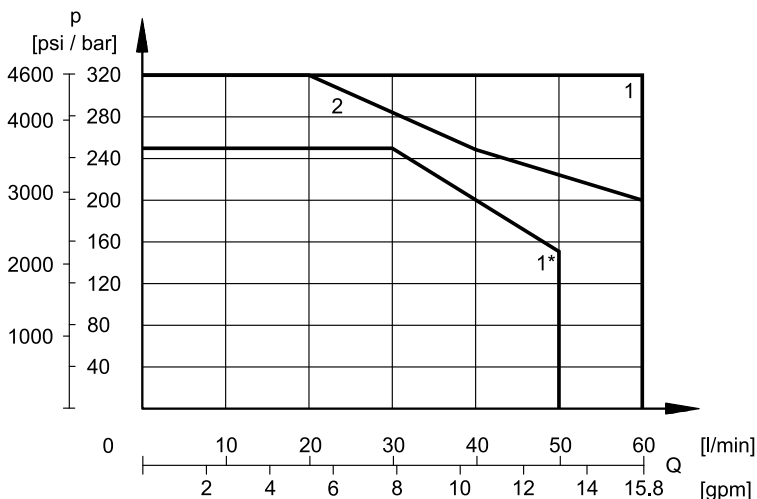
D1, A1, B1	1
D2, A2, B2	2
D3, A3, B3	3
D4, A4, B4	4
D4, A4, B4 reverse flow	4*
TA1, TB1	4
TA2, TB2	1

**SDM PERFORMANCE CURVES**



D1, A1, B1	1
D2, A2, B2	2
D3, A3, B3	3
D4, A4, B4	4
D4, A4, B4 reverse flow	4*
TA1, TB1	2
TA2, TB2	1

**SDS PERFORMANCE CURVES**



D1, A1, B1	1
D2, A2, B2	1
D3, A3, B3	2
D4, A4, B4	1
D4, A4, B4 reverse flow	1*
TA1, TB1	1
TA2, TB2	1



The solenoid consists of tube and coil. The coil is mounted on the tube and fastened to it by a ring retainer.

The WK7D coil includes a suppressor diode of pulses for protection from voltage peaks. During the switching the diode significantly reduces the energy released by the winding, by limiting the voltage to 31.4V in the D12 coil and to 58.9 V in the D24 coil.

Contact us to order coils as spare parts.

<b>DUTY CYCLE</b>		100%
<b>ELECTROMAGNETIC COMPATIBILITY (EMC)</b>		according to European directive 2014/30/EU
<b>PROTECTION CLASS FOR INSULATION</b>	copper wire	class H (180 °C)
	coil	class F (155 °C)

	Absorbed power [W]	Resistance at 20 °C [Ω]	Current at 20 °C. [A]
<b>SDL WORKING SECTION</b>			
<b>D12</b>	26.5	5.4	2.2
<b>D24</b>	27.8	20.7	1.16
<b>D28</b>	28.5	27.5	1.02
<b>D48</b>	28	82	0.58

<b>SDM WORKING SECTION</b>			
<b>D12</b>	28.9	4.98	2.41
<b>D24</b>	28	21	1.15

<b>SDS WORKING SECTION</b>			
<b>D12</b>	32.7	4.4	2.72
<b>D24</b>	31	18.6	1.29
<b>D28</b>	31	26	1.11
<b>D48</b>	29.5	78.6	0.61

<b>UNLOADING VALVE FOR INLET SDX-P (see page 19)</b>			
<b>D12</b>	20	7.2	1.67
<b>D24</b>	20	28.8	0.83

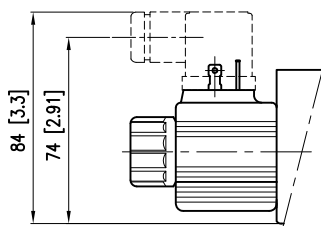
<b>UNLOADING VALVE FOR INLET SDX-QP (see page 20)</b>			
<b>D12</b>	20.5	7	1.2
<b>D24</b>	20.5	28	0.6

### ELECTRICAL CONNECTIONS AND IP DEGREES

Declared IP degrees are intended according to EMC 2014/30/EU, only for both valve and connectors of an equivalent IP degree, installed properly. Mating connectors are not included in solenoid valves delivery. Connectors for K1 coils can be ordered separately.

WK1, WK7 and WK7D coils reach a better IP degree than standard metal coils thanks to the zinc-nickel plating and to some constructive measures.

#### SDL - K1



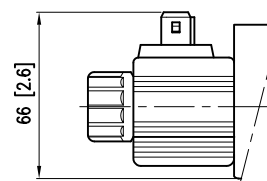
#### DIN 43650 (EN 175301-803)

Mating connectors type ISO 4400 / DIN 43650 (EN 175301-803).

IP degree of electrical connection: IP66

IP degree of whole valve: IP 66

#### SDL - K2



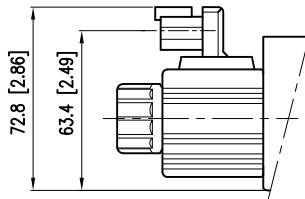
#### AMP Junior

Upon request only.

IP degree of electrical connection: IP65/IP67

IP degree of whole valve: IP65/IP67

**SDL - K7**



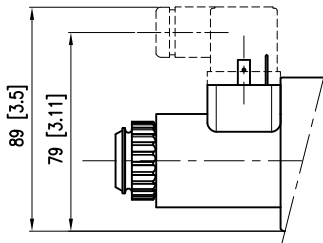
**DEUTSCH DT04 MALE**

IP degree of electrical connection: IP65/IP68/IP69

IP degree of whole valve: IP65/IP68/IP69

IP degree according to ISO 20653: IP69K

**SDM - K1**



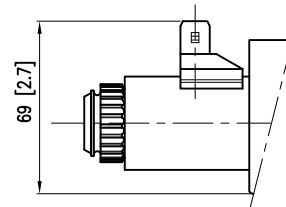
**DIN 43650 (EN 175301-803)**

Mating connectors type ISO 4400 / DIN 43650 (EN 175301-803).

IP degree of electrical connection: IP65

IP degree of whole valve: IP 65

**SDM - K2**



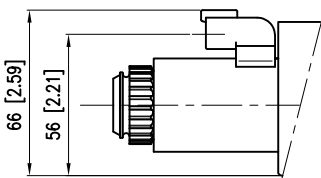
**AMP Junior**

Upon request only.

IP degree of electrical connection: IP65

IP degree of whole valve: IP65

**SDM - K7**

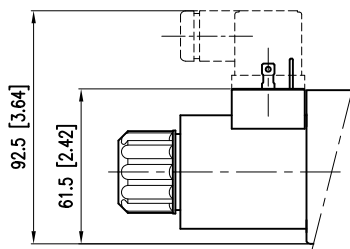


**DEUTSCH DT04 MALE**

IP degree of electrical connection: IP65

IP degree of whole valve: IP65

K1



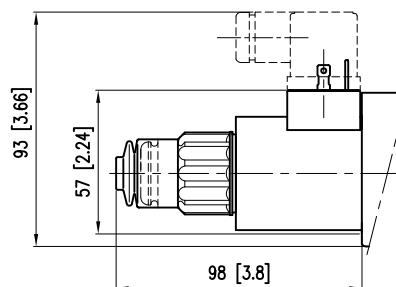
**DIN 43650 (EN 175301-803)**

Mating connectors type ISO 4400 / DIN 43650 (EN 175301-803).

IP degree of electrical connection: IP65

IP degree of whole valve: IP 65

WK1



**DIN 43650 (EN 175301-803)**

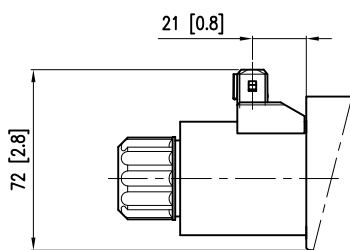
Zinc-nickel plated coil.

IP degree of electrical connection: IP66

IP degree of whole valve: IP66

The pin for manual override is boot-protected (code B).

K2



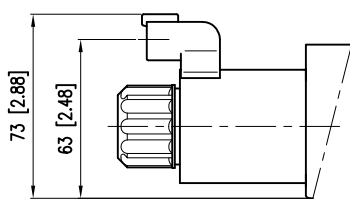
**AMP Junior**

Upon request only.

IP degree of electrical connection: IP65/IP67

IP degree of whole valve: IP 65

K7

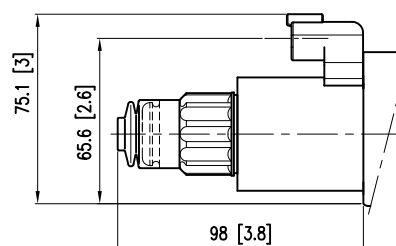


**DEUTSCH DT04 MALE**

IP degree of electrical connection: IP65/IP67

IP degree of whole valve: IP 65

WK7 / WK7D



**DEUTSCH DT04 MALE**

Zinc-nickel plated coil.

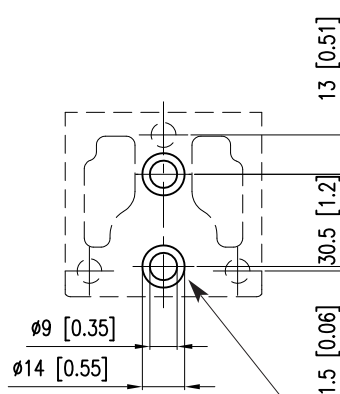
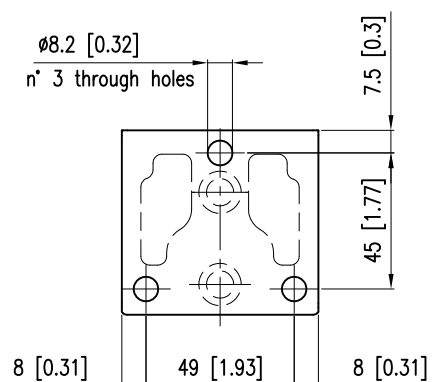
IP degree of electrical connection: IP66/IP68/IP69 -

IP degree of whole valve: IP66/IP68/IP69

IP degree according to ISO 20653: IP69K

The pin for manual override is boot-protected (code B).

**SECTIONAL MOUNTING INTERFACE**



dimensions in mm [in]

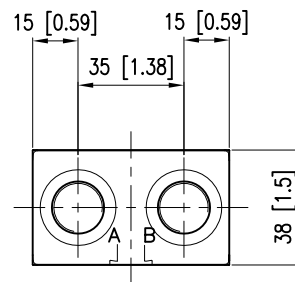
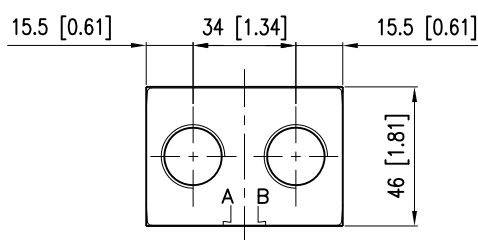
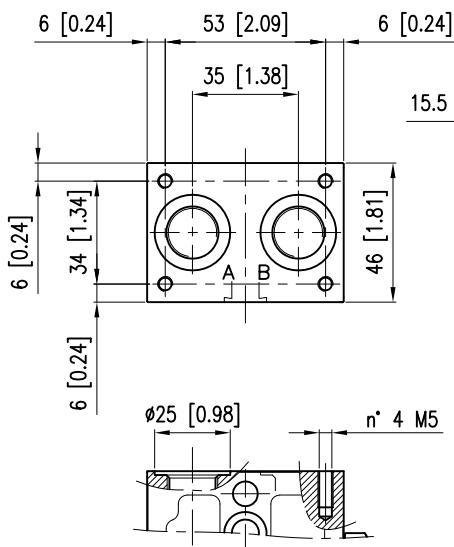
Seals:  
no. 2 O-Ring  
type 2043 (10.82x1.78)

**MOUNTING INTERFACE - WORKING PORTS**

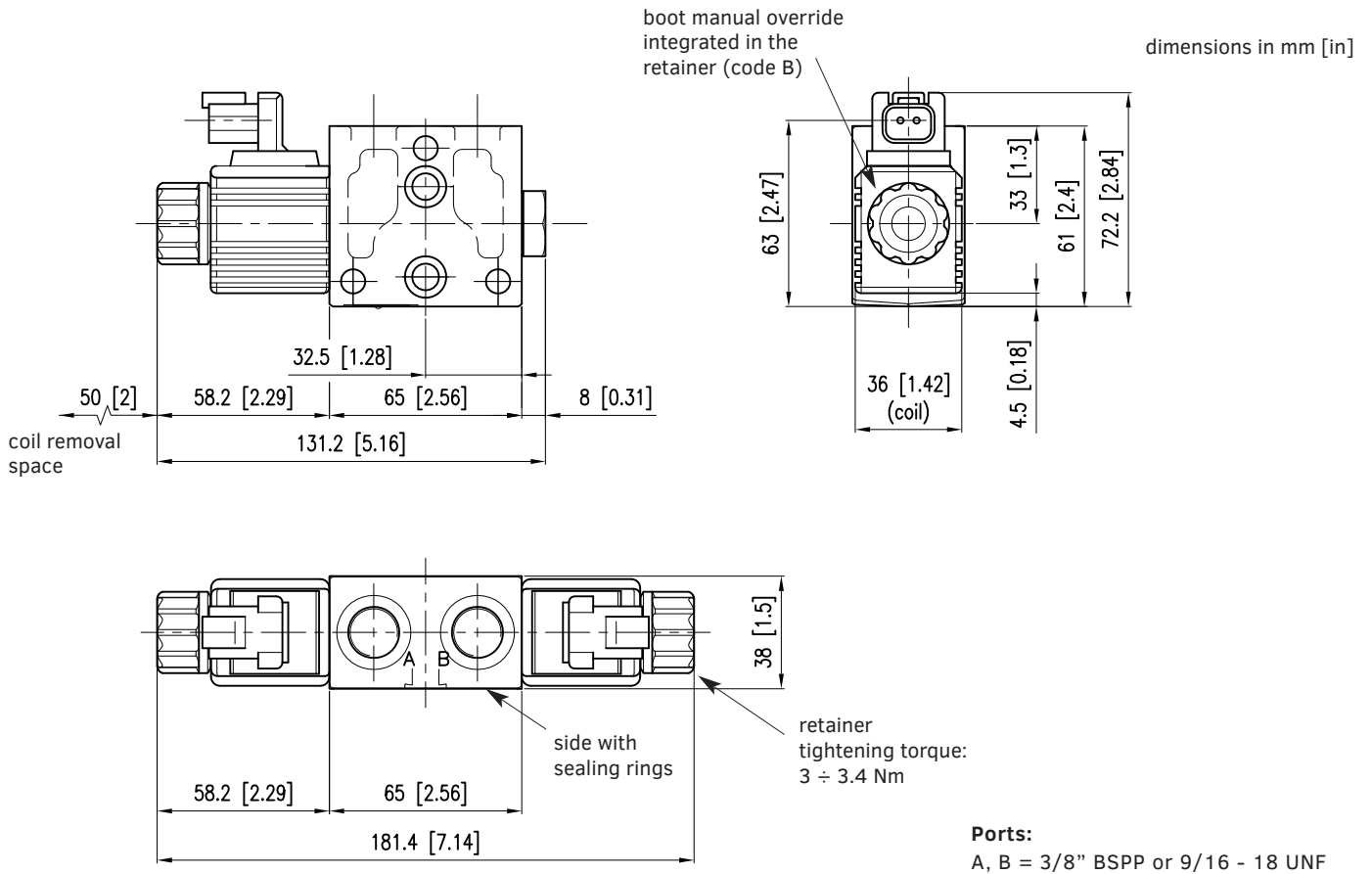
**SDS**  
with mounting surface  
for flangeable component  
available ports:  
B15 or S15

**SDS**  
available ports:  
B2 or S2

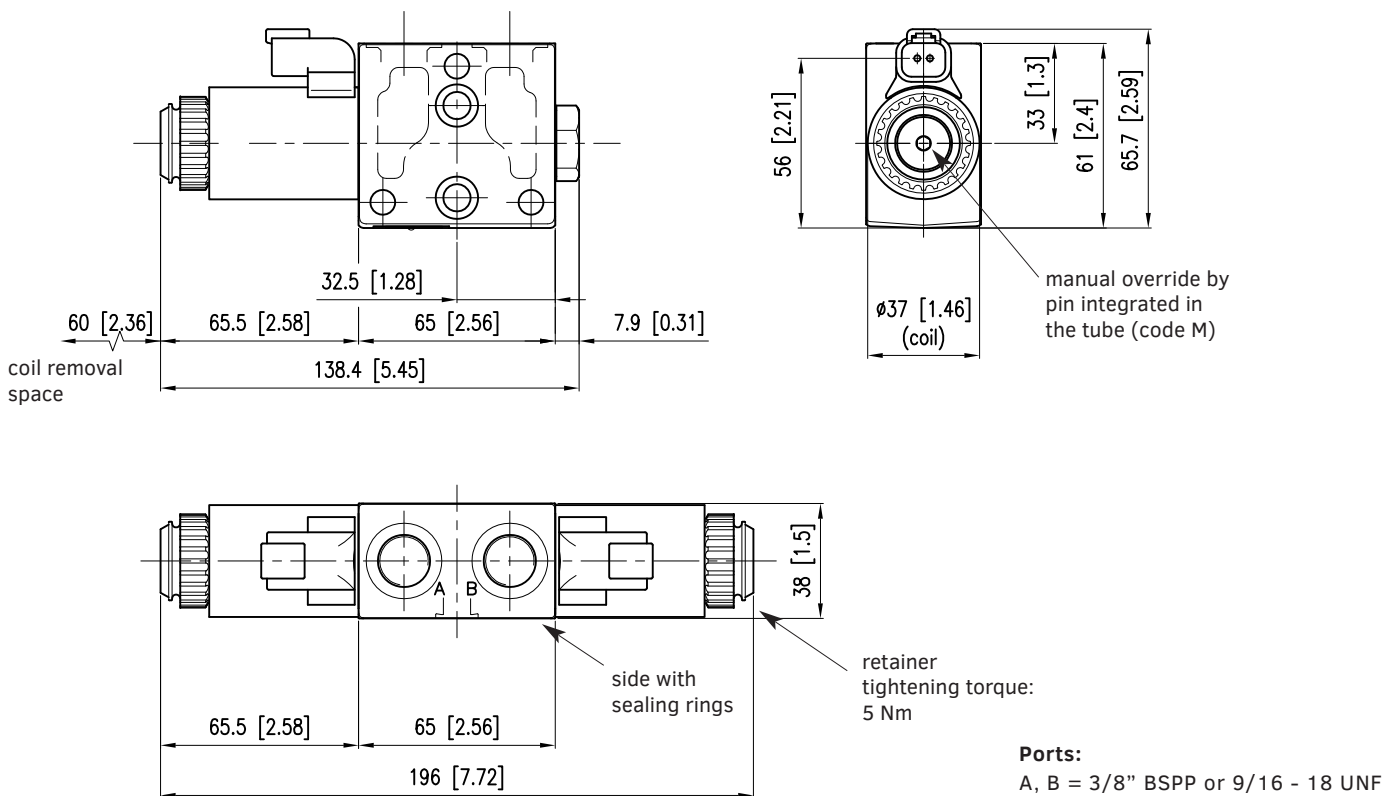
**SDL and SDM**  
available ports:  
B15 or S15



**SDL (K7 COIL)**

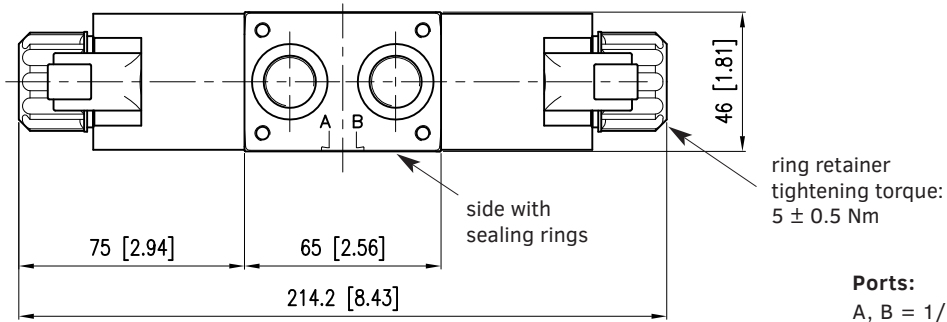
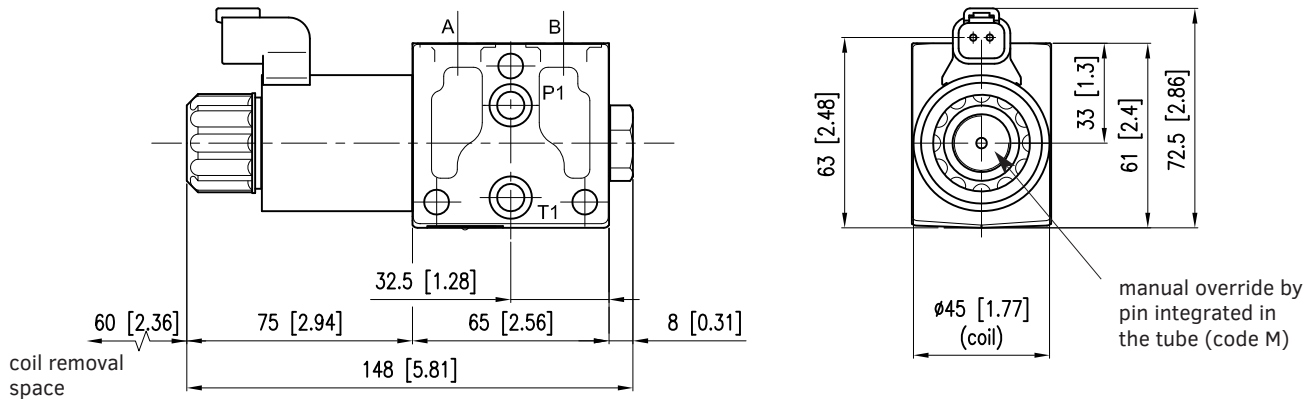


**SDM (K7 COIL)**

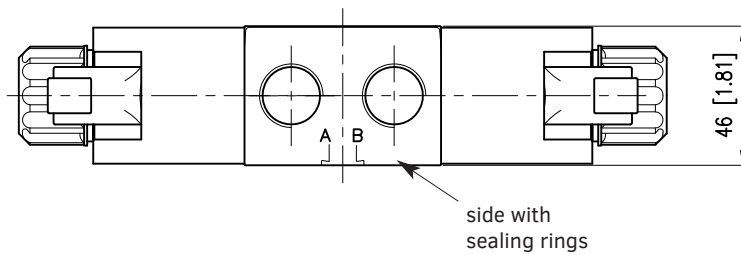


SDS (K7 COIL)

dimensions in mm [in]



**Ports:**  
A, B = 1/2" BSPP or 3/4 - 16 UNF



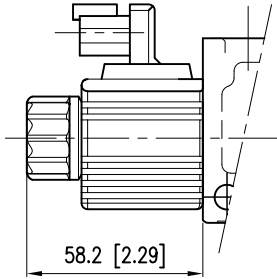
**Ports:**  
A, B = 3/8" BSPP or 9/16 - 18 UNF

**OVERRIDE PINS INTEGRATED THE TUBE, BOOT PROTECTED: Code B**

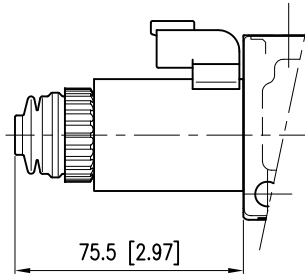
The SDL standard element is already equipped with boot protection of the solenoid tube.

dimensions in mm [in]

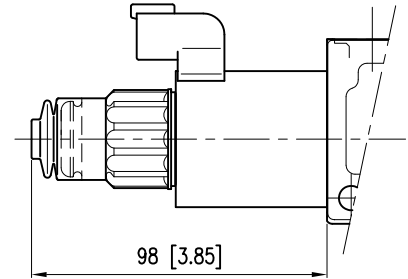
**SDL**



**SDM**

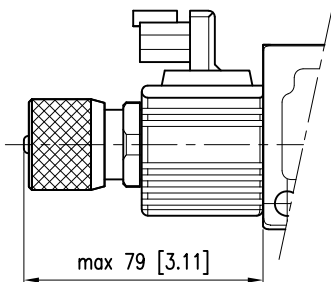


**SDS**

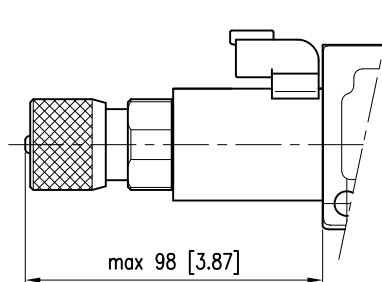


**KNOB, TURNING: Code K**

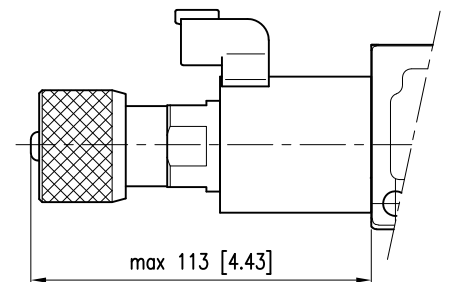
**SDL**



**SDM**



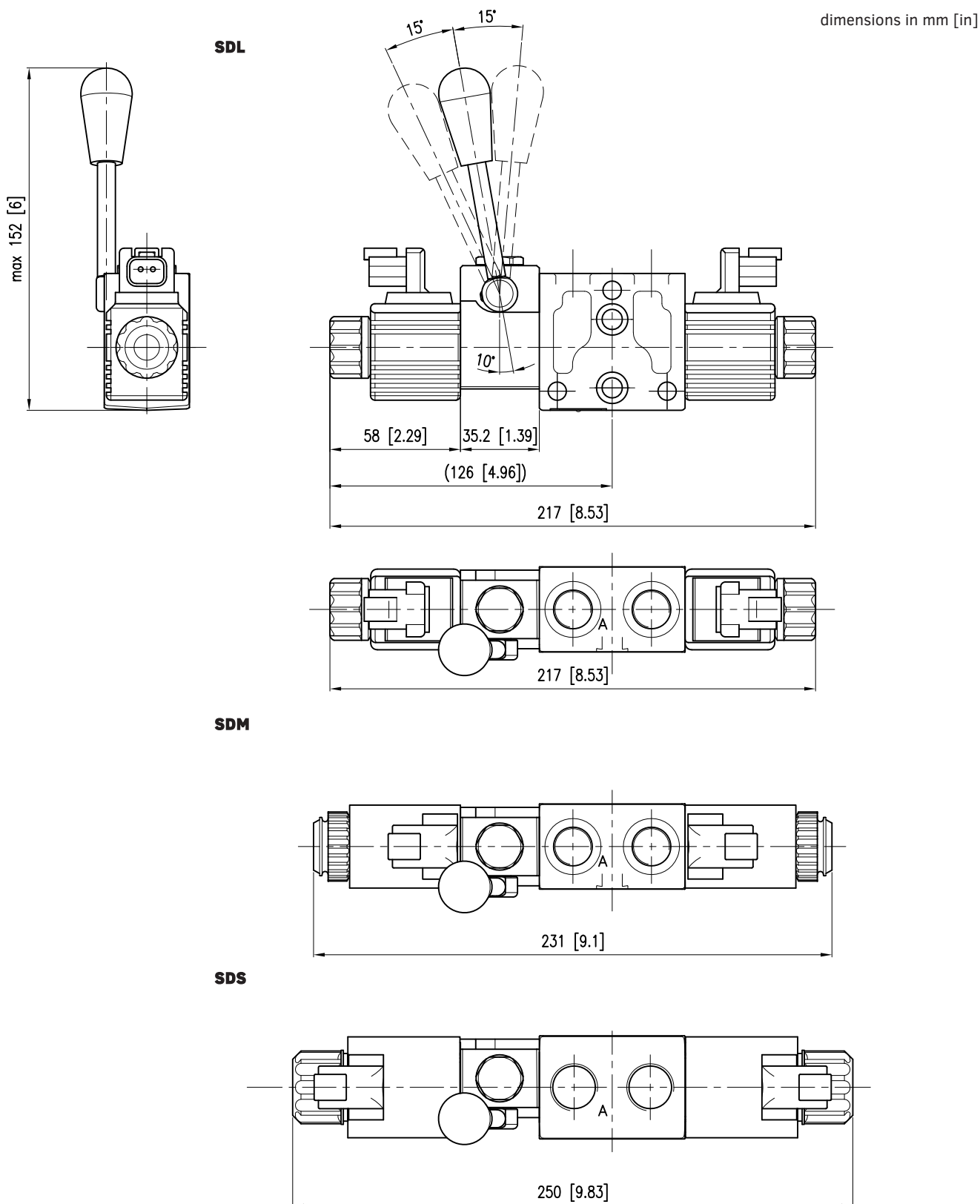
**SDS**



**HAND LEVER: Code L**

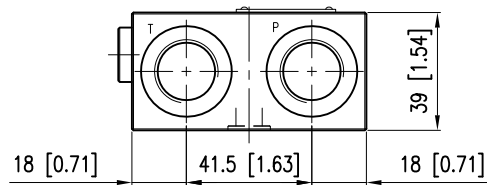
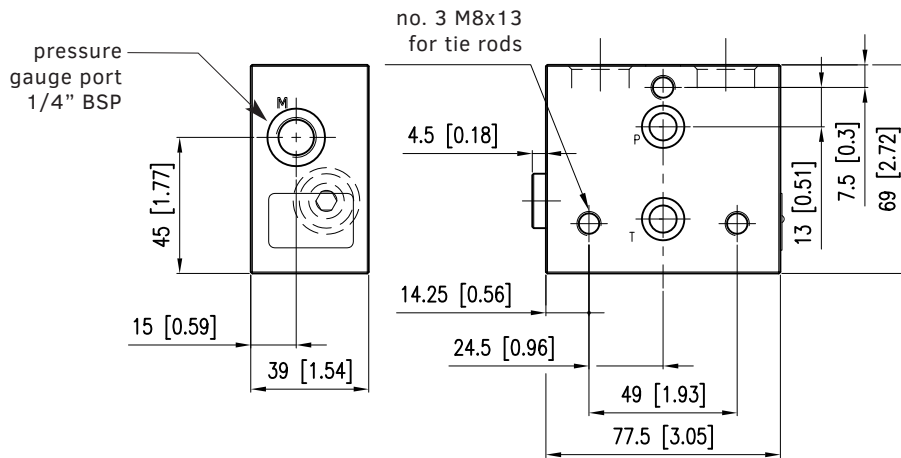
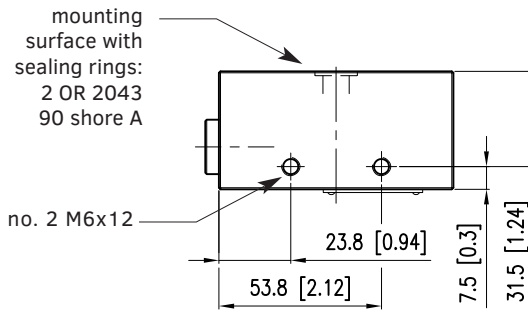
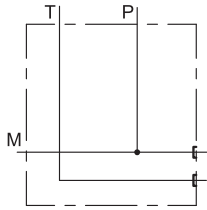
Devices are placed on side A. Please contact our technical depth for other positions. Please refer to the overall drawings in the previous pages for non-quoted dimensions.

The CHL lever device can work with a maximum pressure in line T up to 50 bar, therefore it is not suitable for series circuits.





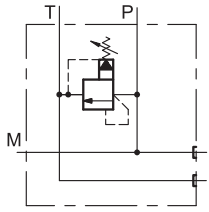
**BASIC INLET SDX-B2S-\*-1**



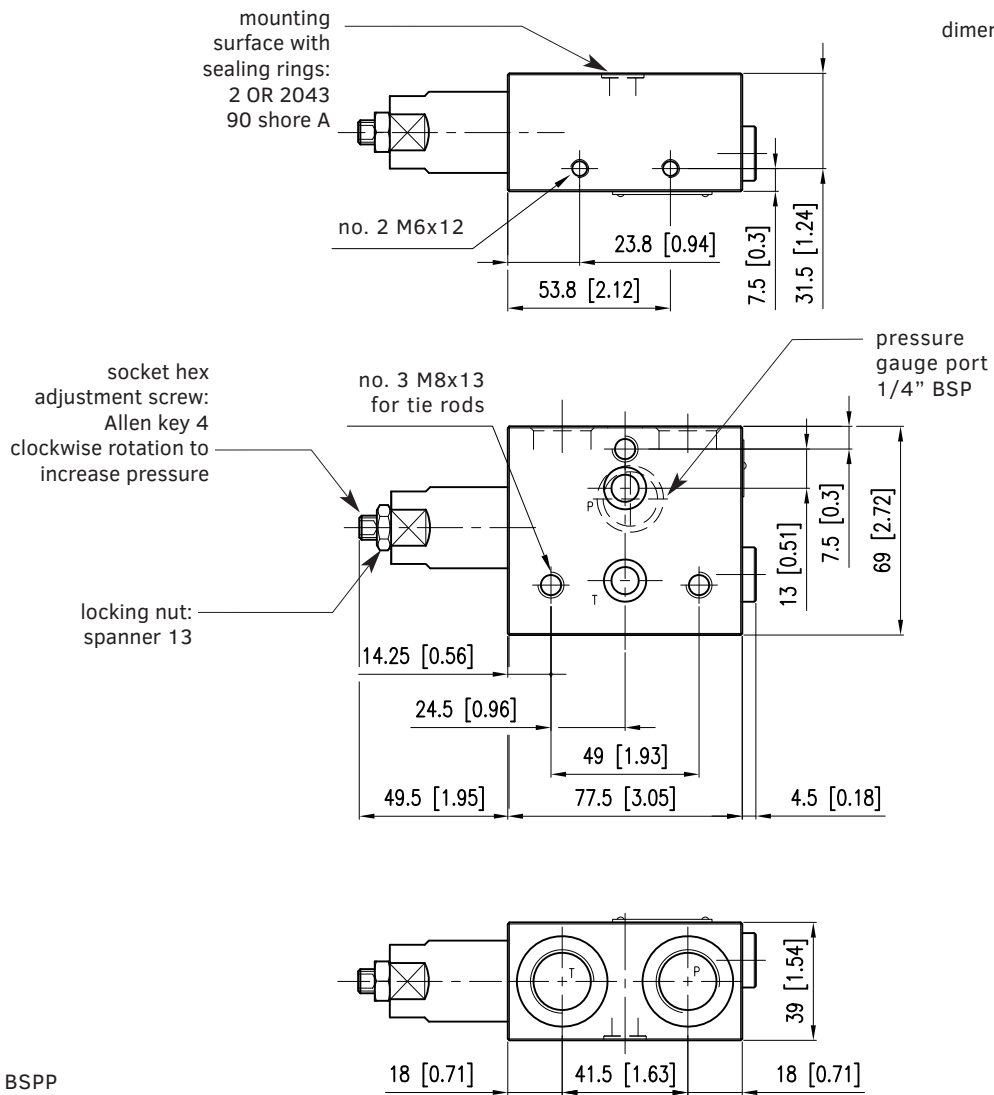
**Ports:** P, T = 1/2" BSPP

**NOTE:** please refer to page 12 for missing dimensions of the mounting interface

INLET WITH PRESSURE CONTROL VALVE SDX-P\*\*\*-B2S-\*-1



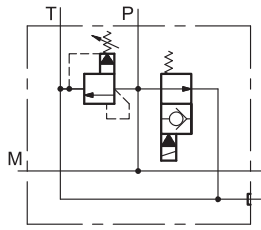
dimensions in mm [in]



Ports: P, T = 1/2" BSPP

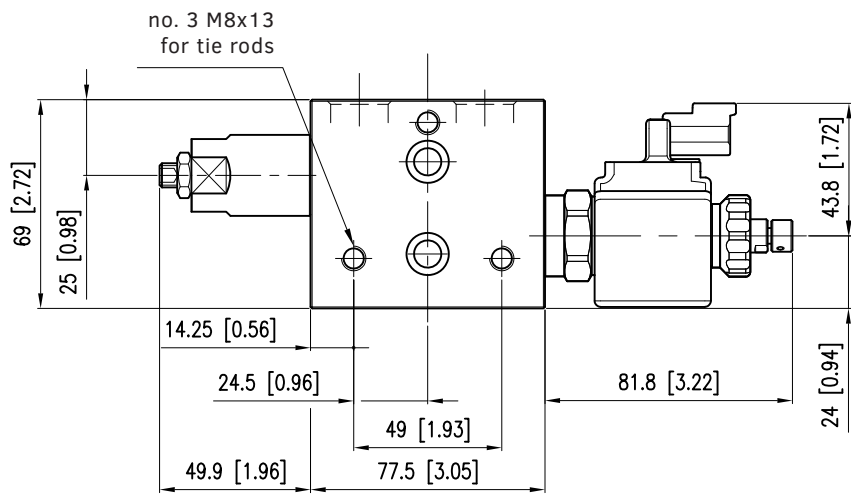
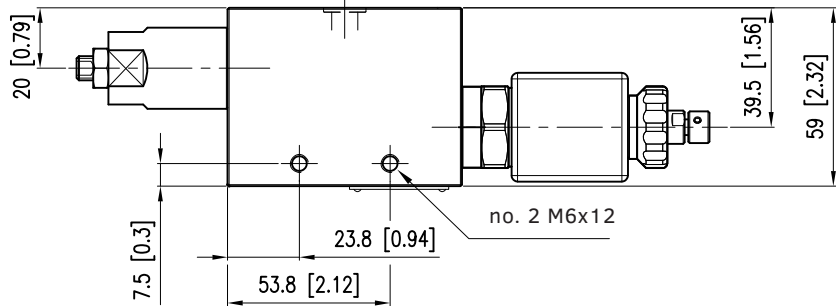
**NOTE:** please refer to page 12 for missing dimensions of the mounting interface

INLET WITH PRESSURE CONTROL VALVE AND UNLOADING SDX-P\*\*\*-B2S-D\*\*K7P-\*-1



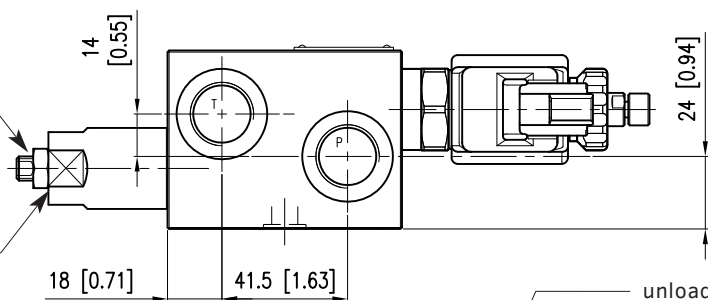
mounting surface with sealing rings: 2 OR 2043 90 shore A

dimensions in mm [in]

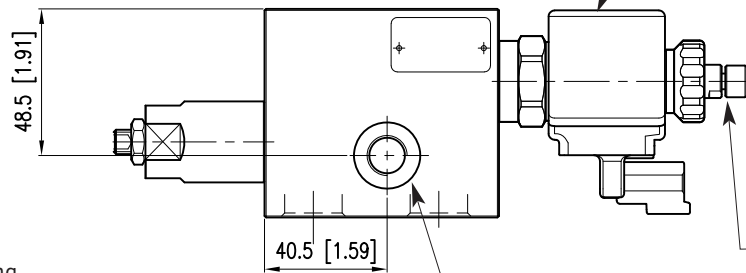


socket hex adjustment screw: Allen key 4 clockwise rotation to increase pressure

locking nut: spanner 13



unloading valve here shown with K7 connection



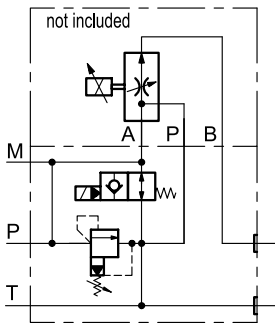
push manual override: look at the model number for further choices.

pressure gauge port 1/4" BSP

Ports: P, T = 1/2" BSPP

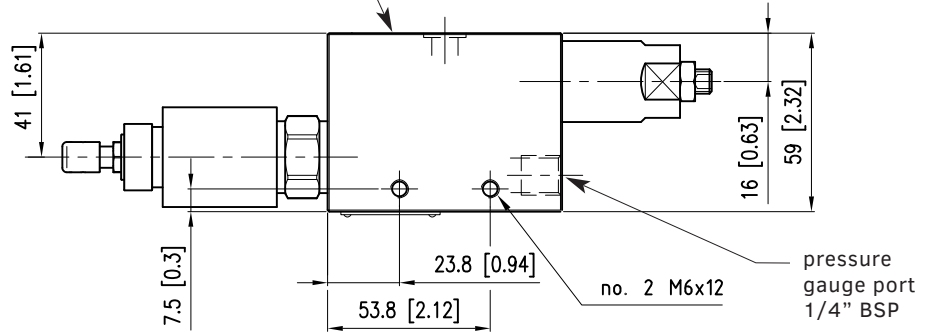
NOTE: please refer to page 12 for missing dimensions of the mounting interface

**INLET WITH PRESSURE CONTROL VALVE AND UNLOADING SDX-QP\*\*\*-B15S-D\*\*K7P-\*-1**

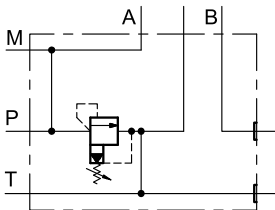


mounting surface with sealing rings: 2 OR 2043 90 shore A

dimensions in mm [in]



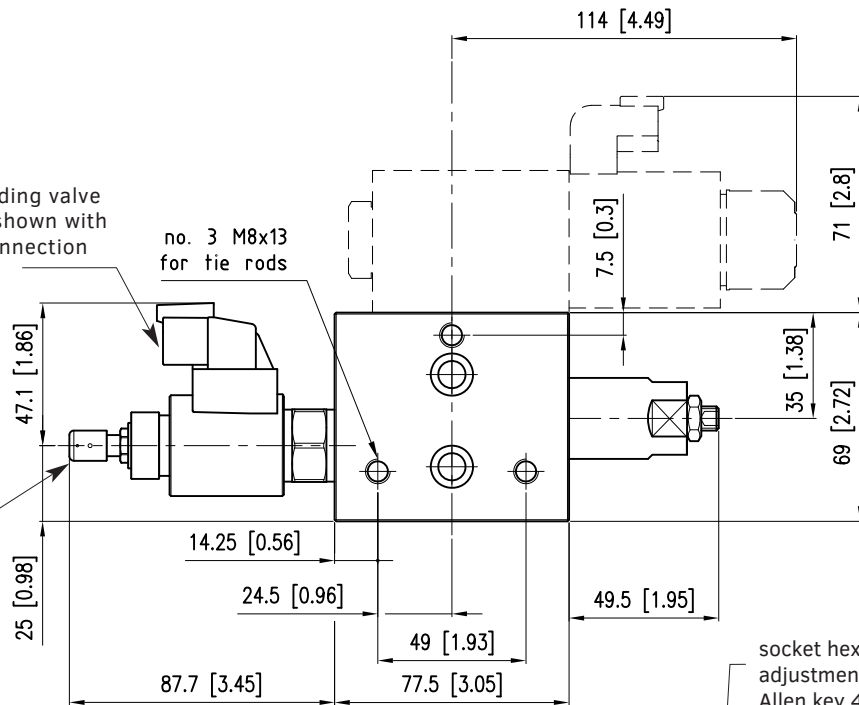
**NOTE** :The same component without the unloading valve is: SDX-PQ\*\*\*-B15S-\*-1



unloading valve here shown with K7 connection

no. 3 M8x13 for tie rods

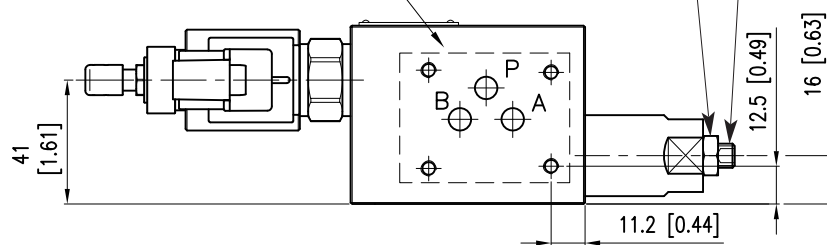
push manual override: look at the model number for further choices.



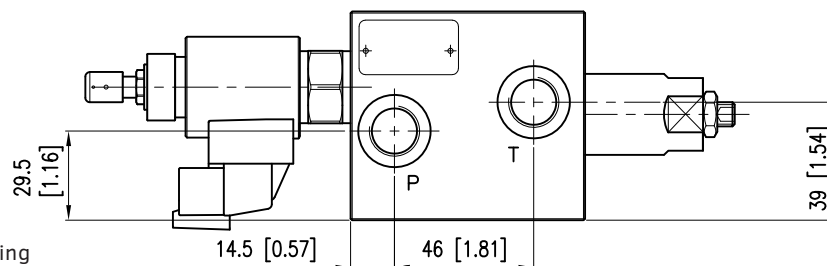
mounting pattern ISO 6263-03 (CETOP 03) without T port

locking nut: spanner 13

socket hex adjustment screw: Allen key 4 clockwise rotation to increase pressure

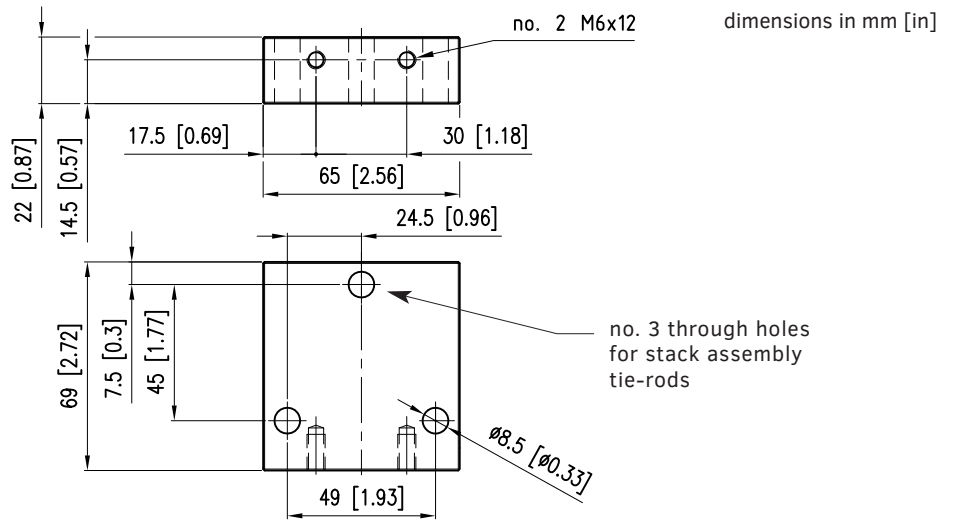


**Ports:** P, T = 3/8" BSPP

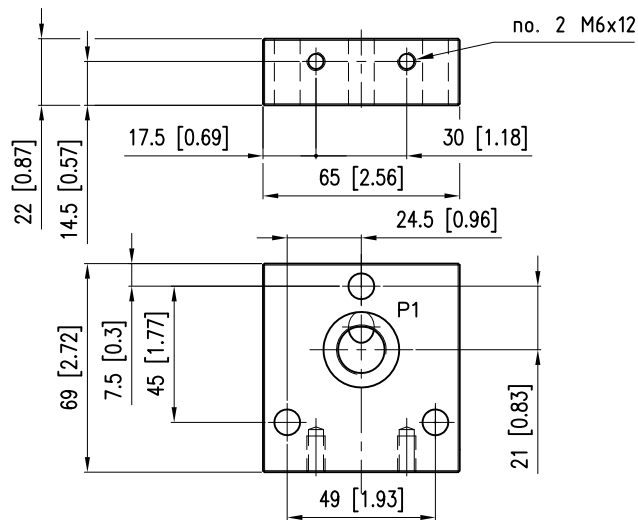
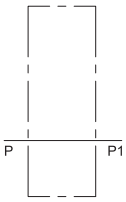


**NOTE:** please refer to page 12 for missing dimensions of the mounting interface

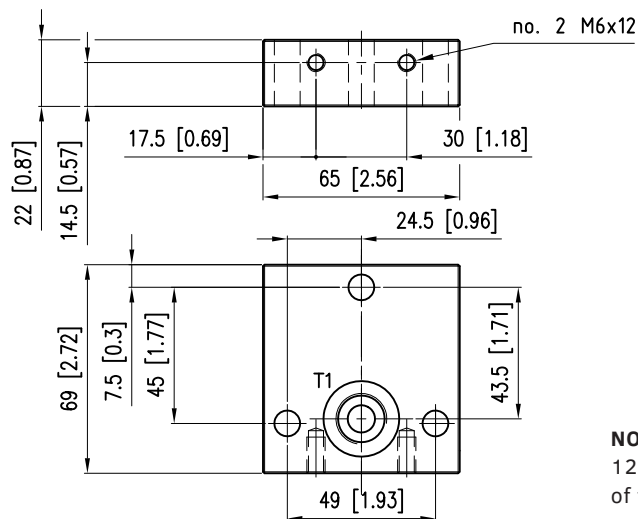
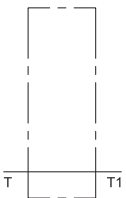
**OUTLET SECTION 00: BLIND**



**OUTLET SECTION 01: P PORT**

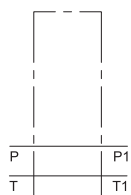


**OUTLET SECTION 02: T PORT**

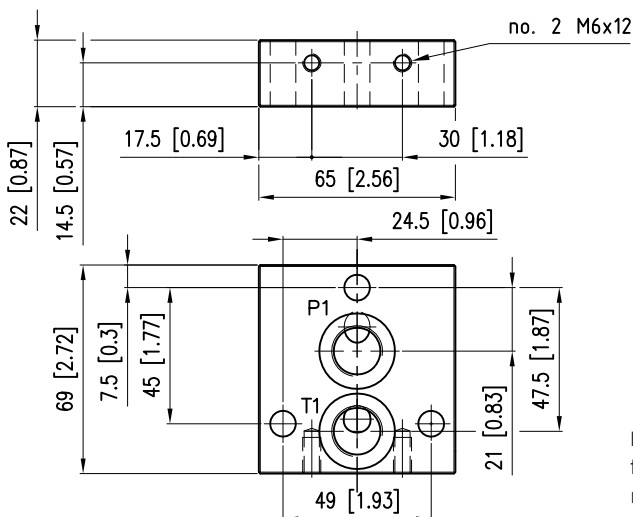


**NOTE:** please refer to page 12 for missing dimensions of the mounting interface

**OUTLET SECTION 03: BOTH P AND T PORTS**



Ports: P1, T1 = 3/8" BSPP



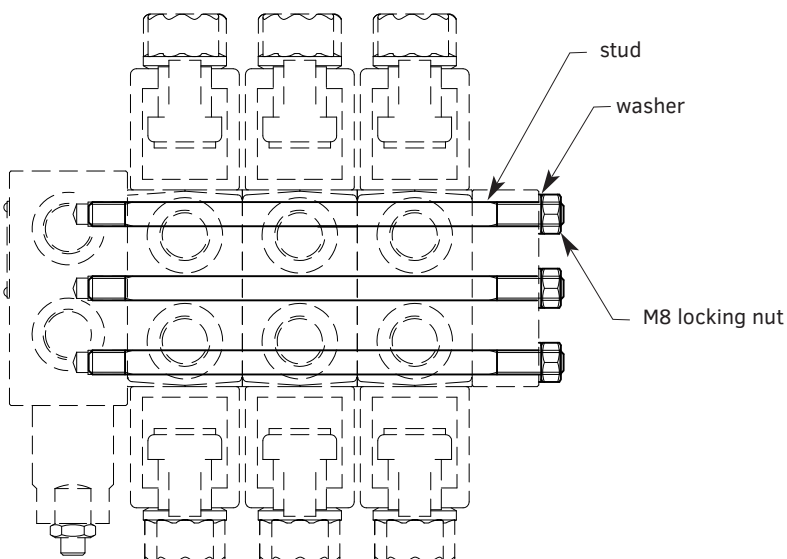
**NOTE:** please refer to page 12 for missing dimensions of the mounting interface

**INSTALLATION**

The stacked valve assembly can be installed in any position without impair the proper functioning.

Ensure that there is no air in the hydraulic circuit.

Assembly kits are available and can be ordered by codes in the tables below. Please contact the technical dept. for dimensional check of special assemblies before order.



**ASSEMBLY KIT**

The assembly kit includes:

- no. 3 studs,
- no. 3 self locking nuts
- no. 3 washers

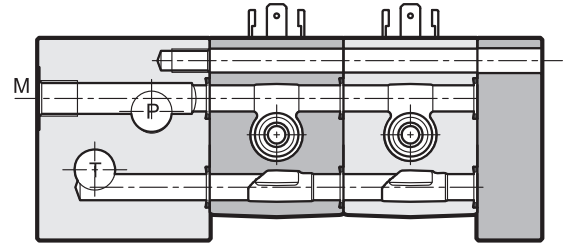
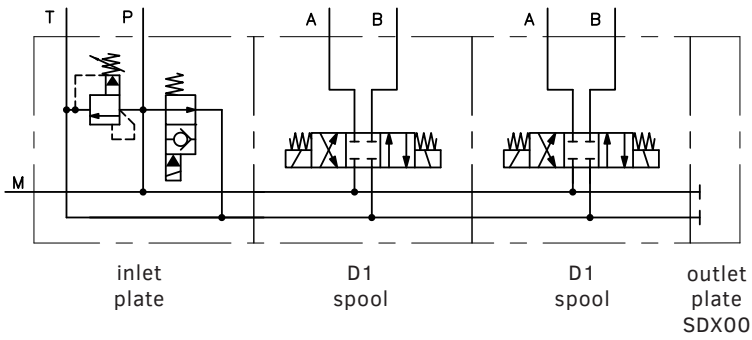
All parts are zinc-coated.

Please use these codes to order the kit:

Valve type	Sectional valves	Code
SDL-B15 SDL-S15	3	3404100100
	4	3404100101
	5	3404100102
SDM-B15 SDM-S15	6	3404100103
	7	3404100104
	8	3404100105
SDS-B15 SDS-S15	9	3404100106
	3	3404100108
	4	3404100109
SDS-B2 SDS-S2	5	3404100110
	6	3404100111

Tightening torque: 20 (0 / +3) Nm

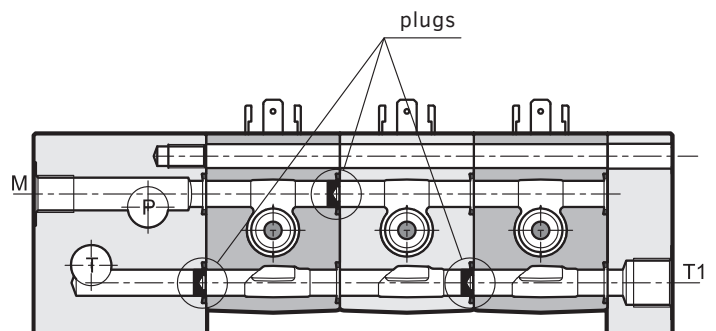
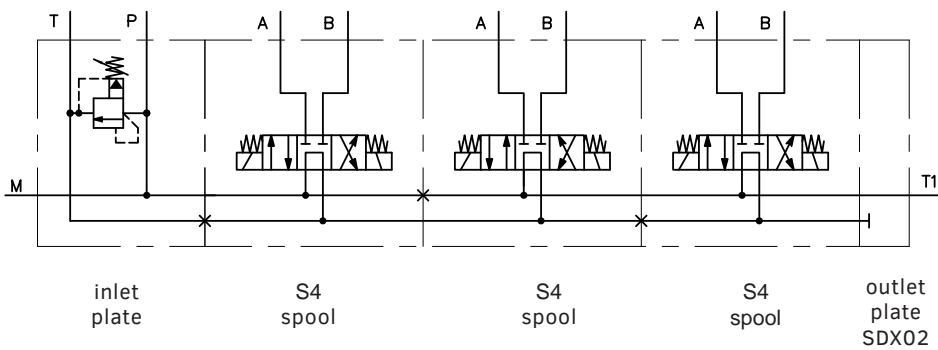
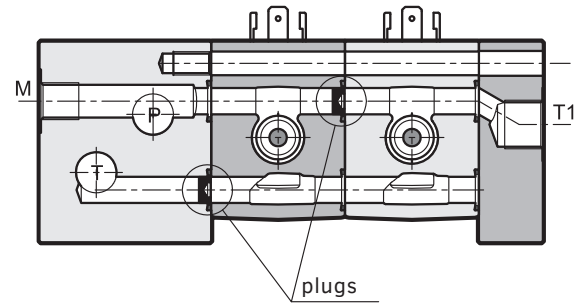
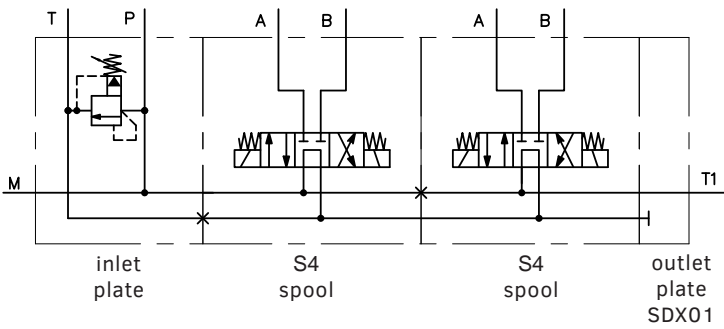
**CIRCUIT EXAMPLE : PARALLEL CIRCUIT**



**CIRCUIT EXAMPLES : SERIES CIRCUITS**

Series circuits are made with sectional valves with D4 spools, by inserting plugs between elements. The oil path is diverted from P to T line alternatively.

Please note that this kind of configuration requires a different outlet plate depending on the number (even or odd) of sectional directional valves in the assembly.



plug Ø9 - ordering code: **0612253**

#### IP DEGREE TIPS

The technical reference standard for IP degree is IEC 60529, which classifies and rates the degree of protection provided by equipments and electrical enclosures against intrusions.

The first digit (6) concerns the protection from solid particles (body parts to dust).

The second digit of the IP rating concerns the liquid ingress protection. It indicates three different types of atmospheric agents from which protection is provided:

Values from 1 to 6 → water jets.

Values 7 and 8 → immersion.

Value 9 → high pressure and high temperature water jets.

This means that IP66 covers all the lower steps, rating IP68 covers IP67 but not IP66 and lower. Instead, IP69 does not cover any of them. Whether a device meets two types of protection requirements it must be indicated by listing both separated by a slash. (E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).





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## CONTACT INFORMATION

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<b>INDIA</b>	Hydreco Hydraulics India Private Ltd, Bangalore	+91 80 67656300	sales-in@hydreco.com