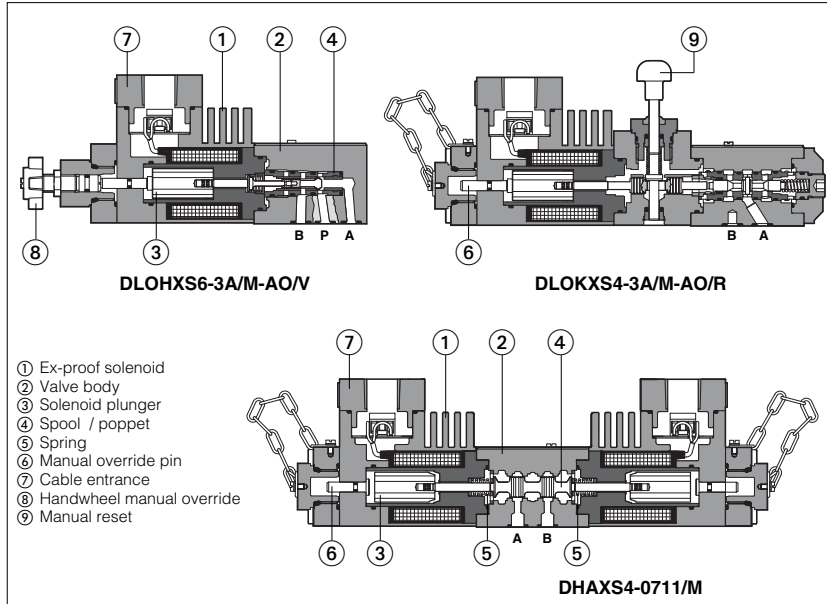


# Stainless steel valves for standard fluids

explosion-proof solenoid valves and pressure relief valves



New line of directional solenoid valves and pressure relief valves with stainless steel external parts for corrosive environments. Stainless steel solenoids ①, ex-proof ATEX, for hazardous areas - see section ③.

**Features:**

- These valves are made by selected inoxidizable materials for external parts to withstand extreme and corrosive environmental conditions. Internal components are in carbon steel.
- Directional valves are available in two basic versions: poppet type, 3-way leak free (suitable for accumulator systems) or spool type, 4-way on-off valves.
- Explosion proof solenoids ① with ATEX 94/9/CE certification, protection mode Ex II 2G, Ex d IIC T6/T4/T3
- Standard manual override pin ⑥ protected by a sealed stainless steel cap.
- Cable connection ⑦ M20x1,5.
- Stainless steel cable glands available
- ISO standard subplate mounting.

**Options:**

- Handwheel manual override ⑧ (option /M)
- Manual reset ⑨ (option /R) for safety applications
- Horizontal cable entrance.

**Common Applications:**

Offshore, Marine.

**1 STAINLESS STEEL VALVES: MAIN DATA**

Code (1)	Description	ISO size	Voltages		ATEX T class (1)		Input Power W	Max flow l/min	Δp (at max flow) bar	Max pressure bar (2)
			DC	AC	Standard	Option /7				
DHAXS6 DHAXS4	4 way, spool type direct solenoid valves	06 (ISO 4401)	12	12/50/60	T6	T4	8	60	see diagram at section ④	350
			24	24/50/60	T4	T3	25	70		
DLOHXS6-AO DLOHXS4-AO	3 way, poppet type, direct solenoid valves	06 (ISO 4401)	48	110/50	T6	T4	8	10		350
			110	120/60	T4	T3	25	12		
DLOKXS6-AO DLOKXS4-AO	3 way, poppet type, direct solenoid valves	06 (ISO 4401)	198	220/50	T6	T4	8	25		250
			220	220/60	T4	T3	25	30		
DLOPXS6-AO	3 way, poppet type, piloted solenoid valve	no	220	220/60	T6	T4	8	220	315	
DLPXS	3 way, poppet type, hydraulic operated valve	no	-	-	-	-	-	220	315	
SP-CART-MXS-3 SP-CART-MXS-6 SP-CART-AREXS-20	relief valve direct screw-in	no no no	-	-	-	-	-	2,5 40 (60 PED) 120 (150 PED)	30	350 350 400
HMPXS-*	relief valve direct modular	06 (ISO 4401)	-	-	-	-	-	40	35	350
LIMMXS-2* (3)	relief valve DIN cartridge	25 (ISO 7368)	-	-	-	-	-	400	6	350

**Notes:**

- 1) X6 and X4 versions differ only for the coil power (see Input Power) - The certified temperature class T6, T4, T3 is related to the max ambient temperature, from which results the max solenoid surface temperature allowed in the application (see section ③). The reference ambient temperature is -40÷+40°C (standard, see the sixth column in the above table), for higher ambient temperature (-40÷+70 °C) the temperature class has to be degraded (option /7).
- 2) Max pressure on T port = 110 bar
- 3) Optional electrohydraulic venting available on request.
- 4) Valves are provided by NBR seals, which allow min ambient temperature down to -40 °C (max oil viscosity = 380 cSt). The min ambient temperature for valves with PE option (FPM seals) is -20°C.

**2 MATERIALS SPECIFICATION**

Valve type	solenoid housing ①	valve body ②	internal parts ③+④	spring ⑤	seals	
					std	/PE
DHAXS	AISI 630	AISI 316L	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
DLOHXS DLOKXS	AISI 630	AISI 316L	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
DLOPXS	AISI 630	AISI 630	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
DLPXS	-	AISI 630	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
SP-CART-*XS	-	AISI 316L	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
HMPXS	-	AISI 316L	Carbon steel	AISI 302	NBR (buna)	FPM (viton)
LIMMXS	-	AISI 316L	Carbon steel	AISI 302	NBR (buna)	FPM (viton)

### 3 EXPLOSION PROOF SOLENOIDS: MAIN DATA

<b>VALVE TYPE</b>	DLOHXS6 DLOKXS6 DLOPXS6		DHAXS4 DLOHXS4 DLOKXS4	
Solenoid code	Group II, ATEX		OAX/WP	
<b>Voltage</b>	V <sub>DC</sub> ±10%			
<b>code</b>	VAC 50/60 Hz ±10%			
<b>Power consumption</b>	8W		25W	
Coil insulation	Class H			
Protection degree	IP 67 According to IEC 144 when correctly coupled with the relevant cable gland SP-PAX19*, see section 16			
Duty factor	100%			
Mechanical construction	Explosion proof safety case classified Ex d, according to EN 60079-0: 2006, EN 6079-1: 2007			
Cable entrance and electrical wiring	Internal terminal board for cable connection threaded connection M20x1,5 for cable entrance, vertical (standard) or Horizontal (option /O) See section 16 for cable gland			
Method of protection	Ex d			
Temperature class (surface temp.)	T6 (≤ 85°C)	T4 (≤ 135°C) option /7	T4 (≤ 135°C)	T3 (≤ 200°C) option /7
Ambient temperature (according ATEX certification)	-40 ÷ +45 °C	-40 ÷ +70 °C	-40 ÷ +40 °C	-40 ÷ +70 °C

**Certification**

**Ex** = explosion proof according to EN 60079-0, EN 60079-1

**d** = flame proof execution

**IIC** = gas group - application in surface plants

**Zone 1** (and 2) = explosive atmosphere desultorily present

**T6** (T4, T3) = temperature class of the solenoid surface is dependent to the ambient temperature

**Solenoid wiring**

(1) For alternating current supply a rectifier bridge is integrated in the solenoid

### 4 SPOOL TYPE DIRECTIONAL SOLENOID VALVES: MODEL CODE

**DHA XS 4 - 0 63 1/2 / PA - M / V 24DC \*\* /\***

Spool type - direct

Stainless steel execution for external parts

Temperature class  
4 = T4  
6 = T6

Size:  
0 = 06

Valve configuration, see section 4.1  
61, 63, 71, 75  
(configurations 63 and 75 are available only with spool type 1/2)

Spool type, see section 4.2

Synthetic fluids:  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

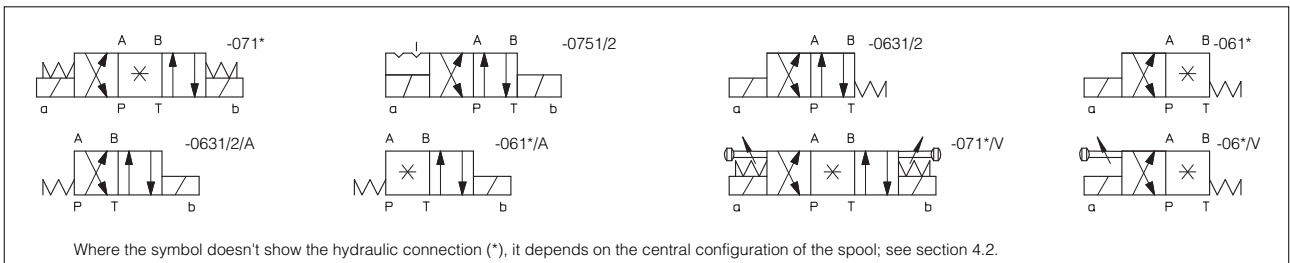
Voltage code - see section 3

Options:  
**A** = solenoid at side of port B  
**V** = with handwheel manual override  
**7** = for ambient temperature up to 70°C  
**O** = horizontal cable entrance

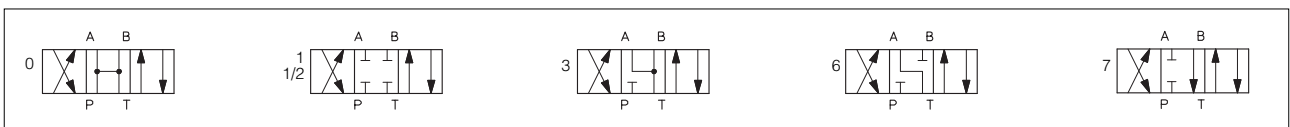
Solenoid threaded connection:  
**M** = M20x1,5 UNI-4535 (6H/6g)

Optional cable gland:  
**PA** = with threaded cable gland, see section 16

#### 4.1 Hydraulic configuration



#### 4.2 Spools - for intermediate passages, see tab. E001.



**5 POPPET TYPE LEAK FREE DIRECTIONAL SOLENOID VALVES: MODEL CODE**

**DLOH XS 6 - 3 A / PA - M - AO / V 24DC \*\* /\***

**DLOH - DLOK** = poppet type - direct  
**DLOP** = poppet type - piloted  
**DLP** = as DLOPX but without pilot valve

Stainless steel execution for external parts

Temperature class

**4** = T4 (for DLOHXS and DLOKXS)  
**6** = T6 (for all models)

**3** = three way

Valve configuration, see section 5.1

**A** = A to T in rest position  
**C** = P to A in rest position

Synthetic fluids:  
**WG** = water-glycol  
**PE** = phosphate ester

Series number

Voltage code - see section 3

Options: ( not for DLPX )

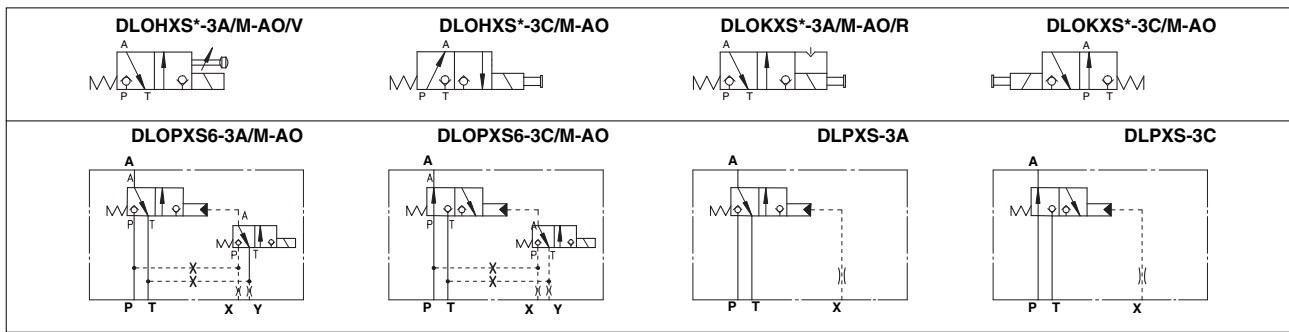
**R** = with solenoid manual reset  
**V** = with handwheel manual override  
**7** = for ambient temperature up to 70°C  
**O** = Horizontal cable entrance  
 Only for DLOPXS  
**D** = internal drain  
**E** = external pilot pressure

**AO** = explosion proof solenoid

Solenoid threaded connection:  
**M** = M20x1,5 UNI-4535 (6H/6g)

Optional cable gland:  
**PA** = with threaded cable gland, see section 16

**5.1 Hydraulic configuration**



**6 PRESSURE CONTROL VALVES: MODEL CODE**

**6.1 Screw-in type**

**SP-CART MXS / 350 / \* / \* \*\* / \***

Screw-in relief cartridge

Stainless steel execution for external parts and size

**MXS-3** = G1/2  
**MXS-6** = M33x1,5  
**AREXS-20** = M35x1,5

Pressure range  
**50** = 50 bar (not for AREXS-20 PED)  
**100** = 100 bar  
**210** = 210 bar  
**315** = 315 bar (only for AREXS-20)  
**350** = 350 bar (not for AREXS-20)  
**400** = 400 bar (only for AREXS-20)

Synthetic fluids:  
**WG** = water glycol  
**PE** = phosphate ester

Series number

Only for PED  
**P** = factory preset regulation

Options  
**PED** = reduced leakages and certified according to 97/23/CE

**6.2 Modular type**

**HMP XS - 011 / 350 \*\* / \***

Modular pressure relief valve ISO 4401 size 06

Stainless steel execution for external parts

Configuration, see section 6.5  
**011, 013, 014**

Synthetic fluids:  
**WG** = water glycol  
**PE** = phosphate ester

Series number

Pressure range for HMP:  
**50** = 50 bar  
**100** = 100 bar  
**210** = 210 bar  
**350** = 350 bar

**6.3 Control cover**

**LIMM XS - 2 / 350 \*\* / \***

Cover according to ISO 7368

Stainless steel execution for external parts

Size  
**2** = 25

Synthetic fluids:  
**WG** = water glycol  
**PE** = phosphate ester

Series number

Pressure range  
**50** = 6 ÷ 50 bar    **100** = 8 ÷ 100 bar  
**210** = 10 ÷ 210 bar    **350** = 15 ÷ 350 bar

**6.4 Standard cartridge valve to be coupled with LIMMX cover**

**SC LI - 25 31 2 \*\* / \***

Cartridge according to ISO 7368

Size 25

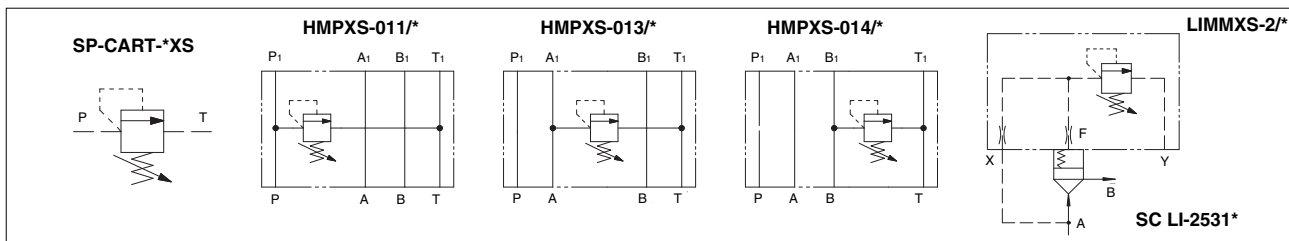
Area ratio 1÷1

Synthetic fluids:  
**WG** = water glycol  
**PE** = phosphate ester

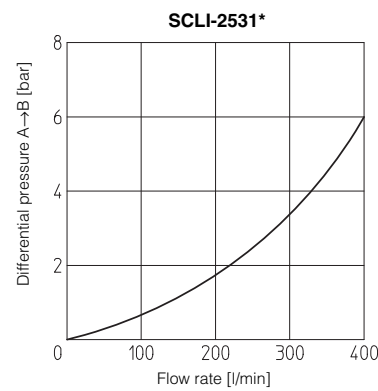
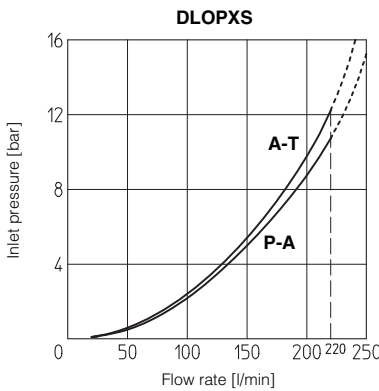
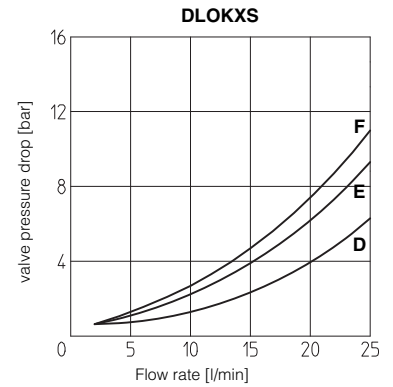
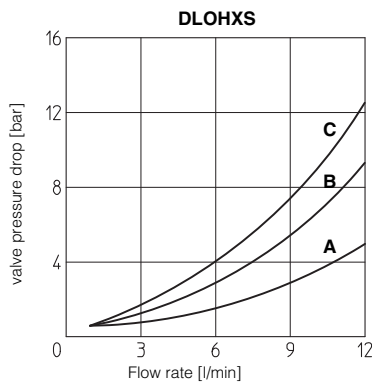
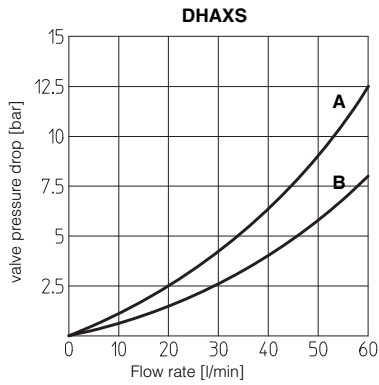
Series number

Spring cracking pressure  
**1** = 0,3 bar    **2** = 1,2 bar  
**3** = 3 bar    **6** = 6 bar

**6.5 hydraulic configuration**



**7 Q/Δp DIAGRAMS** (based on mineral oil ISO VG 46 at 50°C)



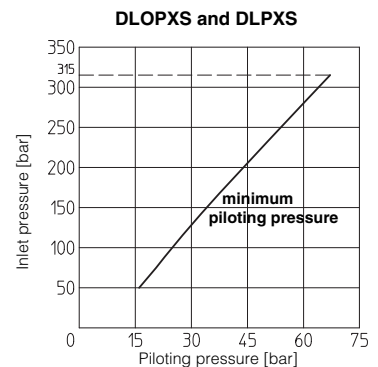
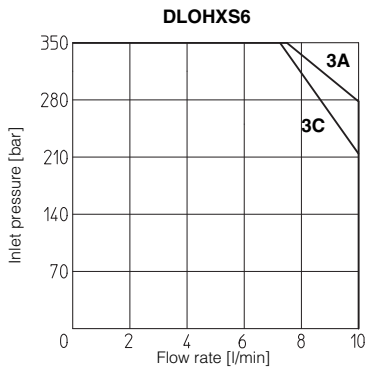
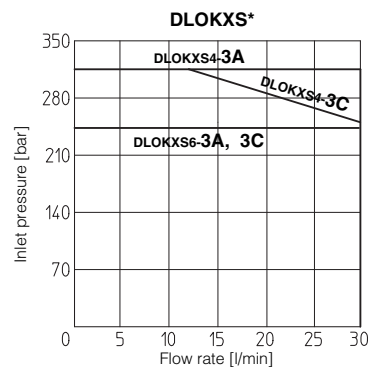
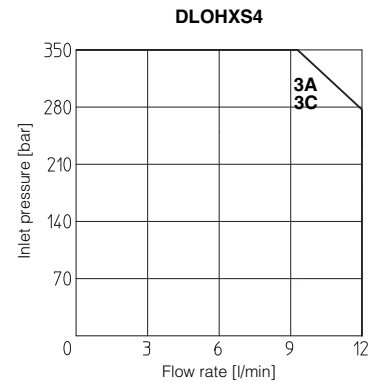
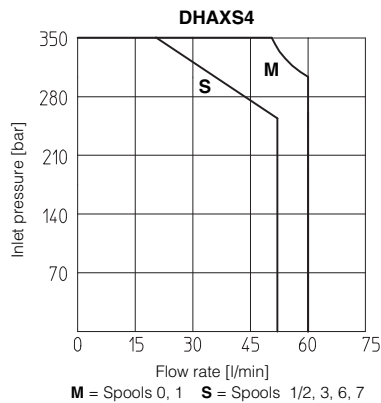
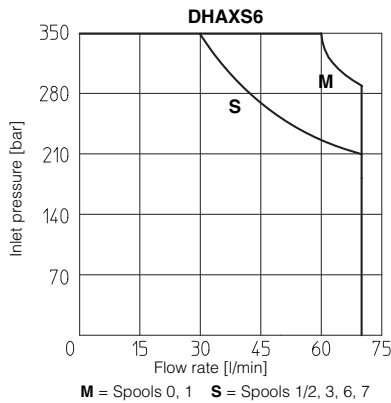
**DHAXS**

Flow direction \ Spool type	P→A	P→B	A→T	B→T	P→T
	<b>0</b>	B	B	B	B
<b>1, 1/2</b>	A	A	A	A	
<b>3</b>	A	A	B	B	
<b>6</b>	A	A	B	A	
<b>7</b>	A	A	A	B	

Flow direction \ Valve type	P → A (P → B)	A → T (B → T)
	<b>DLOHXS-3A</b>	C
<b>DLOHXS-3C</b>	B	A
<b>DLOKXS-3A</b>	F	E
<b>DLOKXS-3C</b>	E	D

**8 OPERATING LIMITS OF ON/OFF DIRECTIONAL CONTROLS** (based on mineral oil ISO VG 46 at 50°C)

The diagram have been obtained with warm solenoids and power supply at lowest value ( $V_{nom}-10\%$ ). For DHAXS valves the curves refer to application with symmetrical flow through the valve (i.e. P → A and B → T). In case of asymmetric flow the operating limits must be reduced.



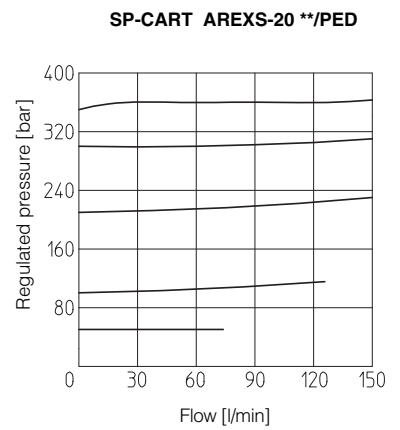
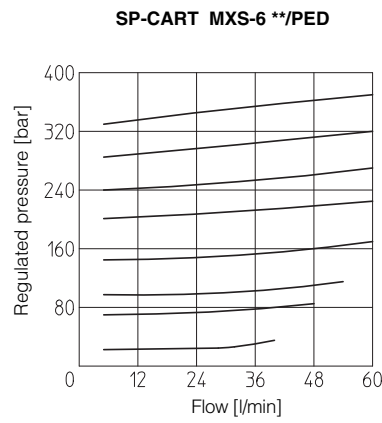
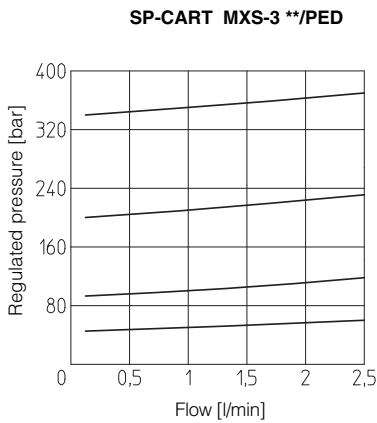
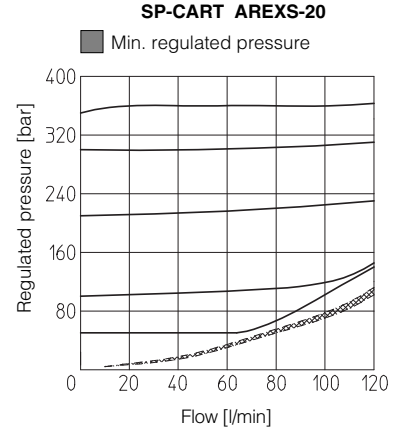
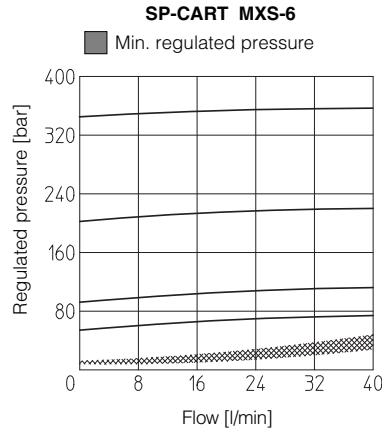
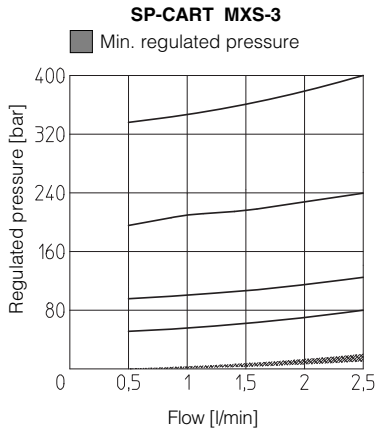
**8.1 Internal leakages**

internal leakage of DLOHXS, DLOKXS, DLOPXS and DLPXS: less than 5 drops/min (0,36 cm<sup>3</sup>/min) at max pressure.

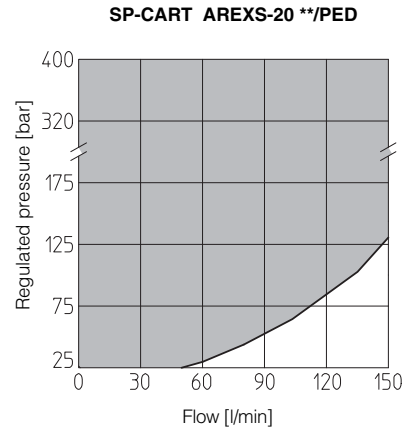
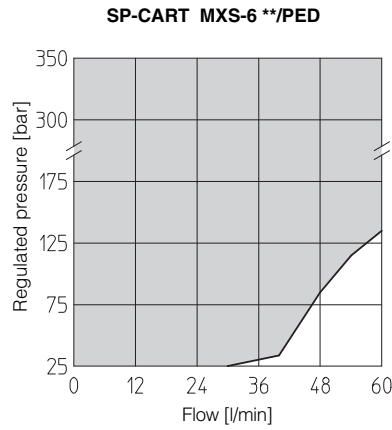
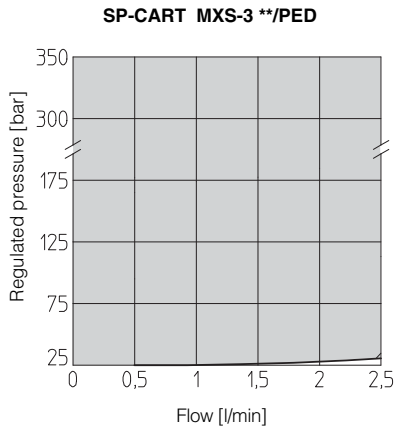
**8.2 Piloting pressure (DLOPXS and DLPXS)**

- max piloting pressure = 315 bar  
- min piloting pressure = see diagram

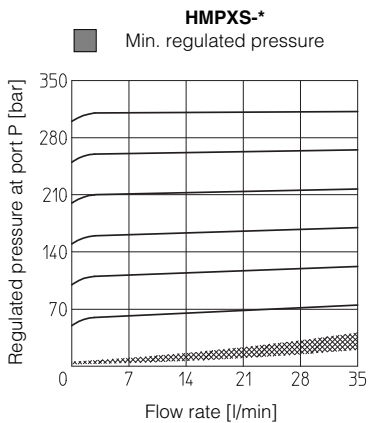
**9 REGULATED PRESSURE VERSUS FLOW DIAGRAM** of screw-in cartridge valves (based on mineral oil ISO VG 46 at 50°C)



**10 PERMITTED WORKING RANGES** of screw-in cartridge valves with PED option (shared area)

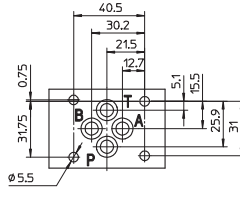
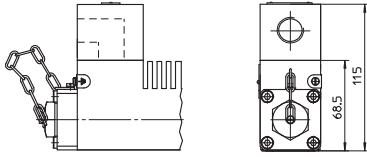


**10.1 Regulated pressure for modular valves**



**11 INSTALLATION DIMENSIONS OF DHAXS [mm]**

horizontal cable entrance option /O



**P** = PRESSURE PORT  
**A, B** = USE PORT  
**T** = TANK PORT

**ISO 4401: 2005**

**Mounting surface: 4401-03-02-0-05**

Fastening bolts:

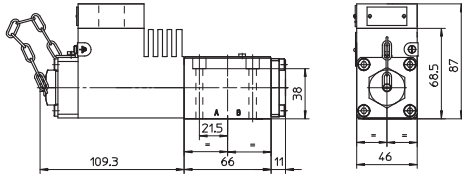
4 socket head screws M5x50-A4-70

Tightening torque = 5,5 Nm

Seals: 4 OR 108

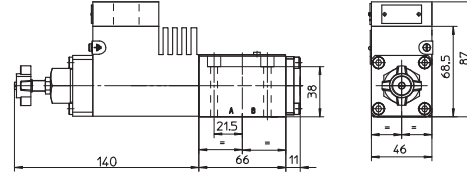
Ports P,A,B,T:  $\varnothing = 7.5$  mm (max).

**DHAXS4-06\***



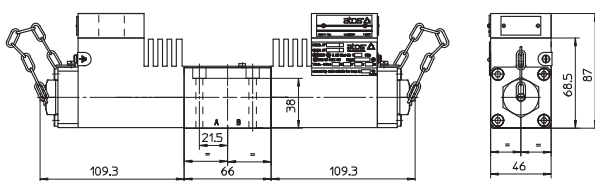
Mass: 2,9 kg

**DHAXS4-06\*/V**



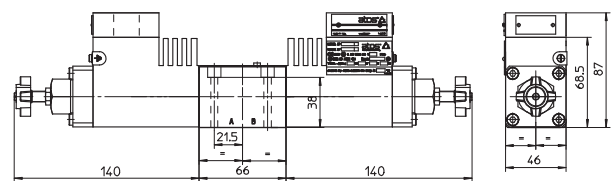
Mass: 3 kg

**DHAXS4-07\***



Mass: 4,6 kg

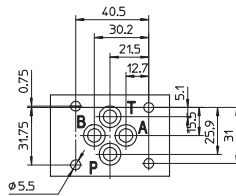
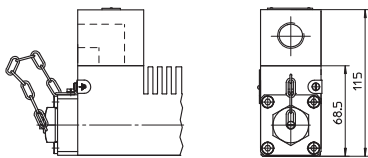
**DHAXS4-07\*/V**



Mass: 4,8 kg

**12 INSTALLATION DIMENSIONS OF DLOHXS AND DLOKXS [mm]**

horizontal cable entrance option /O



**P** = PRESSURE PORT  
**A, B** = USE PORT  
**T** = TANK PORT

**ISO 4401: 2005**

**Mounting surface: 4401-03-02-0-05**

Fastening bolts:

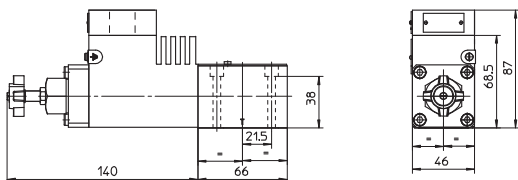
4 socket head screws M5x50-A4-70

Tightening torque = 5,5 Nm

Seals: 4 OR 108

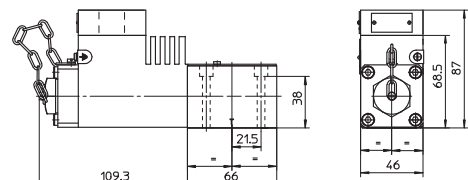
Ports P,A,B,T:  $\varnothing = 7.5$  mm (max).

**DLOHXS6-3A/M-AO/V**

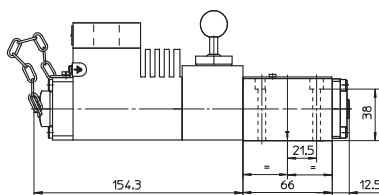


Mass: 3 kg

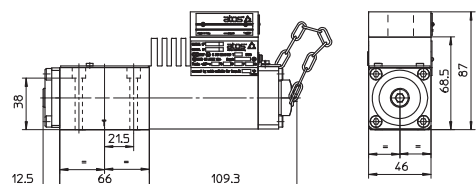
**DLOHXS4-3C/M-AO**



Mass: 2,9 kg



Mass: 3,8 kg



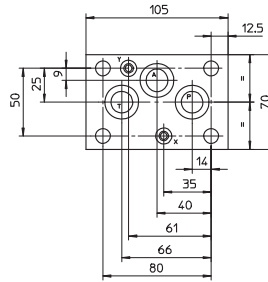
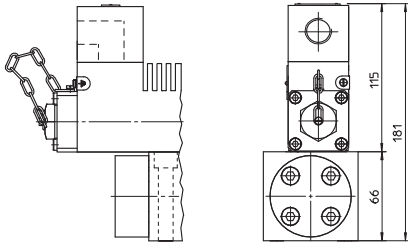
Mass: 2,9 kg

**DLOKXS4-3A/M-AO/R**

**DLOKXS4-3C/M-AO**

**13** INSTALLATION DIMENSIONS OF DLOPXS AND DLPXS [mm]

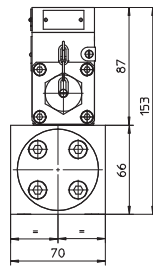
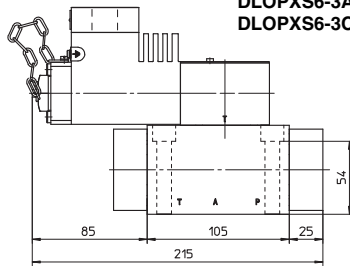
horizontal cable entrance option /O



**Mounting surface of DLOPXS and DLPXS is not ISO standard**

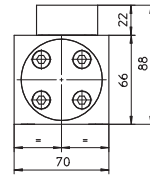
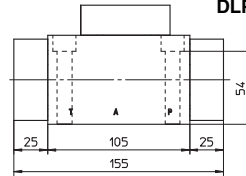
Fastening bolts:  
4 socket head screws M10x70-A4-70  
Tightening torque = 40 Nm  
Seals: 3 OR 3081; 2 OR 108  
Ports P,A,T: Ø = 16 mm (max)  
Ports X, Y: Ø = 7 mm (max)

**DLOPXS6-3A/M-AO  
DLOPXS6-3C/M-AO**



Mass: 7 kg

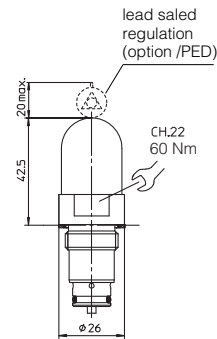
**DLPXS-3A  
DLPXS-3C**



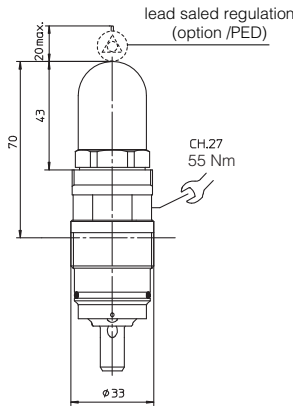
Mass: 4,5 kg

**14** INSTALLATION DIMENSIONS OF SCREW IN PRESSURE RELIEF VALVES [mm]

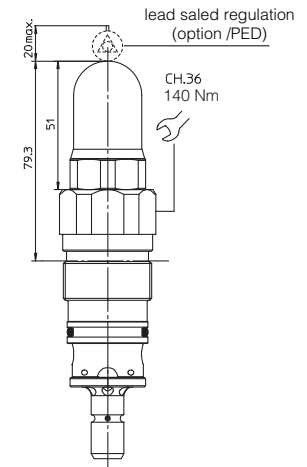
**SP-CART MXS-3\***



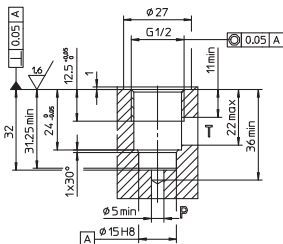
**SP-CART MXS-6\***



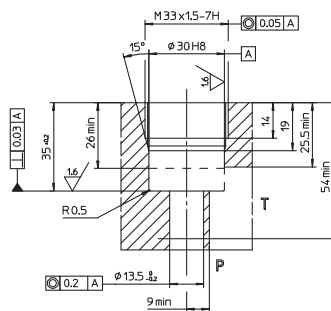
**SP-CART AREXS-20**



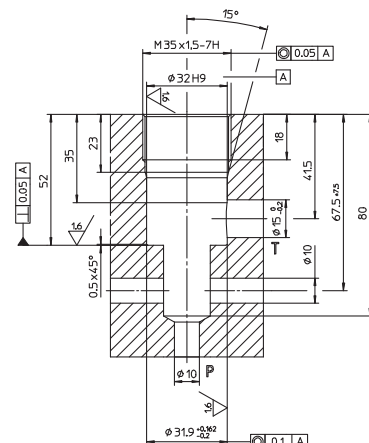
**Recess dimensions for SP-CART MXS-3**



**Recess dimensions for SP-CART MXS-6**



**Recess dimensions for SP-CART AREXS-20**



15 INSTALLATION DIMENSIONS OF MODULAR AND CARTRIDGE VALVES

ISO 4401: 2005

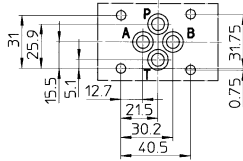
Mounting surface: 4401-03-02-0-05

Fasting bolts: M5x\*\*-A4-70

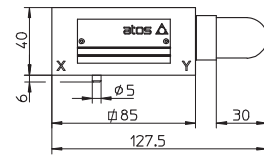
Tightening torque = 5,5 Nm

Seals: 4 OR 108

Ports P,A,B,T: Ø = 7.5 mm (max)

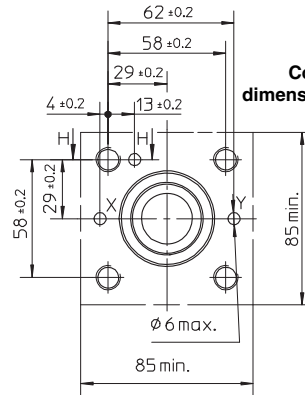


LIMMXS-2/\*

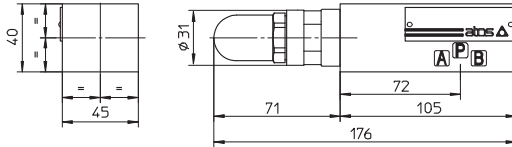


Mass: 2,2 kg

Cover interface dimensions for LIMMXS-2

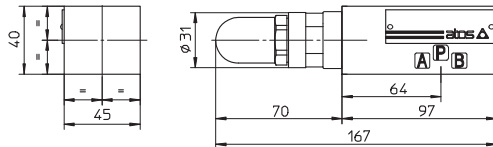


HMPXS-011/\*



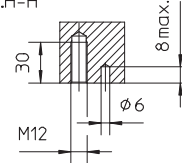
Mass: 1,4 kg

HMPX-013/\*

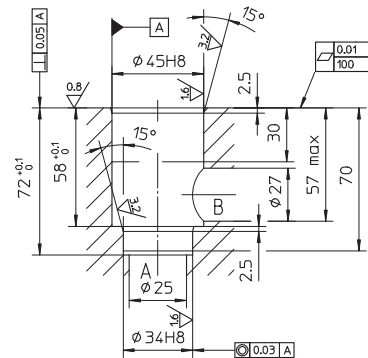


Mass: 1,2 kg

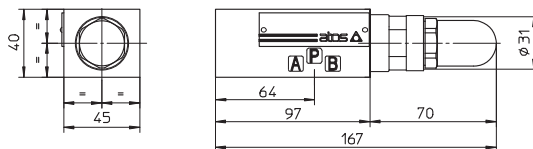
SEZ.H-H



Recess dimensions for SC LI-25



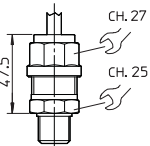
HMPX-014/\*



Mass: 1,2 kg

16 CABLE GLAND

STAINLESS STEEL CABLE GLAND SP-PAXS19/\* (PG9 - IP67)



Stainless steel cable glands - available on request - are certified ATEX according to EN60079-0 and EN60079-1.

Following codes have to be specified for spare cable glands:  
**SP-PAXS19/M** = with threaded connection M20x1,5 UNI-4535 (6H/6g).  
This cable gland must be blocked with loctite or similar or with a lock nut.  
The valves must be connected to the power supply using the terminal board inside the solenoid.

The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.

Additional equipotential grounding can be also performed by the user on the external facility provided on the solenoid case. Minimum section of external ground wire = 4 mm².

Minimum section of internal ground wire = the same of supply wire. In order to reach the terminal board inside the solenoid, the top plate of the solenoid must be removed.

Solenoids are provided with threaded connection for cable entrance: M20x1,5 (UNI-4535)