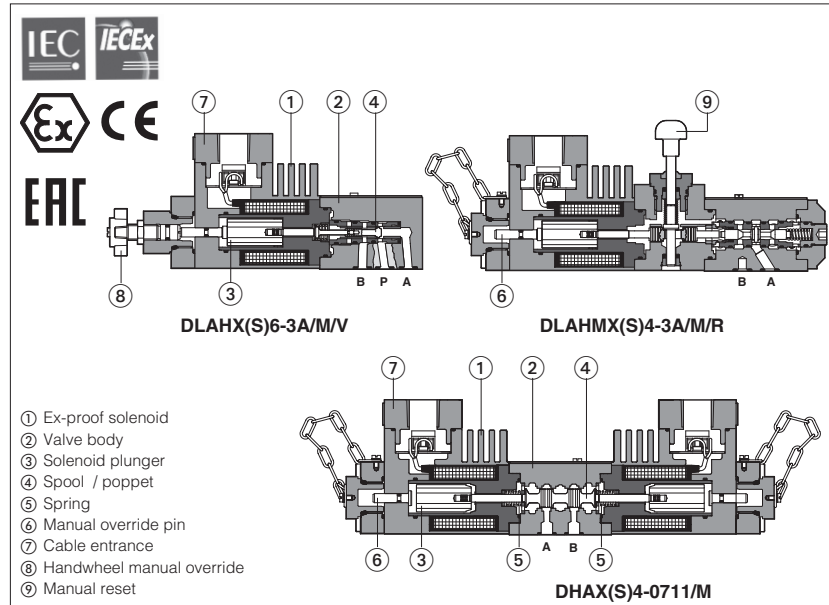


# Stainless steel valves for corrosive environments & water base fluids

ex-proof solenoid valves, Multicertification ATEX, IECEX, EAC or cULus certification

**UL certified valves are obsolete components - availability on request**



New line of directional solenoid valves and pressure relief valves in stainless steel execution for corrosive environments. Ex-proof Stainless steel solenoids ①, with **ATEX, IECEX, EAC Multicertification** or **cULus** North American certification, for hazardous areas - see section 5, 6.

Two executions are available:

- **X** stainless steel for external and internal parts, to withstand extreme and corrosive environmental conditions, and to ensure full compatibility also with water base and special fluids.
- **XS** stainless steel for external parts to withstand extreme and corrosive environmental conditions. Internal components are derived from standard valves.

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.

DHAX(S) and DLAHX(S) valves are **SIL** compliance with IEC 61508 (TÜV certified) - see section 1.1

## 1 STAINLESS STEEL VALVES: MAIN DATA

Valve execution (1)		Description	ISO size	Voltages		ATEX, IECEX		cULus		Max flow l/min	Δp (at max flow) bar	Max pressure bar (3)
X (5)	XS			DC	AC 50/60Hz	T class (1)	Input Power	T class (1)	Input Power			
<b>DHAX4</b>	<b>DHAXS6</b> <b>DHAXS4</b>	4 way, spool type direct solenoid valves	06 (ISO4401)	12 24 48 110 220	12 24 110 230	T6, T4 T4, T3	8 W 25 W	(2) T4	12 W 33 W	60 70	see diagram at section 11	350
<b>DLAHX6</b> <b>DLAHX4</b>	<b>DLAHXS6</b> <b>DLAHXS4</b>	3 way, poppet type, direct solenoid valves	06 (ISO4401)			T6, T4 T4, T3	8 W 25 W	(2) T4	12 W 33 W	10 12		315 350
<b>DLAHMX4</b>	<b>DLAHMXS6</b> <b>DLAHMXS4</b>	3 way, poppet type, direct solenoid valves	06 (ISO4401)			T6, T4 T4, T3	8 W 25 W	(2) T4	12 W 33 W	25 30		250 315
<b>DLAHPX6</b>	<b>DLAHPXS6</b>	3 way, poppet type, piloted solenoid valve	06 (ISO4401)			T6, T4	8 W	-	12 W	40		315
<b>DLAPX6</b>	<b>DLAPXS6</b>	3 way, poppet type, piloted solenoid valve	no			T6, T4	8 W	(2)	12 W	220		315
<b>DLHPX</b>	<b>DLHPXS</b>	3 way, poppet type, hydraulic operated valve	06 (ISO4401)			-	-	-	-	40		315
<b>DLPX</b>	<b>DLPXS</b>	3 way, poppet type, hydraulic operated valve	no			-	-	-	-	220		315
<b>CART-MX-3</b> <b>CART-MX-6</b> <b>CART AREX-20</b>	<b>CART-MXS-3</b> <b>CART-MXS-6</b> <b>CART AREXS-20</b>	relief valve direct screw-in	no no no	- - -	- - -	- - -	- - -	- - -	2,5 40 (60 PED) 120 (150 PED)	30	420 500 400	
<b>HMPX-*</b>	<b>HMPXS-*</b>	relief valve direct modular	06 (ISO4401)	-	-	-	-	-	40	35	350	
<b>SC LIX-2531*</b> <b>LIMMX-2*</b>	<b>LIMMXS-2*</b>	relief valve DIN cartridge (4)	25 (ISO7368)	-	-	-	-	-	400	6	350	

### Notes:

- (1) **XS6** and **XS4** versions differ only for the coil power (see Input Power) - For ATEX, IECEX, EAC multicertification the 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** (+45°C for X\*6), for higher ambient temperature (-40÷+70 °C) the temperature class has to be degraded. For cULus certification the temperature class is related to the coil power 12W or 33 W  
Special execution for ambient temperature -60°C (option /BBT) available on request
- (2) For cULus certification the temperature class corresponding to the coil power 12W is not reported in the nameplate marking. For coil power 33W the temperature class is T4.
- (3) Max pressure on **T** port = **110 bar**
- (4) Optional electrohydraulic venting available on request.
- (5) The "X" valves in full stainless steel execution are factory tested by Atos with mineral oil or pure water in order to avoid the contamination of the end user system. At the end of each valve model code must be specified the type of fluid to be used in the valve's testing: "H" for hydraulic oil or "W" for pure water.

### Ambient temperature:

Valves are provided by HNBR seals, which allow min ambient temperature down to -40 °C (max oil viscosity = 380 cSt). The min ambient temperature for valves with /PE option (FKM seals) is -20°C  
Max ambient temperature for valves without solenoids is 70°C.

### 1.1 SIL compliance with IEC 61508: 2010

DHAX(S), DLAHX(S) meets the requirements of:

- **SC3** (systematic capability)
- max **SIL 2** (HFT = 0 if the hydraulic system does not provide the redundancy for the specific safety function where the component is applied)
- max **SIL 3** (HFT = 1 if the hydraulic system provides the redundancy for the specific safety function where the component is applied)

## 2 MATERIALS SPECIFICATION

Valve type	solenoid housing ①	valve body ②	internal parts for X execution ③ + ④	internal parts for XS execution ③ + ④	spring ⑤	seals	
						std	/PE
DHAX(S)	AISI 630	AISI 316L	AISI 316L, 420B, 440C, 430F	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
DLAHX(S) DLAHMX(S)	AISI 630	AISI 316L	AISI 316L, 420B, 440C, 430F	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
DLAHPX(S)	AISI 630	AISI 630	AISI 316L, 420B, 440C, 430F	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
DLHPX(S)	-	AISI 630	AISI 420B	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
DLAPX(S)	AISI 630	AISI 630	AISI 316L, 420B, 440C, 430F	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
DLPX(S)	-	AISI 630	AISI 420B	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
CART-*X(S)	-	AISI 316L	AISI 316L, 420B, 630	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
HMPX(S)	-	AISI 316L	AISI 316L, 420B, 630	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
LIMMX(S)	-	AISI 316L	AISI 316L, 420B, 630	Carbon steel	AISI 302	HNBR (buna)	FKM (viton)
SC LIX	-	AISI 316L	AISI 630, AISI 420B	-	AISI 302	HNBR (buna)	FKM (viton)

## 3 EX-PROOF SOLENOIDS: MAIN DATA

VALVE TYPE		DHAXS6 DLAHX6 DLAHXS6 DLAPXS6	DLAHMXS6 DLAHPXS6 DLAPX6 DLAHPX6	DHAX4 DHAXS4 DLAHMX4 DLAHX4	DLAHXS4 DLAHMXS4
Solenoid code	<b>Multicertification</b>	OAX/WP, OAXS/WP		OAKX/WP, OAKXS/WP	
	<b>cULus</b>	OAXL/WP, OAXLS/WP		OAKL/WP, OAKXS/WP	
Voltage code	Vdc ±10% VAC 50/60 Hz ±10%	<b>12DC, 24DC, 48DC (1), 110DC, 220DC</b> <b>12AC, 24AC, 110-120AC, 230-240AC</b>			
Power consumption	<b>Multicertification</b>	8W		25W	
	<b>cULus</b>	12W		33W	
Coil insulation		Class H			
Protection degree		<b>IP 66/67</b> According to IEC 144 when correctly coupled with the relevant cable gland PAXMC/M			
Duty factor		100%			
Mechanical construction		Flame proof housing 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 for cable entrance vertical (standard) or Horizontal (option /O)			
Method of protection		Ex d			
Temperature class (surface temperature)	<b>Multicertification</b>	T6 (≤ 85°C)	T4 (≤ 135°C)	T4 (≤ 135°C)	T3 (≤ 200°C)
	<b>cULus</b>	Not applicable		T4 (≤ 135°C)	
Ambient temperature	<b>Multicertification</b>	-40 ÷ +45 °C	-40 ÷ +70 °C	-40 ÷ +40 °C	-40 ÷ +70 °C
	<b>cULus</b>	-40 ÷ +70 °C			

**Notes: (1)** 48DC only for Multicertification

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

## 4 MAIN CHARACTERISTICS, SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office



Assembly position / location	Any position for all valves		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
Seals, recommended fluid temperature	HNBR seals (standard) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity	15 ÷ 100 mm <sup>2</sup> /s - max allowed range 2.8 ÷ 500 mm <sup>2</sup> /s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 µm (β10 ≥75 recommended)		
<b>Hydraulic fluid</b>	<b>Suitable seals type</b>	<b>Classification</b>	<b>Ref. Standard</b>
Mineral oils	HNBR, FKM	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	HNBR	HFC	

## 5 cULus CERTIFICATION

### cULus marking

- Class I** = Equipment for famable gas and vapours
- Division 1** = Possibility of explosive atmosphere during normal functioning
- Groups C&D** = Gas group (according to UL 1002)
- Groups IIA&IIB** = Gas group (according to NEC 505-7)
- T4** = Temperature class of solenoid surface referred to +70°C ambient temperature

### EXAMPLE OF NAMEPLATE MARKING

MODEL CODE	<input type="text"/>	  <small>LISTED 48AM</small> Solenoid for use in hazardous locations
SERIAL N°	<input type="text"/>	
Class I, Groups C & D		Temperature code <input type="text"/>
<input type="radio"/> Max ambient temp. 70° C    158° F <input type="radio"/>		
Electrical rating: <input type="text"/>		
<b>CAUTION:</b> To reduce the risk of ignition of hazardous atmospheres, disconnect from circuit before opening enclosure. Keep tightly closed when in operation.		
<small>T-576/BT</small>		

Notified body and certificate number \_\_\_\_\_

Marking according to UL Directive \_\_\_\_\_

## 6 MULTICERTIFICATION ATEX, IECEX, EAC

In the following are resumed the valves marking according to multicertifications for Group II and Group I (mining)

### GROUP II, ATEX, marking

- II 2 G** = Solenoid for surface plants with gas and vapors environment, category 2, suitable for zone 1 and zone 2
- Ex d** = Explosion-proof equipment
- II C** = Equipment of group IIC suitable for substances (gas) of group IIC
- T6/T4** = Solenoid temperature class (maximum surface temperature)
- Gb** = Equipment protection level, high level protection for explosive Gas atmospheres
- CE** = Mark of conformity to the applicable European directives
- II 2 D** = Solenoid for surface plants with dust environment, category 2, suitable for zone 21 and zone 22
- Ex d** = Explosion-proof equipment
- III C** = Suitable for conductive dust (applicable also IIIB and/or IIIA)
- IP66/67** = Protection degree
- T85/T135** = Maximum surface temperature (Dust)
- Db** = Equipment protection level, high level protection for explosive Dust atmospheres
- Ex** = Mark of conformity to the 94/9/CE directive and to the technical norms

### GROUP II, IECEX marking

- Ex d** = Explosion-proof equipment
- IIC** = Equipment of group IIC suitable for substances (gas) of group IIC
- T6/T4** = Solenoid temperature classes (Gas)
- Gb** = Equipment protection level, high level protection for explosive Gas atmospheres
- Ex tb** = Equipment protection by enclosure "tb"
- IIIC** = Suitable for conductive dust (applicable also IIIB and/or IIIA)
- T85°C/T135°C** = Maximum surface temperature (Dust)
- Db** = Equipment protection level, high level protection for explosive Dust atmospheres
- IP66/67** = Protection degree

### 6.1 EAC marking

EAC (EurAsian certification) acknowledges the whole ATEX Directive 94/9/EC. This certification is available only for gas environment (not for dust).

- II 2 G** = Solenoid for surface plants with gas and vapors environment, category 2, suitable for zone 1 and zone 2
- Ex d** = Explosion-proof equipment
- II C** = Equipment of group IIC suitable for substances (gas) of group IIC
- T6/T4** = Solenoid temperature class (maximum surface temperature)
- Ex** = Mark of conformity to the 94/9/CE directive and to the technical norms

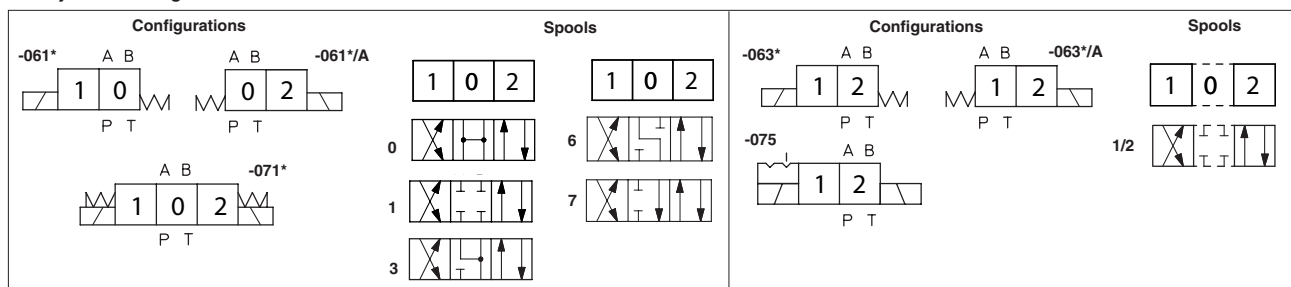
### EXAMPLE OF NAMEPLATE MARKING

Atex notified body and certificate number	MODEL N° <input type="text"/>	atos® Atos spa - Via alla Piana, 57 21018 Sesto Calende (Vt) Italy
	SERIAL N° <input type="text"/>	
Marking according to ATEX Directive	<b>CE 0722 CESI 02 ATEX 014X</b>	
IECEX notified body and certificate number	<b>Ex II 2G Ex d IIC T6/T4 Gb</b>	
	<b>Ex II 2D Ex tb IIIC T85°C / T135°C Db</b>	
Marking according to IECEX Directive	<b>IECEX CES 10.0010X</b>	
	<b>Ex d IIC T6/T4 Gb</b>	
	<b>Ex tb IIIC T85°C / T135°C Db</b>	
EAC notified body and certificate number	TP TC N° TC RU C-IT. Г Б 08. В. 00881 012/2011 Серия RU N°0239862	
Marking according to ATEX Directive	<b>ERC Ex II 2G Ex d IIC T6/T4</b>	
	Supply <input type="text"/> W <input type="text"/> V <input type="text"/> Hz	
	Tamb. - <input type="text"/> ÷ +45°C / +70°C IP66/67	
	<b>For the correct selection of connecting cable temperatures see safety instructions</b>	
		AT-907/BT

## 7 SPOOL TYPE DIRECTIONAL SOLENOID VALVES: MODEL CODE

<b>DHA</b>	<b>X</b>	<b>4</b>	<b>*</b>	<b>- 0</b>	<b>63</b>	<b>1/2</b>	<b>/ M /</b>	<b>V</b>	<b>24DC</b>	<b>**</b>	<b>/ *</b>	<b>/ *</b>	
spool type - direct	<b>X</b> = Stainless steel execution for all parts <b>XS</b> = Stainless steel execution for external parts	Temperature class, see section 11 <b>4</b> = T4 <b>6</b> = T6 (only for XS execution)	Certification type - = omit for <b>Multicertification</b> <b>/UL</b> = cULus with 1 m cables length, factory wired	Size: 0 = 06	Valve configuration, see section 7.1 61, 63, 71, 75 (configurations 63 and 75 are available only with spool type 1/2)	Spool type, see section 4.2				Voltage code - see section 3	Options: <b>A</b> = solenoid at side of port B <b>V</b> = with handweel manual override <b>O</b> = horizontal cable entrance	Test fluid, only for X execution: <b>H</b> = mineral oil <b>W</b> = pure water	Seals material, see section 4: - = HNBR <b>PE</b> = FKM

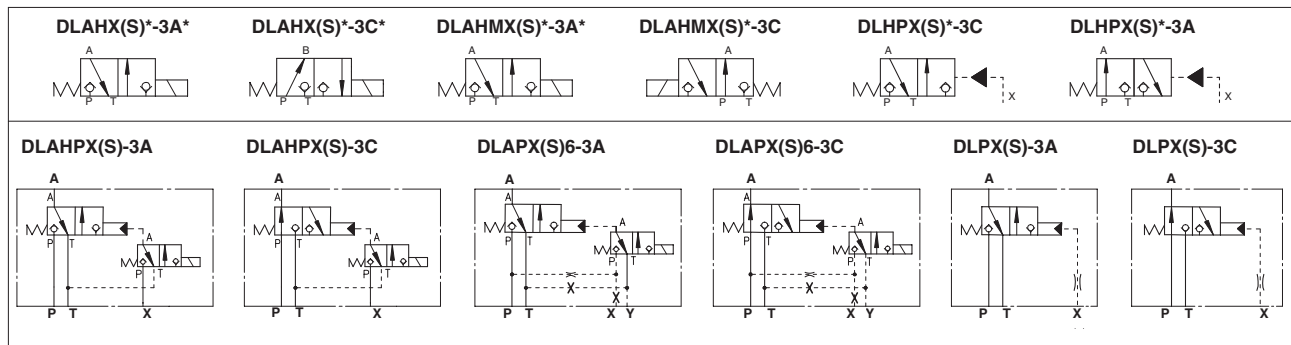
### 7.1 Hydraulic configuration



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

<b>DLAH</b>	<b>X</b>	<b>6</b>	<b>*</b>	<b>-</b>	<b>3</b>	<b>A</b>	<b>/</b>	<b>M</b>	<b>/</b>	<b>V</b>	<b>24DC</b>	<b>**</b>	<b>/</b>	<b>*</b>	<b>/</b>	<b>*</b>
<p><b>DLAH</b> = direct (10 l/min)  <b>DLAHM</b> = direct (25 l/min)  <b>DLHP</b> = hydraulic operated  <b>DLAHP</b> = solenoid piloted  <b>DLP</b> = hydraulic operated  <b>DLAP</b> = solenoid piloted</p> <p><b>X</b> = Stainless steel execution for all parts  <b>XS</b> = Stainless steel execution for external parts</p> <p>Temperature class (not for DLHP and DLP) see sect. 11  <b>4</b> = T4  <b>6</b> = T6</p> <p>Certification type  <b>-</b> = omit for <b>Multicertification</b>  <b>/UL</b> = cULus with 1 m cables lenght, factory wired</p> <p><b>3</b> = three way</p> <p>Valve configuration, see section 8.1  <b>A</b> = A (B) to T in rest position      <b>C</b> = P to A (B) in rest position</p>														<p>Test fluid, only for X esecution:  <b>H</b> = mineral oil  <b>W</b> = pure water</p> <p>Seals material, see section 4:  <b>-</b> = HNBR  <b>PE</b> = FKM</p> <p>Series number</p> <p>Voltage code - see section 3</p>		
<p>Options: (not for DLHP, DLP)  <b>R</b> = solenoid manual reset (not combinable with /V)  <b>V</b> = handweel manual override (not combinable with /R)  <b>O</b> = Horizontal cable entrance</p> <p>Only for DLAP  <b>D</b> = internal drain  <b>E</b> = external pilot pressure</p> <p>Solenoid threaded connection for cable gland:  <b>M</b> = M20x1,5 UNI-4535 (6H/6g) for <b>Multicertification</b>  <b>NPT</b> = 1/2" NPT ANSI B2.1 (tapered) for <b>/UL</b></p>																

**8.1 Hydraulic configuration**



**9 PRESSURE CONTROL VALVES: MODEL CODE**

**9.1 Screw-in type**

<b>CART</b>	<b>MX-3</b>	<b>/</b>	<b>350</b>	<b>/</b>	<b>*</b>	<b>/</b>	<b>*</b>	<b>/</b>	<b>**</b>	<b>/</b>	<b>*</b>	<b>/</b>	<b>*</b>
Screw-in relief cartridge													
<p>See note (1):  <b>MX(S)-3</b> = G1/2  <b>MX(S)-6</b> = M33x1,5  <b>AREX(S)-20</b> = M35x1,5</p> <p>Pressure range:  see hydraulic characteristics in table below</p>											<p>Seals material, see section 4:  <b>-</b> = HNBR  <b>PE</b> = FKM</p> <p>Series number</p>		<p>Test fluid, only for X esecution:  <b>H</b> = mineral oil  <b>W</b> = pure water</p>
<p>Options  <b>PED</b> = reduced leakages and certified according to 2014/68/UE</p>													
<p>Only for PED  <b>*</b> = factory preset regulation to be defined depending to the customer requirements  min step: 1bar - min pressure setting: 25 bar  (example 280 = 280 bar)</p>													

(1): **X** = Stainless steel execution for all parts  
**XS** = Stainless steel execution for external parts

**Hydraulic characteristics**

Valve model	CART MX(S)-3	CART MX(S)-3/PED	CART MX(S)-6	CART MX(S)-6/PED	CART AREX(S)-20	CART AREX(S)-20/PED
Max pressure setting [bar]	/50 /100 /210 /350 /420	/50 /100 /210 /350	/50 /100 /210 /350 /420	/100 /210 /350	/50 /100 /210 /315 /400	/100 /210 /315 /400
Pressure range [bar] (1)	2÷50 6÷100 7÷210 8÷350 15÷420	25÷50 25÷100 25÷210 25÷350	2÷50 3÷100 8÷210 15÷350 15÷420	25÷100 100÷210 210÷350	3÷50 5÷100 6÷210 8÷315 10÷400	25÷100 100÷210 210÷315 315÷400
Max flow [l/min]	2,5	2,5	40	60	120	150

(1) The values correspond to the min and max regulation of the valve's craking pressure.

### 9.2 Modular type

<b>HMP</b>	<b>X</b>	-	<b>011</b>	/	<b>350</b>	<b>**</b>	/	<b>*</b>	/	<b>*</b>
Modular pressure relief valve ISO 4401 size 06						Series number		Seals material, see section 4: - = HNBR <b>PE</b> = FKM		Test fluid, only for X execution: <b>H</b> = mineral oil <b>W</b> = pure water
<b>X</b> = Stainless steel execution for all parts <b>XS</b> = Stainless steel execution for external parts										
Configuration, see section 9.5 <b>011 013 014</b>										
						Pressure range for HMP: <b>50</b> = 50 bar <b>100</b> = 100 bar				<b>210</b> = 210 bar <b>350</b> = 350 bar

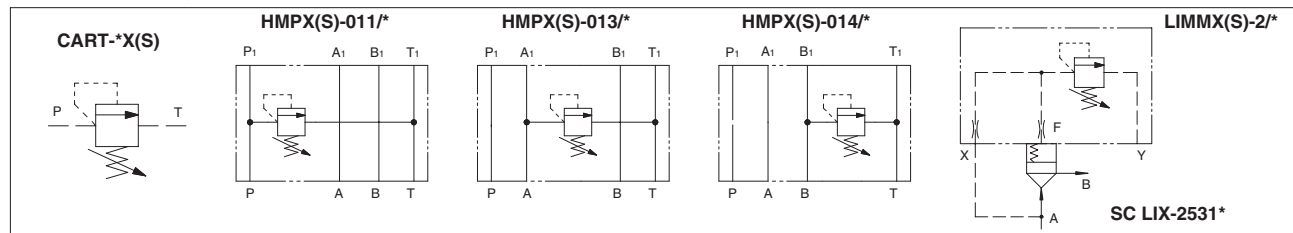
### 9.3 Control cover

<b>LIMM</b>	<b>X</b>	-	<b>2</b>	/	<b>350</b>	<b>**</b>	/	<b>*</b>	/	<b>*</b>
Cover according to ISO 7368						Series number		Seals material, see section 4: - = HNBR <b>PE</b> = FKM		Test fluid, only for X execution: <b>H</b> = mineral oil <b>W</b> = pure water
<b>X</b> = Stainless steel execution for all parts <b>XS</b> = Stainless steel execution for external parts										
Size: <b>2</b> = 25						Pressure range <b>50</b> = 6 ÷ 50 bar <b>100</b> = 8 ÷ 100 bar				<b>210</b> = 10 ÷ 210 bar <b>350</b> = 15 ÷ 350 bar

### 9.4 Standard cartridge valve to be coupled with LIMMX(S) cover

<b>SC LI</b>	<b>X</b>	-	<b>25</b>	<b>31</b>	/	<b>2</b>	<b>**</b>	/	<b>*</b>	/	<b>*</b>
Cartridge according to ISO 7368							Series number		Seals material, see section 4: - = HNBR <b>PE</b> = FKM		Test fluid, only for X execution: <b>H</b> = mineral oil <b>W</b> = pure water
<b>X</b> = Stainless steel execution for all parts											
Size 25						Spring cracking pressure <b>1</b> = 0,3 bar <b>2</b> = 1,2 bar					<b>3</b> = 3 bar <b>6</b> = 6 bar
Area ratio 1÷1											
Note: for LIMMXS cover, the standard SCLI-25* cartridge can be used											

### 9.5 Hydraulic configuration



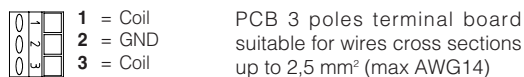
## 10 CABLE GLANDS AND WIRING

### 10.1 Cable glands - only for Multicertification

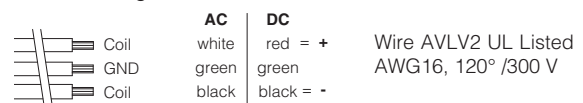
Cable glands with threaded connections M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table **K600**

### 10.2 Terminal board and solenoid wiring

#### Terminal board for Multicertification



#### Solenoid wiring cULus certification



### 10.3 Wiring specifications

Power supply: section of coil connection wires = 2,5 mm<sup>2</sup> for **Multicertification**      1,2 mm<sup>2</sup> for **cULus** certification

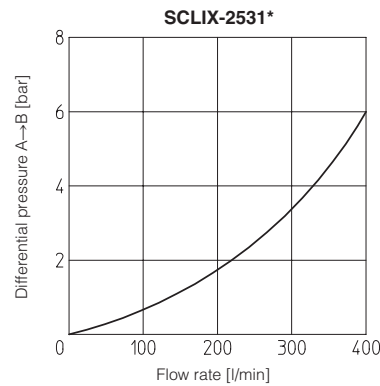
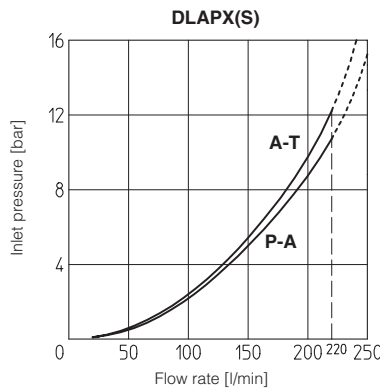
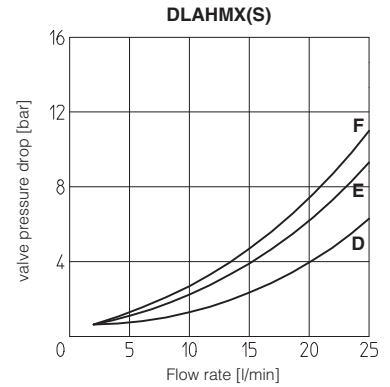
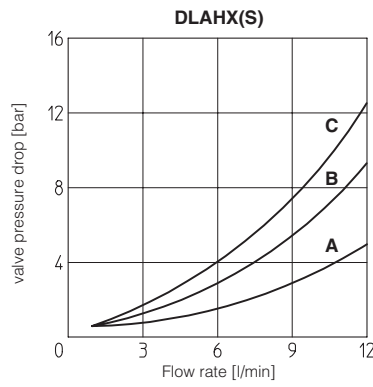
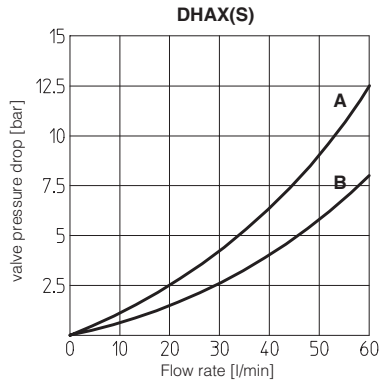
Grounding: section of internal ground wire = 2,5 mm<sup>2</sup> for **Multicertification**      1,2 mm<sup>2</sup> for **cULus** certification

**Only for Multicertification** the additional equipotential grounding can be also performed by the user on the external facility provided on the solenoid case. Section of external ground wire = 4 mm<sup>2</sup>

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

Max ambient temperature [°C]	Temperature class	Surface temperature [°C]	Cable temperature
45 °C	T6	85 °C	not prescribed
70 °C	T4	135 °C	90 °C

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

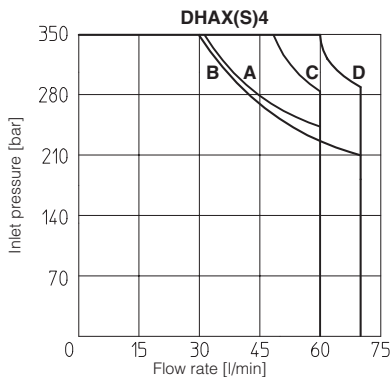


Spool type	Flow direction				
	P→A	P→B	A→T	B→T	P→T
0	B	B	B	B	A
1, 1/2	A	A	A	A	
3	A	A	B	B	
6	A	A	B	A	
7	A	A	A	B	

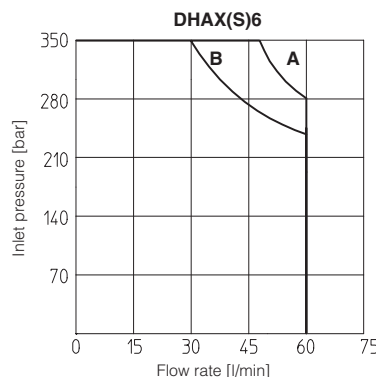
Valve type	Flow direction	
	P → A (P → B)	A → T (B → T)
DLAHX(S)-3A	C	B
DLAHX(S)-3C	B	A
DLAHMX(S)-3A	F	E
DLAHMX(S)-3C	E	D

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

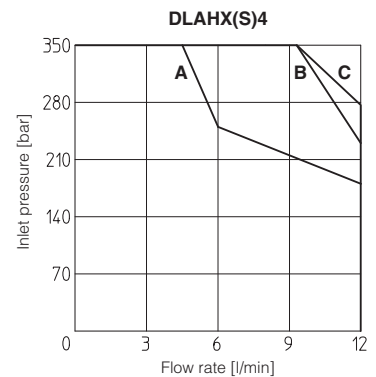
The diagram have been obtained with warm solenoids and power supply at lowest value ( $V_{nom}=10\%$ ). For DHAX(S) valves the curves refer to application with symmetrical flow through the valve (i.e. P → A and B → T). In case of asymmetric flow the operating limits must be reduced.



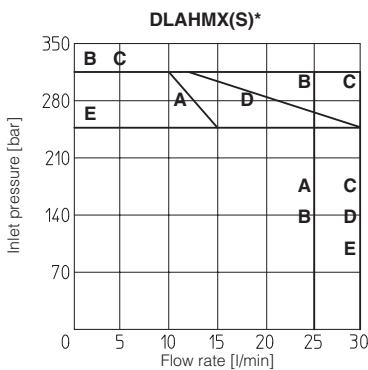
**DHAX4** A = Spools 0,1 B = Spools 1/2, 3, 6, 7  
**DHAXS4** C = Spools 0,1 D = Spools 1/2, 3, 6, 7



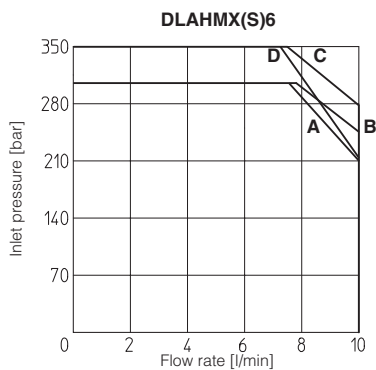
**A** = Spools 0,1 **B** = Spools 1/2, 3, 6, 7



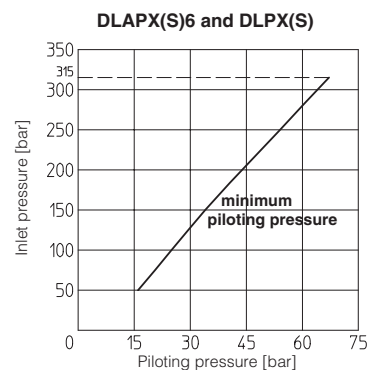
**DLAHX4** A = Spool 3C B = Spool 3A  
**DLAHXS4** C = Spools 3C, 3A



**DLAHMX4** A = Spool 3C B = Spool 3A  
**DLAHMXS4** C = Spool 3A D = Spool 3C  
**DLAHMXS6** E = Spool 3A, 3C



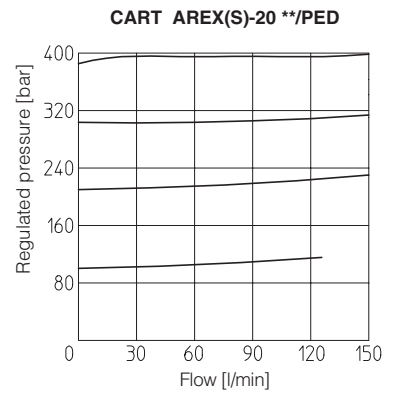
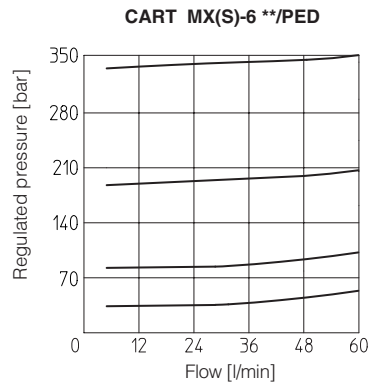
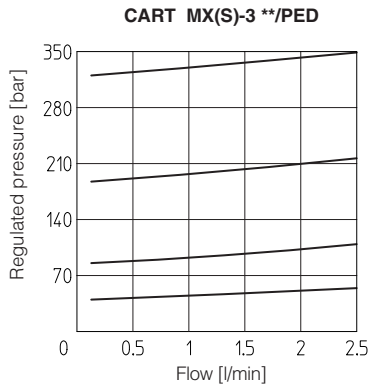
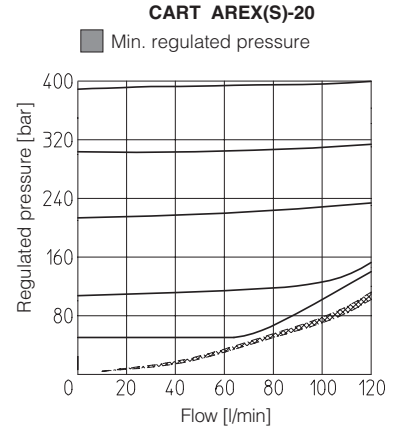
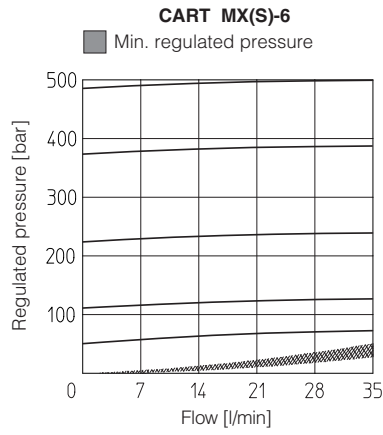
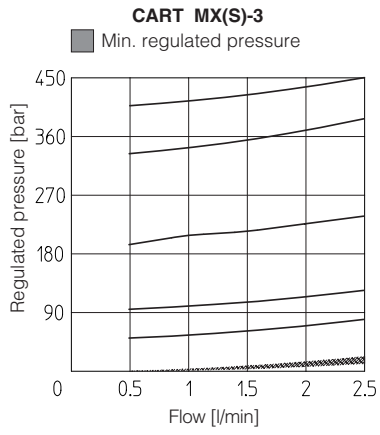
**DLAHX6** A = Spool 3A B = Spool 3C  
**DLAHXS6** C = Spool 3A D = Spool 3C



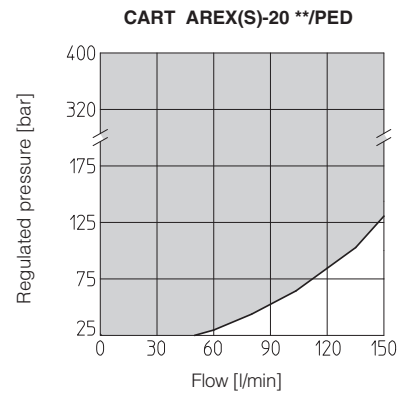
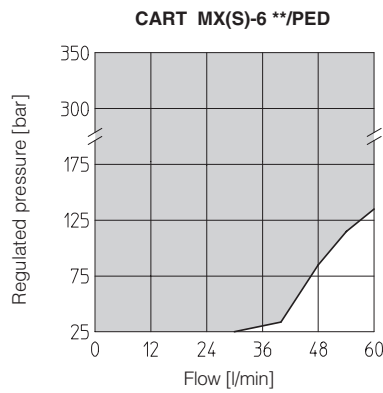
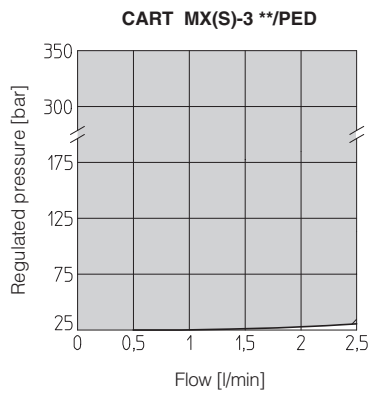
**12.1 Internal leakages** for DLAHX(S), DLAHMX(S), DLAHPX(S), DLHPX(S), DLAPX(S) and DLPX(S): less than 5 drops/min (0,36 cm<sup>3</sup>/min) at max pressure.

**12.2 Piloting pressure** for DLAHPX(S) and DLHPX(S) max piloting pressure = 315 bar; min piloting pressure = 90 bar  
for DLAPX(S) and DLPX(S) max piloting pressure = 315 bar; min piloting pressure = see above diagram

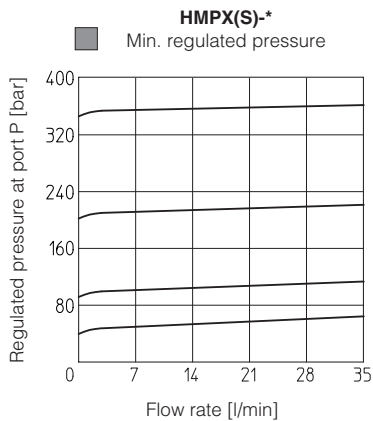
**13 REGULATED PRESSURE VERSUS FLOW DIAGRAM** of screw-in cartridge valves (based on mineral oil ISO VG 46 at 50°C)



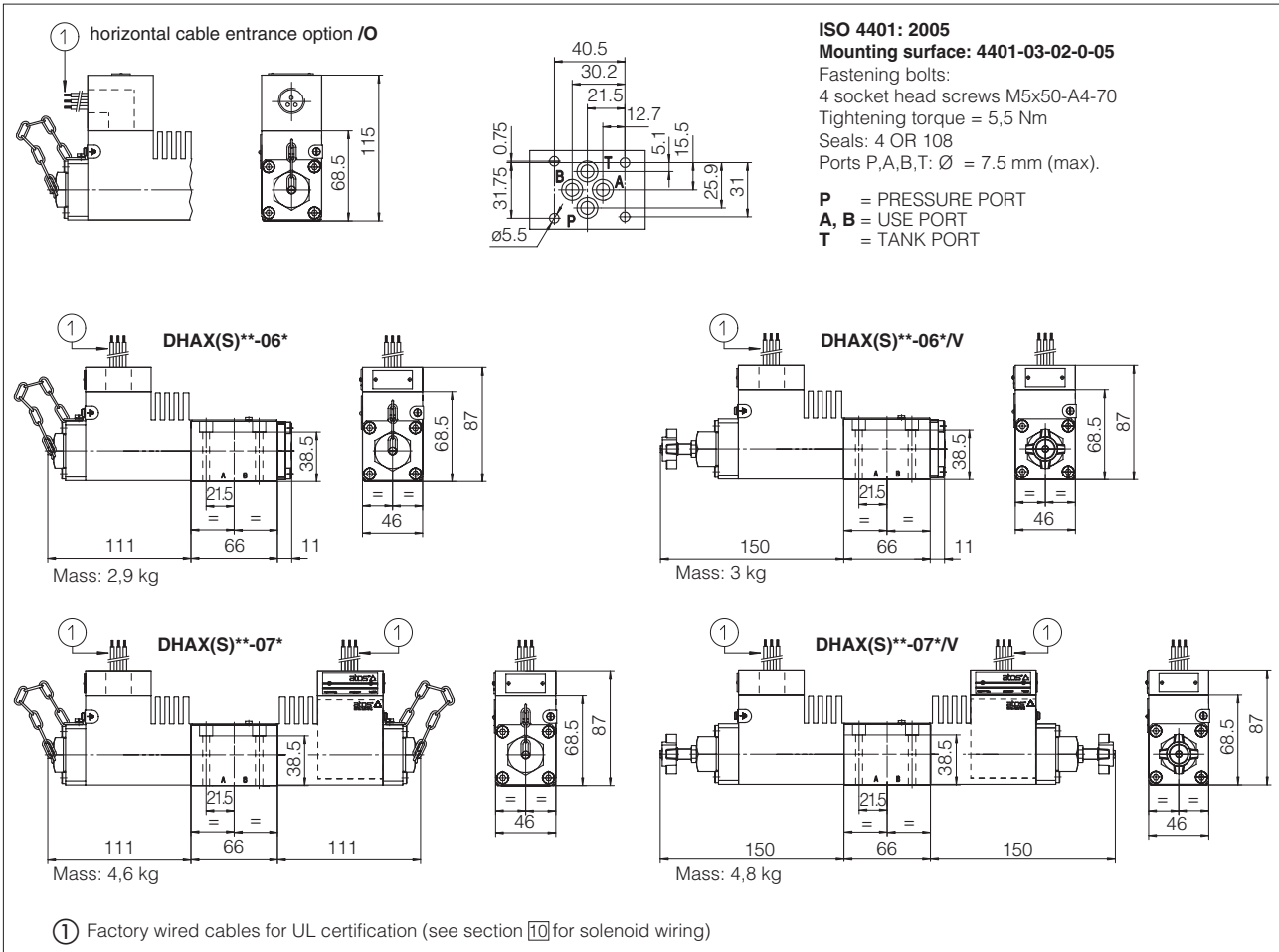
**14 PERMITTED WORKING RANGES** of screw-in cartridge valves with PED option (shared area)



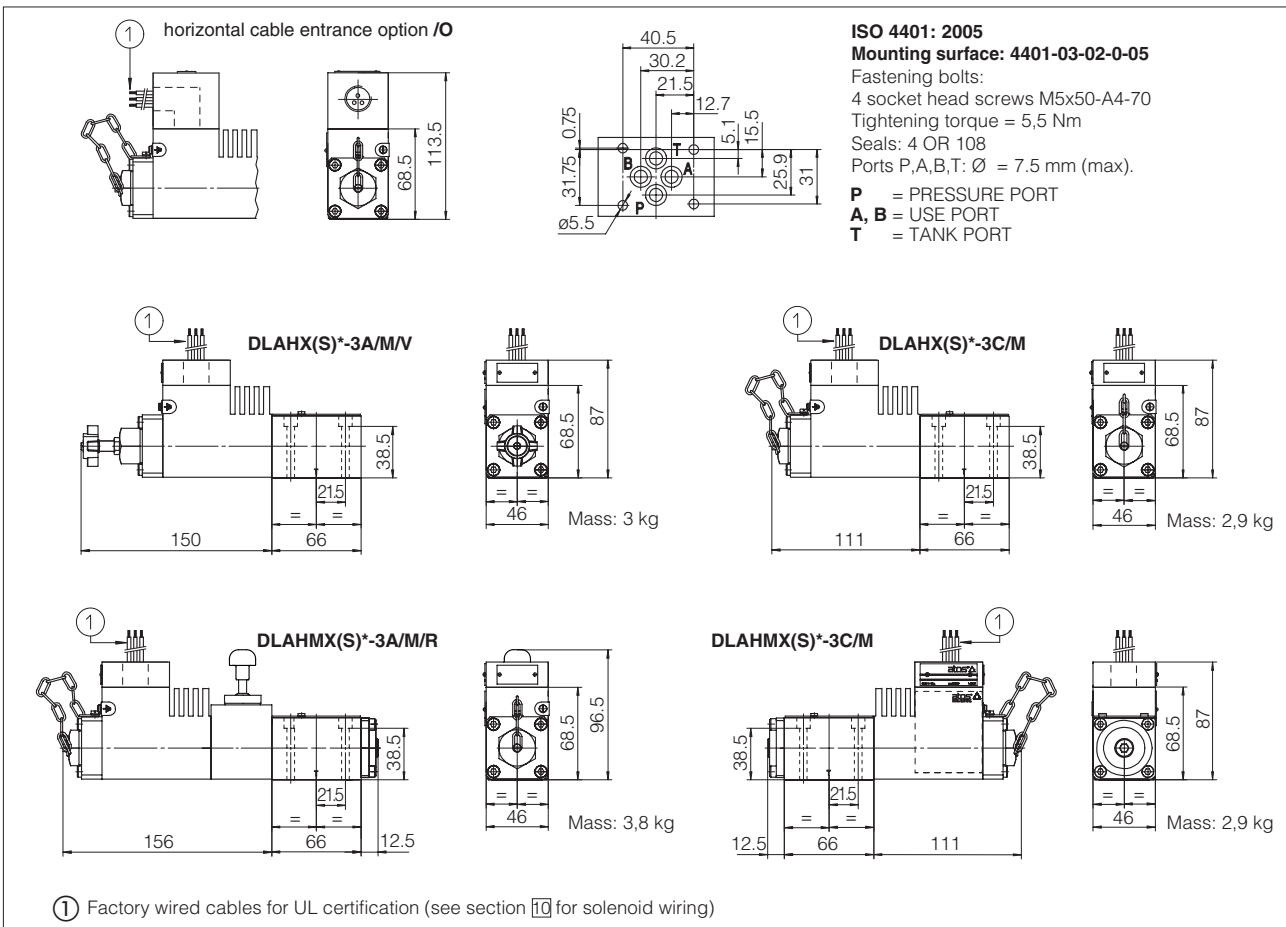
**14.1 Regulated pressure for modular valves**



**15 INSTALLATION DIMENSIONS OF DHAX(S) [mm]**



**16 INSTALLATION DIMENSIONS OF DLAHX(S) AND DLAHMX(S) [mm]**





**17 INSTALLATION DIMENSIONS OF DLHPX(S) AND DLAHPX(S) [mm]**

**ISO 4401: 2005**

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

Fastening bolts:

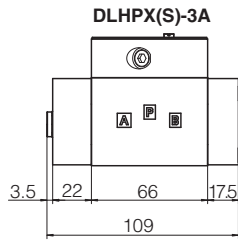
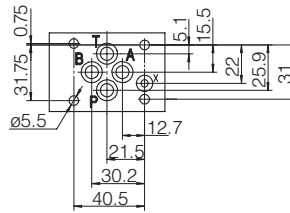
4 socket head screws M5x75-A4-70

Tightening torque = 5,5 Nm

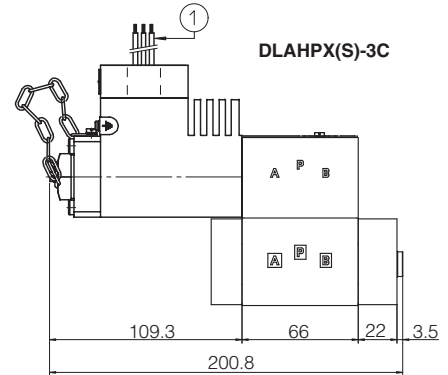
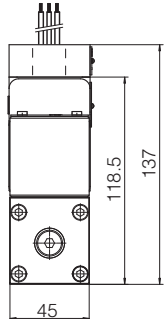
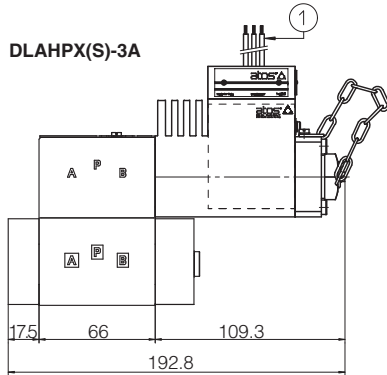
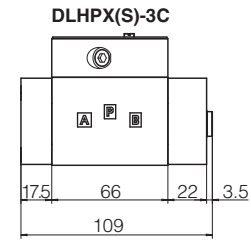
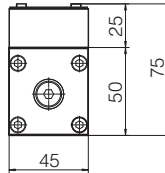
Seals: 4 OR 108

Ports P,A,B,T: Ø = 7.5 mm (max).

**P** = PRESSURE PORT  
**A** = USE PORT  
**B** = not present  
**T** = TANK PORT  
**X** = PILOT PORT



Mass: 5 kg



① Factory wired cables for UL certification (see section 10 for solenoid wiring)

**18 INSTALLATION DIMENSIONS OF DLAPX(S) AND DLPX(S) [mm]**

**Mounting surface DLAPX(S)6 and DLPX(S)**  
**not ISO standard**

Fastening bolts:

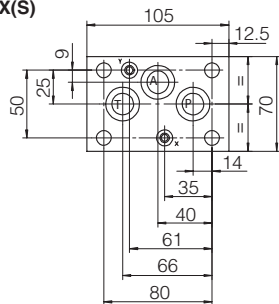
4 socket head screws M10x70-A4-70

Tightening torque = 40 Nm

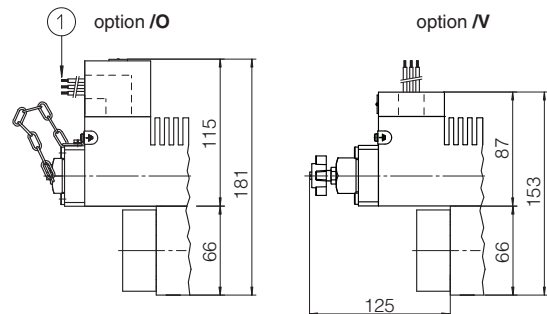
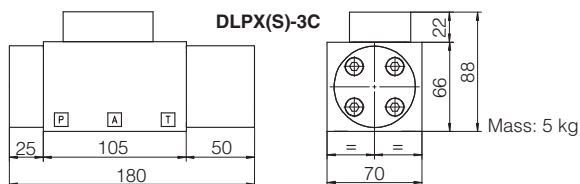
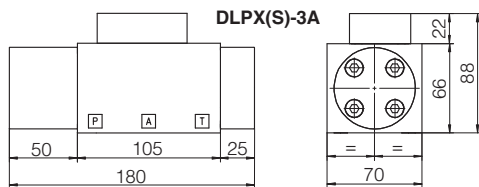
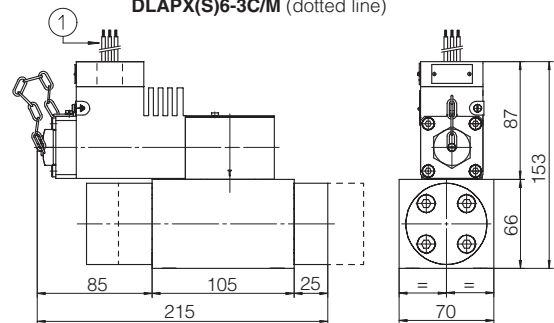
Seals: 3 OR 3081; 2 OR 108

Ports P,A,T: Ø = 16 mm (max)

Ports X, Y: Ø = 7 mm (max)



**DLAPX(S)6-3A/M**  
**DLAPX(S)6-3C/M (dotted line)**



① Factory wired cables for UL certification (see section 10 for solenoid wiring)

