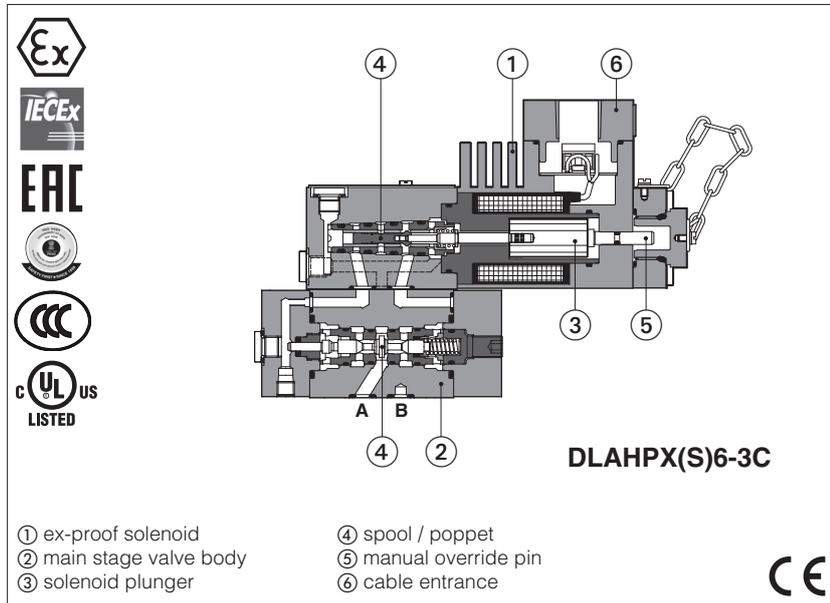


Stainless steel ex-proof solenoid directional valves

on-off, piloted, poppet type leak free - **ATEX, IECEx, EAC, PESO, CCC** or **cULus**



- ① ex-proof solenoid
- ② main stage valve body
- ③ solenoid plunger
- ④ spool / poppet
- ⑤ manual override pin
- ⑥ cable entrance



DLAHPX, DLAHPXS DLAPX, DLAPXS

Ex-proof, poppet type, piloted solenoid valves made in two different stainless steel executions for corrosive environments and fluids.

- **X** full 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 only for external parts to withstand extreme and corrosive environmental conditions.

Ex-proof stainless steel solenoids are provided with **ATEX, IECEx, EAC, PESO, CCC Multicertification** or **cULus** North American certification, see section [8](#).

DLAHPX(S):	DLAPX(S):
Size: 06 - ISO 4401	Size: 16 - not ISO
3/2 way	3/2 way
Max flow: 40 l/min	Max flow: 220 l/min
Max pressure: 315 bar	Max pressure: 315 bar

1 MODEL CODE

DLAHP	X	6	/	*	-	3	/	A	/	M	/	V	24DC	/	*	/	*
<p>Ex-proof solenoid directional valve, leak free</p> <p>DLAHP = ISO size 06 max flow 40 l/min</p> <p>DLAP = size 16 not ISO max flow 220 l/min</p> <p>Stainless steel executions (1)</p> <p>X = full stainless steel XS = stainless steel only external parts</p> <p>Solenoid power and Temperature class, see also certification data in section 8:</p> <p>Multicertification 6 = 8W, class T6/T4</p> <p>cULus 6 = 12W, class T6/T5</p> <p>Certification type:</p> <p>- = omit for Multicertification (Group II)</p> <p>/UL = cULus certification</p> <p>3 = three way</p> <p>Valve configuration - see section 2:</p> <p>A = A to T in rest position C = P to A in rest position</p>																	<p>Test fluid, only for X execution (2):</p> <p>H = mineral oil W = pure water</p> <p>Seals material, see section 6:</p> <p>- = NBR low temp. -40°C PE = FKM BBT = FVMQ fluorosilicon -60°C (3)</p> <p>Series number</p> <p>Voltage code - see section 5</p> <p>Options - see section 12 for possible combined options:</p> <p>D = internal drain - only for DLAPX(S) E = external pilot pressure - only for DLAPX(S) O = horizontal cable entrance R = solenoid manual reset (not combinable with V) V = handwheel manual override (not combinable with R)</p> <p>Solenoid threaded connection for cable gland fitting:</p> <p>M = M20x1,5 UNI-4535 (6H/6g) for Multicertification NPT = 1/2" NPT ANSI/ASME B46.1 (tapered) for UL</p>

(1) See section [6](#) for materials specification.

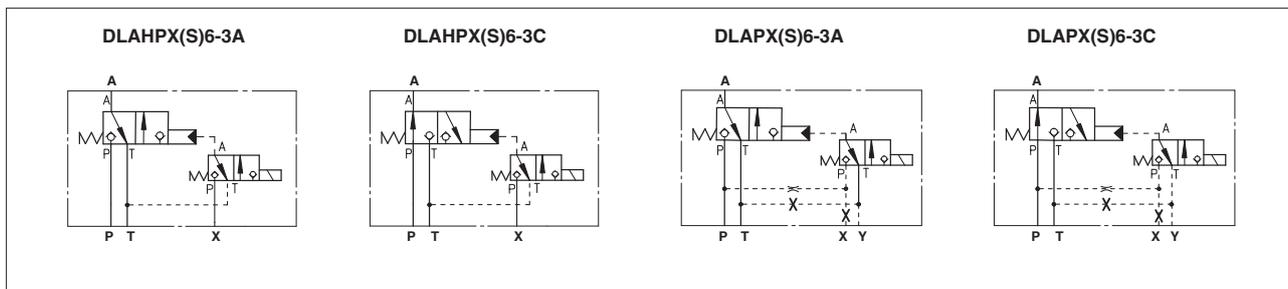
(2) The "X" valves in full stainless steel execution are factory tested by Atos with mineral oil or pure water in order to avoid the contamination of the end user system. At the end of each valve model code must be specified the type of fluid to be used in the valve's testing: "H" for hydraulic oil or "W" for pure water.

(3) Only for Multicertified valves in full stainless steel "X" execution (not available for valves with UL certification)

1.1 Summary of available models

Valve execution		Multicertification		cULus		Max flow (l/min)	Max pressure (bar)
X	XS	Tclass	Power	Tclass	Power		
DLAHPX6	DLAHPXS6	T6, T4	8W	T6, T5	12W	40	315
DLAPX6	DLAPXS6	T6, T4	8W	T6, T5	12W	220	

2 CONFIGURATIONS AND HYDRAULIC SYMBOLS (representation according to ISO 1219-1)



3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
MTTFd values according to EN ISO 13849	75 years; for further details see technical table P007
Ambient temperature	Standard = -40°C ÷ +70°C /PE option = -20°C ÷ +70°C /BBT option = -60°C ÷ +70°C
Storage temperature range	Standard = -40°C ÷ +80°C /PE option = -20°C ÷ +80°C /BBT option = -60°C ÷ +80°C
Compliance	Explosion proof protection, see section 8 -Flame proof enclosure "Ex d" -Dust ignition protection by enclosure "Ex t" RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULIC CHARACTERISTICS

Valve type	DLAHPX6 DLAHPXS6	DLAPX6 DLAPXS6
Valve size	06	not ISO standard
Max operating pressure:	ports P, A, B [bar]: 315 port T [bar]: 110	315
Pilot pressure:	Max [bar]: 315 Min [bar]: 90	315 see diagram at section 14
Max flow [l/min]	40	220
Internal leakage [cm³/min]	less than 5 drops/min (0,36 cm³/min) at max pressure	

! For DLAHPX(S) and for DLAPX(S) with internal drain (option /D) the pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar

5 ELECTRICAL CHARACTERISTICS

Valve type	DLAHPX6 DLAHPXS6	DLAPX6 DLAPXS6	DLAHPX6/UL DLAHPXS6/UL	DLAPX6/UL DLAPXS6/UL
Voltage code (1)	VDC ±10%: 12DC, 24DC, 48DC, 110DC, 125DC, 220DC VAC 50/60 Hz ±10%: 12AC, 24AC, 110AC, 230AC		12DC, 24DC, 110DC, 125DC, 220DC 12AC, 24AC, 110AC, 230AC	
Power consumption at 20°C	8W		12W	
Coil insulation	class H			
Protection degree with relevant cable gland	IP66/67 to DIN EN60529		raintight enclosure, UL approved	
Duty factor	100%			

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid.
 For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

6 MATERIALS SPECIFICATION

Valve type	Solenoid housing	Valve body	Internal parts	Spring	Seals		
					std	/PE	/BBT
DLAHPX	AISI 630	AISI 630	AISI 316L, 420B, 440C, 430F	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)
DLAHPXS	AISI 630	AISI 630	Carbon steel	AISI 302	NBR 70 Sh low temp	FKM (viton)	-
DLAPX	AISI 630	AISI 630	AISI 316L, 420B, 440C, 430F	AISI 302	NBR 70 Sh low temp	FKM (viton)	FMVQ (fluorosilicon)
DLAPXS	AISI 630	AISI 630	Carbon steel	AISI 302	NBR 70 Sh low temp	FKM (viton)	-

7 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature (1)	NBR seals (standard) = -40°C ÷ +60°C FKM seals (/PE option) = -20°C ÷ +80°C FVMQ seals (/BBT option) = -60°C ÷ +60°C		
Recommended viscosity	15÷100 mm ² /s - max allowed range 2.8 ÷ 500 mm ² /s min = 0,9 mm ² /s for X full stainless steel execution with pure water		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR low temp., FKM, FVMQ	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM, FVMQ	HFDU, HFDR	ISO 12922
Flame resistant with water (2)	NBR low temp.	HFA-E, HFA-S, HFB, HFC	

(1) The operating temperature of the fluid must be compatible with the maximum viscosity range allowed for the valve

(2) Performance limitations in case of flame resistant fluids with water:

-max operating pressure = 210 bar -max fluid temperature = 50°C

 The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

8 CERTIFICATION DATA

8.1 Certification data for ambient temperature range -40 ÷ +70°C

Valve type	DLAHPX6, DLAHPXS6 DLAPX6, DLAPXS6		DLAHPX6/ UL , DLAHPXS6/ UL DLAPX6/ UL , DLAPXS6/ UL	
Certifications	Multicertification ATEX IECEx EAC PESO CCC		North American cULus	
Solenoid certified code	OAX/WP OAXS/WP		OAX/EC/WP OAXS/EC/WP	
Temperature class	T6	T4	T6	T5
Surface temperature	≤ 85 °C	≤ 135 °C	≤ 85 °C	≤ 100 °C
Ambient temperature (2)	-40 ÷ +45 °C	-40 ÷ +70 °C	-40 ÷ +55 °C	-40 ÷ +70 °C

8.2 Certification data for ambient temperature range -60 ÷ +70°C (valves with option /BBT)

Valve type	DLAHPX6, DLAPX6	
Certifications	Multicertification ATEX IECEx EAC PESO CCC	
Solenoid certified code	OABX/WP	
Temperature class	T6	T4
Surface temperature	≤ 85 °C	≤ 135 °C
Ambient temperature (2)	-60 ÷ +45 °C	-60 ÷ +70 °C

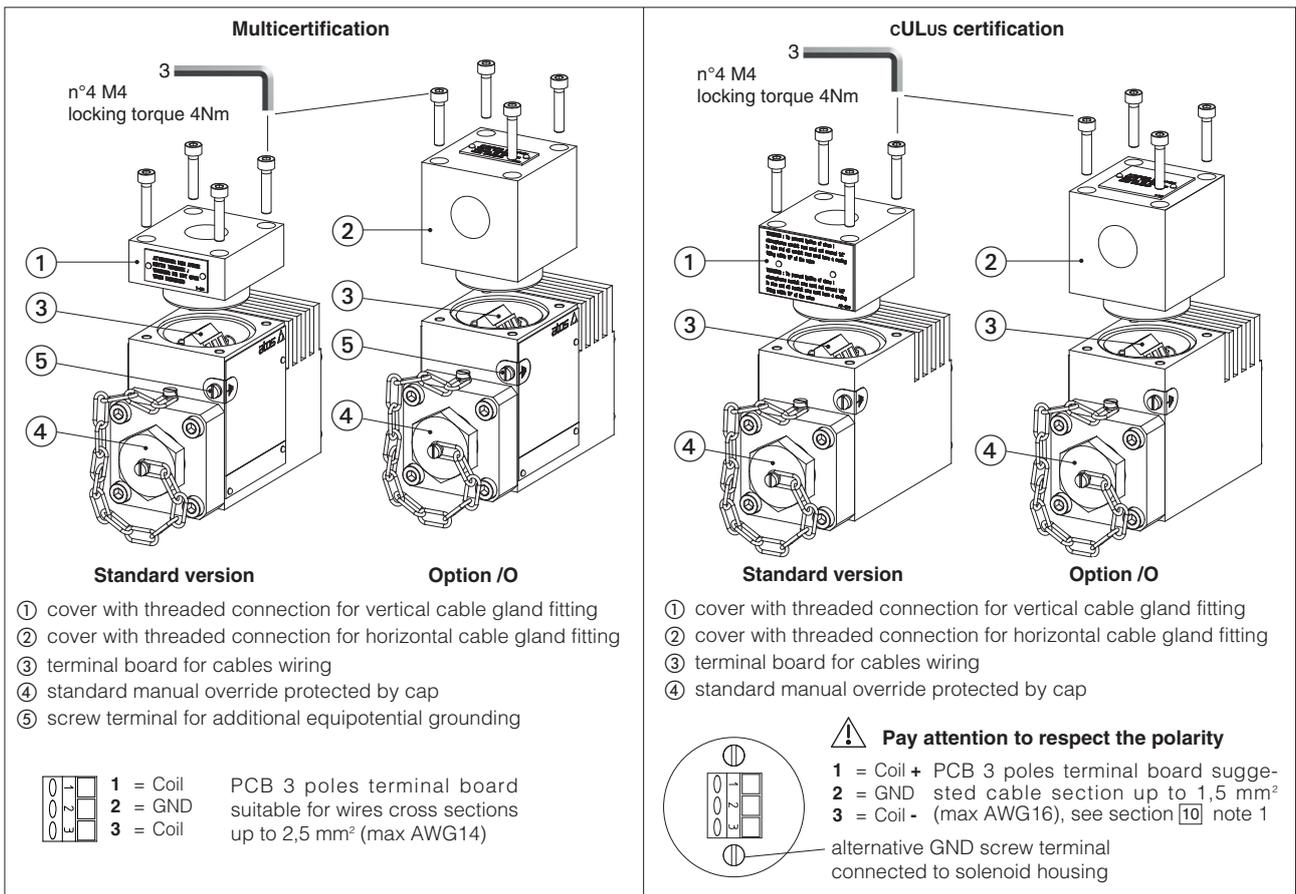
8.3 Certificates and applicable standards

Certifications	Multicertification Group II ATEX IECEx EAC PESO		North American cULus
Type examination certificate (1)	ATEX: CESI 02 ATEX 014 IECEX: IECEx CES 10.0010x EAC: TC RU C-IT. 08.B.01784 PESO: P391133/1 CCC: 2020322307003240		20170324 - E366100
Method of protection	<ul style="list-style-type: none"> • ATEX, EAC Ex II 2G Ex d IIC T6/T4/T3 Gb Ex II 2D Ex tb IIIC T85°C/T200°C Db • IECEx Ex db IIC T6/T4/T3 Gb Ex tb IIIC T85°C/T200°C Db • PESO Ex II 2G Exd IIC T6/T4/T3 Gb • CCC Ex d IIC T6/T4/T3 Gb Ex td A21 IP66/IP67 T85°C/T135°C/T200°C 		<ul style="list-style-type: none"> • UL 1203 Class I, Div.I, Groups C & D Class I, Zone I, Groups IIA & IIB
Applicable standards	EN 60079-0 EN 60079-1 EN 60079-31	IEC 60079-0 IEC 60079-1 IEC 60079-31	UL 1203 and UL429, CSA 22.2 n°30-1986 CSA 22.2 n°139-13
Cable entrance:	M20x1,5		1/2" NPT ANSI/ASME B46.1

(1) The type examiner certificates can be downloaded from www.atos.com

 **WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification**

9 EX PROOF SOLENOIDS WIRING



10 CABLE SPECIFICATION AND TEMPERATURE - Power supply and grounding cables have to comply with following characteristics:

Multicertification	Power supply: section of coil connection wires = 2,5 mm ²	Grounding: section of internal ground wire = 2,5 mm ² section of external ground wire = 4 mm ²
cULus certification:		
<ul style="list-style-type: none"> Suitable for use in Class I Division 1, Gas Groups C Armored Marine Shipboard Cable which meets UL 1309 Tinned Stranded Copper Conductors Bronze braided armor Overall impervious sheath over the armor <p>Any Listed (UBVZ/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm² (14 AWG) having a suitable service temperature range of at least -40°C to +110°C</p> <p>Note 1: For Class I wiring the 3C 1,5 mm² AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.</p>		

10.1 Cable temperature

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

Multicertification

Solenoid code	Max ambient temperature [°C]	Temperature class	Max surface temperature [°C]	Min cable temperature
OA(B)X	45 °C	T6	85 °C	not prescribed
OA(B)XS	70 °C	T4	135 °C	90 °C

cULus certification

Solenoid code	Max ambient temperature [°C]	Temperature class	Max surface temperature [°C]	Min cable temperature
OAX/EC	55 °C	T6	85 °C	100 °C
OAXS/EC	70 °C	T5	100 °C	100 °C

11 CABLE GLANDS - only **Multicertification**

Cable glands with threaded connections M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table **KX800**

Note: a Loctite sealant type 545, should be used on the cable gland entry threads

12 OPTIONS

- O** = horizontal cable entrance , to be selected in case of limited vertical space
- R** = solenoid manual reset (not combinable with /V)
- V** = with handwheel manual override (not combinable with /R)

Only for DLAPX(S)

- D** = internal drain
- E** = external pilot pressure

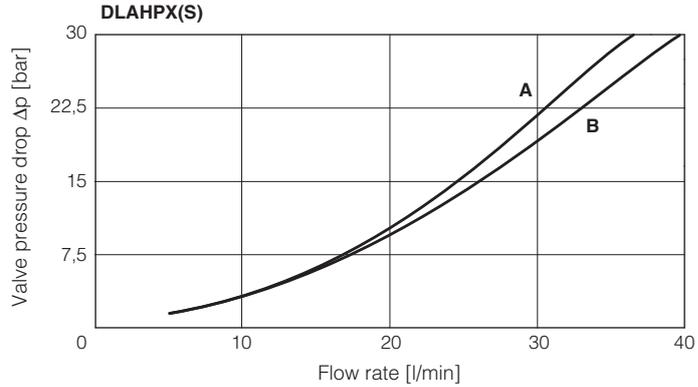
12.1 Possible combined options

DLAHPX(S): OR, OV

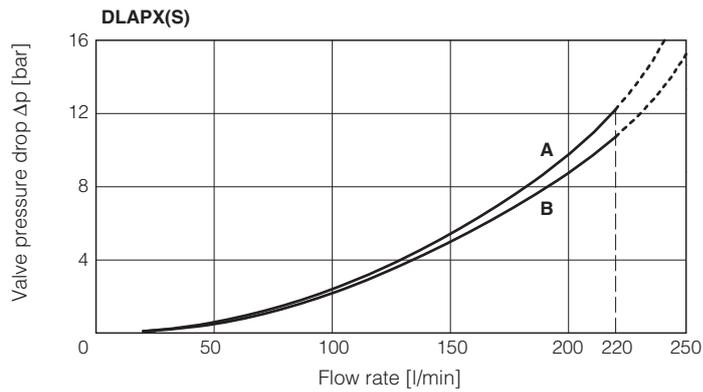
DLAPX(S): DE, DO, DR, DV, EO, ER, EV, OR, OV, DEO, DER, DEV, DOR, DOV, EOR, EOY

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

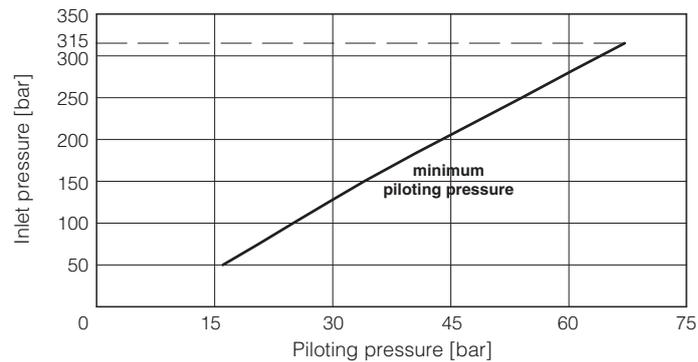
Valve type	Curve	Flow direction
DLAHPX	A	P-A, P-B
DLAHPXS	B	A-T, B-T



Valve type	Curve	Flow direction
DLAPX	A	A-T
DLAPXS	B	P-A



14 MINIMUM PILOT PRESSURE FOR DLAPX(S)



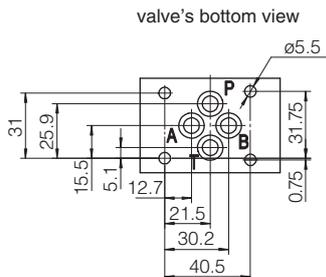
15 FASTENING BOLTS AND SEALS

Type	Size	Fastening bolts	Seals
DLAHPX(S)	06	4 socket head screws M5x75-A4-70 Tightening torque = 5,5 Nm	4 OR 108 Diameter of ports P, A, B, T: Ø 7,5 mm (max)
DLAPX(S)	no ISO standards	4 socket head screws M10x70-A4-70 Tightening torque = 40 Nm	3 OR 3081 Diameter of ports P, A, T: Ø 16 mm (max) 2 OR 108 Diameter of ports X, Y: Ø 7 mm (max)

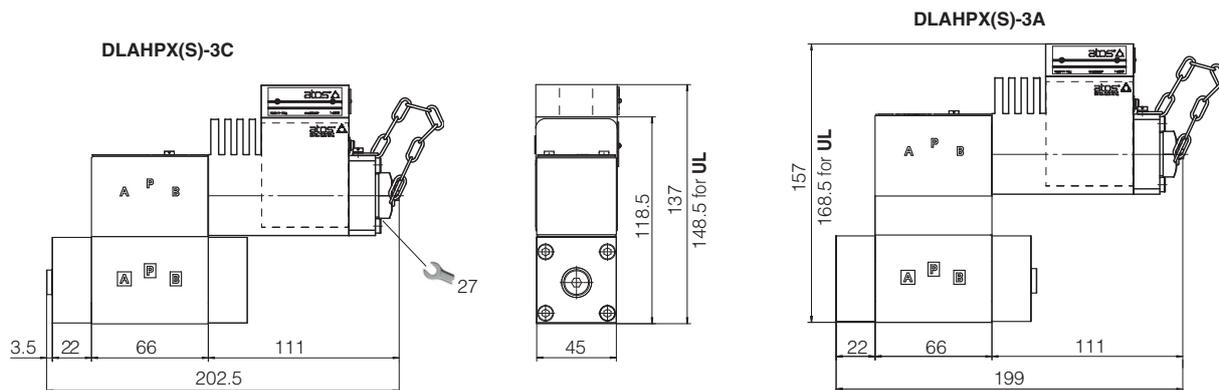
16 INSTALLATION DIMENSIONS OF DLAHPX(S) [mm]

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05

Mass [kg]	
DLAHPX(S)-3A	7,8
DLAHPX(S)-3C	7,5
Option /O	+0,35
Option /V	+0,35



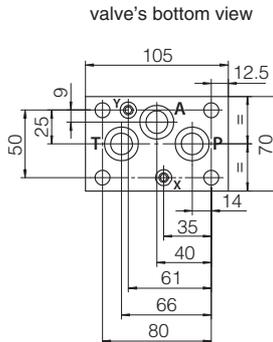
- P** = PRESSURE PORT
- A** = USE PORT
- B** = not used
- T** = TANK PORT
- X** = PILOT PORT



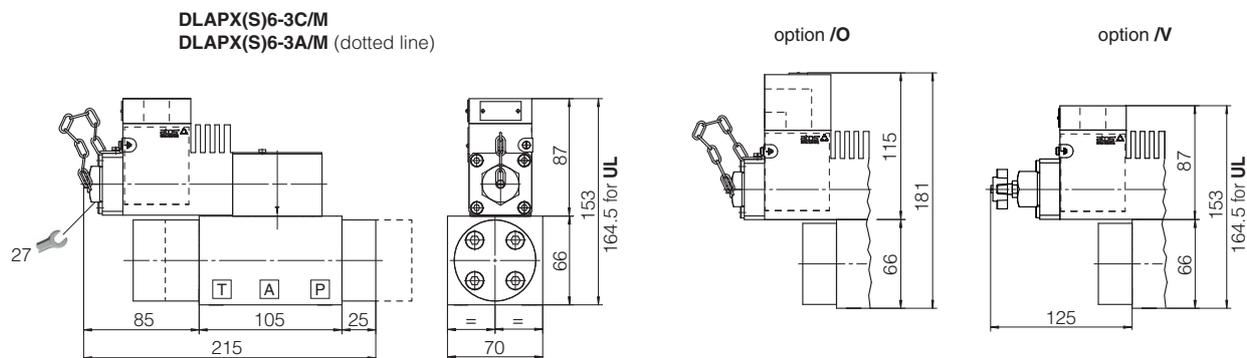
17 INSTALLATION DIMENSIONS OF DLAPX(S) [mm]

Mounting surface not ISO standard

Mass [kg]	
DLAPX(S)6-3A	8,5
DLAPX(S)6-3C	8,5
Option /O	+0,35
Option /V	+0,35



- P** = PRESSURE PORT
- A** = USE POR
- T** = TANK PORT
- X** = PILOT PORT
- Y** = DRAIN PORT



18 RELATED DOCUMENTATION

W010	Basics for electrohydraulics in corrosive environments	X010	Basics for electrohydraulics in hazardous environments
W020	Summary of Atos stainless steel components	KX800	Cable glands for ex-proof valves
EW900	Operating and maintenance information for stainless steel on-off valves	P005	Mounting surfaces for electrohydraulic valves