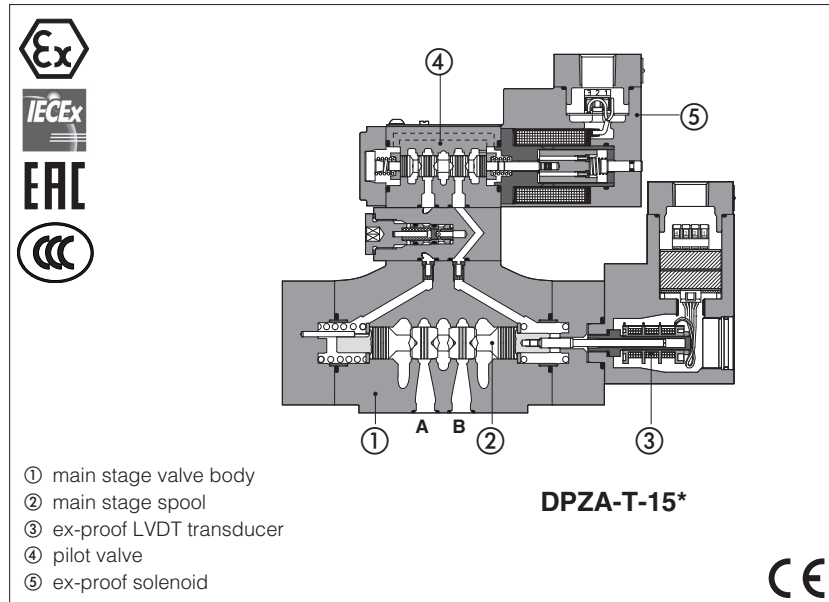


Ex-proof proportional directional valves

piloted, with LVDT transducer and positive spool overlap - **ATEX, IECEx, EAC, CCC**



DPZA-T

Ex-proof proportional valves, piloted, with LVDT position transducer and positive spool overlap, for directional and not compensated speed controls.

They are equipped with ex-proof proportional solenoid and LVDT transducer, certified for safe operations in hazardous environments with potentially explosive atmosphere.

Certifications:

- Multicertification **ATEX, IECEx, EAC** and **CCC** for gas group **II 2G** and dust category **II 2D**
- Multicertification **ATEX** and **IECEx** for gas group **I M2** (mining)

The flameproof enclosure of solenoid and transducer, prevents the propagation of accidental internal sparks or fire to the external environment.

The solenoid is also designed to limit the surface temperature within the classified limits.

Size: **10 ÷ 32** - ISO 4401

Max flow: **180 ÷ 1000 l/min**

Max pressure: **350 bar**

1 MODEL CODE

DPZA	/	*	-	T	-	2	71	-	L	5	/	M	/	*	/	*	/	*
Ex-proof proportional directional valve, piloted																		
Certification type: Multicertification ATEX, IECEx, EAC, CCC: - = omit for Group II 2G / 2D M = Group IM2 (mining)																		
T = with LVDT transducer																		
Valve size ISO 4401: 1 = 10 2 = 16 4 = 25 6 = 32																		
Configuration:																		
Standard																		
Option /B																		
51																		
53																		
71																		
73																		
Seals material, see section 6: - = NBR PE = FKM BT = HNBR (1)																		
Options (3): B = solenoid and position transducer at side of port A of the main stage (2) C = current feedback for position transducer 4 ÷ 20 mA D = internal drain E = external pilot pressure																		
Solenoid and transducer threaded connection for cable gland fitting: GK = GK-1/2" (4) M = M20x1,5 NPT = 1/2" NPT ANSI B2.1 (tapered)																		

Spool size:

	3 (L,S,D)	5 (L,S,D)
DPZA-1 =	-	100
DPZA-2 =	130	200
DPZA-4 =	-	340
DPZA-6 =	-	400

Nominal flow (l/min) at Δp 10bar P-T

Spool type, regulating characteristics:

L = linear

S = progressive

D = differential-progressive



P-A = Q, B-T = Q/2
P-B = Q/2, A-T = Q

(1) Not for multicertification **M** group I (mining)

(2) In standard configuration the solenoid and transducer are at side B of the main stage

(3) Possible combined options: /BC, /BD, /BE, /CD, /CE, /DE

(4) Approved only for the Italian market

⚠ For valve with internal drain (option /D) the pressure at T port makes difficult the manual override operation that can be possible only if the pressure at T port is lower than 50 bar

2 ELECTRONIC DRIVERS

Electronic drivers are factory set with max current limitation for ex-proof valves.

Please include in the driver order also the complete code of the connected ex-proof proportional valve.

Drivers model	E-BM-TEB-* /A	E-BM-TES-* /A
Type	digital	digital
Format	DIN-rail panel	
Data sheet	GS230	GS240

3 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, $R_a \leq 0,8$ recommended $R_a 0,4$ - flatness ratio 0,01/100
MTTFd values according to EN ISO 13849	75 years, see technical table P007
Ambient temperature range	Standard = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ / PE option = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ / BT option = $-40^{\circ}\text{C} \div +70^{\circ}\text{C}$
Storage temperature range	Standard = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ / PE option = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ / BT option = $-40^{\circ}\text{C} \div +70^{\circ}\text{C}$
Surface protection	Zinc coating with black passivation
Corrosion resistance	Salt spray test (EN ISO 9227) > 200h
Compliance	Explosion proof protection, see section 7 -Flame proof enclosure "Ex d" -Dust ignition protection by enclosure "Ex t" RoHs Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

4 HYDRAULIC CHARACTERISTICS - based on mineral oil ISO VG 46 at 50°C

Valve model		DPZA-*-1	DPZA-*-2		DPZA-*-4	DPZA-*-6
Pressure limits	[bar]	ports P, A, B, X = 350; T = 250 (10 for option /D); Y = 10;				
Spool type	standard	L5, S5, D5	L3, S3, D3	L5, S5, D5	L5, S5, D5	L5, S5, D5
Nominal flow	[l/min]					
Δp P-T	Δp = 10 bar	100	130	200	340	400
	Δp = 30 bar	160	220	350	590	700
	max permissible flow	180	320	440	680	1000
Δp max P-T	[bar]	50	60	60	60	70
Piloting pressure	[bar]	min. = 25; max = 350 (option /G advisable for pilot pressure > 200 bar)				
Piloting volume	[cm³]	1,4	3,7		9,0	21,6
Piloting flow (1)	[l/min]	1,7	3,7		6,8	14,4
Leakage (2)	Pilot [cm³/min]	100/300	100/300		200/500	900/2800
	Main stage [l/min]	0,15/0,5	0,2/0,6		0,3/1,0	1,0/3,0
Response time (1)	[ms]	≤ 70	≤ 85		≤ 100	≤ 130
Hysteresis		≤ 1 [% of max regulation]				
Repeatability		± 0,5 [% of max regulation]				
Thermal drift		zero point displacement < 1% at ΔT = 40°C				

Note: above performance data refer to valves coupled with Atos electronic drivers, see section 2

(1) 0 ÷ 100% step signal and pilot pressure 100 bar

(2) at $\Delta p = 100/350$ bar

5 ELECTRICAL CHARACTERISTICS

Max. power	35W
Insulation class	H (180°) Due to the occurring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account
Protection degree with relevant cable gland	Multicertification: IP66/67 to DIN EN60529
Duty factor	Continuous rating (ED=100%)
Voltage code	standard
Coil resistance R at 20°C	3,2 Ω
Max. solenoid current	2,5 A

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

Seals, recommended fluid temperature	NBR seals (standard) = $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$, with HFC hydraulic fluids = $-20^{\circ}\text{C} \div +50^{\circ}\text{C}$ FKM seals (/PE option) = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ HNBR seals (/BT option) = $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$, with HFC hydraulic fluids = $-40^{\circ}\text{C} \div +50^{\circ}\text{C}$		
Recommended viscosity	20 ÷ 100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	normal operation longer life	ISO4406 class 18/16/13 NAS1638 class 7 ISO4406 class 16/14/11 NAS1638 class 5	see also filter section at www.atos.com or KTF catalog
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM, HNBR	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water (1)	NBR, HNBR	HFC	

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

(1) **performance limitations in case of flame resistant fluids with water:**

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

7 CERTIFICATION DATA

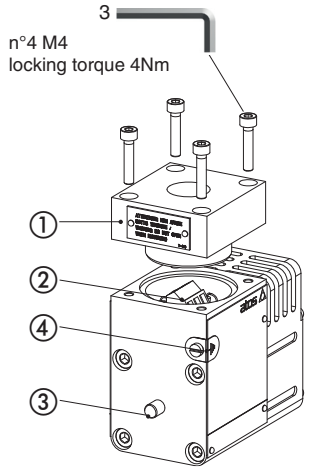
Valve type	DPZA		DPZA/M
Certifications	Multicertification Group II ATEX IECEx EAC CCC		Multicertification Group I ATEX IECEx
Solenoid certified code (pilot stage)	OZA-A		OZAM-A
Type examination certificate (1)	ATEX: CESI 02 ATEX 014 IECEX: IECEX CES 10.0010x EAC: RU C - IT.A 38.B.00425/21 CCC: 2024322307005903		ATEX: CESI 03 ATEX 057x IECEX: IECEX CES 12.0007x
Method of protection	• ATEX: Ex II 2G Ex db IIC T4/T3 Gb Ex II 2D Ex tb IIIC T135°C/T200°C Db • IECEx: Ex db IIC T4/T3 Gb Ex tb IIIC T135°C/T200°C Db • EAC: 1Ex d IIC T4/T3 Gb X Ex tb IIIC T135°C/T200°C Db X • CCC: Ex d IIC T4/T3 Gb Ex tD A21 IP66/IP67 T135°C/T200°C		• ATEX: Ex I M2 Ex db I Mb • IECEx: Ex db I Mb
LVDT transducer certified code (main stage)	ETHA-4/*		ETHAM-4/*
Type examination certificate (1)	ATEX: CESI 02 ATEX 015X / 06 IECEX: IECEX CES 12.006X EAC: RU C - IT.A 38.B.00425/21 CCC: 2024322315005904		ATEX: CESI 03 ATEX 057x IECEX: IECEX CES 12.0007x
Method of protection	• ATEX: Ex II 2G Ex db IIC T6/T5/T4 Gb Ex II 2D Ex tb IIIC T85°C/T100°C/135°C Db • IECEx: Ex db IIC T6/T5/T4 Gb Ex tb IIIC T85°C/T100°C/135°C Db • EAC: 1Ex d IIC T4/T3 Gb X Ex tb IIIC T135°C/T200°C Db X • CCC: Ex d IIC T6/T5/T4 Gb Ex tD A21 IP66/IP67 T85°C/T135°C/T200°C		• ATEX: Ex I M2 Ex db I Mb • IECEx: Ex db I Mb
Temperature class	T4	T3	-
Surface temperature	≤ 135°C	≤ 200°C	≤ 150°C
Ambient temperature (2)	-40 ÷ +40°C	-40 ÷ +70°C	-20 ÷ +60°C
Applicable standards	EN 60079-0; EN 60079-1; EN 60079-31		IEC 60079-0; IEC 60079-1; IEC 60079-31
Cable entrance: threaded connection	GK = GK-1/2" M = M20x1,5 NPT = 1/2" NPT		

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

(2) In case the complete valve must withstand with minimum ambient temperature of -40°C, select **/BT** in the model code

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

8 EX PROOF SOLENOIDS AND TRANSDUCERS WIRING

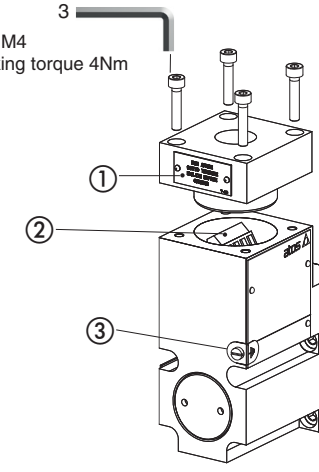


SOLENOID

① cover with threaded connection for vertical cable gland fitting
② terminal board for cables wiring
③ standard manual override
④ screw terminal for additional equipotential grounding

Solenoid wiring

0	1	= Coil	PCB 3 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)
0	2	= GND	
0	3	= Coil	



TRANSDUCER

① cover with threaded connection for vertical cable gland fitting
② terminal board for cables wiring
③ screw terminal for additional equipotential grounding

Position transducer wiring

0	1	= Output signal	PCB 4 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)
0	2	= Supply -15 V	
0	3	= Supply +15 V	
0	4	= GND	

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

Multicertification Group I and Group II

Power supply: section of coil connection wires = 2,5 mm²

Grounding: section of internal ground wire = 2,5 mm²
section of external ground wire = 4 mm²

9.1 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.

SOLENOID - Multicertification

Max ambient temperature [°C]	Temperature class		Max surface temperature [°C]		Min. cable temperature [°C]	
	Group I	Group II	Group I	Group II	Group I	Group II
40°C	-	T4	150°C	135°C	90°C	90°C
45°C	-	T4	-	135°C	-	95°C
55°C	-	T3	-	200°C	-	110°C
60°C	-	-	150°C	-	110°C	-
70°C	N.A.	T3	N.A.	200°C	N.A.	120°C

TRANSDUCER - Multicertification

Max ambient temperature [°C]	Temperature class		Max surface temperature [°C]		Min. cable temperature [°C]	
	Group I	Group II	Group I	Group II	Group I	Group II
40°C	N.A.	T6	150°C	85°C	-	-
70°C	N.A.	T6	150°C	85°C	90°C	90°C

10 CABLE GLANDS

Cable glands with threaded connections GK-1/2", 1/2"NPT or 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

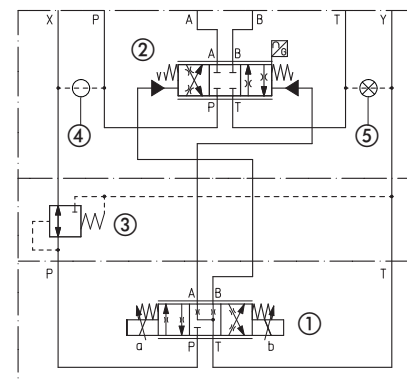
11 OPTIONS

- B** = DPZA-*-5 = solenoid and integral electronics at side of port B of the main stage.
DPZA-*-7 = integral electronics at side of port B of the main stage.
- C** = Position transducer with current feedback 4÷20 mA, suggested in case of long distance between the electronic driver and the proportional valve
- D and E** = Pilot and drain configuration can be modified as shown in section **13**.
The valve's standard configuration provides internal pilot and external drain.
For different pilot / drain configuration select:
- Option /D Internal drain.
Option /E External pilot (through port X).

11.1 Possible combined options: /BC, /BD, /BE, /CD, /CE, /DE

FUNCTIONAL SCHEME

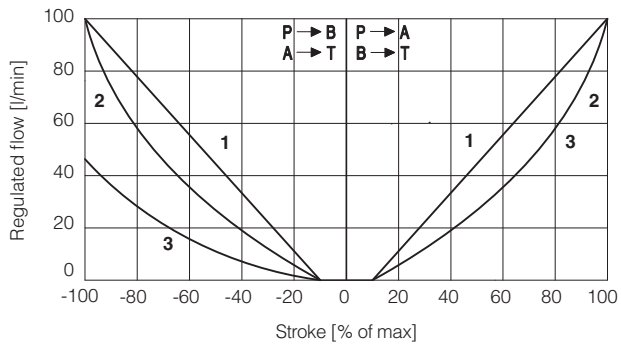
example of configuration 7*
3 positions, spring centered



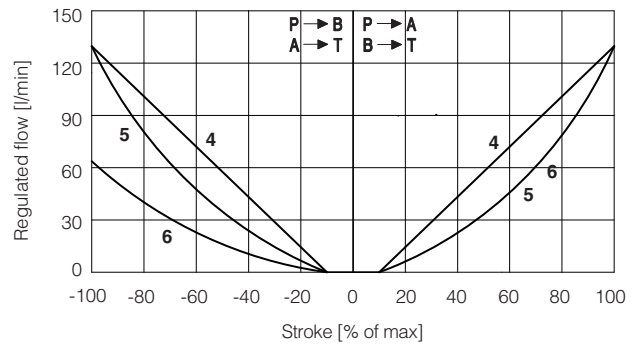
- ① Pilot valve
② Main stage
③ Pressure reducing valve
④ Plug to be added for external pilot through port X
⑤ Plug to be removed for internal drain through port T

12 DIAGRAMS (based on mineral oil ISO VG 46 at 50°C)

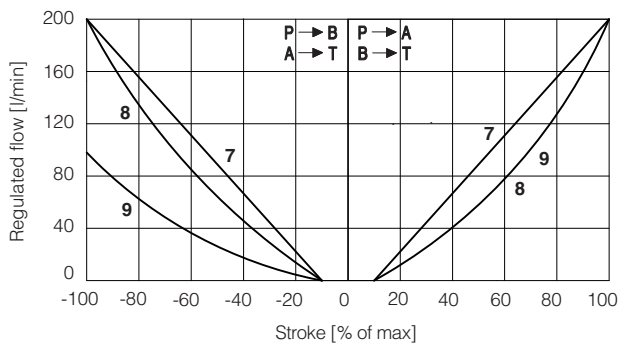
Regulation diagrams (values measure at Δp 10 bar P-T)



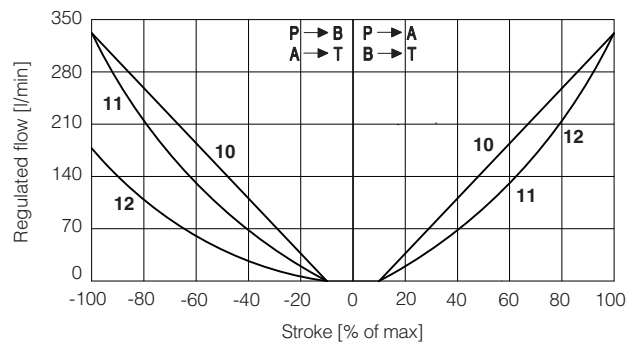
DPZA-1:
1 = L5 2 = S5 3 = D5



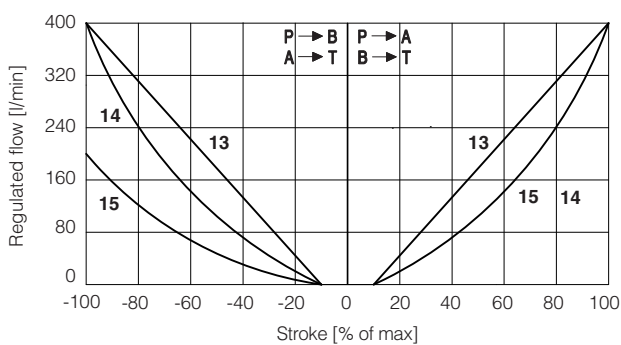
DPZA-2:
4 = L3 5 = S3 6 = D3



DPZA-3:
7 = L5 8 = S5 9 = D5



DPZA-4:
10 = L5 11 = S5 12 = D5



DPZA-6:
13 = L5 14 = S5 15 = D5

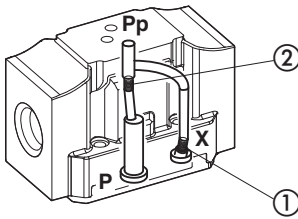
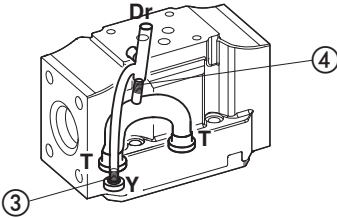
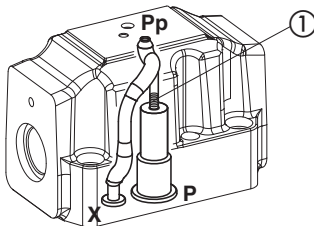
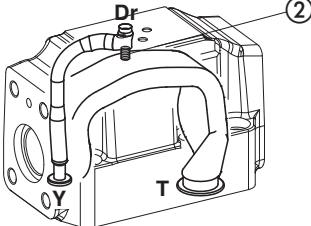
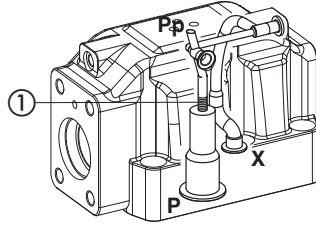
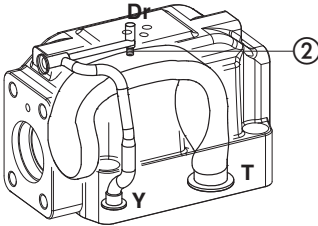
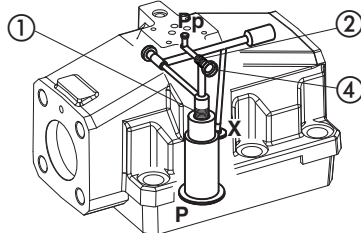
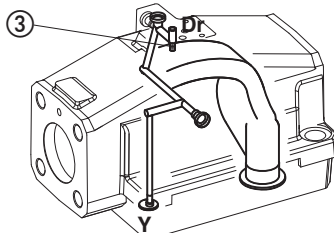
Note: Hydraulic configuration vs. reference signal for configuration 71 and 73 (standard and option /B)

Reference signal $\left. \begin{matrix} 0 \div +10 \text{ V} \\ 12 \div 20 \text{ mA} \end{matrix} \right\} P \rightarrow A / B \rightarrow T$

Reference signal $\left. \begin{matrix} 0 \div -10 \text{ V} \\ 12 \div 4 \text{ mA} \end{matrix} \right\} P \rightarrow B / A \rightarrow T$

13 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

Depending on the position of internal plugs, different pilot/drain configurations can be obtained as shown below.
To modify the pilot/drain configuration, proper plugs must only be interchanged. The plugs have to be sealed using loctite 270.
Standard valves configuration provides internal pilot and external drain

DPZA-1	Pilot channels	Drain channels	Internal piloting: blinded plug SP-X300F ① in X; External piloting: blinded plug SP-X300F ② in Pp; Internal drain: blinded plug SP-X300F ③ in Y; External drain: blinded plug SP-X300F ④ in Dr.
			
DPZA-2	Pilot channels	Drain channels	Internal piloting: Without blinded plug SP-X300F ①; External piloting: Add blinded plug SP-X300F ①; Internal drain: Without blinded plug SP-X300F ②; External drain: Add blinded plug SP-X300F ②.
			
DPZA-4	Pilot channels	Drain channels	Internal piloting: Without blinded plug SP-X500F ①; External piloting: Add blinded plug SP-X500F ①; Internal drain: Without blinded plug SP-X300F ②; External drain: Add blinded plug SP-X300F ②.
			
DPZA-6	Pilot channels	Drain channels	Internal piloting: Without plug ①; External piloting: Add DIN-908 M16x1,5 in pos ①; Add plug SP-X325A in pos ②; Internal drain: Without blinded plug SP-X300F ③; External drain: Add blinded plug SP-X300F ③.
			
To reach the orifice ② remove plug ④ = G1/8"			

14 FASTENING BOLTS AND SEALS

	DPZA-1 Fastening bolts: 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm	DPZA-2 Fastening bolts: 4 socket head screws M10x50 class 12.9 Tightening torque = 70 Nm 2 socket head screws M6x45 class 12.9 Tightening torque = 15 Nm	DPZA-4 Fastening bolts: 6 socket head screws M12x60 class 12.9 Tightening torque = 125 Nm	DPZA-6 Fastening bolts: 6 socket head screws M20x80 class 12.9 Tightening torque = 600 Nm
	Seals: 5 OR 2050 Diameter of ports A, B, P, T: Ø 11 mm (max) 2 OR 108 Diameter of ports X, Y: Ø 5 mm (max)	Seals: 4 OR 130 Diameter of ports A, B, P, T: Ø 20 mm (max) 2 OR 2043 Diameter of ports X, Y: Ø 7 mm (max)	Seals: 4 OR 4112 Diameter of ports A, B, P, T: Ø 24 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø 7 mm (max)	Seals: 4 OR 144 Diameter of ports A, B, P, T: Ø 34 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø 7 mm (max)

DPZA-1

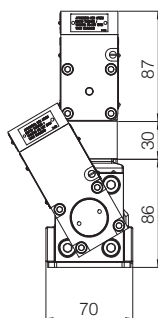
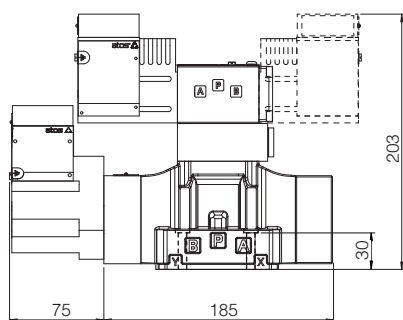
ISO 4401: 2005 (see table P005)

Mounting surface: 4401-05-05-0-05

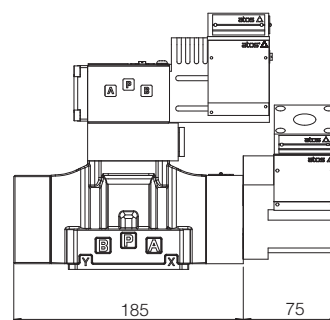
Mass [kg]	
DPZA-*-15*	10,4
DPZA-*-17*	11,8

DPZA-T-15*

DPZA-T-17* (dotted line)



DPZA-T-15* /B



DPZA-2

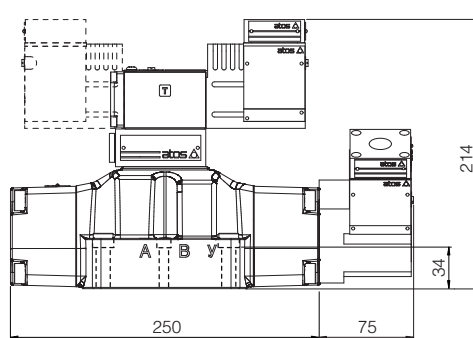
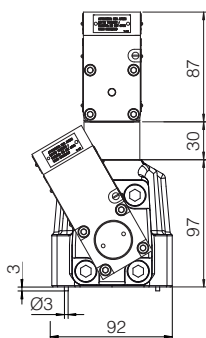
ISO 4401: 2005

Mounting surface: 4401-07-07-0-05 (see table P005)

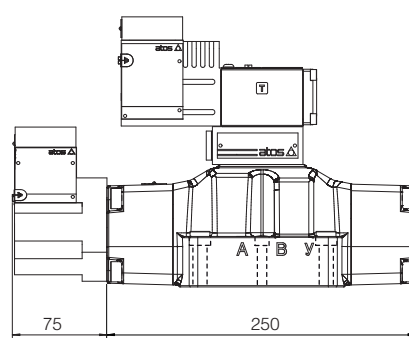
Mass [kg]	
DPZA-*-25*	13,3
DPZA-*-27*	14,7

DPZA-T-25*

DPZA-T-27* (dotted line)



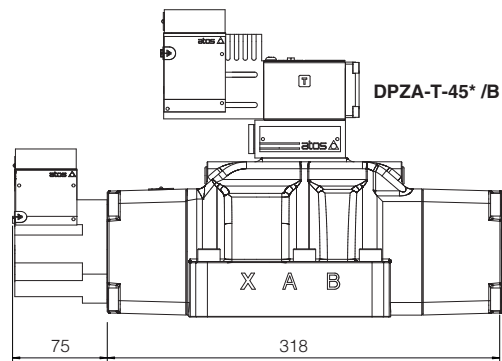
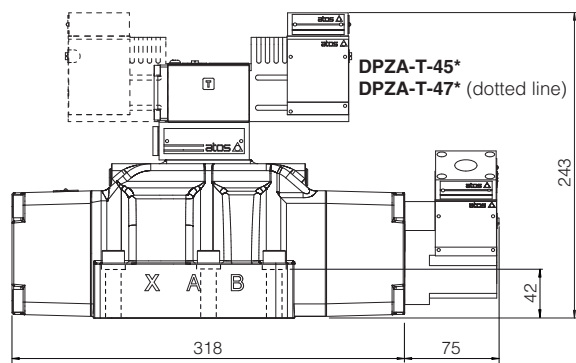
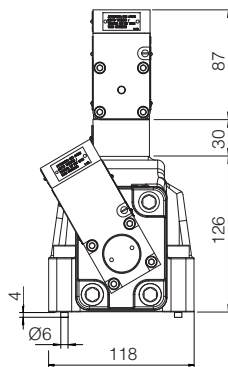
DPZA-T-25* /B



DPZA-4

ISO 4401: 2005 (see table P005)
Mounting surface: 4401-08-08-0-05

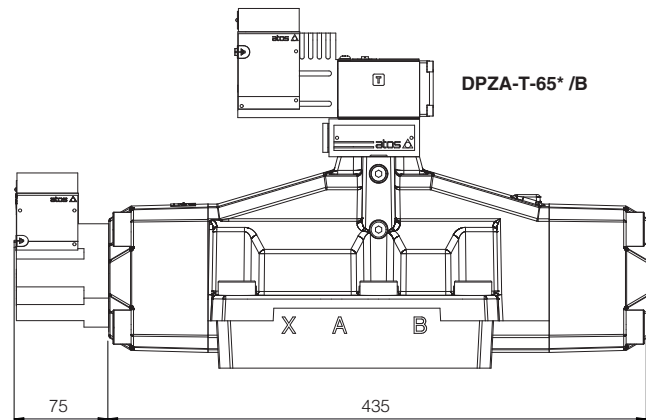
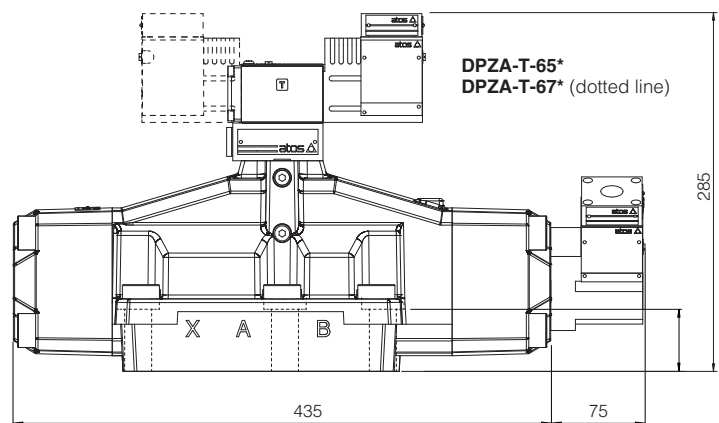
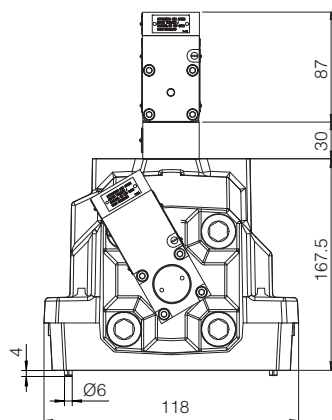
Mass [kg]	
DPZA-*-45*	20,8
DPZA-*-47*	22,2



DPZA-6

ISO 4401: 2005 (see table P005)
Mounting surface: 4401-10-09-0-05

Mass [kg]	
DPZA-*-65*	47,3
DPZA-*-67*	48,7



16 RELATED DOCUMENTATION

X010	Basics for electrohydraulics in hazardous environments
X020	Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO, CCC
FX900	Operating and maintenance information for ex-proof proportional valves
KX800	Cable glands for ex-proof valves
P005	Mounting surfaces for electrohydraulic valves