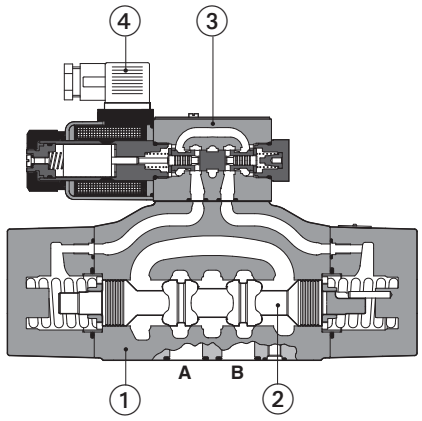
Proportional directional valves

piloted, without transducer, with positive spool overlap



DPZE-A-251-*

① Valve body
② Main spool
③ Pilot valve
④ Electronic connector type 666 (supplied with the valve)

DPZE-A

Piloted proportional valves without position transducer and with positive spool overlap, for open loop directional controls and not compensated flow regulations.

They operate in association with electronic derivers, see section 2, which supply the proportional valve with proper current to align the hydraulic regulation to the reference signal.

The solenoid are certified according to North American standards cURus.

Mounting surface: **ISO 4401**

Size: **10** ÷ **32** - ISO 4401
Max flow: **180** ÷ **1500 l/min**
Max pressure: **350 bar**

1 MODEL CODE

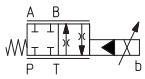
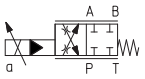
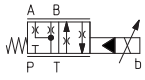
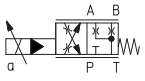
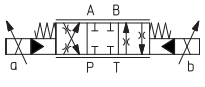
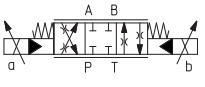
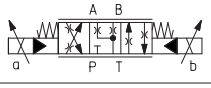
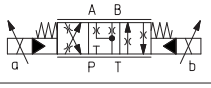
DPZE	-	A	-	2	71	-	L	5	/	*	-	*	/	*	*	/	*

DPZE: Proportional directional valve, piloted

A = for off-board driver, see section 2

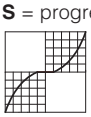
Valve size ISO 4401:
1 = 10 **2** = 16 **4** = 25 **6** = 32

Configuration:

	Standard	Option **/B**
51 =		
53 =		
71 =		
73 =		

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

Spool size:

	3 (L,S,D)	**5** (L,S,D)
DPZE-1 =	-	100
DPZE-2 =	160	250
DPZE-4 =	-	480
DPZE-6 =	-	640

Nominal flow (l/min) at Δp 10bar P-T

Hydraulic options, see sect. 9:
B = solenoid at side of port B of the main stage (side A of pilot valve) **(1)** - only for configuration 51and 53
D = internal drain
E = external pilot pressure
G = pressure reducing valve for piloting

Coils with special connectors, see section 11
- = omit for standard DIN connector
J = AMP Junior Timer connector
K = Deutsch connector
S = Lead Wire connection

Coil voltage, see section 2, 6:
- = standard coil for 24V$_{DC}$ Atos drivers
6 = optional coil for 12V$_{DC}$ Atos drivers
18 = optional coil for low current drivers **(2)**

Series number

Seals material, see sect. 7:
- = NBR
PE = FKM
BT = HNBR

(1) In standard configuration the solenoid (config. 51 and 53) is at side A of the main stage (side B of pilot valve)
(2) Select valve's coil voltage **/18** in case of electronic drivers not supplied by Atos, with power supply 24V$_{DC}$ and with max current limited to 1A.

2 OFF-BOARD ELECTRONIC DRIVERS

Drivers model	E-MI-AC-01F		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	Analog		Digital				
Voltage supply (VDC)	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	plug-in to solenoid				DIN-rail panel		
Tech table	G010		G020		G030		GS050

3 GENERAL NOTES

Atos digital proportionals valves are CE marked according to the applicable directives (e.g. Immunity and Emission EMC Directive).
Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in tech table **FS900** and in the installation notes supplied with relevent components.

4 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index: Ra ≤ 0,8, recommended Ra 0,4 – Flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	75 years, see technical table P007
Ambient temperature range	**Standard** = -20°C ÷ +70°C **/PE** option = -20°C ÷ +70°C **/BT** option = -40°C ÷ +60°C
Storage temperature range	**Standard** = -20°C ÷ +80°C **/PE** option = -20°C ÷ +80°C **/BT** option = -40°C ÷ +70°C
Surface protection	Zinc coating with black passivation
Corrosion resistance	Salt spray test (EN ISO 9227) > 200 h
Compliance	CE according to EMC directive 2014/30/EU (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

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

Valve model	**DPZE-*-1**	**DPZE-*-2**		**DPZE-*-4**	**DPZE-*-6**
Pressure limits [bar]	ports **P**, **A**, **B**, **X** = 350; **T** = 250 (10 with internal drain /D) **Y** = 10				
Spool type	**L5, S5, D5**	**L3, S3, D3**	**L5, S5, D5**		
Nominal flow Δp P-T [l/min] **(1)**					
Δp= 10 bar	100	160	250	480	640
Δp= 30 bar	160	270	430	830	1100
Max permissible flow	180	400	550	900	1500
Piloting pressure [bar]	min = 25; max = 350 (option /G advisable for pilot pressure > 150 bar)				
Piloting volume [cm³]	1,4	3,7		9,0	21,6
Piloting flow **(2)** [l/min]	1,7	3,7		6,8	14,4
Leakage **(3)** [l/min]	0,15 / 0,5	0,2 / 0,6		0,3 / 1,0	1,0 / 3,0
Response time **(4)** [ms]	≤ 80	≤ 100		≤ 120	≤ 180
Hysteresis	≤ 5 [% of max regulation]				
Repeatibility	± 1 [% of max regulation]				

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

(1) For different Δp, the max flow is in accordance to the diagrams in section 8.2
(2) With step reference input signal 0 ÷100 %
(3) At P = 100/350 bar
(4) 0-100% step signal

6 ELECTRICAL CHARACTERISTICS

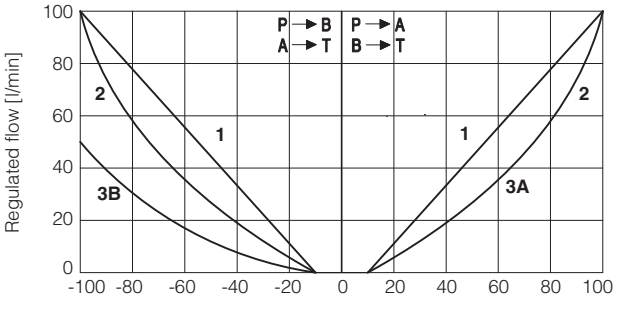
Coil voltage code	**Standard** standard coil to be used with Atos drivers with power supply 24VDC	option **/6** optional coil to be used with Atos drivers with power supply 12 VDC	option **/18** optional coil to be used with electronic drivers not supplied by Atos, with power supply 24 VDC and max current limited to 1A
Max. solenoid current	2,5 A	3 A	1,2 A
Coil resistance R at 20°C	3,1 Ω	2,1 Ω	13,1 Ω
Insulation class	H (180°) Due to the occuring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account		
Protection degree to DIN EN60529	**IP 65** (with connectors 666 correctly assembled)		
Duty factor	Continuous rating (ED=100%)		
Certification	**cURus** North American Standards		

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

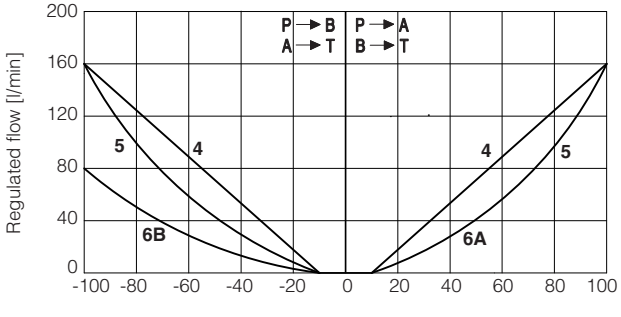
Seals, recommended fluid temperature		NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity		20 ÷ 100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	normal operation	ISO4406 class 18/16/13 NAS1638 class 7		see also filter section at www.atos.com or KTF catalog
	longer life	ISO4406 class 16/14/11 NAS1638 class 5		
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		NBR, HNBR	HFC	

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

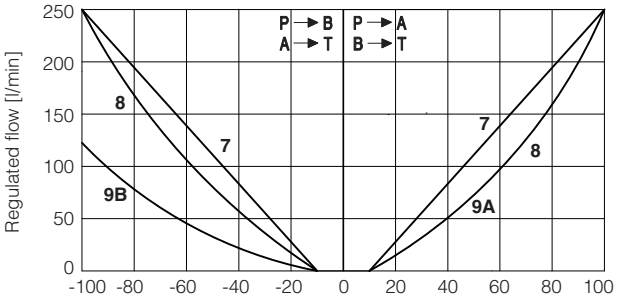
8.1 Regulation diagrams (values measure at Δp 10 bar P-T)



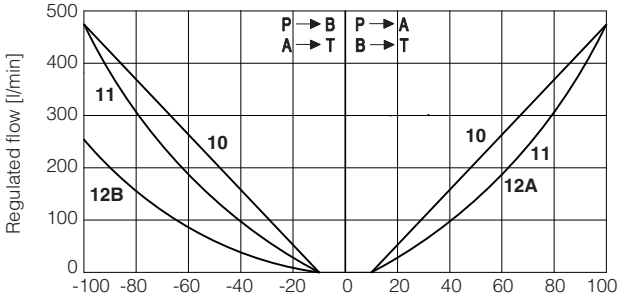
DPZE-1:
1 = L5 **2** = S5 **3A** = D5 (P → A, A → T)
3B = D5 (P → B, B → T)



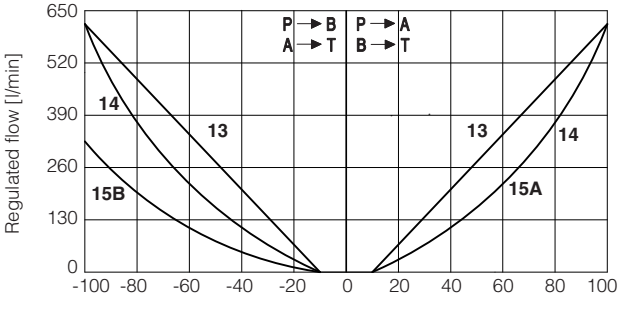
DPZE-2:
4 = L3 **5** = S3 **6A** = D3 (P → A, A → T)
6B = D3 (P → B, B → T)



DPZE-2:
7 = L5 **8** = S5 **9A** = D5 (P → A, A → T)
9B = D5 (P → B, B → T)



DPZE-4:
10 = L5 **11** = S5 **12A** = D5 (P → A, A → T)
12B = D5 (P → B, B → T)



DPZE-6:
13 = L5 **14** = S5 **15A** = D5 (P → A, A → T)
15B = D5 (P → B, B → T)

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

Reference signal $\begin{matrix}0 \div +10\ V\\12 \div 20\ mA\end{matrix}\}$ P → A / B → T

Reference signal $\begin{matrix}0 \div -10\ V\\12 \div 4\ mA\end{matrix}\}$ P → B / A → T

8.2 Flow /Δp diagram

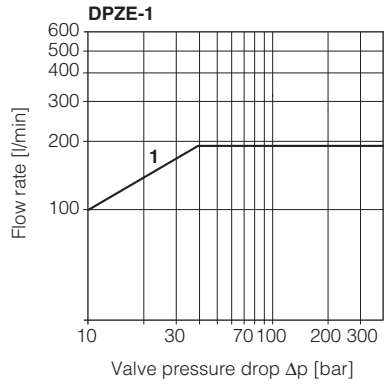
stated at 100% of spool stroke

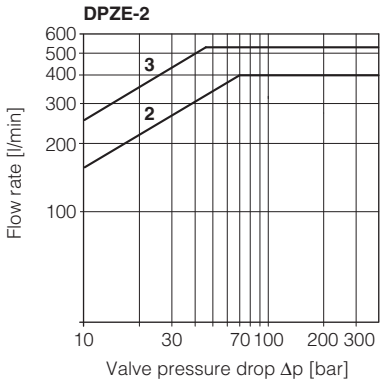
DPZE-1:
1 = spools L5, S5, D5

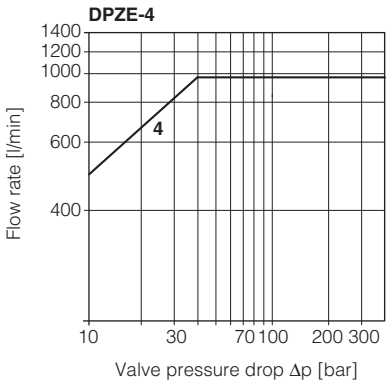
DPZE-2:
2 = spools L3, S3, D3
3 = spools L5, S5, D5

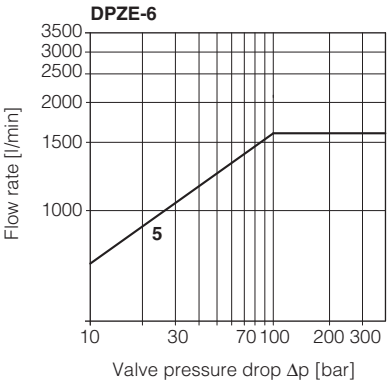
DPZE-4:
4 = spools L5, S5, D5

DPZE-6:
5 = spools L5, S5, D5



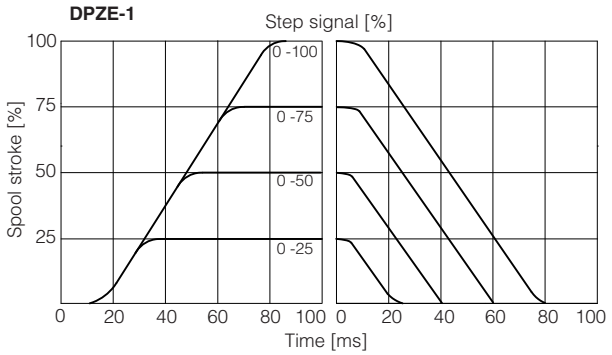


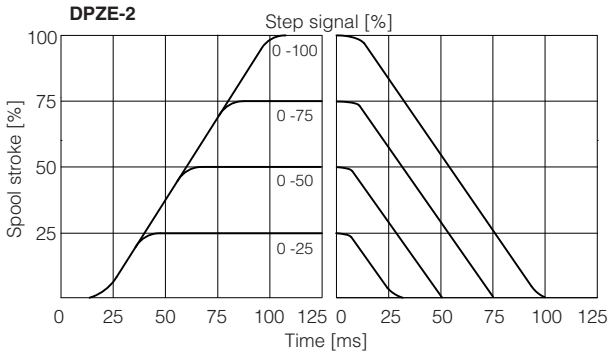


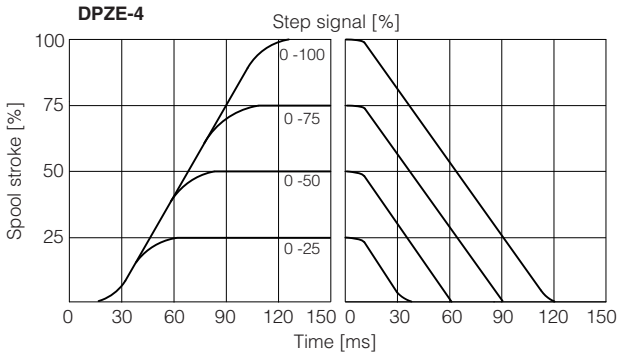


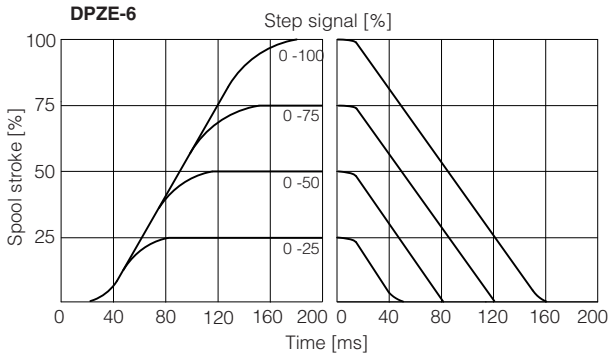
8.3 Response time (measured at pilot pressure = 100 bar)

The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.



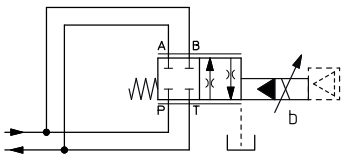






8.4 Operation as throttle valve

Single solenoid valves (*51) can be used as simple throttle valves:
Pmax = 250 bar



DPZE-A-	151-L5	251-L5	451-L5	651-L5
Max flow [l/min] Δp = 15 bar	320	860	1600	2200

9 HYDRAULIC OPTIONS

B = solenoid at side B of the main stage (side A of pilot valve).

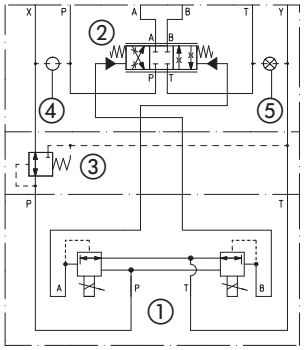
D = Internal drain.
Pilot and drain configuration can be modified as shown in section 12.
The valve's standard configuration provides internal pilot and external drain.

E = External pilot (through port X).
Pilot and drain configuration can be modified as shown in section 12.
The valve's standard configuration provides internal pilot and external drain.

G = Pressure reducing valve installed between pilot valve and main body with fixed setting:
DPZE-1 and DPZE-2 = **40 bar**
DPZE-4 and DPZE-6 = **100 bar**
It is advisable for valves with internal pilot in case of system pressure higher than 150 bar.

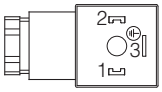
Functional Scheme

Example of configuration 7*
3 positions, spring centered



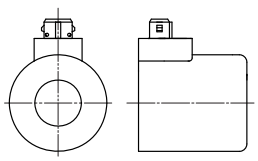
① Pilot valve
② Main stage
③ Pressure reducing valve
④ Plug to be added for external pilot trough port X
⑤ Plug to be removed for internal drain through port T

10 SOLENOID CONNECTION

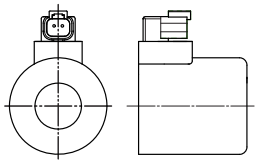
PIN	SIGNAL	TECHNICAL SPECIFICATION	Connector code 666
1	**COIL**	Power supply	
2	**COIL**	Power supply	
3	**GND**	Ground	

11 COILS WITH SPECIAL CONNECTORS

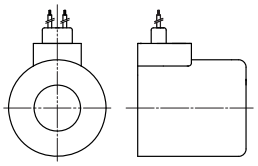
Options -J
Coil type COZEJ
AMP Junior Timer connector
Protection degree IP67



Options -K
Coil type COZEK
Deutsch connector, DT-04-2P male
Protection degree IP67



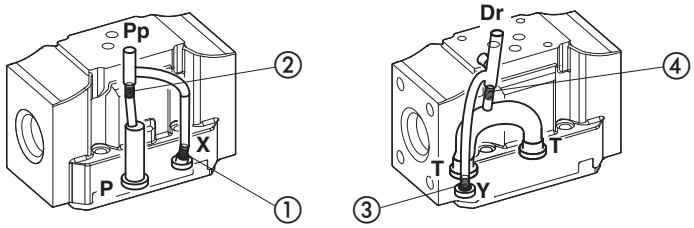
Options -S
Coil type COZES
Lead Wire connection
Cable lenght = 180 mm



12 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

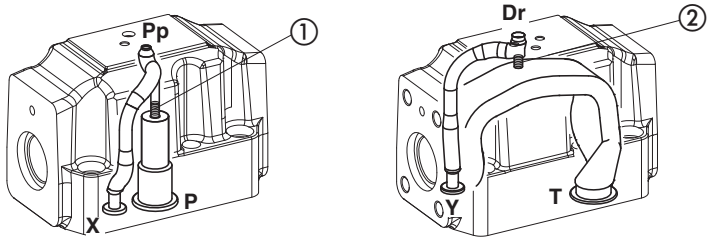
Depending on the position of internal plugs, different pilot/drain configurations can be obtained as shown below.
To modify the pilot/drain configuration, proper plugs must only be interchanged. The plugs have to be sealed using loctite 270.
Standard valves configuration provides internal pilot and external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

DPZE-1 Pilot channels Drain channels



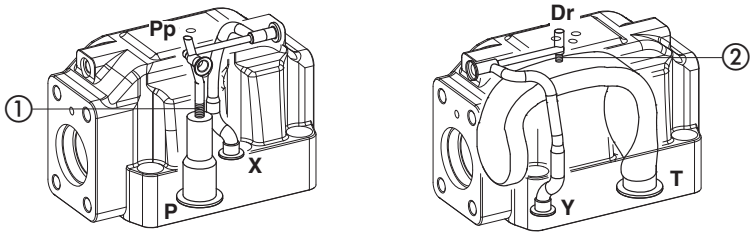
Internal piloting: blinded plug SP-X300F ① in X;
External piloting: blinded plug SP-X300F ② in Pp;
Internal drain: blinded plug SP-X300F ③ in Y;
External drain: blinded plug SP-X300F ④ in Dr.

DPZE-2 Pilot channels Drain channels



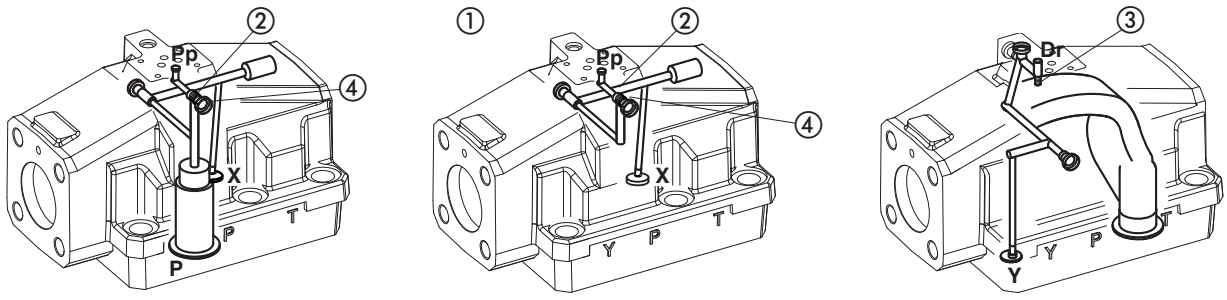
Internal piloting: Without blinded plug SP-X300F ①;
External piloting: Add blinded plug SP-X300F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

DPZE-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.

DPZE-6 Pilot channels Pilot channels Drain channels



Internal piloting:
plug SP-X325A in pos ②;

To reach the orifice ②, remove plug ④ = G 1/8”

External piloting:
plug SP-X325A in pos ②;

Internal drain:
Without blinded plug SP-X300F ③;

External drain:
Add blinded plug SP-X300F ③.

13 FASTENING BOLTS AND SEALS

Type	Size	Fastening bolts	Seals
DPZE	**1** = 10	4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm	5 OR 2050; Diameter of ports A, B, P, T: Ø 11 mm (max) 2 OR 108 Diameter of ports X, Y: Ø = 7 mm (max)
	2 = 16	4 socket head screws M10x50 class 12.9 Tightening torque = 70 Nm 2 socket head screws M6x45 class 12.9 Tightening torque = 15 Nm	4 OR 130; Diameter of ports A, B, P, T: Ø 20 mm (max) 2 OR 2043 Diameter of ports X, Y: Ø = 9 mm (max)
	4 = 25	6 socket head screws M12x60 class 12.9 Tightening torque = 125 Nm	4 OR 4112; Diameter of ports A, B, P, T: Ø 25 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø = 11.5 mm (max)
	6 = 32	6 socket head screws M20x80 class 12.9 Tightening torque = 600 Nm	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)

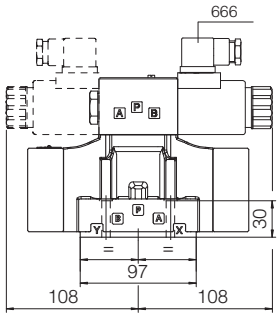
14 INSTALLATION DIMENSIONS [mm]

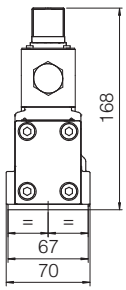
DPZE-1*

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

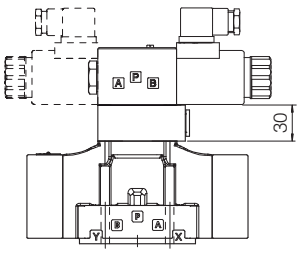
Mass [kg]

	A
DPZE-*-25*	6,9
DPZE-*-27*	7,3
Option /G	+0,9





option /G

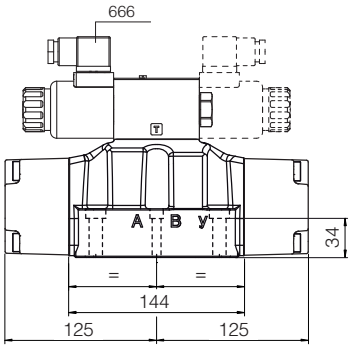


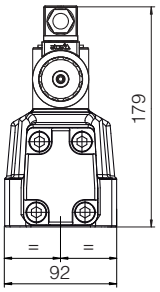
DPZE-2*

ISO 4401: 2005
Mounting surface: 4401-07-07-0-05
(see table P005)

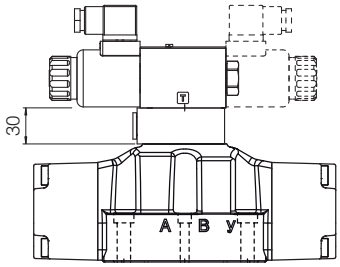
Mass [kg]

	A
DPZE-*-25*	11,9
DPZE-*-27*	12,8
Option /G	+0,9





Option /G

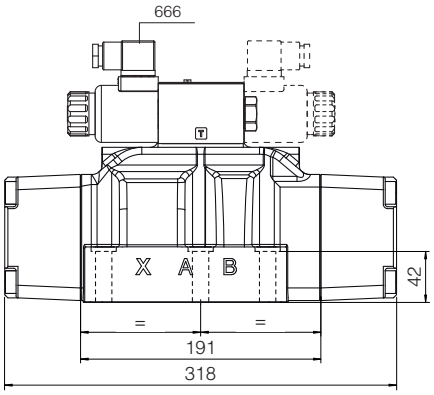


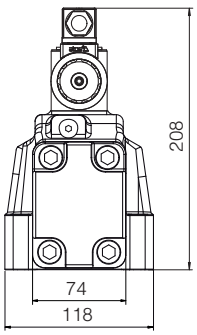
DPZE-4*

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

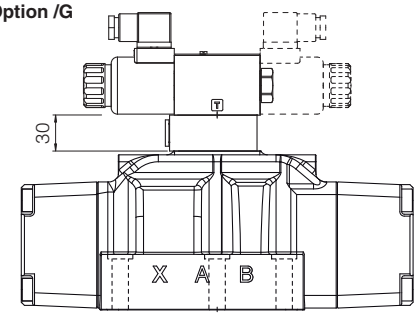
Mass [kg]

	A
DPZE-*-45*	17,1
DPZE-*-47*	18
Option /G	+0,9





Option /G



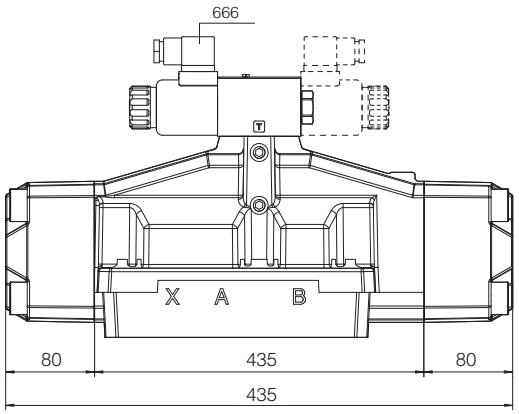
Dotted line = double solenoid version

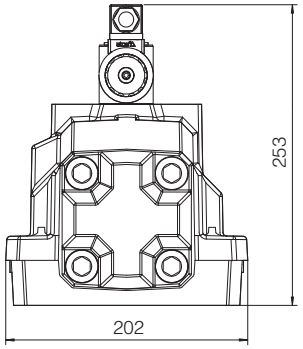
DPZE-6*

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

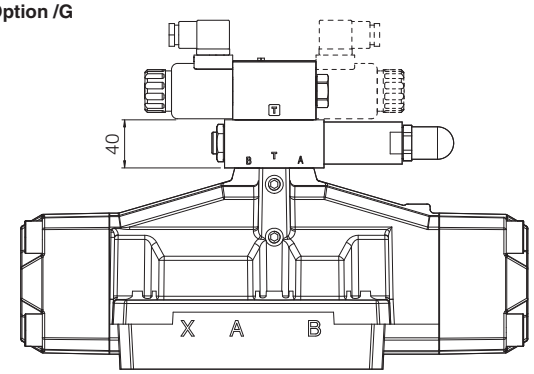
Mass [kg]

	A
DPZE-*-65*	44
DPZE-*-67*	44,5
Option /G	+1





Option /G



Dotted line = double solenoid version