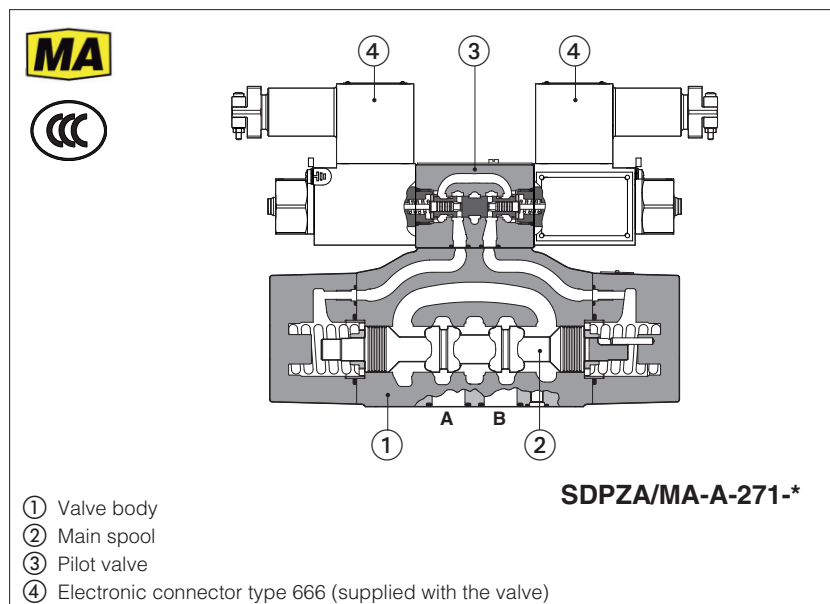


Ex-proof proportional directional valves

piloted, without transducer, with positive overlap - **MA** and **CCC** certification



SDPZA/MA-A

Ex-proof proportional valves, piloted, without transducer and with positive spool overlap, for open loop directional controls and not compensated flow regulations.

They are equipped with explosion-proof solenoids certified according to **CCC** and **MA** Chinese mining certification, protection mode:

Ex db | Mb for surface, tunnel or mine plants

The solenoids are provided with cable glands (horizontally oriented) for cable entrance and internal screw terminal for power supply coils connections.

The solenoid case classified **Ex db** is designed to contain the possible explosion which could be caused by the presence of the gas mixture inside the housing, thus avoiding dangerous propagation in the external environment.

Mounting surface: **ISO 4401**

Size: **16 ÷ 32**

Max flow: **550** and **1500** l/min

Max pressure: **350 bar**

1 MODEL CODE

[illegible]

(1) In standard configuration the solenoid (config. 51 and 53) is at side A of the main stage (side B of pilot valve)

(2) Available on request coil voltage **/6** for Atos driver with power supply 12 VDC

(3) Select coil voltage /24 in case of electronic drivers not supplied by Atos, with power supply 24 VDC

2 OFF-BOARD ELECTRONIC DRIVERS - see www.atos.com or KTI industrial master catalog

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-AS-* /A	E-BM-AES-* /A
Type	digital	digital
Format	DIN-rail panel	
Data sheet	G030	GS050

3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra 0,4 - flatness ratio 0,01/100
MTTFd values according to EN ISO 13849	75 years, for further details see technical table P007
Ambient temperature	Standard = -20°C ÷ +40°C /PE option = -20°C ÷ +40°C
Storage temperature range	Standard = -20°C ÷ +80°C /PE option = -20°C ÷ +80°
Compliance	Explosion proof protection, see section 6 -Flame proof enclosure Ex-db

4 HYDRAULIC CHARACTERISTICS

Valve model	SDPZA/MA-A-2		SDPZA/MA-A-4	SDPZA/MA-A-6
Pressure limits [bar]	ports P, A, B, X = 350; T = 250 (10 for option /D); Y = 10;			
Spool type	L3, S3, D3	L5, S5, D5		
Nominal flow [l/min]				
(1) $\Delta p = 10$ bar	160	250	480	640
Δp P-T $\Delta p = 30$ bar	270	430	830	1100
Max permissible flow [l/min]	400	550	900	1500
Piloting pressure [bar]	min. = 25; max = 350 (option /G advisable for pilot pressure > 150 bar)			
Piloting volume [cm³]	3,7	9,0	21,6	
Piloting flow (2) [l/min]	2,2	4,5	7,2	
Leakage (3) Main stage [l/min]	0,2/0,6	0,3/1,0	1,0/3,0	
Response time (4) (0-100% step signal and pilot pressure 100 bar) [ms]	≤ 120	≤ 130	≤ 190	
Hysteresis	≤ 5 [% of max regulation]			
Repeatability	± 1 [% of max regulation]			

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

(1) for different Δp , see section 8.2

(2) average value, with step reference input signal 0 ÷ 100 %

(3) at P = 100/350 bar

(4) see detailed diagrams in section 8.3

5 SEALS AND HYDRAULIC FLUID

Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity	20 ÷ 100 mm²/s - max allowed range 15 ÷ 300 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	HFDR, 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

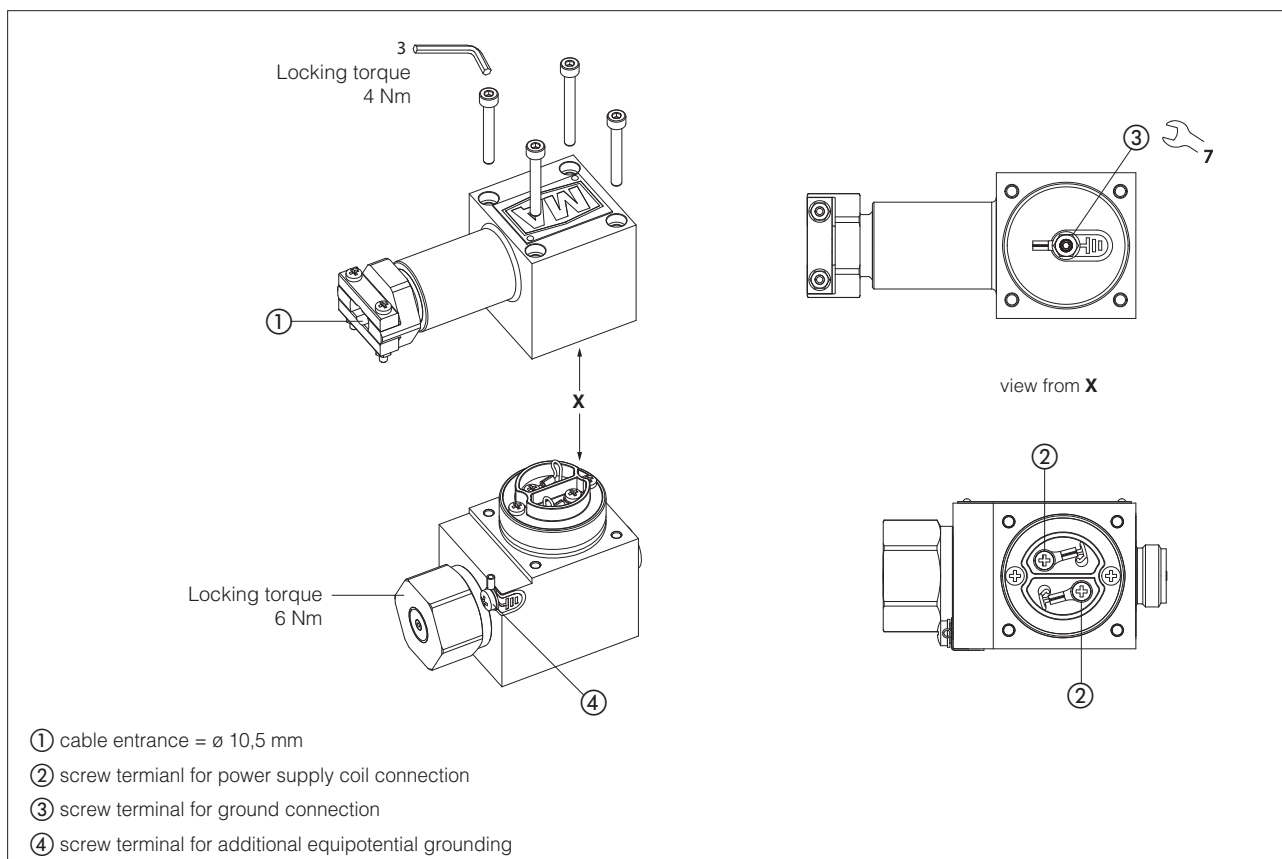
-max fluid temperature = 50°C

6 CERTIFICATION DATA

Valve type	SDPZA/MA	
Voltage code	(standard)	24
Max solenoid current	2,5 A	1,2 A
Certification	MA mining, CCC	
Solenoid certified code	DTBBL10-37/12FYC	DTBBL10-37/24FYC
Type examination certificate	MA: MEE231120	MA: MEE231118
	CNEEx 22.5286X CCC: 2024312307000486	
Method of protection	Ex db I Mb	
Surface temperature	≤150 °C	
Ambient temperature	-20 ÷ +40 °C	
Cable entrance	cable entrance Ø = 10.5mm	
Protection degree to DIN EN60529	IP 65	

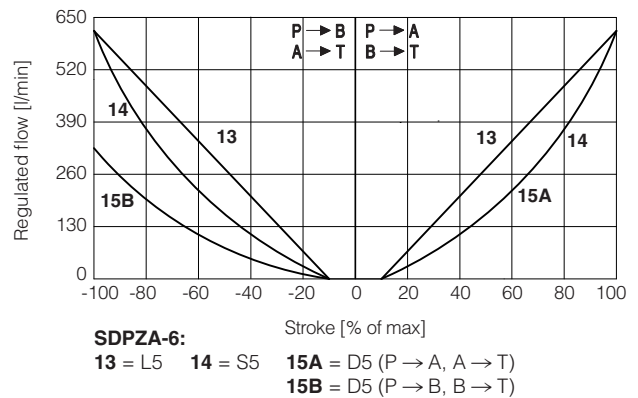
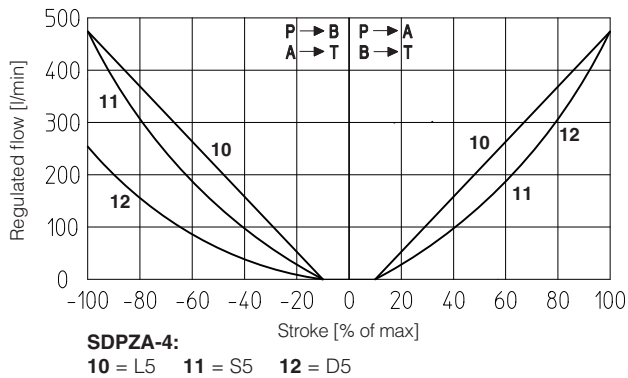
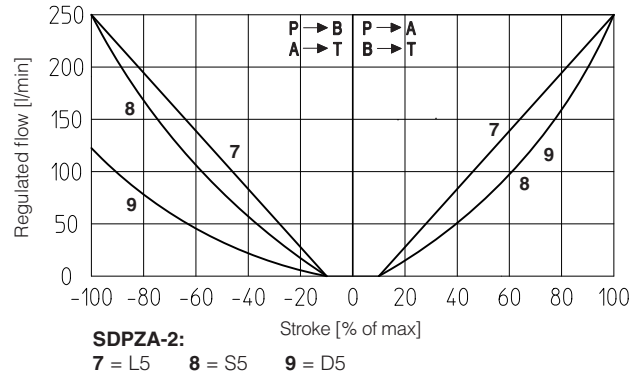
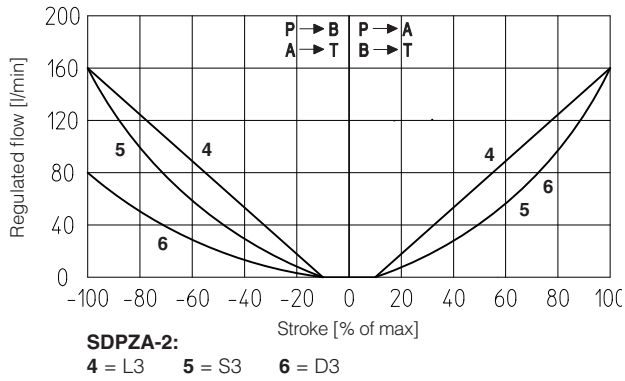
⚠ WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification

7 EX-PROOF SOLENOID WIRING



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

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



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

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

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

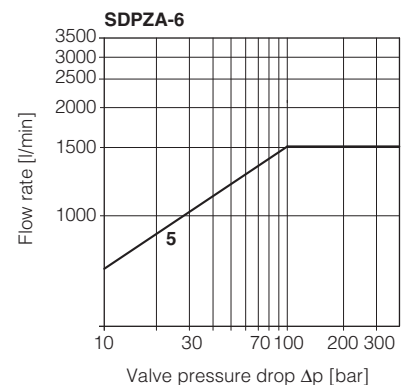
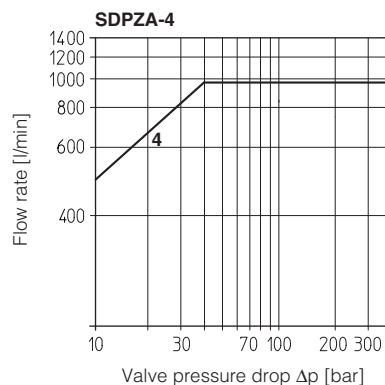
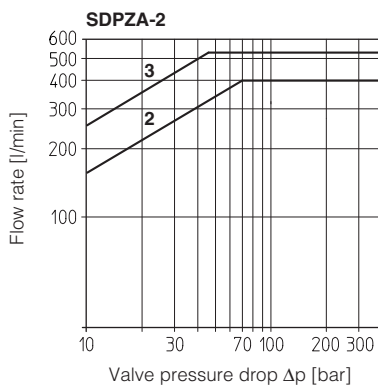
8.2 Flow / Δp diagram

stated at 100% of spool stroke

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

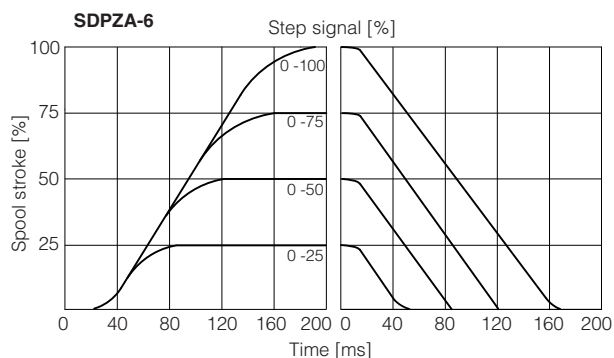
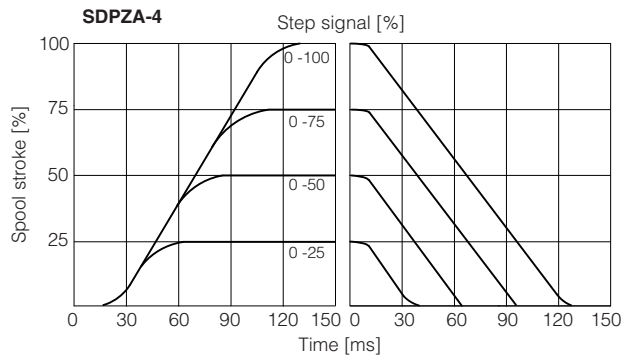
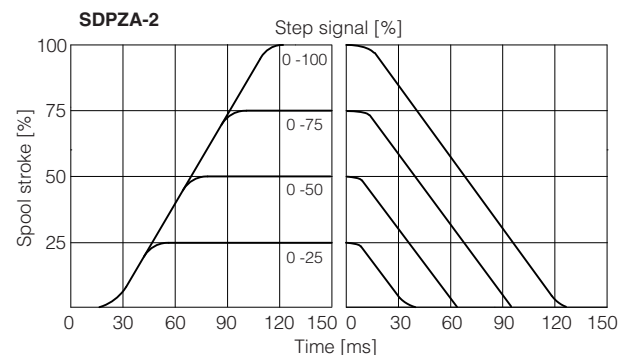
SDPZA-4:
4 = spools L5, S5, D5

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



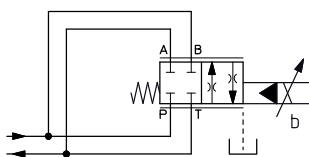
8.3 Response time (measured at pilot pressure = 100 bar)

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



SDPZA/MA-A-	251-L5	451-L5	651-L5
Max flow [l/min]	860	1600	2200
$\Delta p = 15$ bar			

9 HYDRAULIC OPTIONS

9.1 Option /B

SDPZA/MA-A-*5 = solenoid at side of port B of the main stage. Only for config. 51 and 53

9.2 Options /E and /D

Pilot and drain configuration can be modified as shown in section 9

The valve's standard configuration provides internal pilot and external drain.

For different pilot / drain configuration select:

Option /E External pilot (through port X).

Option /D Internal drain.

9.3 Option /G

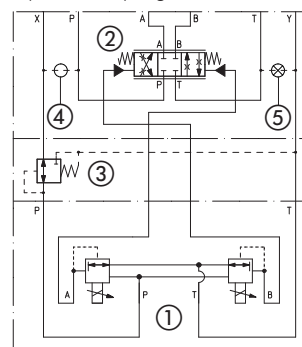
Pressure reducing valve installed between pilot valve and main body with fixed setting:

SDPZA-2, SDPZA-4, SDPZA-6 = 40 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

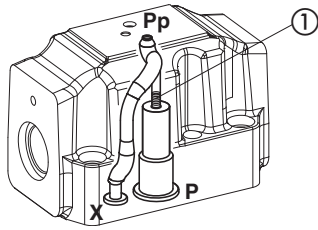


- ① Pilot valve
- ② Main stage
- ③ Pressure reducing valve
- ④ Plug to be added for external pilot through port X
- ⑤ Plug to be removed for internal drain through port T

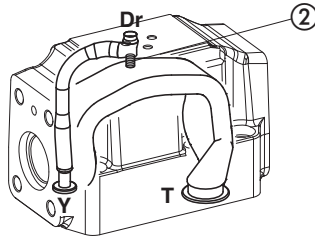
10 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

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

SDPZA-2 Pilot channels

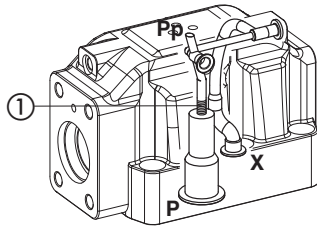


Drain channels

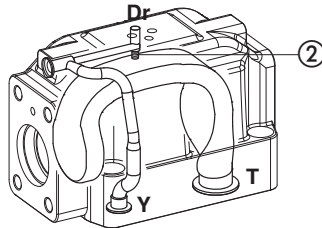


Internal piloting: Without blinded plug SP-X300F ①;
External piloting: Add blinded plug SP-X300F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

SDPZA-4 Pilot channels

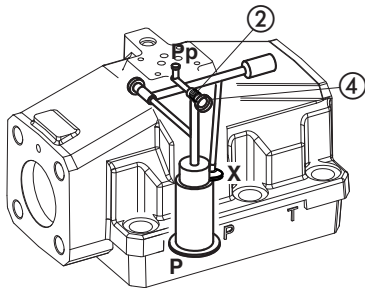


Drain channels

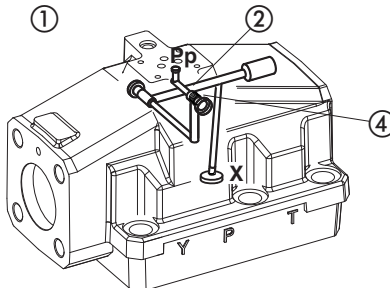


Internal piloting: Without blinded plug SP-X500F ①;
External piloting: Add blinded plug SP-X500F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

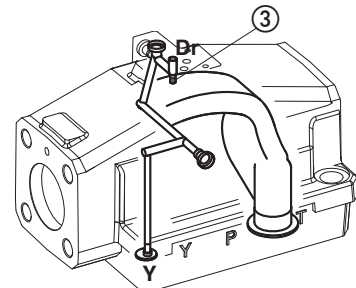
SDPZA-6 Pilot channels



Pilot channels



Drain channels



Internal piloting:
plug SP-X325A in pos ②;

External piloting:
plug SP-X325A in pos ②;

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

Internal drain:
Without blinded plug SP-X300F ③;

External drain:
Add blinded plug SP-X300F ③.

SDPZA/MA-2***ISO 4401: 2005****Mounting surface: 4401-07-07-0-05**

Fastening bolts:

4 socket head screws M10x50 class 12.9

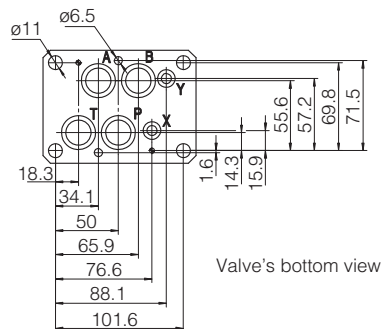
Tightening torque = 70 Nm

2 socket head screws M6x45 class 12.9

Tightening torque = 15 Nm

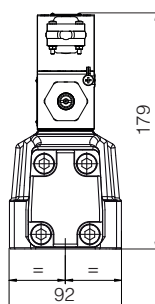
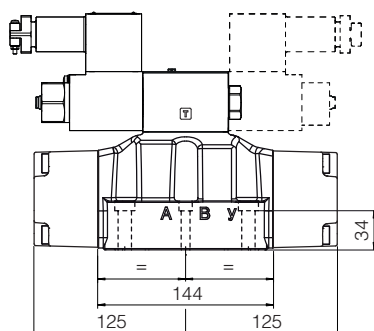
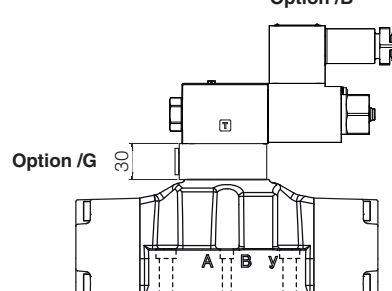
Diameter of ports A, B, P, T: $\varnothing = 20$ mm;Diameter of ports X, Y: $\varnothing = 7$ mm;

Seals: 4 OR 130, 2 OR 2043

P = PRESSURE PORT**A, B** = USE PORT**T** = TANK PORT**X** = EXTERNAL OIL PILOT PORT**Y** = DRAIN PORT

Valve's bottom view

Mass (Kg)	
SDPZA/MA-25	13.2
SDPZA/MA-27	15.4
Option /G	+0.9

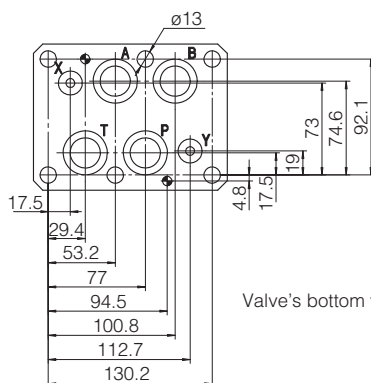
SDPZA/MA-A-25**SDPZA/MA-A-27** (dotted line)**Option /B****SDPZA/MA-4*****ISO 4401: 2005****Mounting surface: 4401-08-08-0-05**

Fastening bolts:

6 socket head screws M12x60 class 12.9

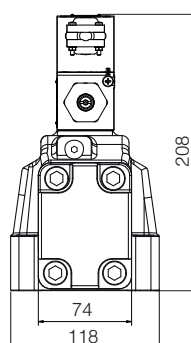
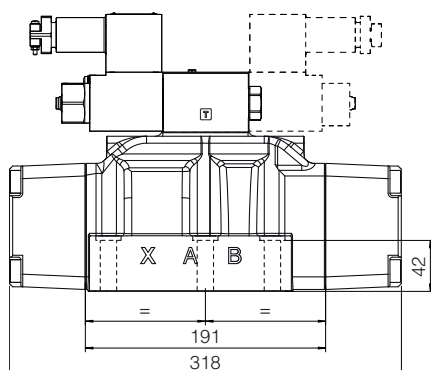
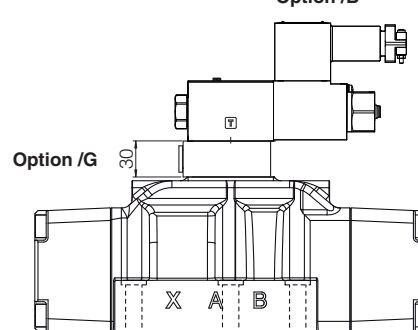
Tightening torque = 125 Nm

Seals: 4 OR 4112; 2 OR 3056

Diameter of ports A, B, P, T: $\varnothing = 24$ mm;Diameter of ports X, Y: $\varnothing = 7$ mm;**P** = PRESSURE PORT**A, B** = USE PORT**T** = TANK PORT**X** = EXTERNAL OIL PILOT PORT**Y** = DRAIN PORT

Valve's bottom view

Mass (Kg)	
SDPZA/MA-45	19.2
SDPZA/MA-47	20.6
Option /G	+0.9

SDPZA/MA-A-45**SDPZA/MA-A-47** (dotted line)**Option /B**

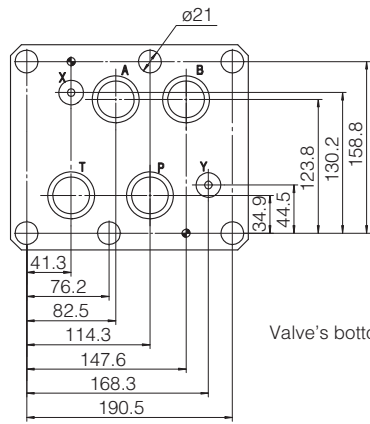
Dotted line = double solenoid version

SDPZA/MA-6*

ISO 4401: 2005
Mounting surface: 4401-10-09-0-05

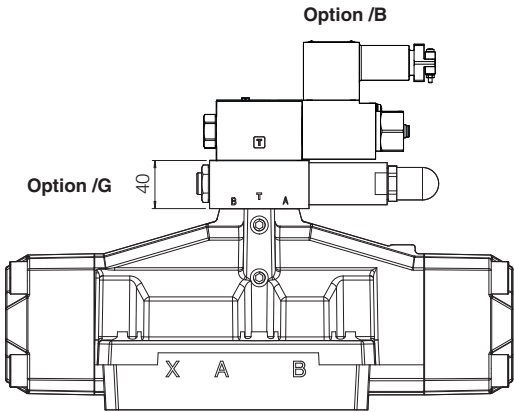
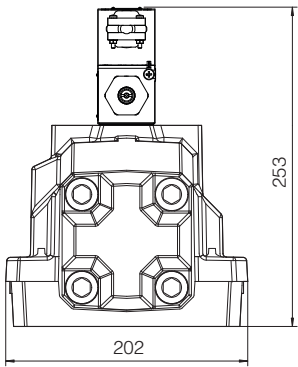
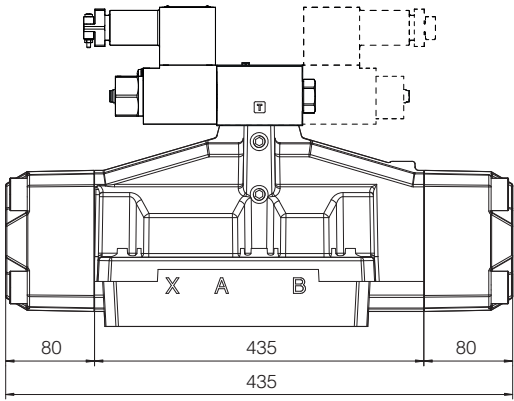
Fastening bolts:
6 socket head screws M20x80 class 12.9
Tightening torque = 600 Nm
Diameter of ports A, B, P, T: Ø = 34 mm;
Diameter of ports X, Y: Ø = 7 mm;
Seals: 4 OR 144, 2 OR 3056

- P = PRESSURE PORT
- A, B = USE PORT
- T = TANK PORT
- X = EXTERNAL OIL PILOT PORT
- Y = DRAIN PORT



Mass (Kg)	
SDPZA/MA-65	45.3
SDPZA/MA-67	47.1
Option /G	+1

SDPZA/MA-A-65
SDPZA/MA-A-67 (dotted line)



Dotted line = double solenoid version