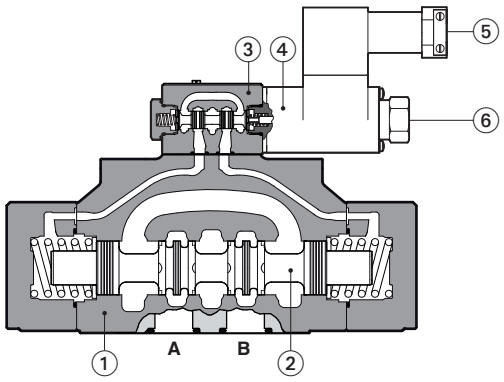
Ex-proof solenoid directional valves

on-off, piloted, spool type - **MA certification**



① main body
② main spool
③ pilot valve
④ ex-proof solenoid
⑤ horizontal cable gland
⑥ manual override

SDPHA/MA-46

SDPHA/MA

On-off, spool type, piloted, directional valves equipped with explosion-proof solenoids certified according to **MA** Chinese mining certification, protection mode:

Ex db I Mb for surface, tunnel or mine plants

The solenoids are provided with cable glands (horizontally oriented) for cable entrance and internal terminal board 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.

They are also designed to limit the external temperature according to the certified class to avoid the self ignition of the explosive mixture present in the environment.

DPHA/MA-2:
Size: **16** - ISO 4401
Max flow: **300 l/min**
Max pressure: **350 bar**

DPHA/MA-4:
Size: **25** - ISO 4401
Max flow: **700 l/min**
Max pressure: **350 bar**

1 MODEL CODE OF PILOTED SOLENOID VALVES TYPE SDPHA

SDPHA	/	MA	-	2	63	1/2	-	A	24DC	**	/*

SDPHA = spool type - piloted

Certification type:
MA = Ex-proof Ma Chinese mining certification

Valve size (ISO 4401)
2 = 16 **4** = 25

Configuration, see section 2

Spool type, see section 2

Voltage code, see section 5

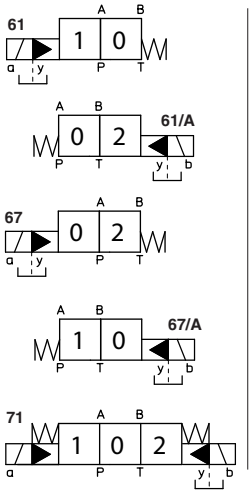
Series number

Seals material, see section 6:
- = NBR
PE = FKM

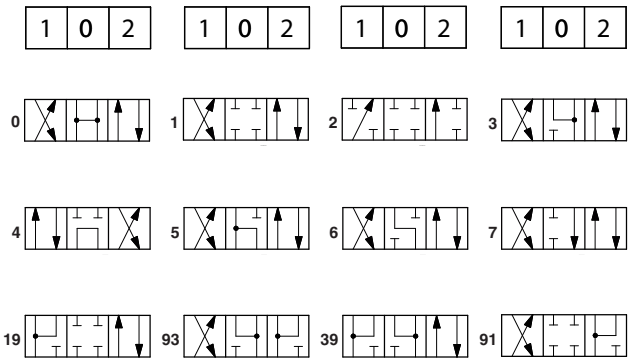
Options:
/A = Solenoid at side of port B (for single solenoid valves)
/D = Internal drain
/E = External pilot pressure
/H = Adjustable chokes (meter-out to the pilot chambers of the main valve)
/R = Pilot pressure generator (4 bar on port P)
/S = Main spool stroke adjustment

2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1)

Configurations



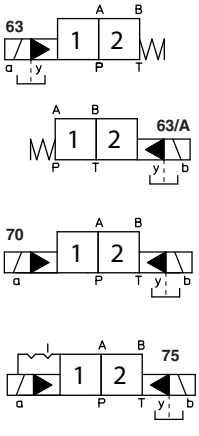
Spools



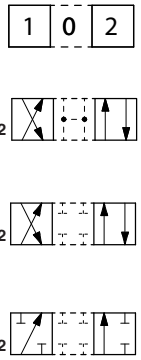
Spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.

Spools type **1** and **4** are also available as **1/1** and **4/8** that are properly shaped to reduce water-hammer shocks during the switching.

Configurations



Spools



3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended 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 ÷ +70°C **/PE** option = -20°C ÷ +70°C
Storage temperature range	**Standard** = -20°C ÷ +80°C **/PE** option = -20°C ÷ +80°C
Compliance	Explosion proof protection, see section 7 -Flame proof enclosure Ex-db

4 HYDRAULIC CHARACTERISTICS

Operating pressure	P, A, B, X = **350 bar** T = **250 bar** (standard) T = **210 bar** (option /D)
	Ports Y = 0 bar - Minimum pilot pressure for correct operation is 8 bar
Maximuim flow	SDPHA-2: **300 l/min;** SDPHA-4: **700 l/min;**

5 ELECTRICAL CHARACTERISTICS

SOLENOID TYPE	ON/OFF
Voltage code VDC ±10%	**12DC, 24DC, 110DC**
Power consumption	16,5 W
Protection degree	IP 65 to DIN EN 60529
Duty factor	100%

6 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	15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s		
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, 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	

7 CERTIFICATION DATA

Valve type	SDPHA**/MA**
Certification	MA mining
Solenoid certified code	**DTBZ12 - 37 FYC**
Type examination certificate	CNEx 22.7656X
Method of protection	Ex db I Mb
Ambient temperature	≤ 135 °C
Ambient temperature	-20 ÷ +40 °C
Cable entrance:	cable entrance Ø =10.5mm

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

8 OPTIONS

Options

/A = Solenoid mounted at side of port A of main body (only for single solenoid valves).
In standard version, solenoid is mounted at side of port B.

/D = Internal drain (standard configuration is external drain)

/E = External pilot pressure (standard configuration is internal pilot pressure).

/R = Pilot pressure generator (4 bar on port P - see section 8.1).

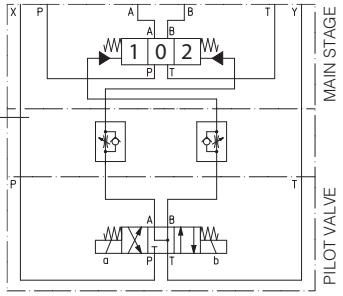
/S = Main spool stroke adjustment.

Devices for main spool switching control and to reduce the hydraulic shocks at the valve operation

/H = Adjustable chokes (meter-out to the pilot chambers of the main valve).

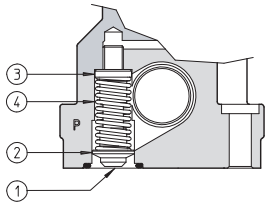
FUNCTIONAL SCHEME (config. 71)
example of switching control options

option H



8.1 Pilot pressure generator (option /R)

The device **/R** generates an additional pressure drop, in order to ensure the minimum pilot pressure, for correct operation of the valves with internal pilot and fitted with spools type **0, 0/1, 4, 4/8, 5, 58, 09, 90, 94, 49.** The device **/R** has to be fitted when the pressure drop in the valve, verified on flow versus pressure diagrams, is lower than the minimum pilot pressure value.

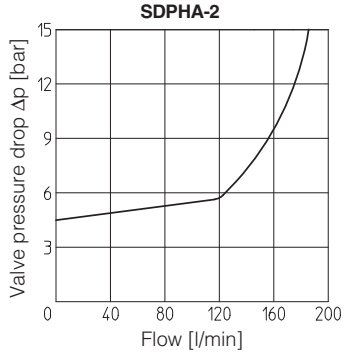


① Flapper-guide
② Flapper
③ Spring stop-washer
④ Spring

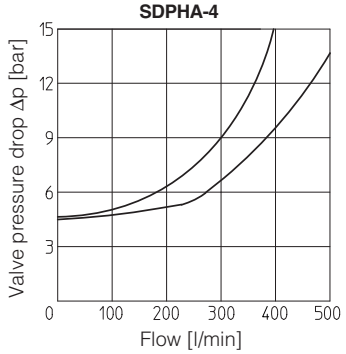
Ordering code of spare pilot pressure generator

R/DP	-	*
Pilot pressure generator		Size: **2** for SDPHA-2 **4** for SDPHA-4

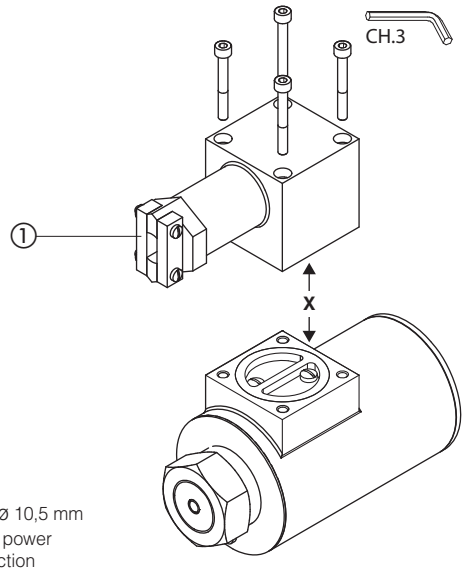
SDPHA-2

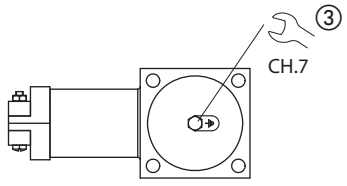


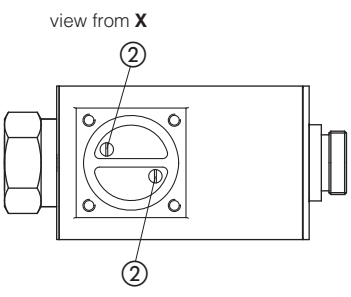
SDPHA-4



9 SOLENOID WIRING







① cable entrance = ø 10,5 mm
② terminal board for power supply coil connection
③ screw terminal for ground connection

10 **Q/ΔP DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

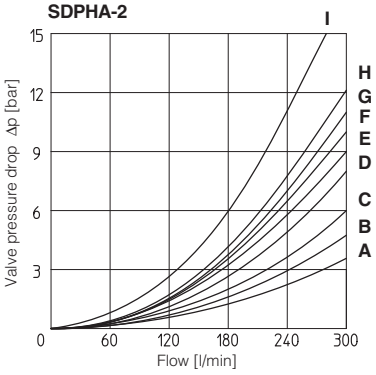
SDPHA-2

Spool type \ Flow direction	P→A	P→B	A→T	B→T	P→T
0/2, 1, 3, 6, 7	A	A	D	A	-
1/1, 1/2	B	B	D	E	-
0	A	A	D	E	C
0/1	A	A	D	-	-
2	A	A	-	-	-
2/2	B	B	-	-	-
3/1	A	A	D	D	-
4	C	C	H	I	F
4/8	C	C	G	I	F
5	A	B	F	H	G
19	C	-	-	G	-
39	C	-	-	H	-
91	C	C	E	-	-
93	-	C	D	-	-

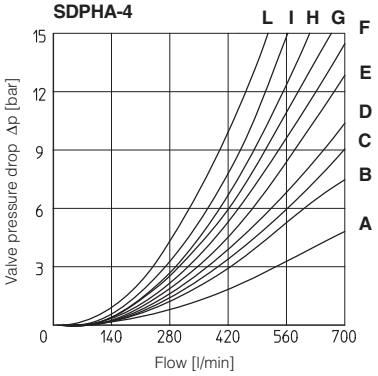
SDPHA-4

Spool type \ Flow direction	P→A	P→B	A→T	B→T	P→T
1	B	B	B	D	-
1/1	D	E	E	F	-
1/2	E	D	B	C	-
0	D	C	D	E	F
0/1, 3/1, 5/1, 6, 7	D	D	D	F	-
0/2	D	D	D	E	-
2	B	B	-	-	-
2/2	E	D	-	-	-
3	B	B	D	F	-
4	C	C	H	L	L
5	A	D	D	D	H
19	F	-	-	E	-
39	G	F	-	F	-
91	F	F	D		
93	-	G	D	-	-

SDPHA-2



SDPHA-4



11 **OPERATING LIMITS** For a correct valve operation do not exceed the max recommended flow rates (l/min) shown in the below tables

SDPHA-2

Spool	**Inlet pressure** [bar]			
	70	**140**	**210**	**350**
	Flow rate [l/min]			
0, 1, 3, 6, 7	300	300	300	250
2, 4, 4/8	300	300	240	140
5	260	220	180	100
0/1, 0/2, 1/2	300	250	210	180
19, 39, 91, 93	300	300	270	200

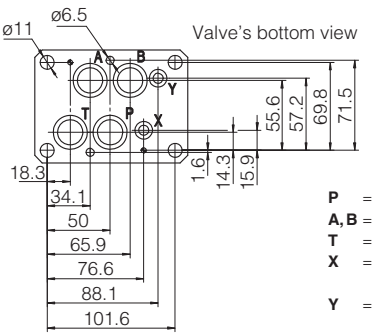
SDPHA-4

Spool	**Inlet pressure** [bar]			
	70	**140**	**210**	**350**
	Flow rate [l/min]			
1, 6, 7	700	700	700	600
2, 4, 4/8	500	500	450	400
5, 0/1, 0/2, 1/2	600	520	400	300
0, 3	700	700	600	540
19, 39, 91, 93	500	500	500	450

SDPHA/MA-2

ISO 4401: 2005
Mounting surface: 4401-07-07-0-05

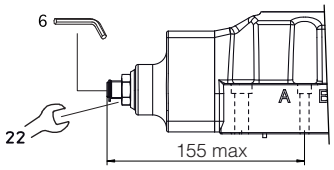
Fastening bolts:
4 socket head screws M10x50 class 12.9
Tightening torque = 70 Nm
2 socket head screws M6x45 class 12.9
Tightening torque = 15 Nm
Diameter of ports A, B, P, T: Ø = 20 mm;
Diameter of ports X, Y: Ø = 7 mm;
Seals: 4 OR 130, 2 OR 2043

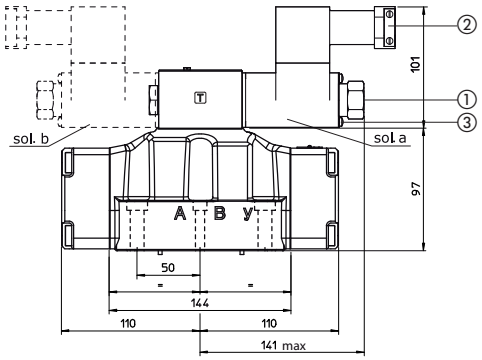


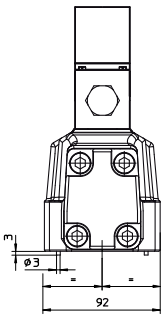
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
X = EXTERNAL OIL PILOT PORT
Y = DRAIN PORT

SDPHA/MA-26
SDPHA/MA-27 (dotted line)

Stroke adjustment device for option **/S**





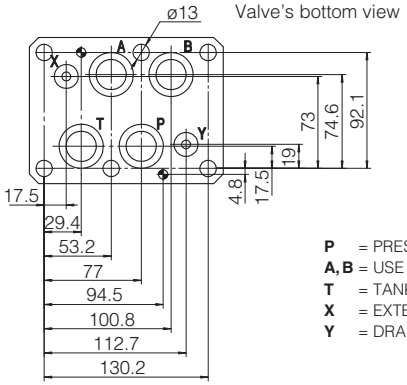


① manual override
② horizontal cable gland, cable entrance = ø 10,5 mm
③ screw terminal for additional equipotential grounding

Mass:
SDPHA/MA-26: 10,8 kg
SDPHA/MA-27: 12,5 kg

SDPHA/MA-4

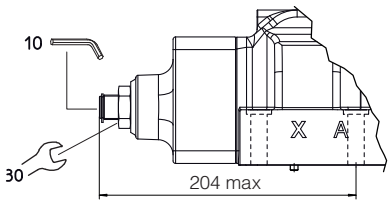
ISO 4401: 2005
Mounting surface: 4401-08-08-0-05 (see table P005)
Fastening bolts:
6 socket head screws M12x60 class 12.9
Tightening torque = 125 Nm
Seals: 4 OR 4112; 2 OR 3056
Diameter of ports A, B, P, T: Ø = 24 mm;
Diameter of ports X, Y: Ø = 7 mm;

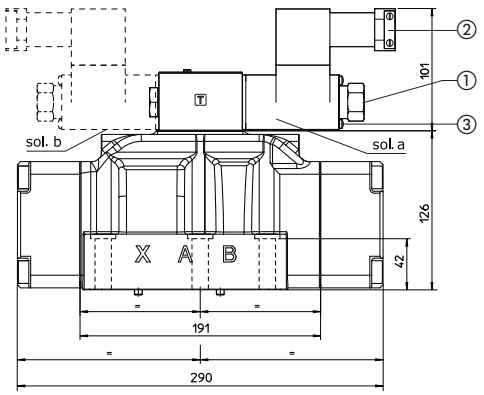


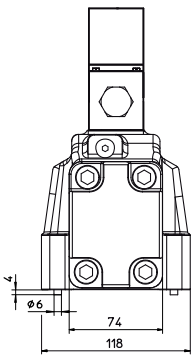
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
X = EXTERNAL OIL PILOT PORT
Y = DRAIN PORT

SDPHA/MA-46
SDPHA/MA-47 (dotted line)

Stroke adjustment device for option **/S**







① manual override
② horizontal cable gland, cable entrance = ø 10,5 mm
③ screw terminal for additional equipotential grounding

Mass:
SDPHA/MA-46: 19,4 kg
SDPHA/MA-47: 21,9 kg