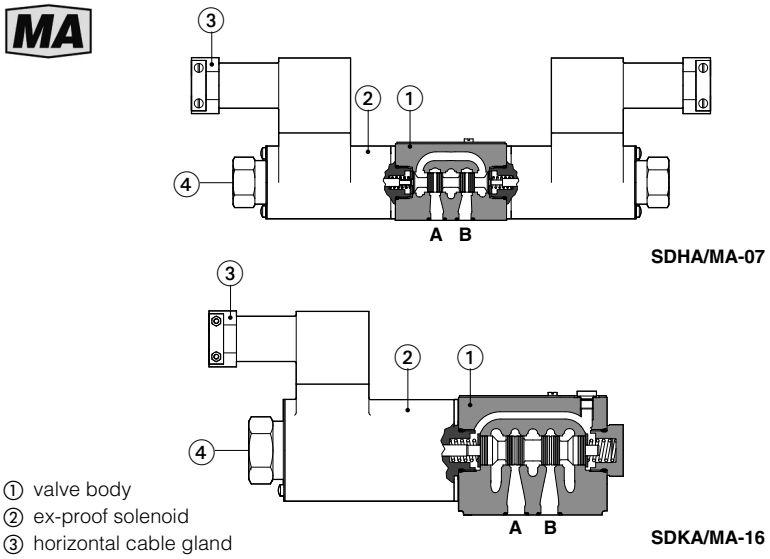
On-off explosion-proof valves with MA certification

Directional, ISO 4401 size 06 and 10 (direct), 16 and 25 (two stage)
Pressure relief, ISO 6264, size 10, 20 and 32



Directional and pilot operated pressure relief valves equipped with explosion-proof solenoids certified according to **MA** Chinese mining certification, protection mode:

Ex d 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 d** 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.

SDHA /MA: directional, direct, size 06
SDKA /MA: directional, direct, size 10
SDPHA /MA: directional, two stage, size 16 and 25
SAGAM /MA: pressure relief, size 10, 20 and 32

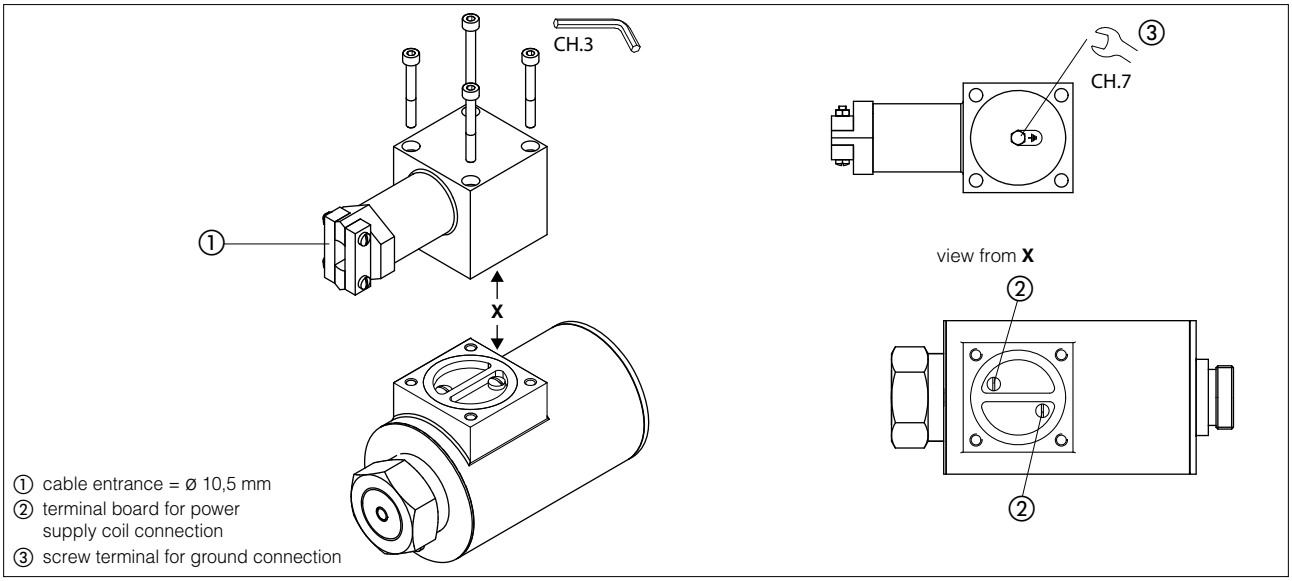
1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

SOLENOID TYPE		ON/OFF
Voltage code VDC ±10%		**12DC, 24DC, 110DC**
Power consumption		16,5 W (SDHA, SDPHA, SAGAM) 18W (SDKA)
Method of protection		Ex d
Temperature class		T4
Surface temperature		≤135 °C
Ambient temperature		-20 ÷ +40 °C
Protection degree		IP 65
Duty factor		100%
Mechanical construction		Flame proof housing classified Ex d
Cable entrance and electrical wiring		Horizontal cable gland, internal terminal board for cable connection, see section 3
MA Certification		**Ex d** = Equipment for explosive atmosphere, flame proof housing **I** = Gas group (Methane) **Mb** = Equipment protection, high level protection for explosive atmospheres
Operating pressure	**SDHA/MA**	P, A, B = **350 bar** T = **210 bar**
	SDKA/MA	P, A, B = **315 bar** T = **210 bar**
	SDPHA/MA	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
	SAGAM/MA	P, X = **350 bar** T, Y = **210 bar**
Maximuim flow	**SDHA/MA**	**80 l/min**
	SDKA/MA	**120 l/min**
	SDPHA/MA	SDPHA-2: **300 l/min;** SDPHA-4: **700 l/min;**
	SAGAM/MA	SAGAM/MA-10 = **200 l/min;** SAGAM/MA-20 = **400 l/min;** SAGAM/MA-32 = **600 l/min;**

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

Assembly position / location	Any position for all valves		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
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		
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	

3 SOLENOID WIRING



4 MODEL CODE OF DIRECT SOLENOID VALVES TYPE SDHA, SDKA

SDHA	/	MA	-	0	63	1/2	/	A	24DC	**	**

SDHA = spool type - direct, size 06
SDKA = spool type - direct, size 10

MA = Ex-proof Ma Chinese mining certification

0 = size 06 for SDHA
1 = size 10 for SDKA

Valve configuration, see section 5

Spool type, see section 5

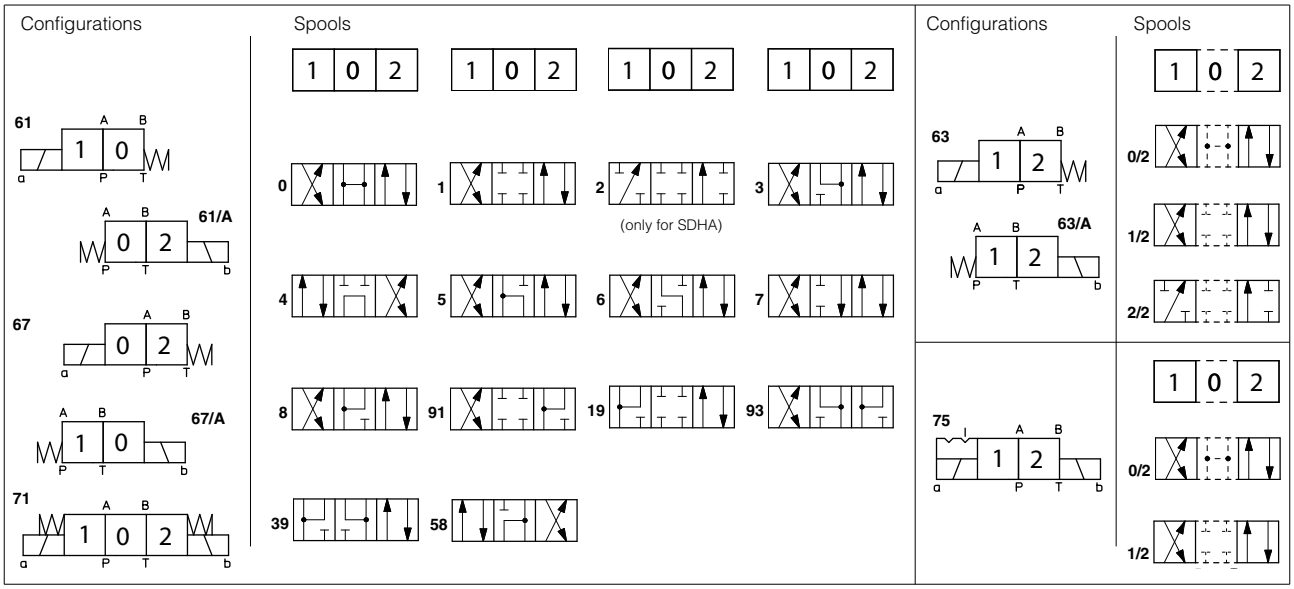
Option:
A = solenoid at side of port B (for single solenoid valves)

Voltage code - see section 1

Series number

Seals material, see sect. 2:
- = NBR
PE = FKM

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

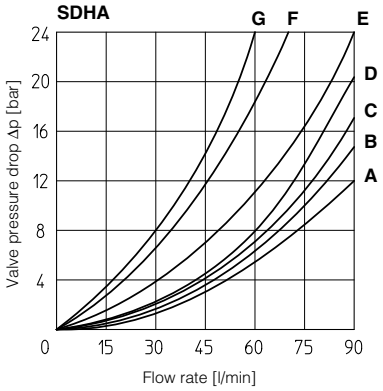


SDHA spools **1, 4**, **5** and **58** are also available as **1/1, 4/8, 5/1** and **58/1.** They are properly shaped to reduce water-hammer shocks during the swiching.
SDKA spool **1** is also available as **1/1.** It is properly shaped to reduce water-hammer shocks during the swiching.

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

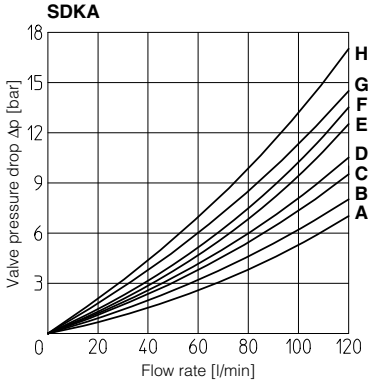
SDHA

Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T
0, 0/1	A	A	C	C	D
1, 1/1	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 58, 58/1 19, 91, 93, 39	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			



SDKA

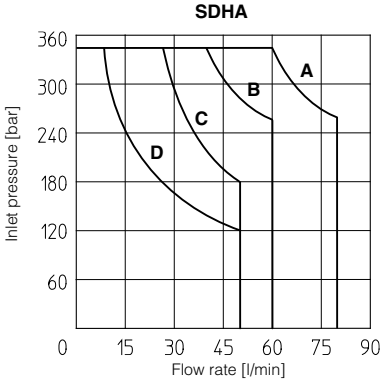
Flow direction / Spool type	P→A	P→B	A→T	B→T	P→T	B→A
0, 0/1, 0/2, 2/2	A	A	B	B		
1, 1/1, 1/3, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	F	
5	A	B	C	C	G	
1/2	B	C	C	B		
19	A	D	C			H



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

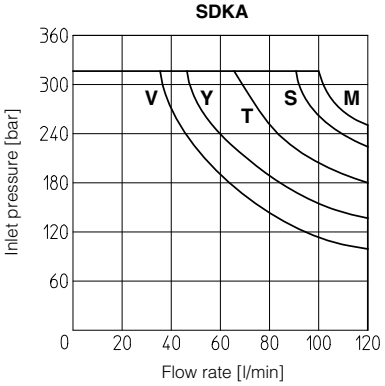
SDHA

A = Spools 0, 0/1, 1, 1/2, 3, 8
B = Spools 0/2, 1/1, 6, 7
C = Spools 3/1, 4, 4/8, 5, 5/1, 19, 39, 58, 58/1, 09, 90, 91, 93, 94
D = Spools 2, 2/2



SDKA

M = Spools 0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8
S = Spools 1/3, 6, 7
Y = Spools 4, 5
V = Spools 2/2
T = Spools 19



8 MODEL CODE OF PILOTED SOLENOID VALVES TYPE SDPHA

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

SDPHA = spool type - piloted

MA = Ex-proof Ma Chinese mining certification

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

Valve configuration, see section 9

Spool type, see section 9

Voltage code - see section 1

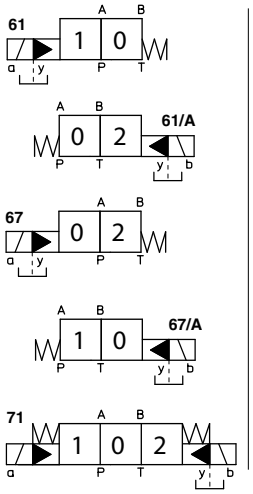
Series number

Seals material:
omit for NBR (mineral oil & water glycol)
PE = FPM

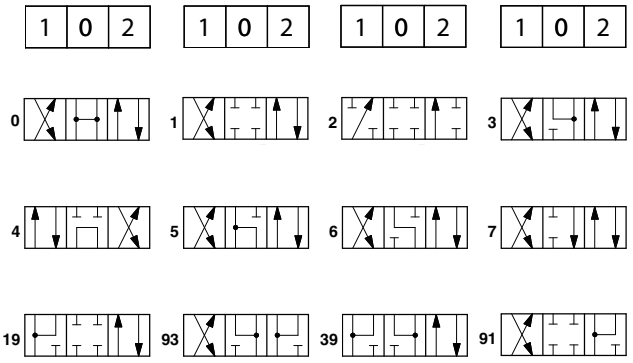
Options:
- **/A** = Solenoid at side of port B (for single solenoid valves)
- **/D** = Internal drain
- **/E** = External pilot pressure
- **/H** = Adjustable chokes (meter-out to the pilot chambers of the main valve)
- **/R** = pilot pressure generator (4 bar on port P)
- **/S** = Main spool stroke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

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

Configurations



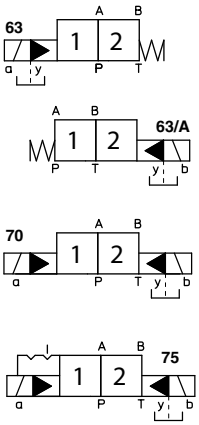
Spools



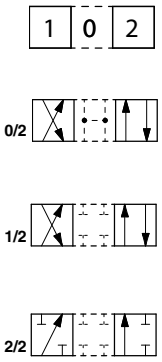
Spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.

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



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

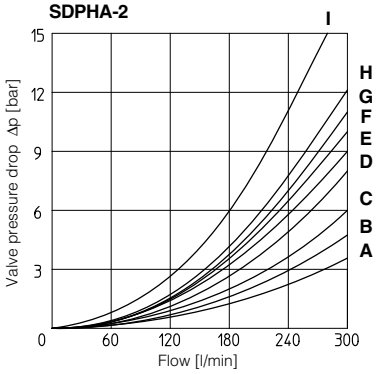
SDPHA-2

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

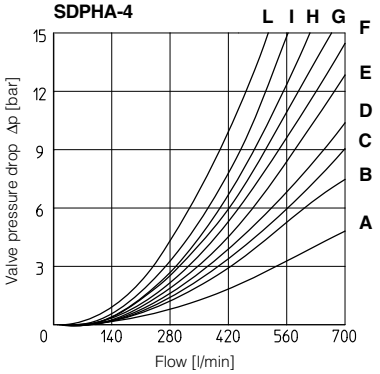
SDPHA-4

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
6/1	D	E	D	F	-
7/1	D	E	F	F	-
8	D	D	E	F	-
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, 8	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
16, 17, 56, *9, 9*	300	300	270	200

SDPHA-4

Spool	Inlet pressure [bar]			
	70	140	210	350
	Flow rate [l/min]			
1, 6, 7, 8	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
16, 17, 58, *9, 9*	500	500	500	450

12 MODEL CODE OF PRESSURE RELIEF VALVES TYPE SAGAM

SAGAM	/	MA	-	20	/	1	0	/	210	-	*	/	24DC	**	/	*

SAGAM = pressure relief valve: subplate mounting

MA = ex-proof MA chinese mining certification

Valve size: **10** (ISO 6264)
20 (ISO 6264)
32 (ISO 6264)

1 = one setting pressure

Valve configuration, see section 13
0 = venting with de-energized solenoid
1 = venting with energized solenoid

Options:
V = regulating handweel

Voltage code - see section 1

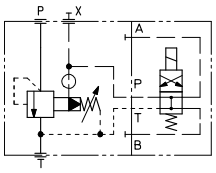
Series number

Seals material, see section 2:
- = NBR
PE = FKM

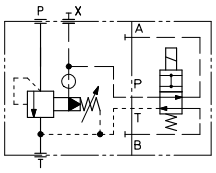
Max regulated pressure:
50 = 50 bar **210** = 210 bar
100 = 100 bar **350** = 210 bar

13 HYDRAULIC SYMBOL

SAGAM-/10**

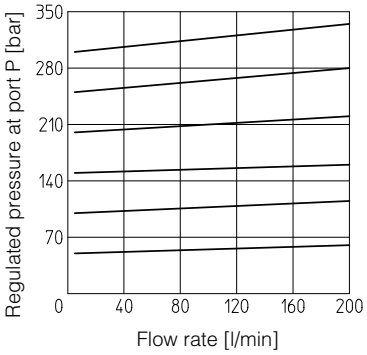


SAGAM-/11**

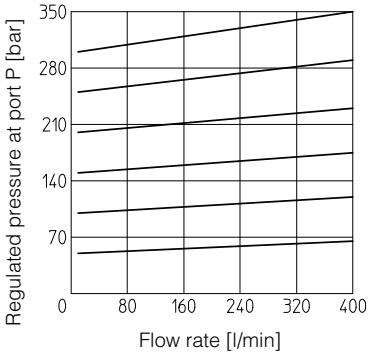


14 REGULATED PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

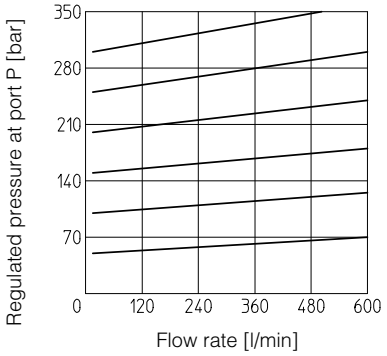
SAGAM-10



SAGAM-20

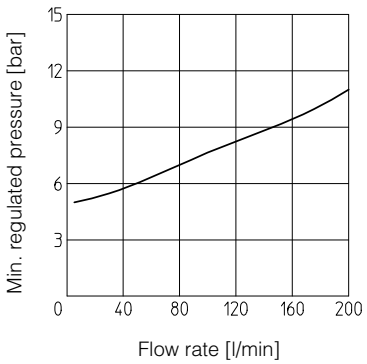


SAGAM-32

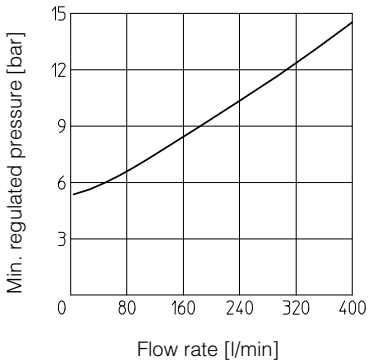


15 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

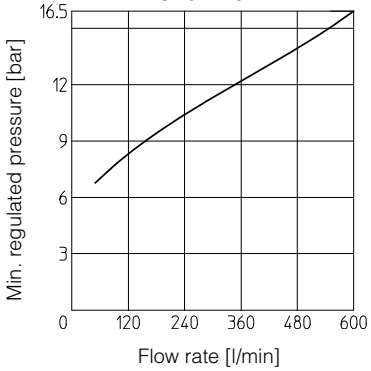
SAGAM-10



SAGAM-20

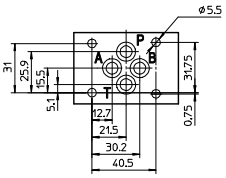


SAGAM-32



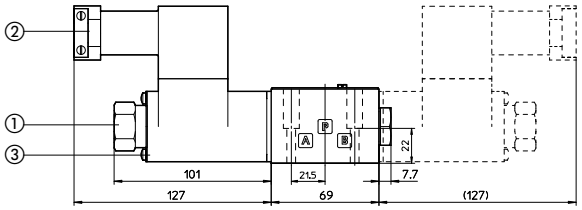
SDHA/MA

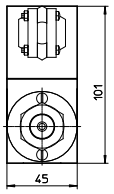
ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
Fastening bolts: 4 socket head screws:
M5x30 class 12.9
Tightening torque = 8 Nm
Seals: 4 OR 108
Ports P,A,B,T: Ø = 7.5 mm (max)



P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT

SDHA/MA-06
SDHA/MA-07 (dotted line)



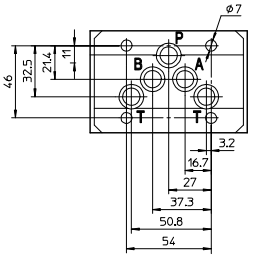


Mass of basic versions:
SDHA/MA-06: 3,2 kg
SDHA/MA-07: 4,9 kg

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

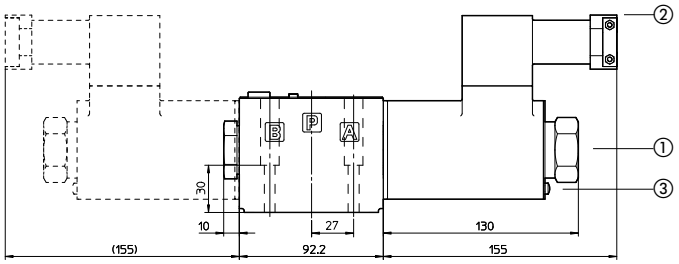
SDKA/MA

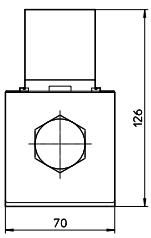
ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050 and 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm



P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT

SDKA/MA-16
SDKA/MA-07 (dotted line)





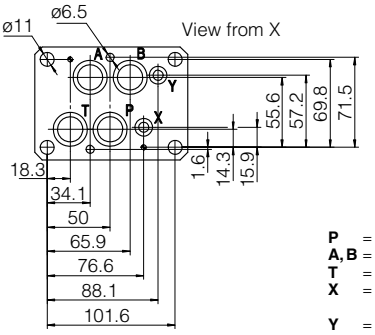
Mass of basic versions:
SDKA/MA-16: 5,7 kg
SDKA/MA-17: 8,7 kg

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

SDPHA/MA-2

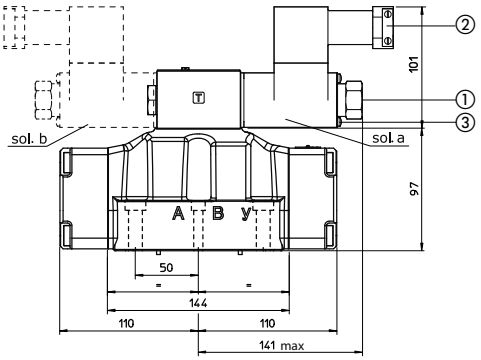
ISO 4401: 2005
Mounting surface: 4401-07-07-0-05

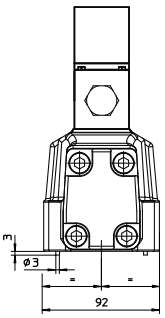
Fastening bolts:
4 socket head screws M10x50 class 12.9
Tightening torque = 70 Nm
2 socket head screws M6x45 class 12.9
Tightening torque = 15 Nm
Diameter of ports A, B, P, T: Ø = 20 mm;
Diameter of ports X, Y: Ø = 7 mm;
Seals: 4 OR 130, 2 OR 2043



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)



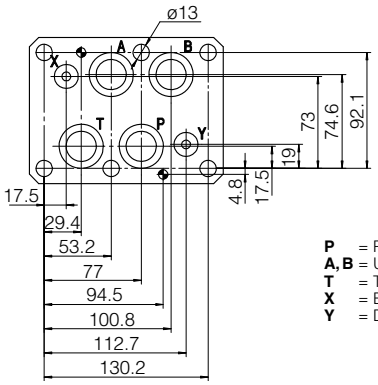


① manual override
② horizontal cable gland, cable entrance = ø 10,5 mm
③ screw terminal for additional equipotential grounding

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

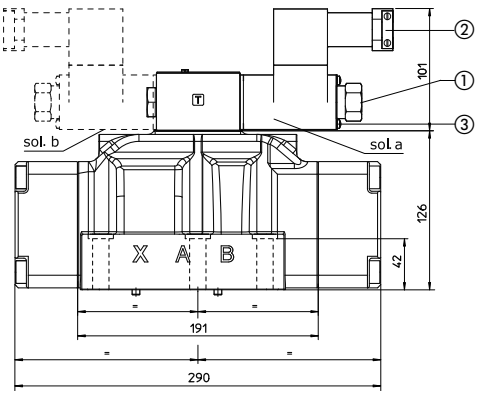
SDPHA/MA-4

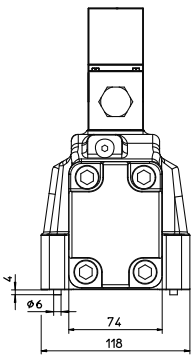
ISO 4401: 2005
Mounting surface: 4401-08-08-0-05 (see table P005)
Fastening bolts:
6 socket head screws M12x60 class 12.9
Tightening torque = 125 Nm
Seals: 4 OR 4112; 2 OR 3056
Diameter of ports A, B, P, T: Ø = 24 mm;
Diameter of ports X, Y: Ø = 7 mm;



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)



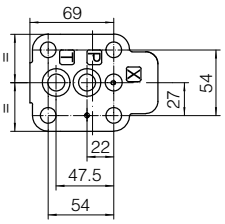


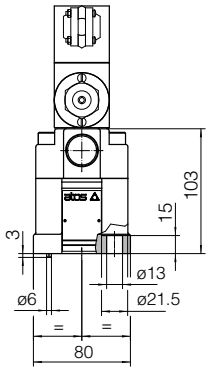
① manual override
② horizontal cable gland, cable entrance = ø 10,5 mm
③ screw terminal for additional equipotential grounding

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

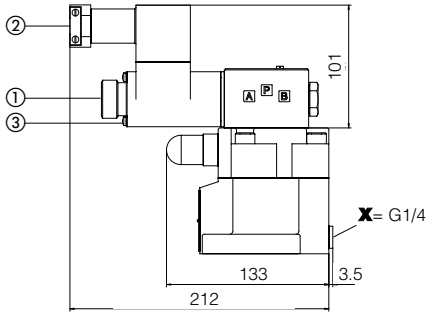
SAGAM/MA-10

ISO 6264: 2007
Mounting surface: 6264-06-09-1-97
Fastening bolts:
4 socket head screws M12x35 class 12.9
Tightening torque = 125 Nm
Seals: 2 OR 123; 1 OR 109/70
Ports P, T: Ø = 14,5 mm
Ports X: Ø = 3,2 mm





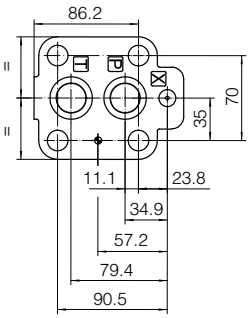
SAGAM/MA-10/**

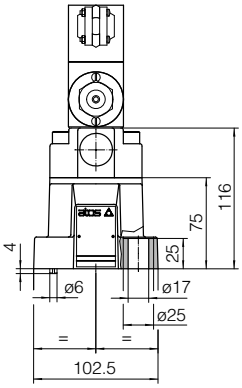


Mass: 5,1 Kg

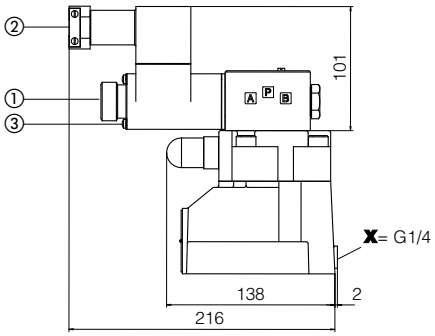
SAGAM/MA-20

ISO 6264: 2007
Mounting surface: 6264-08-11-1-97
Fastening bolts:
4 socket head screws M16x50 class 12.9
Tightening torque = 300 Nm
Seals: 2 OR 4112; 1 OR 109/70
Ports P, T: Ø = 24 mm
Ports X: Ø = 3,2 mm





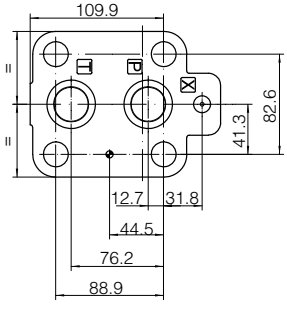
SAGAM/MA-20/**

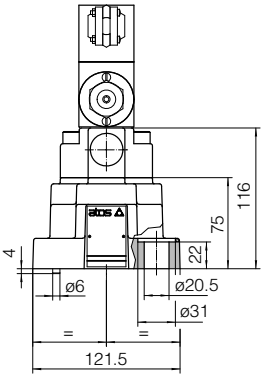


Mass: 6,3 Kg

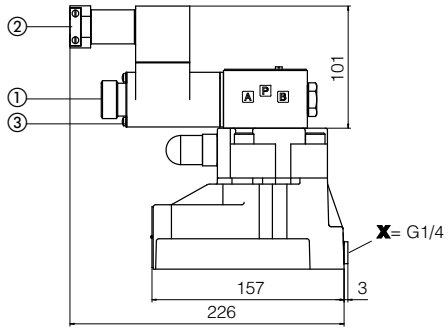
SAGAM/MA-32

ISO 6264: 2007
Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)
Fastening bolts:
4 socket head screws M20x60 class 12.9
Tightening torque = 600 Nm
Seals: 2 OR 4131; 1 OR 109/70
Ports P, T: Ø = 28,5 mm
Ports X: Ø = 3,2 mm





SAGAM/MA-32/**



Mass: 7,7 Kg

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