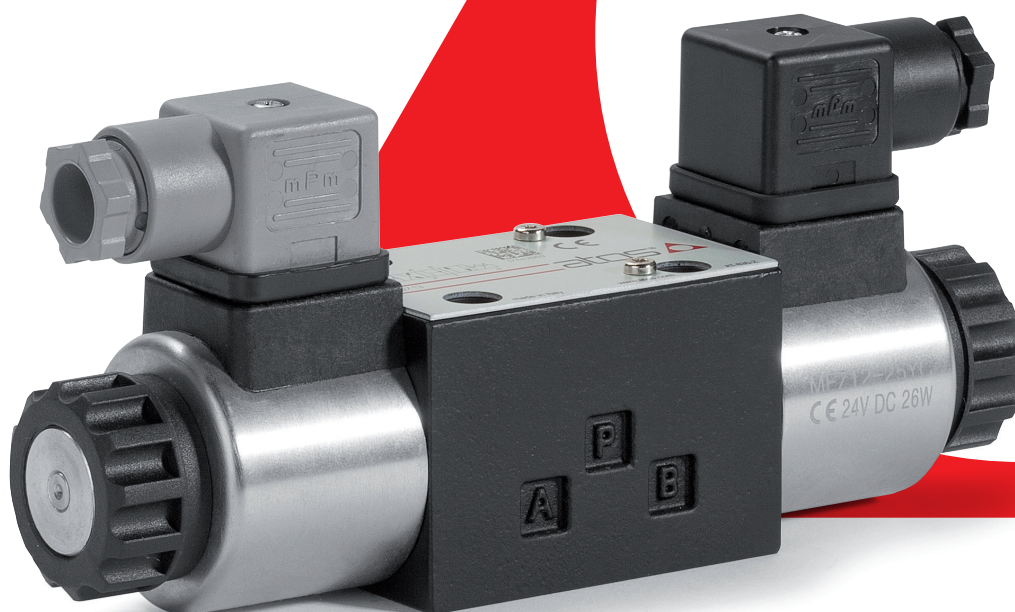


INDUSTRIAL ELECTROHYDRAULICS

ATOS SHANGHAI CATALOG





● **First class facilities**
high level of automation
with in-line process control

● **Know-how**
from the design to the production
of the finished product

● **Full product range**
standard, customized, ex-proof,
stainless steel, safety certified

● **Advanced technology**
thanks to long lasting
investments in R&D

● **Quality first**
according to ISO 9001, including
automotive's sector methods

● **Sales & service**
worldwide network of experienced
engineers, oriented to customer care

● **Professional team**
to quickly meet every
customer need



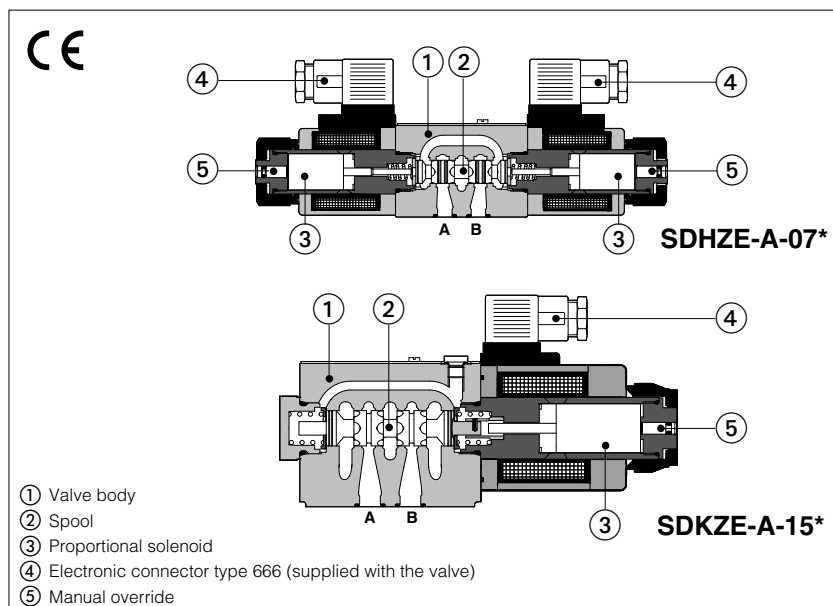
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ATOS SHANGHAI

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SDPZE-A	piloted, positive overlap, off-board driver	16 ÷ 25	550 ÷ 900	SHF170	9
pressure, without transducer					
SRZME-A	relief, direct, subplate, off-board driver	06	4	SHF005	15
CART SRZME-A	relief, direct, screw-in cartridge, off-board driver	M20			
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SDPHA/MA	directional, piloted, spool type, subplate, DC solenoids	16 ÷ 25	300 ÷ 700	SHX121	77
SAGAM/MA	pressure relief, piloted, subplate, DC solenoids	10 ÷ 32	200 ÷ 600		
ACCESSORIES					
SMAP	manual pressure switch with fixed differential switching pressure			SHD250	85

Proportional directional valves

direct operated, open loop



SDHZE-A, SDKZE-A

Direct operated proportional directional 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 drivers, see section 2, which supply the proportional valves with proper current to align the valve regulation to the reference signal.

The spools are available with linear **L**, progressive **S** or differential **D** flow characteristics.

The valve body is 3 chambers type for SDHZE and SDKZE.

The solenoid coils are available with different nominal resistances depending to the voltage supply to the driver (12 VDC or 24 VDC) and to the electronic driver characteristics, see section 2 and 3.

Mounting surface: **ISO 4401**

Size: **06** and **10**

Max flow: up to **70** and **160 l/min**

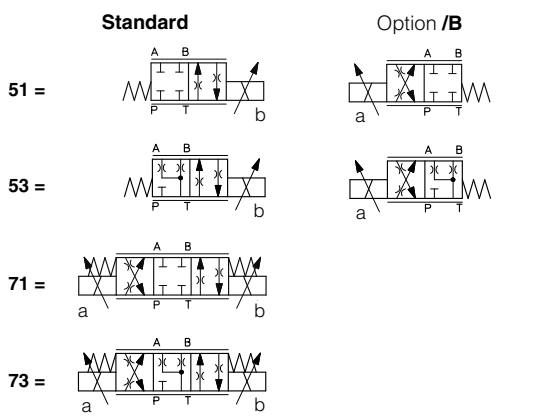
Max pressure: **350 bar** (SDHZE)

315 bar (SDKZE)

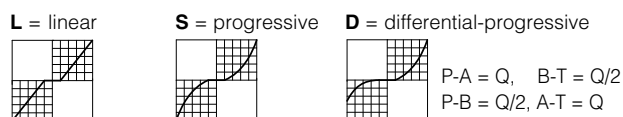
1 MODEL CODE

SDHZE		-	A	-	0	71		-	S	5	/	*	-	*	/	*	**	/	*
SDHZE = size 06 SDKZE = size 10																			
A = open loop																			
Valve size - ISO 4401 0 = size 06 (SDHZE) 1 = size 10 (SDKZE)																			
Seals material , see section 4: - = NBR PE = FKM BT = HNBR																			
																		Series number	

Configuration:



Spool type - regulating characteristics:



Coil option (only for -A execution)

see section 2 and 3:

- = standard coil for 24V_{DC} Atos drivers

6 = optional coil for 12V_{DC} Atos drivers

18 = optional coil for 24V_{DC} low current drivers (1)

Coils with special connectors, see section 10

- = omit for standard DIN connector

J = AMP Junior Timer connector

K = Deutsch connector

S = Lead Wire connection

Hydraulic options

B = solenoid side of port A (only for valve configuration 5)

Spool size:	14 (L)	1 (L)	3 (L,S,D)	5 (L,S,D)
SDHZE =	1	4,5	17	28
SDKZE =	-	-	45	60
Nominal flow (l/min) at Δp 10 bar P-T				

(1) select valve's coil voltage /18 in case of electronic drivers not supply by Atos, with power supply 24V_{DC} and with max current limited to 1A.

2 ELECTRONIC DRIVERS - see www.atos.com, catalog on-line, section "electronics" or KT master paper catalog

Drivers model	E-MI-AC		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	analog		digital		digital		digital
Voltage supply (V _{DC})	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	DIN 43650 plug-in to solenoid				DIN-rail panel		
Data sheet	G010		G020		G030		GS050

3 MAIN CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

Assembly position	Any position					
Subplate surface finishing	Roughness index, Ra 0,4 flatness ratio 0,01/100 (ISO 1101)					
MTTFd valves according to EN ISO 13849	150 years, see KT technical table P007					
Ambient temperature range	Standard and /PE = -20°C ÷ +70°C,			/BT option = -40°C ÷ +60°C		
Storage temperature range	Standard and /PE = -20°C ÷ +80°C,			/BT option = -40°C ÷ +70°C		
Coil code	SDHZE			SDKZE		
	standard	option /6	option /18	standard	option /6	option /18
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω	3,8 ÷ 4,1 Ω	2,2 ÷ 2,4 Ω	12 ÷ 12,5 Ω
Max. solenoid current	2,2 A	2,75 A	1 A	2,6 A	3,25 A	1,2 A
Max. power	30W			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 to DIN EN60529	IP 65 (with connectors 666 correctly assembled)					
Duty factor	Continuous rating (ED=100%)					

Valve model	SDHZE				SDKZE	
Pressure limits [bar]	ports P, A, B = 350; T = 210				ports P, A, B = 315; T = 210	
Spool type and size	L14	L1	S3, L3, D3	S5, L5, D5	S3, L3, D3	S5, L5, D5
Nominal flow (1) [l/min]						
at Δp = 10 bar (P-T)	1	4,5	18	28	45	60
at Δp = 30 bar (P-T)	2	8	30	50	80	105
at Δp = 70 bar (P-T)	3	12	45	70	120	160
Response time (2) [ms]	< 30				< 40	
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.

the flow regulated by the directional proportional valves is not pressure compensated, thus it is affected by the load variations. To keep constant the regulated flow under different load conditions, Atos modular pressure compensators are available at www.atos.com (see KT table D150).

(1) For different Δp, the max flow is in accordance to the diagrams in sections 7.2 and 8.2

(2) 0-100% step signal

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

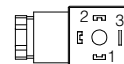
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	20 ÷ 100 mm²/s - max allowed range 15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

5 GENERAL NOTES

SDHZE and SDKZE proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

6 CONNECTIONS

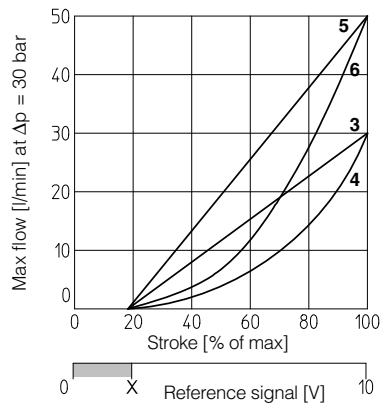
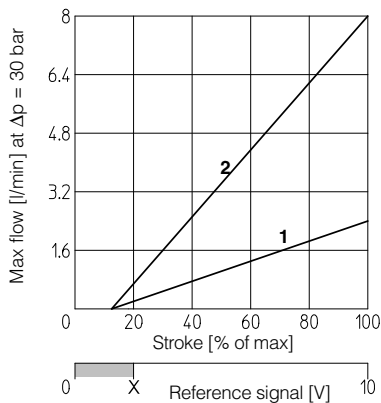
SOLENOID POWER SUPPLY CONNECTOR TYPE 666		
PIN	Signal description	
1	SUPPLY	
2	SUPPLY	
3	GND	



7 DIAGRAMS FOR SDHZE (based on mineral oil ISO VG 46 at 50 °C)

7.1 Regulation diagrams

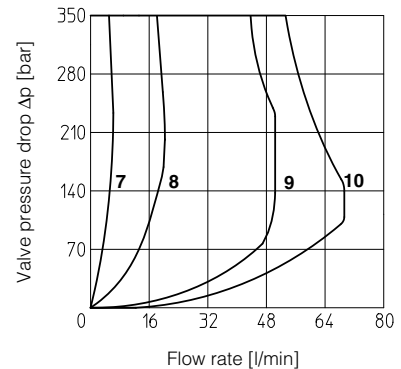
1 = linear spool L14 3 = linear spool L3 5 = linear spool L5
2 = linear spool L1 4 = progressive spool S3, D3 6 = progressive spool S5, D5



X = Threshold for bias activation depending to the valve type and amplifier type

7.2 Operating limits

7 = spool L14 9 = spool L3, S3, D3
8 = spool L1 10 = spool L5, S5, D5



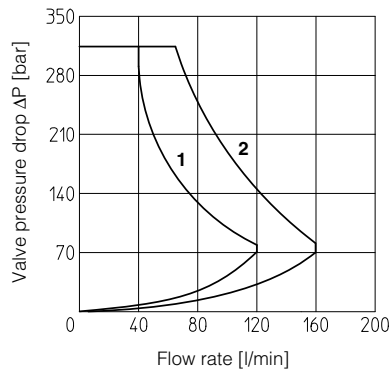
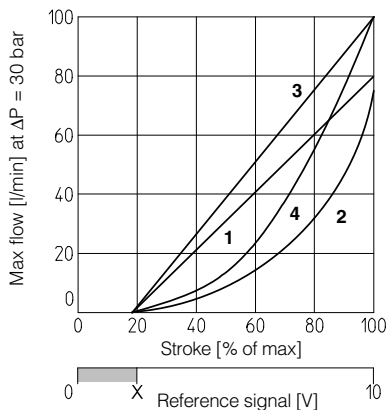
8 DIAGRAMS FOR SDKZE (based on mineral oil ISO VG 46 at 50 °C)

8.1 Regulation diagrams

1 = linear spool L3
2 = progressive spool S3, D3
3 = linear spool L5
4 = progressive spool S5, D5

8.2 Operating limits

1 = spool L3, S3, D3
2 = spool L5, S5, D5

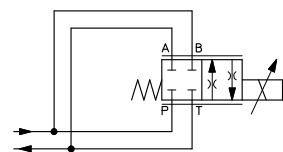


X = Threshold for bias activation depending to the valve type and amplifier type

9 OPERATION AS THROTTLE VALVE

Single solenoid valves (SDHZE-A-051 - SDKZE-A-151) can be used as simple throttle valves:
Pmax = 210 bar

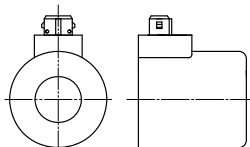
Max flow Δp= 30bar [l/min]	SPOOL TYPE					
	L14	L1	L3	S3	L5	S5
SDHZE	4	16	60		100	
SDKZE	-	-	120		150	



10 COILS WITH SPECIAL CONNECTORS

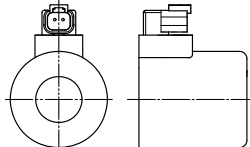
Options -J

Coil type COZEJ (SDHZE)
Coil type CAZEJ (SDKZE)
AMP Junior Timer connector
Protection degree IP67



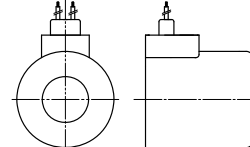
Options -K

Coil type COZEK (SDHZE)
Coil type CAZEK (SDKZE)
Deutsch connector, DT-04-2P male
Protection degree IP67



Options -S

Coil type COZES (SDHZE)
Coil type CAZES (SDKZE)
Lead Wire connection
Cable length = 180 mm



SDHZE

ISO 4401: 2005

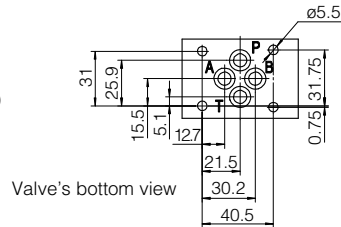
Mounting surface: 4401-03-02-0-05

Fastening bolts: 4 socket head screws M5x30 class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P, A, B, T: $\varnothing = 7.5$ mm (max)

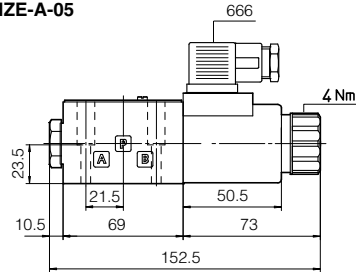
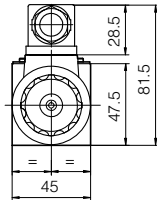


P = PRESSURE PORT

A, B = USE PORT

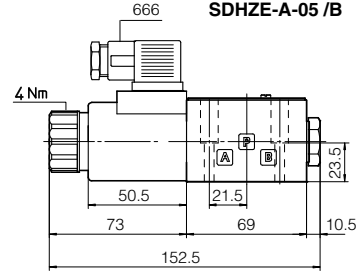
T = TANK PORT

SDHZE-A-05

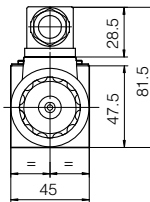
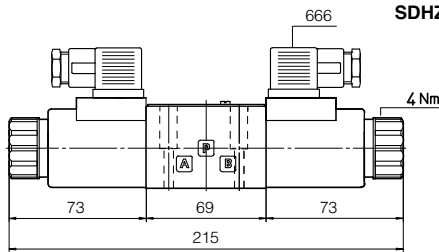


Mass: 1,5 kg

SDHZE-A-05 /B



SDHZE-A-07



Mass: 2 kg

SDKZE

ISO 4401: 2005

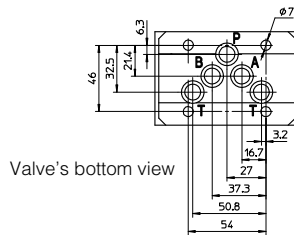
Mounting surface: 4401-05-04-0-05 (see table P005)

Fastening bolts: 4 socket head screws M6x40 class 12.9

Tightening torque = 15 Nm

Seals: 5 OR 2050

Diameter of ports A, B, P, T: $\varnothing 11,2$ mm (max)

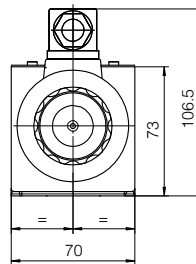
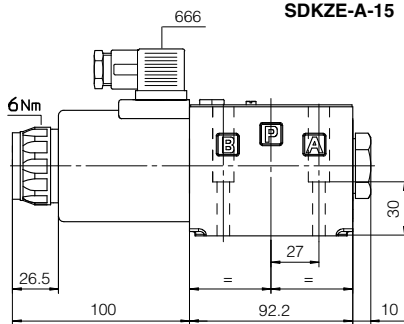


P = PRESSURE PORT

A, B = USE PORT

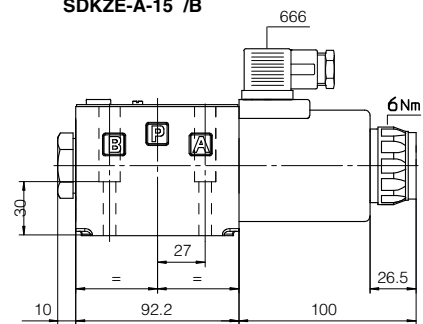
T = TANK PORT

SDKZE-A-15

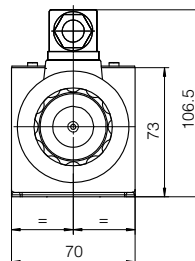
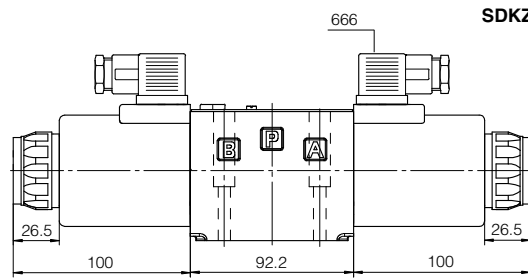


Mass: 4,5 kg

SDKZE-A-15 /B



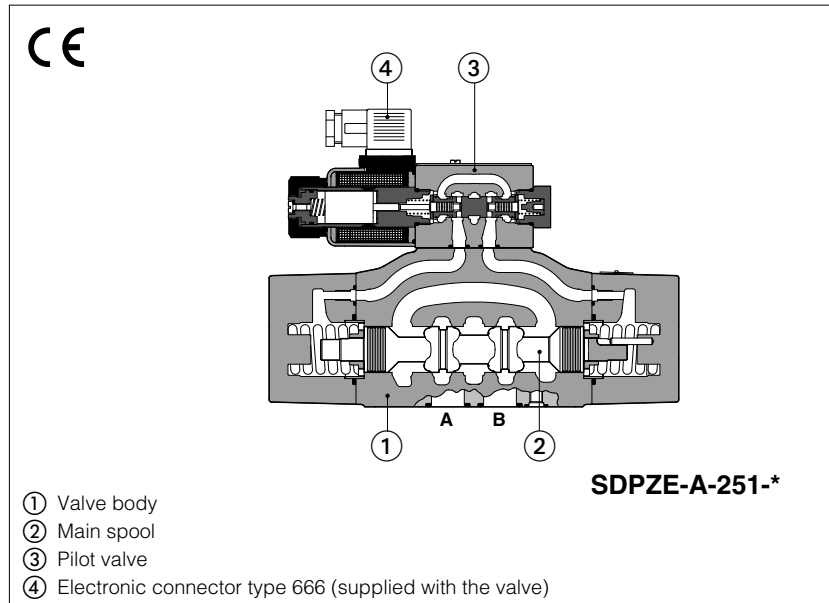
SDKZE-A-17



Mass: 6,1 kg

Two stage proportional directional valves

pilot operated, open loop



SDPZE-A

Pilot operated 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 drivers, see section [2], which supply the proportional valve with proper current to align the valve regulation to the reference signal.

The solenoid coils are available with different nominal resistances depending to the voltage supply to the driver (12 Vdc or 24 Vdc) and to the electronic driver characteristics, see section [2] and [3].

Mounting surface: **ISO 4401**

Size: **16 and 25**

Max flow: **550 and 900 l/min**

Max pressure: **350 bar**

1 MODEL CODE for STANDARD SPOOLS

SDPZE		-	A	-	2	71	-	L	5	/	*	-	*	/	*	*	/	*
Pilot operated proportional directional valve																		
A = open loop - available separated driver see section 2																		
Valve size - ISO 4401: 2 = 16 4 = 25																		
Configuration:																		
Standard		Option /B																
51 =																		
53 =																		
71 =																		
73 =																		
Seals material, see sect. 4: - = NBR PE = FKM BT = HNBR																		
Series number																		
Coil voltage, see section 2, 3: - = standard coil for 24V _{DC} Atos drivers 6 = optional coil for 12V _{DC} Atos drivers 18 = optional coil for low current drivers (2)																		
Coils with special connectors, see section 10: - = omit for standard DIN connector J = AMP Junior Timer connector K = Deutsch connector S = Lead Wire connection																		
Hydraulic options, see sect. 8: B = solenoid at side of port B of the main stage (side A of pilot valve) (1) - only for configuration 51 and 53 D = internal drain E = external pilot pressure G = pressure reducing valve for piloting																		
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)														
SDPZE-2 =		160		250														
SDPZE-4 =		-		480														
Nominal flow (l/min) at Δp 10bar P-T																		

(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 ELECTRONIC DRIVERS - see www.atos.com, catalog on-line, section "electronics" or KT master paper catalog

Drivers model	E-MI-AC		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	analog		digital		digital		digital
Voltage supply (V _{bc})	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	DIN 43650 plug-in to solenoid				DIN-rail panel		
Data sheet	G010		G020		G030		GS050

3 MAIN CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	75 years, for further details see KT technical table P007		
Ambient temperature range	Standard and /PE = -20°C ÷ +70°C; /BT option = -40°C ÷ +60°C		
Storage temperature range	Standard and /PE = -20°C ÷ +80°C; /BT option = -40°C ÷ +70°C		
Coil 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
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω
Max. solenoid current	2,2 A	2,75 A	1 A
Max. power	30 Watt		
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 to DIN EN60529	IP 65 (with connectors 666 correctly assembled)		
Duty factor	Continuous rating (ED=100%)		

Valve model	SDPZE-*-2		SDPZE-*-4
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) Δp = 10 bar	160	250	480
Δp P-T Δp = 30 bar	270	430	830
Max permissible flow [l/min]	400	550	900
Piloting pressure [bar]	min. = 25; max = 350 (option /G advisable for pilot pressure > 150 bar)		
Piloting volume [cm³]	3,7	9,0	
Piloting flow (2) [l/min]	3,7	6,8	
Leakage (3) Main stage [l/min]	0,2/0,6	0,3/1,0	
Response time (4) [ms] (0-100% step signal and pilot pressure 100 bar)	< 100	< 120	
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 7.2

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

(3) at P = 100/350 bar

(4) see detailed diagrams in section 7.3

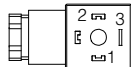
4 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

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 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	NBR, HNBR	HFC	

5 GENERAL NOTES

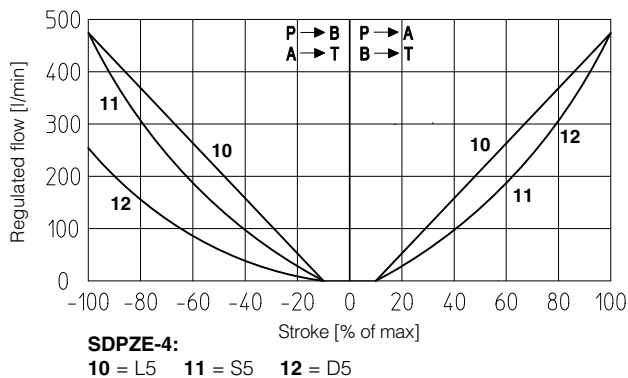
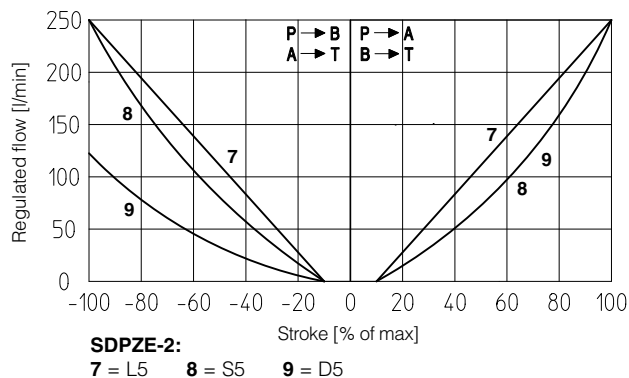
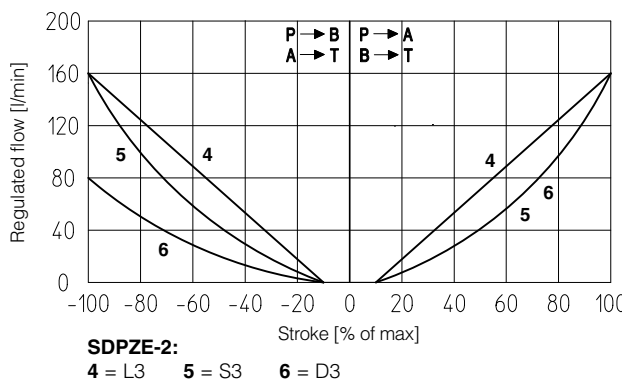
SDPZE-A* proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

6 CONNECTIONS

SOLENOID POWER SUPPLY CONNECTOR TYPE 666		
PIN	Signal description	
1	SUPPLY	
2	SUPPLY	
3	GND	

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

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

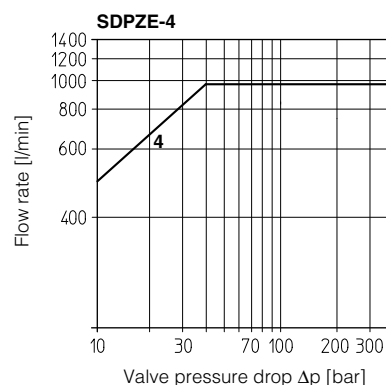
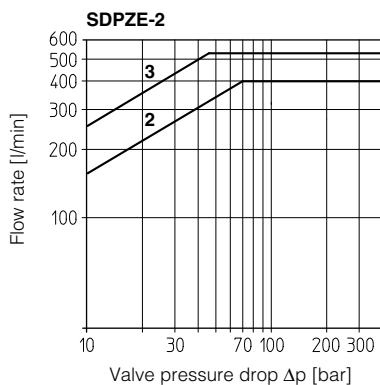
Reference signal $\begin{matrix} 0 \div -10 \text{ V} \\ 12 \div 4 \text{ mA} \end{matrix} \left. \vphantom{\begin{matrix} 0 \div -10 \text{ V} \\ 12 \div 4 \text{ mA} \end{matrix}} \right\} P \rightarrow B / A \rightarrow T$

7.2 Flow / Δp diagram

stated at 100% of spool stroke

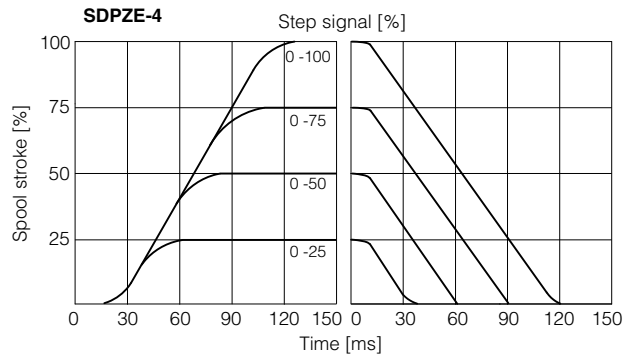
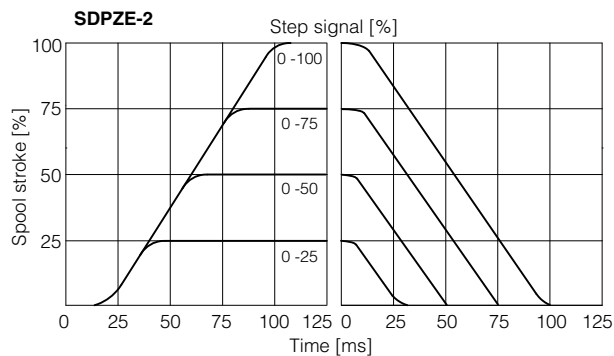
SDPZE-2:
2 = spools L3, S3, D3
3 = spools L5, S5, D5

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



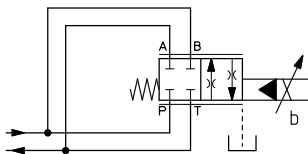
7.3 Response time (measured at pilot pressure = 100 bar)

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.



7.4 Operation as throttle valve

Single solenoid valves (*51) can be used as simple throttle valves:
 $P_{max} = 250 \text{ bar}$



SDPZE-A*	251-L5	451-L5
Max flow [l/min]	850	1400
$\Delta p = 30 \text{ bar}$		

8 HYDRAULIC OPTIONS

8.1 Option /B

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

8.2 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.

8.3 Option /G

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

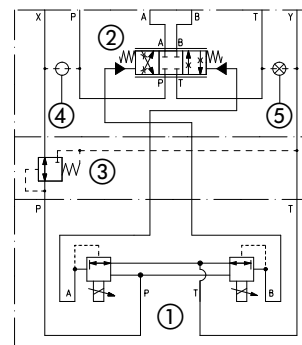
SDPZE-2 = 40 bar

SDPZE-4 = 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 through port X
- ⑤ Plug to be removed for internal drain through port T

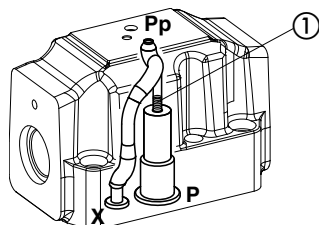
9 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

Depending on the position of internal plugs, different pilot/drain configurations can be obtained as shown below.

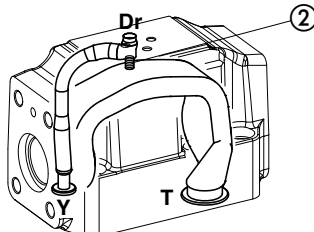
To modify the pilot/drain configuration, proper plugs must only be interchanged. The plugs have to be sealed using loctite 270.

Standard valves configuration provides internal pilot and external drain

SDPZE-2 Pilot channels

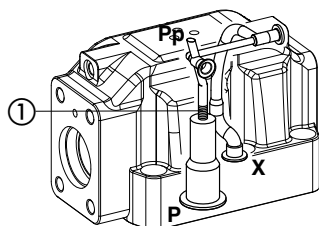


Drain channels

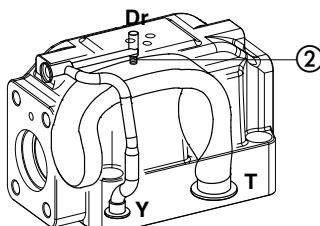


Internal piloting: Without blinded plug SP-X300F ①;
External piloting: Add blinded plug SP-X300F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

SDPZE-4 Pilot channels



Drain channels

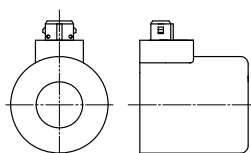


Internal piloting: Without blinded plug SP-X500F ①;
External piloting: Add blinded plug SP-X500F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

10 COILS WITH SPECIAL CONNECTORS

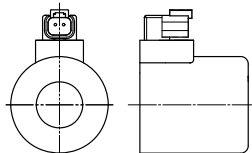
Options -J

Coil type COZEJ
 AMP Junior Timer connector
 Protection degree IP67



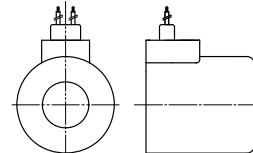
Options -K

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



Options -S

Coil type COZES
 Lead Wire connection
 Cable length = 180 mm



SDPZE-2***ISO 4401: 2005****Mounting surface: 4401-07-07-0-05**

Fastening bolts:

4 socket head screws M10x50 class 12.9

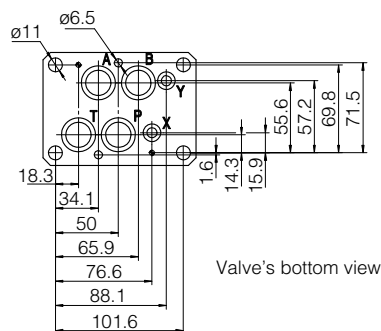
Tightening torque = 70 Nm

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;

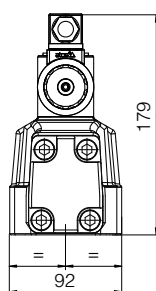
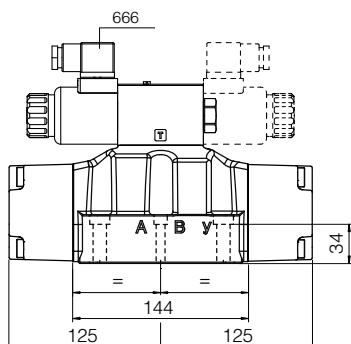
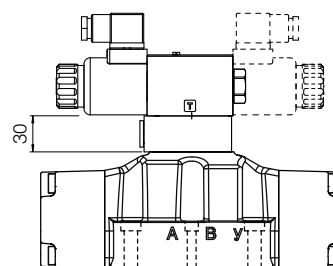
Seals: 4 OR 130, 2 OR 2043

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

Valve's bottom view

Mass [kg]

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

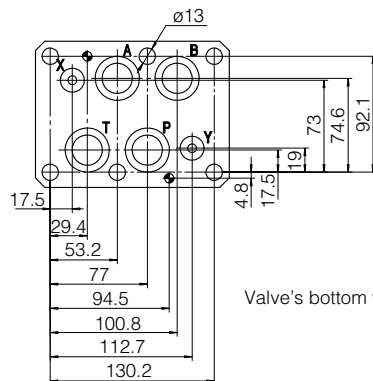
SDPZE-A-2**Option /G****SDPZE-4*****ISO 4401: 2005****Mounting surface: 4401-08-08-0-05**

Fastening bolts:

6 socket head screws M12x60 class 12.9

Tightening torque = 125 Nm

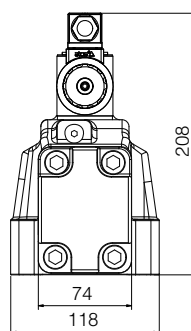
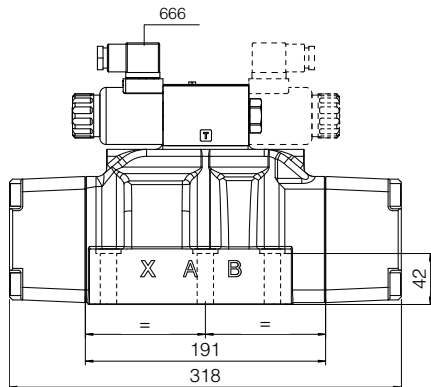
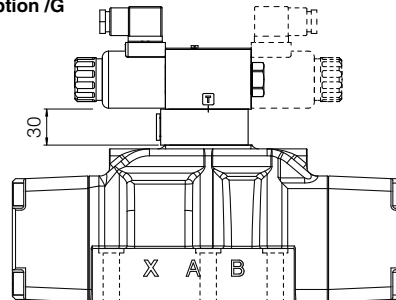
Seals: 4 OR 4112; 2 OR 3056

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]

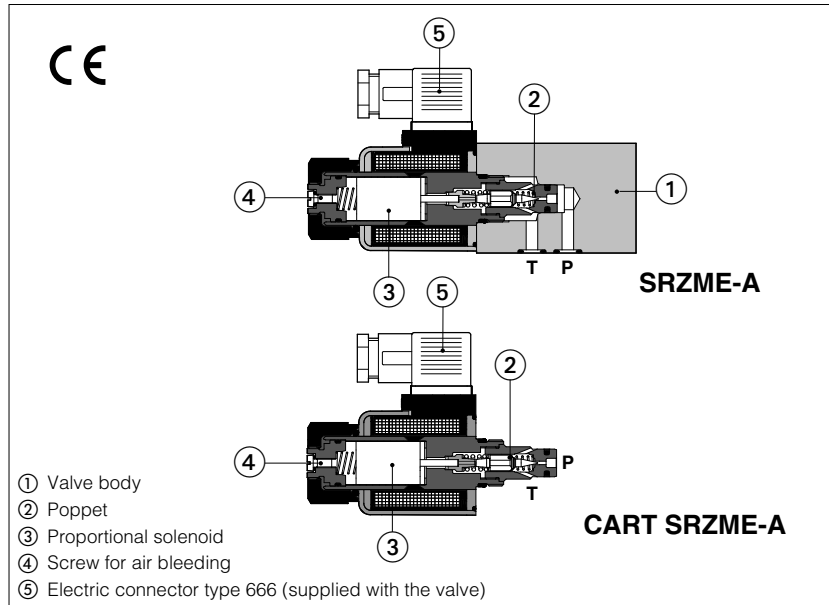
	A
SDPZE-*-45*	17,1
SDPZE-*-47*	18
Option /G	+0,9

SDPZE-A-4**Option /G**

Dotted line = double solenoid version

Proportional relief valves

direct operated, ISO 4401 size 06 subplate mounting or M20 screw-in cartridge execution



SRZME-A, CART SRZME-A

Poppet type direct operated proportional relief valves for pressure open loop controls, available in following executions:

SRZME: subplate mounting, ISO size 06

CART SRZME: M20 cartridge execution

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

The solenoid coils are available with different nominal resistances depending to the voltage supply to the electronic driver (12 VDC or 24 VDC) and to the driver characteristics, see section 2 and 3.

Mounting surface SRZME: **ISO 4401 size 06**

Cavity CART SRZME: see section 10

Max flow = **4 l/min**

Max pressure = **350 bar**

1 MODEL CODE

SRZME	-	A	-	010	/	315	-	*	/	*	**	/	*
<p>Proportional pressure relief valve</p> <p>SRZME = subplate mounting</p> <p>CART SRZME = cartridge execution</p>													
<p>A = open loop pressure control</p>													
<p>Configuration:</p> <p>010 = regulation on port P, discharge in T</p>													
<p>Max regulated pressure:</p> <p>50 = 50 bar</p> <p>100 = 100 bar</p> <p>210 = 210 bar</p> <p>315 = 315 bar</p> <p>350 = 350 bar</p>													
<p>Seals material, see section 4:</p> <p>- = NBR</p> <p>PE = FKM</p> <p>BT = HNBR</p>													
<p>Series number</p>													
<p>Coil voltage see section 2 and 3:</p> <p>- = standard coil for 24V_{DC} Atos drivers</p> <p>6 = optional coil for 12V_{DC} Atos drivers</p> <p>18 = optional coil for low current drivers (1)</p>													
<p>Coils with special connectors, see section 9</p> <p>- = omit for standard DIN connector</p> <p>J = AMP Junior Timer connector</p> <p>K = Deutsch connector</p> <p>S = Lead Wire connection</p>													

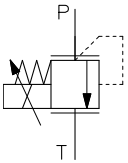
(1) select valve's coil voltage /18 in case of electronic drivers not supplied by Atos, with power supply 24V_{DC} and with max current limited to 1A.

2 ELECTRONIC DRIVERS - see www.atos.com, catalog on-line, section "electronics" or KT master paper catalog

Drivers model	E-MI-AC (1)		E-MI-AS-IR (1)		E-BM-AS-PS		E-BM-AES
Type	analog		digital		digital		digital
Voltage supply (V _{DC})	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	DIN 43650 plug-in to solenoid				DIN-rail panel		
Data sheet	G010		G020		G030		GS050

(1) for **CART SRZME** the electronic driver may interfere with the manifold surface. Please check the installation dimensions at section 10

3 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols	 SRZME-A CART SRZME-A		
Assembly position / location	Any position		
Subplate surface finishing (SRZME)	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see KT technical table P007		
Ambient temperature range	Standard and /PE = -20°C ÷ +70°C; /BT option = -40°C ÷ +60°C		
Storage temperature range	Standard and /PE = -20°C ÷ +80°C; /BT option = -40°C ÷ +70°C		
Coil 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
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω
Max. solenoid current	2,2 A	2,75 A	1 A
Max. power	30 Watt		
Protection degree (CEI EN-60529)	IP 65 (with connectors 666 correctly assembled)		
Duty factor	Continuous rating (ED=100%)		

Max regulated pressure	[bar]	50	100	210	315	350
Min. regulated pressure	[bar]	see min. pressure / flow diagrams at sect. 7				
Max. pressure at port P	[bar]	350				
Max. pressure at port T	[bar]	210				
Max. flow	[l/min]	4				
Response time 0-100% step signal (1) (depending on installation)	[ms]	≤ 70				
Hysteresis	[% of the max pressure]	≤ 1,5				
Linearity	[% of the max pressure]	≤ 3				
Repeatability	[% of the max pressure]	≤ 2				

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

(1) Average response time values; the pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response.

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

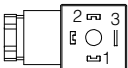
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	20 ÷ 100 mm²/s - max allowed range 15 ÷ 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	

5 GENERAL NOTES

SRZME-A and CART SRZME proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

6 SOLENOID CONNECTIONS

SOLENOID POWER SUPPLY CONNECTOR TYPE 666	
PIN	Signal description
1	SUPPLY
2	SUPPLY
3	GND

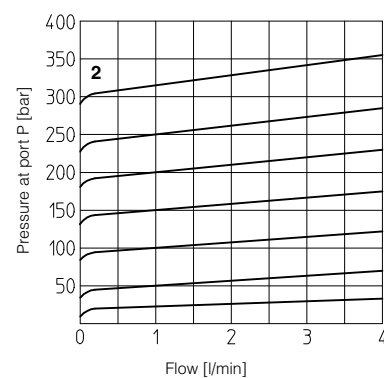
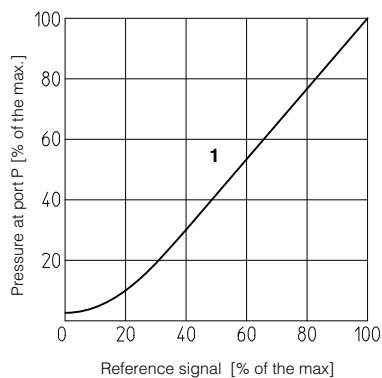


7 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

1 Regulation diagrams with flow rate $Q = 1$ l/min

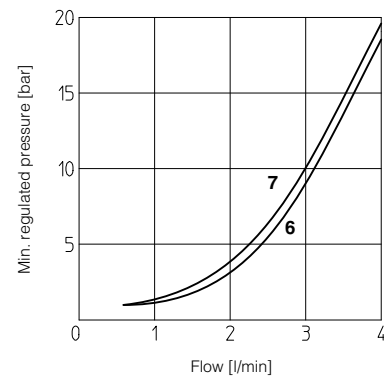
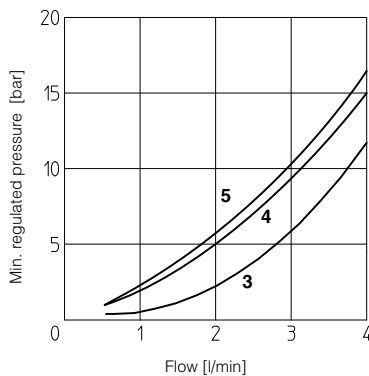
Note: The presence of counter pressure at port T can affect the effective pressure regulation.

2 Pressure/flow diagrams with reference signal set at $Q = 1$ l/min



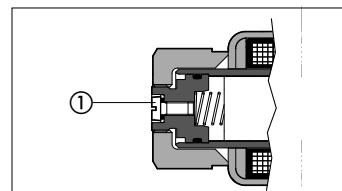
3-7 Min. pressure/flow diagrams with zero reference signal

- 3 = pressure range: 50
- 4 = pressure range: 100
- 5 = pressure range: 210
- 6 = pressure range: 315
- 7 = pressure range: 350



8 AIR BLEEDING

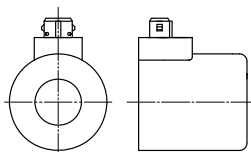
At the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw ① located at the rear side of the solenoid housing. The presence of air may cause pressure instability and vibrations.



9 COILS TYPE WITH SPECIAL CONNECTORS

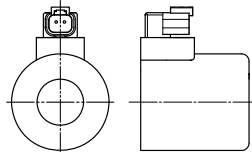
Options -J

Coil type COZEJ
AMP Junior Timer connector
Protection degree IP67



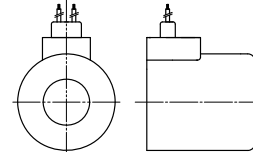
Options -K

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



Options -S

Coil type COZES
Lead Wire connection
Cable length = 180 mm



ISO 4401: 2005

Mounting surface: 4401-03-02-0-05 (see table P005)
(without ports A and B)

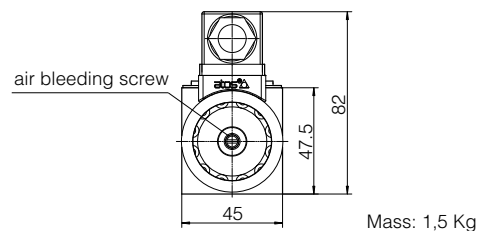
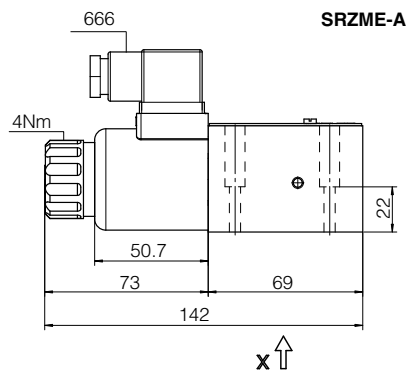
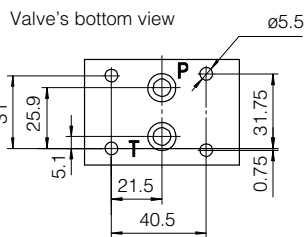
Fastening bolts:

4 socket head screws M5X50 class 12.9

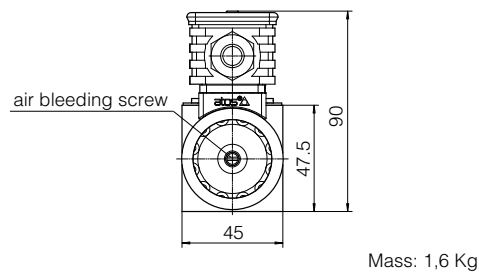
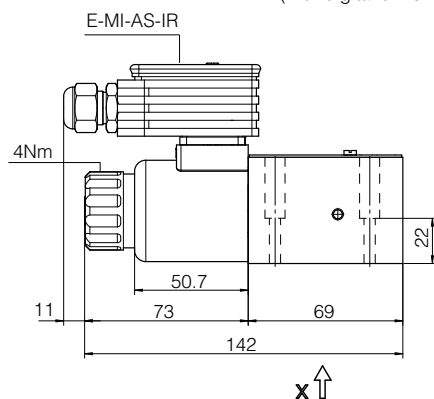
Tightening torque = 8 Nm

Seals: 2 OR 108

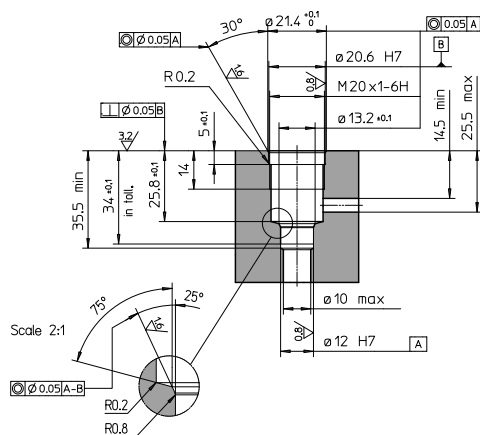
Ports P, T: $\varnothing = 5$ mm



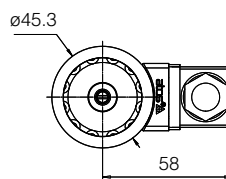
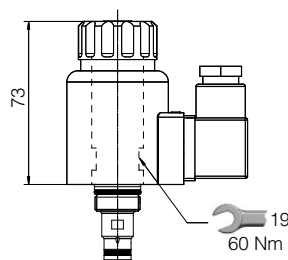
SRZME-A
(with digital driver E-MI-AS-IR)



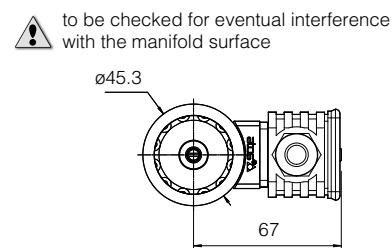
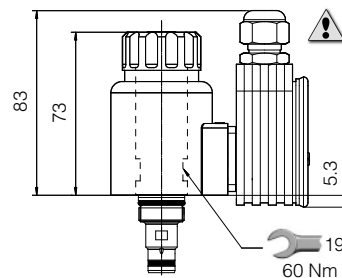
Cavity dimensions
for **CART SRZME-A**



CART SRZME-A

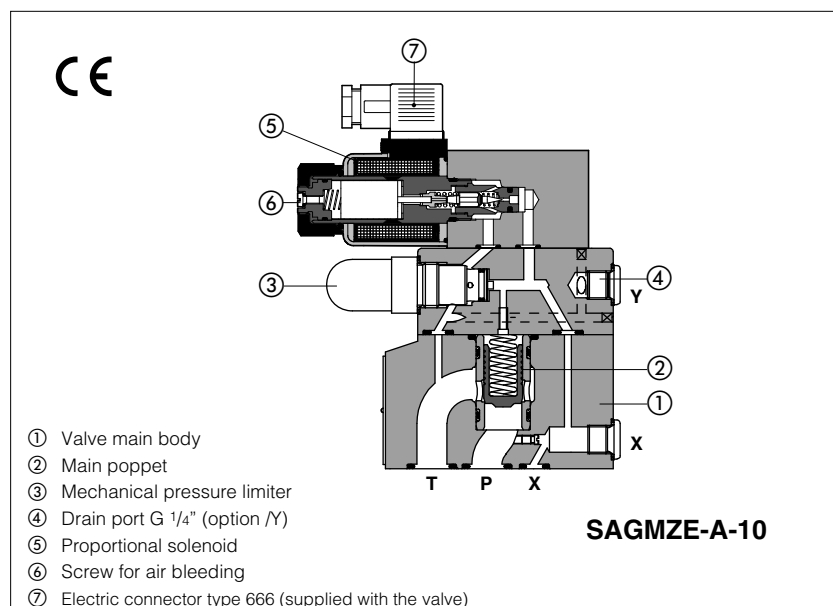


CART SRZME-A
(with digital driver E-MI-AS-IR)



Proportional relief valves

pilot operated, open loop



SAGMZE-A

Poppet type, pilot operated proportional relief valves for pressure open loop controls.

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

The solenoid coils are available with different nominal resistances depending to the voltage supply to the electronic driver (12 Vdc or 24 Vdc) and to the driver characteristics, see section 2 and 3.

Mounting surface: **ISO 6264**

Size: **10, 20, 32**

Max flow: **200, 400, 600 l/min**

Max pressure: **350 bar**

1 MODEL CODE

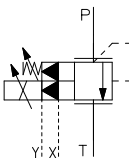
SAGMZE	-	A	-	10	/	315	/	*	-	*	/	*	**	/	*
Proportional pressure relief valve pilot operated															Seals material, see section 4: - = NBR PE = FKM BT = HNBR
A = open loop pressure control															Series number
Valve size ISO 6264 10, 20, 32															
Max regulated pressure: 50 = 50 bar 210 = 210 bar 350 = 350 bar 100 = 100 bar 315 = 315 bar															
Hydraulic options , see section 8 E = external pilot Y = external drain (only pipe connection G 1/4")															
															Coil voltage , see section 2 and 3: - = standard coil for 24VDC Atos drivers 6 = optional coil for 12Vdc Atos drivers 18 = optional coil for low current drivers (1)
															Coils with special connectors , see section 12 - = omit for standard DIN connector J = AMP Junior Timer connector K = Deutsch connector S = Lead Wire connection

(1) 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 ELECTRONIC DRIVERS - see www.atos.com, catalog on-line, section "electronics" or KT master paper catalog

Drivers model	E-MI-AC		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	analog		digital		digital		digital
Voltage supply (V _{dc})	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	DIN 43650 plug-in to solenoid				DIN-rail panel		
Data sheet	G010		G020		G030		GS050

3 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols	 SAGMZE		
Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	75 years, for further details see KT technical table P007		
Ambient temperature range	Standard and /PE = -20°C ÷ +70°C; /BT option = -40°C ÷ +60°C		
Storage temperature range	Standard and /PE = -20°C ÷ +80°C; /BT option = -40°C ÷ +70°C		
Coil 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
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω
Max. solenoid current	2,2 A	2,75 A	1 A
Max. power	30 Watt		
Protection degree (CEI EN-60529)	IP 65 (with connectors 666 correctly assembled)		
Duty factor	Continuous rating (ED=100%)		

Valve size	10	20	32
Max regulated pressure	50; 100; 210; 315; 350		
Min. regulated pressure [bar]	see min. pressure / flow diagrams at sect. 7		
Max. pressure at port P [bar]	350		
Max. pressure at port T [bar]	210		
Max. flow [l/min]	200	400	600
Response time 0-100% step signal (1) [ms] (depending on installation)	120	135	150
Hysteresis [% of the max pressure]	≤ 0,5		
Linearity [% of the max pressure]	≤ 1,0		
Repeatability [% of the max pressure]	≤ 0,2		

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

(1) Average response time values; the pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response.

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

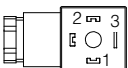
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C		
Recommended viscosity	20 ÷ 100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	normal operation 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	NBR, HNBR	HFC	

5 GENERAL NOTES

SAGMZE proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

6 SOLENOID CONNECTIONS

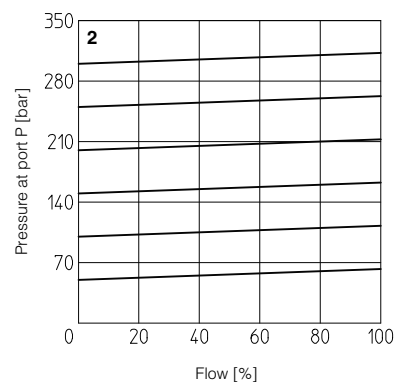
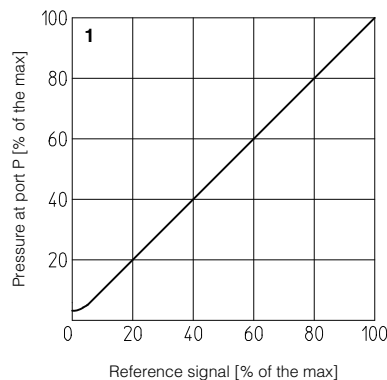
SOLENOID POWER SUPPLY CONNECTOR TYPE 666	
PIN	Signal description
1	SUPPLY
2	SUPPLY
3	GND



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

1 = Regulation diagrams

with flow rate $Q = 50 \text{ l/min}$



2 = Pressure/flow diagrams

with reference signal set at $Q = 50 \text{ l/min}$

3-8 = Min. pressure/flow diagrams

with zero reference signal

3 = SAGMZE-A-10/50, 100, 210, 315

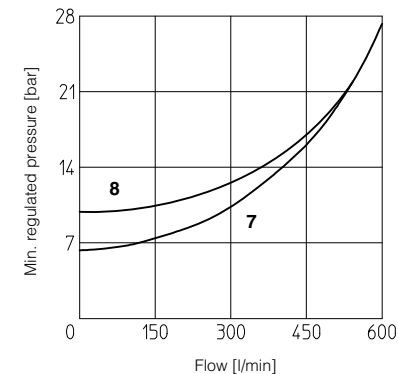
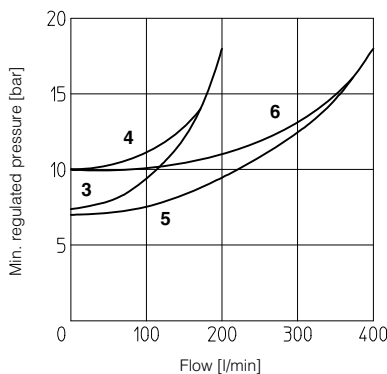
4 = SAGMZE-A-10/350

5 = SAGMZE-A-20/50, 100, 210, 315

6 = SAGMZE-A-20/350

7 = SAGMZE-A-32/50, 100, 210, 315

8 = SAGMZE-A-32/350

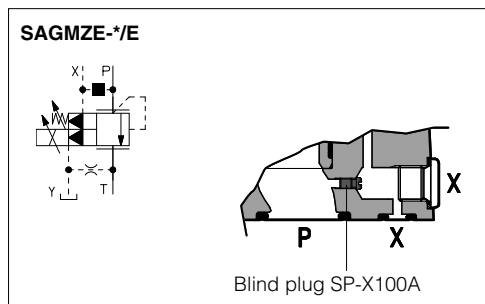


8 HYDRAULIC OPTIONS

8.1 Option E

External pilot option to be selected when the pilot pressure is supplied from a different line respect to the P main line.

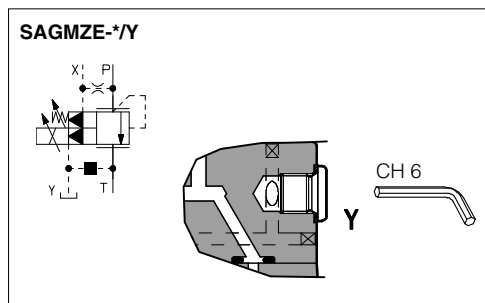
With option E the internal connection between port P and X of the valve is plugged. The pilot pressure must be connected to the X port available on the valve's mounting surface or on main body (threaded pipe connection G 1/4").



8.2 Option Y

The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.

The Y drain port has a threaded connection G 1/4" available on the pilot stage body.



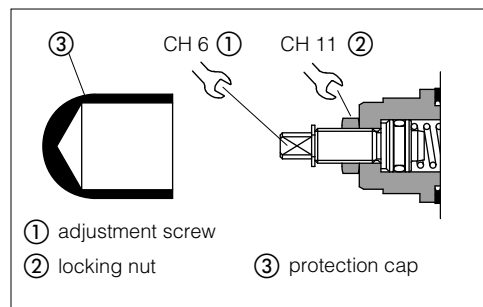
9 MECHANICAL PRESSURE LIMITER

The SAGMZE are provided with mechanical pressure limiter acting as protection against overpressure. For safety reasons the factory setting of the mechanical pressure limiter is fully unloaded (min pressure).

At the first commissioning it must be set at a value lightly higher than the max pressure regulated with the proportional control.

For the pressure setting of the mechanical pressure limiter, proceed according to following steps:

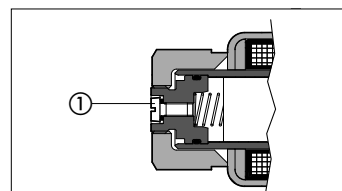
- apply the max reference input signal to the valve's driver. The system pressure will not increase until the mechanical pressure limiter remains unloaded.
- turn clockwise the adjustment screw ① until the system pressure will increase up to a stable value corresponding to the pressure setpoint at max reference input signal.
- turn clockwise the adjustment screw ① of additional 1 or 2 turns to ensure that the mechanical pressure limiter remains closed during the proportional valve working.



10 AIR BLEEDING

At the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw ① located at the rear side of the solenoid housing.

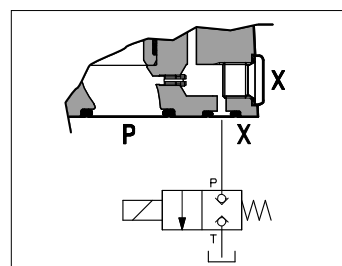
The presence of air may cause pressure instability and vibrations.



11 REMOTE PRESSURE UNLOADING

The **P** main line can be remotely unloaded by connecting the valve X port to a solenoid valve as shown in the below scheme (venting valve).

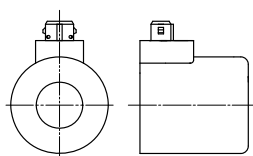
This function can be used in emergency to unload the system pressure by-passing the proportional control.



12 COILS TYPE WITH SPECIAL CONNECTORS

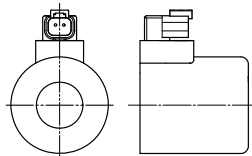
Options -J

Coil type COZEJ
AMP Junior Timer connector
Protection degree IP67



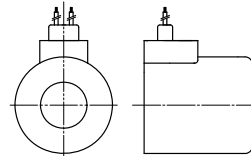
Options -K

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

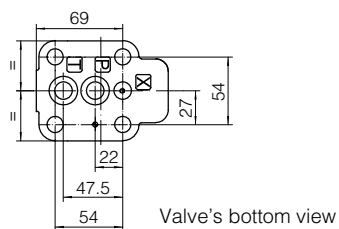


Options -S

Coil type COZES
Lead Wire connection
Cable length = 180 mm



SIZE 10



Valve's bottom view

ISO 6264: 2007

Mounting surface: 6264-06-09-1-97

Fastening bolts:

4 socket head screws M12x35 class 12.9

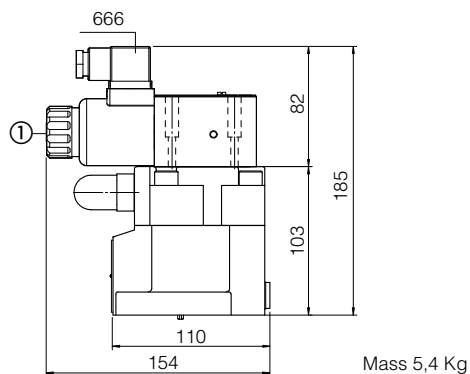
Tightening torque = 125 Nm

Seals: 2 OR 123; 1 OR 109/70

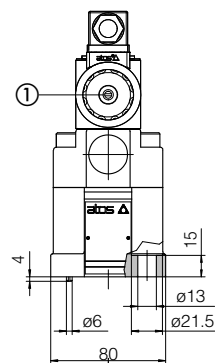
Ports P, T: $\varnothing = 14,5$ mm

Ports X: $\varnothing = 3,2$ mm

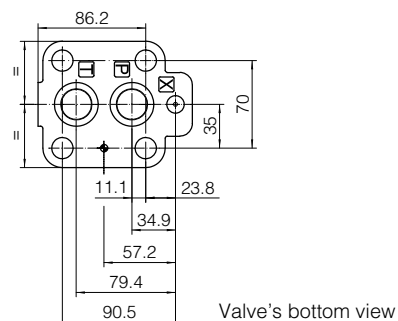
SAGMZE-A-10



Mass 5,4 Kg



SIZE 20



Valve's bottom view

ISO 6264: 2007

Mounting surface: 6264-08-13-1-97

(see table P005)

Fastening bolts: 4 socket head screws

M16x50 class 12.9

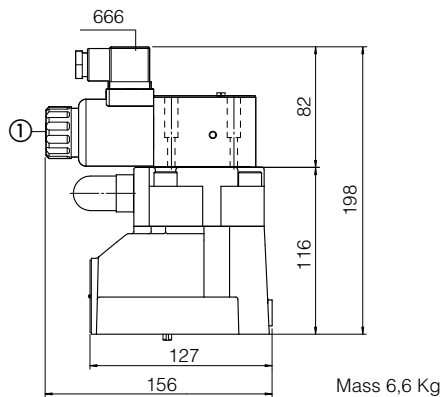
Tightening torque = 300 Nm

Seals: 2 OR 4112, 1 OR 109/70

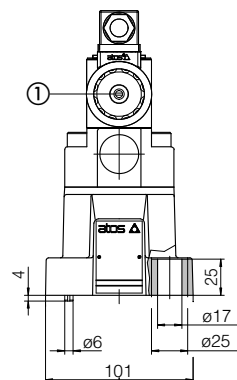
Ports P, T: $\varnothing = 24$ mm

Port X: $\varnothing = 3,2$ mm

SAGMZE-A-20

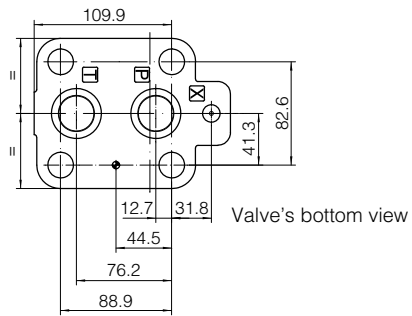


Mass 6,6 Kg



① = Screw for air bleeding

SIZE 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

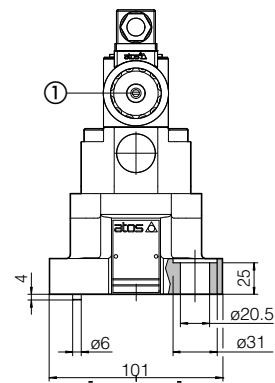
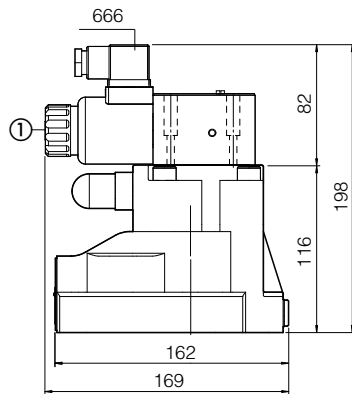
Seals: 2 OR 4131, 1 OR 109/70

Ports P, T: $\varnothing = 28$ mm

Port X: $\varnothing = 3,2$ mm

Mass 8 Kg

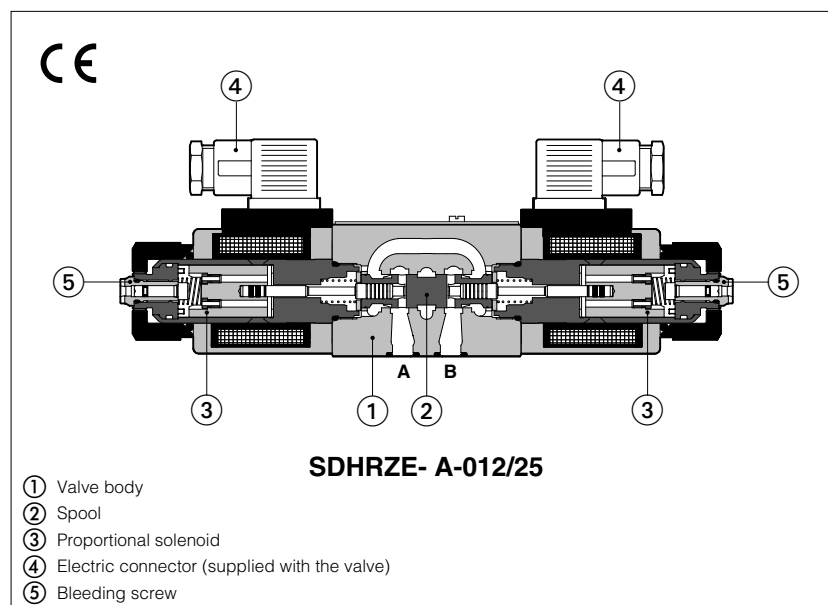
SAGMZE-A-32



① = Screw for air bleeding

Proportional pressure reducing valves type SDHRZE

direct operated, ISO 4401 size 06



SDHRZE-A

3 way, direct operated proportional pressure reducing valves, size 06.

They operate in association with electronic drivers, see section [2], which supply the proportional solenoids with proper current to align the pressure regulation to the reference signal.

Technical characteristics

They provide the pressure reduction on ports A, or B or A and B, depending on the valve model. The direct execution performs low internal leakages, fast response and low hysteresis. The solenoid coils are plastic encapsulated with insulation class H and they are available with different nominal resistances depending to the voltage supply (12 V_{DC} or 24 V_{DC}) and to the electronic driver type, see section [2] and [3]

Typical applications

Pressure reduction in low flow systems
Pilot stage of pilot operated valves

Mounting surface: **ISO 4401 size 06**

Max flow: **24 l/min**

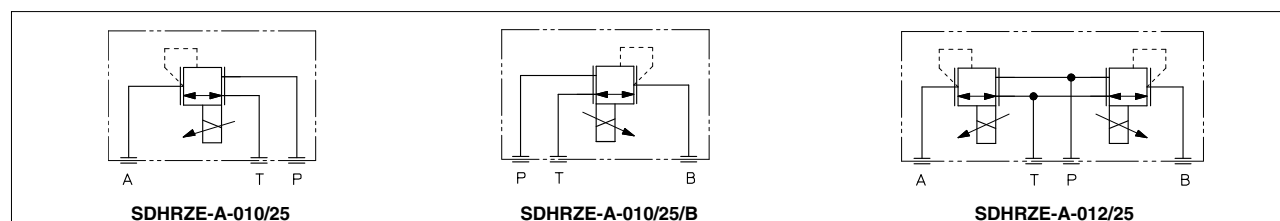
Max pressure: **315 bar**

Max regulated pressure: **25 bar**

1 MODEL CODE

SDHRZE	-	A	-	010	/	25	/	*	/	*	**	/	*
Proportional pressure reducing valve size 06													
A = open loop pressure control													
Configuration:													
010 = reduced pressure on port A (port B for option /B)													
012 = reduced pressure on port A and B													
Regulated pressure:													
25 = reduced pressure range 3÷25 bar													
Coil options													
see section [3] and [4]:													
- = standard coil for 24V _{DC} Atos drivers													
6 = optional coil for 12V _{DC} Atos drivers													
18 = optional coil for 24V _{DC} low current drivers													
Hydraulic option													
B = reduced pressure on port B, solenoid side of port A (only for valve configuration 010)													

HYDRAULIC SYMBOLS



2 ELECTRONIC DRIVERS - see www.atos.com, catalog on line, section "electronics" or KT master paper catalog

Drivers model	E-MI-AC		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	analog		digital		digital		digital
Voltage supply (V _{DC})	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	DIN 43650 plug-in to solenoid				DIN-rail panel		
Data sheet	G010		G020		G030		GS050

3 COIL OPTIONS

Coil voltage

Option /6 optional coil to be used with Atos drivers with power supply 12 V_{DC}

Option /18 optional coil to be used with electronic drivers not supplied by Atos

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

Assembly position / location	Any position		
Subplate surface finishing (RZME)	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd valves according to EN ISO 13849	150 years, see technical table P007		
Ambient temperature	Standard and /PE option = -20°C ÷ +70°C; /BT option = -40°C ÷ +60°C		
Storage temperature	Standard and /PE option = -20°C ÷ +80°C; /BT option = -40°C ÷ +70°C		
Coil code	Standard standard coil to be used with Atos drivers with power supply 24V _{DC}	option /6 optional coil to be used with Atos drivers with power supply 12 V _{DC}	option /18 optional coil to be used with electronic drivers not supplied by Atos, with power supply 24 V _{DC} and max current limited to 1A
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω
Max. solenoid current	2,2 A	2,75 A	1,2 A
Max. power	30 Watt		
Protection degree (CEI EN-60529)	IP65		
Duty factor	Continuous rating (ED=100%)		

Max regulated pressure (Q=1 l/min) [bar]	25
Min. regulated pressure (Q=1 l/min) (1) [bar]	3
Max. pressure at port P [bar]	315
Max. pressure at port T [bar]	210
Max. flow [l/min]	24
Response time 0-100% step signal (2) [ms] (depending on installation)	≤ 45
Hysteresis [% of the max pressure]	≤ 1,5
Linearity [% of the max pressure]	≤ 3
Repeatability [% of the max pressure]	≤ 2

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

(1) Min pressure value to be increased of T line pressure

(2) Average response time value; the pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response

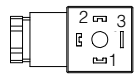
5 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

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 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	NBR, HNBR	HFC	

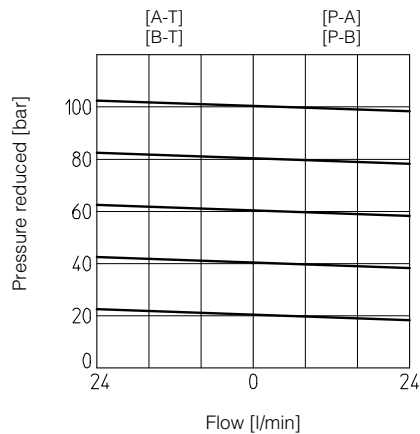
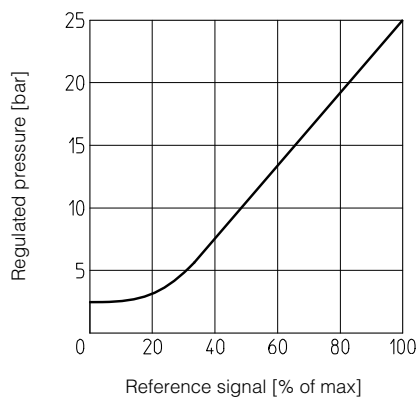
6 GENERAL NOTES

DHRZE proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

7 CONNECTIONS

SOLENOID POWER SUPPLY CONNECTOR		
PIN	Signal description	
1	SUPPLY	
2	SUPPLY	
3	GND	

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



9 INSTALLATION DIMENSIONS FOR SDHRZE [mm]

ISO 4401: 2005

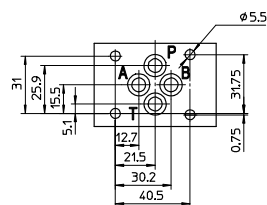
Mounting surface: 4401-03-02-0-05

Fastening bolts: 4 socket head screws M5x30 class 12.9

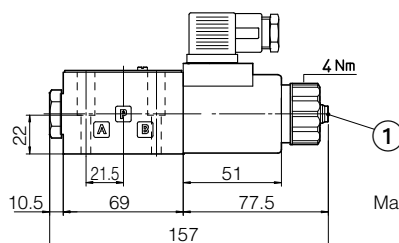
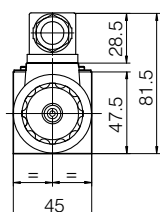
Tightening torque = 8 Nm

Seals: 4 OR 108;

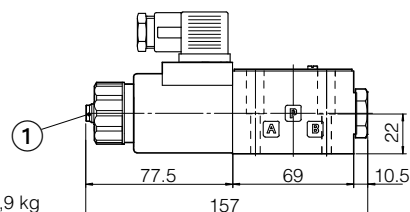
Diameter of ports A, B, P, T: Ø 7,5 mm (max)



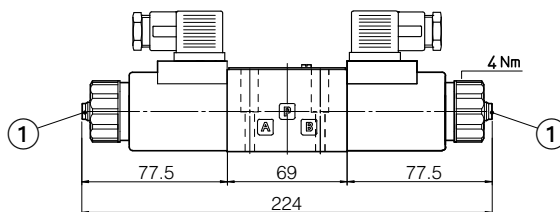
SDHRZE-A-010



SDHRZE-A-010/B



SDHRZE-A-012

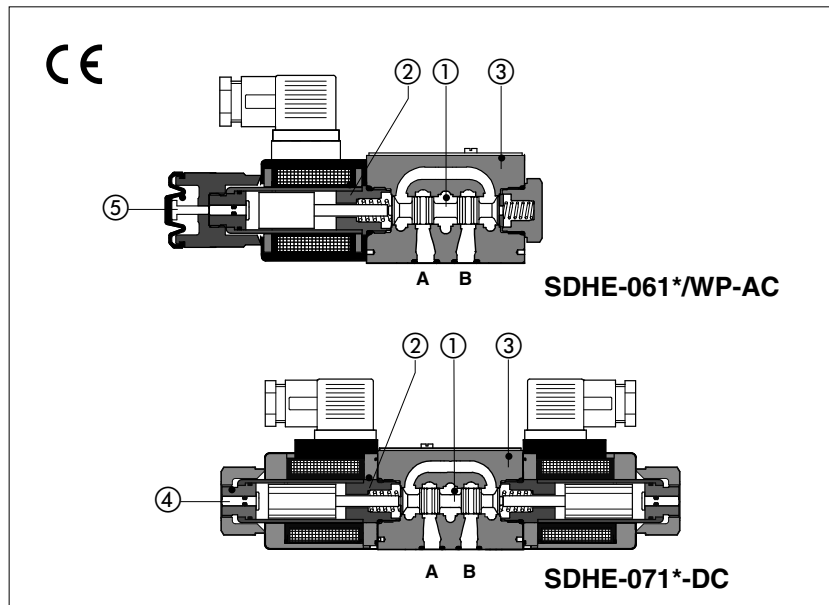


Mass: 2,6 kg

① screw for air bleeding

Solenoid directional valves type SDHE

direct operated, high performances, ISO 4401 size 06



Spool type, two or three position direct operated valves with high performance threaded solenoids certified according the North American standard **cURus**.

Solenoids ② are made by:

- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin ④
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section ⑤ for available voltages

Standard coils protection **IP65** optional coils with IP67 AMP Junior Timer, Deutsch or lead wire connections.

Wide range of interchangeable spools ①, see section ②.

The valve body ③ is 3 chamber type made by shell-moulding casting with wide internal passages ensuring low pressure drops.

Mounting surface: **ISO 4401 size 06**

Max flow: **80 l/min**

Max pressure: **350 bar**

1 MODEL CODE

SDHE - 0	61	1	/A	X	24 DC	**	/*
Directional control valves size 06							Seals material, see section [3]: - = NBR PE = FKM BT = HNBR
Valve configuration, see section [2] 61 = single solenoid, center plus external position, spring centered 63 = single solenoid, 2 external positions, spring offset 67 = single solenoid, center plus external position, spring offset 70 = double solenoid, 2 external positions, without spring 71 = double solenoid, 3 positions, spring centered 75 = double solenoid, 2 external positions, with detent						Series number	
Spool type, see section [2].					Voltage code, see section [5] 00-AC = AC solenoids without coils 00-DC = DC solenoids without coils X = without connector See section [14] for available connectors, to be ordered separately Coils with special connectors, see section [11] XJ = AMP Junior Timer connector XK = Deutsch connector XS = Lead Wire connection		
Options, see note 1 at section [4].							

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

Configurations		Spools		Configurations		Spools	
61		61/A		63		63/A	
67		67/A		70		75	
71							

Note: see also section 4 note 3 for special shaped spools

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

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	HF DU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	
Flow direction	As shown in the symbols of table 2		
Operating pressure	Ports P,A,B: 350 bar; Port T 210 bar for DC version; 160 bar for AC version		
Rated flow	See diagrams Q/Δp at section 6		
Maximum flow	80 l/min. see operating limits at section 7		

3.1 Coils characteristics

Insulation class	H (180°C) for DC coils; F (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 5
Supply voltage tolerance	± 10%
Certification	cURus North American Standard

4 NOTES

1 Options

- A** = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
WP = prolonged manual override protected by rubber cap.



The manual override operation can be possible only if the pressure at T port is lower than 50 bar - see section 12.

L1, L2, L3 = (only for SDHE-DC) device for switching time control, installed in the valve solenoid, see section 9.
For spools 4 and 4/8 only device L3 is available.

2 Type of electric/electronic connector DIN 43650, to be ordered separately

- 666** = standard connector IP-65, suitable for direct connection to electric supply source.
667 = as 666, but with built-in signal led.
669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - I_{max} 1A).

3 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, 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.
- spools type **1, 1/2, 3, 8** are available as **1P, 1/2P, 3P, 8P** to limit valve internal leakages.
- Other types of spools can be supplied on request.

5 ELECTRIC FEATURES

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil SDHE
12 DC	12 DC	666 or 667	30 W	COE-12DC
14 DC	14 DC			COE-14DC
24 DC	24 DC			COE-24DC
28 DC	28 DC			COE-28DC
110 DC	110 DC			COE-110DC
220 DC	220 DC			COE-220DC
110/50 AC	110/50/60 AC	669	58 VA (3)	COE-110/50/60AC (1)
230/50 AC	230/50/60 AC			COE-230/50/60AC (1)
110/50 AC - 120/60 AC	110 RC		30 W	COE-110RC
230/50 AC - 230/60 AC	230 RC			COE-230RC

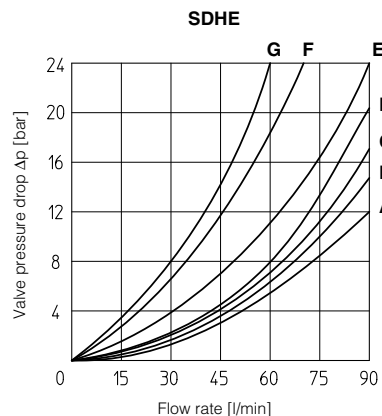
(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10 ÷ 15% and the power consumption is 52 VA.

(2) Average values based on tests preformed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

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

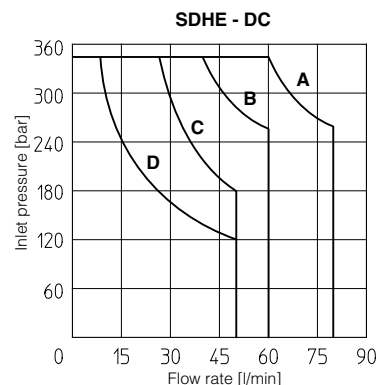
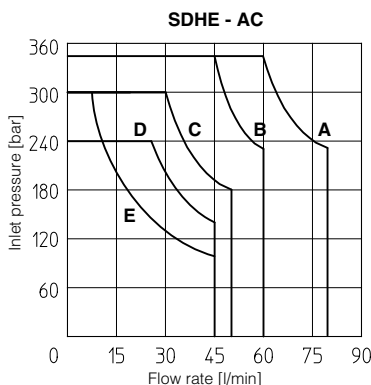
Flow direction	P→A	P→B	A→T	B→T	P→T
Spool type					
0, 0/1	A	A	C	C	D
1, 1/1, 1/9	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 58, 58/1	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			
19, 91	E	E	D	D	
39, 93	F	F	G	G	



7 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom} - 10\%$). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

Curve	Spool type	
	AC	DC
A	1, 1/2, 8	0, 0/1, 1, 1/2, 3, 8
B	0, 0/1, 0/2, 1/1, 1/9, 3	0/2, 1/1, 6, 7, 1/9, 19
C	3, 3/1, 6, 7	3/1, 4, 4/8, 5, 5/1, 19, 39, 58, 58/1, 91, 93
D	4, 4/8, 5, 5/1, 19, 39, 58, 58/1, 91, 93	2, 2/2
E	2, 2/2	-



8 SWITCHING TIMES (average values in msec)

Test conditions: - 36 l/min; 150 bar
- nominal voltage
- 2 bar of counter pressure on port T
- mineral oil: ISO VG 46 at 50°C

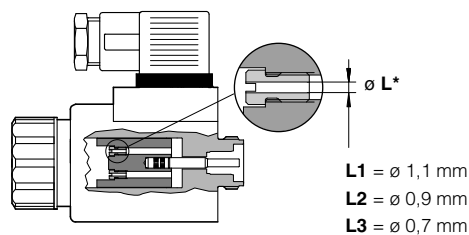
The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

Valve	Switch-on AC	Switch-off AC	Switch-on DC	Switch-off DC
SDHE	10 - 25	20 - 40	30 - 50	15 - 25
SDHE-*/L1	—	—	60	60
SDHE-*/L2	—	—	80	80
SDHE-*/L3	—	—	150	150

9 DEVICES FOR THE SWITCHING TIME CONTROL

These devices are used to control the valve's switching time (only for DC version) and therefore reduce the hammering shocks in the hydraulic circuit.

Options L1, L2, L3 control the switching time in both moving directions of the valve spool by means of calibrated restrictors installed in the solenoid anchor.



10 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
SDHE + 666 / 667	7200	15000

11 COIL WITH SPECIAL CONNECTORS only for voltage supply 12, 14, 24, 28 Vdc

<p>AMP Junior timer connector</p> <p>Options -XJ Coil type COEJ AMP Junior Timer connector Protection degree IP67</p>	<p>Deutsch connector DT-04-2P</p> <p>Options -XK Coil type COEK Deutsch connector DT-04-2P male Protection degree IP67</p>	<p>Lead Wire connection</p> <p>Options -XS Coil type COES Lead Wire connection Cable length = 180 mm</p>
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Note: for the electric characteristics refer to standard coils features - see section 5

12 DIMENSIONS [mm]

ISO 4401: 2005

Mounting surface: 4401-03-02-0-05

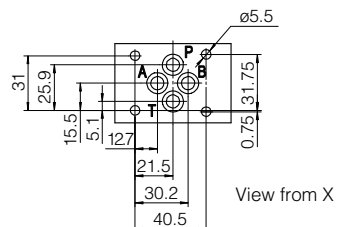
Fastening bolts: 4 socket head screws:

M5x30 class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P,A,B,T: Ø = 7.5 mm (max)



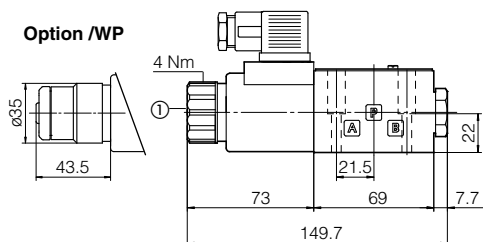
P = PRESSURE PORT

A, B = USE PORT

T = TANK PORT

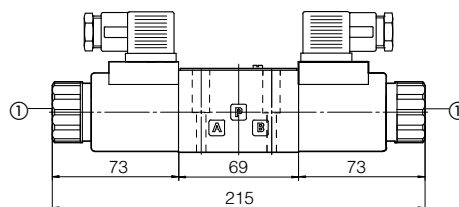
SDHE-06(DC)

Option /WP



Mass: 1,5 kg

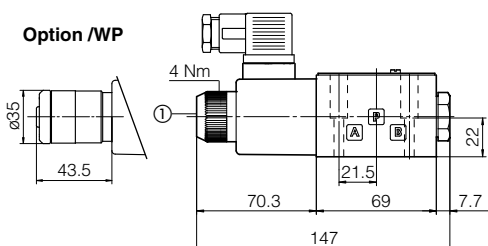
SDHE-07(DC)



Mass: 2 kg

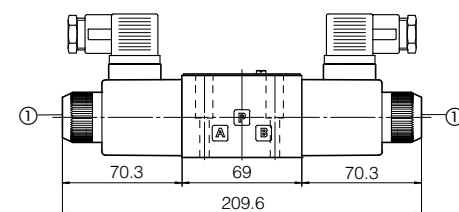
SDHE-06(AC)

Option /WP



Mass: 1,4 kg

SDHE-07(AC)



Mass: 1,8 kg

① Standard manual override PIN

⚠ The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

Overall dimensions refer to valves with connector 666

13 PLUG-IN RESTRICTOR (to be ordered separately)

The use of plug-in restrictors in valve's ports P or A or B may be necessary in case of particular conditions as long flexible hoses or the presence of accumulators which could cause at the valve switching instantaneous high flow peaks over the max valve's operating limits.

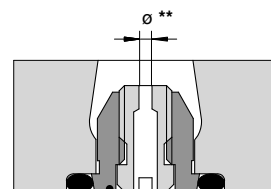
Ordering code:

PLUG H

08, 10, 12, 15 calibrated orifice diameter in tenths of mm

Example PLUG-H-**12** = orifice diameter **1,2 mm**

Other orifice dimensions are available on request



PLUG H-**

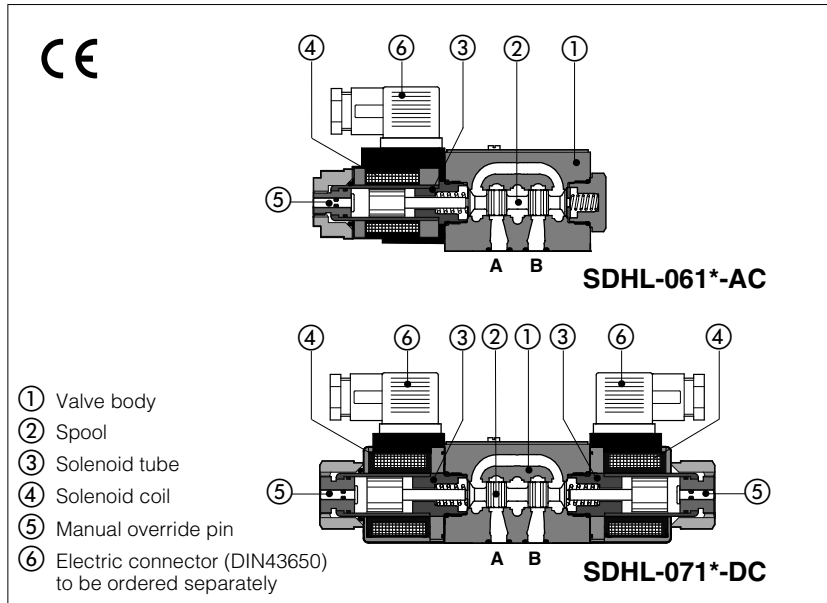
14 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

666, 667 (for AC or DC supply)		669 (for AC supply)		CONNECTOR WIRING	
				666, 667 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground	669 1,2 = Supply voltage V _{AC} 3 = Coil ground
				SUPPLY VOLTAGES	
666 All voltages		667 24 AC or DC 110 AC or DC 220 AC or DC		669 110/50 AC 110/60 AC 230/50 AC 230/60 AC	

Note: for electronic connectors type **E-SD**, see tab. K500

Solenoid directional valves type SDHL

direct operated, ISO 4401 size 06, **compact execution**



Spool type, two or three position direct operated valves size 06 in compact execution with reduced solenoids dimensions, ideal for applications in mini power packs, mobile and agricultural machines.

Solenoids are made by:

- wet type screwed tube ③, different for AC and DC power supply, with integrated manual override pin ⑤
- interchangeable coils ④, specific for AC or DC power supply, easily replaceable without tools - see section ⑤ for available voltages

Standard coils protection **IP65**

Wide range of interchangeable spools ②, see section 2.

The valve body ① is 3 chamber type made by shell-moulding casting with wide internal passages ensuring low pressure drops.

Mounting surface: **ISO 4401 size 06**

Max flow: **60 l/min**

Max pressure: **350 bar**

1 MODEL CODE

[illegible]

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

Configurations	Spools	Configurations	Spools
<p>61</p> <p>61/A</p>		<p>63</p> <p>63/A</p>	
<p>71</p>		<p>75</p>	<p>(1) not available for configuration 75</p>

2.1 Special 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**, **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 switching.
- spools type **1**, **1/2**, **3**, **8** are available as **1P**, **1/2P**, **3P**, **8P** to limit valve internal leakages.
- Other types of spools can be supplied on request.

3 MAIN CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C
Flow direction	As shown in the symbols of table 2
Operating pressure	Ports P,A,B: 350 bar; Port T 210 bar for DC version; 160 bar for AC version
Maximum flow	60 l/min , see Q/Δp diagram at section 8 and operating limits at section 9

3.1 Coils characteristics

Insulation class	H (180°C) for DC coils F (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 6
Supply voltage tolerance	± 10%

4 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		
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	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

5 OPTIONS

Options

- A** = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
WP = prolonged manual override protected by rubber cap.



The manual override operation can be possible only if the pressure at T port is lower than 50 bar

6 ELECTRIC FEATURES

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil SDHL
12 DC	12 DC	666 or 667	26W	COL-12DC
14 DC	14 DC			COL-14DC
24 DC	24 DC			COL-24DC
28 DC	28 DC			COL-28DC
110/50 AC (1)	110/50/60 AC		58 VA (3)	COL-110/50/60AC
230/50 AC (1)	230/50/60 AC			COL-230/50/60AC

- (1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10 ÷ 15% and the power consumption is 52 VA.
(2) Average values based on tests preformed at nominal hydraulic condition and ambient/coil temperature of 20°C.
(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

7 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

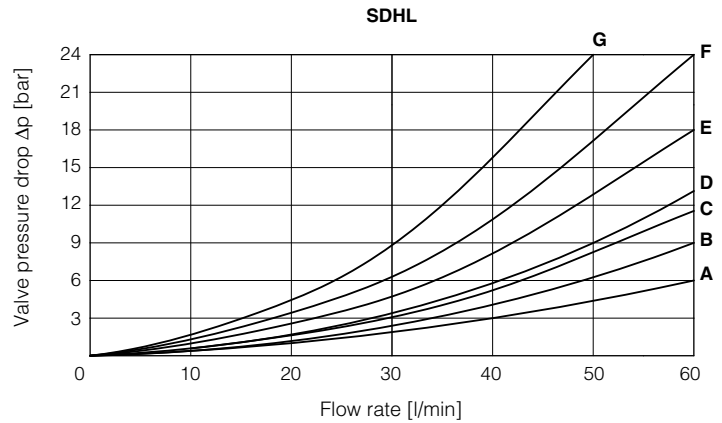
666 = standard connector IP-65, suitable for direct connection to electric supply source.

667 = as 666, but with built-in signal led.

666, 667 (for AC or DC supply)		CONNECTOR WIRING	
		666, 667 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground	
		SUPPLY VOLTAGES	
		666 All voltages	667 24 AC or DC 110 AC or DC 220 AC or DC

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

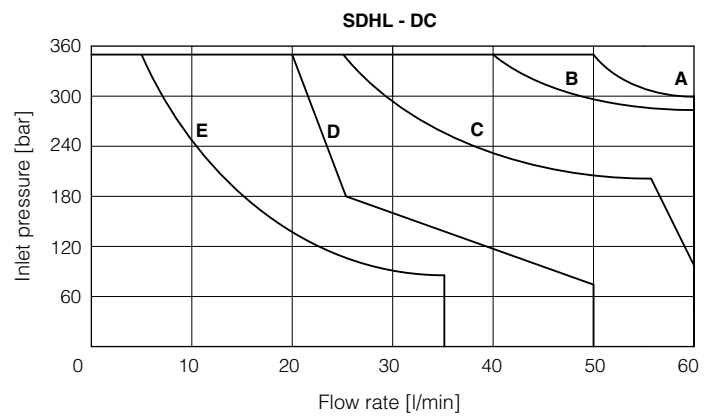
Flow direction Spool type	P→A	P→B	A→T	B→T	P→T
0, 0/1	A	A	C	C	D
1, 1/1	D	C	C	C	
3, 3/1	D	D	A	A	
4, 4/8, 5, 5/1, 58, 58/1	F	F	G	C	E
1/2, 0/2	D	D	D	D	
6, 7	D	D	D	D	
8	A	A	E	E	
2	D	D			
2/2	F	F			
19, 91	E	E	D	D	
39, 93	F	F	G	G	



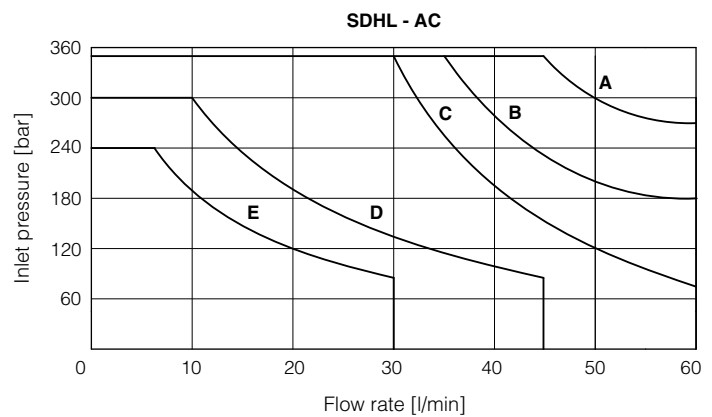
9 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom} - 10\%$). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

Curve	DC version, spool type:
A	0, 0/1, 0/2, 1/2, 8
B	1, 1/1
C	3, 3/1, 6, 7
D	4, 4/8, 5, 5/1, 19, 39, 58, 58/1, 91, 93
E	2, 2/2



Curve	AC version, spool type:
A	0, 0/1, 0/2, 1/2, 8
B	1, 1/1
C	3, 3/1, 6, 7
D	4, 4/8, 5, 5/1, 19, 39, 58, 58/1, 91, 93
E	2, 2/2



10 SWITCHING TIMES (average values in msec)

Test conditions: - 20 l/min; 150 bar
- nominal voltage
- 2 bar of counter pressure on port T
- mineral oil: ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

Valve	Switch-on AC	Switch-off AC	Switch-on DC	Switch-off DC
SDHL	10 - 25	20 - 40	30 - 50	15 - 25

11 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
SDHL + 666 / 667	7200	15000

12 DIMENSIONS [mm]

ISO 4401: 2005

Mounting surface: 4401-03-02-0-05

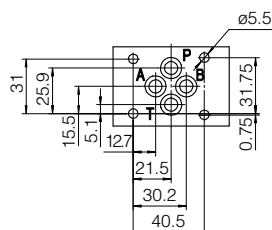
Fastening bolts: 4 socket head screws:

M5x30 class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P,A,B,T: $\varnothing = 7.5$ mm (max)

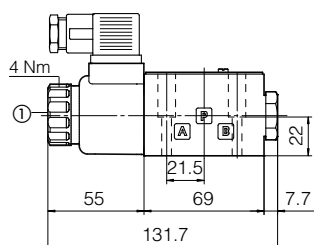


P = PRESSURE PORT

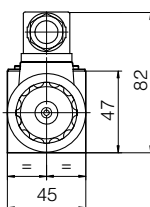
A, B = USE PORT

T = TANK PORT

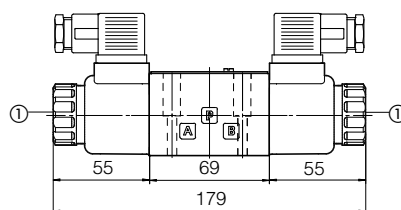
SDHL-06(DC)



Mass: 1,3 kg

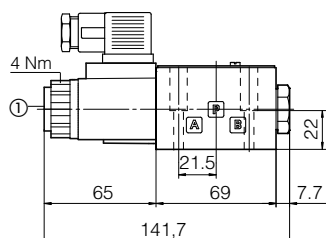


SDHL-07(DC)

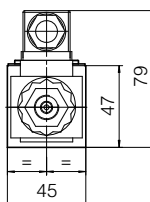


Mass: 1,6 kg

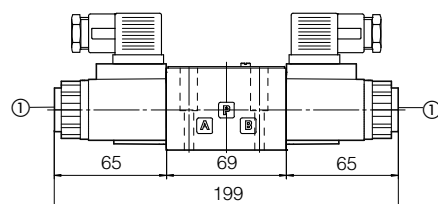
SDHL-06(AC)



Mass: 1,2 kg

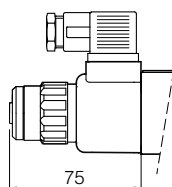


SDHL-07(AC)

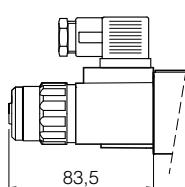


Mass: 1,4 kg

Option /WP
(DC version)



Option /WP
(AC version)



① Standard manual override PIN

⚠ The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

Overall dimensions refer to valves with connector 666

13 PLUG-IN RESTRICTOR (to be ordered separately)

The use of plug-in restrictors in valve's ports P or A or B may be necessary in case of particular conditions as long flexible hoses or the presence of accumulators which could cause at the valve switching instantaneous high flow peaks over the max valve's operating limits.

Ordering code:

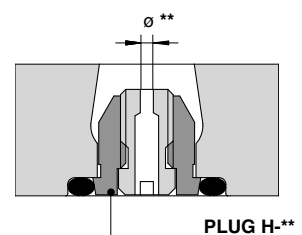
PLUG H

-

08, 10, 12, 15 calibrated orifice diameter in tenths of mm

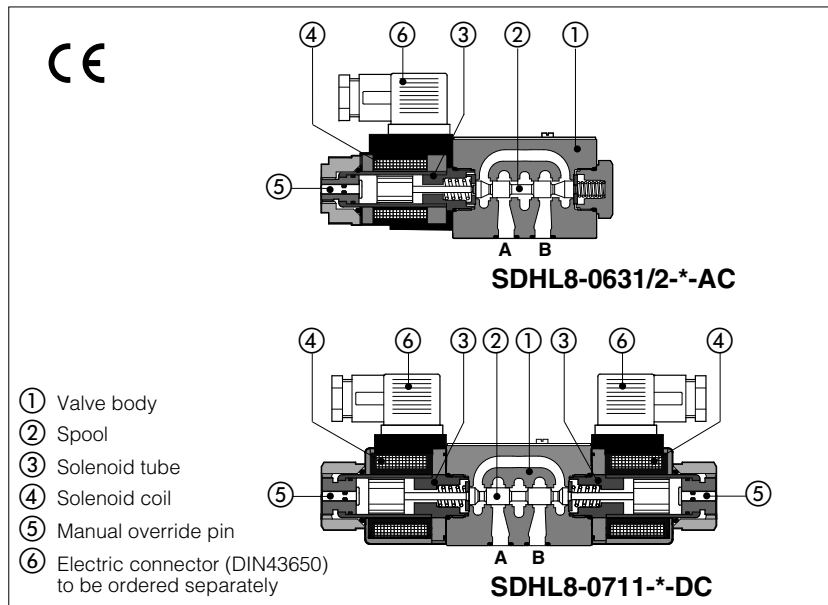
Example PLUG-H-12 = orifice diameter **1,2 mm**

Other orifice dimensions are available on request



Solenoid directional valves type **SDHL8**

direct operated, ISO 4401 size 06, **low leakage, compact execution**



Spool type, two or three position direct operated solenoid valves size 06 **in low leakage and compact execution** with reduced solenoids dimensions, ideal for hydraulic systems assisted by accumulators.

They are equipped with spool diameter 8mm accurately coupled to the body granting very low internal leakages, see section 10

Solenoids are made by:

- wet type screwed tube ③, different for AC and DC power supply, with integrated manual override pin ⑤
- interchangeable coils ④, specific for AC or DC power supply, easily replaceable without tools - see section 6 for available voltages

Mounting surface: **ISO 4401 size 06**

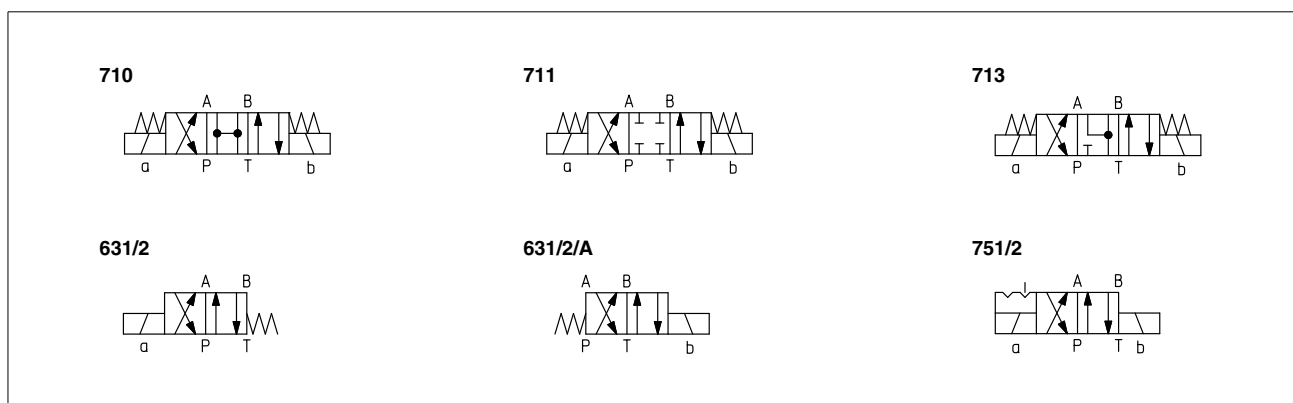
Max flow: **30 l/min**

Max pressure: **350 bar**

1 MODEL CODE

SDHL8 - 0	71	1	/WP	-	X	24 DC	**	I*
Directional control valves size 06 low leakage, compact execution								Seals material, see section 4: - = NBR PE = FKM
Valve configuration, see section 2 63 = single solenoid, 2 external positions, spring offset 71 = double solenoid, 3 positions, spring centered 75 = double solenoid, 2 external positions, with detent								Series number
Spool type, see section 2.								
Options: A , WP , see section 5								
								Voltage code, see section 6
								X = without connector See section 7 for available connectors, to be ordered separately

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



3 MAIN CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
MTTFd values according to EN ISO 13849	150 years, for further details see KT technical table P007
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C
Flow direction	As shown in the symbols of table 2
Operating pressure	Ports P,A,B: 350 bar; Port T 210 bar for DC version; 160 bar for AC version
Maximum flow	30 l/min , see Q/Δp diagram at section 8 and operating limits at section 9

3.1 Coils characteristics

Insulation class	H (180°C) for DC coils F (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 6
Supply voltage tolerance	± 10%

4 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		
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	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

5 OPTIONS

Options

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

WP = prolonged manual override protected by rubber cap.



The manual override operation can be possible only if the pressure at T port is lower than 50 bar

6 ELECTRIC FEATURES

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil SDHL
12 DC	12 DC	666 or 667	26 W	COL-12DC
14 DC	14 DC			COL-14DC
24 DC	24 DC			COL-24DC
28 DC	28 DC			COL-28DC
110/50 AC (1)	110/50/60 AC		58 VA (3)	COL-110/50/60AC
230/50 AC (1)	230/50/60 AC			COL-230/50/60AC

(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10 ÷ 15% and the power consumption is 52 VA.

(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

7 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

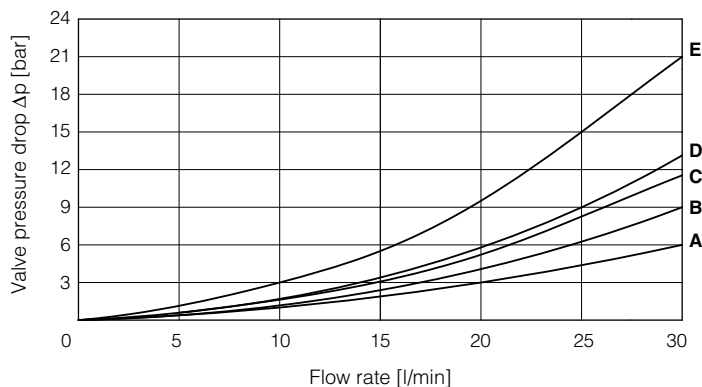
666 = standard connector IP-65, suitable for direct connection to electric supply source.

667 = as 666, but with built-in signal led.

666, 667 (for AC or DC supply)		CONNECTOR WIRING	
		666, 667 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground	
		SUPPLY VOLTAGES	
		666 All voltages	667 24 AC or DC 110 AC or DC 220 AC or DC

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

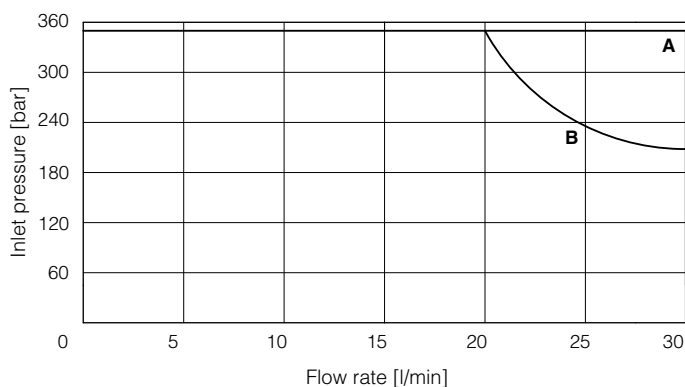
Flow direction Spool type	P→A	P→B	A→T	B→T	P→T center	A→T B→T center
0	A	A	A	A	E	
1	C	C	B	B		
1/2	D	B	D	B		
3	C	C	A	A		E



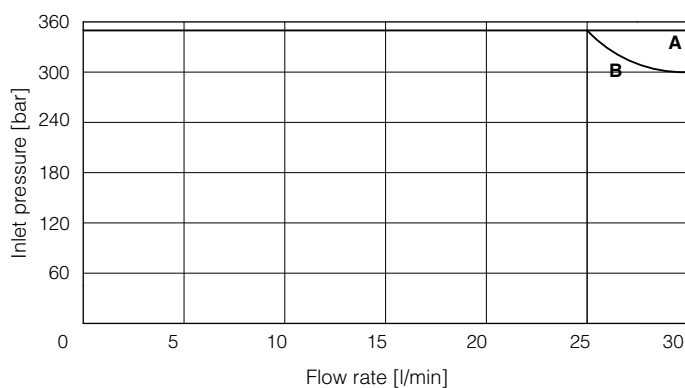
9 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom} - 10\%$). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

Curve	DC version, spool type
A	1, 3
B	0, 1/2

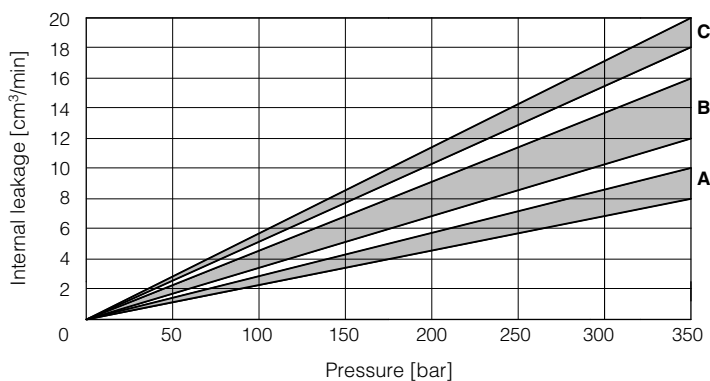
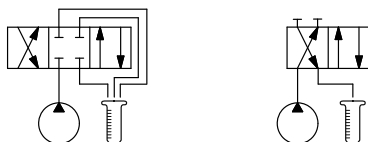


Curve	AC version, spool type
A	1, 1/2
B	0, 3



10 INTERNAL LEAKAGES based on mineral oil at viscosity 15 cSt

Spool type	center pos.	P→A B→T	P→B A→T
0		C	C
1	C	B	B
1/2		A	A
3	C	B	B



11 SWITCHING TIMES (average values in msec)

Test conditions: - 20 l/min; 150 bar
 - nominal voltage
 - 2 bar of counter pressure on port T
 - mineral oil: ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

Switch-on AC	Switch-off AC	Switch-on DC	Switch-off DC
10-25	20-40	30-50	15-25

12 SWITCHING FREQUENCY

AC (cycles/h)	DC (cycles/h)
7200	15000

13 DIMENSIONS [mm]**ISO 4401: 2005****Mounting surface: 4401-03-02-0-05**

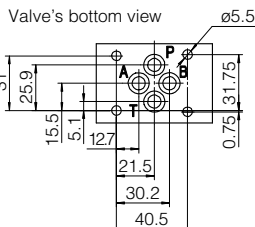
Fastening bolts: 4 socket head screws:

M5x30 class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

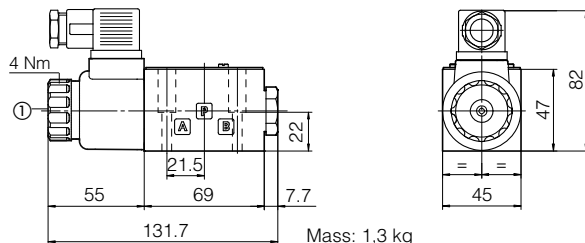
Ports P,A,B,T: $\varnothing = 7.5$ mm (max)



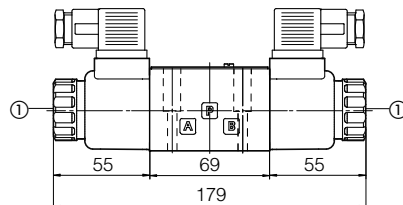
P = PRESSURE PORT

A, B = USE PORT

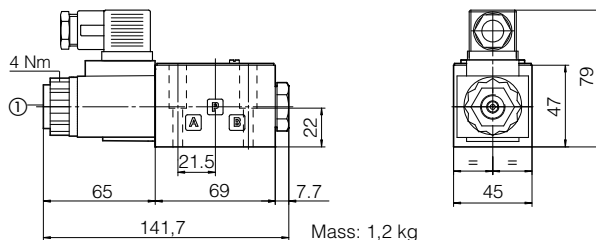
T = TANK PORT

SDHL8-06(DC)

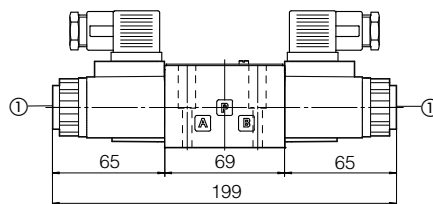
Mass: 1,3 kg

SDHL8-07(DC)

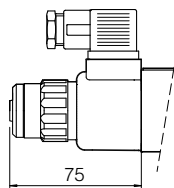
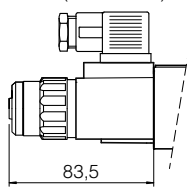
Mass: 1,6 kg

SDHL8-06(AC)

Mass: 1,2 kg

SDHL8-07(AC)

Mass: 1,4 kg

**Option /WP
(DC version)****Option /WP
(AC version)**

① Standard manual override PIN



The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

Overall dimensions refer to valves with connector 666

14 PLUG-IN RESTRICTOR (to be ordered separately)

The use of plug-in restrictors in valve's ports P or A or B may be necessary in case of particular conditions as long flexible hoses or the presence of accumulators which could cause at the valve switching instantaneous high flow peaks over the max valve's operating limits.

Ordering code:

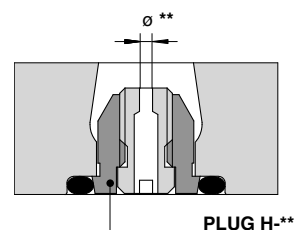
PLUG H

-

08, 10, 12, 15 calibrated orifice diameter in tenths of mm

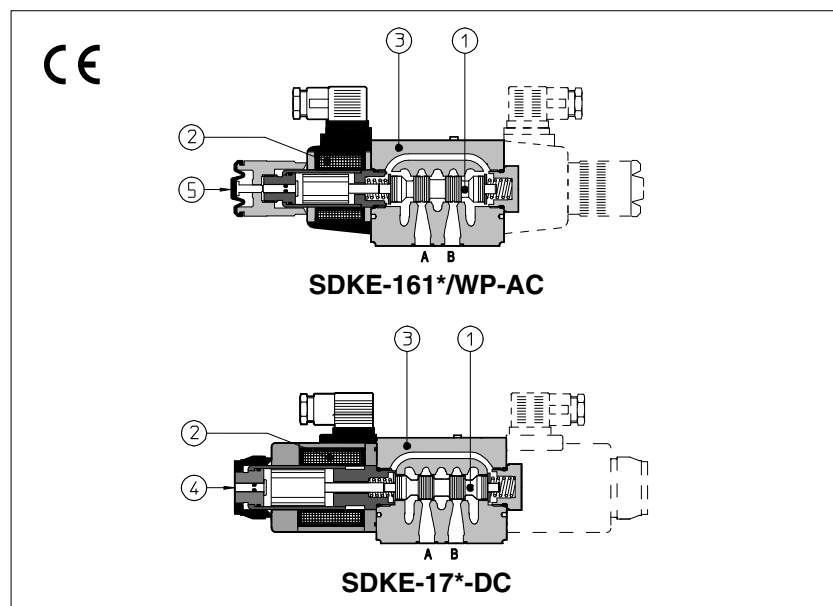
Example PLUG-H-12 = orifice diameter **1,2 mm**

Other orifice dimensions are available on request



Solenoid directional valves type **SDKE**

direct operated, ISO 4401 size 10



Spool type, two or three position direct operated valves with threaded solenoids.

Solenoids ② are made by:

- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin ①
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section ⑤ for available voltages

Standard coils protection **IP65**.

Optional coils are available with **IP67** AMP Junior Timer, Deutsch, lead wire connections (options XJ, XK, XS) or with North American Standard Certification **cURus**, without connector (option XUL).

Wide range of interchangeable spools ①, see section ②.

The valve body ③ is 3 chamber type made by shell-moulding casting with wide internal passages ensuring low pressure drops

Mounting surface: **ISO 4401 size 10**

Max flow: **150 l/min**

Max pressure: **350 bar**

1 MODEL CODE

SDKE - 1	61	1 / A	X	24 DC	** / *
Directional control valves size 10					Seals material, see section ④: - = NBR PE = FKM BT = HNBR
Valve configuration, see section ②					Series number
61 = single solenoid, center plus external position, spring centered 63 = single solenoid, 2 external positions, spring offset 67 = single solenoid, center plus external position, spring offset 70 = double solenoid, 2 external positions, without springs 71 = double solenoid, 3 positions, spring centered 75 = double solenoid, 2 external positions, with detent					Voltage code, see section ⑤
Spool type, see section ②.					00-AC = AC solenoids without coils 00-DC = DC solenoids without coils X = standard coil without connector XUL = coils certified cURus without connector See section ③ for available connectors, to be ordered separately Coils with special connectors, see section ⑥ XJ = AMP Junior Timer connector, certified cURus XK = Deutsch connector XS = Lead Wire connection, certified cURus
Options, see note 1 at section ④.					

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

Configurations	Spoils	Configurations	Spoils
61 61/A 67 67/A 71 	 	63 63/A 70 75 	
	Note: see also section ④ note 3 for special shaped spools		

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

Assembly position / location	Any position for all valves except for type - 170* (without springs) that must be installed with horizontal axis if operated by impulses		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	
Flow direction	As shown in the symbols of table 2		
Operating pressure	Ports P,A,B: 350 bar; Port T 210 bar for DC version (250 bar with option /Y); 160 bar for AC version		
Rated flow	See diagrams Q/Δp at section 6		
Maximum flow	150 l/min. see operating limits at section 7		

3.1 Coils characteristics

Insulation class	H (180°C) for DC coils F (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 5
Supply voltage tolerance	± 10%
Certification (only for XUL coils)	cURus North American Standard

4 NOTES

1 Options

A = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
WP = prolonged manual override protected by rubber cap - see section 12.
L7, L8 see section 10 = device for switching time control (only for DC solenoids).
L7 and L8 are available only for spool type 0/1, 1/1, 3/1, 4 and 5.

2 Type of electric connectors DIN 43650, to be ordered separately - see section 13.

666 = standard connector IP-65 for direct connection to electric supply source.
667 = as 666, but with built-in signal led.
669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - I_{max} 1A).

3 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.
- spool type **1** is also available as **1/1**, properly shaped to reduce the water-hammer shocks during the switching.
- spool type **1/9** has closed center in rest position but it avoids the pressurization of A and B ports due to the internal leakages.

5 ELECTRIC FEATURES

External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil
12 DC	12 DC	666 or 667	36 W	CAE-12DC
14 DC	14 DC			CAE-14DC
24 DC	24 DC			CAE-24DC
28 DC	28 DC			CAE-28DC
110 DC	110 DC			CAE-110DC
220 DC	220 DC			CAE-220DC
110/50/60 AC	110/50/60 AC	669	100 VA (3)	CAE-110/50/60AC (1)
230/50/60 AC	230/50/60 AC			CAE-230/50/60AC (1)
110/50/60 AC	110 DC	669	36 W	CAE-110DC
230/50/60 AC	220 DC			CAE-220DC

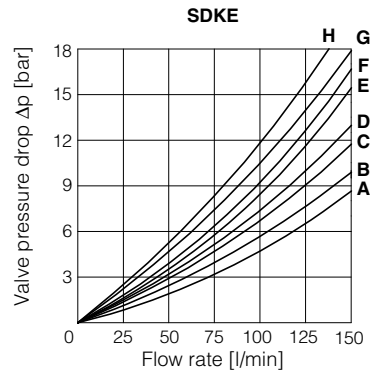
(1) In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 90 VA

(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

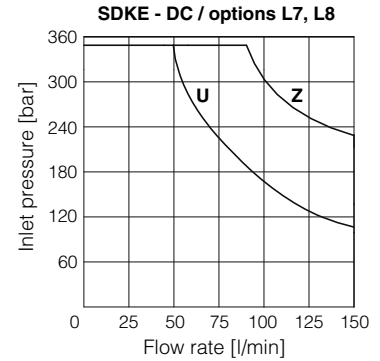
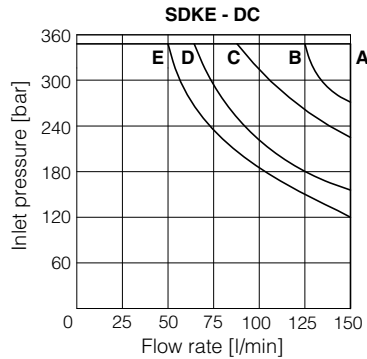
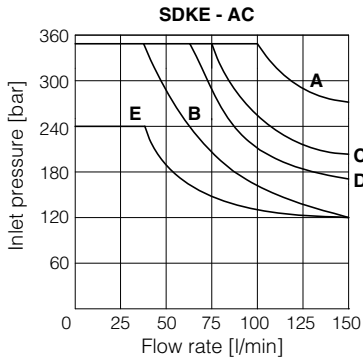
6 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

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, 1/9, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	F	
5, 58	A	B	C	C	G	
1/2	B	C	C	B		
19, 91	F	F	G	G		H
39, 93	F	F	G	G		H



7 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom} - 10\%$). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.



Curve	AC	Spool type	DC
A	0/1	0, 0/1, 1, 1/1, 3, 3/1, 1/2, 0/2, 8	
B	4, 5, 19, 91		6, 7
C	0, 1/1, 3, 3/1		19, 91
D	1, 1/2, 0/2		4, 5
E	6, 7, 8, 2/2		2/2
U	-		4, 5
Z	-		0/1, 1/1, 3/1

8 SWITCHING TIMES (average values in msec)

Valve	Switch-on AC	Switch-on DC	Switch-off AC	Switch-off DC
SDKE + 666 / 667	40	60	25	35
SDKE + 669	60	—	90	—
SDKE-*/L7 - SDKE-*/L8	—	100÷150	—	100÷150

Test conditions:

- 50 l/min; 150 bar
- nominal supply voltage
- 2 bar of back pressure on port T
- mineral oil ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

9 SWITCHING FREQUENCY

Valve	AC (cycles/h)	DC (cycles/h)
SDKE + 666 / 667	7200	15000

10 DEVICES FOR SWITCHING TIME CONTROL

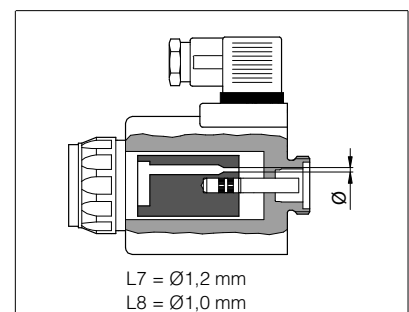
The shifting time control devices L7 and L8 are specifically designed to reduce shocks in the hydraulic circuit, sometime occurring at the valve switching. The soft movement of the actuator is obtained through the control of the spool shifting time, by means of calibrated restrictors ① installed in the solenoid core. The soft shifting device version is possible only with DC solenoids.

Two options with different switching effect are available:

L7 = calibrated restrictors diam. 1,2 mm

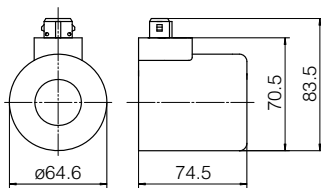
L8 = calibrated restrictors diam. 1,0 mm

see section 8 for switching time.

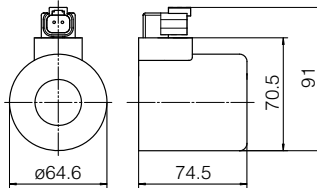


11 COILS TYPE CAE WITH SPECIAL CONNECTORS (only for 12DC, 14DC, 24DC and 28DC)

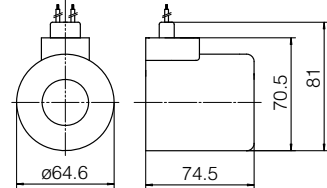
Options -XJ
Coil type CAEJ
AMP Junior Timer connector
Protection degree IP67
certified **cURus**



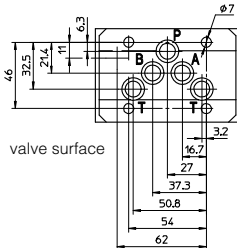
Options -XK
Coil type CAEK
Deutsch connector, DT-04-2P male
Protection degree IP67



Options -XS
Coil type CAES
Lead Wire connection
Cable lenght = 180 mm
certified **cURus**

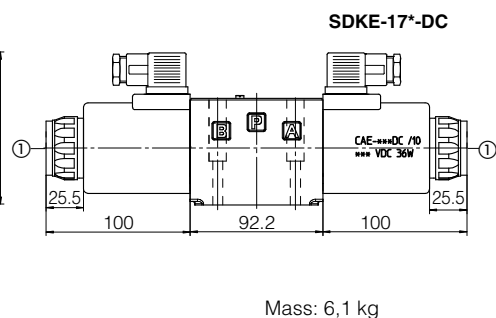
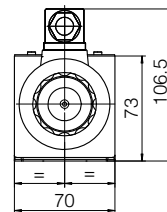
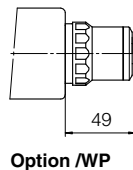
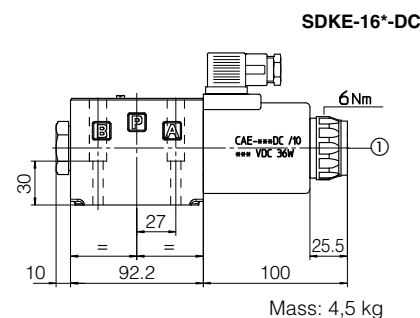
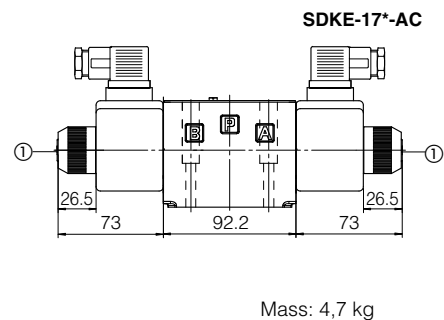
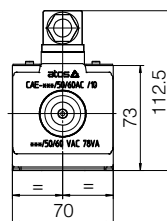
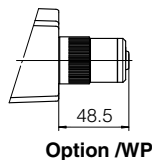
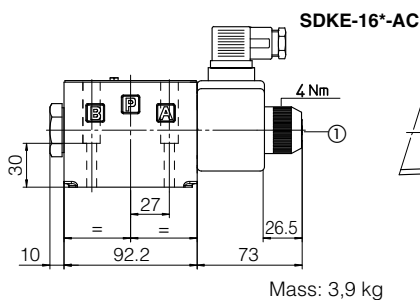


12 INSTALLATION DIMENSIONS [mm]



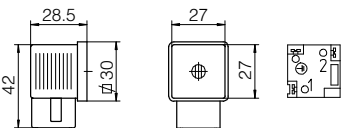
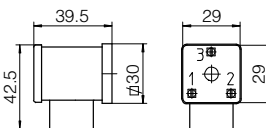
ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050 and 1 OR 108
Ports P,A,B,T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm

P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
For the max pressures on ports, see section 3



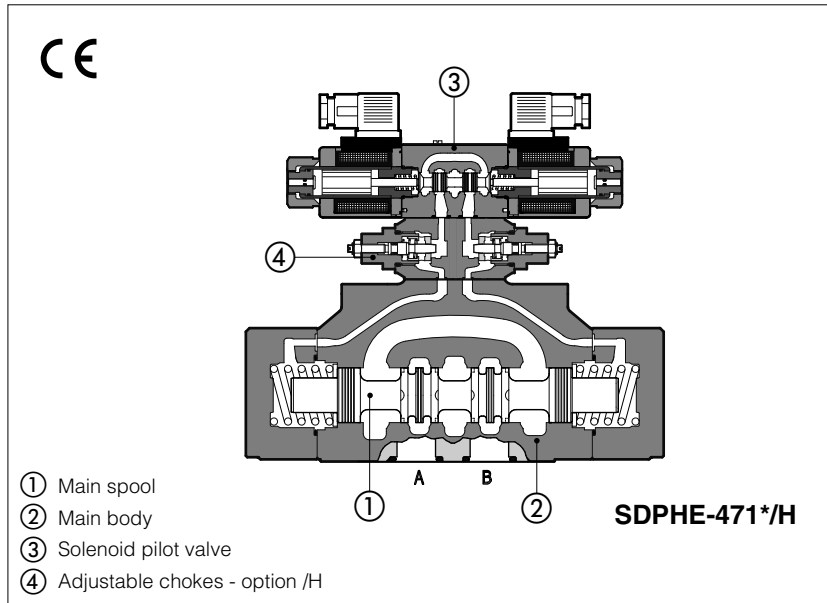
① Standard manual override PIN. The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

13 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

666, 667 (for AC or DC supply)		669 (for AC supply)		CONNECTOR WIRING		
				666, 667 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground		669 1,2 = Supply voltage V _{AC} 3 = Coil ground
SUPPLY VOLTAGES						
666 All voltages		667 24 AC or DC 110 AC or DC 220 AC or DC		669 110/50 AC 110/60 AC 230/50 AC 230/60 AC		

Solenoid directional valves type **SDPHE**

pilot operated, ISO 4401 size 16, 25 and 32



Spool type, pilot operated directional solenoid valves available in three or four way configurations.

They are operated by a directional valve ③ type SDHE (see technical table SHE015) equipped with threaded solenoids for AC or DC power supply and certified according to North American Standard **cURus**. Spools ① are fully interchangeable and they are available in a wide range of hydraulic configurations.

The valve body is made by shell-moulding castings ② machined by transfer lines and then cleaned by thermal deburring. Optimized flow paths largely cored with extrawide channels to tank ensures low pressure drops.

Valves can be supplied with following optional devices:

- Option /H, adjustable chokes for the valve's switching times control ④;
- Option /S, main spool stroke adjustment.

Rugged execution suitable for outdoor use.

Mounting surface: **ISO 4401 size 16, 25, 32**

Max flow **up to 300, 700 and 1000 l/min.**

Pressure **up to 350 bar**

1 MODEL CODE

SDPH	E	-	2	61	1	/	A	-	X	24 DC	**	/	*
Pilot operated directional control valve											Seals material, see section ③: - = NBR PE = FKM BT = HNBR		
Solenoid pilot valve: E = SDHE for AC and DC supply, high performances with cURus certified solenoids											Series number		
Valve size: 2 = 16 4 = 25 6 = 32											Voltage code, see section ⑤		
Valve configuration, see section ② 61 = single solenoid, center plus external position, spring centered 63 = single solenoid, 2 external positions, spring offset 67 = single solenoid, center plus external position, spring offset 71 = double solenoid, 3 positions, spring centered 75 = double solenoid, 2 external positions, with detent											X = without connector See section ⑪ for available connectors, to be ordered separately 00-AC = AC solenoid valve without coils 00-DC = DC solenoid valve without coils XJ = AMP Junior Timer connector XK = Deutsch connector XS = Lead Wire connection		
Spool type, see section ②											Options, see section ④		

Note: SDPHE-* S PIL version without pilot solenoid valve available on request

2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1, for functional scheme, see section ④)

Configurations	Spools	Configurations	Spools
61 61/A 67 67/A 71 	0 1 2 3 4 5 6 7 91 19 93 39 58 	63 63/A 75 	0/2 1/2 2/2
NOTES (see also section 4.2 for special shaped spools): - For DP*-6 are available only spools: 0, 1, 1/2, 2, 3, 4, 5, 58, 6, 7, 19, 91			

3 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 except for type -*70 (without springs) that must be installed with horizontal axis if operated by impulses.		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	75 years, for further details see technical table P007		
Ambient temperature	Standard = -30°C ÷ +70°C; /PE option = -20°C ÷ +70°C; /BT option = -40°C ÷ +70°C		
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	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	
Flow direction	As shown in the symbols of table 2		
Operating pressure	P, A, B, X = 350 bar T = 250 bar for external drain (standard) T with internal drain (option /D) and port Y = 210 bar SDPHE (DC); 160 bar SDPHE (AC) Minimum pilot pressure = 8 bar		
Rated flow	See diagrams Q/Δp at section 6		
Maximum flow	SDPHE-2: 300 l/min ; SDPHE-4: 700 l/min ; SDPHE-6: 1000 l/min (see rated flow at section 6 and operating limits at section 7)		

3.1 Coils characteristics

Insulation class	H (180°C) for DC coils F (155°C) for AC coils Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667 or 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric features 5
Supply voltage tolerance	± 10%
Certification	cURus North American standard

4 NOTES

4.1 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 4.2
- /S** = Main spool stroke adjustment.
- /WP** = Prolonged manual override protected by rubber cap.

⚠ The manual override operation can be possible only if the pressure at T port is lower than 50 bar

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).
- /L9** = plug with calibrated restrictor in P port of pilot valve - see section 9

Suggested for pilot pressure higher than 210 bar or to limit the hydraulics shocks caused by the fast main spool switching

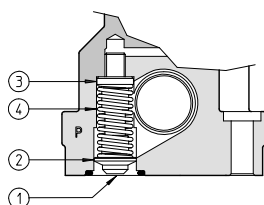
4.2 Special shaped spools

- 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**, **4** are also available as **1/1** and **4/8** that are properly shaped to reduce water-hammer shocks during the switching (to use with option /L*).

Shaped spool availability	0/1	3/1	1/1	4/8
SDPHE-2, SDPHE-4	•	•	•	•
SDPHE-6	-	•	•	•

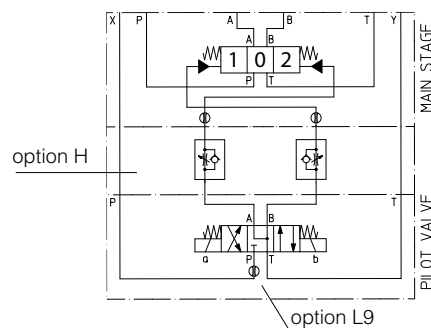
4.3 Pilot pressure generator (option /R)

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**. 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

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



5 ELECTRIC FEATURES

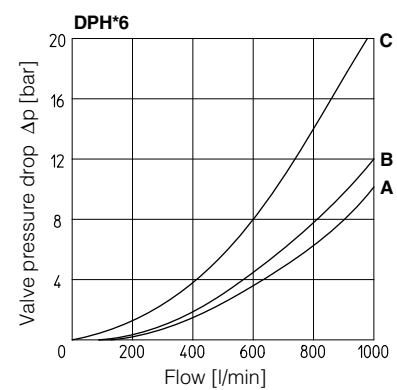
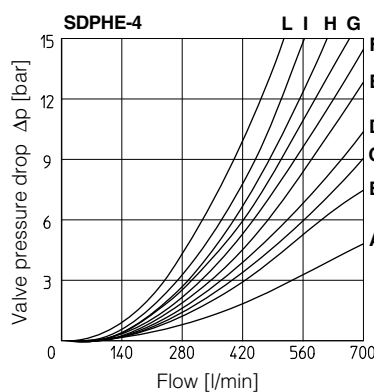
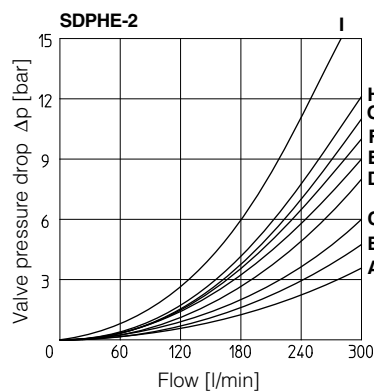
Valve	External supply nominal voltage ± 10%	Voltage code	Type of connector	Power consumption (2)	Code of spare coil
SDPHE	12 DC	12 DC	666 or 667	30 W	COE-12DC
	14 DC	14 DC			COE-14DC
	24 DC	24 DC			COE-24DC
	28 DC	28 DC			COE-28DC
	110 DC	110 DC			COE-110DC
	220 DC	220 DC			COE-220DC
	110/50 AC	110/50/60 AC			58 VA (3)
	230/50 AC	230/50/60 AC	COE-230/50/60AC (1)		
	110/50 AC 120/60 AC	110RC	669	30 W	COE-110RC
	230/50 AC 230/60 AC	230RC			COE-230RC

(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10÷15% and the power consumption is 58 VA

(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current. Inrush current values correspond to a power consumption of about 150 VA.

6 FLOW VERSUS PRESSURE DIAGRAMS Based on mineral oil ISO VG 46 at 50°C



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	-
49	-	D	-	-	-
58	B	A	F	H	H
91	C	C	E	-	-
93	-	C	D	-	-

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, 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	-
58	E	A	B	F	H
91	F	F	D	-	-
93	-	G	D	-	-

Spool type	Flow direction				
	P→A	P→B	A→T	B→T	P→T
0	A	A	B	B	B
1	A	A	A	B	-
3	A	-	A	B	-
4	A	A	C	C	C

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

SDPHE-2

Spool	Inlet pressure [bar]			
	70	140	210	350
Flow rate [l/min]				
0, 1, 3, 6, 7, 8	300	300	300	300
2, 4, 4/8	300	300	240	140
5	260	220	180	100
0/1, 0/2, 1/2	300	250	210	180
58, *9, 9*	300	300	270	200

SDPHE-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
58, *9, 9*	500	500	500	450

SDPHE-6

Spool	Inlet pressure [bar]			
	70	140	210	350
Flow rate [l/min]				
1, 3, 6, 7,	1000	950	850	700
0	950	900	800	650
1/2, 2, 4, 5	850	800	700	450
58, 19/91	950	850	650	450

8 SWITCHING TIMES (average values in m sec)

Valve model	Configuration		70 bar		Piloting pressure 140 bar		250 bar	
			Alternating current	Direct current	Alternating current	Direct current	Alternating current	Direct current
SDPHE-2	71, 61, 67, 61*/A, 67*/A	Switch ON	40	55	30	50	20	40
		Switch OFF	60					
	63, 63*/A	Switch ON	55	80	45	70	35	55
		Switch OFF	95					
SDPHE-4	71, 61, 67, 61*/A, 67*/A	Switch ON	60	80	45	60	30	45
		Switch OFF	80					
	63, 63*/A	Switch ON	95	115	75	95	50	65
		Switch OFF	130					
SDPHE-6	71, 61, 67, 61*/A, 67*/A	Switch ON	70	95	55	70	40	55
		Switch OFF	150					
	63, 63*/A	Switch ON	115	145	95	110	70	90
		Switch OFF	280					

Notes:

1) For configuration 75, times of switching ON and switching OFF are the same: this value is equal to time of switch ON of configuration 63.

2) TEST CONDITIONS

- Nominal voltage supply DC (direct) and AC (alternating) with connector type SP-666. The use of other connectors can affect the switching time;
- 2 bar of counter pressure on port T;
- mineral oil: ISO VG 46 at 50°C

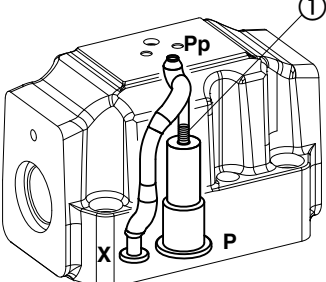
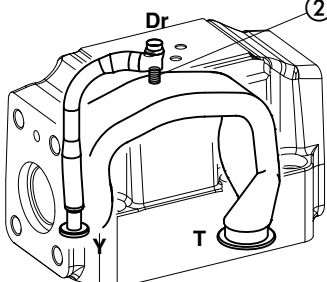
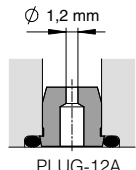
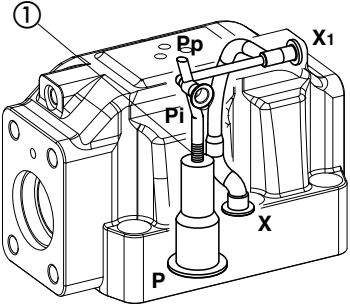
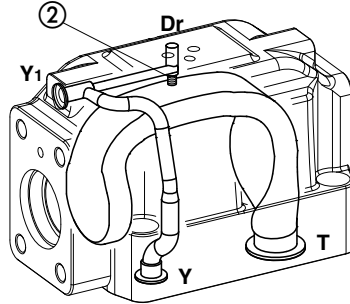
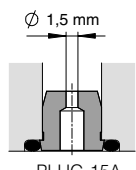
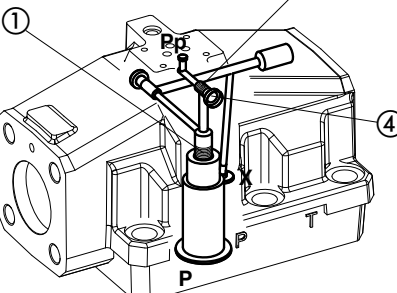
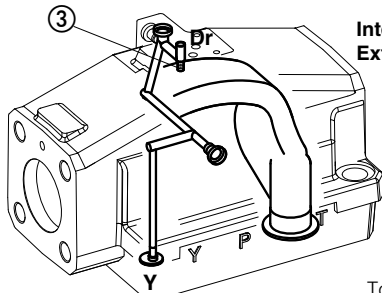
3) The response time is affected by elasticity of the hydraulic circuit, by variation of hydraulic characteristics and temperature.

9 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

SDPHE-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.
Option L9 This option provides a calibrated restrictor PLUG-H-12A (Ø 1,2 mm) in the P port of the pilot valve				
SDPHE-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.
Option L9 This option provides a calibrated restrictor PLUG-H-15A (Ø 1,5 mm) in the P port of the pilot valve				
SDPHE-6 Pilot channels 		Drain channels 		Internal piloting: Without plug ①; plug SP-X325A in pos ②; External piloting: Add DIN-908 M16x1,5 in pos ①; 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 = G 1/8"

10 DIMENSIONS FOR SDPHE-2 [mm]

SDPHE-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

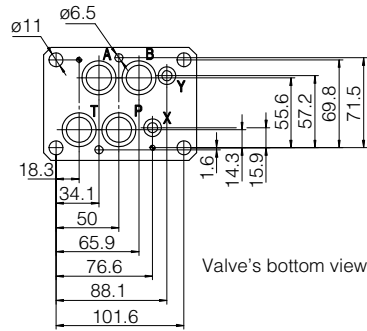
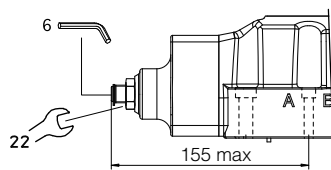
T = TANK PORT

X = EXTERNAL OIL

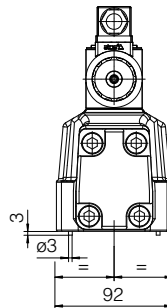
PILOT PORT

Y = DRAIN PORT

Stroke adjustment
device for option /S

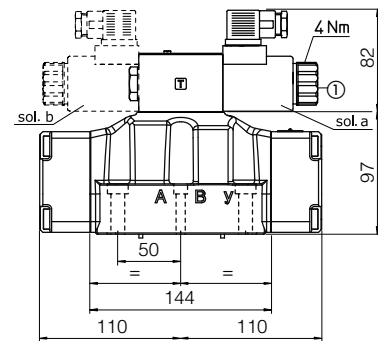
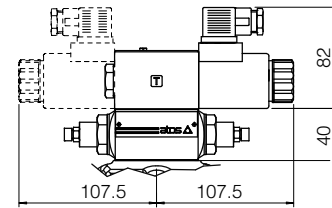


Valve's bottom view



SDPHE-2*

SDPHE-2*/H



Overall dimensions refer to valves with connectors type 666

① Standard manual override PIN

11 DIMENSIONS FOR SDPHE-4 [mm]

SDPHE-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;

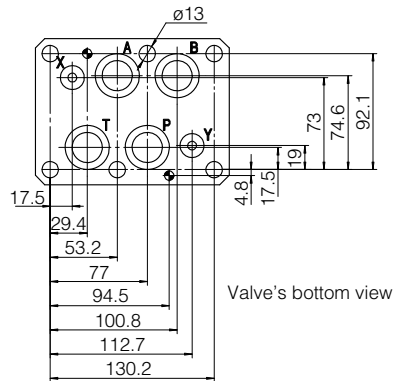
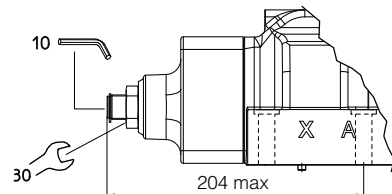
P = PRESSURE PORT

A, B = USE PORT

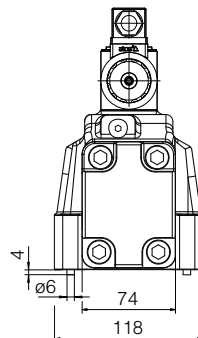
T = TANK PORT

X = EXTERNAL OIL PILOT PORT

Y = DRAIN PORT

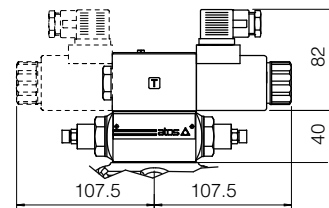


Valve's bottom view

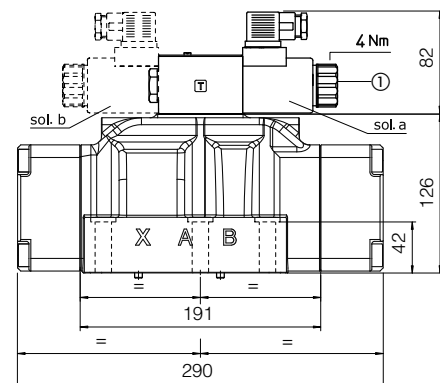


Mass (Kg)	
SDPHE-46	17,4
SDPHE-47	17,8
Option /S	+1,5
Option H	+1,0

SDPHE-4*/H



SDPHE-4*



Overall dimensions refer to valves with connectors type 666

① Standard manual override PIN

SDPHE-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: $\varnothing = 34$ mm;

Diameter of ports X, Y: $\varnothing = 7$ mm;

Seals: 4 OR 144, 2 OR 3056

P = PRESSURE PORT

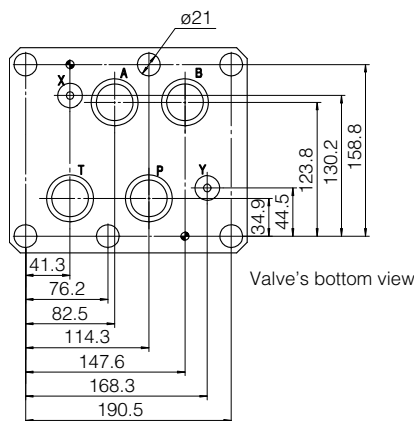
A, B = USE PORT

T = TANK PORT

X = EXTERNAL OIL

PILOT PORT

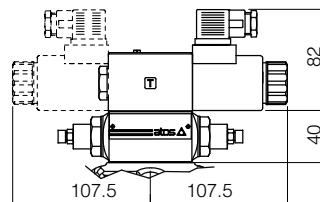
Y = DRAIN PORT



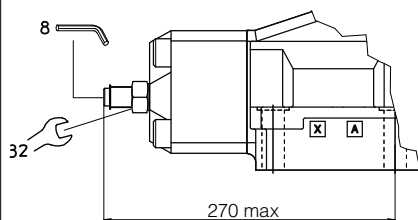
Valve's bottom view

Mass (Kg)	
SDPHE-66	43,8
SDPHE-67	44,1
Option /S	+3,5
Option H	+1,0

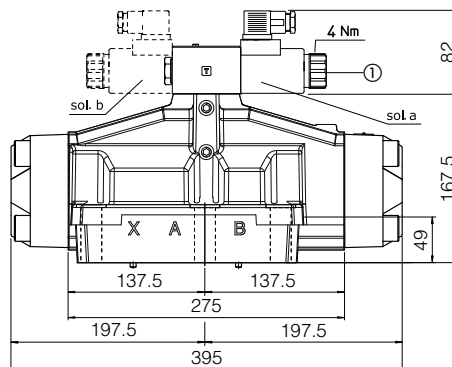
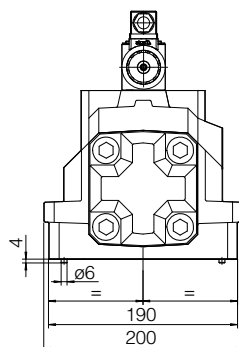
SDPHE-6*/H



Stroke adjustment device for option/S



SDPHE-6*



Overall dimensions refer to valves with connectors type 666

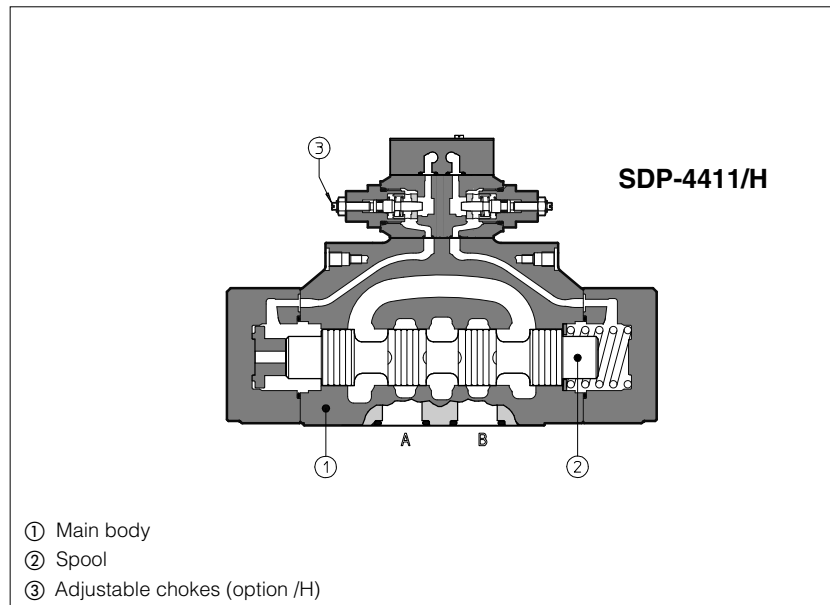
① Standard manual override PIN

13 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 - the connectors must be ordered separately

Connector code	Function
666	Connector IP65, suitable for direct connection to electric supply source
667	As 666 connector IP65 but with built-in signal led, suitable for direct connection to electric supply source
669	With built-in rectifier bridge for supplying DC coils by alternating current (AC 110V and 230V - I _{max} 1A)

Hydraulic operated directional valves type **SDP**

ISO 4401 size 16, 25 and 32



Spool type hydraulic operated directional valves in three or four way, two or three position, designed to operate in oil hydraulic systems.
Available with single or double hydraulic actuator.

Mounting surface: **ISO 4401**
size 16, 25, 32

SDP-2 = size 16, flow up to 300 l/min
SDP-4 = size 25, flow up to 700 l/min
SDP-6 = size 32, flow up to 1000 l/min

Max pressure: **350 bar**

1 MODEL CODE

SDP-2	4	1	3	/	H	**	/	*
Hydraulic operated directional control valve, size: SDP-2 = 16 SDP-4 = 25 SDP-6 = 32						Series number		Seals material, see section 4: - = NBR PE = FKM BT = HNBR
Type of actuator: 4 = single actuator 5 = double actuator								Options: /H = adjustable chokes for controlling the main spool shifting time (meter-out to the pilot chambers of the main valve) /R = pilot pressure generator (4 bar on port P) /S = main spool stroke adjustment
Valve configuration, see section 2 : 0 = free, without springs 1 = spring centered, without detent 3 = spring offset external position 7 = center and external positions								Spool type, see section 2

2 CONFIGURATIONS and SPOOLS valves type **SDP**-*

Configurations	Spools	Configurations	Spools
41 47 51 	1 0 2 1 0 2 1 0 2 1 0 2 4 5 6 7 91 19 93 39 58 	43 50 	1 0 2 1/2 2/2

NOTES:
- For **DP*-6** are available only spools:
0, 1, 1/2, 2, 3, 4, 5, 58, 6, 7, 19, 91

Special shaped 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** are properly shaped to reduce water-hammer shocks during the switching.

3 HYDRAULIC CHARACTERISTICS

Valve model		SDP-2	SDP-4	SDP-6
Max recommended flow	[l/min]	300	700	1000
Max pressure on port P, A, B	[bar]	350		
Max pressure on port T (also X, Y for SDP)	[bar]	250		
Minimum pilot pressure	[bar]	4		
Max recommended pressure on piloting line	[bar]	250		

(1) The max pressure on port T has to be not over 50% of pilot pressure

4 MAIN CHARACTERISTICS, SEALS AND FLUIDS - for other fluids not included in below table, consult our technical office

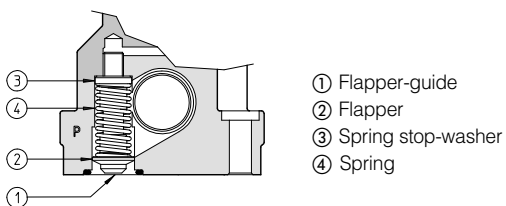
Assembly position / location	any position except for valves type SDP-*50 (without springs) that must be installed with their longitudinal axis horizontal		
Subplate surface finishing	roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature range	standard execution = -30°C ÷ +70°C; /PE option = -20°C ÷ +70°C; /BT option = -40°C ÷ +70°C		
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	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	HFUD, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

5 Q/ΔP DIAGRAMS

SDP-2	See note and diagrams on table SHE085 relating the SDPH*-2 valve from which SDP-2* are derived
SDP-4	See note and diagrams on table SHE085 relating the SDPH*-4 valve from which SDP-4* are derived
SDP-6	See note and diagrams on table SHE085 relating the SDPH*-6 valve from which SDP-6* are derived

6 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, 589**. 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.



SDP-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

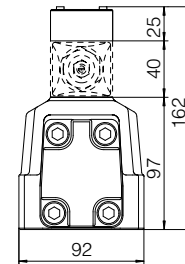
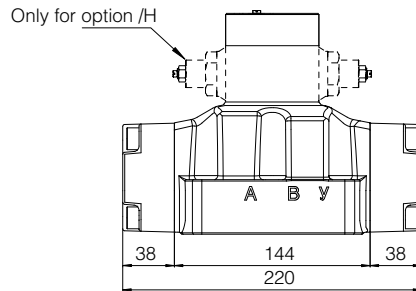
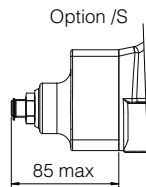
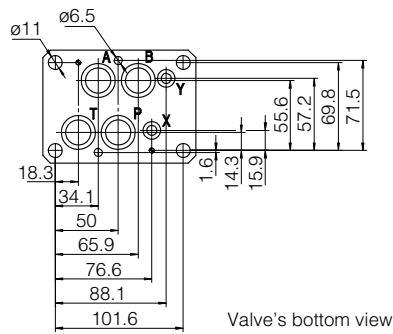
Tightening torque = 15 Nm

Diameter of ports A, B, P, T: $\varnothing = 20$

Diameter of ports X, Y: $\varnothing = 7$ mm

Diameter of port L: $\varnothing = 5$ mm

Seals: 4 OR 130, 2 OR 2043



Mass: 10 Kg

SDP-4

ISO 4401: 2005

Mounting surface: 4401-08-08-0-05

Fastening bolts:

6 socket head screws M12x60 class 12.9

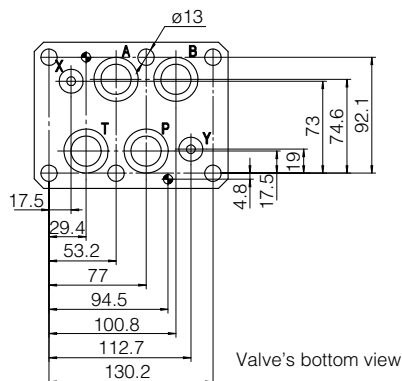
Tightening torque = 125 Nm

Diameter of ports A, B, P, T: $\varnothing = 24$

Diameter of ports X, Y: $\varnothing = 7$ mm

Diameter of port L: $\varnothing = 5$ mm

Seals: 4 OR 4112, 2 OR 3056



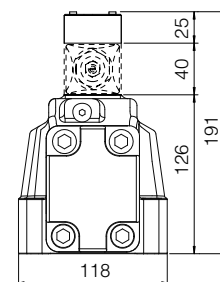
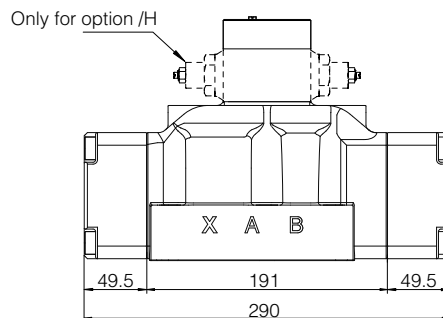
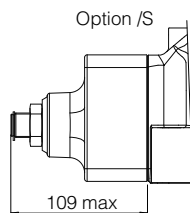
P = PRESSURE PORT

A, B = USE PORT

T = TANK PORT

X = EXTERNAL OIL PILOT PORT

Y = DRAIN PORT

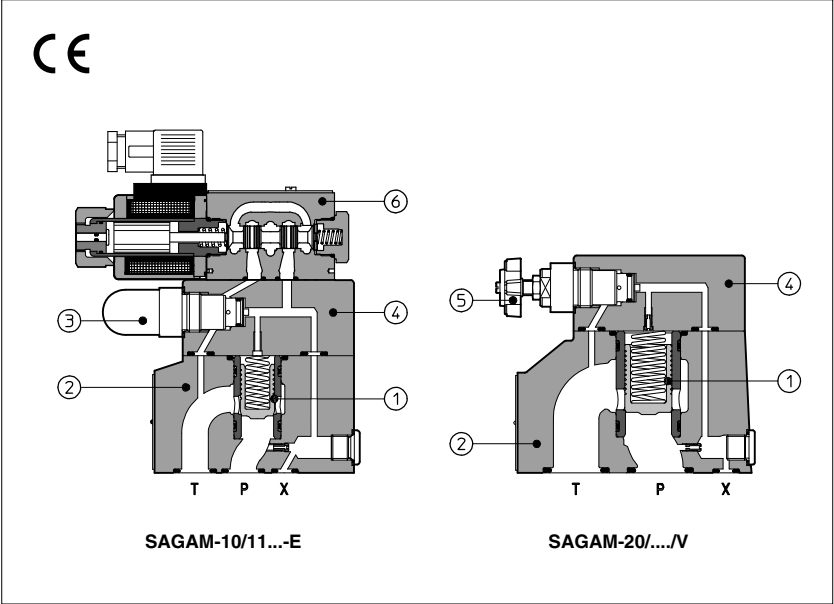


Mass: 16,5 Kg

Seals: 4 OR 144, 2 OR 3056

Pressure relief valves type SAGAM

two stage, subplate mounting - ISO 6264 size 10, 20 and 32



SAGAM are two stage pressure relief valves with balanced poppet, designed to operate in oil hydraulic systems.

In standard versions the piloting pressure of the poppet (1) of the main stage (2) is regulated by means of a grub screw protected by cap (3) in the cover (4).

Optional versions with setting adjustment by handwheel (5) instead of the grub screw are available on request.

Clockwise rotation increases the pressure.

SAGAM can be equipped with a SDHE pilot solenoid valve (6) for venting

Mounting surface: **ISO 6264 size 10, 20 and 32**

Max flow: **200, 400 and 600 l/min**

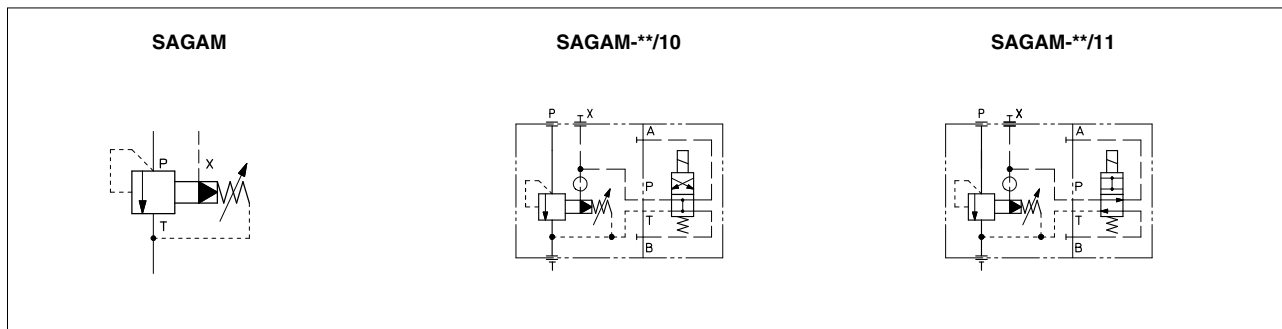
Max pressure up to **350 bar**

1 MODEL CODE

SAGAM	-	20	/	10	/	210	/	V	-	E	X	24DC	**	/	*
<p>SAGAM = pressure relief valve subplate mounting</p>															
<p>Size: 10 20 32</p>															
<p>Venting option: - = without venting 10=venting with de-energized solenoid 11=venting with energized solenoid</p>															
<p>Setting: see section 3 for available setting</p>															
<p>Options, see section 5 E V WP Y</p>															
<p>X = without connector (1): See section 6 for available connectors, to be ordered separately -00-AC = AC solenoid valve without coils -00-DC = DC solenoid valve without coils</p>															
<p>Solenoid venting valve (1): E = SDHE for AC and DC supply with cURus certified solenoids</p>															
<p>Seals material, see section 4: - = NBR PE = FKM BT = HNBR</p>															
<p>Series number</p>															
<p>Voltage code, see section 7 (1):</p>															

(1) Only for SAGAM with solenoid valve for venting.

2 HYDRAULIC SYMBOLS



3 HYDRAULIC CHARACTERISTICS

Valve model	SAGAM-10	SAGAM-20	SAGAM-32
Setting [bar]	50; 100; 210; 350		
Pressure range [bar]	4÷50; 6÷100; 7÷210; 8÷350		
Max pressure [bar]	ports P, X = 350 Ports T, Y = 210 (without pilot solenoid valve) For version with pilot solenoid valve, see technical tables SHE015		
Max flow [l/min]	200	400	600

4 MAIN CHARACTERISTICS, SEALS AND FLUIDS - for other fluids not included in below table, consult our technical office

Assembly position	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

4.1 Coils characteristics (for SAGAM with solenoid venting valve)

Insulation class	H (180°C) for DC coils F (155°C) for AC coils	Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account
Protection degree to DIN EN 60529	IP 65 (with connectors 666, 667, 669 correctly assembled)	
Relative duty factor	100%	
Supply voltage and frequency	See electric feature 8	
Supply voltage tolerance	± 10%	
Certification	cURus North American standard	

5 OPTIONS

- /E** = external pilot
- /V** = regulating handwheel instead of grub screw protected by cap
- /WP** = prolonged manual override protected by rubber cap (only for SAGAM with pilot solenoid valve)
- /Y** = external drain (only for SAGAM with pilot solenoid valve)

6 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 FOR SAGAM WITH SOLENOID VALVE

The connectors must be ordered separately

Code of connector	Function
666	Connector IP-65, suitable for direct connection to electric supply source
667	As 666 connector IP-65 but with built-in signal led, suitable for direct connection to electric supply source

7 ELECTRIC FEATURES FOR SAGAM WITH SOLENOID VALVE

Solenoid valve type	External supply nominal voltage $\pm 10\%$ (1)		Voltage code	Type of connector	Power consumption SDHE (3)	Code of spare coil SDHE
SDHE	DC	12 DC 24 DC 110 DC 220 DC	12 DC 24 DC 110 DC 220 DC	666 or 667	30 W	COE-12DC COE-24DC COE-110DC COE-220DC
	AC	110/50 AC (2) 115/60 AC 230/50 AC (2) 230/60 AC	110/50/60 AC 115/60 AC 230/50/60 AC 230/60 AC	666 or 667	58 VA 80 VA 58 VA 80 VA (4)	COE-110/50/60AC COE-115/60AC COE-230/50/60AC COE-230/60AC

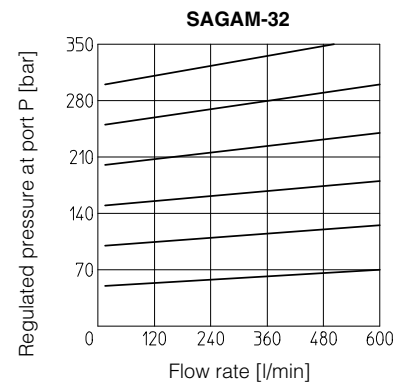
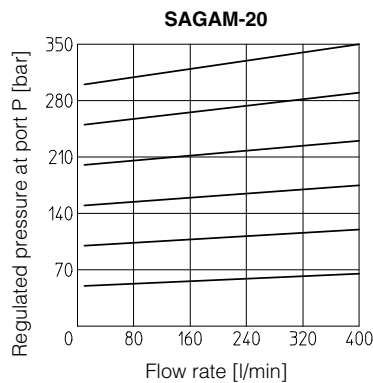
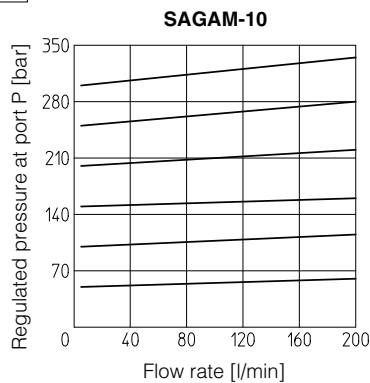
(1) For other supply voltages available on request see technical tables SHE015.

(2) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10 ÷ 15% and the power consumption is 55 VA

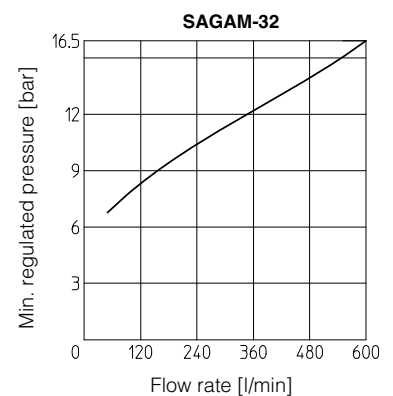
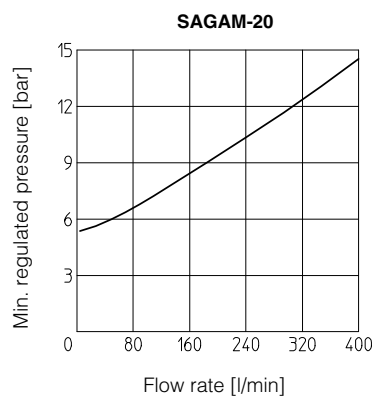
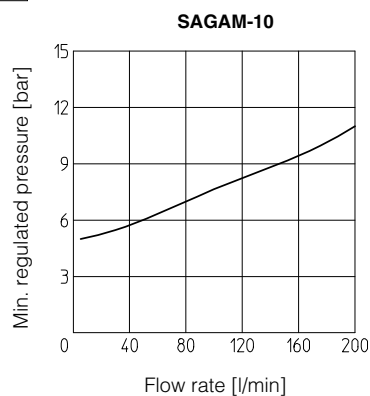
(3) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(4) When AC solenoid is energized, the inrush current is approx 3 times the holding current.

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



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



SAGAM-10

ISO 6264: 2007

Mounting surface: 6264-06-09-1-97

Fastening bolts:

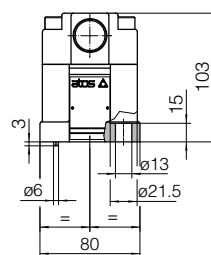
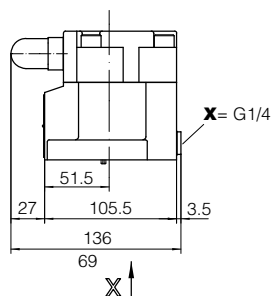
4 socket head screws M12x35 class 12.9

Tightening torque = 125 Nm

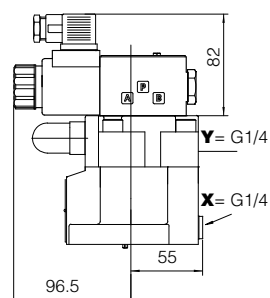
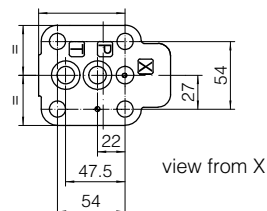
Seals: 2 OR 123; 1 OR 109/70

Ports P, T: $\varnothing = 14,5$ mm

Ports X: $\varnothing = 3,2$ mm



Mass: 3,6 Kg



SAGAM-10/10/-EX**

SAGAM-10/11/-EX**

Mass: 5,1 Kg

SAGAM-20

ISO 6264: 2007

Mounting surface: 6264-08-11-1-97

Fastening bolts:

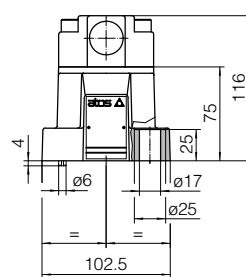
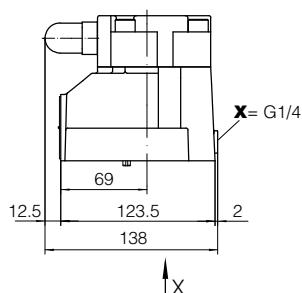
4 socket head screws M16x50 class 12.9

Tightening torque = 300 Nm

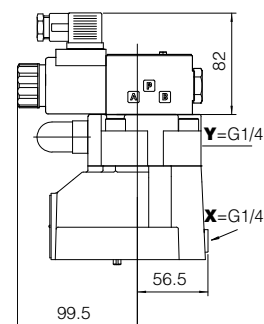
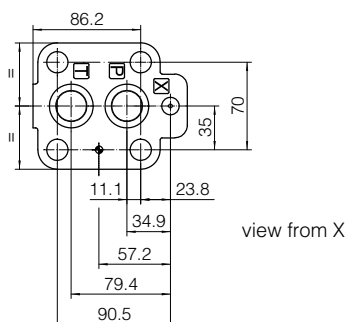
Seals: 2 OR 4112; 1 OR 109/70

Ports P, T: $\varnothing = 24$ mm

Ports X: $\varnothing = 3,2$ mm



Mass: 4,8Kg



SAGAM-20/10/-EX**

SAGAM-20/11/-EX**

Mass: 6,3 Kg

SAGAM-32

ISO 6264: 2007

Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)

Fastening bolts:

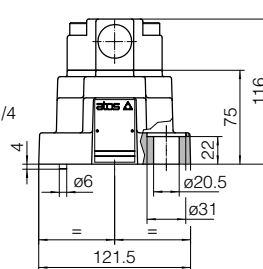
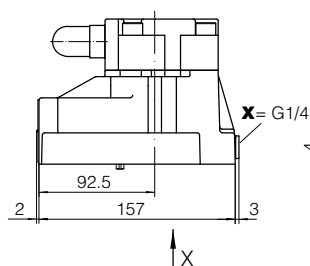
4 socket head screws M20x60 class 12.9

Tightening torque = 600 Nm

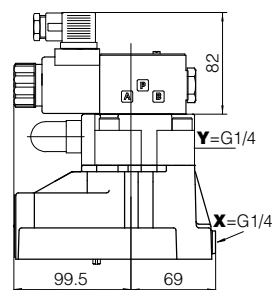
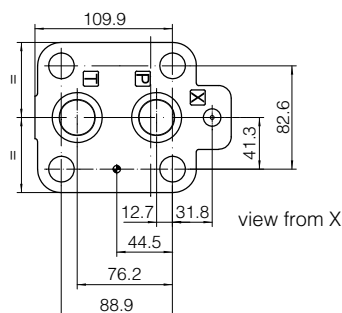
Seals: 2 OR 4131; 1 OR 109/70

Ports P, T: $\varnothing = 28,5$ mm

Ports X: $\varnothing = 3,2$ mm



Mass: 6,2 Kg



SAGAM-32/10/-EX**

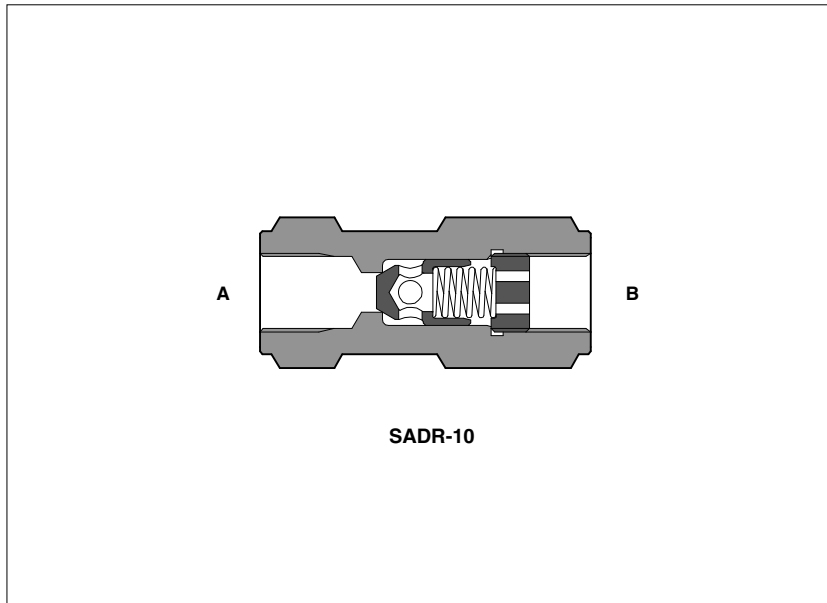
SAGAM-32/11/-EX**

Mass: 7,7 Kg

Overall dimensions refer to valves with connectors type 666

Check valves type **SADR**

in-line mounting - from G 1/4" to G 1" threaded ports



SADR are direct operated check valves for in-line mounting available with port size from 1/4" to 1" GAS.

They are designed to operate in hydraulic systems with hydraulic mineral oil or synthetic fluids having similar lubricating characteristics.

Flow up to **360 l/min**
Pressure up to **400 bar**

1 MODEL CODE

SADR	-	10	/	4	**
Check valve in-line mounting					Series number
Size/threaded connections:		Cracking pressure:			
06 = G 1/4"		- = 0,5 bar			
10 = G 3/8"		/2 = 2 bar			
15 = G 1/2"		/4 = 4 bar			
20 = G 3/4"		/8 = 8 bar			
25 = G 1"					

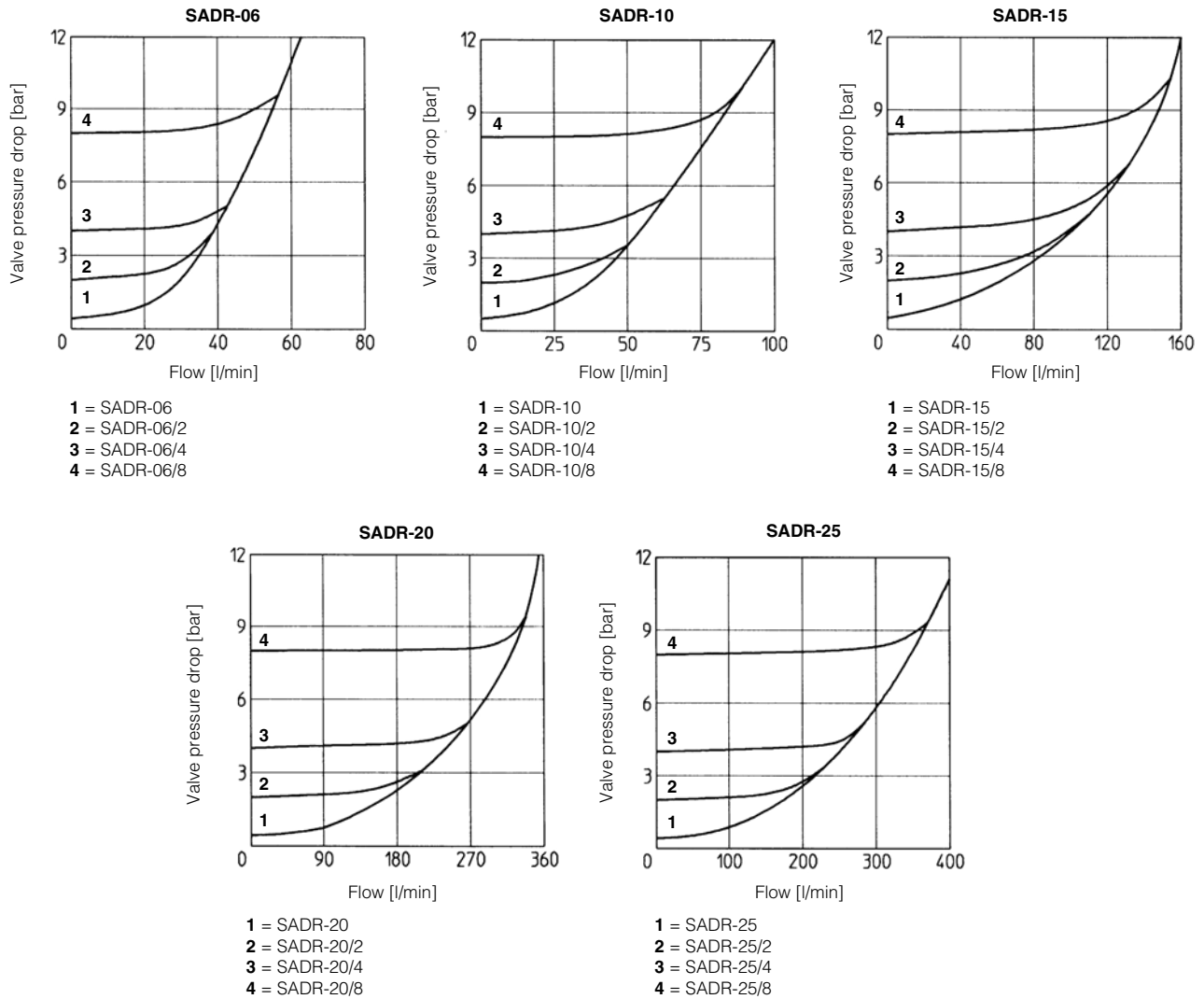
2 HYDRAULIC CHARACTERISTICS

Hydraulic symbol					
Valve model	SADR-06	SADR-10	SADR-15	SADR-20	SADR-25
Max recommended flow [l/min]	40	80	150	300	360
Max pressure [bar]	400		350		

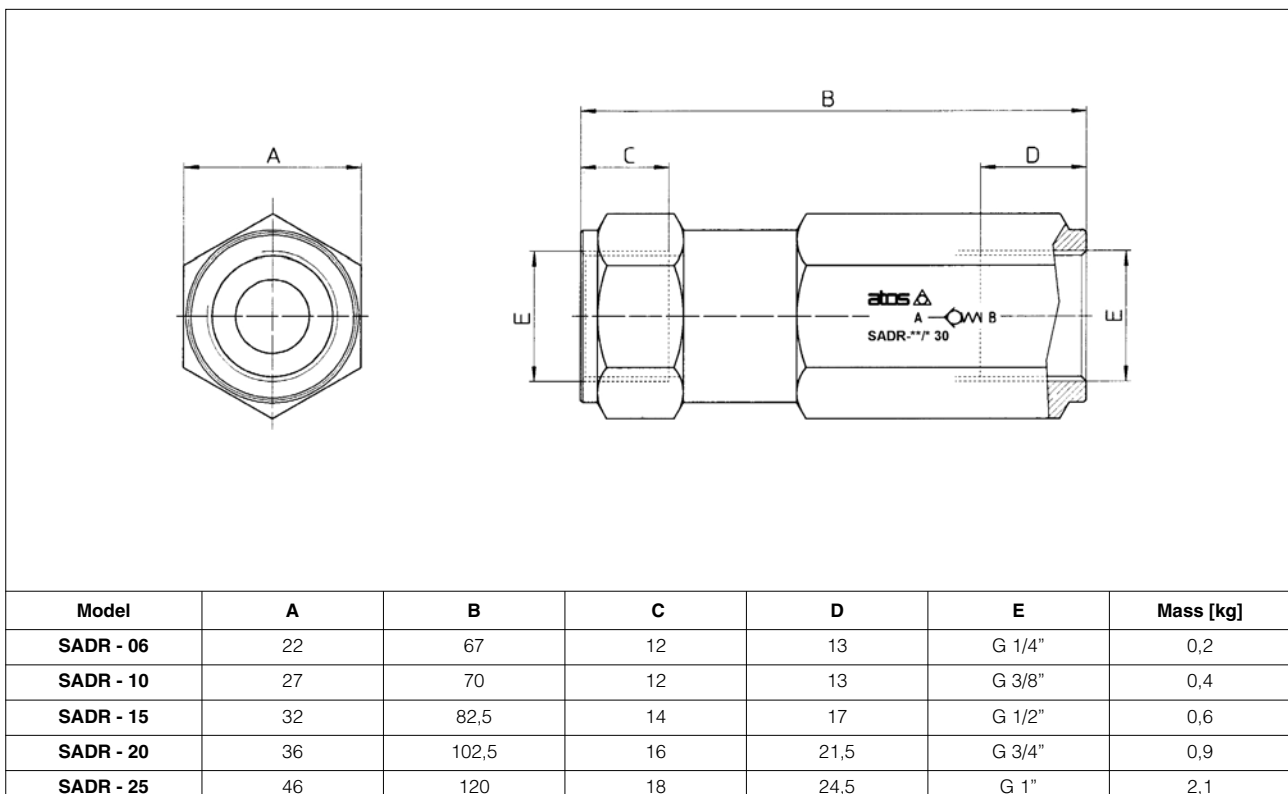
3 MAIN CHARACTERISTICS OF CHECK VALVES TYPE SADR

Assembly position / location	Any position
Fluid	Hydraulic oil as per DIN 51524 ... 535;
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
Fluid temperature	-20 ÷ +80°C
Flow direction	As shown in the symbol at section 2
Rated flow	See diagrams Q/Δp at section 4

4 FLOW VERSUS PRESSURE DROP DIAGRAMS Based on based on mineral oil ISO VG 46 at 50°C

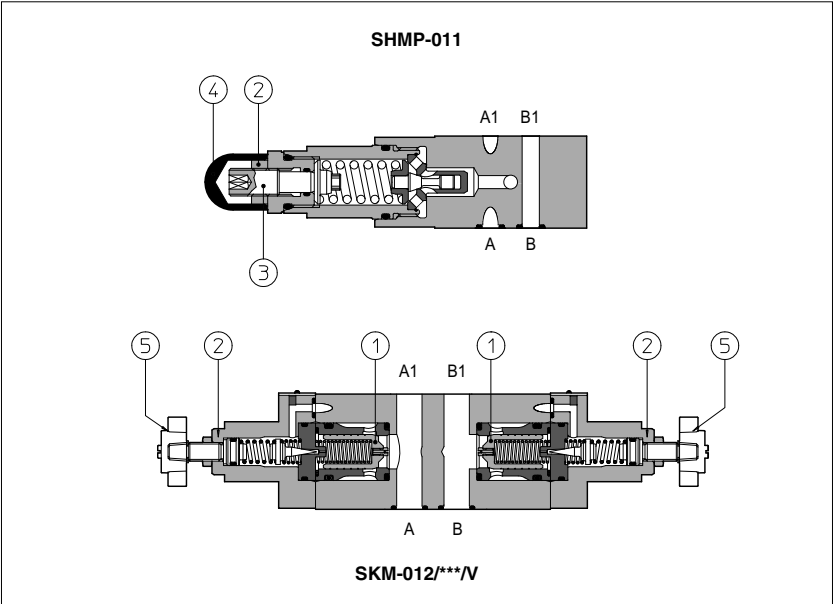


5 DIMENSIONS [mm]



Modular relief valves type SHMP, SKM

ISO 4401 sizes 06 and 10



SHMP are direct operated pressure relief valves, size 06.
SKM are double stage pressure relief valves size 10 with balanced poppet ①.

The pressure adjustment is operated by loosening the locking nut ② and turning the screw ③ protected by cap ④. Optional versions with setting adjustment by handwheel ⑤ instead of the screw are available on request. Clockwise rotation increases the pressure.

Valve size and max flow:

SHMP = size 06, max flow: 35 l/min
SKM = size 10, max flow: 120 l/min

Mounting surface: **ISO 4401 size 06, 10**
 Max pressure: up to **350 bar**

1 MODEL CODE

SHMP	-	011	/	210	/	V	**	/	*
Modular pressure relief valve size:									Seals material, see section 3:
SHMP = 06									- = NBR
SKM = 10									PE = FKM
									BT = HNBR
Configuration, see section 2									
Options:									
V = setting adjustment by handwheel instead of a grub screw protected by cap									
Pressure range									
SHMP:									SKM:
50 = 2÷ 50 bar									50 = 4÷ 50 bar
100 = 3÷100 bar									100 = 5÷100 bar
210 = 10÷210 bar									210 = 5÷210 bar
350 = 15÷350 bar									350 = 5÷350 bar

2 HYDRAULIC CHARACTERISTICS

Hydraulic configuration

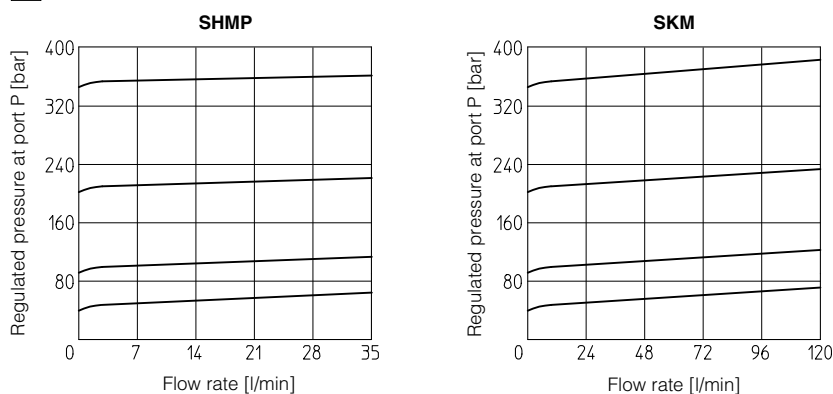
The diagrams illustrate the hydraulic configurations for two series of valves: SHMP (SHMP-011 to SHMP-015) and SKM (SKM-011 to SKM-015). Each diagram shows a 3-position, 4-way valve with a double-acting cylinder. The ports are labeled P (Pressure), A (Acting), B (Acting), and T (Tank). The SHMP series diagrams show the valve in its center position, with the cylinder in a retracted state. The SKM series diagrams show the valve in its center position, with the cylinder in an extended state. The diagrams are arranged in two rows, with SHMP models in the top row and SKM models in the bottom row. The SHMP-015 and SKM-015 diagrams include a pump symbol at the top, indicating a specific hydraulic circuit configuration.

Valve model		SHMP	SKM
Max flow	[l/min]	35	120
Pressure range	[bar]	2÷50; 3÷100; 10÷210; 15÷350	4÷50; 5÷100; 5÷210; 5÷350

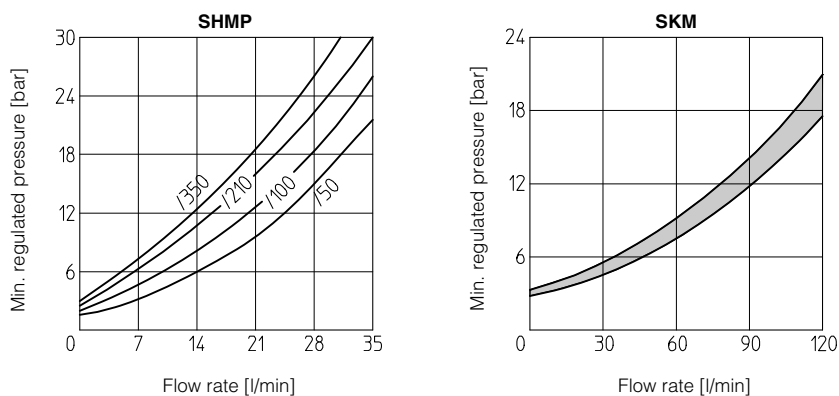
3 MAIN CHARACTERISTICS, SEALS and HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
Seals, recommended fluid temperature	NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FSKM 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	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, FSKM, HNBR	HL, HLP, HLPD, HVLP, HVLDP	DIN 51524
Flame resistant without water	FSKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

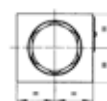
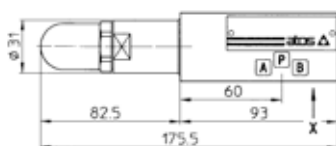
4 REGULATED PRESSURE VERSUS FLOW DIAGRAMS (Based on mineral oil ISO VG 46 at 50°C)



5 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS (Based on fluid viscosity of 25 mm²/s at 40°C)

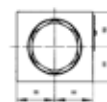
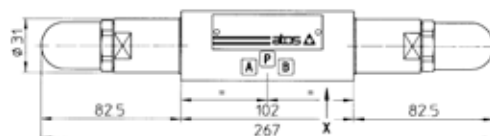
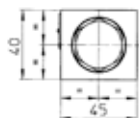


SHMP-011

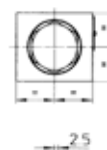
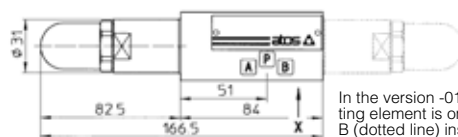
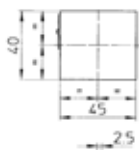


Mass: 1,4 Kg

SHMP-012

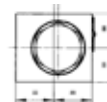
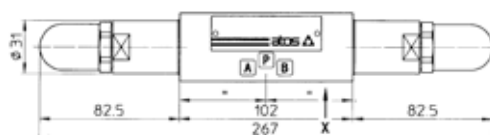
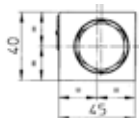


Mass: 1,7 Kg

SHMP-013
SHMP-014


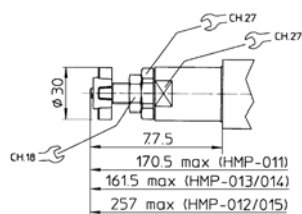
Mass: 1,2 Kg

SHMP-015



Mass: 1,7 Kg

Adjustment device for option /V

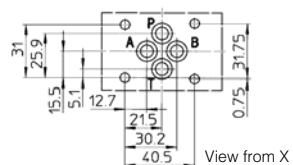


ISO 4401: 2005

Mounting surface: 4401-03-02-0-05

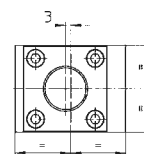
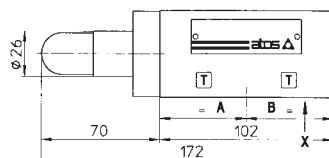
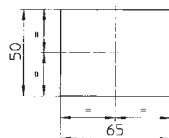
Diameter of ports A, B, P, T: $\varnothing = 7,5$ mm

Seals: 4 OR 108



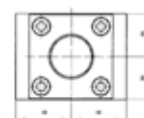
Fastening bolts: n° 4 socket head screws M5. The length depends on number and type of modular elements associated.

SKM-011



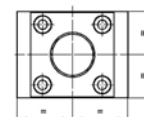
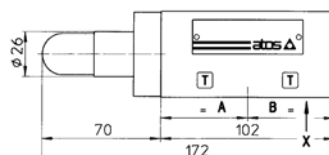
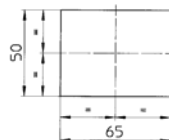
Mass: 2,5 Kg

SKM-012



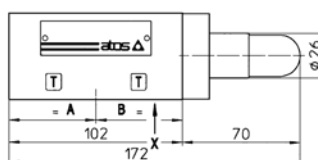
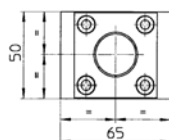
Mass: 2,8 Kg

SKM-013



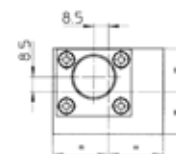
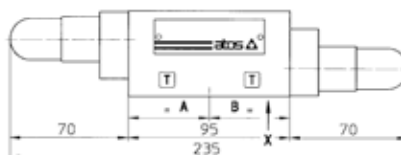
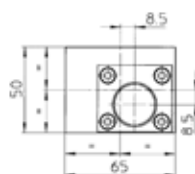
Mass: 2,5 Kg

SKM-014



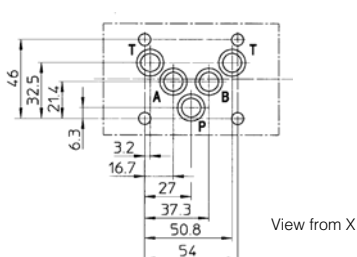
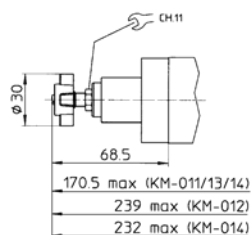
Mass: 2,5 Kg

SKM-015



Mass: 2,5 Kg

Adjustment device for option /V



ISO 4401: 2005

Mounting surface: 4401-05-04-0-05

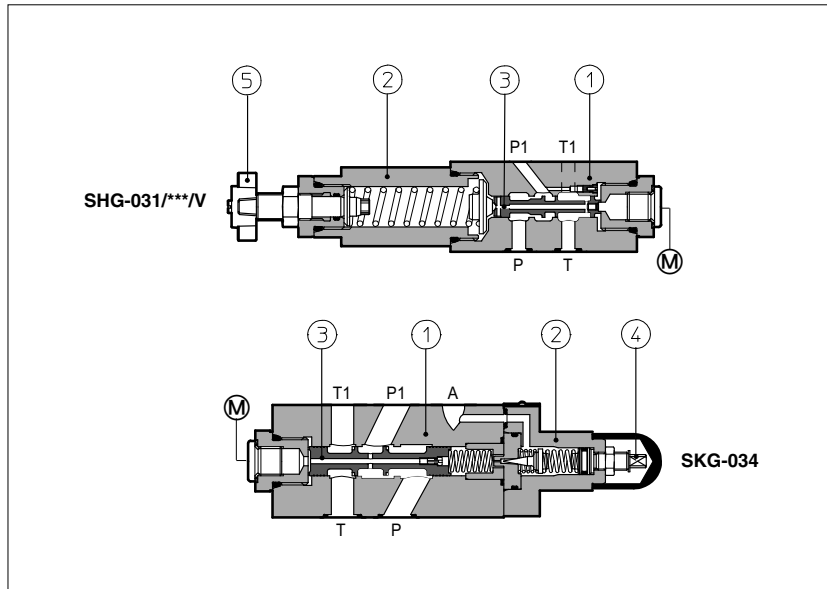
Diameter of ports A, B, P, T: $\varnothing = 11,2$ mm

Seals: 5 OR 2050

Fastening bolts: n° 4 socket head screws M6. The length depends on number and type of modular elements associated.

Modular reducing valves type SHG, SKG

spool type, ISO 4401 sizes 06 and 10



SHG and **SKG** are pressure reducing valves, spool type ③, designed to operate in oil hydraulic systems.

SHG are direct, three way valves;

SKG are double stage ① ②, three way valves;

Clockwise rotation increases the pressure.

Valve size and max flow:

SHG = size 06 flow up to 50 l/min;

SKG = size 10 flow up to 100 l/min;

Mounting surface:

ISO 4401 size 06 and 10

Max pressure: **350 bar** for SHG

315 bar for SKG

1 MODEL CODE

SHG-0

31

210

V

Modular pressure reducing valve, size:

SHG-0 = 06

SKG-0 = 10

Series number

Seals material, see sect. ③:

N = NBR

PE = FKM

BT = HNBR

Options:

V = setting adjustment by handwheel instead of a grub screw protected by cap

Configuration, see section ②

three way:

31 = reduced pressure on P port

33 = reduced pressure on A port

34 = reduced pressure on B port

Pressure range

SHG

32 = 3 - 32 bar

50 = 2 - 50 bar

75 = 10 - 75 bar

100 = 20 - 100 bar

210 = 50 - 210 bar

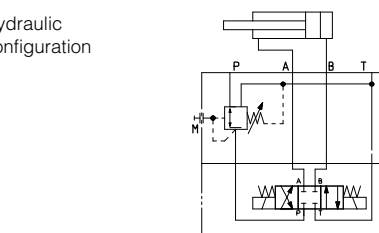
SKG

100 = 7 - 100 bar

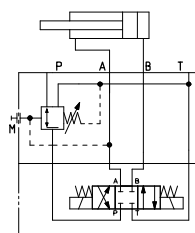
210 = 8 - 210 bar

2 HYDRAULIC CHARACTERISTICS

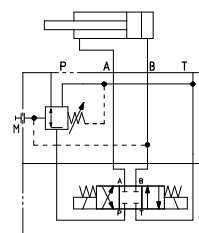
Hydraulic configuration



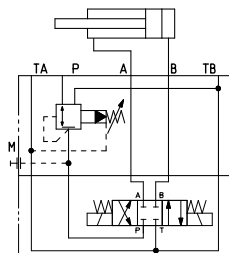
SHG-031



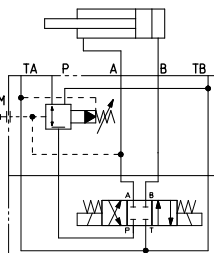
SHG-033



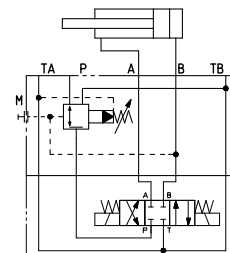
SKG-034



SKG-031



SKG-033



SKG-034

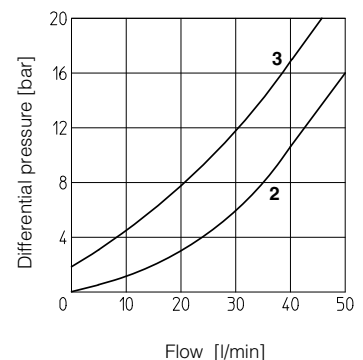
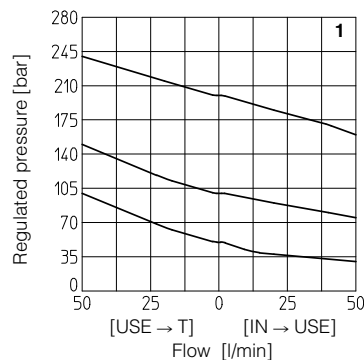
Valve model	SHG-03*/32	SHG-03*/50	SHG-03*/75	SHG-03*/100	SHG-03*/210	SKG-03*/100	SKG-03*/210
Max flow [l/min]	50					100	
Pressure range [bar]	3 ÷ 32	2 ÷ 50	10 ÷ 75	20 ÷ 100	50 ÷ 210	7 ÷ 100	8 ÷ 210
Max inlet pressure [bar]	350					315	
Max pressure on port T [bar]	160					160	

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

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	

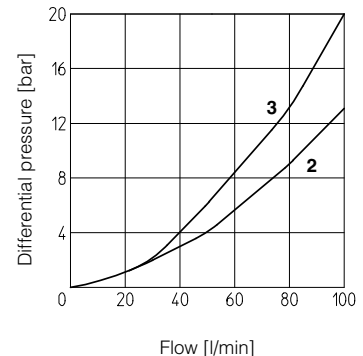
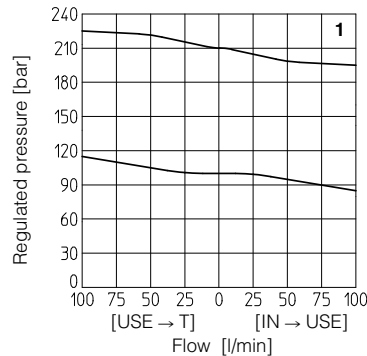
4 DIAGRAMS OF SHG-03* based on mineral oil ISO VG 46 at 50°C

- 1** = regulated pressure variation versus flow:
- between use port and discharge port
- between inlet port and use port
- 2** = differential pressure variation versus flow between inlet port and use port
- 3** = differential pressure variation versus flow between use port and discharge port



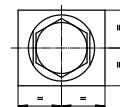
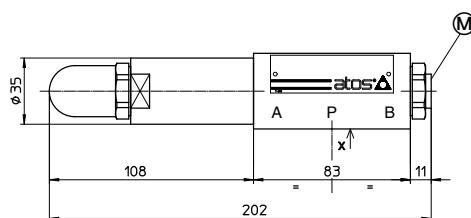
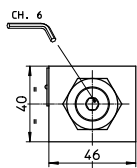
5 DIAGRAMS OF SKG-03* based on mineral oil ISO VG 46 at 50°C

- 1** = regulated pressure variation versus flow:
- between use port and discharge port
- between inlet port and use port
- 2** = differential pressure variation versus flow between inlet port and use port
- 3** = differential pressure variation versus flow between use port and discharge port



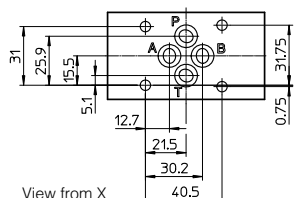
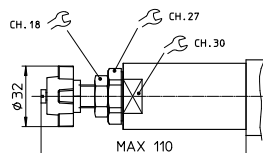
6 INSTALLATION DIMENSIONS OF SHG-0 VALVES [mm]

SHG-03*



Ⓜ = Pressure gauge port = G 1/4"

Adjustment device for option /V



ISO 4401: 2005

Mounting surface: 4401-03-02-0-05

Diameter of ports A, B, P, T: Ø = 7,5 mm

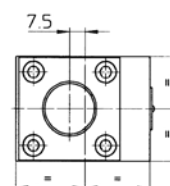
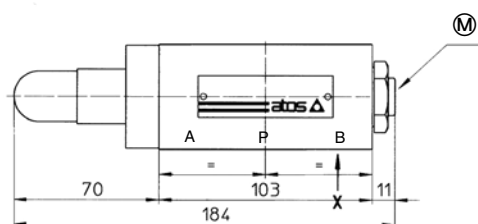
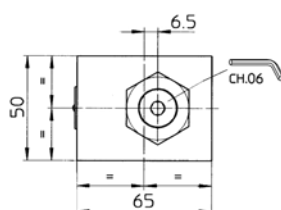
Seals: 4 OR 108

Mass: 2,3 Kg

Fastening bolts: n° 4 socket head screws M5. The length depends on number and type of modular elements associated.

7 INSTALLATION DIMENSIONS OF SKG-0 VALVES [mm]

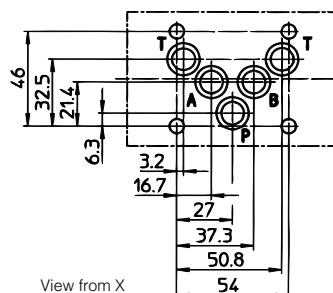
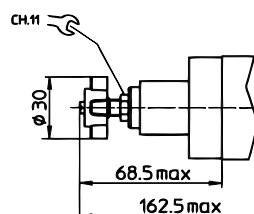
SKG-03*



Ⓜ = Pressure gauge port = G 1/4"

Mass: 3,8 kg

Adjustment device for option /V



ISO 4401: 2005

Mounting surface: 4401-05-04-0-05

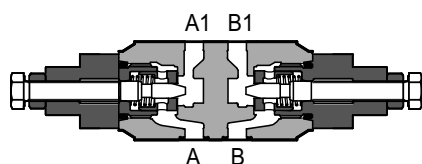
Diameter of ports A, B, P, T: Ø = 11,2 mm

Seals: 5 OR 2050

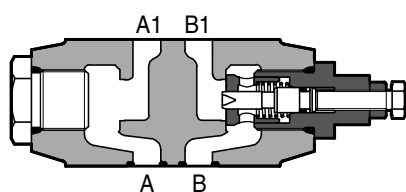
Fastening bolts: n° 4 socket head screws M6. The length depends on number and type of modular elements associated.

Modular throttle valves type **SHQ, SKQ**

flow control, ISO 4401 sizes 06 and 10



SHQ-012



SKQ-014

SHQ and **SKQ** are flow throttling valves, not compensated, and with check valve to allow free reverse flow. The flow adjustment is performed by turning the setting screw. Clockwise rotation increases the throttling (passage reduced).

Valve size and max flow:

SHQ-0 = size 06, flow up to 80 l/min

SKQ-0 = size 10, flow up to 160 l/min

Mounting surface:

ISO 4401 size 06 and 10

Max pressure: **350 bar** (SHQ)
315 bar (SKQ)

1 MODEL CODE

SHQ-0

13

/

Modular flow control valve, size:

SHQ-0 = 06

SKQ-0 = 10

Configuration, see section 2

meter OUT control:

12 = double, acting on port A and B

13 = single, acting on port A

14 = single, acting on port B

meter IN control:

22 = double, acting on port A and B

23 = single, acting on port A

24 = single, acting on port B

Seals material,
see section 3:

- = NBR

PE = FKM

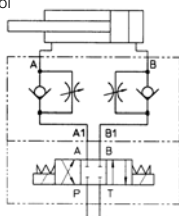
BT = HNBR

Series number

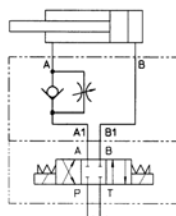
2 VALVE CONFIGURATION

Meter OUT control

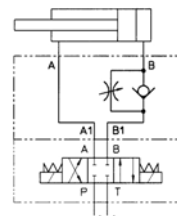
SHQ-012
SKQ-012



SHQ-013
SKQ-013

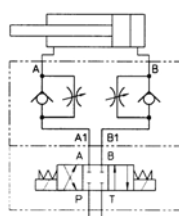


SHQ-014
SKQ-014

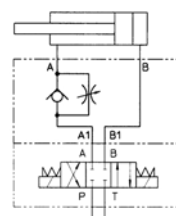


Meter IN control

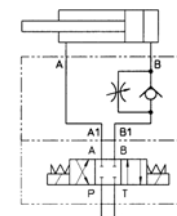
SHQ-022
SKQ-022



SHQ-023
SKQ-023



SHQ-024
SKQ-024

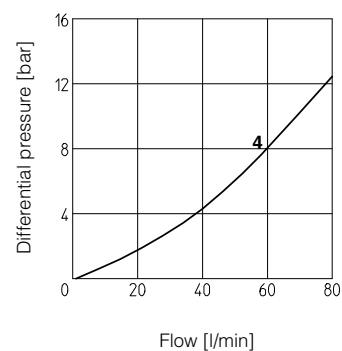
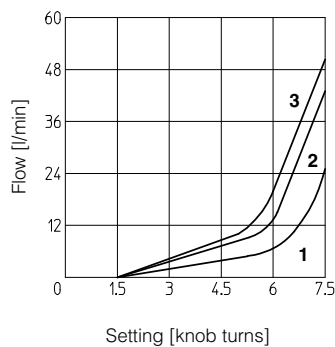


3 MAIN CHARACTERISTICS, SEALS and HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	HFUD, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

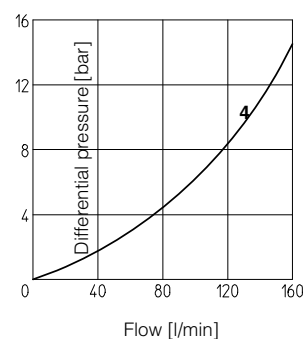
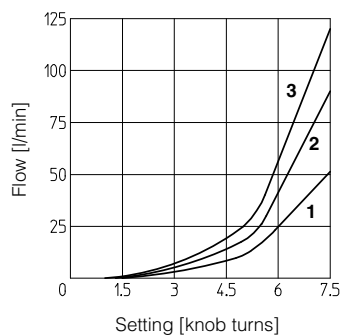
4 DIAGRAMS OF SHQ-0 based on mineral oil ISO VG 46 at 50°C

- 1** = Regulation diagram at Δp 10 bar
2 = Regulation diagram at Δp 30 bar
3 = Regulation diagram at Δp 50 bar
4 = Q/ Δp diagram for free flow through the non-return valve



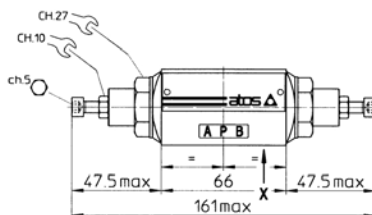
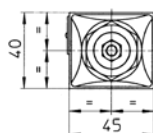
5 DIAGRAMS OF SKQ-0 based on mineral oil ISO VG 46 at 50°C

- 1** = Regulation diagram at Δp 10 bar
2 = Regulation diagram at Δp 30 bar
3 = Regulation diagram at Δp 50 bar
4 = Q/ Δp diagram for free flow through the non-return valve



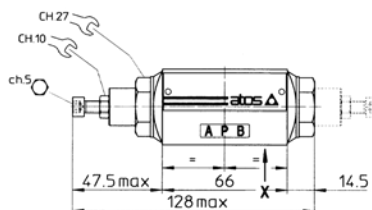
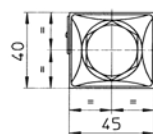
6 INSTALLATION DIMENSIONS OF SHQ-0 VALVES [mm]

SHQ-012
SHQ-022



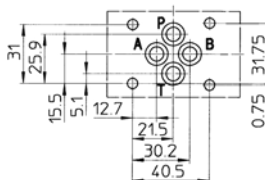
Mass: 1,1 Kg

SHQ-013
SHQ-014
SHQ-023
SHQ-024



In version -014 and -024 the regulating element is on side of port B (dotted line) instead of side of port A.

Mass: 1,2 Kg



ISO 4401: 2005

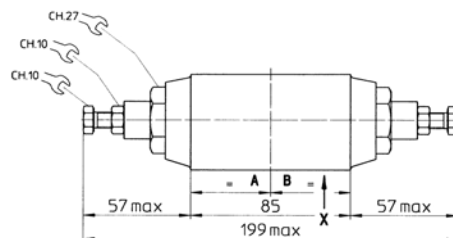
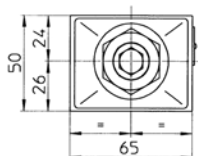
Mounting surface: 4401-03-02-0-05

Diameter of ports A, B, P, T: $\varnothing = 7,5$ mm (max)
Seals: 4 OR 108

Fastening bolts: n° 4 socket head screws M5. The length depends on number and type of modular elements associated.

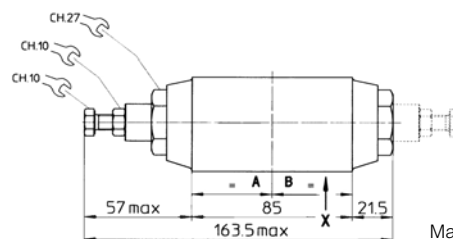
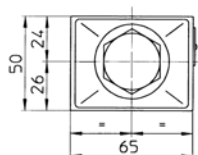
7 INSTALLATION DIMENSIONS OF SKQ-0 VALVES [mm]

SKQ-012
SKQ-022



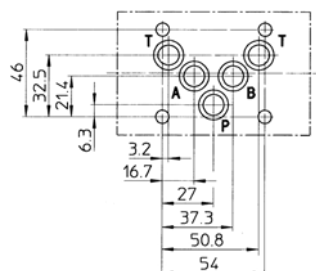
Mass: 2 Kg

SKQ-013
SKQ-014
SKQ-023
SKQ-024



In version -014 and -024 the regulating element is on side of port B (dotted line) instead of side of port A.

Mass: 2,2 Kg



ISO 4401: 2005

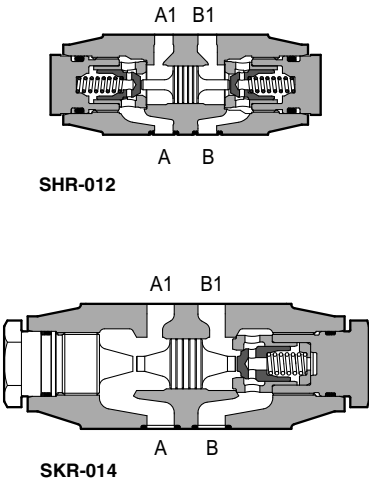
Mounting surface: 4401-05-04-0-05

Diameter of ports A, B, P, T: $\varnothing = 11,2$ mm (max)
Seals: 5 OR 2050

Fastening bolts: n° 4 socket head screws M6. The length depends on number and type of modular elements associated.

Modular check valves type SHR, SKR

direct or pilot operated, ISO 4401 sizes 06 and 10



SHR, SKR are check valves available in direct or pilot operated models.

SHR-0 = size 06: flow up to 60 l/min, pressure up to 350 bar.

SKR-0 = size 10: flow up to 120 l/min, pressure up to 315 bar.

Valves are designed to operate in hydraulic systems with hydraulic mineral oil or synthetic fluid having similar lubricating characteristics.

1 MODEL CODE

SHR-0

Modular check valve, size:
SHR-0 = 06
SKR-0 = 10

12

pilot operated:
12 = double, acting on port A and B
13 = single, acting on port A
14 = single, acting on port B

4

Spring cracking pressure:
– = 0,5 bar (std.) **4** = 4 bar
2 = 2 bar **8** = 8 bar

**

Series number

*

Seals material, see section 3:
– = NBR
PE = FKM
BT = HNBR

2 VALVE CONFIGURATION

SHR-002
SKR-002

SHR-003
SKR-003

SHR-004
SKR-004

SHR-011
SKR-011

SHR-016
SKR-016

SHR-012
SKR-012

SHR-013
SKR-013

SHR-014
SKR-014

The pilot pressure applied through ports A or B opens the valve acting on ports B and A, respectively.
The minimum pilot pressure is a function of the area ratio, see the following table.

VALVE TYPE	AREA RATIO
SHR	3,3:1
SKR	3,3:1

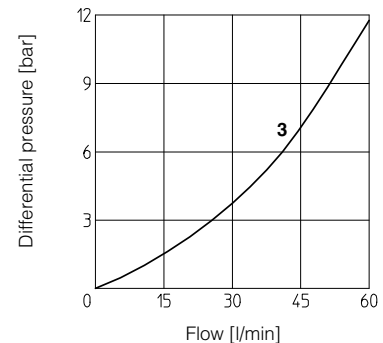
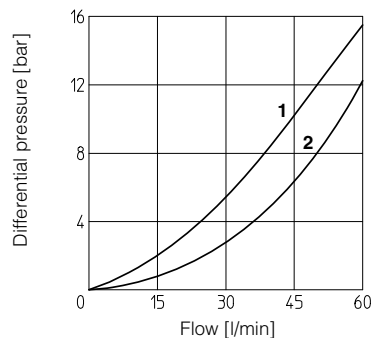
3 MAIN CHARACTERISTICS, SEALS and HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
MTTFd values according to EN ISO 13849	150 years, for further details see technical table P007		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C		
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	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	HFDD, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

4 DIAGRAMS OF SHR-0 based on mineral oil ISO VG 46 at 50°C

Flow through check valve:

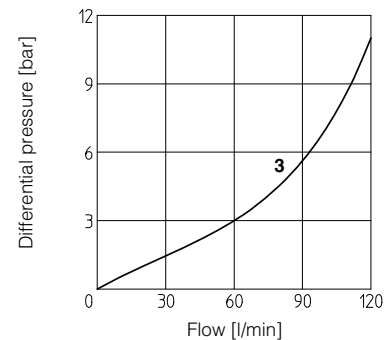
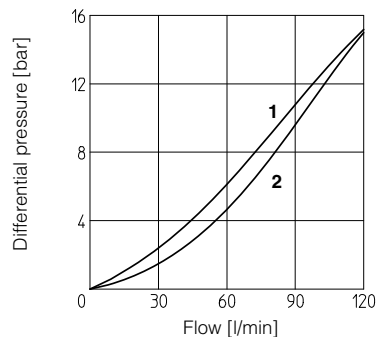
- 1** = A→A₁; B→B₁ of
SHR-012, SHR-013, SHR-014
- 2** = A₁→A; B₁→B of
SHR-012, SHR-013, SHR-014
- 3** = SHR-011, SHR-016



5 DIAGRAMS OF SKR-0 based on mineral oil ISO VG 46 at 50°C

Flow through check valve:

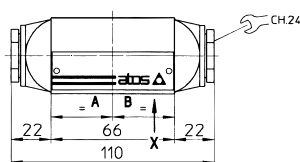
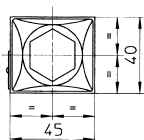
- 1** = A→A₁; B→B₁ of
SKR-012, SKR-013, SKR-014
- 2** = A₁→A; B₁→B of
SKR-012, SKR-013, SKR-014
- 3** = SKR-011, SKR-016



6 INSTALLATION DIMENSIONS OF SHR-0 VALVES [mm]

SHR-002
SHR-003
SHR-004
SHR-012
SHR-013
SHR-014

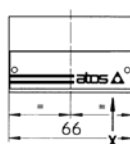
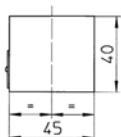
LATERAL VIEW



Mass: 1 Kg

SHR-011
SHR-016

LATERAL VIEW



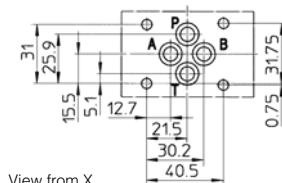
Mass: 0,7 Kg

ISO 4401: 2005

Mounting surface: 4401-03-02-0-05

Diameter of ports A, B, P, T: $\varnothing = 7,5$ mm (max)

Seals: 4 OR 108



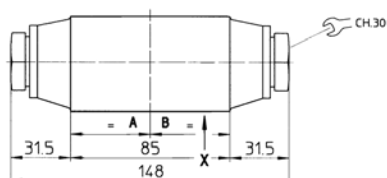
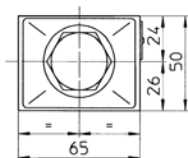
View from X

Fastening bolts: n° 4 socket head screws M5. The lenght depends on number and type of modular elements associated.

7 INSTALLATION DIMENSIONS OF SKR-0 VALVES [mm]

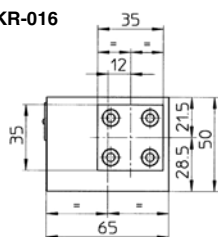
SKR-012
SKR-002
SKR-003
SKR-004
SKR-013
SKR-014

LATERAL VIEW



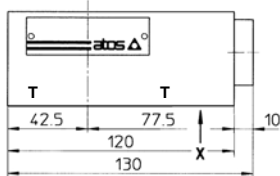
Massa: 2,3 Kg

SKR-016



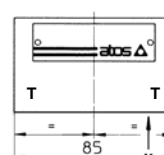
Mass: 2,5 Kg

LATERAL VIEW



SKR-011

LATERAL VIEW



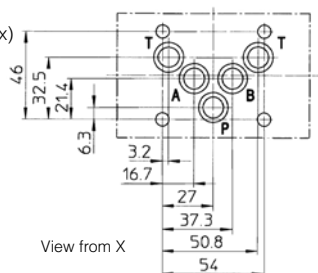
Mass: 1,7 Kg

ISO 4401: 2005

Mounting surface: 4401-05-04-0-05

Diameter of ports A, B, P, T: $\varnothing = 11,2$ mm (max)

Seals: 5 OR 2050



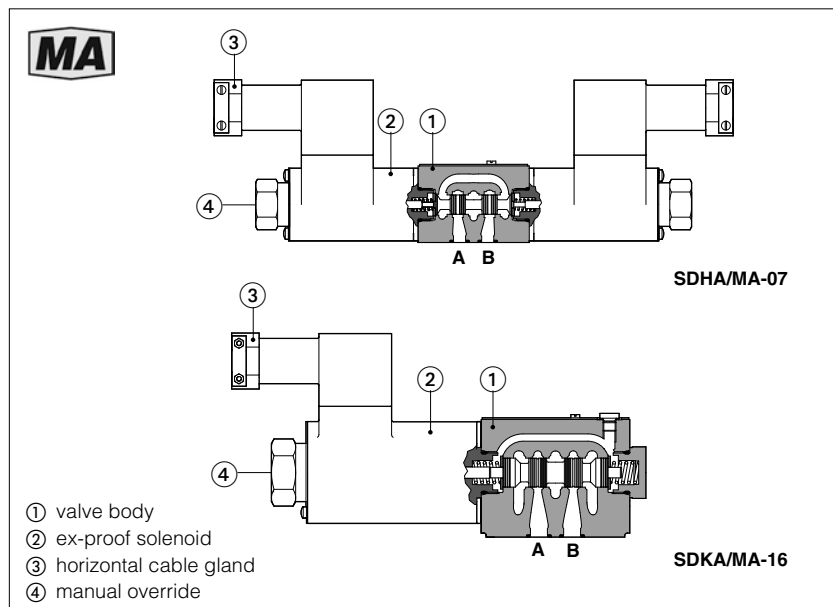
View from X

Fastening bolts: n° 4 socket head screws M6. The lenght depends on number and type of modular elements associated.

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

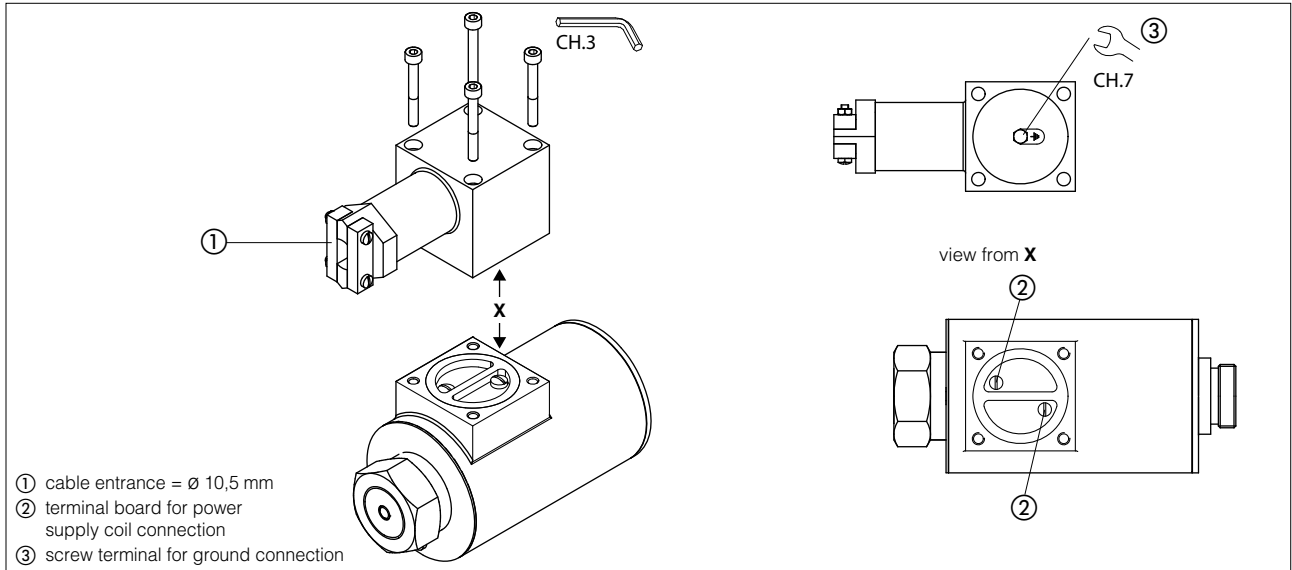
1 EXPLOSION PROOF SOLENOIDS: MAIN DATA

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
Maximum 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)									Seals material, see sect. 2: - = NBR PE = FKM Series number Voltage code - see section 1		

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

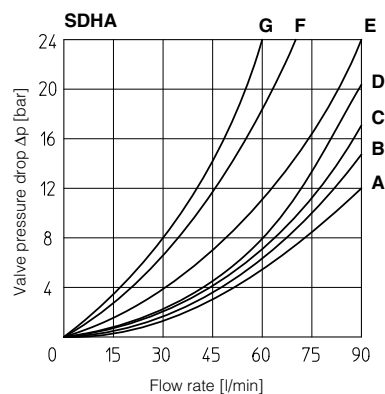
Configurations	Spools	Configurations	Spools
61 61/A 67 67/A 71 	1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 	63 63/A 75 	1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2 1 0 2

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 switching.
SDKA spool **1** is also available as **1/1**. It is properly shaped to reduce water-hammer shocks during the switching.

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

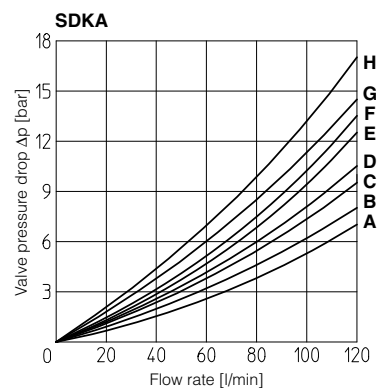
SDHA

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

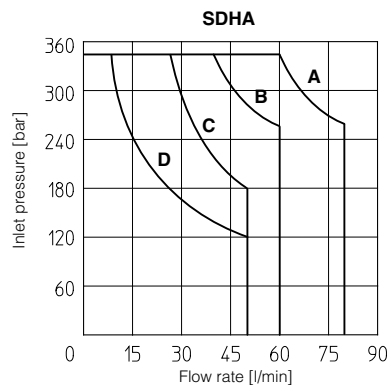
Flow direction Spool type	P→A	P→B	A→T	B→T	P→T	B→A
0, 0/1, 0/2, 2/2	A	A	B	B		
1, 1/1, 1/3, 6, 8	A	A	D	C		
3, 3/1, 7	A	A	C	D		
4	B	B	B	B	F	
5	A	B	C	C	G	
1/2	B	C	C	B		
19	A	D	C			H



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

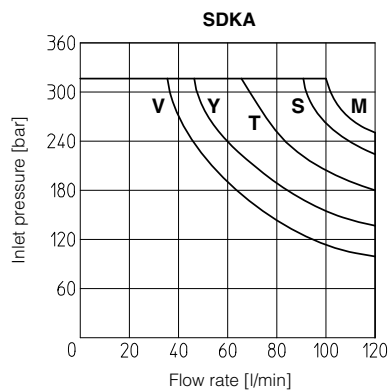
SDHA

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



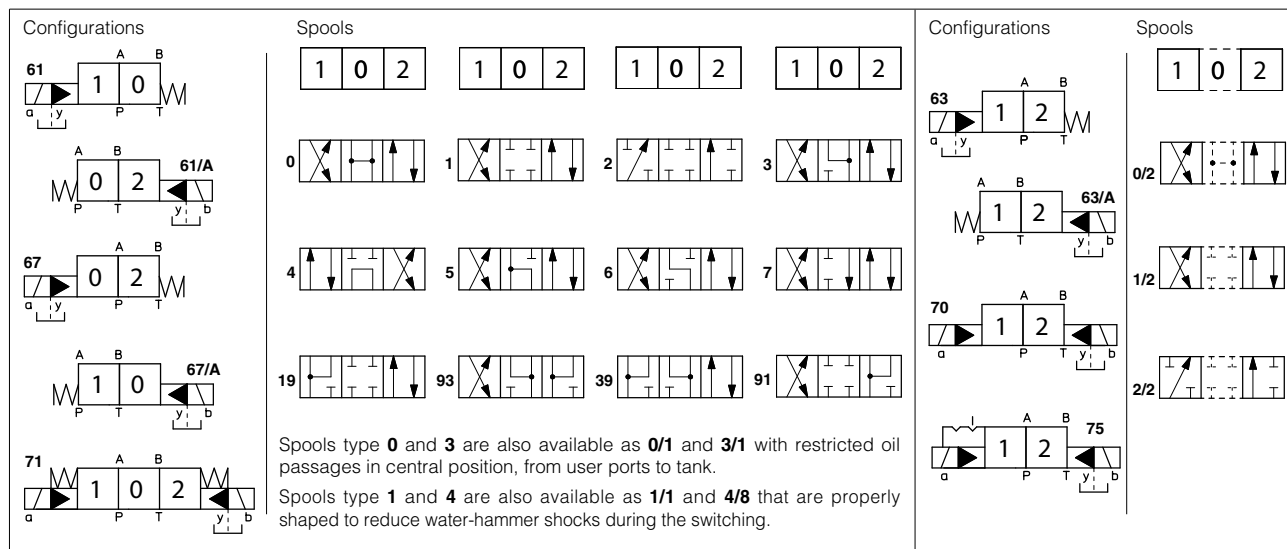
8 MODEL CODE OF PILOTED SOLENOID VALVES TYPE SDPHA

SDPHA 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	/	MA	-	2	-	63	-	1/2	-	A	24DC Voltage code - see section 11	** 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)



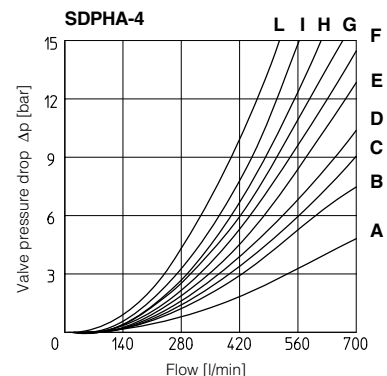
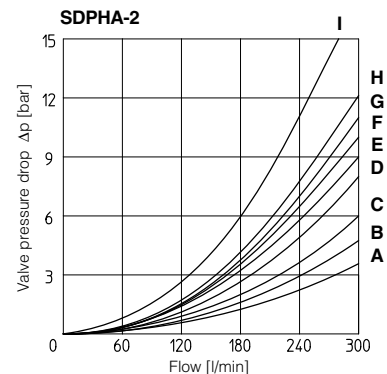
10 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

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	-	-



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
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
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

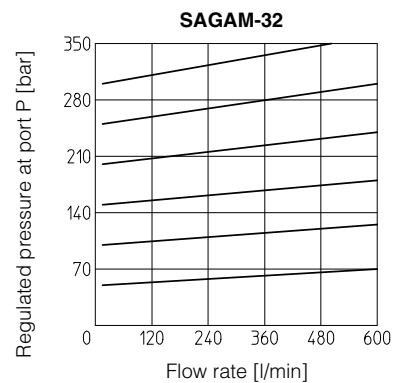
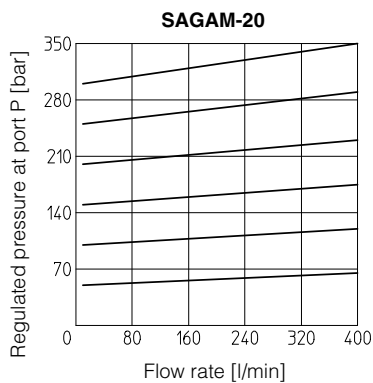
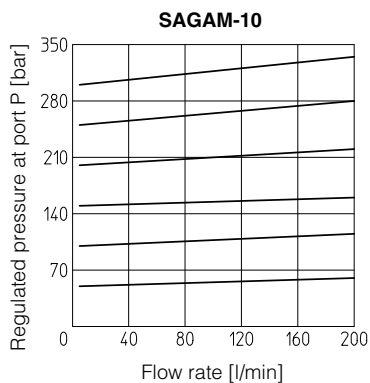
12 MODEL CODE OF PRESSURE RELIEF VALVES TYPE SAGAM

SAGAM	/	MA	-	20	/	1	0	/	210	-	*	/	24DC	**	/	*
<p>SAGAM = pressure relief valve: subplate mounting</p> <p>MA = ex-proof MA chinese mining certification</p> <p>Valve size: 10 (ISO 6264) 20 (ISO 6264) 32 (ISO 6264)</p> <p>1 = one setting pressure</p> <p>Valve configuration, see section 13 0 = venting with de-energized solenoid 1 = venting with energized solenoid</p>																
<p>Options: V = regulating handwheel</p> <p>Max regulated pressure: 50 = 50 bar 210 = 210 bar 100 = 100 bar 350 = 210 bar</p>																
<p>Seals material, see section 2: - = NBR PE = FKM</p> <p>Series number</p> <p>Voltage code - see section 1</p>																

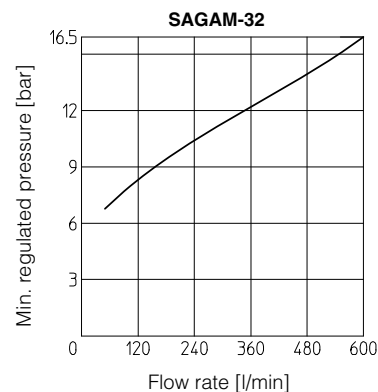
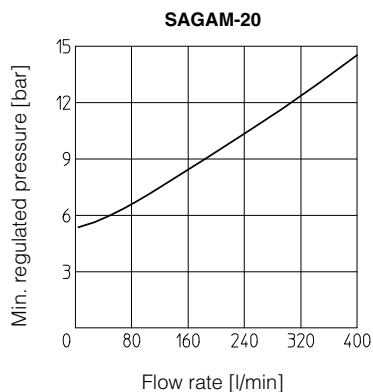
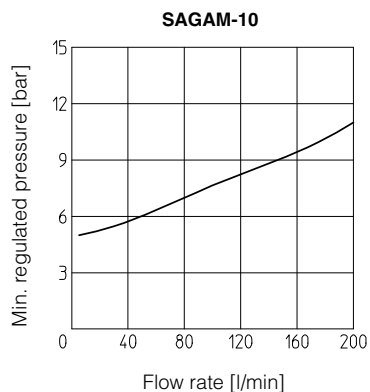
13 HYDRAULIC SYMBOL



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



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



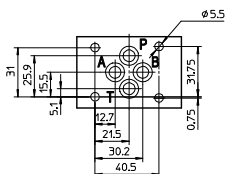
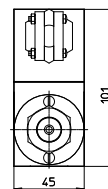
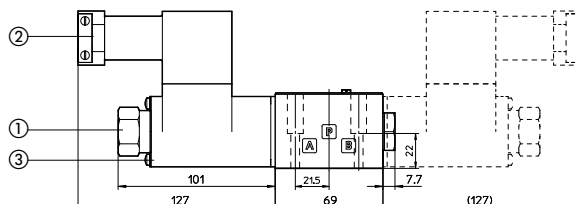
SDHA/MA**ISO 4401: 2005****Mounting surface: 4401-03-02-0-05**

Fastening bolts: 4 socket head screws:

M5x30 class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P,A,B,T: $\varnothing = 7.5$ 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 = $\varnothing 10,5$ mm
- ③ screw terminal for additional equipotential grounding

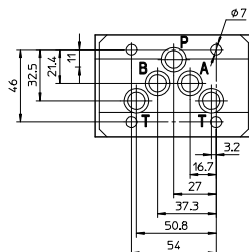
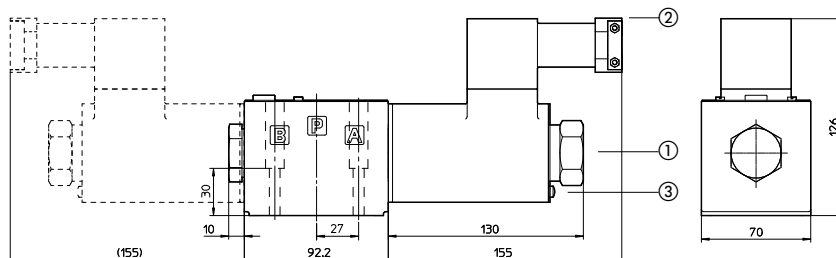
SDKA/MA**ISO 4401: 2005****Mounting surface according to 4401-05-05-0-05****(without X port, Y port optional)**

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: $\varnothing = 11.5$ mm (max)Ports Y: $\varnothing = 5$ 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 = $\varnothing 10,5$ 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

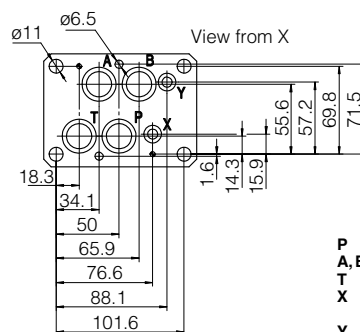
Tightening torque = 70 Nm

2 socket head screws M6x45 class 12.9

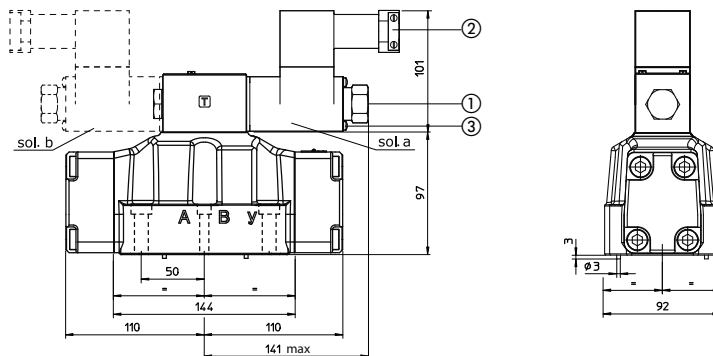
Tightening torque = 15 Nm

Diameter of ports A, B, P, T: $\varnothing = 20$ 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

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

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

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

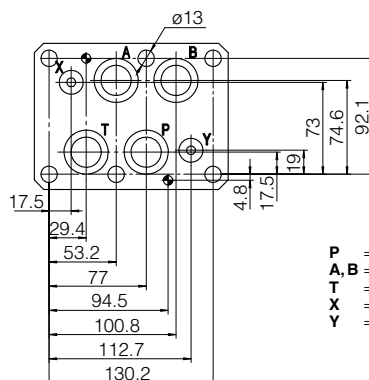
SDPHA/MA-4**ISO 4401: 2005****Mounting surface: 4401-08-08-0-05** (see table P005)

Fastening bolts:

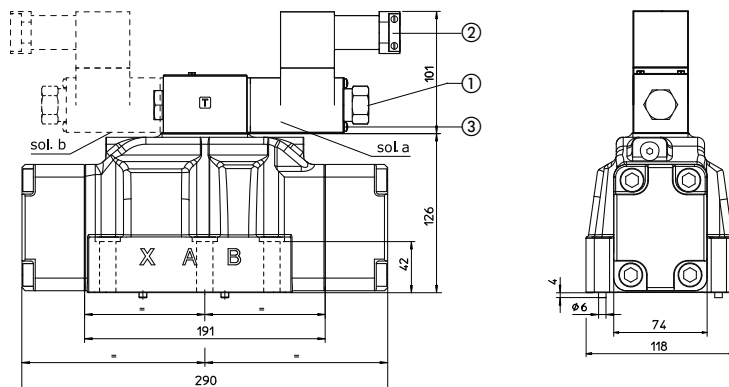
6 socket head screws M12x60 class 12.9

Tightening torque = 125 Nm

Seals: 4 OR 4112; 2 OR 3056

Diameter of ports A, B, P, T: $\varnothing = 24$ 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

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

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

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

ISO 6264: 2007

Fastening bolts:

Fastening bolts:

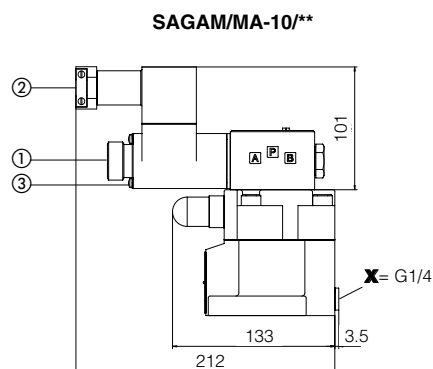
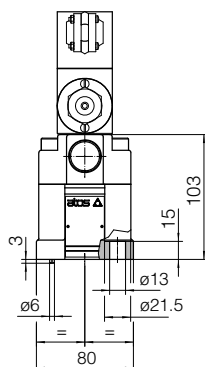
4 socket head screws M12x35 class 12.9

Tightening torque = 125 Nm

Seals: 2 OR 123; 1 OR 109/70

Ports P, T: $\varnothing = 14,5 \text{ mm}$

Ports X: $\varnothing = 3,2 \text{ mm}$

**SAGAM/MA-20**

ISO 6264: 2007

Fastening bolts:

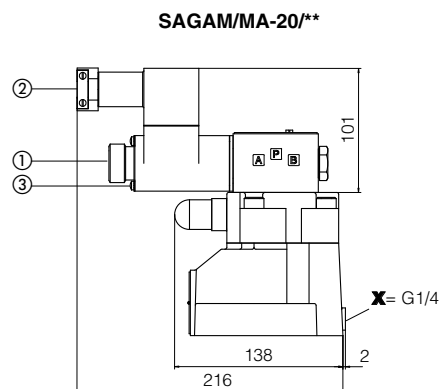
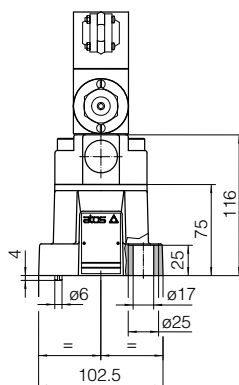
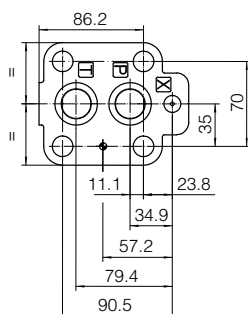
4 socket head screws M16x50 class 12.9

Tightening torque = 300 Nm

Seals: 2 OR 4112; 1 OR 109/70

Ports P, T: $\varnothing = 24$ mm

Ports X: $\varnothing = 3.2 \text{ mm}$



SAGAM/MA-32

ISO 6264: 2007

(with M20 fixing holes instead of standard M18)

Fastening bolts:

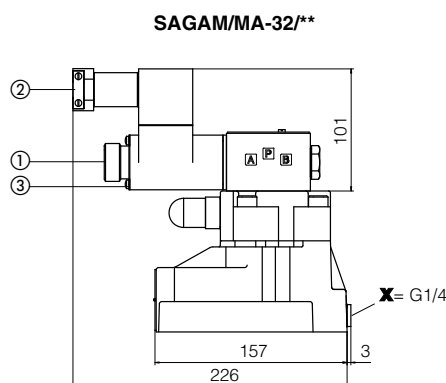
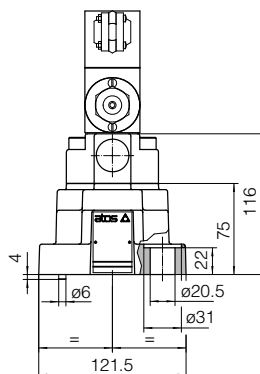
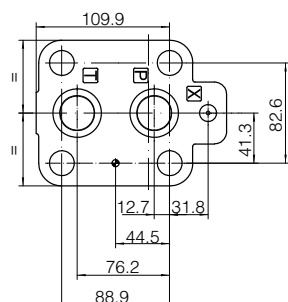
4 socket head screws M20x60 class 12.9

Tightening torque = 600 Nm

Seals: 2 OR 4131; 1 OR 109/70

Ports P, T: $\varnothing = 28,5 \text{ mm}$

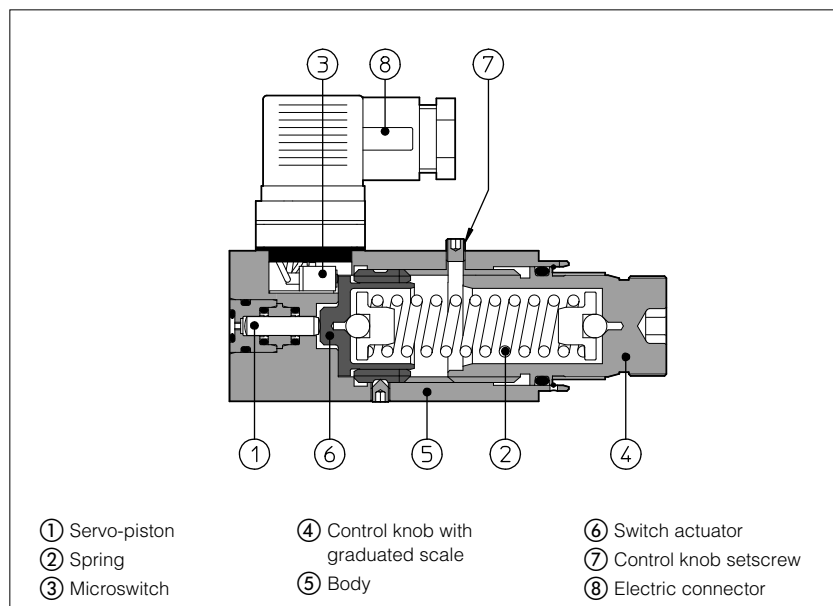
Ports X: $\varnothing = 3,2 \text{ mm}$



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

Pressure switches type **SMAP**

with fixed switching pressure differential and microswitch with gold plated contacts



SMAP are hydro-electric pressure switches with fixed switching pressure differential. The mechanical microswitch with gold plated contacts grants high reliability and long life service.

The microswitch changes its status when the pressure in the hydraulic circuit reaches the switching value set on the adjusting knob. The microswitch returns to the original rest position when the pressure in the hydraulic circuit drops below the nominal fixed switching pressure differential (hysteresis). The electric connector provides both NC or NO contacts.

The pressure in the circuit operates the piston ① acting against the adjustable spring ②; once the pressure setting is reached, the piston ⑥ actuates the microswitch ③.

The pressure switching value is selectable by a graduated adjusting knob ④.

Clockwise rotation increases the setting pressure.

Max pressure: **650 bar**




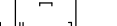
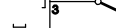

1 MODEL CODE

SMAP	-	160	/	E	**	/	*
Fixed differential pressure switch					Series number		Seals material, see section 2 - = NBR PE = FKM
Pressure range:				Options:			
160	=	10 ÷ 160 bar		E	=	Common electric contact connected to pin 1 (see section 3)	
40	=	5 ÷ 40 bar					
320	=	30 ÷ 320 bar					
80	=	7 ÷ 80 bar					
630	=	50 ÷ 630 bar					

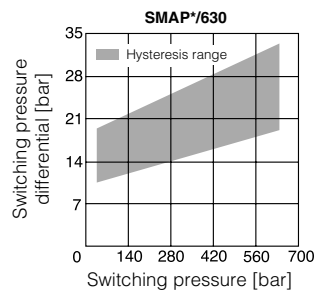
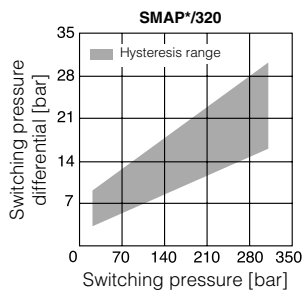
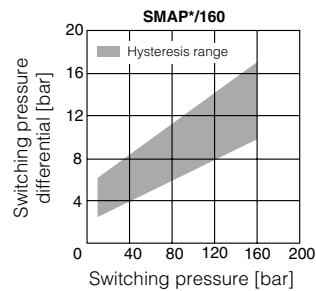
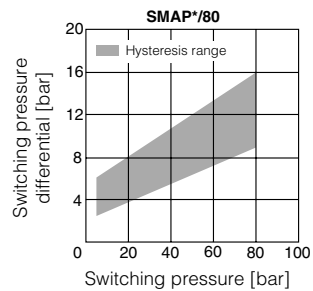
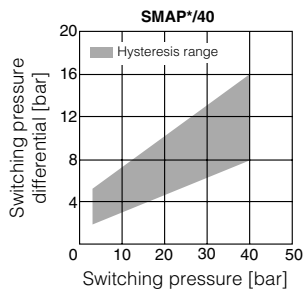
2 MAIN CHARACTERISTICS, SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

Assembly position / location	Any position		
Subplate surface finishing	Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)		
Ambient temperature	Standard execution = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C		
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	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

3 CHARACTERISTICS AND WIRING OF INTERNAL MICROSWITCH

	Supply voltage [V]						Rest position	Pressure operated position
	125 AC	250 AC	30 DC	250 DC				
Max current resistive load [A]	7	5	5	0,2	STD			
Max current inductive load (Cos φ = 0,4) [A]	4	2	3	0,02				
Insulating resistance	≥100MΩ				/E			
Contact resistance	15 mΩ							
Electrical life-expectancy	≥1.000.000 switchings							
Mechanical life-expectancy	≥10.000.000 switchings							

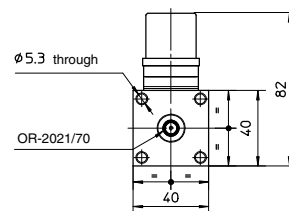
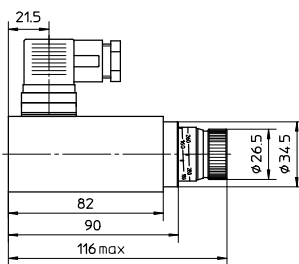
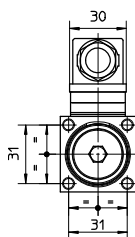
4 DIAGRAMS



The diagrams show, the switching pressure difference (hysteresis) between the switching positions of the pressure switch electric contacts.

⚠ The switching pressure differential may increased depending to the deterioration of the fluid contamination class.

5 DIMENSIONS OF SMAP WITHOUT ADAPTORS [mm]



Fastening bolts:
4 socket head screws M5X90 supplied with the pressure switch



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