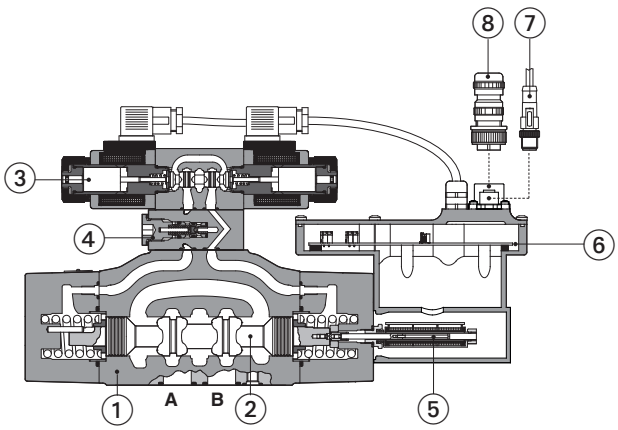
Digital proportional directional valves **high performance**

piloted, with on-board driver, LVDT transducer and positive spool overlap



SDPZE-TID-NP-271

① Valve body
② Main stage Spool
③ Pilot valve
④ Pilot pressure reducing (standard)
⑤ Main stage LVDT transducer
⑥ On-board digital driver
⑦ USB connector
⑧ Main connector

SDPZE-TID

Digital high performances proportional directional valves, piloted, with LVDT position transducer (main stage) and positive spool overlap for directional controls and not compensated flow regulations.

TID on board digital driver performs the valve's hydraulic regulation according to the reference signal sent to the 7 pin main connector.
The software setting of functional parameters can be performed via USB port.

The LVDT transducer grants high regulation accuracy and response sensitivity.
With de-energized proportional solenoids, the mechanical central position of the spool is performed by centering springs.

Size: **16** ÷ **32** - ISO 4401
4/3 way with standard spools
4/4 way with regenerative spools
Max flow: **550** ÷ **1600 l/min**
Max pressure: **350 bar**

1 MODEL CODE OF STANDARD SPOOLS

SDPZE	-	TID	-	NP	-	2	71	-	L	5	/	*	*	/	*

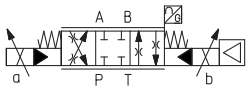
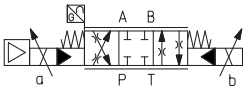
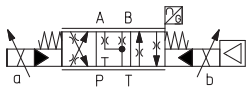
SDPZE — Proportional directional valve, piloted

TID = on-board digital driver and LVDT transducer

Fieldbus interfaces, USB port always present:
NP = Not present

Valve size ISO 4401:
2 = 16 **4** = 25 **6** = 32
For sizes 16 and 25, on board driver is assembled on LVDT housing, in horizontal position.
For size 32 on board driver is assembled on pilot valve, in vertical position

Configuration:

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

Series number

Seals material, see sect. 8:
- = NBR
PE = FKM

Hydraulic options, see section 10 **(2)** :
B = on-board digital driver, connection and LVDT transducer at side of port A of the main stage (side B of pilot valve)

Electronic options, see section 11 :
I = current reference input and monitor 4÷20mA

Spool size:	**3** (L,S,D)	**5** (L,DL,S,D)
SDPZE-2 =	160	250
SDPZE-4 =	-	480
SDPZE-6 =	-	640

Nominal flow (l/min) at Δp 10 bar P-T

Spool type, regulating characteristics **(1)**:

L
linear

DL
differential-linear
P-A = Q, B-T = Q/2
P-B = Q/2, A-T = Q

S
progressive

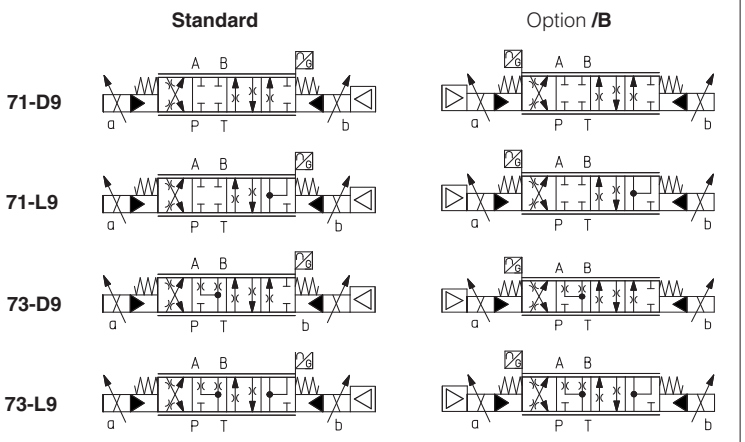
D
differential-progressive
P-A = Q, B-T = Q/2
P-B = Q/2, A-T = Q

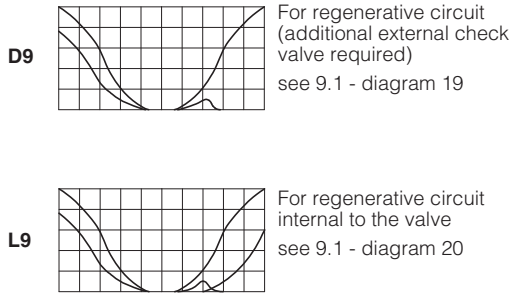
(1) Spool for regenerative circuit, see section 2
(2) Pilot and Drain configuration: standard configuration is internal pilot and external drain, other configurations on request

2 MODEL CODE OF SPOOLS FOR REGENERATIVE CIRCUIT - for valve model code and options, see section 1

SDPZE	-	TID	-	NP	-	2	71 - L9	/	*	*	/	*

Configuration and spool:





Spool size:	**D9**	**L9**
SDPZE-2 =	250	250
SDPZE-4 =	480	-

Nominal flow (l/min) at Δp 10 bar P-T

3 GENERAL NOTES

Atos digital proportionals valves are CE marked according to the applicable directives (e.g. Immunity and Emission EMC Directive).
Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in the user manuals included in the E-SW-* programming software.

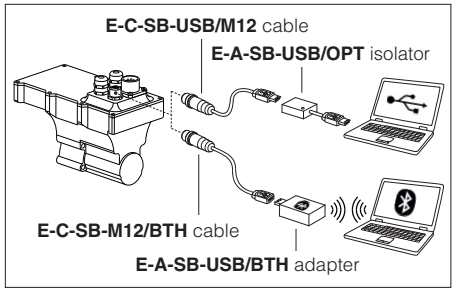
4 VALVE SETTINGS AND PROGRAMMING TOOLS

Valve's functional parameters and configurations, can be easily set and optimized using Atos E-SW-BASIC programming software connected via USB port to the digital driver, see tech. table **GS500-SH**.

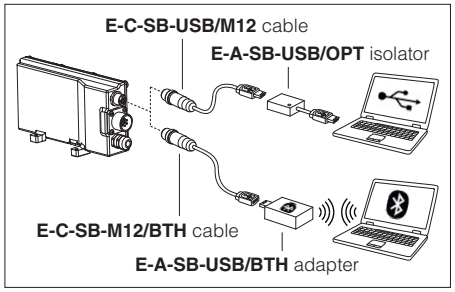
WARNING:
drivers USB port is not isolated! For E-C-SB-USB/M12 cable, the use of isolator adapter is highly recommended for PC protection

WARNING: see tech table **GS500-SH** for the list of countries where the Bluetooth adapter has been approved

USB or Bluetooth connection for sizes 16 and 25



USB or Bluetooth connection for size 32



5 GENERAL CHARACTERISTICS

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

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

Valve model		SDPZE-*-2		SDPZE-*-4	SDPZE-*-6
Pressure limits [bar]		ports **P, A, B, X** = 350; **T** = 250; **Y** = 10;			
Spool type **(1)**	standard	**L3, S3, D3**	**L5, DL5, S5, D5**		**L5, S5, D5**
	regenerative		**D9, L9**	**D9**	
Nominal flow Δp P-T **(2)** [l/min]	Δp= 10 bar	160	250	480	640
	Δp= 30 bar	270	430	830	1100
	Max permissible flow	400	550	1000	1600
Piloting pressure [bar]		min. = 25; max = 350			
Piloting volume [cm³]		3,7		9,0	21,6
Piloting flow **(3)** [l/min]		3,7		6,8	14,4
Leakage **(4)**	Pilot [l/min]	0,1 / 0,3		0,2 / 0,5	0,9 / 2,8
	Main stage [l/min]	0,2 / 0,6		0,3 / 1,0	1,0 / 3,0
Response time **(5)** [ms]		≤ 75		≤ 90	≤ 120
Hysteresis		≤ 1 [% of max regulation]			
Repeatability		± 0,5 [% of max regulation]			
Thermal drift		zero point displacement < 1% at ΔT = 40°C			

(1) For spool type **D** and **DL** the flow value is referred to single path P-A (A-T) at Δp/2 per control edge. The flow P-B (B-T) is 50% of P-A (A-T)

(2) For different Δp, the max flow is in accordance to the diagrams in section 9.2

(3) With step reference input signal 0 ÷100 %

(4) At p = 100/350 bar

(5) 0-100% step signal see detailed diagrams in section 9.3

7 ELECTRICAL CHARACTERISTICS

Power supplies	Nominal : +24 VDC Rectified and filtered : VRMS = 20 ÷ 32 VMAX (ripple max 10 % VPP)
Max power consumption	50 W
Max. solenoid current	2,6 A
Coil resistance R at 20°C	3,1 Ω
Analog input signals	Voltage: range ±10 VDC (24 VMAX tollerant) Input impedance: Ri > 50 kΩ Current: range ±20 mA Input impedance: Ri = 500 Ω
Monitor outputs	Output range: voltage ±10 VDC @ max 5 mA current ±20 mA @ max 500 Ω load resistance
Alarms	Solenoid not connected/short circuit, cable break with current reference signal, over/under temperature, valve spool transducer malfunctions, alarms history storage function
Insulation class	H (180°) Due to the occuring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account
Protection degree to DIN EN60529	IP66 / IP67 with mating connectors
Duty factor	Continuous rating (ED=100%)
Additional characteristics	Short circuit protection of solenoid's current supply; spool position control by P.I.D. with rapid solenoid switching; protection against reverse polarity of power supply
Communication interface	USB - Atos ASCII coding
Communication physical layer	not insulated - USB 2.0 + USB OTG
Recommended wiring cable	LiYCY shielded cables, see section 14

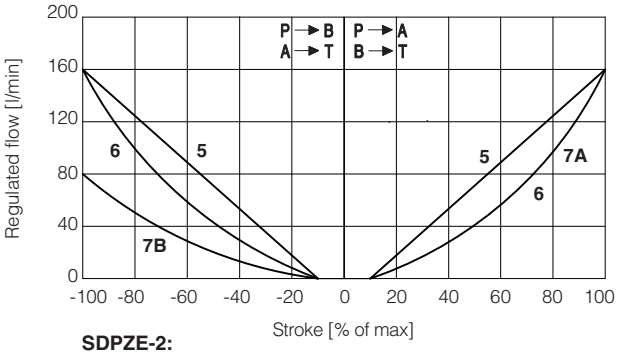
Note: a maximum time of 400 ms has to be considered between the driver energizing with the 24 VDC power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

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

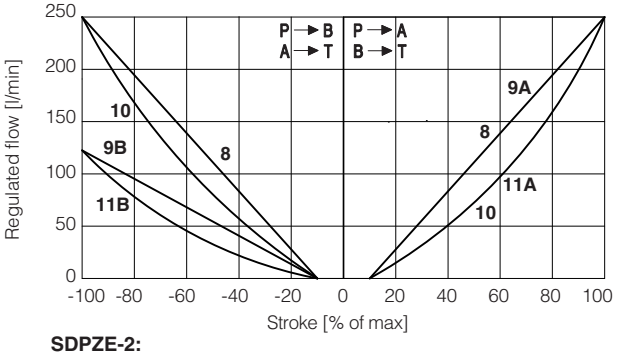
Seals, recommended fluid temperature		NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity		20÷100 mm²/s - max allowed range 15 ÷ 380 mm²/s		
Max fluid contamination level	normal operation	ISO4406 class 18/16/13 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	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water		FKM	HFDU, HFDR	ISO 12922
Flame resistant with water		NBR	HFC	

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

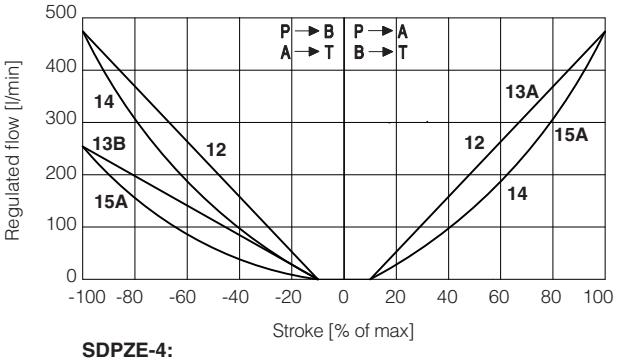
9.1 Regulation diagrams (values measure at p 10 bar P-T)



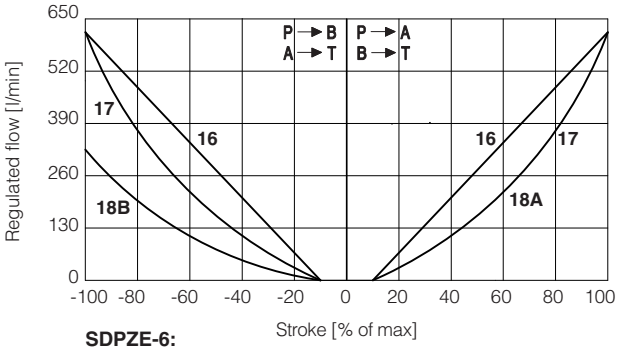
SDPZE-2:
5 = L3 **7A** = D3 (P → A, A → T)
6 = S3 **7B** = D3 (P → B, B → T)



SDPZE-2:
8 = L5 **9A** = DL5 (P → A, A → T) **11A** = D5 (P → A, A → T)
10 = S5 **9B** = DL5 (P → B, B → T) **11B** = D5 (P → B, B → T)



SDPZE-4:
12=L5 **13A**=DL5 (P → A, A → T) **15A**=D5 (P → A, A → T)
14=S5 **13B**=DL5 (P → B, B → T) **15B**=D5 (P → B, B → T)



SDPZE-6:
16 = L5 **18A** = D5 (P → A, A → T)
17 = S5 **18B** = D5 (P → B, B → T)

Note:

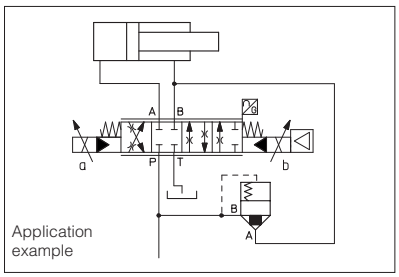
Hydraulic configuration vs. reference signal (standard and option /B)

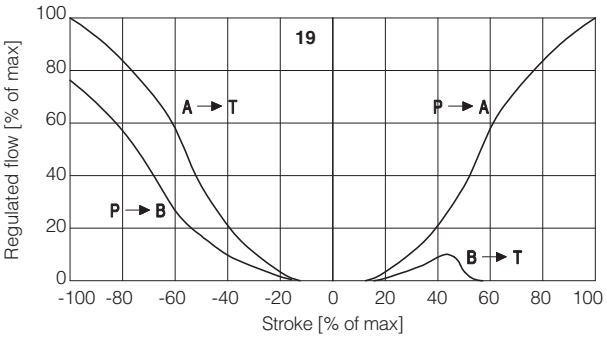
Reference signal $\begin{matrix}0 \div +10\ V\\ 12 \div 20\ mA\end{matrix}\}$ P → A / B → T

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

19 = differential - regenerative spool **D9**
(not available for valve size 32)

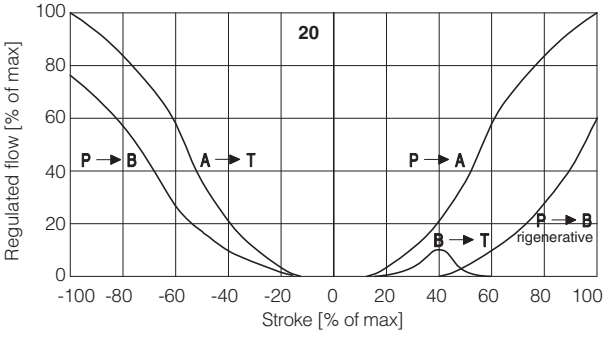
D9 spool type with a fourth position specific to regenerative circuit, performed by means of an additional external check valve.





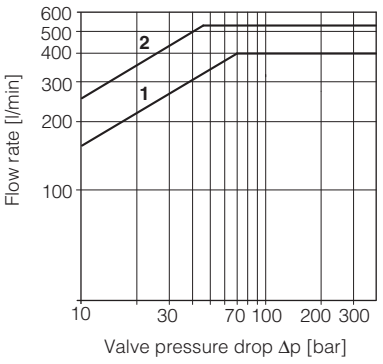
20 = linear - internal regenerative spool **L9**
(available only for valve size 16)

L9 spool type with a fourth position specific to perform a regenerative circuit internal to the valve.

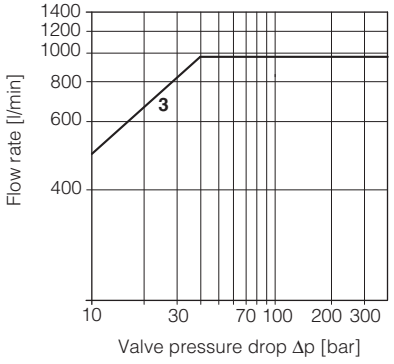


9.2 Operating diagrams

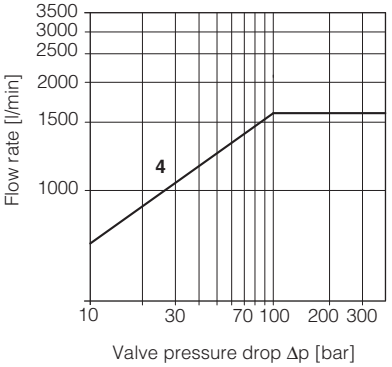
Flow /Δp diagram stated at 100% of spool stroke



SDPZE-2:
1 = spools L3, S3, D3
2 = spools L5, S5, D5, DL5, D9, L9



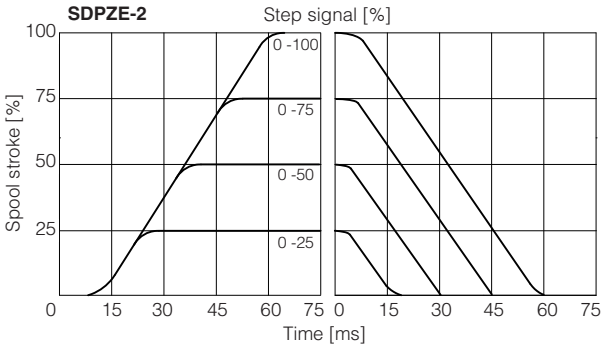
SDPZE-4:
3 = spools L5, S5, D5, DL5, D9

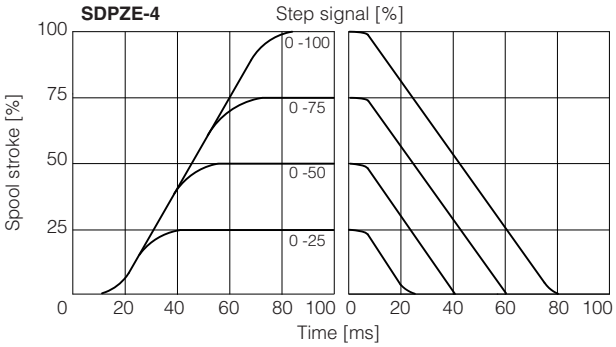


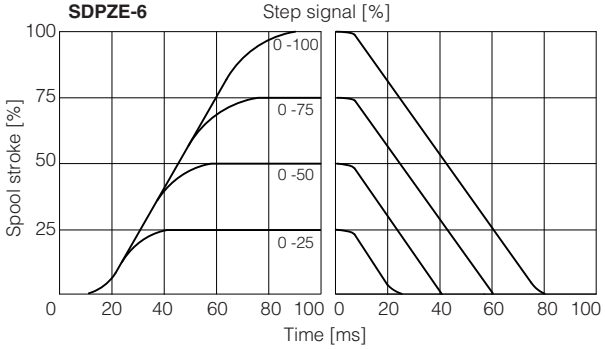
SDPZE-6:
4 = L5, S5, D5

9.3 Response time

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.



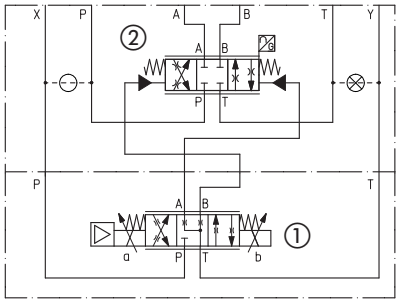




10 HYDRAULIC OPTIONS

B = Configurations 71, 73: on-board digital driver connections and LVDT transducer at side of port A of the main stage (side B of pilot valve).
For hydraulic configuration vs reference signal, see 9.1

Functional Scheme
example of configuration 71



① Pilot valve
② Main stage

11 ELECTRONIC OPTIONS

I = This option provides 4 ÷ 20 mA current reference and monitor signals, instead of the standard ±10 VDC.
It is normally used in case of long distance between the machine control unit and the valve or where the reference signal can be affected by electrical noise; the valve functioning is disabled in case of reference signal cable breakage.

12 POWER SUPPLY AND SIGNALS SPECIFICATIONS

12.1 Power supply (V+ and V0)

The power supply must be appropriately stabilized or rectified and filtered: apply at least a 10000 μF/40 V capacitance to single phase rectifiers or a 4700 μF/40 V capacitance to three phase rectifiers.

⚠ A safety fuse is required in series to the power supply: 2,5 A time lag fuse.

12.2 Flow reference input signal (Q_INPUT+)

The driver controls in closed loop the valve spool position proportionally to the external reference input signal.
Standard (voltage reference input): default is ±10 VDC and can be reconfigured via software, within a maximum range of ±10 VDC.
Option /I (current reference input): default is 4 ÷ 20 mA and can be reconfigured via software, within a maximum range of ± 20 mA.

12.3 Flow monitor output signal (Q_MONITOR)

The driver generates an analog output signal proportional to the actual spool position of the valve; the monitor output signal can be software set to show other signals available in the driver.
Standard (voltage monitor output): default is ±10 VDC and can be reconfigured via software, within a maximum range of ±10 VDC.
Option /I (current monitor output): default is 4 ÷ 20 mA and can be reconfigured via software, within a maximum range of ± 20 mA.

Note:

- monitor output signal must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, ISO 4413).

13 ELECTRONIC CONNECTIONS

13.1 Main connector signals - 7 pin (A1)

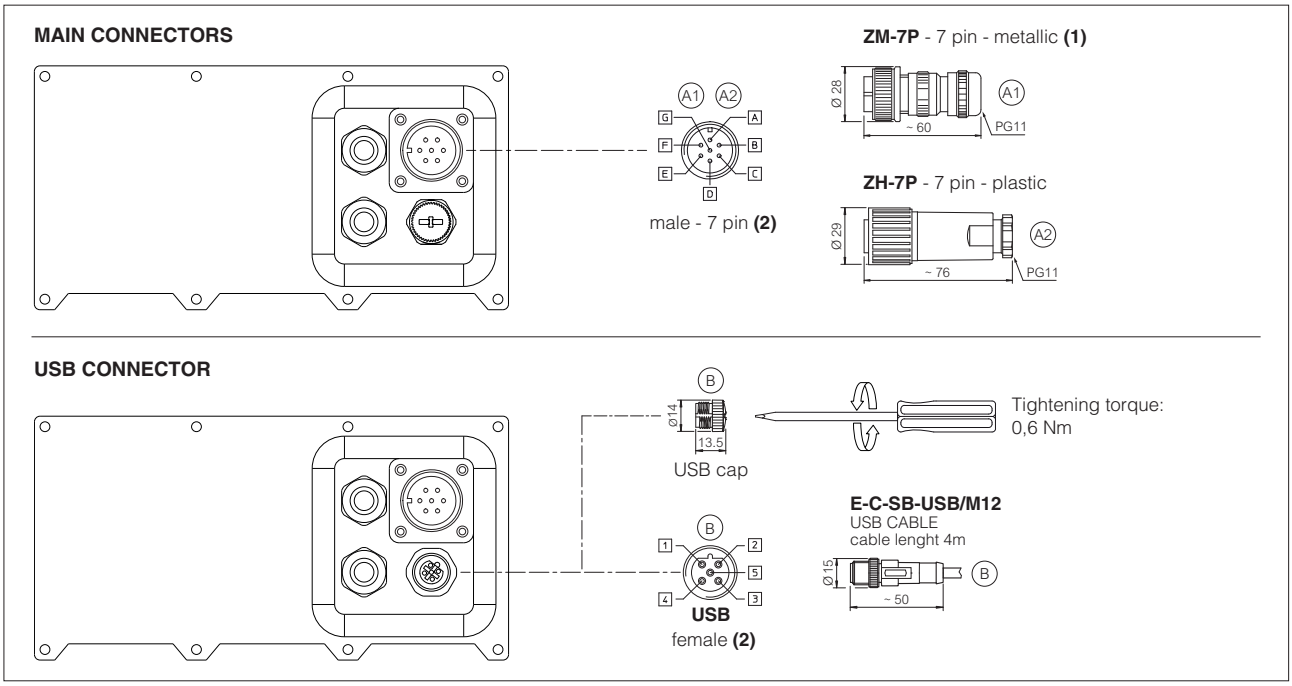
PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
A	**V+**	Power supply 24 VDC	Input - power supply
B	**V0**	Power supply 0 VDC	Gnd - power supply
C	**AGND**	Analog ground	Gnd - analog signal
D	**Q_INPUT+**	Flow reference input signal: ±10 VDC maximum range ±10 VDC for standard, 4 ÷ 20 mA for /I option	Input - analog signal
E	**INPUT-**	Negative reference input signal for Q_INPUT+	Input - analog signal
F	**Q_MONITOR**	Flow monitor output signal: ±10 VDC maximum range, referred to AGND ±10 VDC for standard, 4 ÷ 20 mA for /I option	Output - analog signal
G	**EARTH**	Internally connected to driver housing	

13.2 Communication connectors (B)

(B) **USB connector - M12 - 5 pin** always present		
PIN	**SIGNAL**	**TECHNICAL SPECIFICATION (1)**
1	**+5V_USB**	Power supply
2	**ID**	Identification
3	**GND_USB**	Signal zero data line
4	**D-**	Data line -
5	**D+**	Data line +

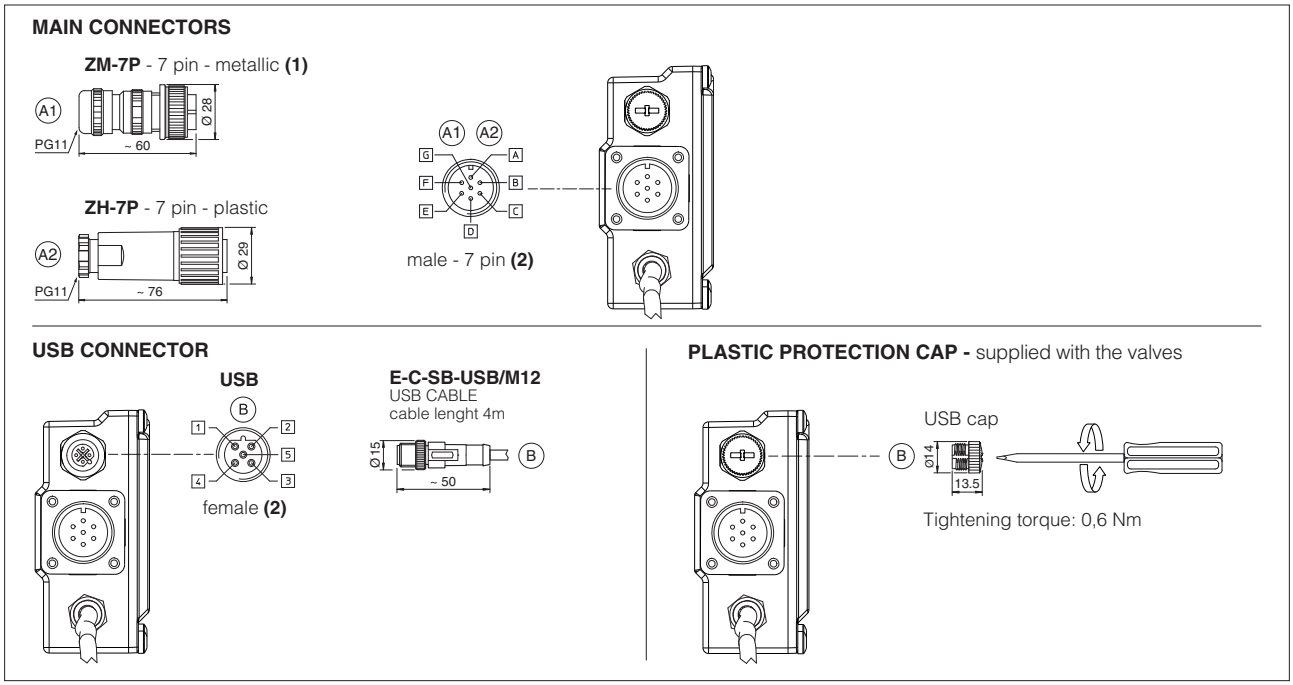
13.3 Connections layout

Connection layout for sizes 16 and 25



(1) use of metallic connectors is strongly recommended in order to fulfill EMC requirements **(2)** pin layout always referred to driver's view

Connection layout for size 32



(1) use of metallic connectors is strongly recommended in order to fulfill EMC requirements **(2)** pin layout always referred to driver's view

14 **CONNECTORS CHARACTERISTICS** - to be ordered separately

CONNECTOR TYPE	POWER SUPPLY	POWER SUPPLY
CODE	A1 ZM-7P	A2 ZH-7P
Type	7pin female straight circular	7pin female straight circular
Standard	According to MIL-C-5015	According to MIL-C-5015
Material	Metallic	Plastic reinforced with fiber glass
Cable gland	PG11	PG11
Recommended cable	LiYCY 7 x 0,75 mm² max 20 m (logic and power supply) or LiYCY 7 x 1 mm² max 40 m (logic and power supply)	LiYCY 7 x 0,75 mm² max 20 m (logic and power supply) or LiYCY 7 x 1 mm² max 40 m (logic and power supply)
Conductor size	up to 1 mm² - available for 7 wires	up to 1 mm² - available for 7 wires
Connection type	to solder	to solder
Protection (EN 60529)	IP 67	IP 67

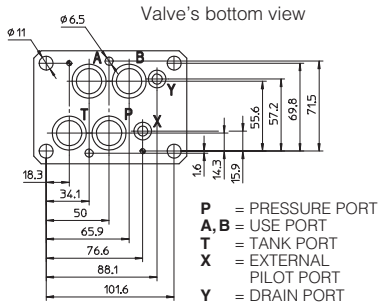
15 FASTENING BOLTS AND SEALS

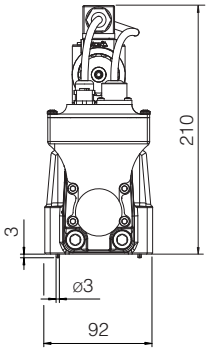
Type	Size	Fastening bolts	Seals
SDPZE	**2** = 16	4 socket head screws M10x50 class 12.9 Tightening torque = 70 Nm 2 socket head screws M6x45 class 12.9 Tightening torque = 15 Nm	4 OR 130; Diameter of ports A, B, P, T: Ø 20 mm (max) 2 OR 2043 Diameter of ports X, Y: Ø = 7 mm (max)
	4 = 25	6 socket head screws M12x60 class 12.9 Tightening torque = 125 Nm	4 OR 4112; Diameter of ports A, B, P, T: Ø 24 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø = 7 mm (max)
	6 = 32	6 socket head screws M20x80 class 12.9 Tightening torque = 600 Nm	4 OR 144; Diameter of ports A, B, P, T: Ø 34 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø = 7 mm (max)

16 INSTALLATION DIMENSIONS [mm]

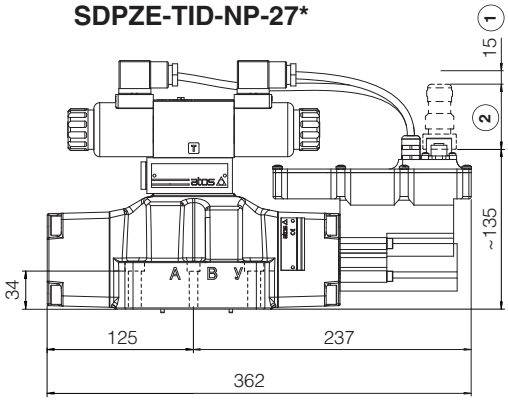
SDPZE-TID-NP-2*

ISO 4401: 2005
Size 16
Mounting surface: 4401-07-07-0-05



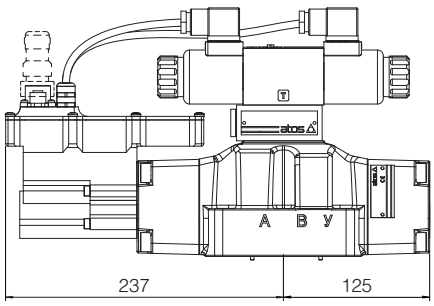


SDPZE-TID-NP-27*



Mass [kg]	
SDPZE-*-27	14,8

SDPZE-TID-NP-27*/B



(1) = Space to remove the connectors

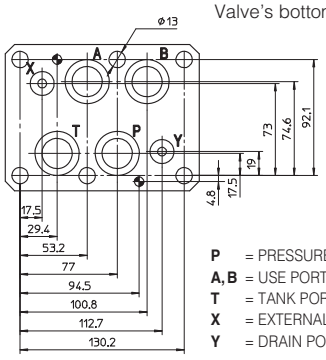
(2) = The dimensions of all connectors must be considered, see section 13.3

SDPZE-TID-NP-4*

ISO 4401: 2005
Size 25
Mounting surface: 4401-08-08-0-05

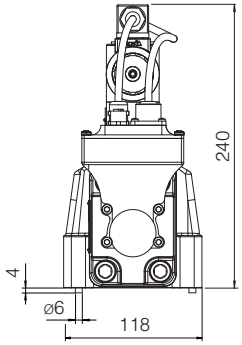
Mass [kg]	
SDPZE-*-47	19,3

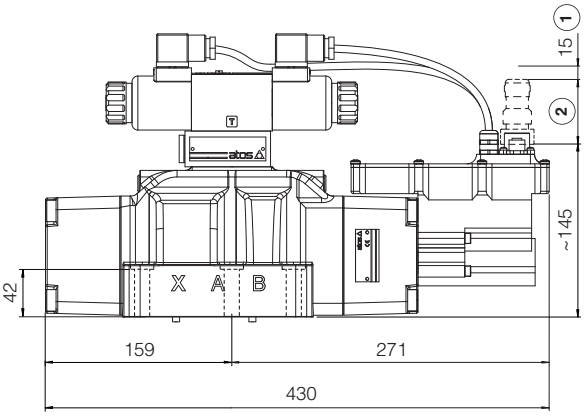
Valve's bottom view



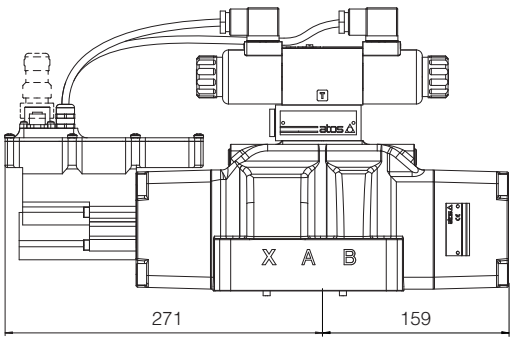
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
X = EXTERNAL PILOT PORT
Y = DRAIN PORT

SDPZE-TID-NP-47*





SDPZE-TID-NP-47*/B



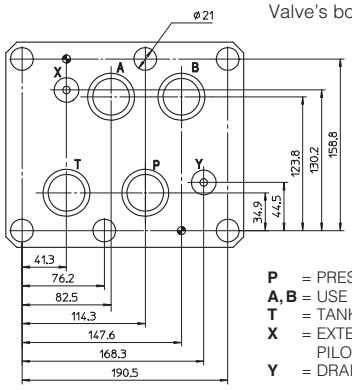
(1) = Space to remove the connectors

(2) = The dimensions of all connectors must be considered, see section 13.3

SDPZE-TID-NP-6*

ISO 4401: 2005
Size 32
Mounting surface: 4401-10-09-0-05

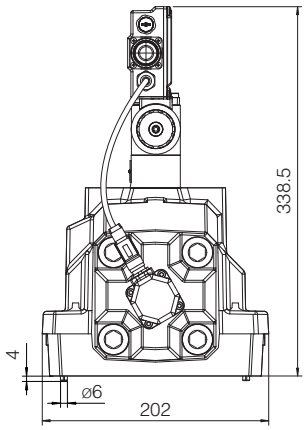
Mass [kg]	
SDPZE-*-67	43,3

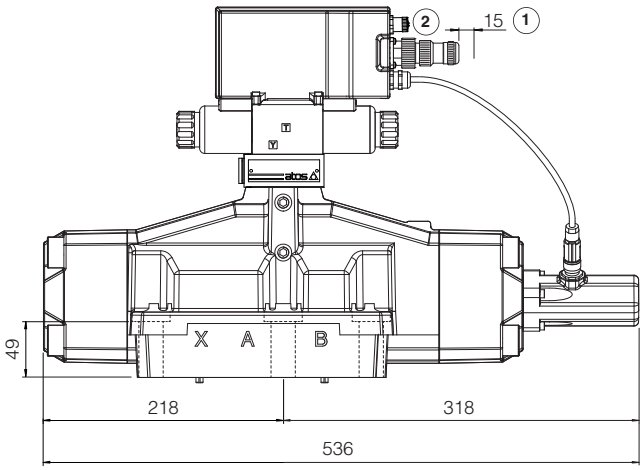


Valve's bottom view

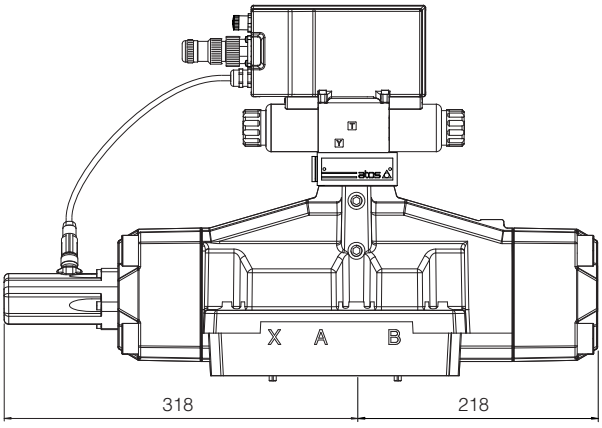
P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
X = EXTERNAL OIL PILOT PORT
Y = DRAIN PORT

SDPZE-TID-NP-67*





SDPZE-TID-NP-67*/B



(1) = Space to remove the connectors

(2) = The dimensions of all connectors must be considered, see section 13.3