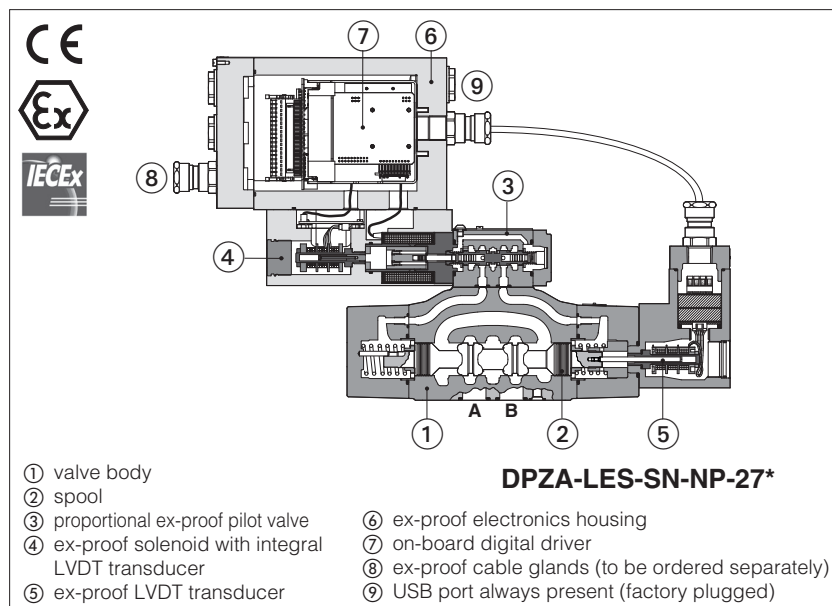


Ex-proof digital servoproportional directional valves

piloted, with on-board driver, two LVDT transducers and zero spool overlap - **ATEX and IECEx**



DPZA-LES

Ex-proof digital servoproportional directional valves, piloted with two LVDT position transducers (pilot valve and main stage) and zero spool overlap for position closed loop controls.

They are equipped with ex-proof on-board digital driver, LVDT transducer and proportional solenoid certified for safe operations in hazardous environments with potentially explosive atmosphere.

- Multicertification **ATEX** and **IECEx** for gas group **II 2G** and dust category **II 2D**

The flameproof enclosure of on-board digital driver, solenoid and transducers, prevents the propagation of accidental internal sparks or fire to the external environment. The driver and solenoid are also designed to limit the surface temperature within the classified limits.

LEZ execution includes valve driver plus axis card to perform position control (see section 6).

Size: **10 ÷ 27** -ISO4401

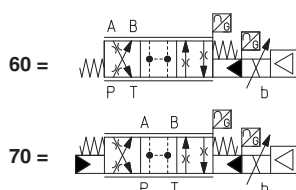
Max flow: **180 ÷ 800 l/min**

Max pressure: **350 bar**

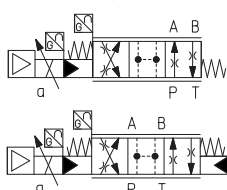
1 MODEL CODE

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|----------|-------|----|---|----|---|---|----|---|---|---|---|---|---|---|---------------|---|--|--|---|--|--|------------|-------|----------|-------|--------|-----|-----|---|--------|-------|-----|-----|--------|-----|-----|---|---------|-----|-----|---|---|--|--|
| DPZA | - | LES | - | SN | - | NP | - | 2 | 70 | - | L | 5 | / | M | / | * | Series number | Seals material, see section 8: - = NBR PE = FKM BT = HNBR | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Ex-proof proportional directional valve, piloted</p> <p>LES = on-board driver and two LVDT transducers</p> <p>Alternated P/Q controls, see section 5: SN = none SP = pressure control (1 pressure transducer) SF = force control (2 pressure transducers) SL = force control (1 load cell)</p> <p>Fieldbus interface, USB port always present: NP = Not Present BC = CANopen BP = PROFIBUS DP EH = EtherCAT EW = POWERLINK EI = EtherNet/IP EP = PROFINET RT/IRT</p> <p>Valve size ISO 4401: 1 = 10 2 = 16 4 = 25 4M = 27</p> | | | | | | | | | | | | | | | | | | <p>Hydraulic options (1): B = solenoid at side of port A (2) D = internal drain E = external pilot pressure G = pressure reducing valve for piloting (standard for size 10)</p> <p>Electronic options (1): C = current feedback for pressure transducer 4÷20 mA, only for SP, SF, SL (omit for std voltage ±10 Vdc) I = current reference input and monitor 4÷20mA (omit for std voltage ±10Vdc)</p> <p>Cable entrance threaded connection: M = M20x1,5</p> | | | <table><tr><td>Spool size</td><td>3 (L)</td><td>5 (L,DL)</td><td>5 (T)</td></tr><tr><td>DPZA-1</td><td>= -</td><td>100</td><td>-</td></tr><tr><td>DPZA-2</td><td>= 130</td><td>200</td><td>150</td></tr><tr><td>DPZA-4</td><td>= -</td><td>340</td><td>-</td></tr><tr><td>DPZA-4M</td><td>= -</td><td>390</td><td>-</td></tr></table> <p>Nominal flow (l/min) at Δp 10bar P-T</p> | | | Spool size | 3 (L) | 5 (L,DL) | 5 (T) | DPZA-1 | = - | 100 | - | DPZA-2 | = 130 | 200 | 150 | DPZA-4 | = - | 340 | - | DPZA-4M | = - | 390 | - | <p>Spool type, regulating characteristics: L = linear T = non linear (3) DL = differential-linear P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> | | |
| Spool size | 3 (L) | 5 (L,DL) | 5 (T) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZA-1 | = - | 100 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZA-2 | = 130 | 200 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZA-4 | = - | 340 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZA-4M | = - | 390 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Configuration: Standard



Option /B



(1) For possible combined options, see section 16

(2) In standard configuration the solenoid with on-board digital driver and position transducer are at side A of main stage (side B of pilot valve)

(3) only for configuration 70

2 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 tech table **FX900** and in the user manuals included in the E-SW-* programming software.

3 VALVE SETTINGS AND PROGRAMMING TOOLS

WARNING: the below operation must be performed in a safety area

Valve's functional parameters and configurations, can be easily set and optimized using Atos E-SW programming software connected via USB port to the digital driver (see table **GS003**). For fieldbus versions, the software permits valve's parameterization through USB port also if the driver is connected to the central machine unit via fieldbus.

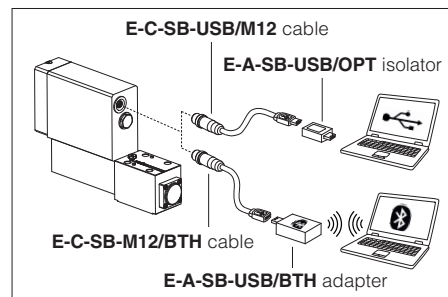
The software is available in different versions according to the driver's options (see table **GS500**):

| | | | |
|----------------------|---|------------------|---------------|
| E-SW-BASIC | support: NP (USB) | PS (Serial) | IR (Infrared) |
| E-SW-FIELDBUS | support: BC (CANopen) | BP (PROFIBUS DP) | EH (EtherCAT) |
| | EW (POWERLINK) | EI (EtherNet/IP) | EP (PROFINET) |
| E-SW-*/PQ | support: valves with SP, SF, SL alternated control (e.g. E-SW-BASIC/PQ) | | |

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** for the list of countries where the Bluetooth adapter has been approved

USB or Bluetooth connection



4 FIELDBUS - see tech. table **GS510**

Fieldbus allows valve direct communication with machine control unit for digital reference, valve diagnostics and settings. These executions allow to operate the valves through fieldbus or analog signals available on the terminal board.

5 ALTERNATED P/Q CONTROLS - see tech. table **FX500**

S* options add the closed loop control of pressure (**SP**) or force (**SF** and **SL**) to the basic functions of proportional directional valves flow regulation. A dedicated algorithm alternates pressure (force) depending on the actual hydraulic system conditions.

An additional connector is available for transducers to be interfaced to the valve's driver (1 pressure transducer for SP, 2 pressure transducers for SF or 1 load cell for SL). The alternated pressure control (SP) is possible only for specific installation conditions.

6 AXIS CONTROLLER - see tech. table **FX630**

Digital servoproportional with integral electronics **LEZ** include valve's driver plus axis controller, performing position closed loop of any hydraulic actuator equipped with analog, encoder or SSI position transducer. Alternated pressure or force closed loop control can be set by software additionally to the position control.

Atos also supplies complete servoactuators integrating servocylinder, digital servoproportional valve and axis controller, fully assembled and tested. For more information consult Atos Technical Office.

7 GENERAL CHARACTERISTICS

| | |
|--|--|
| Assembly position | Any position |
| Subplate surface finishing to ISO 4401 | Acceptable roughness index, $Ra \leq 0,8$ 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 = $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$ /PE option = $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$ /BT option = $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$ |
| Storage temperature range | Standard = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ /PE option = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ /BT option = $-40^{\circ}\text{C} \div +70^{\circ}\text{C}$ |
| Surface protection | Zinc coating with black passivation - salt spray test (EN ISO 9227) > 200 h |
| Compliance | Explosion proof protection, see section [11] -Flame proof enclosure "Ex d" -Dust ignition protection by enclosure "Ex t" RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006 |

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

| Valve model | | DPZA-*-1 | DPZA-*-2 | | | DPZA-*-4 | DPZA-*-4M |
|--------------------------|----------------------|--|-----------|----------------|-----------|----------------|-----------|
| Pressure limits | [bar] | ports P, A, B, X = 350; T = 250 (10 for option /D); Y = 10; | | | | | |
| Spool type | | L5, DL5 | L3 | L5, DL5 | T5 | L5, DL5 | |
| Nominal flow | [l/min] | | | | | | |
| Δp P-T | Δp = 10 bar | 100 | 130 | 200 | 150 | 340 | 390 |
| | Δp = 30 bar | 160 | 220 | 350 | 260 | 590 | 670 |
| | Max permissible flow | 180 | 320 | 440 | 360 | 680 | 800 |
| Δp max P-T | [bar] | 50 | 60 | 60 | 60 | 60 | 60 |
| Piloting pressure | [bar] | min. = 25; max = 350 (option /G advisable for pilot pressure > 200 bar) | | | | | |
| Piloting volume | [cm³] | 1,4 | 3,7 | | | 9,0 | 11,3 |
| Piloting flow (1) | [l/min] | 1,7 | 3,7 | | | 6,8 | 8 |
| Leakage | Pilot [cm³/min] | 100/300 | | 150/450 | | 200/600 | 200/600 |
| (2) | Main stage [l/min] | 0,4/1,2 | | 0,6/2,5 | | 1,0/4,0 | 1,0/4,0 |
| Response time (1) | [ms] | ≤ 30 | | ≤ 30 | | ≤ 35 | ≤ 40 |
| Hysteresis | | ≤ 0,1 [% of max regulation] | | | | | |
| Repeatability | | ± 0,1 [% of max regulation] | | | | | |
| Thermal drift | | zero point displacement < 1% at ΔT = 40°C | | | | | |

(1) 0 ÷ 100 % step signal and pilot pressure 100 bar

(2) at P = 100/350 bar


9 ELECTRICAL CHARACTERISTICS

| | | | | |
|-------------------------------------|---|-----------------------------------|----------------------------|--|
| Power supplies | Nominal : +24 VDC Rectified and filtered : VRMS = 20 ÷ 32 VMAX (ripple max 10 % VPP) | | | |
| Max power consumption | 35 W | | | |
| Analog input signals | Voltage: range ±10 Vdc (24 VMAX tolerant) Input impedance: Ri > 50 kΩ Current: range ±20 mA Input impedance: Ri = 500 Ω | | | |
| 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 | | | |
| Monitor outputs | Output range: voltage ±10 VDC @ max 5 mA current ±20 mA @ max 500 Ω load resistance | | | |
| Enable input | Range: 0 ÷ 5 Vdc (OFF state), 9 ÷ 24 Vdc (ON state), 5 ÷ 9 Vdc (not accepted); Input impedance: Ri > 10 kΩ | | | |
| Fault output | Output range: 0 ÷ 24 Vdc (ON state > [power supply - 2 V] ; OFF state < 1 V) @ max 50 mA; external negative voltage not allowed (e.g. due to inductive loads) | | | |
| Pressure transducer power supply | +24VDC @ max 100 mA (E-ATRA-7 see tech table GX800) | | | |
| Alarms | Solenoid not connected/short circuit, cable break with current reference signal, over/under temperature, valve spool transducer malfunctions | | | |
| Protection degree to DIN EN60529 | IP66/67 with relevant cable gland | | | |
| Duty factor | Continuous rating (ED=100%) | | | |
| Tropicalization | Tropical coating on electronics PCB | | | |
| Additional characteristics | Short circuit protection of solenoid current supply; spool position control (SN) or pressure/force control (SP, SF, SL) P.I.D. with rapid solenoid switching; protection against reverse polarity of power supply | | | |
| Electromagnetic compatibility (EMC) | According to Directive 2014/30/UE (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) | | | |
| Communication interface | USB | CANopen | PROFIBUS DP | EtherCAT, POWERLINK, EtherNet/IP, PROFINET IO RT / IRT |
| | Atos ASCII coding | EN50325-4 + DS408 | EN50170-2/IEC61158 | EC 61158 |
| Communication physical layer | not insulated USB 2.0 + USB OTG | optical insulated CAN ISO11898 | optical insulated RS485 | Fast Ethernet, insulated 100 Base TX |

Note: a maximum time of 800 ms (depending on communication type) have 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

10 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 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 (1) | NBR, HNBR | HFC | |

 The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

(1) Performance limitations in case of flame resistant fluids with water:

- max operating pressure = 210 bar
- max fluid temperature = 50°C

11 CERTIFICATION DATA

| | | | |
|-------------------------------------|--|---|--------------|
| Valve type | DPZA | | |
| Certifications | Multicertification Group II ATEX IECEx | | |
| Solenoid certified code | OZA-LES | | |
| Type examination certificate (1) | <ul style="list-style-type: none"> ATEX: TUV IT 18 ATEX 068 X IECEX: IECEX TPS 19.0004X | | |
| Method of protection | <ul style="list-style-type: none"> ATEX 2014/34/EU Ex II 2G Ex db IIC T6/T5/T4 Gb Ex II 2D Ex tb IIIC T85°C/T100°C/T135°C Db IECEX Ex db IIC T6/T5/T4 Gb Ex tb IIIC T85°C/T100°C/T135°C Db | | |
| Temperature class | T6 | T5 | T4 |
| Surface temperature | ≤ 85 °C | ≤ 100 °C | ≤ 135 °C |
| Ambient temperature (2) | -40 ÷ +40 °C | -40 ÷ +55 °C | -40 ÷ +70 °C |
| Applicable Standards | EN 60079-0 EN 60079-1 | EN 60079-31 IEC 60079-0 IEC 60079-1 | IEC 60079-31 |
| Cable entrance: threaded connection | M = M20x1,5 | | |

(1) The type examiner certificates can be downloaded from www.atos.com

(2) The driver and solenoids are certified for minimum ambient temperature -40°C.
In case the complete valve must withstand with minimum ambient temperature -40°C, select **/BT** in the model code.

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

12 CABLE SPECIFICATION AND TEMPERATURE - Power supply and grounding cables have to comply with following characteristics:

| | |
|--|---|
| Power supply and signals: section of wire = 1,0 mm ² | Grounding: section of external ground wire = 4 mm ² |
|--|---|

12.1 Cable temperature

The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.

| Max ambient temperature [°C] | Temperature class | Max surface temperature [°C] | Min. cable temperature [°C] |
|------------------------------|-------------------|------------------------------|-----------------------------|
| 40 °C | T6 | 85 °C | 80 °C |
| 55 °C | T5 | 100 °C | 90 °C |
| 70 °C | T4 | 135 °C | 110 °C |

13 CABLE GLANDS

Cable glands with threaded connections M20x1,5 for standard or armoured cables have to be ordered separately, see tech table **KX800**

Note: a Loctite sealant type 545, should be used on the cable gland entry threads

14 HYDRAULIC OPTIONS

B = Solenoid, integral electronics and position transducer at side of port B of the main stage.

D and E = Pilot and drain configuration can be modified as shown in section 21.
The valve's standard configuration provides internal pilot and external drain.
For different pilot / drain configuration select:

- Option /D Internal drain.
- Option /E External pilot (through port X).

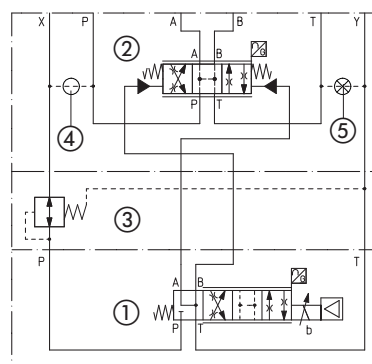
G = Pressure reducing valve installed between pilot valve and main body with fixed setting:

- DPZA-2 = 28 bar
- DPZA-1, -4 and -4M = 40 bar

It is advisable for valves with internal pilot in case of system pressure higher than 150 bar.

Pressure reducing valve is standard for DPZA-1, for other sizes add **/G** option.

FUNCTIONAL SCHEME - example of configuration 70



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

15 ELECTRONIC OPTIONS

I = It provides 4 ÷ 20 mA current reference signal, instead of the standard ±10 Vdc.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ±10 Vdc or ±20 mA.

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.

C = Only for **SP, SF, SL**

Option /C is available to connect pressure (force) transducers with 4 ÷ 20 mA current output signal, instead of the standard ±10 Vdc.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ±10 Vdc or ±20 mA.

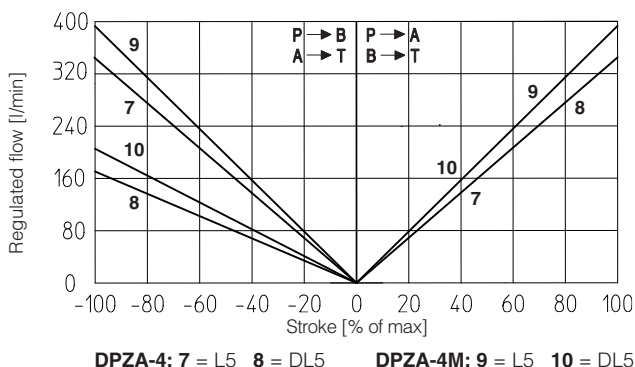
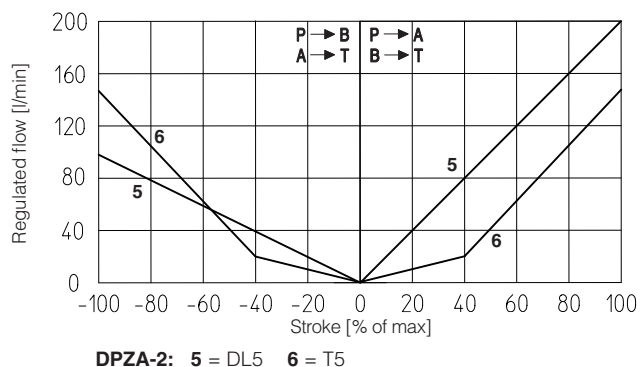
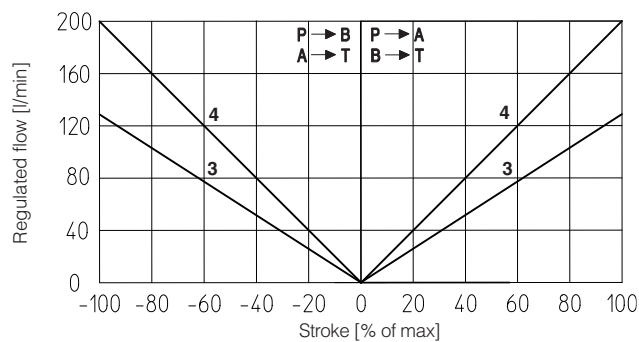
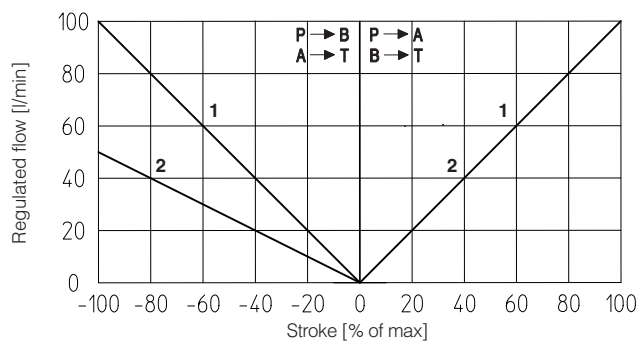
16 POSSIBLE COMBINED OPTIONS

Hydraulic options: all combination possible

Electronics options: /CI (only for **SP, SF, SL**)

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

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

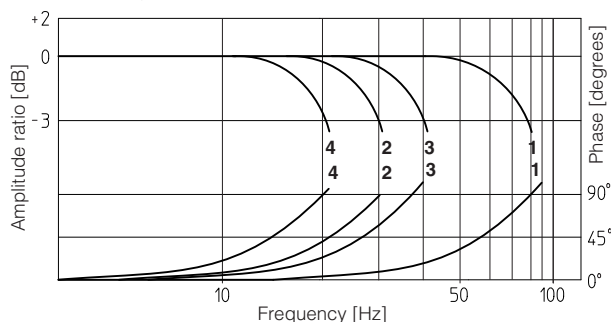


Note: Hydraulic configuration vs. reference signal for configurations 60 and 70 (standard and option /B)

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

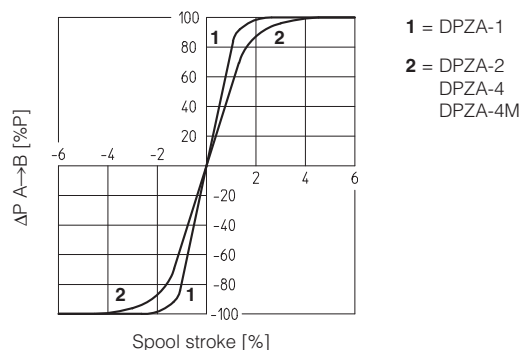
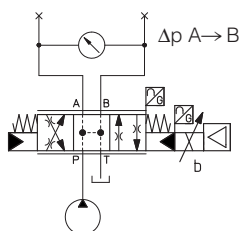
17.2 Bode diagrams

Stated at nominal hydraulic conditions.



1 = DPZA-1 } $\pm 5\%$ 2 = DPZA-1 } $\pm 100\%$
 3 = DPZA-4 } $\pm 5\%$ 4 = DPZA-4 } $\pm 100\%$

17.3 Pressure gain



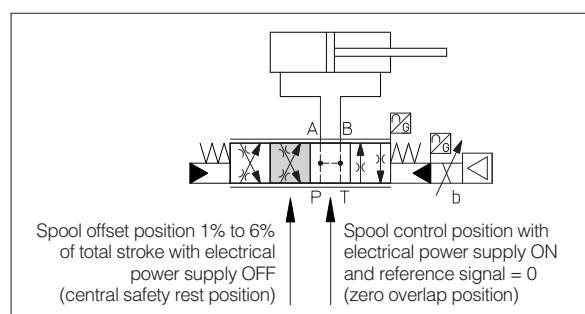
17.4 Safety rest position - configuration 70

In absence of electric power supply (+24 VDC), the valve main spool is moved by the springs force to the **central safety rest position** characterized by a small offset of about 1% to 6% of the total stroke in P-B / A-T configuration.

This is specifically designed to avoid that in case of accidental interruption of the electrical power supply to the valve, the actuator moves towards an undefined direction (due to the tolerances of the zero overlap spool), with potential risk of damages or personnel injury.

Thanks to the **central safety rest position** the actuator movement is suddenly stopped and it is recovered at very low speed towards the direction corresponding to the P-B / A-T connection.

The main spool moves to the closed loop control position (zero overlap) when the pilot pressure is activated, the valve is fed with power supply +24 VDC and reference input = 0V (or 12 mA for option /I) is applied to the driver.



18 POWER SUPPLY AND SIGNALS SPECIFICATIONS

Generic electrical output signals of the valve (e.g. fault or monitor signals) 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, EN-982).

18.1 Power supply (V+ and V0)

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



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

18.2 Power supply for driver's logic and communication (VL+ and VL0)

The power supply for driver's logic and communication must be appropriately stabilized or rectified and filtered: apply at least a 10000 μ F/40 V capacitance to single phase rectifiers or a 4700 μ F/40 V capacitance to three phase rectifiers.

The separate power supply for driver's logic on pin 3 and 4, allow to remove solenoid power supply from pin 1 and 2 maintaining active the diagnostics, USB and fieldbus communications.



A safety fuse is required in series to each driver's logic and communication power supply: 500 mA fast fuse.

18.3 Flow reference input signal (Q_INPUT+)

The driver controls in closed loop the valve spool position proportionally to the external reference input signal.

Reference input signal is factory preset according to selected valve code, defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.

Drivers with fieldbus interface can be software set to receive reference signal directly from the machine control unit (fieldbus reference). Analog reference input signal can be used as on-off commands with input range $0 \div 24$ VDC.

18.4 Pressure or force reference input signal (F_INPUT+) - only SP, SF, SL

Functionality of F_INPUT+ signal (pin 12), is used as reference for the driver pressure/force closed loop (see tech. table FX500).

Reference input signal is factory preset according to selected valve code, defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.

Drivers with fieldbus interface can be software set to receive reference signal directly by the machine control unit (fieldbus reference).

Analog reference input signal can be used as on-off commands with input range $0 \div 24$ VDC.

18.5 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 (e.g. analog reference, fieldbus reference, pilot spool position).

Monitor output signal is factory preset according to selected valve code, defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option.

Output signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.

18.6 Pressure or force monitor output signal (F_MONITOR) - only for SP, SF, SL

The driver generates an analog output signal proportional to alternated pressure/force control; the monitor output signal can be software set to show other signals available in the driver (e.g. analog reference, force reference).

Monitor output signal is factory preset according to selected valve code, defaults are ± 10 VDC for standard and $4 \div 20$ mA for /I option.

Output signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.

18.7 Enable input signal (ENABLE)

To enable the driver, supply a 24 VDC on pin 6: Enable input signal allows to enable/disable the current supply to the solenoid, without removing the electrical power supply to the driver; it is used to active the communication and the other driver functions when the valve must be disabled for safety reasons. This condition **does not comply** with norms IEC 61508 and ISO 13849.

Enable input signal can be used as generic digital input by software selection.

18.8 Fault output signal (FAULT)

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal cable broken for $4 \div 20$ mA input, spool position transducer cable broken, etc.). Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC.

Fault status is not affected by the Enable input signal. Fault output signal can be used as digital output by software selection.

18.9 Remote pressure/force transducer input signal - only for SP, SF, SL

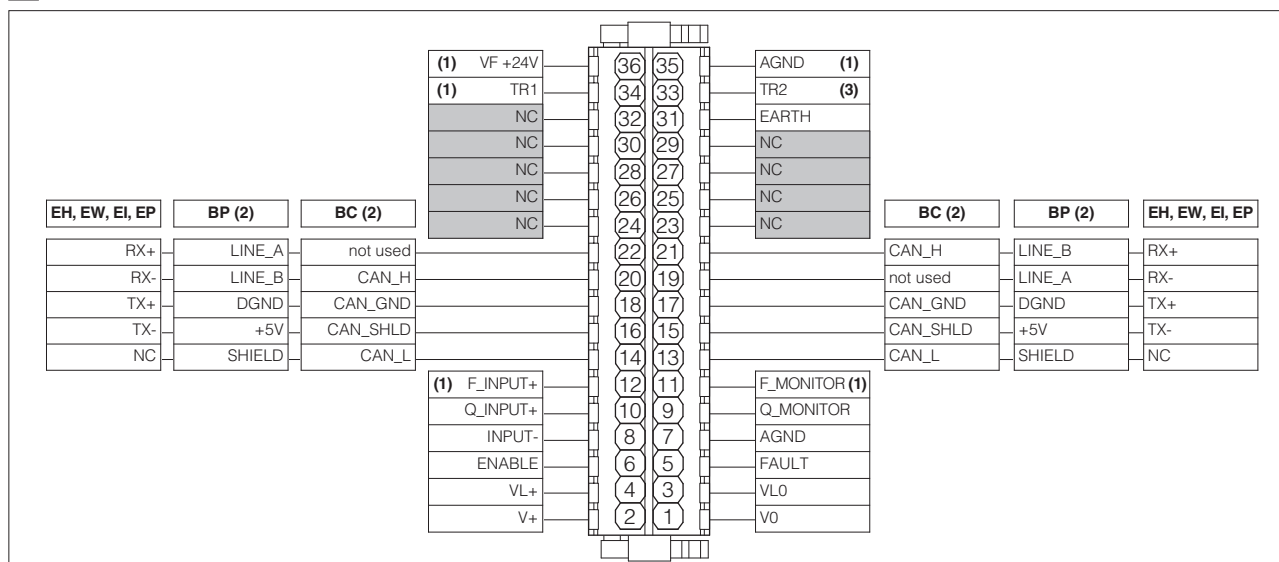
Analog remote pressure transducers or load cell can be directly connected to the driver.

Analog input signal is factory preset according to selected valve code, defaults are ± 10 VDC for standard and $4 \div 20$ mA for /C option.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.

Refer to pressure/force transducer characteristics to select the transducer type according to specific application requirements (see table FX500).

19 TERMINAL BOARD OVERVIEW



(1) connections available only **SP, SF, SL**

(2) For BC and BP executions the fieldbus connections have an internal pass-through connection

(3) connection available only **SF**

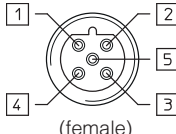
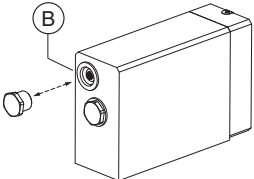
20 ELECTRONIC CONNECTIONS

20.1 Main connections signals

| CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|----------------|-----|------------------|---|--|
| A | 1 | V0 | Power supply 0 Vdc | Gnd - power supply |
| | 2 | V+ | Power supply 24 Vdc | Input - power supply |
| | 3 | VL0 | Power supply 0 Vdc for driver's logic and communication | Gnd - power supply |
| | 4 | VL+ | Power supply 24 Vdc for driver's logic and communication | Input - power supply |
| | 5 | FAULT | Fault (0 Vdc) or normal working (24 Vdc), referred to VL0 | Output - on/off signal |
| | 6 | ENABLE | Enable (24 Vdc) or disable (0 Vdc) the driver, referred to VL0 | Input - on/off signal |
| | 7 | AGND | Analog ground | Gnd - analog signal |
| | 8 | INPUT- | Negative reference input signal for Q_INPUT+ and F_INPUT+ | Input - analog signal |
| | 9 | Q_MONITOR | Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range, referred to AGND Defaults are: ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | 10 | Q_INPUT+ | Flow reference input signal: ± 10 Vdc / ± 20 mA maximum range Defaults are: ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Input - analog signal Software selectable |
| | 11 | F_MONITOR | Pressure/Force monitor output signal: ± 10 Vdc / ± 20 mA maximum range, referred to AGND (1) Defaults are: ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | 12 | F_INPUT+ | Pressure/Force reference input signal: ± 10 Vdc / ± 20 mA maximum range (1) Defaults are: ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Input - analog signal Software selectable |
| | 31 | EARTH | Internally connected to driver housing | |

(1) Available only for **SP, SF, SL**

20.2 USB connector - M12 - 5 pin always present

| CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | Driver view | |
|----------------|-----|----------------|--------------------------|---|---|
| B | 1 | +5V_USB | Power supply |  |  |
| | 2 | ID | Identification | | |
| | 3 | GND_USB | Signal zero data line | | |
| | 4 | D- | Data line - | | |
| | 5 | D+ | Data line + | | |

20.3 BC fieldbus execution connections

| CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS |
|----------------|-----|-----------------|------------------------------------|----------------|-----|-----------------|------------------------------------|
| C1 | 14 | CAN_L | Bus line (low) | C2 | 13 | CAN_L | Bus line (low) |
| | 16 | CAN_SHLD | Shield | | 15 | CAN_SHLD | Shield |
| | 18 | CAN_GND | Signal zero data line | | 17 | CAN_GND | Signal zero data line |
| | 20 | CAN_H | Bus line (high) | | 19 | not used | Pass-through connection (1) |
| | 22 | not used | Pass-through connection (1) | | 21 | CAN_H | Bus line (high) |

(1) Pin 19 and 22 can be fed with external +5V supply of CAN interface

20.4 BP fieldbus execution connections

| CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS |
|----------------|-----|---------------|---------------------------------------|----------------|-----|---------------|---------------------------------------|
| C1 | 14 | SHIELD | | C2 | 13 | SHIELD | |
| | 16 | +5V | Power supply | | 15 | +5V | Power supply |
| | 18 | DGND | Data line and termination signal zero | | 17 | DGND | Data line and termination signal zero |
| | 20 | LINE_B | Bus line (low) | | 19 | LINE_A | Bus line (high) |
| | 22 | LINE_A | Bus line (high) | | 21 | LINE_B | Bus line (low) |

20.5 EH, EW, EI, EP fieldbus execution connections

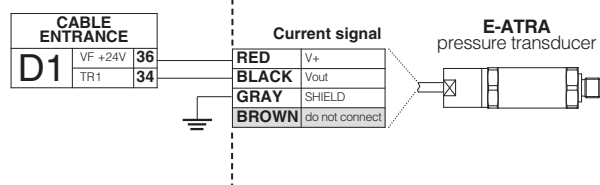
| CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | CABLE ENTRANCE | PIN | SIGNAL | TECHNICAL SPECIFICATIONS |
|----------------------|-----|------------|--------------------------|-----------------------|-----|------------|--------------------------|
| C1 (input) | 14 | NC | do not connect | C2 (output) | 13 | NC | do not connect |
| | 16 | TX- | Transmitter | | 15 | TX- | Transmitter |
| | 18 | TX+ | Transmitter | | 17 | TX+ | Transmitter |
| | 20 | RX- | Receiver | | 19 | RX- | Receiver |
| | 22 | RX+ | Receiver | | 21 | RX+ | Receiver |

20.6 Remote pressure transducer connector - only for **SP, SF, SL**

| CABLE ENTRANCES | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES | SP, SL - Single transducer (1) | | SF - Double transducers (1) | |
|-----------------|-----|----------------|---|---|--------------------------------|---------|-----------------------------|---------|
| D1 | 33 | TR2 | 2nd signal transducer ± 10 Vdc / ± 20 mA maximum range | Input - analog signal Software selectable | Voltage | Current | Voltage | Current |
| | 34 | TR1 | 1st signal transducer ± 10 Vdc / ± 20 mA maximum range | Input - analog signal Software selectable | Connect | Connect | Connect | Connect |
| D2 | 35 | AGND | Common gnd for transducer power and signals | Common gnd | Connect | / | Connect | / |
| | 36 | VF +24V | Power supply +24Vdc | Output - power supply | Connect | Connect | Connect | Connect |

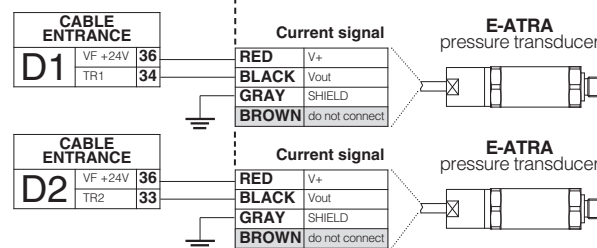
E-ATRA remote pressure transducer connection - see tech table GX800

for SP option



Connect the transducer cable to the terminal board of the electronic driver

for SF option



Connect the transducers cables to the terminal board of the electronic driver

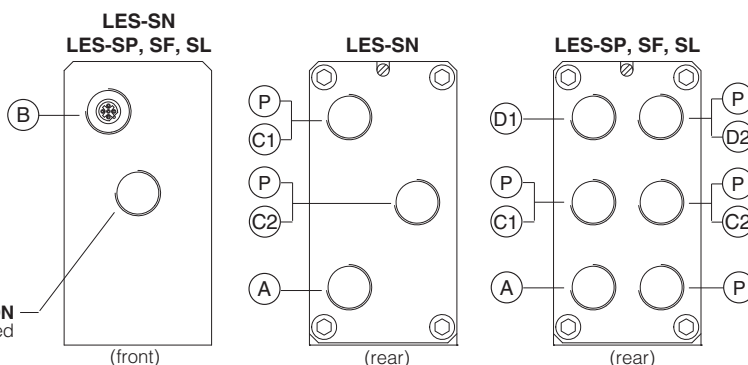
21 CONNECTIONS LAYOUT

CABLE ENTRANCE OVERVIEW

Cables entrance description:

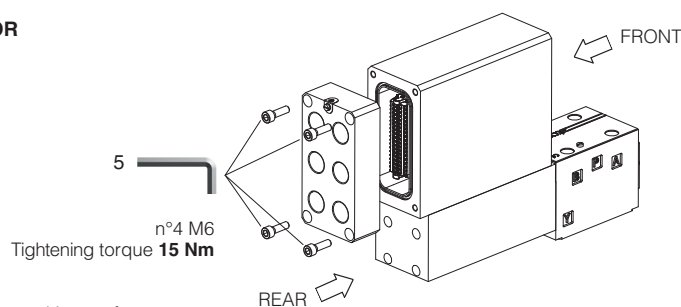
- (A) main connections
- (B) USB connector always present (factory plugged)
- (C1) fieldbus (input)
- (C2) fieldbus (output)
- (D1) pressure transducer 1
- (D2) pressure transducer 2
- (P) threaded plug

LVDT CONNECTION
factory wired



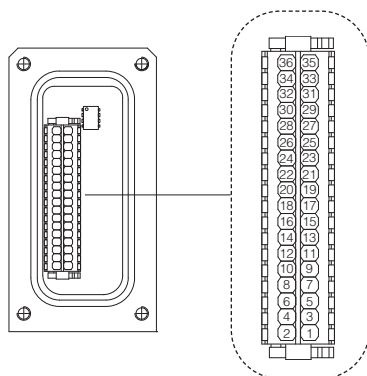
TERMINAL BOARD AND FIELDBUS TERMINATOR

Remove the 4 screws of driver's rear cover to access terminal board and fieldbus terminator

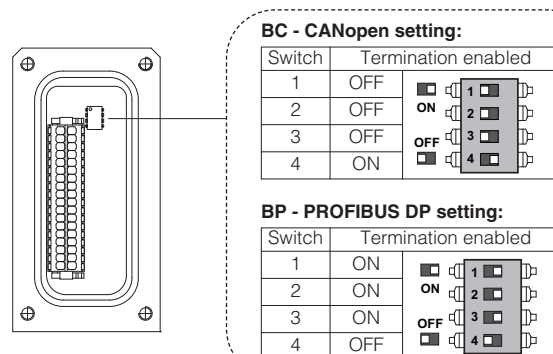


WARNING: the above operation must be performed in a safety area

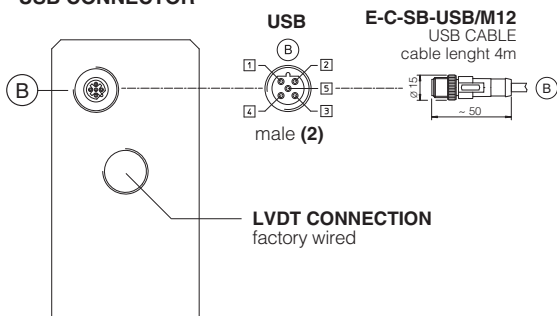
Terminal board - see section 19



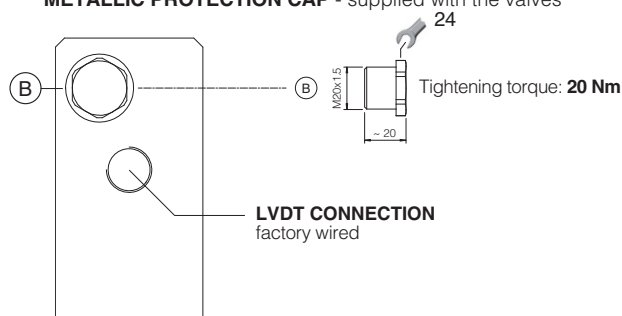
Fieldbus terminator only for BC and BP executions (1)



USB CONNECTOR



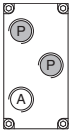
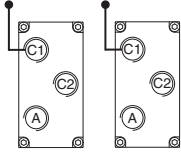
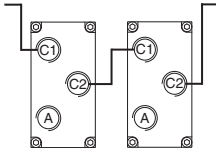
METALLIC PROTECTION CAP - supplied with the valves



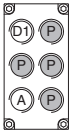
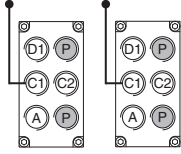
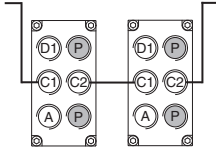
(1) Drivers with BC and BP fieldbus interface are delivered by default 'Not Terminated'. All switches are set OFF

(2) Pin layout always referred to driver's view

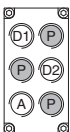
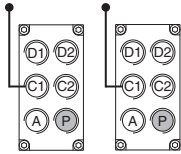
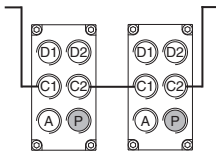
21.1 Cable glands and threaded plug for LES-SN - see tech table KX800

| Communication interfaces | To be ordered separately | | | | Cable entrance overview | Notes |
|--|--------------------------|----------------------|------------------------|------------------------|---|--|
| | Cable gland quantity | Cable gland entrance | Threaded plug quantity | Threaded plug entrance | | |
| NP | 1 | A | none | none |  | Cable entrance A is open for costumers Cable entrance P are factory plugged |
| BC, BP, EH, EW, EI, EP "via stub" connection | 2 | C1 A | 1 | C2 |  | Cable entrance A, C1, C2 are open for costumers |
| BC, BP, EH, EW, EI, EP "daisy chain" connection | 3 | C1 C2 A | none | none |  | Cable entrance A, C1, C2 are open for costumers |

21.2 Cable glands and threaded plug for LES-SP, SL - see tech table KX800

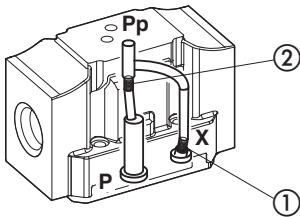
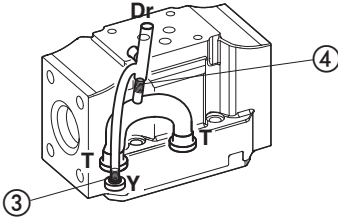
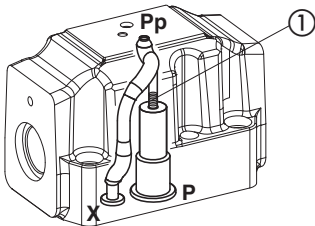
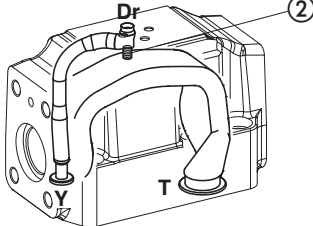
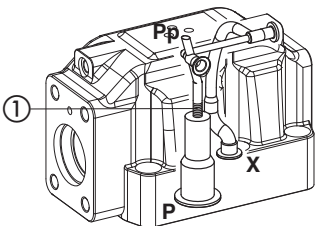
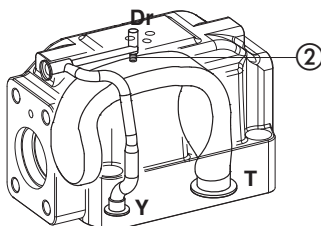
| Communication interfaces | To be ordered separately | | | | Cable entrance overview | Notes |
|--|--------------------------|----------------------|------------------------|------------------------|---|---|
| | Cable gland quantity | Cable gland entrance | Threaded plug quantity | Threaded plug entrance | | |
| NP | 2 | D1 A | none | none |  | Cable entrance A, D1 are open for costumers Cable entrance P are factory plugged |
| BC, BP, EH, EW, EI, EP "via stub" connection | 3 | D1 C1 A | 1 | C2 |  | Cable entrance A, C1, C2, D1 are open for costumers Cable entrance P are factory plugged |
| BC, BP, EH, EW, EI, EP "daisy chain" connection | 4 | D1 C1 - C2 A | none | none |  | Cable entrance A, C1, C2, D1 are open for costumers Cable entrance P are factory plugged |

21.3 Cable glands and threaded plug for LES-SF - see tech table KX800

| Communication interfaces | To be ordered separately | | | | Cable entrance overview | Notes |
|--|--------------------------|-------------------------|------------------------|------------------------|---|--|
| | Cable gland quantity | Cable gland entrance | Threaded plug quantity | Threaded plug entrance | | |
| NP | 3 | D1 D2 A | none | none |  | Cable entrance A, D1, D2 are open for costumers Cable entrance P are factory plugged |
| BC, BP, EH, EW, EI, EP "via stub" connection | 4 | D1 - D2 C1 A | 1 | C2 |  | Cable entrance A, C1, C2, D1, D2 are open for costumers Cable entrance P is factory plugged |
| BC, BP, EH, EW, EI, EP "daisy chain" connection | 5 | D1 - D2 C1 - C2 A | none | none |  | Cable entrance A, C1, C2, D1, D2 are open for costumers Cable entrance P is factory plugged |

22 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

| | Pilot channels | Drain channels | |
|---------------|---|---|---|
| DPZA-1 |  |  | <p>Internal piloting: blinded plug SP-X300F ① in X; External piloting: blinded plug SP-X300F ② in Pp; Internal drain: blinded plug SP-X300F ③ in Y; External drain: blinded plug SP-X300F ④ in Dr.</p> |
| DPZA-2 |  |  | <p>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.</p> |
| DPZA-4 |  |  | <p>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.</p> |

23 FASTENING BOLTS AND SEALS

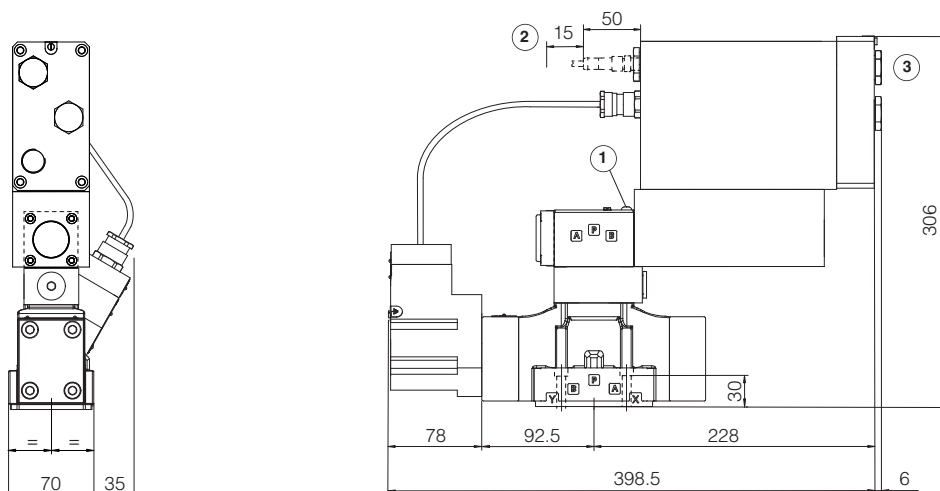
| Type | Size | Fastening bolts | Seals |
|------|---------|---|--|
| DPZA | 1 = 10 | 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm | 5 OR 2050; Diameter of ports A, B, P, T: Ø 11 mm (max) 2 OR 108 Diameter of ports X, Y: Ø = 5 mm (max) |
| | 2 = 16 | 4 socket head screws M10x50 class 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) |
| | 4M = 27 | 6 socket head screws M12x60 class 12.9 Tightening torque = 125 Nm | 4 OR 3137; Diameter of ports A, B, P, T: Ø 32 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø = 7 mm (max) |

DPZA-LES-*-1

ISO 4401: 2005

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

| Mass [kg] | |
|------------|------|
| DPZA-*-17* | 13,7 |
| Option /G | +0,9 |

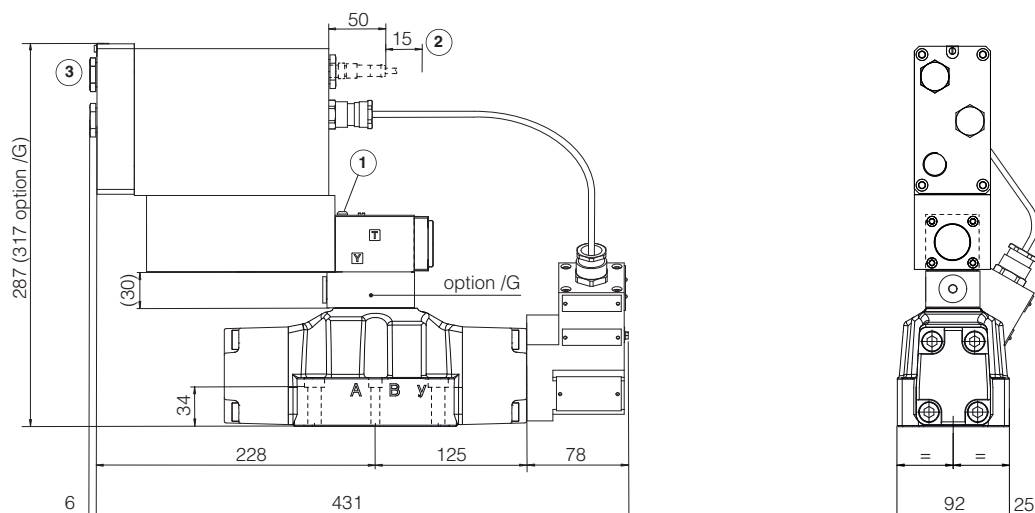


DPZA-LES-*-2

ISO 4401: 2005

Mounting surface: 4401-07-07-0-05
(see table P005)

| Mass [kg] | |
|------------|------|
| DPZA-*-27* | 17,9 |
| Option /G | +0,9 |



① = Air bleed off

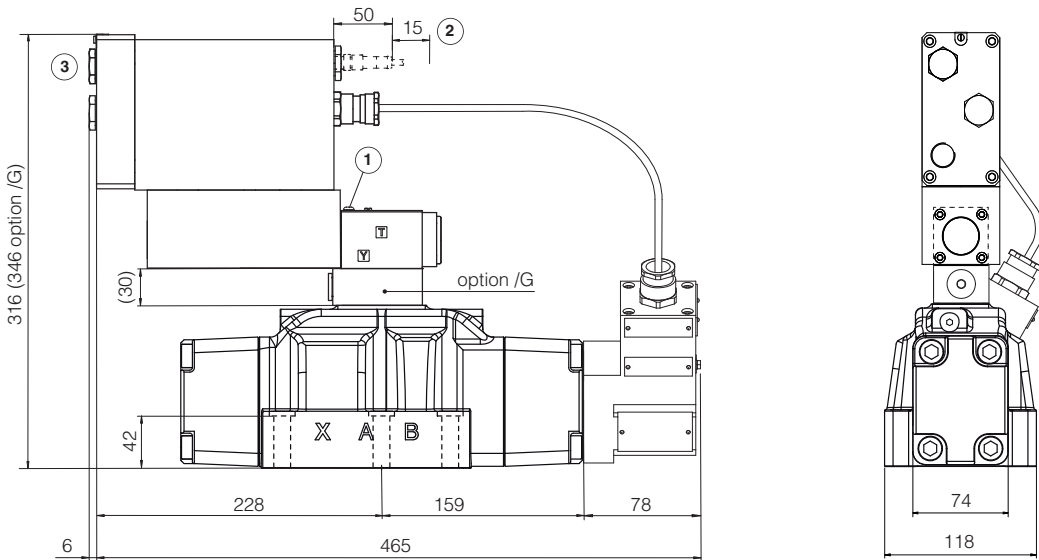
② = Space to remove the USB connector

③ = The dimensions of cable glands must be considered (see tech table **KX800**)

DPZA-LES-^{*}-4 DPZA-LES-^{*}-4M

ISO 4401: 2005
Mounting surface: 4401-08-08-0-05
(see table P005)

| Mass [kg] | |
|-------------------------------------|------|
| DPZA- [*] -4 [*] | 23,1 |
| DPZA- [*] -4M [*] | 23,1 |
| Option /G | +0,9 |



- ① = Air bleed off
- ② = Space to remove the USB connector
- ③ = The dimensions of cable glands must be considered (see tech table **KX800**)

25 RELATED DOCUMENTATION

| | | | |
|--------------|---|--------------|---|
| X010 | Basics for electrohydraulics in hazardous environments | GS500 | Programming tools |
| X020 | Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO | GS510 | Fieldbus |
| FX500 | Ex-proof digital proportionals with P/Q control | GX800 | Ex-proof pressure transducer type E-ATRA-7 |
| FX630 | Ex-proof servoproportionals with on-board axis card | KX800 | Cable glands for ex-proof valves |
| FX900 | Operating and maintenance information for ex-proof proportional valves | P005 | Mounting surfaces for electrohydraulic valves |