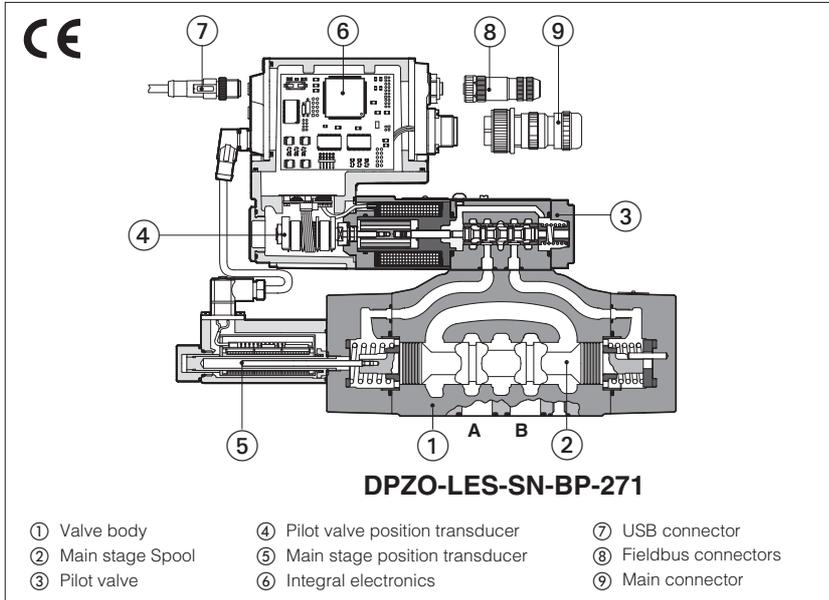


Two stage proportional directional valves high performance

rugged digital with two position transducers and positive spool overlap



DPZO-LEB, DPZO-LES

High performance two stage digital proportional valves specifically designed for high speed closed loop controls.

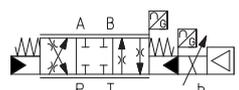
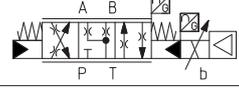
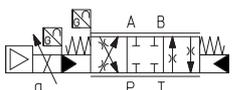
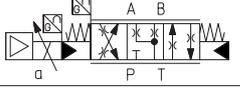
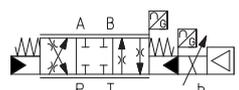
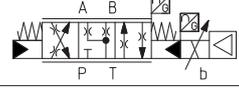
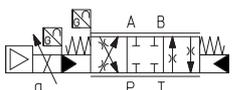
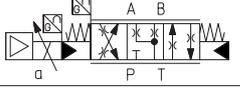
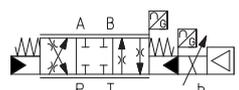
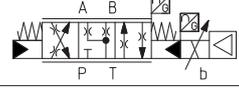
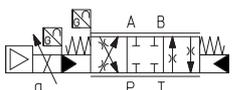
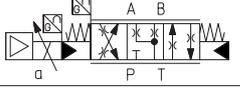
They are equipped with two LVDT position transducers (pilot valve and main stage) and positive spool overlap for best dynamics in directional controls and not compensated flow regulations.

The integral digital electronic driver performs the valve's hydraulic regulation according to the reference signal and assures valve-to-valve interchangeability thanks to the factory presetting.

High performances valves are available in LEB basic execution with analog reference signals and USB port for software functional parameters setting or in LES full execution which includes also optional alternated P/Q controls and fieldbus interfaces for functional parameters setting, reference signals and real-time diagnostics.

Size: **10 to 35**
 Max flow: **180 to 3500 l/min**
 Max pressure: **350 bar**

1 MODEL CODE for STANDARD SPOOLS

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------|-----|-----------|---|-----------|---|-----------|---|----------|---|---|---|----------|--|----------|---|---|---|---|---|---|--|---|---|---|---|--------|---|-----|-----|---|--------|---|---|-----|---|---------|---|---|-----|---|--------|---|---|---|-----|--------|---|---|---|------|
| DPZO | - | L | - | ES | - | SN | - | NP | - | 2 | - | 71 | - | L | - | 5 | / | * | / | * | / | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Two stage proportional directional valve</p> <p>L = closed-loop two LVDT transducer</p> <p>Integral digital drivers: EB = basic (1) ES = full</p> <p>Alternated P/Q controls - see section 4 SN = none SP = pressure control (1 pressure transducer) SF = force control (2 pressure transducers) SL = force control (1 load cell)</p> <p>Fieldbus interfaces USB port always present: NP = Not present (1) BP = PROFIBUS DP BC = CANopen EH = EtherCAT</p> <p>Valve size ISO 4401: 1 = 10 2 = 16 4 = 25 4M = 27 6 = 32 8 = 35</p> <p>Configuration:</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Standard</td> <td style="text-align: center;">Option /B</td> </tr> <tr> <td style="text-align: center;"> <p>71 = </p> <p>73 = </p> </td> <td style="text-align: center;"> <p></p> <p></p> </td> </tr> </table> | | | | | | | | | | | | | | | | | | | | | | | Standard | Option /B | <p>71 = </p> <p>73 = </p> | <p></p> <p></p> | <p>Seals material, see sect. 5, 6: - = NBR PE = FKM BT = HNBR</p> <p>Series number</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Standard | Option /B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>71 = </p> <p>73 = </p> | <p></p> <p></p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Hydraulic options, see section 10: B = solenoid, integral electronics and position transducer at side of port B of the main stage D = internal drain E = external pilot (through port X) G = pressure reducing valve for piloting - standard for size 10</p> <p>Electronic options, see sections 11 I = current reference input and monitor 4÷20 mA (omit for standard voltage reference input and monitor ±10 V)</p> <p>Only for SN (2) : F = fault signal Q = enable signal Z = double power supply, enable, fault and monitor signals - 12 pin connector (3)</p> <p>Only for SP, SF, SL: C = current feedback for remote transducer(s)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Spool type - regulating characteristics:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>L =  linear</p> <p>S =  progressive</p> </td> <td style="width: 50%; vertical-align: top;"> <p>DL =  differential-linear P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> <p>D =  differential-progressive P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> </td> </tr> </table> | | | | | | | | | | | | | | | | | | | | | | | <p>L =  linear</p> <p>S =  progressive</p> | <p>DL =  differential-linear P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> <p>D =  differential-progressive P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>L =  linear</p> <p>S =  progressive</p> | <p>DL =  differential-linear P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> <p>D =  differential-progressive P-A = Q, B-T = Q/2 P-B = Q/2, A-T = Q</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | <p>Spool size 3 (L,S,D) 5 (L,DL,S,D) 5 (L,S,D)</p> | | | <table border="0" style="width: 100%;"> <tr> <td>DPZO-1</td><td>=</td><td>-</td><td>100</td><td>-</td></tr> <tr> <td>DPZO-2</td><td>=</td><td>160</td><td>250</td><td>-</td></tr> <tr> <td>DPZO-4</td><td>=</td><td>-</td><td>480</td><td>-</td></tr> <tr> <td>DPZO-4M</td><td>=</td><td>-</td><td>550</td><td>-</td></tr> <tr> <td>DPZO-6</td><td>=</td><td>-</td><td>-</td><td>640</td></tr> <tr> <td>DPZO-8</td><td>=</td><td>-</td><td>-</td><td>1200</td></tr> </table> <p>Nominal flow (l/min) at Δp 10bar P-T</p> | | | | | | | | DPZO-1 | = | - | 100 | - | DPZO-2 | = | 160 | 250 | - | DPZO-4 | = | - | 480 | - | DPZO-4M | = | - | 550 | - | DPZO-6 | = | - | - | 640 | DPZO-8 | = | - | - | 1200 |
| DPZO-1 | = | - | 100 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZO-2 | = | 160 | 250 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZO-4 | = | - | 480 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZO-4M | = | - | 550 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZO-6 | = | - | - | 640 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DPZO-8 | = | - | - | 1200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

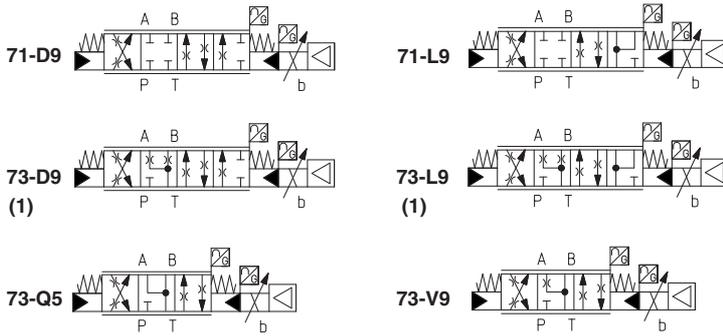
(1) LEB basic execution available only in version SN-NP
 (3) double power supply only for LES

(2) F, Q, Z options are standard for SP, SF, SL

2 MODEL CODE for SPECIAL SPOOLS - refer to section 1 for valve model code and options

DPZO - **L** **ES** - **SN** - **NP** - **2** **71 - L9** / * / * / *

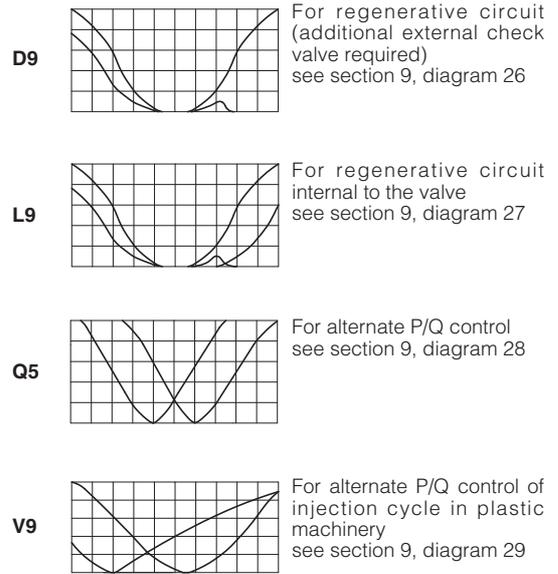
Configuration, spool type and size:



| Spool size | D9 | L9 | V9 | Q5 |
|------------|-----|-----|------|-----|
| DPZO-1 = | 100 | - | 100 | 100 |
| DPZO-2 = | 250 | 250 | 250 | 250 |
| DPZO-4 = | 480 | - | 480 | 480 |
| DPZO-4M = | 550 | - | 550 | 550 |
| DPZO-6 = | - | - | 640 | - |
| DPZO-8 = | - | - | 1200 | - |

Nominal flow (l/min) at Δp 10bar P-T

(1) do not use with alternated P/Q control (options SP, SF, SL)



3 GENERAL NOTES

DPZO-LEB, LES proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive). Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in table F003 and in the installation notes supplied with relevant components. The electrical signals of the valve (e.g. 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).



WARNING

To avoid overheating and possible damage of the electronic driver, the valves must be never energized without hydraulic supply to the pilot stage. In case of prolonged pauses of the valve operation during the machine cycle, it is always advisable to disable the driver (option /Q or /Z)

A safety fuse 2,5 A installed on 24Vdc power supply of each valve is always recommended, see also Power supply note at sections 11

4 ALTERNATED P/Q CONTROLS - only for **LES** with valve configuration **73**

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). Main 12 pin connector is the same as /Z option plus two analog signals specific for the pressure (force) control.

The alternated P/Q controls are specific for valve configuration 73, optional spools type Q5 and V9 recommended, see section 2

For detailed information and connector wiring of options SP, SF, SL see tech table **GS212**.

5 FIELDBUS - only for **LES**

Fieldbus allows the direct communication of the proportional valve with machine control unit for digital reference signal, diagnostics and settings of functional parameters. Analog reference signal remain available on the main connector for quick commissioning and maintenance. For detailed information about fieldbus features and specification see tech table **GS510**.

6 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 | 75 years, see technical table P007 | | | |
| Ambient temperature range | standard execution = -20°C ÷ +60°C /BT option = -40°C ÷ +60°C | | | |
| Storage temperature range | Standard execution = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C | | | |
| Coil resistance R at 20°C | 3 ÷ 3,3 Ω | | | |
| Max. solenoid current | 2,6 A | | | |
| Max. power | 50 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 | IP66/67 | | | |
| Tropicalization | Tropical coating on electronics PCB | | | |
| Duty factor | Continuous rating (ED=100%) | | | |
| EMC, climate and mechanical load | See technical table G004 | | | |
| Communication interface | USB Atos ASCII coding | CANopen EN50325-4 + DS408 | PROFIBUS DP EN50170-2/IEC61158 | EtherCAT IEC 61158 |
| Communication physical layer | not insulated USB 2.0 + USB OTG | optical insulated CAN ISO11898 | optical insulated RS485 | Fast Ethernet, insulated 100 Base TX |

| Valve model | DPZO-*-1 | DPZO-*-2 | DPZO-*-4 | DPZO-*-4M | DPZO-*-6 | DPZO-*-8 |
|------------------------------|--|------------------------|-------------------|------------------------|-------------------|-------------------|
| Pressure limits [bar] | ports P, A, B, X = 350; T = 250 (10 for option /D); Y = 10; | | | | | |
| Spool type | standard | L5, DL5, S5, D5 | L3, S3, D3 | L5, DL5, S5, D5 | | L5, S5, D5 |
| | special | D9, V9, Q5 | | D9, L9, V9, Q5 | D9, V9, Q5 | V9 |
| Nominal flow (1) [l/min] | | | | | | |
| Δp P-T | | | | | | |
| Δp = 10 bar | 100 | 160 | 250 | 480 | 550 | 640 |
| Δp = 30 bar | 160 | 270 | 430 | 830 | 950 | 1100 |
| Max permissible flow [l/min] | 180 | 400 | 550 | 1000 | 1100 | 1600 |
| 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 | 21,6 | 39,8 |
| Piloting flow (2) [l/min] | 1,7 | 3,7 | 6,8 | 8 | 14,4 | 20 |
| Leakage (3) | Pilot [cm³/min] | 100/300 | 100/300 | 200/500 | 200/600 | 900/2800 |
| | Main stage [l/min] | 0,15/0,5 | 0,2/0,6 | 0,3/1,0 | 0,3/1,0 | 1,0/3,0 |
| Response time (4) [ms] | < 50 | < 60 | < 80 | < 85 | < 90 | < 120 |
| Hysteresis | ≤ 0,1 [% of max regulation] | | | | | |
| Repeatability | ± 0,1 [% of max regulation] | | | | | |
| Thermal drift | zero point displacement < 1% at ΔT = 40°C | | | | | |

Notes: above performance data refer to valves coupled with Atos electronic drivers, see section 8.

(1) for different Δp, see section 9.2

(3) at p = 100/350 bar

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

(4) see detailed diagrams in section 9.3

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

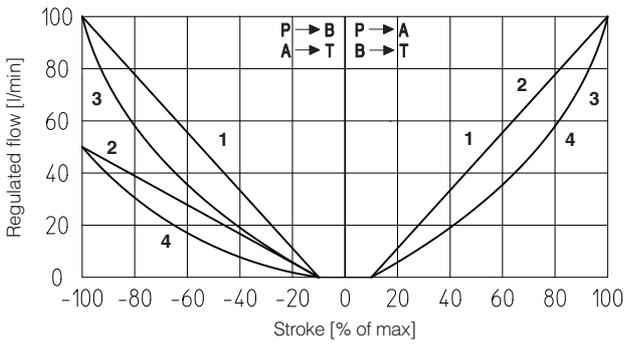
| | | | |
|--------------------------------------|---|----------------------------|----------------------|
| Seals, recommended fluid temperature | NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C | | |
| Recommended viscosity | 20 ÷ 100 mm²/s - max allowed range 15 ÷ 380 mm²/s | | |
| Fluid contamination class | ISO 4406 class 20/18/15 NAS 1638 class 9, in line filters of 10 μm (β10 ≥75 recommended) | | |
| 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 | |

8 ELECTRONIC DRIVERS - for main and communication connector see sections 13, 14

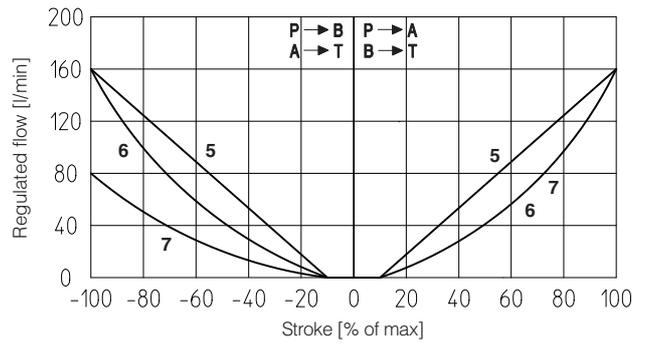
| | | | |
|---------------|-------------------|------------|-----------------------|
| Valve model | LEB | LES | LES-SP, SF, SL |
| Drivers model | E-RI-LEB-N | E-RI-LES-N | E-RI-LES-S |
| Type | Digital | | |
| Format | Integral to valve | | |
| Data sheet | GS208 | GS210 | GS212 |

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

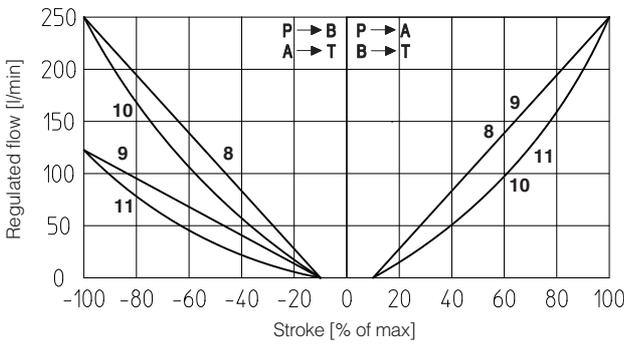
9.1 Regulation diagrams (values measure at Δp 10 bar P-T)



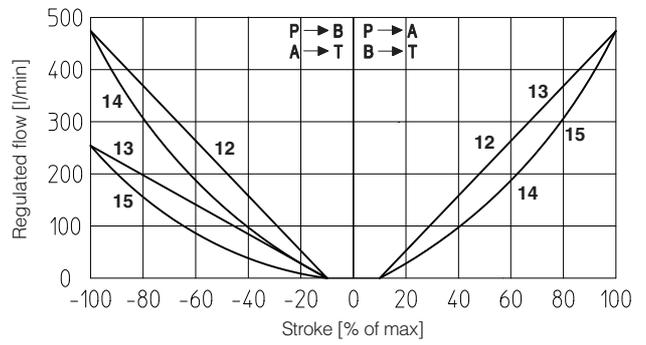
DPZO-1:
 1=L5 2 = DL5
 3=S5 4 = D5



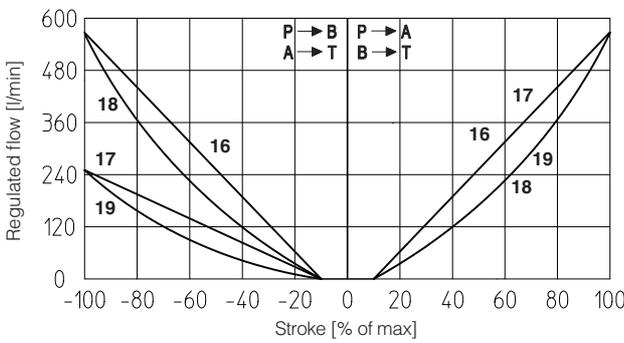
DPZO-2:
 5=L3 6 = S3
 7=D3



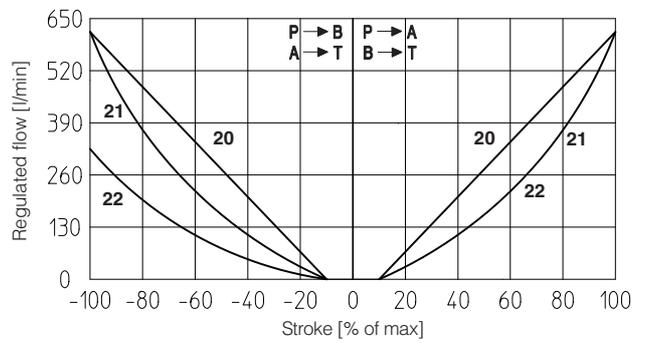
DPZO-3:
 8 = L5 9 = DL5
 10 = S5 11 = D5



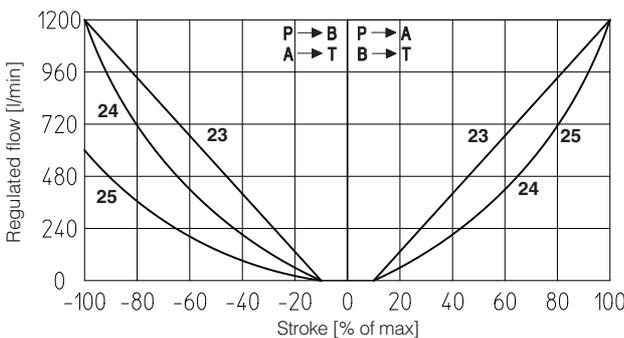
DPZO-4:
 12 = L5 13 = DL5
 14 = S5 15 = D5



DPZO-5:
 16 = L5 17 = DL5
 18 = S5 19 = D5



DPZO-6:
 20 = L5 21 = S5
 22 = D5



DPZO-8:
 23 = L5 24 = S5
 25 = D5

Note:

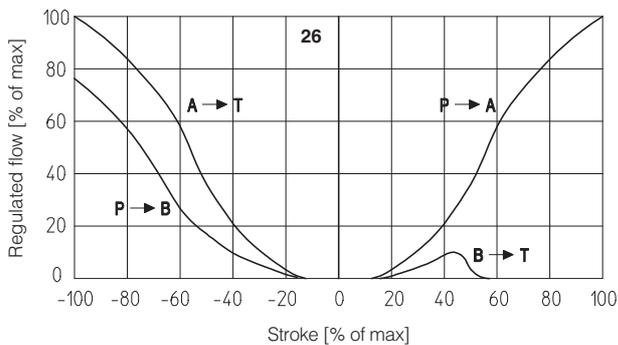
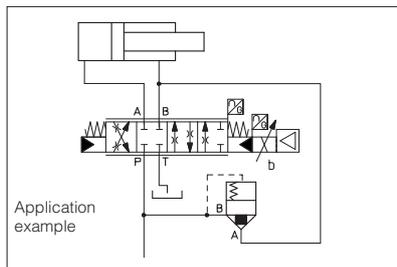
Hydraulic configuration vs. reference signal (standard and option /B)

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

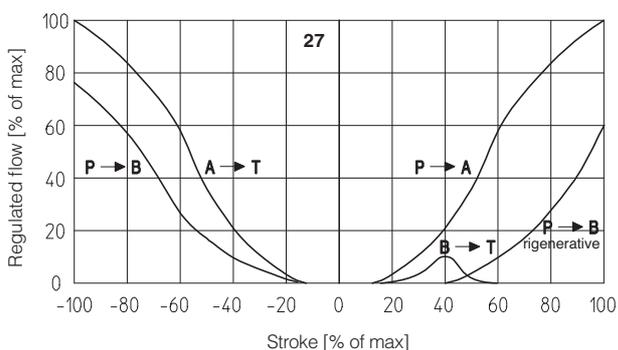
26 = differential - regenerative spool **D9**
(not available for valve size 32 and 35)

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



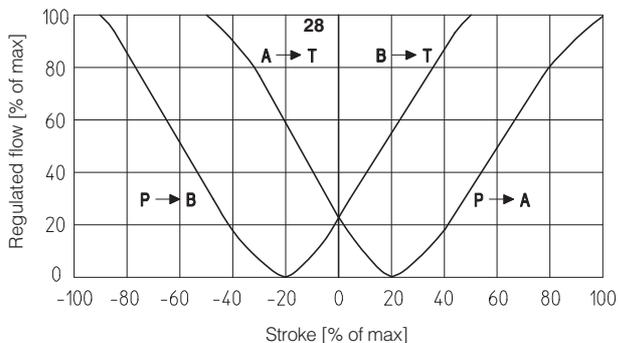
27 = linear - internal regenerative spool **L9**
(available only for valve size 16)

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



28 = linear spool **Q5**
(not available for valve size 32 and 35)

Q5 spool type is specific for alternate P/Q controls in combination with /S* option of digital integral drivers, (see tech. table **GS212**). It allows to control the pressure in A port or B port and it provides a safety central position (A-T/B-T) to depressurize the actuator chambers. The strong meter-in characteristic makes the spool suitable for both pressure control and motion regulations in several applications.

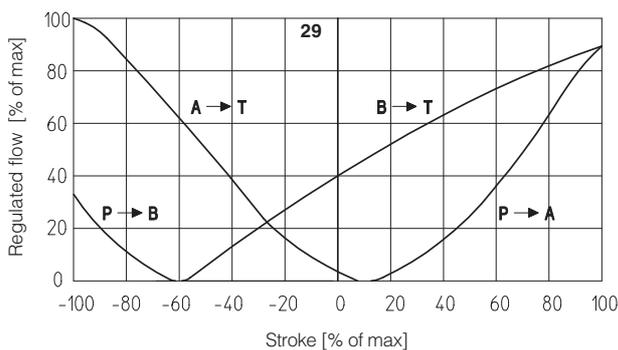


29 = differential - progressive spool **V9**

V9 spool type is specific for alternate P/Q controls in combination with S* option of digital integral drivers (see tech table **GS212**) or Z-ME-KZ/GI axis card (see tech table **G345**).

This spool is specially designed to manage the whole injection cycle in plastic machinery, thanks to the following specific features:

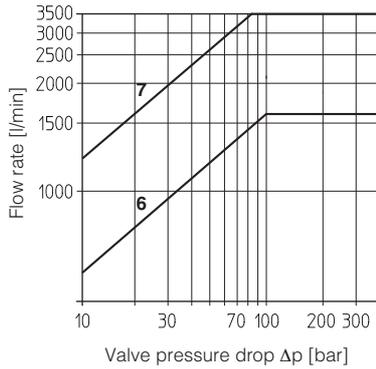
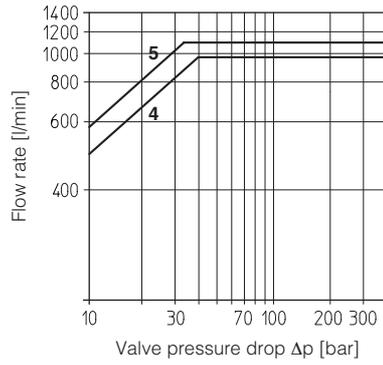
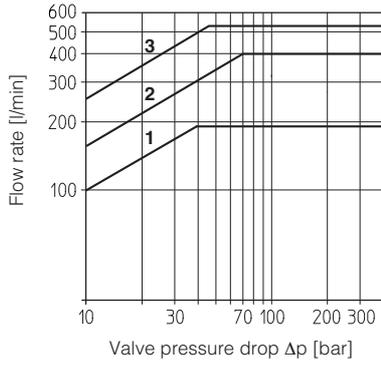
- strong meter-in characteristic to allow the pressure control in A port during the holding pressure (P-A) and the plasticizing (A-T) phases
- safety central position (A-T/B-T) to depressurize the actuator chambers
- large A-T and B-T flow capability, required during the plasticizing phase, to discharge big volumes from high differential injection cylinders with low pressure drops and permitting the contemporary oil suction from tank



9.2 Operating diagrams

Flow / Δp diagram

stated at 100% of spool stroke



DPZO-1:

1 = spools L5, S5, D5, DL5, D9, V9, Q5

DPZO-2:

2 = spools L3, S3, D3

3 = spools L5, S5, D5, DL5, D9, L9, V9, Q5

DPZO-4:

4 = spools L5, S5, D5, DL5, D9, V9, Q5

DPZO-4M:

5 = spools L5, S5, D5, DL5, D9, V9, Q5

DPZO-6:

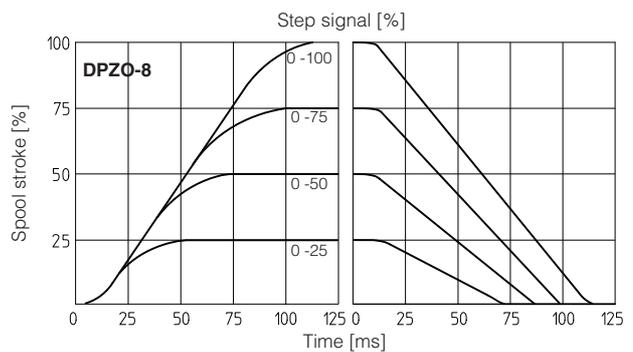
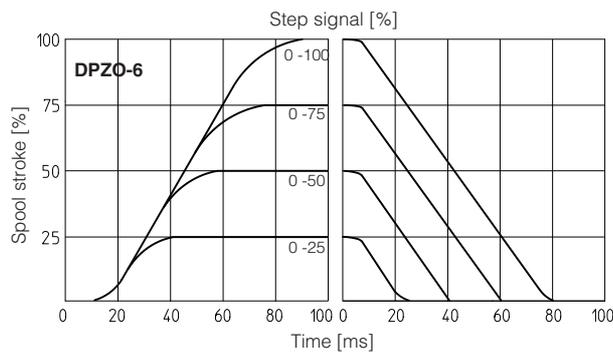
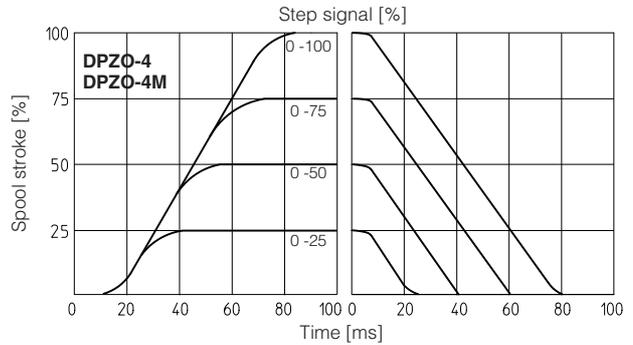
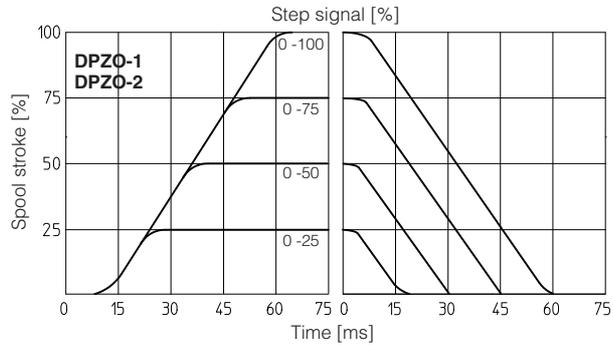
6 = L5, S5, D5, V9

DPZO-8:

7 = L5, S5, D5, V9

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

10.1 Option /B

Solenoid, integral electronics and position transducer at side of port B of the main stage.
For hydraulic configuration vs reference signal, see section 9.1

10.2 Option /G

Pressure reducing valve ③ with fixed setting, installed between pilot valve and main body. Reduced pressure setting:

40 bar for DPZO-1 and DPZO-2

100 bar for DPZO-4(M), DPZO-6 and DPZO-8

It is advisable for valves with internal pilot in case of system pressure higher than 200 bar.

Pressure reducing valve ③ is standard for DPZO-1, for other sizes add /G option.

10.3 Pilot and drain configuration

The pilot / drain configuration can be modified as shown in the functional scheme here aside, for detailed view of plugs position, see section 16

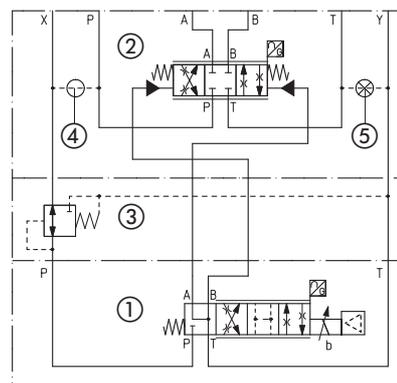
The valve's standard configuration provides internal pilot and external drain.

For different pilot / drain configuration select:

Option /E External pilot (through port X)

Option /D Internal drain (through port T)

FUNCTIONAL SCHEME - example of configuration 71



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

11 ELECTRONIC OPTIONS

Standard driver execution provides on the 7 pin main connector:

Power supply - 24 VDC must be appropriately stabilized or rectified and filtered; a 2,5 A safety fuse is required in series to each driver power supply. 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

Reference input signal - analog differential input with ± 10 VDC nominal range (pin D, E), proportional to desired valve spool position

Monitor output signal - analog output signal proportional to the actual valve's spool position with ± 10 VDC nominal range

A minimum time of 300 to 500 ms 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.

11.1 Option /F

It provides a Fault output signal in place of the Monitor output signal, to indicate fault conditions of the driver (cable interruption of spool transducers or reference signal - for /I option): Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC

11.2 Option /I

It provides 4 \div 20 mA current reference and monitor signals, instead of the standard ± 10 V.

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

11.3 Option /Q

It provides the possibility to enable or disable the valve functioning without cutting the power supply (the valve functioning is disabled but the driver current output stage is still active). To enable the driver supply a 24 VDC on the enable input signal.

11.4 Option /Z

It provides, on the 12 pin main connector, the following additional features:

Enable Input Signal

To enable the driver, supply 24 VDC on pin 3 referred to pin 2: when the Enable signal is set to zero the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active.

Fault Output Signal

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal cable broken for 4 \div 20mA input, etc.). Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC (pin 11 referred to pin 2): Fault status is not affected by the Enable input signal

Power supply for driver's logics and communication - only for LES

Separated power supply for the solenoid (pin 1, 2) and for the digital electronic circuits (pin 9, 10).

Cutting solenoid power supply allows to interrupt the valve functioning but keeping energized the digital electronics thus avoiding fault conditions of the machine fieldbus controller. This condition aids to realize safety systems in compliance with European Norms EN13849-1 (ex EN954-1).

11.5 Options /C - only for SP, SF, SL

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

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

11.6 Possible combined options

For **SN**: /FI, /IQ and /IZ

For **SP, SF, SL**: /CI

12 ELECTRONIC CONNECTIONS AND LEDS

12.1 Main connector signals - 7 pin - standard, /F and /Q options (A1)

| PIN | Standard | /Q | /F | TECHNICAL SPECIFICATIONS | NOTES |
|-----|--------------------------------|--------|-------|--|--|
| A | V+ | | | Power supply 24 Vdc | Input - power supply |
| B | V0 | | | Power supply 0 Vdc | Gnd - power supply |
| C | AGND | | AGND | Analog ground | Gnd - analog signal |
| | | ENABLE | | Enable (24 Vdc) or disable (0 Vdc) the valve, referred to V0 | Input - on/off signal |
| D | 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 |
| E | INPUT- | | | Negative reference input signal for Q_INPUT+ | Input - analog signal |
| F | Q_MONITOR referred to: AGND | V0 | | Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range Defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | | | FAULT | Fault (0 Vdc) or normal working (24 Vdc) | Output - on/off signal |
| G | EARTH | | | Internally connected to the driver housing | |

12.2 Main connector signals - 12 pin - /Z option and SP, SF, SL (A2)

| PIN | LEB-SN /Z | LES-SN /Z | LES-SP, SF, SL BC, BP, EH | SL NP | TECHNICAL SPECIFICATIONS | NOTES |
|-----|--------------------------------|-----------|-------------------------------|----------|--|--|
| 1 | V+ | | | | Power supply 24 Vdc | Input - power supply |
| 2 | V0 | | | | Power supply 0 Vdc | Gnd - power supply |
| 3 | ENABLE referred to: V0 | VL0 | VL0 | V0 | Enable (24 Vdc) or disable (0 Vdc) the valve | Input - on/off signal |
| 4 | 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 |
| 5 | INPUT- | | | | Negative reference input signal for Q_INPUT+ and F_INPUT+ | Input - analog signal |
| 6 | Q_MONITOR referred to: AGND | VL0 | VL0 | V0 | Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range Defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | AGND | | | | Analog ground | Gnd - analog signal |
| 7 | | NC | | | Do not connect | |
| | | | F_INPUT+ | | Pressure/Force 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 |
| 8 | R_ENABLE | | | | Repeat enable, output repeter signal of enable input, referred to V0 | Output - on/off signal |
| | | NC | | | Do not connect | |
| 9 | | | F_MONITOR referred to: VL0 | V0 | Pressure/Force monitor output signal: ± 10 Vdc / ± 20 mA maximum range Defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | NC | | | | Do not connect | |
| 10 | | VL+ | | | Power supply 24 Vdc for driver's logic and communication | Input - power supply |
| | | | D_IN0 | | Multiple pressure/force PID selection, referred to V0 | Input - analog signal |
| 11 | | | | | Do not connect | |
| | | VL0 | | | Power supply 0 Vdc for driver's logic and communication | Gnd - power supply |
| 11 | | | D_IN1 | | Multiple pressure/force PID selection (not available for SF), referred to V0 | Input - on/off signal |
| | FAULT referred to: V0 | VL0 | VL0 | VL0 | Fault (0 Vdc) or normal working (24 Vdc) | Output - on/off signal |
| PE | EARTH | | | | Internally connected to the driver housing | |

Note: do not disconnect VL0 before VL+ when the driver is connected to PC USB port

12.3 Communications connectors (B) - (C)

| (B) USB connector - M12 - 5 pin always present | | |
|--|---------|-------------------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | +5V_USB | Supply for external USB Flash Drive |
| 2 | ID | USB Flash Drive identification |
| 3 | GND_USB | Signal zero data line |
| 4 | D- | Data line - |
| 5 | D+ | Data line + |

| (C1) (C2) BP fieldbus execution, connector - M12 - 5 pin | | |
|--|--------|---------------------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | +5V | Termination supply signal |
| 2 | LINE-A | Bus line (high) |
| 3 | DGND | Data line and termination signal zero |
| 4 | LINE-B | Bus line (low) |
| 5 | SHIELD | |

Notes: (1) shield connection on connector's housing is recommended

| (C1) (C2) BC fieldbus execution, connector - M12 - 5 pin | | |
|--|----------|---|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | CAN_SHLD | Shield |
| 2 | not used | (C1) - (C2) pass-through connection (2) |
| 3 | CAN_GND | Signal zero data line |
| 4 | CAN_H | Bus line (high) |
| 5 | CAN_L | Bus line (low) |

| (C1) (C2) EH fieldbus execution, connector - M12 - 4 pin | | |
|--|--------|-----------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | TX+ | Transmitter |
| 2 | RX+ | Receiver |
| 3 | TX- | Transmitter |
| 4 | RX- | Receiver |
| Housing | SHIELD | |

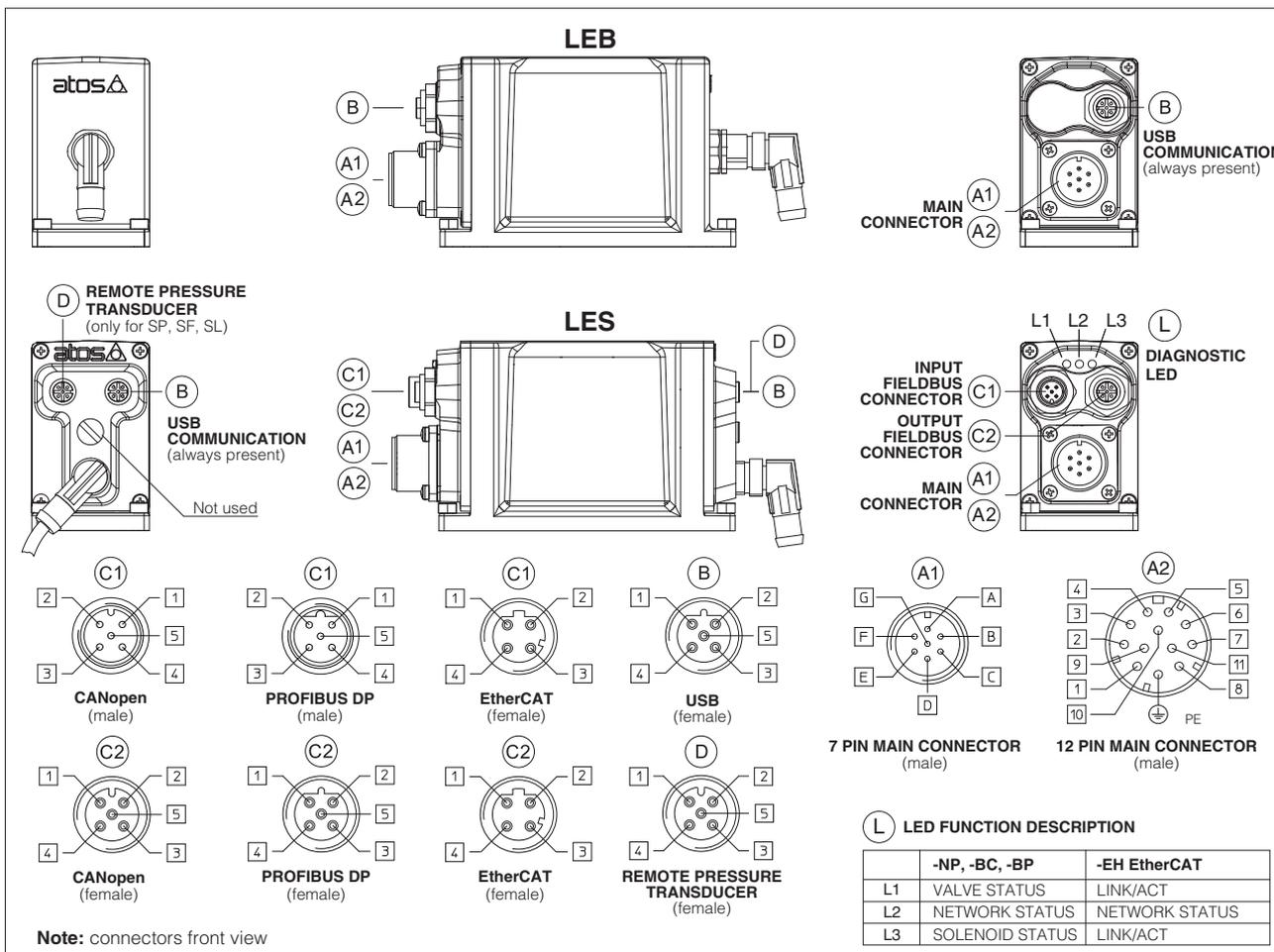
(2): pin 2 can be fed with external +5V supply of CAN interface

12.4 Remote pressure/force transducer connector - M12 - 5 pin - only for SP, SF, SL (D)

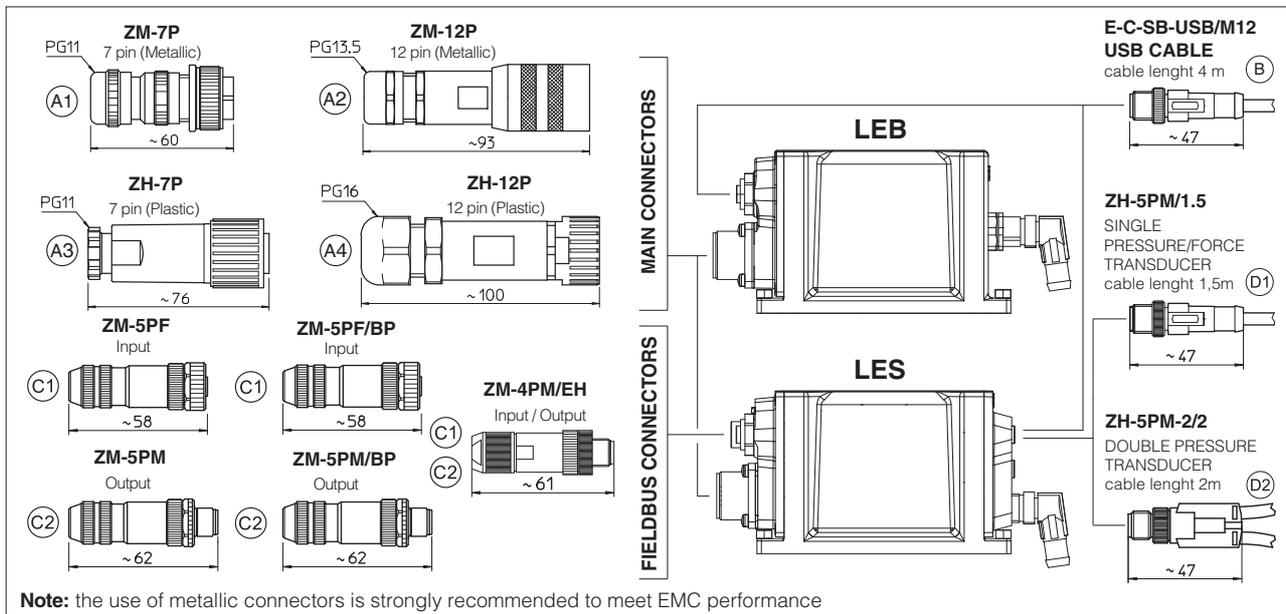
| PIN | SIGNAL | TECHNICAL SPECIFICATION | Single transducer (1) | | Double transducers (1) | |
|-----|---------|---|-----------------------|---------|------------------------|---------|
| | | | Voltage | Current | Voltage | Current |
| 1 | VF +24V | Power supply +24Vdc | Connect | Connect | Connect | Connect |
| 2 | TR1 | 1st signal transducer: ± 10 Vdc / ± 20 mA maximum range, software selectable Defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /C option | Connect | Connect | Connect | Connect |
| 3 | AGND | Common GND for transducer power and signals | Connect | / | Connect | / |
| 4 | TR2 | 2nd signal transducer: ± 10 Vdc / ± 20 mA maximum range, software selectable Defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /C option | / | / | Connect | Connect |
| 5 | NC | Not connect | / | / | / | / |

Note (1) single/double transducer configuration is software selectable

12.5 Connections layout



13 CONNECTORS



14 MODEL CODES OF MAIN CONNECTORS AND COMMUNICATION CONNECTORS - to be ordered separately

| VALVE VERSION | LEB LES | LEB /Z LES /Z | CANopen (BC) | PROFIBUS DP (BP) | EtherCat (EH) | P/Q controls SP, SL, SF |
|-------------------|---------------------------|------------------|-----------------|---------------------|------------------|----------------------------|
| CONNECTOR CODE | ZM-7P (A1) | ZM-12P (A2) | ZM-5PF (C1) | ZM-5PF/BP (C1) | ZM-4PM/EH (C1) | ZH-5PM/1.5 (1) (D1) |
| | ZH-7P (A3) | ZH-12P (A4) | ZM-5PM (C2) | ZM-5PM/BP (C2) | ZM-4PM/EH (C2) | ZH-5PM-2/2 (2) (D2) |
| PROTECTION DEGREE | IP67 | | | | | |
| DATA SHEET | GS208, GS210, GS212, K500 | | | | | |

only for LES

(1) only for SP or SL

(2) only for SF

15 PROGRAMMING TOOLS - see table **GS500**



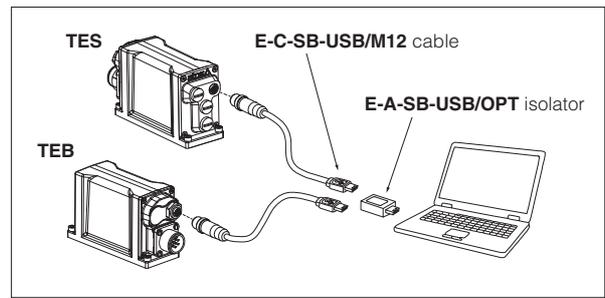
Valve's functional parameters and configurations, can be easily set and optimized using Atos E-SW programming software connected via USB communication port to the digital driver. E-SW software is available in different versions according to the driver's fieldbus interface:
 NP (not present) E-SW-PS, BC (CANopen) E-SW-BC, BP (PROFIBUS DP) E-SW-BP and EH (EtherCAT) E-SW-EH.

For fieldbus versions, E-SW software permits valve's parameterization through USB communication port also if the driver is connected to the central machine unit via fieldbus.

WARNING: drivers USB port is not isolated!

Use of E-A-SB-USB/OPT isolator adapter is highly recommended for PC protection.

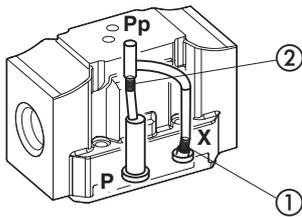
USB connection



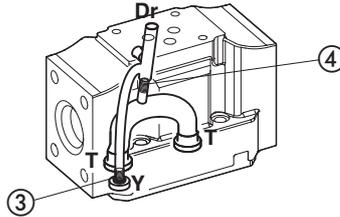
16 PLUGS LOCATION FOR PILOT/DRAIN CHANNELS

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.

DPZO-1 Pilot channels

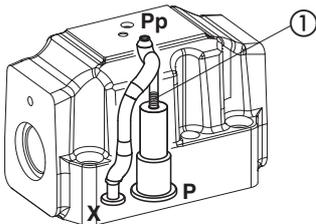


Drain channels

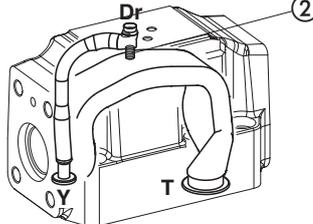


Internal piloting: blinded plug SP-X300F ① in X;
External piloting: blinded plug SP-X300F ② in Pp;
Internal drain: blinded plug SP-X300F ③ in Y;
External drain: blinded plug SP-X300F ④ in Dr.

DPZO-2 Pilot channels

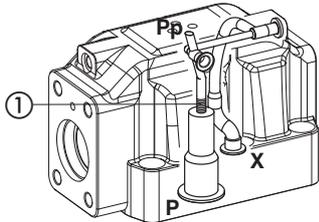


Drain channels

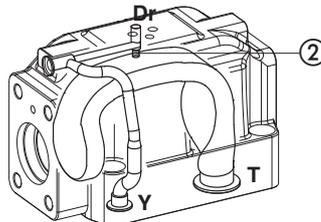


Internal piloting: Without blinded plug SP-X300F ①;
External piloting: Add blinded plug SP-X300F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

DPZO-4 Pilot channels

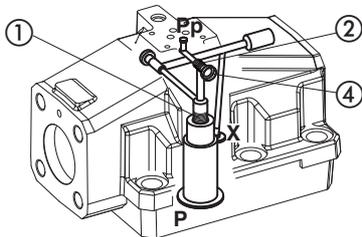


Drain channels

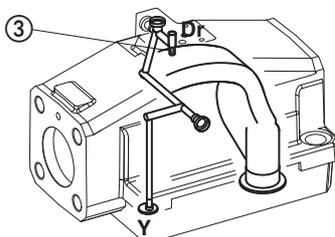


Internal piloting: Without blinded plug SP-X500F ①;
External piloting: Add blinded plug SP-X500F ①;
Internal drain: Without blinded plug SP-X300F ②;
External drain: Add blinded plug SP-X300F ②.

DPZO-6 Pilot channels

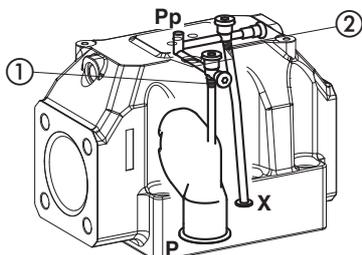


Drain channels

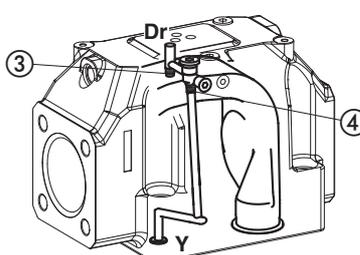


Internal piloting: Without plug ①;
External piloting: Add DIN-908 M16x1,5 in pos ①;
Internal drain: Without blinded plug SP-X300F ③;
External drain: Add blinded plug SP-X300F ③.

DPZO-8 Pilot channels

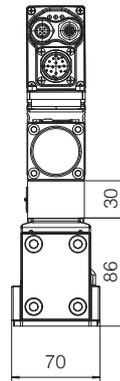
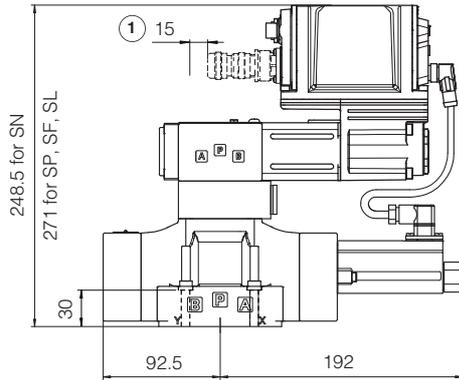


Drain channels



Internal piloting: Without plug ①;
External piloting: Add NPTF 1/8 in pos ①;
 plug NPTF 1/8 in pos ②;
Internal drain: Without plug NPTF 1/8 in pos ③;
 Add plug NPTF 1/8 in pos ④;
External drain: Add plug NPTF 1/8 in pos ③.

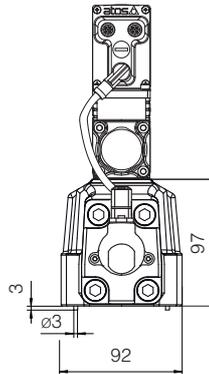
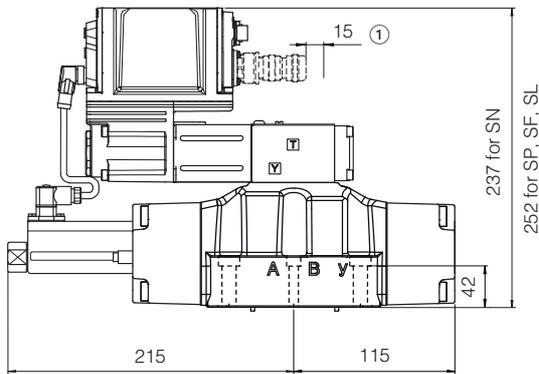
DPZO-LEB-*-1
DPZO-LES-*-1



ISO 4401: 2005
Mounting surface: 4401-05-05-0-05
(see table P005)
Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm
Seals: 5 OR 2050; 2 OR 108
Diameter of ports A, B, P, T: $\varnothing = 11$ mm;
Diameter of ports X, Y: $\varnothing = 5$ mm;

Mass 9,5 kg

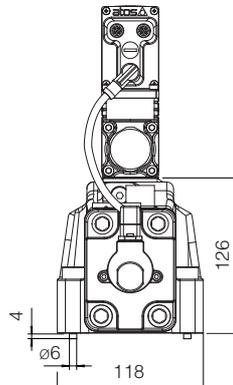
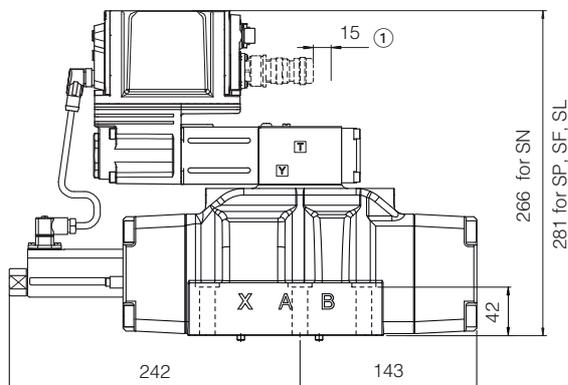
DPZO-LEB-*-2
DPZO-LES-*-2



ISO 4401: 2005
Mounting surface: 4401-07-07-0-05
(see table P005)
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
Seals: 4 OR 130; 2 OR 2043
Diameter of ports A, B, P, T: $\varnothing = 20$ mm;
Diameter of ports X, Y: $\varnothing = 7$ mm;

Mass 14 kg

DPZO-LEB-*-4
DPZO-LES-*-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

DPZO-4
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;

DPZO-4M
Seals: 4 OR 4131; 2 OR 3056
Diameter of ports A, B, P, T: $\varnothing = 32$ mm;
Diameter of ports X, Y: $\varnothing = 7$ mm;

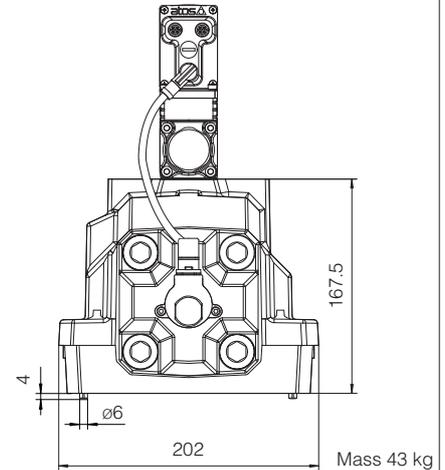
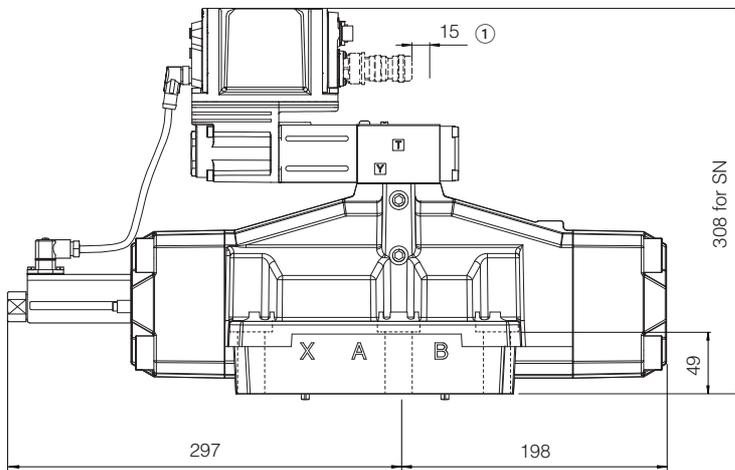
Mass 19 kg

① = Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 13, 14

Note: the overall height is increased by 40 mm for /G option (0,9 kg).
For option /B the proportional solenoid, the position transducer and the electronics are at side of port B of the main stage.

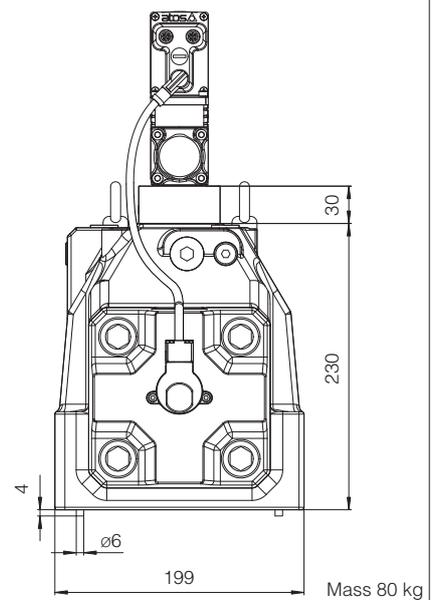
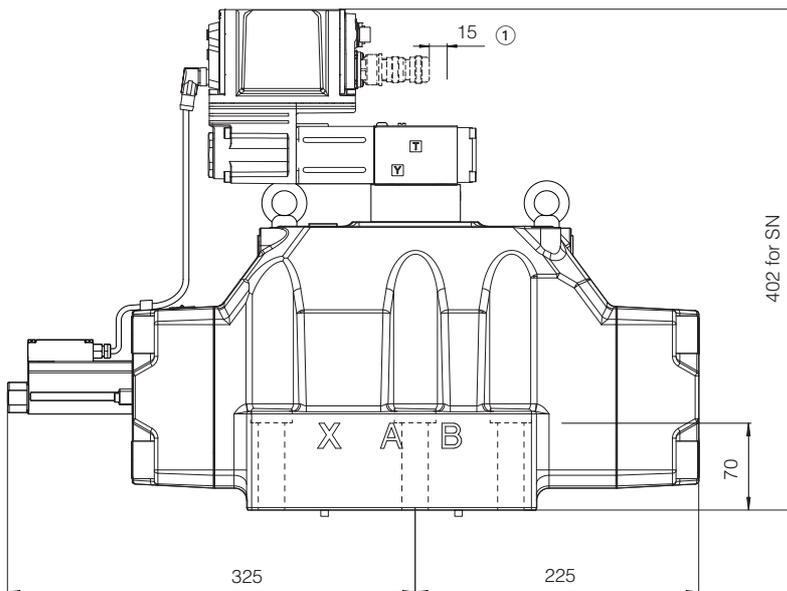
DPZO-LEB-*-6
DPZO-LES-*-6

ISO 4401: 2005
Mounting surface: 4401-10-09-0-05
 (see table P005)
 Fastening bolts:
 6 socket head screws M20x90 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



DPZO-LEB-*-8
DPZO-LES-*-8

ISO 4401: 2005
Mounting surface: 4401-10-09-0-05
 (see table P005)
 Fastening bolts:
 6 socket head screws M20x100 class 12.9
 Tightening torque = 600 Nm
 Diameter of ports A, B, P, T: $\varnothing = 50$ mm;
 Diameter of ports X, Y: $\varnothing = 9$ mm;
 Seals: 4 OR 156, 2 OR 3056



① = Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 13, 14

Note: the overall height is increased by 40 mm for /G option (0,9 kg).
 For option /B the proportional solenoid, the position transducer and the electronics are at side of port B of the main stage.