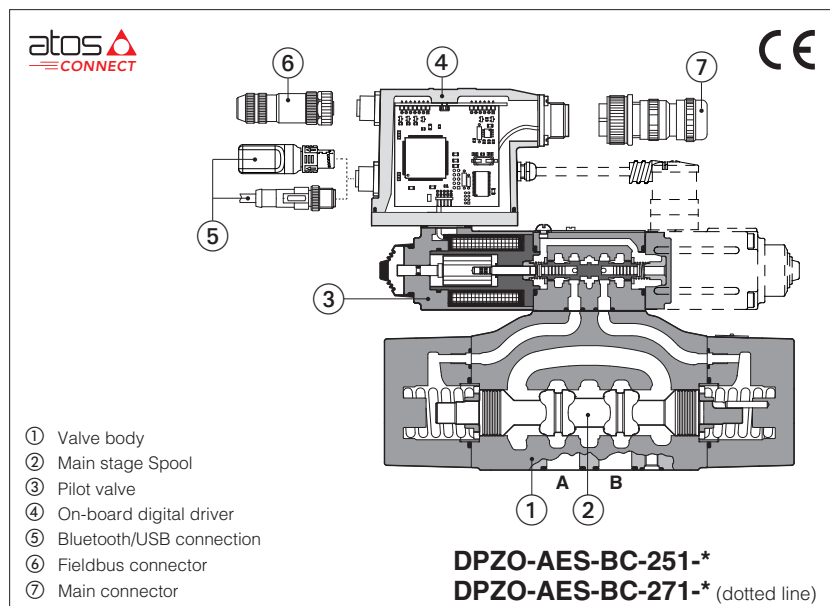


Digital proportional directional valves

piloted, without transducer, with positive spool overlap



DPZO-A, DPZO-AEB, DPZO-AES

Digital proportional valves without position transducer and with positive spool overlap, for open loop directional controls and not compensated flow regulations.

A to be coupled with off-board drivers.

AEB basic execution, with on-board digital driver, with analog reference signal or IO-Link interface for digital reference signal, valve settings, and real-time diagnostics.

AES full execution, with on-board digital driver which includes also fieldbus interfaces for digital reference signal, valve settings, and real-time diagnostics.

For **AEB** and **AES**, Bluetooth/USB connection is always present for valve settings via mobile App and Atos PC software.

Size: **10 ÷ 32** - ISO 4401

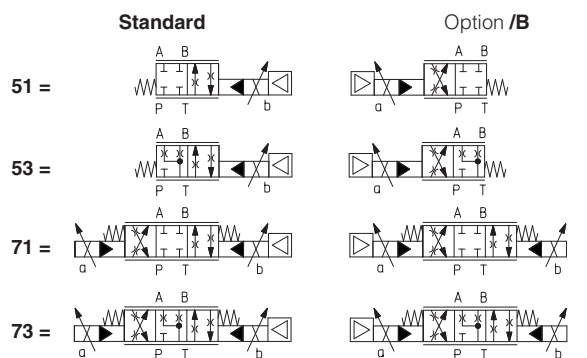
Max flow: **180 ÷ 1500 l/min**

Max pressure: **350 bar**

1 MODEL CODE

DPZO	-	AES	-	BC	-	2	71	-	L	5	/	*	/	*	/	*	/	*	/	*	
Proportional directional valve, piloted																					
A = off-board driver, see section [2] AEB = basic on-board digital driver AES = full on-board digital driver																					
IO-Link interface , only for AEB, see section [6] : NP = Not present IL = IO-Link Fieldbus interfaces , only for AES, see section [7] : BC = CANopen EH = EtherCAT BP = PROFIBUS DP																					
Valve size ISO 4401: 1 = 10 2 = 16 4 = 25 6 = 32																					
																	Series number	Seals material , see section [11] : - = NBR PE = FKM BT = NBR low temp.			
																	Coil voltage , only for A - see section [16] : - = standard coil for 24Vdc Atos drivers 6 = optional coil for 12Vdc Atos drivers 18 = optional coil for low current drivers				
																	Bluetooth option , only for AEB and AES , see section [5] : T = Bluetooth adapter supplied with the valve				

Configuration (1):



Spool type, regulating characteristics, see section [12]:

L = linear **S** = progressive **D** = differential-progressive
 P-A = Q, B-T = Q/2
 P-B = Q/2, A-T = Q

Hydraulic options (2):

B = solenoid and on-board digital driver at side of port B of the main stage (side A of pilot valve)

D = internal drain

E = external pilot pressure

G = pressure reducing valve for piloting

Electronic options (3), only for AEB and AES:

C = current feedback for pressure transducer 4÷20 mA (only for **W**)

I = current reference input 4÷20 mA

Q = enable signal

Z = double power supply, enable, fault and monitor signals -12 pin connector

W = power limitation function

Spool size: 3 (L,S,D) 5 (L,S,D)

DPZO-1 =	-	100
DPZO-2 =	160	250
DPZO-4 =	-	480
DPZO-6 =	-	640

Nominal flow (l/min) at Δp 10bar P-T (see section [9])

(1) Hydraulic symbols are represented with on-board digital driver

(2) For possible combined options, see section [15]

(3) /I, /Q, /Z options not available for AEB-IL

2 OFF-BOARD ELECTRONIC DRIVERS - only for A

Drivers model	E-MI-AC-01F		E-MI-AS-IR		E-BM-AS-PS		E-BM-AES
Type	Analog		Digital				
Voltage supply (Vbc)	12	24	12	24	12	24	24
Valve coil option	/6	std	/6	std	/6	std	std
Format	plug-in to solenoid				DIN-rail panel		
Tech table	G010		G020		G030		GS050

3 GENERAL NOTES

Atos digital proportionals valves are CE marked according to the applicable directives (e.g. Immunity and Emission EMC Directive). Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in tech table **FS900** and in the user manuals included in the E-SW-SETUP programming software.

4 VALVE SETTINGS AND PROGRAMMING TOOLS - see tech. table GS500

4.1 Atos CONNECT mobile App

Free downloadable App for smartphones and tablets which allows quick access to valve main functional parameters and basic diagnostic information via Bluetooth, thus avoiding physical cable connection and significantly reducing commissioning time. Atos CONNECT supports Atos digital valve drivers equipped with E-A-BTH adapter or with built-in Bluetooth. It does not support valves with p/Q control or axis controls.



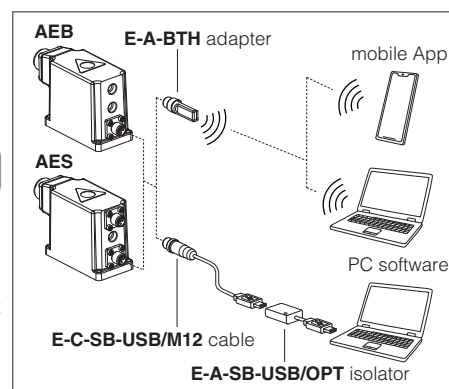
4.2 E-SW-SETUP PC software

Free downloadable software for PC allows to set all valve functional parameters and to access complete diagnostic information of digital valve drivers via Bluetooth/USB service port. Atos E-SW-SETUP PC software supports all Atos digital valve drivers and it is available at www.atos.com in MyAtos area.



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

Bluetooth or USB connection



5 BLUETOOTH OPTION - see tech. table GS500

T option adds Bluetooth® connectivity to Atos valve drivers thanks to E-A-BTH adapter, which can be left permanently installed on-board, to allow the Bluetooth connection with the valve drivers at any time. E-A-BTH adapter can also be purchased separately and used to connect with any supported Atos digital product.

Bluetooth connection to the valve can be protected against unauthorised access by setting a personal password. The adapter leds visually indicates the status of valve driver and Bluetooth connection.



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

T option is not available for the Indian market, so the Bluetooth adapter must be ordered separately.

6 IO-LINK - only for AEB, see tech. table GS520

IO-Link allows low cost digital communication between the valve and machine central unit. The valve is directly connected to a port of an IO-Link master (point-to-point connection) via low-cost unshielded cables for digital reference, diagnostic and settings. The IO-Link master works as a hub exchanging this information with the machine central unit via fieldbus.

7 FIELDBUS - only for AES, see tech. table GS510

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

8 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, for further details see technical table P007
Ambient temperature range	A: Standard = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ / /PE option = $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$ / /BT option = $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$ AEB, AES: 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	A: Standard = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ / /PE option = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ / /BT option = $-40^{\circ}\text{C} \div +70^{\circ}\text{C}$ AEB, AES: 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, galvanic treatment (driver housing for AEB and AES)
Corrosion resistance	Salt spray test (EN ISO 9227) > 200 h
Vibration resistance	See technical table G004 (for AEB and AES)
Compliance	CE according to EMC directive 2014/30/EU (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

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

Valve model	DPZO-*-1	DPZO-*-2	DPZO-*-4	DPZO-*-6
Pressure limits [bar]	ports P, A, B, X = 350; T = 250 (10 with internal drain /D) Y = 10			
Spool type and size	L5, S5, D5	L3, S3, D3	L5, S5, D5	
Nominal flow Δp P-T [l/min] (1)				
Δp = 10 bar	100	160	250	480
Δp = 30 bar	160	270	430	830
Max permissible flow	180	400	550	900
Piloting pressure [bar]	min = 25; max = 350 (option /G advisable for pilot pressure > 150 bar)			
Piloting volume [cm ³]	1,4	3,7	9,0	21,6
Piloting flow (2) [l/min]	1,7	3,7	6,8	14,4
Leakage (3) [l/min]	0,15 / 0,5	0,2 / 0,6	0,3 / 1,0	1,0 / 3,0
Response time (4) [ms]	≤ 80	≤ 100	≤ 120	≤ 180
Hysteresis	≤ 5 [% of max regulation]			
Repeatability	± 1 [% of max regulation]			

Note: above performance data refer to valves coupled with Atos electronic drivers, see section **[2]**

(1) For different Δp , the max flow is in accordance to the diagrams in section 12.2

(3) At $p = 100/350$ bar

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

(4) 0-100% step signal

10 ELECTRICAL CHARACTERISTICS

Power supplies	Nominal : +24 VDC Rectified and filtered : VRMS = 20 ÷ 32 VMAX (ripple max 10 % VPP)				
Max power consumption	A = 30 W AEB, AES = 50 W				
Coil voltage code	standard	option /6	option /18		
Max. solenoid current	2,2 A	2,75 A	1 A		
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω		
Analog input signals	Voltage: range ±10 VDC (24 VMAX tolerant) Input impedance: Ri > 50 kΩ Current: range ±20 mA Input impedance: Ri = 500 Ω				
Monitor output	Output range: voltage ±5 VDC @ max 5 mA				
Enable input	Range: 0 ÷ 9 Vdc (OFF state), 15 ÷ 24 VDC (ON state), 9 ÷ 15 VDC (not accepted); Input impedance: Ri > 87 kΩ				
Fault output	Output range : 0 ÷ 24 VDC (ON state ≡ VL+ [logic power supply] ; OFF state ≡ 0 V) @ max 50 mA; external negative voltage not allowed (e.g. due to inductive loads)				
Pressure transducer power supply (only for /W option)	+24Vdc @ max 100 mA (E-ATR-8 see tech table GS465)				
Alarms	Solenoid not connected/short circuit, cable break with current reference signal, over/under temperature, current control monitoring, power supplies level, pressure transducer failure (/W option)				
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	A = IP65; AEB, AES = IP66 / IP67 with mating connectors				
Duty factor	Continuous rating (ED=100%)				
Tropicalization	Tropical coating on electronics PCB				
Additional characteristics	Short circuit protection of solenoid's current supply; current control by P.I.D. with rapid solenoid switching; protection against reverse polarity of power supply				
Communication interface	USB Atos ASCII coding	IO-Link Interface and System Specification 1.1.3	CANopen EN50325-4 + DS408	PROFIBUS DP EN50170-2/IEC61158	EtherCAT IEC 61158
Communication physical layer	not insulated USB 2.0+USB OTG	SDCI class port B	optical insulated CAN ISO11898	optical insulated RS485	Fast Ethernet, insulated 100 Base TX
Recommended wiring cable	LiYCY shielded cables, see section 20				

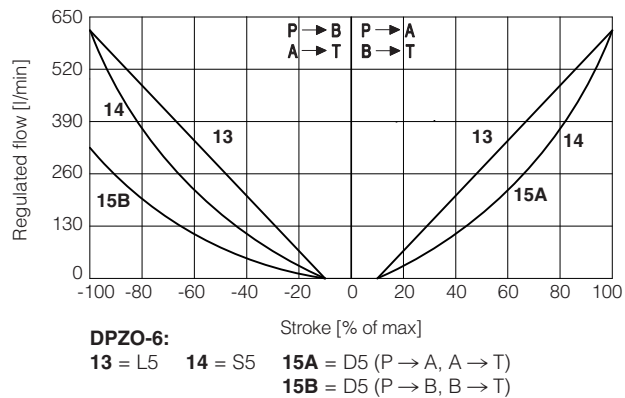
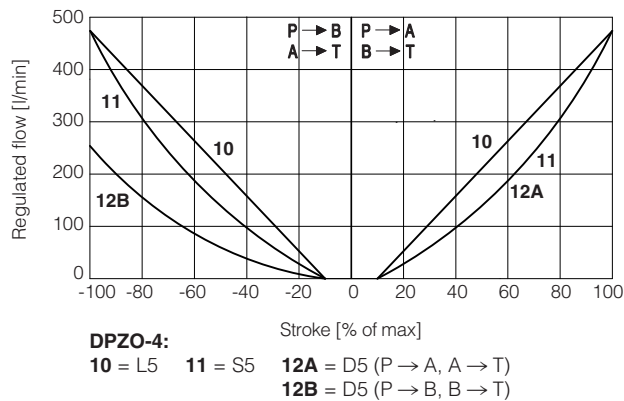
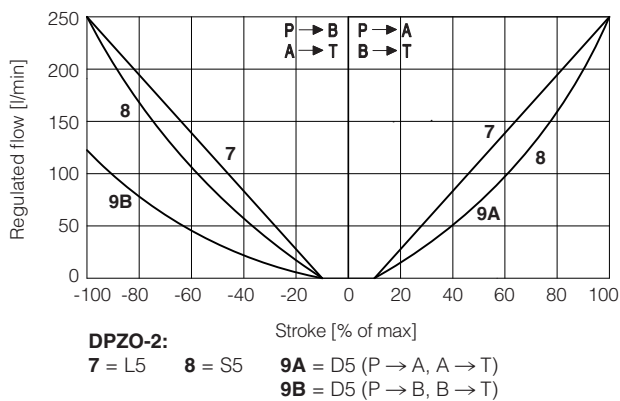
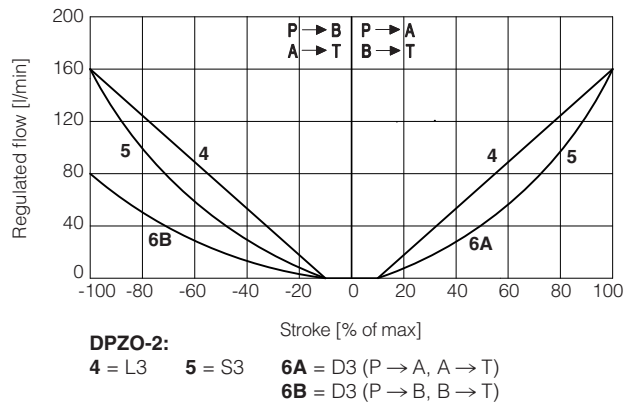
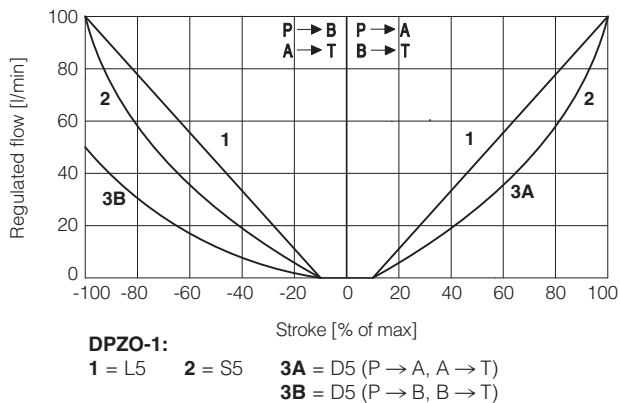
Note: a maximum time of 500 ms (depending on communication type) has to be considered between the driver energizing with the 24 VDC power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

11 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 (+80°C for A), with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C NBR low temp. seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C		
Recommended viscosity	20 ÷ 100 mm ² /s - max allowed range 15 ÷ 380 mm ² /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, NBR low temp.	HL, HLP, HLPD, HVLP, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, NBR low temp.	HFC	

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

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



Note: Hydraulic configuration vs. reference signal for configuration 71 and 73 (standard and option /B)

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

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

12.2 Flow / Δp diagram

stated at 100% of spool stroke

DPZO-1:

1 = spools L5, S5, D5

DPZO-2:

2 = spools L3, S3, D3

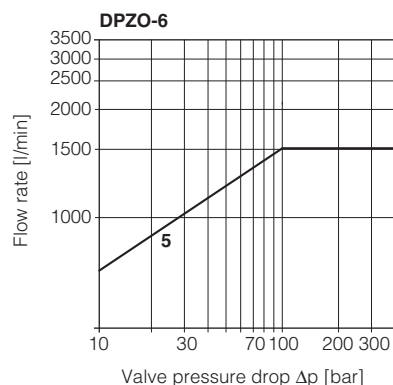
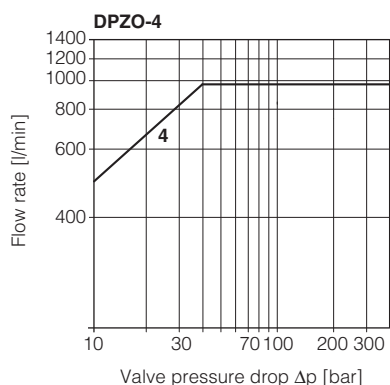
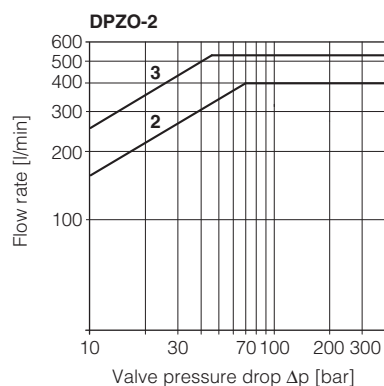
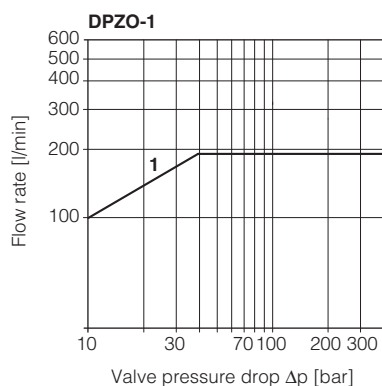
3 = spools L5, S5, D5

DPZO-4:

4 = spools L5, S5, D5

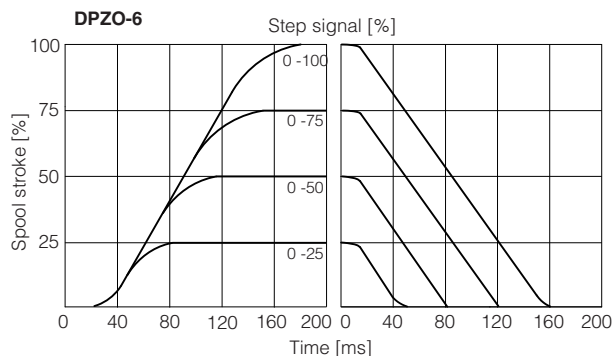
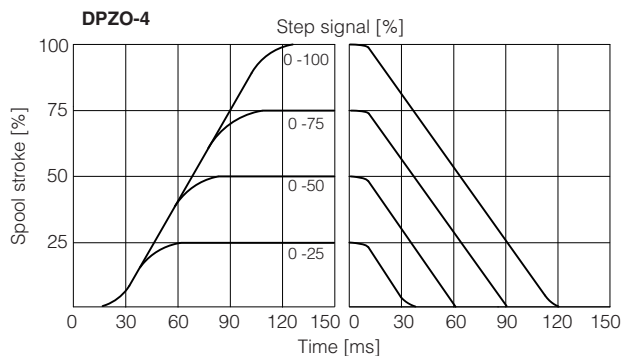
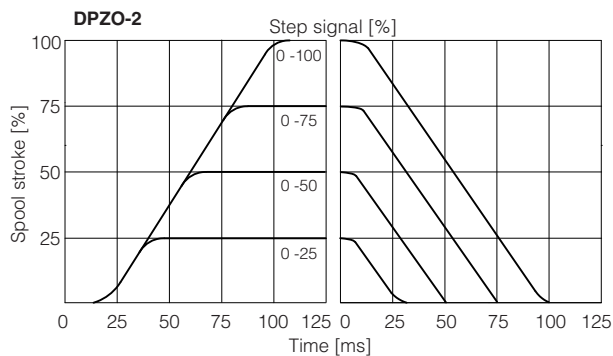
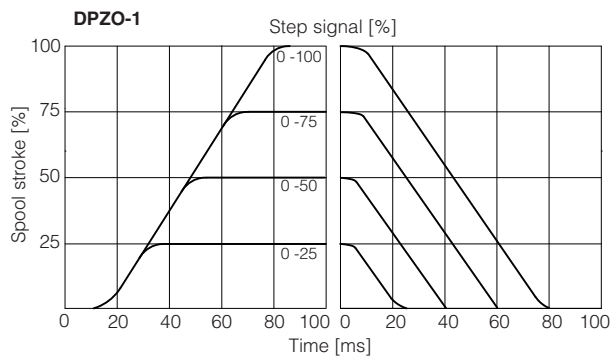
DPZO-6:

5 = spools L5, S5, D5



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

The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.

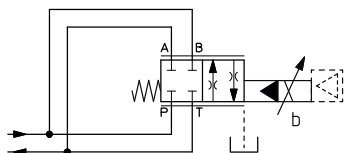


12.4 Operation as throttle valve

Single solenoid valves (*51) can be used as simple throttle valves:

$P_{max} = 250$ bar

For this application, the use of valve -TEB or -TES (see tab. FS172) is advisable (consult our technical office)



DPZO-*	151-L5	251-L5	451-L5	651-L5
Max flow [l/min]	320	860	1600	2200
$\Delta p = 15$ bar				

13 HYDRAULIC OPTIONS

- B** = DPZO-*-5 = solenoid and on-board digital driver at side B of the main stage (side A of pilot valve).
DPZO-*-7 = on-board digital driver at side of port B of the main stage (side A of pilot valve).
- D** = Internal drain.
Pilot and drain configuration can be modified as shown in section 21.
The valve's standard configuration provides internal pilot and external drain.
- E** = External pilot (through port X).
Pilot and drain configuration can be modified as shown in section 21.
The valve's standard configuration provides internal pilot and external drain.
- G** = Pressure reducing valve installed between pilot valve and main body with fixed setting:
DPZO-1 and DPZO-2 = **30 bar**
DPZO-4 and DPZO-6 = **100 bar**
It is advisable for valves with internal pilot in case of system pressure higher than 150 bar.

14 ELECTRONIC OPTIONS - only for AEB and AES

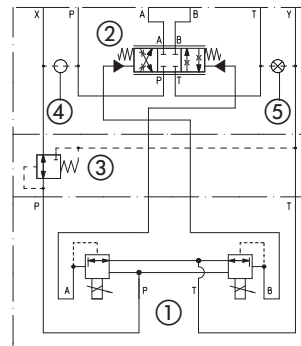
- I** = This option provides $4 \div 20$ mA current reference, instead of the standard ± 10 VDC.
Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 VDC or ± 20 mA.
It is normally used in case of long distance between the machine control 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.
Note: **/I** option not available for **AEB-IL**.
- Q** = This option permits to inhibit the valve function without removing the power supply to the driver. Upon disable command the current to the solenoid is zeroed and the valve's spool moves to rest position. The option **/Q** is suggested for all cases where the valve has to be frequently inhibited during the machine cycle – see 17.5 for signal specifications.
Note: **/Q** option not available for **AEB-IL**.
- Z** = This option provides, on the 12 pin main connector, the following additional features:
Fault output signal - see 17.6
Enable input signal - see above option **/Q**
Power supply for driver's logics and communication - see 17.2
Note: **/Z** option not available for **AEB-IL**.
- C** = Only in combination with option **/W**
This option is available to connect pressure transducers with $4 \div 20$ mA current output signal, instead of the standard $0 \div 10$ Vdc.
Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 Vdc or ± 20 mA.
- W** = Only for valves coupled with pressure compensator, see tech table **D150**.
It provides the hydraulic power limitation function. The driver receives the flow reference signal by the analog input INPUT+ and a pressure transducer, installed in the hydraulic system, has to be connected to the driver's analog input TR. When the actual requested hydraulic power **p x Q** (TR x INPUT+) reaches the max power limit ($p_1 \times Q_1$), internally set by software, the driver automatically reduces the flow regulation of the valve. The higher is the pressure feedback the lower is the valve's regulated flow:

$$\text{Flow regulation} = \min \left(\frac{\text{PowerLimit [sw setting]}}{\text{Transducer Pressure [TR]}} ; \text{Flow Reference [INPUT+]} \right)$$

Notes: for **AEB-IL** the drive receives the flow reference signal directly by IO-Link interface
for **AES** the drive can receive the flow reference signal directly by fieldbus interface

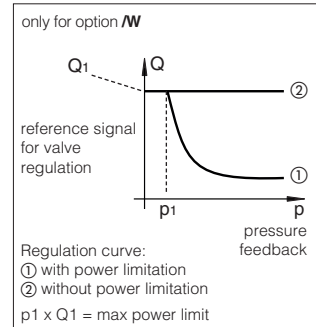
Functional Scheme

Example of configuration 7*
3 positions, spring centered



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

Hydraulic Power Limitation



15 POSSIBLE COMBINED OPTIONS

For **AEB-NP** and **AES**

Hydraulic options: all combinations possible

Electronic options: /IQ, /IZ, /IW, /CW, /CWI

For **AEB-IL**

Hydraulic options: all combinations possible

Electronic options: /CW

Note: **/T** Bluetooth adapter option can be combined with all other options

16 COIL VOLTAGE OPTIONS - only for A

6 = Optional coil to be used with Atos drivers with power supply 12 VDC.

18 = Optional coil to be used with electronic drivers not supplied by Atos, with power supply 24 VDC and with max current limited to 1A.

17 POWER SUPPLY AND SIGNALS SPECIFICATIONS - only for AEB and AES

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, ISO 4413).

For AEB-IL see section 18 for IO-Link signals specifications and see 17.7 for pressure transducer signal for /W option.

17.1 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. In case of separate power supply see 17.2.



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

17.2 Power supply for driver's logic and communication (VL+ and VL0) - only for /Z and /W options

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 9 and 10, 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.

17.3 Reference input signal (INPUT+)

The driver controls in closed loop the current to the valve 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 (BC, BP, EH) can be software set to receive reference signal directly from the machine control unit (fieldbus reference).

17.4 Monitor output signals (MONITOR and MONITOR2)

The driver generates an analog output signal (MONITOR) proportional to the actual coil current 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).

Monitor output signal is factory preset according to selected valve code, default settings is ± 5 Vdc (1V = 1A).

Output signal can be reconfigured via software, within a maximum range of ± 5 Vdc.

Option /W

The driver generates a second analog output signal (MONITOR2) proportional to the actual system pressure.

The output maximum range is ± 5 Vdc; default setting is $0 \div 5$ Vdc.

17.5 Enable input signal (ENABLE) - not for standard

To enable the driver, supply a 24 Vdc on pin 3 (pin C): 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.

17.6 Fault output signal (FAULT) - only for /Z and /W options

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal broken for $4 \div 20$ mA input, etc.).

Fault presence corresponds to 0 Vdc, normal working corresponds to 24 Vdc.

Fault status is not affected by the Enable input signal.

17.7 Remote pressure transducer input signal (TR) - only for /W option

Analog pressure transducers can be directly connected to the driver (see 19.5).

Analog input signal is factory preset according to selected driver code, defaults are $0 \div 10$ 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.

Note: transducer feedback can be read as a digital information through fieldbus and IO-Link communication - software selectable.

18 IO-LINK SIGNALS SPECIFICATIONS - only for AEB-IL

18.1 Power supply for IO-Link communication (L+ and L-)

The IO-Link master provides dedicated 24 Vdc power supply for IO-Link communication.

Maximum power consumption: 2 W

Internal electrical isolation of power L+, L- from P24, N24

18.2 Power supply for driver's logic and valve regulation (P24 and N24)

The IO-Link master provides dedicated 24 Vdc power supply for valve regulation, logics and diagnostics.

Maximum power consumption: 50 W

Internal electrical isolation of power P24, N24 from L+, L-

18.3 IO-Link data line (C/Q)

C/Q signal is used to establish communication between IO-Link master and valve.

19 ELECTRONIC CONNECTIONS

19.1 Main connector signals - 7 pin (A1) Standard and /Q option - for AEB-NP and AES

PIN	Standard	/Q	TECHNICAL SPECIFICATIONS	NOTES
A	V+		Power supply 24 Vdc	Input - power supply
B	V0		Power supply 0 Vdc	Gnd - power supply
C	AGND		Analog ground	Gnd - analog signal
		ENABLE	Enable (24 Vdc) or disable (0 Vdc) the driver, referred to V0	Input - on/off signal
D	INPUT+		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 INPUT+	Input - analog signal
F	MONITOR referred to: AGND V0		Monitor output signal: ± 5 Vdc maximum range Default is ± 5 Vdc (1V = 1A)	Output - analog signal Software selectable
G	EARTH		Internally connected to driver housing	

19.2 Main connector signals - 12 pin (A2) /Z and /W options - for AEB-NP and AES

PIN	/Z	/W	TECHNICAL SPECIFICATIONS	NOTES
1	V+		Power supply 24 Vdc	Input - power supply
2	V0		Power supply 0 Vdc	Gnd - power supply
3	ENABLE		Enable (24 Vdc) or disable (0 Vdc) the driver, referred to V0	Input - on/off signal
4	INPUT+		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 INPUT+	Input - analog signal
6	MONITOR		Monitor output signal: ± 5 Vdc maximum range, referred to V0 Default is ± 5 Vdc (1V = 1A)	Output - analog signal Software selectable
7	NC		Do not connect	
8	NC		Do not connect	
		MONITOR2	2nd monitor output signal: ± 5 Vdc maximum range, referred to V0. Default is $0 \div 5$ Vdc	Output - analog signal
9	VL+		Power supply 24 Vdc for driver's logic and communication	Input - power supply
10	V0		Power supply 0 Vdc for driver's logic and communication	Gnd - power supply
11	FAULT		Fault (0 Vdc) or normal working (24 Vdc), referred to V0	Output - on/off signal
PE	EARTH		Internally connected to driver housing	

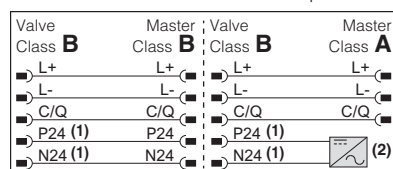
Note: do not disconnect V0 before VL+ when the driver is connected to PC USB port

19.3 IO-Link connector signals - M12 - 5 pin - Coding A, port class B (A) only for AEB-IL

PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
1	L+	Power supply 24 Vdc for IO-Link communication	Input - power supply
2	P24	Power supply 24 Vdc for valve regulation, logics and diagnostics	Input - power supply
3	L-	Power supply 0 Vdc for IO-Link communication	Gnd - power supply
4	C/Q	IO-Link data line	Input / Output - signal
5	N24	Power supply 0 Vdc for valve regulation, logics and diagnostics	Gnd - power supply

Note: L+, L- and P24, N24 are electrically isolated

Valve to Master connection examples



(1) Maximum power consumption: 50 W
(2) External power supply

19.4 Communication connectors - for AEB (B) and AES (B) - (C)

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

(C1) BC fieldbus execution, connector - M12 - 5 pin (2)		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	CAN_SHLD	Shield
2	NC	do not connect
3	CAN_GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

(C2) BP fieldbus execution, connector - M12 - 5 pin (2)		
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	

(1) Shield connection on connector's housing is recommended

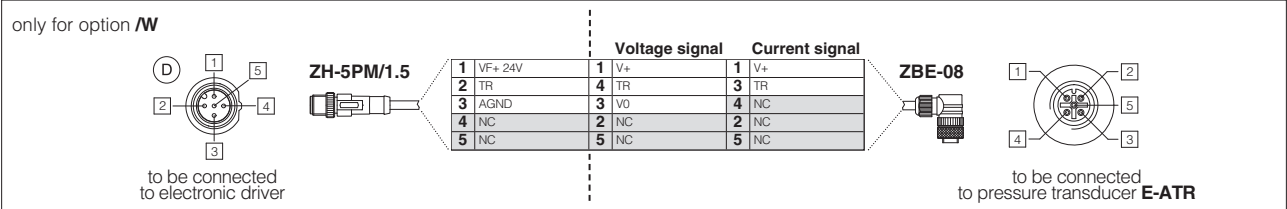
(C3) (C4) EH fieldbus execution, connector - M12 - 4 pin (2)		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
Housing	SHIELD	

(2) Only for AES execution

19.5 Remote pressure transducer connector - M12 - 5 pin - only for /W option - for AEB and AES (D)

PIN	SIGNAL	TECHNICAL SPECIFICATION	Voltage	Current
1	VF +24V	Power supply +24Vdc	Connect	Connect
2	TR	Signal transducer maximum range ± 10 Vdc / ± 20 mA, software selectable Defaults are 0 ÷ 10 Vdc for standard and 4 ÷ 20 mA for /C option	Connect	Connect
3	AGND	Common GND for transducer power and signals	Connect	/
4	NC	Not Connect	/	/
5	NC	Not Connect	/	/

Remote pressure transducer connection - example



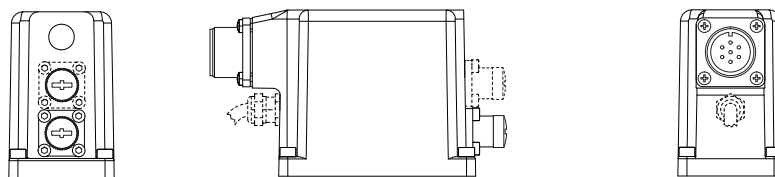
Note: connectors front view

19.6 Solenoid connection - only for A

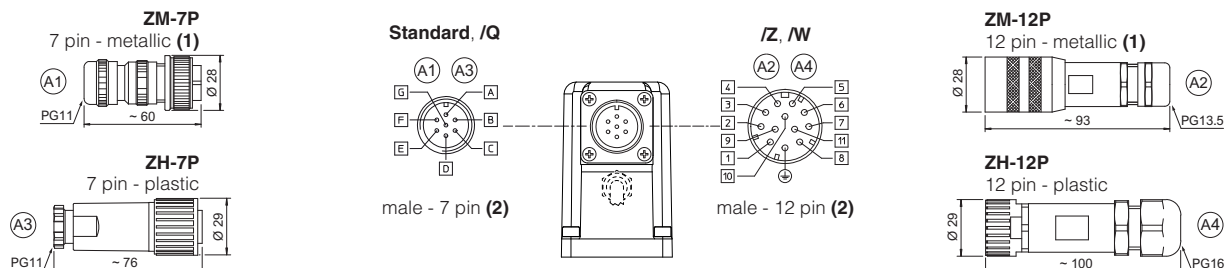
PIN	SIGNAL	TECHNICAL SPECIFICATION	Connector code 666
1	COIL	Power supply	
2	COIL	Power supply	
3	GND	Ground	

19.7 AEB-NP connections layout

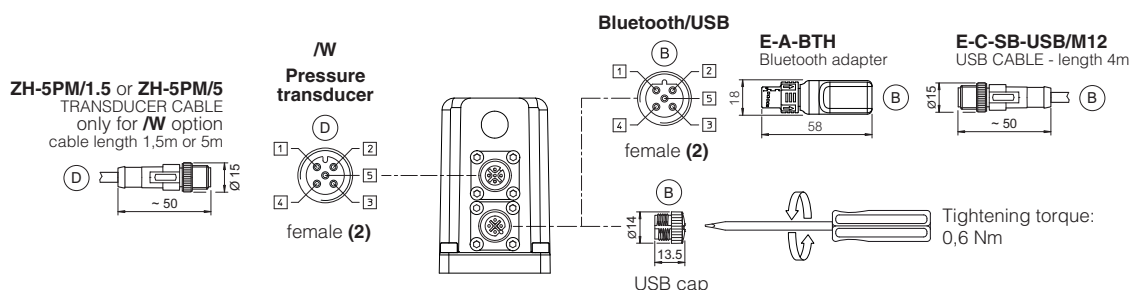
DRIVER OVERVIEW



MAIN CONNECTORS



TRANSDUCER CONNECTOR - BLUETOOTH ADAPTER AND USB CONNECTOR

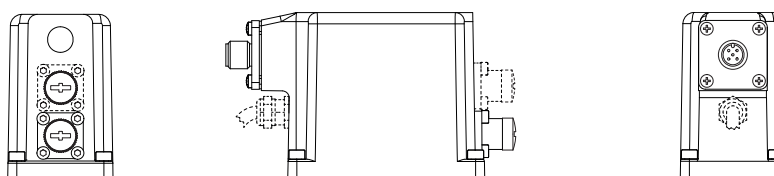


(1) Use of metallic connectors is strongly recommended in order to fulfill EMC requirements

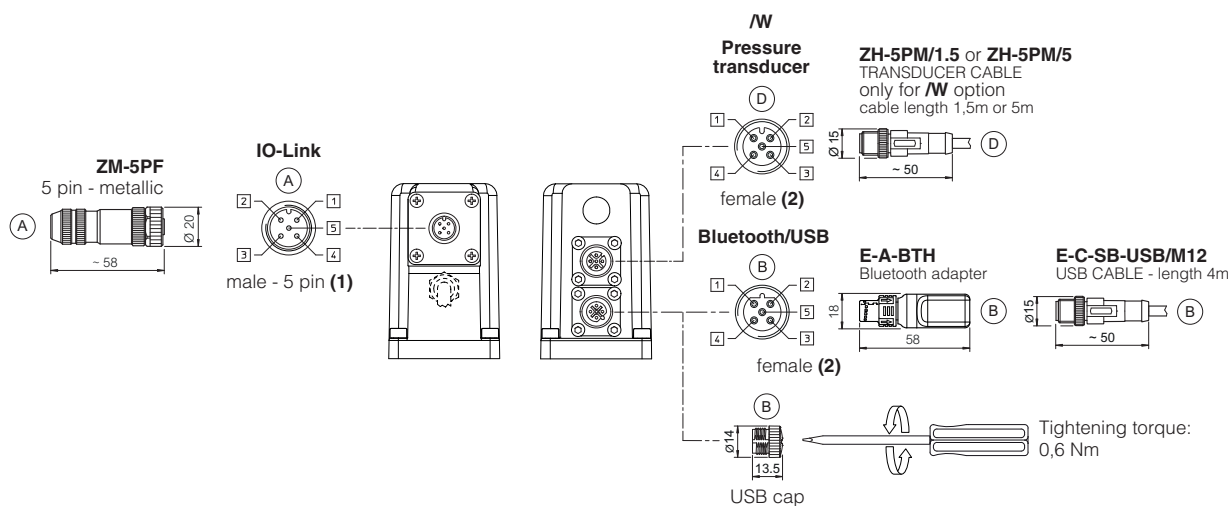
(2) Pin layout always referred to driver's view

19.8 AEB-IL connections layout

DRIVER OVERVIEW



IO-Link AND TRANSDUCER CONNECTORS - BLUETOOTH ADAPTER AND USB CONNECTOR

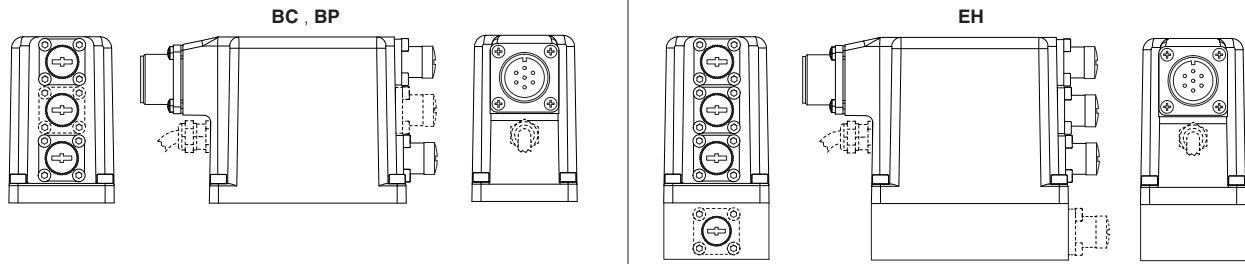


(1) Use of metallic connectors is strongly recommended in order to fulfill EMC requirements

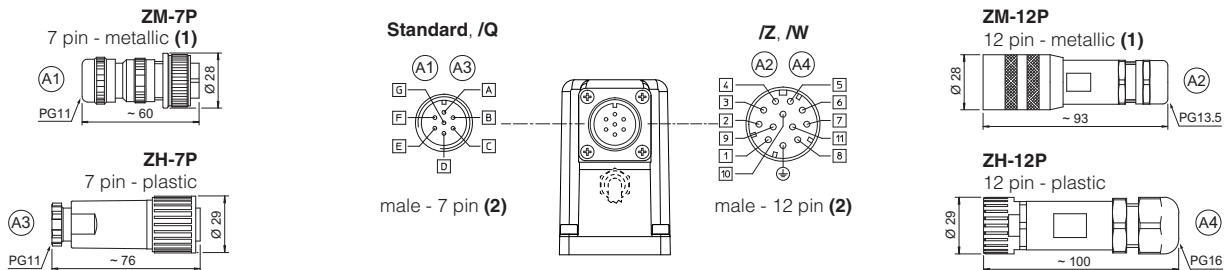
(2) Pin layout always referred to driver's view

19.9 AES connections layout

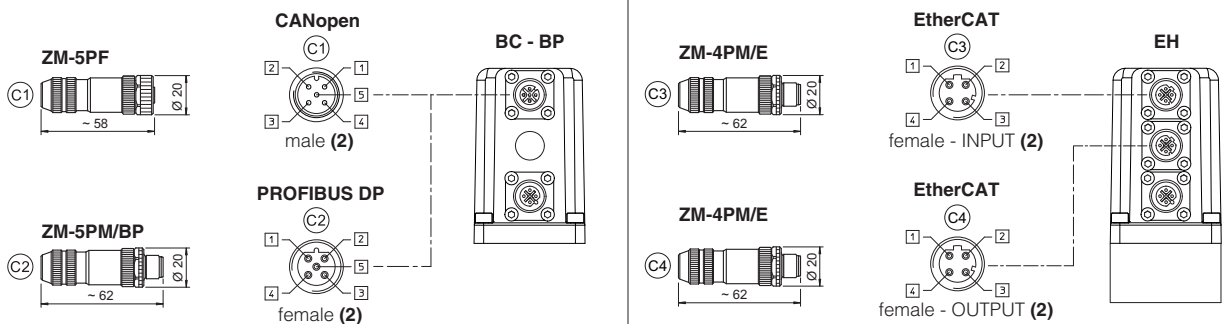
DRIVER OVERVIEW



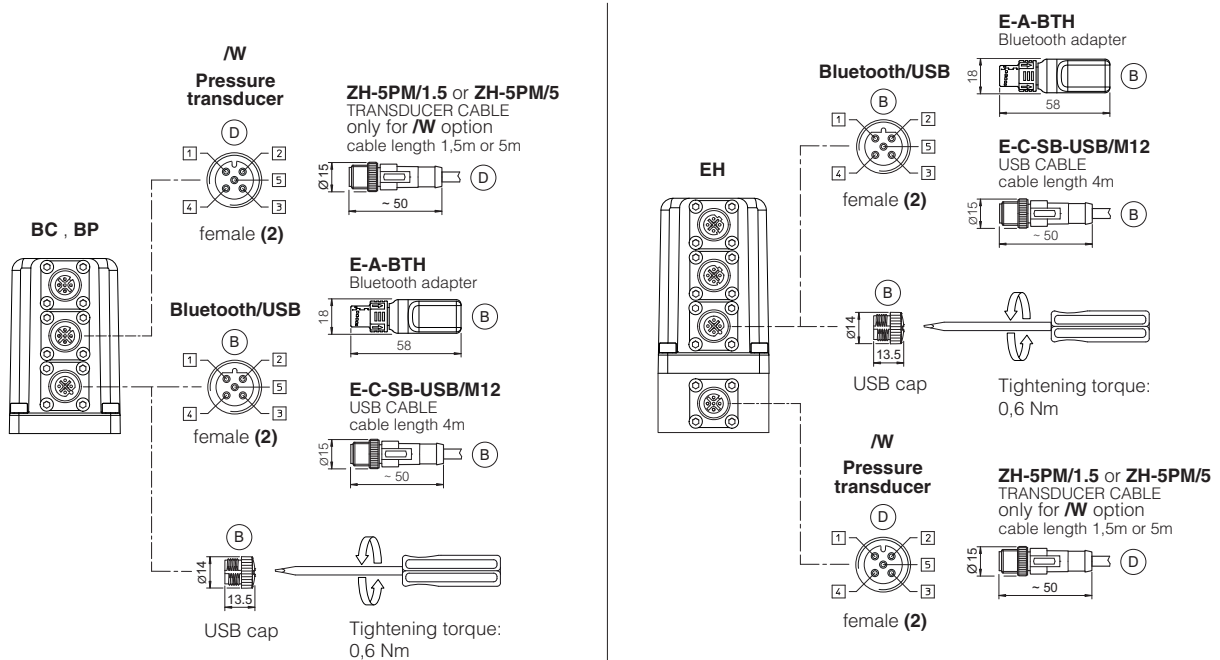
MAIN CONNECTORS



FIELDBUS CONNECTORS



TRANSDUCER CONNECTOR - BLUETOOTH ADAPTER AND USB CONNECTOR



(1) Use of metallic connectors is strongly recommended in order to fulfill EMC requirements

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

20 CONNECTORS CHARACTERISTICS - to be ordered separately**20.1 Main connectors - 7 pin** - for **AEB-NP** and **AES**

CONNECTOR TYPE	POWER SUPPLY AND SIGNALS	POWER SUPPLY AND SIGNALS
CODE	(A1) ZM-7P	(A3) ZH-7P
Type	7pin female straight circular	7pin female straight circular
Standard	According to MIL-C-5015	According to MIL-C-5015
Material	Metallic	Plastic reinforced with fiber glass
Cable gland	PG11	PG11
Recommended cable	LiYCY 7 x 0,75 mm ² max 20 m (logic and power supply) or LiYCY 7 x 1 mm ² max 40 m (logic and power supply)	LiYCY 7 x 0,75 mm ² max 20 m (logic and power supply) or LiYCY 7 x 1 mm ² max 40 m (logic and power supply)
Conductor size	up to 1 mm ² - available for 7 wires	up to 1 mm ² - available for 7 wires
Connection type	to solder	to solder
Protection (EN 60529)	IP 67	IP 67

20.2 Main connectors - 12 pin - for **AEB-NP** and **AES**

CONNECTOR TYPE	POWER SUPPLY AND SIGNALS	POWER SUPPLY AND SIGNALS
CODE	(A2) ZM-12P	(A4) ZH-12P
Type	12pin female straight circular	12pin female straight circular
Standard	DIN 43651	DIN 43651
Material	Metallic	Plastic reinforced with fiber glass
Cable gland	PG13,5	PG16
Recommended cable	LiYCY 12 x 0,75 mm ² max 20 m (logic and power supply)	LiYCY 10 x 0,14mm ² max 40 m (logic) LiYY 3 x 1mm ² max 40 m (power supply)
Conductor size	0,5 mm ² to 1,5 mm ² - available for 12 wires	0,14 mm ² to 0,5 mm ² - available for 9 wires 0,5 mm ² to 1,5 mm ² - available for 3 wires
Connection type	to crimp	to crimp
Protection (EN 60529)	IP 67	IP 67

20.3 IO-Link connector - only for **AEB-IL**

CONNECTOR TYPE	IL IO-Link
CODE	(A) ZM-5PF
Type	5pin female straight circular
Standard	M12 coding A – IEC 61076-2-101
Material	Metallic
Cable gland	Pressure nut - cable diameter 6÷8 mm
Recommended cable	5 x 0,75 mm ² max 20 m
Connection type	screw terminal
Protection (EN 60529)	IP 67

20.4 Fieldbus communication connectors - only for **AES**

CONNECTOR TYPE	BC CANopen (1)	BP PROFIBUS DP (1)	EH EtherCAT (2)
CODE	(C1) ZM-5PF	(C2) ZM-5PM/BP	(C3) (C4) ZM-4PM/E
Type	5 pin female straight circular	5 pin male straight circular	4 pin male straight circular
Standard	M12 coding A – IEC 61076-2-101	M12 coding B – IEC 61076-2-101	M12 coding D – IEC 61076-2-101
Material	Metallic	Metallic	Metallic
Cable gland	Pressure nut - cable diameter 6÷8 mm	Pressure nut - cable diameter 6÷8 mm	Pressure nut - cable diameter 4÷8 mm
Cable	CANbus Standard (DR 303-1)	PROFIBUS DP Standard	Ethernet standard CAT-5
Connection type	screw terminal	screw terminal	terminal block
Protection (EN 60529)	IP67	IP 67	IP 67

(1) E-TRM-** terminators can be ordered separately - see tech table **GS500****(2)** Internally terminated**20.5 Remote pressure transducer connectors** - only for **/W** option

CONNECTOR TYPE	TRANSDUCER	
CODE	(D) ZH-5PM/1.5	(D) ZH-5PM/5
Type	5 pin male straight circular	
Standard	M12 coding A – IEC 61076-2-101	
Material	Plastic	
Cable gland	Connector moulded on cables 1,5 m length 5 m length	
Cable	5 x 0,25 mm ²	
Connection type	molded cable	
Protection (EN 60529)	IP 67	

21 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	<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>
DPZO-2	Pilot channels	Drain channels	<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>
DPZO-4	Pilot channels	Drain channels	<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>
DPZO-6	Pilot channels	Drain channels	<p>Internal piloting: Without plug ①; External piloting: Add DIN-908 M16x1,5 in pos ①; Add plug SP-X325A in pos ②; Internal drain: Without blinded plug SP-X300F ③; External drain: Add blinded plug SP-X300F ③.</p> <p>To reach the orifice ② remove plug ④ = G1/8"</p>

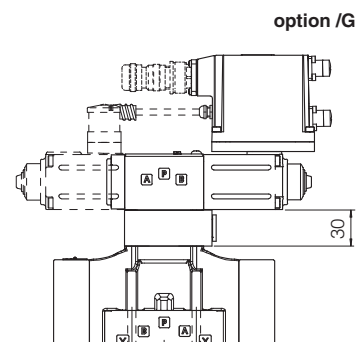
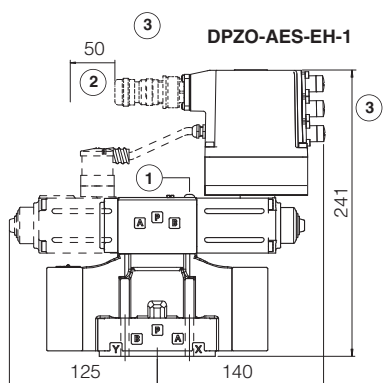
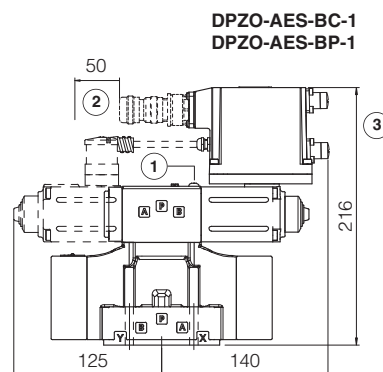
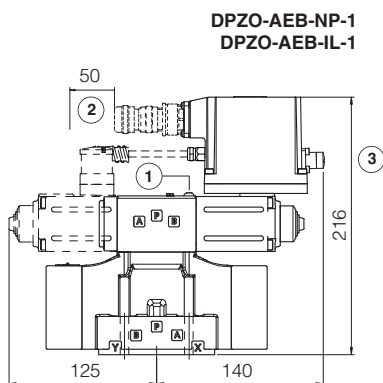
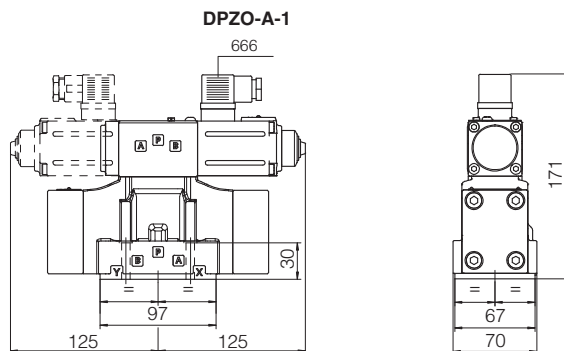
22 FASTENING BOLTS AND SEALS

Type	Size	Fastening bolts	Seals
DPZO	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)
	6 = 32	6 socket head screws M20x80 class 12.9 Tightening torque = 600 Nm	4 OR 144; Diameter of ports A, B, P, T: Ø 34 mm (max) 2 OR 3056 Diameter of ports X, Y: Ø = 7 mm (max)

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

	Mass [kg]		
	A	AEB, AES	AES-EH
DPZO-*-15	7,7	8,1	8,2
DPZO-*-17	8,6	9	9,1
Option /G	+0,9		



Dotted line = double solenoid version

① = Air bleeding

② = Space required for connection cable and for connector removal

③ = The dimensions of connectors and Bluetooth adapter must be considered, see section 19.7, 19.8 and 19.9

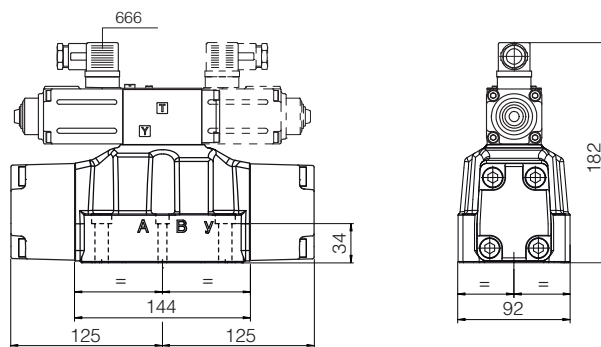
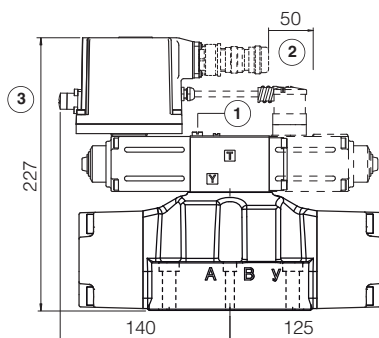
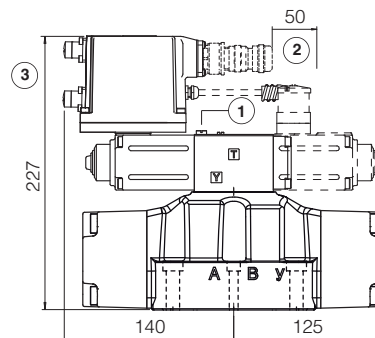
Note: for /B option the solenoid and the on-board digital driver are at side of port B of the main stage

ISO 4401: 2005

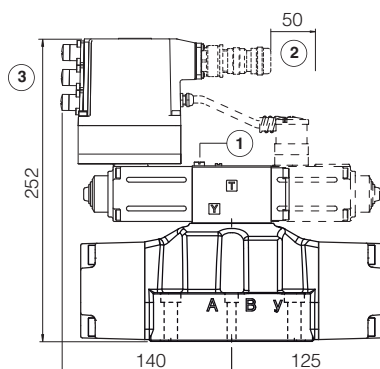
Mounting surface: 4401-07-07-0-05 (see table P005)

	Mass [kg]		
	A	AEB, AES	AES-EH
DPZO-*-25	11,9	12,3	12,4
DPZO-*-27	12,8	13,2	13,3
Option /G	+0,9		

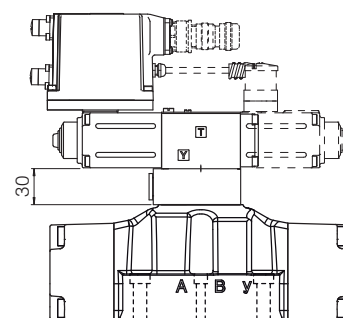
DPZO-A-2

DPZO-AEB-NP-2
DPZO-AEB-IL-2DPZO-AES-BC-2
DPZO-AES-BP-2

DPZO-AES-EH-2



option /G



Dotted line = double solenoid version

① = Air bleeding 

② = Space required for connection cable and for connector removal

③ = The dimensions of connectors and Bluetooth adapter must be considered, see section 19.7, 19.8 and 19.9

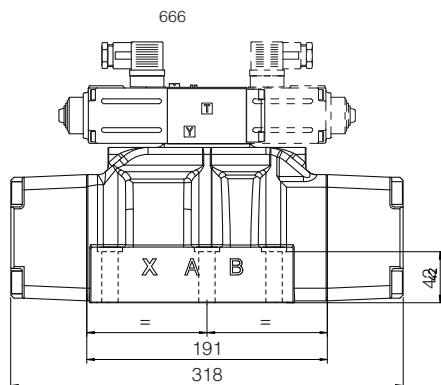
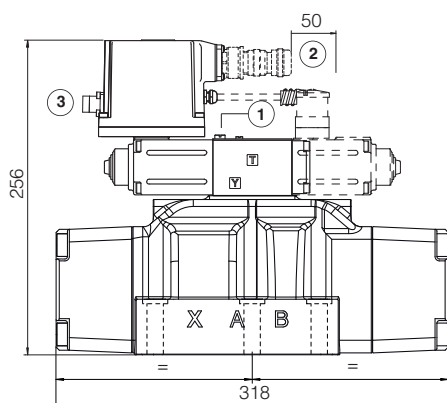
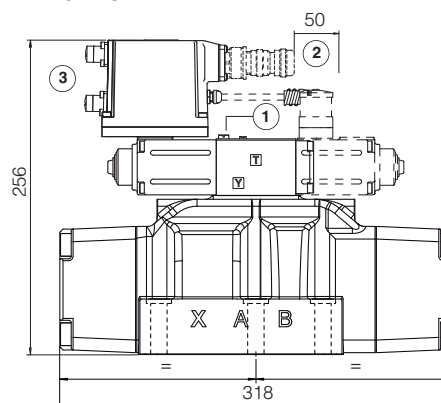
Note: for /B option the solenoid and the on-board digital driver are at side of port B of the main stage

ISO 4401: 2005

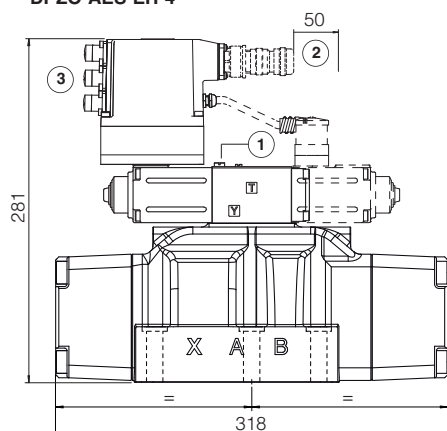
Mounting surface: 4401-08-08-0-05 (see table P005)

	Mass [kg]		
	A	AEB, AES	AES-EH
DPZO-*-45	17,1	18	18,1
DPZO-*-47	18	18,9	19
Option /G	+0,9		

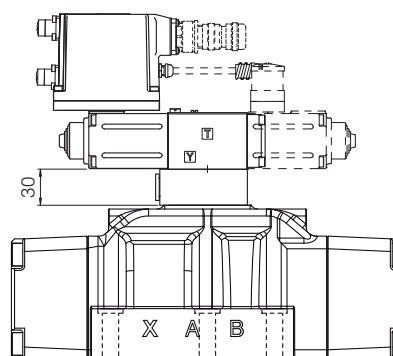
DPZO-A-4


DPZO-AEB-NP-4
DPZO-AEB-IL-4

DPZO-AES-BC-4
DPZO-AES-BP-4



DPZO-AES-EH-4



option /G



Dotted line = double solenoid version

- ① = Air bleeding 
- ② = Space required for connection cable and for connector removal
- ③ = The dimensions of connectors and Bluetooth adapter must be considered, see section 19.7, 19.8 and 19.9

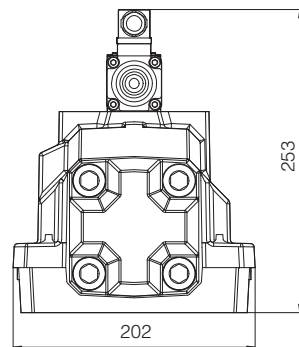
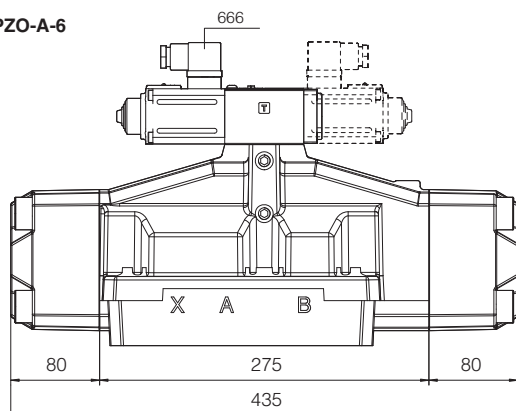
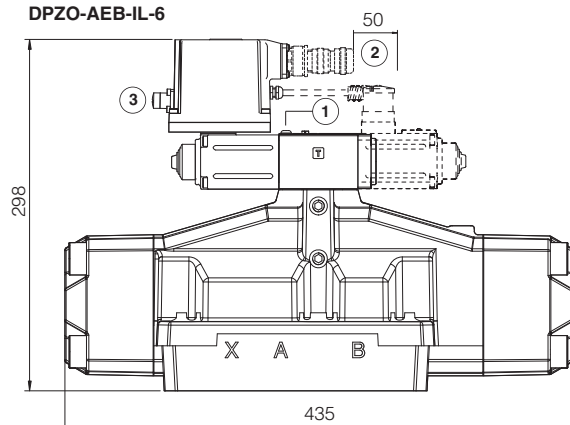
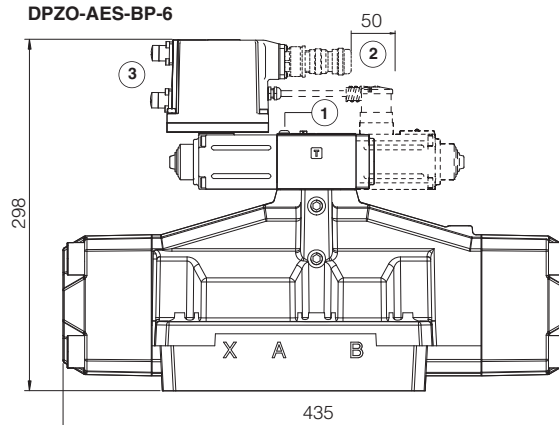
Note: for /B option the solenoid and the on-board digital driver are at side of port B of the main stage

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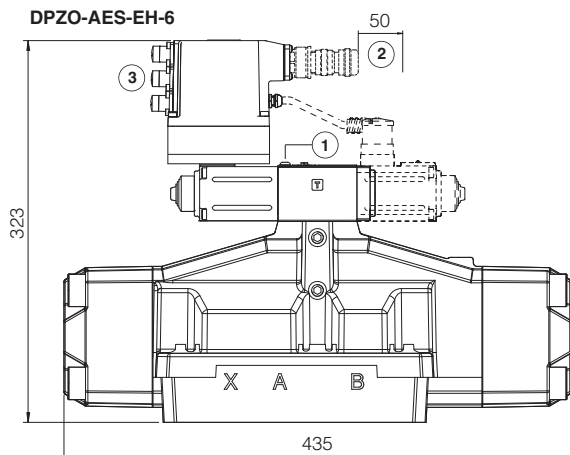
Mounting surface: 4401-10-09-0-05 (see table P005)

	Mass [kg]		
	A	AEB, AES	AES-EH
DPZO-*-65	42,1	42,5	42,6
DPZO-*-67	42,7	43,1	43,2
Option /G	+2,3		

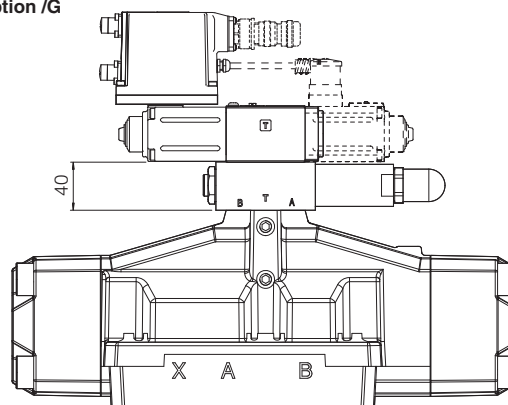
DPZO-A-6

DPZO-AEB-NP-6
DPZO-AEB-IL-6DPZO-AES-BC-6
DPZO-AES-BP-6

DPZO-AES-EH-6



option /G



Dotted line = double solenoid version

① = Air bleeding 

② = Space required for connection cable and for connector removal

③ = The dimensions of connectors and Bluetooth adapter must be considered, see section 19.7, 19.8 and 19.9

Note: for /B option the solenoid and the on-board digital driver are at side of port B of the main stage

27 RELATED DOCUMENTATION

FS001	Basics for digital electrohydraulics	K800	Electric and electronic connectors
FS900	Operating and maintenance information for proportional valves	P005	Mounting surfaces for electrohydraulic valves
G010	E-MI-AC analog driver	QB120	Quickstart for AEB valves commissioning
G020	E-MI-AS-IR digital driver	QF120	Quickstart for AES valves commissioning
G030	E-BM-AS digital driver	E-MAN-MI-AS	E-MI-AS-IR user manual (off-board)
GS050	E-BM-AES digital driver	E-MAN-BM-AS	E-BM-AS user manual (off-board)
GS500	Programming tools	E-MAN-BM-AES	E-BM-AES user manual (off-board)
GS510	Fieldbus	E-MAN-RI-AEB	AEB user manual
GS520	IO-Link interface	E-MAN-RI-AES	AES user manual