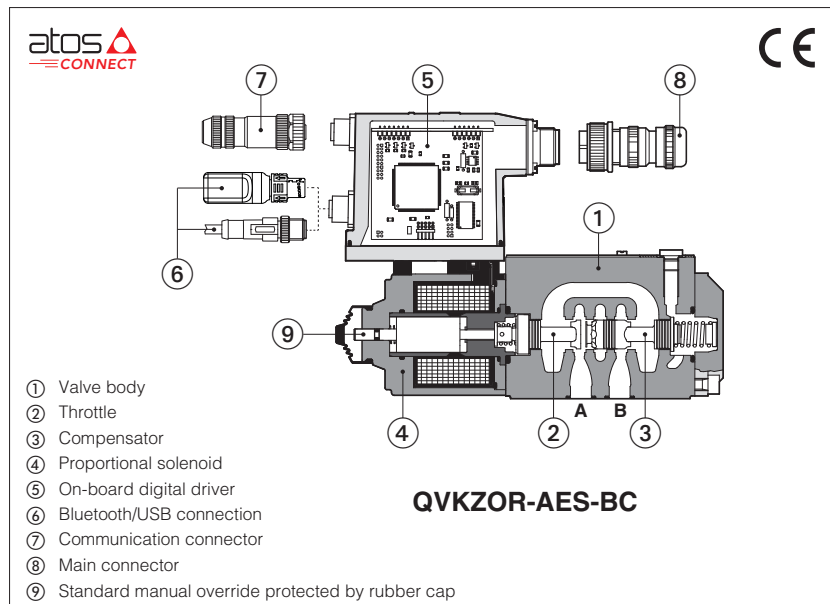


Digital proportional flow valves

direct, pressure compensated, without transducer



QVHZO-A, QVHZO-AEB, QVHZO-AES QVKZOR-A, QVKZOR-AEB, QVKZOR-AES

Proportional flow control valves, direct, pressure compensated without position transducer for open loop 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 signals, valve settings, and real-time diagnostics.

AES full execution, with on-board digital driver which includes also fieldbus interfaces for digital reference signals, 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.

QVHZO:

Size: **06** - ISO 4401

Max flow: **45 l/min**

Max pressure: **210 bar**

QVKZOR:

Size: **10** - ISO 4401

Max flow: **90 l/min**

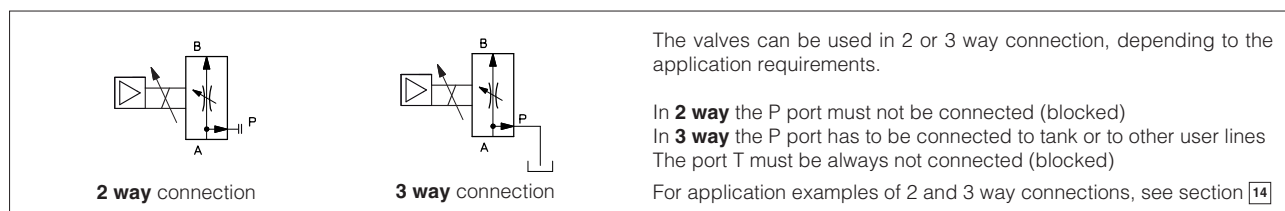
Max pressure: **210 bar**

1 MODEL CODE

QVKZOR	-	AES	-	BC	-	10	/	65	/	*	/	*	/	*	/	*	/	*												
<p>Pressure compensated flow control valves, direct</p> <p>QVHZO = size 06 QVKZOR = size 10</p>																														
<p>A = off-board driver, see section 3 AEB = basic on-board digital driver AES = full on-board digital driver</p>																														
<p>IO-Link interface, only for AEB, see section 7 : NP = Not present IL = IO-Link</p> <p>Fieldbus interfaces, only for AES, see section 8 : BC = CANopen EH = EtherCAT BP = PROFIBUS DP</p>																														
<p>Valve size ISO 4401: 06 = 06 10 = 10</p>																														
<p>Max regulated flow:</p> <table><tr><td>QVHZO:</td><td></td><td>QVKZOR:</td></tr><tr><td>3 = 3,5 l/min</td><td>36 = 35 l/min</td><td>65 = 65 l/min</td></tr><tr><td>12 = 12 l/min</td><td>45 = 45 l/min</td><td>90 = 90 l/min</td></tr><tr><td>18 = 18 l/min</td><td></td><td></td></tr></table>																			QVHZO:		QVKZOR:	3 = 3,5 l/min	36 = 35 l/min	65 = 65 l/min	12 = 12 l/min	45 = 45 l/min	90 = 90 l/min	18 = 18 l/min		
QVHZO:		QVKZOR:																												
3 = 3,5 l/min	36 = 35 l/min	65 = 65 l/min																												
12 = 12 l/min	45 = 45 l/min	90 = 90 l/min																												
18 = 18 l/min																														
<p>Seals material, see section 12 : - = NBR PE = FKM BT = NBR low temp.</p> <p>Coil voltage, only for A - see section 18 : - = standard coil for 24Vdc Atos drivers 6 = optional coil for 12Vdc Atos drivers 18 = optional coil for low current drivers</p> <p>Bluetooth option, only for AEB and AES, see section 6 : T = Bluetooth adapter supplied with the valve</p>																														
<p>Hydraulic options (1): D = quick venting of port B</p> <p>Hand lever options, only for QVHZO-A: MO = horizontal hand lever MV = vertical hand lever</p> <p>Electronic options (1), only for AEB-NP and AES: I = current reference input 4÷20 mA Q = enable signal Z = double power supply, enable, fault and monitor signals -12 pin connector</p>																														

(1) For possible combined options, see section 17

2 HYDRAULIC SYMBOLS



Note: hydraulic symbols are represented with on-board digital driver

3 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 (Vdc)	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

4 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.

5 VALVE SETTINGS AND PROGRAMMING TOOLS - see tech. table **GS500**

5.1 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.



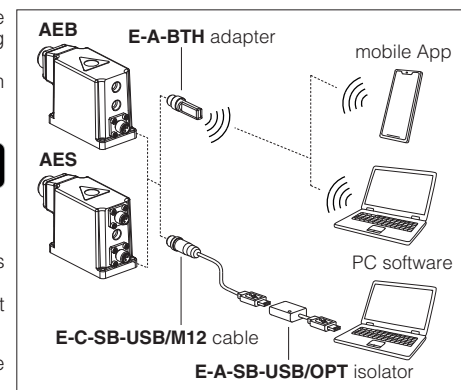
5.2 E-SW-SETUP PC software

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



6 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.

7 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.

8 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.

9 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	150 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

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

Valve model	QVHZO					QVKZOR	
Max regulated flow [l/min]	3,5	12	18	35	45	65	90
Min regulated flow [cm³/min]	15	20	30	50	60	85	100
Regulating Δp [bar]	4 - 6		10 - 12		15	6 - 8	10 - 12
Max flow on port A [l/min]	40			50	55	70	100
Max pressure [bar]	210						
Response time 0-100% step signal [ms]	≤ 30					≤ 45	
Hysteresis	≤ 5 [% of the regulated max flow]						
Linearity	≤ 3 [% of the regulated max flow]						
Repeatability	≤ 1 [% of the regulated max flow]						

Note: above performance data refer to valves coupled with Atos electronic drivers, see section [3](#)

11 ELECTRICAL CHARACTERISTICS

Power supplies	Nominal : +24 VDC Rectified and filtered : VRMS = 20 ÷ 32 VMAX (ripple max 10 % VPP)					
Max power consumption	QVHZO			QVKZOR		
	A = 30 W	AEB, AES = 50 W		A = 35 W	AEB, AES = 50 W	
Coil voltage code	standard	option /6	option /18	standard	option /6	option /18
Max. solenoid current	2,2 A	2,75 A	1,2 A	2,6 A	3,25 A	1,2 A
Coil resistance R at 20°C	3 ÷ 3,3 Ω	2 ÷ 2,2 Ω	13 ÷ 13,4 Ω	3,8 ÷ 4,1 Ω	2,2 ÷ 2,4 Ω	12 ÷ 12,5 Ω
Analog input signals	Voltage: range ±10 VDC (24 VMAX tolerant) Current: range ±20 mA			Input impedance: Ri > 50 kΩ 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)					
Alarms	Solenoid not connected/short circuit, cable break with current reference signal, over/under temperature, current control monitoring, power supplies level					
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	IO-Link	CANopen	PROFIBUS DP	EtherCAT	
	Atos ASCII coding	Interface and System Specification 1.1.3	EN50325-4 + DS408	EN50170-2/IEC61158	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 22					

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.

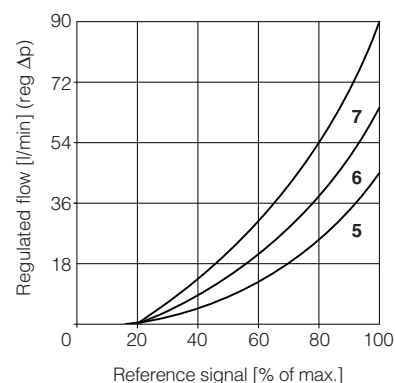
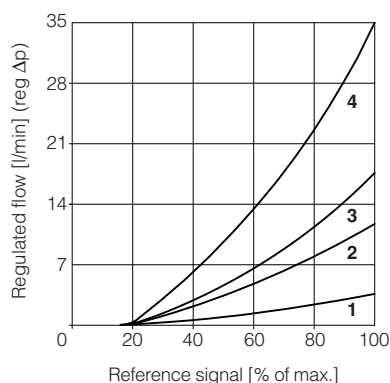
12 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature	NBR seals (standard) = -20°C \div +60°C (+80°C for A), with HFC hydraulic fluids = -20°C \div +50°C FKM seals (/PE option) = -20°C \div +80°C NBR low temp. seals (/BT option) = -40°C \div +60°C, with HFC hydraulic fluids = -20°C \div +50°C		
Recommended viscosity	20 \div 100 mm²/s - max allowed range 15 \div 380 mm²/s		
Max fluid contamination level	normal operation	ISO4406 class 18/16/13 NAS1638 class 7	see also filter section at www.atos.com or KTF catalog
	longer life	ISO4406 class 16/14/11 NAS1638 class 5	
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM, 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	

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

13.1 Regulation diagrams

- 1 = QVHZO-*-06/3
- 2 = QVHZO-*-06/12
- 3 = QVHZO-*-06/18
- 4 = QVHZO-*-06/36
- 5 = QVHZO-*-06/45
- 6 = QVKZOR-*-10/65
- 7 = QVKZOR-*-10/90

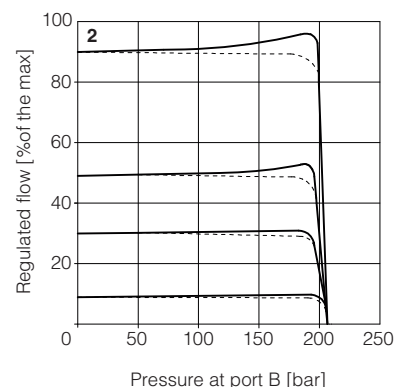
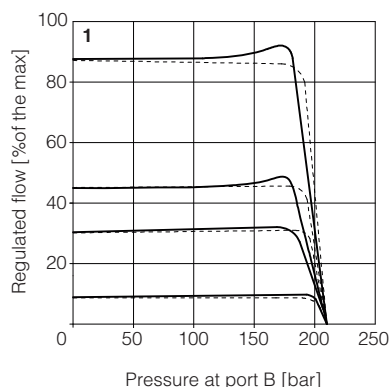


13.2 Regulated flow/outlet pressure diagrams

with inlet pressure = 210 bar

- 1 = QVHZO
- 2 = QVKZOR

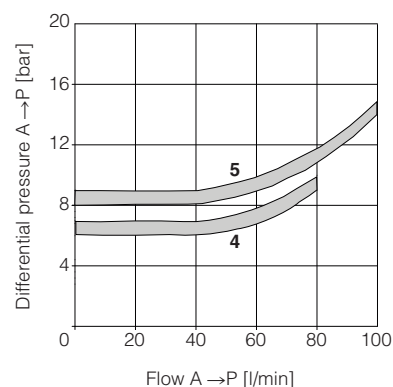
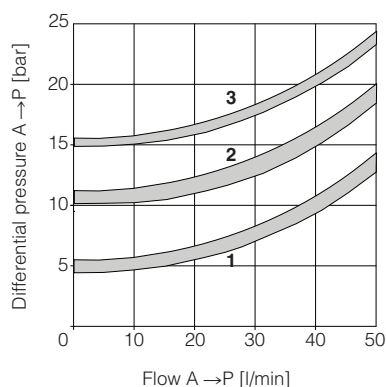
Dotted line for 3-way versions



13.3 Flow A → P/Δp diagrams

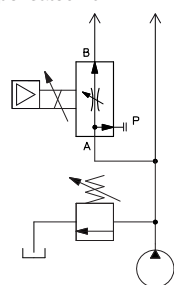
3-way configuration

- 1 = QVHZO-*-06/3
- 2 = QVHZO-*-06/12
- 3 = QVHZO-*-06/18
- 4 = QVHZO-*-06/36
- 5 = QVHZO-*-06/45
- 6 = QVKZOR-*-10/65
- 7 = QVKZOR-*-10/90



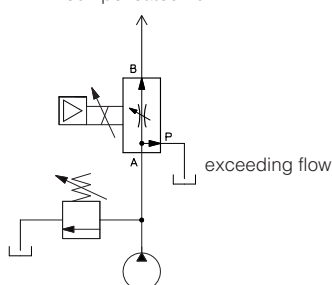
14 APPLICATIONS AND CONNECTIONS

compensated flow



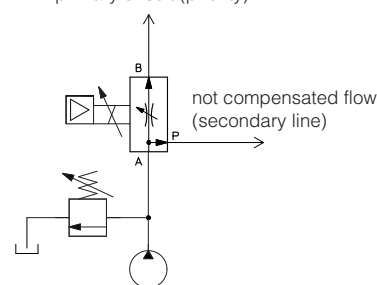
2 way connection

compensated flow



3 way connection

compensated flow
primary circuit (priority)



priority connection

2 way connection

The 2 way connection is normally used to control the flow in one part of the hydraulic circuit or to regulate the speed of a specific actuator. The metered flow in the controlled line is kept constant, independently to the load variations. If the valve is directly installed on the pump main line, the exceeding flow is returned to tank through the pressure relief valve.

3 way connection

The 3 way connection is normally used when the valve directly controls the pump flow (main line). The metered flow in the controlled line is kept constant, independently to the load variations. The exceeding flow (not metered by the valve) it is returned to tank through the valve P port = T line (3rd way).

Priority connection

The priority connection guarantees the pressure compensated flow supply to the primary circuit. The exceeding flow (not required by the primary circuit) is bypassed through the valve P port, to secondary circuit operating at lower pressure and not requiring compensated flow regulations.

15 HYDRAULIC OPTIONS

D = This option provides a quick venting of the use port B when the valve is closed or de-energized.

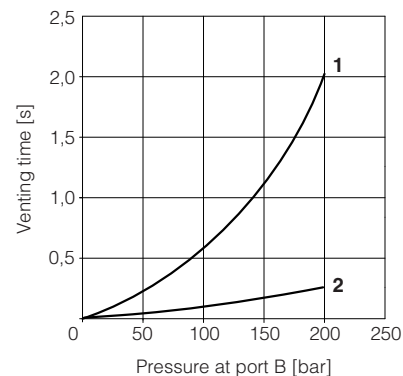
The valve must be connected in 3 way, with P port connected to tank.

When the proportional throttle is fully closed, the valve's port B is internally connected to port P (tank), permitting a quickly decompression of the pressure in the use line.

In the diagram aside are represented the venting times of **QVHZO** and **QVKZOR** with option /D respect to standard versions:

1 = standard version

2 = option /D



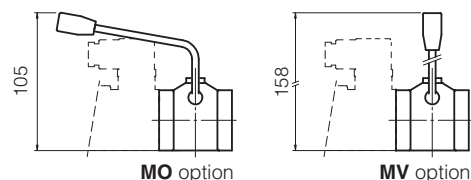
Hand lever option - only for **QVHZO-A**

It allows to operate the valve in absence of electrical power supply.

For detailed description of QVHZO-A with hand lever option see tech. table **E138**.

MO = Horizontal hand lever

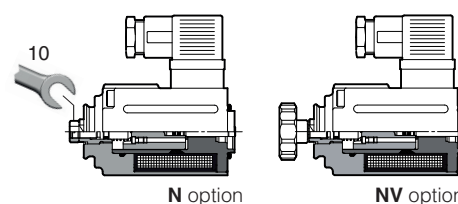
MV = Vertical hand lever



The following supplementary options allow to operate **QVHZO-A** and **QVKZOR-A** in absence of electrical power supply by means of a micrometric screw replacing the standard solenoid manual override, see tech. table **TK150**

N = Manual micrometric adjustment

NV = As option /N plus handwheel



16 ELECTRONIC OPTIONS - only for **AEB-NP** and **AES**

I = This option provides $4 \div 20$ mA current reference, 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.

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.

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 19.5 for signal specifications.

Z = This option provides, on the 12 pin main connector, the following additional features:

Fault output signal - see 19.6

Enable input signal - see above option /Q

Power supply for driver's logics and communication - see 19.2

17 POSSIBLE COMBINED OPTIONS

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

Hydraulic options: all combination possible

Electronic options: /IQ, /IZ

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

For **AEB-IL**

Hydraulic options: all combination possible

18 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.

19 POWER SUPPLY AND SIGNALS SPECIFICATIONS - only for **AEB-NP** 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 **20** for IO-Link signals specifications.

19.1 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 19.2.



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

19.2 Power supply for driver's logic and communication (VL+ and VL0) - only for **/Z** option

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.

19.3 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 0 ÷ 10 V_{DC} for standard and 4 ÷ 20 mA for /I option.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 V_{DC} 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).

19.4 Monitor output signal (MONITOR)

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 0 ÷ 5 V_{DC} (1V = 1A).

Output signal can be reconfigured via software, within a maximum range of ± 5 V_{DC}.

19.5 Enable input signal (ENABLE) - not for standard

To enable the driver, supply a 24 V_{DC} 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.

19.6 Fault output signal (FAULT) - only for **/Z** option

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

Fault presence corresponds to 0 V_{DC}, normal working corresponds to 24 V_{DC}.

Fault status is not affected by the Enable input signal.

20 IO-LINK SIGNALS SPECIFICATIONS - only for **AEB-IL**

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

The IO-Link master provides dedicated 24 V_{DC} power supply for IO-Link communication.

Maximum power consumption: 2 W

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

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

The IO-Link master provides dedicated 24 V_{DC} power supply for valve regulation, logics and diagnostics.

Maximum power consumption: 50 W

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

20.3 IO-Link data line (C/Q)

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

21 ELECTRONIC CONNECTIONS

21.1 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 0 \div 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 0 \div 5 Vdc (1V = 1A)	Output - analog signal Software selectable
G	EARTH		Internally connected to driver housing	

21.2 Main connector signals - 12 pin (A2) /Z option - for AEB-NP and AES

PIN	SIGNAL	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 0 \div 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 0 \div 5 Vdc (1V = 1A)	Output - analog signal Software selectable
7	NC	Do not connect	
8	NC	Do not connect	
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	

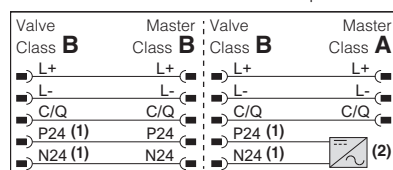
Note: do not disconnect V0 before VL+ when the driver is connected to PC USB port

21.3 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

21.4 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	

(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	

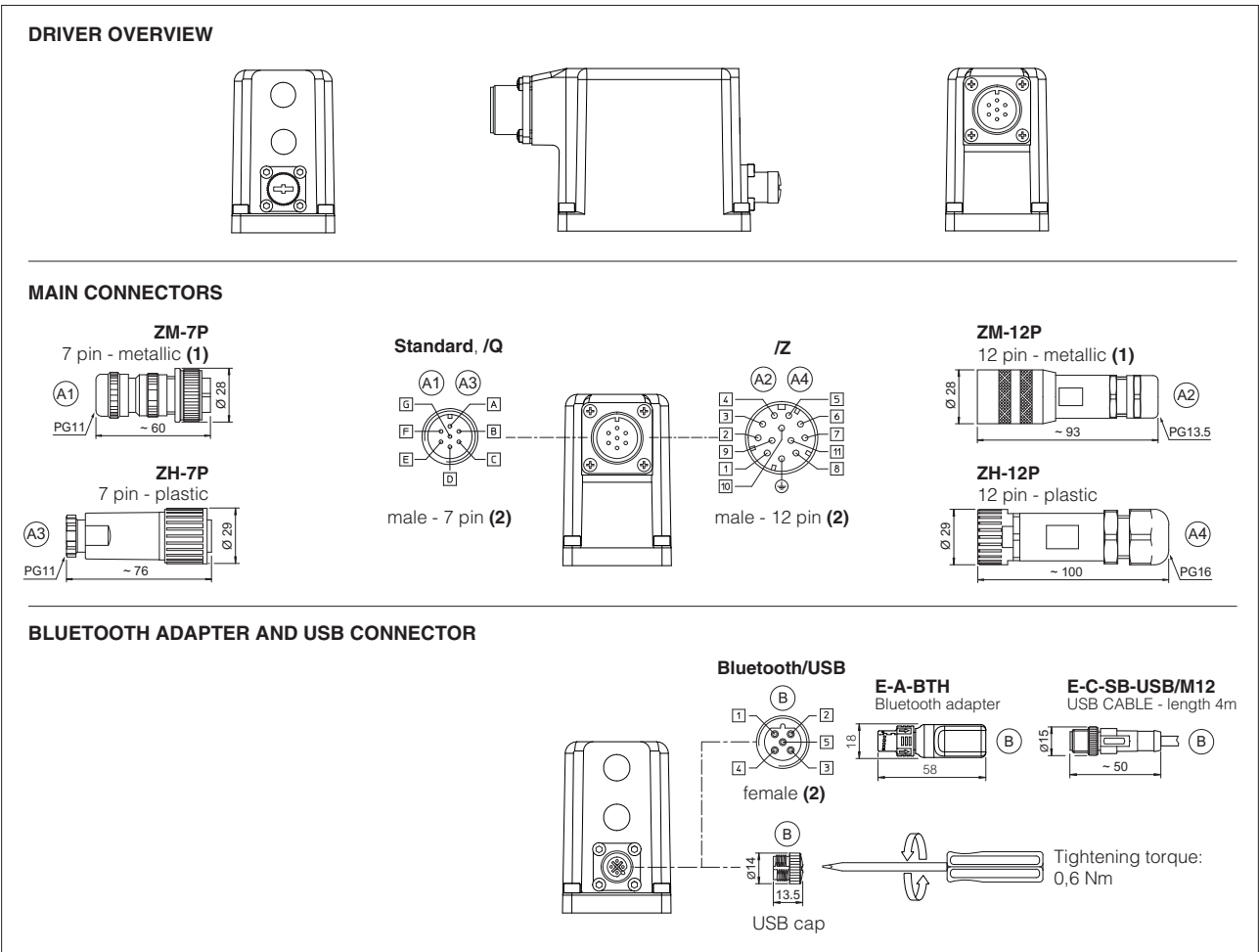
(1) Shield connection on connector's housing is recommended

(2) Only for AES execution

21.5 Solenoid connection - only for A

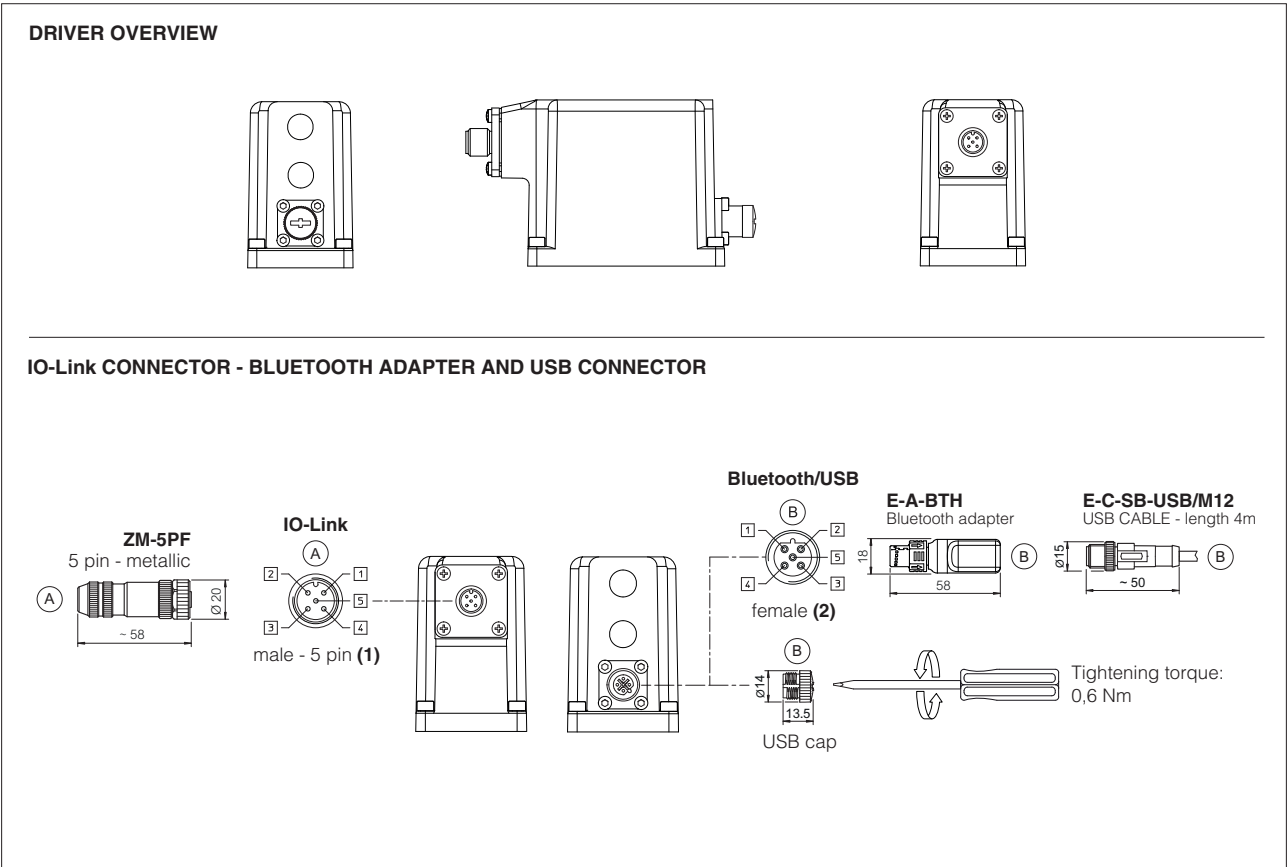
PIN	SIGNAL	TECHNICAL SPECIFICATION	Connector code 666
1	COIL	Power supply	
2	COIL	Power supply	
3	GND	Ground	

21.6 AEB-NP connections layout



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

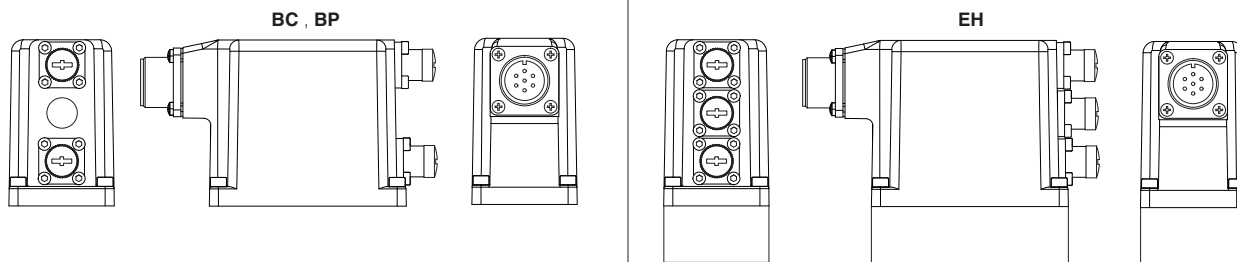
21.7 AEB-IL connections layout



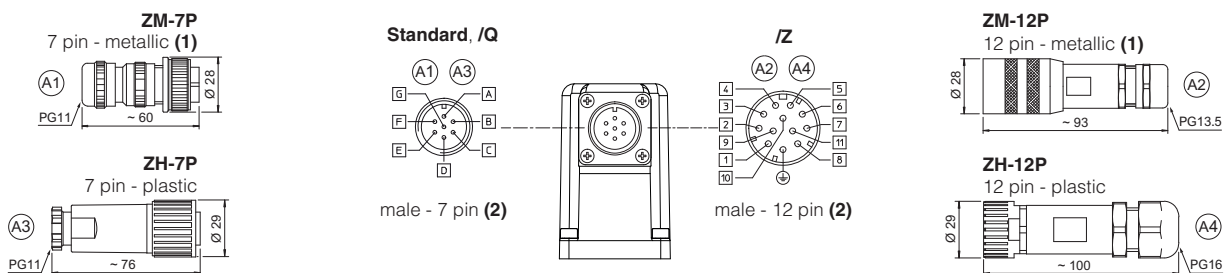
(1) Use of metallic connectors is strongly recommended in order to fulfill EMC requirements (2) Pin layout always referred to driver's view

21.8 AES connections layout

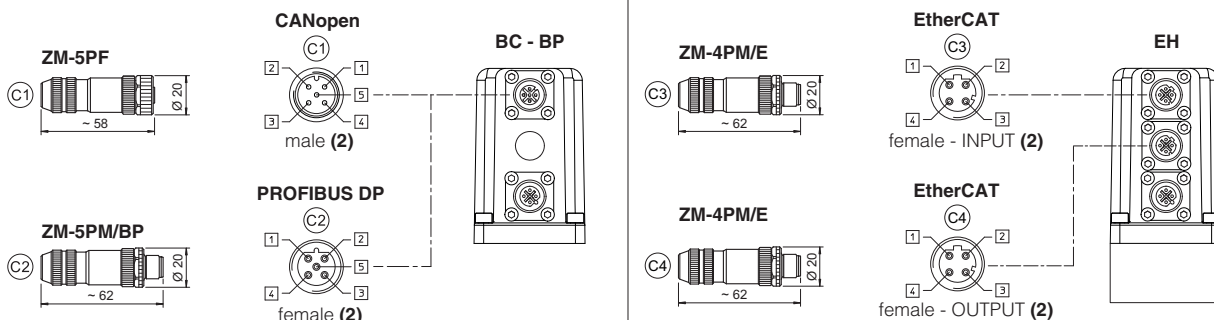
DRIVER OVERVIEW



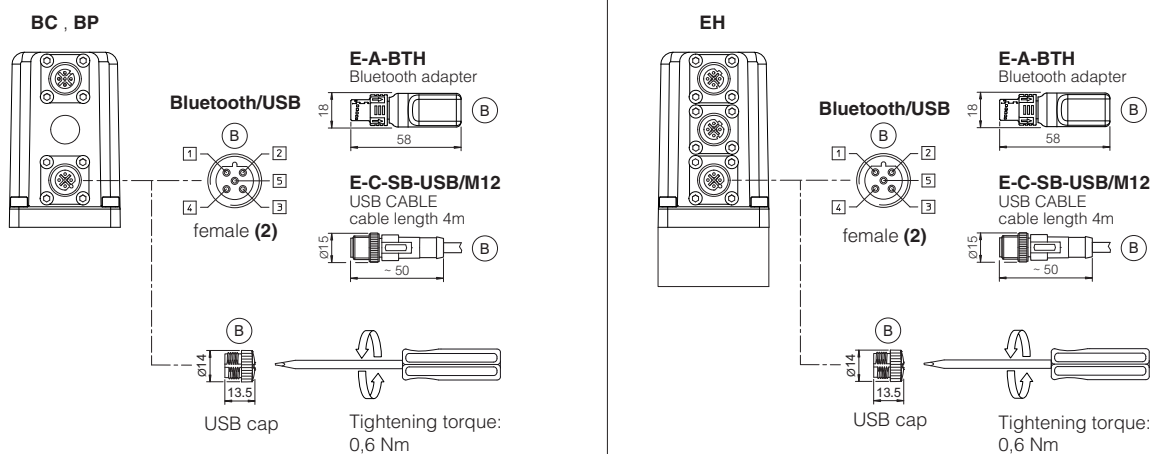
MAIN CONNECTORS



FIELDBUS 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

22 CONNECTORS CHARACTERISTICS - to be ordered separately**22.1 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

22.2 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

22.3 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

22.4 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

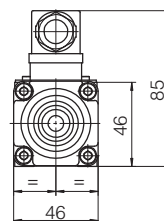
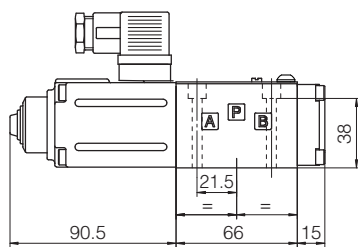
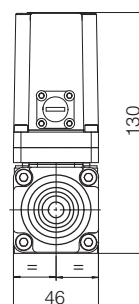
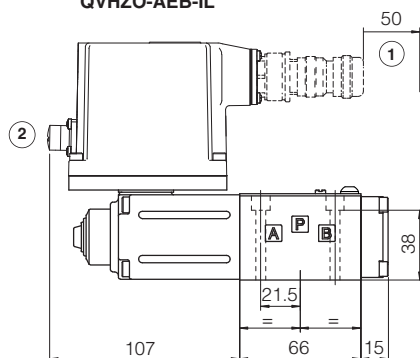
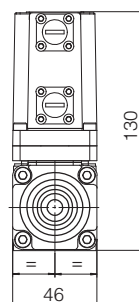
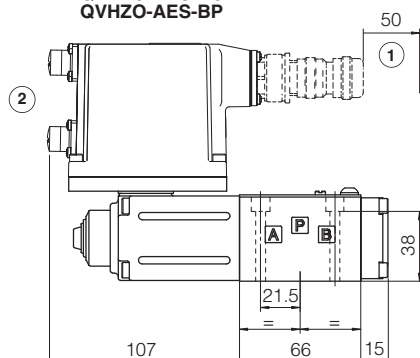
(1) E-TRM-** terminators can be ordered separately - see tech table **GS500****(2)** Internally terminated

ISO 4401: 2005

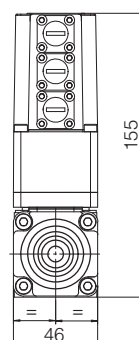
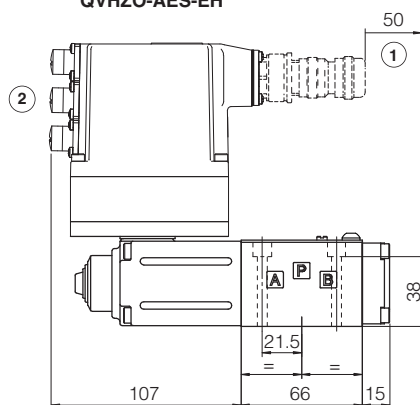
Mounting surface: 4401-03-02-0-05 (see tab. P005)

Mass [kg]		
A	AEB, AES	AES-EH
2,3	2,8	2,9

QVHZO-A

QVHZO-AEB-NP
QVHZO-AEB-ILQVHZO-AES-BC
QVHZO-AES-BP

QVHZO-AES-EH



① = Space required for connection cable and for connector removal

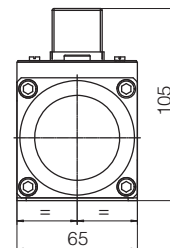
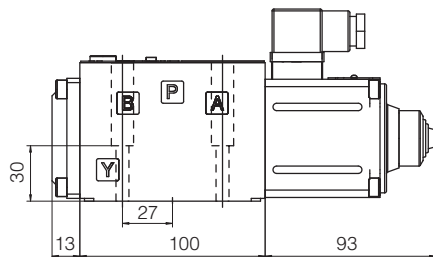
② = The dimensions of connectors and Bluetooth adapter must be considered, see section 21.6, 21.7 and 21.8

ISO 4401: 2005

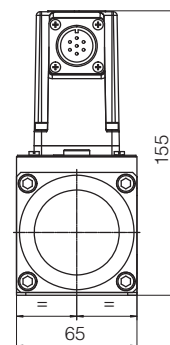
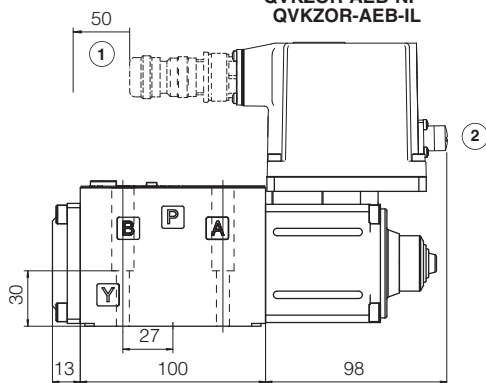
Mounting surface: 4401-05-04-0-05 (see tab. P005)

Mass [kg]		
A	AEB, AES	AES-EH
3,8	4,3	4,4

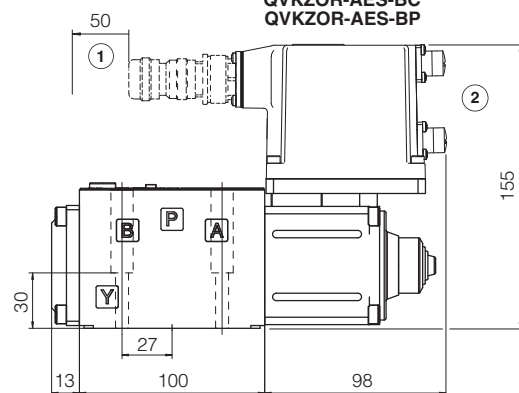
QVKZOR-A



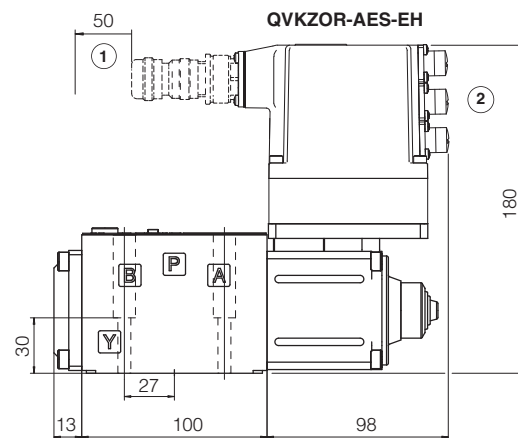
**QVKZOR-AEB-NP
QVKZOR-AEB-IL**



**QVKZOR-AES-BC
QVKZOR-AES-BP**





QVKZOR-AES-EH



① = Space required for connection cable and for connector removal

② = The dimensions of connectors and Bluetooth adapter must be considered, see section 21.6, 21.7 and 21.8

25 FASTENING BOLTS AND SEALS

	QVHZO	QVKZOR
	Fastening bolts: 4 socket head screws M5x50 class 12.9 Tightening torque = 8 Nm	Fastening bolts: 4 socket head screws M6x40 class 12.9 Tightening torque = 15 Nm
	Seals: 4 OR 108 Diameter of ports A, B, P, T: Ø 7,5 mm	Seals: 5 OR 2050 Diameter of ports A, B, P, T: Ø 11,2 mm

26 RELATED DOCUMENTATION

FS001 Basics for digital electrohydraulics FS900 Operating and maintenance information for proportional valves G010 E-MI-AC analog driver G020 E-MI-AS-IR digital driver G030 E-BM-AS digital driver GS050 E-BM-AES digital driver GS500 Programming tools GS510 Fieldbus GS520 IO-Link interface	K800 Electric and electronic connectors P005 Mounting surfaces for electrohydraulic valves QB100 Quickstart for AEB valves commissioning QF100 Quickstart for AES valves commissioning E-MAN-MI-AS E-MI-AS-IR user manual (off-board) E-MAN-BM-AS E-BM-AS user manual (off-board) E-MAN-BM-AES E-BM-AES user manual (off-board) E-MAN-RI-AEB AEB user manual E-MAN-RI-AES AES user manual
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