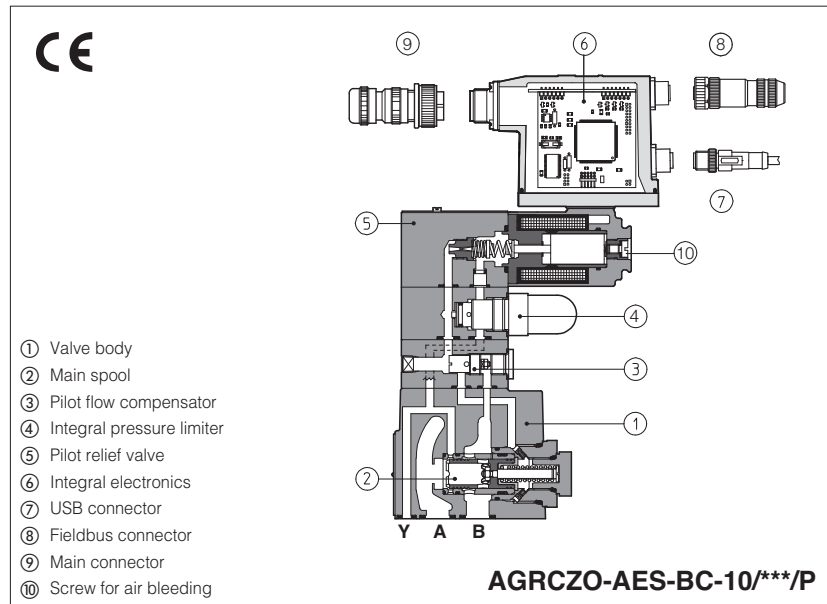


Proportional reducing valves

digital, pilot operated, open loop



- ① Valve body
- ② Main spool
- ③ Pilot flow compensator
- ④ Integral pressure limiter
- ⑤ Pilot relief valve
- ⑥ Integral electronics
- ⑦ USB connector
- ⑧ Fieldbus connector
- ⑨ Main connector
- ⑩ Screw for air bleeding

AGRCZO-A, AGRCZO-AEB, AGRCZO-AES

Pilot operated digital proportional reducing valves for pressure open loop controls.

Executions:

- **A** without integral driver, to be coupled with separated drivers, see section 2
- **AEB** with basic integral digital electronic driver, analog reference signals and USB port for software functional parameters setting
- **AES** with full integral digital electronic driver and fieldbus interface for functional parameters setting, reference signals and real-time diagnostics

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

Size: **10 and 20**

Max flow: **160 and 300 l/min**

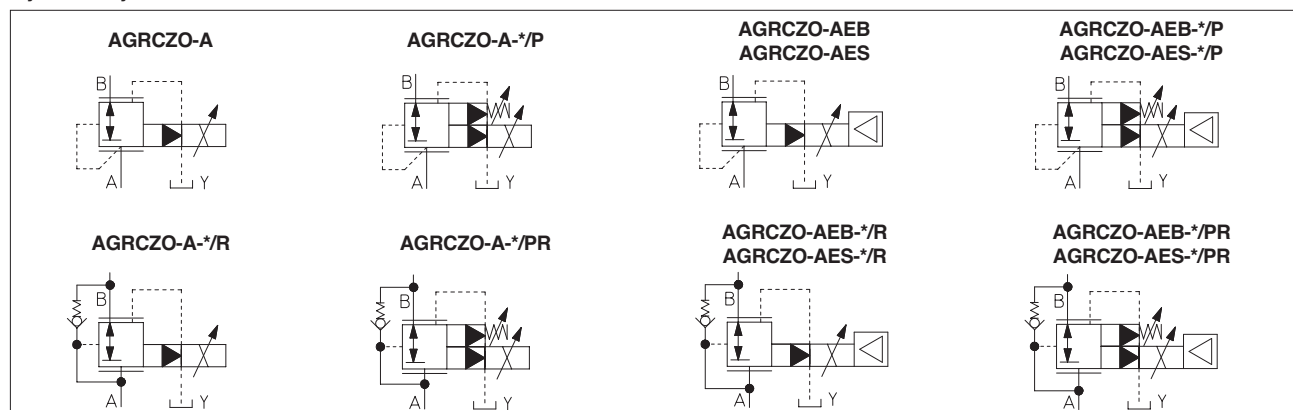
Max pressure: **350 bar**

1 MODEL CODE

AGRCZO	-	A	-	EB	-	NP	-	10	/	315	/	*	/	*	/	**	/	*	
Proportional pressure relief valve, two stage																		Seals material, see sect. 5, 6: - = NBR PE = FKM BT = HNBR	
A = open loop pressure control																		Series number	
- = omit for execution with separated driver see section 2																		Coil voltage only for A - see section 10: - = standard coil for 24V _{DC} Atos drivers 6 = optional coil for 12V _{DC} Atos drivers 18 = optional coil for low current drivers	
EB = basic integral driver ES = full integral driver																		Hydraulic options - see section 8: P = with integral mechanical pressure limiter R = with integral check valve for free reverse flow	
Fieldbus interfaces - USB port always present (1): NP = Not present BP = PROFIBUS DP BC = CANopen EH = EtherCAT																		Electronics options only for AEB and AES - see section 11: I = current reference input 4 ÷ 20 mA (omit for standard voltage reference input 0 ÷ 10 V) Q = enable signal Z = double power supply, enable, fault and monitor signals - 12 pin connector	
Valve size ISO 5781: 10, 20																			
Max regulated pressure: 50 = 50 bar 210 = 210 bar 350 = 350 bar 100 = 100 bar 315 = 315 bar																			

(1) Omit for **A** execution; **AEB** available only in version **NP**; **AES** available only in version **BC, BP, EH**

Hydraulic symbol



2 ELECTRONIC DRIVERS

Valve model	A										AEB	AES
Drivers model	E-MI-AC-01F	E-BM-AC-01F	E-ME-AC-01F	E-MI-AS-IR	E-BM-AS-PS	E-BM-AES	E-RI-AEB	E-RI-AES				
Type	Analog					Digital						
Voltage supply (V_{DC})	12	24	12	24	24	12	24	12	24	24		24
Valve coil option	/6	std	/6	std	std	/6	std	/6	std	std		std
Format	plug-in to solenoid	DIN 43700 UNDECAL	EUROCARD	plug-in to solenoid	DIN-rail panel			Integral to valve				
Data sheet	G010	G025	G035	G020	G030	GS050	GS115					

Note: for main and communication connector see sections [14](#), [15](#)

3 GENERAL NOTES

AGRCZO proportional valve 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.

4 FIELDBUS - only for AES

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**.

5 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	A: standard = -20°C ÷ +70°C,		/BT option = -40°C ÷ +60°C	
	AEB, AES: standard = -20°C ÷ +60°C,		/BT option = -40°C ÷ +60°C	
Storage temperature range	A: standard = -20°C ÷ +80°C,		/BT option = -40°C ÷ +70°C	
	AEB, AES: standard = -20°C ÷ +70°C,		/BT option = -40°C ÷ +70°C	
Coil resistance R at 20°C	Standard = 3 ÷ 3,3 Ω		Option /6 = 2 ÷ 2,2 Ω	Option /18 = 13 ÷ 13,4 Ω
Max. solenoid current	Standard = 2,6 A		Option /6 = 3,25 A	Option /18 = 1,5 A
Max. power	A = 30 Watt		AEB, AES = 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 with mating connectors			
Tropicalization (only REB, RES)	Tropical coating on electronics PCB			
Duty factor	Continuous rating (ED=100%)			
EMC, climate and mechanical load	See technical table G004			
Communication interface (only REB, RES)	USB Atos ASCII coding	CANopen EN50325-4 + DS408	PROFIBUS DP EN50170-2/IEC61158	EtherCAT IEC 61158
Communication physical layer (only REB, RES)	not insulated USB 2.0 + USB OTG	optical insulated CAN ISO11898	optical insulated RS485	Fast Ethernet, insulated 100 Base TX
Valve size	10		20	
Max regulated pressure [bar]	50; 100; 210; 315; 350			
Min. regulated pressure (1) [bar]	1; 3 (only for /350)			
Max. pressure at port A or B [bar]	350			
Max. pressure at port Y [bar]	pilot drain always external, to be directly connected to tank at zero pressure			
Max. flow [l/min]	160		300	
Response time 0-100% step signal (2) (depending on installation) [ms]	≤ 45		≤ 50	
Hysteresis [% of the max pressure]	≤ 2,0			
Linearity [% of the max pressure]	≤ 3,0			
Repeatability [% of the max pressure]	≤ 2,0			

Notes: above performance data refer to valves coupled with Atos electronic drivers, see section [2](#)

(1) Min pressure value to be increased of T line pressure

(2) Average response time value; the pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response

6 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 mm ² /s - max allowed range 15 ÷ 380 mm ² /s		
Fluid contamination class	ISO 4406 class 20/18/15 NAS 1638 class 9, achievable with in line filter - 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	

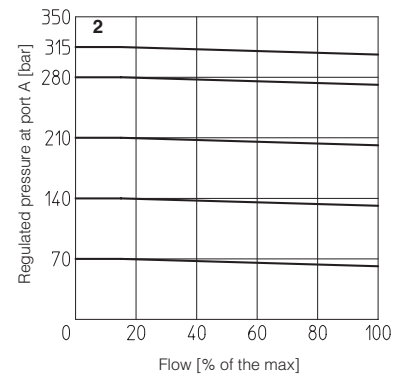
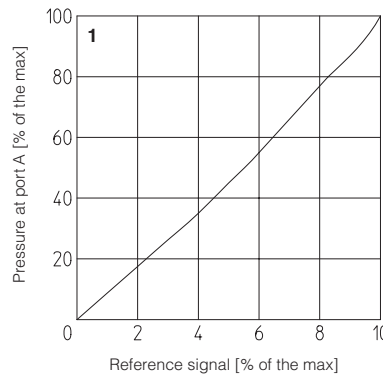
7 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

1 Regulation diagrams

with flow rate Q = 10 l/min

2 Pressure/flow diagrams

with reference pressure set with Q = 10 l/min



3-6 Pressure drop/flow diagrams

with zero reference signal

Differential pressure B→A

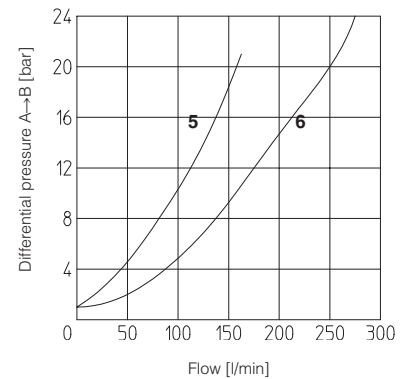
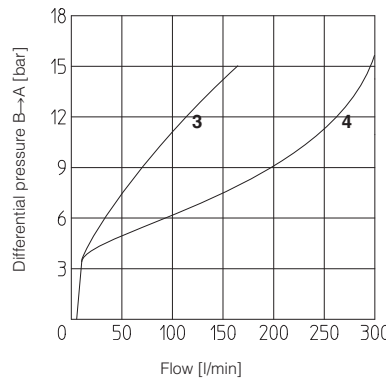
3 = AGRCZO-*-10

4 = AGRCZO-*-20

Differential pressure A→B (through check valve)

5 = AGRCZO-*-10*/R

6 = AGRCZO-*-20*/R



8 HYDRAULIC OPTIONS

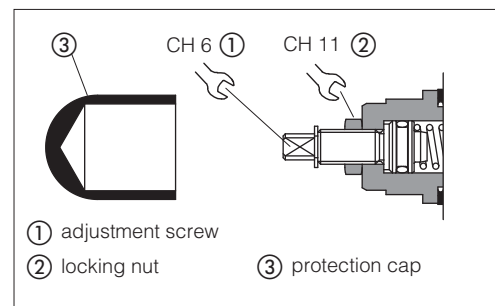
8.1 Option /P - integral mechanical pressure limiter

The AGRCZO-*/P are provided with mechanical pressure limiter acting as protection against overpressure. For safety reasons the factory setting of the mechanical pressure limiter is fully unloaded (min pressure).

At the first commissioning it must be set at a value lightly higher than the max pressure regulated with the proportional control.

For the pressure setting of the mechanical pressure limiter, proceed according to following steps:

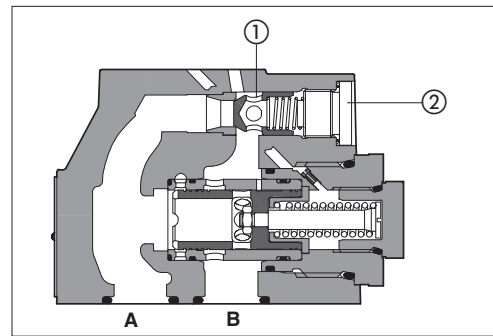
- apply the max reference input signal to the valve's driver. The system pressure will not increase until the mechanical pressure limiter remains unloaded.
- turn clockwise the adjustment screw ① until the system pressure will increase up to a stable value corresponding to the pressure setpoint at max reference input signal.
- turn clockwise the adjustment screw ① of additional 1 or 2 turns to ensure that the mechanical pressure limiter remains closed during the proportional valve working.



8.2 Option /R - integral check valve for free reverse flow

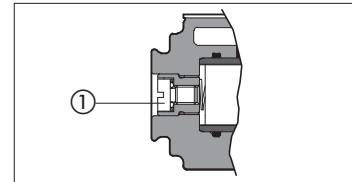
The AGRCZO-*/R are provided with integral check valve for free reverse flow A→B

- ① Check valve - cracking pressure = 0,5 bar
- ② Plug



9 AIR BLEEDING

At the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw ① located at the rear side of the solenoid housing. The presence of air may cause pressure instability and vibrations.



10 OPTIONS for -A

10.1 Coil voltage

- Option /6** optional coil to be used with Atos drivers with power supply 12 Vdc
- Option /18** optional coil to be used with electronic drivers not supplied by Atos

11 ELECTRONIC OPTIONS - for AEB and AES

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 µF/40 V capacitance to single phase rectifiers or a 4700 µF/40 V capacitance to three phase rectifiers

Reference input signal - analog differential input with 0÷+10 Vdc nominal range (pin D,E), proportional to desired valve pressure regulation

Monitor output signal - analog output signal proportional to the actual valve's coil current (1V monitor = 1A coil current)

Note: a minimum booting time of 500 ms has been considered from the driver energizing with the 24 Vdc power supply before the valve has been ready to operate. During this time the current to the valve coils is switched to zero.

11.1 Option /I

It provides 4 ÷ 20 mA current reference signal, instead of the standard 0÷+10 Vdc.

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

11.2 Option /Q

To enable the driver, supply 24 Vdc on pin C referred to pin B: 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 maintain active the communication and the other driver functions when the valve has to be disabled. This condition does not comply with European Norms EN13849-1 (ex EN954-1).

11.3 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: 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 maintain active the communication and the other driver functions when the valve has to be disabled. This condition does not comply with European Norms EN13849-1 (ex EN954-1).

Fault Output Signal

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal cable broken for 4÷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

Separate power supply (pin 9,10) allow to cut solenoid power supply (pin 1,2) while maintaining active diagnostics, serial and fieldbus communication. A safety fuse is required in series to each driver power supply: 500 mA fast fuse.

11.4 Possible combined options: /IQ, /IZ

12 PROGRAMMING TOOLS - see tech table **GS500**

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

The software is available in different versions according to the driver's options:

E-SW-BASIC support: NP (USB) PS (Serial) IR (Infrared)

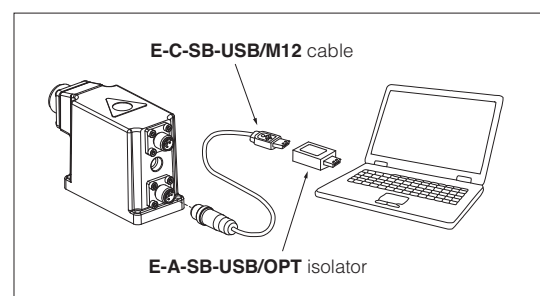
E-SW-FIELDBUS support: BC (CANopen) BP (PROFIBUS DP) EH (EtherCAT)
EW (POWERLINK) EI (EtherNet/IP)

E-SW-*/PQ support: valves with SP, SF, SL alternated control (e.g. E-SW-BASIC/PQ)

WARNING: drivers USB port is not isolated!

The use of isolator adapter is highly recommended for PC protection (see table **GS500**)

USB connection



13 ELECTRONIC CONNECTIONS

13.1 Main connector signals - 7 pin - standard and /Q option - AGRCZO-AEB and AGRCZO-AES (A1)

PIN	Standard	/Q	TECHNICAL SPECIFICATIONS	NOTES
A	V+		Power supply 24 Vdc Rectified and filtered: $V_{RMS} = 20 \div 32 V_{MAX}$ (ripple max 10 % V_{PP})	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+		Pressure reference input signal: $\pm 10 V_{dc} / \pm 20 mA$ 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 P_INPUT+	Input - analog signal
F	MONITOR referred to: AGND V0		Pressure monitor output signal: $\pm 5 V_{dc}$ maximum range Default is 0 \div 5 Vdc (1V = 1A)	Output - analog signal Software selectable
G	EARTH		Internally connected to driver housing	

13.2 Main connector signals - 12 pin - /Z option - AGRCZO-AEB and AGRCZO-AES (A2)

PIN	/Z	TECHNICAL SPECIFICATIONS	NOTES
1	V+	Power supply 24 Vdc Rectified and filtered: $V_{RMS} = 20 \div 32 V_{MAX}$ (ripple max 10 % V_{PP})	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+	Pressure reference input signal: $\pm 10 V_{dc} / \pm 20 mA$ 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 P_INPUT+	Input - analog signal
6	MONITOR	Pressure monitor output signal: $\pm 5 V_{dc}$ maximum range Defaults 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	VL0	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	

13.3 Communication connectors - AGRCZO-AEB (B) and AGRCZO-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	

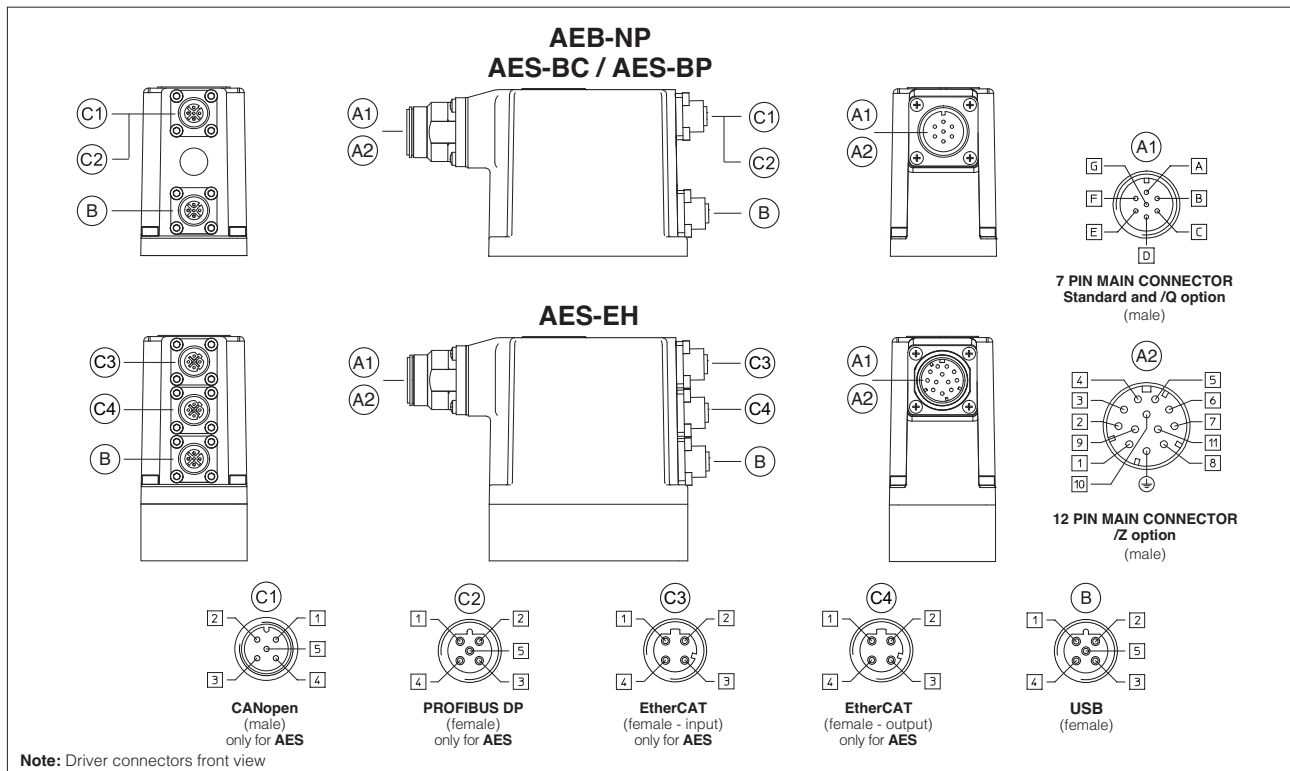
(C3) (C4) EH fieldbus execution, connector - M12 - 4 pin (2)		
PIN	SIGNAL	TECHNICAL SPECIFICATION (1)
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
Housing	SHIELD	

Notes: (1) shield connection on connector's housing is recommended (2) only for AES execution

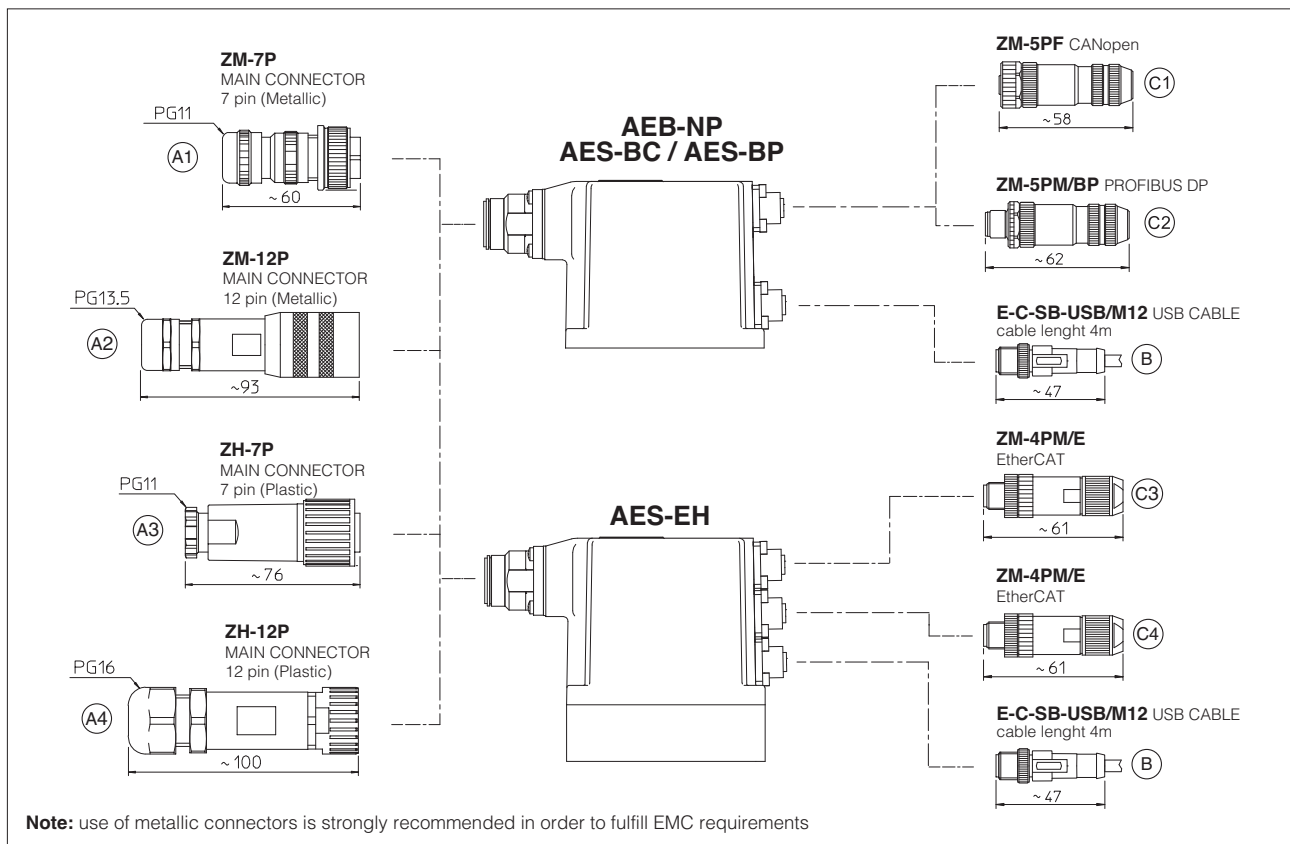
13.4 Solenoid connection - only for AGRCZO-A

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

13.5 Connections layout - only for AEB and AES



14 CONNECTORS



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

VALVE VERSION	A (1) Power supply	AEB AES	AEB/Z AES/Z	BC - CANopen	BP - PROFIBUS DP	EH - EtherCAT
CONNECTOR CODE	666	ZM-7P (A1)	ZM-12P (A2)	ZM-5PF (C1)	ZM-5PM/BP (C2)	ZM-4PM/E (C3)
		ZH-7P (A3)	ZH-12P (A4)			ZM-4PM/E (C4)
PROTECTION DEGREE	IP67	IP67				
DATA SHEET	K500	GS115, K500				

(1) Connectors supplied with the valve

only for AES

SIZE 10

ISO 5781: 2000

Mounting surface: 5781-06-07-0-00 (see table P005)

Fastening bolts:

4 socket head screws M10x45 class 12.9

Tightening torque = 70 Nm

Seals: 2 OR 109/70; 2 OR 3068

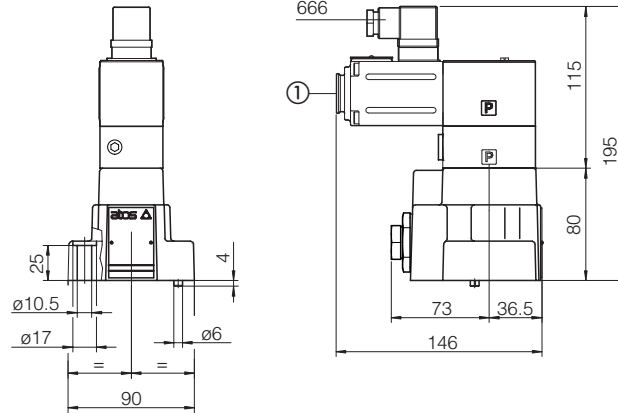
Diameters of ports A, B: $\varnothing = 14$ mm

Diameters of ports X, Y: $\varnothing = 5$ mm

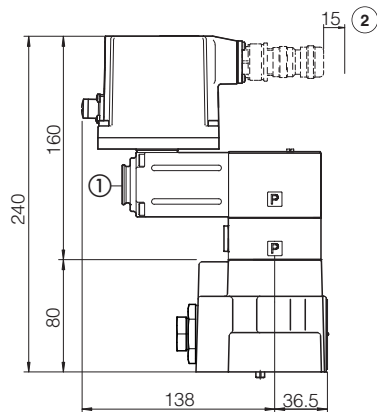
Mass [kg]

	A	AEB, AES	AES-EH
AGRCZO-*-10	5,0	5,6	5,7
Option /P	+0,5		

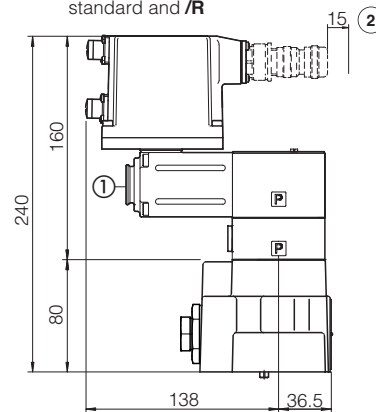
AGRCZO-A-10
standard and /R



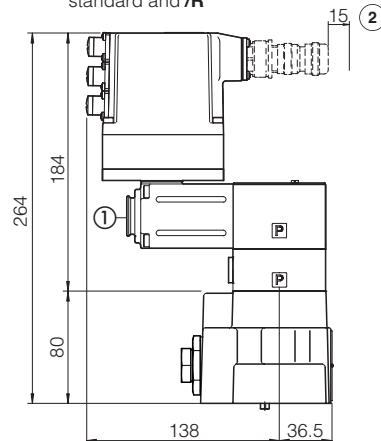
AGRCZO-AEB-NP-10
standard and /R



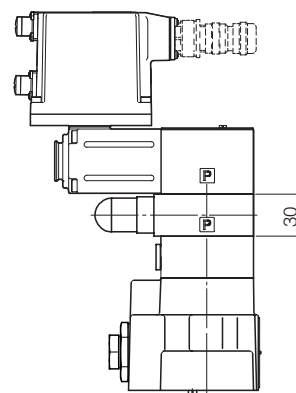
AGRCZO-AES-BC-10
AGRCZO-AES-BP-10
standard and /R



AGRCZO-AES-EH-10
standard and /R



Option /P



① = Screw for air bleeding: at the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw ①

② = Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 14, 15

SIZE 20

ISO 5781: 2000

Mounting surface: 5781-08-10-0-00 (see table P005)

Fastening bolts:

4 socket head screws M10x45 class 12.9

Tightening torque = 70 Nm

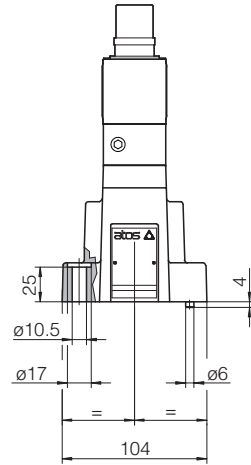
Seals: 2 OR 109/70 ; 2 OR 4100

Diameters of ports A, B: $\varnothing = 22$ mm

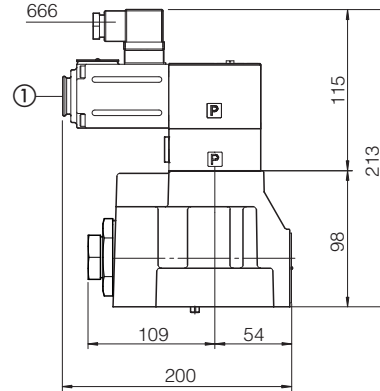
Diameters of ports X, Y: $\varnothing = 5$ mm

Mass [kg]

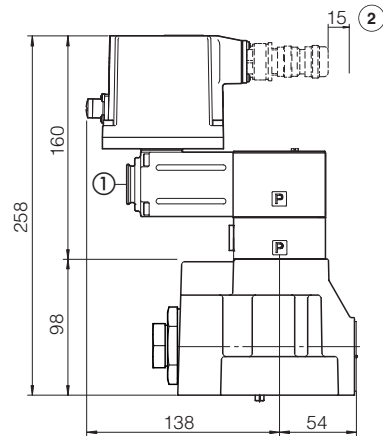
	A	AEB, AES	AES-EH
AGRCZO-*20	7,5	8,1	8,2
Option /P	+0,5		



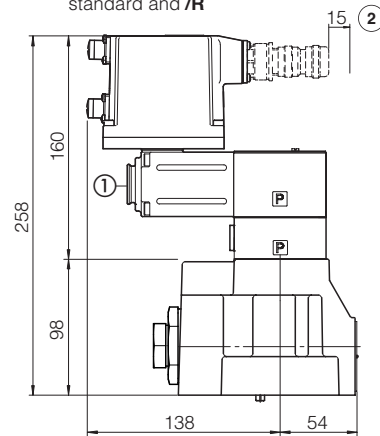
AGRCZO-A-20
standard and /R



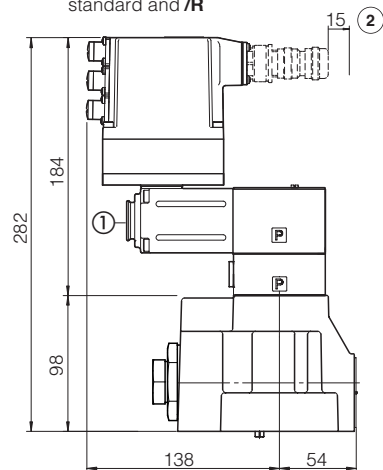
AGRCZO-AEB-NP-20
standard and /R



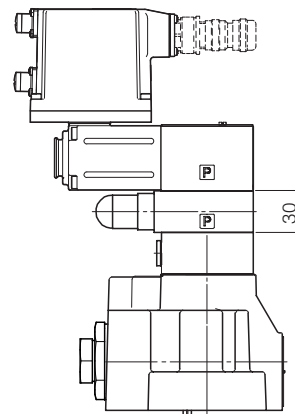
AGRCZO-AES-BC-20
AGRCZO-AES-BP-20
standard and /R



AGRCZO-AES-EH-20
standard and /R



Option /P



① = Screw for air bleeding: at the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw ①

② = Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 14, 15