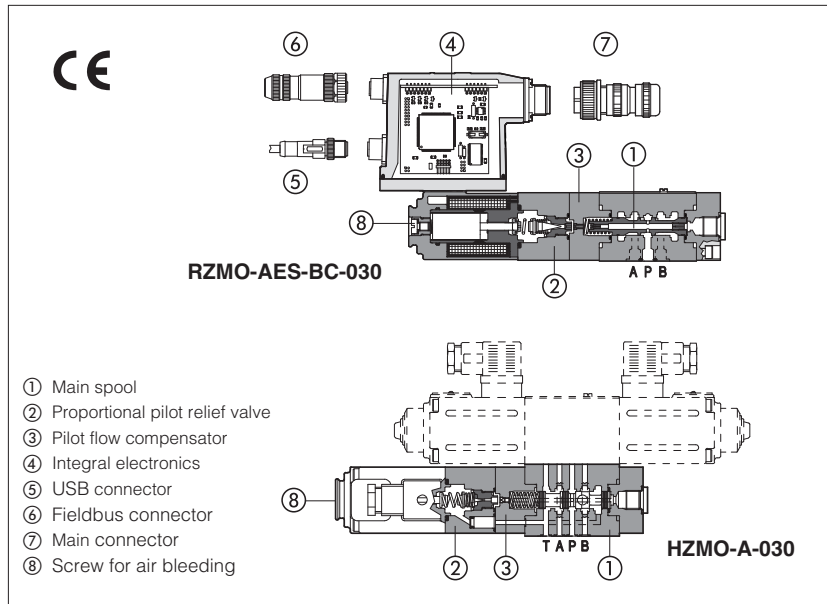


Proportional relief valves

digital, pilot operated, open loop, subplate or modular mounting



RZMO-A, RZMO-AEB, RZMO-AES HZMO-A

Spool type pilot operated digital proportional relief valves for pressure open loop controls, available in subplate or modular mounting.

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: **06**
Max flow: **40 l/min**
Max pressure: **350 bar**

1 MODEL CODE

| | | | | | | | | | | | | | | | |
|--|---|----------|-----------|---|-----------|---|------------|---|------------|---|----------|---|-----------|--|----------|
| RZMO | - | A | EB | - | NP | - | 030 | / | 315 | / | * | / | ** | / | * |
| Proportional pressure relief valve size 06 | | | | | | | | | | | | | | Seals material, see sect. 9, 10: | |
| RZMO = subplate HZMO = modular | | | | | | | | | | | | | | - = 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 sect. 8: - = standard coil for 24V _{DC} Atos drivers 6 = optional coil for 12V _{DC} Atos drivers 18 = optional coil for low current drivers Electronics options only for AEB, AES - see sect. 9: 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 | |
| Fieldbus interfaces - USB port always present (1): NP = Not present BP = PROFIBUS DP BC = CANopen EH = EtherCAT | | | | | | | | | | | | | | | |
| Configuration: 030 = regulation on port P, discharge in T (pilot operated version) | | | | | | | | | | | | | | Max regulated pressure: 50 = 50 bar 315 = 315 bar 100 = 100 bar 350 = 350 bar 210 = 210 bar | |

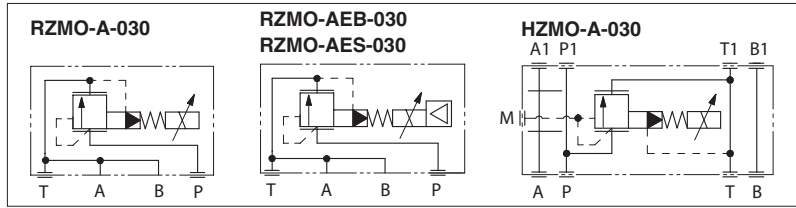
(1) Omit for **A** execution; **AEB** available only in version **NP**; **AES** available only in version **BC, BP, EH**

2 ELECTRONIC DRIVERS

| Valve model | A | | | | | | | AEB | AES |
|---------------|---------------------|-------------------|-------------|-----------------------|---------------------|----------------|----------|-------------------|------------|
| Drivers model | E-MI-AC-01F | E-BM-AC-01F | E-ME-AC-01F | E-RP-AC-01F | E-MI-AS-IR | E-BM-AS-PS | E-BM-AES | E-RI-AEB | E-RI-AES |
| Type | Analog | | | | Digital | | | | |
| Format | plug-in to solenoid | DIN 43700 UNDECAL | EUROCARD | sealed and rugged box | plug-in to solenoid | DIN-rail panel | | Integral to valve | |
| Data sheet | G010 | G025 | G035 | G100 | G020 | G030 | GS050 | GS115 | |

Note: for main and communication connector see sections 12, 13

Hydraulic symbol



3 GENERAL NOTES

RZMO-A* and HZMO-A proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in table F003 and in the installation notes supplied with relevant components.

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 AEB, AES) | Tropical coating on electronics PCB | | | |
| Duty factor | Continuous rating (ED=100%) | | | |
| EMC, climate and mechanical load | See technical table G004 | | | |
| Communication interface (only AEB, AES) | USB Atos ASCII coding | CANopen EN50325-4 + DS408 | PROFIBUS DP EN50170-2/IEC61158 | EtherCAT IEC 61158 |
| Communication physical layer (only AEB, AES) | not insulated USB 2.0 + USB OTG | optical insulated CAN ISO11898 | optical insulated RS485 | Fast Ethernet, insulated 100 Base TX |

| | [bar] | 50 | 100 | 210 | 315 | 350 |
|---|-------------------------|--|------------|------------|------------|------------|
| Max regulated pressure | [bar] | | | | | |
| Min. regulated pressure | [bar] | see min. pressure / flow diagrams at section 7 | | | | |
| Max. pressure at port P | [bar] | | | 350 | | |
| Max. pressure at port T | [bar] | | | 210 | | |
| Min. ÷ Max. flow | [l/min] | | | 2,5 ÷ 40 | | |
| Response time 0-100% step signal (1) (depending on installation) | [ms] | | | ≤ 60 | | |
| Hysteresis | [% of the max pressure] | | | ≤ 2 | | |
| Linearity | [% of the max pressure] | | | ≤ 3 | | |
| Repeatability | [% of the max pressure] | | | ≤ 2 | | |

Notes: above performance data refer to valves coupled with Atos electronic drivers, see section 2

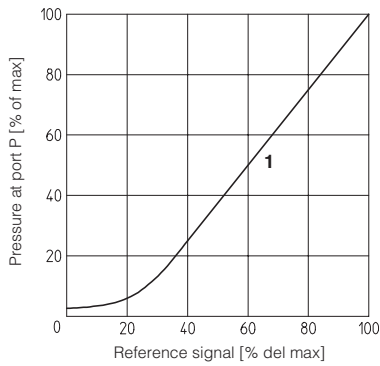
(1) Average response time value; the pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response.

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

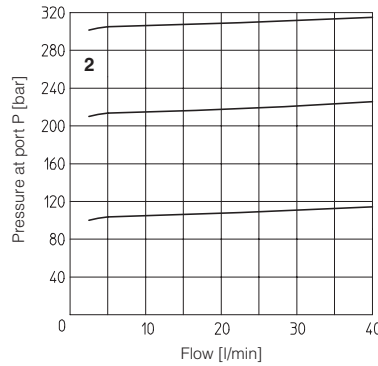
| | | | |
|--------------------------------------|---|----------------------------|----------------------|
| Seals, recommended fluid temperature | NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +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)

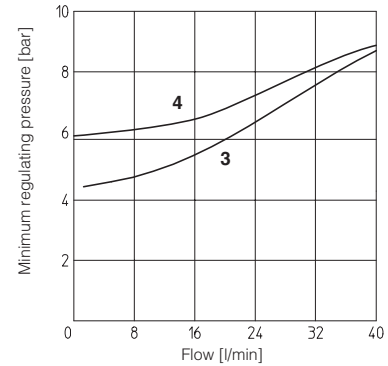
1 Regulation diagrams
with flow rate Q = 10 l/min



2 Pressure/flow diagrams
with reference signal set at Q = 10 l/min



3-4 Min. pressure/flow diagrams
with zero reference signal



Note:

The presence of counter pressure at port T can affect the pressure regulation and the minimum pressure.

3 = All the models (except /350)
4 = All the models (only /350)

8 OPTIONS for -A

8.1 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

9 ELECTRONIC OPTIONS - for AEB and AES

Standard driver execution provides on the 7 pin main connector:

Power supply - 24Vdc must be appropriately stabilized or rectified and filtered; a 2.5 A fuse time lag 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 to be 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.

9.1 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

9.2 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).

9.3 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.

9.4 Possible combined options: /IQ, /IZ

10 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.

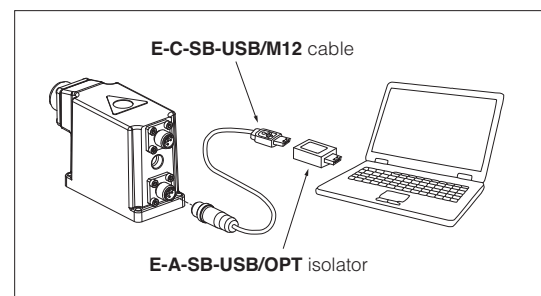
The software is available in different versions according to the driver's options:

- E-SW-BASIC** support: NP (USB) PS (Serial) IR (Infrared)
- E-SW-FIELDBUS** support: BC (CANopen) BP (PROFIBUS DP) EH (EtherCAT)
EW (POWERLINK)
- 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



11 ELECTRONIC CONNECTIONS

11.1 Main connector signals - 7 pin - standard and /Q option - RZMO-AEB and RZMO-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: $\pm 10 Vdc / \pm 20 mA$ 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: $\pm 5 Vdc$ maximum range Default is 0 \div 5 Vdc (1V = 1A) | Output - analog signal Software selectable |
| G | EARTH | | Internally connected to driver housing | |

11.2 Main connector signals - 12 pin - /Z option - RZMO-AEB and RZMO-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: $\pm 10 Vdc / \pm 20 mA$ 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: $\pm 5 Vdc$ 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 | VLO | 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 | |

11.3 Communication connectors - RZMO-AEB (B) and RZMO-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 + |

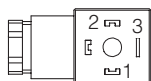
| (C1) BC fieldbus execution, connector - M12 - 5 pin (2) | | |
|---|----------|-----------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | CAN_SHLD | Shield |
| 2 | NC | do not connect |
| 3 | CAN_GND | Signal zero data line |
| 4 | CAN_H | Bus line (high) |
| 5 | CAN_L | Bus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

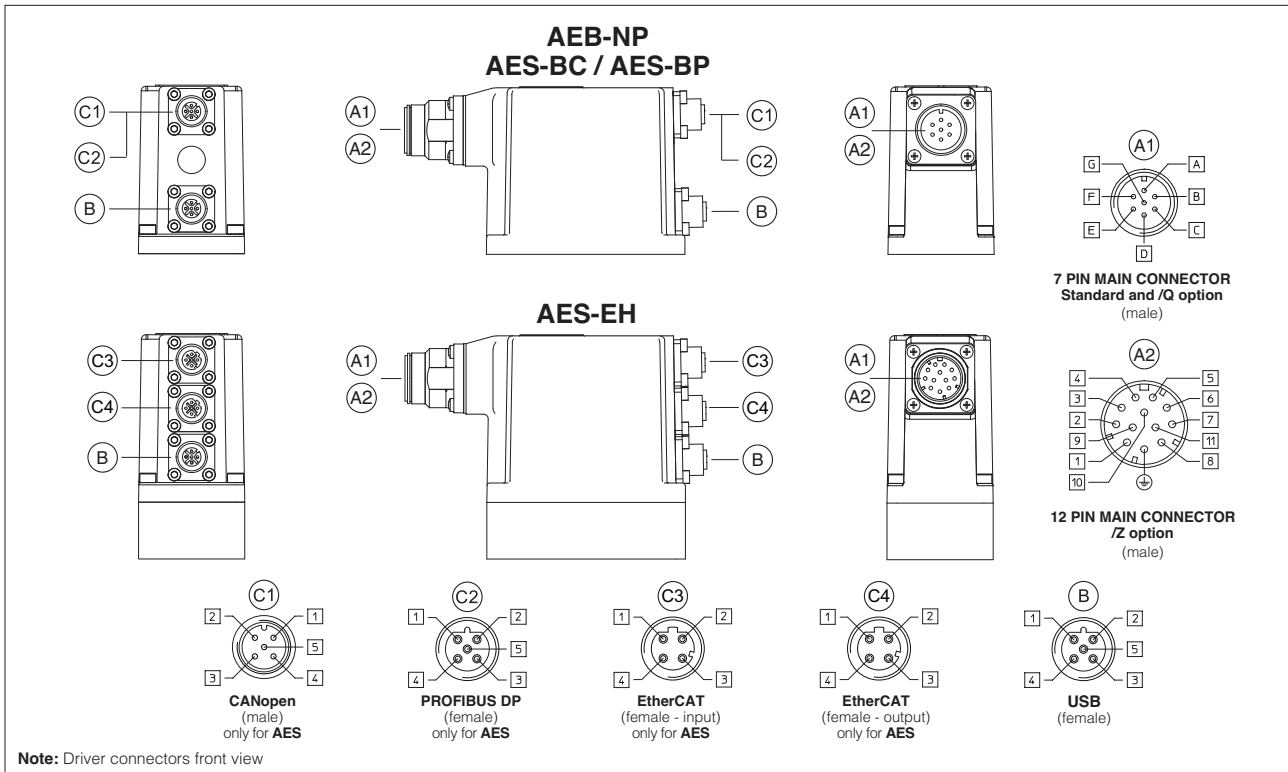
| (C3) (C4) EH fieldbus execution, connector - M12 - 4 pin (2) | | |
|--|--------|-----------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | TX+ | Transmitter |
| 2 | RX+ | Receiver |
| 3 | TX- | Transmitter |
| 4 | RX- | Receiver |
| Housing | SHIELD | |

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

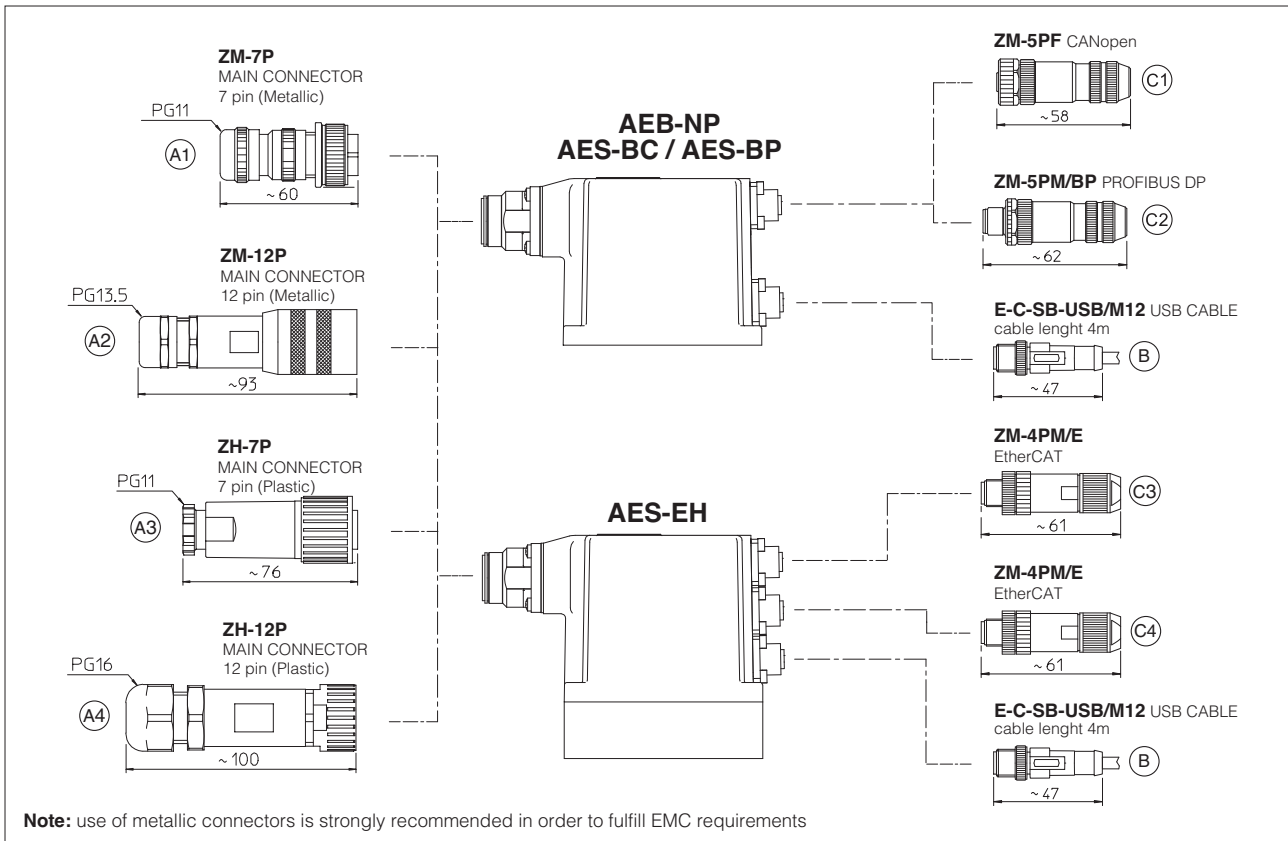
11.4 Solenoid connection - only for RZMO-A and HZMO-A

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

11.5 Connections layout - only for AEB and AES



12 CONNECTORS



13 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

14 INSTALLATION DIMENSIONS [mm]

ISO 4401: 2000

Mounting surface: 4401-03-02-0-05

(see table P005)

Fastening bolts:

4 socket head screws M5X50 bolts class 12.9

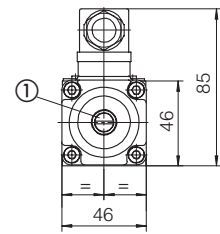
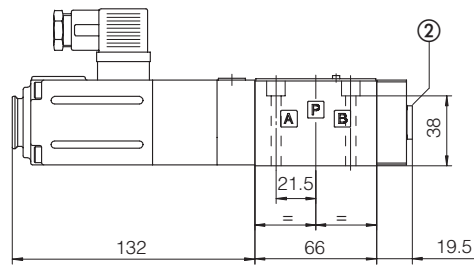
Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P, T: $\varnothing = 7,5$ mm

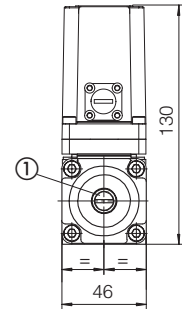
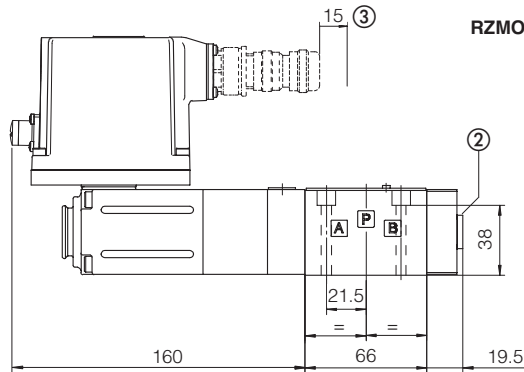
Ports A, B connected to port T

RZMO-A



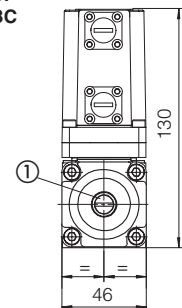
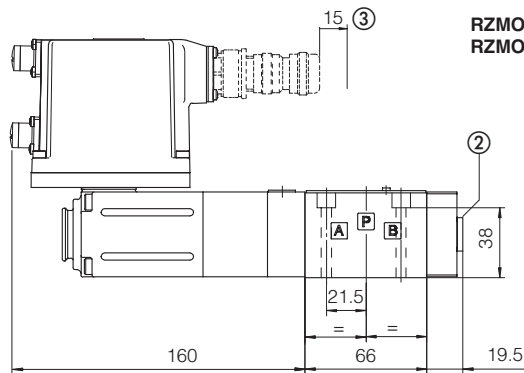
Mass: 2,8 Kg

RZMO-AEB



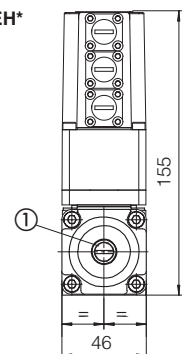
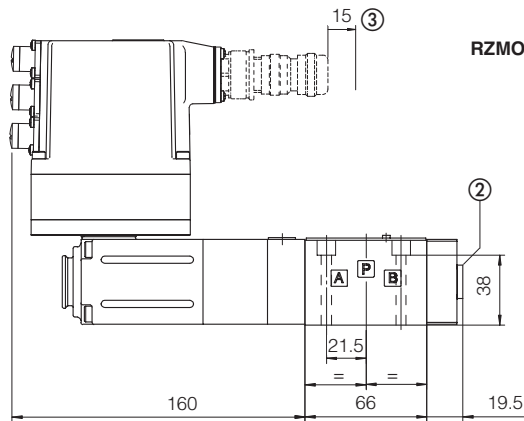
Mass: 3,3 Kg

RZMO-AES-BP
RZMO-AES-BC

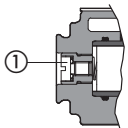


Mass: 3,3 Kg

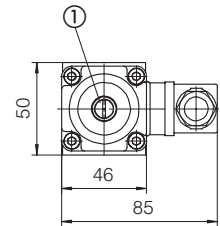
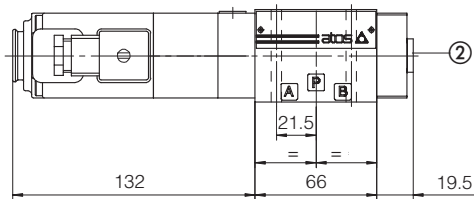
RZMO-AES-EH*



Mass: 3,4 Kg



HZMO-A



Mass: 2,8 Kg

ISO 4401: 2000

Mounting surface: 4401-03-02-0-05

(see table P005)

Seals: 4 OR 108

Ports P, T, A, B: $\varnothing = 6,5$ mm

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 = Pressure gauge port = G1/4"

③ = Space to remove the 7 or 12 pin main connector. For main and communication connectors see section 12, 13