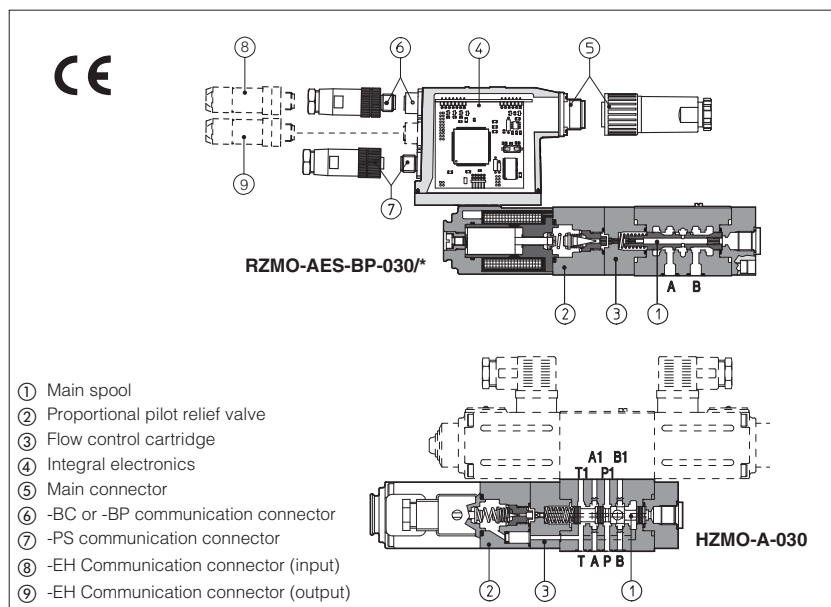


Proportional relief valves type RZMO-AES and HZMO-A

pilot operated, without integral pressure transducer, subplate or modular mounting, ISO 4401 size 06



1 MODEL CODE

| | |
|---|---|
| RZ | MO - AES - PS - 030 / 315 / * ** / * |
| Proportional pressure relief valves size 06 RZ = subplate HZ = modular | Seals material: omit for NBR (mineral oil & water glycol) PE = FPM |
| MO = pressure relief | Series number |
| A = without integral transducer | |
| Only for RZMO: AE = as A plus integral electronics AES = as A plus integral digital electronics | |
| Communication interfaces (only for AES) PS = Serial (1) BC = CANopen BP = PROFIBUS DP EH = EtherCAT | Options: Coil voltage (only for -A execution) see section 7: - = standard coil for 24V _{DC} Atos drivers 6 = optional coil for 12V _{DC} Atos drivers 18 = optional coil for low current drivers for -AE execution , see section 9: I = current reference (4÷20 mA) Q = enable signal for -AES execution , see section 11: Q = enable signal Z = adds double power supply, enable and fault signals (12 pin connector) |
| Configuration, see section 8: 030 = regulation on port P, discharge in T | |
| Pressure range 50 = 50 bar 100 = 100 bar 210 = 210 bar 315 = 315 bar 350 = 350 bar | |

(1) Serial communication interface always present, also for -BC, -BP and -EH options

Proportional pressure relief valves, pilot operated without integral pressure transducer, available in two different executions:

- RZMO subplate mounting;
- HZMO modular mounting.

They operate in association with electronic drivers, see table 2 which supply the proportional valve with proper current signal to align valve regulation to the reference signal supplied to the electronic driver.

They are available in different executions:

- -A, without integral pressure transducer.
- -AE, -AES, as -A plus analogue (AE) or digital (AES) integral electronics ⑤ (only for RZMO).

The system pressure is controlled by the spool ①, piloted by the proportional pilot relief valve ②.

The intermediate compensated flow control cartridge ③ assures constant pilot flow and therefore high pressure stability.

The integral electronics ④ ensures factory presetting, fine functionality plus valve-to-valve interchangeability and simplified wiring and installation.

The electronic main connector ⑤ is fully interchangeable for -AE and -AES executions. Standard 7 pin connector is used for power supply, analog input reference and monitor signals.

12 pin connector is used option /Z (AES).

Following communication interfaces ⑥, ⑦, ⑧, ⑨ are available for the digital -AES execution:

- -PS, Serial communication interface for configuration, monitoring and firmware updating through Atos PC software - always present also for -BC, -BP and -EH options
- -BC, CANopen interface
- -BP, PROFIBUS DP interface
- -EH, EtherCAT interface

The valves with -BC and -BP interfaces can be integrated into a fieldbus communication network and thus digitally operated by the machine control unit.

The coils are fully plastic encapsulated with insulation class H.

Surface mounting: ISO 4401 size 06

Max flow: 40 l/min

Max pressure: 350 bar

2 ELECTRONIC DRIVERS FOR *ZMO

| Valve model | -A | | | | | | -AE | -AES |
|---------------|-------------|------------|-------------|------------|-------------|-------------|---------|----------|
| Drivers model | E-MI-AC-01F | E-MI-AS-IR | E-BM-AC-01F | E-BM-AS-PS | E-ME-AC-01F | E-RP-AC-01F | E-RI-AE | E-RI-AES |
| Data sheet | G010 | G020 | G025 | G030 | G035 | G100 | G110 | G115 |

3 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

| | | | | | |
|---|-----------------------------------|-----------------------------------|-----|------------|-----|
| Hydraulic symbols | | | | | |
| | | | | | |
| RZMO-A-030 | | RZMO-AE-030 | | HZMO-A-030 | |
| Valve model | | RZMO-A, RZMO-AE, RZMO-AES, HZMO-A | | | |
| Max. regulated pressure (Q = 10 l/min) | | 50 | 100 | 210 | 315 |
| Min. regulated pressure (Q = 10 l/min) | [bar] | 6 | | | |
| Max. pressure at ports P, T | [bar] | port P = 350 bar; port T 210 bar | | | |
| Minimum flow | [l/min] | 2,5 | | | |
| Maximum flow | [l/min] | 40 | | | |
| Response time 0-100% step signal (depending on installation) - see section 6.4 | [ms] | 60 | | | |
| Hysteresis | [% of the max regulated pressure] | ≤ 2 | | | |
| Linearity | [% of the max regulated pressure] | ≤ 3 | | | |
| Repeatability | [% of the max regulated pressure] | ≤ 2 | | | |

Above performance data refer to valves coupled with Atos electronic drivers, see section 2.

4 MAIN CHARACTERISTICS

| | |
|----------------------------------|--|
| Assembly position | Any position |
| Subplate surface finishing | Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101) |
| Ambient temperature | -20°C ÷ +70°C for -A execution; -20°C ÷ +60°C for -AE and -AES executions |
| Fluid | Hydraulic oil as per DIN 51524 ... 535 for other fluids see section 1 |
| Recommended viscosity | 15 ÷ 100 mm²/s at 40°C (ISO VG 15÷100) |
| Fluid contamination class | ISO 4406 class 20/18/15 NAS 1638 class 9, in line filters of 10 µm (β ₁₀ ≥ 75 recommended) |
| Fluid temperature | -20°C +60°C (standard seals) -20°C +80°C (PE seals) |
| Coil resistance R at 20°C | 3 ÷ 3,3 Ω for standard; 2 ÷ 2,2 Ω for option /6; 13 ÷ 13,4 Ω for option /18 |
| Max solenoid current | 2,6 A for standard 12 V _{DC} coil; 3,25 A for 6 V _{DC} coil; 1,5 A for 18 V _{DC} coil |
| Max power | 30 Watt for -A execution; 50 Watt for -AE and AES executions |
| Protection degree (CEI EN-60529) | IP65 for -A execution; IP67 for -AE and AES executions |
| Duty factor | Continuous rating (ED=100%) |

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

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

1 = RZMO-A; RZMO-AE; RZMO-AES; HZMO-A

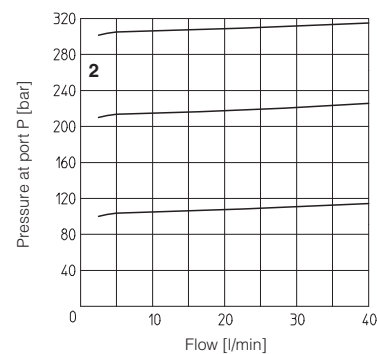
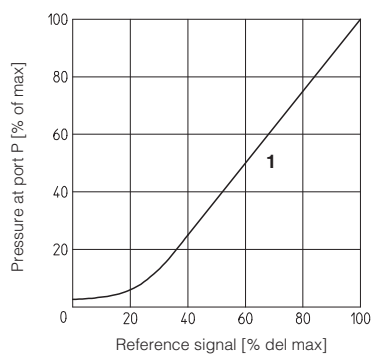
Note:

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

5.2 Pressure/flow diagrams

with reference signal set at Q = 10 l/min

2 = RZMO-A, RZMO-AE, RZMO-AES, HZMO-A

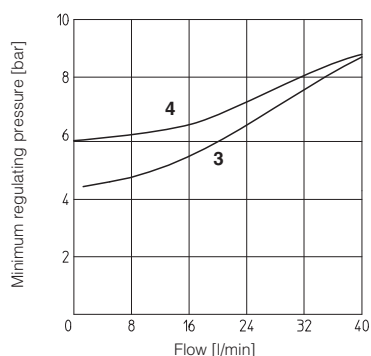


5.3 Minimum pressure/flow diagrams

with zero reference signal

3 = All the models (except /350)

4 = All the models (only /350)



5.4 Dynamic response

The response times in section 3 have to be considered as average values.

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 GENERAL NOTES

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

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

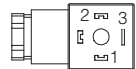
The electrical signals of the valve (e.g. monitor signals) must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, EN-982).

7 OPTIONS FOR -A EXECUTION

7.1 Option /6 optional coil to be used with Atos drivers with power supply 12 Vdc

7.2 Option /18 optional coil to be used with electronic drivers not supplied by Atos

8 CONNECTIONS FOR -A EXECUTION

| SOLENOID POWER SUPPLY CONNECTOR | | |
|---------------------------------|--------------------|---|
| PIN | Signal description | |
| 1 | SUPPLY |  |
| 2 | SUPPLY | |
| 3 | GND | |

9 ANALOG INTEGRAL DRIVERS -AE - OPTIONS

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 safety fuse is required in series to the 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÷+10Vdc nominal range (pin D,E), proportional to desired coil current

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

Following options are available to adapt standard execution to special application requirements:

9.1 Option /I

It provides the 4÷20 mA current reference signal instead of the standard 0÷+10 Vdc. Monitor output signal is still the standard 0÷+10Vdc.

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.

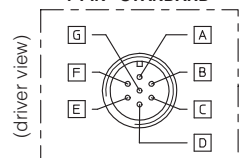
9.2 Option /Q

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

9.3 Possible combined option: /IQ

10 ANALOG INTEGRAL DRIVERS -AE - MAIN FUNCTIONS AND ELECTRONIC CONNECTIONS

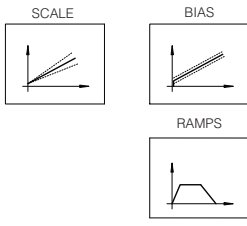
MAIN CONNECTOR
7 PIN - STANDARD



| Selector SW | | | | Dither frequency [Hz] |
|-------------|-----|-----|-----|-----------------------|
| SW1 | SW2 | SW3 | SW4 | |
| | | | | 100 |
| ON | | | | 130 |
| | ON | | | 160 |
| | | ON | | 200 (Standard) |
| ON | | ON | | 230 |
| | ON | ON | | 270 |
| ON | ON | ON | | 300 |
| ON | ON | | ON | 380 |
| ON | | ON | ON | 430 |
| | ON | ON | ON | 470 |
| ON | ON | ON | ON | 500 |

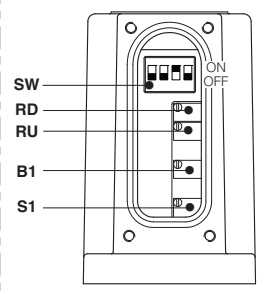
The dither frequency is factory preset at 200 Hz and its regulation may be adjusted after contact with Atos technical department

MAIN FUNCTIONS



B1: positive bias adjust
S1: positive scale adjust
RU: ramp for increasing reference signal
RD: ramp for decreasing reference signal
SW: dither frequency selector (see table beside)

REGULATIONS AND SWITCHES
(remove the rear cover)



10.1 7 PIN MAIN CONNECTOR

| PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|------------------|---------|---|------------------------|
| A | V+ | Power supply 24 Vdc for solenoid power stage and driver logic | Input - power supply |
| B | V0 | Power supply 0 Vdc for solenoid power stage and driver logic | Gnd - power supply |
| C ⁽¹⁾ | AGND | Ground - signal zero for MONITOR signal | Gnd - analog signal |
| | ENABLE | Enable (24 Vdc) or disable (0 Vdc) the driver (for /Q option) | Input - on/off signal |
| D | INPUT+ | Reference analog input: 0÷+10 Vdc maximum range (4÷20 mA for /I option) | Input - analog signal |
| E | INPUT - | Normal working range 0÷+10 Vdc (4÷20 mA for /I option) | |
| F | MONITOR | Monitor analog output: 0÷+5 Vdc maximum range; 1 V = 1 A | Output - analog signal |
| G | EARTH | Internally connected to the driver housing | |

Note: (1) with /Q option ENABLE signal replaces AGND on pin C; MONITOR signal is referred to pin B.

A minimum time of 60ms to 160ms have be considered between the driver energizing with the 24 Vdc power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero

11 DIGITAL INTEGRAL DRIVERS -AES - OPTIONS

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 safety fuse is required in series to each driver power supply. Apply at least a 10000 μ F/40 V capacitance to single phase rectifiers or a 4700 μ F/40 V capacitance to three phase rectifiers.
- Reference input signal** - analog differential input with 0÷+10 Vdc nominal range (pin D,E), proportional to desired coil current (4÷20 mA with cable break detection, ± 10 mA, ± 20 mA or 0÷20 mA software selectable)
- Monitor output signal** - analog output signal proportional to the actual valve's coil current (1V monitor = 1A coil current)

Following options are available to adapt standard execution to special application requirements:

11.1 Option /Q

To enable the driver, supply 24Vdc on pin C referred to pin B: when the enable signal is set to zero the valve status is software selectable, by factory default the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active. For the complete list of selectable status, see tab. G115.

11.2 Option /Z

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

Logic power supply

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

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

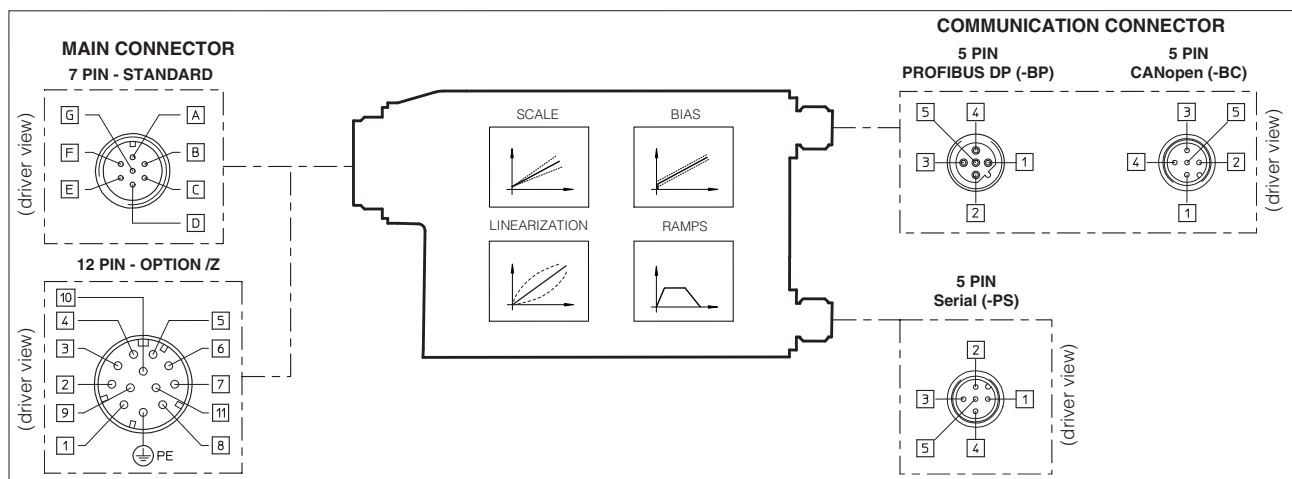
Enable Input Signal

To enable the driver, supply 24Vdc on pin 3 referred to pin 2: when the enable signal is set to zero the valve status is software selectable, by factory default the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active. For the complete list of selectable status, see tab. G115.

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 24Vdc (pin 11 referred to pin 2): Fault status is not affected by the Enable input signal.

12 DIGITAL INTEGRAL DRIVERS -AES - MAIN FUNCTIONS AND ELECTRONIC CONNECTIONS



12.1 7 or 12 PIN MAIN CONNECTOR

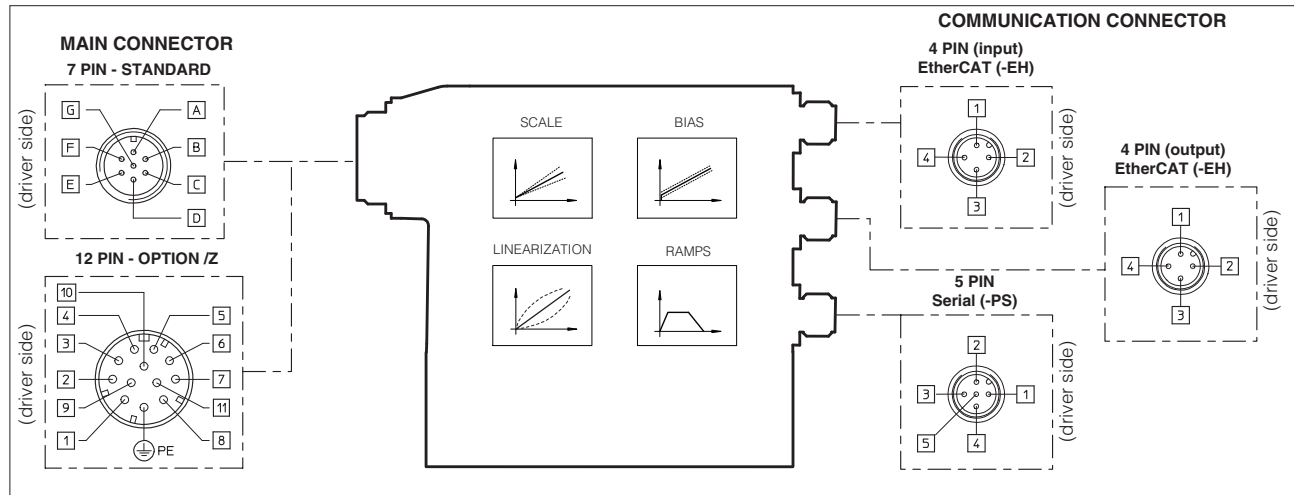
| Standard 7pin | /Z option 12pin | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|---------------|-----------------|---------|--|------------------------|
| A | 1 | V+ | Power supply 24 Vdc for solenoid power stage (and for driver logic on 7 pin connection) | Input - power supply |
| B | 2 | V0 | Power supply 0 Vdc for solenoid power stage (and for driver logic on 7 pin connection) | Gnd - power supply |
| D | 4 | INPUT+ | Reference analog input: ± 10 Vdc / ± 20 mA maximum range software selectable | Input - analog signal |
| E | - | INPUT - | Default setting 0÷+10 Vdc differential input /Z option: common mode INPUT+ referred to AGND | |
| C | 3 | ENABLE | Enable (24 Vdc) or disable (0 Vdc) the driver | Input - on/off signal |
| | 5 | AGND | Ground - signal zero for MONITOR signal signal zero for INPUT+ signal (only for /Z option) | Gnd - analog signal |
| F | 6 | MONITOR | Monitor analog output: 0÷+5 Vdc maximum range; 1V = 1A | Output - analog signal |
| - | 7 | NC | do not connect | |
| - | 8 | NC | do not connect | |
| - | 9 | VL+ | Power supply 24 Vdc for driver logic | Input - power supply |
| - | 10 | VLO | Power supply 0 Vdc for driver logic | Gnd - power supply |
| - | 11 | FAULT | Fault (0 Vdc) or normal working (24 Vdc) | Output - on/off signal |
| G | PE | EARTH | Internally connected to the driver housing | |

Note: A minimum time of 270 to 340 ms have be considered between the driver energizing with the 24Vdc power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

12.2 ELECTRONIC CONNECTIONS - 5 PIN COMMUNICATION CONNECTORS

| -PS Serial | | | -BC CANopen | | -BP PROFIBUS DP | |
|------------|--------|-------------------------------|-------------|-------------------------|-----------------|---------------------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION | SIGNAL | TECHNICAL SPECIFICATION | SIGNAL | TECHNICAL SPECIFICATION |
| 1 | NC | do not connect | CAN_SHLD | Shield | +5V | for termination |
| 2 | NC | do not connect | NC | do not connect | LINE-A | Bus line (high) |
| 3 | RS_GND | Signal zero data line | CAN_GND | Signal zero data line | DGND | data line and termination Signal zero |
| 4 | RS_RX | Valves receiving data line | CAN_H | Bus line (high) | LINE-B | Bus line (low) |
| 5 | RS_TX | Valves transmitting data line | CAN_L | Bus line (low) | SHIELD | |

13 DIGITAL INTEGRAL DRIVER -AES-EH - MAIN FUNCTIONS AND ELECTRONIC CONNECTIONS



Note: for the electronic connections of 7 or 12 pin main connector, see section 12.1

13.1 4 & 5 PIN M12 COMMUNICATION CONNECTORS

| Serial (-PS) | | | EtherCAT (-EH) | | |
|--------------|--------|-------------------------------|----------------|--------|------------------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION | PIN | SIGNAL | TECHNICAL SPECIFICATION |
| 1 | NC | do not connect | 1 | TX+ | Transmitter |
| 2 | NC | do not connect | 2 | RX+ | Receiver |
| 3 | RS_GND | Signal zero data line | 3 | TX- | Transmitter |
| 4 | RS_RX | Valves receiving data line | 4 | RX- | Receiver |
| 5 | RS_TX | Valves transmitting data line | Housing | Shield | Positioned on control cabinet side |

14 MODEL CODES OF POWER SUPPLY AND COMMUNICATION CONNECTORS (to be ordered separately)

| VALVE VERSION | -A | -AE, -AES | | -AES/Z | -Serial (-PS) or CANopen (-BC) | PROFIBUS DP (-BP) | EtherCAT (-EH) |
|-------------------|------|------------------|-------|--------|--------------------------------|-------------------|----------------|
| CONNECTOR CODE | 666 | ZH-7P | ZM-7P | ZH-12P | ZH-5P | ZH-5P/BP | ZM-4PM/EH |
| PROTECTION DEGREE | IP65 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 |
| DATA SHEET | K500 | G110, G115, K500 | | | G115, K500 | | |

connectors supplied with the valve

15 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 to the digital driver. E-SW software is available in different versions according to the driver's communication interface: PS (Serial) E-SW-PS, BC (CANopen) E-SW-BC and BP (PROFIBUS DP). Proportional valves with fieldbus communication interface can be directly managed by the machine control unit; it is required to implement in the machine control the standard communication as described in the user manuals supplied with the relevant programming software.

ISO 4401: 2000
Mounting surface: 4401-03-02-0-05
(see table P005)

Fastening bolts:

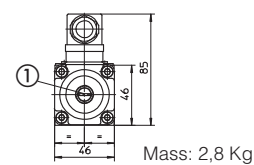
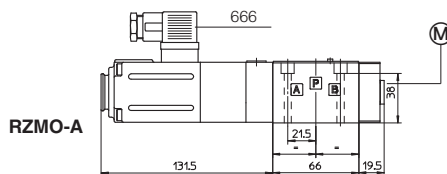
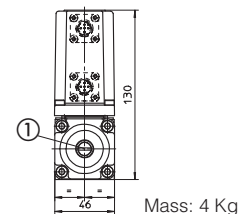
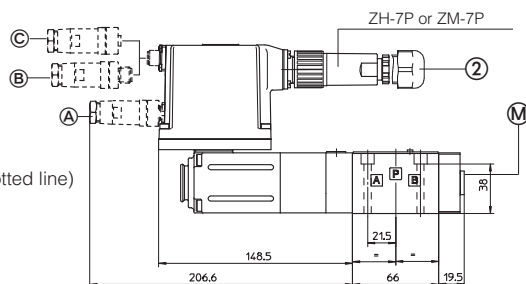
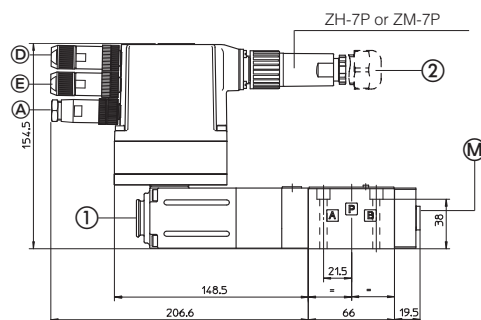
4 socket head screws M5X50 bolts class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108

Ports P, T: Ø = 5 mm

Ports A, B not used


RZMO-AE
RZMO-AES* (dotted line)

RZMO-AES-EH*


Mass: 4,1 Kg

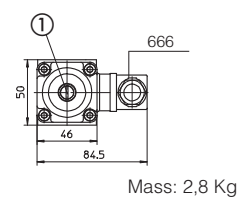
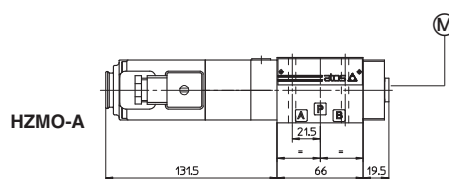
ISO 4401: 2000
Mounting surface: 4401-03-02-0-05
(see table P005)

Fastening bolts:

4 socket head screws M5 bolts class 12.9

Tightening torque = 8 Nm

Seals: 4 OR 108



- Ⓐ -PS communication interface, ZH-5P connector
- Ⓑ -BP communication interface, ZH-5P/BP connector
- Ⓒ -BC communication interface, ZH-5P connector
- Ⓓ -EH communication interface (input), ZM-4PM/EH connector
- Ⓔ -EH communication interface (output), ZM-4PM/EH connector

① = screw for air bleeding

② dotted line = 12 pin connector ZH-12P for option /Z