Proportional relief valves
digital, pilot operated, open loop

AGMZO-A, AGMZO-AEB, AGMZO-AES
Poppet type, pilot operated proportional relief valves for pressure open loop controls.
Executions:
• A without integral driver, to be coupled with separated driver, see section 3
• 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, 20, 32
Max flow: 200, 400, 600 l/min
Max pressure: 350 bar

Fieldbus interfaces - USB port always present (1)
NP = Not present
BP = PROFIBUS DP
BC = CANopen
EH = EtherCAT

Max regulated pressure:
50 = 50 bar
100 = 100 bar
210 = 210 bar
350 = 350 bar

Electronics options
only for AEB and AES - see section 13
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 6264: 10, 20, 32

Table FS035-1/E

Note: for main and communication connector see sections 16, 17
### GENERAL NOTES

AGMZO-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.

### 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.

### MAIN CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

<table>
<thead>
<tr>
<th>Assembly position</th>
<th>Subplate surface finishing</th>
<th>MMTFd valves according to EN ISO 13849</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any position</td>
<td>Roughness index, Ra 0.4, flatness ratio 0.01/100 (ISO 1101)</td>
<td>75 years, see technical table P007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature range</th>
<th>Storage temperature range</th>
<th>Coil resistance R at 20°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, standard = -20°C +70°C</td>
<td>AEB, AES standard = -20°C +60°C</td>
<td>AEB, AES standard = -20°C +70°C</td>
</tr>
<tr>
<td>/BT option = -40°C +60°C</td>
<td>/BT option = -40°C +70°C</td>
<td>/BT option = -40°C +70°C</td>
</tr>
</tbody>
</table>

### Notes:

- Above performance data refer to valves coupled with Atos electronic drivers, see section [3].
- Average response time 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.

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

#### Seals, recommended fluid temperature

<table>
<thead>
<tr>
<th>Seal type</th>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBR seals (standard)</td>
<td>-20°C +60°C, with HFC hydraulic fluids: -20°C +50°C</td>
</tr>
<tr>
<td>FKM seals (PE option)</td>
<td>-20°C +80°C</td>
</tr>
<tr>
<td>HNBR seals (BT option)</td>
<td>-40°C +60°C, with HFC hydraulic fluids: -40°C +50°C</td>
</tr>
</tbody>
</table>

| Recommended viscosity | 20+100 mm/l/s - max allowed range 15 + 380 mm/l/s |

| Fluid contamination class | ISO 4406 class 20/10/15 NAS 1638 class 9, achievable with in line filter - 10 μm (B10 ≥ 75 recommended) |

<table>
<thead>
<tr>
<th>Hydraulic fluid</th>
<th>Suitable seals type</th>
<th>Classification</th>
<th>Ref. Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>NBR, FKM, HNBR</td>
<td>HL, HLP, HLDP, HVLP, HVLPD</td>
<td>DIN 51524</td>
</tr>
<tr>
<td>Flame resistant without water</td>
<td>FKM</td>
<td>HFDU, HFDR</td>
<td>ISO 12922</td>
</tr>
<tr>
<td>Flame resistant with water</td>
<td>NBR, HNBR</td>
<td>HFC</td>
<td></td>
</tr>
</tbody>
</table>
7 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

1 = Regulation diagrams
with flow rate Q = 50 l/min

2 = Pressure/flow diagrams
with reference signal set at Q = 50 l/min

3-8 = Min. pressure/flow diagrams
with zero reference signal

- 3 = AGMZO-*10/50, 100, 210, 315
- 4 = AGMZO-*10/350
- 5 = AGMZO-*20/50, 100, 210, 315
- 6 = AGMZO-*20/350
- 7 = AGMZO-*32/50, 100, 210, 315
- 8 = AGMZO-*32/350

8 HYDRAULIC OPTIONS

8.1 Option E
External pilot option to be selected when the pilot pressure is supplied from a different line respect to the P main line.
With option E the internal connection between port P and X of the valve is plugged.
The pilot pressure must be connected to the X port available on the valve’s mounting surface or on main body (threaded pipe connection G ¼").

8.2 Option Y
The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.
The Y drain port has a threaded connection G ¼” available on the pilot stage body.

9 MECHANICAL PRESSURE LIMITER

The AGMZO 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.
10 AIR BLEEDING
At the first valve commissioning the air eventually trapped inside the solenoid must be bled-off through the screw 0 located at the rear side of the solenoid housing.
The presence of air may cause pressure instability and vibrations.

11 REMOTE PRESSURE UNLOADING
The P main line can be remotely unloaded by connecting the valve X port to a solenoid valve as shown in the below scheme (venting valve).
This function can be used in emergency to unload the system pressure by-passing the proportional control.

12 OPTIONS for -A
12.1 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

13 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 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 coil current (1V monitor = 1A coil current)

Note: a minimum booting time of 500 ms has 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.

13.1 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.

13.2 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).

13.3 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

13.4 Possible combined options: /IQ, /IZ

14 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)
- E-SW-*/PQ support: EW (POWERLINK), EI (EtherCAT/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

E-C-SB-USB/M12 cable
E-A-SB-USB/OPT isolator
## 15 Electronic Connections

### 15.1 Main Connector Signals - 7 pin - standard and I/O option - AGMZO-AEB and AGMZO-AES

<table>
<thead>
<tr>
<th>PIN</th>
<th>Standard</th>
<th>/I</th>
<th>Technical Specifications</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>V+</td>
<td></td>
<td>Power supply 24 VDC</td>
<td>Rectified and filtered: $V_{RSS} = 20 + 32 V_{max}$ (ripple max 10 % Vrms) Input - power supply</td>
</tr>
<tr>
<td>B</td>
<td>V0</td>
<td></td>
<td>Power supply 0 VDC</td>
<td>Gnd - power supply</td>
</tr>
<tr>
<td>C</td>
<td>AGND</td>
<td></td>
<td>Analog ground</td>
<td>Gnd - analog signal</td>
</tr>
<tr>
<td></td>
<td>ENABLE</td>
<td></td>
<td>Enable (24 VDC) or disable (0 VDC) the driver, referred to V0</td>
<td>Input - on/off signal</td>
</tr>
<tr>
<td>D</td>
<td>INPUT+</td>
<td></td>
<td>Pressure reference input signal: ±10 VDC / ±20 mA maximum range Defaults are 0 ± 10 VDC for standard and 4 ± 20 mA for I/O option</td>
<td>Input - analog signal Software selectable</td>
</tr>
<tr>
<td>E</td>
<td>INPUT-</td>
<td></td>
<td>Negative reference input signal for P_INPUT+</td>
<td>Input - analog signal</td>
</tr>
<tr>
<td>F</td>
<td>MONITOR</td>
<td></td>
<td>Pressure monitor output signal: ±5 VDC maximum range Defaults is 0 ± 5 VDC (3V = 1A)</td>
<td>Output - analog signal Software selectable</td>
</tr>
<tr>
<td>G</td>
<td>EARTH</td>
<td></td>
<td>Internally connected to driver housing</td>
<td></td>
</tr>
</tbody>
</table>

### 15.2 Main Connector Signals - 12 pin - /Z option - AGMZO-AEB and AGMZO-AES

<table>
<thead>
<tr>
<th>PIN</th>
<th>/Z</th>
<th>Technical Specifications</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V+</td>
<td>Power supply 24 VDC</td>
<td>Rectified and filtered: $V_{RSS} = 20 + 32 V_{max}$ (ripple max 10 % Vrms) Input - power supply</td>
</tr>
<tr>
<td>2</td>
<td>V0</td>
<td>Power supply 0 VDC</td>
<td>Gnd - power supply</td>
</tr>
<tr>
<td>3</td>
<td>ENABLE</td>
<td>Enable (24 VDC) or disable (0 VDC) the driver, referred to V0</td>
<td>Input - on/off signal</td>
</tr>
<tr>
<td>4</td>
<td>INPUT+</td>
<td>Pressure reference input signal: ±10 VDC / ±20 mA maximum range Defaults are 0 ± 10 VDC for standard and 4 ± 20 mA for I/O option</td>
<td>Input - analog signal Software selectable</td>
</tr>
<tr>
<td>5</td>
<td>INPUT-</td>
<td>Negative reference input signal for P_INPUT+</td>
<td>Input - analog signal</td>
</tr>
<tr>
<td>6</td>
<td>MONITOR</td>
<td>Pressure monitor output signal: ±5 VDC maximum range Defaults is 0 ± 5 VDC (3V = 1A)</td>
<td>Output - analog signal Software selectable</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>Do not connect</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>Do not connect</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>VL+</td>
<td>Power supply 24 VDC for driver's logic and communication</td>
<td>Input - power supply</td>
</tr>
<tr>
<td>10</td>
<td>VL0</td>
<td>Power supply 0 VDC for driver's logic and communication</td>
<td>Gnd - power supply</td>
</tr>
<tr>
<td>11</td>
<td>FAULT</td>
<td>Fault (0 VDC) or normal working (24 VDC), referred to V0</td>
<td>Output - on/off signal</td>
</tr>
<tr>
<td>PE</td>
<td>EARTH</td>
<td>Internally connected to driver housing</td>
<td></td>
</tr>
</tbody>
</table>

### 15.3 Communication Connectors - AGMZO-AEB and AGMZO-AES

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal</th>
<th>Technical Specification (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+5V_USB</td>
<td>Power supply</td>
</tr>
<tr>
<td>2</td>
<td>ID</td>
<td>Identification</td>
</tr>
<tr>
<td>3</td>
<td>GND_USB</td>
<td>Signal zero data line</td>
</tr>
<tr>
<td>4</td>
<td>D-</td>
<td>Data line -</td>
</tr>
<tr>
<td>5</td>
<td>D+</td>
<td>Data line +</td>
</tr>
</tbody>
</table>

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

### 15.4 Solenoid Connection - only for AGMZO-A

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal</th>
<th>Technical Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COIL</td>
<td>Power supply</td>
</tr>
<tr>
<td>2</td>
<td>COIL</td>
<td>Power supply</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

**Connector Code:** 666
15.5 Connections layout - only for AEB and AES

Note: Driver connectors front view

16 Connectors

Note: use of metallic connectors is strongly recommended in order to fulfill EMC requirements

17 Model codes of main connectors and communication connectors - to be ordered separately

<table>
<thead>
<tr>
<th>Valve Version</th>
<th>A (1)</th>
<th>AEB</th>
<th>AEB/Z</th>
<th>BC - CANopen</th>
<th>BP - PROFIBUS DP</th>
<th>EH - EtherCAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Code</td>
<td>666</td>
<td>ZM-7P (A)</td>
<td>ZM-12P (B)</td>
<td>ZM-5PF (C)</td>
<td>ZM-5PM/BP (D)</td>
<td>ZM-4PM/E (E)</td>
</tr>
<tr>
<td>Protection Degree</td>
<td>IP67</td>
<td>IP67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Sheet</td>
<td>K500</td>
<td>GS115, K500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Connectors supplied with the valve only for AES
INSTALLATION DIMENSIONS of AGMZO [mm]

SIZE 10
ISO 6264: 2007
Mounting surface: 6264-06-09-1-97
(see table P005)
Fastening bolts: 4 socket head screws
M12x55 class 12.9
Tightening torque = 125 Nm
Seals: 2 OR 123, 1 OR 108/70
Ports P, T: Ø = 14 mm
Port X: Ø = 3.2 mm

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>A</th>
<th>AEB, AES</th>
<th>AES-EH</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGMZO-**-10</td>
<td>5.4</td>
<td>5.9</td>
<td>6.0</td>
</tr>
</tbody>
</table>

AGMZO-AEB-NP-10
AGMZO-AES-BP-10
AGMZO-AES-EH-10

SIZE 20
ISO 6264: 2007
Mounting surface: 6264-08-13-1-97
(see table P005)
Fastening bolts: 4 socket head screws
M16x50 class 12.9
Tightening torque = 300 Nm
Seals: 2 OR 4112, 1 OR 109/70
Ports P, T: Ø = 24 mm
Port X: Ø = 3.2 mm

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>A</th>
<th>AEB, AES</th>
<th>AES-EH</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGMZO-**-20</td>
<td>6.6</td>
<td>7.1</td>
<td>7.2</td>
</tr>
</tbody>
</table>

AGMZO-AEB-NP-20
AGMZO-AES-BP-20
AGMZO-AES-EH-20

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 [3][3]
SIZE 32

ISO 6264: 2007
Mounting surface: 6264-10-17-1-97
(see table P005)
(with M20 fixing holes instead of standard M18)
Fastening bolts: 4 socket head screws
M20x60 class 12.9
Tightening torque = 600 Nm
Seals: 2 OR 4131, 1 O R 109/70
Ports P, T: Ø = 28 mm
Port X: Ø = 3.2 mm

Mass [kg]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>AEB, AES</th>
<th>AES-EH</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGMZO-32</td>
<td>8</td>
<td>8.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

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 ③ ③