Intrinsically safe pressure relief valves

pilot operated, subplate or in line mounting - ATEX or IECEx certification

AGAM, ARAM
Intrinsically safe pressure relief valves equipped with solenoid pilot valve for venting or multiple pressure selection, certified for safe operation in hazardous environment with potentially explosive atmosphere.

Certifications:
- ATEX or IECEx:
  II 1G Ex ia IIC, IIB, IIA
  surface plants zone 0, 1 and 2
- ATEX or IECEx:
  IM2 Ex ia IMb, Ex ib IMb
  surface, tunnels or mining plants

The valves must be electrically powered through specific “safety barriers” limiting the max current to the solenoid, see section.

AGAM: pressure relief, subplate mounting
Size: 10, 20 and 32 - ISO 6264
Max flow: 200, 400 and 600 l/min

ARAM: pressure relief, threaded connections
Size: 20 and 32 - G 3/4” and G 1 1/4”
Max flow: 350 and 500 l/min
Max pressure: 350 bar

Options (2):
- E = external pilot
- V = regulating handweel for pressure adjustment
- WP = manual override
- Y = external drain

WO = intrinsically safe solenoid

Seals material, see section:
- NBR
- FKM
- HNBR (1)

Connector type:
6 = DIN 43650 (standard)

Table CX030-1/E
Replaces E130-20/E

<table>
<thead>
<tr>
<th>Configuration, see section</th>
<th>10</th>
<th>20</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
<td>21</td>
<td>32</td>
</tr>
</tbody>
</table>

(1) Not for certification M and IEM. Group I (mining)
(2) Possible combined options: all combinations are available

The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar
2 CONFIGURATIONS AND HYDRAULIC SYMBOLS

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>AGAM-**/10</th>
<th>AGAM-**/11</th>
<th>AGAM-**/22</th>
<th>ARAM-**/10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>one setting pressure + venting with de-energized solenoid</td>
<td>one setting pressure + venting with energized solenoid</td>
<td>two setting pressure without venting</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>AGAM-**/20</th>
<th>ARAM-**/20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>two setting pressure + venting with de-energized solenoid</td>
<td></td>
</tr>
</tbody>
</table>

AGAM-**/21 ARAM-**/21

AGAM-**/22 ARAM-**/22

two setting pressure without venting

3 GENERAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Assembly position / location</th>
<th>Horizontal position only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subplate surface finishing to ISO 4401</td>
<td>Acceptable roughness index, Ra ≤ 0.8 recommended Ra 0.4 - flatness ratio 0.01/100</td>
</tr>
<tr>
<td>MTTFd values according to EN ISO 13849</td>
<td>75 years, for further details see technical table P007</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Standard = -20°C ÷ +60°C /PE option = -20°C ÷ +60°C /BT option = -40°C ÷ +60°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>Standard = -20°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C</td>
</tr>
<tr>
<td>Surface protection</td>
<td>Zinc coating with black passivation</td>
</tr>
<tr>
<td>Compliance</td>
<td>Intrinsically safe protection, see section 7</td>
</tr>
</tbody>
</table>

4 HYDRAULIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>10</th>
<th>20</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max operating pressure (bar)</td>
<td>350</td>
<td>port P</td>
<td>210</td>
</tr>
<tr>
<td>Max regulated pressure (bar)</td>
<td>50</td>
<td>100</td>
<td>210</td>
</tr>
<tr>
<td>Pressure range (bar)</td>
<td>4÷50; 6÷100; 7÷210; 8÷350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max flow AGAM (1) (l/min)</td>
<td>200</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Max flow ARAM (1) (l/min)</td>
<td>350</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

(1) see Q/Δp diagrams at section 11 and 12

5 ELECTRICAL CHARACTERISTICS - see also section 7

<table>
<thead>
<tr>
<th>Nominal resistance at 20°C</th>
<th>150 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil insulation</td>
<td>Class H</td>
</tr>
<tr>
<td>Working voltage</td>
<td>12 ÷ 26 V</td>
</tr>
<tr>
<td>Minimum supply current</td>
<td>65mA, from I.S. barriers</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP66</td>
</tr>
<tr>
<td>Duty factor</td>
<td>100%</td>
</tr>
<tr>
<td>Electrical connector</td>
<td>DIN 43650 2 pin+GND</td>
</tr>
</tbody>
</table>
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 ÷ +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
15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s

Max fluid contamination level
ISO 4406 class 20/18/15; NAS 1638 class 9, see also filter section at www.atos.com or KTF catalog

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, HDFR | ISO 12922
Flame resistant with water | NBR, HNBR | HFC | ISO 12922

The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

Performance limitations in case of flame resistant fluids with water:
- max operating pressure = 210 bar
- max fluid temperature = 50°C

CERTIFICATION DATA

Valve type
AGAM | AGAMIE | AGAM/M | AGAMIE/M | AGAMIE/M
ARAM | ARAMIE | ARAM/M | ARAMIE/M | ARAMIE/M

Certification
ATEX (Group II) | IECEx (Group II) | ATEX (mining) (Group I) | IECEx (mining) (Group I)

Solenoid code
OW-18/6 | OW1-18/6 | OWM-18/6

Type examination certificate (1)
CESI 02 | ATEX 013 | CESI 02 | ATEX 013
ATEX 013 | IECEx | IECEx

Method of protection
Ex II 1G | Ex Ia | Ex I M2 | Ex Ia I Mb | Ex Ib I Mb

Electrical characteristics (max values)

<table>
<thead>
<tr>
<th></th>
<th>Ui [V]</th>
<th>Ii [mA]</th>
<th>Pi [W]</th>
<th>Ci , Li</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIA T5 Ga</td>
<td>28</td>
<td>396</td>
<td>2,8</td>
<td>0</td>
</tr>
<tr>
<td>IIB T6 Ga</td>
<td>28</td>
<td>250</td>
<td>1,8</td>
<td>0</td>
</tr>
<tr>
<td>IIIC T6 Ga</td>
<td>27</td>
<td>360</td>
<td>0,9</td>
<td>0</td>
</tr>
</tbody>
</table>

Temperature class
T5 | T6

Surface temperature (ambient temp. +60°C)
≤ 100°C | ≤ 85°C | ≤ 150°C

Ambient temperature
-20 ÷ +60°C | -40 ÷ +60°C (2) | -20 ÷ +60°C

Applicable standards
EN 60079-0: 2012+A11:2013 | IEC 60079-0:2017
EN 60079-1:2014 | IEC 60079-1:2017-04

(1) The type examiner certificates can be downloaded from www.atos.com
(2) Only for /BT option

WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification


8 OPTIONS

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”).

V = Regulating handweel for pressure adjustment

WP = Manual override protect by metallic cap

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.

11.1 Possible combined options: all combinations are available

9 SOLENOIDS WIRING

DIN 43650

10 INTRINSICALLY SAFE BARRIERS - see tech. table GX010

Intrinsically safe valves must be powered through safety barriers certified according to Ex-ie protection mode, limiting the energy to the solenoid.
To select the proper intrinsically safe barriers following data must be considered:
1) Vmax and Imax of the solenoid as specified in section 7 must not be exceeded also in fault conditions;
2) the resistance of the solenoid is 150 Ω and the current supplied by the barrier, in normal operation condition, must be over the min. limit (65 mA) to ensure the valve correct operation (over 70 mA for max performances).
The barriers type Y-BXNE 412 are galvanically isolated electronic devices, complying with European Norms EN60079-0/06, EN60079-11/07 and ATEX certified according to protection mode Ex ia IIC.
These barriers ensure the optimized functioning of the Atos valves up to the max operating limits specified in section 4.
The barriers Y-BXNE-412 are double channel type, suitable to operate valves with double or single solenoid. Two single solenoid valves can be connected to the barrier (one to each channel) but they cannot be contemporary operated.

MODEL CODE OF I.S. BARRIER

Y-BXNE 412 00

Supply voltage
E = 110/230 VAC
2 = 24÷48 VDC
11 REGULATED PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

12 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-06-09-1-97

Fastening bolts:
4 socket head screws M12x35 class 12.9
Tightening torque = 125 Nm
Seals: 2 OR 123, 1 OR 109/70
Ports P, T: Ø = 14.5 mm
Ports X: Ø = 3.2 mm

X = port connection for external pilot (option /E)
Y = port connection for external drain (option /Y)

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-10/10</th>
<th>AGAM-10/20</th>
<th>AGAM-10/22</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10/11</td>
<td>10/21</td>
<td>10/32</td>
</tr>
<tr>
<td>AGAM-10/10</td>
<td>6.45</td>
<td>7.55</td>
<td>7.25</td>
</tr>
<tr>
<td>AGAM-10/20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGAM-10/22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Valve’s bottom view

AGAM-10/10/**-WO
AGAM-10/11/**-WO

AGAM-10/20/**-WO
AGAM-10/21/**-WO

AGAM-10/22/**-WO

Option /V
Option /WP

Mining version /M and /IEM
(different cover shape)
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-08-11-1-97

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
Ports X: Ø = 3,2 mm

X = port connection for external pilot (option /E)
Y = port connection for external drain (option /Y)

<table>
<thead>
<tr>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGAM-20/10 7,65</td>
</tr>
<tr>
<td>AGAM-20/20 8,75</td>
</tr>
<tr>
<td>AGAM-20/22 8,45</td>
</tr>
<tr>
<td>AGAM-20/32 10,2</td>
</tr>
</tbody>
</table>

Option /WP
Mining version /M and /IEM
(different cover shape)
AGAM-32

ISO 6264: 2007 (see table P005)
Mounting surface: 6264-10-17-1-97
(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 OR 109/70
Ports P, T: Ø = 28.5 mm
Ports X: Ø = 3.2 mm

X = port connection for external pilot (option /E)
Y = port connection for external drain (option /Y)

<table>
<thead>
<tr>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGAM-32/10 9.05</td>
</tr>
<tr>
<td>AGAM-32/11 10.05</td>
</tr>
<tr>
<td>AGAM-32/20 9.85</td>
</tr>
<tr>
<td>AGAM-32/21 11.6</td>
</tr>
</tbody>
</table>

Valve's bottom view

Option /WP
Mining version /M and /IEM
(different cover shape)
**ARAM-20**

X = port connection for external pilot (option /E)
Y = port connection for external drain (option /Y)

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>ARAM-20/10 20/11</th>
<th>6.75</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARAM-20/20 20/21</td>
<td>8.45</td>
</tr>
<tr>
<td></td>
<td>ARAM-20/22 20/22</td>
<td>8.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.1</td>
</tr>
</tbody>
</table>

Option /V
Option /WP

Mining version /M and /REM (different cover shape)

Option /V
ARAM-32

X = port connection for external pilot (option /E)
Y = port connection for external drain (option /Y)

<table>
<thead>
<tr>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAM-32/10 32/11</td>
</tr>
<tr>
<td>ARAM-32/20 32/21</td>
</tr>
<tr>
<td>ARAM-32/22 32/32</td>
</tr>
</tbody>
</table>

Mass [kg]

15 RELATED DOCUMENTATION

X010 Basics for electrohydraulics in hazardous environments
X050 Summary of Atos intrinsically safe components range certified to ATEX, IECEx
X300 Operating and maintenance norms for intrinsically safe valves
P005 Mounting surfaces for electrohydraulic valves