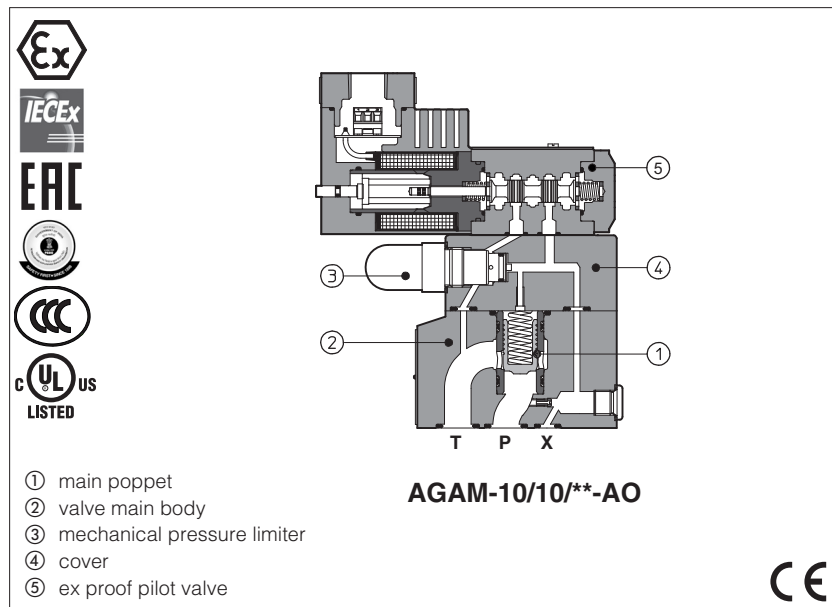


# Ex-proof pressure relief valves

piloted, subplate or in line mounting - **ATEX, IECEx, EAC, PESO, CCC** or **cULus**



## AGAM, ARAM

Ex-proof pressure relief valves equipped with solenoid pilot valve for venting or multiple pressure selection, certified for safe operation in hazardous environments with potentially explosive atmosphere.

Certifications:

- Multicertification **ATEX, IECEx, EAC, PESO, CCC** for gas group **II 2G** and dust category **II 2D**
- Multicertification **ATEX, IECEx, CCC** for gas group **I M2** (mining)
- **cULus** North American certification for gas group **C&D**

The flameproof enclosure of solenoid prevents the propagation of accidental internal sparks or fire to the external environment.

The solenoid is also designed to limit the surface temperature within the classified limits.

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

**ARAM:** pressure relief, threaded connections  
Size: **G 3/4"** and **G 1 1/4"**  
Max flow: **350** and **500 l/min**

Max pressure: **350 bar**

## 1 MODEL CODE

<b>AGAM</b>	-	<b>20</b>	/	<b>20</b>	/	<b>210/100/100</b>	/	<b>M</b>	-	<b>AO</b>	/	<b>*</b>	/	<b>24DC</b>	/	<b>*</b>	/	<b>*</b>
<p>Ex-proof pressure relief valves, piloted <b>AGAM</b> subplate mounting <b>ARAM</b> threaded connections</p>																		
<p><b>Seals material</b>, see section <b>6</b> : - = NBR <b>PE</b> = FKM <b>BT</b> = HNBR (1)</p>																		
<p>Series number</p>																		

### Valve size:

- 10** = AGAM (ISO 6264)
- 20** = AGAM (ISO 6264)
- 32** = AGAM (ISO 6264)
- 20** = ARAM G 3/4"
- 32** = ARAM G 1 1/4"

### Configuration, see section **2** :

<b>10</b>	<b>20</b>	<b>22</b>
<b>11</b>	<b>21</b>	<b>32</b>

### Max regulated pressure

of first (second / third) setting, see section **4** :

<b>50</b> = 50 bar	<b>100</b> = 100 bar
<b>210</b> = 210 bar	<b>350</b> = 350 bar

### Voltage code, see section **5**

### Options (2):

- E** = external pilot
- O** = horizontal cable entrance (1)
- V** = regulating handweel for pressure adjustment
- WP** = manual override protected by metallic cap
- Y** = external drain

### Certification type:

- AO** = Multicertification for Group II 2G / II 2D (3)
- AO/M** = Multicertification for Group I M2 (mining)
- AO/UL** = cULus North American certification

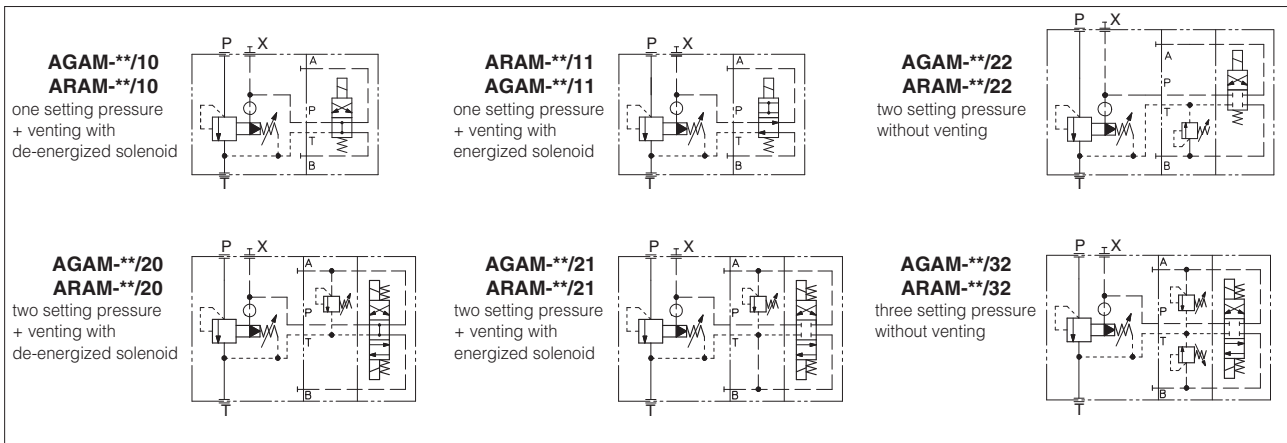
### Solenoid threaded connection for cable gland fitting:

- GK** = GK-1/2" - not for **cULus (4)**
- M** = M20x1,5 - not for **cULus**
- NPT** = 1/2" NPT

(1) Not for multicertification **M** group I (mining) (2) For possible combined options, see 11.1 (3) The valves with Multicertification for Group II are also certified for Indian market according to **PESO** (Petroleum and Explosives Safety Organization). The PESO certificate can be downloaded from [www.atos.com](http://www.atos.com) (4) Approved only for the Italian market

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



## 3 GENERAL CHARACTERISTICS

Assembly position / location	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100
MTTFd values according to EN ISO 13849	75 years, for further details see technical table P007
Ambient temperature	<b>Standard</b> = -20°C ÷ +70°C <b>/PE</b> option = -20°C ÷ +70°C <b>/BT</b> option = -40°C ÷ +70°C
Storage temperature range	<b>Standard</b> = -20°C ÷ +80°C <b>/PE</b> option = -20°C ÷ +80°C <b>/BT</b> option = -40°C ÷ +70°C
Surface protection	Zinc coating with black passivation -salt spray test (EN ISO9227) > 200h
Compliance	Explosion proof protection, see section 7 -Flame proof enclosure "Ex d" -Dust ignition protection by enclosure "Ex t" RoHs Directive 2011/65/EU as last update by 2015/65/EU REACH Regulation (EC) n°1907/2006

## 4 HYDRAULIC CHARACTERISTICS

Valve size	10	20	32
Max operating pressure [bar]	port P = <b>350</b> port T, Y = <b>210</b>		
Max regulated pressure [bar]	<b>50</b>	<b>100</b>	<b>210</b>
Pressure range [bar]	4÷50;	6÷100;	7÷210;
Max flow <b>AGAM (1)</b> [l/min]	200	400	600
Max flow <b>ARAM (1)</b> [l/min]	-	350	500

(1) see Q/Δp diagrams at section 12 and 13

## 5 ELECTRICAL CHARACTERISTICS

Valve type	AGAM-*/AO ARAM-*/AO	AGAM-*/AO/M ARAM-*/AO/M	AGAM-*/AO/UL ARAM-*/AO/UL
Voltage code (1) VDC ±10%	<b>12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC</b>		<b>12DC, 24DC, 110DC, 125DC, 220DC</b>
VAC 50/60 Hz ±10%	<b>12AC, 24AC, 110AC, 230AC</b>		<b>12AC, 24AC, 110AC, 230AC</b>
Power consumption at 20°C	8W		12W
Coil insulation	class H		
Protection degree with relevant cable gland	IP66/67 to DIN EN60529		raintight enclosure, UL approved
Duty factor	100%		

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid  
For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

## 6 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 mm <sup>2</sup> /s - max allowed range 2.8 ÷ 500 mm <sup>2</sup> /s		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 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, HVL, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR, HNBR	HFC	

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

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

**7 CERTIFICATION DATA**

Valve type	AGAM-*/AO ARAM-*/AO		AGAM-*/AO/M ARAM-*/AO/M	AGAM-*/AO/UL ARAM-*/AO/UL	
Certifications	Multicertification Group II <b>ATEX, IECEX, EAC, PESO, CCC</b>		Multicertification Group I <b>ATEX, IECEX</b>	North American cULus <b>cULus</b>	
Solenoid certified code	<b>OA</b>		<b>OA/M</b>	<b>OA/EC</b>	
Type examination certificate (1)	ATEX: CESI 02 ATEX 014 IECEX: IECEX CES 10.0010x EAC: TC RU C-IT. 08.B.01784 PESO: P468212/2 CCC: 2020322307003240		ATEX: CESI 03 ATEX 057x IECEX: IECEX CES 12.0007x	20170324 - E366100	
Method of protection	<ul style="list-style-type: none"> <li>• ATEX, EAC Ex II 2G Ex d IIC T6/T4/T3 Gb Ex II 2D Ex tb IIIC T85°C/T200°C Db</li> <li>• IECEX Ex d IIC T6/T4/T3 Gb Ex tb IIIC T85°C/T200°C Db</li> <li>• PESO Ex db IIC T6/T4/T3 Gb</li> <li>• CCC Ex d IIC T6/T4/T3 Gb Ex tD A21 IP66/IP67 T85°C/T135°C/T200°C</li> </ul>		<ul style="list-style-type: none"> <li>• ATEX Ex I M2 Ex db I Mb</li> <li>• IECEX Ex db I Mb</li> </ul>	<ul style="list-style-type: none"> <li>• UL 1203 Class I, Div.I, Groups C &amp; D Class I, Zone I, Groups IIA &amp; IIB</li> </ul>	
Temperature class	<b>T6</b>	<b>T4</b>	-	<b>T6</b>	<b>T5</b>
Surface temperature	≤ 85 °C	≤ 135 °C	≤ 150 °C	≤ 85 °C	≤ 100 °C
Ambient temperature (2)	-40 ÷ +45 °C	-40 ÷ +70 °C	-20 ÷ +70 °C	-40 ÷ +55 °C	-40 ÷ +70 °C
Applicable standards	EN 60079-0 EN 60079-1 EN 60079-31		IEC 60079-0 IEC 60079-1 IEC 60079-31	UL 1203 and UL429, CSA 22.2 n°30-1986 CSA 22.2 n°139-13	
Cable entrance: threaded connection vertical (standard) or horizontal (option /O)			<b>GK</b> = GK-1/2" <b>M</b> = M20x1,5 <b>NPT</b> = 1/2" NPT	1/2" NPT ANSI/ASME B46.1	

(1) The type examiner certificates can be downloaded from [www.atos.com](http://www.atos.com)

(2) The solenoids **Group II** and **cULus** are certified for minimum ambient temperature -40°C

In case the complete valve must withstand with minimum ambient temperature of -40°C, select **/BT** in the model code

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

**8 EX PROOF SOLENOIDS WIRING**

**Multicertification**

**Standard version**                      **Option /O**

**cULus certification**

**Standard version**                      **Option /O**

① cover with threaded connection for vertical cable gland fitting  
 ② cover with threaded connection for horizontal cable gland fitting  
 ③ terminal board for cables wiring  
 ④ standard manual override  
 ⑤ screw terminal for additional equipotential grounding

① = Coil      PCB 3 poles terminal board  
 ② = GND      suitable for wires cross sections  
 ③ = Coil      up to 2,5 mm<sup>2</sup> (max AWG14)

**⚠ Pay attention to coil polarity**

① = Coil +    PCB 3 poles terminal board  
 ② = GND    suggested cable section up to 1,5 mm<sup>2</sup>  
 ③ = Coil -    (max AWG16), see section 9 note 1

alternative GND screw terminal connected to solenoid housing

**9 CABLE SPECIFICATION AND TEMPERATURE** - Power supply and grounding cables have to comply with following characteristics:

<b>Multicertification Group I and Group II</b>	
<b>Power supply:</b> section of coil connection wires = 2,5 mm <sup>2</sup>	<b>Grounding:</b> section of internal ground wire = 2,5 mm <sup>2</sup> section of external ground wire = 4 mm <sup>2</sup>
<b>cULus certification:</b>	
<ul style="list-style-type: none"> <li>• Suitable for use in Class I Division 1, Gas Groups C</li> <li>• Armored Marine Shipboard Cable which meets UL 1309</li> <li>• Tinned Stranded Copper Conductors</li> <li>• Bronze braided armor</li> <li>• Overall impervious sheath over the armor</li> </ul>	
Any Listed (UBVZ/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm <sup>2</sup> (14 AWG) having a suitable service temperature range of at least -25°C to +110°C ("BT" Models require a temperature range from -40°C to +110°C)	
<b>Note 1:</b> For Class I wiring the 3C 1,5 mm <sup>2</sup> AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.	

**9.1 Cable temperature**

The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.

**Multicertification**

Max ambient temperature [°C]	Temperature class		Max surface temperature [°C]		Min cable temperature
	Group I	Group II	Group I	Group II	
45 °C	-	T6	150 °C	85 °C	not prescribed
70 °C	-	T4	150 °C	135 °C	90 °C

**cULus certification**

Max ambient temperature [°C]	Temperature class	Max surface temperature [°C]	Min cable temperature
55 °C	T6	85 °C	100 °C
70 °C	T5	100 °C	100 °C

**10 CABLE GLANDS only for Multicertification**

Cable glands with threaded connections GK-1/2", 1/2"NPT or M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table **KX800**

**Note:** a Loctite sealant type 545, should be used on the cable gland entry threads

**11 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 1/4").

**O** = Horizontal cable entrance, to be selected in case of limited vertical space

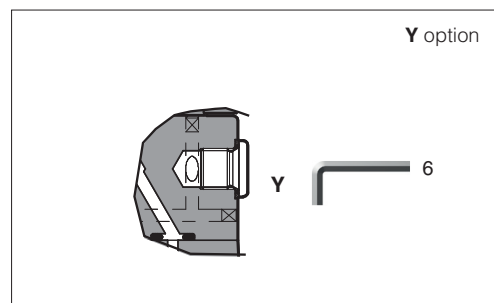
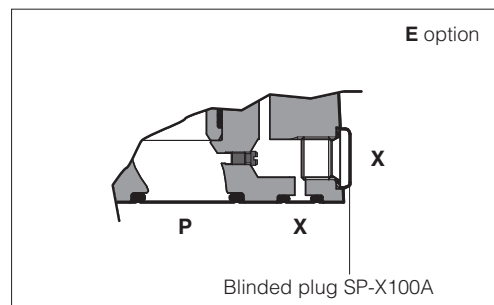
**V** = Regulating handweel for pressure adjustment

**WP** = Manual override protect by metallic cap

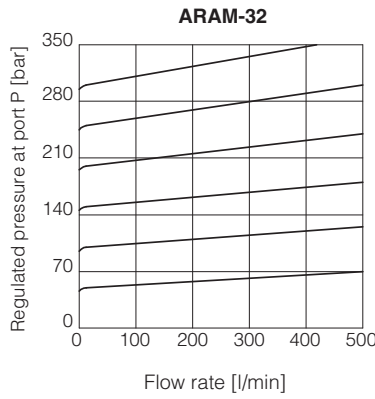
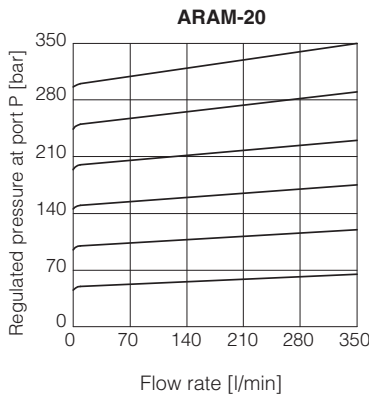
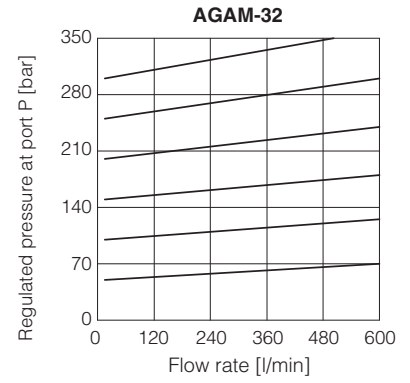
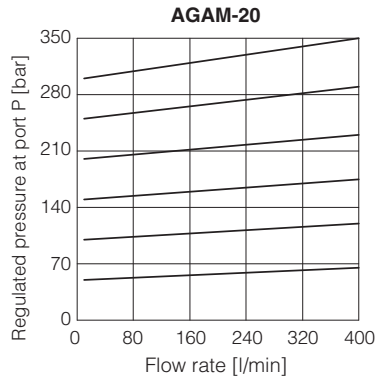
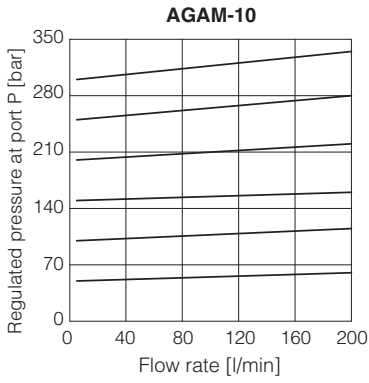
**Y** = The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.  
The Y drain port has a threaded connection G 1/4" available on the pilot stage body.

**11.1 Possible combined options:**

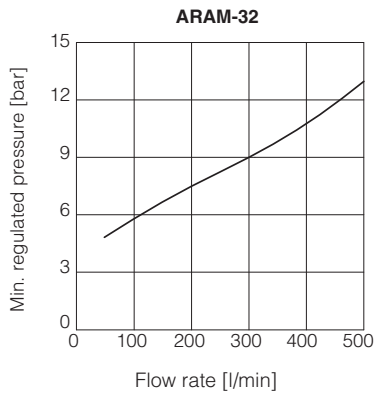
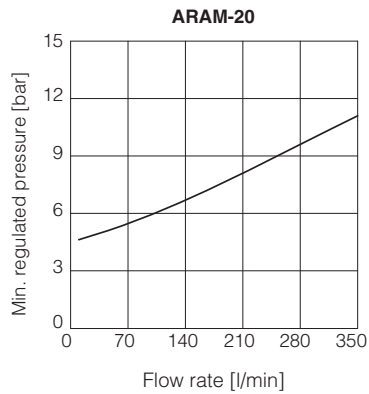
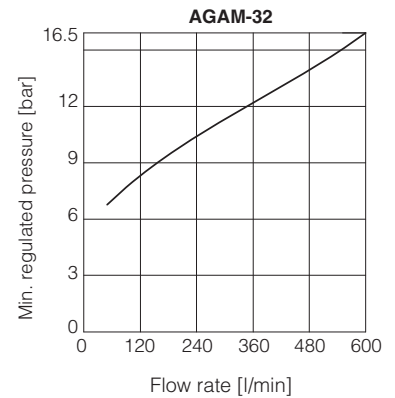
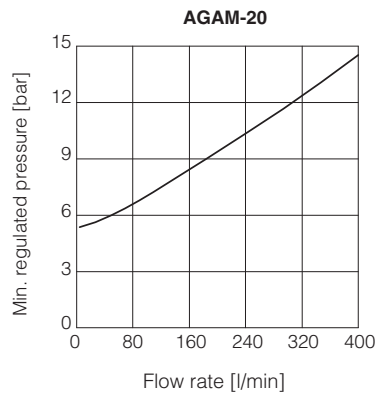
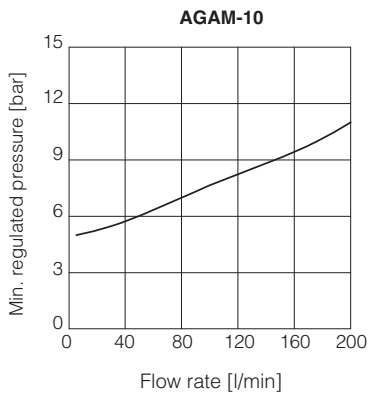
- /EO, /EV, /EY, /EW, /EWP, /EOV, /EOY, /EVY
- /EOWP, /EWPY, /EOVY, /EOVWP, /EVWPY, /EOWWPY
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- /VY, /VWP, /VWPY
- /WPY



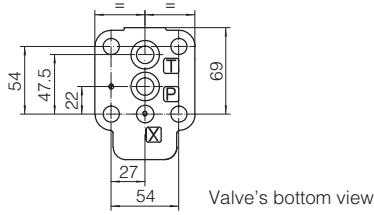
**12 REGULATED PRESSURE VERSUS FLOW DIAGRAMS** based on mineral oil ISO VG 46 at 50°C



**13 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

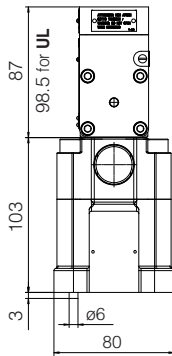


### AGAM-10

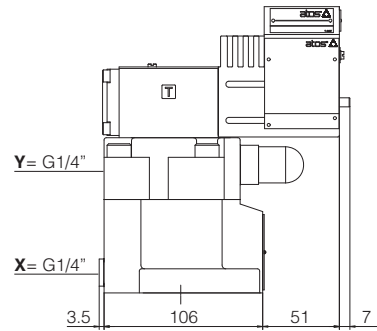


**ISO 6264: 2007** (see table P005)  
**Mounting surface: 6264-06-09-1-97**  
 Fastening bolts:  
 4 socket head screws M12x35 class 12.9  
 Tightening torque = 125 Nm  
 Seals: 2 OR 123; 1 OR 109/70  
 Ports P, T:  $\varnothing = 14,5$  mm  
 Ports X:  $\varnothing = 3,2$  mm

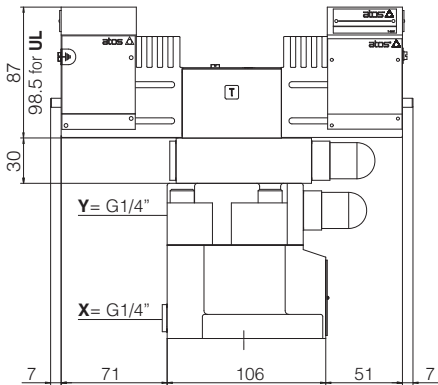
Mass [kg]	
AGAM-10/10 10/11	6,45
AGAM-10/20 10/21	7,55
AGAM-10/22 10/32	7,25 9
option /V	-
option /O	+0,35
option /WP	+0,25



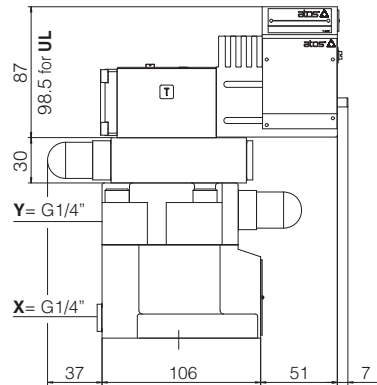
### AGAM-10/10\*\* -AO AGAM-10/11\*\* -AO



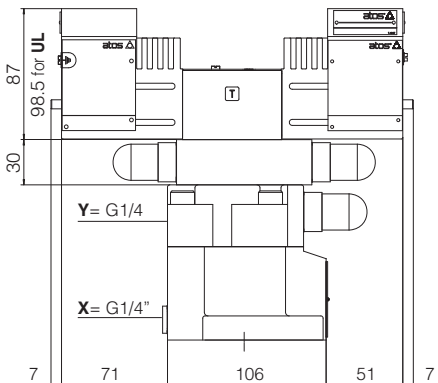
### AGAM-10/20\*\* -AO AGAM-10/21\*\* -AO



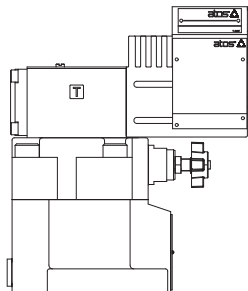
### AGAM-10/22\*\* -AO



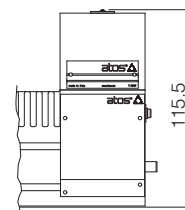
### AGAM-10/32\*\* -AO



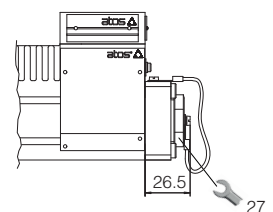
### Option /V



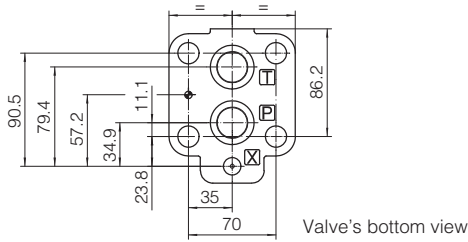
### Option /O



### Option /WP



# AGAM-20



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

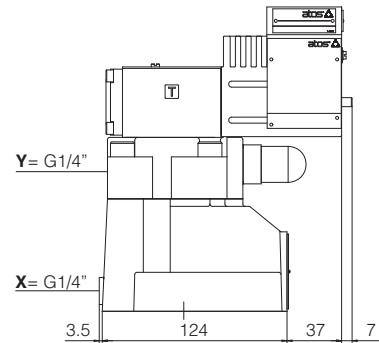
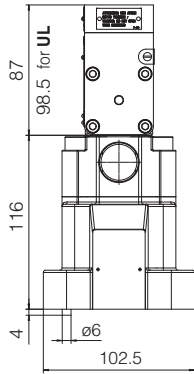
Seals: 2 OR 4112; 1 OR 109/70

Ports P, T:  $\varnothing = 24$  mm

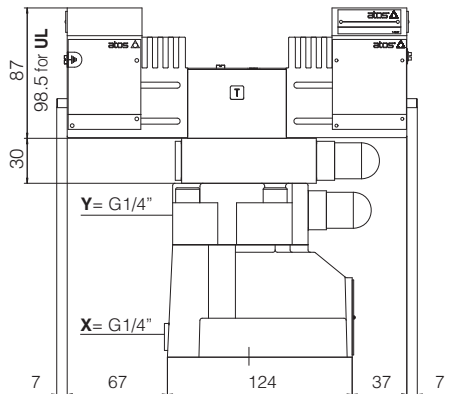
Ports X:  $\varnothing = 3,2$  mm

Mass [kg]	
AGAM-20/10 20/11	7,65
AGAM-20/20 20/21	8,75
AGAM-20/22 20/32	8,45 10,2
Option /V	-
Option /O	+0,35
Option /WP	+0,25

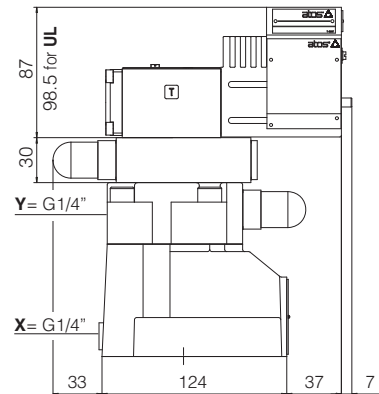
AGAM-20/10\*\*-AO  
AGAM-20/11\*\*-AO



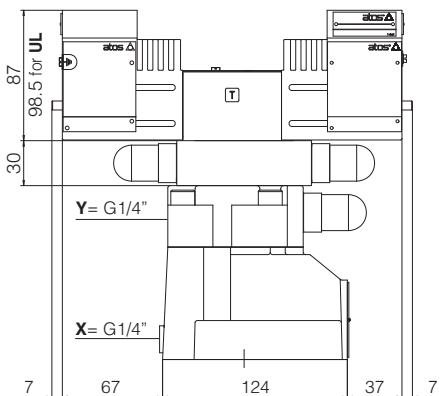
AGAM-20/20\*\*-AO  
AGAM-20/21\*\*-AO



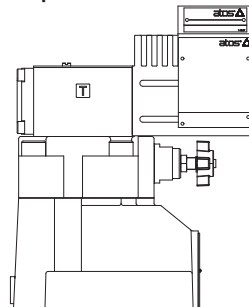
AGAM-20/22\*\*-AO



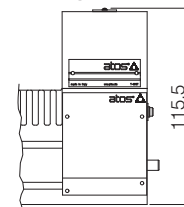
AGAM-20/32\*\*-AO



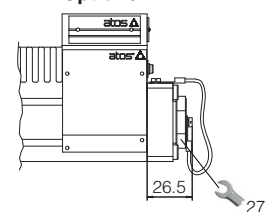
Option /V



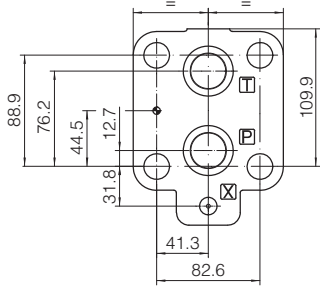
Option /O



Option /WP



# AGAM-32



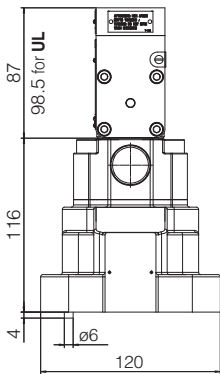
Valve's bottom view

**ISO 6264: 2007** (see table P005)  
**Mounting surface: 6264-10-17-1-97**  
**(with M20 fixing holes instead of standard M18)**

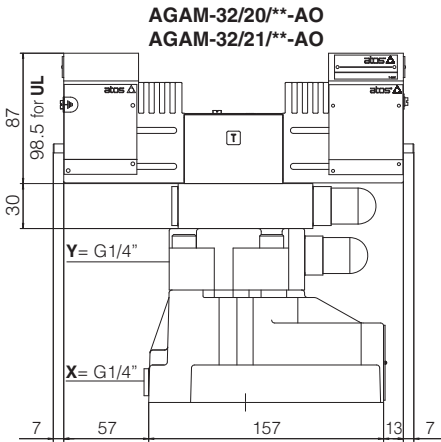
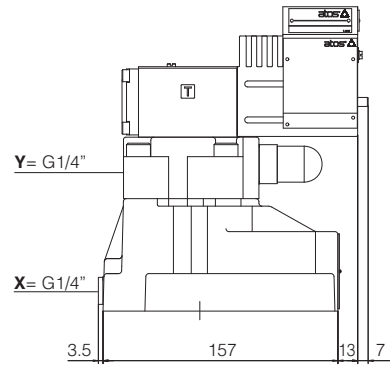
Fastening bolts:  
 4 socket head screws M20x60 class 12.9  
 Tightening torque = 600 Nm  
 Seals: 2 OR 4131; 1 OR 109/70  
 Ports P, T:  $\varnothing = 28,5$  mm  
 Ports X:  $\varnothing = 3,2$  mm

**X** = port connection for external pilot  
**Y** = port connection for external drain

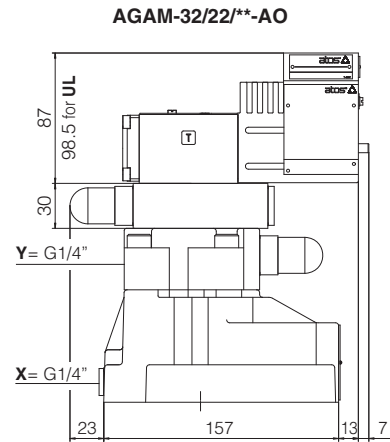
Mass [kg]	
AGAM-32/10 32/11	9,05
AGAM-32/20 32/21	10,05
AGAM-32/22 32/32	9,85 11,6
Option /V	-
Option /O	+0,35
Option /WP	+0,25



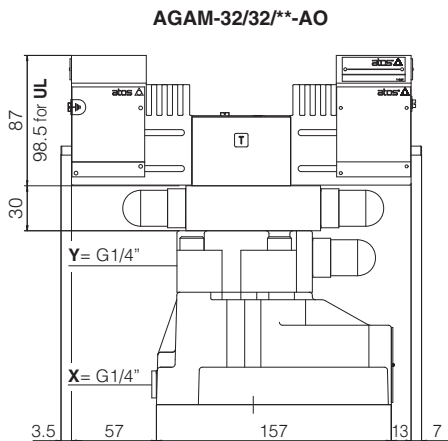
**AGAM-32/10\*\* -AO**  
**AGAM-32/11\*\* -AO**



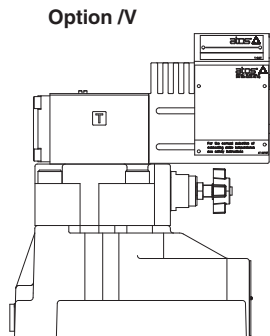
**AGAM-32/20\*\* -AO**  
**AGAM-32/21\*\* -AO**



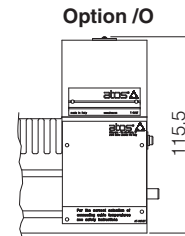
**AGAM-32/22\*\* -AO**



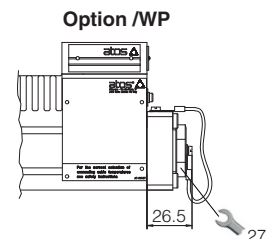
**AGAM-32/32\*\* -AO**



**Option /V**



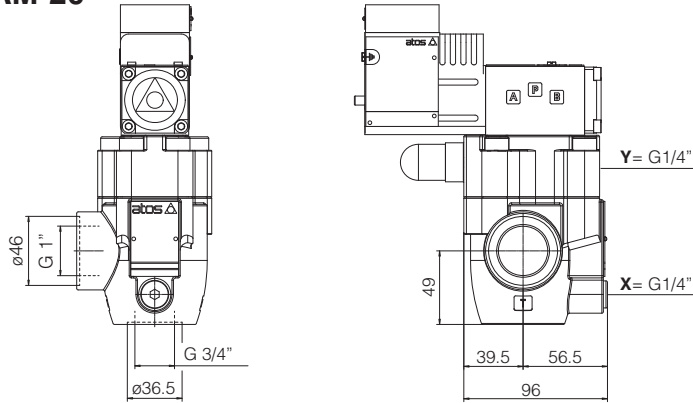
**Option /O**



**Option /WP**



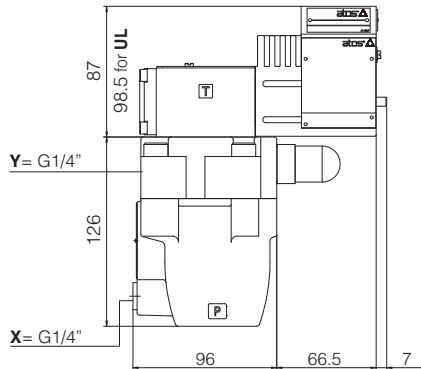
**ARAM-20**



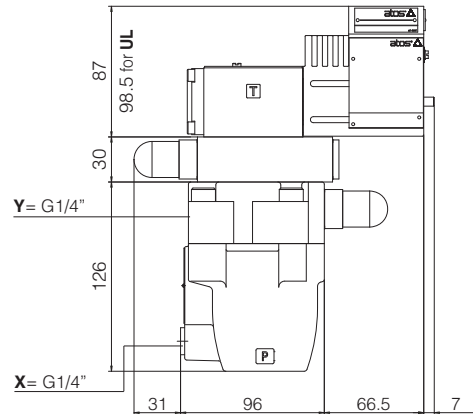
Mass [kg]	
ARAM-20/10 20/11	6,75
ARAM-20/20 20/21	8,45
ARAM-20/22 20/32	8,15 10,1
Option /V	-
Option /O	+0,35
Option /WP	+0,25

**X** = port connection for external pilot  
**Y** = port connection for external drain

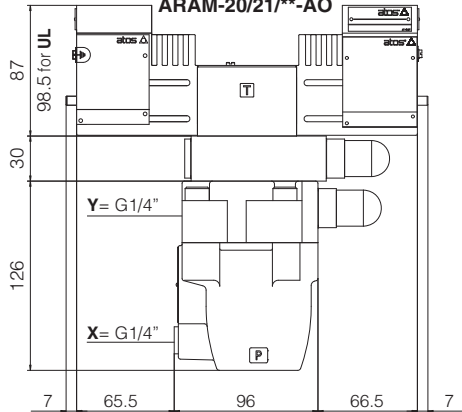
**ARAM-20/10/\*\*-AO  
 ARAM-20/11/\*\*-AO**



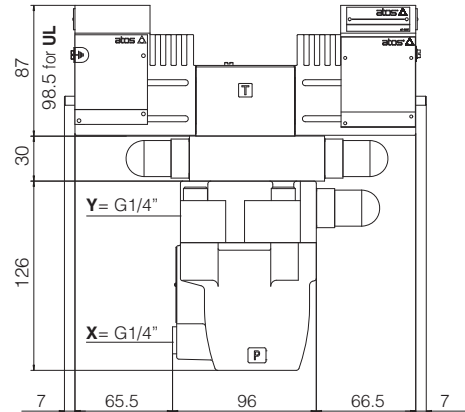
**ARAM-20/22/\*\*-AO**



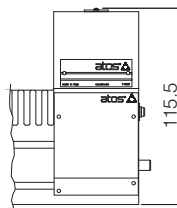
**ARAM-20/20/\*\*-AO  
 ARAM-20/21/\*\*-AO**



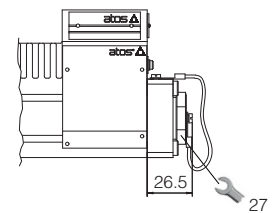
**ARAM-20/32/\*\*-AO**



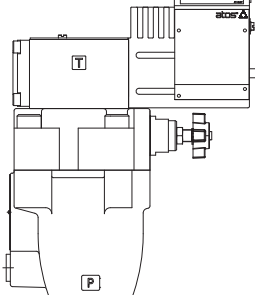
**Option /O**



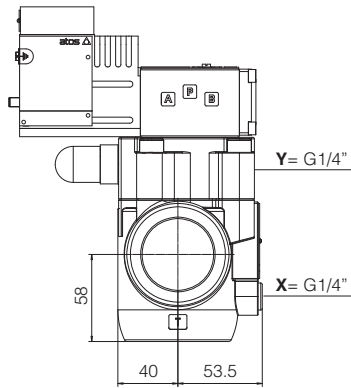
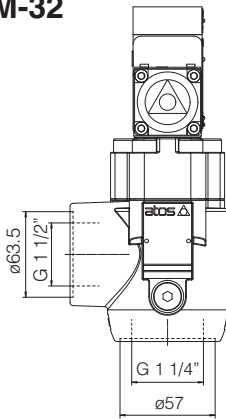
**Option /WP**



**Option /V**

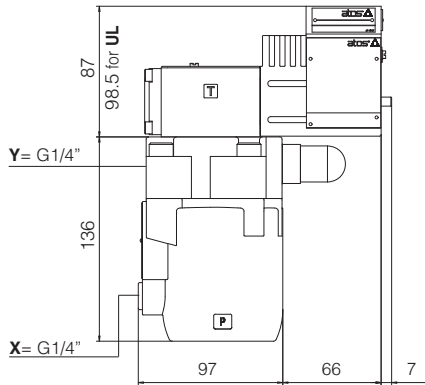


# ARAM-32

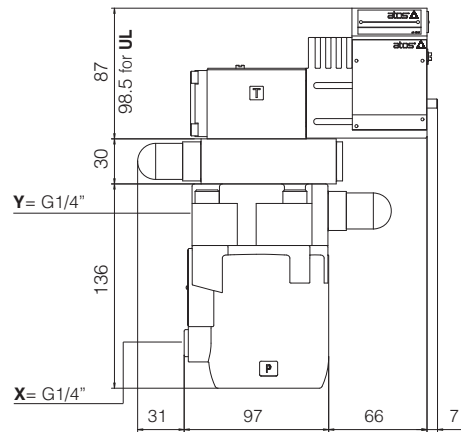


Mass [kg]	
ARAM-32/10 32/11	7,05
ARAM-32/20 32/21	9,05
ARAM-32/22 32/32	8,55 10,7
Option /V	-
Option /O	+0,35
Option /WP	+0,25

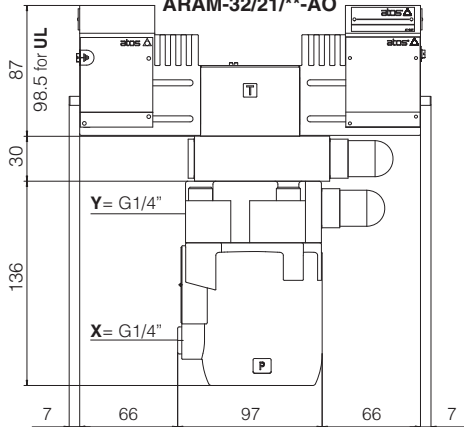
## ARAM-32/10/\*\*-AO ARAM-32/11/\*\*-AO



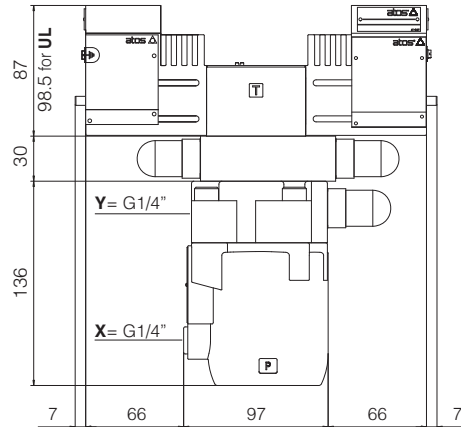
## ARAM-32/22/\*\*-AO



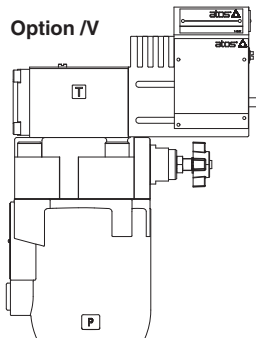
## ARAM-32/20/\*\*-AO ARAM-32/21/\*\*-AO



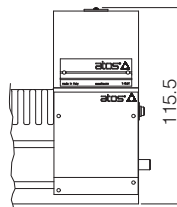
## ARAM-32/32/\*\*-AO



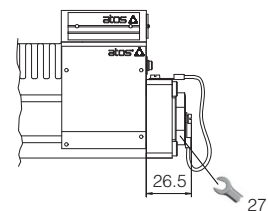
## Option /V



## Option /O



## Option /WP



### 16 RELATED DOCUMENTATION

- X010** Basics for electrohydraulics in hazardous environments
- X020** Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, CCC, PESO
- X030** Summary of Atos ex-proof components certified to cULus

- EX900** Operating and maintenance information for ex-proof on-off valves
- KX800** Cable glands for ex-proof valves
- P005** Mounting surfaces for electrohydraulic valves