



Table **CX010-1/E**

Ex-proof pressure relief valves

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

AGAM-10/10/-AO**

- ① main poppet
- ② valve main body
- ③ mechanical pressure limiter
- ④ cover
- ⑤ ex proof pilot valve

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** and **PESO** for gas group **II 2G** and dust category **II 2D**
- Multicertification **ATEX** and **IECEx** 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**

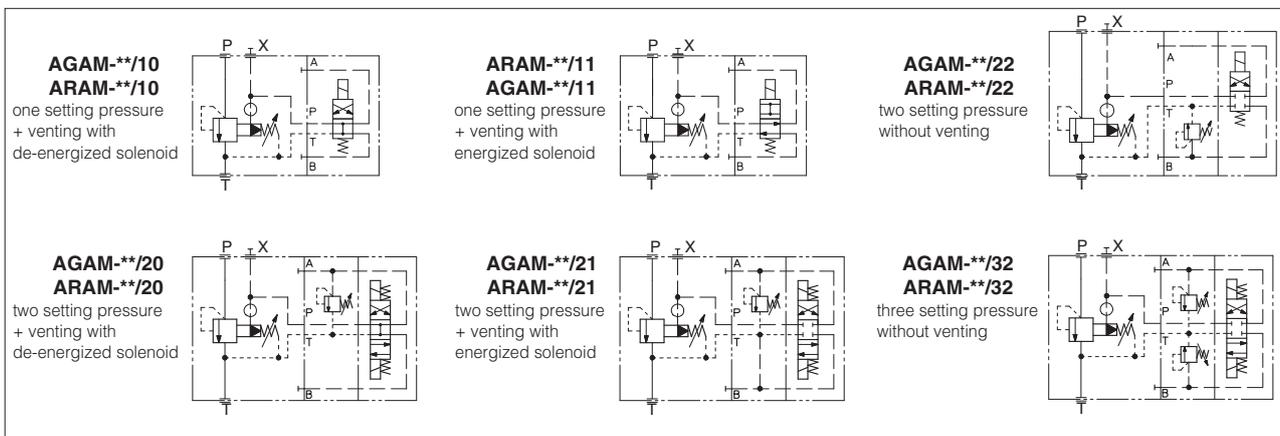
1 MODEL CODE

AGAM	-	20	/	20	/	210/100/100	/	M	-	AO	/	*	/	24DC	/	*	/	*							
Ex-proof pressure relief valves, piloted AGAM subplate mounting ARAM threaded connections																			Seals material, see section [6]: - = NBR PE = FKM BT = HNBR (1)						
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"																			Series number						
Configuration, see section [2]: <table style="margin-left: 20px;"> <tr> <td>10</td> <td>20</td> <td>22</td> </tr> <tr> <td>11</td> <td>21</td> <td>32</td> </tr> </table>	10	20	22	11	21	32																			Voltage code, see section [5]
10	20	22																							
11	21	32																							
Max regulated pressure of first (second / third) setting, see section [4]: <table style="margin-left: 20px;"> <tr> <td>50 = 50 bar</td> <td>100 = 100 bar</td> </tr> <tr> <td>210 = 210 bar</td> <td>350 = 350 bar</td> </tr> </table>	50 = 50 bar	100 = 100 bar	210 = 210 bar	350 = 350 bar																			Options (2): E = external pilot O = horizontal cable entrance (1) V = regulating handwheel for pressure adjustment WP = manual override protected by metallic cap Y = external drain		
50 = 50 bar	100 = 100 bar																								
210 = 210 bar	350 = 350 bar																								
																			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 (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	Standard = -20°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C
Storage temperature range	Standard = -20°C ÷ +80°C /PE option = -20°C ÷ +80°C /BT 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 = 350 port T, Y = 210		
Max regulated pressure [bar]	50	100	350
Pressure range [bar]	4÷50;	6÷100;	7÷210; 8÷350
Max flow AGAM (1) [l/min]	200	400	600
Max flow ARAM (1) [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%	12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC		12DC, 24DC, 110DC, 125DC, 220DC
VAC 50/60 Hz ±10%	12AC, 24AC, 110AC, 230AC		12AC, 24AC, 110AC, 230AC
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 mm²/s - max allowed range 2.8 ÷ 500 mm²/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, HVLP, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDU, 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 ATEX IECEx EAC PESO		Multicertification Group I ATEX IECEx	North American cULus cULus	
Solenoid certified code	OA		OA/M	OA/EC	
Type examination certificate (1)	ATEX: CESI 02 ATEX 014 IECEX: IECEX CES 10.0010x EAC: TC RU C-IT. 08.B.01784 PESO: P338131		ATEX: CESI 03 ATEX 057x IECEX: IECEX CES 12.0007x	20170324 - E366100	
Method of protection	<ul style="list-style-type: none"> • ATEX, EAC Ex II 2G Ex d IIC T6/T4/T3 Gb Ex II 2D Ex tb IIIC T85°C/T200°C Db • IECEx Ex d IIC T6/T4/T3 Gb Ex tb IIIC T85°C/T200°C Db • PESO Ex II 2G Ex d IIC T6/T4 Gb 		<ul style="list-style-type: none"> • ATEX Ex I M2 Ex db I Mb • IECEx Ex db I Mb 	<ul style="list-style-type: none"> • UL 1203 Class I, Div.I, Groups C & D Class I, Zone I, Groups IIA & IIB 	
Temperature class	T6	T4	-	T6	T5
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)	GK = GK-1/2" M = M20x1,5 NPT = 1/2" NPT			1/2" NPT ANSI/ASME B46.1	

(1) The type examiner certificates can be downloaded from 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

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 suitable for wires cross sections up to 2,5 mm² (max AWG14)
2 = GND
3 = Coil

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

⚠ Pay attention to coil polarity

1 = Coil + PCB 3 poles terminal board suggested cable section up to 1,5 mm²
2 = GND
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:

Multicertification Group I and Group II	
Power supply: section of coil connection wires = 2,5 mm ²	Grounding: section of internal ground wire = 2,5 mm ² section of external ground wire = 4 mm ²
cULus certification:	
<ul style="list-style-type: none"> • Suitable for use in Class I Division 1, Gas Groups C • Armored Marine Shipboard Cable which meets UL 1309 • Tinned Stranded Copper Conductors • Bronze braided armor • Overall impervious sheath over the armor 	
Any Listed (UBVZ/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm ² (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)	
Note 1: For Class I wiring the 3C 1,5 mm ² 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

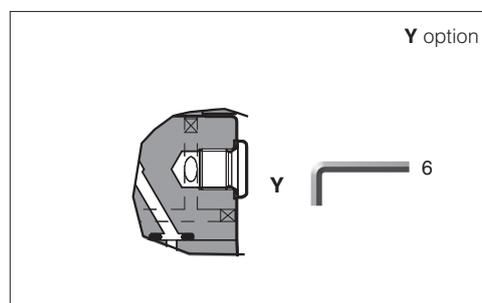
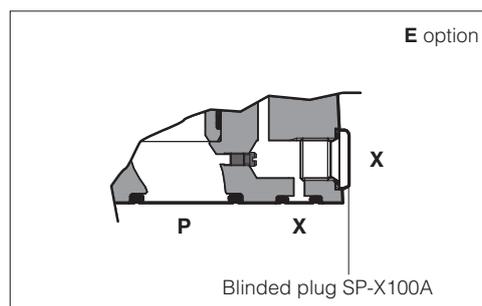
V = Regulating handweel for pressure adjustment

WP = Manual override protect by metallic cap

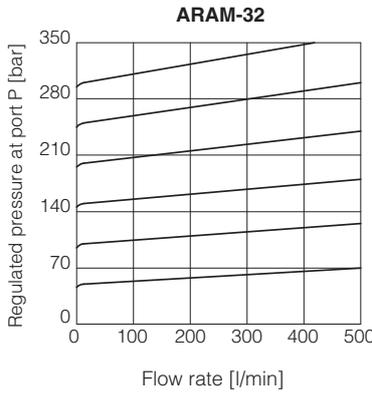
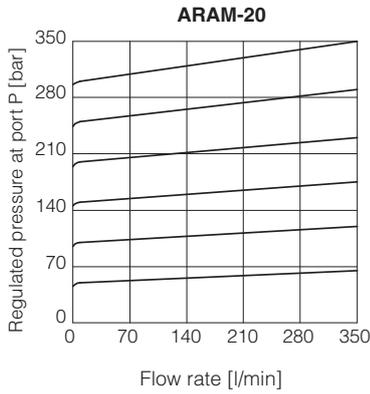
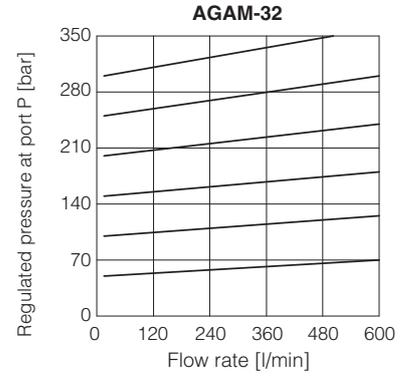
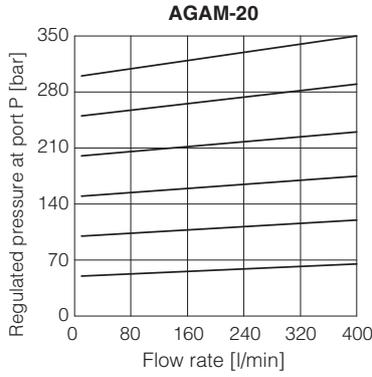
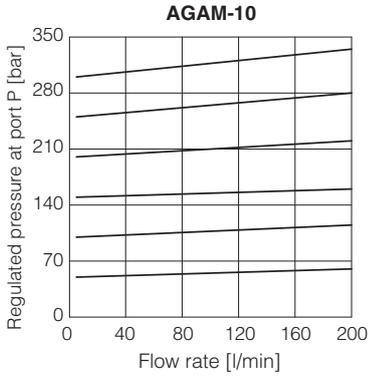
Y = The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.
The Y drain port has a threaded connection G 1/4" available on the pilot stage body.

11.1 Possible combined options:

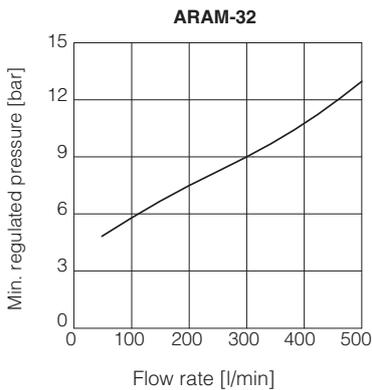
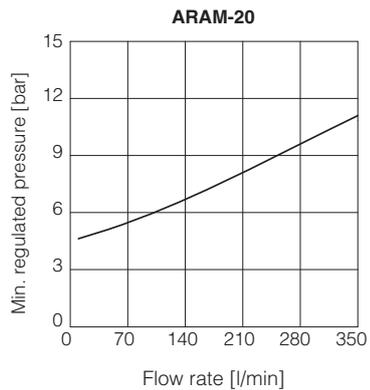
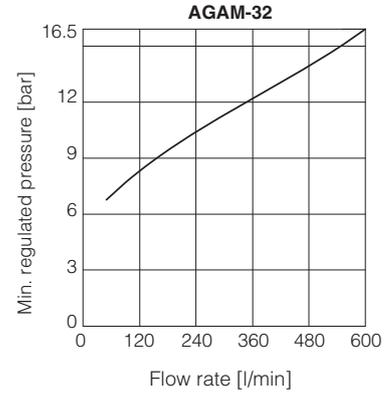
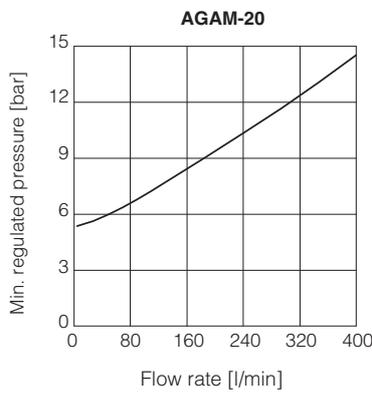
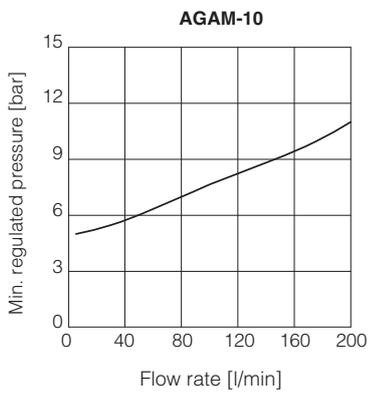
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- /WPY



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

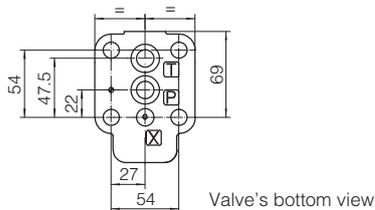


13 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C



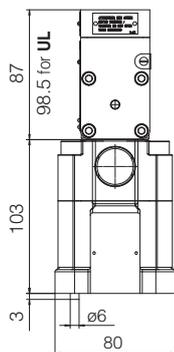
14 INSTALLATION DIMENSIONS FOR AGAM [mm] - Multicertified and UL

AGAM-10

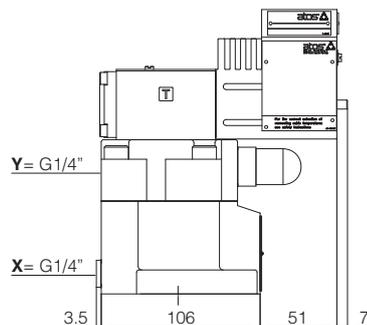


ISO 6264: 2007 (see table P005)
Mounting surface: 6264-06-09-1-97
 Fastening bolts:
 4 socket head screws M12x35 class 12.9
 Tightening torque = 125 Nm
 Seals: 2 OR 123; 1 OR 109/70
 Ports P, T: $\varnothing = 14,5$ mm
 Ports X: $\varnothing = 3,2$ mm

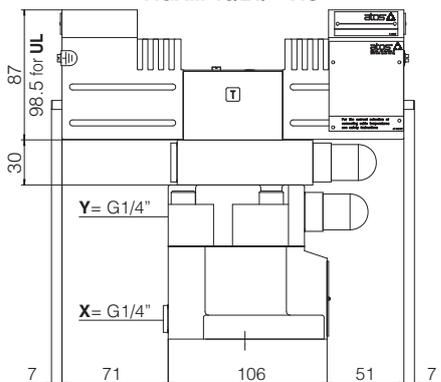
Mass [kg]	
AGAM-10/10 10/11	6,45
AGAM-10/20 10/21	7,55
AGAM-10/22 10/32	7,25 9
option /V	-
option /O	+0,35
option /WP	+0,25



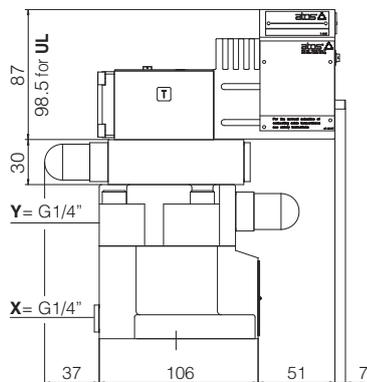
AGAM-10/10-AO**
AGAM-10/11-AO**



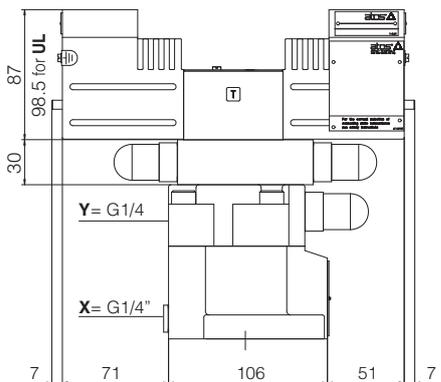
AGAM-10/20-AO**
AGAM-10/21-AO**



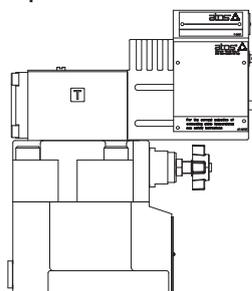
AGAM-10/22-AO**



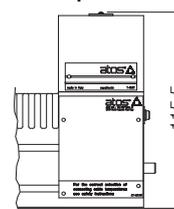
AGAM-10/32-AO**



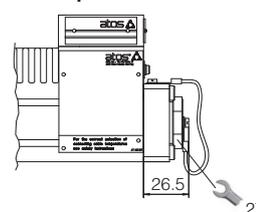
Option /V



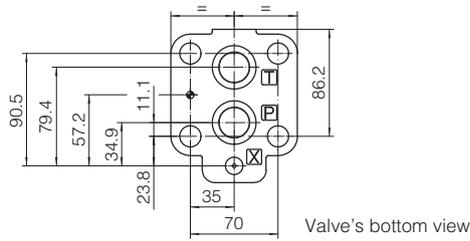
Option /O



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

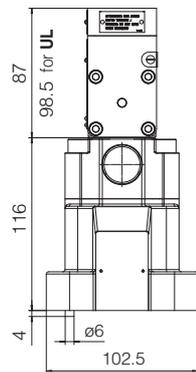
Tightening torque = 300 Nm

Seals: 2 OR 4112; 1 OR 109/70

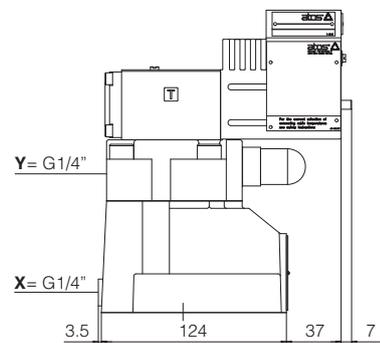
Ports P, T: Ø = 24 mm

Ports X: Ø = 3,2 mm

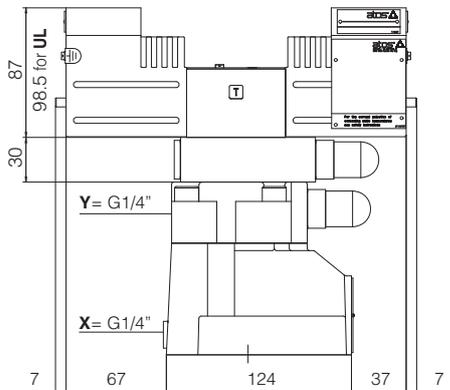
Mass [kg]	
AGAM-20/10 20/11	7,65
AGAM-20/20 20/21	8,75
AGAM-20/22 20/32	8,45 10,2
Option /V	-
Option /O	+0,35
Option /WP	+0,25



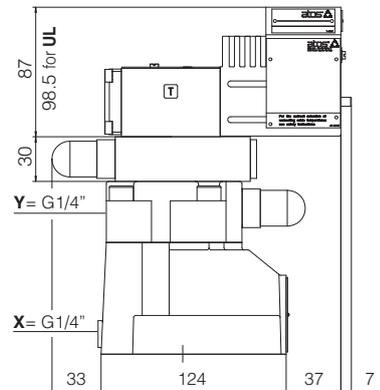
AGAM-20/10-AO**
AGAM-20/11-AO**



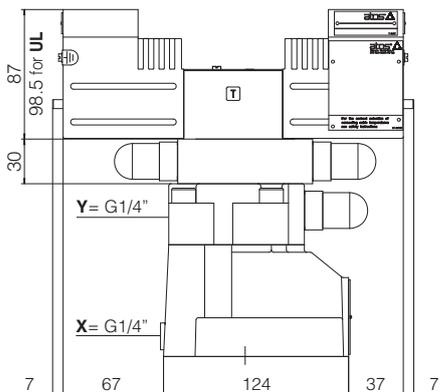
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AGAM-20/21-AO**



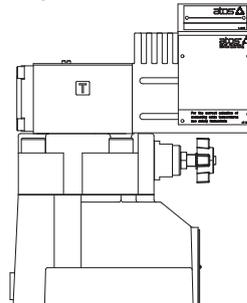
AGAM-20/22-AO**



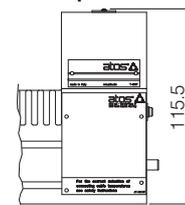
AGAM-20/32-AO**



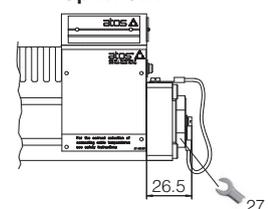
Option /V



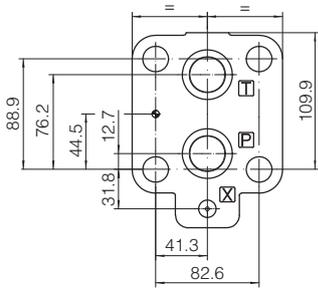
Option /O



Option /WP



AGAM-32

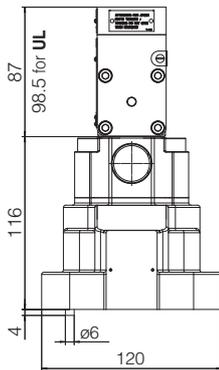


Valve's bottom view

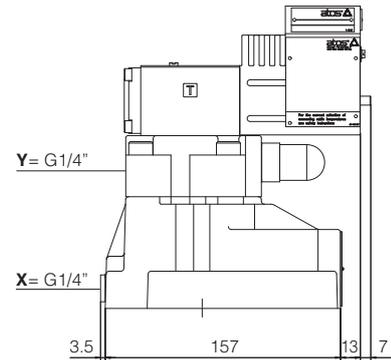
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)
 Fastening bolts:
 4 socket head screws M20x60 class 12.9
 Tightening torque = 600 Nm
 Seals: 2 OR 4131; 1 OR 109/70
 Ports P, T: Ø = 28,5 mm
 Ports X: Ø = 3,2 mm

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

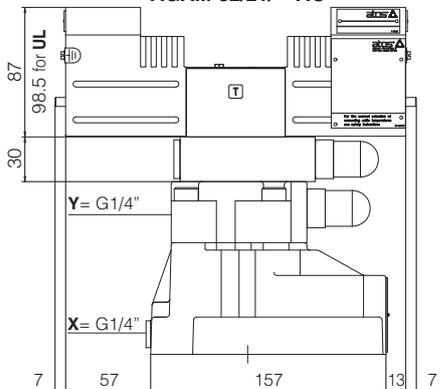
X = port connection for external pilot
Y = port connection for external drain



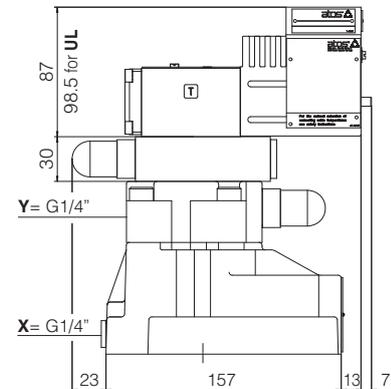
AGAM-32/10AO**
AGAM-32/11AO**



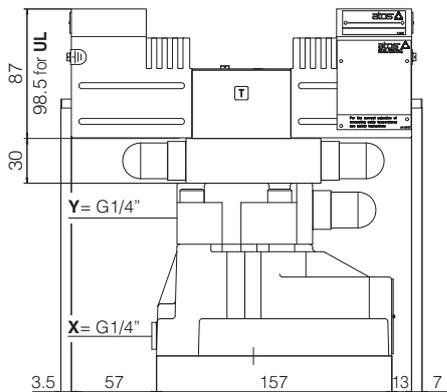
AGAM-32/20AO**
AGAM-32/21AO**



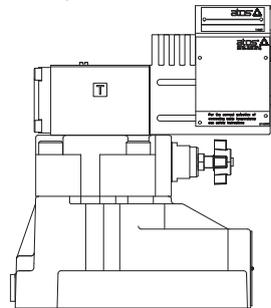
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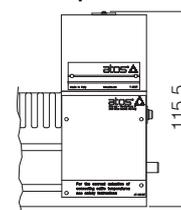
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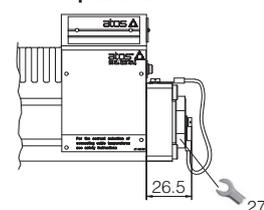
Option /V



Option /O

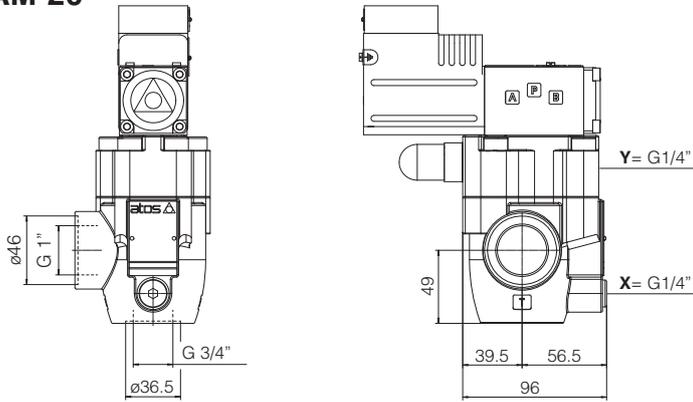


Option /WP



15 INSTALLATION DIMENSIONS FOR ARAM [mm] - Multicertified and UL

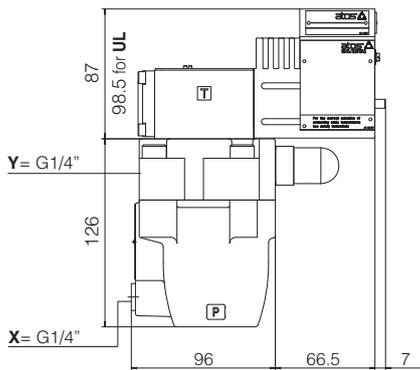
ARAM-20



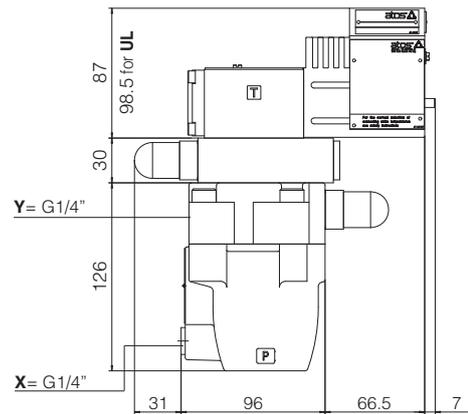
Mass [kg]	
ARAM-20/10 20/11	6,75
ARAM-20/20 20/21	8,45
ARAM-20/22 20/32	10,1
Option /V	-
Option /O	+0,35
Option /WP	+0,25

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

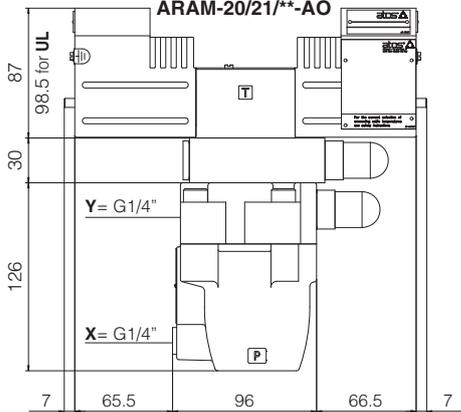
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ARAM-20/11/**-AO



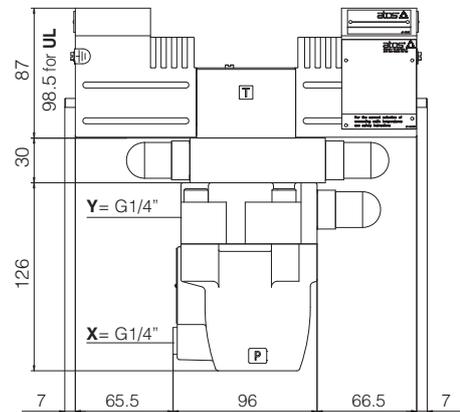
ARAM-20/22/**-AO



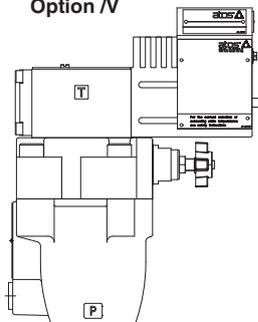
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ARAM-20/21/**-AO



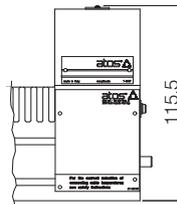
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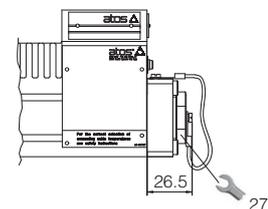
Option /V



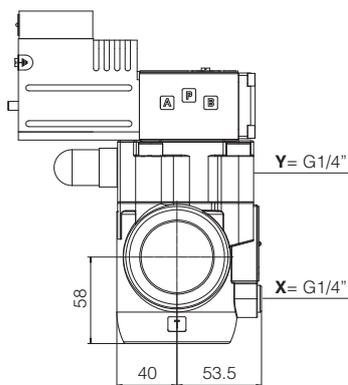
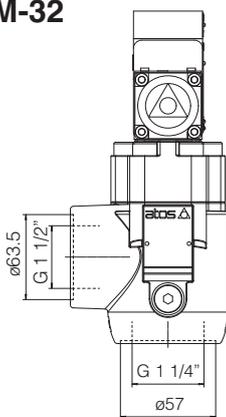
Option /O



Option /WP

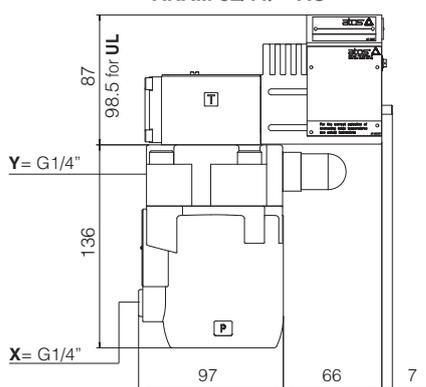


ARAM-32

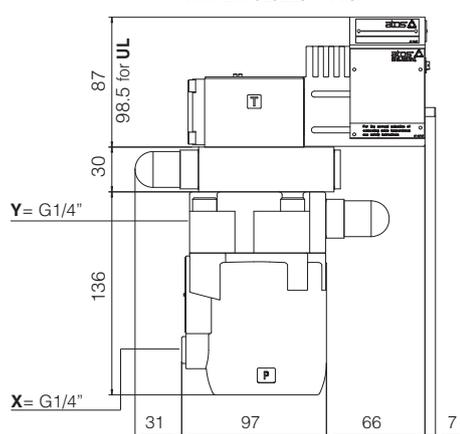


Mass [kg]	
ARAM-32/10 32/11	7,05
ARAM-32/20 32/21	9,05
ARAM-32/22 32/32	8,55 10,7
Option /V	-
Option /O	+0,35
Option /WP	+0,25

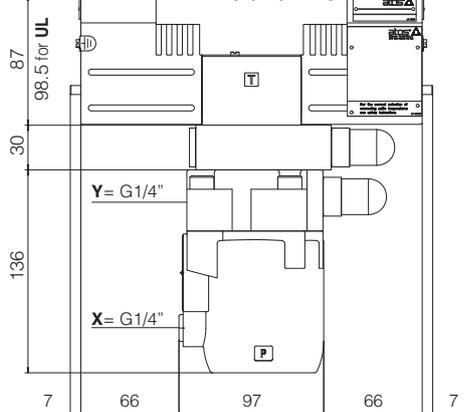
ARAM-32/10/-AO
ARAM-32/11/**-AO**



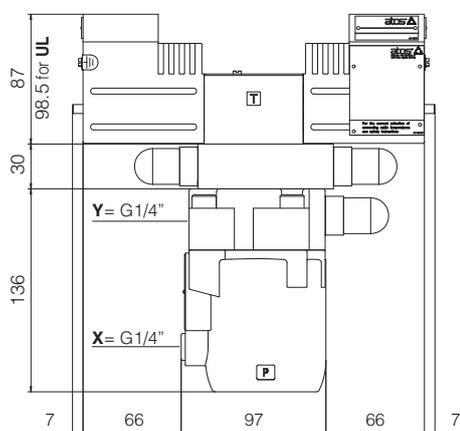
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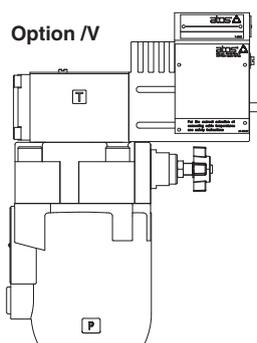
ARAM-32/20/-AO
ARAM-32/21/**-AO**



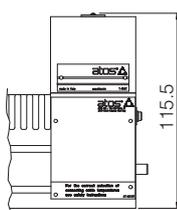
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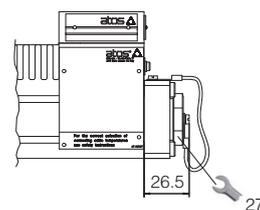
Option /V



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, 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