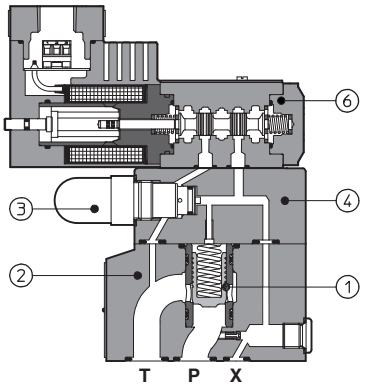
Ex-proof pressure relief valves

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: **20** and **32** - 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	**	/	*

AGAM
Ex-proof pressure relief valves, piloted
AGAM
subplate mounting
ARAM
threated connections

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 :

10	**20**	**22**
11	**21**	**32**

Max regulated pressure
of first (second / third) setting, see section 4 :

50 = 50 bar	**100** = 100 bar
210 = 210 bar	**350** = 350 bar

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

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

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

Voltage code, see section 5

Series number

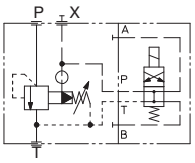
Seals material, see section 6 :
- = NBR
PE = FKM
BT = HNBR **(1)**

(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

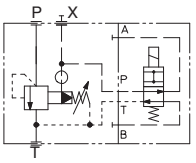
⚠ The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar

2 CONFIGURATIONS AND HYDRAULIC SYMBOLS

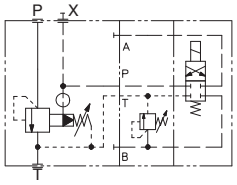
AGAM-/10**
ARAM-/10**
one setting pressure
+ venting with
de-energized solenoid



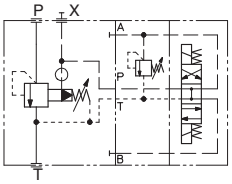
ARAM-/11**
AGAM-/11**
one setting pressure
+ venting with
energized solenoid



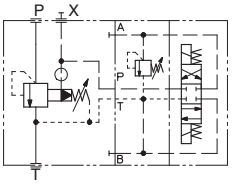
AGAM-/22**
ARAM-/22**
two setting pressure
without venting



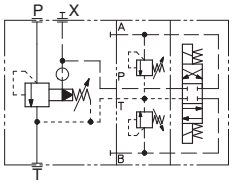
AGAM-/20**
ARAM-/20**
two setting pressure
+ venting with
de-energized solenoid



AGAM-/21**
ARAM-/21**
two setting pressure
+ venting with
energized solenoid



AGAM-/32**
ARAM-/32**
three setting pressure
without venting



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** **210**	**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, HVLPD	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

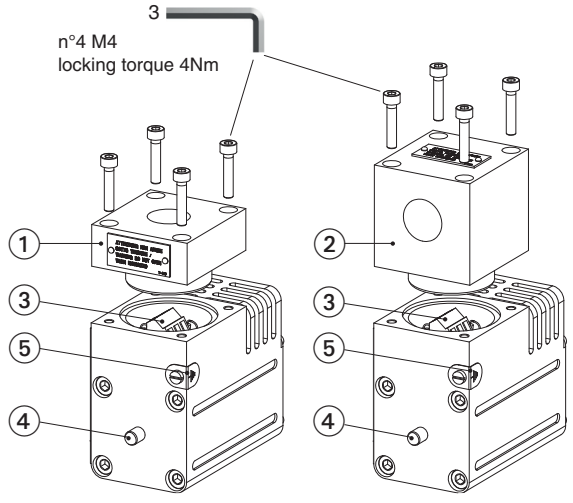
Valve type	AGAM-*/**AO** ARAM-*/**AO**		AGAM-*/**AO/M** ARAM-*/**AO/M**	AGAM-*/**AO/UL** ARAM-*/**AO/UL**	
Certifications	Multicertification Group II **ATEX IECEx EAC PESO**		Multicertification Group I **ATEX IECEx**	North American cULus **cULus**	
Solenoid certified code	**OA**		**OA/M**	**OA/EC**	
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	• 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		• ATEX Ex I M2 Ex db I Mb • IECEx Ex db I Mb	• 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: 2012+A11:2013 EN 60079-1:2014 EN 60079-31:2014		IEC 60079-0:2017 IEC 60079-1:2017-04 IEC 60079-31:2013	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 examinator 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**

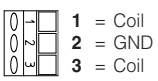
8 EX PROOF SOLENOIDS WIRING

Multicertification



Standard version **Option /O**

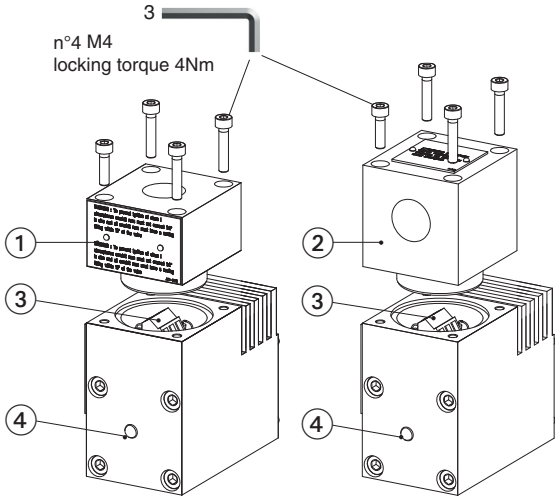
① cover with threaded connection for vertical cable gland fitting
② cover with threaded connection for horizontal cable gland fitting
③ terminal board for cables wiring
④ standard manual override
⑤ screw terminal for additional equipotential grounding



1 = Coil
2 = GND
3 = Coil

PCB 3 poles terminal board suitable for wires cross sections up to 2,5 mm² (max AWG14)

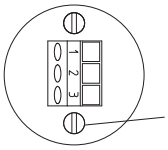
cULus certification



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 **+**
2 = GND
3 = Coil **-**

PCB 3 poles terminal board suggested cable section up to 1,5 mm² (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 mm²

Grounding: section of internal ground wire = 2,5 mm²
section of external ground wire = 4 mm²

cULus certification:

- 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 mm² (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 mm² 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 ¼").

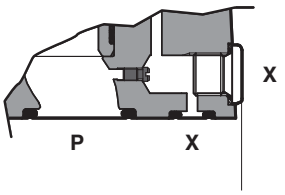
O = Horizontal cable entrance, to be selected in case of limited vertical space

V = Regulating handweel for pressure adjustment

WP = Manual override protect by metallic cap

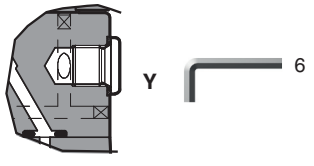
Y = The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.
The Y drain port has a threaded connection G ¼" available on the pilot stage body.

E option



Blinded plug SP-X100A

Y option

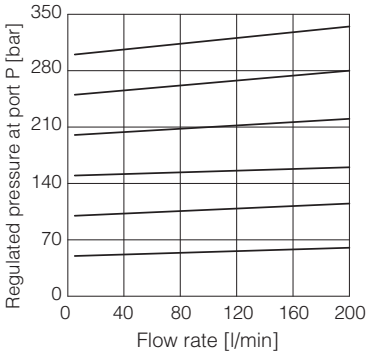


11.1 Possible combined options:

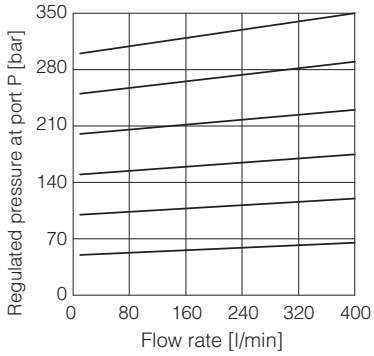
/EO, /EV, /EY, /EW, /EWP, /EOV, /EOY, /EVY
/EOWP, /EWPY, /EOVY, /EOVWP, /EVWPY, /EOVWPY
/OV, /OY, /OWP, /OVY, /OVWP, /OWPY, /OVWPY,
/VY, /VWP, /VWPY
/WPY

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

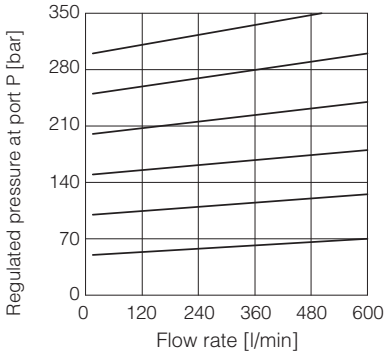
AGAM-10



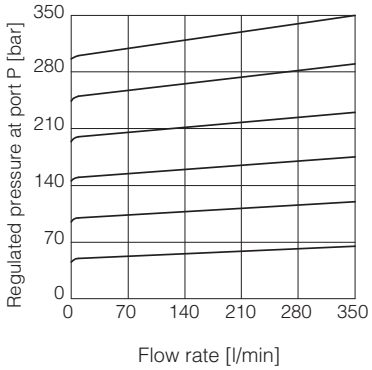
AGAM-20



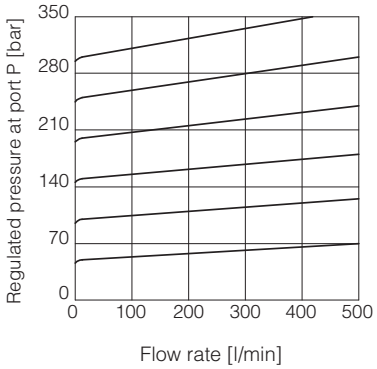
AGAM-32



ARAM-20

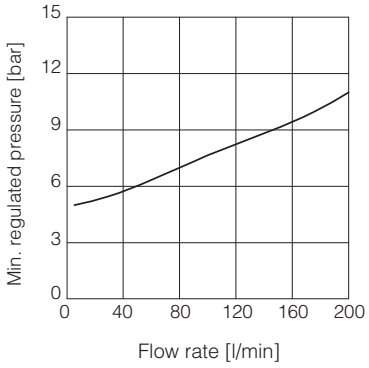


ARAM-32

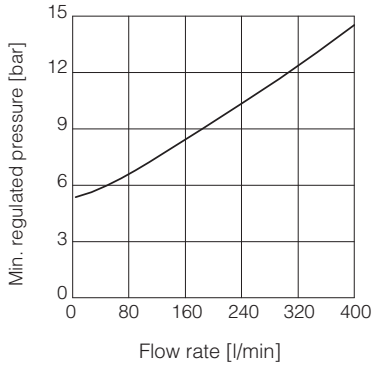


13 MINIMUM PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

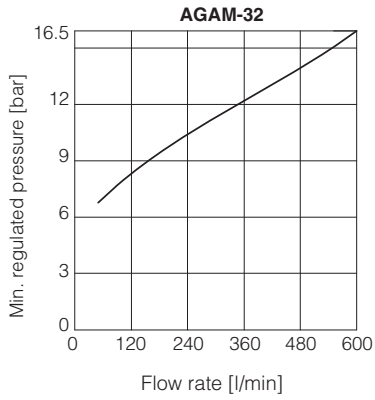
AGAM-10



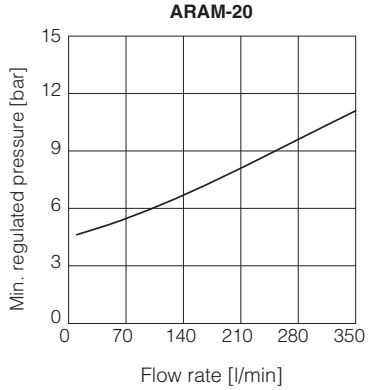
AGAM-20



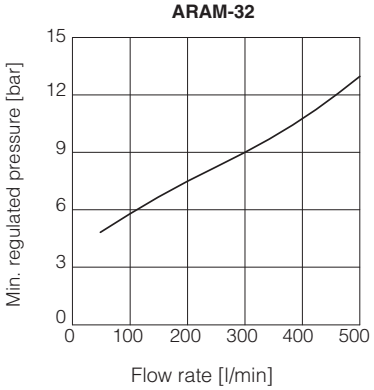
AGAM-32



ARAM-20



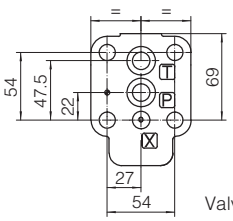
ARAM-32



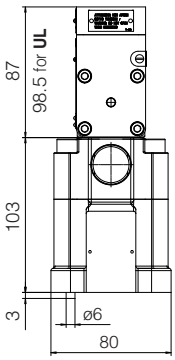
AGAM-10

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: Ø = 14,5 mm
Ports X: Ø = 3,2 mm

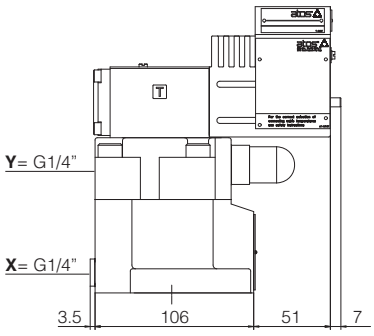
Mass [kg]	
AGAM-10/10 10/11	6,45
AGAM-10/20 10/21	7,55
AGAM-10/22 10/32	7,25 9
option /V	-
option /O	+0,35
option /WP	+0,25



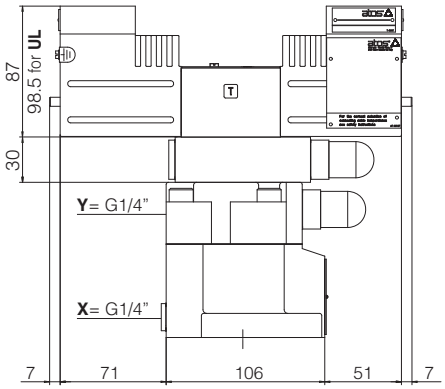
Valve's bottom view



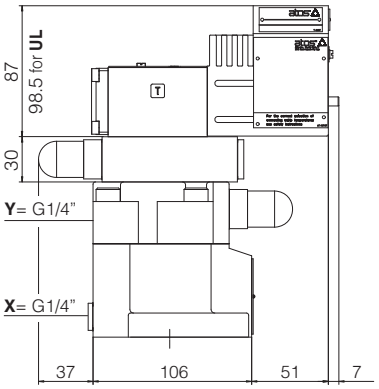
AGAM-10/10/-AO**
AGAM-10/11/-AO**



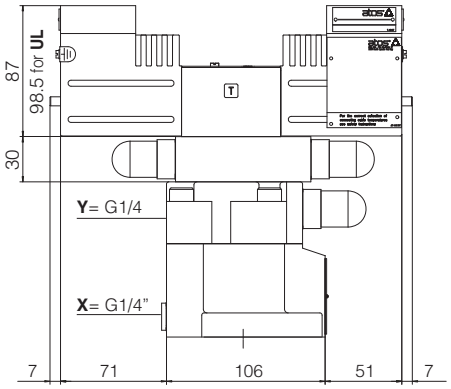
AGAM-10/20/-AO**
AGAM-10/21/-AO**



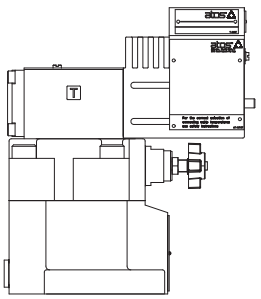
AGAM-10/22/-AO**



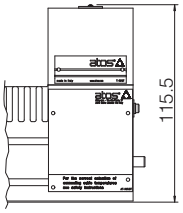
AGAM-10/32/-AO**



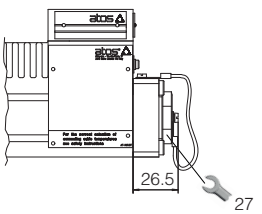
Option /V



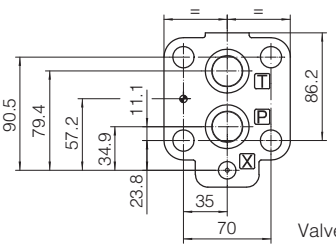
Option /O



Option /WP



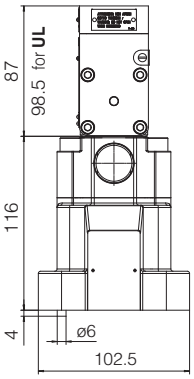
AGAM-20



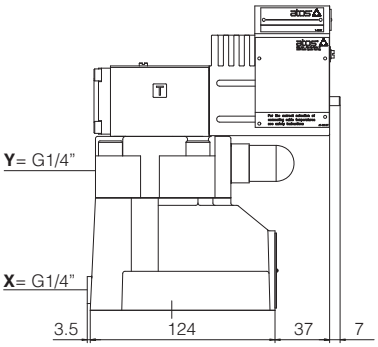
Valve's bottom view

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

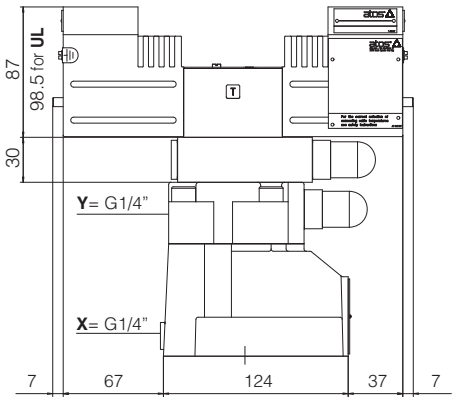
Mass [kg]	
AGAM-20/10 20/11	7,65
AGAM-20/20 20/21	8,75
AGAM-20/22 20/32	8,45 10,2
Option /V	-
Option /O	+0,35
Option /WP	+0,25



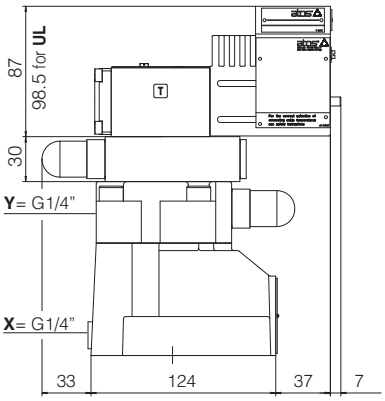
AGAM-20/10/-AO**
AGAM-20/11/-AO**



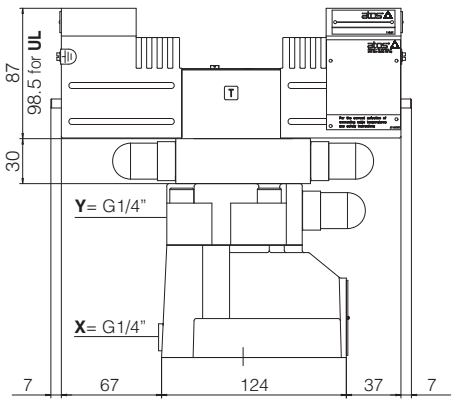
AGAM-20/20/-AO**
AGAM-20/21/-AO**



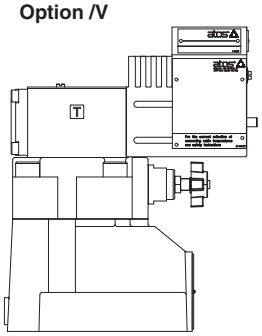
AGAM-20/22/-AO**



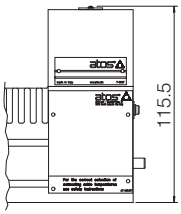
AGAM-20/32/-AO**



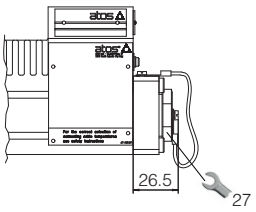
Option /V



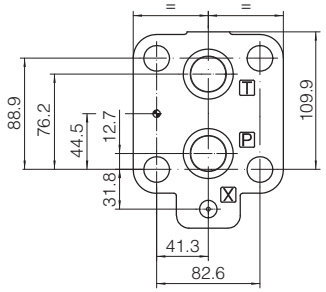
Option /O



Option /WP



AGAM-32

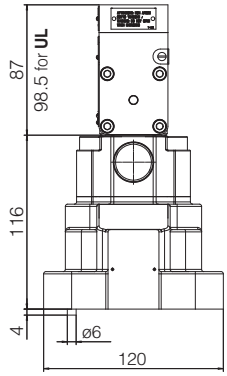


Valve's bottom view

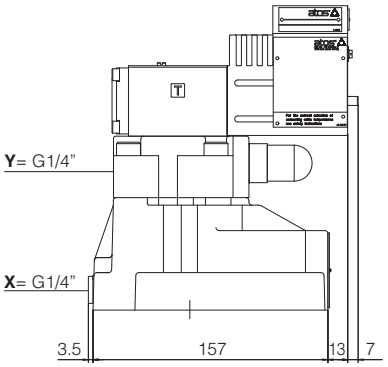
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)
Fastening bolts:
4 socket head screws M20x60 class 12.9
Tightening torque = 600 Nm
Seals: 2 OR 4131; 1 OR 109/70
Ports P, T: Ø = 28,5 mm
Ports X: Ø = 3,2 mm

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

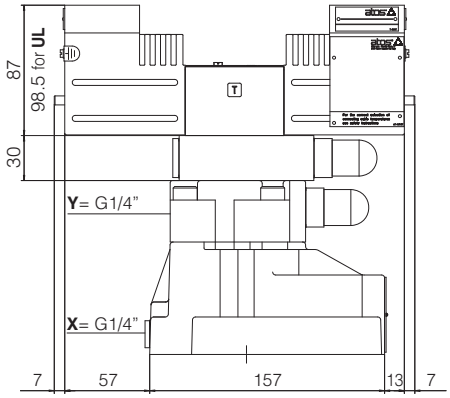
Mass [kg]	
AGAM-32/10 32/11	9,05
AGAM-32/20 32/21	10,05
AGAM-32/22 32/32	9,85 11,6
Option /V	-
Option /O	+0,35
Option /WP	+0,25



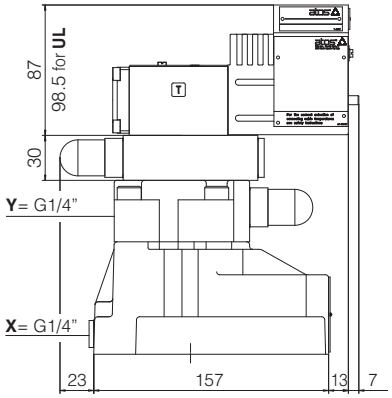
AGAM-32/10/-AO**
AGAM-32/11/-AO**



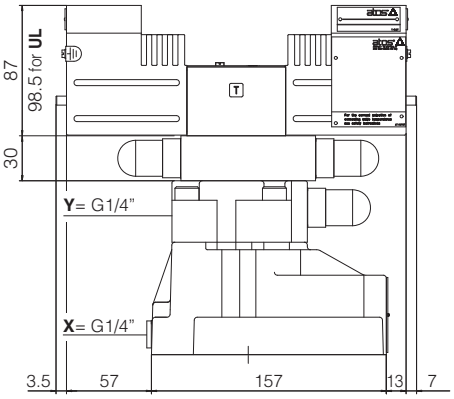
AGAM-32/20/-AO**
AGAM-32/21/-AO**



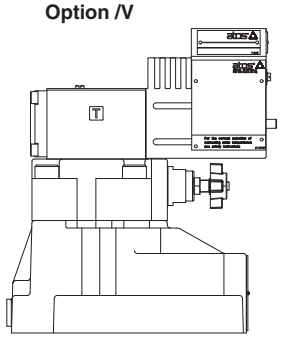
AGAM-32/22/-AO**



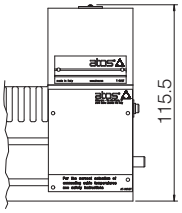
AGAM-32/32/-AO**



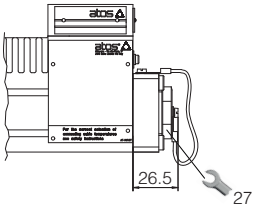
Option /V



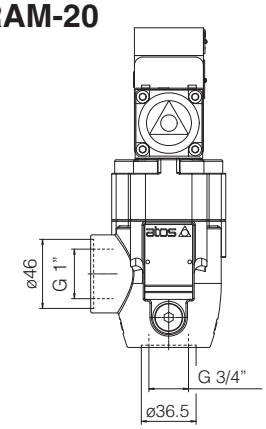
Option /O

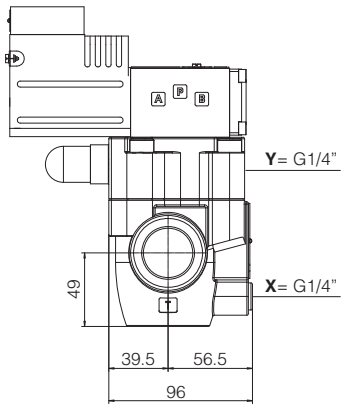


Option /WP



ARAM-20

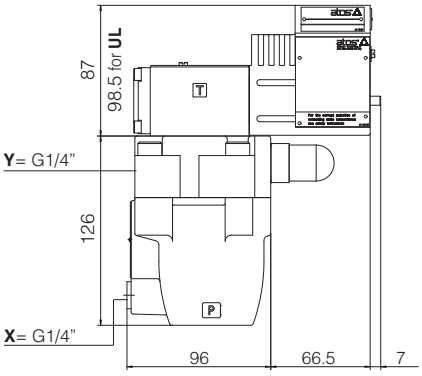




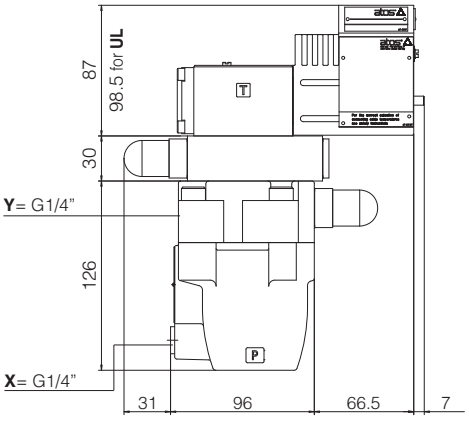
Mass [kg]	
ARAM-20/10 20/11	6,75
ARAM-20/20 20/21	8,45
ARAM-20/22 20/32	8,15 10,1
Option /V	-
Option /O	+0,35
Option /WP	+0,25

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

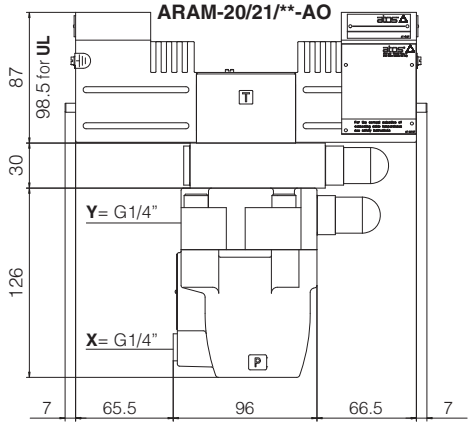
ARAM-20/10/-AO**
ARAM-20/11/-AO**



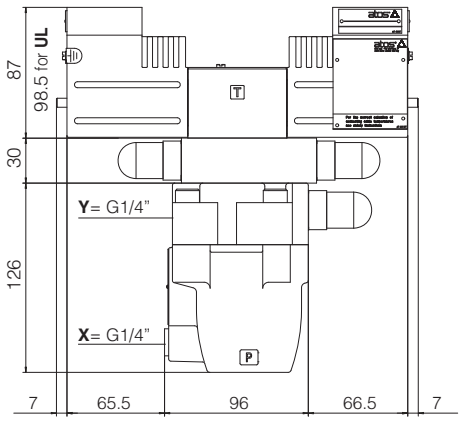
ARAM-20/22/-AO**



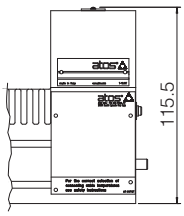
ARAM-20/20/-AO**
ARAM-20/21/-AO**



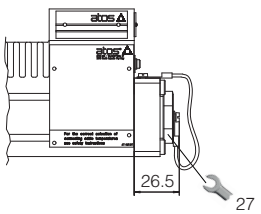
ARAM-20/32/-AO**



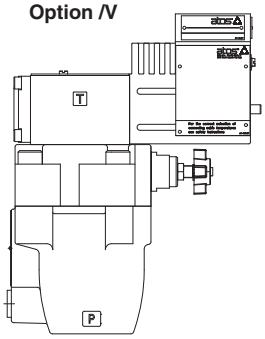
Option /O



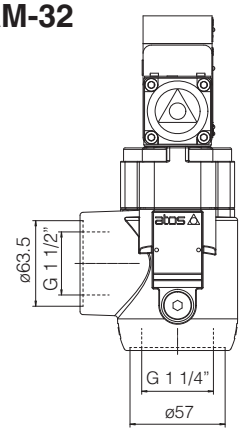
Option /WP

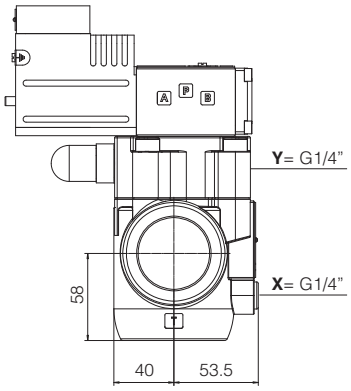


Option /V



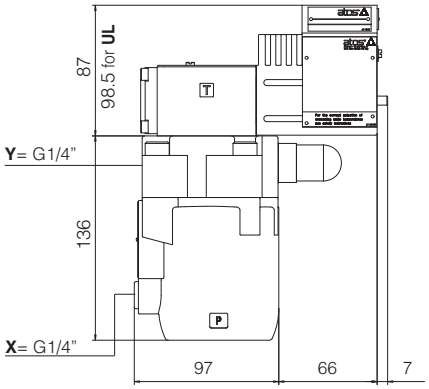
ARAM-32



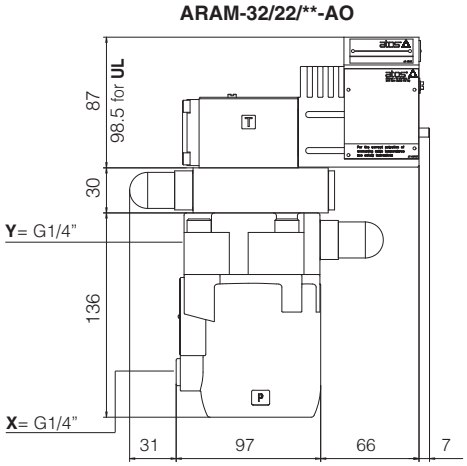


Mass [kg]	
ARAM-32/10 32/11	7,05
ARAM-32/20 32/21	9,05
ARAM-32/22 32/32	8,55 10,7
Option /V	-
Option /O	+0,35
Option /WP	+0,25

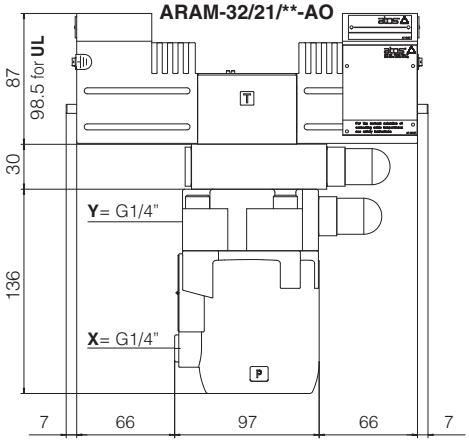
ARAM-32/10/-AO**
ARAM-32/11/-AO**



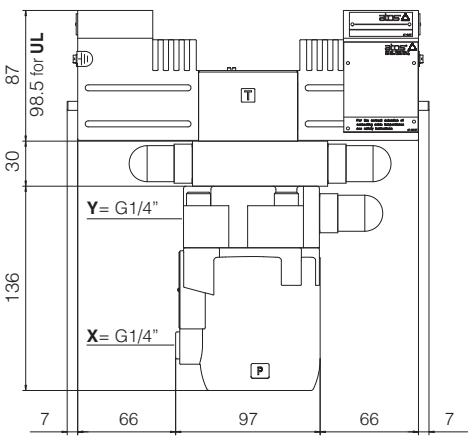
ARAM-32/22/-AO**



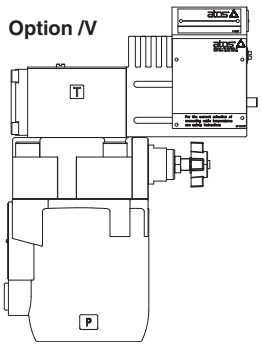
ARAM-32/20/-AO**
ARAM-32/21/-AO**



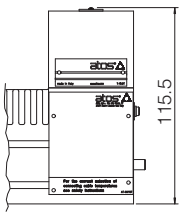
ARAM-32/32/-AO**



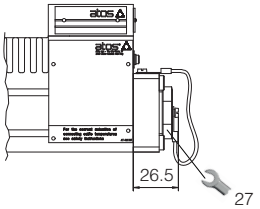
Option /V



Option /O



Option /WP



16 RELATED DOCUMENTATION

X010	Basics for electrohydraulics in hazardous environments	**EX900**	Operating and manintenance information for ex-proof on-off valves
X020	Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO	**KX800**	Cable glands for ex-proof valves
X030	Summary of Atos ex-proof components certified to cULus	**P005**	Mounting surfaces for electrohydraulic valves