

INSTALLATION GUIDE

DI 026 EN A CRYOTRONIQUE CO2

Described in EU-type examination certificate N°: LNE-34322



A	2020/01/21	Creation [PJV162]	DSM	MV
Issue	Date	Nature of modifications	Written by	Approved by

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	DOSSIER D'INSTALLATION DI 026 FR A CRYOTRONIQUE CO2			Unités de Mesures : Longueur : mm Angle : degré (° ' ") Température : °C
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1. GENERAL RECOMMENDATIONS

IN ORDER TO AVOID ALL THE PROBLEMS CONCERNING THE INSTALLATION, THE OPERATION AND THE MAINTENANCE OF THE EQUIPMENTS, BEING ABLE TO CREATE INOPPORTUNE FAILURE, PLEASE RESPECT THE FOLLOWING RECOMMENDATIONS.

BEFORE ANY WORK, MAKE SURE THAT THE EQUIPMENTS ARE NOT POWERED.

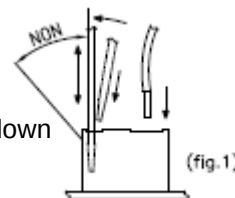
1.1. MECHANICAL RECOMMENDATIONS

- ⇒ Respect the recommendations of the instruction manual specifying the installation, operation and maintenance conditions of the ATEX equipment (instruction manual supplied with the equipment).
- ⇒ Take care to place the equipment in order to facilitate their installation, operation and maintenance by the technicians (working ergonomics).
- ⇒ Take care to position properly the equipment; the display must be readable without any difficulty.
- ⇒ Apply a tightening torque suitable with size and material of the fixation element except particular specifications mentioned on the presentation drawing or in the installation guides.
- ⇒ Mechanically protect the cables with the corrugated conduit if the cables are not ADR (corrugated conduit adapted to vehicles used for "carriage of dangerous goods of road" - hydrocarbons, LPG ... - and meet the requirements of French standard NF R13-903. Refer to the regulations in force).
- ⇒ Ensure there are a good mechanical strength and a good sealing between cable glands and cables, and between cable glands and corrugated conduit.
- ⇒ Respect cables and corrugated conduit radii of curvature.
- ⇒ Leave enough flexibility to wires in order to avoid any risk of stripping.
- ⇒ Allow the drainage of the water in the lower loop (siphon) of the corrugated conduit (not water retention inside the corrugated conduit).
- ⇒  See § INSTALLATION AND SEALING RECOMMENDATIONS ADRIANE TURBINE METER.

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1.2. ELECTRICAL RECOMMENDATIONS

- ⇒ According to the ATEX directive or any other regulations in force in the country of destination, the safety protection level of the equipment must agree with the installation area (potentially explosive atmospheres).
- ⇒ Respect the recommendations of the instruction manual specifying the installation, operation and maintenance conditions of the ATEX equipment (instruction manual supplied with the equipment).
- ⇒ Connect the supply of the equipment downstream cut-out, on the power supply reserved to the measured distribution.
- ⇒ Put a delayed protection of 5A upstream the 24VDC supply to protect equipment in case of reverse polarity or overcurrent.
- ⇒ Use ADR specific cable, if it is not the case, use at minimum a cable resisting to hydrocarbons. Mechanically protect this cable with a corrugated conduit (corrugated conduit adapted to vehicles used for "carriage of dangerous goods by road" - hydrocarbons, LPG ... - and meet the requirements of French standard NF R13-903. Refer to the regulations in force).
- ⇒ Take care not to damage the terminals of the different electronic boards while wiring.
 - Screw terminals: do not damage the screw heads of the terminals.
 - Use insulated lugs and insulated wire ferrules adapted to the section of wires.
 - Spring terminals: do not block the springs (if a spring is blocked, the electronic board must be replaced).
 - Use flat screwdriver 0.4x2.5 (see fig.1).
 - Insert the screwdriver slightly tilted, then push it perpendicularly to the terminal.
 - Do not exceed the upright position when the screwdriver is down in order not to block the spring.
 - Insert or remove the wire and remove the screwdriver.
- ⇒ Pass the power supply cores (24VDC truck) through the ferrites by carrying out a loop (ALMA supply).
- ⇒ Do not use wires of section higher than 1.5mm².
- ⇒ Do not insert more than two wires in a terminal, if necessary use an insulated twin wire ferrule (unless otherwise indicated).
- ⇒ Strictly respect the polarities of the input/output when wiring, in accordance with serigraphy on the cards and/or with the installation guide indications.
- ⇒ Whenever possible, perform a wired test, after wiring and before powering.
- ⇒ Whenever possible, respect the locations of the cables specified in the installation guide.
- ⇒ Equipment must be connected to the frame ground (external ground connection).
- ⇒ Whenever possible, use shielded cables with a 360° connection through the metal cable glands (see the documentation delivered with the equipment).
Otherwise, connect the shields to devices inside the equipment (ground terminal, earth bar, earth boss...).



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- ⇒ Whenever possible, label the cables and cores according to the installation guide to facilitate the later maintenance operations.
- ⇒ Respect a homogeneous wire color code.
- ⇒ Printer TMU295: before positioning the printer on its support, check that configuration switches of the data link protocol, located under the printer, are well positioned: No3 on 'ON' and the 7 others on 'OFF'.
- ⇒ Current of the electrical devices:

Electrical devices	Supply voltage	Minimum current	Maximum current
MICROCOMPT+	24VDC +/-10%	0.7 A	1.5 A
PRINTER	24VDC +/-10%	0.1 A	5.5 A (switch-on)

- ⇒ Color code according to DIN 47100.
- ⇒ Code for designation of colours according to IEC 60757 (except FR codes):

FR				EN	IT	ES	DE
Couleurs	Codes		Standard codes CEI 60757	Colours	Colori	Colores	Farbe
Blanc	Bc		WH	White	Bianco	Blanco	Weiß
Marron	Mr		BN	Brown	Marrone	Marrón	Braun
Vert	Vt		GN	Green	Verde	Verde	Grün
Jaune	Jn		YE	Yellow	Giallo	Amarillo	Gelb
Gris	Gr		GY	Grey	Grigio	Gris	Grau
Rose	Rs		PK	Pink	Rosa	Rosa	Lila
Bleu	Bl		BU	Blue	Blu	Azul	Blau
Rouge	Rg		RD	Red	Rosso	Rojo	Rot
Noir	Nr		BK	Black	Nero	Negro	Schwarz
Violet	Vi		VL	Violet	Viola	Violeta	Violett
Orange	Or		OG	Orange	Arancio	Naranja	Orange
Vert/Jaune	V/J		GNYE	Green/Yellow	Verde/Giallo	Verde/Amarillo	Grün/Gelb

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1.3. PNEUMATIC RECOMMENDATIONS

- ⇒ Air must be filtered – from 40 to 20µm. Specific recommendations may be added in the installation guides or on the presentation drawings.
- ⇒ The air lubrication must be permanent and correct to avoid any damage on the pneumatic components.
- ⇒ The air supply pressure to the inlet of the equipment must be at least 6 bar and max 8 bar. Specific recommendations may be added in the installation guides or on the presentation drawings.
- ⇒ The pneumatic supply pipes (6/4) must be cut straight (no slanting cut) and should not be crushed after cutting to prevent leakage on fittings.
- ⇒ Respect the radii of curvature of the pneumatic pipes indicated by the manufacturer.
- ⇒ Use colored pneumatic pipes to ease maintenance operation.
- ⇒ In no case the exhaust holes of the pneumatic organs should be plugged, obstructed, unless if that is clearly specified in the installation guides or on presentation drawings.
- ⇒ The use of muffler is not allowed under any circumstances (fouling, frost...). Put a pneumatic pipe of sufficient length, pointed downwards, so that its end is placed in a protected area (L = 100 mm min.).
- ⇒ Pressure unit conversion:

PRESSURE UNIT CONVERSION				
Unités	Bar	PSI	Pascal	kg/cm ²
1 Bar =	1	14,5	100 000 (1x10 ⁵)	1,0197
1 PSI =	0.069	1	6894,5	0,07031
1 Pascal =	1x10 ⁻⁵	14,5x10 ⁻⁵	1	1,0197x10 ⁻⁵
1 kg/cm ² =	0,98	14,22	98066,5	1

PSI = Pound per Square Inch (livre par pouce carré)

1 bar = 100 kPa = 0.1 MPa (1 MPa = 10 bar)

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2. GENERAL PRESENTATION

2.1. USE ACCORDING TO MID CERTIFICATE

The measuring system CRYOTRONIQUE is covered by the EU type examination certificate N° LNE-34322. Refer to this certificate for any precision about its installation.

For the sealing plan, see Annex to EU type examination certificate N° LNE-34322.

2.2. SPECIAL CONDITIONS FOR INSTALLATION

- ⇒ Piping and equipment located upstream or downstream of the ADRIANE DN50-50 CO₂ turbine meter must have a nominal diameter identical to that of the turbine on a length at least equal to 10 times the nominal diameter upstream and at least equal to 5 times the nominal diameter downstream.

No regulating device (variable opening valve, check valve...) must be located on the piping upstream of the turbine for a length at least equal to 10 times its nominal diameter

- ⇒ The entire installation, including the meter and the line between the meter and the transfer point, is emptied during shutdown periods.

In the filling phase of the meter and the installation, the delivery valve is closed. For reasons specific to the handling of CO₂, the installation is filled with gaseous CO₂ under pressure before being filled with liquid CO₂. When the gaseous CO₂ comes into contact with the liquid CO₂, it liquefies immediately.

- ⇒ The connection between the gaseous phases of the tank of the truck and the receiving tank is permitted if any flow from the delivery tank to the receiving tank through the gas circuit is prevented in a secure manner.

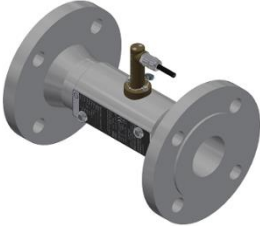
In this case, an additional hose is installed between the gaseous phases of the receiving and delivery tanks. The quantities of gas returned must be compensated.

- ⇒ If a printer device which does not benefit from any evaluation is associated with the electronic calculator-indicator device, a label stating that the printed data are not subject to the legal control shall be affixed in a visible manner on the printing device.
- ⇒ When the power supply of the measuring system is cut off, the flow is interrupted even when the pump is previously running.

NOTE: The pressure sensors are mounted without any hydraulic shock absorber.

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3. PART LIST

EQUIPMENTS INCLUDED IN THE MEASURING SYSTEM DELIVERED BY ALMA				
Item	Equipment	Designation	Qty	Option*
1		CALCULATOR INDICATOR MICROCOMPT+ CRYOTRONIQUE WITH Bluetooth CONNECTION	1	●
		Wi-Fi CONNECTION (As an alternative to Bluetooth)		
		RFID SUPERVISOR KEY		
2		ADRIANE TURBINE METER DN50-50 CO2 PN40	1	
3		Pt100 TEMPERATURE PROBE – CT1001-Pe ATEX (Supplied with thermowell)	1	
4		2-ANTENNA BOX GSM AND GPS	1	●
5		KIT FOR MEASURING SYSTEM IDENTIFICATION PLATE (Plate and sealing device)	1	
Option*: equipment sold as an option by ALMA must be installed on the measuring system if required by the certificate.				

Non-contractual pictures

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4. MICROCOMPT+



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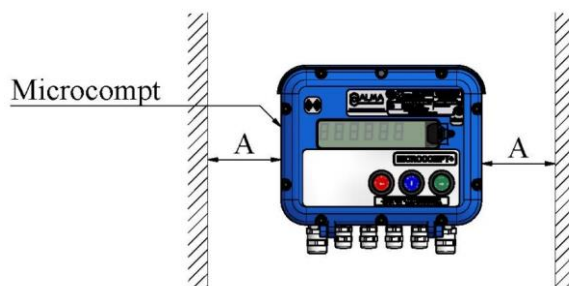
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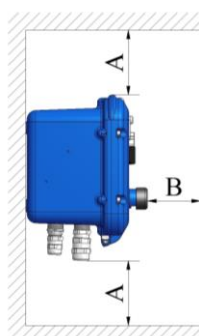
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4.1. INSTALLATION RECOMMENDATIONS CALCULATOR-INDICATOR MICROCOMPT+

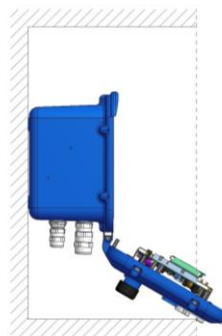
- Fasten the box with 4 M6 screws (holder suitable for vibrations and designed to support the MICROCOMPT). On the box: 4 M6 blind holes tapped length=12 over 185x132).
- Leave an open space around the box in order:
 - o To facilitate maintenance operation.
 - o To prevent any pressing on pushbuttons and on the glass.
- The space between the front face of the box and the cabinet door shall be sufficient.
- Dimensions: $A > 100\text{mm}$ and $B > 60\text{mm}$



- SOLUTION 1: straight box if it's a breast height.

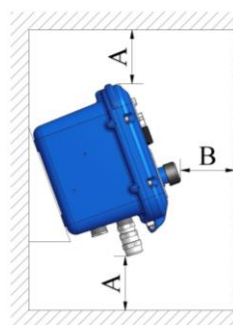


Left hand view
Closed box

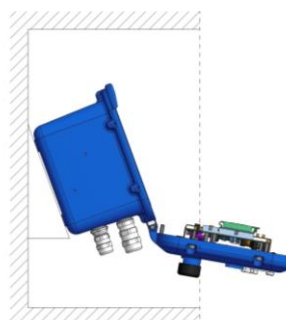


Left hand view
open box

- SOLUTION 2: 20° angle if it's not at breast height.



Left hand view
Closed box



Left hand view
open box

REFER TO THE INSTRUCTION MANUAL
(DELIVERED WITH THE EQUIPMENT OR AVAILABLE ON ALMA WEBSITE)

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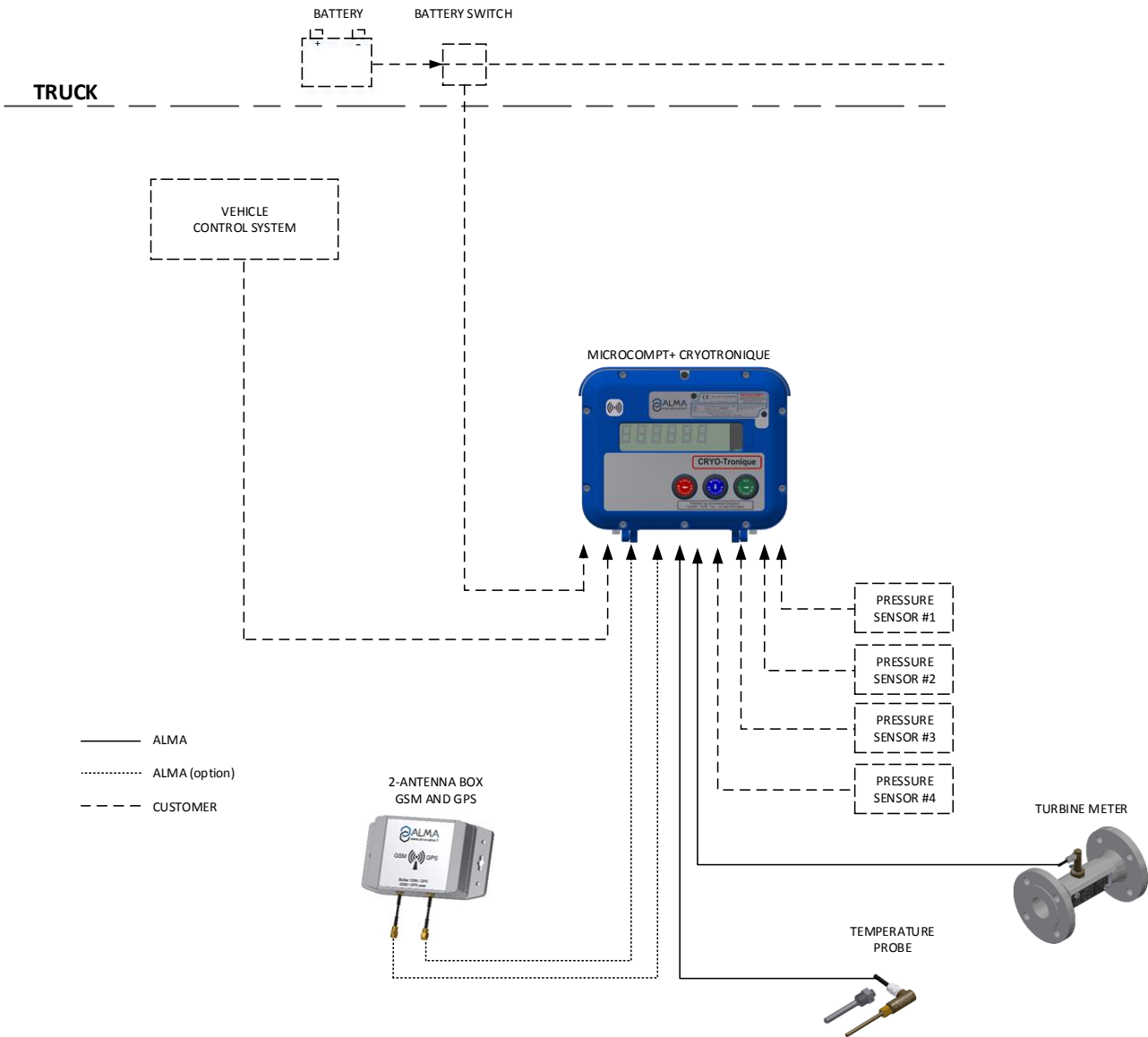
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4.2. ELECTRICAL WIRING CALCULATOR-INDICATOR MICROCOMPT+



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EQUIPMENTS CONNECTED TO THE MICROCOMPT+								POWER SUPPLY BOARD			
Option	Equipment	Cable (for information)				Function	Color or No.	Terminal	Function		Observation
		No.	CG*	Alma	Type						
								70	0V	FOR VARIATOR CONTROL	Reference mass
	CALIBRATION REQUEST							71	24VDC	SWITCHING TO CALIBRATION TOWARDS MASTER METER	
	VARIATOR AUTHORISATION							73	24VDC	VARIATOR AUTHORISATION	24VDC = variator control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	VARIATOR CONTROL HIGH FLOW 1					Grand débit 1		74	24VDC	VARIATOR CONTROL SIMPLE HOSE	24VDC = variator control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	VARIATOR CONTROL HIGH FLOW 2					Grand débit 2		75	24VDC	VARIATOR CONTROL DOUBLE HOSE	24VDC = variator control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	VALVE V4B					Livraison (double effet V4)		76	24VDC	PRESSURIZE DISCHARGING	24VDC = valve control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	VALVE V8					Mise en pression		77	24VDC	PRESSURIZE	24VDC = valve control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	CALIBRATION REQUEST							78	24VDC	SWITCHING TO CALIBRATION TOWARDS MASTER METER	24VDC = variator control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
	FAULTY OUTPUT							79	24VDC	FAULT	24VDC = variator control (Outputs FET 24V 5W max. FET: Field Effect Transistor)
SOME EXTENSION BOARDS MAY BE SET ON TO THE POWER SUPPLY BOARD											
<i>*Refer to the Cable Glands Installation Instructions</i>											

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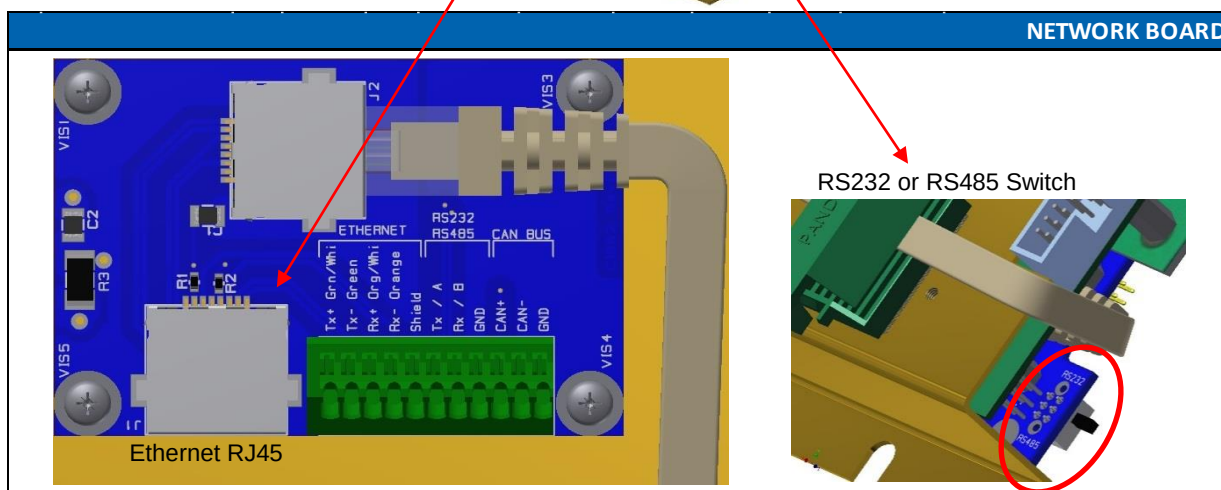
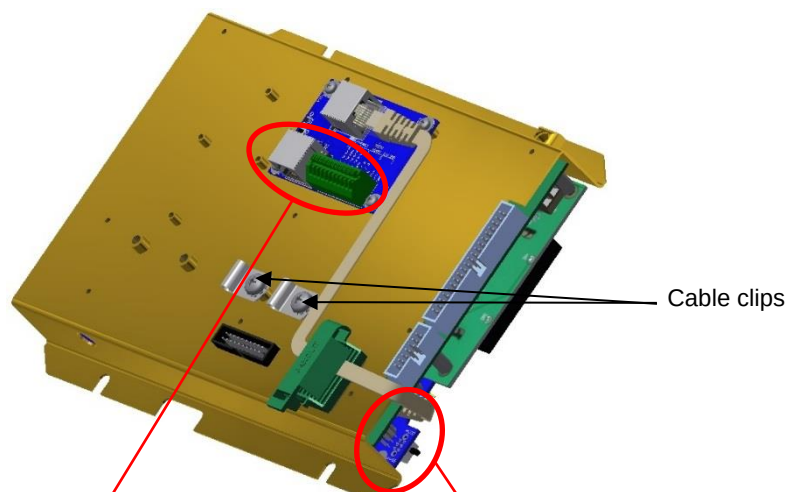
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Connection of the network board – Ethernet, RS232/485, CANBus

Connection to the Ethernet network:

- With the RJ45 connector according to the EIA/TIA-568 standard
- Or with the screw-terminal: see details in the table below.



NETWORK CONNECTION TYPE								NETWORK BOARD			
Option	Connection	Cable (for information)				Function	Coulor or No.	Coulor	Function		Observation
		No.	CG*	Alma	Type						
	ETHERNET NETWORK							Vt/Bc	Tx+	Ethernet	Or connection with RJ45 according to EIA/TIA- 568
								Vt	Tx-		
								Or/Bc	Rx+		
								Or	Rx-		
	RS232 or RS485								Sh	RS232 or RS485	Depending on the switch configuration See above
									Tx / A		
									Rx / B		
									GND		
	CANBus NETWORK								CAN+	CANBus	
									CAN-		
									GND		

*Refer to the Cable Glands Installation Instructions

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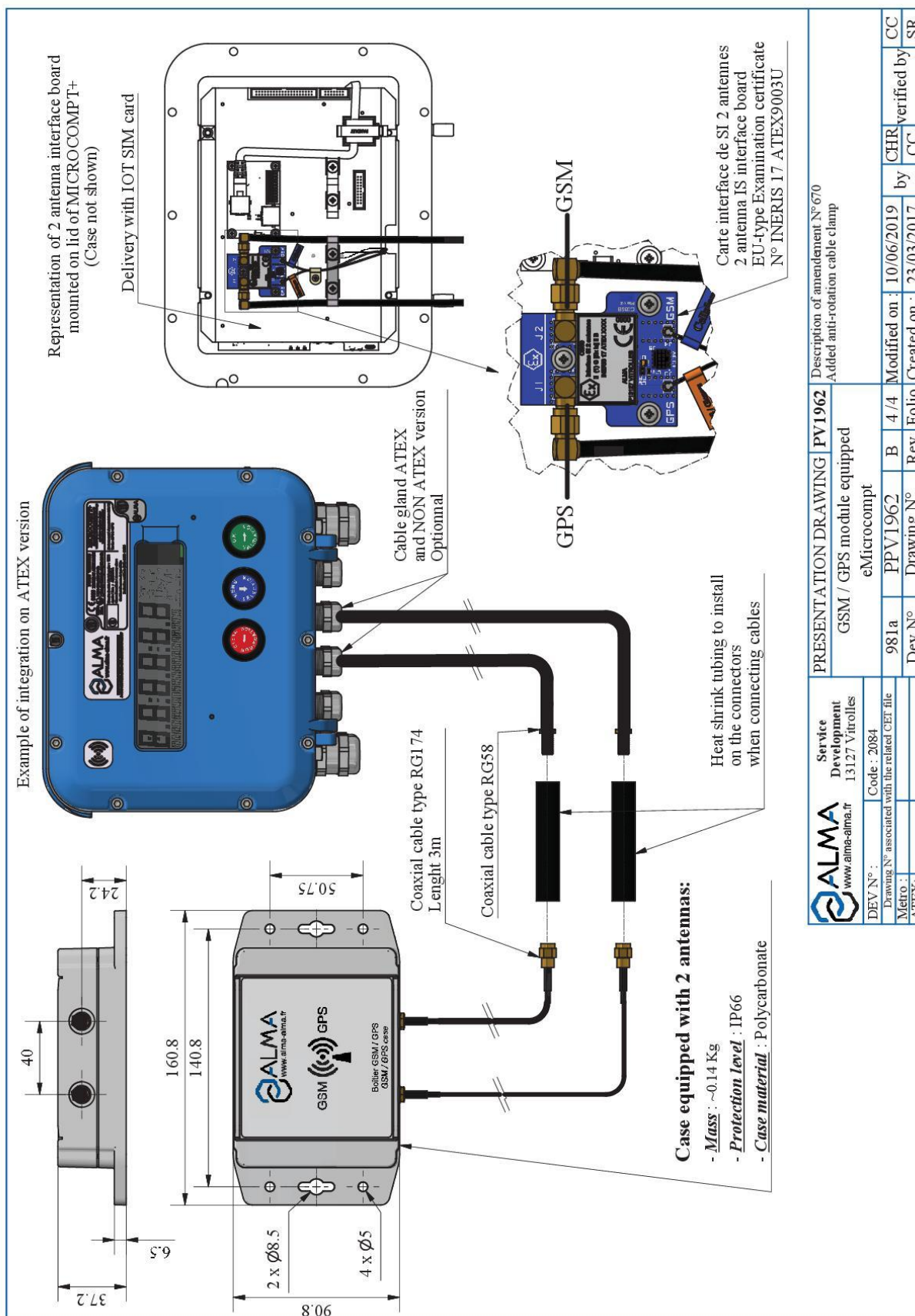


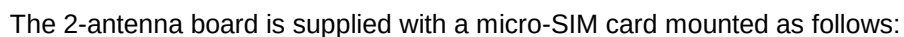
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4.3. GSM/GPS MODULE EQUIPPED – 2-ANTENNA BOX





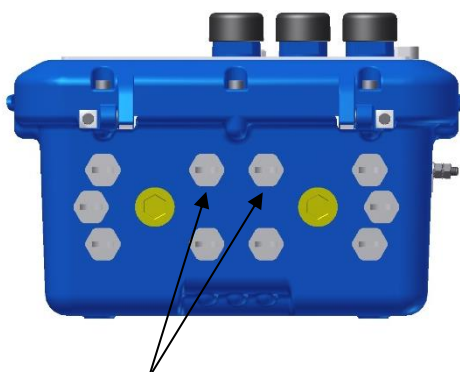
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Mounting of the GSM/GPS cables into the cable glands

ALMA connects the GSM and GPS antenna to the MICROCOMPT+ (2-antenna board).



At the outlet of the MICROCOMPT+ box, you must pass both cables through cable glands. In case of an ATEX MICROCOMPT+, cable glands must be ATEX.



RECOMMENDED CABLE GLANDS
(FOR INFORMATION ONLY)

Into the MICROCOMPT+, adjust the cable length to easily open and close the cover. Make sure to prevent damage to the cable.

Tighten both cable glands.

Wiring of the 2-antenna box to the MICROCOMPT+

Fasten the box. You must install it in an area free of metallic cover to have a good reception and broadcasting of signal. You can install the box in a horizontal or vertical position.

Put each coaxial cable through the heat shrink sleeve.

Plug the RG58⁽¹⁾ cable from the MICROCOMPT+ with the RG174⁽²⁾ cable from the antenna box and tighten them. Isolate the male/female SMA connectors with the supplied heat shrink sleeve (both antennas in the box are the same, cables don't have to be labelled).

Position and heat up the sleeve on the connectors to prevent corrosion and humidity.



WARNING: The cables of this box can be **neither shortened nor extended**

⁽¹⁾ RG58: Semi-rigid coaxial cable, 5mm diameter

⁽²⁾ RG174: Flexible coaxial cable, 2.7mm diameter

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5. ADRIANE TURBINE METER DN50-50 CO2 PN40

Ø165

Bride PN40
Inox 316L

2H00 pulse emitter
Shielded ADR cable 4x0.35, lenght 5m

9'16

Flow direction

236

Stamping area

2H00 pulse emitter well

2B00 pulse emitter well

A preliminary cleaning is done on the Turbine

- *Mass* : ~ 7.8Kg,
- *Material* : Stainless steel
- *Flow rate* : from 4 to 43 m³/h
- *Liquids measured* : Liquefied carbon dioxide (CO₂),
- *Accuracy class* : 1.5

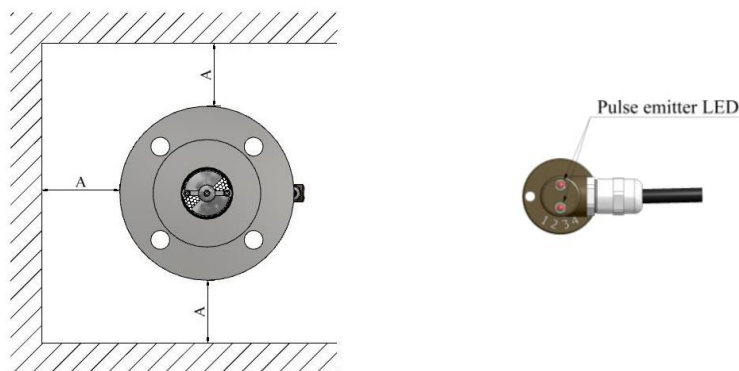
It is advisable to install upstream of the turbine a filter minimum 400µ

Associated item		PRESENTATION DRAWING DFV149		Description of amendment N°									
Designations	Codes	Plan	ADRIANE DN50-50 313	CO2 PN40	953b	PPV149	A	5 / 6	Modified on :	by	CC	verified by	ROC
2H00 pulse emitter	8145	PPV069							04/12/2019				
2B00 pulse emitter	8147	PPV025											

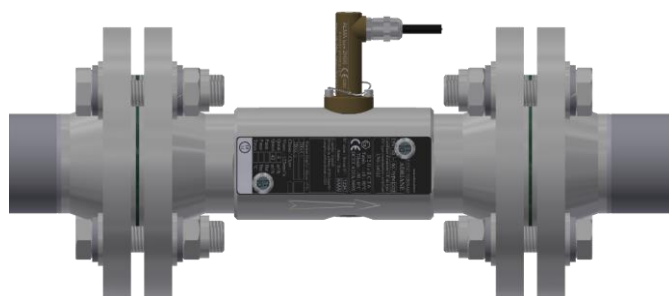
Document available on website alma-alma.fr

5.1. INSTALLATION AND SEALING RECOMMENDATIONS ADRIANE TURBINE METER

- The identification plate and the led of the pulse emitter(s) shall be visible and accessible.
- The turbine must be installed with respect to the flow direction.
- Put sealing rings each other sides between the turbine and the backflanges.
- Leave an open space all around the turbine in order to ease maintenance.
- Install a 400 μ filter (mini) on the pipe upstream from the turbine meter.
- After installation or during the commissioning period, if the new or modified pipes have not been perfectly cleaned or pickled and passivated, the turbine should be protected by a honeycomb sieve – max. 1mm mesh. It must be placed between two flanges upstream from the turbine.
- Dimensions: A > 100mm.



- Refer to the certificate written on the identification plate of the measuring system to suit the sealing requirements
- No loose lead wire on the sealing devices



For accuracy class 0.5 and 1.0 measuring systems, the pipes and equipment upstream or downstream the turbine meter must have the same nominal diameter as the meter on a length at least equal to 10 times this diameter upstream and 5 times this diameter downstream.

These lengths can be straight or bent.

It is mandatory that no flowrate adjustment device (e.g. a variable-opening valve) is located upstream at a distance less than 10 times the nominal diameter of the meter: Do not create derivation circuits with sample or bypass, specially make sure that no nozzle is present on this pipe.

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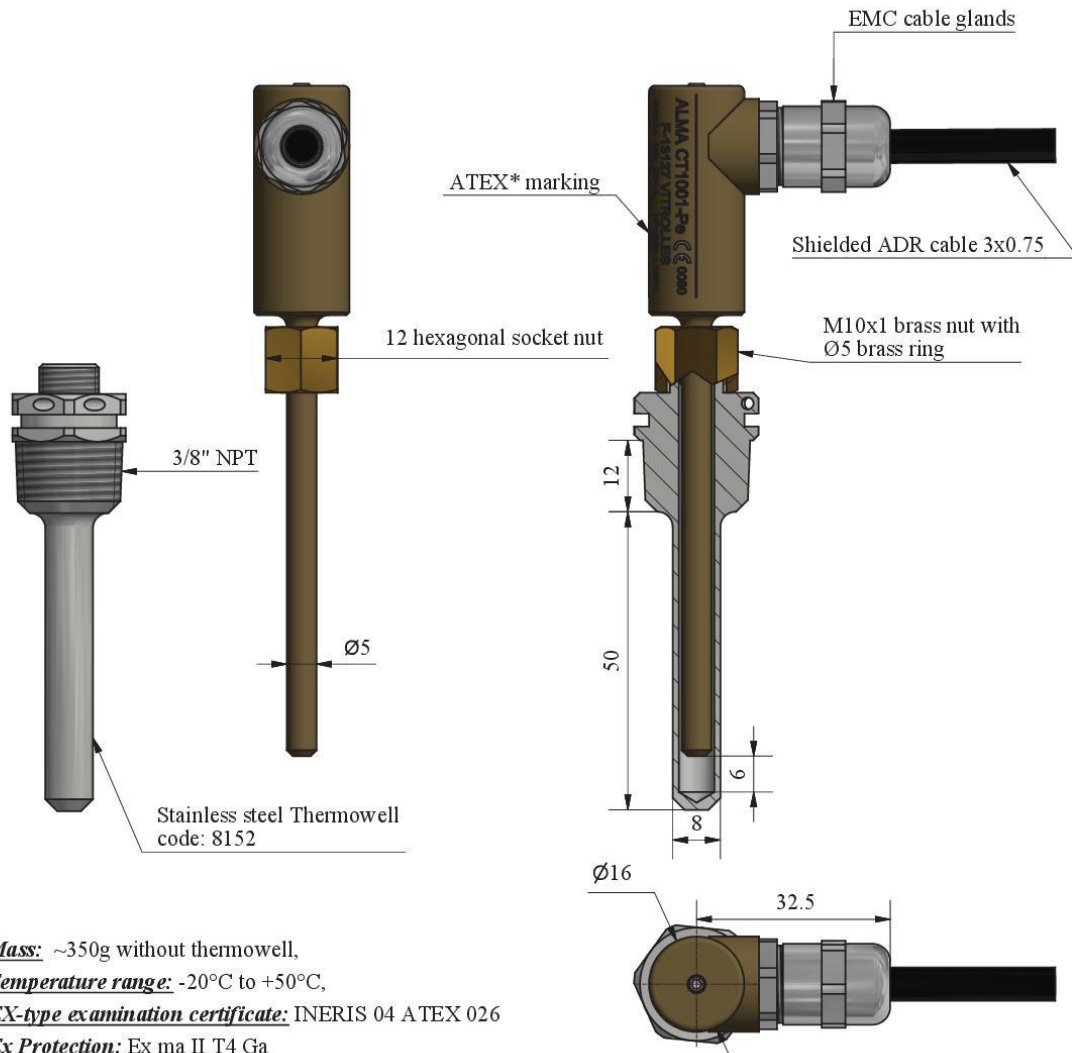
INSTALLATION GUIDE DI 026 ENA CRYOTRONIQUE CO2

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Units of measure:
Length: mm
Angle: degree (° ' ")
Temperature: °C

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6. TEMPERATURE PROBE Pt100 – CT1001 ATEX



- **Mass:** ~350g without thermowell,
- **Temperature range:** -20°C to +50°C,
- **EX-type examination certificate:** INERIS 04 ATEX 026
- **Ex Protection:** Ex ma II T4 Ga

The sensor body is made of bronze color anodized aluminum alloy; The ring and the nut are made of brass. The probe can be mounted either on a ALMA thermowell or on a thimble connection 1/4 "BSP (M10x1 n5). Before installation, lubricate the parts in contact with the thermowell or the boss, to prevent corrosion

PT100 features:

- 3 wires
- 1/3 DIN

*ATEX "ma" certification.
For installation and use in hazardous areas see Instruction manual

Also available with output connector according to IEC 60947-5-2

Connecting the cable		
<i>Function</i>	<i>Marking on the wire</i>	<i>Color wire</i>
PT100/1	1	Yellow
PT100/2	2	White
PT100/3	3	Green

 www.alma-aima.fr	Service Development 13127 Vitrolles	PRESENTATION DRAWING		DFV042	Description of the amendment N°662 Removal of the apparent 5mm requirement on the wiring							
		Temperature probe CT100I-Pe										
		DEV N° : 949d	Code : S151									
Drawing N° associated with the related CET file												
Metro ATEX	INERIS 04 ATEX 0026	949d	Dev N°	Drawing N°	Rev	5 / 6	Modified on :	29/03/2019	by	CHR BM	verified by	CC BM
							Created on :	13/09/2003				

Document available on website alma-alma.fr

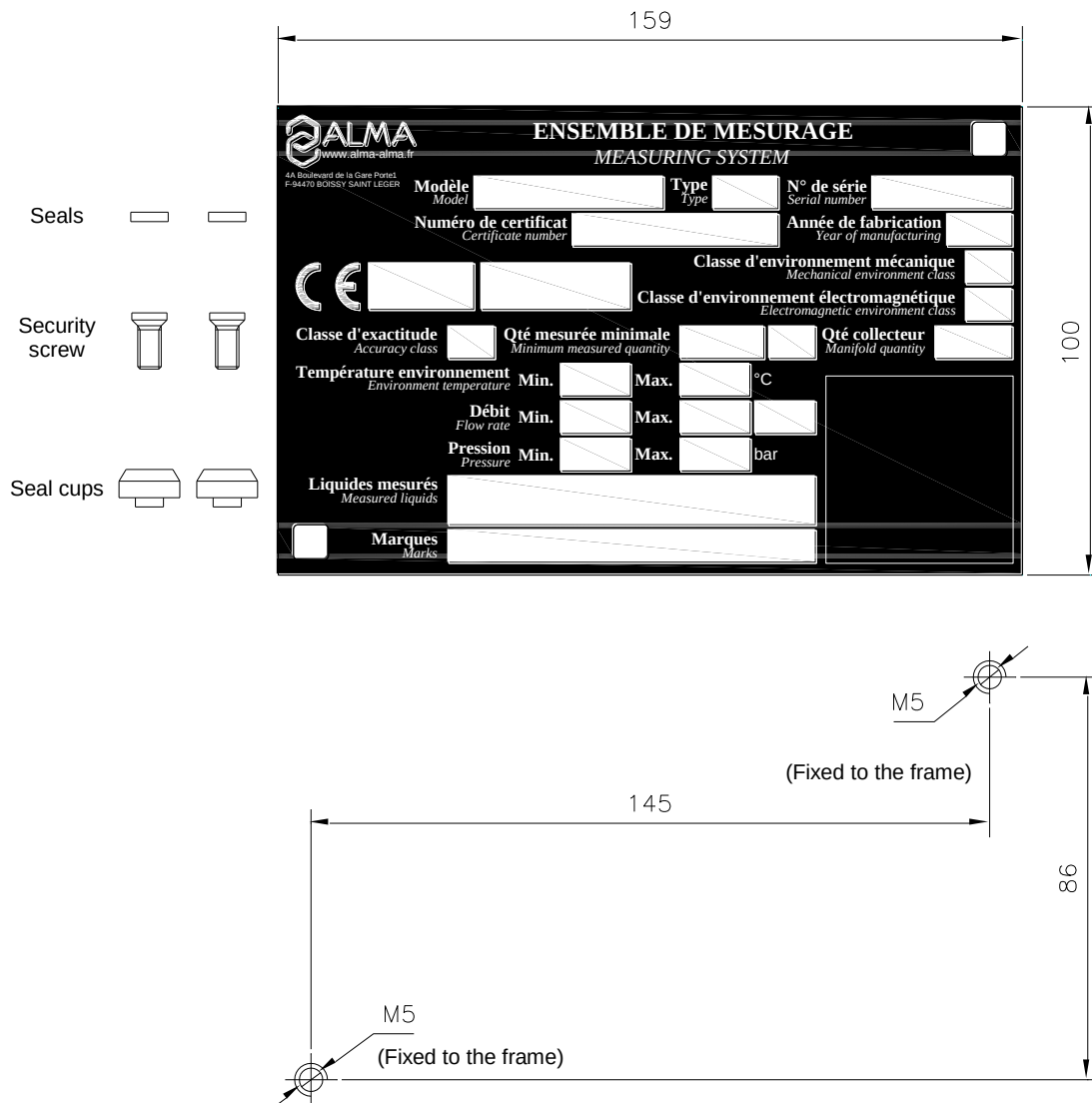
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7. KIT FOR MEASURING SYSTEM IDENTIFICATION PLATE

The identification plate shall be clearly installed, near the associated indicator device, and of easy access in order to be able to read features and to stamp the regulatory marks.



The security screws of the cups (provided by ALMA) must be screwed in the tap of the frame (do not use removable nuts).

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