

# INSTALLATION GUIDE

## DI 101 EN C TURBOCOMPT

Measuring system accuracy class 0.5, designed for loading road tankers and rail tank trucks

Described in EC-type examination certificate N°: LNE-22081



C	2016/09/20	Creation	DSM	SH
Issue	Date	Nature of modifications	Written by	Approved by

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	<b>INSTALLATION GUIDE DI 101 ENC TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	



<b>7.</b>	<b>TURBOCOMPT ELECTRICAL CONNECTION.....</b>	<b>21</b>
7.1.	General interconnection of equipment.....	21
7.2.	Electrical connection of the MICROCOMPT+.....	22
7.3.	Electrical connection of the meter.....	22
7.3.1.	Specificity of the FAURE HERMAN TLM 4-150 turbine .....	22
<b>8.</b>	<b>SEALING.....</b>	<b>22</b>
<b>9.</b>	<b>MEASURING SYSTEM PLATE KIT .....</b>	<b>23</b>

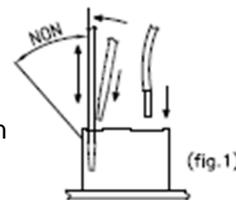
ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION

	<p style="text-align: center;"><b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b></p>	<p><b>Units of measure:</b> Length: mm Angle: degree (° ‘ ‘’) Temperature: °C</p>
	<p style="text-align: center;">This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a></p>	<p style="text-align: right;">Page 3 / 23</p>



- ⇒ Put a delayed protection of 3A upstream the 230VDC supply to protect equipment in case of overcurrent.
- ⇒ Use cable resisting to hydrocarbons and protect it mechanically.
- ⇒ 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.



- ⇒ Do not use wires of section higher than 1.5mm<sup>2</sup>.
- ⇒ 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...).
- ⇒ Respect a homogeneous wire color code.
- ⇒ Color code according to DIN 47100.

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 5 / 23

⇒ 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	<b>Bc</b>		<b>WH</b>	White	Bianco	Blanco	Weiß
Marron	<b>Mr</b>		<b>BN</b>	Brown	Marrone	Marrón	Braun
Vert	<b>Vt</b>		<b>GN</b>	Green	Verde	Verde	Grün
Jaune	<b>Jn</b>		<b>YE</b>	Yellow	Giallo	Amarillo	Gelb
Gris	<b>Gr</b>		<b>GY</b>	Grey	Grigio	Gris	Grau
Rose	<b>Rs</b>		<b>PK</b>	Pink	Rosa	Rosa	Lila
Bleu	<b>Bl</b>		<b>BU</b>	Blue	Blu	Azul	Blau
Rouge	<b>Rg</b>		<b>RD</b>	Red	Rosso	Rojo	Rot
Noir	<b>Nr</b>		<b>BK</b>	Black	Nero	Negro	Schwarz
Violet	<b>Vi</b>		<b>VL</b>	Violet	Viola	Violeta	Violett
Orange	<b>Or</b>		<b>OG</b>	Orange	Arancio	Naranja	Orange
Vert/Jaune	<b>V/J</b>		<b>GNYE</b>	Green/Yellow	Verde/Giallo	Verde/Amarillo	Grün/Gelb

## 2. GENERAL PRESENTATION

### 2.1. Measuring system used according to MID certificate

The TURBOCOMPT measuring system is covered by the EC type examination certificate N° LNE-22081. Refer to this certificate for any precision about its installation.

For the sealing plan, see Annex to EC type examination certificate N° LNE-22081.

### 2.2. Special conditions of installation (outside Europe-wide regulation)

The TURBOCOMPT measuring system must be installed in accordance with the recommendations provided in this document.

The TURBOCOMPT measuring system must be installed in such a way that during normal operation neither air entry nor gas release will occur in the liquid upstream of the meter.

When the liquid is pumped through the measuring system, the pressure at the pump inlet must always be higher than the atmospheric pressure and the saturation vapour pressure of the liquid. These conditions are not required when the measuring system is fitted with a gas separator

Operating characteristics of the automatic stop valve shall be compatible with the measuring system.

When the power supply to the measuring system is cut, flow shall be interrupted even if the pump is already operating.

In any case, you are required to comply with the regulations in force in the country where the measuring system is installed.

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



## INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 6 / 23

### 3. PART LIST

EQUIPMENTS INCLUDED IN THE MEASURING SYSTEM DELIVERED BY ALMA				
Item	Equipment	Designation	Qty	Option*
1		<b>CALCULATOR INDICATOR MICROCOMPT+</b>	1	
2		<b>TURBINE</b> ALMA type ADRIANE DN 50-50, DN 80-80, DN 100-80 or DN100-150 FAURE HERMAN type TLM 4-150	1	
3	According to listed models in §6.4.1	<b>AUTOMATIC STOP VALVE</b>	1	
4		<b>LOADING ARM OR RIGID HOSE</b>	1	
5		<b>ANCILLARY EQUIPMENT according to context:</b> Pt100 Temperature sensor One or more automatic vent valves or a gas separator		•
6		<b>KIT FOR MEASURING SYSTEM IDENTIFICATION PLATE</b> (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

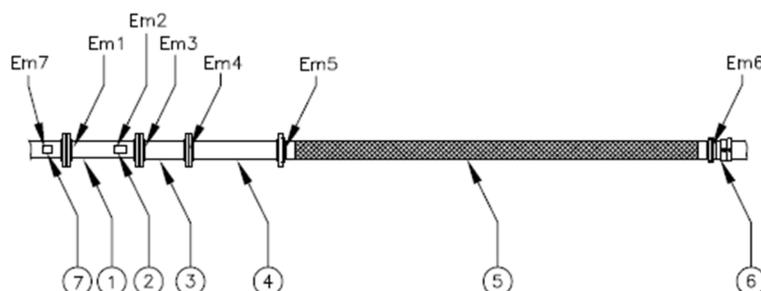
ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION

	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 7 / 23

## 4. GENERAL PRESENTATION

### 4.1. Horizontal pipe loading system



Em1: SEAL FOR PIPE/TURBINE  
 Em2: SEAL FOR GAS EXTRACTOR OR PLUGS  
 Em3: SEAL FOR TURBINE/AUTOMATIC STOP VALVE  
 Em4: SEAL FOR AUTOMATIC STOP VALVE/RIGID PIPE  
 Em5: SEAL FOR RIGID PIPE/HOSE  
 Em6: SEAL FOR CALIBRATED NON-RETURN VALVE  
 Em7: SEAL FOR TUBE/PT100 TEMPERATURE SENSOR (optional)

- ① TURBINE METER
- ② GAS EXTRACTOR OR PLUGS (according to configuration)
- ③ AUTOMATIC STOP VALVE
- ④ RIGID PIPE AFTER VALVE
- ⑤ LOADING HOSE
- ⑥ CALIBRATED NON-RETURN VALVE
- ⑦ PT100 TEMPERATURE SENSOR (optional)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



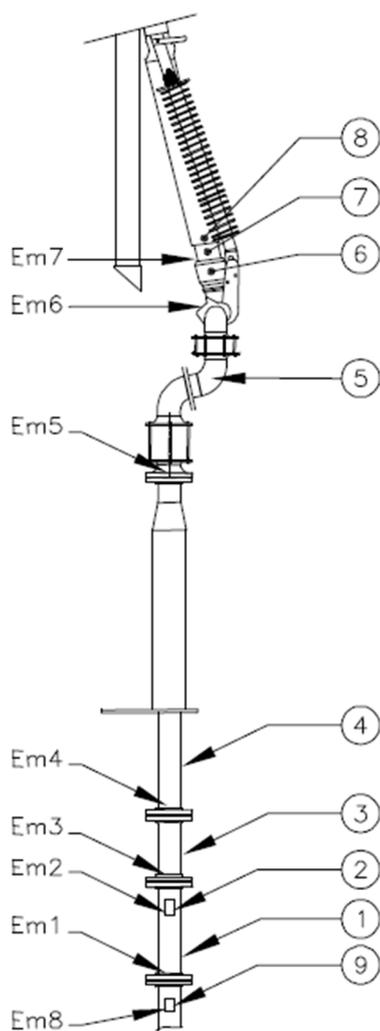
## INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 8 / 23

## 4.2. Top loading system



Em1: SEAL FOR PIPE/TURBINE  
 Em2: SEAL FOR GAS EXTRACTOR OR PLUGS  
 Em3: SEAL FOR TURBINE/AUTOMATIC STOP VALVE  
 Em4: SEAL FOR AUTOMATIC STOP VALVE/PRODUCT ARM SLEEVE  
 Em5: SEAL FOR PRODUCT ARM SLEEVE/PRODUCT ARM SUPPORT  
 Em6: SEAL FOR PRODUCT ARM SUPPORT/FIAB VALVE  
 Em7: SEAL FOR FIAB VALVE/CALIBRATED NON-RETURN VALVE  
 Em8: SEAL FOR TUBE/PT100 TEMPERATURE SENSOR (optional)

① TURBINE METER  
 ② GAS EXTRACTOR OR PLUGS (according to configuration)  
 ③ AUTOMATIC STOP VALVE  
 ④ PRODUCT ARM SLEEVE  
 ⑤ LOADING ARM  
 ⑥ FIAB VALVE  
 ⑦ CALIBRATED NON-RETURN VALVE  
 ⑧ VACUUM BREAKER  
 ⑨ PT100 TEMPERATURE SENSOR (optional)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



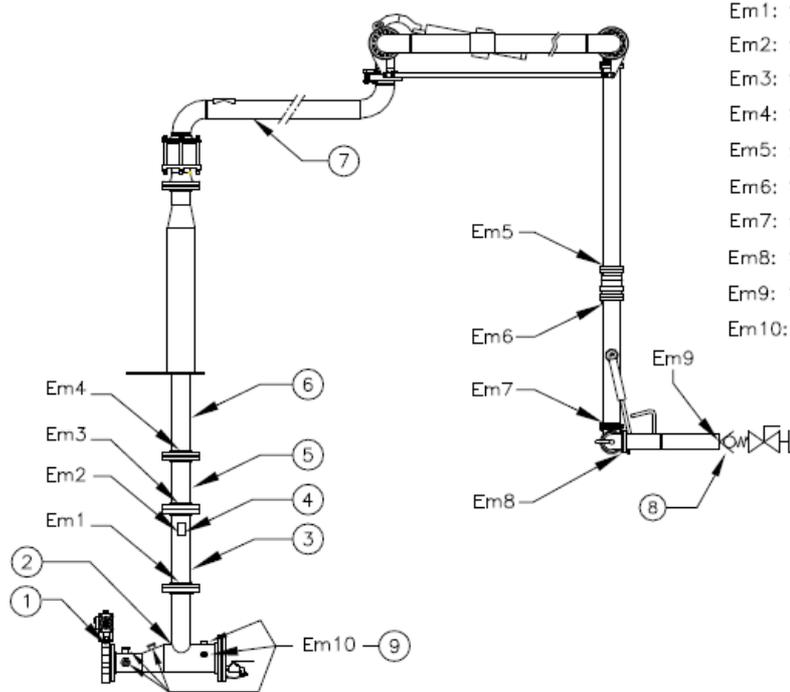
### INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 9 / 23

### 4.3. Bottom loading system with rigid arm (CSE)



Em1: SEAL FOR FILTER TEE/TURBINE  
 Em2: SEAL FOR GAS EXTRACTOR OR PLUGS  
 Em3: SEAL FOR TURBINE/AUTOMATIC STOP VALVE  
 Em4: SEAL FOR AUTOMATIC STOP VALVE/PRODUCT ARM SLEEVE  
 Em5: SEAL FOR DOWN TUBE/SWIVEL COUPLING  
 Em6: SEAL FOR SWIVEL COUPLING/DOWN TUBE  
 Em7: SEAL FOR DOWN TUBE/BALL PIVOT  
 Em8: SEAL FOR BALL PIVOT/COUPLER TUBE  
 Em9: SEAL FOR COUPLER TUBE/CALIBRATED NON-RETURN VALVE  
 Em10: SEAL FOR FILTER TEE/PT100 TEMPERATURE SENSOR (optional)

- ① FAST-CLOSING SHUTOFF VALVE
- ② FILTER TEE
- ③ TURBINE METER
- ④ GAS EXTRACTOR OR PLUGS  
(according to configuration)
- ⑤ AUTOMATIC STOP VALVE
- ⑥ PRODUCT ARM SLEEVE
- ⑦ RIGID LOADING ARM
- ⑧ CALIBRATED NON-RETURN VALVE
- ⑨ PT100 TEMPERATURE SENSOR (optional)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



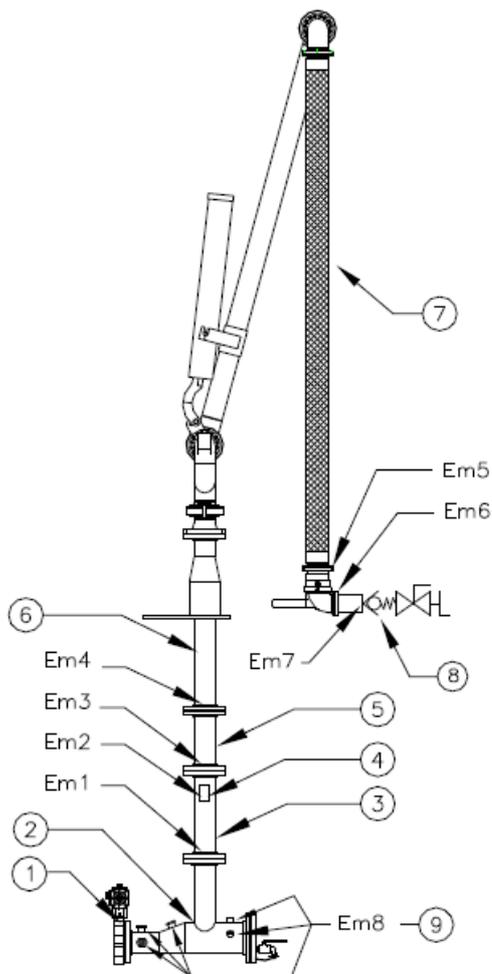
## INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 10 / 23

#### 4.4. Bottom loading system with flexible arm (CFA)



Em1: SEAL FOR FILTER TEE/TURBINE

Em2: SEAL FOR GAS EXTRACTOR OR PLUGS

Em3: SEAL FOR TURBINE/AUTOMATIC STOP VALVE

Em4: SEAL FOR AUTOMATIC STOP VALVE/PRODUCT ARM SLEEVE

Em5: SEAL FOR HOSE/BALL PIVOT

Em6: SEAL FOR BALL PIVOT/COUPLER TUBE

Em7: SEAL FOR COUPLER TUBE/CALIBRATED NON-RETURN VALVE

Em8: SEAL FOR FILTER TEE/PT100 TEMPERATURE SENSOR (optional)

① FAST-CLOSING SHUTOFF VALVE

② FILTER TEE

③ TURBINE METER

④ GAS EXTRACTOR OR PLUGS (according to configuration)

⑤ AUTOMATIC STOP VALVE

⑥ PRODUCT ARM SLEEVE

⑦ FLEXIBLE LOADING ARM

⑧ CALIBRATED NON-RETURN VALVE

⑨ PT100 TEMPERATURE SENSOR (optional)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



### INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 11 / 23

## 5. ESSENTIAL FEATURES

### 5.1. Generic characteristics

Measuring system ALMA	TURBOCOMPT type TC 50	TURBOCOMPT type TC80	TURBOCOMPT type TC150	TURBOCOMPT type TCFH150
Turbine meter type	ADRIANE DN50-50	ADRIANE DN80-80 or DN100-80	ADRIANE DN100-150	FAURE HERMAN TLM 4-150
Accuracy class	0.5			
Liquids measured <sup>(1)</sup>	Liquid hydrocarbons (except LPG), biofuels, chemical liquids, alcohols			
Maximum cinematic viscosity at metering conditions	10 mm <sup>2</sup> /s	13 mm <sup>2</sup> /s	13 mm <sup>2</sup> /s	15 mm <sup>2</sup> /s
Indication scale interval	1 m <sup>3</sup> / 0.1 m <sup>3</sup> / 0.01 m <sup>3</sup> / 1 L / 0.1 L			
Minimum flowrate <sup>(3)</sup>	4 m <sup>3</sup> /h	8 m <sup>3</sup> /h	15 m <sup>3</sup> /h	15 m <sup>3</sup> /h
Maximum flowrate <sup>(1)</sup>	50 m <sup>3</sup> /h	80 m <sup>3</sup> /h	150 m <sup>3</sup> /h	150 m <sup>3</sup> /h
Temperature of measured liquid	- 10 °C <sup>(2)</sup> to + 50 °C			-30 °C to +180 °C <sup>(1)</sup>
Minimum relative pressure <sup>(3)</sup>	0,3 bar	0 bar		
Maximum relative pressure <sup>(3)</sup>	20 bar	30 bar		
Minimum measured quantity	200 scale intervals (50 L minimum)	200 scale intervals (100 L minimum)		200 L
Power supply	230 V AC			

<sup>(1)</sup> Maximum flowrate, liquids measured and temperature of measured liquid ranges for measuring systems can be reduced regarding characteristics of the meter and the gas separator if relevant.

<sup>(2)</sup> Except in certain cases (see evaluation certificate LNE-12393 covering ALMA Adriane turbine meter DN 50-50, DN 80-80, DN 100-80 or DN 100-150).

<sup>(3)</sup> The maximum operating pressure may be reduced according to characteristics of the control valve used and the gas separator if relevant.

The minimum operating pressure may be increased according to characteristics of the control valve used and the gas separator if relevant.

### 5.2. Determination of the scale interval

The possible indication scale intervals for a TURBOCOMPT system are as follows: 0,1L, 1L, 0,01m<sup>3</sup>, 0,1m<sup>3</sup> and 1m<sup>3</sup>. The scale interval must be chosen in accordance with the chosen Minimum Measured Quantity (QMM).

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	

### 5.3. Determination of the minimum measured quantity (QMM)

The QMM must be of the form  $1 \times 10^n$  scale interval or  $2 \times 10^n$  scale interval or  $5 \times 10^n$  scale interval.

It must be determined in accordance with the indication scale interval, the customer requirements and errors caused by the contraction of the product in pipes before and after the meter.

**In all cases, the following recommendations must be observed:**

Meter	Minimum QMM	
	Scale interval 0.1L	Other scale interval (higher)
ADRIANE DN50-50	20 L or+	200 Scale interval or+
ADRIANE DN80-80	100 L or+	200 Scale interval or+
ADRIANE DN100-80	100 L or+	200 Scale interval or+
ADRIANE DN100-150	100 L or+	200 Scale interval or+
FH TLM4-150	200 L or+	200 Scale interval or+

### 5.4. Measured liquid

The measured liquid must be compatible with the list of products defined in the generic characteristics table.

Warning: Depending on the product family metered and the chosen meter, there may be restrictions on the instrument operating range (see § on temperature range).

In all cases, the viscosity of the product must remain compatible with the maximum viscosity accepted by the meter.

### 5.5. Measured liquid temperature range

The temperature range of the measured liquid must be within the generic range defined in the generic characteristics table.

However, depending on the meters, the following restrictions should be taken into account for the minimum temperature of the measured product:

Meter	Product	Minimum temperature
ADRIANE DN50-50	EMHV	8 °C
	Gas or regular fuel	-2°C
ADRIANE DN80-80 ADRIANE DN100-80 ADRIANE DN100-150	EMHV	0 °C
	Gas or regular fuel	-2°C
FH TLM4-150	all	-30°C

In all cases, at the minimum temperature defined, the viscosity of the measured liquid must be less than the maximum viscosity allowed, depending on the meter.

Meter	Maximum kinematic viscosity
ADRIANE DN50-50	10 mm <sup>2</sup> /s
ADRIANE DN80-80 ADRIANE DN100-80 ADRIANE DN100-150	13 mm <sup>2</sup> /s
FH TLM4-150	15 mm <sup>2</sup> /s

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION

	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 13 / 23

## 5.6. Environment conditions

The environment conditions are fixed by the type of gas separator, the calculator and the meter used.

### 5.6.1. Environment temperature

The environment temperature range for a TURBOCOMPT system is **[-25°C; + 55 °C]**.

If the chosen calculator is the MICROCOMPT +, Rack version, in this case, this range is reduced to **[-10°C; +40 °C]**, **but only for the latter**. The latter must be installed as per the recommendations indicated in this document.

### 5.6.2. Environment mechanical class

- Class M2 for the parts installed on site
- Class M1 **only for the MICROCOMPT+ if it is the RACK version**. It must be installed as per the recommendations indicated in this document.

### 5.6.3. Environment electromagnetic class

- Class E2 for the ALMA electronic calculator-indicator, type MICROCOMPT+, **RACK version**
- E3 for the parts installed on site with BOPP & REUTHER, type ZGA separators
- E2 for the parts installed on site for the TCFH150 (FAURE HERMAN TLM4-150 turbine)
- E3 for the parts installed on site for the TC50, TC80, and TC150 (ALMA ADRIANE turbines)

## 5.7. Flowrate ranges

The flowrate range must be within the generic range defined in the generic characteristics table.

However, the maximum flowrate may be limited if a gas separator is used.

Separator type	Maximum flowrate [m <sup>3</sup> /h]
PERNIN Equipment FSGB48E	48
PERNIN Equipment SG80-1 AI	80
ALMA DN80/80	80
ALMA DN100/150	150
All other types listed (§ "Description" of LNE 22081)	Depending on size (see CEV separator)

Warning: A gas separator may be common to several measuring systems.

In this case, the maximum flowrate allowed for this measuring system must take the sum of the maximum flowrates for the other measuring systems concerned by the same gas separator into account.

And in this case only, it may not be part of the LNE 22081 list.

The compatibility of flowrates must be demonstrated in the "Supply Conditions file".

## 5.8. Pressure ranges

The pressure range must be within the generic range defined in §5.1.

### 5.8.1. Minimum pressure

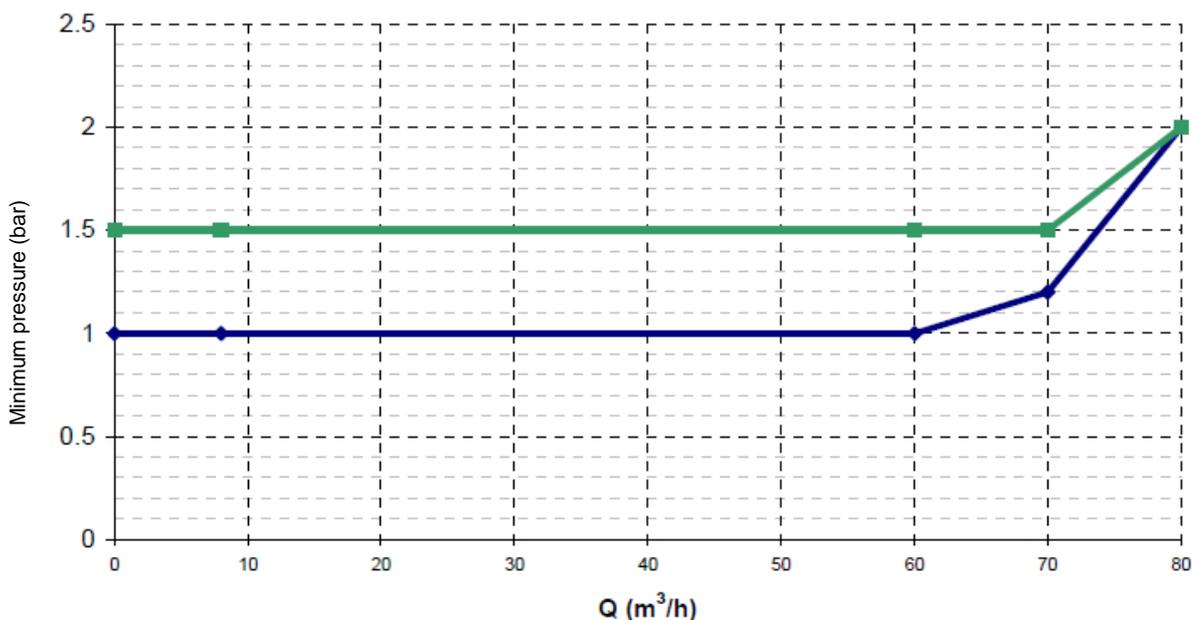
The minimum pressure must be equal to the highest minimum pressure of the various components.

In particular, the use of certain gas separators or certain types of valves results in an increase of the minimum operating pressure.

For the gas separators listed in the following table, the specific minimum pressure value is given based on the various types of apparatus.

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	INSTALLATION GUIDE DI 101 ENC TURBOCOMPT	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 14 / 23



**XAD 37 (bottom curve) and ZC.E5.E.80 (upper curve)****5.8.2. Maximum operating pressure**

The maximum pressure must be equal to the lowest maximum pressure of the various components. In particular, the use of certain gas separators or certain types of valves results in a decrease of the maximum operating pressure. Depending on the separator.

**5.9. Need to establish a Supply conditions file**

Refer to the § “Hydraulic supply” of CE CET LNE-22081.

ALMA TURBOCOMPT model measuring systems, types TC50, TC80, TC150 and TCFH150 must be installed in such a way that during normal operation neither air entry nor gas release will occur in the liquid upstream of the meter.

**If there is no gas separator**, it is necessary to establish a Supply conditions file in accordance with the § “Supply conditions file” of CE CET LNE-22081 to show that the pressure at the pump inlet must always be higher than the atmospheric pressure and the saturation vapour pressure of the liquid.

**When the gas separator (even if not listed in the § “Description” of LNE-22081) is common to several measuring systems**, it is necessary to establish a Supply conditions file in accordance with the § “Supply conditions file” of CE CET LNE-22081 to show that the maximum flowrate of the gas separator must always be higher than the sum of flowrates of all the measuring systems it supplies.

**5.10. Need to install gas detectors and extractors**

Refer to § “Gas evacuation system” of CE CET LNE 22081.

During shut-off periods, gas pockets may form in the piping following the thermal contraction especially between closing devices.

If they cause a measuring error greater than 1% of the minimum measured quantity, a gas detection system and possible vent devices at the high points of the supply pipe must be installed. The vent must be positioned so that it is able to efficiently drain the air when the flow is stopped (pump(s) running, loading valve closed).

To determine the effect of gas pockets, depending on the case, calculate the volume of the pipe between the pump and the meter or between the gas separator and the meter.

**The installation of an automatic detection system is required if:**

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ‘ ‘’) Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 16 / 23

- $V_{\text{pipe}} > \text{QMM}$  for exposed pipes
- $V_{\text{pipe}} > 5 \times \text{QMM}$  for insulated or underground pipes

An automatic detection system must be installed if the volume of the pipe is between the pump and the meter or between the gas separator and the meter.

### 5.11. Contraction of the product between the meter and transfer point

Refer to OIML R117-1.

The effect of contractions due to temperature variations in the pipes between the meter and the transfer point must not exceed 1 % of the minimum measured quantity.

For this, the volume of the pipe between the meter and the check valve acting as a transfer point must not exceed the following volume (CE CET TURBOCOMPT LNE-22081):

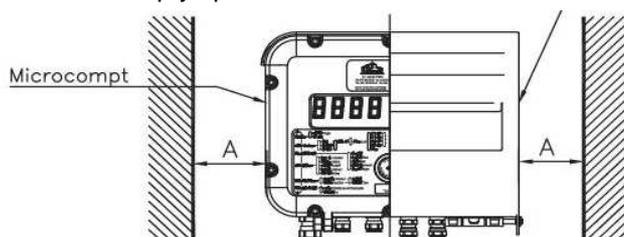
- $V_{\text{pipe}} \leq \text{QMM}$  for exposed pipes
- $V_{\text{pipe}} \leq 5 \times \text{QMM}$  for insulated or underground pipes

## 6. GENERAL MECHANICAL RECOMMENDATIONS

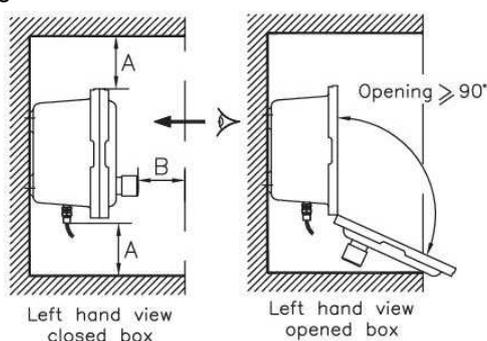
### 6.1. MICROCOMPT+ assembly guidelines

It is necessary to comply with the instructions contained in the ATEX instruction handbook supplied with the MICROCOMPT+ calculator.

- Secure the box to a support adapted to the weight of the calculator with 4 x M6 screws (4 x M6 blind tapped holes, 12 mm deep, on 185x132 mm).
- Leave an empty space A of 100 mm around the MICROCOMPT+ to work on it more easily.



- Leave enough space under the box to avoid pressing the pushbuttons and pressing against the glass when the front of the MICROCOMPT+ is open.



**REFER TO THE INSTRUCTION MANUAL**

(DELIVERED WITH THE EQUIPMENT, AVAILABLE ON THE ALMA WEBSITE)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	<b>INSTALLATION GUIDE DI 101 ENC</b> <b>TURBOCOMPT</b>	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 17 / 23

### 6.1.1. Specificities of the RACK Version

The MICROCOMPT+, RACK version, **must be installed in a control room** (outside installation is prohibited). Precautions must be taken to ensure that the ambient temperature remains between -10°C and +40°C.

## 6.2. Meter assembly guidelines

### 6.2.1. ALMA ADRIANE Turbine

The installation of an ALMA ADRIANE turbine (all models) must comply with the following conditions:

- Position the turbine so that the nameplate as well as the pulse emitter(s) LEDs are easily accessible and visible
- Install the turbine in compliance with the direction of flow
- Fit seals between the turbine and the counter flanges
- Leave an empty space of at least 100 mm around the turbine to work on it more easily
- At the measuring system inlet, install a filter with a mesh equal to 400µm to protect the turbine, or a smaller mesh if other devices require specific protection (loading valve...) Warning: Use a type of filter whose reliability has been demonstrated and in particular, never use a Y-filter.
- After installation, if new or modified pipes have not been perfectly cleaned or pickled and passivated, the turbine must be protected during the commissioning period with a honeycomb strainer with a mesh of 1 mm or less, placed between the two flanges upstream of the filter.



The piping situated upstream or downstream of the turbine may be built with or without the straight pipe sections but it is important that they do not include any component that adjusts the flowrate which would effectively reduce the nominal diameter of the turbine at a distance of 10 times the nominal diameter upstream and 5 times the nominal diameter downstream.

### 6.2.2. FAURE HERMAN TML 4-150 Turbine

The installation of a FAURE HERMAN TML 4-150 turbine must comply with the following conditions:

- The upstream and downstream pipe must have the same nominal diameter as the turbine diameter
- If the turbine is equipped with an integrated flow conditioner, there are no specific requirements on the straight length before and after the turbine
- If the turbine is not equipped with an integrated flow conditioner
  - The upstream pipe must include a straight length equal to at least 20 times the nominal diameter of the turbine if there is no flow conditioner or equal to at least 10 times the nominal diameter if this is not the case
  - The downstream must include a straight length equal to at least 5 times the nominal diameter of the turbine

## 6.3. Gas separator

All gas separators must be installed **vertically** and the associated gas discharge channel must be **rigid and non-pinchable**.

The gas separator (or its installation) must include a **sighting device at the liquid outlet** providing a visual control that it is operating correctly.

**The gas discharge channel must not include a manual control valve** if the closing of this valve neutralises the correct operation of the gas separator.

**If such a closing device is required** for security reasons, **a sealing device must ensure it is held in an open position** or its closure must automatically prevent any subsequent measuring of the measuring system in which the gas separator is integrated.

**If the gas separator is lower** than the meter, **a check valve must be integrated at the outlet** to avoid draining the pipe that connects these two devices.

See provisions set out in the separator CEV.

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	INSTALLATION GUIDE DI 101 ENC TURBOCOMPT	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	Page 18 / 23

## 6.4. Control valve

### 6.4.1. Compatible valve types

The following control valves can be installed on a TURBOCOMPT system.

- SATAM types XAD36 or XAD 37 respectively for TURBOCOMPT measuring systems, types TC150 and TC80
- SATAM types ZC.E5.E.150 or XAD ZC.E5.E.80 respectively for TURBOCOMPT measuring systems, types TC150 and TC80E
- MASONEILAN type CAMFLEX for the TURBOCOMPT measuring system
- SMITH type 210
- SAMPI type HPV
- BROOKS/EMERSON types 788DVC and 787C
- BRODIE type BV88
- DANIELS types 401 AV501 and 788

**For any other valve types, please contact the Products & Project Technical Manager first to validate the characteristics.**

### 6.4.2. Installation

All valves must be installed in accordance with its manufacturer's installation instructions.

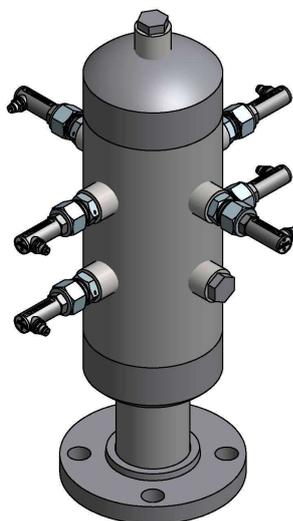
The settings for use flowrates must be compatible with the measuring system flowrate range and if necessary, with the maximum flowrates indicated in the Supply conditions file.

## 6.5. Automatic gas detection system

If necessary, a gas detector must be installed at the high point of the pipe between the pump (or the separator depending on the configuration) and the meter.

**If the device does not have an automatic valve, a notice must be clearly displayed beside the gas extractor** indicating that the manual gas extraction valve must stay closed. The valve is for gas evacuation only and is opened under the operator's sole responsibility.

### INSTALLATION OF GAS DETECTOR IN A CHAMBER:



**REFER TO THE INSTRUCTIONS MANUAL**  
(DELIVERED WITH THE EQUIPMENT, AVAILABLE ON THE ALMA WEBSITE)

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



## INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

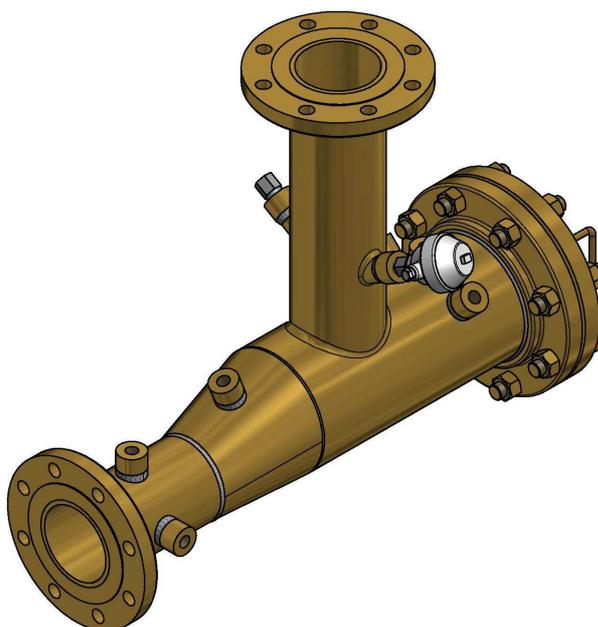
Page 19 / 23

## 6.6. Temperature sensor

If the temperature sensor is installed connected to the MICROCOMPT+ calculator, it is necessary to comply with the following requirements:

- The sensor must be a 3 wire Pt 100 temperature sensor
- The thermowell receiving this sensor must be able to measure the temperature at the centre of the liquid flow
- A control pocket must:
  - be installed close to it in order to take a measurement identical to that of the previously mentioned sensor. **In particular, the length of the two thermowells must be identical**
  - be installed as vertically as possible so that it can be used with heat transfer fluid during the checks

### INSTALLATION OF A TEMPERATURE SENSOR IN A TEE FILTER



ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY

THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION



## INSTALLATION GUIDE DI 101 ENC TURBOCOMPT

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

This document is available at [www.alma-alma.fr](http://www.alma-alma.fr)

Page 20 / 23

### 6.7. Transfer point

The transfer point for the TURBOCOMPT SOURCE system or on a horizontal pipe is represented by a calibrated valve, integrated or not in a coupler at the end of the arm.

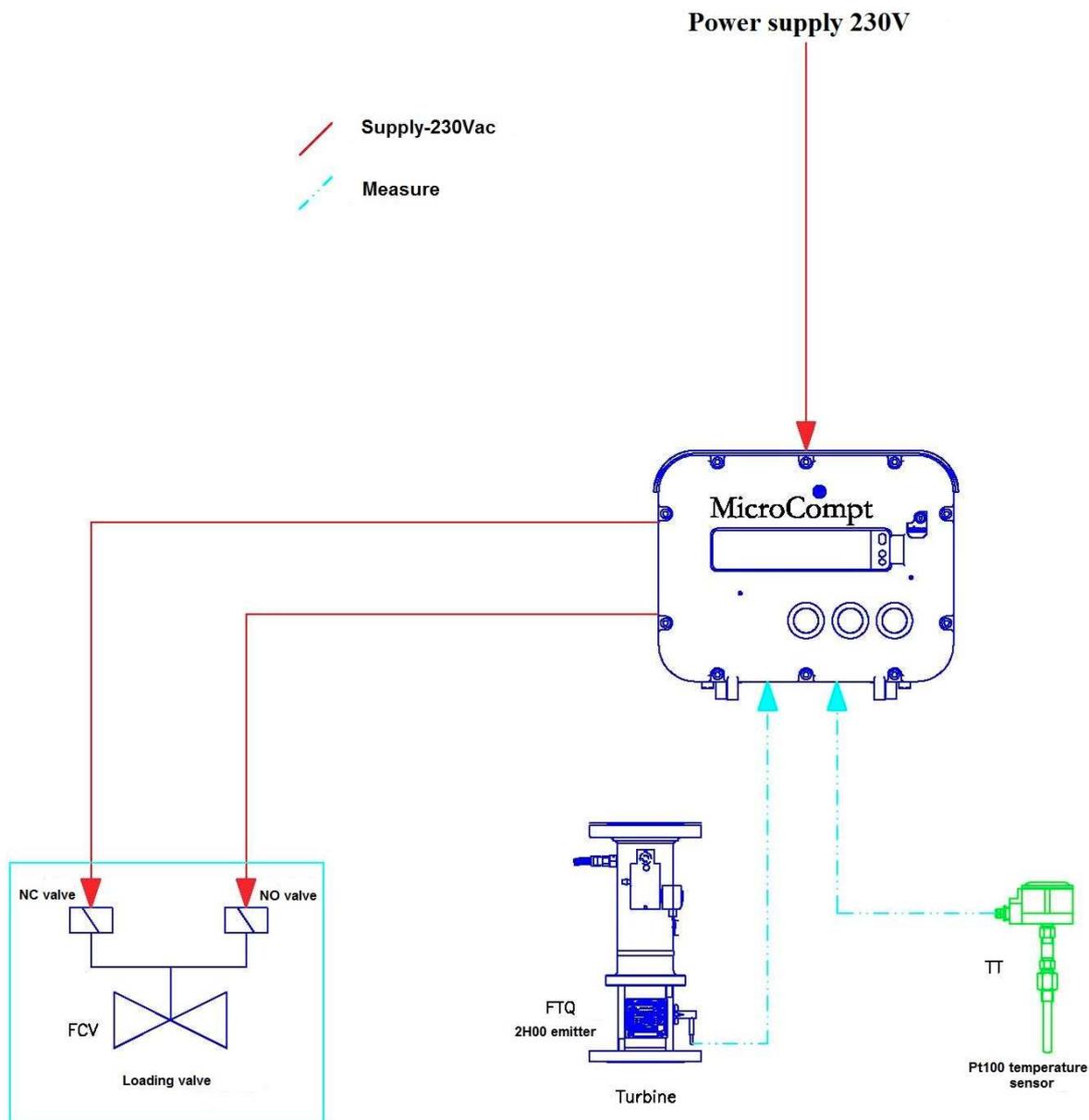
The transfer point for the TURBOCOMPT top loading system is represented by a calibrated valve, at the high point of the top loading arm followed by a venting system to drain the downstream part of the arm to this transfer point.

This valve retains the liquid when measuring and during shut-off periods of the pipe between the meter and the transfer point.

It must be sealed, calibrated to at least 0.3 bar and equipped with a decompression system.

## 7. TURBOCOMPT ELECTRICAL CONNECTION

### 7.1. General interconnection of equipment



ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	INSTALLATION GUIDE DI 101 ENC TURBOCOMPT	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	

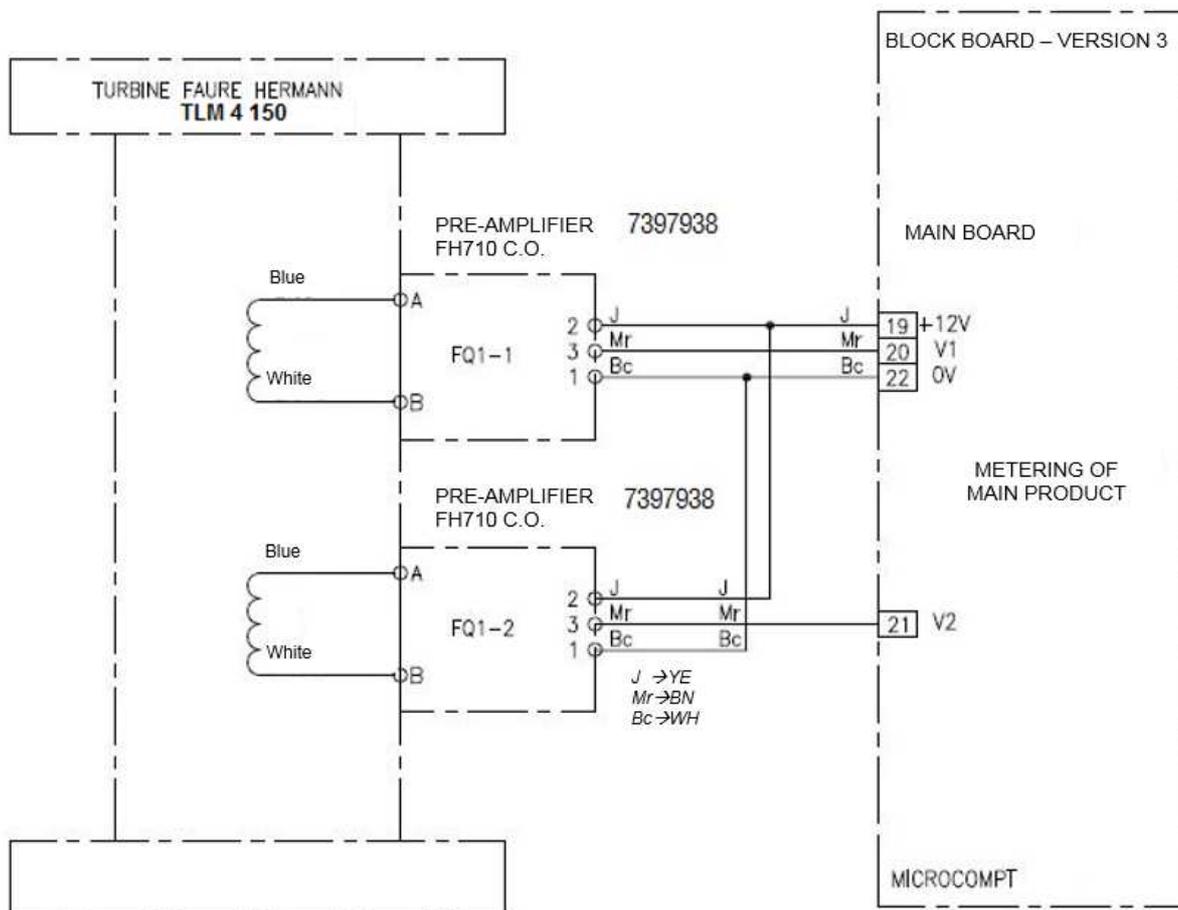
## 7.2. Electrical connection of the MICROCOMPT+

Refer to the MICROCOMPT+ DI 104 Installation file

## 7.3. Electrical connection of the meter

### 7.3.1. Specificity of the FAURE HERMAN TLM 4-150 turbine

The FAURE HERMAN turbine must be used with FH71 CO amplifiers, ref. **7397938** installed in the turbine connection boxes, in accordance with the following diagram:



## 8. SEALING

Seals must comply with the sealing plans available in the Annex of the LNE-22081 certificate.

In so far as possible, sealing must be done with the sealing caps provided for this purpose or with beaded wire providing security.

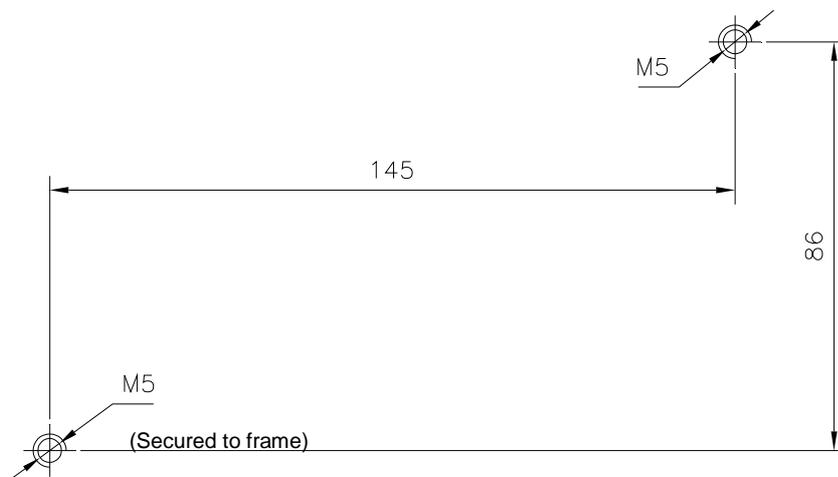
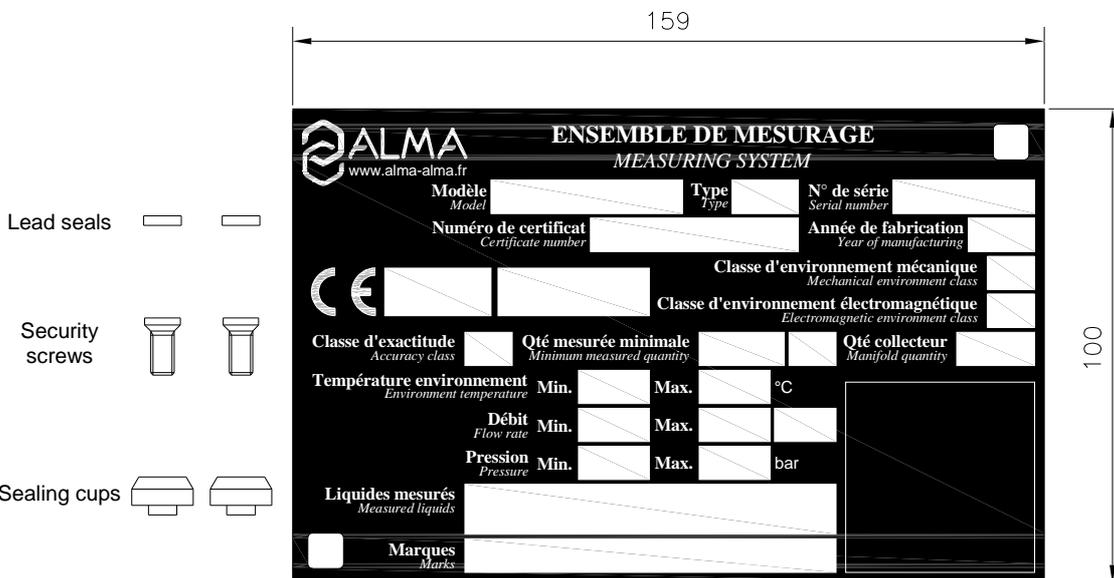
Seals with labels that are destroyed when pulled off **are only authorised for elements found in the control room.**

The cables used for metrological signals must be sealed over its entire length; **the junction boxes or other intermediate boxes** between the sensor and the calculator **must be sealed** (box opening is sealed or the relevant terminals are sealed). This concerns metering, gas and temperature detection if the latter measurement is used for metrology.

ALL RECOMMENDATIONS ARE FOR REFERENCE ONLY		
THIS DOCUMENT IS THE PROPERTY OF ALMA. IT CAN BE NEITHER COPIED NOR COMMUNICATED TO ANY THIRD PARTIES WITHOUT ALMA AUTHORIZATION		
	INSTALLATION GUIDE DI 101 ENC TURBOCOMPT	<b>Units of measure:</b> Length: mm Angle: degree (° ' ") Temperature: °C
	This document is available at <a href="http://www.alma-alma.fr">www.alma-alma.fr</a>	

### 9. MEASURING SYSTEM PLATE KIT

The identification plate must be mounted close to the associated indicator so that it is clearly visible and easy to access in order to read the characteristics and add the regulatory markings.



 The security screws for sealing cups (supplied by ALMA) must be screwed into the tapped holes which are part of the frame (no removable nuts).