TECFLUID

Instructions manual

Series LT
Level gauge

The art of measuring

R-MI-LT Rev.: 5 english version

PREFACE

Thank you for choosing a product from Tecfluid S.A.

This instruction manual allows the installation, configuration, programming and maintenance. It is recommended to read it before using the equipment.

WARNINGS

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- Make sure this manual goes to the end user.
- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website www.tecfluid.com Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
- Do not modify the equipment without permission. Tecfluid S.A. are not responsible for any problems caused by a change not allowed. If you need to modify the equipment for any reason, please contact us in advance.

TABLE OF CONTENTS
SERIES LT

1 INTRODUCTION

The level gauges series LT are very robust equipment and resistant to extreme conditions of temperature and pressure, as well as corrosive chemicals, depending on the manufacturing materials used.

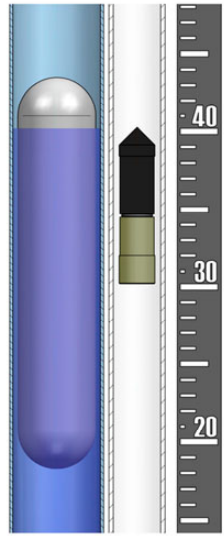
They can fit switches that allow to detect a specific level and provide an alarm signal to a remote device. They can also fit a resistive sensor with a 4-20 mA transmitter proportional to the level.

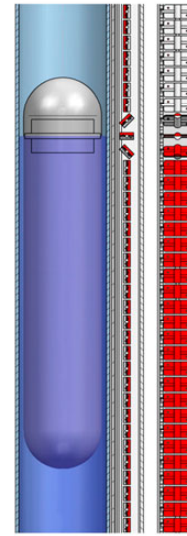
2 WORKING PRINCIPLE

A float inside a chamber communicated with the tank whose liquid level needs to be measured, floats on the liquid surface and moves together with it, as level increases or decreases.

The float is designed for the specific working liquid density and shows the tank level by means of magnetic coupling.

This is possible thanks to an external float housed in a borosilicate glass pipe (LT models) that rises or falls depending on the height of the level in the tank, or by a magnetic strips rail (LTL models), that mounted externally and isolated of the level gauge chamber, changes its colour with the magnetic field.





3 MODELS

- LT ... LTL106 Body in AISI 316L, flanged connection
- LT ... LTL116 Body in AISI 316L, threaded connection
- LT ... LTL14 Body in PVC, PVC-C, PP or PVDF, flanged connection
- LT ... LTL15 Body in SS 316L with internal PTFE coating, flanged connection

4 RECEPTION

The series LT level gauges are supplied conveniently packaged for their protection during transportation and storage, together with their instructions manual for installation and operation.

All the instruments have been verified in our facilities, ready for installation and operation.

LT level gauges are supplied with the float blocked in its bottom position by means of a stop introduced into the lower side coupling.

Before mounting on the tank, this stop must be removed.

5 HANDLING

It must be done carefully and without blows.

6 INSTALLATION

Important: Check that the maximum working pressure is below the limit shown on the identification label of the equipment. Check that the maximum working temperature of the liquid is within the limits given in the following chart.

Model	Materials	Liquid temperature range
LT106	EN 1.4404 (AISI 316L)	-20ºC … 400ºC
LTL106	EN 1.4404 (AISI 316L)	-20ºC … 200ºC
LT … LTL14 / PVC	PVC	0ºC … 45ºC
LT … LTL14 / PVC-C	PVC-C	0ºC … 70ºC
LT … LTL14 / PP	PP	-10ºC … 80ºC
LT … LTL14 / PVDF	PVDF	-20ºC … 145ºC
LT … LTL15 / PTFE	PTFE	-20ºC … 150ºC

The working temperatures are given for an ambient temperature of 20ºC.

The couplings to the tank must be aligned and perpendicular.

Flange bolts should be tightened progressively in a criss-cross sequence to avoid causing stress.

With threaded connections, they should be tightened progressively and together.

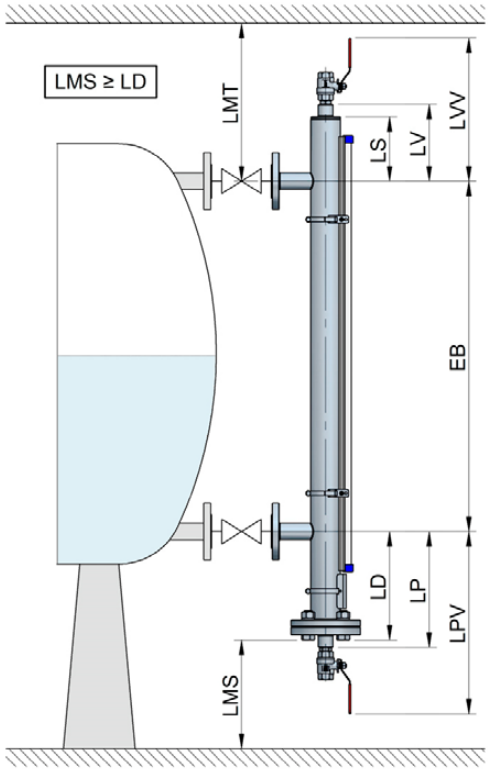
For the LT models (with a glass tube), it is recommended to remove this tube before mounting the level to the tank.

6.1 Minimum distances

It is important to take in account some distances that must be kept in order to remove the float due to a change in density or for maintenance purposes.

Distance LMS between the lowest side of the level gauge and the floor must be kept longer or equal to LD distance.

On the other hand, the lower dimension LD, LP or LPV of series LT level gauges is variable depending on the working liquid density. The lower the density, the longer the dimension.



Model	Liquid density (kg/l)	Lower dimension			Upper dimension		
		Without drain (LD)	With drain (LP)	With drain + valves (LPV)	Without vent (LS)	With vent (LV)	With vent + valve (LVV)
LT ... LTL / AISI 316L	0,55 ... 0,59 0,60 ... 0,91 ≥ 0,92	430 340 260	445 355 275	590 500 420	130	155	300
LT ... LTL / PVC	0,60 ... 0,79 0,80 ... 0,89 ≥ 0,90	400 310 240		525 435 365	150	140	265
LT ... LTL / PP	≥ 0,70	240		365	150	165	290
LT ... LTL / PVDF	0,80 ... 0,89 0,90 ...0,99 1,00 ... 1,19 ≥ 1,20	415 340 290 240		540 465 415 365	150	165	290

For the LT level gauges, once the level is connected to the tank, fill the glass tube, and next reassemble the glass tube on the chamber.

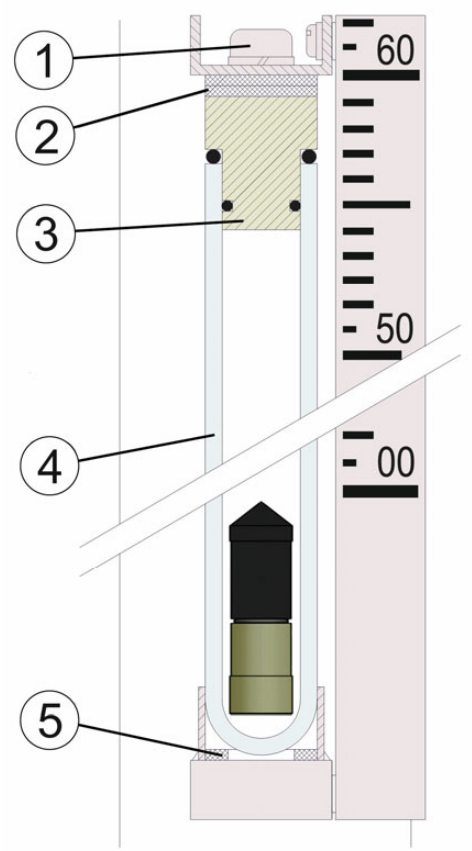
This process should be done in the following way:

Remove the M8 upper allen screw (1).

Withdraw the glass tube from its support and remove the plug at the top (3).

Fill the glass tube (4) with the liquid supplied with the level gauge.

Insert the plug (3) in the tube and maintain in a vertical position.



To place the tube on the body, proceed as follows:

Check that the rubber seal (5) is in its position.

The bottom of the glass tube (4) should rest on the rubber seat (5).

Mount the spacer (2) in its position.

Assemble the glass tube in its position and screw the allen screw (1) into the plug (3).

The M8 DIN 912 allen screw (1) should not be tightened too hard, it is enough to tighten until a slight resistance is felt.

7 LEVEL ASSEMBLY IN TWO SECTIONS

When the level gauge is delivered in two sections, due to its total length, the following instructions must be followed carefully for its correct installation.

The numbering of the different elements corresponds to the different figures.

NOTE: Handle the glass tube sections with care.

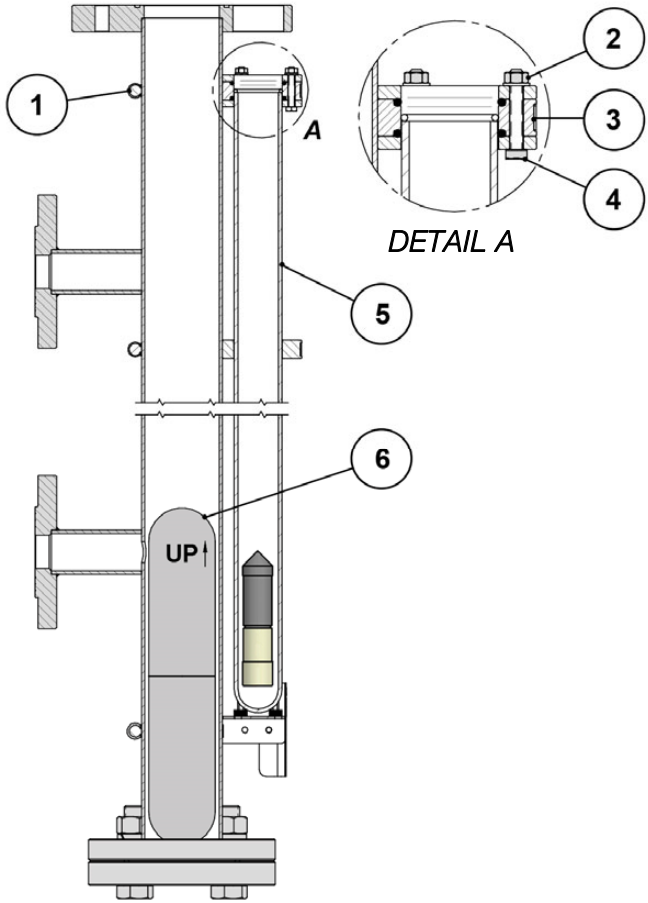
7.1 Model LT106 (stainless steel)

Fix the lower half of the level to the installation.

Remove the adhesive tape from the lower glass tube (5) and loosen the 3 screws DIN933 M5 x 30 (4) without removing the nuts (2).

In case there is not enough space to introduce the float (6) through the lower part of the gauge body once the assembly is completed, the float must be in its correct position inside this lower half at the time of installation.

NOTE: The clamp (1) that fixes the guide-support (3) should never be loosened.



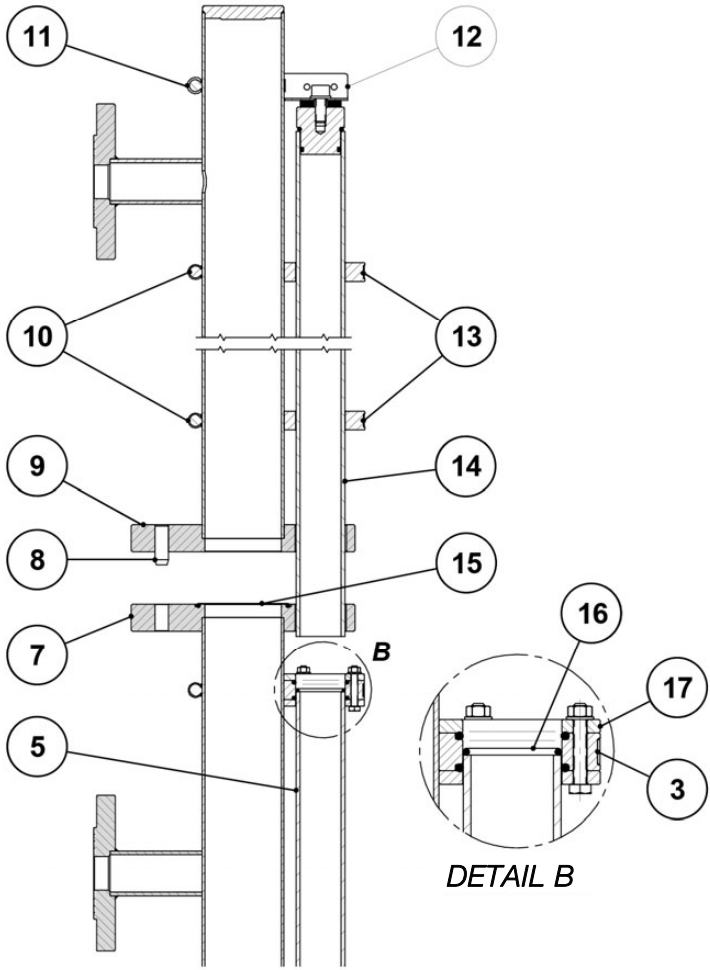
Check the placement of the NBR gasket Ø63 x 3 (15) in its seat on top of the lower flange (7) and the NBR gasket Ø31.42 x 2.62 (16) on top of the lower glass tube (5).

Place the upper half of the level gauge above the lower half and in the coaxial position, and carefully go down by passing the upper glass tube (14) through the corresponding hole in the lower flange (7) until the upper flange (9) rests on the NBR gasket Ø63 x 3 (15).

Pay special attention in this phase of the assembly, since at the same time the two guide pins (8) are inserted in the guide-holes of the lower connecting flange (7) at the same time as the upper glass tube (14) passes through the guide-supports of the join group (17, 3).

During this step, do not remove the adhesive tape from the upper glass tube (14) or loosen the clamp (11) that fixes the upper support (12).

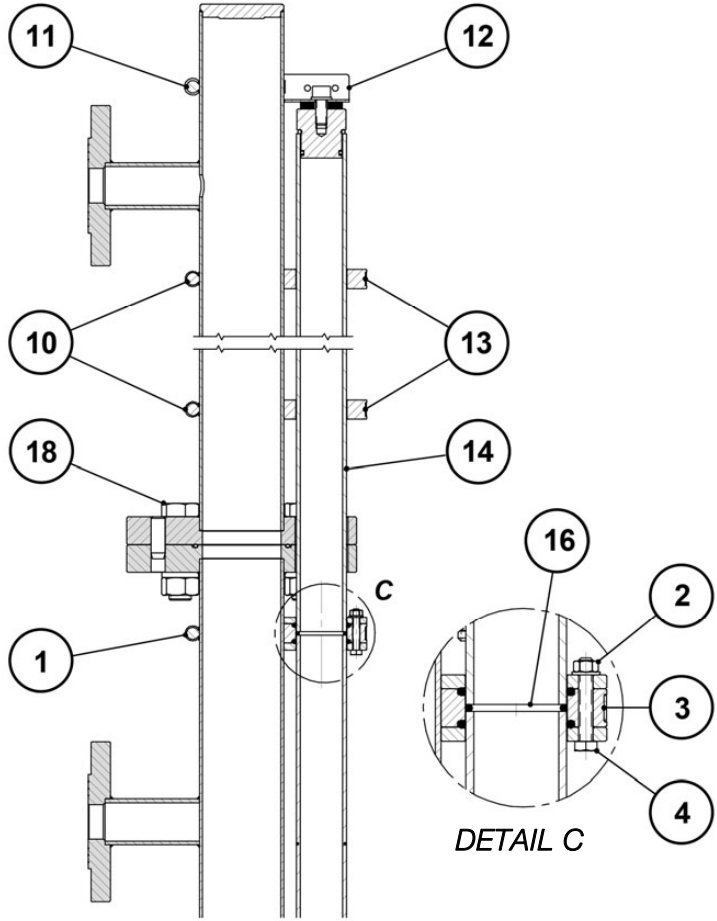
NOTE: The clamps (10) that fix the guide-supports (13) should never be loosened.



Join the two halves of the level by means of the 4 screws DIN933, variable metric according to model (18), and their corresponding washers and nuts, and fix the level to the upper connection of the installation.

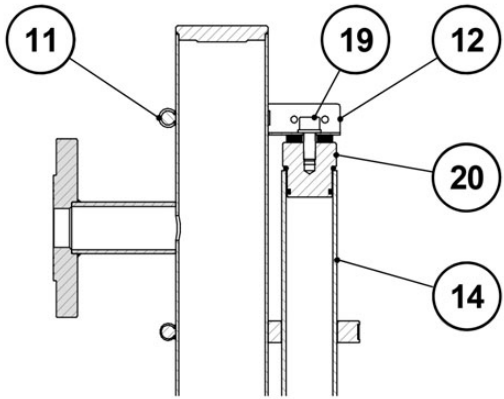
Slightly loosen the clamp (11) that fixes the upper support (12), remove the adhesive tape from the upper glass tube (14) and lower it until it rests on the seal (16). Gently press the tube longitudinally against the seal and tighten the 3 screws (4) and their nuts (2).

NOTE: The clamps (1, 10) that fix the guide-supports (3,13) should never be loosened.



IMPORTANT NOTE: The joint group of the 2 sections of glass tube does not fix its longitudinal displacement, but ensures the correct sealing of the joint.

Remove the screw (19) and the plug (20) and proceed to fill the glass tube (14+5). Re-insert the plug (20) into the tube (14) and, keeping the upper support (12) slightly pressed down, tighten the clamp (11) and the screw (19).



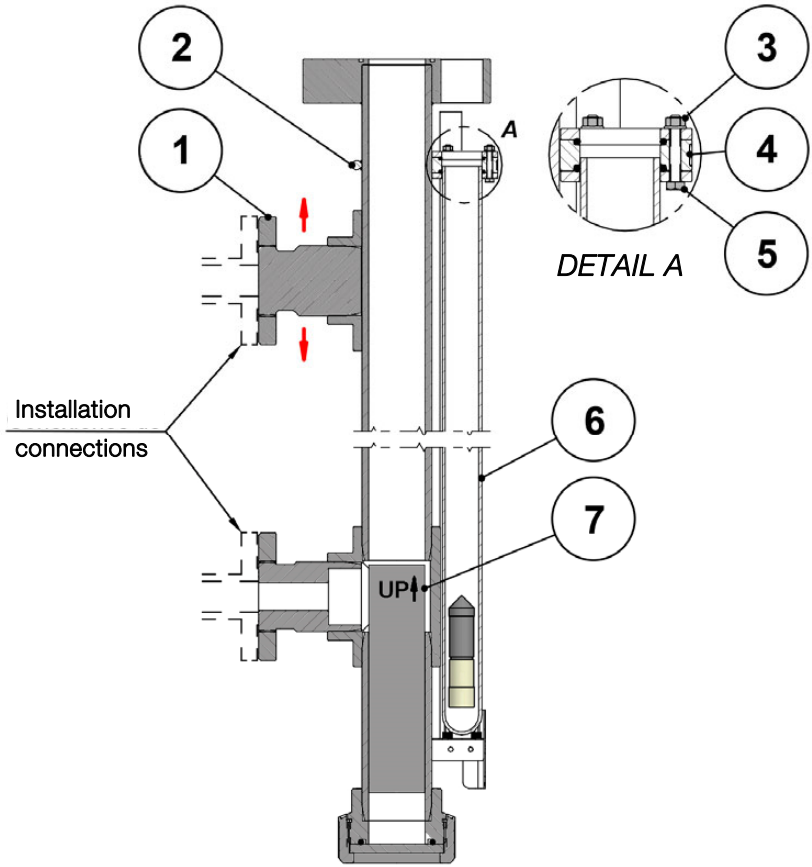
7.2 Model LT14 (plastic)

Fix the lower half of the level gauge to the installation. The mobile flange-group (1) allows adjusting its anchoring height.

Remove the adhesive tape from the lower glass tube (6) and loosen the 3 screws DIN933 M5 x 30 (5) without removing the nuts (3).

In case there is not enough space to introduce the float (7) through the lower part of the gauge body once the assembly has been completed, the float must be in its correct position inside this lower half at the time of installation.

NOTE: The clamp (2) that fixes the guide-support (4) should never be loosened.



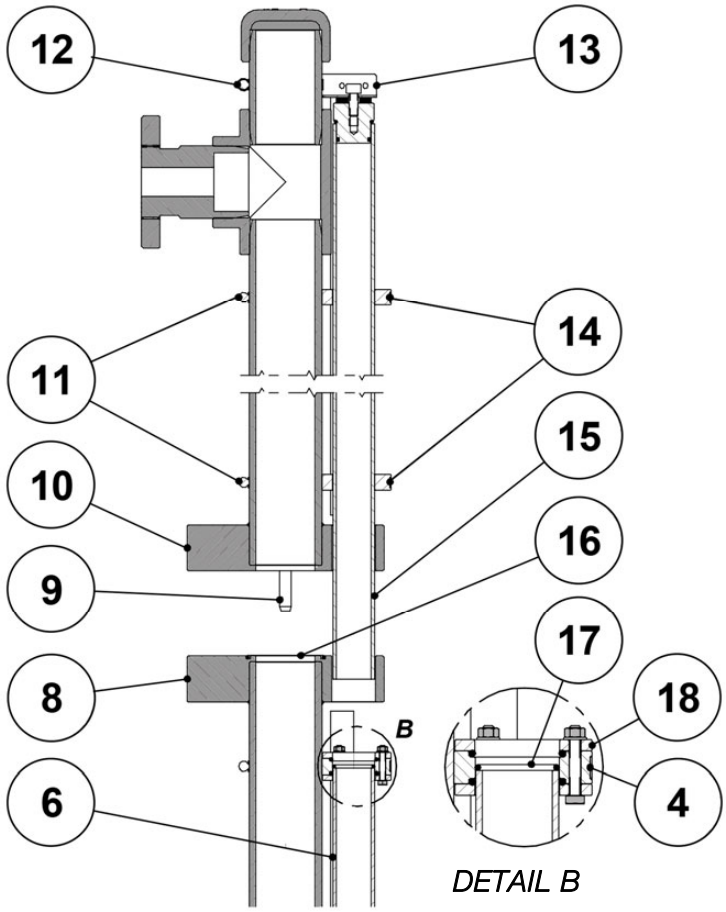
Check the placement of the NBR gasket Ø63 x 3 (16) in its seat on top of the lower flange (8), and the NBR gasket Ø31.42 x 2.62 (17) on top of the lower glass tube (6).

Place the upper half of the level gauge above the lower half and in the coaxial position, and carefully go down by passing the upper glass tube (15) through the corresponding hole in the lower flange (8) until the upper flange (10) rests on the NBR Ø63 x 3 gasket (16).

Pay special attention in this phase of the assembly, since at the same time the two guide pins (9) are inserted in the guide-holes of the lower connection flange (8) at the same time as the upper glass tube (15) passes through the guide-supports of the join group (18, 4).

During this step, do not remove the adhesive tape from the upper glass tube (15) or loosen the clamp (12) that fixes the upper support (13).

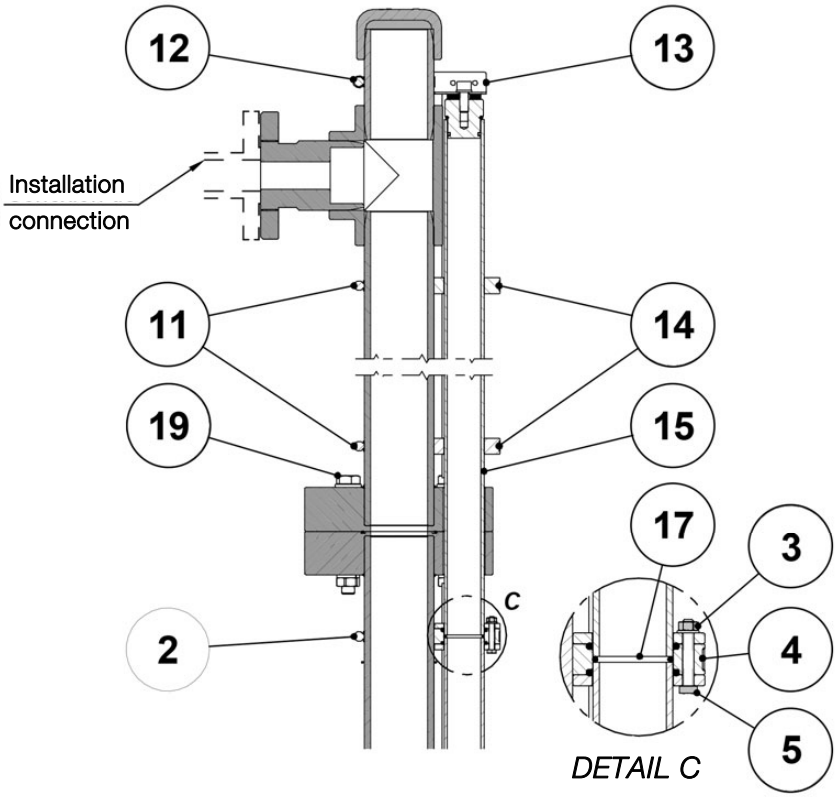
NOTE: The clamps (11) that fix the guide-supports (14) should never be loosened.



Join the two halves of the level gauge by means of the 4 screws DIN933, variable metric according to model (19), and their corresponding washers and nuts, and fix the level gauge to the upper connection of the installation.

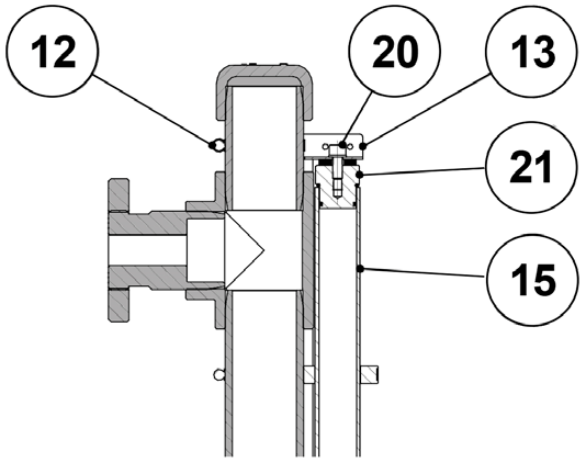
Slightly loosen the clamp (12) that fixes the upper support (13), remove the adhesive tape from the upper glass tube (15) and lower it until it rests on the seal (17). Gently press the tube longitudinally against the seal and tighten the 3 screws (5) and their nuts (3).

NOTE: The clamps (2, 11) that fix the guide-supports (4,14) should never be loosened.



IMPORTANT NOTE: The joint group of the 2 sections of glass tube does not fix its longitudinal displacement, but ensures the correct sealing of the joint.

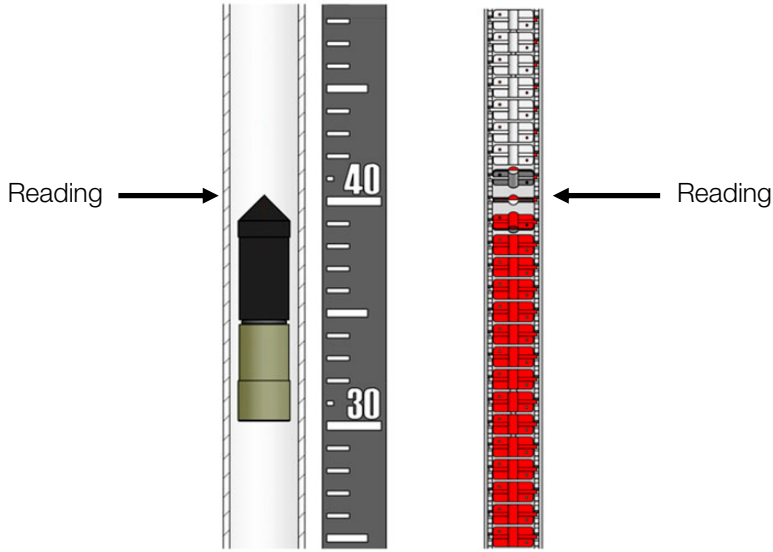
Remove the screw (20) and the plug (21) and proceed to fill the glass tube (15+6). Re-insert the plug (21) into the tube (15) and, keeping the upper support (13) slightly pressed down, tighten the clamp (12) and the screw (20).



8 LEVEL READING

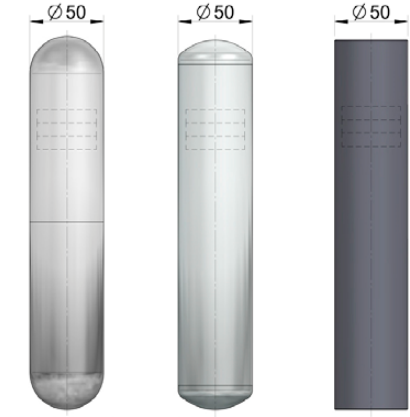
For level gauges with a glass tube (LT models), the value of the level is read on the scale at the height of the top of the external follower. For level gauges with indication by means of magnetic strips (LTL models), the reading is taken where the strips change from red to white.

LTL models can be supplied with graduated scale on request.



9 FLOAT TYPES

Material	Liquid density kg/l	Maximum pressure
Titanium	0.55 ... 0.83	PN40
Titanium	0.68 … 0.83	PN63
Titanium	0.77 … 0.83	100 bar max.
EN 1.4404	0.84 ... 2.00	PN40
EN 1.4404	0.84 ... 2.00	PN63
EN 1.4404	0.84 ... 2.00	PN100
PVC	0.60 ... 2.00	6 bar max.
PP	0.70 ... 2.00	6 bar max.
PVDF	0.80 ... 2.00	6 bar max.
PTFE	≥1	6 bar max.



10 AMD LIMIT SWITCH

10.1 Introduction

The AMD limit switch can be used to generate an alarm or an operation when the level that the instrument is measuring reaches a preset value. It is a bi-stable limit switch.

It consists of a NAMUR slot type inductive sensor, that is actuated by the float, by means of a vane that changes its position from one detection position to the other.

10.2 Operation

When the float passes through the point where the limit switch is positioned, it changes the state of the inductive sensor, and therefore the output state. This is maintained until the float passes in the opposite direction by the point where the switch is, returning again to the previous state.

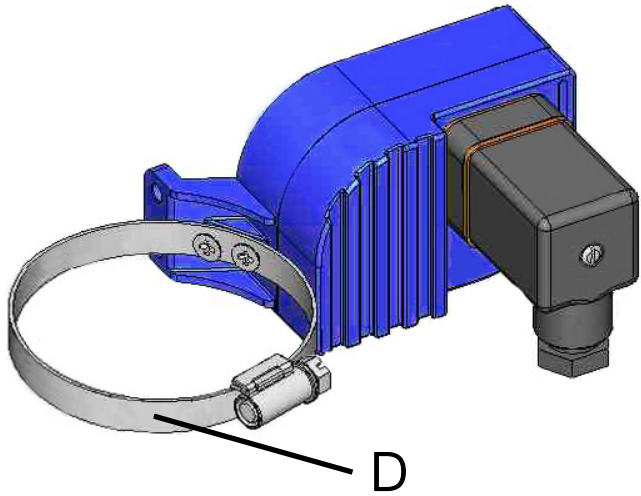
As an optional element, a NAMUR amplifier with a switching relay as an output element can be supplied.

10.3 Switching point adjustment

10.3.1 LT models

To fix the limit switch on the level gauge, completely loosen the clamp (D) and open it. With the clamp open, place the limit switch in the body of the level indicator and close the clamp on the tube.

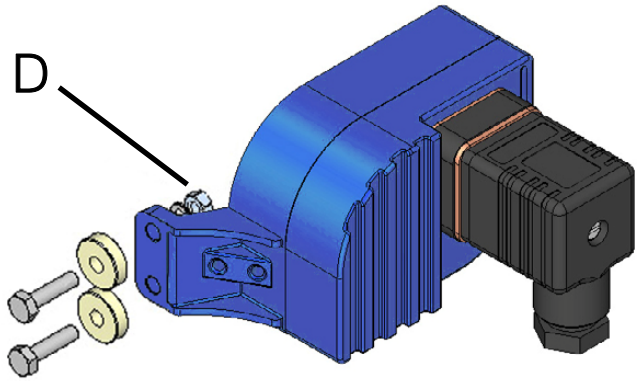
Place the level switch at the desired level and tighten the clamp.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the inductive sensor switches.

10.3.2 LTL models

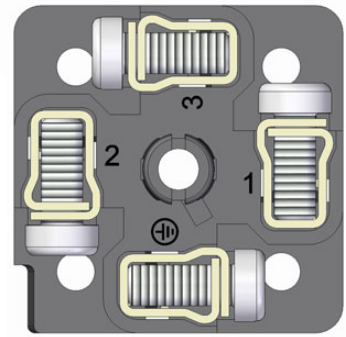
To fix the limit switch on the level gauge, loosen the nuts (D), move the switch to the desired height and tighten the nuts (D) again.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the inductive sensor switches.

10.4 Electrical connection

For the electrical installation it is recommended to use multiple conductor cables, and not single cables, in order to guarantee the cable gland will stay watertight. The connector has a PG9 cable gland for cables with outer diameters between 5 mm and 7 mm. The numbering of the terminals is the following:

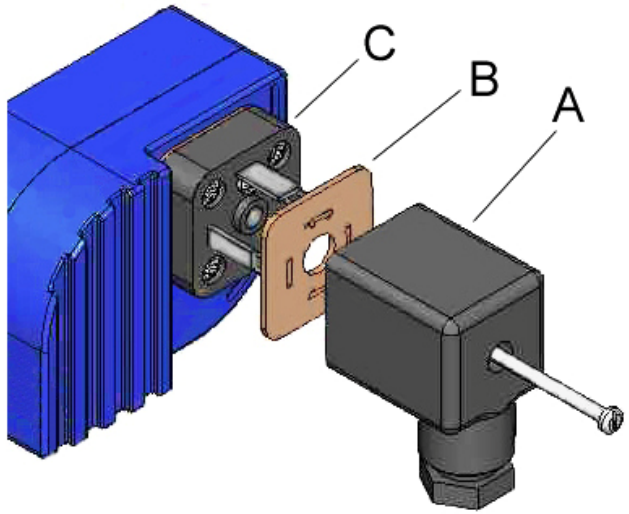


In the female connector (A):

Terminal 1:	Negative (Blue sensor cable)
Terminal 2:	Positive (Brown sensor cable)
Terminal 3:	Not connected
Earth terminal:	Earth

10.5 Mounting

Once the electrical connection is made and the cable gland is tightened, connect the female connector (A) to the male base (C) in the correct position, placing the gasket (B) between them.



11 AMM LIMIT SWITCH

11.1 Introduction

The AMM limit switch can be used to generate an alarm or an operation when the level that the instrument is measuring reaches a preset value. It is a bi–stable SPDT limit switch.

It consists of a micro-switch that is actuated by the magnetic field of the float, by means of a cam that pushes the micro-switch lever.

11.2 Operation

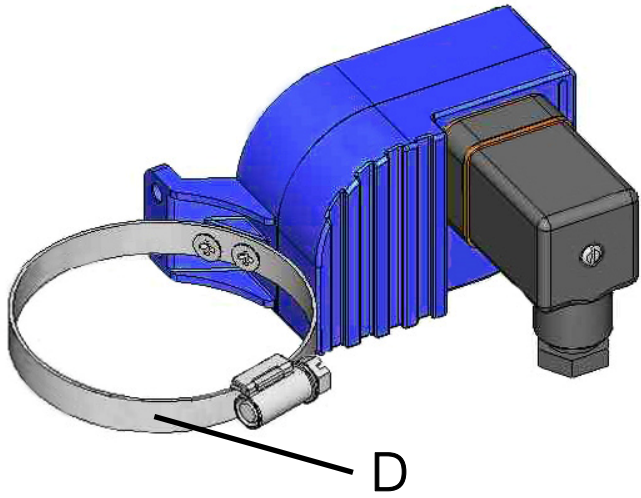
When the float passes through the point where the limit switch is positioned, it changes the state of the micro-switch, and therefore the output state. This is maintained until the float passes in the opposite direction by the point where the switch is, returning again to the previous state.

11.3 Switching point adjustment

11.3.1 LT models

To fix the limit switch on the level gauge, completely loosen the clamp (D) and open it. With the clamp open, place the limit switch in the body of the level indicator and close the clamp on the tube.

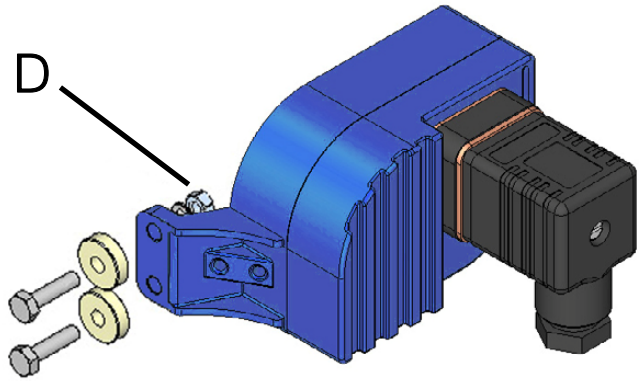
Place the level switch at the desired level and tighten the clamp.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the micro-switch switches.

11.3.2 LTL models

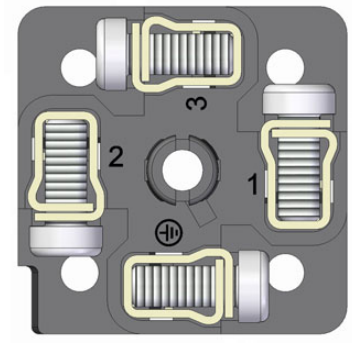
To fix the limit switch on the level gauge, loosen the nuts (D), move the switch to the desired height and tighten the nuts (D) again.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the micro-switch switches.

11.4 Electrical connection

For the electrical installation it is recommended to use multiple conductor cables, and not single cables, in order to guarantee the cable gland will stay watertight. The connector has a PG9 cable gland for cables with outer diameters between 5 mm and 7 mm. The numbering of the terminals is the following:

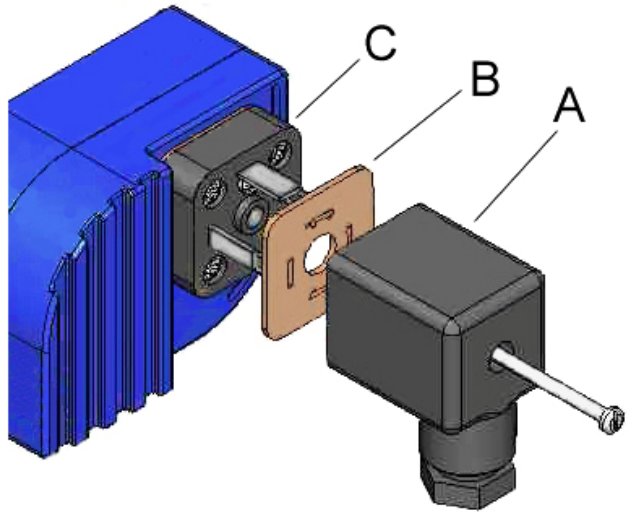


In the female connector (A):

Terminal 1:	Common
Terminal 2:	NO (Normally open)
Terminal 3:	NC (Normally closed)
Earth terminal:	Earth

11.5 Mounting

Once the electrical connection is made and the cable gland is tightened, connect the female connector (A) to the male base (C) in the correct position, placing the gasket (B) between them.



12 APR LIMIT SWITCH

12.1 Introduction

The APR limit switch can be used to generate an alarm or an operation when the level that the instrument is measuring reaches a preset value. It is a bi–stable SPDT limit switch.

It consists of a reed sensor that is actuated by the magnetic field of the float.

12.2 Operation

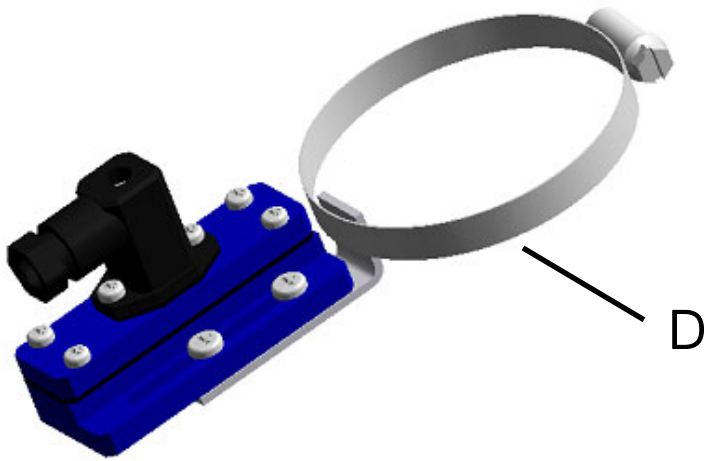
When the float passes through the point where the limit switch is positioned, it changes the state of the reed sensor, and therefore the output state. This is maintained until the float passes in the opposite direction by the point where the switch is, returning again to the previous state.

12.3 Switching point adjustment

12.3.1 LT models

To fix the limit switch on the level gauge, completely loosen the clamp (D) and open it. With the clamp open, place the limit switch in the body of the level indicator and close the clamp on the tube.

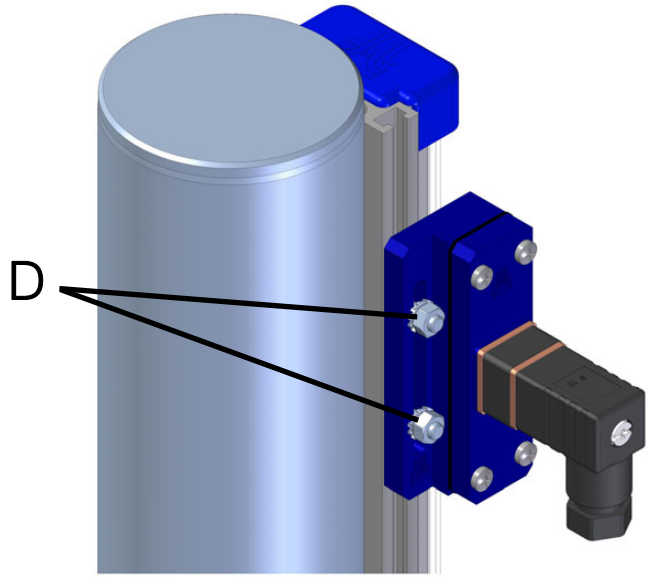
Place the level switch at the desired level and tighten the clamp.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the reed sensor switches.

12.3.2 LTL models

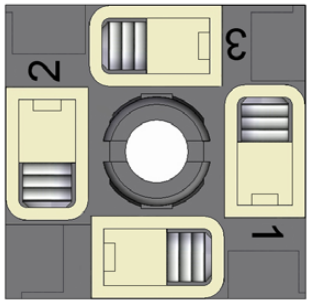
To fix the limit switch on the level gauge, loosen the nuts (D), move the switch to the desired height and tighten the nuts (D) again.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the reed sensor switches.

12.4 Electrical connection

For the electrical installation it is recommended to use multiple conductor cables, and not single cables, in order to guarantee the cable gland will stay watertight. The connector has a PG7 cable gland for cables with outer diameters between 4 mm and 6 mm. The numbering of the terminals is the following:



In the female connector:

Terminal 1:	Common
Terminal 2:	NO (Normally open)
Terminal 3:	NC (Normally closed)
Earth terminal:	Not connected

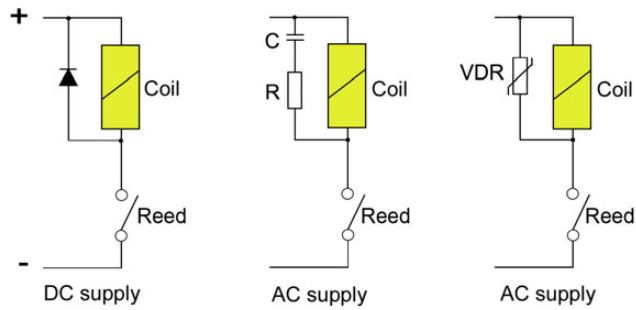
Terminal 2 is the normally open contact when the float is below the limit switch.

Make sure that the contact rating is not exceeded. If high loads are to be switched, use an auxiliary relay.

When using inductive loads, such as relays or solenoid valve coils, surge arresters should be installed to protect the reed contacts.

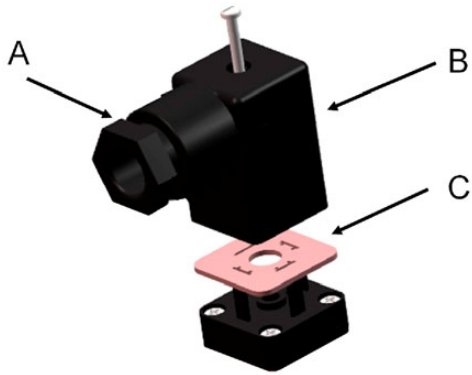
With a DC supply, a diode should be connected as shown.

For an AC supply, a RC circuit can be used as shown, although a varistor (VDR) is better and is easier to select the right value. The VDR should have a breakdown voltage greater than 1.5 times the rms voltage. The standard varistor ratings specify the rms working voltage for the varistor, for example a S05K25 varistor will be for 25 V_{rms} working and will have a breakdown voltage of 39 V at 1 mA.



The electrical installation should provide a fuse or circuit breaker to protect the reed switch from overloads.

When installing the connector, make sure that the cable gland (A) closes over the cable and that the connector (B) with the rubber seal (C) is well screwed down to maintain the IP65 rating.



13 AAR LIMIT SWITCH

13.1 Introduction

The AAR limit switch can be used to generate an alarm or an operation when the level that the instrument is measuring reaches a preset value. It is a bi–stable SPDT limit switch. t is used when the product can reach high temperatures (see characteristics on page 35), and is only available for glass tube indication system with external follower (LT models).

It consists of a reed sensor that is actuated by the magnetic field of the float.

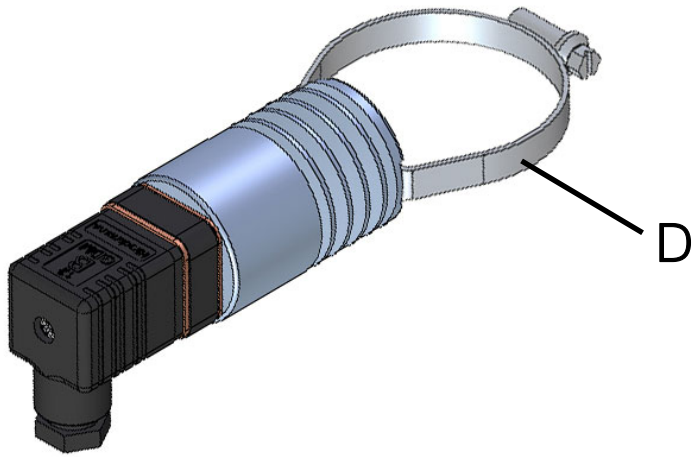
13.2 Operation

When the float passes through the point where the limit switch is positioned, it changes the state of the reed sensor, and therefore the output state. This is maintained until the float passes in the opposite direction by the point where the switch is, returning again to the previous state.

13.3 Switching point adjustment

To fix the limit switch on the level gauge, completely loosen the clamp (D) and open it. With the clamp open, place the limit switch in the body of the level indicator and close the clamp on the tube.

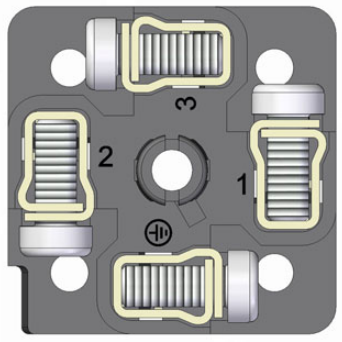
Place the level switch at the desired level and tighten the clamp.



The position of the reading point of the float with respect to the switching point of the limit switch can vary from one type of float to another. If it is the first time that the switching point is adjusted, with the float in a stable position, move the limit switch until the reed sensor switches.

13.4 Electrical connection

For the electrical installation it is recommended to use multiple conductor cables, and not single cables, in order to guarantee the cable gland will stay watertight. The connector has a PG9 cable gland for cables with outer diameters between 5 mm and 7 mm. The numbering of the terminals is the following:



In the female connector:

Terminal 1:	Common
Terminal 2:	NO (Normally open)
Terminal 3:	NC (Normally closed)
Earth terminal:	Earth

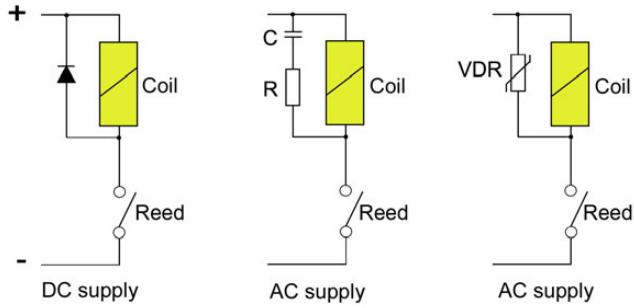
Terminal 2 is the normally open contact when the float is below the limit switch.

Make sure that the contact rating is not exceeded. If high loads are to be switched, use an auxiliary relay.

When using inductive loads, such as relays or solenoid valve coils, surge arresters should be installed to protect the reed contacts.

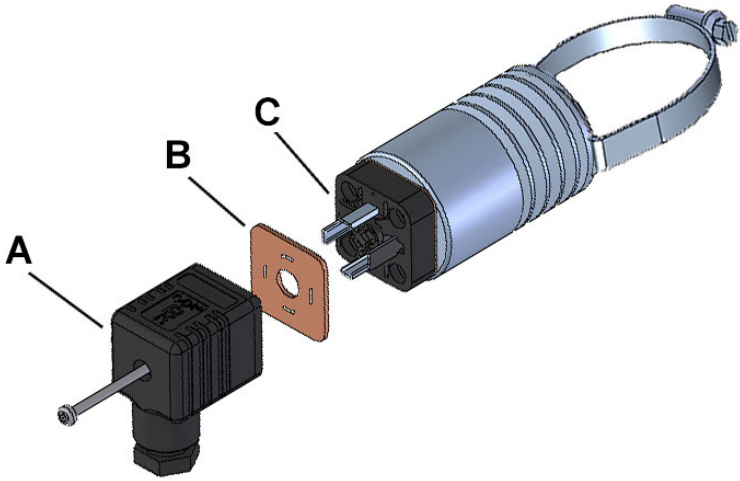
With a DC supply, a diode should be connected as shown.

For an AC supply, a RC circuit can be used as shown, although a varistor (VDR) is better and is easier to select the right value. The VDR should have a breakdown voltage greater than 1.5 times the rms voltage. The standard varistor ratings specify the rms working voltage for the varistor, for example a S05K25 varistor will be for 25 V_{rms} working and will have a breakdown voltage of 39 V at 1 mA.



The electrical installation should provide a fuse or circuit breaker to protect the reed switch from overloads.

When installing the connector, make sure that the cable gland (A) closes over the cable and that the connector (B) with the rubber seal (C) is well screwed down to maintain the IP65 rating.



14 LTE TRANSMITTER

14.1 Introduction

The LTE transmitter is a resistive sensor based on the variation of resistance as a function of the height of the float. This signal, once processed by a microcontroller, is converted into a two-wire current signal of 4-20 mA proportional to the level.

14.2 Operation

For each level, the float height activates a certain reed sensor incorporated in a set of resistances, giving a resistive value that becomes a current proportional to the level.

14.3 Models

Depending on the need of each application, the following transmitters can be supplied:

- TR3420. 4-20 mA transmitter
- TR2420H. 4-20 mA transmitter + HART. Ex zone 2
- TR2420FP. 4-20 mA transmitter + Profibus PA / Foundation Fieldbus. Ex zone 2
- TR2420Ex. 4-20 mA transmitter. Ex ia IIC T6
- TR2420HEx. 4-20 mA transmitter + HART. Ex ia IIC T6
- TR2420FPEx. 4-20 mA transmitter + Profibus PA / Foundation Fieldbus. Ex ia IIC T6

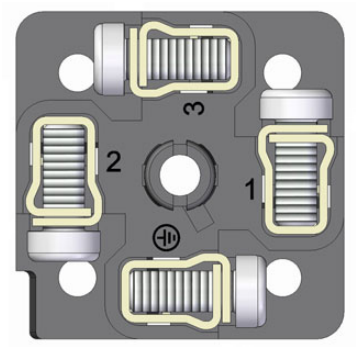
Information related to these transmitters can be found in the transmitter specific instructions manual.

14.4 Remote transmitter

When the transmitter is remote, the resistive system includes a connector DIN 43650A.

14.4.1 Electrical connection

For the electrical installation it is recommended to use multiple conductor cables, and not single cables, in order to guarantee the cable gland will stay watertight. The connector has a PG9 cable gland for cables with outer diameters between 4.5 mm and 7 mm. The numbering of the terminals is the following:

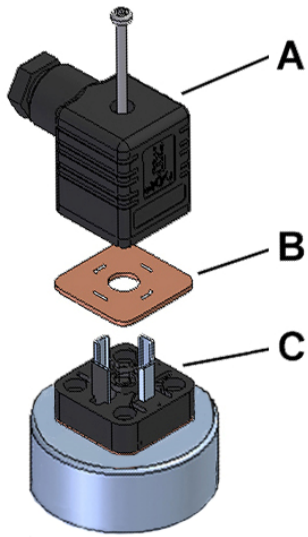


In the female connector:

Terminal 1:	Resistive sensor
Terminal 2:	Resistive sensor
Terminal 3:	Not connected
Earth terminal:	Not connected

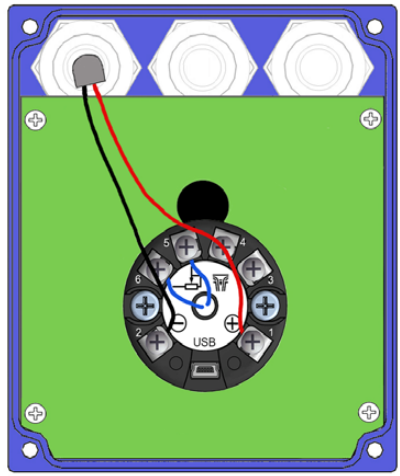
14.4.2 Mounting

Once the electrical connection is made and the cable gland is tightened, connect the female connector (A) to the male base (C) in the correct position, placing the gasket (B) between them.

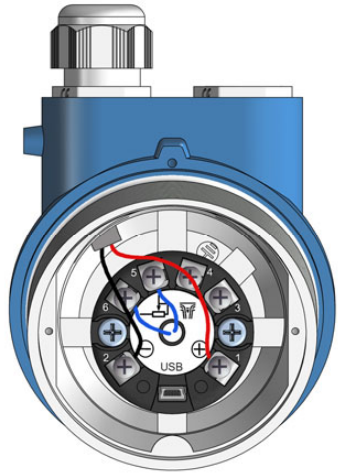


14.5 Compact transmitter

When the transmitter is compact, it can be supplied with plastic or aluminium housing.



Transmitter in plastic housing



Transmitter in aluminium housing

Connection of these transmitters can be found in the transmitter specific instructions.

15 LTDR TRANSMITTER

The LTDR level transmitter uses TDR (Time Domain Reflectometry) technology to measure level.

This technology is based on the emission of electromagnetic pulses of low energy and high frequency, generated by an electronic circuit. The impulses are propagated along a probe immersed in a liquid.

When these impulses reach the surface of the liquid, part of the impulse energy is reflected and returns to the electronic circuit, which calculates the fluid level from the time difference between the sent and received impulses.

The transmitter analyses the signal and converts it into a continuous and proportional to the level measurement through its analog output, or into a programmable switching signal at a specific level point.

TDR sensors are also known as guided radar devices.

The information related to these transmitters can be found in its specific manual.

16 MAINTENANCE

16.1 Series LT

No special maintenance is required.

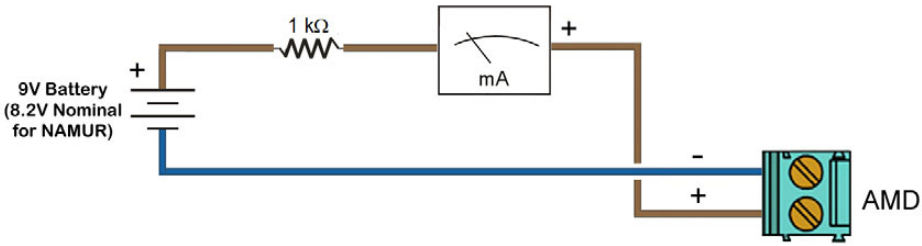
16.2 AMD limit switch maintenance

16.2.1 Electrical verification

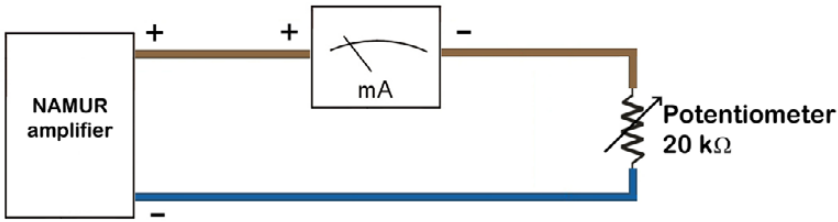
Check that the voltage at the terminals + and - is over 7.5 V when the vane is in the slot. Connect a multimeter with the scale in DC mA, in series with the terminal +.

Verify that the current is less than 1 mA when the vane is inside the slot and more than 3 mA when the vane is outside the slot.

If a NAMUR amplifier is not available, the verification can be done with the following circuit diagram:



Without the sensor, the operation of the amplifier can be checked by using the following circuit diagram:



With the potentiometer the current through the NAMUR amplifier can be modified. The switching point must be between 1.2 mA and 2.1 mA. That is, with the current below 1.2 mA the output relay must have a state and above 2.1 mA the output relay must have the other state.

16.3 AMM limit switch maintenance

The micro-switch (1) has a roller that runs on the cam (2).

To check the operation and correct possible misalignments, do the following steps:

Open the limit switch housing by removing the four M4 x 25 DIN 7985 screws.

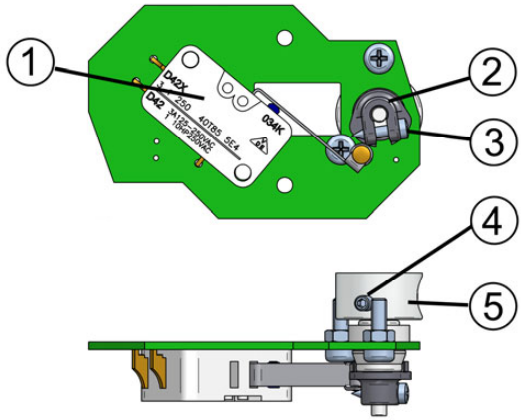
Check that the magnet assembly (5) is firmly fixed to the shaft by the screw M3 x 10 DIN 913 (4).

Position the screw (4) as in the drawing (against the stop in a clockwise direction). Position the cam (2) as in the drawing and tighten the screw (3).

If a multimeter with resistance measurement is available, connect it to terminals 1 & 2 of the connector. Move the cam (2) slowly in both directions over the whole of its travel. The multimeter must change from open circuit to short circuit in one direction and vice versa in the other, when the roller is half way up the eccentric zone of the cam.

When a multimeter is not available, the above can be done by hearing the “click” when the micro-switch (1) changes over.

NOTE: If due to bad handling of the micro-switch lever, the operation is not correct, the micro-switch lever (1) should be bent slightly until correct operation is obtained.



16.4 APR limit switch maintenance

No special maintenance is required.

16.5 AAR limit switch maintenance

No special maintenance is required.

17 TECHNICAL CHARACTERISTICS

17.1 Series LT

Accuracy

±10 mm measured value

Liquid density

0,55 ... 2 kg/l (others on request)

Liquid viscosity

1500 cSt maximum

Measuring range

150 mm ... 15 m

Temperature

Liquid temperature:

LTL106:	-20ºC … 200ºC
LT106:	-20ºC … 400ºC, depending on configuration
LT ... LTL14 / PVC:	0ºC … 45ºC
LT ... LTL14 / PVC-C:	0ºC … 70ºC
LT ... LTL14 / PP:	-10ºC … 80ºC
LT ... LTL14 / PVDF:	-20ºC … 145ºC
LT ... LTL15 / PTFE:	-20ºC … 150ºC

Ambient temperature: -20ºC ... +70ºC

Working pressure:

Models with float in titanium: PN40, PN63, 100 bar max depending on density
Models with float in in EN 1.4404: PN40, PN63, PN100 depending on density
Models with float in PVC, PP, PVDF, PTFE: 6 bar max

17.2 AMD limit switch

Aluminium housing

DIN 43650 A connector

Nominal voltage:	8 V
Working voltage :	5 ... 25 V
Power supply internal resistance:	1 kΩ
Current with the vane inside the slot:	< 1 mA
Current with the vane outside the slot:	≥ 3 mA
Standard:	DIN EN 60947-5-6 (NAMUR)
Ingress protection:	IP65
Liquid temperature:	-20ºC ... +250ºC
Ambient temperature:	-25ºC ... +100ºC

17.3 AMM limit switch

Aluminium housing

DIN 43650 A connector

Technical characteristics of the micro-switch:

Maximum switching voltage:	250 VAC
Maximum switching current:	3 A
Hysteresis:	±10% of full scale value
Ingress protection:	IP65
Liquid temperature:	-20ºC ... +250ºC
Ambient temperature:	-25ºC ... +80ºC

17.4 APR limit switch

Polycarbonate housing

DIN 43650 C connector

Technical characteristics of the reed sensor:

Maximum switching power:	60 VA
Maximum switching voltage:	220 VAC
Maximum switching current:	0.5 A
Hysteresis:	±6 mm
Ingress protection:	IP65
Liquid temperature:	-20ºC ... +250ºC
Ambient temperature:	-10ºC ... +70ºC

17.5 AAR limit switch

Aluminium housing

DIN 43650 A connector

Technical characteristics of the reed sensor:

Maximum switching power:	60 VA
Maximum switching voltage:	220 VAC
Maximum switching current:	0.5 A
Hysteresis:	±6 mm
Ingress protection:	IP65
Liquid temperature:	-20ºC ... +400ºC
Ambient temperature:	-10ºC ... +70ºC

17.6 LTE transmitter

Connection by means of IP65 connector, IP67 polycarbonate housing or IP68 aluminium housing

Distance between reeds:	10 mm
Liquid temperature:	-20ºC ... +250ºC
Ambient temperature:	-20ºC ... +60ºC

18 SAFETY INSTRUCTIONS

The series LT of level gauges are in conformity with all essential requirements of all EC directives applicable to them:

2014/68/EU Pressure equipment directive (PED)

Limit switches:

2014/30/EU Electromagnetic compatibility directive (EMC)

2012/19/EU Waste electric and electronic equipment (WEEE).

2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS).

AMM limit switch:

2014/35/EU Low voltage directive (LV)

Equipment for hazardous areas:

2014/34/EU Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX).

The declarations UE of conformity can be downloaded from the section “Download” of the Tecfluid S.A. website www.tecfluid.com

18.1 Pressure equipment directive

Tecfluid S.A. have subjected the series LT of level gauges to a conformity assessment method for the pressure equipment directive, specifically according to module H (full quality assurance).

Conformity with the directive is reflected by the CE marking in each pressure equipment and by the written declaration of conformity. The CE marking is accompanied by the identification number of the notified body involved at the production control phase.

The marking of the equipment takes into account the fluid type, the group of fluid and the category, for example: G1 CATI

G Gases and vapours

1 Group of liquids 1

CATI Category I

Devices that, due to their size, are not subject to conformity assessment, are considered outside the scope of the directive and therefore they have not the CE mark according to pressure directive. These devices are subject to applicable sound engineering practice (SEP).

This equipment is considered as being a pressure accessory and **NOT** a safety accessory as defined in the 2014/68/EU directive, Article 2, paragraph 4.

18.2 Certificate of conformity TR CU (EAC marking)

Tecfluid S.A. have subjected the series LT of level gauges to a certification procedure according to the technical regulations of the Customs Union of the Eurasian Economic Union (EEU).

This Certificate is an official document confirming the quality of production with the standards on the territory of the Customs Union, particularly regarding safety requirements and electromagnetic compatibility.

19 ADDITIONAL INSTRUCTIONS FOR THE ATEX VERSION

This chapter only applies to equipment intended for use in explosive atmospheres.

The equipment with AMM or AMR limit switches can be considered as simple apparatus according to the IEC 60079-11 standard, and thus they do not need to be marked as ATEX.

The equipment with AMD limit switches can be installed in potentially explosive atmospheres as elements of intrinsic safety. These equipment conform with the directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres) as indicated in the EC-type examination certificate and its marking.

19.1 Flameproof enclosure

These equipment conform with the directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres) as indicated in the EC-type examination certificate LOM 05ATEX2010 X, LOM 19ATEX1045 and its marking.

Given that this instrument belongs to group II, it is intended for use in places likely to become endangered by explosive atmospheres, but not in mines.

The category is 2GD, that is, it is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or air/dust mixtures are likely to occur.

19.1.1 Surface temperature

The equipment is certificated as Exd IIC T6.

The maximum possible surface temperature is 85ºC.

For the LTE model, maximum allowed surface temperature depends on the product temperature.

Temperature class	Maximum product temperature	Maximum Surface temperature
T6	80ºC	80ºC
T5	95ºC	95ºC
T4	130ºC	130ºC
T3	150ºC	195ºC

19.1.2 Non metallic parts

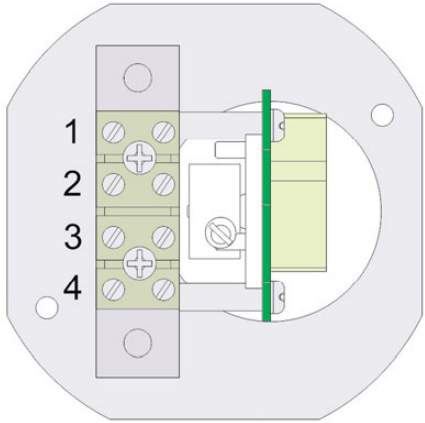
WARNING: POTENTIAL RISK OF ELECTROSTATIC CHARGE

If the equipment has plastic parts, since the danger of ignition by electrostatic discharge can not be avoided, **the instrument must always be cleaned with a damp cloth**.

19.1.3 Electrical connection

The limit switches of the LT series are provided of a terminal block in order to connect the cables.

The connection indications according to each limit switch are the following:



19.1.3.1 LT AMD Exd

Terminal	
1	Earth
2	+
3	-
4	Not connected

19.1.3.2 LT AMM Exd

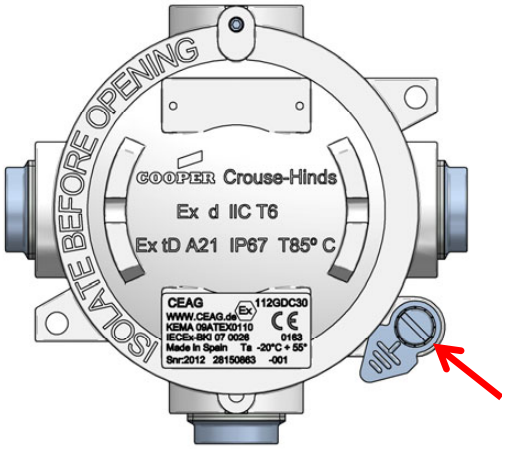
Terminal	
1	Earth
2	Common
3	Normally closed
4	Normally open

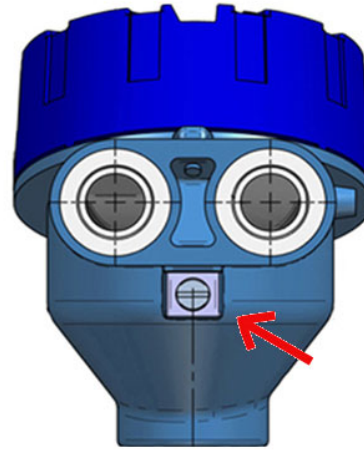
19.1.3.3 LT AMR Exd

Terminal	
1	Earth
2	Common
3	Normally closed
4	Normally open

19.1.4 Connecting conductive parts to earth

When the instrument is not grounded securely through the connection process, it should be grounded through the housing screw, as shown in the figure.





19.1.5 Maintenance

NOTE: Before performing any maintenance that involves opening the flameproof enclosure, make sure that there is no tension in any of its internal components.

Modification or reparation of the flameproof housing is not permitted.

The flameproof seals of the housing should kept greased to avoid corrosion, water ingress and seizing.

19.1.6 Technical characteristics of the ATEX version

Temperature

Ambient temperature: -20ºC ... +40ºC

Electrical connection

Inside the flameproof housing.

Recommended cable

The standard thread supplied for the cable gland is M20 or ¾ "NPT.

ATEX cable glands can be placed for normal cable or armoured cable.

ATEX cable glands can be supplied on request.

The outer diameters of the cables that adapt to the cable glands range from 6 to 21 mm.

The ingress protection of the flameproof housing is IP67.

The maximum process temperature for the LTE model is 150ºC.

The rest of characteristics are the same as in the section 17.

19.1.7 Marking

An example of marking is shown as follows.

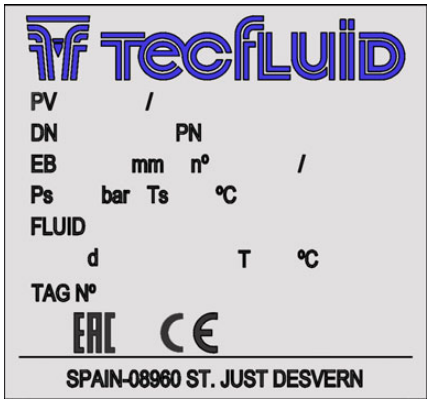
The marking of the equipment shows the following characteristics:

- Manufacturer
- Model
- Serial number
- CE marking
- ATEX marking
- Certification number
- Address of the manufacturer

The marking label is located at one side of the housing, always visible

20 NAME PLATE

Each level gauge is delivered identified with its nameplate.



The different parameters of the plate are the following:

PV: Tecfluid's order number

DN and PN: Nominal diameter and Nominal pressure. These parameters determine the dimensions of the flanges, tubes, etc, according to each standard. They also serve to relate the maximum working pressure at a specific temperature.

EB: Distance between connections of the level gauge.

No.: Serial number.

Ps and Ts: Maximum admissible pressure and temperature. They are the maximum pressure and Temperature for which the level is designed, specified by the manufacturer.

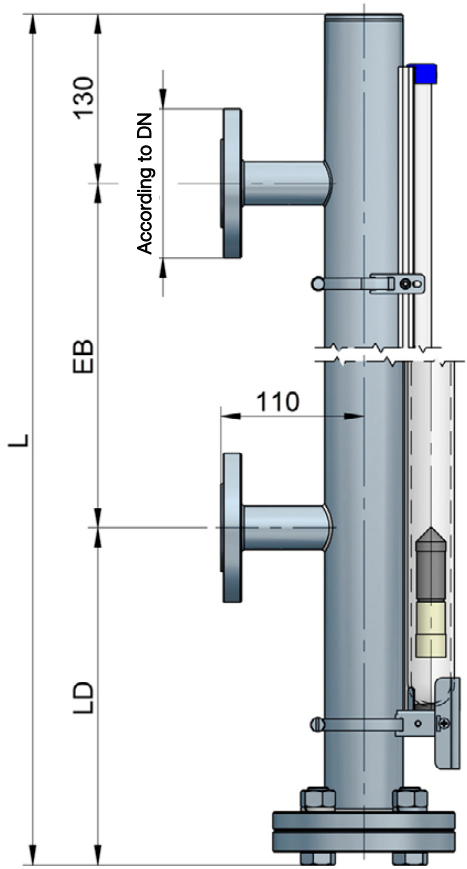
FLUID: Operating liquid, specified by the customer.

d: Density of the liquid, specified by the costumer.

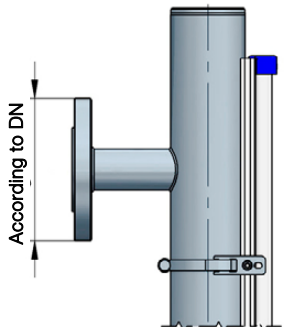
T: Working temperature, specified by the customer.

TAG nº: Tag indicated by the customer to identify the level gauge.

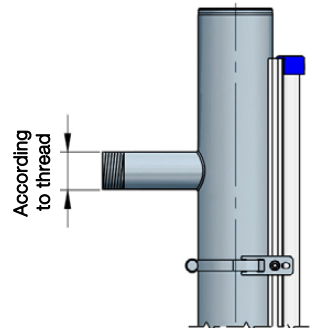
21 DIMENSIONS



LT ... LTL106
LT ... LTL116

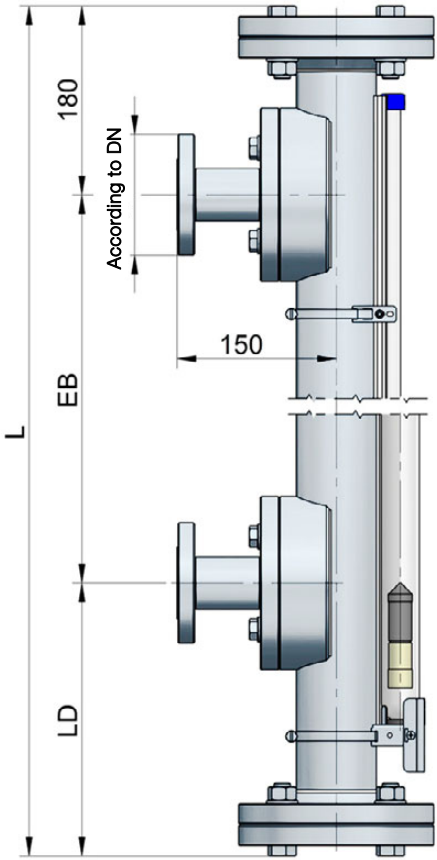


Flanged connection

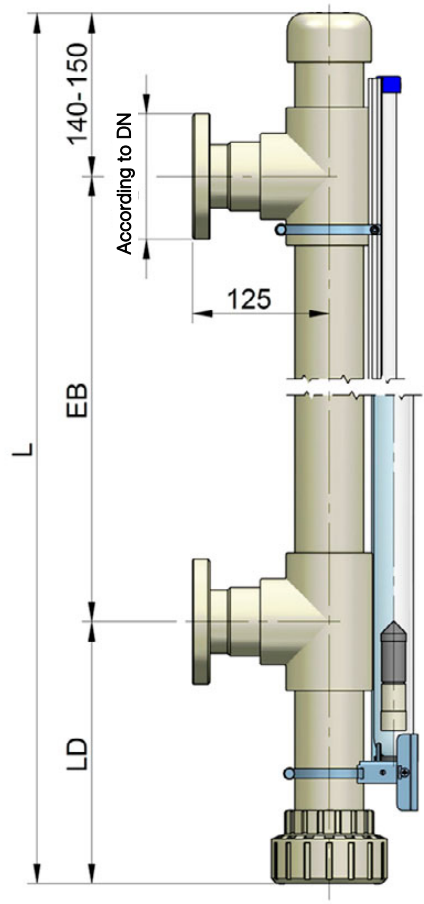


Threaded connection

All dimensions in mm

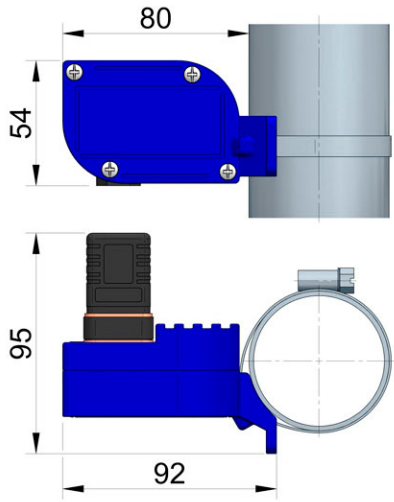


LT ... LTL15 / PTFE

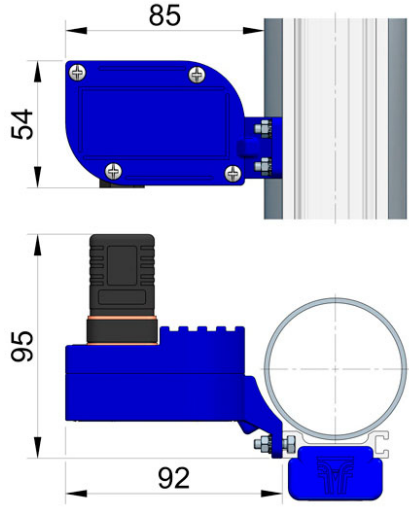


LT ... LTL14 / PP, PVC, PVC-C, PVDF

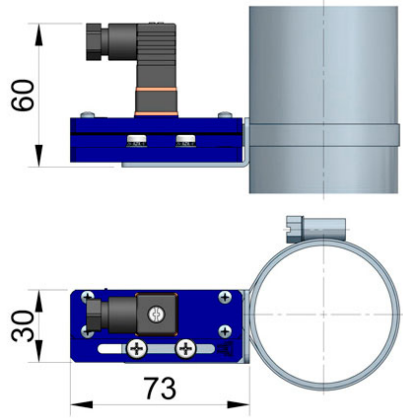
All dimensions in mm



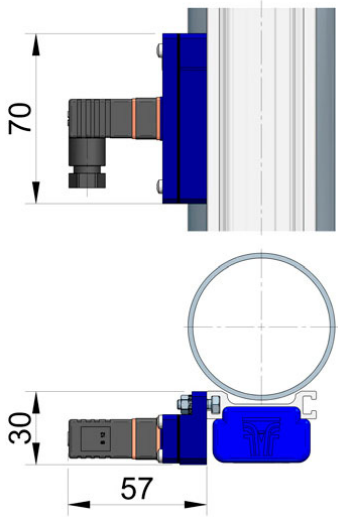
LT-AMM / AMD



LTL-AMM / AMD

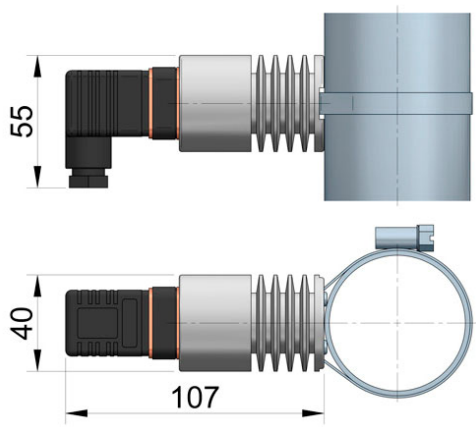


LT-APR



LTL-APR

All dimensions in mm



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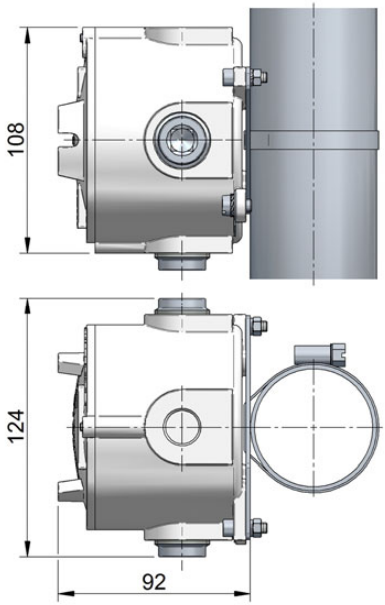
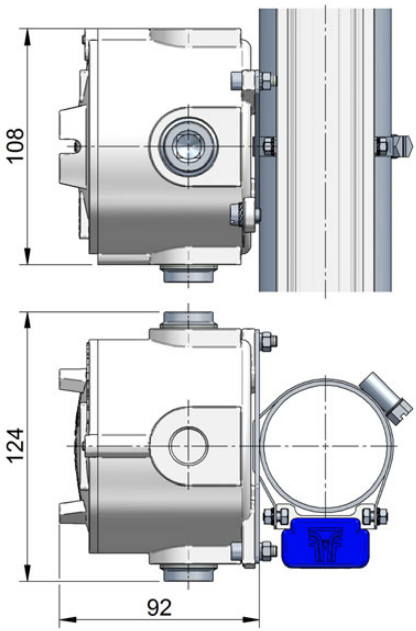


LT-xxx ADF



LTL-xxx ADF

All dimensions in mm

LABORATORIO OFICIAL J. M. MADARIAGA

(1) EC-TYPE EXAMINATION CERTIFICATE

(2) Equipment or protective system intended for use in potentially explosive atmospheres
Directive 94/9/EC

(3) EC-Type Examination Certificate number: **LOM 05ATEX2010 X**

(4) Equipment or Protection System: Level indicators/detectors
Types LT1./....-...

(5) Applicant: TECFLUID, S.A.

(6) Address: Narcis Monturiol, 33
08960 SANT JUST DESVERN (BARCELONA)
SPAIN

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) Laboratorio Oficial J.M. Madariaga (LOM), notified body number 0163 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in confidential report nr. **LOM 04.082 AP**

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
– Standards **EN 50014:1997 + A1:1999 + A2:1999**
EN 50018:2000+ A1:2002
EN 50281-1-1:1998 + A1:2002

(10) If the sign X is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design and construction of this specified equipment or protective system in accordance with the Directive 94/9/EC. Further requirements of the Directive applies to the manufacture and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:
Ex II 2 GD EEx d IIC T6 IP67 T85 ºC

Madrid, 14th February 2005

LABORATORIO OFICIAL J.M. MADARIAGA LOM

Carlos Fernández Ramón
DIRECTOR OF THE LABORATORY

Angel Vega Remesal
Head of ATEX area

ENAC INSPECCIÓN Nº 23/IH037
UNIVERSIDAD POLITÉCNICA DE MADRID
ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA
(Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29 -)
Alenza, 2 - 28003-MADRID • ☎ (34) 91 4421366/ 91 3367009 • Fax (34) 91 4419933 • ✉ lom@lom.upm.es

(A1) SCHEDULE

(A2) EC-Type Examination Certificate: : **LOM 05ATEX2010 X**

(A3) Description of equipment or protective system

Level limit switches/ indicators by float or strips based on an aluminium flame proof head and magnetic coupling. The head is based on a type C3 housing from Cooper Crouse-Hinds with certificate LOM 02ATEX2037. The floats or strips are mechanical elements with linear displacement, installed inside a tube that contains the fluid whose level is measured.

The head can contain different types of electrical or electronic limit switches.

Coding of types LT.1./....-...

- Level indicating code (strips or float)
- Connecting elements material code
- Flange and float material code
- Limit switch code

Electrical characteristics: Maximum voltage: 400 V
Maximum current: 16 V
Maximum power dissipation: 10W

(A4) Test report nr: **LOM 04.082 AP**

(A5) Special conditions for safe use

For the models with a non-metallic parts, electrostatic risks that may occur must be taken into account, limiting its use in places where the formation of electrostatic charges are predictable.

(A6) Individual tests

None

(A7) Essential Health and Safety Requirements

Explosion safe requirements are covered by application of the standards indicated in page 1/2 of this certificate.

(A8) Descriptive documents:

		Rev.	Date
- Description nr.		0	2004-07-21
- Drawings nr.:	P161120235/00	0	2004-11-04
	191110006	0	2004-11-11
	219120007	0	2004-11-04
	219120008	0	2004-11-11
	239560026	0	2004-11-11
	219110003	0	2004-11-04
	219130002	0	2004-11-04
	239420003	0	2004-11-11
	239560024	0	2004-11-11

OFICIAL LABORATORIO J.M. MADARIAGA LOM

UE Declaration of Conformity

Manufacturer: TECFLUID S.A.
Narcís Monturiol, 33
E 08960 Sant Just Desvern

Equipment: Series LT of level switches

Certification: LOM 05ATEX2010 X

Group and category: II 2GD EEx d IIC T6 IP67 T85ºC

Standards to which conformity is declared:

Directive ATEX 2014/34/EU

EN50014:1999	Equipment. General requirements
EN50018:2002	Equipment protection by flameproof enclosures "d"
EN50281-1-1:2002	Electrical apparatus for use in the presence of combustible dust. Part 1-1: Electrical apparatus protected by enclosures – construction and testing

Changes in the current standards regarding the standards mentioned in this declaration of conformity do not affect the EC-type examination certificate LOM 05ATEX2010 X corresponding to this equipment

For production, Tecfluid S.A. complies with the Module D (annex IV) of the directive 2014/34/EU, having the notification for production quality assurance n. LOM 02ATEX9033, of the notified body with identification number 0163 (Laboratorio Oficial J.M. Madariaga)

I, the undersigned, declare that the equipment stated above is in conformity with the essential requirements of the Directives of the European Parliament and the Council on the approximation of the laws of Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

In Sant Just Desvern
Date: July 20, 2017

Esteve Cusidó (R&D manager)

WARRANTY

Tecfluid S.A. guarantee all the products for a period of 24 months from their sale, against all faulty materials, manufacturing or performance. This warranty does not cover failures which might be imputed to misuse, use in an application different to that specified in the order, the result of service or modification carried out by personnel not authorized by Tecfluid S.A., wrong handling or accident.

This warranty is limited to cover the replacement or repair of the defective parts which have not damaged due to misuse, being excluded all responsibility due to any other damage or the effects of wear caused by the normal use of the devices.

Any consignment of devices for repair must observe a procedure which can be consulted in the website www.tecfluid.com, “After-Sales” section.

All materials sent to our factory must be correctly packaged, clean and completely exempt of any liquid, grease or toxic substances.

The devices sent for repair must enclose the corresponding form, which can be filled in via website from the same “After-Sales” section.

Warranty for repaired or replaced components applies 6 months from repair or replacement date. Anyway, the warranty period will last at least until the initial supply warranty period is over.

TRANSPORTATION

All consignments from the Buyer to the Seller´s installations for their credit, repair or replacement must always be done at freight cost paid unless previous agreement.

The Seller will not accept any responsibility for possible damages caused on the devices during transportation.

Tecfluid
The art of measuring

Tecfluid S.A.
Narcís Monturiol 33
08960 Sant Just Desvern
Barcelona
Tel: +34 93 372 45 11
Fax: +34 93 473 08 54
tecfluid@tecfluid.com
www.tecfluid.com

Quality Management System ISO 9001 certified by

Pressure Equipment Directive certified by Lloyd's Register

ATEX European Directive certified by

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