

Instructions manual

Series LU Ultrasonic level transmitter LU9X2



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The art of measuring

R-MI-LU9X2 Rev.: 1 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.

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1 INTRODUCTION

The series LU level transmitters are electronic equipment based on the transmission of ultrasonic waves to measure the distance to a liquid or solid in a vessel.

The microprocessed electronic circuit offers the following features:

- Emission and reception circuits for the ultrasonic signals, and microprocessor treatment.
- Alarm outputs with programmable hysteresis level.
- Programmable current output proportional to the distance or level.
- Quick current range programming by means of internal keys.
- Keyboard and 128x64 pixel graphic display module (optional).

2 WORKING PRINCIPLE

An emitting circuit sends an electrical signal to a transducer that converts it into an ultrasonic signal that propagates through the medium until it bounces off the surface of a liquid or solid. The echo signal travels back until it reaches the transducer again and is converted into an electrical signal.

By multiplying the time it takes for the signal to propagate by the speed of sound in the medium, the travelled distance is obtained.



Distance = $v_{sound} (t_1+t_2) / 2$

3 RECEPTION

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

All the instruments are supplied tested in our facilities.

3.1 Unpacking

Unpack the instrument carefully, removing any remains of the packing .

3.2 Storage temperatures

Sensors of :	PVDF	-20°C +60°C
	PP	-5°C +50°C

4 INSTALLATION

To make the instrument work in the best conditions, it is important that the bottom face of the sensor is installed parallel to the surface of the product to be measured. In the case of liquids, the face of the transducer should be horizontal.

It is important to avoid installing the instrument at the center of the vessel. In some cases unwanted echoes that affect the measurement may appear. The installation at the center is only advantageous in vessels with tapered bottom, since distances can be measured to the bottom.

The LU transmitters should be installed at a minimum distance of the walls of the vessel of about 200 mm, so that they could not give unwanted reflections.

The socket where the instrument is installed should be such that the bottom of the instrument exceeds at least 10 mm below it, as shown in the following figure.



Screw the instrument in the socket with an appropriate key, always by the flat sides for this purpose. The maximum torque is 25 Nm.



Never use the electronics housing for threading the device to the vessel.

Excessive tightening can damage the transducer irreparably.

4.1 Measuring range

The minimum distance that the instrument can measure is called dead zone. If the product gets closer than that distance, the level transmitter indicates an alarm by means of the current loop, that will be 3.6 mA or 22 mA depending on the programming (see point 8.2.1 on page 18). If the instrument has a display it will show the message "Dead zone".



Never work within the dead zone. In certain circumstances, false level readings may occur.

Model	Dead zone	Max. distance (liquids)	Max. distance (solids)
LU912	0.35 m	5 m	2.5 m
LU932	0.55 m	10 m	5 m

In cases where it is necessary to measure distances shorter than the dead zone, a reflector can be installed as shown in the figure.



The measured distance will be the addition of the real distance plus the distance between the transducer and the reflector.

It should be avoided that the product reaches the instrument, since accumulations might form on the transducer, and that would affect the measurement.

4.2 Obstacles in the vessel

The transmitter must be installed so that the ultrasonic beam cannot find anything on its path, as this could lead to unwanted echoes and incorrect measures.

In some cases, inclined reflectors can be placed in front of an obstacle, so that the beam in this region is diverted and the reflected signal does not return to the instrument.



4.3 Filling entries

It is not recommended to install the level transmitter in the upper zone of a filling entry, because the instrument could detect the level of the jet filling instead of the level of the stored product.

4.4 Foams

Some liquids generate foams when in movement. In vessels with agitators, or in the filling processes, important layers can be generated that weaken the reflected signal which is essential for measuring the level.

In a lot of cases the problem of the foam and wave turbulences can be solved by putting a standpipe.

4.5 Standpipe measurement

It can be appropriated in cases of waves or foam. It is based on placing a tube in the tank so that the instrument measures the level inside the tube.

The length of the tube depends on the distance that you want to measure, or the minimum level desired.

The diameter of the tube should be bigger than the threaded connection size of the instrument (> 2 inches or 50 mm for the LU912 and > 2 1/2" or 65 mm for the LU932).

The standpipe should incorporate a drill top vent grilled hole with a diameter between 5 and 10 mm.

If the standpipe is composed of several sections, it is necessary that the inner wall is free from defects (welding, edges, etc.) that could be interpreted as a false measurement. In the same way, if the product is susceptible to leaving adherences or inlaid inside the tube, these can lead to false readings.

4.6 Temperature

In outdoor installations, the measurement margins can be reduced due to environmental conditions such as rain or wind, since the ultrasonic signal that travels through the air can be affected.

It is also recommended to install a protection to avoid direct sunlight on the level transmitter.

The maximum working temperatures are indicated on page 41.



5 ELECTRICAL CONNECTION

For the electrical connection, the LU level transmitter is provided of terminal strips. To help in the wiring of the equipment, the description of the terminals is marked next to each terminal strip.

For the electrical installation it is recommended to use multiple conductor cables with individual cable sections in the order of 0.25 to 0.5 $\rm mm^2$ in order to make it easier to connect.

Before starting the installation, check that the cable glands are the right size for the cables to be used, this will guarantee the instrument will stay watertight. The M16 x 1.5 cable glands used are for cables with outer diameters between 5 mm and 12 mm.

To connect the cables, peel the outer insulation to free the inner cables. Then pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip as indicated in the following point.

Grip carefully the cables with the cable glands to maintain the ingress protection.

Incorrect installation of the cable gland or inadequate cable placement can cause unrepairable damage to the converter.

5.1 Power supply and analog output wiring

Before starting the installation of the equipment, check that the supply voltage available is the same as marked on the label of the level transmitter.

Models LU912 and LU932 are two-wire instruments, that is, the equipment is powered through the current loop.

The positive terminal of the power supply is connected to the position + and the positive terminal of the load to the position -. The negative terminals of the power supply and the load are connected together.



Since it is a 2-wire instrument, the supply and signal line is the same. It is recommended to use a twisted pair wiring or shielded cable to avoid interferences in the current loop.

It is recommended to use a load with a resistance lower than 700 $\boldsymbol{\Omega}$ to guarantee a good performance.



NOTE: The analog output has protection against reversed polarity. Due to another protection against overvoltages, if a loop supply voltage with inverted polarity and higher than 32 V is connected, the equipment may be damaged.

5.2 Alarm outputs wiring



The alarm outputs are connected in the positions D and S of the terminal block.

Outputs are N-channel MOSFET transistor isolated from the rest of the circuit and potential free.



Example of the connection of the alarm output to a PLC

6 OPERATION

6.1 Without display module

The instrument allows programming the current loop limits by means of the 4 mA and 20 mA keys. To do this, the top cover must be remove, previously releasing the DIN913 M3 x 8 safety screw.



The procedure is the following:

Point the equipment to a flat surface and place it at the distance corresponding to 4 mA. Press the 4 mA button until the led blinks (about 4 seconds).

Then place the equipment at the distance corresponding to 20 mA. Press the 20 mA button until the LED blinks (about 4 seconds).

From this moment, the level transmitter will transmit the current proportional to the distance between the two programmed values.

6.2 With display module

The instrument is delivered generally calibrated and programmed to indicate a distance. To change any configuration parameter, the keyboard can be accessed by removing the top cover.

LU level transmitters have a graphic display and 4 keys.



In the following figure the operation of each key is described.



NOTE: The function of the key (Down / Left) that changes to the left digit is done by pressing the key for more than one second.

7 MAIN MENU

To access the main menu of the converter, press the key (Enter). The following screen appears:

MENU	1/6
Installation	
Programming	
Language	
Serial number	
Firmware version	
Contrast	

The "Installation" option allows to configure the instrument, in order to obtain a correct indication. It is explained in Chapter 8 of this manual.

The "Programming" option allows to program all parameters of the converter, as explained in Chapter 9 of this manual.

The "Language" option selects the language in which all the menus will be displayed.

LANGUAGE	2/4
Catalan	
Spanish	
French	
English	

The options "Serial Number" and "Firmware Version" are informative and are discussed in Chapters 10 and 11 of this manual.

Finally, the option "Contrast" allows to adjust the contrast of the information on the screen, to adapt it to the ambient light of each installation.

7.1 Access codes to the menus

It is possible to program a different password for the "Installation" menu and for the "Programming" menu.

By default, the equipment is factory configured with the passwords disabled.

To change any of these passwords, it is necessary to enter the corresponding menu and once inside, access the submenu "Password".

To change the access password of the installation menu, select "Installation" on the main menu and then "Password".

INSTALLATION	5/5
Tank	
Dead zone	
Diagnosis	
Mode	
Password	

To change the access password of the programming menu, select "Programming" in the main menu and then "Password".

PROGRAMMING	6/6
Units	
Decimals	
Filter	
Outputs	
Default screen	
Password	

When the "Password" option is selected, a screen that indicates the password status for this menu appears.



Selecting "enable", the screen to enter the new password appears.



Once entered, the new password is asked again to avoid possible inadvertent error.



If the re-entered password does not match the first one, the following error message appears and the process should be carried out again.

ERROR	
Invalid change	
Password and	
verification do not	
match	

If both passwords match, the following information message is displayed.

INFORMATION

Password enabled

If the password needs to be changed or disabled, the procedure is the same. Once entered the "Password" menu, the following screen appears:

PASSWORD	1/2
Disable	
Change	

If "Change" is selected, the equipment will ask for a password again. If "Disable" is selected, the following message will appear:

INFORMATION	
Password disabled	

8 INSTALLATION PARAMETERS

Power on the electronic converter with the voltage indicated on the label.

Press the (Enter) key in order to enter the main menu.

With the keys (Down / Left) and (Up), select "Installation", and then validate with the key (Enter).

If the instrument has a password enabled, it must be entered to access the menu. For more details about the password, see point 7.1 on page 14.



Once in the "Installation" menu, the first screen allows to choose between the different options.

INSTALLATION	1/5
Tank	
Dead zone	
Diagnosis	
Mode	
Password	

8.1 Tank

First, a screen appears where the bottom and top distances can be selected. These distances allow the instrument to indicate measurements in level mode or percentage mode (see point 9.5 on page 26).



8.1.1 Bottom distance

The bottom distance is the distance between the transducer face and the bottom of the vessel. It allows to calculate el level with respect to that point. This parameter is necessary to visualize data in level mode or percentage mode, because the instrument takes this distance as a reference (see point 9.5 on page 26).



The following figure shows the bottom distance. In case of non flat bottom vessels, the bottom distance should be taken between the end of the instrument, and the desired point of zero level.



8.1.2 Top distance

This distance is necessary to visualize data in percentage mode (see point 9.5 on page 26).



The percentage of filling is calculated given the bottom distance and the top distance (see points 8.1.1 and 8.1.2 on page 17), according to the following equation:

$$\% = \frac{(di - ds) - (d - ds)}{(di - ds)} \times 100$$

di: bottom distance ds: top distance

When the distance between the product and the sensor is "di", the visualized percentage is 0%.



When the distance between the product and the sensor is "ds", the visualized percentage is 100%.

8.2 Dead zone

 DEAD ZONE 1/2
 Dead zone current Dead zone length

In this screen the dead zone current and the dead zone length can be chosen.

8.2.1 Dead zone current

When the distance between the instrument and the product surface is shorter than the minimum measuring distance, that is, when the product is in the dead zone (see section 4.1 on page 7), the instrument can transmit an alarm by means of a value of current out of range. This value can be either 3.6 mA or 22 mA.



When programming this value, the no echo alarm is automatically programmed with the opposite value.

8.2.2 Dead zone length

In some installations it may be convenient to increase the dead zone value. For example, in cases of vertical tube measurement.

In this screen the dead zone distance in m can be programmed.



8.3 Diagnosis

It allows to check some parameters of the instrument quickly.

DIAGNOSIS	1/3
 Alarm 1 Alarm 2 4 mA T=22.6 °C 	есно 86

Pressing the key (Enter) when Alarm 1 or Alarm 2 are selected, this output will be activated or deactivated. When the output is activated, the text is shown as inverse.

DIAGNOSIS	1/3
 Alarm 1 Alarm 2 4 mA T=22.6 °C 	есно 86

Pressing the key (Enter) over 4 mA, the analog output alternates between 4, 8, 12, 16 and 20 mA, which allows to check the analog output adjustment.



In all cases the echo intensity is displayed by means of a value between 0 and 100. This intensity depends on the distance to the target, the type of product where the wave is reflected and the conditions of installation.

If the distance of the product at the time of verification is longer than half the maximum measuring distance, it is normal that the intensity has a low value.

In the event that the distance is shorter, if the value of the intensity is low, it may be due to two reasons:

a) That the product has a high absorption coefficient. This means that an important part of the wave is absorbed by the product and is not reflected to the instrument. In this case, the maximum measuring distance will be shorter than specified in the characteristics of the instrument.

b) That the instrument has not been installed correctly. As the face of the transducer is no longer parallel to the surface of the product, part of the reflected signal does not return to the instrument, thus decreasing the intensity of the echo.

8.4 Operating mode

Distance or level can be selected. The reference point to calculate the level is the one programmed as bottom distance (see point 8.1.1 on page 17).



The instrument will always be working in this mode even if there is a power fail.

Parameters related to the analog output and alarm outputs will be programmed in the chosen mode.

9 PROGRAMMING PARAMETERS

By the programming parameters the visualization and the outputs of the instrument can be configured.

Turn on the converter and press (Enter) to enter the main menu. The following screen appears:



With the keys (Down / Left) and (Up), select "Programming", and then validate with the key (Enter).

If the instrument has an enabled password, it must be entered to access the menu. For more details about the password, see point 7.1 on page 14.

Once in the "Programming" menu, the first screen allows to choose between the different options.

PROGRAMMING	1/6
Units	
Decimals	
Filter	
Outputs	
Default screen	
Password	

9.1 Measurement units

The instrument can indicate the measured distance or level in meters or feet.

UNITS	1 / 2
▶ m	
ft	

9.2 Decimals

In this screen the desired number of decimals for the measured value is chosen.



For the selection of the number of decimals it must be taken into account that an indication with an excess of decimals may give the sensation of instability of the reading.

9.3 Filter

The level transmitter has a filter (damping) to provide stable level and analog output readings.

The configuration of this filter can be very useful in the cases where the readings have some instability (due to waves, foams, solids, etc.).



9.3.1 Filter time

By selecting a filter with a shorter or longer integration time, response to level variation will be obtained in more or less time.



The filter time is selected in seconds, with a minimum value of 1 and a maximum value of 25 seconds. For example, with an integration time of 15 seconds, the display will indicate the average level over the last 15 seconds. This does not mean that the display is refreshing its data every 15 seconds. The display shows a new value several times per second, indicating an average of the level values of the last 15 seconds.

9.3.2 Hysteresis

When there is a sudden variation of the level then the filter should react as fast as possible to give a correct reading of the new value.

On this screen the level variation in m necessary to reset the filter can be programmed.



The filter controls for each reading the deviation of the instant level with respect to the average level. If this deviation exceeds the programmed value, the filter will reset, indicating the instant value, and will start again the filtering process.

For example, consider an instrument measuring an average level of 2.4 m and the programmed hysteresis is 0.04 m.

The filter will continue to give average readings while the instant measured level is within 2.36 and 2.44 m.

9.3.3 Interference time

Sometimes objects that interfere the path of the ultrasonic wave can cause wrong readings. An example is the case where the blades of an agitator can generate unwanted reflected signals.

To avoid these readings, on this screen, the number of seconds that an unwanted object should remain so that the instrument interprets it as correct can be programmed.



For example, if the time is set to 5 seconds, an object that interferes the ultrasonic wave path must remain 5 seconds so that the level transmitter takes this object into account.

9.4 Outputs

In this screen, one of the three outputs to be programmed can be selected: Analog (4-20 mA), Alarm 1 and Alarm 2

OUTPUTS	1/3
▶ 4-20 mA	
Alarm 1	
Alarm 2	

9.4.1 Analog output

The level (or distance) corresponding to 4 mA and 20 mA can be programmed and the calibration for these two values can be made as well.

4-20 mA	1/4
Level 4 mA	
Level 20 mA	
Calibration 4 mA	
Calibration 20 mA	

9.4.1.1 Programming output 4-20 mA





Level (or distance) limits equivalent to each current are entered.

The programmed value for 20 mA can be higher than the programmed for 4 mA or vice versa.

9.4.1.2 Current calibration for 4 and 20 mA

The LU9X2 is delivered with the current output already calibrated. If you want to correct a derive of the 4 or 20 mA current values because they do not coincide with the ammeter used, it can be done by entering the ammeter value and pressing the key (Enter). The ammeter will indicate the new value and the screen will show the values of 4 or 20 mA again in the event the operation needs to be done again. More than one adjustment can be necessary to do a complete calibration.



CAL. 20 mA	
Min: 10mA	Max: 23mA
20.0) () ()



Before making a current calibration, be sure that the ammeter used for that is showing a correct value.

9.4.2 Alarm outputs

When selecting one of the two outputs, the options available for each one appear.

ALARM 1	1/3	ALARM 2	1/3
Level		▶ Level	
Dead zone		No echo	
Disabled		Disabled	

9.4.2.1 Level

In these screens the level (or distance) values at which the alarms will change its status and the level of hysteresis are selected. By level of hysteresis we understand the difference between activation and deactivation of the output. Sometimes the level of a vessel is not stable due to waves generated by agitators, etc. To avoid that an alarm output is continuously moving from activate to deactivate status, we must program the points of connection and disconnection.



Example 1

Suppose we work in level mode. If the output is programmed to activate at 1 m and to deactivate at 0.9 m, when the level is zero the output will be deactivated. When the level reaches a value of 1 m the output will be activated and it will not return to deactivated state until the level falls below 0.9 m.



Example 2

If the output is programmed to deactivate at 1 m and to activate at 0.9 m, when the level is zero the output will be activated. When the level reaches a value of 1 m the output will be deactivated and it will not return to activated state until the level falls below 0.9 m.



9.4.2.2 Dead zone

The alarm will activate when the instrument detects dead zone. It is available for Alarm 1.

9.4.2.3 No echo

The alarm will activate when the instrument does not detect any echo. It is available for Alarm 2.

9.4.2.4 Disabled

The alarm is always deactivated.

9.5 Default screen

The converter presents the selected screen when a power failure occurs or when returning from "Installation" or "Programming" menus.

Three screens can be programmed:



Distance. In this case the screen shows the distance between the sensor and the surface where the ultrasonic wave is reflected.



Level. In this case the screen shows the level or height from a reference, normally the bottom of the tank, to the liquid or solid surface.



To display correctly the level, the parameter "Bottom distance" should be previously programmed (see point 8.1.1 on page 17).

Level %. Displays the percentage of filling.

ō	%mA	100
47	7.3	%
LEVEL %	A1	A2



To display correctly the level in percentage, the parameters "Bottom distance" and "Top distance" should be previously programmed (see point 8.1.1 and 8.1.2 on page 17).

10 SERIAL NUMBER

In this section the transmitter serial number is shown.

SERIAL NUMBER

11 FIRMWARE VERSION

From the main menu, if "Firmware version" is selected, the screen will show this data and the corresponding date.



12 CONTRAST

By means of this option, the screen contrast can be adjusted.



13 OPERATION SCREEN

When exiting the menu, the display shows the operation screen. To scroll between the three operating screens, simply press the key (Up). The three possible screens are distance, level and percentage (see point 9.5 on page 26).

The screens also indicate the alarm output status, if they are enabled (see point 9.4.2 on page 24).

If Alarm 1 is enabled, an "A1" is shown, and if Alarm 2 is also enabled, an "A2" is shown. Depending on the state of the alarms, deactivated or activated, the text format will appear in normal or inverse.



Alarm 1 enabled and deactivated Alarm 2 disabled



Alarm 1 disabled Alarm 2 disabled



Alarm 1 enabled and activated Alarm 2 enabled and activated

13.1 indication of echo in dead zone

In the case that the distance is shorter than the minimum measuring distance, that is, when the product is within the dead zone (see point 4.1 on page 7), the transmitter cannot measure a correct value.

In this situation the instrument replaces the display value with the text "Dead Zone". The analog signal passes as programmed at 3.6 mA or at 22 mA (see point 8.2.1 on page 18), indicating incorrect measurement due to exceeding the minimum distance.

If, in addition, alarm 1 is programmed for dead zone detection, it will be shown as activated in the display.



13.2 Indication of absence of echoes

If the distance is longer than the maximum measuring distance, the transmitter does not receive the reflected signal. In the same way, if the product is not suitable for ultrasonic measurement, it may be the case that there is no signal received.

In this situation the instrument replaces the display value with the text "No echo". The analog signal passes as programmed at 3.6 mA or at 22 mA (see point 8.2.1 on page 18), indicating incorrect measurement due to echo absence.

If, in addition, alarm 2 is programmed for echo absence indication, it will be shown as activated in the display.



14 ASSOCIATED SOFTWARE WINSMETER LU

By means of this associated software, calibration and adjustment of the instrument can be done in a comfortable and intuitive way.

Such software can be downloaded from the "Downloads" section of the Tecfluid S.A. <u>www.tecfluid.com/downloads</u>

14.1 USB cable connection and software installation

Extract the files from the Winsmeter LU.zip to a new system folder.

Execute the Setup.exe file and follow the steps for the installation.

In order to connect the converter to a computer an USB cable is required. This cable is type A at one end and mini USB type B at the other, and it is readily available on the market.

The ends of the cables can be seen in the picture.



The USB connector is located at the opposite side of the cable glands.



Connect the USB cable at one end to the converter and at the other to the computer where the software is installed.

Power on the electronic converter.

Execute the program WinsmeterLU following the sequence Start – Programs – Tecfluid S.A. - WinsmeterLU.

Open Port		Open		_
Installation Passw O	pen	Lock	Current password	The art of measuring
Programming Passwe	ord pen lose	Lock	Current password New password Confirm	

14.2 Port connection

In the "Port" section, choose the appropriate port for the converter. This will appear with the name of the port followed by LU9X2 and its serial number. Then click "Open".

Winsmeter LU		
File Language Firmware	Help	
LU9X2		
Open		
LU9X2 : BH12345	▼ Open	
Installation		
Password		Current password

Once the port is open, the button "Lock" is activated.

File Lan	er LU nguage Firmware Help Installation Programming Visualiza	tion Datalogger		
- Open P	² ort LU9XX: BH12345 ▼	Close	Winsmeter connected to LU9XX Serial number: BH12345	
∼ Install	lation Password Open Cose	Lock	Current password New password Confirm	TECILUID The art of measuring
Progra	anming Password Open Cose	Lock	Current password	

14.3 Password

The LU9X2 level transmitter can be locked so that programming data can be modified only with previous password access.

When the converter is locked, data can be read but not modified.

By default the device is unlocked. All data can be modified by means of the program Winsmeter LU.

To set a password access to a section ("Installation" or "Programming"), the section must be unlocked. To do this, simply press the "Lock" button in the desired section.



Each section can be locked or unlocked independently. Passwords are equally independent for each section.

Once the "Lock" button is pressed, the following window will appear:

USXX Installation Programming Open	aualization Datalogger	
LU9XX: BH12345	Close Serial number: BH12345	
Installation		
Password		
	Password	
Open	Lock	
Close	Confine CFLUII	D
Programming		
Password	Current password	
Open	New password	
Clore	Lock	
01030		
Close		
- Color		

In the "Password" textbox a 4 numeric digit code should be entered, and in the "Confirm" textbox, the code is confirmed to avoid unintentional errors.

Once the password is confirmed, press the "Lock" button and the section ("Installation" or "Programming") will be locked.

The text "Device locked" will appear, and the program returns to the home screen.

Open				
Port LU9XX	(: BH12345 •	Close	Winemeter connected to LU9XX Serial number: BH12345	
Installation				_
	Password	C Lock	Current password	
	Open	Password	Lock	
	Close	Confirm	Device locked	
Programming	3	L		
	Password		Current password	
	Open		New pessword	
	Close	Lock	Confirm	

After accessing back to the port and pressing the "Open" button, the screen shows the textbox to enter or change the locked passwords.

Open				
Por	t 19XX · BH12345	Close	Winsmeter connected to LU9XX	
2			Jenamunuer, prinz343	
Installat	tion			
	Password		Current password	
			New exercised	
	Open		New paseword	
	Close	Lock	Confirm	
			CARTERIN	WF TREEFLUID
				The art of measuring
Program	nming			
	Password		Current password	
	0		New pessword	
	opon			
	Close	Lock	Confirm	

To unlock the section it is necessary to write the correct password and press "Enter" or the "Open" button. The text "Installation enabled" or "Programming enabled" will appear at the bottom of the section

Once a section is enabled, pressing the corresponding button "Unlock", the section will be unlocked.

14.4 Access to "Installation"

To enter to "Installation" window, press the corresponding tab.

Wir	nsmeter LU								
File	Language	Firmware H	Help						
LU9	XX Installation	Programming	Visualization	Datalogger					
	Limits						Mode		
	Bottor	m distance value	•		Top distance value			Operating mode	
	5		m		0.3	m		Level	
	Zona muerta	3							
	Corriente	zona muerta	3.6 mA						
			22 mA		D.z. length				
) 3.6 mA		U.3	m			
	Comente a	ausencia eco	22 mA						
				3.6		Ξi II	allin		
				11/II					
				Th	ie art of m	easur	ring		
					Send				
							-		
Serial r	number: BH123	45							Tecfluid S.A.

Changing the parameters of this window, the functions of the equipment that affect the measurement can be programmed. Once the changes have been made, press the "Send" button to save all data into the device memory.



Note: The installation parameters are always programmed as real distances and their units are meters.

14.4.1 Limits

In this section the values corresponding to the top and bottom distance of the tank can be configured (see points 8.1.1 and 8.1.2 on page 17).

14.4.2 Mode

In the **Mode** section one of the two operating modes can be chosen, distance or level (see point 8.4 on page 20).

14.4.3 Dead zone

The dead zone current and the echo absence current are programmed (see point 8.2.1 on page 18), as well as the length of the dead zone (see point 8.2.2 on page 19).

To transfer the data to the instrument, press the "Send" button. The message "Saving program" will appear in the level transmitter for two seconds. The installation data will be saved in the internal memory.

14.5 Access to "Programming"

To enter the "Programming" window, simply press the corresponding tab.

XX Datalogger Inst	allation Programming	Visualization Datalogger				
Nivel						
Level						
Units		Default screen	Decimals			
m	•	Distance -	3			
Filtro					ivf Tre	Chluii
Filter		Hysteresis	Interferences		The art	of measuring
10	⇒ s	0.04 m	4	s		
Current loop		Nams				
Level for 4 mA		Alam action 1	Activation		Deactivation	
5	m	Level alam 💌	0.3	m	5	
		Alam 2				
Level for 20 mA		Alam action 2	Activation		Deactivation	
0.3	m	Level alarm 🔻	0.3	m	5	m
mA calibration						
	Multimeter value					_
4 mA		Prog. 4 mA			Send	
		95				
	Multimater value	mAO	N	_		
20 mA	Multimoter value	Prog. 20 mA				
		3438				

Changing the parameters in this screen, the different functions of the equipment can be programmed. Once the changes are made, press the "Send" button to save all data into the device memory.

14.5.1 Level

It allows to change the **Units** of measure. Programming parameters that have distance or level units will update their value when those units are changed.

The **Default screen** can be chosen. The instrument will save this screen in memory and it will be loaded when it is powered.

Finally, the number of **Decimals** to display the measured value on the screen can be selected.

14.5.2 Filter

In this box the value in seconds of the **Filter** can be programmed. This filter allows to obtain stable current readings despite of fluctuations of the level (see point 9.3.1 on page 22).

The value of **Hysteresis** is that which indicates when the filter should stop working (see point 9.3.2 on page 22).

In the **Interferences** section, the time necessary for a sudden change of level to be accepted as valid can be programmed (see point 9.3.3 on page 22).

14.5.3 Current loop

In this section the **Distance or level values for 4 mA and 20 mA** can be configured. These values correspond to the current range limits. Therefore, the current loop will give a linear signal between 4 mA and 20 mA when the input signal has a value between the programmed values in these textboxes.

14.5.4 Alarm outputs

In the Alarms textbox, the functionality of the two alarm outputs can be selected.

These functions can be level alarm, dead zone, no echo or deactivated (see point 9.4.2 on page 24).

14.5.5 Current loop calibration

The LU level transmitter is delivered with the current output already calibrated. If you want to correct a derive of the 4 or 20 mA current values because they do not coincide with the ammeter used, it can be done in the following way:

To calibrate the 4 mA point, press the button "4 mA". The transmitter will fix the output to this value. Then enter the current value indicated in the multimeter and press the button "Prog. 4 mA". The transmitter will adjust its output and the multimeter will show 4 mA.

Follow the same steps for the 20 mA point.

Finally, press the "mA ON" button. The current loop will be calibrated.



Before making a current calibration, be sure that the ammeter used for that is showing the real measure.

14.6 Visualization

When the communication with the computer port is established (see section 14.2), the tab "Visualization" opens. This tab lets you view real-time the distance, level and percentage values, as well as the current value of the analog output and the status of the digital outputs if they are enabled.

Winsmeter LU			
File Language Firmware Help			
LU9XX Installation Programming Visualization Datalogger			
Distance			
1,787	m		m
Level	_	The art of measu	ring
3,213	m		
,			
Level (%)			
68,4	%		
Current loop		Alarm 1	
	10,1 mA	Alarm 2	
Temperature 29,2 ≌C			
Serial number: BH12345			Tecfluid S.A.

It is an intuitive tool to verify that the instrument has been installed and programmed correctly.

14.7 Datalogger

In this window the progress of the different variables of the equipment can be registered in a file.

The time between samples, as well as the start and end time of the registry can be selected.

Das Tme Level (m) Detance (X) (X) Level (X) (X) Temperature (X) (X) Current locy (M) 15/03/2017 12/44/04 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/05 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/07 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/07 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/07 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/07 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/10 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/13 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/15 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/15 10.117 1.883 88.0 21.7	Installation	Programmin	g Vieualizatio	on Datalogg	-				
LV 00/2017 12:44:04 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:05 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:05 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:06 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:08 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:08 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:09 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:10 10.117 1.883 88.0 21.7 5.9 15:012/017 12:44:13 10.117 1.883 88.0 21.7 5.9 15:002/017 12:44:16 10.117 1.883 88.0 21.7 5.9 15:002/017 12:44:16 10.117 1.883 88.0 21.7 5.9 1	Data	Time	Level (m)	Distance (m)	Level (%) (%)	Temperature (%C)	Current loc (mA)	p	_
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15/10/2017 12/44.06 10,117 1.883 88.0 21.7 5.9 F 15/10/2017 12/44.07 10,117 1.883 88.0 21.7 5.9 F 15/03/2017 12/44.07 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.09 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.10 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.12 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.12 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.12 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.12 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.16 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.16 10,117 1.883 88.0 21.7 5.9 15/03/2017 12/44.16 10,117 1.883 88.0 <td>15/03/2017</td> <td>12 44 05</td> <td>10,117</td> <td>1,883</td> <td>88,0</td> <td>21,7</td> <td>5,9</td> <td></td> <td></td>	15/03/2017	12 44 05	10,117	1,883	88,0	21,7	5,9		
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15/03/2017 12/44/08 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/09 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/10 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/10 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/12 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/15 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/15 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/16 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/16 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/16 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/16 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44/20 10.117 1.883 88.0 21.7	15/03/2017	12:44:07	10,117	1,883	88,0	21,7	5,9		
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15/03/2017 12/44:16 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/44:17 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:10 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:10 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:0 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:21 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:23 10.117 1.883 0.0.0 21.7 5.9 15/03/2017 12/44:24 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/44:25 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/44:26 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/44:26 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/44:26 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/44:26 10.117 1.883 0.8.0 21.7 5.9 15/03/2017 12/4	15/03/2017	12:44:15	10,117	1,883	88,0	21,7	5,9		Continuous
15/03/2017 12.44:17 10.117 1.803 00.0 21.7 5.9 15/03/2017 12.44:19 10.117 1.803 00.0 21.7 5.9 15/03/2017 12.44:19 10.117 1.803 88.0 21.7 5.9 15/03/2017 12.44:20 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:20 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:21 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:24 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:24 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:24 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:24 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:26 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:26 10.117 1.883 88.0 21.7 5.9 15/03/2017 12.44:27 10.117 1.883 88.0 21.7 5.9	15/03/2017	12:44:16	10,117	1,883	88.0	21,7	5.9		
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15/03/2017 12/44.19 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/0 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9 15/03/2017 12/42/3 10.117 1.883 88.0 21.7 5.9	15/03/2017	12:44:18	10.117	1.883	88.0	21.7	5.9		
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	15/03/2017	12:44:27	10,117	1,883	88,0	21,7	5,9		
15/03/2017 12:44:29 10,117 1,883 88,0 21,7 5,9 Reset	15/03/2017	12:44:29	10,117	1,883	88,0	21,7	5,9		Reset
15/03/2017 12:44:30 10,117 1,883 88,0 21,7 5,9 -	15/03/2017	12:44:30	10,117	1,883	88,0	21,7	5,9	-	

When the "Register" button is pressed, the screen that allows to name the file and select its location appears.

Winsmeter LU				= 0 X		
File Language Firm	ware Help ramming Visualization Dat	talogger				
Data Tr	ne Level Dist	ance Level m) (%)(%)	Temperature Current loop (IC) (mA)			
	Save as	uip + Local (C:)	,		• 4. Butcar Local (C-)	
	Organizar - N	ueva carpeta			j: •	
	Koronicos Solos reciente Solos reciente Descençais Programas Biblictecas Discumentos Discumen	5	Nombre	Facha de modifica Tipo	Tamako	
erial number BHI2345	Videos Videos Equip Autoral (C:) Nombre:					
	Ocultar carpetas	Excel files (*.csv)			Guardar Cano	celar

The created file has CSV format, which can be viewed directly with a spreadsheet.

14.8 Firmware updates

New firmware updates can be published in the website. These updates contain improvements or bug fixes that make that the equipment operates at best conditions.

The updates can be downloaded from the following link at Tecfluid S.A. website:

www.tecfluid.com\downloads

To update the device, go to menu "Firmware" - "Update", and a screen with the button "File" will appear. Pressing this button the file explorer can be accessed. The downloaded file has to be searched there.



Once the file is selected, press the "Program" button. A message "Programming device" will appear.



Progress bar will indicate the process, after which the message "Device programmed" will appear.



From this moment, the instrument already has the new version of Firmware.

14.9 Configuration file

A device configuration backup can be made by saving data into a file. To do this, go to menu "File" - "Save file".

W W	insmeter LU	
File	Language Firmware Help	
0	Load file Programming Visualization Datalogger	
0	Save file	
	Quit	
	Port LU9XX: BH12345 Close 	Winsmeter connected to LU9XX Serial number: BH12345
	Installation Password	Current password

The file is saved in the same folder where the Winsmeter LU software is located.

In the same way, a configuration data file can be loaded into the device. To do this, go to the menu "File" - "Load file", and the file explorer will appear. The file has to be searched there.

The filename is the serial number and the extension is INI.



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NOTE: When the configuration is saved into a file, the stored data are those in the device memory. These data may be different from those shown on the Winsmeter program. To ensure that the data match press the "Send" button in the "Programming" tab.



IMPORTANT: The USB connection is used only for the configuration and commissioning of the device. In no case it is intended to be used continuously, as a normal mode of operation in an industrial environment.

15 TECHNICAL CHARACTERISTICS

Materials

Sensor: PP, PVDF Housing body: Coated aluminium Housing cover: Without display: Coated aluminium With display: Transparent polycarbonate UV resistant

Process connection

LU912: Thread G2 (BSP), LU932: Thread G2 ½ (BSP).

Measuring range

LU912: 0,35 m \ldots 5 m (solids up to 2.5 m) LU932: 0,55 m \ldots 10 m (solids up to 5 m)

Power supply

12 ... 36 VDC, 2-wire system Consumption: Maximum 22 mA

Analog output

4-20 mA or 20-4 mA Measuring error signals: 3,6 mA and 22 mA

Alarm outputs

2, MOSFET transistor N channel potential free. Imax: 200 mA

Measuring indication

Number of digits: 1 integer and 3 configurable decimals Digit size: 9 mm

General characteristics

Ingress protection: IP66/IP67 Ambient temperature range:

With aluminium cover: -40°C ... +70°C With plastic cover: -40°C ... +60°C

Maximum working pressure: 300 kPa (3 bar) Resolution: 1 mm Uncertainty: < 0,25% of measuring range Repeatability: < 0,25% of measuring range

16 SAFETY INSTRUCTIONS

LU level transmitters are in conformity with all essential requirements of all EC directives applicable to them:

- 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).



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

16.1 Certificate of conformity TR CU (EAC marking)

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



Problem Probable cause Solution The product is in "dead zone". The Separate the level transmitter from distance between the level the product whose level you need transmitter and the product is too The display indicates to measure. (see page 7). short. "dead zone" There is an obstacle placed in the Separate the level transmitter from dead zone of the instrument. the obstacle (see page 8). The ultrasonic wave reflected from the surface is very weak because the product has a very low index of Verify that the level transmitter is reflection toward the sensor. the adequate for this application. It can happen with foams, sands, solids The display indicates "no Verify that the bottom face of the echo" level transmitter is installed parallel Bad installation of the equipment. to the surface of the product (see page 7). The sensor is not working within its Verify that the level transmitter is measuring range the adequate for this application. Verify the polarity of the cables of the power supply, check that they Display is off Power supply is not adequate. are well connected to the terminal block and there is voltage between them. Verify the polarity of the cables of the power supply, check that they Power supply is not adequate. are well connected to the terminal block and there is voltage between them. Measured values are not There may be some objects Change the position of the level stable between the sensor and the transmitter so that the object is not product. an obstacle. There are waves on the liquid Increase the duration of the filter surface. (damping) (see page 22).

17 TROUBLESHOOTING





LU932





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.





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Quality Management System ISO 9001 certified by

Pressure Equipment Directive 2014/68/UE certified by

ATEX European Directive 2014/34/EU certified by



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The technical data described in this manual is subject to modification without notification if the technical innovations in the manufacturing processes so require.