USER MANUEL

Model **LP4**

LOOP POWERED
PROCESS METER

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LOOP POWERED **LP4**

Industrial panel meter, loop powered

Digital panel meter, in 96x48mm housing (1/8DIN standard). Accepts 4/20mA signals from active loops. The instrument is loop powered from the input signal. Scalable reading with 4 digits (9999/-1999) with configurable decimal point. Display made of 7 segment red color led for best reading. Front protection IP50 with optional IP65. Connections with plug-in screw terminals.
Configurable fast access menu at front key '**UP**' (5) to maximum and minimum memories, and '*measure*' function. '*Square root*' function to work with differential pressure flow meters. '*Field correction*' function and several display filters to tune reading stability. Configuration with simplified scaling, '*password*' function to block access to the configuration menu.
Designed for industrial use, with potential integration into a wide range of applications, reduced cost, excellent quality and optional customization of the instrument.

1. Material included

The instrument is provided with the following elements:

- 1 x instrument **LP4**
- 1 x plug-in screw terminals
- 1 x quick installation guide
- 1 x set of units labels

2. Installation and start-up

If this is the first time you are configuring this instrument, below are the steps to follow to install and configure the instrument. Read all the manual sections in order to have a full and clear view of the characteristics of the instrument. Do not forget to read the installation precautions at section 17.

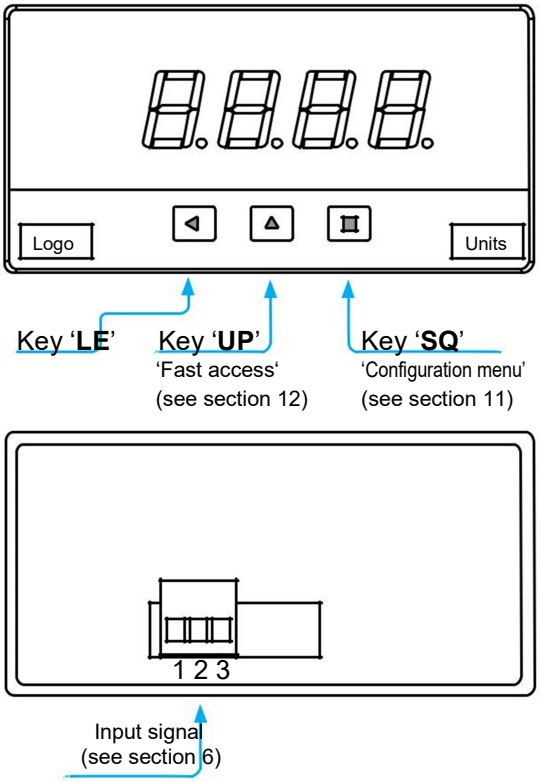
1. Connect the input signal (see section 6). The instrument display will light as soon as the input signal loop is active.

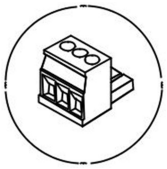
2. To configure the reading, access the '*configuration menu*' (see section 13.1).
3. If needed, block access to the '*configuration menu*' (see section 13.5)

3. How to order

Model	Options	Customization
LP4	-NBT *(no front keypad)*	.XXXX *(customized execution)*
	-65 *(front IP65)*	
	- *(empty)*	

4. Front and rear view





Detail of the plug-in screw terminals provided with the instrument. The instrument is provided with all terminals needed, both male and female.

5. Input signal connections

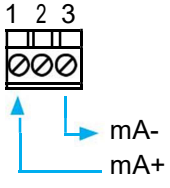
The instrument is '*loop powered*' and needs a minimum current at the input signal to operate (see section 14).

Connect the input signal to terminals 1 '*current input*' and 3 '*current output*' (see Table 1).

The instrument is protected against inverted connections. Inverted connections will not damage the instrument, the loop will remain open and the instrument does not operate (display does not light).

Terminal 2 is not connected. Connecting any of the wires to terminal 2 will not damage the instrument, the loop will remain open and the instrument will not operate (display will not light).

Table 1 | **INPUT signal connections**

INPUT signal	Input terminals			Connections
	1	2	3	
4/20 mA active	mA+ (in)	not connected	mA- (out)	

6. Functions included

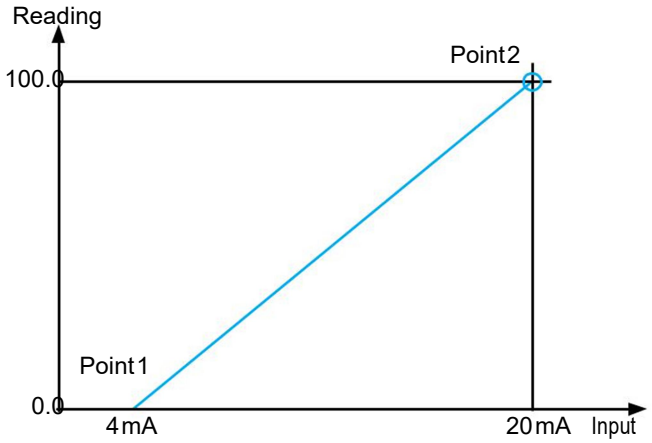
Table 2 | **Functions included**

Function	Description	Section
Square root	Apply a square root to the reading, for example when working with differential pressure flow meters.	13.3
Fast access	Use front key '**UP**' (5) to have a fast access to memory of maximum and minimum, and to '*measure*' function.	13.4
Field correction	Apply the actual input signal to the '*display low*' or '*display high*' parameter.	13.2
Measure	Visualize the actual signal at the input, directly in milliamperes, without scaling, for example for troubleshooting purposes.	13.4
Memory of max. and min.	Visualize the memory of maximum and minimum reading since the last reset.	13.4
Simplified scaling	Simplified scaling, only with '*display low*' and '*display high*' parameters. Access to '*input high*' and '*input low*' is still available at the '*tools*' section.	13.1
Password	Block access to the configuration menu, to non authorized operators.	13.5

7. Simplified scaling

The instrument needs 2 points to scale the reading, as they define a straight line at the '*input vs reading*' graph. By default, the instrument is scaled with a 4/20 mA=0/100.0 configuration. The 2 points are indicated at the graph below (see Table 3).

Table 3 | **INPUT VERSUS READING (4/20 mA=0/100.0)**



'*input low*'=4 mA	'*display low*'=0.0
'*input high*'=20 mA	'*display high*'=100.0

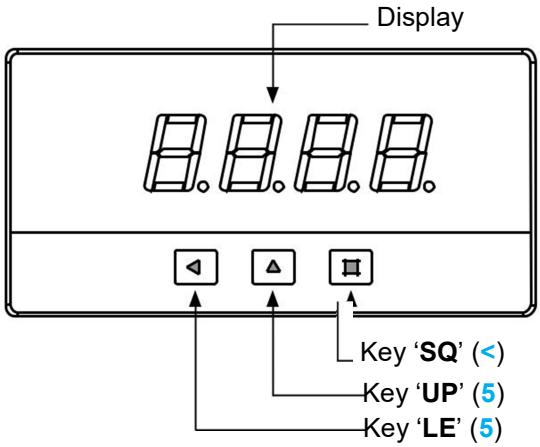
The usual scaling only needs to configure the '*display low*' and '*display high*' parameters (see section 13.1). The '*input low*' and the '*input high*' parameters can still be directly accessed from the '*tools*' menu (see section 13.5) or from the '*field correction*' function (see section 13.2).

8. Configuration system

CONFIGURATION SYSTEM

The **LP4** loop powered process meter is fully configurable from the instrument front panel, through a configuration system made of three push button keypad and the four red digit led display (see Table 4).

Table 4 | **CONFIGURATION SYSTEM**



9. 'Normal mode' of operation

AT POWER-UP

When the input signal loop is connected, the instrument applies the following sequence:

- the '*display*' shows the configured '*input range*' ('**mA**')
- the instrument measures the input signal, applies the configured scaling, and shows the value on display. The instrument is now in '*normal mode*' of operation.

FROM 'NORMAL MODE' OF OPERATION

From '*normal mode*' of operation, the operator can access the following functions:

- key '**SQ**' (<) gives access to the '*configuration menu*' (see section 11)
- key '**UP**' (5) gives access to the '*fast access*' menu (see section 12)

10. How to operate the 'Configuration menu'

HOW TO ENTER THE 'CONFIGURATION MENU'

With the instrument in '*normal mode*' of operation (see section 10), press the '**SQ**' (<) key and maintain for 1 second. The horizontal leds light from bottom to top. When the upper led lights, the instrument enters into the '*configuration menu*'.

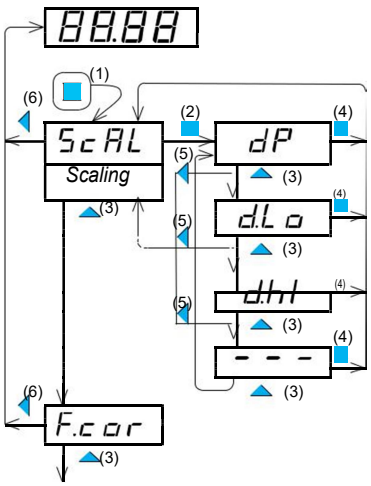
If the '**SQ**' (<) key is released before entering into the '*configuration menu*', the horizontal leds light downwards from top to bottom, and the instrument returns to '*normal mode*' of operation.

HOW TO OPERATE INSIDE THE 'CONFIGURATION MENU'

Inside the '*configuration menu*', use the front keypad to move through menu entries, parameters, and select configuration values:

- **Key 'SQ'** (<) functions as the '*ENTER*' key. It selects the menu entry currently displayed. At numerical value entries, it validates the number displayed.
- **Key 'UP'** (5) moves vertically through the different menu entries. At numerical value entries, it modifies the selected digit by increasing its value to 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
- **Key 'LE'** (3) functions as the '*ESCAPE*' key. It leaves the selected menu entry (discarding changes), and eventually, will leave the '*configuration menu*' (storing changes validated with the **'SQ'** (<) key). When leaving the '*configuration menu*', the changed parameters are stored, the instrument is restarted, and the new configuration is activated. At numerical value entries, the **'LE'** (3) key allows to select the active digit. To modify a numeric value press the **'LE'** (3) key to select the digit to modify, select the '**UP**' (5) key to increase the value '+1', and when all digits are modified, press the **'SQ'** (<) key to validate the new value.

Table 5 | **Example of how to operate inside the 'Configuration menu'**



1. The '**SQ**' (<) key enters into the '*configuration menu*'.
2. The '**SQ**' (<) key enters into the '**ScAL**' menu.
3. The '**UP**' (5) key moves through the menu options.
4. The '**SQ**' (<) key selects the value and returns to the '**ScAL**' menu.
5. The '**LE**' (3) key leaves the actual menu level and moves to the previous menu level.
6. The '**LE**' (3) key leaves the '*configuration menu*'. Changes are applied and saved at this moment.

Note: example indicated above is for information purposes only, and may not match with the actual menu entries of the instrument.

HOW TO EXIT THE ‘CONFIGURATION MENU’

When exiting the ‘*configuration menu*’ without changes (either by ‘*rollback*’ activation or because there are no changes in the configuration), the horizontal leds light down from top to bottom, and the instrument returns to ‘*normal mode*’ of operation.

When exiting the ‘*configuration menu*’ with changes, the display leds light a round shape while the new configuration is stored. When the round shape is finished, the horizontal leds light down from top to bottom and the instrument restarts with the new configuration. The instrument is now in ‘*normal mode*’ of operation.

‘ROLLBACK’ FUNCTION

If there is no interaction from the operator for 30 seconds, the instrument exits the ‘*configuration menu*’ discarding changes, and returns to ‘*normal mode*’ of operation.

11. How to operate the ‘Fast access’ menu

HOW TO ENTER THE ‘FAST ACCESS’ MENU

With the instrument in ‘*normal mode*’ of operation (see section 10), press the ‘**UP**’ (5) key. The instrument enters into the *‘fast access*’ menu.

HOW TO OPERATE INSIDE THE ‘FAST ACCESS’ MENU

The available functions inside the ‘*fast access*’ menu can be configured (see section 13.4). By default, ‘*memory of maximum*’, ‘*memory of minimum*’ and ‘*measure function*’ are available. See section 13.4 for a list of configurable functions.

- press the ‘**UP**’ (5) key to move to the next function.
- press the ‘**SQ**’ (<) key to activate the selected function.

When the function is active, the display remains flashing. Press any key to deactivate the function (display stops flashing).

‘ROLLBACK’ FUNCTION

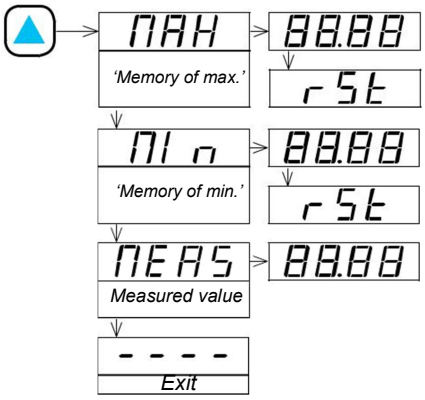
If there is no interaction from the operator for 30 seconds, the instrument exits the ‘*fast access*’ menu and returns to ‘*normal mode*’ of operation.

HOW TO EXIT ‘FAST ACCESS’ MENU

To exit the ‘*fast access*’ menu, press the ‘**LE**’ (3) key, or press the key ‘**UP**’ (5) key until the parameter ‘- - - -’ appears, and select by pressing the ‘**SQ**’ (<) key, or wait without pressing any key until the automatic ‘*rollback*’ activates.

When exiting the ‘*fast access*’ menu, the instrument returns to ‘*normal mode*’ of operation.

Table 6 | **Example of ‘Fast access’ menu with all functions set to ‘on’**



See section 13.4 for a list and a description of available functions.

12. Configuration menu

12.1 Scaling

At the '**Scaling**' (**ScAL**) menu entry, configure the display reading.

See section 8 for a detail on the 2 points associated to scaling.

- at the '**Decimal point**' ('**dP**') parameter configure the position for the decimal point. Use key '**LE**' (3) to move the decimal point position. Press key '**SQ**' (<) to validate.
- at the '**Display low**' ('**d.Lo**') parameter configure the reading associated to an input signal low of 4 mA. Input signal low can be modified by using the '*field correction*' function (see section 13.2) or by direct configuration of '*input low*' parameter (see section 13.5).
- at the '**Display high**' ('**d.hI**') parameter configure the reading associated to an input signal high of 20 mA. Input signal high can be modified by using the '*field correction*' function (see section 13.2) or by direct configuration of '*input high*' parameter (see section 13.5).

12.2 Field correction

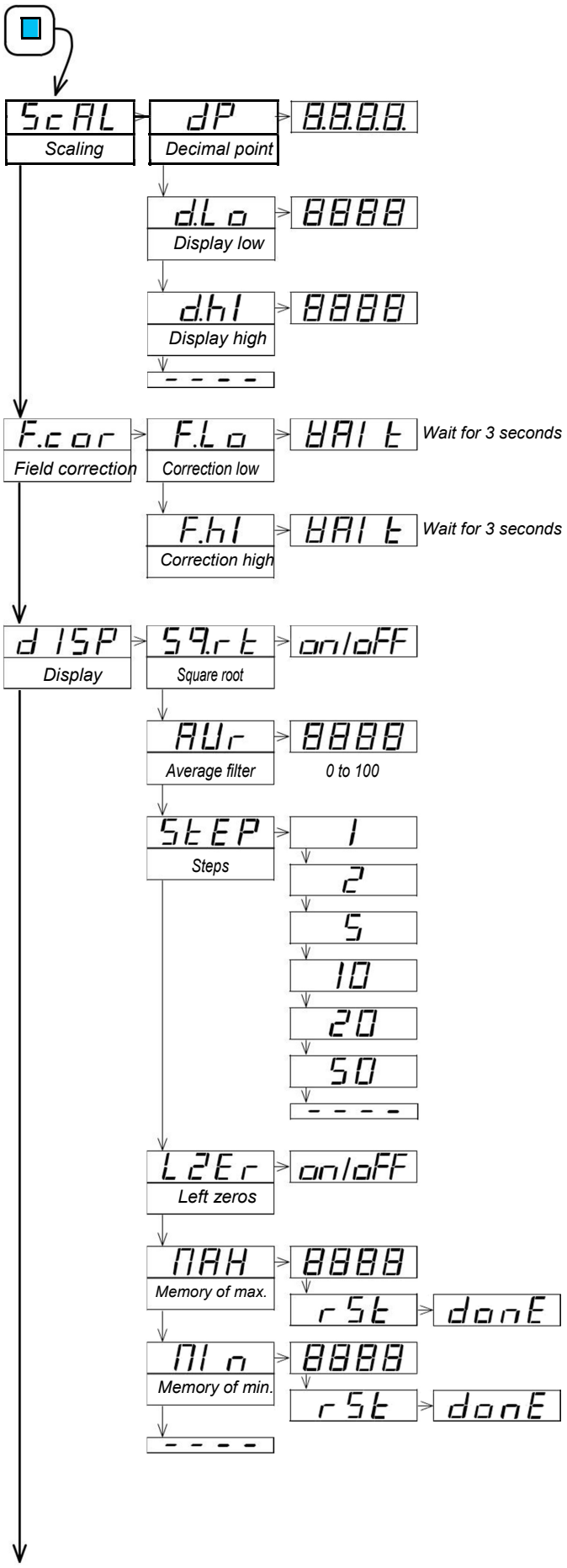
At the '**Field correction**' (**F.cor**) menu entry, access the '*field correction*' functions. Use the '*field correction*' functions to associate the actual input signal at terminals, to the '*display low*' or '*display high*' display values. See section 8 for a detail on the 2 points associated to scaling.

- at '**Correction low**' (**F.Lo**) press key '**SQ**' (<) to activate the function. The display reads '*wait*' while performs the reading of the actual input signal value and associates this value to the '*input low*' parameter. When finished, the instrument goes back to the '**Correction low**' (**F.Lo**) menu entry.
- at '**Correction high**' (**F.hI**) press key '**SQ**' (<) to activate the function. The display reads '*wait*' while performs the reading of the actual input signal value and associates this value to the '*input high*' parameter. When finished, the instrument goes back to the '**Correction high**' (**F.hI**) menu entry.

12.3 Display

The '**Display**' (**dISP**) menu entry groups configuration parameters associated to the display.

- activate the '**Square root**' (**Sq.rt**) parameter to '**on**' to apply a '*square root*' function to the reading. The instrument reads the input signal value in milliamperes, and scales the reading as configured at the '*scaling*' section. Then applies the '*square root*' function to the scaled value. The last action applies the filter values ('*average*', '*steps*', etc) and reads the final value on display. The '*square root*' function is to be applied when working with differential pressure flow meters.
- the '**Average filter**' (**AVr**) applies a recursive filter upon the reading values, in order to reduce oscillations due to noisy signals. Configure the filter strength between '0' and '100'. The filter is stronger with higher values. Value '0' disables the filter. Increasing the strength of the filter slows the reading.
- the '**Steps**' (**StEP**) function configures the reading to be done in steps of 1, 2, 5, 10, 20 or 50 counts.
- the '**Left zeros**' (**LZEr**) parameter activates the reading with active left zeros.



13 Configuration menu (cont.)

• the '**Memory of maximum**' (**MAX**) displays the maximum reading stored on memory. To reset this memory, select the '**rSt**' input. The value can be accessed through the '*fast access*' menu at front key '**UP**' (5) (see section 13.4).

• the '**Memory of minimum**' (**Mln**) displays the minimum reading stored on memory. To reset this memory, select the '**rSt**' input. The value can be accessed through the 'fast access' menu at front key '**UP**' (5) (see section 13.4).

13.4 Key UP (fast access)

The key '**UP**' (5) at the front of the instrument gives access to a configurable list of functions. See section 12 for information on how to operate the '*fast access*' menu.

At the '**Key UP** (**fast access**)' (**K.uP**) menu select which functions will be available when pressing the front key '**UP**' (5). Select '**on**' to activate the desired functions.

• Select '**Memory of max**.' (**MAX**) to activate access to the memory of maximum value, and reset function.

• Select '**Memory of min**.' (**Mln**) to activate access to the memory of minimum value, and reset function.

• Select '**Measure function**' (**MEAS**) to activate an access to visualize the actual input signal value, in milliamperes, without the scaling.

13.5 'Tools' menu

The '**Tools'** (**tool**) menu groups several functions.

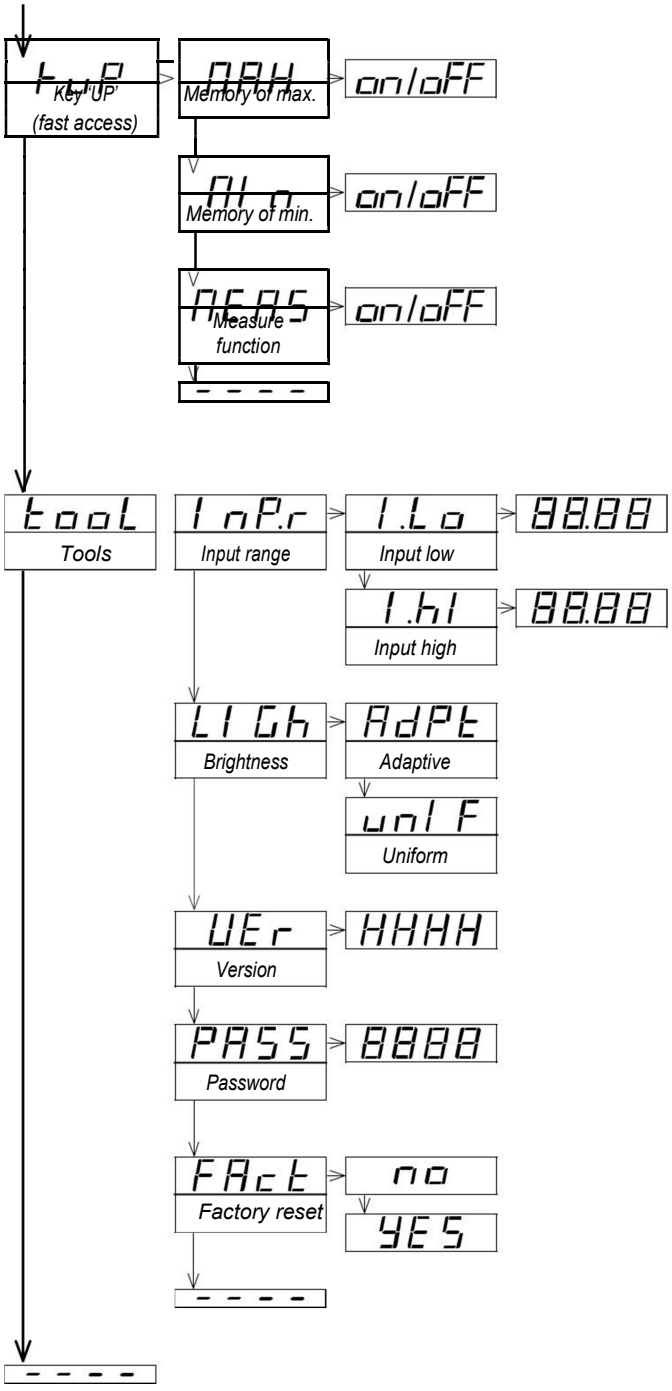
• at the '**Input range**' (**InP.r**) menu entry, manually configure the '*input low*' and the '*input high*' values. These values are by default set to '*4.00*' and '*20.00*' milliamperes, and are associated to the '*display low*' and '*display high*' parameters. See section 8 for a detail on the 2 points associated to scaling.

• at '**Brightness**' (**LIGh**) select '*uniform*' for a constant brightness, independent of the input signal. Select '*adaptive*' to get higher brightness when input signal is higher than 6mA (aprox.).

• the '**Version**' (**VEr**) parameter informs about the firmware version running in the instrument.

• at the '**Password**' (**PASS**) parameter define a 4 digit code to block access to the '*configuration menu*'. Activate the password to prevent access to the instrument configuration by non authorized personnel. To activate the '*Password*' function, enter the code and validate. The password will be requested when entering the '*configuration menu*'. The password does not block access to the '*fast access*' menu. To deactivate the password, set the password value to '0000'.

• at the '**Factory reset**' (**FAct**) parameter select '**yes**' to activate the default factory configuration (see section 19 for a list of factory default parameters).



14. Technical specifications

DIGITS AND READING	
number of digits	4
type	7 segment led
color	red
digit height	14 mm
maximum reading	9999
minimum reading	-1999
decimal point	configurable X.X.X.X.
overrange/underrange	flash on display
display refresh	2 times/second
acquisition per second	2 acquisitions/second
memory retention	values for maximum and minimum reading are stored every 10 minutes
INPUT SIGNAL	
signals accepted	4/20 mA (2 wire)
maximum oversignal	30 mA (signals above this value may destroy the input circuit)
accuracy	±0.1 % F.S. (±1 count)
thermal drift	<150 ppm/ºC
step response	1500 mSec. (0 % to 99 % signal)
POWER SUPPLY	
type	loop powered from the input signal
minimum current to power-up	3.8 mA
voltage drop at terminals	<11 Vdc
wires	0.5 mm_2 to 2.0 mm_2 (AWG20 to AWG14)
CONFIGURATION	
front keypad	3 push buttons
MECHANICAL	
mounting	panel mount
IP front protection	IP50 standard (IP65 optional)
IK impact protection	IK06
connections	plug-in screw terminals (pitch 5.08 mm)
housing material	ABS, polycarbonate (V2)
weight	<110 grams
front size	96x48 mm (1/8 DIN standard)
panel cut-out	92x44 mm
deep	91 mm including terminals
TEMPERATURE	
operation	from 0 to +50ºC
storage	from -20 to +70ºC
'warm-up' time	15 minutes
PACKAGING	
size	116x114x50 mm
material	cardboard
weight	<150 grams

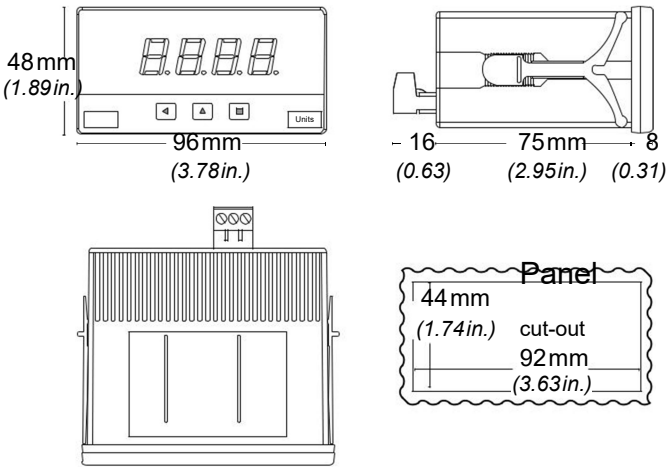
15. Error codes

In case of error, the error code is shown flashing on display. The error codes are not visible while on '*configuration mode*' or in '*fast access*' menu.
The error code remains active on display until the problem that caused the error is solved. In case of multiple error codes, solve the first problem to see the next active error code.

Table 7 | **Error codes**

(Blank)	No display is lightning. The input current is lower than 3.8 mA.
E2	'Hardware overrange'. Input signal is above the maximum readable signal (+10.5 Vdc, +20.5 mA). Possible sensor break.
E3	'Password error'. If 'password' function is active, the password code entered is not correct.

16. Mechanical dimensions (mm/inch)



17. Precautions on installation

CE Instrument conforms to CE rules and regulations.

This instrument has been designed and verified conforming to the 61010-1 CE Security Regulation, for industrial applications. Installation of this instrument must be performed by qualified personnel only. This manual contains the appropriate information for the installation. Using the instrument in ways not specified by the manufacturer may lead to a reduction of the specified protection level. Disconnect the instrument from all external circuits before starting any maintenance and / or installation action.

The instrument does not have a general switch and will start operation as soon as signal is connected and the current is higher than the minimum current needed.

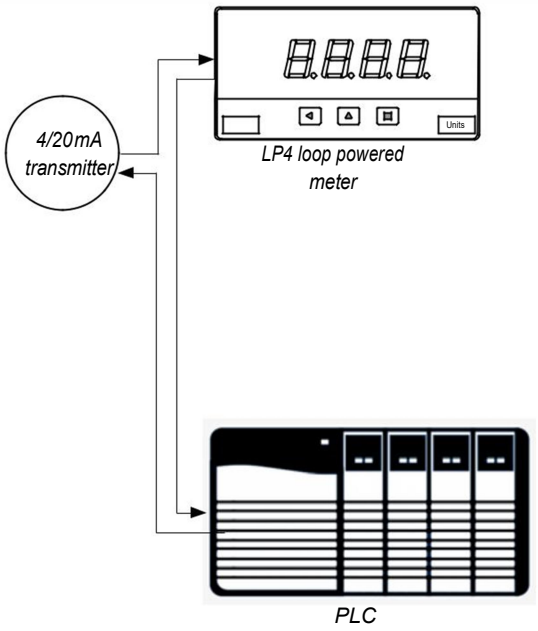
The instrument is designed to be panel mounted. An appropriate ventilation of the instrument must be assured. Do not expose the instrument to excess of humidity. Maintain clean by using a humid rag and do NOT use abrasive products such as alcohols, solvents, etc. General recommendations for electrical installations apply, and for proper functionality we recommend: if possible, install the instrument far from electrical noise or magnetic field generators such as power relays, electrical motors, speed variators, ... If possible, do not install along the same conduits power cables (power, motor controllers, electrovalves, ...) together with signal and/or control cables. In case of fire, disconnect the instrument from the power line, fire alarm according to local rules, disconnect the air conditioning, attack fire with carbonic snow, never with water.

19. Factory default parameters

Scaling	
Decimal point	xxxx
Display low	0
Display high	9000
Display	
Square root	off
Average filter	0
Steps	1
Left zeros	off
Memory of maximum	-1999
Memory of minimum	9999
Key ‘UP’ (fast access)	
Memory of maximum	on
Memory of minimum	on
Measure function	on
Tools	
Input range	
Input low	4.00 [mA]
Input high	20.00 [mA]
Brightness	adaptive
Password	off (0000)

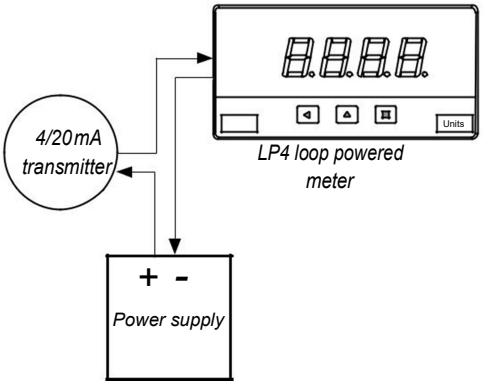
20. Application examples

Table 8 | **Example of LP4 '*loop powered meter*' placed close to the transmitter using the existing loop to the PLC**



The LP4 loop powered meter can be directly inserted into the existing current loop that connects the trasmitter and the PLC. Just cut the loop, and connect the LP4. Place it close to the transmitter to provide instant information to the local operator and maintenance personnel.

Table 9 | **Example of LP4 '*loop powered meter*' placed close to the transmitter**



The LP4 loop powered meter can be used to for local visualization of the transmitter reading.

21. Options and accessories

21.1 Other options

21.1.1 Option NBT

Instruments without front keypad. To configure the instrument, remove the meter from the panel and remove the front filter. Internal press buttons for configuration are accessible. Optionally, request the instrument preconfigured from factory.

Without front keypad

21.1.2 Option 65

O-ring for IP65 front protection

21.1.3 Option 'customized'

Instruments can be adapted to your needs :

- improved technical specifications
- custom configurations
- special functions
- ...

22.2 Accessories

22.2.1 Adapter DRA-M

Adapter for DIN rail mount, for 96x48mm panel meters.

22.2.2 Adapter KA96

Adapter 96x96mm for 96x48mm panel meters

22.2.3 Protector KIP

Removable front cover for additional mechanical and IP65 front protection.

22.2.4 WME wall housing

Wall mount housing. Together with the KIP protector, offers a full IP65 protection. For for 96x48mm panel meters.

22.2.5 THM benchtop housing

Benchtop housing for for 96x48mm panel meters. Handle with three selectable positions. Power connector with manual switch and fuse holder.

22.2.6 Set of units (included)

Set of labels 'Vdc', 'Vac', 'Adc', 'Aac', 'mVdc', 'mVac', 'mAdc', 'mAac', '%', 'ºC', 'ºF', 'ph', 'm', 'cm', 'mm', 'bar', 'psi', 'Pa', N', 'Ω', 'KΩ', 'W', 'kW', 'MW', 'kV', 'kA', 'm/min', 'rpm', 'l'

(1 set included with each instrument)