Sensopress LCD

User Guide

MAC3
WATER MEETS TECHNOLOGY

CE

Made in Italy

Cod. /620020102 Dis.7208 Rev.00 06-2015 Eng

1 WARNINGS

	**DANGER** Risk of persons and things injury if you do not comply with requirements **ELECTRIC SHOCK** Risk of electrical shocks if you do not comply with requirements
	**WARNING** Risk of damages to property or to the environment if you do not comply with requirements.

	**WARNING** Before installing and using the product read this book in all its parts. Installation and maintenance must be performed by qualified personnel in accordance with current regulations. MAC3 will not be held responsible for any damage caused by improper or prohibited use and is not responsible for any damages caused by a not correct installation or maintenance. The use of non-original spare parts, tempering or improper use, make the product warranty null.
	**WARNINGS** Sensopress LCD must be installed following the description on the “Installation” paragraph. Sensopress LCD is an electric device, possible water seepage in contact with the electrical components can be damaging.

	**DANGER** Sensopress LCD is CE labelled but in the case of wrong installation can cause electromagnetic interference. Verify the correct operation of other electronic devices with Sensopress LCD on and running. Malfunction of equipment can be harmful to people and property. In the case of electromagnetic interference stop the plant and contact technical support. Before any intervention make sure Sensopress LCD is disconnected from the electricity supply. Do not attempt operations with Sensopress LCD open. The connection of Sensopress LCD to the electric panel must be carried out by qualified personnel in accordance with current norms . Sensopress LCD must be connected to an efficient ground system.

2 GENERAL REMARKS

This manual intends to provide essential information for the installation, use and maintenance of the product Sensopress LCD.
It's important that the user and / or installer reads this manual in all its parts before installing and using the product.
An improper use may lead to failures and loss of guarantee.
Please always specify the exact model number parts to our sales and assistance service when asking for technical information or spare parts to our trade and assistance service.
there are to be requested technical information or spare parts
For instructions, situations and events not covered by this manual, please contact the customer service.

2.1 Product description

Sensopress LCD is a measuring and high-tech electronic level controller that can be used in sandy drinkable waters, in liquid food products or if availing oneself with an adequate plant design, it can also be used in filthy waters or corrosive liquids.
The measurement is committed by a very perceptible pressure sensor. Its signal once transformed and elaborated by a microcontroller is converted in “height of water column” measured in water cm.
Note: all the visualized values are in mBar. The correct value in water cm is obtained by augmenting the pressure in mBar of 2 % (1.973 % a 4°C).

Sensopress LCD can be produced in two versions: with a single output or with 4 outputs in the multichannel version.
Sensopress LCD is a device which allows to start a relay (4 relays in the multichannel version) in function of differential threshold levels set-up in the data storage by the user.

2.2 Advantages and Benefits

Thanks to its LCD display in which they are visualised all the information concerning the device and to the three function keys with which it is possible to interact so that to change the parameters, Sensopress LCD can be easily used.
Sensopress LCD in the multichannel version, by using just a sensor, allows to supervise the start of 4 relays in function of 4 different differential threshold set-up by the user.

2.3 Operating Conditions

- Room-temperature: between +5°C and +40°C
- Maximum relative Humidity: 50% to +40°C (no condensation)
- Sensopress LCD must be installed in locations protected from bad weather and frost.
- The Sensopress LCD sensor can be used in waters free of chemically aggressive substances (ph 5÷9)
- Sensopress LCD sensor cannot be used with abrasive liquids, solid fibrous substances, flammable explosive or aggressive liquids.

2.4 Technical features

Power Supply	**TSL00Y0100**		**230V~ 50 ÷ 60 Hz**
	TSL00Y0400		**230V~ 50 ÷ 60 Hz**
	TSL00X0100		**117 V~ 50 ÷ 60 Hz**
	TSL00X0400		**117 V~ 50 ÷ 60 Hz**
Consumption	5,5 VA		
Visualisation	LCD 2x16		
Operating temperature	0 ÷ +50 °C		
Storage Temperature	-10 ÷ +60 °C		
Measuring range	-0.020 ÷ 9 m H_2O		
Maximum overpressure	20 m H_2O		
Accuracy of measurement	± 1% FS		
Resolution	1 cm H_2O		
Minimum differential obtainable	2 cm H_2O		
Output Relays	**TSL00Y0100**	n° 1	(10A 250V~)
	TSL00Y0400	n° 4	n° 1 (10A 250V~) + n° 3 (2A 250V~)
	TSL00X0100	n° 1	(10A 250V~)
	TSL00X0400	n° 4	n° 1 (10A 250V~) + n° 3 (2A 250V~)
Housing	NORYL UL94V0		
Dimensions	105x90x73 mm		
Weight	450 g		
Protection degree	IP20		
Approval	CE		

Sensors for Sensopress LCD	
Code	**PRS00B1A1M20000**
Housing	BRASS
Principle operation	Ceramic Capsule piezoresistive, calibratedand temperature compensated
Dimension	32x76 mm
Weight	840 g
Cable	PVC (2 fili + compensation tube) [o PU + SCREEN at instance]
Cable length	20 m
Installation	In or outside the water tank
Measuring range	0 ÷ 9 m H_2O
Maximum overpressure	20 m H_2O
Temperature	0 ÷ 50 °C
Storage	15÷30 V 20mA max (as from equipment)
Output	4÷20mA Rt=250 Ohm max (as on the device)
Long term stability	± 0,3%f.s./year at 25°C
Thermal Shift of zero	± 0,02%f.s: /°C
Thermal Shift of span	± 0,01%f.s./°C
Note	It can be used in every kind of water with ph between 5 ÷ 9. For the use with different liquids, please contact the factory.

3 INSTALLATION

- Avoid places where it can be possible the formation of condensation.
- Avoid places where the temperature can decrease under (0°C).

3.1 Electrical Connection

The device is provided with a terminal to which is possible to connect the Sensopress LCD supply wires and also the connecting sensor's wires and those of the relay's output.

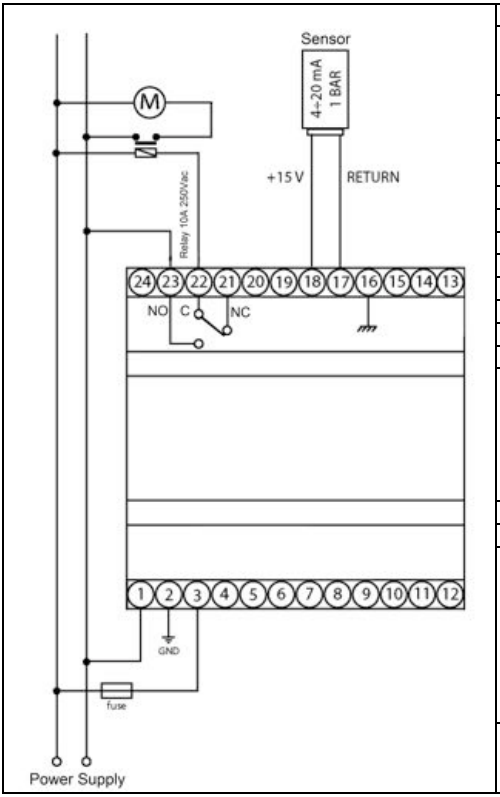
ATTENTION:

All the inner parts of the device are on electricity grid. In case of a contact can bring to death.

All installation and maintenance work must be performed by qualified personnel with proper tools!
The staff must use appropriate safety devices. In case of failure, disconnect or turn off the power supply.

Safety devices :
- Ground protection
- Use an automatic residual-current device

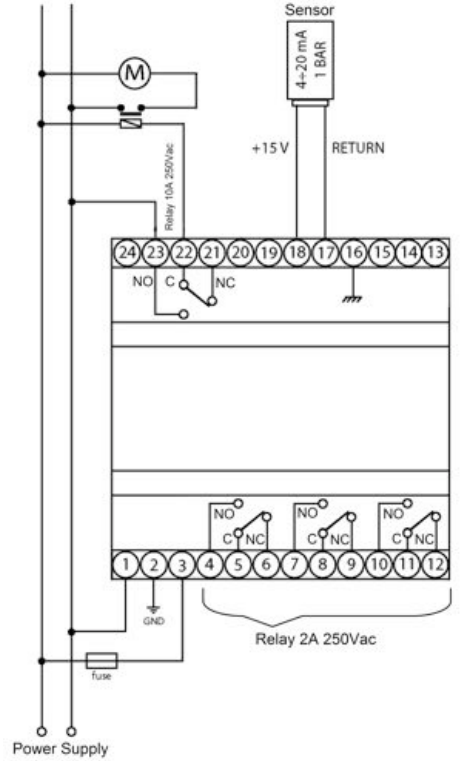
Below the diagrams of the electric connection for the two versions, the one with 1 output and other with 4 outputs.



Function	Terminal	Description	
Supply	1	Neutral	N
	2	Ground GND	⏚
	3	Fase	L
	4	--	
	5	--	
	6	--	
	7	--	
	8	--	
	9	--	
	10	--	
	11	--	
	12	--	
	13	--	
	14	--	
	15	--	
Sensore	16	Sensor Mass *	⏚
	17	Riturn Sensor	RETURN
	18	Supply Sensor	+15V
	19	--	
	20	--	
Relay Output 10A 250Vac 10A 30Vdc	21	Contact Normally Closed **NC**	
	22	Contact Common **C**	
	23	Contact Normally Open **NO**	
	24	--	

Figure 1. Connections for the version with a single output (TSL00Y0100 e TSL00X0100)

* For the sensor with the PVC cable, the sensor's ground is the brown wire, for the sensor with the polyurethane cable PU + screen is the braided shield one.



Function	Terminal	Description	
Power Supply	1	Neutral	N
	2	Ground GND	⏚
	3	Fase	L
Relay Output 2 2A 250Vac 2A 30Vdc	4	Normally Open**NO**	
	5	Common **C**	
	6	Normally Closed **NC**	
Relay Output 3 2A 250Vac 2A 30Vdc	7	Normally Open **NO**	
	8	Common **C**	
	9	Normally Closed **NC**	
Relay Output 4 2A 250Vac 2A 30Vdc	10	Normally Open **NO**	
	11	Common **C**	
	12	Normally Closed **NC**	
	13	--	
	14	--	
	15	--	
Sensor	16	Sensor Mass *	
	17	Riturn Sensor	RETURN
	18	Power Supply Sensor	+15V
	19	--	
	20	--	
Relay Output 1 10A 250Vac 10A 30Vdc	21	Normally Closed **NC**	
	22	Common **C**	
	23	Normally Closed **NO**	
	24	--	

Figure 2. Connections for the version with 4 Outputs (TSL00Y0400 e TSL00X0400)

* For the sensor with the PVC cable, the sensor's ground is the brown wire, for the sensor with the polyurethane cable PU + screen is the braided shield one.

4 OPERATION AND USE

With Sensopress LCD, is possible the managing of a differential threshold for the liquid control (4 differential threshold with the multi-channel version).

After having accomplished accurately the electric installation is possible to proceed with the starting of the device.

Sensopress LCD has a liquid crystal display in which is possible to visualize all the informations concerning the device. It has also three buttons with which is possible to interact and change the parameters. With these is possible to determine the intervention points in which to start or to turn off a control relay (4 in the multi-channel version), of any other power device (pump, engine), or warning device (lights, alarm, etc) which have compatible features with those of the device's relay (relays in the multi-channel version) of the device (look at next table).

Output Relay	Single Output Version	Multi-channel versione
Channel 1	10A 250Vac / 10A 30Vdc	10A 250Vac / 10A 30Vdc
Channel 2	Not present	2A 250Vac / 2A 30Vdc
Channel 3	Not present	2A 250Vac / 2A 30Vdc
Channel 4	Not present	2A 250Vac / 2A 30Vdc

In the single output version the relay turns on in function of the set differential threshold levels. The relay turns on when the liquid reaches the high threshold and it turns off when the liquid while decreasing reaches the low threshold.

In the multichannel version we have 4 relays available which can manage 4 different and indipendent differential thresholds. The relays turn on when the liquid reaches the threshold level set up for that channel and they turn off when the liquid decreases to the set up low threshold level, always related to that channel.
There is the possibility to disable the relays of the channel one does not want to use. The relay of the disabled channel does not commute, regardless of the threshold levels.

4.1 Front Panel Sensopress LCD

When it turns on the device's display shows the name of the manufacturer MAC3, the software version V20 and the product name SENSOPRESS

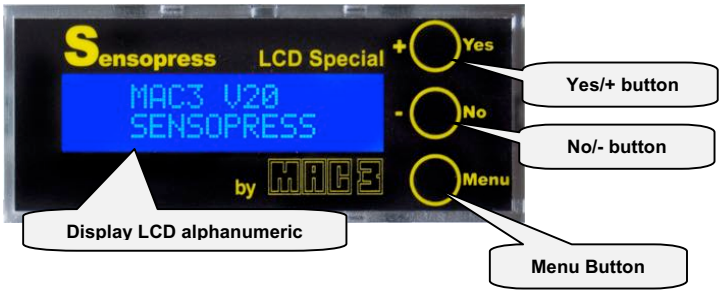


Figure 3

4.2 Visualization Menu

4.2.1 Auto Mode

Just after the initial frame the device shows the frame corresponding to the **AUTO** Mode.
The auto mode shows, how it is indicated in Figure 4, the following parameters:

- The chosen channel (in the single output version is only CH:1)
- The relay's state corresponding to the chosen channel is specified on the display (on: |; off: o). In Figure 4 the relay is on.
- The measure in centimetres of the liquid's level. (274 cm in Figure 4).
- The low intervention's threshold referred to the chosen channel and specified on the display. In Figure 4, the low threshold for channel 1 is 99 cm .
- The high intervention threshold referred to the chosen channel and indicated on the display. In Figure 4 the high threshold for channel 1 is 301 cm.

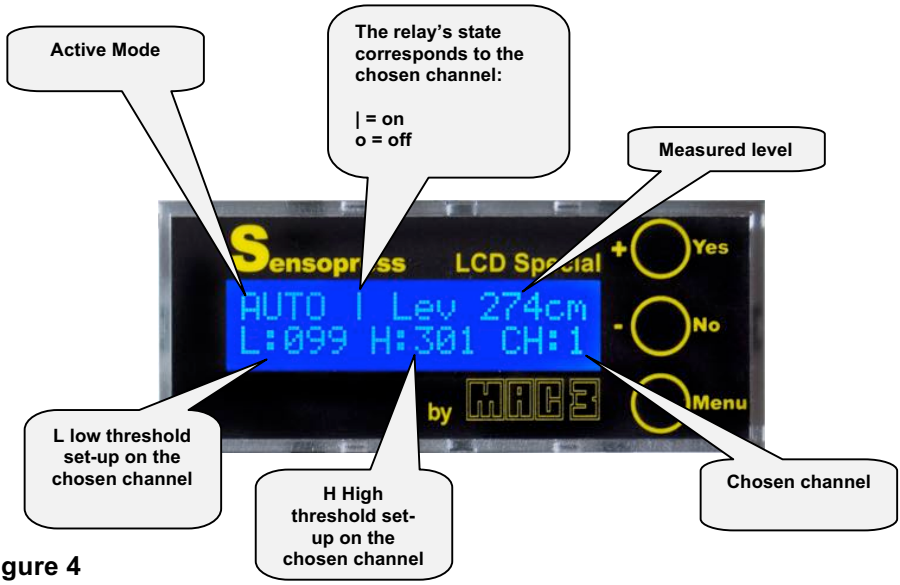


Figure 4

In the **AUTO** mode the function buttons **Yes/+**, **No/-** are not turned on

By pushing the **Menu** button it is possible to watch the current mode and the request of transfer to other modes, how is specified in the example of Figure 5.

Figure 5

The auto mode is the default one, and if the device is in a different mode, after some minutes of inactivity it goes on the **AUTO** mode.

After the choise of the wanted mode with the **Menu** button, push button **Yes/+** to enter it.

4.3 Setting menu

By pushing the Menu button it is possible to choose between the different modes of visualising and to set-up the device.
in particular there are the following modes:

Mode	***Accomplished Operation***
AUTO	Indicates : • The water's level in the tank • The chosen channel • The low and the high threshold set-up for the chosen channel • The relay's state of the chosen channel
CHANNEL	***Only with the multi-channel version*** • Channel selection both for visualization in **AUTO** and for the set-up of the intervention's threshold in **LOW** and **HIGH**. • Enabling and disabling of the channels
LOW	Set-up of the low threshold for the chosen channel
HIGH	Set-up of the high threshold for the chosen channel
MANUAL	Manual set-up of the outputs
DISPLAY	Display's backlight adjustment
PROTECT	Insertion of the device's protection
CALIB	Fine-tune the water's level scale

4.3.1 CHANNEL Mode

This mode is possible only with the multi-channel version and it is used for :

- To enable or not the wanted channel.
  - *!Attention: if the channel is disabled, the corresponding relay, even if the liquid's level oversteps the set-up thresholds for that channel, does not get active.*
- Choose the channel to modify the intervention thresholds.
- Choose the channel to visualise when in the **AUTO** mode.

It is possible to enter the **CHANNEL** mode from any other mode, by choosing the sign **GO to CHANNEL** with the **Menu** button and by pushing **Yes/+**.

To enable/disable the channel:

- Choose the channel by pushing the button **Yes/+**, the chosen channel is indicated on the low left side of the display as shown in Figure 6.
- Push the button **No/-** to enable/disable the indicated channel. The indication of the channel's state is visualized on the low right side of the display as shown in Figure 6.
- In particular:
  - **ACTIVE** = enabled channel
  - **INACTIVE** = disabled channel

The channel that stays chosen on the display, no matter if active or not, is the one visualised in the **AUTO** mode and it is the one on which it is possible to change the thresholds in **LOW** and **HIGH** mode.

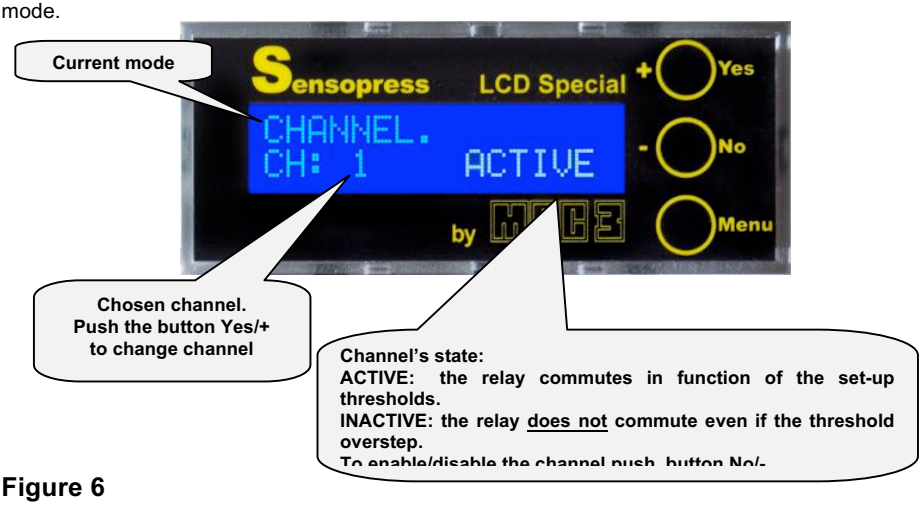


Figure 6

4.3.2 LOW Mode

This mode is necessay for choosing the low threshold of intervention for the chosen channel.
It is possible to enter the **LOW** mode from whatever other mode by choosing the sign **GO to LOW** with the button Menu and by pushing **yes/+**.

The **LOW** mode allows to set-up the minimum point of intervention. On the display it is shown the chosen channel ready to be modified (in the single channel version it is shown LOW), the current minimum threshold identified by the user (HIGH: 638 cm in Figure 7) and the minimum level to be set-up (Low Level: 012 cm in Figure 7). By pushing the **Yes/+, No/-** buttons it is possible to increase or decrease the wanted minimum threshold; the minimum threshold cannot exceed the maximum one; if by mistake the minimum threshold overtakes the maximum one, the value of the minimum one will start again from 000. With the **Menu** button it is possible to memorize the set-up value and to pass to the changing state request; if no button is pushed, the device after a few minutes goes to the **AUTO** state.

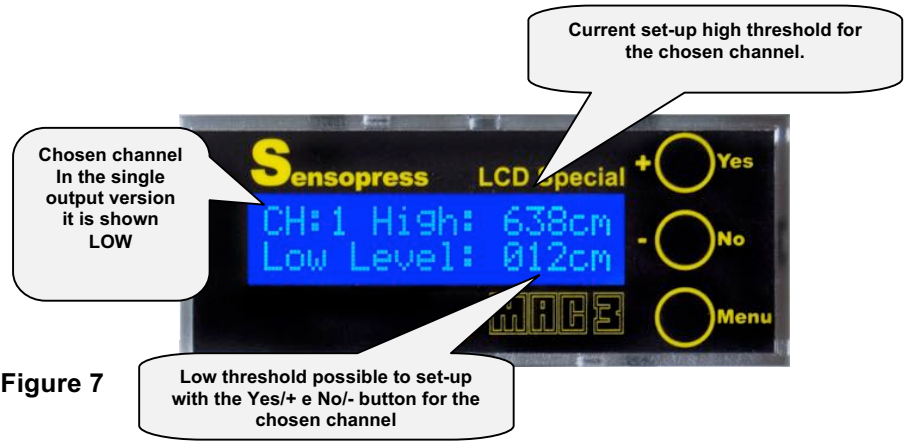


Figure 7

To set-up the low threshold of a channel which is not the selected one it is necessary to go to the **CHANNEL** mode and choose the wanted channel by following the instructions described in paragraph **4.3.1 CHANNEL Mode.**

4.3.3 HIGH Mode

This mode is necessary for setting-up the high threshold of intervention for the chosen channel.
It is possible to enter the **HIGH** Mode from whatever Mode by selecting the sign **GO to HIGH** with the **Menu** button and by pushing **Yes/+**.

The HIGH Mode allows to set-up the maximum point of intervention. On the display it is shown the selected channel ready to be modified (in the version with a single output it is shown HIGH), the current minimum threshold (LOW: 099 cm in Figure 8) and the maximum level to set-up (HIGH

LEVEL: 301 cm in Figure 8). By pushing the **Yes/+, No/-** buttons it is possible to increase or to decrease the wanted maximum threshold; the maximum threshold cannot be lower than the minimum one; if this gets reached the device will start again from the point 899 cm; with the **Menu** button it is possible to memorize the set-up value and it is possible to go to the changing state request; if no button is pushed the device goes to the **AUTO** state.

Figure 8

To set-up the high threshold of a channel which is not the chosen one it is necessary to go to the CHANNEL mode and choose the wanted channel by following the instructions described in paragraph 4.3.1 **CHANNEL Mode**

4.3.4 MANUAL Mode

The **MANUAL** Mode is necessary to activate or disactivate manually the relays of the different channels.
It is possible to enter the MANUAL Mode from any other mode by selecting the sign **GO to MANUAL** with the **Menu** button and by pushing **Yes/+**.

On the display it is shown the state name (**Manua**l) and the relay position (Relay: OFF, Relay: ON) and the number of the channel correspondent to the relay. (in the single output version there is no channel indication)
In the **MANUAL** state , by pushing button **Yes/+,** it is possible to intervene on the relay, so that to pass from ON to OFF
Button **No/-** is used to select the channel on which one wants to intervene manually.
The activating of the relay in the **MANUAL** mode is not linked to the channel state. It can be enabled or disabled.
With the **Menu** button it passes to the state of chaning request.

NOTE
*!Attention: in the MANUAL state the device does not go back automatically to the **AUTO** state!*
If needed to leave the MANUAL state use the Menu button as usual.

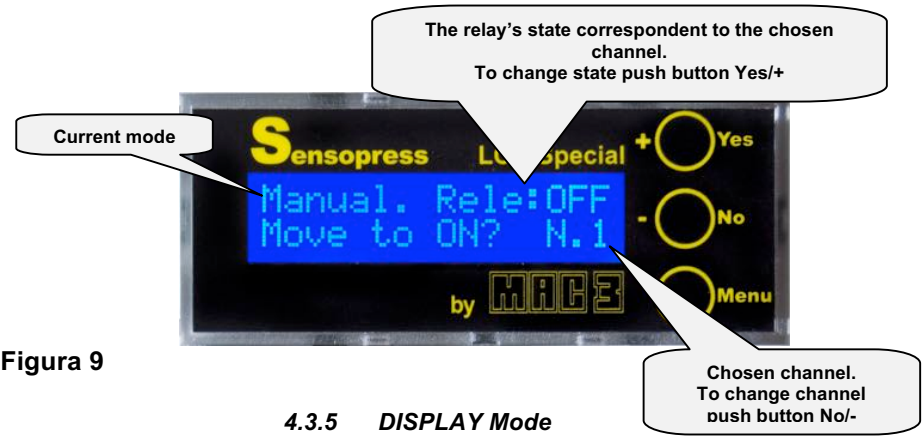


Figura 9

4.3.5 DISPLAY Mode

This mode is necessary for managing the backlight of the display.
It is possible to enter the **DISPLAY** mode from any other mode by selecting the sign **GO to DISPLAY** with the **Menu** button and by pushing **Yes/+**.

The **DISPLAY** state allows the control of the liquid crystal display's backlight.
At power-up the device's backlght is on, and it will turn off automatically after 5 minutes of the keys not pressed. By pushing the **Yes/+** button it is possible to set-up the backlight mode.
With the set-up of Figure 10, the backlight is continuous, whereas with the one of Figure 11 becomes timed (5 minutes after the last pushed button).
The timer that riactivate the timed backlight starts again by pushing any button.
With the **Menu** button we go to the request of state changing; if no button is pushed the device goes to the **AUTO** state.

Figure 10

Figure 11

4.3.6 PROTECT Mode

In the **PROTECT** mode there is the possibility to activate or disactivate the device's protection so that to prevent the change of parameters from not authorised persons;
On the start the device's protection is disactivated.
It is possible to enter the **PROTECT** mode from any other mode by selecting the sign **GO to PROTECT** with the **Menu** button and by pushing **Yes/+**.

La password is a Yes/+ and No/- key combination and it is set-up in the factory. This is not modifiable.
The series to insert is: No/-; Yes/+; Yes/+; Yes/+; No/-

To enable the protection it is necessary to enter the PROTECT mode and by pushing the Yes/- button and to select Enabled to enable it and Disabled to disable it.

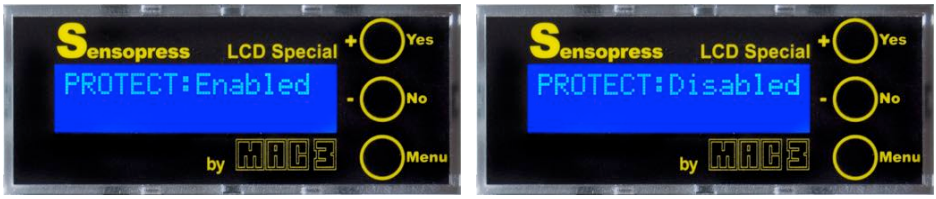


Figure 12

NOTE:
If one decides to activate the device's protection, to enter any state, on the display it will be visualised **ENTER PASSWORD,** as in Figure 13 it will be requested a password composed of five characters and introduced with the combination of **Yes/+** e **No/-** buttons; if the combination is correct there will be the possibility to enter the planning change; if the combination is wrong no change will be possible.
For an easier use, once written the password the device memorize it for about 10 minutes.
By this time it is not necessary to re-enter the password also if entering the modes where this is requested.
At the end of this time, the password, to enter the mode where this is necessary, is asked again.
The password is not necessary to enter the **AUTO** and the **CHANNEL** mode.

Figure 13

5 CALIBRATION OF WATER'S LEVEL SCALE

The devices produced by MAC3 are calibrated, this means they can measure the water's level in the expected measure field and with the specifications indicated by MAC3.
In this respect no intervention is required by the user.

For various reasons, such as the aging of components, sensor replacement, a change in the sensor's setup, etc., it might be necessary a new calibration. If requested, this can be realized by the MAC3 specialists
An alternative can be the feature given for this purpose by the device, thanks to this one the user as well can autonomously do the calibration
There should be the possibility to put the pressure sensor through two known levels with good approximation as specified below.

5.1 CALIB Mode

It is possible to enter the CALIB mode from any other mode by selecting the sign **GO to CALIB** with the **Menu** button and by pushing **Yes/+**.

In the **CALIB** mode it is possible to save the reading realized by the sensor that has been put through level zero and through the maximum level that can be fit by the user.

This makes the reading correct in all the expected measure field.

When entered this, there is the visualization of Figure 14.
By pushing the **No/-** button it is possible to enter the procedure of zero setting.
By pushing the **Yes/+** button it is possible to enter on the procedure of the setting of the maximum level.

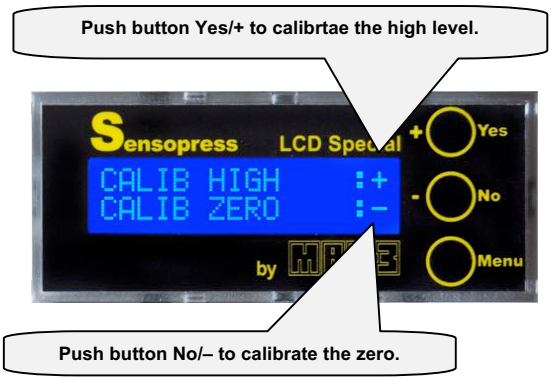


Figure 14

5.1.1 Zero Calibration

It is possible to enter the zero calibration by pushing the **No/-** button after entered the **CALIB**.
On the display it is visualised the screen of Figure 15.

Figure 15

Make sure the sensor is at zero level.
Push the **Menu** button to enter the zero setting and it is visualized the screen of Figure 16.

Figure 16

By pushing the **Yes/+** button it is possible to make the zero setting and on the display it is shown the writing **SAVING**…….for a few seconds, after which the device turns in the **AUTO** Mode.
By pushing the **Menu** button there is the possibility to go out from the calibration procedure without saving the zero. It turns back to the **AUTO** mode.

5.1.2 High Level Calibration

It is possible to enter the calibration of high level by pushing the **Yes/+** button after entered the **CALIB**.
Make sure the sensor is put through the water column which needs to be set-up.
On the display is visualized the screen of Figure 17.

Figure 17

With the **Yes/+** and **No/-** buttons it is possible to set-up the water column value to which the high level calibration needs to be done and to which is put through the sensor.
Push the **Menu** button to enter the saving of the high setting level and it is visualized the screen of Figure 18.

Figure 18

By pushing the **Yes/+** button it is possible to do the saving of the set-up high level and on the displays it is given the writing **SAVING**….. for a few seconds, after this the device turns in the **AUTO** mode.

By pushing the **Menu** button there is the possibility to leave the calibrating procedure without saving the high level. It turns back to the **AUTO** mode.

6 Electrical Noise

If the device is arranged in a place with electromagnetic noise, or if the relay's contacts supply some specific loads, the device may show anomalous behaviors.
The software is able to take measures and restore the correct operation.
If there are inductive loads particularly irksome, with disturbances that cause very frequent anomalies, it is adviced the use of a snubber cicuit, connected in parallel to the load.
Make the snubber circuit by connecting a resistor in series with a capacitor.
Figure 19 shows an example of connection.
Advised values : R1=47 Ohm ½ W, C1=0,1uF 250 Vac poliestere.

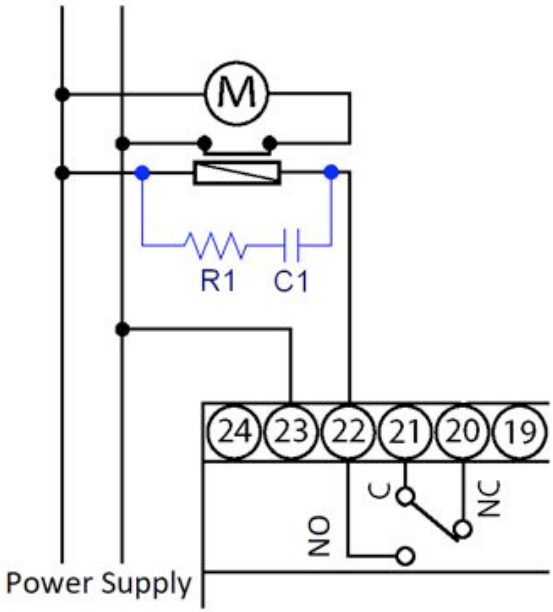


Figure 19

WATER MEETS TECHNOLOGY
Via Maestri del Lavoro 25/27
50013 - Campi Bisenzio (FI) ITALY
Tel. +39.055.88.77.672 - +39.055.88.77.372
+39.055.88.79.276 Fax. +39.055.88.77.068