EN

S401-L
Panel Mounting Indicator with OLED data Display.

1. GENERAL SPECIFICATIONS

The S401-L module is a panel mounting indicator with OLED data display.
The module has two RS485 serial ports, both supporting MODBUS-RTU protocol:
-Master MODBUS-RTU Port: through it the data exchange with the connected slave I/O modules is performed.
-Slave MODBUS-RTU Port: through it the data acquired from the slave I/O modules and their elaborations are exchanged with a master device. Through this port it is besides possible the indicator software configuration.
New Possibility by a self-reading to visualize and read the data written from an modbus-rtu master module connected to the Modbus-rtu slave port(when S401-L is in modbus-rtu MASTER modality)
Besides the module has the following features:
-Complete parameters configurability both by the programming Menu and via software through the Slave RS485.
-Easy navigation on the programming Menu by three buttons on the frontal panel.
-Possibility to read and at choice to display up to 20 quantities.
New Autoscroll for visualized values
-Possibility to define and display up to 10 elaborated quantities, obtained by the application of mathematical or logical functions on the acquired/elaborated quantities.
-Optional calculation of the moving average for the acquired analog quantities.
-Optional scaling of the acquired/elaborated analog quantities.
-Possibility to force the continuous or trigger writing of 10 quantities relative to the connected slave modules.
-Possibility to define, for each elaborated quantity, an alarm with two individually activable thresholds.
-Alarm signalling by warning message or by trigger writing.
-The quantities acquired through the Master MODBUS-RTU port and theirelaborations are made available to a master device through the Slave MODBUS RTU port.
-Selectable menu language: Italian, English, French.
-Settable display contrast.
-Number of quantities to view on the same display screen: 1, 2 or 3 measurements.
-Settable number of decimal figures: automatic, 1, 2 or 3.

2. TECHNICAL SPECIFICATIONS

2.1 Power Supply Specifications

Power Supply :	10..40 Vdc, 19..28 Vac
Consumption :	Max: 1 W, mean: 0,5 W

2.2 Master RS485 Specifications

Type:	Half-duplex RS485.
Capacity:	32 Standard nodes.
Protocol:	Master MODBUS-RTU.
Protection:	Max 12 Vdc, Max 350 W (8 X 20 us).

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2.3 Slave RS485 Specifications

Type:	Half-duplex RS485.
Capacity:	32 Standard nodes.
Protocol:	Slave MODBUS-RTU.
Protection:	Max 12 Vdc, Max 350 W (8 X 20 us)

2.3 General Technical Features

Environmental Conditions:	Temperature: -10..60°C. Humidity min: 30%, max 90% at 40°C non-condensing.
Storage Temperature:	-20..85 °C.
Isolation:	1500 V among each pair of ports.
Connections:	-Removable screw terminals, 5,08 mm pitch. -Three buttons for menu navigation.
Protection Degree:	IP65 (on the frontal panel with the provided seal).
Dimensions (L x H x W):	96x 4 8 x 4 0 mm.
Standards:	EN61000-6-4/2002-10 (electromagnetic emission, industrial environment).
CE	EN61000-6-2/2006-10 (electromagnetic immunity, industrial environment). EN61010-1/2001 (safety). All circuits must be isolated from the other circuits under dangerous voltage with double isolation. The power supply transformer must comply with EN60742: “Isolated transformers and safety transformers”.

3. FUNCTIONING DESCRIPTION

The S401-L module is a front-panel display and it is configurable in ModBUS RTU “master” or “slave” modality.The S401-L module can display and process the data acquired from the modbus-rtu slave modules in MASTER modality. In the same modality it can make a self-reading (at address #248 of the internal register from 41000 at 41099) for the written data by Modbus-rtu master module connected to the S401-L slave port.

The data exchange with the measurement modules is performed through the Master RS485 port, according to MODBUS-RTU Master protocol; so the acquired data may be viewed by the OLED display.

In Master modality the S401-L can read the written data from an master module connected to the S401-L slave port.

The three buttons on the frontal panel allow to scroll the acquired data list and to accede to the programming menu.

3.1 Setting Modalities

All the module parameters may be set both by the programming menu and through the Slave RS485 port by the apposite Z-NET3 configuration tool.

3.2 Data Acquisition through the Master MODBUS-RTU Port

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3.2.1 Number and Types of acquirable data

The instrument may be programmed to acquire up to 20 quantities through the Master RS485.

The following data types may be acquired:

-Floating-point
-Long
-Word
-Boolean

In case of Floating-point and Long data types, it is possible to define the order of the two registers which compose the data.

3.2.2 Acquired quantities Moving Average

It is possible to activate for each Long, Word or Floating-point acquired quantities, the moving average calculation on the last 8 read measurements.

3.3 Elaborated Quantities

It is possible to define and view up to 10 elaborated quantities, obtained by the application of mathematical and logical functions on the acquired or elaborated quantities.

Functions and operations may be applied on all the acquirable data types.

The result may also be viewed or not by display.

An alarm with two individually activable thresholds and corresponding hysteresises may be associated to each elaborated quantities.

3.3.1 Applicable Functions and Operations

The user has at his disposal different operations to execute on the defined quantities.

For example the following operations may be used: arithmetic average of two or three quantities. Other operations are : sum, subtraction, multiplication, division, square, cube, square root, etc.

For the boolean quantities the following operations may be executed: AND and OR.

All the operations are listed on the section 4.2.2.

3.3.2 Alarms on elaborated quantities

An alarm may be associated to each not boolean elaborated quantity.

The following parameters may be individually activated: High Threshold, Low Threshold, Hysteresis on the High Threshold, Hysteresis on the Low Threshold.

When the quantity value is greater than the High Threshold, the high alarm condition is activated; the alarm condition ends when the quantity value is < High Threshold - High Hysteresis.

When the quantity value is smaller than the Low Threshold, the low alarm condition is activated; the alarm condition ends when the quantity value is > Low Threshold + Low Hysteresis.

The alarm conditions are displayed by an alarm message, alternated to the value of the quantity on the display list.

3.4 Acquired and Elaborated Quantities Scaling

During the definition of an acquired or elaborated quantity, It is possible to decide also its scaling.

So the DATA OFFSET and the SCALE FACTOR parameters have to be set.

The resulting Scaled Quantity is:

SCALE FACTOR * Original quantity + DATA OFFSET

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3.5 Display Data List

The user may decide just during the definition phase of a reading or function, to display its value or not.
Once the quantity insertion procedure has been finished, it is always possible to enable/disable its presence on the display list; also the position on the display list may be modified later.

3.6 Data Writing through the Master MODBUS RTU port

3.6.1 Number and Types of writable data

The instrument may be set to write through the Master RS485 port, up to 10 quantities relative to the connected I/O modules
The same acquirable data types may be written:
-Floating-point
-Long
-Word
-Boolean.

3.6.2 Writing Modalities: Continuous or Trigger

It is possible to set up to 10 writings.
Continuous Writing
The writing is performed at every program cycle (if the quantity to write is available).
It is possible to write on the selected I/O registers the value of a previously defined acquired or elaborated quantity.
Trigger Writing
The writing is associated to the value of a previously defined elaborated quantity. If two alarm thresholds or at least one of them have been defined for the quantity, it is possible to enable the writing only at the verifying of one of the alarm conditions. In case of single bit writing, an action of alarm end is performed.
Instead in case of analog register writing, at the end of the alarm condition the writing operation only ends to be executed.

3.7 Configuration through the Slave MODBUS RTU port

All the menu parameters may be programmed through the Slave RS485 port; so the complete programmation of the instrument is possible. The apposite Z-NET3 software is available: it allows an easy configuration of the module.

4. PROGRAMMING MENU

The programming menu allows to completely configure the module on all the functionalities described in Chapter 3.

4.1 Navigation modalities on the programming Menu

4.1.1 Access to the Programming Menu

When the module is in view phase, press the OK MENÙ button to accede to the menu: on the lower part of the display the following message appears: OK: MAIN MENU; until this message is visible (for approsimately 40 sec), the pressure of the OK MENU button allows the access to the menu and to view the MAIN MENU.

4.1.2 Buttons Meaning

The instrument has three buttons: UP, DOWN, OK MENÙ.

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On the programming menu, the buttons have the following functionalities:
UP Button
- It allows to scroll the menu items towards the top, in order to place on the item of interest. The selected item is marked by a flashing cursor at its left.
- During the setting of the numeric or literal values, it allows to select the figure or the letter of interest; a pressure entails the passage to the figure of following numeric value (ex: 1- >2) or to the next alphabetic letter (ex A->B).
DOWN Button
-It allows to scroll the menu items downwards in order to place on the item of interest. The selected item is marked by a flashing cursor at its left.
-During the setting of the numeric or literal values, it allows to select the figure or the letter of interest; a pressure entails the passage to the figure of previous numeric value (ex: 2- >1) or to the previous alphabetic letter (ex B->A).
OK MENÙ Button
-Access to the programming menu (see 4.1.1 Access to the programming menu)
-It allows to confirm the item selected by UP and DOWNbuttons and so to pass at the next screen. The selected item is marked by a flashing cursor at the left of the item.
-During the setting of numeric or literal values, it allows to confirm the figure or the letter selected by the UP and DOWNbuttons. Once the value of the figure or letter has been confirmed, the procedure automatically continues with the figure or letter in the next
position. At the end of the parameter setting, the confirmation of the set value is required.
-Since the button has many functionalities, its meaning is sometimes indicated on the lower part of the display.

4.1.3 Parameters Modify

Once the user has selected (by subsequent pressures of the 3 navigation buttons) an item which entails the setting of one or more parameters, the editing or modify of the parameters are performed figure by figure (if numeric), letter by letter (ifl iteral).
Numeric Parameter Modify
During the editing or modify phase, the first figure flashes: the pressure of the UP button increases the value of a unit, a pressure of DOWN decreases the value of a unit; by pressing the OK MENÙ button, the value set for the figure is confirmed and the procedure goes on with the next figure. The position modify is marked by the flashing of the next figure. In case of signed parameters, for the first figure only '+' or ''-' signs may be selected (always by the UP and DOWNbuttons). Once also the last figure has been modified, the pressure of the OK MENÙ button entails the passage to the Confirmation Menu which allows to save the setting, return to the parameter setting or exit from the setting.
Literal Parameter Modify
During the editing or modify phase, the first letter flashes: the pressure of the UP button entails the view of the next alphabetic letter (ex A->B), the pressure of the DOWNbutton entails the view of the previous alphabetic letter (B->A); by pressing the OK MENU button the letter set for that position is confirmed and the procedure continues with the letter of the next position. The position modify is marked by the flashing of the next letter.
Once also the last letter has been modified, the pressure of the OK MENU button entails the passage to the Confirmation Menu which allows to save the setting, return to the parameter setting or exit from the setting

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The table containing the admitted characters is on Appendix A .

4.1.4 Exit from menu

The exit from the programming menu is performed by selecting Exit from the Main Menu or from the Setup Menu. If the buttons are not used for approximately 40 sec, the instrument automatically exits from the menu and returns to view mode.

4.2 Menu Description

The programming menu is structured into four basic submenus:

1) Readings Menu
2) Functions Menu
3) Writings Menu
4) Setup Menu

The submenus structure is described on the schemes on pages 19, 20 and 21. This section instead illustrates all the parameters which may be set for each submenu.

4.2.1 READINGS MENU

It allows to define the data to read from the I/O modules connected through the Master RS485 port and the data came from an modbus master module through the RS485 slave port.

This menu allows to:

1) Insert a new reading.
2) Delete a previously defined reading.
3) Modify a previously defined reading.
4) Decide if the read data will be viewed or not and in the first case to select the data position on the display list.

Readings Setting Modalities

For each defined reading, it is possible to set the following parameters:

Description

Identification name for the reading.

Slave Address

The S401-L in master modality uses the addresses from #1 to #247 for communicate with slaves module; it is also possible to execute the auto-reading function at the address #248 for the modbus registers written previously from a master module connected to the S401-L RS485 slave port.

Register address

Modbus address of the data to read on the correspondent slave I/O module.

The register for the self-reading are from 41000 to 41099 at address #248.

Use the following addressing modality depending on the utilized Modbus function and on the data type to read:

ADDRESSES	DATA TYPE	FUNCTION
1..10000	Boolean	01
10001..20000	Boolean	02
30001..40000	Float/Long Int/ Short Int	04
40001..50000	Float/Long Int/ Short Int	03

For example if we want to read an holding register with address 40002 then the Register Address has to be set at 40002.

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Data Format
It sets the data type to read. The following formats may be selected:
-Float: 32-bit floating point format
-Long Integer: 32-bit integer format
-Short Integer: 16-bit integer format
-Boolean: boolean format.

Reading Order (only for Float or Long Integer formats)
Order of the two words which constitute Float or Long Integer data. The following items may be selected:
-MSW first: The most significant word is read before, then the least significant one.
-LSW first: The least significant word is read before, then the most significant one.

Data Display Format (Decimal Figures) (only for Float or Long/Short Integer formats)
Number of decimal figures to view after the decimal point:
-Automatic: Maximum Displayable Number of decimal figures.
-Max 1 Figure: 1 decimal figure after the decimal point.
-Max 2 Figures: 2 decimal figures after the decimal point.
-Max 3 Figures: 3 decimal figures after the decimal point.

Boolean Logic (only for Boolean format)
Reading logic of boolean Data:
-Positive: the same logic value present on the I/O module register is displayed.
-Negative: the negated logic value of the one present on the I/O module register is displayed.

Measure Units (only for Float, Long and Short formats)
It allows to insert a measure unit, settable letter by letter

Data Offset (only for Float, Long and Short formats)
It represents with the scale factor one of the two parameters defining the data scaling. The Data Offset value may be both long and float. The resulting scaled quantity depends on the Data Offset according to the following formula:
Scaled Quantity = Scale Factor * Read quantity + Data Offset

Scale Factor (only for Float, Long and Short formats)
It represents with the Data Offset one of the two parameters defining the data scaling. The Scale Factor value may be both long and float. The resulting scaled quantity depends on the Scale Factor according to the following formula:
Scaled Quantity = Scale Factor * Read quantity + Data Offset

Time Average (only for Float, Long and Short formats)
By activation (YES) of this functionality, the moving average value is calculated on the last 8 readings. The mean value is displayed (if enaled).

Display Data
By selecting YES, the data will be displayed. Also the position on the display list may be

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chosen.
The Readings Menu is illustrated on the schemes on page 19.

4.2.2 FUNCTIONS MENU

It allows to define some Functions, obtained by the elaboration of one or more read or/and elaborated quantities.
This menu allows to:
1) Insert a new function.
2) Delete a previously defined function.
3) Modify a previously defined function and quickly modify only the alarm thresholds.
4) Decide if the elaborated data will be viewed or not and in the first case to select the data position on the display list.

Functions Setting Modalities
For each function the following settings are possible:
Description
Identication Name for the function.

Operation
Operation to execute. The selectable operations and the supported data types are listed on the below table:

Operation Code	Operation	Operands Number	Operands and Resulting Quantity Format
0	Identity	1	Integer (Long/Word) and Float
1	Sum of 2	2	Integer (Long/Word) and Float
2	Sum of 3	3	Integer (Long/Word) and Float
3	Subtraction	2	Integer (Long/Word) and Float
4	Multiplication	2	Integer (Long/Word) and Float
5	Division	2	Integer (Long/Word) and Float
6	Square	1	Integer (Long/Word) and Float
7	Cube	1	Integer (Long/Word) and Float
8	Square Root	1	Integer (Long/Word) and Float
9	Math. Average of 2	2	Integer (Long/Word) and Float
10	Math. Average of 3	3	Integer (Long/Word) and Float
11	Logical AND of 2	2	Boolean
12	Logical AND of 3	3	Boolean
13	Logical OR of 2	2	Boolean
14	Logical OR of 3	3	Boolean
15	Bit extraction 0..15 from register	1	Integer (Word)

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Input N. 1 or 2 or 3
It selects the read or elaborated quantities among which the operation will be performed. All the previously defined readings and functions (if their data type is supported may be selected. Depending on the operation type, it will be possible to select 1, 2 or 3 operands.

Data Display Format (Decimal Figures) (only for Float or Long/Short Integer Formats)
Number of decimal figures to view after the decimal point:
-Automatic: Maximun displayable number of decimal figures
-Max 1 Figure: 1 decimal figure after the decimal point
-Max 2 Figure: 2 decimal figures after the decimal point
-Max 3 Figure: 2 decimal figures after the decimal point

Measure Units (only for Float, Long and Short formats)
It allows to insert a measure unit, settable letter by letter

Data Offset (only for Float, Long and Short formats)
It represents with the scale factor one of the two parameters defining the data scaling. The Data Offset value may be both long and float. The resulting scaled quantity depends on the Data Offset according to the following formula:
Scaled Quantity = Scale Factor * Elaborated not scaled quantity + Data Offset

Scale Factor (only for Float, Long and Short formats)
It represents with the Data Offset one of the two parameters defining the data scaling. The Scale Factor value may be both long and float. The resulting scaled quantity depends on the Scale Factor according to the following formula:
Scaled Quantity = Scale Factor * Elaborated not scaled quantity + Data Offset

Alarm Threshold (only for Float, Long and Short formats)
By activating this functionality (YES), it is possible to define the alarm thresholds. These threshold may be both activated, both disbled or individually enabled. So the user may define:
-High Threshold: High Alarm thresohold. The value may both Long and Float.
-High Threshold Hysteresis: Hysteresis of the high threshold. The value may both Long and Float.
-Low Threshold: Low Alarm thresohold. The value may both Long and Float.
-Low Threshold Hysteresis: Hysteresis of the low threshold. The value may both Long and Float.

Boolean Logic (only for Boolean format)
Interpretation logic of boolean Data:
-Positive: the displayed logic value is the operation result.
-Negative: the displayed logic value is the negation of the operation result.

Display Data
By selecting Yes the data will be displayed. Also the position on the display list may be chosen.

The Functions Menu is illustrated on the schemes on pages 19 and 20.

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4.2.3 WRITINGS MENU

It allows to define some continuous or trigger writings on the quantities of an I/O module connected through the Master RS485 port.
The Writings Menu allows to:
1) Insert a new writing.
2) Delete a previously defined writing.
3) Modify a previously defined writing.

Writings Setting Modalities
The following settings are possible for each writing:
Select Data
It allows to select the read or elaborated quantity which will be involved on the writing operation. This quantity may be used on the following ways:
1) If we select a Read Quantity or a Function without active alarms: the value of this quantity (analog or digital) will be continuously written on the I/O register which will be set by the Register Address.
2) If we select a Function with at least an activated alarm threshold: it is possible to choose between the continuous writing of the function on the I/O register (as in point 1) or the writing only in case of alarm condition (with the correspondent alarm end action). In this last case it will be possible to write a constant, a bit or the quantity selected at the beginning in this field.
Slave Address

Address of the slave I/O module connected to the Master RS485 and where the data will be written. Values from 1 to 247.
Register Address

Modbus address of the register which will be written.

Use the following addressing modality depending on the utilized Modbus function and on the data type to write:

ADDRESSES	DATA TYPE	FUNCTION
1..10000	Boolean	05
40001..50000	Boolean	06 read-modify-write: write the single bit on the register without modifying the other ones.
40001..50000	Float/Long Int/ Short Int	06 / 16

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So if we want to write an Holding Register with address 40003 on the I/O slave, then the parameter Register address will be set at 40003.

Enable Trigger (only if a function with at least an active threshold has been selected in Data Select)
This functionality may be activated only if a function with at least an active threshold has been set in Data Select.
By selecting Yes, the trigger writing is enabled (the writing is executed only if the selected function is in alarm condition). If the trigger is disabled, the continuous writing is performed.

Alarm Threshold (only if the trigger has been enabled in Trigger Enable)
If the trigger has been enabled (writing on alarm) in Trigger Enable, it is possible to decide the threshold which will be associated to the writing (it is not possible to enable the writing on both the thresholds):
High Threshold: It enables the writing at the overcoming of the high threshold (only if it was enabled on the associated function; otherwise the option does not appear).
Low Threshold: It enables the writing if the function is inferior to the low threshold (only if it was enabled on the associated function; otherwise the option does not appear).

Data to Write (only if the trigger has been enabled in Trigger Enable)
It sets the data type which will be written. The following formats may be selected:
-Boolean 1 (0): in case of alarm condition a specified bit will be forced to the logical value 1 while at the end of the alarm condition it is forced to logical value 0.
-Boolean 0 (1): in case of alarm condition a specified bit will be forced to the logical value 0 while at the end of the alarm condition it is forced to logical value 1.
-Word: sets the 16 bits integer value which will be written in case of alarm condition. When the alarm ends the value is no more written.
-Data Value: in case of alarm condition, the selected (in Data Select field) function is written. In this case it is necessary to set the output format (see Output Format field). If the output format is long or float, it is also necessary to specify the writing data order (MSW first or LSW first). At the end of the alarm condition the function writing stops.

Output Format (only if the trigger has not been enabled in Enable Trigger or if Data Value has been selected in Data to Write)
It sets the data type to write.
The following formats are selectable:

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-Float: 32-bit floating point format.
-Long Integer: 32-bit integer format.
-Short Integer: 16-bit integer format.

In case of Float or Long integer formats, it is necessary to set also the Reading Order of the two words which compose the data:
-MSW first: The high word is transmitted first, then the low one.
-LSW first: The low word is transmitted first, then the high one.

Writing Modalities (only if a boolean reading / function has been selected in Data Select or if Boolean 1 (0) / Boolean 0 (1) has been set in Data to Write .
If we want to write a boolean value it is necessary to specify the writing modalities:
-Single Output: The value is written by using the function 05 (write single coil). Pay attention to have opportunely set the register address in Register Address (in this case addresses from 1 to 10000).
-Read-Modify-Write: the bit value is written by using the function 06 (write single register) of 16-bit register writing. In this case only the specified bit is modified while the remaining bits of the word are not changed. Pay attention to have opportunely set the register address in Register Address (in this case addresses from 40001 to 50000).

Bit Index (only if the data to write is boolean and if Read-Modify-Write has been selected in Writing Mode) .
If the value to write is boolean and if the Read-Modify-Write writing mode has been selected, it allows to select the index of the bit to write within the 16-bit word. Settable value from 0 a 15.
The Writings Menu is illustrated on the schemes on pages
20 and 21.

4.2.4 SETUP MENU

It allows to set the system general parameters and the communication ports parameters:
1) Language Selection.
2) Number of data displayed on the same screen.
3) Display contrast setting.
4) Modbus Master port parameters.
5) Modbus Slave port parameters.

The following settings are possible:
Language
It allows to select the module language: Italian, English, French.

Data View
It allows to choose how many data (rows) to display on the same screen: 3 rows, 2 rows, 1 row.

Contrast
It sets the display contrast. Values from 1 to 15.

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SYSTEM PARAMETERS

It allows to set the communication parameters of the two RS485 ports.

Master Module

Reception Timeout

It represents the reception timeout of the master module: maximum time in which the master waits for an answer from the connected slaves modules before declaring the operation failed. Values from 10 ms to 2,55 s (default 100 ms).

Parity

Type of parity control of the port: absent, even, odd. Default: absent.

Tx/Rx Baud Rate

It sets the port communication speed. Admitted values: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200. Default: 38400.

Delay between polls

Delay time that the master waits before sending the request to a connected slave. Values from 10 ms to 2,55 s (default: 100 ms).

Slave Module

Device Address

Address assigned to the instrument when it is used as a Modbus slave. Default: 1.

Parity

Type of parity control of the port: absent, even, odd. Default: absent.

Tx/Rx Baud Rate

It sets the port communication speed. Admitted values: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200. Default:38400.

Answer Delay

Answer Delay. Number of pauses of 6 characters each to be entered between the end of the Rx message and the start of the Tx. Settable value: 0..20. Default: 0.

For more informations on Setup Menu, refer to the schemes on page 21.

Scroll

Enable or disable the automatic scroll function for the visualized value.

5. FUNCTIONING IN VIEW MODE

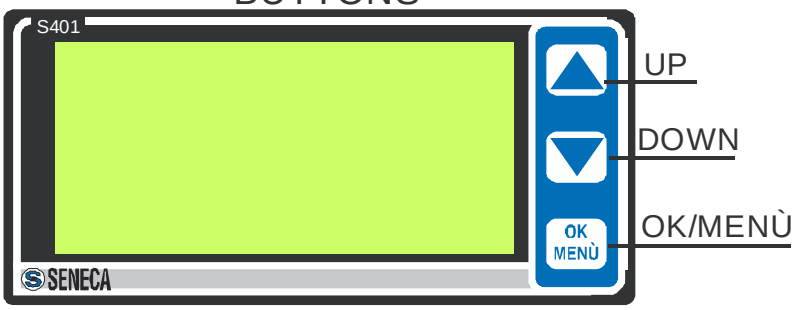
In view mode the indicator displays the values of the quantities defined on the display list; it may view 1, 2 or 3 data for screen. If all the data may not be viewed on the same screen, press the UP and DOWN buttons to move of a position the data on the list. Below an example of 3 data for screen:

VAR1	10	W
VAR2	10	W
VAR3	10	W

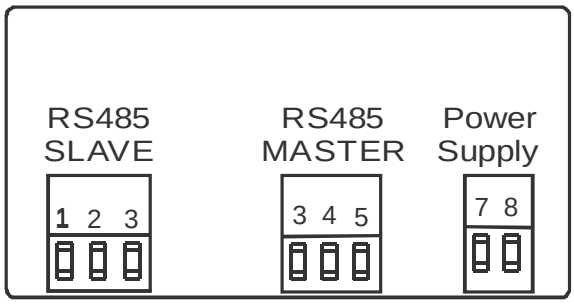
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6. TERMINALS AND BUTTONS POSITION

FRONTAL PANEL: DISPLAY AND BUTTONS

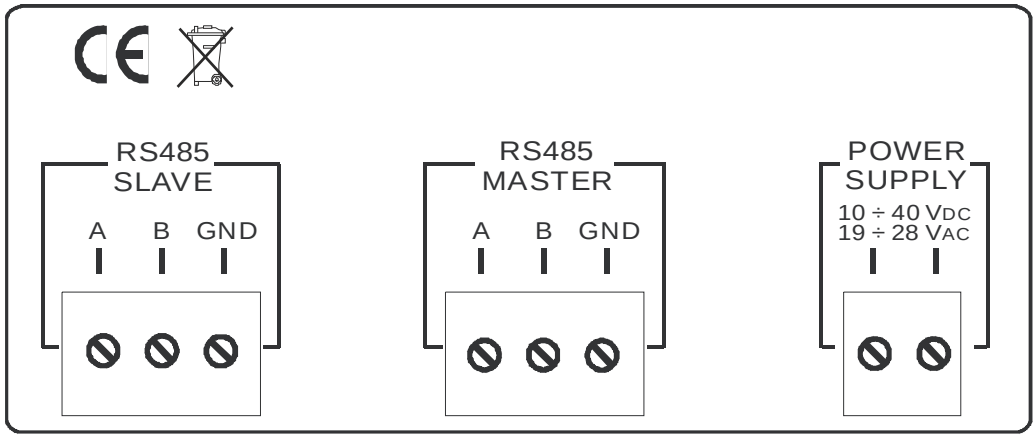


REAR SIDE: TERMINALS



7. ELECTRICAL CONNECTIONS

The electrical connections for the serial ports and power supply are illustrated below. For RS485 connections we advise to use screened cables.



8. ERROR SIGNALLINGS

The errors are directly viewed by display.

The possible signallings and their meaning are listed below. They flashes instead of the quantity numeric value. If no data has been inserted on the Display list, the LIST EMPTY message is displayed.

8.1 Reading Error Signallings

NO ANSWER: the I/O module connected through the master RS485 port does not answer.

SLAVE ERROR an error message has been received from the I/O module connected through the master RS485 port.

RX ERROR: value not available due to an error on the answer of the I/O module connected through the master RS485 port.

SINGLE ERROR: presence of a generic error (of any nature).

8.2 Functions Error Signallings

BAD INPUT: the value of one or more operands is not available.

DIVISION_BY_ZERO: the operation involves a division by a null quantity.

8.3 Alarms Signallings

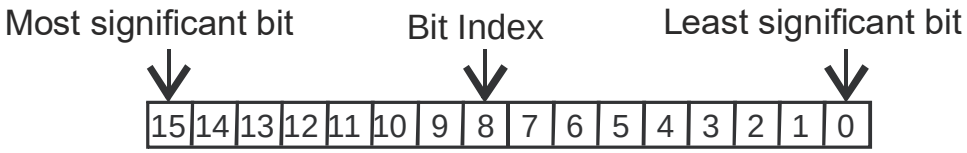
TOO HIGH: the function value is greater than the high threshold.

TOO LOW: the function value is smaller than the low threshold.

9. MODBUS REGISTERS ACCESSIBLE THROUGH THE SLAVE RS485 PORT

The read and elaborated quantities are available within blocks of 16-bit registers and are accessible by the slave RS485 serial communication. In the below tables the notation Bit [x:y] indicates all bits from x to y. For example Bit [2:1] indicates bit 2 and bit 1, and serves to illustrate the meaning of the various united combinations of the values of the two bits. The 16-bit Holding Registers have the following structure:

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Word (16 bits): MODBUS Register

9.1 Supported MODBUS COMMANDS

Codice	Funzione	DESCRIPTION
03	Read Holding Registers	Reading of word registers up to 2 at a time.
04	Read Input Registers	Reading of word registers up to 2 at a time.

9.2 MEMORY MAP FOR READ AND ELABORATED QUANTITIES

All registers are Read Only.

READ DATA

The values are represented in flaoting point (32 bits - 2 Modbus registers).

Only one floating point value can be read a time.

ADDRESS: REGISTER NAME	ADDRESS: REGISTER NAME
40801 : DATA_MSW_READ1	40802 : DATA_LSW_READ1
40803 : DATA_MSW_READ2	40804 : DATA_LSW_READ2
40805 : DATA_MSW_READ3	40806 : DATA_LSW_READ3
40807 : DATA_MSW_READ4	40808 : DATA_LSW_READ4
40809 : DATA_MSW_READ5	40810 : DATA_LSW_READ5
40811 : DATA_MSW_READ6	40812 : DATA_LSW_READ6
40813 : DATA_MSW_READ7	40814 : DATA_LSW_READ7
40815 : DATA_MSW_READ8	40816 : DATA_LSW_READ8
40817 : DATA_MSW_READ9	40818 : DATA_LSW_READ9
40819 : DATA_MSW_READ10	40820 : DATA_LSW_READ10
40821 : DATA_MSW_READ11	40822 : DATA_LSW_READ11

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40823 : DATA_MSW_READ12	40824 : DATA_LSW_READ12
40825 : DATA_MSW_READ13	40826 : DATA_LSW_READ13
40827 : DATA_MSW_READ14	40828 : DATA_LSW_READ14
40829 : DATA_MSW_READ15	40830 : DATA_LSW_READ15
40831 : DATA_MSW_READ16	40832 : DATA_LSW_READ16
40833 : DATA_MSW_READ17	40834 : DATA_LSW_READ17
40835 : DATA_MSW_READ18	40836 : DATA_LSW_READ18
40837 : DATA_MSW_READ19	40838 : DATA_LSW_READ19
40839 : DATA_MSW_READ20	40840 : DATA_LSW_READ20

ELABORATED DATA

The values are in floating point (32 bits 2 Modbus registers), only one floating point value can be read at a time.

ADDRESS: REGISTER NAME	ADDRESS: REGISTER NAME
40901 : DATA_MSW_FUNCTION1	40902 : DATA_LSW_FUNCTION1
40903 : DATA_MSW_FUNCTION2	40904 : DATA_LSW_FUNCTION2
40905 : DATA_MSW_FUNCTION3	40906 : DATA_LSW_FUNCTION3
40907 : DATA_MSW_FUNCTION4	40908 : DATA_LSW_FUNCTION4
40909 : DATA_MSW_FUNCTION5	40910 : DATA_LSW_FUNCTION5
40911 : DATA_MSW_FUNCTION6	40912 : DATA_LSW_FUNCTION6
40913 : DATA_MSW_FUNCTION7	40914 : DATA_LSW_FUNCTION7
40915 : DATA_MSW_FUNCTION8	40916 : DATA_LSW_FUNCTION8

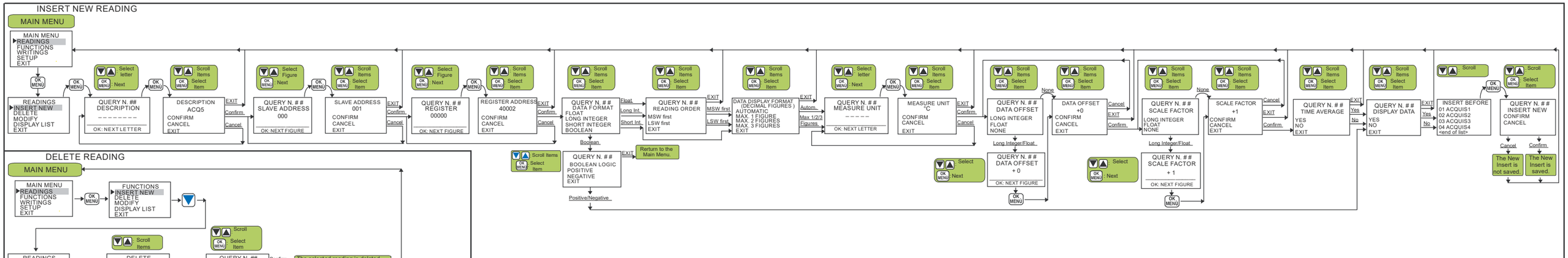
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40917 : DATA_MSW_FUNCTION9	40918 : DATA_LSW_FUNCTION9
40919 : DATA_MSW_FUNCTION10	40920 : DATA_LSW_FUNCTION10

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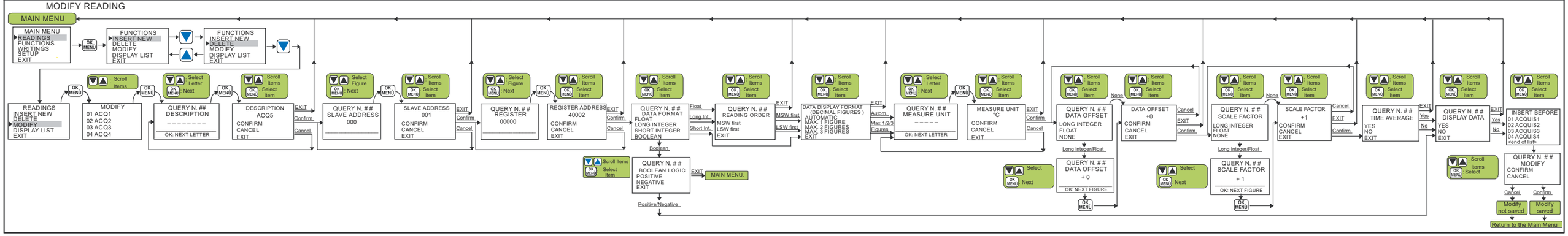
READINGS SETUP

INSERT NEW READING



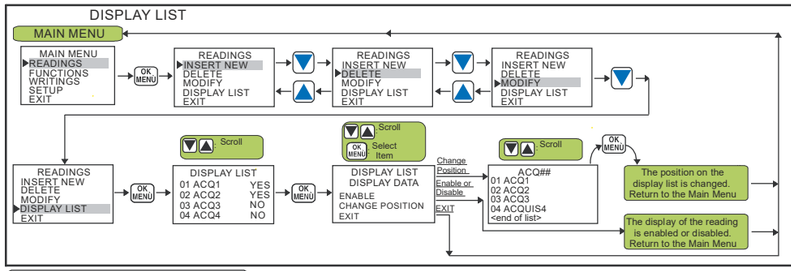
DELETE READING

MODIFY READING

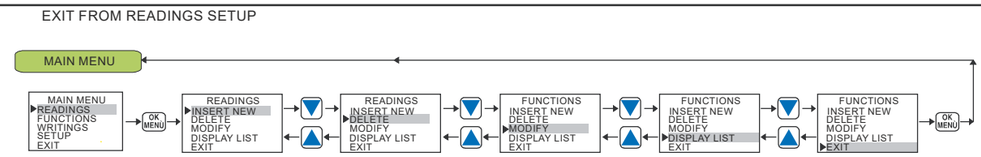


READINGS SETUP

DISPLAY LIST

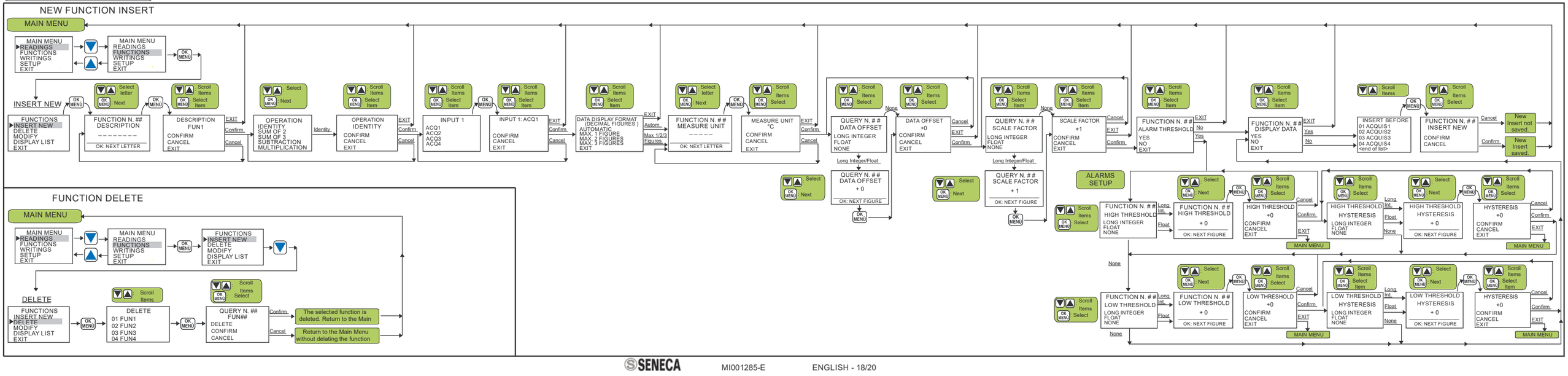


EXIT FROM READINGS SETUP



FUNCTIONS SETUP

NEW FUNCTION INSERT

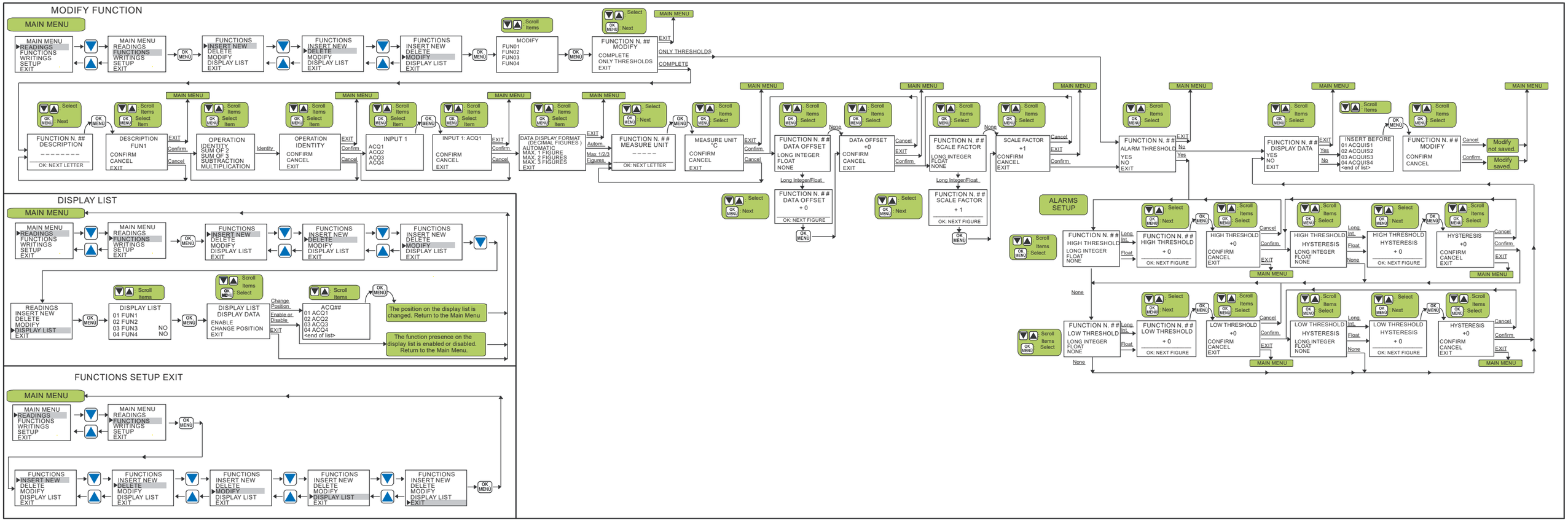


FUNCTION DELETE

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FUNCTIONS SETUP

MODIFY FUNCTION

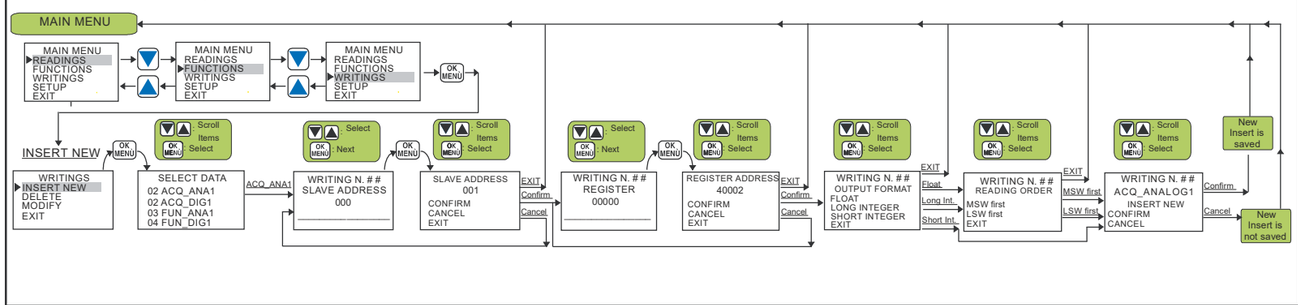


DISPLAY LIST

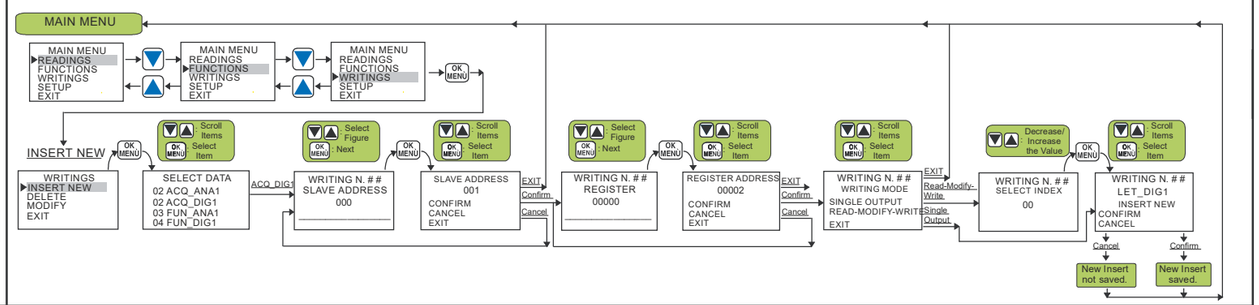
FUNCTIONS SETUP EXIT

WRITINGS SETUP

INSERT A NEW CONTINUOUS WRITING: THE VALUE OF AN ANALOG QUANTITY (READING OR FUNCTION) IS CONTINUOUSLY WRITTEN IN AN ANALOG REGISTER (FLOAT, LONG INTEGER, SHORT INTEGER).



INSERT A NEW CONTINUOUS WRITING: THE VALUE OF A DIGITAL QUANTITY (READING OR FUNCTION) IS CONTINUOUSLY WRITTEN IN AN DIGITAL REGISTER OR IN A BIT OF A ANALOG REGISTER.

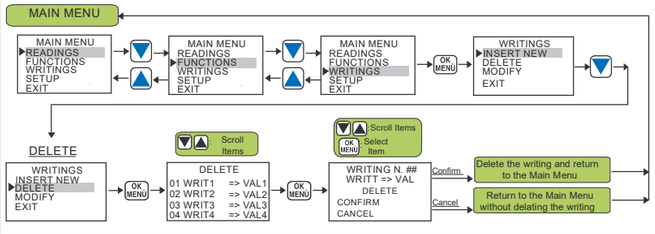


INSERT A NEW TRIGGER WRITING: THE WRITING EXECUTION DEPENDS ON THE VALUE OF A FUNCTION WITH ACTIVE ALARM THRESHOLD.

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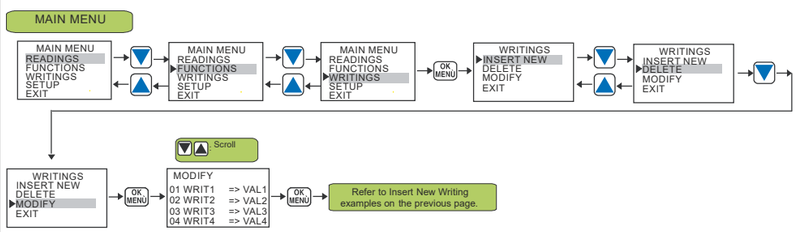
WRITINGS SETUP

DELETE WRITING

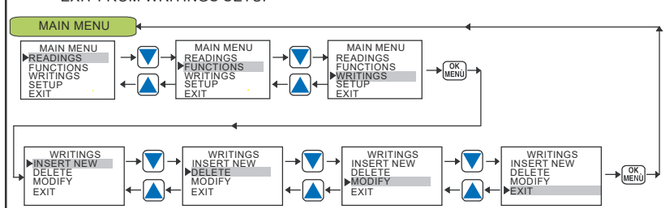


MODIFY WRITING

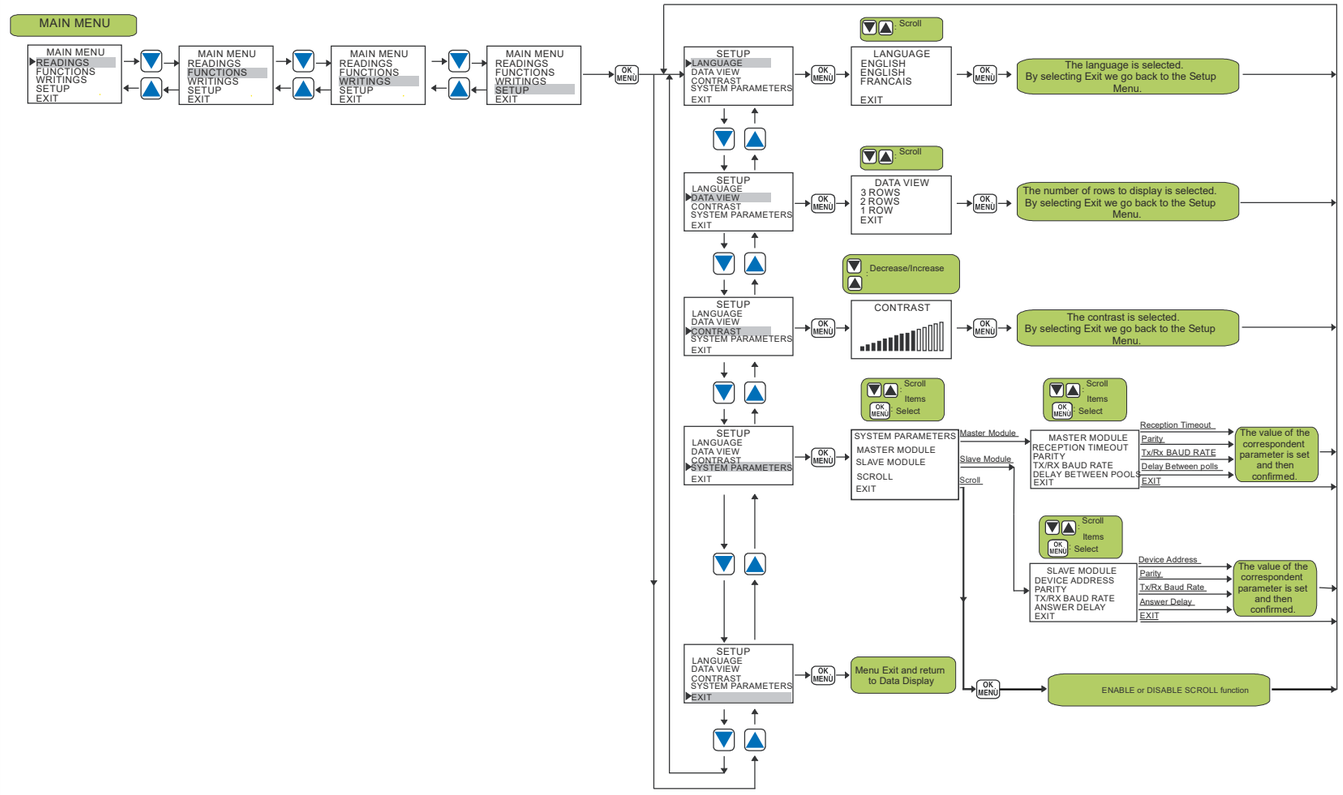
For the Modify Menu refer to the Insert New Writing Menues on page 20: they are identical, the only difference is that now it will be possible to select the writing to modify. We only illustrate the passages which are not present on the Insert New Writing Menues.



EXIT FROM WRITINGS SETUP



SETUP MENU



Appendix A

We are going to list the characters which may be inserted for the literal parameters setting.
They are listed in the order in which they may be selected by the UP and DOWNbuttons.

Characters admitted for all the literal parameters except	Measure Unit:
A...Z 0...9 % ' - . /	
Admitted Characters for Measure Unit literal parameter :	
A...Z a...z ₂ ₃ α ß Γ π Σ σ µ τ Φ ϑ Ω δ ϕ ε % ' ( ) / °	

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This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, waste disposal service or thè retail store where you purchased this product.

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