



Series B . Models Bxx-CR

Chronometers and time counters

INDUSTRIAL SERIES . LARGE FORMAT METERS

Large format industrial meters with chronometer and time counter functions. Different formats available with 60 mm and 100 mm digit height, 4 and 6 digits, in red or green color. Sturdy metal housing, with full IP65 protection, designed for panel, wall or hanging mount. Versatile and configurable, with up and down counting modes, independent controls for 'start', 'stop' and 'reset' signals, reading in decimal and sexagesimal formats (time format), configurable fast access menu, 'on power up' function, password and 5 configurable brightness levels. Universal AC and DC power. Accepts up to 3 output and control options (relays, analog retransmission, Modbus RTU, transistor outputs, RS-485 ASCII, ...). Configuration from frontal keypad or remote keypad.

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1. Series B, models Bxx-CR

Large format industrial meters with chronometer and time counter functions

Large format meters for long distance reading, for industrial applications. Different formats available with 4 and 6 digits, with 60 mm and 100 mm digit height. Front keypad to access the configuration menu, and optional remote keypad.

Multiple reading time formats in hours, minutes, seconds, cents of seconds and days. Configurable for decimal or sexagesimal reading (time format). Functions for up and down counting, with preset value configurable.

Controls

Independent controls for 'start', 'stop' and 'reset' through free potential contacts. Configurable for activation with other control signals (NPN, PNP, inductive, ...).

Reset

External reset control, with activation configurable by edge or by level, front reset and automatic reset configurable when reaching an alarm setpoint.

Special functions

Special functions with activation by external connection : counting direction, total accumulated times, total exceeded time, display hold, and memory of events, maximum and minimum (see section 1.14.6).

Alarms

Independent alarms configurable as maximum or minimum, with configurable activation and deactivation delays and optional inverted relay activation and relay manual unlocking. Alarms with 'repeat' mode with activation at multiples of configured time (see section 1.14.12).

'On_alarm' parameter to link functions to alarm activation;;

continue, reset to '0', load 'preset' value or stop counting (see section 1.14.12).

Flash

Configurable display flashing in case of 'stop' counting, 'start' counting, or alarm activation.

Security on start-up

'On power-up' function to define inactivity times after power-up, configure the counter status ('start' or 'stop') after power-up, and the option to apply a reset after power-up.

Memory

The instrument saves and recovers the last reading value in case of power-loss.

Configurable 'fast-access' menu

The front key 'UP' () gives access to a user configurable menu with direct access to several useful functions such as alarm setpoints and/or preset value (see section 1.14.14).

Configurable 'Fast access' to selected functions with key 'UP' (▲) (see section 1.14.14), typically alarm setpoints and preset values.

Control and retransmission options

Output and control options with 1, 2 and 3 relays, transistor outputs, controls for SSR relays, isolated analog outputs, communications in Modbus RTU, RS-485 ASCII and RS-232.

Mechanical and mounting

Sturdy metal housing with full IP65 protection. Internal connections by plug-in screw clamp terminals, and output through cable glands. Housing prepared for panel, wall and hanging mount.

1.1 How to use this manual

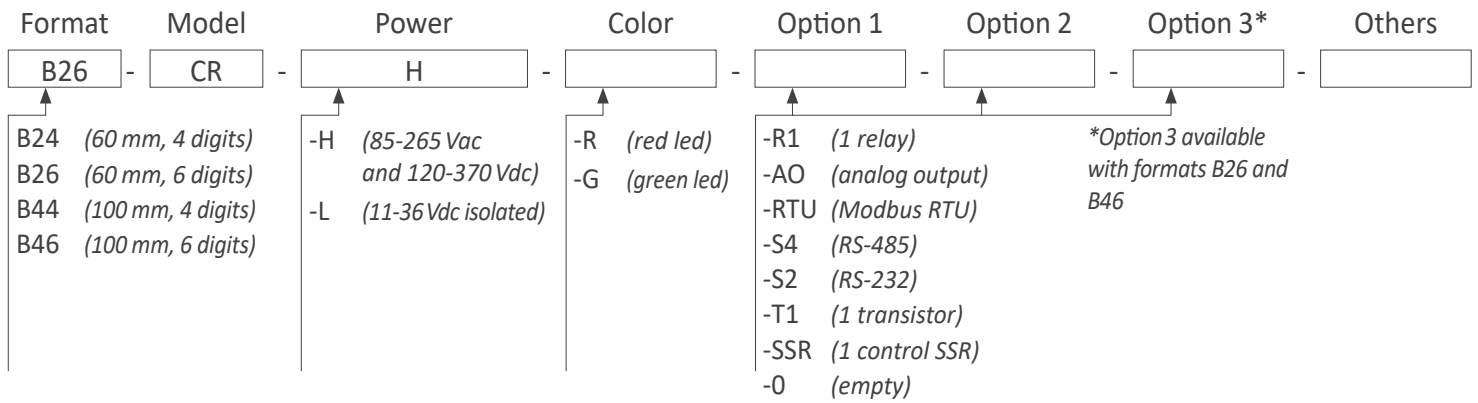
If this is the first time you are configuring a Series B large format meter, below are the steps to follow to install and configure the instrument. Read all the manual sections in

1. Identify the instrument format (see section 1.4)
2. Power and signal connections
 - open the instrument (see section 1.5)
 - connect the power (see section 1.7)
 - connect the signal (see section 1.8)
 - close the instrument (see section 1.5)
3. Configure the instrument (see section 1.14)
 - select the reading format, counting direction and preset value (see section 1.14.2)
4. Advanced configuration (optional)
 - functions 'on power up', external reset and 'B' function (see section 1.14.7)
 - control configurations (see section 1.14.10)
 - configure the alarms (see section 1.14.12)

order to have a full and clear view of the characteristics of the instrument. Do not forget to read the installation precautions at section 1.20.

- configure the fast access (see section 1.14.14), and key 'LE' (1.14.15)
 - configure other functions (see section 1.14.16)
5. If the instrument includes analog output (AO) or serial communications (RTU, S4, S2)
 - to include an option to an instrument see section 1.6
 - to configure an installed option, access the option configuration menu (see section 1.14.23)
 - see section 2 for information regarding the output and control options available
 6. Install the instrument
 - mount on panel, wall or hanging (see section 1.19)
 - adjust the brightness level according to your environmental needs (see section 1.14.22)
 7. Check application examples at sections 1.15 and 1.16

1.2 How to order

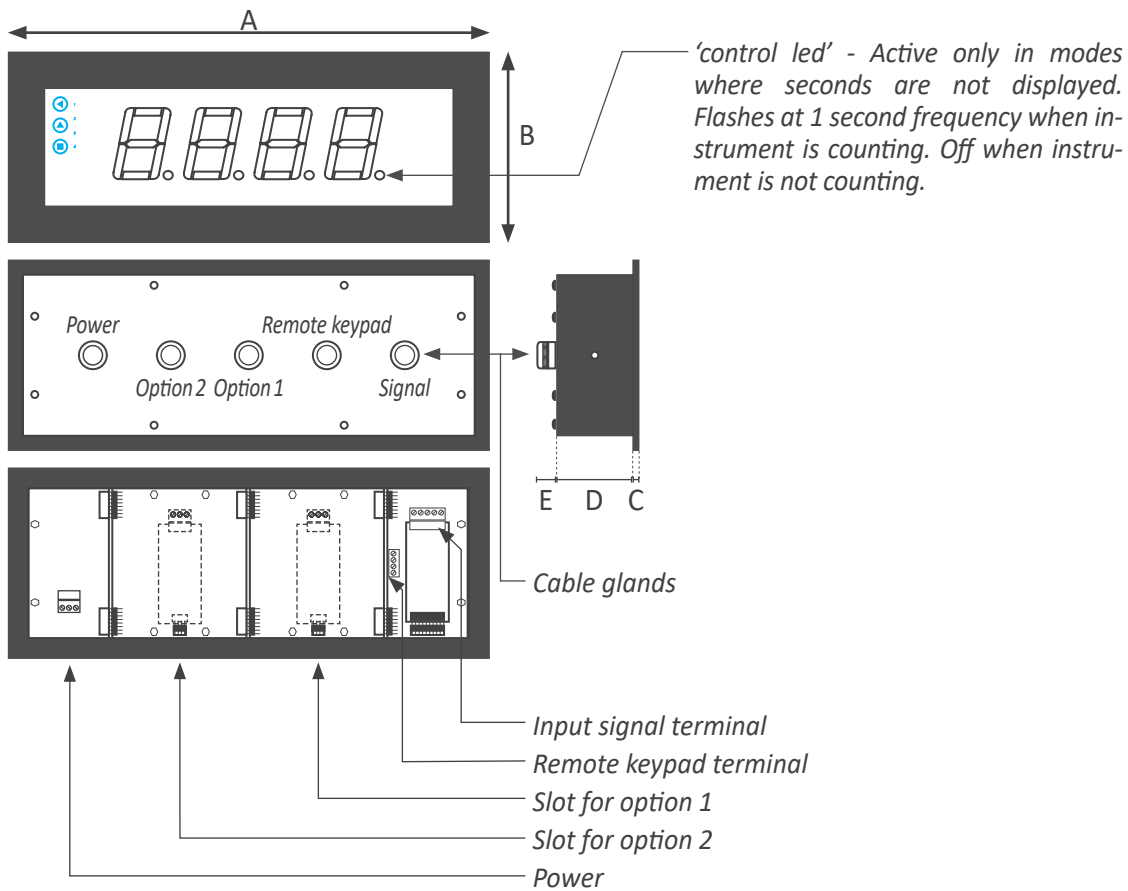


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1.4 Sizes and formats

1.4.1 Format B24

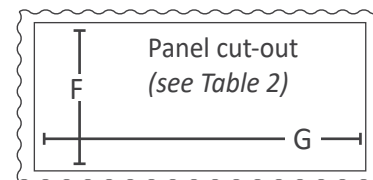


Size A	340 mm
Size B	135 mm
Size C	3 mm
Size D	55 mm
Size E	25 mm

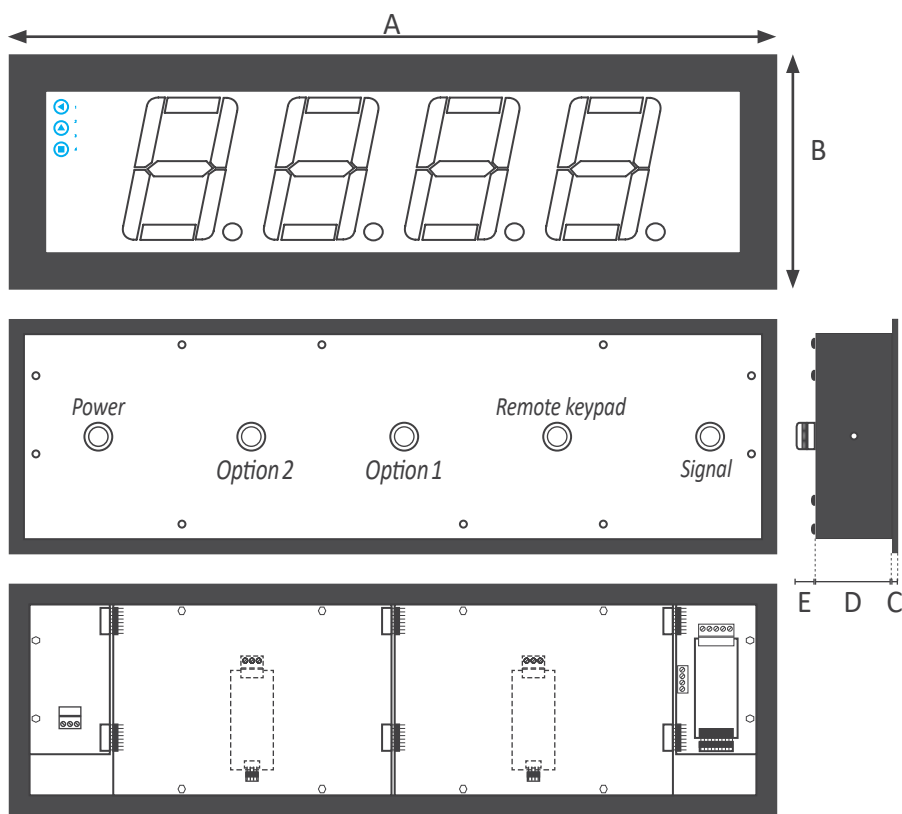
Table 1 - Sizes B24

Cut-out G	322 mm (±1)
Cut-out F	117 mm (±1)

Table 2 - Panel cut-out B24



1.4.2 Format B44

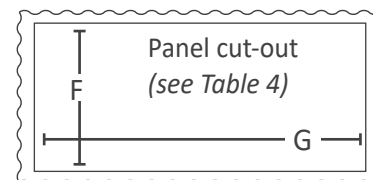


Size A	542 mm
Size B	166 mm
Size C	3 mm
Size D	55 mm
Size E	25 mm

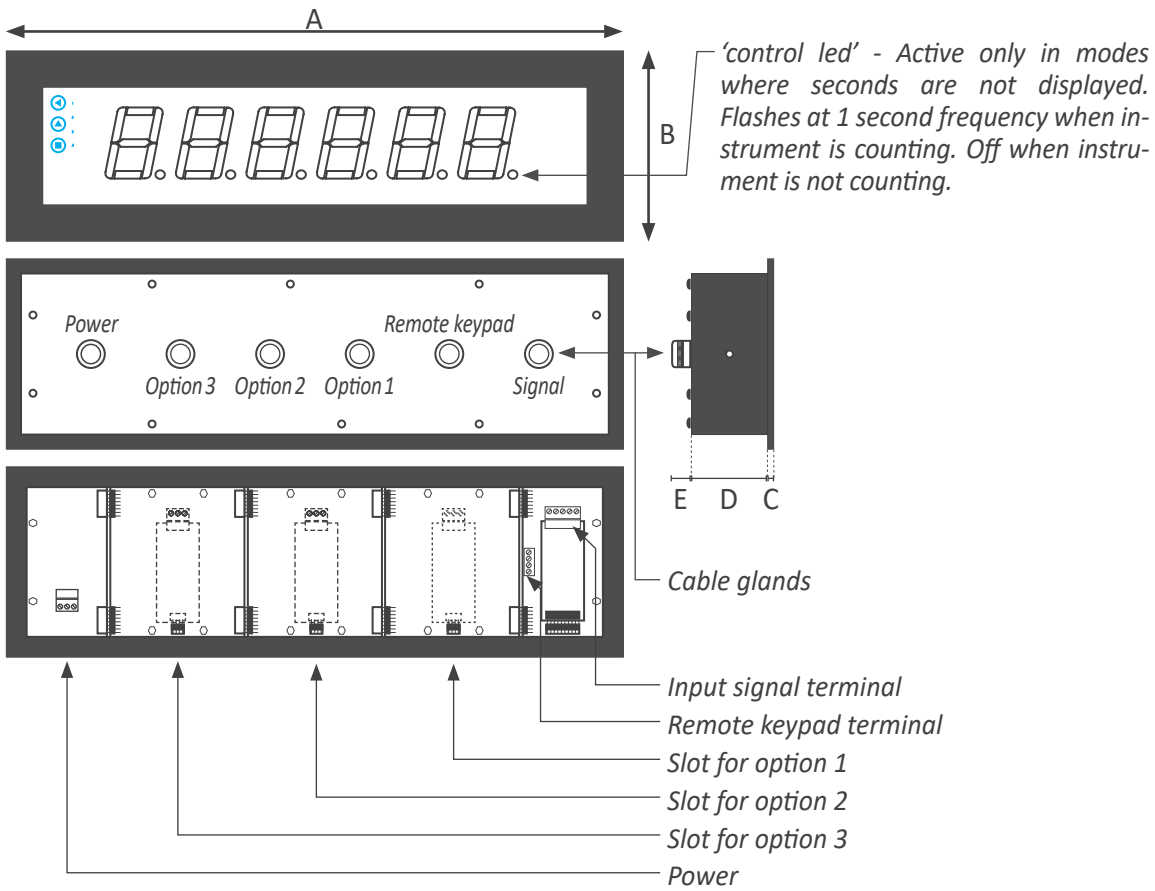
Table 3 - Sizes B44

Cut-out G	524 mm (±1)
Cut-out F	148 mm (±1)

Table 4 - Panel cut-out B44



1.4.3 Format B26

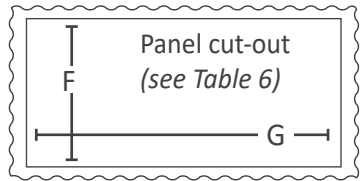


Size A	436 mm
Size B	135 mm
Size C	3 mm
Size D	55 mm
Size E	25 mm

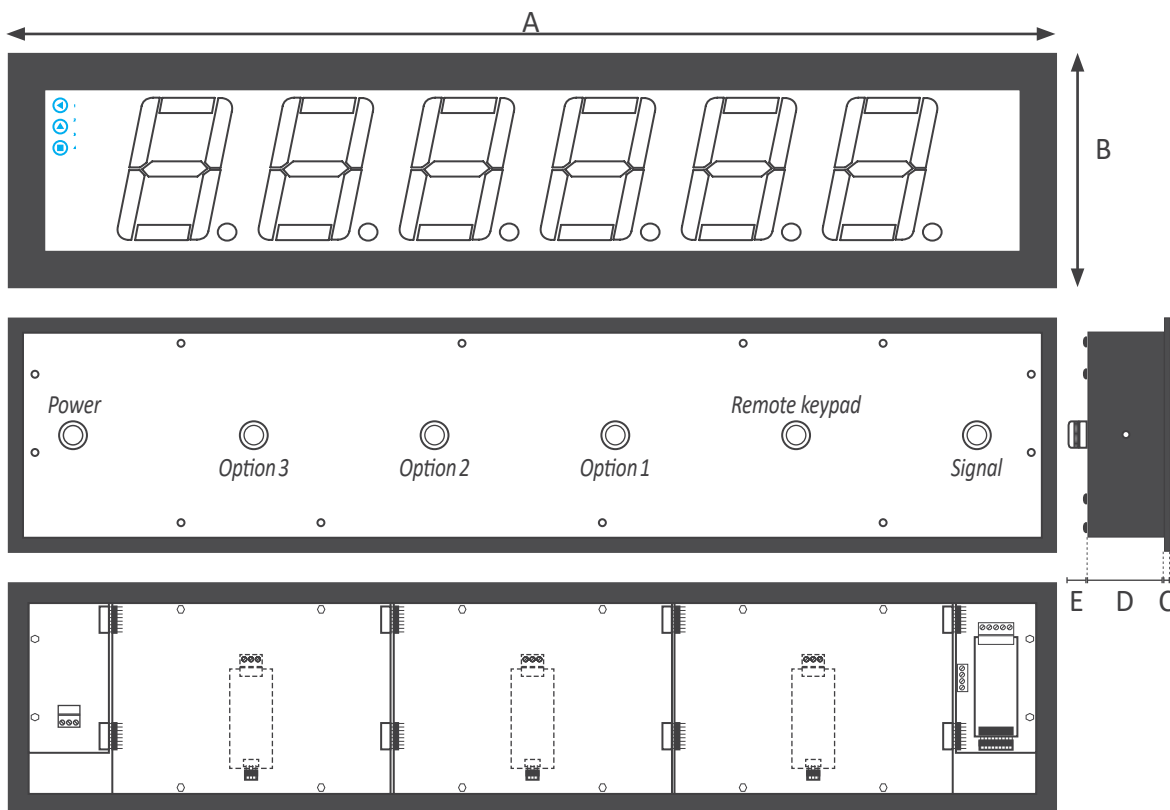
Table 5 - Sizes B26

Cut-out G	418 mm (±1)
Cut-out F	117 mm (±1)

Table 6 - Panel cut-out B26



1.4.4 Format B46

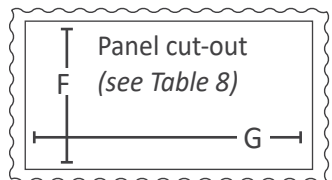


Size A	740 mm
Size B	166 mm
Size C	3 mm
Size D	55 mm
Size E	25 mm

Table 7 - Sizes B46

Cut-out G	722 mm (±1)
Cut-out F	148 mm (±1)

Table 8 - Panel cut-out B46



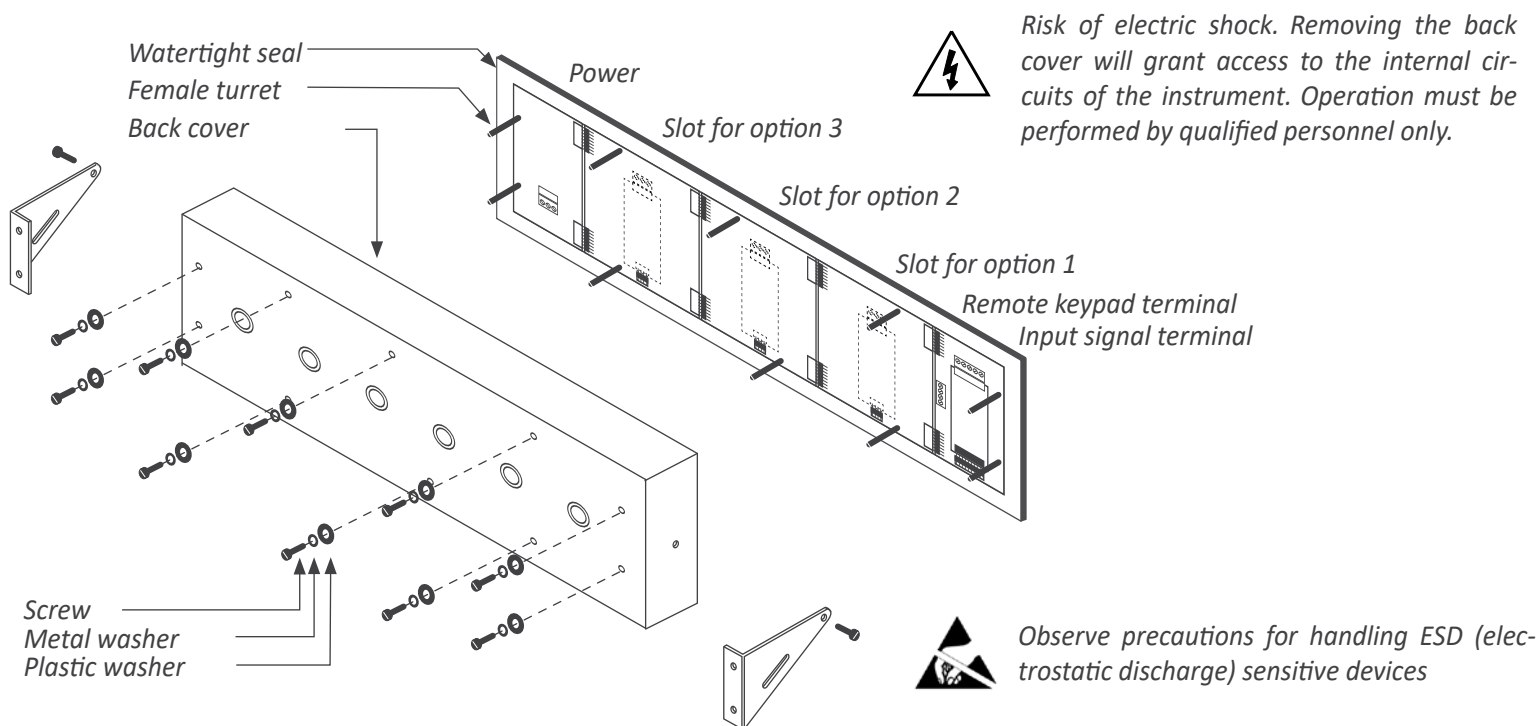
1.5 To access the instrument

To open the housing, remove the screws from the back cover. With each screw there is a metal washer and a plastic washer. Once the screws are out, remove the back cover.

The figure below shows the instrument internal structure for a B26 format. It shows the location of the 3 slots for optional output and control modules, the power terminal and the input signal terminal.

To close the instrument, place the back cover, the screws, the metal washer and the plastic washer. The plastic washer is in contact with the back cover. Confirm that the screws are correctly turning inside the internal female screws.

To ensure a correct IP65 protection tighten the back cover screws with a strength between 30 and 40 Ncm, with the help of a dynamometer screwdriver.

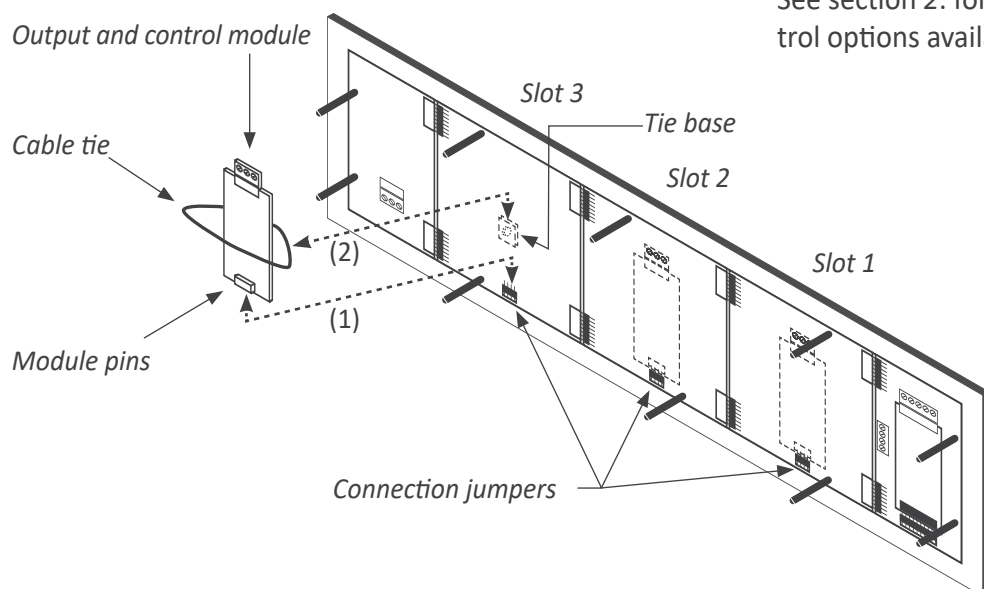


1.6 Modular system

Large format meters from Series B are designed with an internal modular architecture. The output and control modules are independent and can be installed by accessing the internal circuits of the instrument, and connecting the module to the connection jumpers of the selected slot.

Each module is provided with a cable tie to fix the module to the tie base. The input signal modules defines the instrument function and are exchangeable, switching a temperature meter to an impulse counter only by replacing the input signal module.

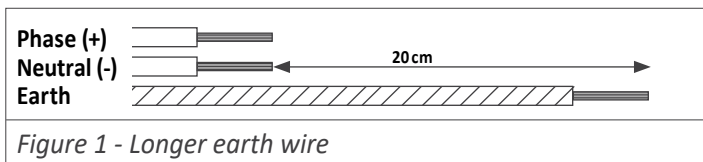
See section 2. for information regarding the output and control options available



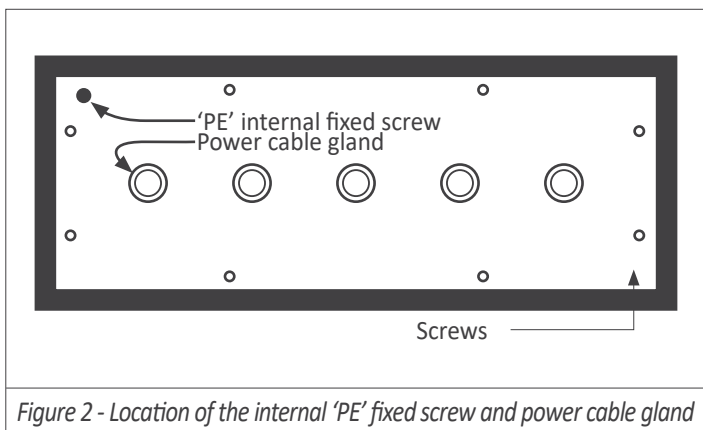
- To install an output and control module
- (1) insert the 'module pins' into the 'connection jumpers' in one of the free slots
 - (2) place the 'cable tie' into the 'tie base' and embrace the 'module' firmly, until it is fixed

1.7 Power connections and protective earth

1. Unscrew the screws from the back cover and remove the back cover (see section 1.5).
2. Pass the power cable through the power cable gland (see section 1.4).
3. Prepare the power cables so that the earth wire is 20 cm longer than the other cables (see Figure 1).



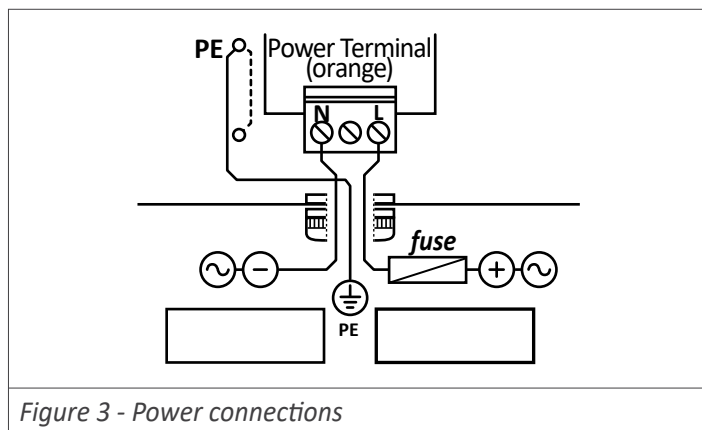
4. Connect the earth wire to the internal fixed screw 'PE' (see Figure 2) located at the inside of the back cover. The instrument internally connects the back cover metallic



structure with the front metallic structure through an internal green-yellow cable. (dotted cable at Figure 3).

5. Connect phase and neutral (in AC power) or positive and negative (in DC power) to the internal power terminal.
6. The connections label attached to the outside of the instrument has some free space left to write the color or local code for each cable.
7. To comply with security regulation 61010-1, add to the power line a protection fuse acting as a disconnection element, easily accessible to the operator and identified as a protection device.

Power 'H'	500 mA time-lag fuse
Power 'L'	1000 mA time-lag fuse

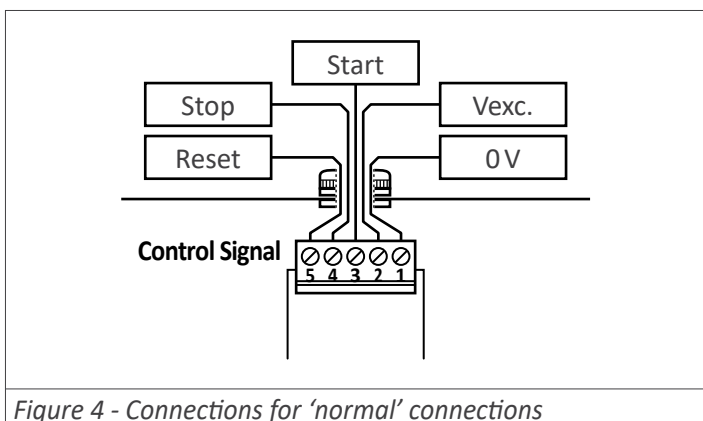


1.8 Control signal connections

The connections terminal is located in the instrument (see section 1.5). All control signals activate by falling edge, by short-circuit to 0V. To activate controls with other signals or activation, see section (see section 1.14.10).

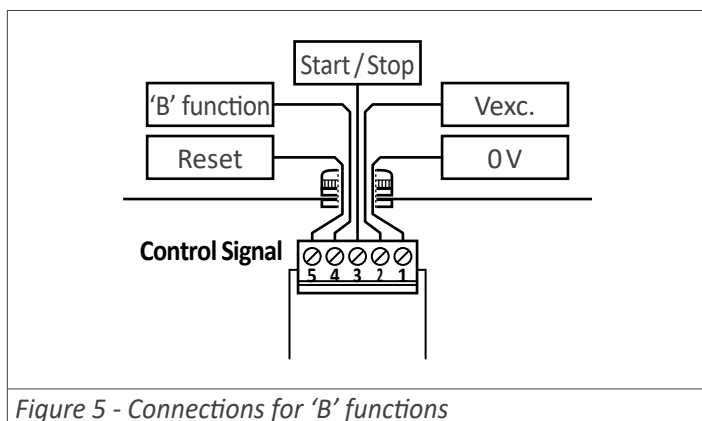
1.8.1 'Normal' connections

At normal connections, the 'start', 'stop' and 'reset' controls are independent.



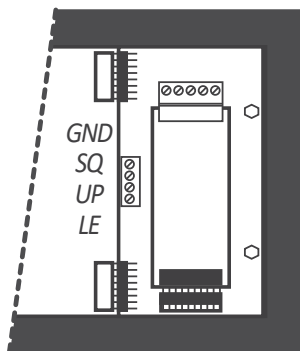
1.8.2 'B' connections

The 'B' connections activates automatically when one of the special 'B' functions (see section 1.14.6) is configured. The 'start' and 'stop' controls share the same terminal 3. Signal at 'high' level activates the 'start', and at 'low' level activates the 'stop'. The remaining terminal is dedicated to control the 'B' function selected.



1.9 Connections for remote keypad

The 4 pin terminal located beside the input signal module allows to replicate a remote version of the front keypad. Connect 4 cables for front keys 'SQ' (■), 'UP' (▲) and 'LE' (◀) and for the common. Pass these cables through the 'remote keypad' cable gland (see section 1.4).



1.10 Functions included

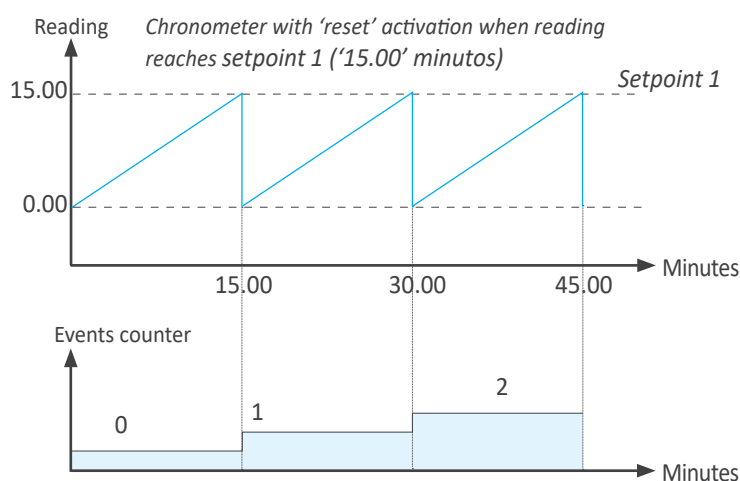
Functions included		Section
Reading	15 different formats	1.14.2
Counting direction	up or down counting	1.14.2
Preset	yes	1.14.2
'On Power Up'	yes	1.14.3
Reset	configurable : external, front and linked to alarm activation	1.11
Special functions	control up / down event counter total time exceeded time reading 'hold' longest and shortest cycle	1.14.6
Controls	configurable	1.14.10
Alarms	simple or double setpoint 'on alarm' events activation delays deactivation delays inverted relays locked alarms	1.14.12
Fast access menu	yes, configurable	1.14.14
Front 'LE' key	yes, configurable	1.14.15
Retention memory	yes, recovers with power	1.13
Password	configuration locked	1.14.19
Brightness	configurable, 5 levels	1.14.22

Table 9 - Functions included

1.11 Reset types

The reset function can be activated from three independent and configurable sources:

- Front reset - associated to the front key 'LE' (◀). This reset can be configured by menu (see section 1.14.15). The front reset is activated by levels (pressed / not pressed).
- External reset - connected to pin 5 at the internal signal terminal (see section 1.8). It activates by falling edge, by connection to the 0 Vdc terminal. To configure a different activation see section 1.14.10. Configurable trigger level between 0 and 3.9 Vdc, configurable pull-up / pull-down resistors, can be configured to work with other type of signals (NPN, PNP, push-pull, inductive, TTL, ...).
- Alarm reset - the 'on alarm' parameter at alarms 1, 2 and 3 (see section 1.14.12) can be configured to activate a certain function when alarm activates: stop, load '0', load 'preset'.



1.12 Messages and errors

Error messages related to the local instrument are shown on display, in flash mode (see Table 10). Examples given are for instrument with 6 digit formats.

Messages and errors on display	
'Err.1'	incorrect password.
'Err.2'	at 'oPt.X' menu entry. Installed module is not recognized.
'Err.8'	excitation voltage overload
'999999'	+ flashing mode. Reading is in overrange.
'-199999'	+ flashing mode. Reading is in underrange.

Table 10 - Messages and error codes for local instrument

1.13 Technical specifications

Digits	
number of digits	4 or 6 (see Table 12)
digit	7 segments
view angle	120°
color	red or green
digit height	(see Table 12)
Reading	
max., min.	(see Table 12)
reading formats	(see Table 11) for 6 digits (see Table 13) for 4 digits
display refresh	15 refresh / second
memory	yes, recovers the last counter value after power loss
quartz accuracy	±0.01 %
thermal drift	20 ppm / °C

Reading formats (6 digits)			
Sexagesimal modes	mm.ss.cc	mmmm.ss	
	hh.mm.ss	hhhh.mm	
	dd.hh.mm	dddd.hh	
Decimal modes	sssss	mmmmm	hhhhh
	sssss.s	mmmmm.m	hhhhh.h
	ssss.ss	mmmm.mm	hhhh.hh

Table 11 - Reading formats (d=days, h=hours, m=minutes, s=seconds, c=cents of second)

Reading formats (4 digits)			
Sexagesimal	mm.ss	hh.mm.ss	dd.hh
Decimal modes	ssss	mmmm	hhhh
	sss.s	mmm.m	hhh.h
	ss.ss	mm.mm	hh.hh

Table 13 - Reading formats (d=days, h=hours, m=minutes, s=seconds)

Controls	start, stop, reset
default control signal	free potential contact
configurable for ...	NPN, PNP, Namur, pick-up, TTL, inductive, mechanical, ...
max. Vdc on terminals	±30 Vdc
excitation voltage	+18 Vdc, +15 Vdc, +9 Vdc, +5 Vdc
max. current	70 mA
protection	yes, current limited to 70 mA
control wires section	max. 0.5 mm ²
Power	
power 'H'	85 to 265 Vac and 120 to 370 Vdc isolated (isolation 2500 Vac)
power 'L'	11 to 36 Vdc isolated (isolation 1500 Vdc) (see Table 12)
consumption	(see section 1.7)
fuses	max. 2.5 mm ²
wire section	
Configuration	front keypad with 3 keys remote keypad (see section 3.1)
Output and control options	relay output, analog retransmission, Modbus RTU, ... (see section 2)
Mechanical	
IP protection	full IP65 housing
mounting	panel, wall, hanging (see section 1.19)
connections	cable gland outputs internal plug-in screw terminals
housing material	textured iron, black painted methacrylate front filter (see Table 12)
weight	(see section 1.4)
front sizes	(see section 1.4)
panel cut-out depth	(see section 1.4)
Temperature	
operation	from 0 to +50 °C
storage	from -20 to +70 °C
warm-up time	15 minutes

	Format B24	Format B44	Format B26	Format B46
Number of digits	4	4	6	6
Digit height	60 mm	100 mm	60 mm	100 mm
Reading distance	25 meters	50 meters	25 meters	50 meters
Slots for output and control options	2	2	3	3
Maximum reading	9999		999999	
Minimum reading	-1999		-199999	
Consumption (without options installed)	3 W	5.25 W	3.5 W	5.5 W
Consumption (with options installed)	5 W	6.75 W	5,5 W	7 W
Weight	2200 gr.	2500 gr.	3500 gr.	4500 gr.

Table 12 - Technical specifications associated to format

1.14 Configuration

1.14.1 How to operate the menus

The instrument has two menus accessible to the user :

‘*Configuration menu*’ (key ‘SQ’) (■)

‘*Fast access*’ menu (key ‘UP’) (▲)

Configuration menu

The ‘*configuration menu*’ modifies the configuration parameters to adapt the instrument to the application needs. To access the ‘*configuration menu*’ press for 1 second the ‘SQ’ (■) key. This access can be blocked by activating the ‘**Password**’ (‘PASS’) function. While operating the ‘*configuration menu*’, the alarm status is ‘hold’ to the status it had before accessing the menu, and the output and control modules remain in ‘*error*’ state. When leaving the ‘*configuration menu*’, the instrument applies a system reset, followed by a brief disconnection of the alarms and the output and control modules. Functionality is then recovered.

For a detailed explanation on the ‘*configuration menu*’ see the following sections, and for a full view of the ‘*configuration menu*’ see section 1.17.

‘Fast access’ menu

The ‘*fast access*’ menu is an operator configurable menu, providing fast and direct access to the most usual functions of the instrument with a single key pad stroke. Press key ‘UP’ (▲) to access this menu.

See section 1.14.14 for a list of selectable functions for the ‘*fast access*’ menu in this instrument. The ‘**Password**’ (‘PASS’) function does not block access to this menu. Accessing and modifying parameters in the ‘*fast access*’ menu does not interfere with the normal functionality of the instrument, and it does not generate any system reset when validating the changes.

Operating with the front keypad inside the menus

Key ‘SQ’ (■) - press the ‘SQ’ (■) key for 1 second to access the ‘*configuration menu*’. Inside the menu, the ‘SQ’ (■) key acts as an ‘ENTER’. It enters into the menu option selected, and when entering a numerical value, it validates the number.

Key ‘UP’ (▲) - press the ‘UP’ (▲) key to access the ‘*fast access*’ menu. Inside the menu, the ‘UP’ (▲) key sequentially moves through the available parameters and menu entries. When entering a numerical value, it modifies the digit selected by increasing its value to 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Key ‘LE’ (◀) - press the ‘LE’ (◀) key to activate the configured special functions associated to this key. Inside the menu, the ‘LE’ (▲) acts as an ‘ESCAPE’. It leaves the selected menu level and eventually, by leaving all menu levels, it leaves from the configuration menu. Then changes are applied and the instrument is back to normal function. When entering a numerical value, it selects the active digit, and the value is then modified by key ‘UP’ (▲).

‘Rollback’

After 30 seconds without interaction from the operator, the instrument will rollback and leave the ‘*configuration menu*’ or the ‘*fast access*’ menu. All changes will be discarded.

Instruments with 4 and 6 digits

The configuration menus included in this document show values for a 6 digit instrument. In case of 4 digit instruments, note that maximum reading values should be 9999 instead of 999999 to 9999 and minimum reading values should be -1999 instead of -199999.

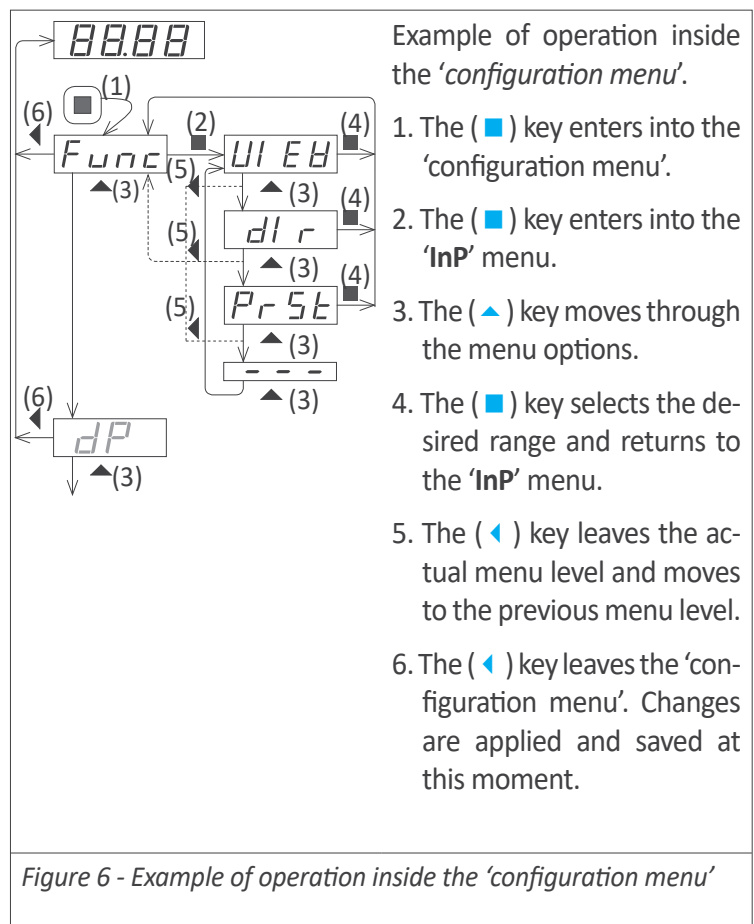
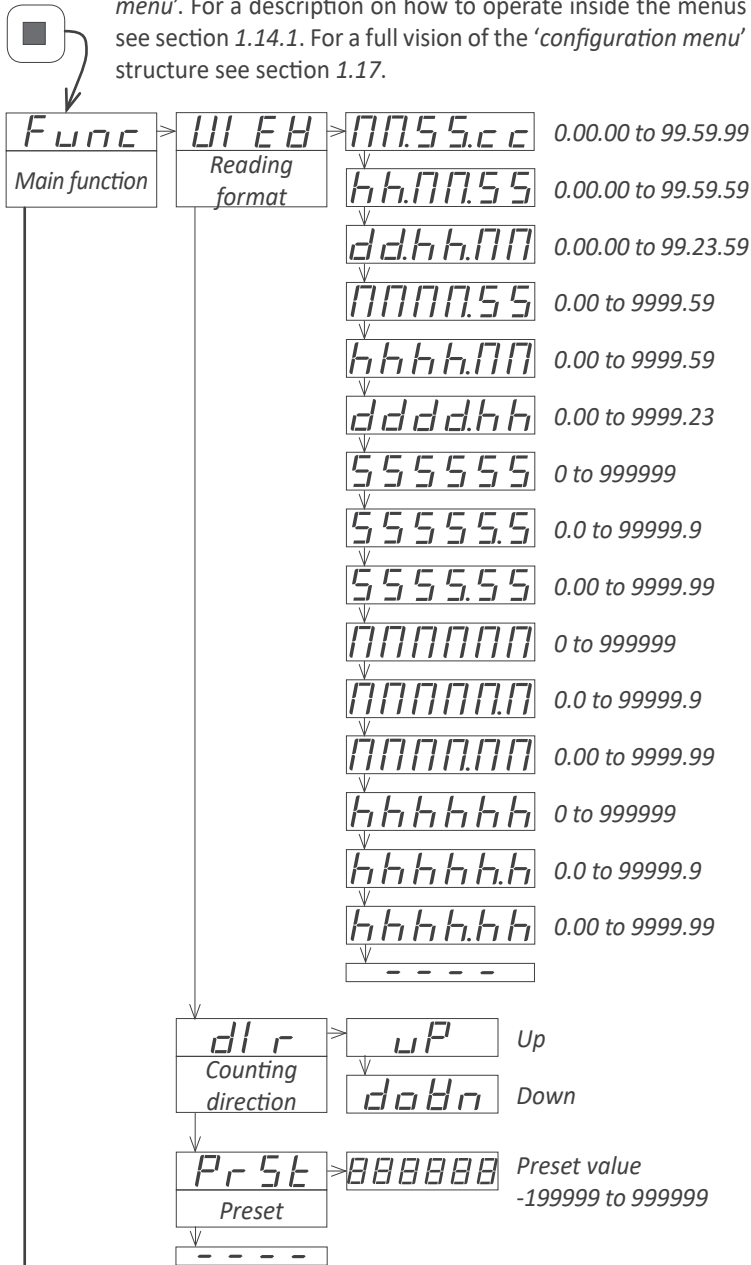


Figure 6 - Example of operation inside the ‘*configuration menu*’

1.14.2 Initial set-up

Press 'SQ' (■) for 1 second to access the 'configuration menu'. For a description on how to operate inside the menus see section 1.14.1. For a full vision of the 'configuration menu' structure see section 1.17.



To configure the initial set up, enter the 'Main function' ('Func') menu and select the reading format, the counting direction and the preset value.

At the 'Reading format' ('VIEW') menu select one of the available formats.

- 'MM.SS.cc' - clock format, minutes, seconds and cents.
- 'hh.MM.SS' - clock format, hours, minutes and seconds.
- 'dd.hh.MM' - clock format, days, hours and minutes.
- 'MMMM.SS' - counter of minutes and seconds.
- 'hhh.MM' - counter of hours and minutes.
- 'ddd.hh' - counter of days and hours.
- 'SSSSS' - counter of seconds.
- 'SSSS.S' - counter of seconds with one decimal.
- 'SSSS.SS' - counter of seconds with two decimals.
- 'MMMMMM' - counter of minutes.
- 'MMMMM.M' - counter of minutes with one decimal.
- 'MMMM.MM' - counter of minutes with two decimal.
- 'hhhhh' - counter of hours.
- 'hhhhh.h' - counter of hours with one decimal.
- 'hhhh.hh' - counter of hours with two decimal.

At the 'Counting direction' ('dlr') parameter, select 'uP' for up counting or 'doWn' for down counting.

At the 'Preset' ('PrSt') parameter, configure the value that will load on display when the 'reset' function activates. See section 1.11 for the different types of reset activation.

1.14.3 'On power up' function

The '**On Power Up**' ('**on.Pu**') functions allows to define a series of actions to activate when the instrument restarts after a power loss. Functions available are a delay so the instrument waits a defined time before starting to measure and control, an automatic reset of the time counter and the definition of the status of the counter (counting or stopped).

The functions will apply only after a restart due to power-loss, they will not apply after a restart due to changes in configuration.

Delaying the measure and control functions gives additional time to elements of the system who are slower, so they can

start completely before the instrument begins to acquire signal and control the outputs.

While on delay mode, the instrument shows all decimal points lightened and flashing, all alarms are deactivated, and there is no signal acquisition or communications control. When the delay time is over, the instrument starts its normal functioning.

El full start-up process of the instrument is as follows: waits the time configured at '**Delay**', resets the time counter (as configured at '**Reset**'), starts counting or stopped, and reads the status of the external controls 'start', 'stop' and 'reset'.

1.14.4 Flash function

The '**Flash**' ('**FLSh**') configures flashing display when the instrument is stopped ('**StP.F**') and/or when the instrument is counting ('**StP.F**').

1.14.5 External reset configuration

The external reset can be activated by edge or by level. Edge activation means that the reset will activate when there is a transition from '0' to '1' or from '1' to '0'. Level activation means that the reset activates at level '0' or level '1'.

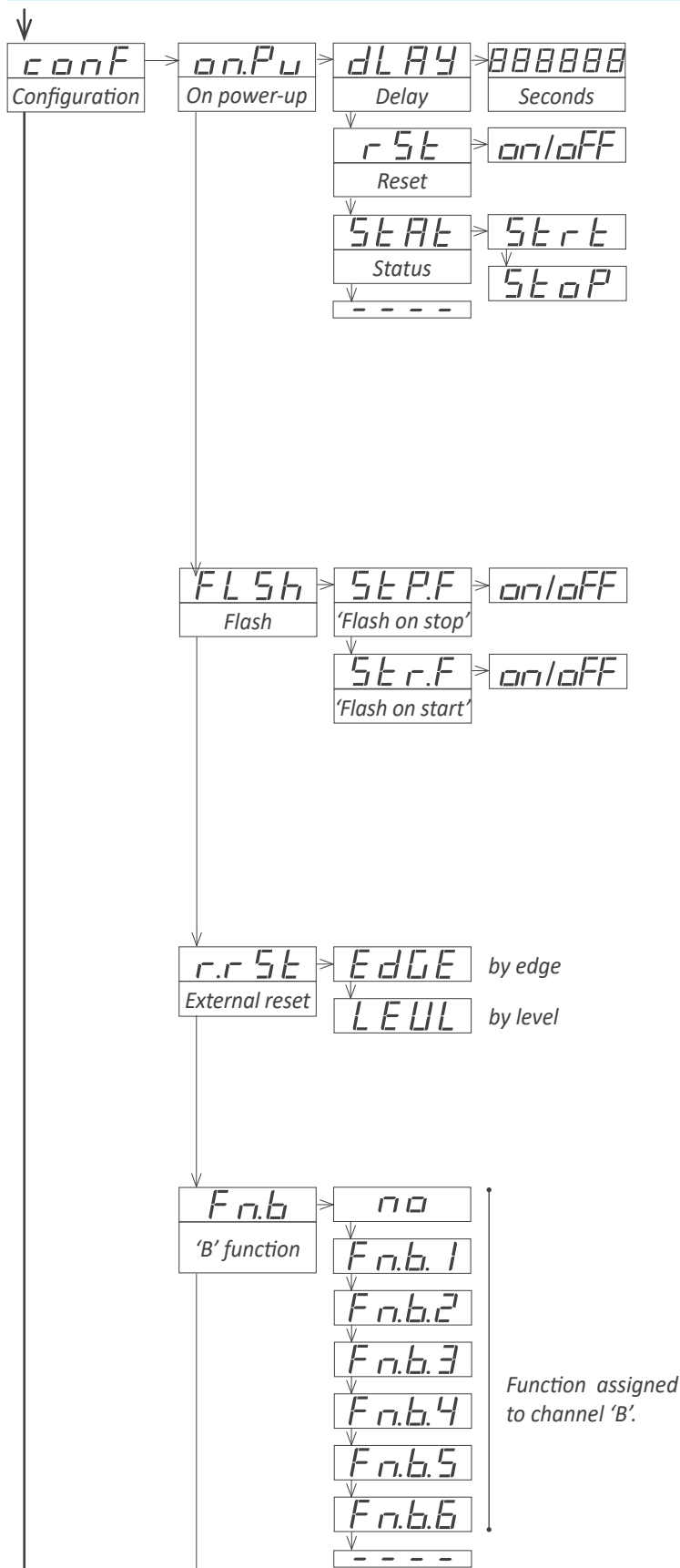
To invert the logic of the activation see section 1.14.10.

1.14.6 'B' function

The operator can select a special function (called 'B' function) to be controlled from external control terminal 3 (see section 1.8.2). Selecting a 'B' function modifies the standard connection of the instrument, and activates the 'B' connections in order to free one of the terminals to control the 'B' function. Available functions are listed below. See also section 1.14.8 :

- function B1 ('**Fnb.1**') to control counting direction (up or down)
- function B2 ('**Fnb.2**') to count events
- function B3 ('**Fnb.3**') to view total accumulated working times
- function B4 ('**Fnb.4**') to view exceeded times
- function B5 ('**Fnb.5**') to 'hold' the reading
- function B6 ('**Fnb.6**') to control maximum an minimum values (memories of longer and shorter times)

1.14.7 'Configuration' menu



The 'On Power Up' ('on.Pu') menu assigns functions to be applied when the instrument starts after a power loss. For more information see section 1.14.3.

- at the 'Delay' ('dLAY') parameter configure the time the instrument will wait before starting normal functionality. Time between 0 and 200 seconds.
- at the 'Reset' ('rSt') parameter set to 'on' to activate a reset when restarting after a power loss
- at the 'Status' ('StAt') parameter configure the state of the counter after power-up. Select 'Strt' to count after power-up or 'StoP' to remain stopped after power-up.

At the 'Flash' ('FLSH') menu configure:

- 'Flash on stop' ('StP.F') set to 'on' to activate flashing reading when the chronometer is stopped.
- 'Flash on start' ('Str.F') set to 'on' to activate flashing reading when the chronometer is counting.

At the 'External reset' ('r.rSt') select the activation of the external reset by edges or by levels.

At the 'B' function' ('Fn.b') select the the function associated to channel 'B'. By default there is no selected 'B' function. For more information see section 1.14.6.

Next menu entry gives access to the configuration parameters for the "B' function' selected. Following are explanations for possible menus 'Fn.b.1' to 'Fn.b.6' (or message 'Fn.b.n' if no 'B' function' has been selected).

1.14.8 Functions 'B1' to 'B6'

The 'B' function is a special function disabled by default. To activate one of the 'B' functions, see section 1.14.6. When activating a 'B' function, the 'B' connection also activates (see section 1.8.2). The 'B' function control signal (terminal 3) activates by short-circuit to 0V. For other activation signals see section 1.14.10 and take into account that the 'start' signal is now 'start-stop', and the 'stop' signal is now the 'channel 'B'' control signal.

- with the '**B.1 control up / down**' ('Fn.b.1') function the up or down counting is controlled through the channel 'B' control signal.

- the '**B.2 events**' ('Fn.b.2') function enables an internal events counter (0 to 999999) visible on display activating the channel 'B' control signal. Events that add '+1' to the internal event counter are :

- at '**on alarm 1**' ('o.AL1') select '**on**' to add '+1' each time alarm 1 activates.

- at '**on alarm 2**' ('o.AL2') select '**on**' to add '+1' each time alarm 2 activates.

- at '**on alarm 3**' ('o.AL3') select '**on**' to add '+1' each time alarm 3 activates.

- at '**on reset**' ('o.rSt') select '**on**' to add '+1' each time the reset function activates.

Application - a production process repeats every 15 minutes. Each time the chronometer reaches '15.00' minutes, it activates alarm 1 to inform the operator that the material can be packed. Once the material is packed, the operator manually unlocks the alarms and they cycle restarts. At the end of the day, the operator can activate the 'B' function and see the total number of cycles done during the day.

- the '**B.3 total**' ('Fn.b.3') function enables an internal time counter visible on display activating the channel 'B' control signal. To reset the internal counter visualize the value and activate the reset (front or external). The internal time counter can be configured to count the total time the instrument has been powered, or counting, or stopped.

- at the '**Format**' ('ForM') parameter configure the visualization format for the internal time counter. Select '**ch.A**' to visualize with the same format as the main instrument.

- at the '**Count**' ('cnt') parameter select '**ALWS**' to count the time the instrument has been powered, select '**Strt**' to count the time the instrument has been counting or select '**StoP**' to count the time the instrument has been stopped.

Application - a manufacturing process repeats every 120

minutes. Any change in the production process, model or series implies a stop in the manufacturing process. The operator can activate the 'B' function to visualize the total accumulated time the system has been stopped.

- the '**B.4 exceeded**' ('Fn.b.4') function enables an internal exceeded time counter visible on display activating the channel 'B' control signal. To reset the internal counter visualize the value and activate the reset (front or external). The reset leaves the exceeded counter at '0' and stopped. The exceeded time counter can be configured to count the total elapsed from a configured event.

- at the '**Start**' ('Strt') parameter select '**o.AL1**' to start the exceeded counter when alarm 1 activates. Select '**o.AL2**' or '**o.AL3**' to start counting with the activation of alarm 2 or alarm 3.

- at the '**Format**' ('ForM') parameter configure the visualization format for the exceeded time counter. Select '**ch.A**' to visualize with the same format as the main instrument

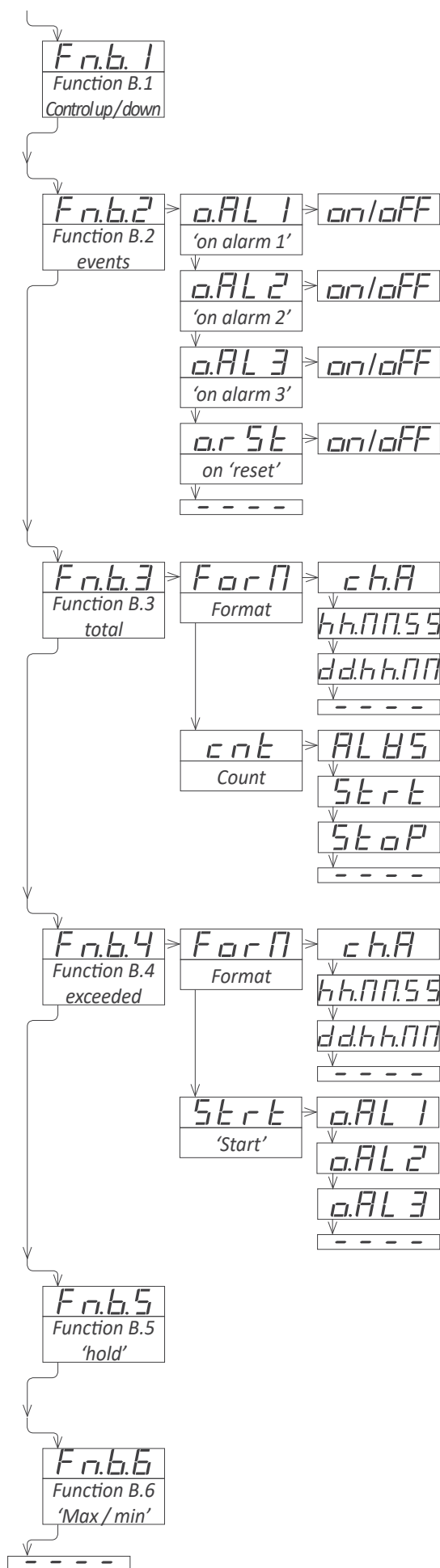
Application - a long duration manufacturing process repeats every 72 hours continuously without stop. At the end of each cycle the operator must refill the consumed material in less than 60 minutes. When a cycle is finished the instrument activates and locks alarm 1, starting the exceeded counter 'B'. The alarm activates a signal to the operator and at the same time activates the visualization of the exceeded time counter. The operator now can see the elapsed since the alarm activated.

- the '**B.5 hold**' ('Fn.b.5') function allows to hold the reading. The chronometer continues counting on the background.

- the '**B.6 max / min**' ('Fn.b.6') function allows to access the memory of maximum and minimum time. Each time a reset is applied, the instrument compares the reading value with the maximum and minimum value and updates the memory values if needed. Values can be displayed with front (or remote) key UP (▲) (see section 1.14.14). Activate channel 'B' to reset the maximum and minimum values.

Application - a production process executes a reset signal each time a cycle ends. At the end of the day the operator can access the maximum and minimum memory values, related to the longer and shorter production cycles of the day.

1.14.9 'B' function configuration menu



Only the configuration menu for the 'B' function selected is visible. See section 1.14.8 for more information on each function.

- special function 'B1' has no associated configuration.
- at the special function 'B2' select 'on' at the events that add '+1' to the event counter.
- at the special function 'B3' configure at the 'Format' ('ForM') parameter the visualization format for the internal totalizer. At the 'Count' ('cnt') parameter select 'ALWS' to count continuously, 'Strt' to totalize only counting times and 'StoP' to totalize the time the chronometer has been stopped.
- at the special function 'B4' configure at the 'Format' ('ForM') parameter the visualization format for the internal totalizer. At the 'Start' ('Strt') parameter select the event that triggers the start of the internal totalizer.

• the special function 'B5' has no associated configuration.

• the special function 'B6' has no associated configuration.

1.14.10 External controls configuration

The instrument allows to configure the 'start', 'stop' and 'reset' external controls to accept different types of signals and different activation signals

The default configuration is activation by free potential contacts, with activation by falling edge (direct connection to terminal 0 Vdc). The following parameters allow to configure the external controls to work with other type of signals:

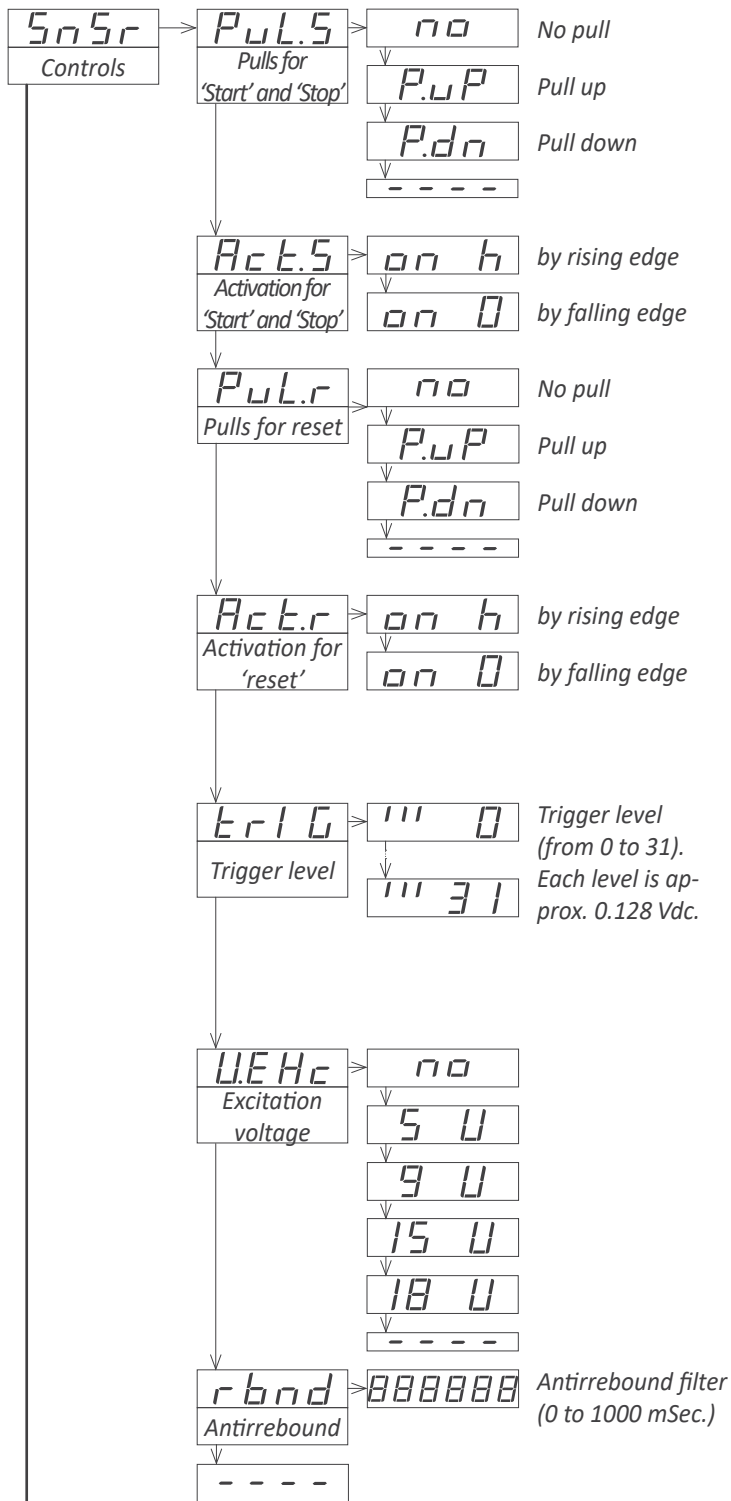
- **'Pulls for 'Start' and 'Stop' ('PuL.S')** - select **'P.uP'** to activate pull-up resistors (needed for NPN sensors). Select **'P.dn'** to activate pull-down resistors (needed for PNP sensors). Select **'no'** to deactivate pulls. Selecting a pull resistors configures the trigger level to 2,5 Vdc.
- **'Activation for 'Start' and 'Stop' ('Act.S')** - select **('on_h')** to activate the 'Start' and 'Stop' controls by rising edge. Select **('on_0')** to activate by falling edge. (With 'B' connections active, the affected signals are the 'start/stop' and the 'B' function signals)
- **'Pulls for reset' ('PuL.r')** - select **'P.uP'** to activate pull-up resistors (needed for NPN sensors). Select **'P.dn'** to activate pull-down resistors (needed for NPN sensors). Select **'no'** to deactivate pulls. The trigger level for the reset is fixed to 2,5 Vdc.
- **'Activation for 'Reset' ('Act.r')** - select **('on_h')** to activate the 'Reset' control by rising edge. Select **('on_0')** to activate by falling edge. Additionally, reset signal can be configured to activate by levels instead of edges (*see section 1.14.5*). In case of activation by levels, value **'on_h'** activates the reset on high signal value, and value **'on_0'** activates reset on low signal. Front reset activates always by state (pressed activates the reset).

- **'Trigger level' ('trIG')** - select the signal voltage level at which the instrument will consider that the signal has reached the activation level. Selectable from 0 to 31 levels, where each level is approximately 0.128 Vdc. Trigger level is the same for channels 'start' and 'stop'. Reset channel has a fixed trigger to 2,5 Vdc. The three leds to the left of the value reflect the state ('0' or '1') of control channels 'Start', 'Stop' and 'Reset'.

- **'Excitation voltage' ('V.EXc')** - power provided by the instrument to power-up the sensors (if needed) used to control the signals 'start', 'stop' and / or 'reset', or to be used as an active signal ('1') for special connections. Select the for the excitation voltage at 5 Vdc, 9 Vdc, 15 Vdc or 18 Vdc. Select **'no'** to disable the excitation voltage.

- **'Excitation voltage' ('V.EXc')** - power provided by the instrument to power-up the sensors (if needed) used to control the signals 'start', 'stop' and / or 'reset', or to be used as an active signal ('1') for special connections. Select the for the excitation voltage at 5 Vdc, 9 Vdc, 15 Vdc or 18 Vdc. Select **'no'** to disable the excitation voltage.

1.14.11 External control configuration menu



The 'Controls' ('SnSr') menu contains all the configuration parameters related to the detection of the control signals 'start', 'stop' and 'reset'. For more information see section 1.14.10.

- at the 'Pulls for 'Start' and 'Stop'' ('PuL.S') parameter select pull-up, pull-down or without pull resistors, for the 'start' and 'stop' control signals.
- at the 'Activation for 'Start' and 'Stop'' ('PuL.S') parameter select activation by rising edge or falling edge for the 'start' and 'stop' control signals.
- at the 'Pulls for reset' ('PuL.r') parameter select pull-up, pull-down or without pull resistors, for the 'reset' external control signal
- at the 'Activation for reset' ('Act.r') parameter select activation by rising edge or falling edge, for the 'reset' external control signal.
- at the 'Trigger level' ('trIG') parameter empirically select the trigger level from 0 to 31. The 3 leds to the left inform about the actual state '0' or '1' for the external controls 'start', 'stop' and 'reset'.
- at the 'Excitation voltage' ('V.Exc') parameter select the voltage value for the excitation voltage, in case it is needed to power the sensors for the 'start', 'stop' and 'reset' external signals.
- at the 'Antirrebound' ('rbnd') parameter configure the time in milliseconds for the antirrebound filter.

1.14.12 Alarms

The instrument manages 3 independent internal alarms, each one controlling the activation of an optional relay, transistor or control SSR output.

Optional modules (see section 2) are installed at the free slots inside the instrument (see section 1.4). B24 and B44 formats have 2 free slots for output and control modules, while B26 and B46 formats have 3 free slots for output and control modules.

The instrument has 3 front leds that reflect the state of the 3 internal alarms. These leds are only for local help during installation, as they are not appropriate for long distance reading.

Each alarm controls the activation of the relay, transistor or control SSR installed on its associated slot, and the front led.

• **Alarms in 'repeat' mode**

With 'repeat' ('rEPt') mode the alarm activates each time that the chronometer reaches a multiple of the setpoint. Alarm remains active during the time indicated at parameter 'deactivation delay' ('dEL.1'). Other parameters on the 'Alarm' menu have no effect in this mode. This mode is not functional in viewing modes with tenths of second or cents of second.

Application: chronometer in 'mm.ss' mode with a 'repeat' alarm and setpoint 1 at '15.00'. Alarm activates at '15.00', '30.00', '45.00', etc.

• **Alarms in 'normal' mode**

In 'normal' mode ('norM') the alarm activates when the reading reached the setpoint value. Each alarm has several parameters for configuration, starting with the usual setpoint, hysteresis and maximum (alarm active when reading is higher than setpoint) or minimum (alarm active when reading is lower than minimum) alarm types (see Figure 7).

Each alarm can configure independent activation and deactivation delays. These delays affect the alarm as a whole, and the delay will affect the front led and the associated relay.

Activate the 'inverted relay' function to invert the activation logic of the associated relay.

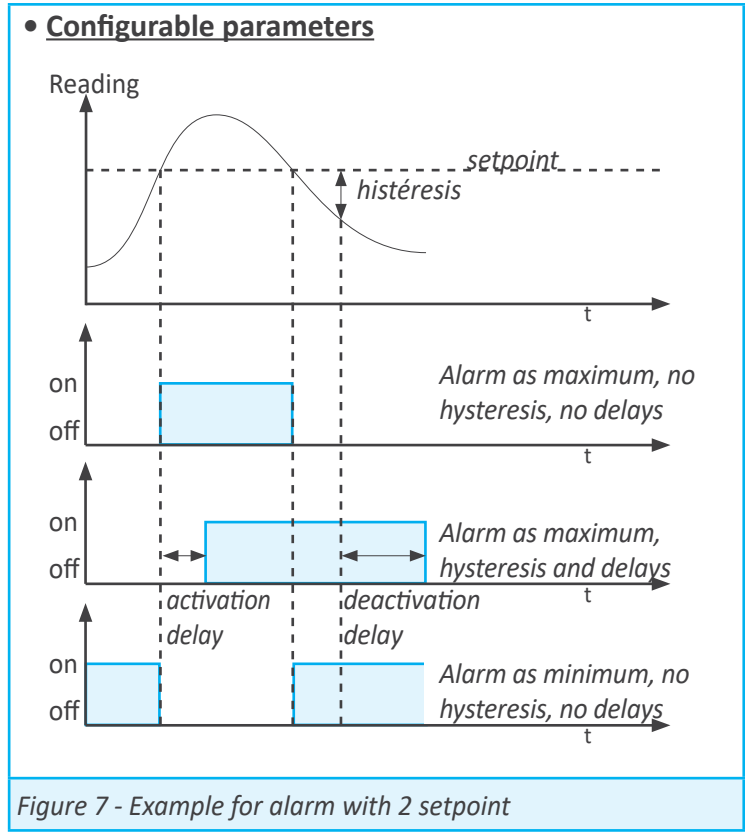
Activate the 'locked alarms' function will force the operator to interact with the instrument when an alarm has been activated. Once activated, the alarm will remain locked at active state, even is the reading returns to a value below setpoint, until the operator manually unlocks the alarms pressing the front key 'LE' (or the remote key 'LE', see section 3.1).

• **'On alarm' functions**

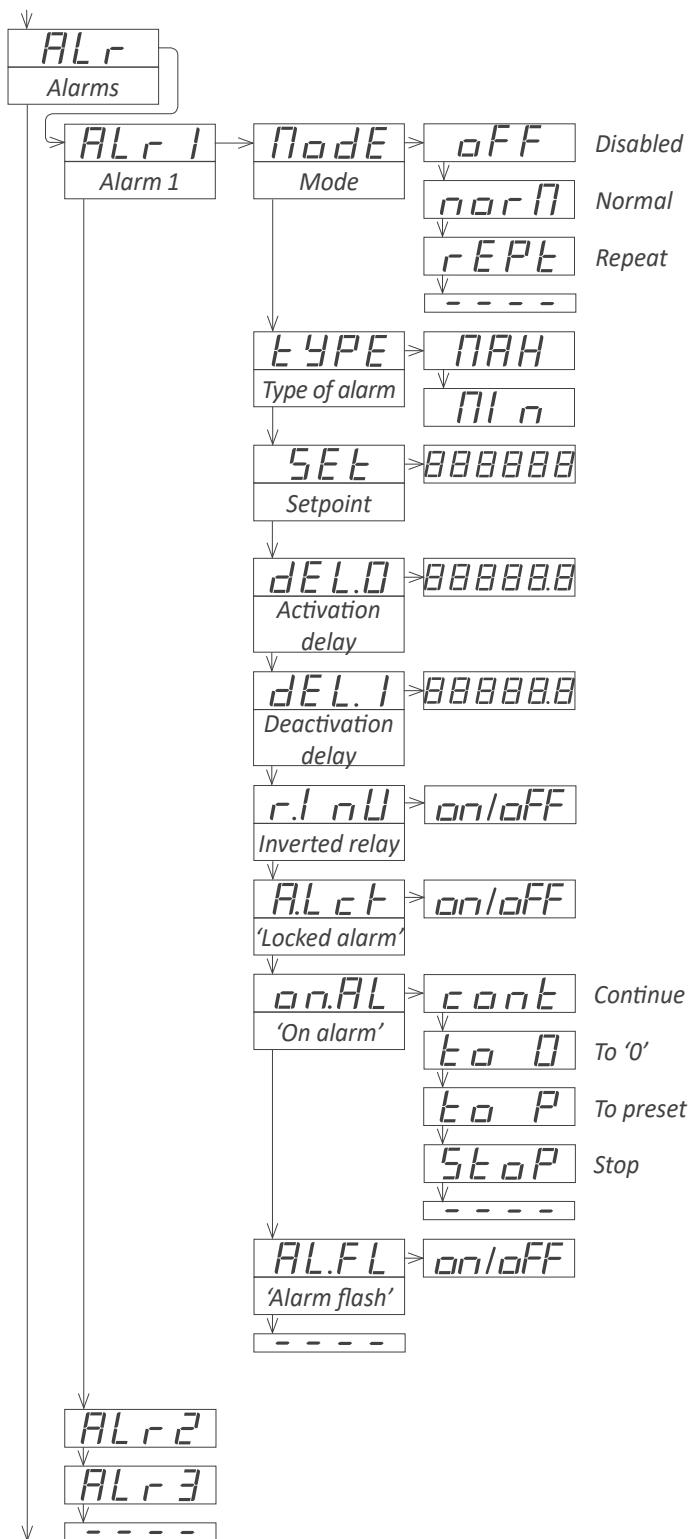
The 'on alarm' functions allow to associate a function to the alarm activation event. Functions available are reset to '0', load the preset value, stop counting, or do nothing. Functions reset and preset create counting cycles (from 0, then to setpoint, then to 0 again, ...). The number of cycles performed can be accessed through the fast access menu (see section 1.14.14).

• **Alarm flash**

The 'Alarm flash' ('AL.FL') set to 'on' activate the flash on display when the alarm activates To stop the flashing mode press any of the front (or remote) keys or change the state of any of the external controls 'start', 'stop' or 'reset'.



1.14.13 Alarms configuration menu



To configure the alarm, access the alarm menu ('ALr1', 'ALr2' or 'ALr3') and configure the following parameters :

- at the 'Mode' ('MODE') select 'oFF' to disable the alarm, select 'normal' ('norM') to enable the normal mode, or select 'repeat' ('rEPT') to enable the repeat mode. The 'repeat' mode only needs the 'deactivation delay' ('dEL.1') parameter and other parameters have no effect on this mode. The 'repeat' mode is not functional if cents or tenths of seconds are visualized.
- at the 'Type of alarm' ('Type') parameter select 'MAX' for maximum alarm (activates when reading is higher than setpoint), or 'Min' for minimum alarm (activates when reading is lower than setpoint).
- at the 'Setpoint' ('SET') parameter configure the alarm activation point. Parameter value is accessible through 'fast access' (see section 1.14.14).
- at the 'Hysteresis' ('hySt') parameter select the hysteresis value. Hysteresis applies to the alarm deactivation. Alarm deactivates once the reading is beyond the setpoint plus the hysteresis value. Hysteresis prevents relay switching in case of signal fluctuations close to the setpoint value.
- at the 'Activation delay' ('dEL.0') parameter configure the delay to apply before the alarm is activated. Delay starts to count once the setpoint is reached. Value from 0.0 to 99.9 seconds.
- at the 'Deactivation delay' ('dEL.1') parameter configure the delay to apply before the alarm is deactivated. Delay starts to count once the setpoint is reached plus the hysteresis value. Value from 0.0 to 99.9 seconds.
- at the 'Inverted relay' ('r.Inv') parameter select 'on' to invert the activation logic of the relay. Relay is inactive when alarm is active, and relay is active when alarm is inactive.
- at the 'Locked alarm' ('A.Lck') parameter select 'on' to block the automatic alarm deactivation. Alarm deactivation must be performed manually, by pressing the 'LE' front button (see section 1.14.15).
- at the 'On alarm' ('on.AL') parameter configure the action to activate when the alarm activates. Select 'cont' to do nothing and continue counting, select 'to_0' to load a '0' on display, or select 'to_p' to load the preset value on display. Selecting 'to_0' or 'to_p' configures 'dEL.1' to 1 second. Select 'stoP' to stop counting.
- at the 'Alarm flash' ('AL.FL') select 'on' to activate the flash in display when the alarm is active.

1.14.14 Fast access

The 'fast access' is an operator configurable menu. The operator can access this menu with a single press of the front key 'UP' (▲). The configured menu entries will be accessible. Eligible parameters to be accessed by this menu are:

- access to the alarm setpoints through the 'UP' (▲) key allows to read and modify the values.
- access to the maximum, minimum and events alarms through the 'UP' (▲) key allows to read and reset the values. To reset the memory values: visualize the value on display, press the 'UP' (▲) key, when the 'rSt' message appears, press 'SQ' (■). The instrument will return to the memory visualization. Press the 'LE' (◀) key to exit his menu.
- access to the preset value to read and modify the value.

The 'fast access' menu is not affected by the password function. This means that the configuration menu can be password blocked, while some configured functions or parameters can still be accessible to the operator through the 'fast access' menu.

- **Super fast access**

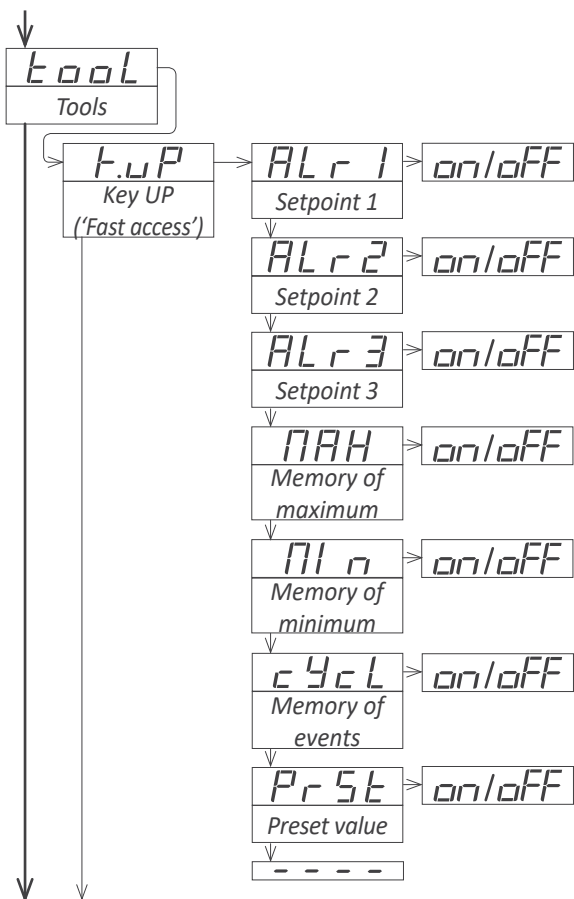
If only a single function is selected for the 'fast access' menu, pressing the the 'UP' (▲) key will shortly display the function name and then automatically jump to the function value.

1.14.15 Key 'LE'

The 'LE' (◀) key at the front of the instrument can be configured to activate several functions. Only one function can be assigned to the 'LE' (◀) key. Eligible functions are reset of the counter and the alarm unlock function (see section 1.14.12).

Example: the chronometer activates alarm 1 when reaching value '15.00' hours. Automatically the instrument resets to '0' and activates the relay to inform the time has been reached. To prevent the automatic alarm deactivation when loading the '0', the 'locked alarms' function is activated. Once at '0', the chronometer is configured to continue counting. When the operator arrives, it applies the routine functions on the system, and it frees the locked alarms by pressing the front (or external) key 'LE', resets the instrument to '0' again, and starts a new cycle.

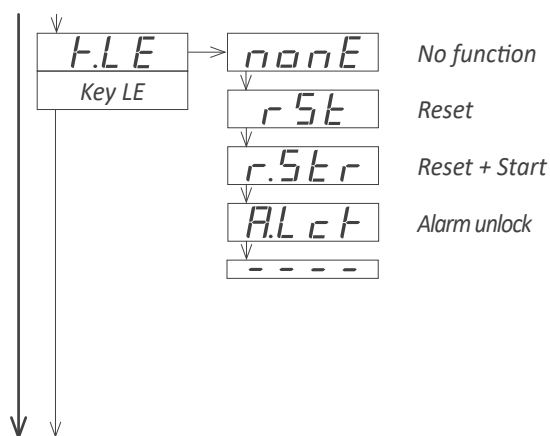
1.14.16 'Fast access' configuration menu



At the 'Key UP ('fast access')' ('K.uP') menu configure which functions and parameters will be accessible through the 'fast access' menu. Select 'on' to activate each function. For more information see section 1.14.14.

- the 'Setpoint 1' ('ALr1') function allows to visualize and modify the alarm 1 setpoint through the 'fast access' menu.
- the 'Setpoint 2' ('ALr2') function allows to visualize and modify the alarm 2 setpoint through the 'fast access' menu.
- the 'Setpoint 3' ('ALr3') function allows to visualize and modify the alarm 3 setpoint through the 'fast access' menu.
- the 'Memory of maximum' ('MAX') or 'Memory of minimum' ('Min') functions allow to visualize the maximum or minimum reading value stored in memory.
- the 'Memory of events' ('cYcL') function allows to visualize the number of cycles value stored in memory. The cycles value increases '+1' with each reset or preset associated to the alarm activation or resets associated to 'overrange' / 'underrange'.
- the 'Preset value' ('PrSt') function allows to visualize and modify the preset value through the 'fast access' menu.

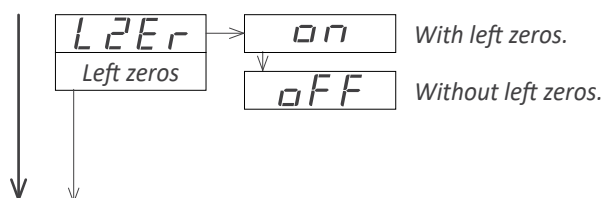
1.14.17 'Key LE' configuration menu



The 'LE' (◀) key at the front of the instrument can be configured to activate several functions. For more information see section 1.14.15.

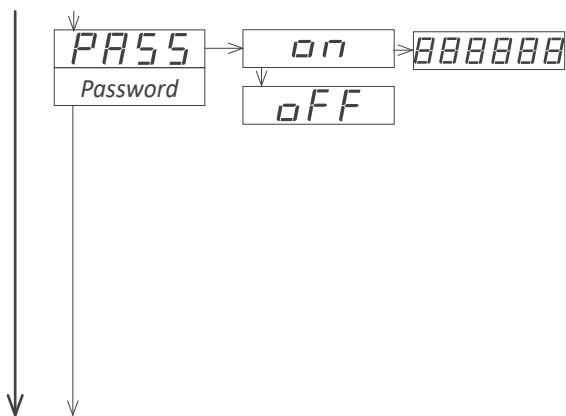
- the 'No function' ('none') value assigns no function.
- the 'Reset' ('rSt') value assigns the reset function.
- the 'Reset + start' ('r.Str') value assigns the reset and start function with the same key.
- the 'Alarm unlock' ('A.Lck') value assigns the manual alarm unlocking, when the 'Locked alarms' ('A.Lck') function is active (see section 1.14.12).

1.14.18 Left zeros configuration menu



The 'Left zeros' ('L.ZEr') parameter controls the left zeros on or off.

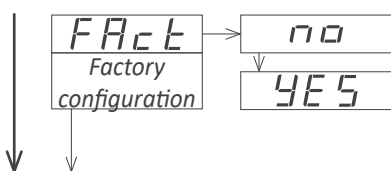
1.14.19 'Password' function



The password function blocks access to the configuration menu. The 'fast access' menu is not affected by the password function. This means that the configuration menu can be password blocked, while some configured functions or parameters (setpoint values, preset value, ...) can still be accessible to the operator through the 'fast access' menu.

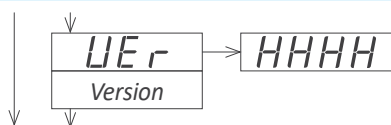
To activate the 'Password' function select 'on' and introduce the 6 digits code. The code will be requested when trying to access the 'configuration menu' (front key 'SQ' (■)).

1.14.20 Default factory configuration



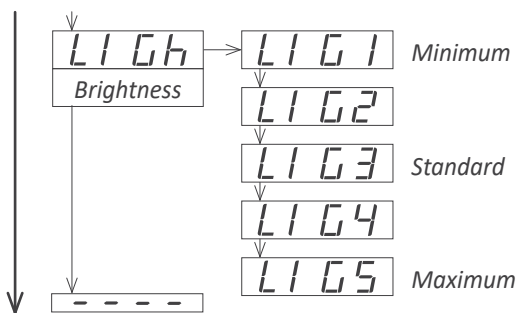
At the 'Factory configuration' ('FACT') menu select 'yes' to activate the default factory configuration. See section 1.18 for a list of default parameters.

1.14.21 Firmware version



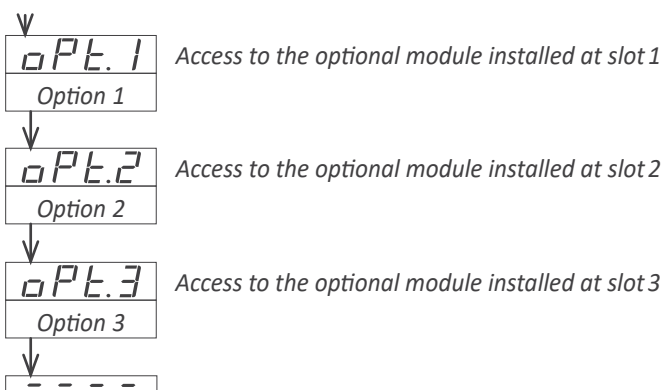
The 'Version' ('VER') menu informs about the firmware version installed on the instrument.

1.14.22 Brightness configuration



At the 'Brightness' ('LIGH') menu select the intensity level for the display . Use this function to adapt the brightness to match other instruments in the vicinity or to the darkness or clarity of your environment.

1.14.23 Access to the options configuration menu



The output and control options are optional modules that can be installed at the instrument. Formats B24 and B44 have 2 free slots for output and control options, while formats B26 and B46 have 3 free slots (see section 1.4).

Several of these optional modules have their own configuration menu embedded.

The 'OPT.1', 'OPT.2' and 'OPT.3' menu entries give access to the configuration menu of the option installed.

See section 2 for a list of available output and control modules

1.15 Example for application 1

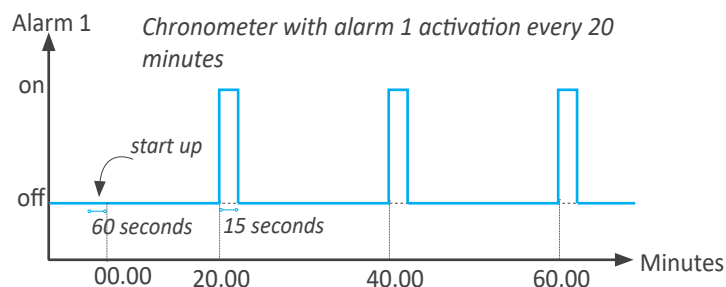
An industrial process with electrolytic bath needs to remove the pieces and submerge new ones every 20 minutes. The process of removing and adding new pieces needs 15 seconds. During these 15 seconds the bath system must be powered off. Power should reactivate after the 15 seconds, when the new elements are inside the bath-

The objective is to configure the instrument to activate a relay output every 20 minutes, and this output should be active for 15 seconds and then disabled.

Additionally, the instrument should start to count automatically at power up, although it is necessary to wait 1 minute before count starts to give time to the first power activation of the whole system. The counter must not be restarted at power up, but it must continue counting from the last value it had before the power off.

Configuration should be as shown below:

- Reading
'Func' / 'View' 'hh.mm.ss'
- Counting direction
'Func' / 'dir' 'uP'
- Preset value
'Func' / 'PrSt' '0.00'
- Start up delay
'conF' / 'on_Pu' / 'dLAY' 60 seconds
- Initial reset disabled
'conF' / 'on_Pu' / 'rSt' 'oFF'
- Start counting
'conF' / 'on_Pu' / 'StAt' start ('Strt')
- Alarm mode
'ALr' / 'ALr1' / 'Mode' repeat ('rEPt')
- Alarm every 20 minutes
'ALr' / 'ALr1' / 'SEt' 20.00
- Deactivation delay
'ALr' / 'ALr1' / 'dEL.1' 15.0 seconds
- When alarm activates
'ALr' / 'ALr1' / 'on_AL' continue ('cont')

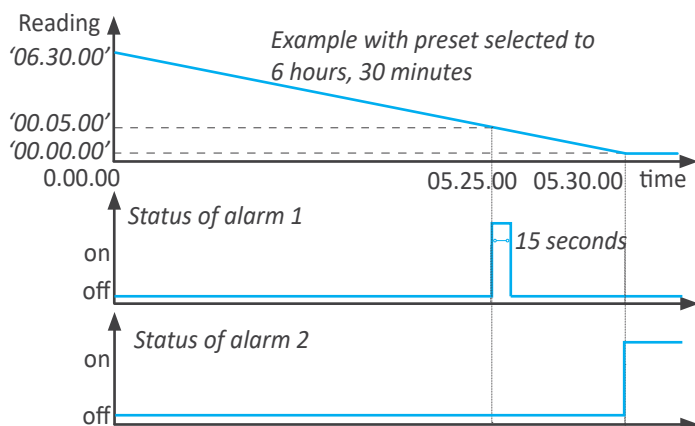


1.16 Example for application 2

An industrial process has an oven to dry different elements. The dry time for each element is variable and the operator an easy way to needs to enter the time each time. All other parameters must be not accessible to the operator. During the process, the operator needs two signals. The first one controls a buzzer which must be on for 15 seconds and start 5 minutes before the end of the dry time. The second signal must activate when the time is over and will be active until the operator resets manually the signal.

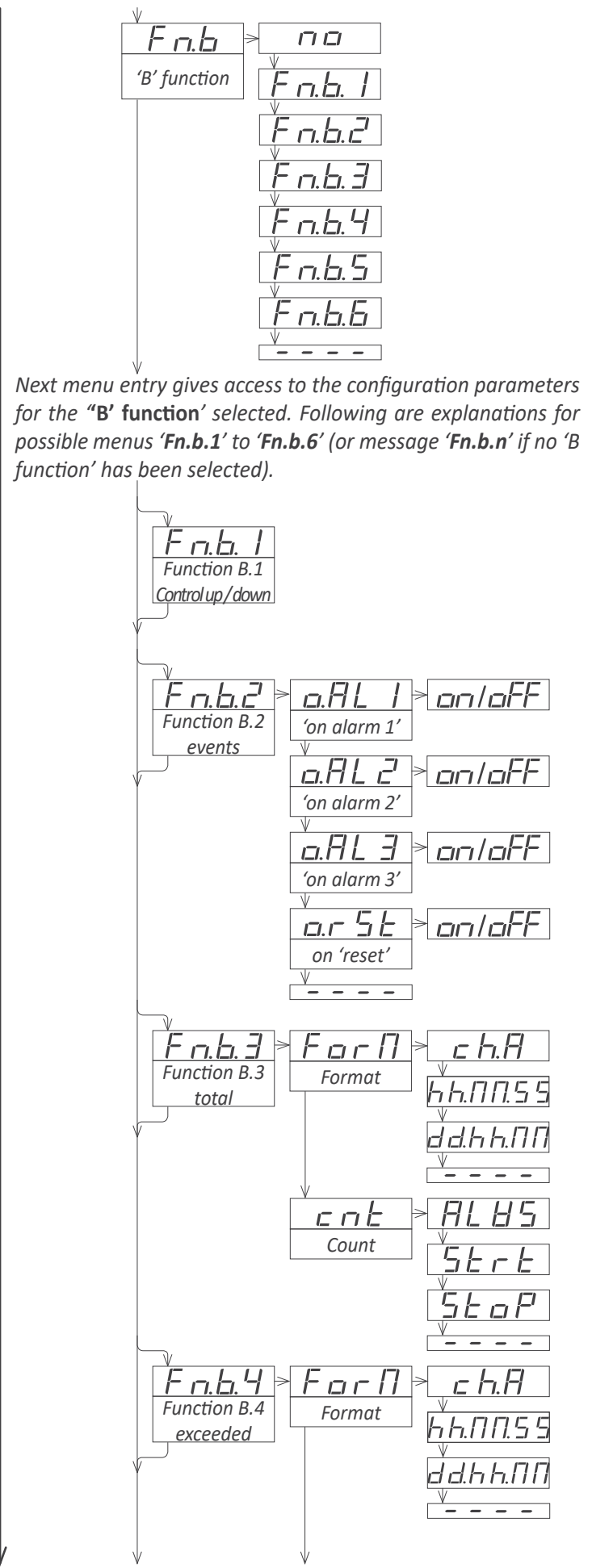
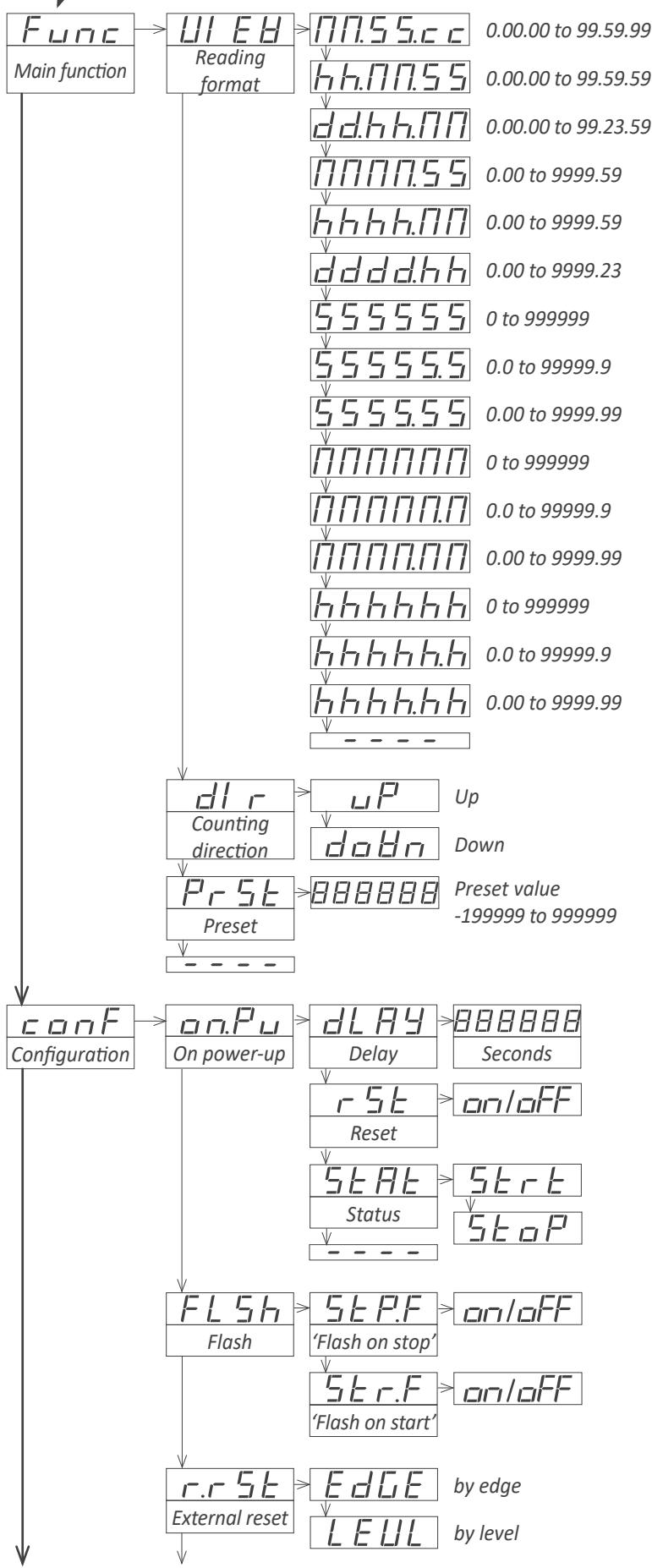
The objective is to configure a down counter, starting at preset value, and this preset value will be directly accessible to be modified through the key UP ('▲') front or remote. The configuration (except the preset value) will be locked with a password. Alarm 1 will activate during 15 seconds when there are 5 minutes to end the process. Alarm 2 will activate when the process finishes and will remain active until the operator forces a manual reset.

- Reading
'Func' / 'View' 'hh.mm.ss'
- Counting direction
'Func' / 'dir' down ('doWn')
- Alarm 1 : alarm mode
'ALr' / 'ALr1' / 'Mode' normal ('norM')
- Alarma 1 : alarm type
'ALr' / 'ALr1' / 'tYPE' minimum ('MIn')
- Alarma 1 : activation point
'ALr' / 'ALr1' / 'SEt' '00.05.00'
- Alarma 1 : deactivation delay
'ALr' / 'ALr1' / 'dEL.1' 15.0 seconds
- Alarma 1 : when alarm activates, continue
'ALr' / 'ALr1' / 'on_AL' continue ('cont')
- Alarma 2 : alarm mode
'ALr' / 'ALr1' / 'Mode' normal ('norM')
- Alarma 2 : alarm type
'ALr' / 'ALr1' / 'tYPE' minimum ('MIn')
- Alarma 2 : activation point
'ALr' / 'ALr1' / 'SEt' '00.00.00'
- Alarma 1 : when alarm activates, stop
'ALr' / 'ALr1' / 'on_AL' stop ('stop')
- Assign the preset to the 'UP' key
'TooL' / 'K.uP' / 'PrSt' 'on'
- Lock the configuration with a password
'TooL' / 'PASS' / 'on' assign the code

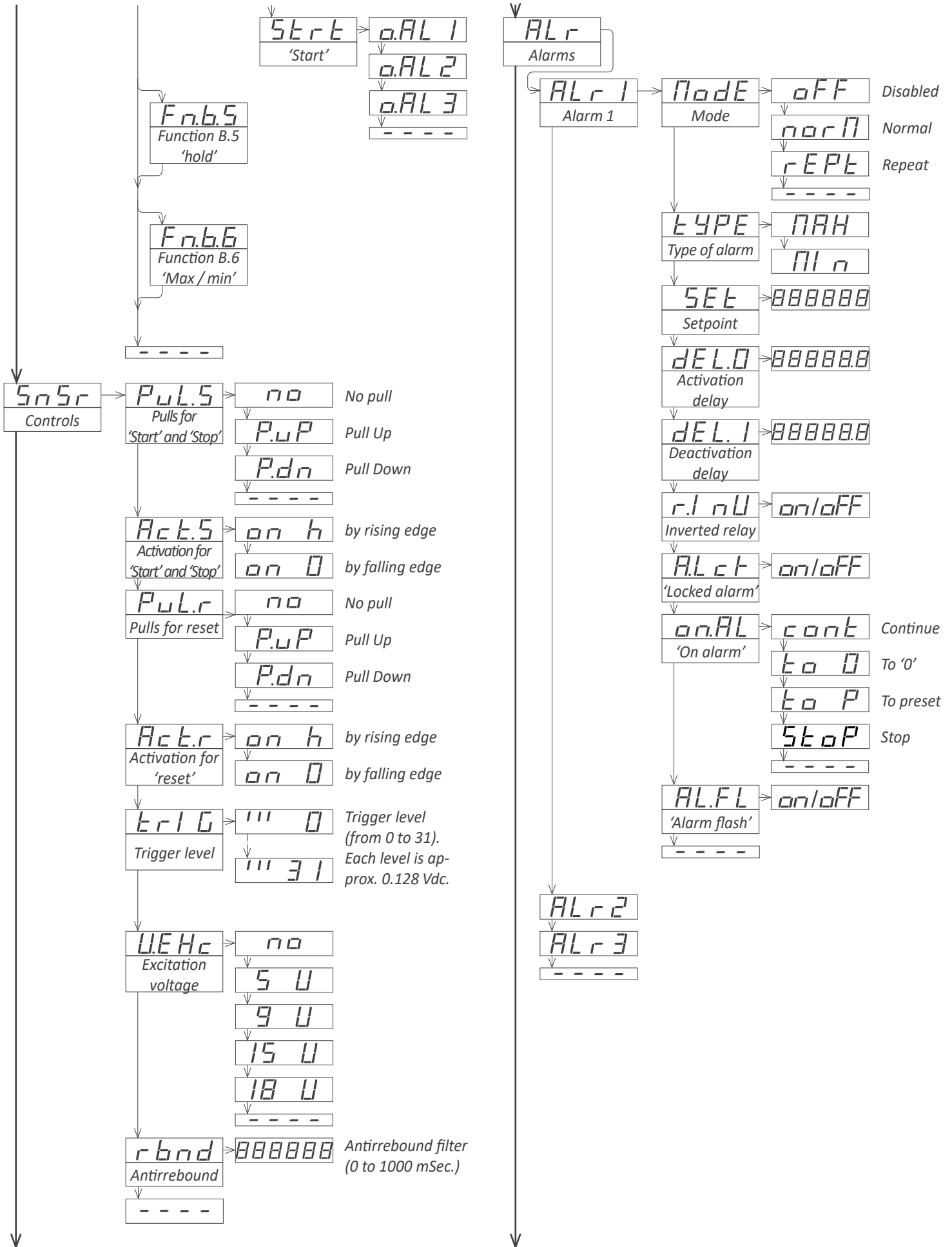


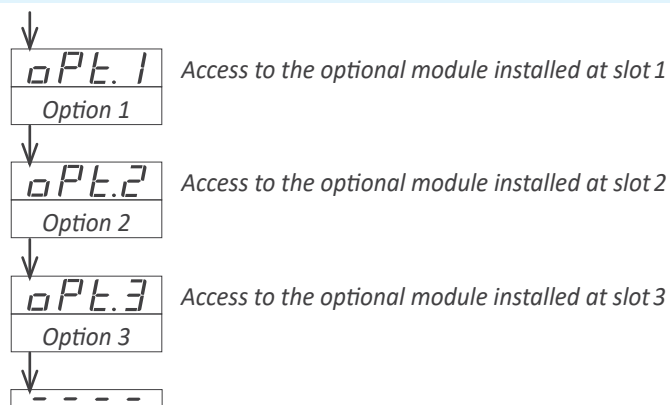
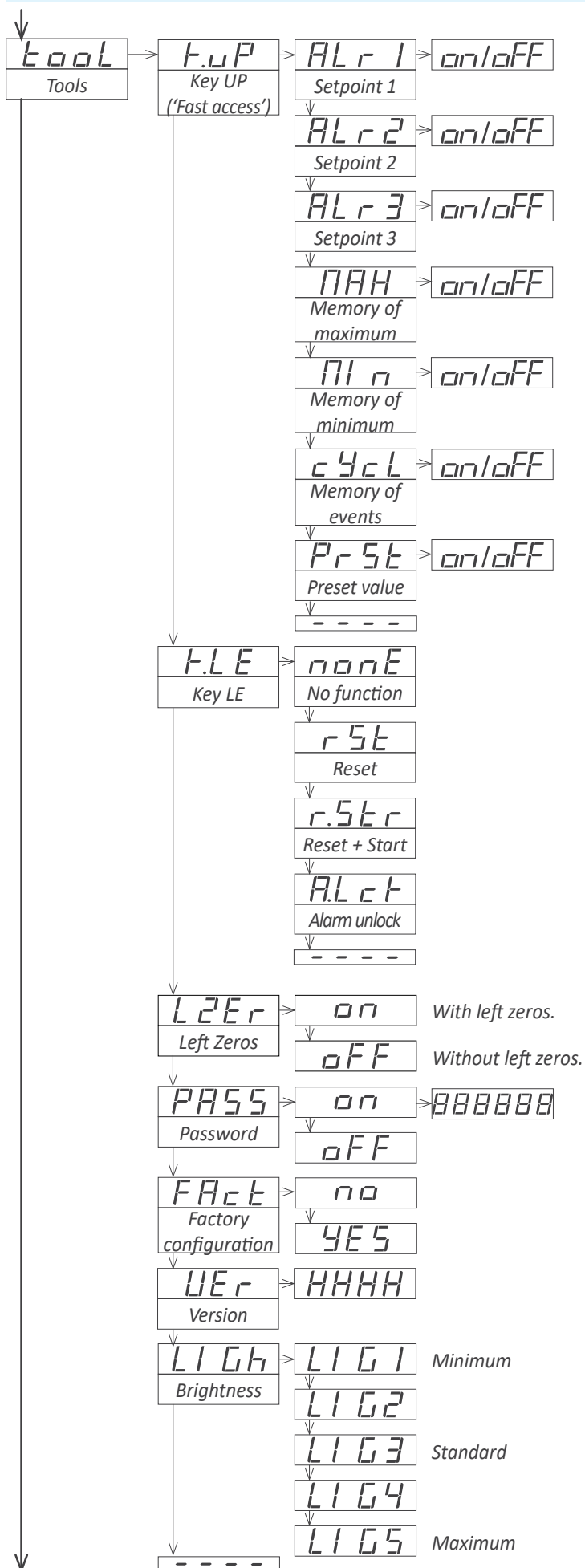
1.17 Full configuration menu

Press 'SQ' (■) for 1 second to access the 'Configuration menu'.



Next menu entry gives access to the configuration parameters for the "B' function' selected. Following are explanations for possible menus 'Fn.b.1' to 'Fn.b.6' (or message 'Fn.b.n' if no 'B function' has been selected).





1.18 Factory configuration

Function mode	
View format	hh.MM.SS
Counting direction	up
Preset	00.00.00
Configuration	
'On power-up'	
Delay	0 seconds
Reset	off
State	stopped ('StoP')
Flash	
'Flash on stop'	off
'Flash on start'	off
External reset	activates by edges ('EdGE')
Function on channel 'B'	no
Controls	
Pulls for 'start' and 'stop'	pull-up ('P.uP')
Activation for 'start' and 'stop' by falling edge ('on_0')	
Pulls for reset	pull-up ('P.uP')
Activation for reset	by falling edge ('on_0')
Trigger level	2.56 Vdc (level 20)
Excitation voltage	15 Vdc
Antirrebound filter	disabled (0 mSeconds)
Alarms 1,2 and 3	
Mode	off (disabled)
Type of alarm	of maximum
Setpoint	0
Activation delay	0.0 seconds
Deactivation delay	0.0 seconds
Inverted relay	off
'Locked alarms'	off
'On alarm'	continue
'Alarm flash'	off
Tools ('Tool')	
'Fast access' (key UP)	off
Setpoint 1	off
Setpoint 2	off
Setpoint 3	off
Memory of maximum	off
Memory of minimum	off
Cycles	off
Preset	off
Ley 'LE'	reset function
Left zeros	off
Password	off
Brightness	3

Empty page

1.19 Mounting

The instrument fixations are designed to allow panel mount, wall mount, or hanging mount. For each type of mounting,

- Panel mount. Apply the cut-out to the panel as seen on section 1.4. Remove the side fixations. Introduce the instrument into the panel cut-out. Mount the side fixations as shown (see Figure 8). Slightly loosen the fixation screw of one side and press the instrument against the panel. Tighten the fixation screw so it presses the panel and maintains the fixation. Repeat with the opposite side fixation.

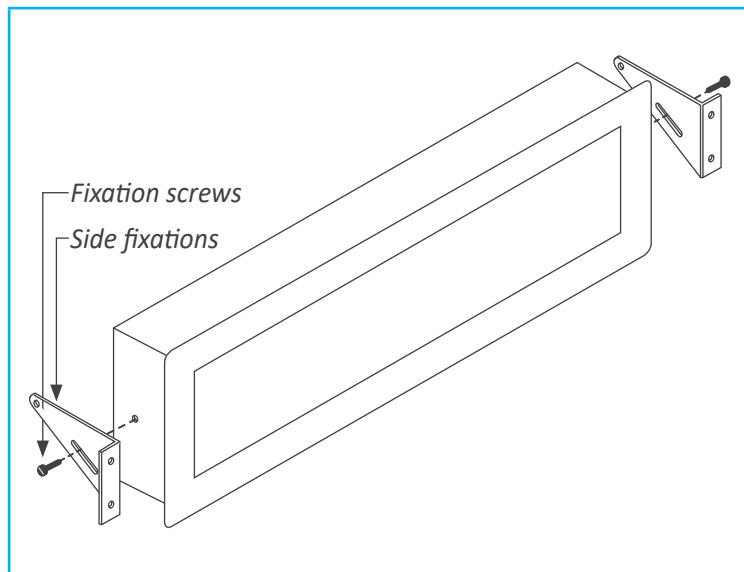


Figure 8 - Panel mount

see the position of the fixations at the images below.

- Wall mount. Mount the side fixations against the wall, as shown (see Figure 10). Each fixation has 2 holes with 4,5 mm diameter and a separation between hole centers of 30 mm. Once the side fixations are secured against the wall, place the instrument and press the fixation screws slightly. Tilt the instrument to the desired viewing angle and firmly screw the fixation screws.

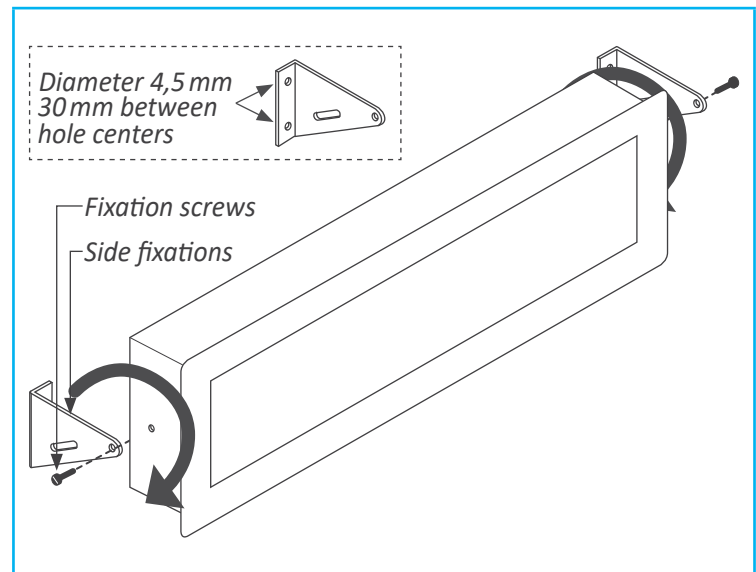


Figure 10 - Wall mount

- Hanging mount. Mount the side fixations as shown (see Figure 9). Each fixation has 2 holes with 4,5 mm diameter and a separation between hole centers of 30 mm. Instrument can be hanged using cable, threaded rod,

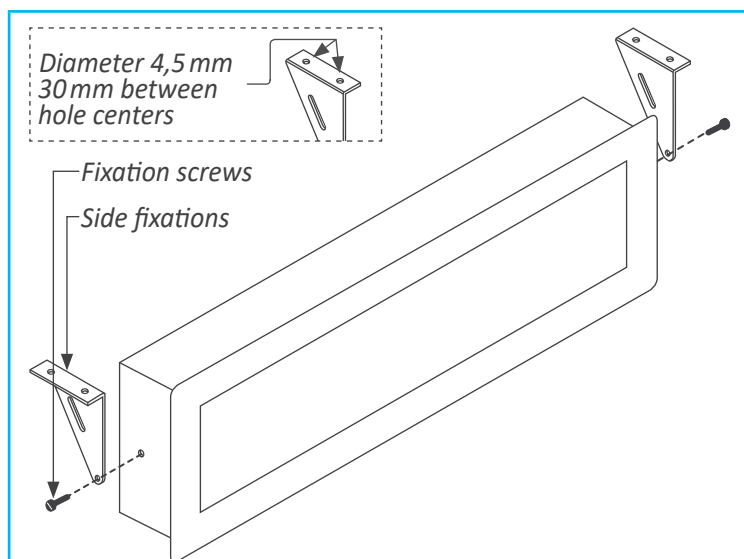


Figure 9 - Hanging mount

1.20 Installation precautions



Risk of electrical shock. Instrument terminals can be connected to dangerous voltage.



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 power before starting any maintenance and / or installation action. The instrument does not have a general switch and will start operation as soon as power is connected. The instrument does not have protection fuse, the fuse must be added during installation.

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.

Before proceeding to the power connection, verify that the voltage level available matches the power levels indicated in the label on the instrument.

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.

1.21 Warranty

This instrument is warranted against all manufacturing defects for a period of 36 MONTHS from the shipment date. This warranty does not apply in case of misuse, accident or manipulation by non-authorized personnel. In case of malfunction get in contact with your local provider to arrange for repair. Within the warranty period and after examination by the manufacturer, the unit will be repaired or substituted when found to be defective. The scope of this warranty is limited to the repair cost of the instrument, not being the manufacturer eligible for responsibility on additional damages or costs.

1.22 CE declaration of conformity

Manufacturer FEMA ELECTRÓNICA, S.A.
 Altimira 14 - Pol. Ind. Santiga
 E08210 - Barberà del Vallès
 BARCELONA - SPAIN
 www.fema.es - info@fema.es

Products B24-CR, B44-CR, B26-CR, B46-CR

The manufacturer declares that the instruments indicated comply with the directives and rules indicated below.

Electromagnetic compatibility directive 2014/30/EU
 Low voltage directive 2014/65/EU
 Directive ROHS 2011/65/EU
 Directive WEEE 2012/19/EU

Security rules EN-61010-1:2010

Instrument Fixed, Permanently connected
 Pollution degree 1 and 2 (without condensation)
 Isolation Basic + Protective union

Electromagnetic compatibility rules EN-61326-1:2013

EM environment Industrial

Immunity levels

EN-61000-4-2	By contact ±4 KV By air ±8 KV	Criteria B Criteria B
EN-61000-4-3		Criteria A
EN-61000-4-4	On AC power lines: ±2 KV On DC power lines: ±2 KV On signal lines : ±1 KV	Criteria B Criteria B Criteria B
EN-61000-4-5	Between AC power lines ±1 KV Between AC power lines and earth ±2 KV Between DC power lines ±1 KV Between DC power lines and earth ±2 KV Between signal lines and earth ±1 KV	Criteria B Criteria B Criteria B Criteria B Criteria B
EN-61000-4-6		Criteria A
EN-61000-4-8	30 A/m at 50/60 Hz	Criteria A
EN-61000-4-11	0 % 1 cycle 40 % 10 cycles 70 % 25 cycles 0 % 250 cycles	Criteria A Criteria A Criteria B Criteria B

Emission levels

CISPR 11 Instrument Class A, Group 1 Criteria A

Barberà del Vallès October 2020
 Xavier Juncà - Product Manager

Declarations available:

CE - www.fema.es/docs/5647_CE-Declaration_B_en.pdf

UK CA - www.fema.es/docs/5653_UKCA-Declaration_B_en.pdf



According to directive 2012/19/EU, electronic equipment must be recycled in a selective and controlled way at the end of its useful life.

2. Output and control modules

2.1 Module R1

The R1 module provides 1 relay output to install in large format industrial meters from Series B. Formats B26 and B46 accept up to 3 relays, and formats B24 and B44 accept up to 2 relays.

Configuration is performed from the front keypad of the instrument, by setting the alarm parameters. Check the alarm menu parameters at the instrument user's manual for full information.

Modules R1 can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

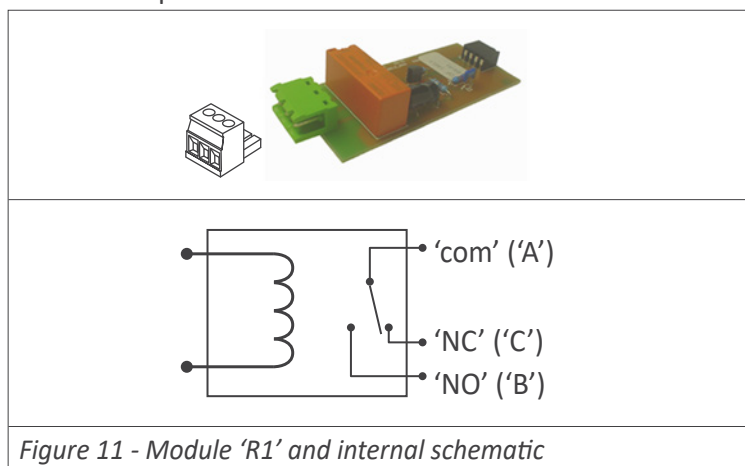


Figure 11 - Module 'R1' and internal schematic

Type of relay	3 contacts (Com, NO, NC)
Max. current	3 A (resistive load)
Voltage	250 Vac continuous
Isolation	3500 Veff
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3

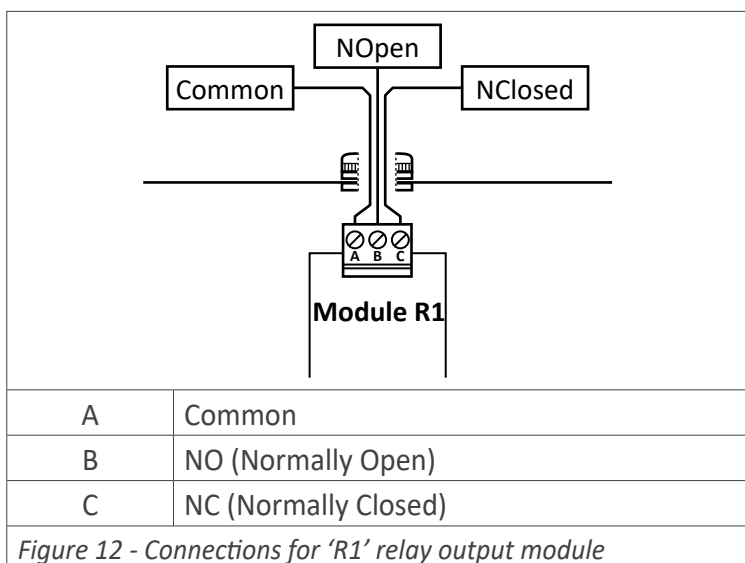


Figure 12 - Connections for 'R1' relay output module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.2 Module T1

The T1 module provides 1 transistor output to install in large format industrial meters from Series B. Formats B26 and B46 accept up to 3 transistor outputs, and formats B24 and B44 accept up to 2 transistor outputs.

Configuration is performed from the front keypad of the instrument, by setting the alarm parameters. Check the alarm menu parameters at the instrument user's manual for full information.

Modules T1 can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

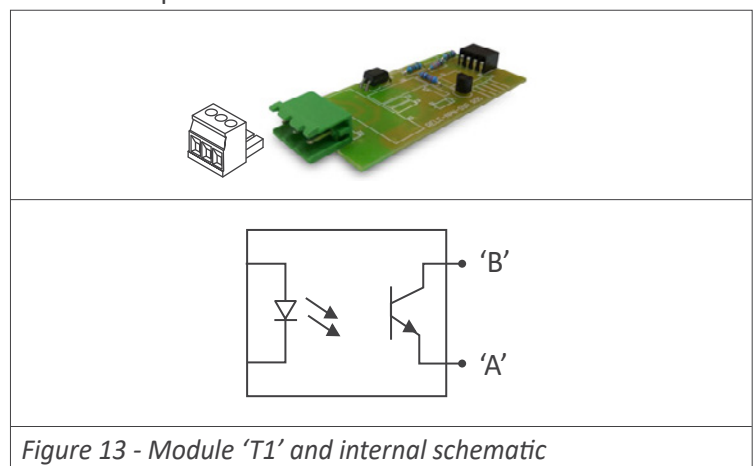


Figure 13 - Module 'T1' and internal schematic

Type of output	transistor
Max. voltage	35 Vdc
Max. current	50 mA
Isolation	3500 Veff, optoisolated
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3

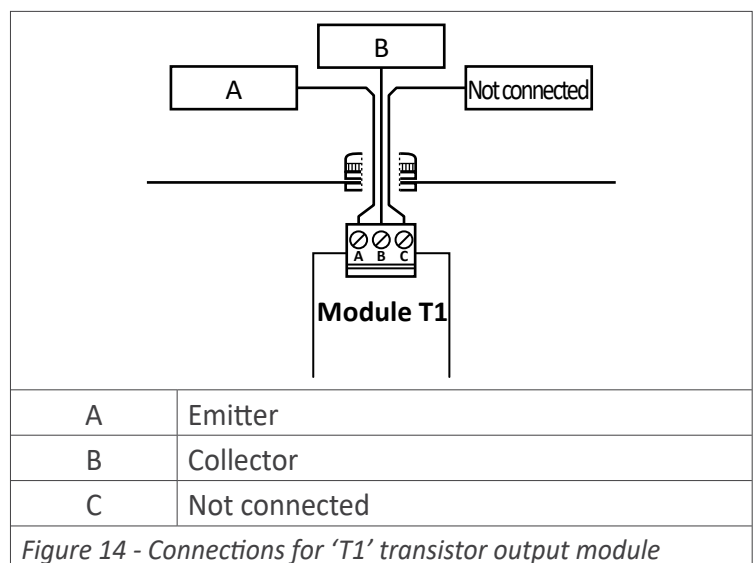


Figure 14 - Connections for 'T1' transistor output module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.3 Module SSR

The SSR module provides 1 output for SSR relay control, to install in large format industrial meters from Series B. Formats B26 and B46 accept up to 3 SSR control outputs, and formats B24 and B44 accept up to 2 SSR control outputs.

Configuration is performed from the front keypad of the instrument, by setting the alarm parameters. Check the alarm menu parameters at the instrument user's manual for full information.

Modules SSR can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

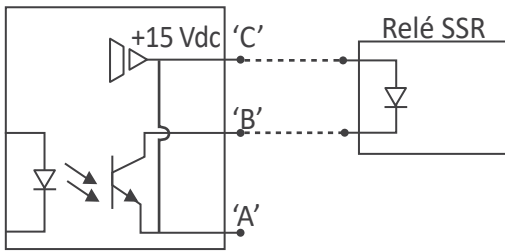
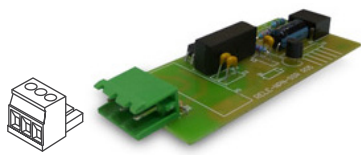
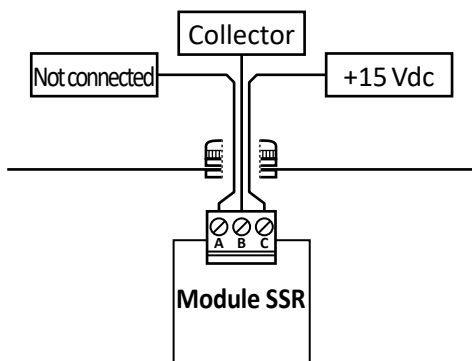


Figure 15 - Module 'SSR' and internal schematic

Type of output	for SSR relay control
Output voltage	+15 Vdc
Max. current	45 mA
Isolation	1000 Vdc
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3



A	Not connected
B	Collector (-)
C	+15 Vdc (+)

Figure 16 - Connections for 'SSR' control module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.4 Module AO

The AO module provides 1 analog output, configurable for 4/20 mA or 0/10 Vdc signal, to install in large format industrial meters from Series B. Formats B26 and B46 accept up to 3 analog outputs, and formats B24 and B44 accept up to 2 analog outputs.

Output signal is fully scalable, both with positive and negative slopes, and is proportional to the reading. The mA output can be configured for active loops (the instrument provides the power to the mA loop) or passive loops (the loop power is external to the instrument).

Configuration is performed from the front keypad of the instrument, by accessing the menu entries 'Opt.1', 'Opt.2' or 'Opt.3', according to the slot where the module is installed.

AO modules can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

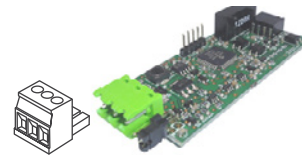
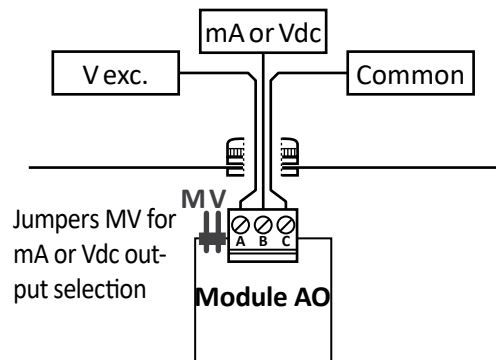


Figure 17 - Module 'AO'

Signal output	4/20mA, 0/10Vdc (active and passive)
Accuracy	0.1% FS
Isolation	1000 Vdc
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3



A	Excitation voltage
B	Signal in mA or Vdc
C	Common
Jumper M	Jumper closed for mA output
Jumper V	Jumper closed for Vdc output

Figure 18 - Connections for 'AO' analog output module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.5 Module RTU

The RTU module provides an isolated Modbus RTU communications port, to install in large format industrial meters from Series B.

The RTU module implements function '4' ('Read Input Registers') of the Modbus RTU protocol, to access the instrument registers (reading value, alarm status, memory of maximum and minimum, ...).

Configuration is performed from the front keypad of the instrument, by accessing the menu entries 'Opt.1', 'Opt.2' or 'Opt.3', according to the slot where the module is installed.

Modules RTU can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

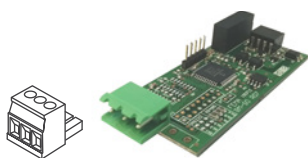
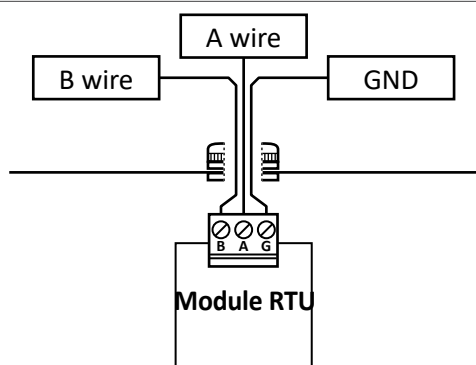


Figure 19 - Communications module 'RTU'

Protocol	Modbus RTU
Bus	RS-485, up to 57.6 Kbps
Isolation	1000 Vdc
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3



A	Bus signal A
B	Bus signal B
G	GND

Figure 20 - Connections for Modbus 'RTU' communications module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.6 Module S4

The S4 module provides an isolated RS-485 ASCII communications port, to install in large format industrial meters from Series B.

The S4 module implements a MASTER / SLAVE protocol, with up to 31 addressable slaves. In SLAVE mode allows access to reading values, alarm status, memory of maximum and minimum, ...

Configuration is performed from the front keypad of the instrument, by accessing the menu entries 'Opt.1', 'Opt.2' or 'Opt.3', according to the slot where the module is installed.

Modules S4 can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

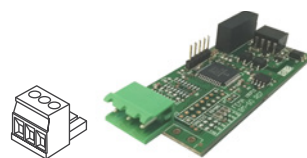
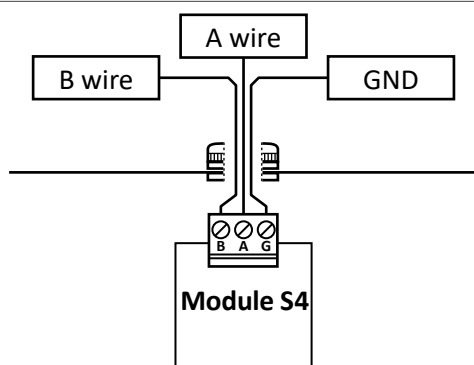


Figure 21 - Communications module 'S4'

Protocol	ASCII
Bus	RS-485, up to 57.6 Kbps
Isolation	1000 Vdc
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3



A	Bus signal A
B	Bus signal B
G	GND

Figure 22 - Connections for RS-485 'S4' communications module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

2.7 Module S2

The S2 module provides an isolated RS-232 ASCII communications port, to install in large format industrial meters from Series B.

The S2 module implements a MASTER / SLAVE protocol, with up to 31 addressable slaves, with 'daisy-chain' connection. In SLAVE mode allows access to reading values, alarm status, memory of maximum and minimum, ...

Configuration is performed from the front keypad of the instrument, by accessing the menu entries 'Opt.1', 'Opt.2' or 'Opt.3', according to the slot where the module is installed.

Modules S2 can be provided factory installed into a Series B instrument, or standalone for delayed installation. No soldering or special configuration is required. See section 1.6 on how to install output and control modules.

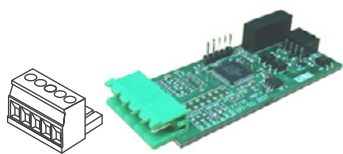
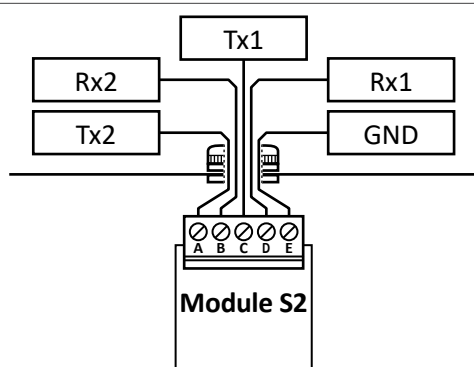


Figure 23 - Communications module Module 'S2'

Protocol	ASCII
Bus	RS-232, up to 57.6 Kbps
Isolation	1000 Vdc
Terminal	plug-in screw clamp, pitch 5.08 mm
Installation allowed at	slot 1, slot 2, slot 3



A	'Daisy chain' Tx data transmission
B	'Daisy chain' Rx data reception
C	Tx data transmission
D	Rx data reception
E	GND

Figure 24 - Connections for RS-232 'S2' communications module

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

For more information:
http://fema.es/docs/4326_SERIES-B_OPTIONS_manual_en.pdf

3. Other options and accessories

3.1 RKB - Remote keypad

Remote keypad for large format industrial meters from Series B. Replicates a remote version of the front keypad, close to the operator.

(*Cable not provided).



3.2 Red LED

Red LED



3.3 Green LED

Green LED



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DIGITAL PANEL METERS
 Section Industrial



SIGNAL CONVERTERS
 Section Industrial



LARGE DISPLAYS
 Section Industrial



PANEL METERS . LOW COST
 Section OEM



CONVERTERS . ISOLATORS
 Section OEM



LARGE DISPLAYS
 Section Special



SPECIAL INSTRUMENTS
 Section Special



DATA ACQUISITION
 Section Industrial



'CUSTOMIZED' INSTRUMENTS