GEFRAN

# 650 L - 1250 L

Alarm limit indicator

## INSTALLATION AND INSTRUCTION MANUAL

CE

code: 80224A


80224_MHW_650 L - 1250 L_07-2018_ENG

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## CONTENTS

# INTRODUCTION

## Device data

This information will be needed by Gefran Customer Service in order to provide technical assistance. In the space below, write the order code and other plate data shown on the label attached to the outside of instrument (see figure).


| | | |
|---|---|---|
| Serial number | **SN** | |
| Finished product code | **CODE** | |
| Order code | **TYPE** | |
| Supply voltage | **SUPPLY** | |
| Firmware version | **VERS.** | |

## Warnings and safety

Make sure that you always have the latest version of this manual, downloadable at no cost from Gefran's website (www.gefran.com).

The devices described in this manual must be installed by trained personnel in conformity to current laws and regulations, following all of the instructions in this manual.

Installers and/or maintenance personnel MUST read this manual and follow all of the instructions contained herein and in the attachments. Gefran will not be liable for any damage/harm caused to persons and/or property, or to the device itself, if any instructions are not followed.

This manual must always be available to people who use or work on the devices described herein.
Before using the instruments 650 L - 1250 L, the operator must be trained with regard to operating, emergency, diagnostics, and maintenance procedures.

If the instruments 650 L - 1250 L are used in applications with risk of harm to persons or damage to machines or materials, auxiliary alarm devices must be installed.
It is advisable, during normal operations, to provide a way to check if the alarms have tripped.

DO NOT touch the terminals when the device is powered.

In case of malfunction, before contacting Gefran Customer Service, we recommend you to consult "Troubleshooting" in the Maintenance section and the F.A.Q. (Frequently Asked Questions) section on Gefran's website (www.gefran.com).

## Symbols used in this manual

Pay attention when you see these symbols in the manual.

Indicates very important information on correct product function or on safety, or an instruction that MUST be followed.

Indicates risk for the safety of the installer or user due to the presence of high voltage.

Indicates a point to which the reader's attention is called.

Indicates a suggestion that could be useful for better use of the device


Indicates a reference to other technical documents that can be downloaded from www.gefran.com.

## Glossary

**4...20 mA** Current used as signal transmitted by certain sensors or in a specific way to control a device, such as a motorized valve.

**Alarm** Output that trips when a certain condition is reached, for example, a defined temperature

**Hysteresis** The phenomenon in which the value of a physical property lags behind changes in the effect causing it, as for instance when thermocouples temperature lags behind the heater temperature

**Pt100** A commonly used temperature measurement device. At 0°C its resistance is 100 ohm, normal extension cables can be used.

**PV** Acronym for Process Value, i.e., the value that the process variable (temperature, valve opening, etc.) has at that moment.

**Sensor** Device that translates physical phenomena (such as change in resistance based on temperature) into electrical signals that can be acquired and processed by the indicator

**Thermocouple** Sensor that transmits an electrical signal of a few millivolts. It needs specially designed extension cables

## Disclaimer

Although all of the information in this manual has been carefully checked, Gefran S.p.A. assumes no liability regarding the presence of any errors or regarding damage to property and/or harm to individuals due to any improper use of this manual

Gefran S.p.A. also reserves the right to change the contents and form of this manual, as well as the characteristics of the devices described herein, at any time and without notice.

The technical data and performance levels specified in this manual are to be considered a guide for the user in order to determine the device's suitability for a defined use, and do not constitute a guarantee.
They may be the result of test conditions at Gefran S.p.A., and the user must compare them to his/her real application requirements.

Under no circumstances will Gefran S.p.A. be liable for any damage to property and/or harm to individuals due to tampering, incorrect or improper use, or use not conforming to the characteristics of the indicator and to the instructions contained in this manual.

## Copyright

# 1. GENERAL DESCRIPTION

## 1.1. Profile


650 L 1250 L

Indicators 650 L and 1250 L are a family of devices used to limit overheating in industrial processes.

In the event of alarm, the instrument latches the fault conditions until reset by the operator. Reset can be run by the operator from the front key (red R), from the digital input (optional) or serial line (optional).
As an additional feature, the instrument counts the number of times the alarm limit is exceeded and total amount of time the alarm is active.
This information can help to evaluate furnace deterioration and plan maintenance work.

The devices have the same main characteristics and the same range of functions. They differ in size (1/16, 1/8 DIN), the amount of information shown on the display, and the maximum number of digital inputs.

The displays show the process values, plus multilingual scrolling messages for diagnostics and alarms.
The 1250 L model includes a segmented bar that graphically displays the temperature deviation from the alarm limit.

Configuration and unit operation is done with the front keys. The keys have
dual-function LEDs indicating pressing of the keys. The LEDs provide feedback for pressed
key and also provide guidance for permitted operations.

Initial commissioning is simplified by guided configuration text prompts that cover the commonly used
base parameters accompanied by in line help messages.

With GF_eXpress software and PC, you can program the extended configuration, create recipes and update the firmware without having to apply power to the instrument.
Thanks to the Smart Configurator function, you obtain the required configuration by answering a few simple questions. The initial parameters can always be reset, both from the keypad and from the GF_eXpress software.

The devices offer complete diagnostics (broken or incorrect connection of sensor), operation count, settable alarm limits (useful for scheduling preventive maintenance)
A trigger meter and alarm memory reset timer are available for alarm 1.

Maintenance of the system in which the device is installed is made easier by the ability to replace the instrument at any time simply by removing it from the faceplate.
No additional steps are needed.

## 1.2. Differences between models

| | 650 L | 1250 L |
|---|---|---|
| Display dimensions | 35 × 30 mm (1.38” x 1.18”) | 37 × 68 mm (1.46” x 2.68”) |
| PV display | 4 digit, 7 seg., H = 17 mm (0.67”) | 4 digit, 7 seg., H = 17 mm (0.67”) |
| SV display | 5 digit, 14 seg., H = 7 mm (0.27”) | 4 digit, 7 seg., H = 14 mm (0.55”) |
| Display F | n/a | 5 digit, 14 seg., H = 9 mm (0.35”) |
| Bargraph | n/a | 11 segments |
| Keys | 4 | 4 |
| Max. digital inputs | 3 | 5 |
| Power dissipation | 5 W | 10 W |
| Dimensions | 48 × 48 mm (1.89” x 1,89”) 1/16 DIN | 48 x 96 mm (1.89” x 3.78”) 1/8 DIN |
| Weight | 0,16 kg (0.35 lb) | 0,24 kg (0.53 lb) |

n/a = not available

## 1.3. Indicator 650 L


Dimensions 48 x 48 x 80 (1.89” x 1,89”) 1/16 DIN

**Main features**

- Operator interface with large LCD Display, customizable, with choice of colors
- Scrolling diagnostic messages, configurable, in the selected language
- Easy, guided configuration, copy/paste parameters even with power off
- Different password levels
- Universal input configurable for thermocouples, RTDs, Current/voltage inputs
- Relay, logic,
- RS485 serial communication in Modbus RTU
- Removable faceplate for quick replacement
- Sampling time 60 ms

### 1.3.1. Display and keys 650 L


Figure 1 - Description of 650 L display and keys

1. Temperature unit of measurement
2. ALARM status
3. Alarm reset key
4. Up/down keys: raise/lower the value of the parameter displayed on the SV or PV display.
5. F key: lets you navigate among menus and parameters. Confirms the parameter value and selects the next parameter.
6. Key pressed signals.
7. SV display: Alarm 1 limit, description of parameters, diagnostic and alarm messages.
   It can be used to view the alarm limit and displays the associated message in the event of alarm.
8. PV display: process variable, parameter values.

### 1.3.2. Cutout and mounting dimensions

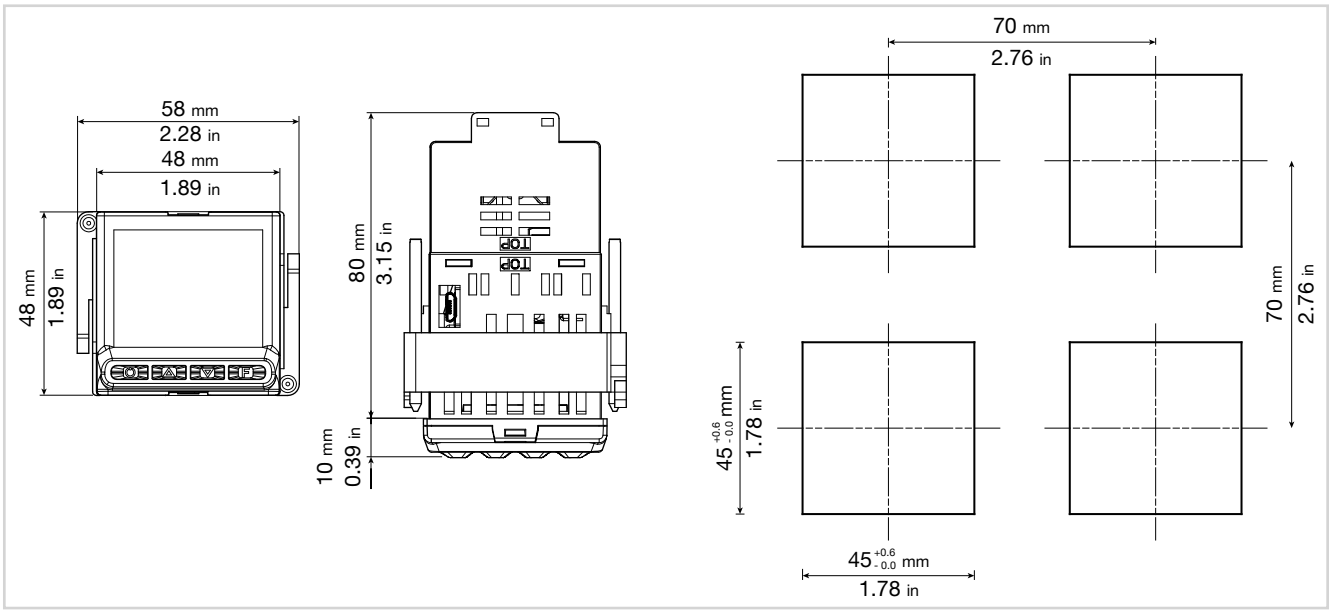



Figure 2 - 650 L Cutout and mounting Dimensions

## 1.4. Indicator 1250 L


Dimensions 48 × 96 × 80 mm (1.89” x 3.78”) 1/8 DIN

**Main features**

- Operator interface with large LCD Display, customizable, with choice of colors
- Scrolling diagnostic messages, configurable, in the selected language
- Easy, guided configuration, copy/paste parameters even with power off
- Different password levels
- Universal input configurable for thermocouples, RTDs, Current/Voltage inputs
- Relay, logic,
- RS485 serial communication in Modbus RTU
- Removable faceplate for quick replacement
- Sampling time 60 ms

### 1.4.1. Display and keys 1250 L

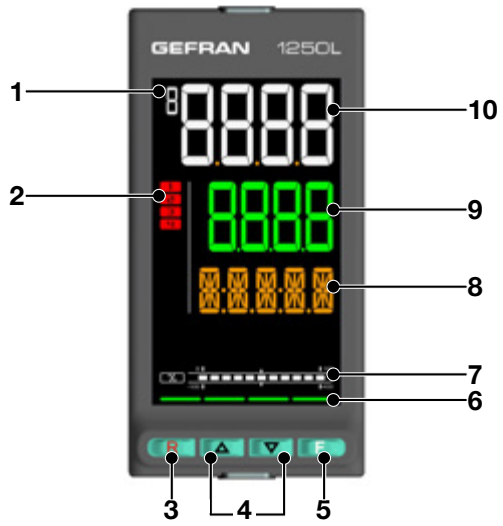



Figure 3 - Description of 1250 L display and keys

1. Temperature unit of measurement
2. ALARM status
3. Alarm reset key
4. Up/down keys: raise/lower the value of the parameter displayed on the SV or PV display.
5. F key: lets you navigate among menus and parameters. Confirms the parameter value and selects the next parameter.
6. Alarm 1 limit deviation display
7. Key pressed signals.
8. Display F: parameters, diagnostic and alarm messages.
9. SV display: Alarm 1 limit, parameters being set.
10. PV display: process variable, parameter values.

### 1.4.2. Cutout and mounting Dimensions

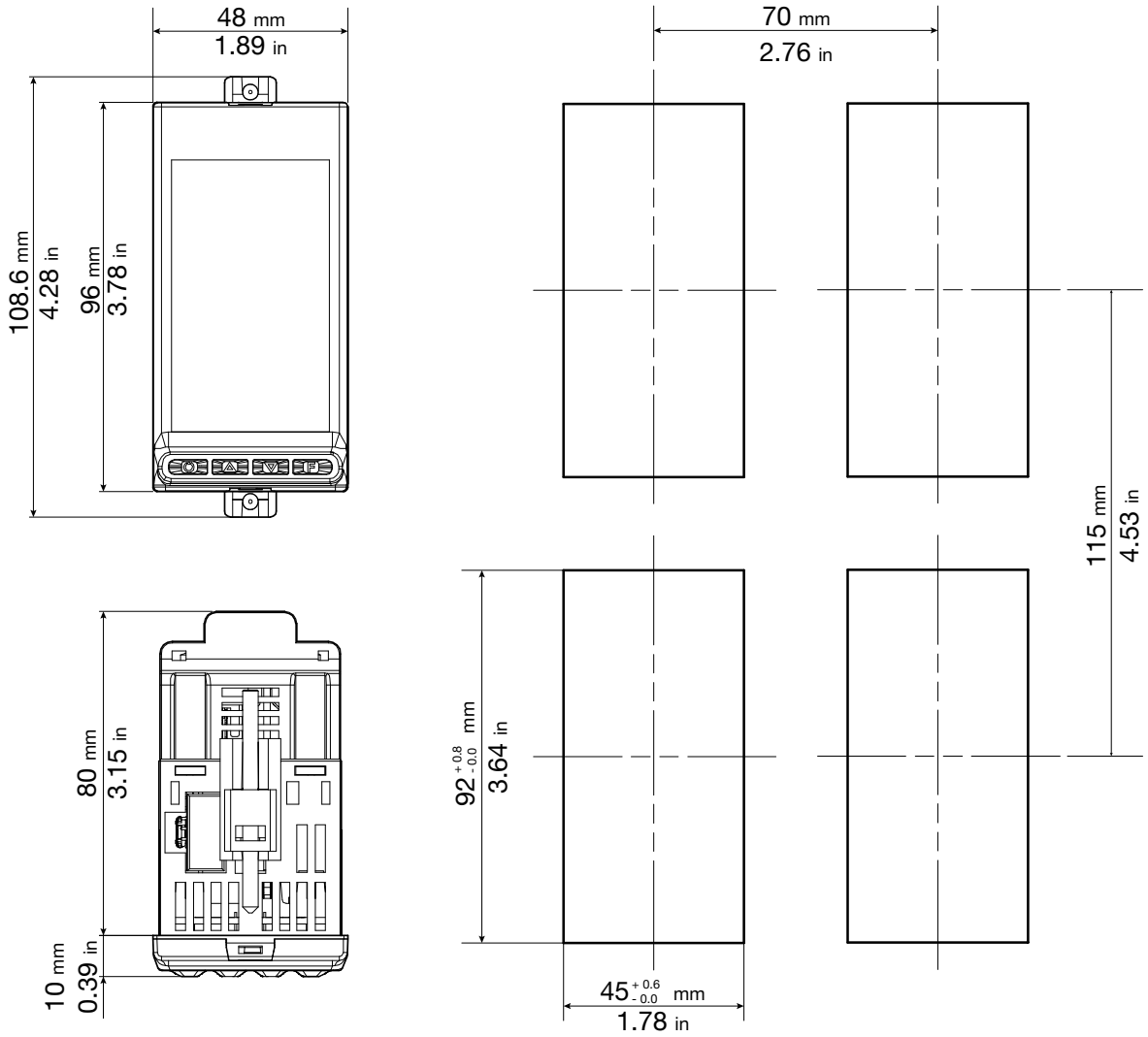



Figure 4 - 1250 L Cutout and mounting Dimensions

# 2. INSTALLATION

**Attention!** The devices described in this manual must be installed by trained personnel in conformity to current laws and regulations, following all of the instructions in this manual.

Before installing, check that the indicator is in whole condition and was not damaged in shipment. Make sure that the package contains all of the accessories listed on the accompanying document, especially the gasket and the fastening brackets.

Check that the order code matches the configuration required for the intended application (supply voltage, number and type of inputs and outputs). See Chapter 10 - Ordering code - to check the configuration corresponding to each order code.

**Attention!** If even one of the requirements mentioned above is not satisfied or there is noticeable damage to the unit, discontinue the installation and contact your Gefran dealer or Gefran Customer Service.

## 2.1. Mounting the indicator

### 2.1.1. General considerations

The instrument is designed for permanent indoor installation. It must be mounted in electrical panels or in panels controlling machines or production process plants that are able to protect the exposed terminals on the rear of the instrument.

**Attention!** DO NOT install the instrument in a potentially inflammable or explosive atmosphere.

**Attention!** the instrument is used in applications with risk of harm/damage to persons/property, it MUST be connected to dedicated alarm devices.
It is advisable to provide a means of alarm checking and intervention even during instrument normal operation or through the equipment where the instrument is monitored.

The indicator must be installed in a location that is not subject to sudden temperature changes or to freezing or condensation, and no corrosive gases must be present.

The indicator can work in Pollution Degree 2 environments. Do not allow scrap or metal particles from machining or condensation products to reach the device.

The instrument is sensitive to strong electromagnetic fields. Do not position it near radio devices or other equipment that may generate electromagnetic fields, such as power contactors, relays, thyristor power units (especially phase angle), motors, solenoids, transformers, high-frequency welders, etc.

### 2.1.2. Mounting dimensions

For correct installation, respect the dimensions of each hole and the distance between adjacent holes shown in the figures for each model (“Figure 2 - 650 L Cutout and mounting Dimensions” on page 9, “Figure 4 - 1250 L Cutout and mounting Dimensions” on page 11.

**Attention!** The support on which the operator panel is mounted must:
- be sufficiently rigid and robust to support the device without bending during use;
- be from 1 to 4 mm thick to allow the device to be fastened with the supplied bracket.

### 2.1.3. Protection against infiltration of dust and water

The front of the instrument has an IP65 protection index, so the device can be installed without problems in rooms that are very dusty or subject to splashing water provided:
- the housing in which the device is inserted is dust-tight and watertight;
- the support on which the device is installed is perfectly smooth and without undulations on the front;
- the hole on the support respects the specified dimensions;
- the device is fully tightened to the support to ensure that the gasket inserted between the device and the panel is watertight

**Attention!** If not adequately protected, the instrument has an IP20 protection index (rear container and terminal board.

### 2.1.4. Vibrations

The instrument can support vibrations from 10 to 55 Hz, 20 m/s$^2$, in all directions (X, Y and Z).
If the device is mounted on a support that exceeds these limits, it is recommended to provide a suspension system to reduce vibrations.

### 2.1.5. Minimum space for ventilation

The temperature in the housing containing the instrument must NEVER exceed 55°C. NEVER block the ventilation slits.

**Advice.** The lower the temperature in which the device works, the longer the life of its electronic components.

**Attention!** Forced cooling (for example, with a fan) of the rear of the instrument may cause measurement errors.

### 2.1.6. Positioning

The indicator must be positioned so that the display is not subject to direct sunlight or to very strong sources of light. If necessary, filter direct light, for example, with a reflective screen. The instrument must be tilted between 30° and 120°, as shown in the figure.

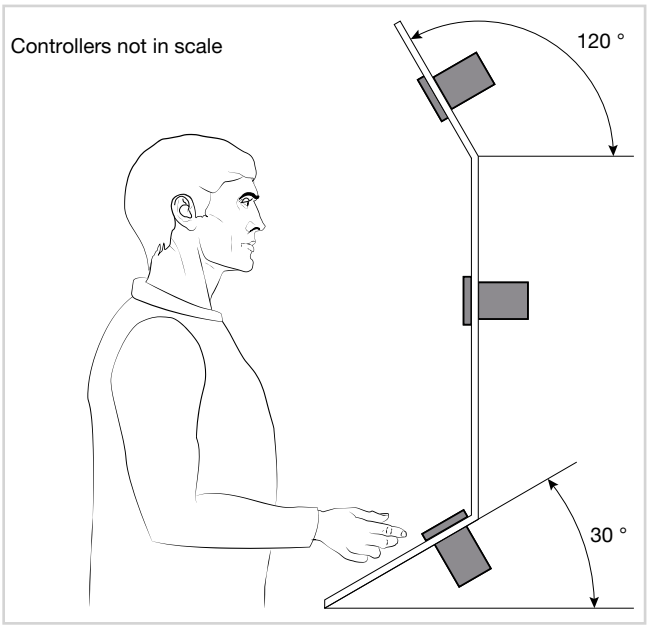



Figure 5 - Positioning the indicator

### 2.1.7. Fastening to the panel

1. Insert the die-cut rubber gasket between the instrument and the panel. The gasket (supplied) is required for ensuring the declared protection index of the faceplate.
2. Insert the device into the hole previously made on the panel.
3. Place the supplied bracket(s) onto the rear of the instrument.
4. Tighten the screws to fasten the device to the panel. The tightening torque must be between 0,3 and 0,4 N m.

The following figures show how to fasten the two indicator models.

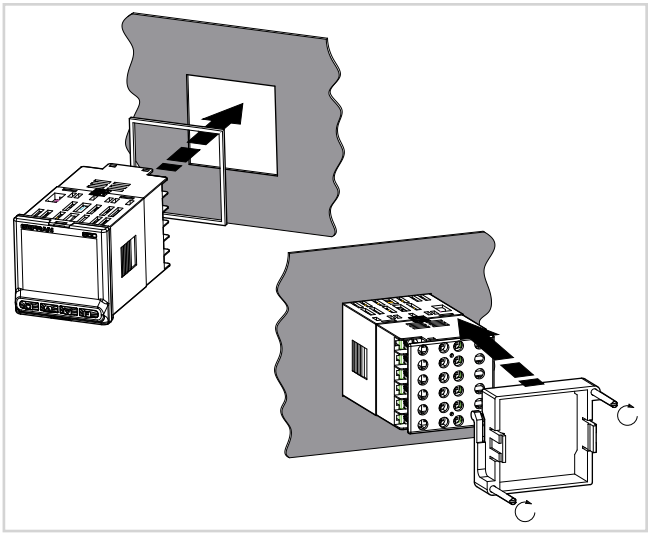


Figure 6 - Fastening the 650 L

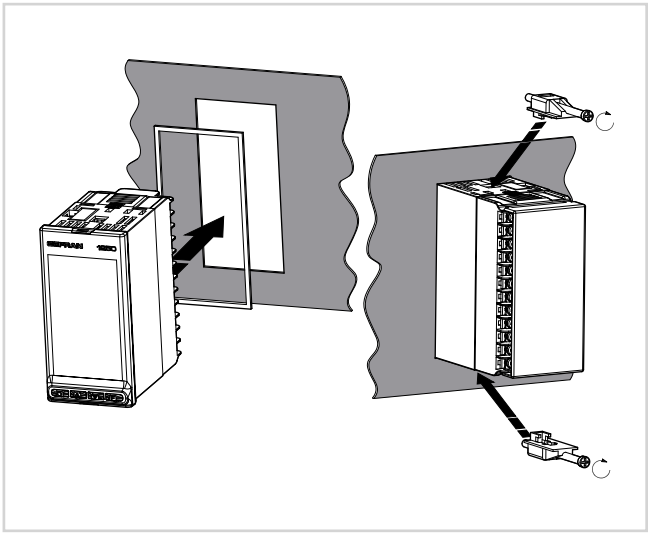


Figure 7 - Fastening the 1250 L

## 2.2. Connections

**Attention!** Failure to follow the instructions in this section may cause problems in electrical safety and electromagnetic compatibility, in addition to voiding the warranty.

### 2.2.1. General considerations

1. Connected external circuits must be isolated for both single and differential inputs.
2. When using shielded cables, the shield must be grounded at a single end point, preferably at the instrument end.
3. Input cables must be physically separated from power cables, output cables, and power connections.
4. Do not connect unused terminals.
5. Do not overtighten connection terminals. The recommended torque is 0.5 Nm.
6. When making connections,manitain proper polarity where required.
7. Do not bend or twist the cables
8. After connecting the cables, install the transparent cover to protect the terminals. The terminal teeth ensure the correct orientation of the cover.

### 2.2.2. Electromagnetic compatibility (EMC)

For electromagnetic conformity, the strictest general rules have been applied, using the following test configuration:

| Connection | Cable section | Length |
|---|---|---|
| Power supply | 1 mm² (17 AWG) | 1 m (39.37”) |
| Relay | 1 mm² (17 AWG) | 3,5 m (137.79”) |
| Serial port | 0,35 mm² (21 AWG) | 3,5 m (137.79”) |
| Thermocouple | 0,8 mm² (18 AWG) | 5 m (196.85”) compensated |
| Potentiometer, linear, “PT100” resistance thermometer | 1 mm² (17 AWG) | 3 m (118.11”) |
| Digital input/ outputs | 1 mm² (17 AWG) | 3,5 m (137.79”) |

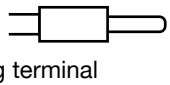
### 2.2.3. Cables

Always use cables appropriate for the voltage and current limits specified in the Technical Characteristics.

Use copper cables with 60/75°C insulation.
Use twisted and shielded cables for non-power connections.

The instrument’s terminal board has screw terminals (M3) that accept stripped cables and crimped terminals for a tightening torque of 0.5 N m.
Two ring or crimped fork terminals can be connected on each terminal

The following table shows the characteristics of the cables and terminals that can be used.

| Cable / terminal | Cable / terminal section | Terminal size |
|---|---|---|
| Rigid cable | 0,2...2,5 mm² (24...14 AWG) | |
| Twisted | 0,2...2,5 mm² (24...14 AWG) | |
|  Tag terminal (to be crimped) | 0,25...2,5 mm² (23...14 AWG) | |
|   Fork terminal (to be crimped) | | 5,8 mm max (0.23”) |
|   Ring terminal (to be crimped | | 5,8 mm max (0.23”) |

**Attention!** Tie the cables, in pairs, to prevent bending at the terminal connections.

### 2.2.4. Power supply

**Attention!** Before powering the instrument, make sure that the supply voltage matches the one shown on the instrument data plate.

Because the instrument does not have a switch, a disconnect and fuse must be inserted ahead of the device. The disconnect, or isolator, must be positioned near of the device and must be easily reached by the operator.
A single disconnect can control multiple instruments.

The instrument must be powered by a line separated from the one used for electromechanical power devices (relays, contactors, solenoids, etc).

It is recommended to install a ferrite core on the power line, as close as possible to the device, to limit the instrument’s susceptibility to electromagnetic noise.

If the instrument’s power line is heavily disturbed by noise, it is advisable to use an isolation transformer only for the instrument, grounding the shield.

Use appropriate line filters when near high-frequency generators or arc welders.
Use a voltage stabilizer if there are wide shifts in line voltage.

20...27 VAC/VDC models must be powered by a class II or low-voltage limited-energy source.
The power supply must use a line separated from the one used for electromechanical power devices, and low-voltage power cables must run along a path separated from the system or machine power cables.

**Attention!** Make sure the ground connection is efficient. Absent or inefficient grounding can make the device unstable due to excessive noise.
Specifically, check that:
- voltage between object and ground is < 1 V;
- resistance is < 6 Ω.

## 2.2.5. Connecting inputs and outputs

To prevent noise, the instrument's input and output wiring must be kept away from the power cables (high voltages or high currents).
The input and output cables and the power cables must not be placed parallel to one another.
Use shielded cables or separate cable trays.

To connect the output to an inductive load (relay, contactor, valve, motor, fan, solenoid, etc.) that works in AC, mount a snubber, i.e., an RC group (resistor and condenser in series) placed parallel to the load. Installing this filter lengthens the life of the relays.

NOTE: All condensers must conform to VDE (class X2) standards and support voltage ≥ 220 VAC.
The power of the resistor must be ≥ 2 W.

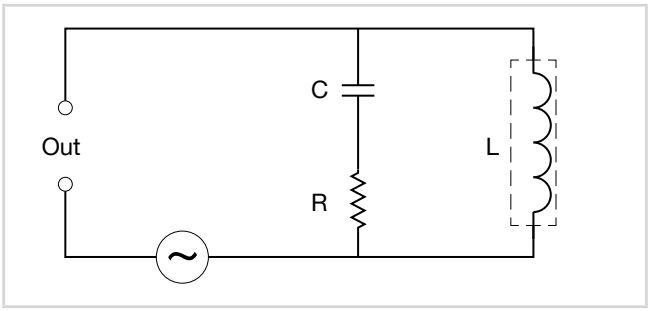



Figure 8 - Snubber connection diagram (AC)

For inductive loads that work in DC, mount a 1N4007 diode parallel to the coil.

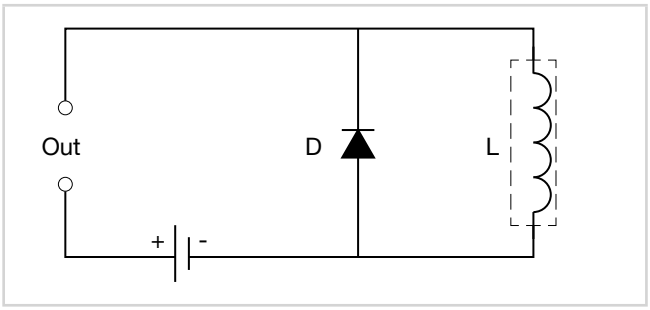


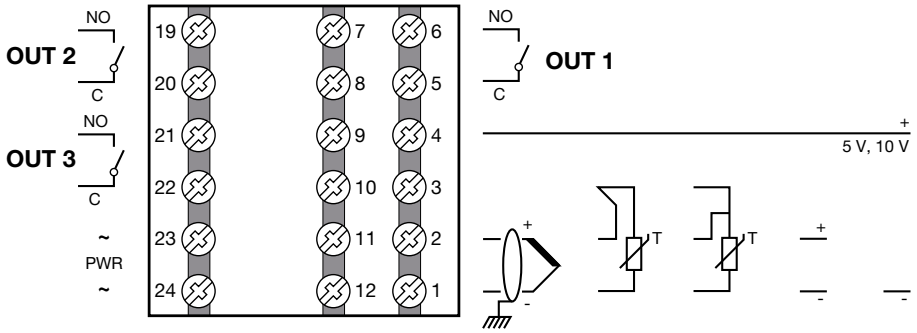

Figure 9 - Snubber connection diagram (DC)

The filters must be connected as close as possible to the instrument.

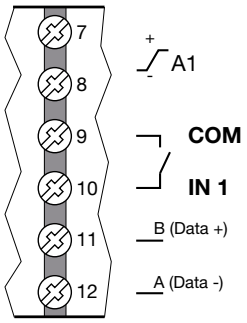
**Attention!** If the instrument is connected to devices that are NOT electrically isolated (such as thermocouples), ground with a separate conductor to prevent grounding directly through the machine structure.

## 2.3. 650 L connection diagrams

### 2.3.1. General diagram




**OPTIONS**




**LEGEND**

~ PWR ~ *Power supply*

\+ / - *Linear input in voltage / current*

*dry contact digital input*

*Thermocouple input*

T T *Input PT100 JPT100 2 / 3 wires*

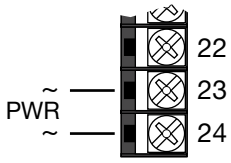
NO C *Relay output*

\+ A1 - *Isolated analog output*

B (Data +) A (Data -) *RS485 serial line*

## 2.3.2. Power supply

**Powe supply**

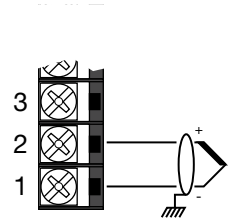



Standard: 100...240VAC/VDC ± 10%
50/60Hz, max 5 VA

Optional: 20...27VAC/VDC ± 10%
50/60Hz, max 5 VA

## 2.3.3. Inputs

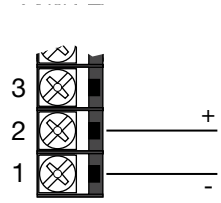
**TC Input**




Available thermocouples:
J, K, R, S,T, C, D, B, E, L, U, G, N, Pt20Rh-Pt40Rh
ITS90 or custom linearization

Maintain polarity
For extensions, use a compensated cable suitable for the type of TC used

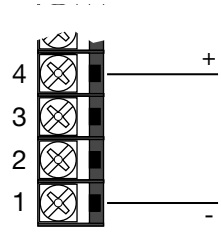
**Linear input (V, I)**




linear input voltage
60 mV (Ri > 70kΩ
1 V (Ri > 15kΩ

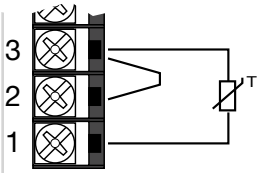
Linear input in direct current
0/4...20mA, Ri = 50 Ω.

**Linear input (V)**



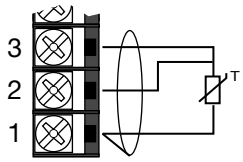

Linear input in direct voltage
5 V, 10V (Ri > 30kΩ

**Input PT100/JPT100 - 2-wires connection**




**Attention**:
with this type of connection the line resistance can introduce measurement error, we recommend that you use wires of adequate cross-section.
The resistance of the three wires must be equal, and less than 20 ohm.

**Input PT100/JPT100 - 3-wires connection**

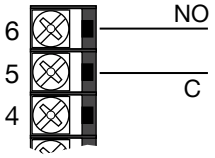



**Attention**:
with this type of connection the line resistance can introduce measurement error, we recommend that you use wires of adequate cross-section.
The resistance of the three wires must be equal, and less than 20 ohm.

## 2.3.4. Outputs

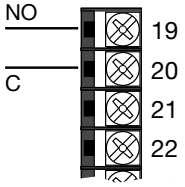
Type of outputs are specified when the indicator is ordered.

**Output Out 1 – 5 A relay**



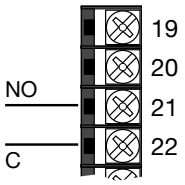

5 A Relay
250 VAC

**Output Out 2 - 5A relay**




5 A Relay
250 VAC

**Output Out 3 - 5A relay**

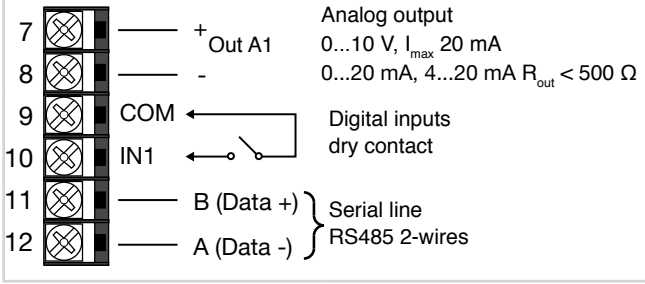



5 A Relay
250 VAC

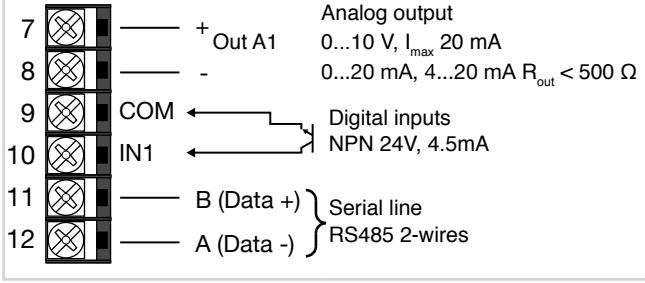
## 2.3.5. Options

Types of optional inputs and outputs are specified when is ordered.

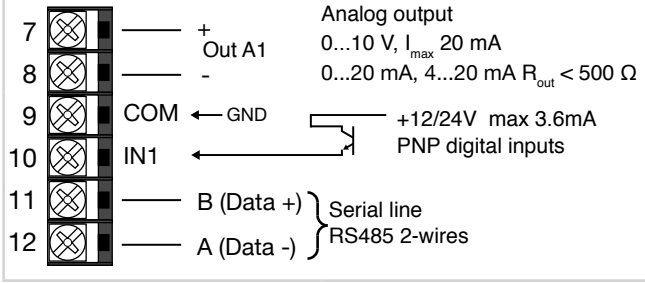
**Option**




**Option**

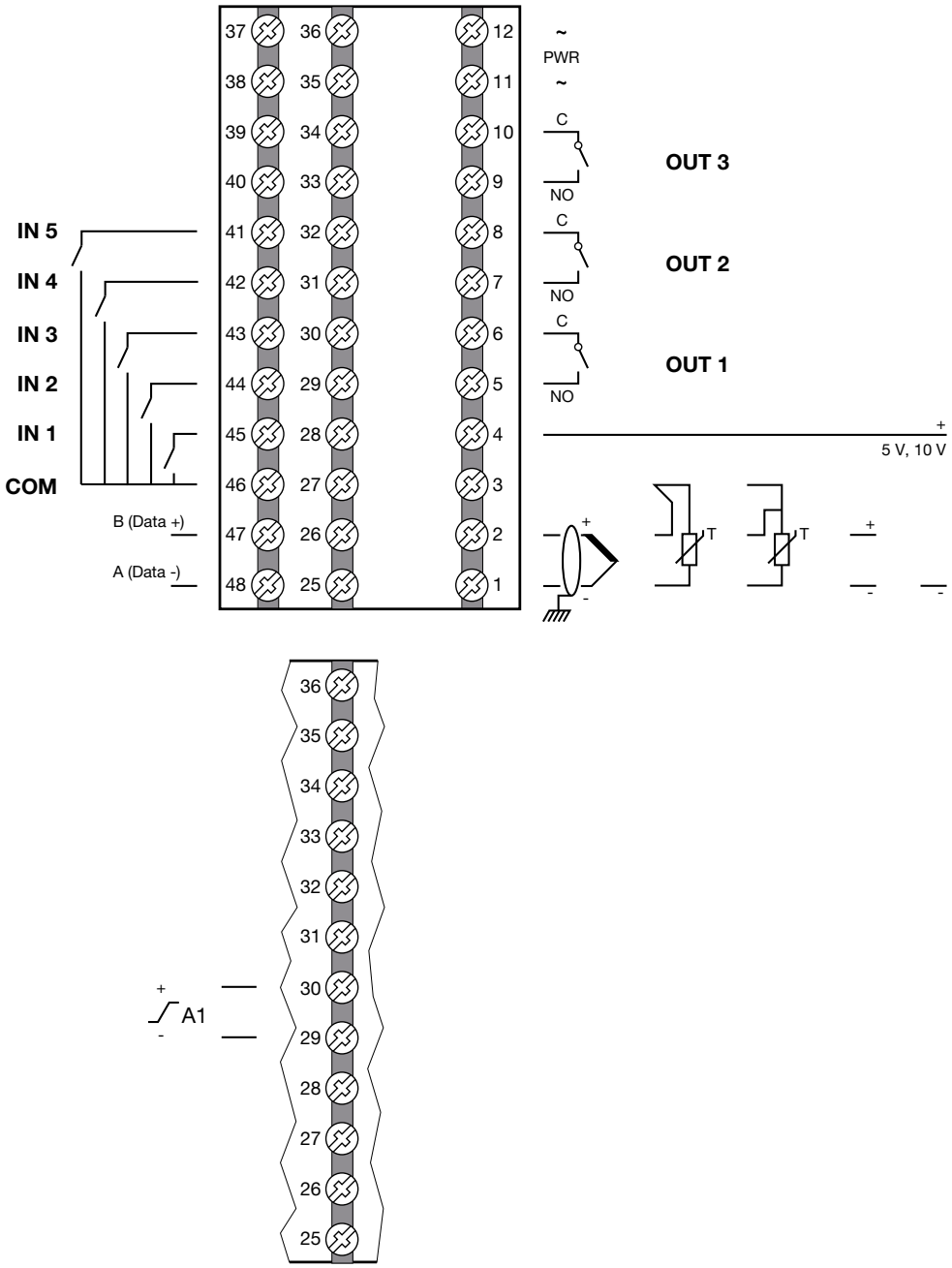



**Option**



## 2.4. 1250 L connection diagrams

### 2.4.1. General diagram




**LEGEND**

~ PWR *Power supply*

*Linear input in voltage/current*

*dry contact digital inputs*

*Thermocouple input*

*Input PT100 JPT100 2 / 3 wires*

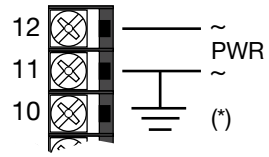
C NO *Relay output*

+ A1 - *Isolated analog output*

B (Data +) A (Data -) *RS485 serial line*

## 2.4.2. Power supply

**Powe supply**



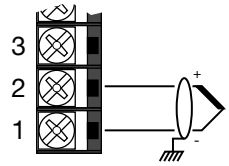

Standard: 100...240VAC/DC ± 10%
50/60Hz, max 10VA

Optional: 20...27VAC/DC ± 10%
50/60Hz, max 10VA

(*) ground connection only with option 20...27VAC/DC

## 2.4.3. Inputs

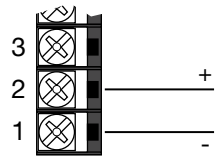
**TC inputs**




Available thermocouples:
J, K, R, S, T, C, D,
B, E, L, U, G, N, Pt20Rh-Pt40Rh
ITS90 or custom linearization

Maintain polarity
For extensions, use a compensated cable

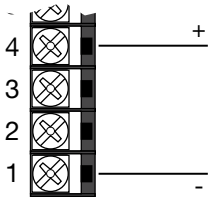
**Linear input (V, I)**




linear input voltage
60 mV (Ri > 70 kΩ)
1 V (Ri > 15 kΩ)

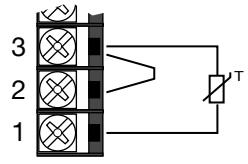
Linear input in direct current
0/4...20 mA, Ri = 50Ω

**Linear input (V)**



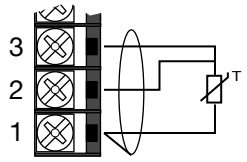

Linear input in direct voltage
5V, 10V (Ri > 30 kΩ)

**Input PT100/JPT100 - 2-wires connection**




**Attention**:
with this type of connection the line resistance can introduce measurement error, we recommend that you use wires of adequate cross-section.
The resistance of the three wires must be equal, and less than 20 ohm.

**Input PT100/JPT100 - 3-wires connection**

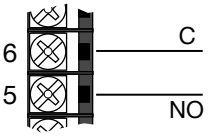



**Attention**:
with this type of connection the line resistance can introduce measurement error, we recommend that you use wires of adequate cross-section.
The resistance of the three wires must be equal, and less than 20 ohm.

## 2.4.4. Outputs

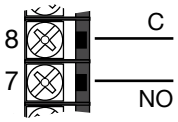
Type of outputs Out1, Out2, Out3, are specified when is ordered.

**Output Out 1 - 5A relay**



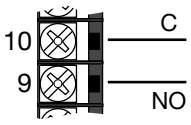

5A relay 250VAC / 30VDC

**Output Out 2 – 5 A relay**




5 A relay 250 VAC / 30 VDC

**Output Out 3 –5A relay**

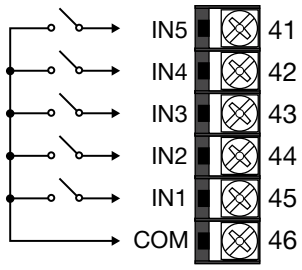



5A relay 250VAC / 30VDC

## 2.4.5. Digital inputs

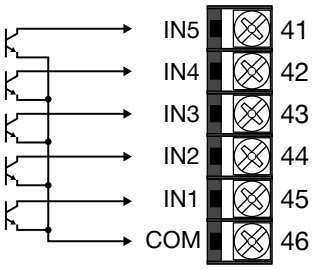
**Digital inputs**

Digital inputs
dry contact




**Digital inputs**

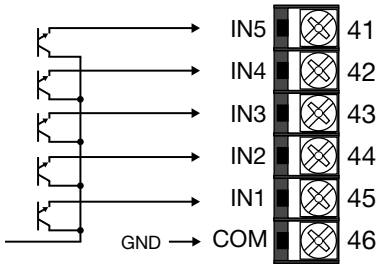
Digital inputs
NPN 24 V, 4,5 mA




**Digital inputs**

PNP digital inputs

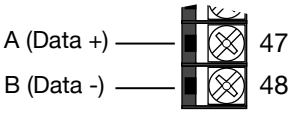
+12/24 V max 3,6 mA




## 2.4.6. Serial line

**Serial line**

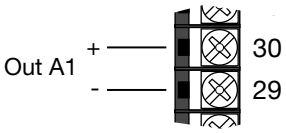
Serial line
RS485 2-wires




## 2.4.7. Analog output

**Analog output**

Analog output
0...10 V, max 20 mA
0...20 mA, 4...20 mA,
Rout < 500Ω



## 2.5. RS485 serial connection diagram

Up to 31 instruments (including different models) can be connected in parallel on the RS485 line. The line must end with a resistor (120 Ω, 1/2 W).

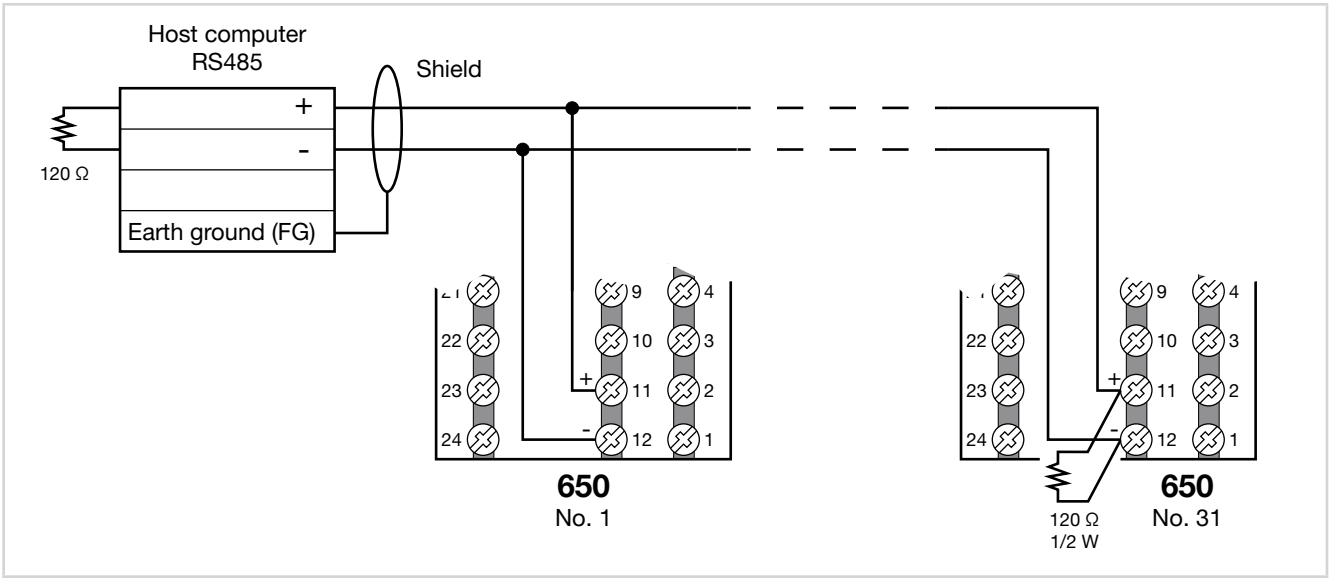



Figure 10 - RS485 connection for 650 L indicators

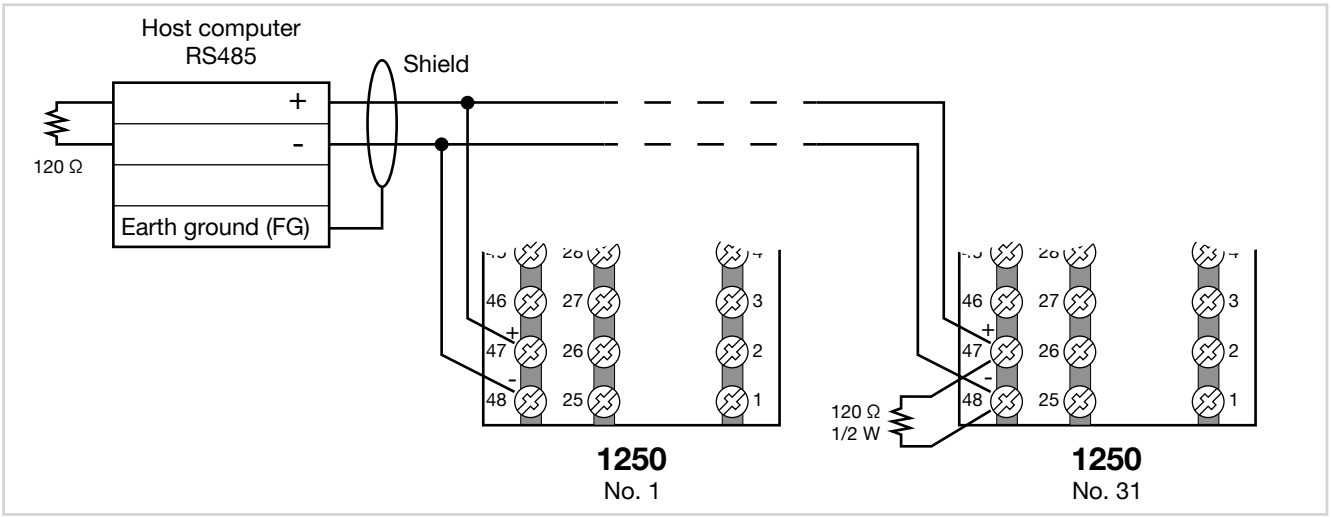



Figure 11 - RS485 connection for 1250 L indicators

# 3. COMMISSIONING

## 3.1. Information on displays and use of keys

The general description of the displays and keys for each model is in paragraphs “1.3.1. Display and keys 650 L” on page 8, “1.4.1. Display and keys 1250 L” on page 10.

### 3.1.1. Menu navigation

4 keys are used for navigating the menus and submenus and for changing parameters and confirming choices.
Their function depends on the context and on how long they are pressed.

The LEDs above the keys not only give confirmation that each key has been pressed (by flashing), but also show which keys can be used in each situation.

The navigation functions assigned to the keys are:

**F** At first power-on, scrolls the fast configuration menu; otherwise, the user configuration menu (Alarm limits, etc.).
Each time you press the key, the value of the displayed parameter is confirmed and you go to the next menu item.
Keep the key pressed for more than 2 seconds to enter the Programming/Configuration menu.

**R** Each time you press the key, you return to the previous menu item or to the higher menu level, as appropriate.
Keep the key pressed for more than 2 seconds to return to the Main menu.
Alarm RESET holding down the key for 3 seconds

Press the key to enter a submenu or to reduce the value of the displayed parameter, as appropriate.
Keep the key pressed to progressively increase the speed of reduction of the displayed parameter

Press the key to raise the value of the displayed parameter.
Keep the key pressed to progressively increase the speed of raising the displayed parameter.

### 3.1.2. Displays

The indicators have 2 or 3 displays, depending on the model.
The Main menu shows:
- PV display: value of process variable.
- SV display: value of parameter (Alarm 1 limit).
- F Display (models 1250 L only): value of control output (if parameter dS.F = OUT.PW).

On models 1250 L, the percentage value of the control output is also shown graphically on a bargraph.

According to the situation (programming, alarm, etc.), the indicator displays can show other information, such as the name of the parameter, description of the parameter, diagnostics messages and alarm messages.

**Attention!** The displays show only the parameters and menus for a defined configuration.

#### 3.1.2.1. Display characters

The displays reproduce the various characters by combining 7 or 14 segments.
The following tables show the shape of the various characters.

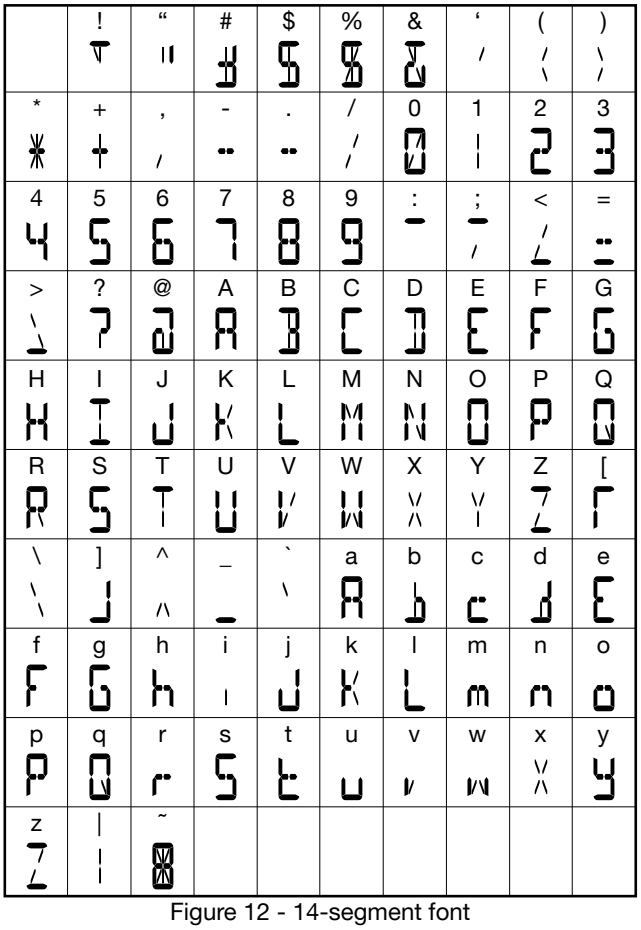



Figure 12 - 14-segment font

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ! | “ | # | $ | % | & | ‘ | ( | ) |
| * | + | , | - | . | / | 0 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = |
| > | ? | @ | A | B | C | D | E | F | G |
| H | I | J | K | L | M | N | O | P | Q |
| R | S | T | U | V | W | X | Y | Z | [ |

Figure 13 - 7-segment font

#### 3.1.2.2. Scrolling messages

The SV (650 L) and F (1250 L) displays can show scrolling alphanumeric messages. These messages, up to 32 characters in length, appear:

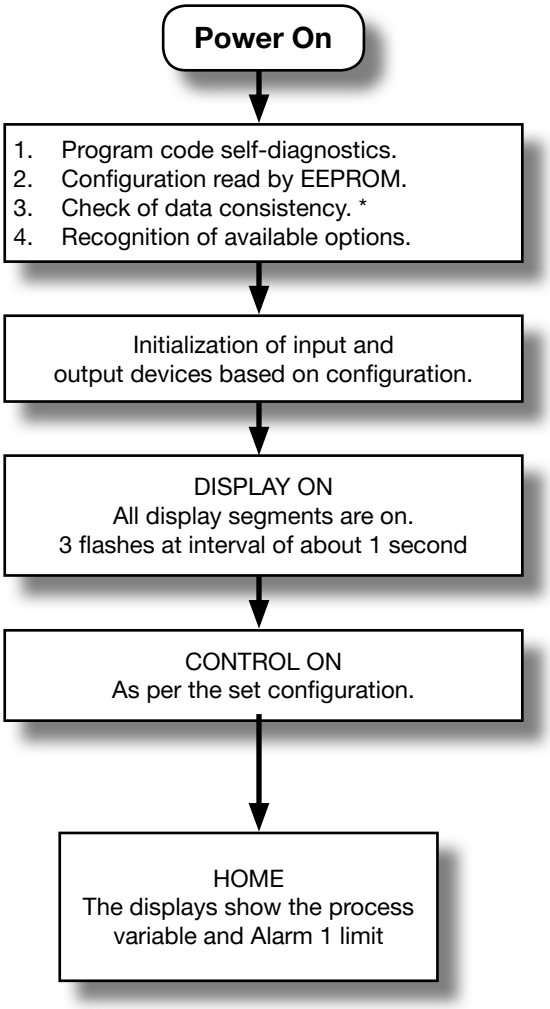
- during configuration, describing the active parameter;
- during operation, after the tripping of alarms, digital inputs and logic function outputs, if the relative messages were enabled

Message texts can be set via PC with GF_eXpress software.

There are 3 message groups, one for each of the 3 languages provided, selectable from the HMI menu with the LANG.n parameter. Each group contains up to 25 messages.

## 3.2. Power-on sequence

The following diagram shows the indicator sequence at power-on.
**Note**: the USB-TTL programming cable must be disconnected.



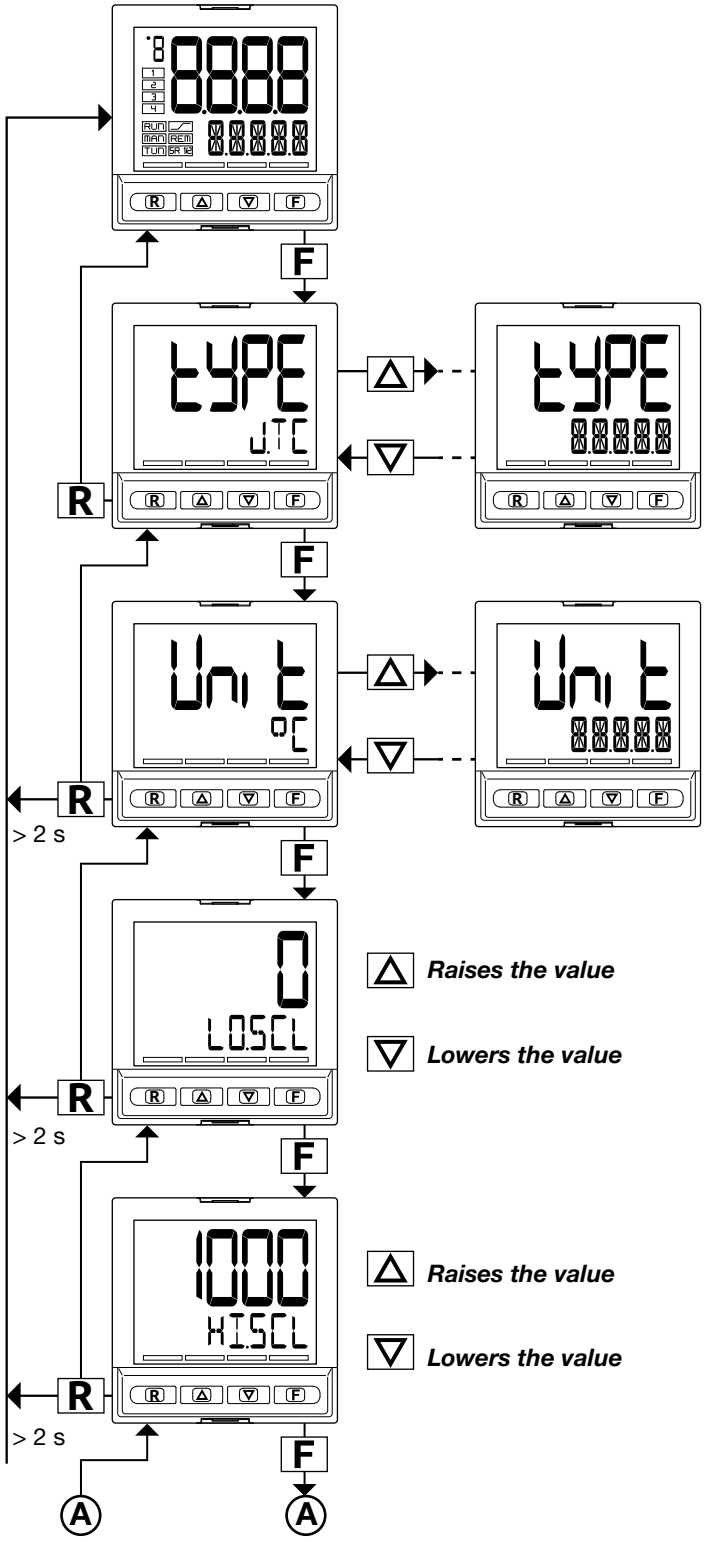

*) Any error is signaled by the message EEPROM CHECKSUM ERROR.

## 3.3. First power-on

At first power-on, after the indicator has run the self-diagnostics test, press the F key to access the Fast Configuration Menu. The parameters shown are a subset of all the indicator parameters and let you rapidly configure the inputs and outputs.
The number and type of the parameters shown depends on the indicator HW configuration and on the choices made with the parameters previously shown.
For example, minimum and maximum scale limits are shown only if you have chosen an mA or V type temperature sensor.

Fast Configuration also appears if the HMI menu is set to parameter QuiCk = On

### 3.3.1. Fast configuration



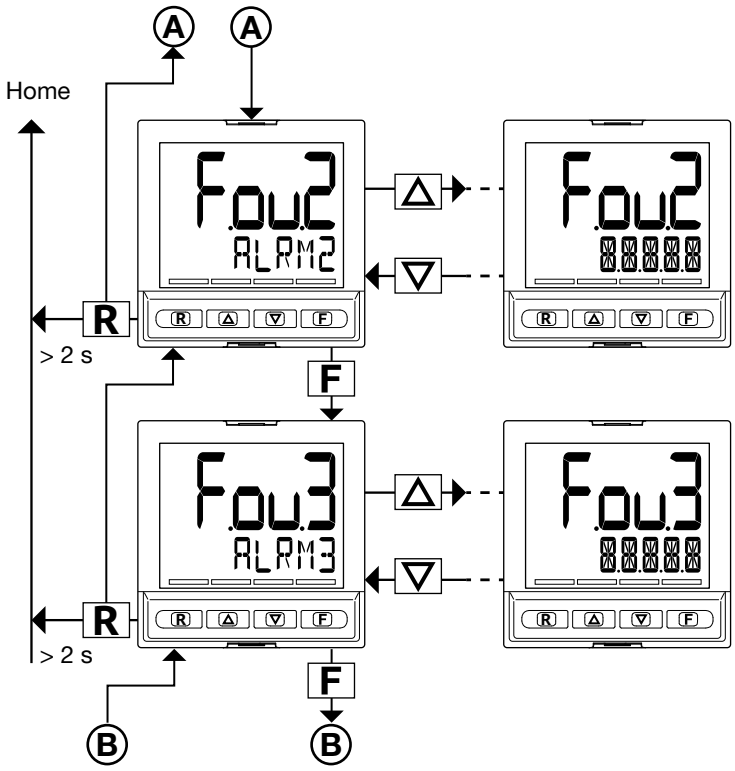

Home

**Select sensor type**

**Select engineering unit**
The engineering units can be
°C or °F only if a TC or Rtd sensor is selected.

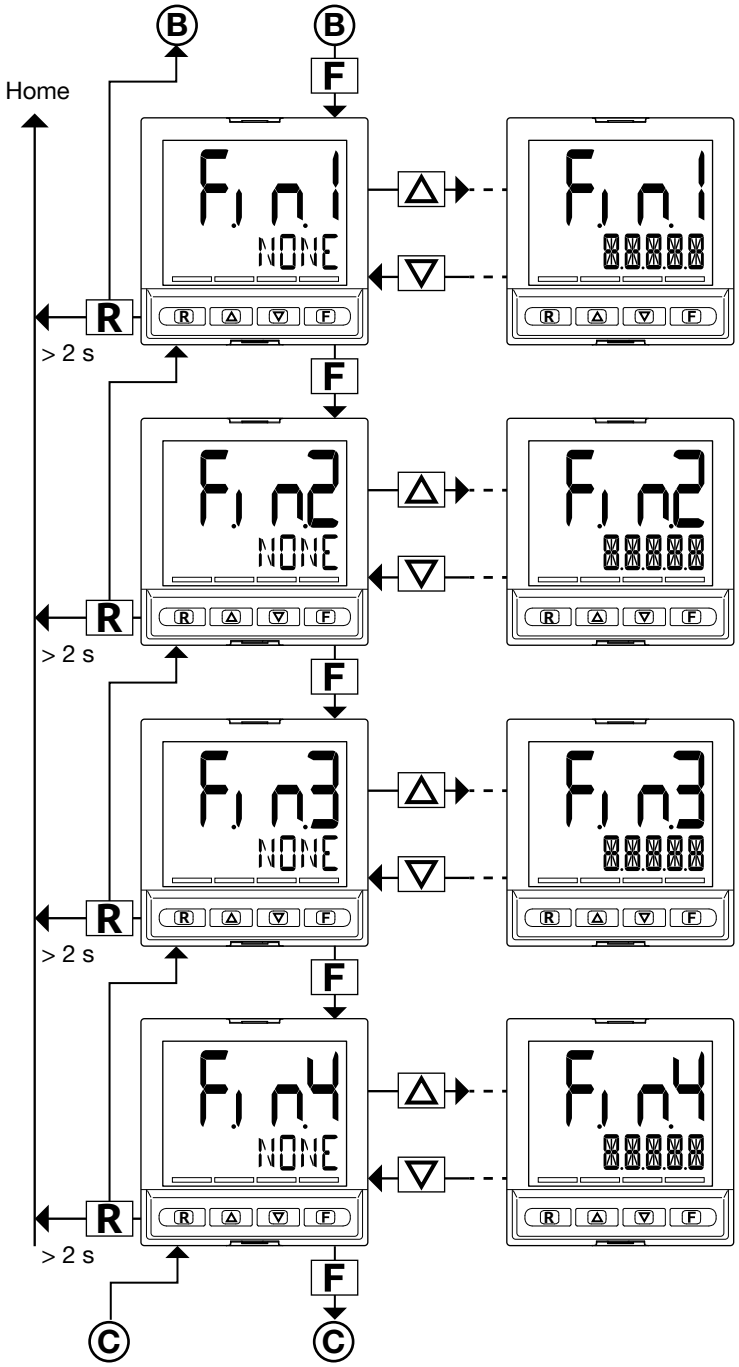
**Minimum scale limit**
Only for selected sensors mV or V, the scale limits LO.SCL, HI.SCL setpoint for TC or RTD sensors are automatically set according to sensor type and engineering units.

**Maximum scale limit**
Only for selected sensors mV or V.




**Select output 2 function**
The allowed functions depend on output type (relay, logic).

**Select output 3 function**
The menu item appears only if the optional output is available.

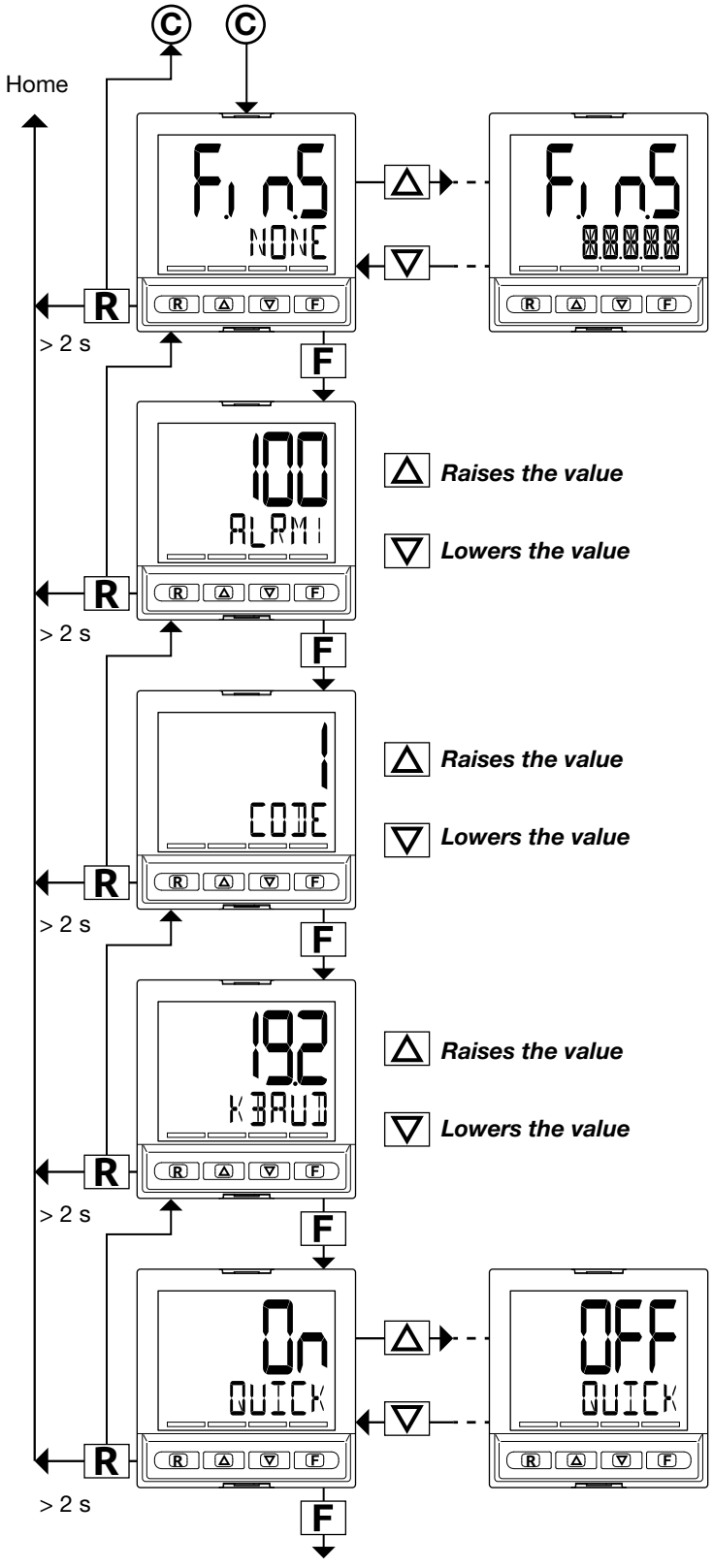



**Select digital input 1 function**
The menu item appears only if the optional input is available.

**Select digital input 2 function**
The menu item appears only if the optional input is available (for model 1250 L).

**Select digital input 3 function**
The menu item appears only if the optional input is available (for model 1250 L).

**Select digital input 4 function**
The menu item appears only if the optional input is available (for model 1250 L only).




**Select digital input 5 function**
The menu item appears only if the optional input is available (for model 1250 L).

**Setting Alarm 1**

**Setting Modbus address**
The menu item appears only if the optional RS485 port is available.

**Selecting baudrate**
The menu item appears only if the optional RS485 port is available.

**Enabling / disabling Fast Configuration**

*Selection of probe type*

## 3.4. Setting up quick configuration

The quick configuration menu lets you quickly configure and start an indicator.

To do this, it uses default values for many of the parameters assigned to the functions.

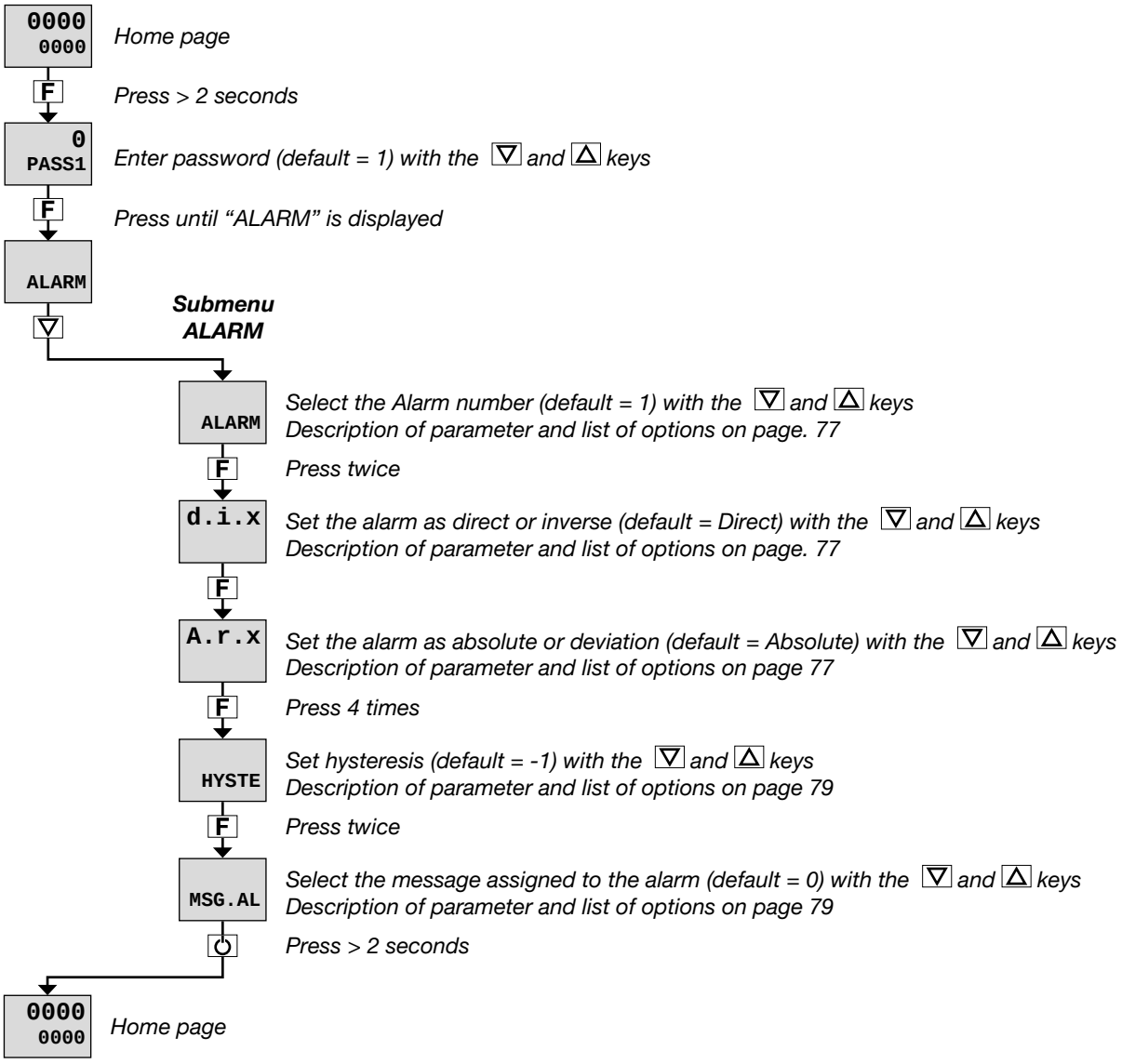
With this configuration, the indicator can satisfy the majority of operating requirements.

You can set up the first configuration with the main configuration menu (see paragraph "4.1. Programming/Configuration Menu" on page 30), which gives access to all of the parameters.

For purposes of example, some of the indicator's main functions are listed below, with a list of parameters to be changed after running fast configuration to configure the indicator to specific working conditions.

### 3.4.1. Setting up the Alarm

If at least one output was configured as Alarm in the fast configuration.




The ALARM submenu also lets you:

- select the method for applying hysteresis (parameter n.S.x, default = NORML);
- enable or disable the power-on alarm (parameter PWON.E, default = OFF);
- latch/not latch the active alarm state (parameter LATCH, default = OFF);
- set the alarm trip delay (parameter DELAY, default = 0.00);
- activate or deactivate flashing of the PV display in case of alarm (parameter BLK.AL, default = OFF).

# 4. CONFIGURATION

The fast configuration described in the previous chapter lets you rapidly put the indicator into operation.
To do this, the procedure configures the indicator's main parameters only, which satisfies the most common application requirements.

On the other hand, to satisfy all application requirements and to configure the indicator in detail, you have to set the parameters that are accessible only on the Programming/ Configuration menu.

This type of configuration is also useful for optimizing performance.

The indicator can be configured with the buttons on its panel and from the PC with GF_eXpress software (see chapter "6. Programming with PC" on page 75).

## 4.1. Programming/Configuration Menu

### 4.1.1. First: know what you're doing

Correctly setting the parameters needed to configure the indicator requires thorough knowledge of the problems and techniques involved.

If you are unsure of your know-how, or are not fully aware of the consequences of incorrectly setting the parameters, we advise you not to configure the indicator with this menu.

**Attention!** To prevent harm to persons and damage to property, the user must check that the parameters are correctly set before commissioning the indicator.

In case of doubts, or if you need any explanations, please consult www.gefran.com or contact Gefran Customer Care.

### 4.1.2. Passwords

The configuration menu is protected by 2 passwords that allow access to two different menu sections.

The first section, accessed with password 1, groups the most operative submenus and parameters, i.e., the ones most involved in daily functioning of the controlled machine or system.

The second section, accessed with password 2, groups the submenus and parameters used to configure HW resources

The factory password settings are:
- Password 0 = 10
- Password 1 = 1
- Password 2 = 2

The passwords can be changed and even disabled if you want. See paragraphs on page 71 "4.15. PASC0 – Setting level 0 password"; "4.16. PASC1 - Setting level 1 password"; "4.17. PASC2 - Setting level 2 password".

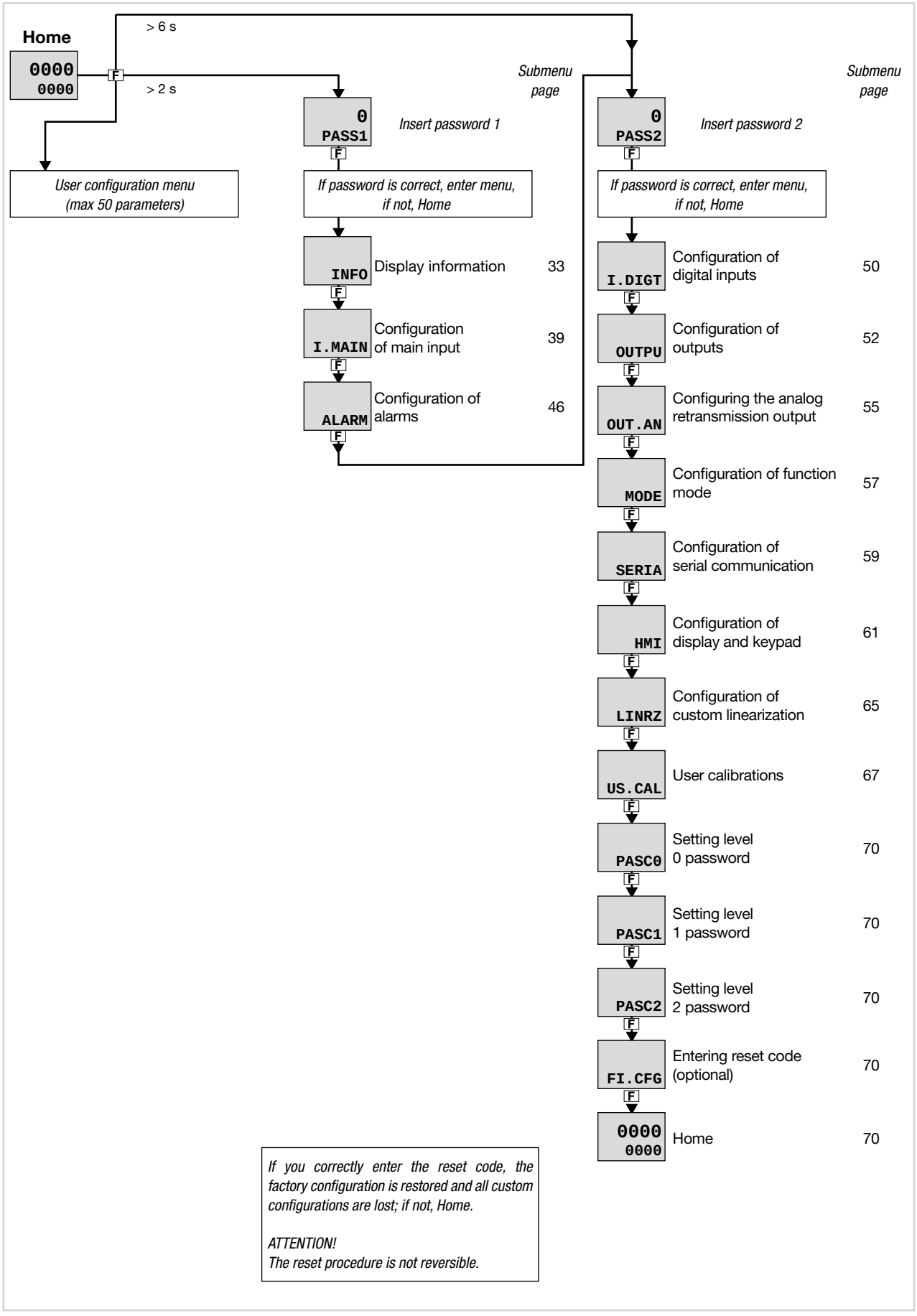
### 4.1.3. Password in the User Menu

Two passwords can be entered in the User menu, respectively:
- Password 0 (default = 0)
- Password 1 (default = 1)

to inhibit navigation to parameters in positions subsequent to that assigned to the password.

Once one of the two passwords is reached:
- if the entered value matches that expected, navigation continues in the User Menu
- if the entered value does not match that expected, the Home screen will be displayed

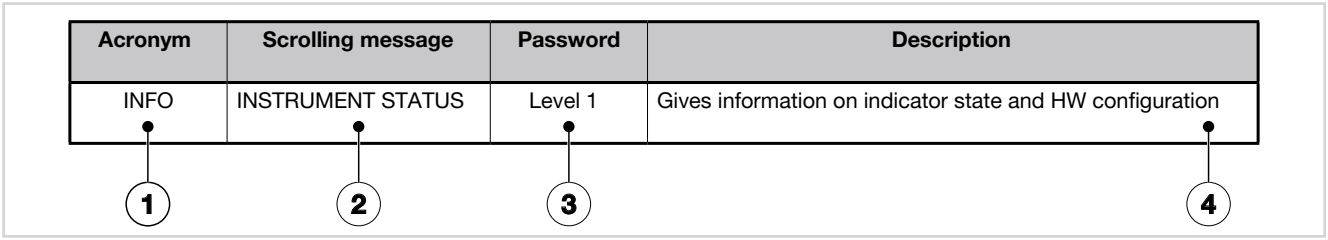
## 4.2. Main menu


Home
0000
0000
F
> 6 s
> 2 s
User configuration menu (max 50 parameters)
0
PASS1
Insert password 1
If password is correct, enter menu, if not, Home
Submenu page
INFO
Display information
33
I.MAIN
Configuration of main input
39
ALARM
Configuration of alarms
46
0
PASS2
Insert password 2
If password is correct, enter menu, if not, Home
Submenu page
I.DIGT
Configuration of digital inputs
50
OUTPU
Configuration of outputs
52
OUT.AN
Configuring the analog retransmission output
55
MODE
Configuration of function mode
57
SERIA
Configuration of serial communication
59
HMI
Configuration of display and keypad
61
LINRZ
Configuration of custom linearization
65
US.CAL
User calibrations
67
PASC0
Setting level 0 password
70
PASC1
Setting level 1 password
70
PASC2
Setting level 2 password
70
FI.CFG
Entering reset code (optional)
70
0000
0000
Home
70
If you correctly enter the reset code, the factory configuration is restored and all custom configurations are lost; if not, Home.
ATTENTION!
The reset procedure is not reversible.

## 4.3. Legend for submenus and parameters

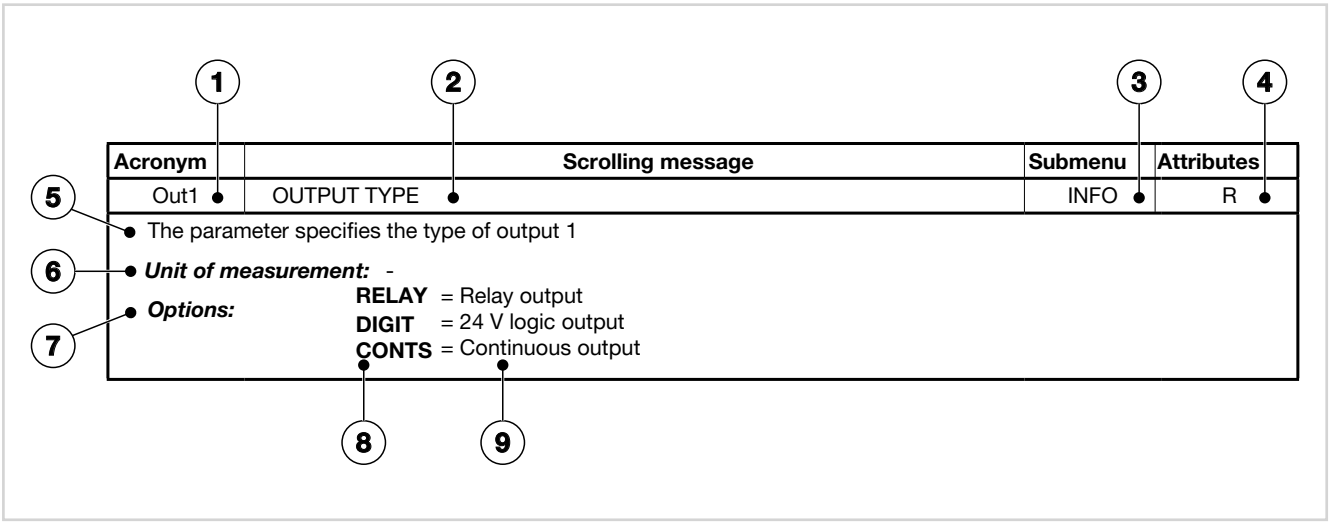
The purposes and characteristics of submenus and parameters are described and summarized in the following tables.

### 4.3.1. Submenu




1. Acronym of submenu as it appears on indicator display.
2. Text of scrolling message as it appears on indicator display.
3. Password needed to access submenu items.
4. Description of functions that manage submenu

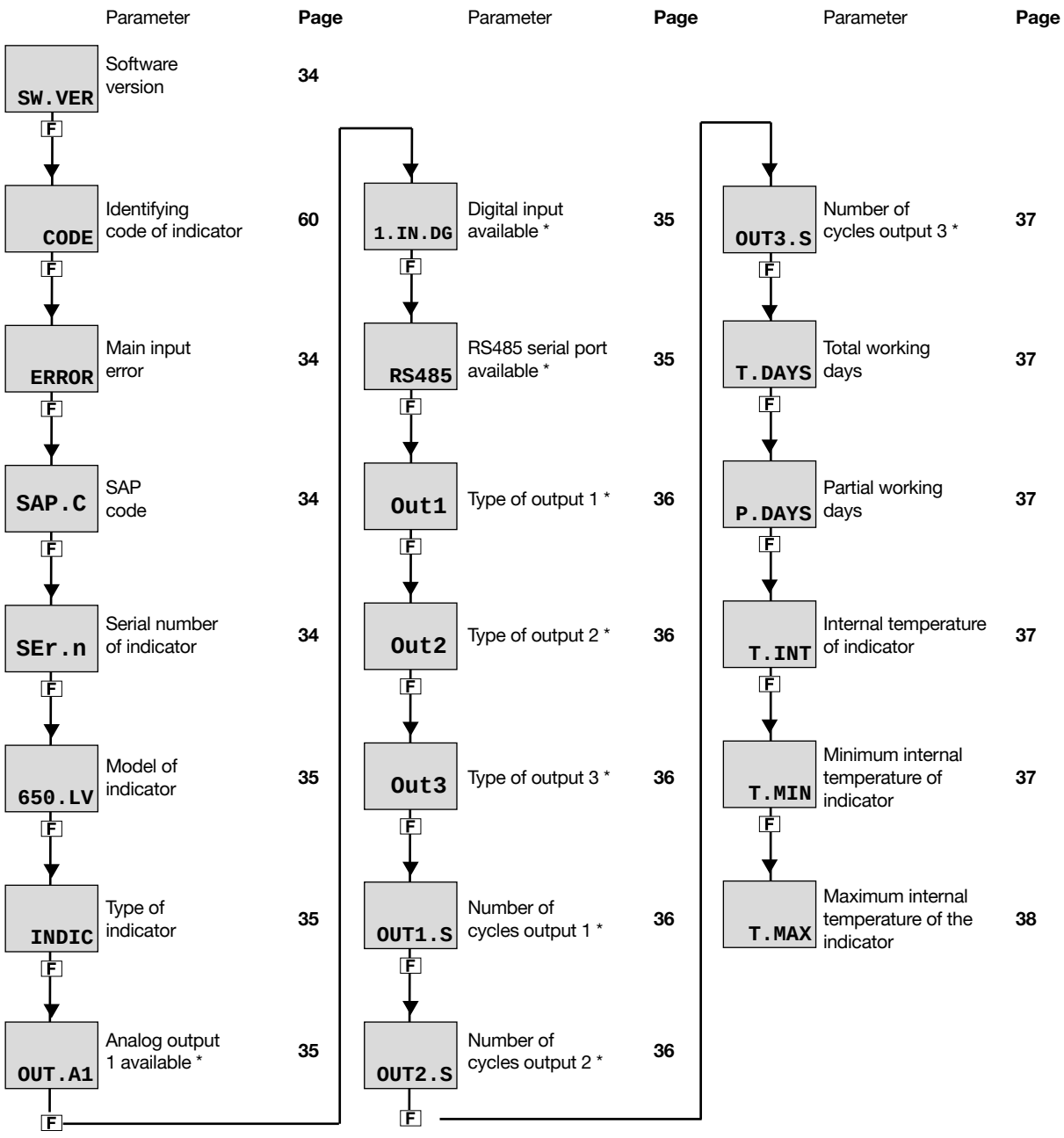
### 4.3.2. Parameters




1. Acronym of parameter as it appears on indicator display.
2. Text of scrolling message as it appears on indicator display.
3. Submenu to which parameter belongs.
4. Attributes of parameter: R = readable, W = writable. If only R, the operator can read the parameter value but cannot change it.
5. Description of use of parameter, including any warnings or suggestions.
6. Engineering units of value managed by parameter. Engineering units can be unique or depend on other configuration choices, for example, the engineering units temperature, which can be set in degrees Centigrade or Fahrenheit. Not all parameters require the use of units of measurement.
7. Description of parameter values or information that can be read or written, as appropriate.
8. Value that the parameter can have. Value can be two types: discrete, typically numerical. For a discrete value, all possible values are listed as they appear on the indicator display. For intervals of values, the minimum and maximum parameter values are shown.
9. Any additional description of value of individual parameter.

## 4.4. INFO Submenu - information display

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| INFO | INSTRUMENT STATUS | Level 1 | Gives information on indicator state and HW configuration. |




* Appears only if function is available on indicator.

### 4.4.1. SW.VER - Software Version

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| SW.VER | SOFTWARE VERSION | INFO | R |

The parameter shows the version (*major.minor*) of the indicator software.

***Unit of measurement: -***

***Options:*** **-**

### 4.4.2. CODE - Serial address of the indicator

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| CODE | INSTRUMENT ID CODE FOR SERIAL COMM | INFO | R |

The parameter shows identifying address of the device for serial communication.

***Unit of measurement:*** -

***Options***: 0...247

### 4.4.3. ERROR - Primary input error

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| ERROR | MAIN INPUT ERROR | INFO | R |

The parameter shows error detected by the main input.

***Unit of measurement:*** -

***Options***:

| | |
|---|---|
| **nonE** | = No error |
| **-Lo** | = Process variable (PV) is below lower scale limit |
| **-Hi** | = Process variable (PV) is above upper scale limit |
| **Err** | = PT100 in short circuit or input values below lower limit (for example, TC with incorrect connection) |
| **Sbr** | = Sensor break or input values higher than upper limit |

### 4.4.4. SAP.C - SAP code

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| SAP.C | SAP ORDER CODE | INFO | R |

The parameter shows the product number (Fxxxxxx).

***Unit of measurement***: -

***Options***: -

### 4.4.5. SEr.n - Serial address of the indicator

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| SEr.n | SERIAL NUMBER | INFO | R |

The parameter shows the serial number of the indicator (number shown on data plate).
The serial number is displayed in the form *yy.ww nnnn*, where

*yy* = last two digits of year of production
*ww* = week of production
*nnnn* = progressive in week of production

***Unit of measurement***: -

***Options***: -

### 4.4.6. xxxxx - Model of indicator

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| xxxxx | MODEL | INFO | R |

The parameter shows the model of the indicator.
xxxxx indicates the indicator model (650L.LV, 650L.HV, 1250L.LV and 1250L.HV only).

***Unit of measurement***: -

***Options***:
**650.LV** = 650 L indicator powered at 20...27 VAC/VDC
**650.HV** = 650 L indicator powered at 100...240 VAC/VDC
**125.LV** = 1250 L indicator powered at 20...27 VAC/VDC
**125.HV** = 1250 L indicator powered at 100...240 VAC/VDC

### 4.4.7. INDIC - Type of indicator

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| INDIC | MODEL OPTION | INFO | R |

The parameter shows the type (xxxxx) of function.

***Unit of measurement***: -

***Options***: **INDIC = The devices only operates as an indicator**

### 4.4.8. OUT.A1 - Analog output 1 available

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OUT.A1 | ANALOG OUTPUT AVAILABLE | INFO | R |

If present, the parameter indicates that the analog output in voltge or current is installed on the indicator.

***Unit of measurement***: -

***Options***: -

### 4.4.9. x.IN.DG - Digital input available

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| x.IN.DG | DIGITAL INPUT AVAILABLE | INFO | R |

If present, the parameter indicates how many digital inputs are installed on the indicator.

***Unit of measurement***: -

***Options***:
**1.IN.DG** = 1 digital input installed on the indicator (for 650 L only)
**5.IN.DG** = 4 digital input installed on the indicator (for 1250 L only)

### 4.4.10. RS485 - RS485 serial port available

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| RS485 | FIELDBUS AVAILABLE | INFO | R |

If present, the parameter indicates that an RS485 is installed on the indicator.

***Unit of measurement***: -

***Options***: -

### 4.4.11. Out1 - Type of output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| Out1 | OUTPUT TYPE | INFO | R |

The parameter specifies the type of output 1.

***Unit of measurement***: -

***Options***: **RELAY** = Relay output

### 4.4.12. Out2 - Type of output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| Out2 | OUTPUT TYPE | INFO | R |

If present, the parameter indicates that output 2 is available on the indicator and specifies the type.

***Unit of measurement***: -

***Options***: **RELAY** = Relay output

### 4.4.13. Out3 - Type of output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| Out3 | OUTPUT TYPE | INFO | R |

If present, the parameter indicates that output 3 is available on the indicator and specifies the type.

***Unit of measurement***: -

***Options***: **RELAY** = Relay output

### 4.4.14. OUT1.S - Number of cycles output 1

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OUT1.S | NUMBER X 1000 RELAY CYCLES | INFO | R |

If output 1 is relay or logic, the parameter shows the number of cycles (in thousands).

***Unit of measurement***: Number (× 1000)

***Options***: -

### 4.4.15. OUT2.S - Number of cycles output 2

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OUT2.S | NUMBER X 1000 RELAY CYCLES | INFO | R |

If output 2 is available on the indicator, and if it is relay or logic, the parameter shows the number of cycles (in thousands).

***Unit of measurement***: Number (× 1000)

***Options***: -

### 4.4.16. OUT3.S - Number of cycles output 3

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OUT3.S | NUMBER X 1000 RELAY CYCLES | INFO | R |

If output 3 is available on the indicator, the parameter shows the number of cycles (in thousands).

***Unit of measurement***: Number (× 1000)

***Options***: -

### 4.4.17. T.DAYS - Total working days

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| T.DAYS | TOTAL DAYS OF OPERATION | INFO | R |

The parameter shows total number of working days of the indicator since first power-on. Each working day equals 24 hours of actual functioning.

***Unit of measurement***: Day

***Options***: 0...9999

### 4.4.18. P.DAYS - Partial working days

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| P.DAYS | PARTIAL DAYS OF OPERATION | INFO | R |

The parameter shows the number of working days of the indicator since the last counter reset, Each working day equals 24 hours of actual functioning.
The counter can be reset with the Us.cal function.

***Unit of measurement***: Day

***Options***: 0...9999

### 4.4.19. T.INT - Internal temperature of indicator

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| T.INT | INTERNAL TEMPERATURE | INFO | R |

The parameter shows the instantaneous internal temperature of the indicator.

***Unit of measurement***: °C

***Options***: -

### 4.4.20. T.MIN - Minimum internal temperature of the indicator

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| T.MIN | MIN INTERNAL TEMPERATURE | INFO | R |

The parameter shows the minimum internal temperature of the indicator.

***Unit of measurement***: °C

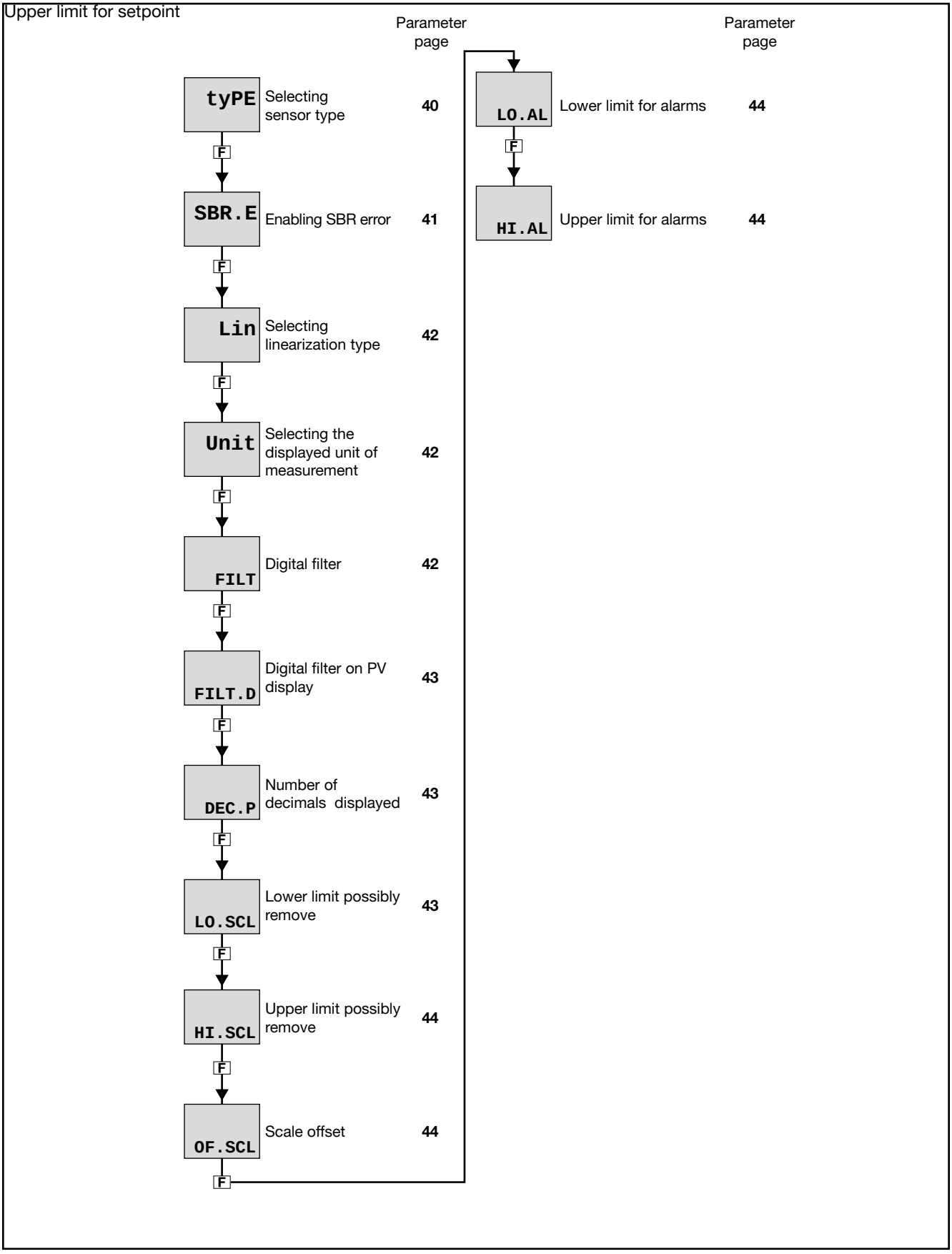
***Options***: -

### 4.4.21. T.MAX - Maximum internal temperature of the indicator

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| T.MAX | MAX INTERNAL TEMPERATURE | INFO | R |
| The parameter shows the maximum internal temperature of the indicator.<br>***Unit of measurement***: °C<br>***Options***: - | | | |

## 4.5. I.MAIN Submenu - Configuration of main input

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| I.MAIN | MAIN INPUT CONFIG | Level 1 | Lets you configure the indicator's main input. |



### 4.5.1. tyPE - Selecting sensor type

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| tyPE | MAIN INPUT TYPE OF PROBE | I.MAIN | R W |

The parameter shows and sets the sensor type of the main input.
The functions for calibrating Custom sensors are on the US.CAL menu.
When a 4...20 mA input is used and the current is less than 2 mA, an Err message is generated and the relay state specified with the FAUL.T parameters is activated.

The table shows the scale limits for each sensor type or input based on the set number of decimals.

| Sensor type | Sensor | Unit of measurement | Scale limits for DEC.P = 0 | Scale limits for DEC.P = 1 | nominal accuracy limits @ 25°C DEC.P=0 | DEC.P=1 |
|---|---|---|---|---|---|---|
| Thermocouple | J | °C | 0...1000 | 0.0...999.9 | | |
| | K | °C | 0...1300 | 0.0...999.9 | | |
| | R | °C | 0...1750 | 0.0...999.9 | >100°C | >300°C |
| | S | °C | 0...1750 | 0.0...999.9 | | |
| | T | °C | -200...400 | -199.9...400.0 | | |
| | C | °C | 0...2300 | 0.0...999.9 | | >300°C |
| | D | °C | 0...2300 | 0.0...999.9 | | >200°C |
| | B | °C | 44…1800 | n.d. | | |
| | E | °C | -100…750 | -100.0…750.0 | | |
| | L | °C | -200…900 | -199.9...900.0 | | |
| | LGOST | °C | 0...600 | 0.0...600.0 | | |
| | U | °C | -200…400 | -199.9…400.0 | | |
| | G | °C | 0…2300 | n.d. | | |
| | N | °C | 0…1300 | 0.0…999.9 | | |
| | Pt20Rh Pt40Rh | °C | 0...1880 | n.d. | | |
| Infrared characteristic of the Tc K model see note | 1 | °C | 10...70 | 10.0...70.0 | | |
| | 2 | °C | 60...120 | 60.0...120.0 | | |
| | 3 | °C | 115...165 | 115.0...165.0 | | |
| | 4 | °C | 140...260 | 140.0...260.0 | | |
| Resistance thermometer | PT100 | °C | -200...850 | -199.9...850.0 | | |
| | PT100 | °C | -50...250 | -50.0...250.0 | | |
| | JPT100 | °C | -200...600 | -199.9...600.0 | | |
| Voltage /Current | 0...60 mV | | -1999...9999 | -199.9...999.9 | | |
| | 0...20 mA | | | | | |
| | 4...20 mA | | | | | |
| | 0...10 V | | | | | |
| | 2...10 V | | | | | |
| | 0...5 V | | | | | |
| | 1...5 V | | | | | |
| | 0...1 V | | | | | |
| | 0.2...1 V | | | | | |
| Custom | RTD | | -1999...9999 | -199.9...999.9 | | |
| | 0...60 mV | | | | | |
| | 0...20 mA | | | | | |
| | 4...20 mA | | | | | |
| | 0...10 V | | | | | |
| | 2...10 V | | | | | |
| | 0...5 V | | | | | |
| | 1...5 V | | | | | |
| | 0...1 V | | | | | |
| | 0.2...1 V | | | | | |

**Note:** the infrared temperature sensor has an output in voltage for direct connection to the input terminals of the indicator. An external thermometer is needed in order to correct the sensor error.
After identifying the work temperature range (for example, 140 – 260°C), bring the process to a temperature near the minimum scale value, and after reaching it make a note of value A1 indicated by the instrument and of value A2 indicated by the external thermometer. Bring the process to a temperature near the maximum scale value, and after reaching it make a note of value B1 indicated by the instrument and of value B2 indicated by the external thermometer. Enable 4-point linearization (see Correcting 4-point input) and enter the four requested values (A1, B1 and A2, B2)..

**Unit of measurement**: -

***Options***:

**J.TC** = J thermocouple
**K.TC** = K thermocouple
**R TC** = R thermocouple
**S TC** = S thermocouple
**T.TC** = T thermocouple
**C.TC** = C thermocouple
**D.TC** = D thermocouple
**B.TC** = B thermocouple
**E.TC** = E thermocouple
**L.TC** = L thermocouple
**L.GO.TC** = L GOST thermocouple
**U.TC** = U thermocouple
**G.TC** = G thermocouple
**N.TC** = Termocoppia N **PT2.TC** = Pt20Rh / Pt40Rh thermocouple
**INFR1** = IR sensor type 1
**INFR2** = IR sensor type 2
**INFR3** = IR sensor type 3
**INFR4** = IR sensor type 4
**PT100** = Pt100 resistance thermometer
**PT.LIM** = Pt 100 limitated resistance thermometer
**JTP10** = JPT100 resistance thermometer
**60MV** = 0...60 mV sensor
**20MA** = 0...20 mA sensor
**4-20M** = 4...20 mA sensor
**10V** = 0...10 V sensor
**2-10V** = 2...10 V sensor
**5V** = 0...5 V sensor
**1-5V** = 1...5 V sensor
**1V** = 0...1 V sensor
**0.2-1V** = 0,2...1 V sensor
**C.RTD** = RTD sensor with user calibration
**C.60MV** = 0...60 mV sensor with user calibration
**C.20MA** = 0...20 mA sensor with user calibration
**C.4-20** = 4...20 mA sensor with user calibration
**C.10V** = 0...10 V sensor with user calibration
**C.2-10** = 2...10 V sensor with user calibration
**C.5V** = 0...5 V sensor with user calibration
**C.1-5V** = 1...5 V sensor with user calibration
**C.1V** = 0...1 V sensor with user calibration
**C.0.2-1** = 0,2...1 V sensor with user calibration

### 4.5.2. SBR.E - Enabling Sensor Break Alarm (SBR)

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| SBR.E | SBR ENABLE | INPUT | R W |

Enables open thermocouple probe error detection (sensor break alarm), also permitting infrared sensor management with maximum 4Kohm output impedance.
The parameter only appears when a thermocouple type input is selected.
The parameter will be forced ON (see options) at each Power On

***Unit of measurement***: -

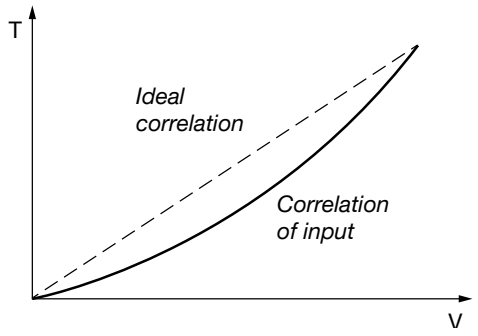
***Options***:

**On** = Enable SBR alarm
**Off** = Disable SBR alarm

### 4.5.3. Lin - Linearization type

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| Lin | CUSTOM LINEARIZATION | I.MAIN | R W |

The parameter sets linearization for the selected sensor type.
The function corrects any linearity and proportionality errors in the correlation between measured value and the actual value.




This correction can be made with two different algorithms: 32-step linearization and 4-point linearization. Values are set (33 linearization for 32 steps and 4 for 4-point linearization) with the LINRZ submenu parameters.

For an explanation of 4-point linearization, see paragraph “5.4. 4-point input correction ”5.2. 4-point input correction” on page 73.

**Unit of measurement**: -

***Options***:
**NONE** = No linearization
**32.STP** = 32-step linearization
**4.POIN** = 4-point linearization

### 4.5.4. Unit - Displayed engineering units

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| Unit | ENGINEERING UNITS | I.MAIN | R W |

The parameter shows and sets the engineering units displayed for input 1. The unit appears on the Home page of the display.
For thermocouple or RTD inputs, the °C / °F selection automatically converts the temperature value; the related scale limits and setpoint limits must be set.

***Unit of measurement***: -

***Options***:
**NONE** = No unit of measurement
**°C** = Degrees Celsius
**°F** = Degrees Fahrenheit
**CUST** = Custom, settable with GF_eXpress

### 4.5.5. FILT - Digital filter

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| FILT | DIGITAL FILTER | I.MAIN | R W |

The parameter shows and sets the value of the digital filter time constant.
With 0.00 no filter is applied.

***Unit of measurement***: Seconds

***Options***: **0.00...20.00**

### 4.5.6. FILT.D - Digital filter on PV display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| FILT.D | DIGITAL FILTER ON DISPLAY PV | I.MAIN | R W |

The parameter shows and sets the allowed tolerance between the real PV value and the value on the PV display: if the variation in real PV is within the interval displayed value - FILT.D... displayed value + FILT.D the displayed value does not change.
With 0.00 no filter is applied..

***Unit of measurement***: The one set with the Unit parameter

***Options***: **0.0...9.9**

### 4.5.7. DEC.P - Number of decimals displayed

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| DEC.P | DECIMAL POINT POSITION | I.MAIN | R W |

The parameter shows and sets the decimal point position for the process value (PV) displayed, i.e., defines its number of decimal figures.
The number of decimal set may reduce the limits of the measurement scale used.

***Unit of measurement***: Number

***Options***: **0...3** = Number of decimals displayed
**0 / 1** = Number of decimals displayed, only for TC and RTD sensors

### 4.5.8. LO.SCL - Lower limit of scale

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| LO.SCL | INPUT LOW LIMIT | I.MAIN | R W |

The parameter shows and sets the lower limit of the measurement scale used for the main input, based on input (or sensor) type, engineering units, and number of decimals selected.
The upper value of LO.SCL is not limited by the value of HI.SCL

***Unit of measurement***: The one set with the Unit parameter

***Options***: A numerical value within the temperature range of the input or sensor

| | Unit = °C DEC.P = 0 | Unit = °F DEC.P = 0 |
|---|---|---|
| **J.TC** | 0...1000 | 32...1832 |
| **K.TC** | 0...1300 | 32...2372 |
| **R TC** | 0...1750 | 32...3182 |
| **S TC** | 0...1750 | 32...3182 |
| **T.TC** | -200...400 | -328...752 |
| **C.TC** | 0...2300 | 32...4172 |
| **D.TC** | 0...2300 | 32...4172 |
| **B** | 44…1800 | 111…3272 |
| **E** | -100…750 | -148…1382 |
| **L** | -200...900 | -328...1652 |
| **LGOST** | 0...600 | 32...1112 |
| **U** | -200…400 | -328…752 |
| **G** | 0…2300 | 32…4172 |
| **N** | 0…1300 | 32…2372 |
| **PT2.TC** | 0...1880 | 32...3416 |
| **INFR1** | 10...70 | 50...158 |
| **INFR2** | 60...120 | 140...248 |
| **INFR3** | 115...165 | 239...329 |
| **INFR4** | 140...260 | 284...500 |
| **PT100** | -200...850 | -328...1562 |
| **PT.LIM** | -50...250 | -58...482 |

| | Unit = °C DEC.P = 0 | Unit = °F DEC.P = 0 |
|---|---|---|
| **JTP10** | -200...600 | -328...1112 |
| **60MV** | -1999...9999 | -1999...9999 |
| **20MA** | -1999...9999 | -1999...9999 |
| **4-20M** | -1999...9999 | -1999...9999 |
| **10V** | -1999...9999 | -1999...9999 |
| **2-10V** | -1999...9999 | -1999...9999 |
| **5V** | -1999...9999 | -1999...9999 |
| **1-5V** | -1999...9999 | -1999...9999 |
| **1V** | -1999...9999 | -1999...9999 |
| **0.2-1V** | -1999...9999 | -1999...9999 |
| **C.RTD** | -1999...9999 | -1999...9999 |
| **C.60MV** | -1999...9999 | -1999...9999 |
| **C.20MA** | -1999...9999 | -1999...9999 |
| **C.4-20** | -1999...9999 | -1999...9999 |
| **C.10V** | -1999...9999 | -1999...9999 |
| **C.2-10** | -1999...9999 | -1999...9999 |
| **C.5V** | -1999...9999 | -1999...9999 |
| **C.1-5V** | -1999...9999 | -1999...9999 |
| **C.1V** | -1999...9999 | -1999...9999 |
| **C.0.2-1** | -1999...9999 | -1999...9999 |

### 4.5.9. HI.SCL - Upper limit of scale

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| HI.SCL | INPUT HIGH LIMIT | I.MAIN | R W |

The parameter shows and sets the upper limit of the measurement scale used for the main input, based on input (or sensor) type, engineering units, and number of decimals selected.
The lower value of HI.SCL is limited by the value of LO.SCL.

***Unit of measurement***: The one set with the Unit parameter

***Options***: A value in the interval corresponding to the input or sensor type (see tables for LO.SCL parameter).

### 4.5.10. OF.SCL - Scale offset correction

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OF.SCL | INPUT OFFSET | I.MAIN | R W |

The parameter shows and sets the offset applied to the value read in input to make it correspond to the expected value for a certain temperature. It corrects any constant read error of the sensor.
This offset is applied linearly to all reads; therefore it cannot be used to correct any sensor linearity errors.

***Unit of measurement***: The one set with the Unit parameter

***Options***: **-999...999**

### 4.5.11. LO.AL - Lower limit for alarms

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| LO.AL | LOW LIMIT FOR ABSOLUTE ALARMS | I.MAIN | R W |

The parameter shows and sets, the minimum value for setting an alarm.

***Unit of measurement***: The one used for the alarm limit.

***Options***: **-1999...9999**

### 4.5.12. HI.AL - Upper limit for alarms

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| HI.AL | HIGH LIMIT FOR ABSOLUTE ALARMS | I.MAIN | R W |

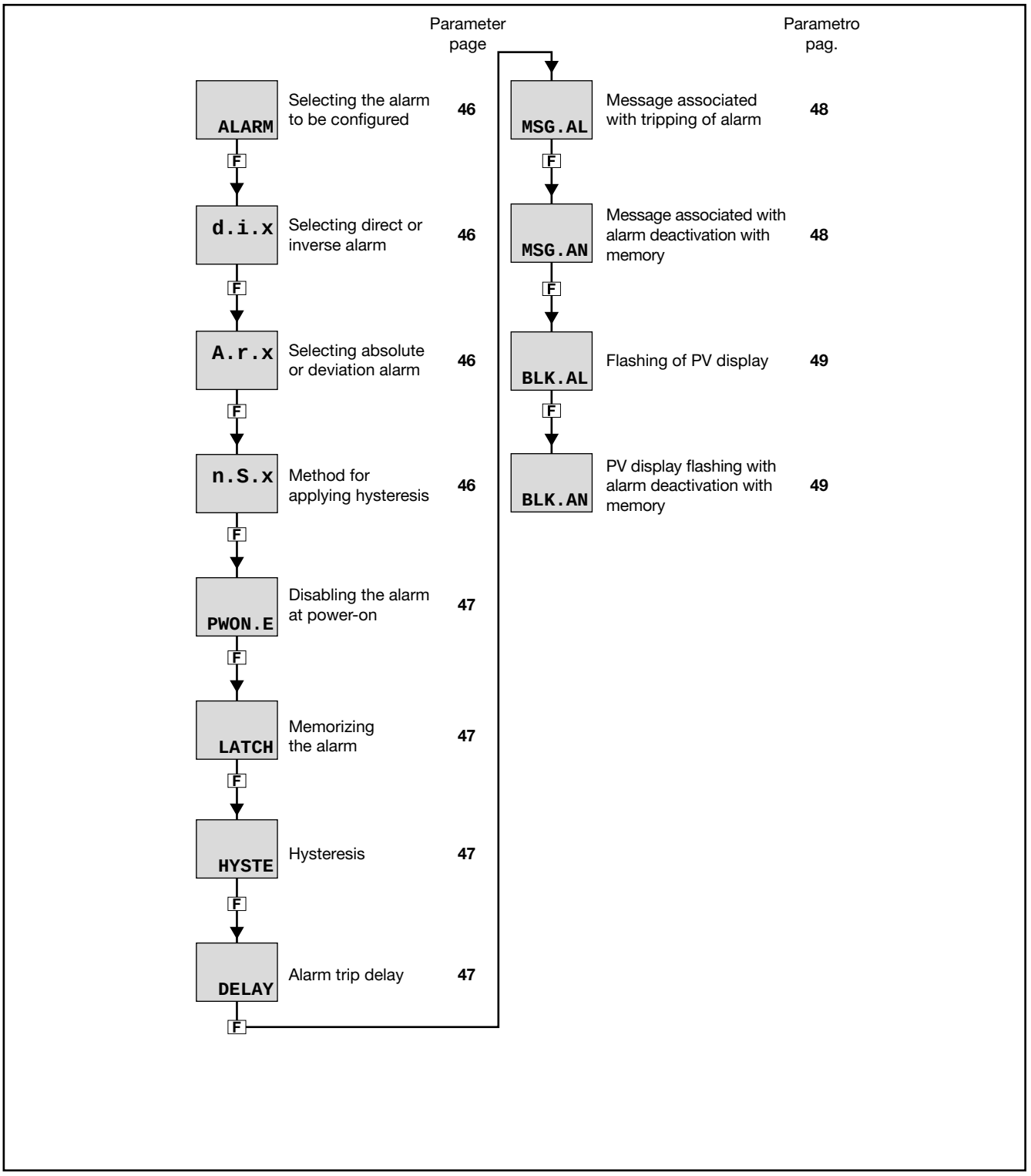
The parameter shows and sets the upper limit for defining alarms, i.e., the maximum value for setting an alarm.

***Unit of measurement***: The one used for the alarm limit.

***Options***: **-1999...9999**

## 4.6. ALARM Submenu - Configuration of alarms

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| ALARM | ALARM CONFIG | Level 1 | Lets you configure the generic alarms. |



### 4.6.1. ALARM - Selecting the alarm to be configured

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| ALARM | ALARM NUMBER | ALARM | R W |

The parameter shows and sets the alarm to be configured, identified by its number.

***Unit of measurement:*** Number

***Options***: **1...ALRM.N** = Identifying number of alarm, where ALRM.N is the total number of alarms, setting by submenu MODE.

### 4.6.2. d.i.x - Selecting direct or inverse alarm

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| d.i.x | DIRECT/INVERSE DEFINITION | ALARM | R W |

The parameter shows and sets the behavior of alarm number “x” with respect to the alarm limit and hysteresis.
Direct or inverse defines when the alarm has to trip. For a detailed explanation of this behavior, see paragraph “5.6.1. Generic alarms AL1...AL4” on page “5.3.1. Generic alarms AL2-4” on page 74.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only DIREC for Alarm 1

***Unit of measurement***: -

***Options***: **DIREC** = Direct alarm
**INVRS** = Inverse Alarm

### 4.6.3. A.r.x - Selecting absolute or deviation alarm

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| A.r.x | ABSOLUTE/DEVIATION DEFINITION | ALARM | R W |

The parameter shows and defines the reference value of alarm number “x” for the alarm limit.
For a detailed explanation of the difference between absolute and deviation, see paragraph “5.6.1. Generic alarms AL1... AL4” on page “5.3.1. Generic alarms AL2-4” on page 74.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only ABSLT for Alarm 1

***Unit of measurement***: -

***Options***: **ABSLT** = Absolute alarm
**RELAT** = Deviation alarm

### 4.6.4. n.S.x - Selecting hysteresis type

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| n.S.x | NORMAL/SYMMETRIC DEFINITION | ALARM | R W |

The parameter shows and sets the method for applying hysteresis for alarm number “x” with respect to the alarm limit value.
With normal, hysteresis is added to / subtracted from the alarm limit(s) based on the general alarm configuration. With symmetrical, hysteresis is added to / subtracted from the alarm limit itself. For a detailed explanation of the difference between normal and symmetrical, see paragraph “5.6.1. Generic alarms AL1...AL4” on page “5.3.1. Generic alarms AL2-4” on page 74.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only NORML for Alarm 1

***Unit of measurement:*** -

***Options:*** **NORML** = Normal alarm
**SYMMT** = Symmetrical alarm (window)

### 4.6.5. PWON.E - Disabling the alarm at power-on

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| PWON.E | DISABLE AT SWITCH ON | ALARM | R W |

The parameter shows and sets the behavior of the alarm (being configured) when the indicator is powered on.
If the parameter is “OFF,” the alarm will trip when the indicator is powered on if the process variable exceeds the alarm setpoint limits.
If the parameter is “On,” the alarm will not trip until the alarm limit value is reached at least once after the indicator is powered on.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only OFF for Alarm 1

ATTENTION! The setpoint can be reached in increment or in decrement, or it may never be reached. Therefore, with “On” the alarm might never trip even if the value of the process variable exceeds the alarm setpoint limits.

**Example – Minimum, inverse and absolute alarm**
When the system is off, the process variable equals room temperature (20 °C). The alarm setpoint is set at 150°C ± 10°C. The indicator powers on with the system.
So with “OFF” the alarm trips as soon as the indicator is powered on because the temperature of the process variable exceeds the alarm setpoint limits.
Instead, with “On” the alarm trips only after the temperature of 150°C is reached at least once for the process variable.

***Unit of measurement:*** -

***Options:*** **OFF** = Alarm enabled at power-on
**On** = Alarm disabled at power-on (until setpoint is reached)

### 4.6.6. LATCH - Set alarm latching

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| LATCH | MEMORY DEFINITION | ALARM | R W |

The parameter shows and sets latching of the alarm being configured.
Latching maintains the active alarm state even after the alarm conditions are eliminated.
The alarm state can be removed by or reset by the digital input, serial input, or key.
Only On or ONnOF settable for ALARM=1

***Unit of measurement***: -

***Options:*** **OFF** = Alarm not latched (for Alarms 2...4 only)
**On** = Alarm latched with status saved even after Power OFF
**OnOF** = The alarm is saved with status deleted after Power OFF

### 4.6.7. HYSTE - Hysteresis

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| HYSTE | HYSTERESIS | ALARM | R W |

The parameter shows and sets the hysteresis applied to the alarm setpoint value for the alarm being configured.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4

***Unit of measurement***: Scale points

***Options***: **0...999** = For absolute (A.r.x = ABSLT) and symmetrical alarm (n.S.x = SYMMT)
**-999...999** = For other types of alarms

### 4.6.8. DELAY - Alarm trip delay

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| DELAY | DELAY OF ACTIVATION | ALARM | R W |

The parameter shows and sets the alarm trip delay for the alarm being configured, i.e., the time that the value of the process variable has to exceed the alarm setpoint for the alarm to trip.
This parameter prevents repeated alarms due to instantaneous and insignificant exceeding of that value or nuisance trips.
If the parameter is set to “0.00” the alarm will be instantaneous, regardless of the time in which the process variable exceeds the alarm setpoint.
For a detailed explanation of this behavior, see paragraph “5.6.1. Generic alarms AL1...AL4” on page “5.3.1. Generic alarms AL2-4” on page 74.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
It is always 0.00 for Alarm 1

***Unit of measurement***: Minutes.seconds

***Options***: **0.00...99.59**

### 4.6.9. MSG.AL - Alarm message

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.AL | SCROLLING MESSAGE AT ALARM ACT | ALARM | R W |

The parameter shows and sets the number of the message associated with tripping of the alarm being configured, i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed when the alarm trips.
The same message number can be assigned to different alarms
The default MSG.AL for Alarm 1 is message “5” (for LANG1 it corresponds to “HIGH ALARM1”, for LANG2 it corresponds to “MAXIMUM ALARM1”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.6.10. MSG.AN - Alarm reset message

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.AN | SCROLLING MESSAGE AT ALARM DISACT | ALARM | R W |

The parameter displays and sets the message number associated with alarm deactivation after an alarm condition was intercepted and left saved (for alarms with latching only).

The parameter only appears if LATCH=On or OnOF.

Further information on scrolling messages are found in paragraph “3.1.2.2. Scrolling messages” on page 34.
When the parameter is set to “0”, no message is displayed when the alarm is deactivated. The same message (number) can be attributed to different alarms.
The default MSG.ACN for Alarm 1 is message “6” (for LANG1 it corresponds to “HIGH ALARM1 PRESS R”, for LANG2 it corresponds to “MAXIMUM ALARM1 PRESS R”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.6.11. BLK.AL - Flashing of PV display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| BLK.AL | BLINK DISPLAY PV DEF | ALARM | R W |

The parameter shows and sets the flashing of the PV display in case of alarm, for the alarm being configured.
If the parameter is “On,” the value shown on the PV display starts to flash in case of alarm.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only On for Alarm 1

***Unit of measurement***: -

***Options***: **OFF** = PV display does not flash in case of alarm
**On** = The PV display flashes in the event of alarm

### 4.6.12. BLK.AN - PV display alarm flashing with alarm reset

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| BLK.AN | BLINK DISPLAY PV DEF AT ALARM DISACT | ALARM | R W |

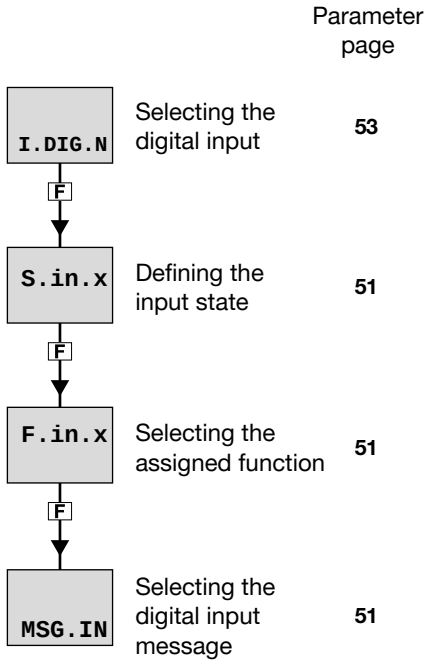
The parameter controls the optional blinking of the PV value display with regard to latched alarms. The parameter sets PV display flashing in the case when the alarm is no longer active, but has been latched from prior triggering, but has not yet been cleared from memory.
If the parameter is “On”, the value displayed on the PV display flashes.
The parameter only appears for ALARM=2, ALARM=3 and ALARM=4.
Only OFF for Alarm 1
The parameter only appears if LATCH=On or OnOF.

***Unit of measurement***: -

***Options***: **OFF** = The PV display does not flash
**On** = The PV display flashes

## 4.7. I.DIGT Submenu – Configuring digital inputs

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| I.DIGT | DIGITAL INPUT CONFIG | Level 2 | Lets you configure the indicator's digital inputs.<br>The menu is present if there are digital inputs. |



### 4.7.1. I.DIG.N - Selecting the digital input

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| I.DIG.N | DIGITAL INPUT NUMBER | I.DIGT | R W |

The parameter shows and sets the identifying number of the digital input to be configured.

***Unit of measurement***: Number

***Options***: **1...5** for model 1250 L with 5 digital inputs option

### 4.7.2. S.in.x - Defining the input state

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| S.in.x | DIGITAL INPUT STATUS | I.DIGT | R W |

The parameter shows and sets the state of the input with identifying number “x”.
The direct digital input is active when there is current in the digital input or the contact is closed.
The inverse digital input is active when there is no current in the digital input or the contact is open.
Digital inputs can be forced so that they are always on or off.

***Unit of measurement***: -

***Options***:
**DIREC** = Direct digital input
**INVRS** = Inverse digital input
**OFF** = Digital input forced off
**ON** = Digital input forced on

### 4.7.3. F.in.x - Selecting the assigned function

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| F.in.x | DIGITAL INPUT FUNCTION | I.DIGT | R W |

The parameter shows and sets the function assigned to the digital input with identifying number “x”.

***Unit of measurement***: -

***Options***:
**NONE** = No assigned function
**AL.ACK** = Reset alarm latches
**FKEY** = Block F key
**PK.RES** = Maximum, minimum and peak-peak reset
**AL.PK.A** = Alarm latch + maximum, minimum peak and peak-peak reset
**TM.AL1** = ALARM1 timer reset
**CN.AL1** = ALARM1 meter reset
**TC.AL1** = ALARM1 timer and meter reset

### 4.7.4. MSG.IN - Selecting the digital input message

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.IN | NUMBER OF SCROLLING MESSAGE AT INPUT ACT | I.DIGT | R W |

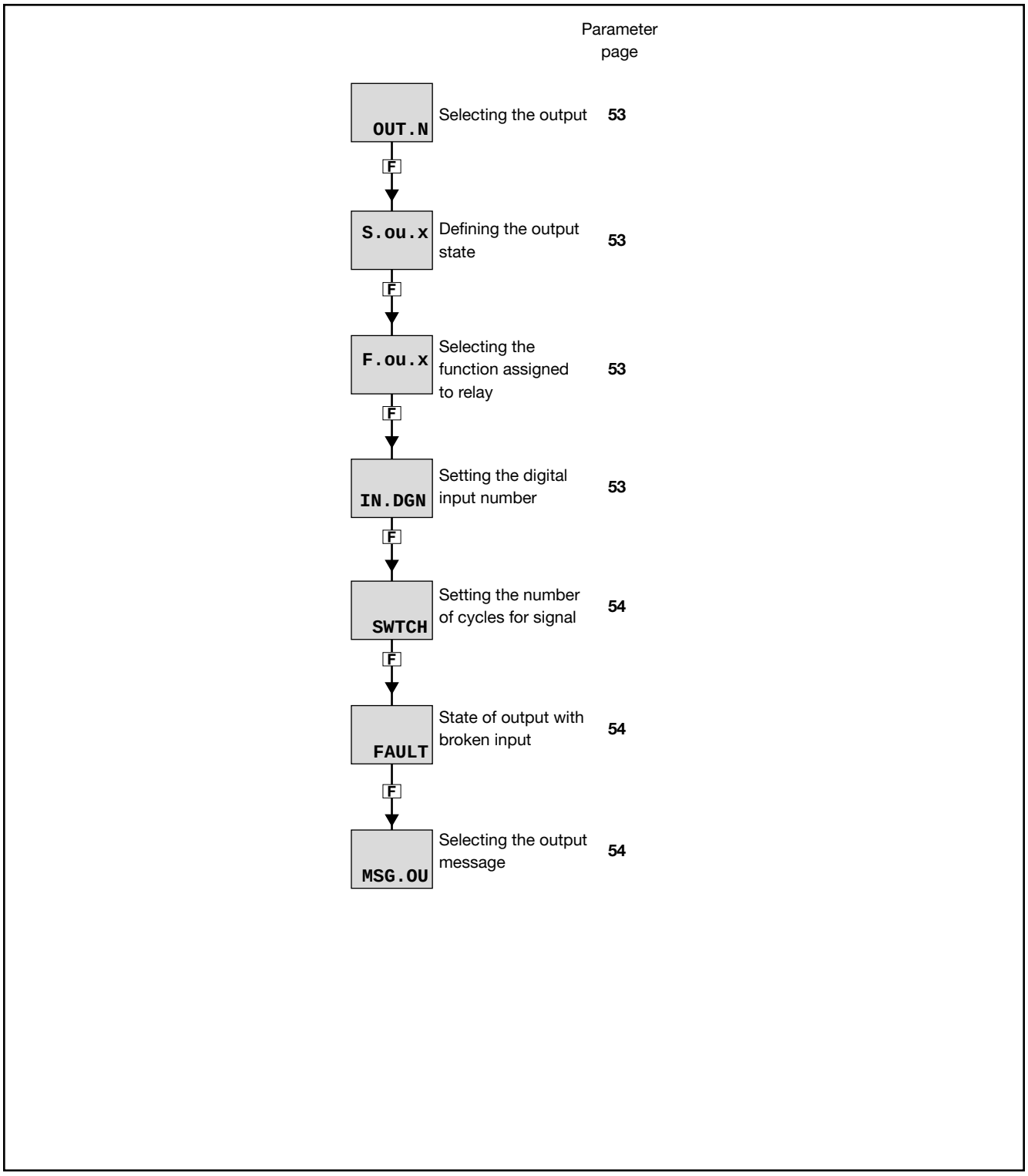
The parameter shows and sets the number of the message assigned to activation of the digital input, i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed when the digital input is activated.
The same message number can be assigned to different inputs.

***Unit of measurement***: Message number

***Options***: **0...25**

## 4.8. OUTPU Submenu – Configuring outputs

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| OUTPU | OUTPUT CONFIG | Level 2 | Lets you configure the indicator outputs. |



### 4.8.1. OUT.N - Selecting the output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| OUT.N | OUTPUT NUMBER | OUTPU | R W |

The parameter shows and sets the identifying number of the output to be configured.

***Unit of measurement***: Number

***Options:*** **1...3**

### 4.8.2. S.ou.x - Defining the output state

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| S.ou.x | DIGITAL OUTPUT STATUS | OUTPU | R W |

The parameter shows and sets the state of the output with identifying number "x".
The active direct output corresponds to the relay, output ON.
The active inverse output corresponds to the relay, output OFF.
The parameter only appears for OUT.N=2 and OUT.N=3.
Only INVRS for OUT.1

***Unit of measurement***: -

***Options***: **DIREC** = Direct output
**INVRS** = Inverse output

### 4.8.3. F.ou.x - Selecting the function assigned to relay, logic or Triac output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| F.ou.x | OUTPUT FUNCTION | OUTPU | R W |

The parameter shows and sets the function assigned to the output with identifying number "x".
The parameter only appears for OUT.N=2 and OUT.N=3.
Only ALRM1 for OUT.1

***Unit of measurement:*** -

***Options***:

| | | |
|---|---|---|
| **NONE** | = | No assigned function |
| **ALRM1** | = | Output for Alarm 1 |
| **ALRM2** | = | Output for Alarm 2 |
| **ALRM3** | = | Output for Alarm 3 |
| **ALRM4** | = | Output for Alarm 4 |
| **OR.12** | = | Alarm 1 OR Alarm 2 |
| **OR.123** | = | Alarm 1 OR Alarm 2 OR Alarm 3 |
| **O.1234** | = | Alarm 1 OR Alarm 2 OR Alarm 3 OR Alarm 4 |
| **AND.12** | = | Alarm 1 AND Alarm 2 |
| **AND.123** | = | Alarm 1 AND Alarm 2 AND Alarm 3 |
| **AND.1234** | = | Alarm 1 AND Alarm 2 AND Alarm 3 AND Alarm 4 |
| *if model with digital inputs:* | | |
| **IN.DIG** | = | Repetition of a digital input |

### 4.8.4. IN.DG.N - Setting the digital input number

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| IN.DG.N | DIGITAL INPUT NUMBER | OUTPU | R W |

The parameter shows and sets the number of the digital input assigned to the output.
The parameter appears if the parameter F.ou.x = IN.DIG.

***Unit of measurement:*** Number

***Options***: **1...5** Model 1250 L with option 5 digital inputs

### 4.8.5. SWTCH - Output cycle limit alarm

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| SWTCH | NUMBER OF SWITCHING CYCLES | OUTPU | R W |

The parameter shows and sets the number of cycles (x1000) of the relay, exceeding which the signal is generated OUTX. SWITCH ALARM where X is the number of output 1 or 2 or 3 or 4 if the output is relay, logic or triac.
The function is disabled if the parameter equals “0”.

***Unit of measurement:*** Number

***Options***: **0...9999**

### 4.8.6. FAULT - State of output with broken input

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| FAULT | FAULT OUTPUT STATE | OUTPU | R W |

The parameter shows and sets the state (on, off) that the output assumes in case of broken input (Err, Sbr, ...), if the output is direct or inverse.

***Unit of measurement***: -

***Options***: **OFF** = Output is off
**On** = Output is on

### 4.8.7. MSG.OU - Selecting the output message

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.OU | NUMBER OF SCROLLING MESSAGE AT OUTPUT ACT | OUTPU | R W |

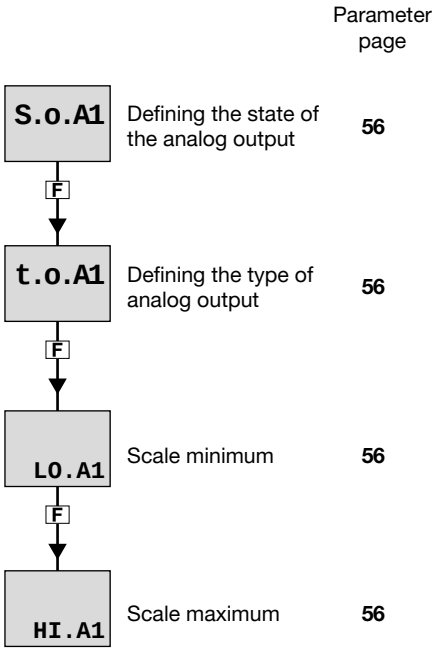
The parameter shows and sets the number of the message assigned to activation of the output, i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed when the output is activated.
The same message number can be assigned to different outputs.

***Unit of measurement***: Message number

***Options***: **0...25**

## 4.9. OUT.AN - Submenu – Configuring the analog retransmission output

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| OUT.AN | ANALOG RETRASMISSION OUTPUT CONFIG | Level 2 | Lets you configure the analog output used for retransmission of analog values.<br><br>The submenu appears if the analog retransmission output is present on the indicator. |



### 4.9.1. S.o.A1 - Defining the signal direction of the analog output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| S.o.A1 | ANALOG OUTPUT STATUS | OUT.AN | R W |

The parameter shows and sets the state of analog retransmission output A1.
The active direct output corresponds to minimum with the minimum output value in voltage or current.
The active inverse output corresponds to minimum with the maximum output value in voltage or current.
The outputs can be forced so that they are always on or off.

***Unit of measurement***: -

***Options***:
**DIREC** = Direct output
**INVRS** = Inverse output
**OFF** = Forced output inactive (minimum voltage or current value)
**ON** = Forced output active (maximum voltage or current value)

### 4.9.2. t.o.A1 - Defining the type of analog output

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| t.o.A1 | ANALOG OUTPUT TYPE | OUT.AN | R W |

The parameter shows and sets the definition of analog output A1.

***Unit of measurement***: -

***Options***:
**20MA** = Output 0...20 mA
**4-20M** = Output 4...20 mA
**10V** = Output 0...10 V
**2-10V** = Output 2...10 V
**C.20MA** = Custom Output 0...20 mA
**C.4-20** = Custom Output 4...20 mA
**C.10V** = Custom Output 0...10 V
**C.2-10** = Custom Output 2...10 V

### 4.9.3. LO.A1 - Scale minimum

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| LO.A1 | LOW LIMIT ANALOG OUTPUT | OUT.AN | R W |

The parameter shows and sets the scale minimum, which corresponds to minimum output value in voltage or current.

***Unit of measurement***: Scale points of quantity assigned to analog output.

***Options***: **-1999...9999**

### 4.9.4. HI.A1 - Scale maximum

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| HI.A1 | HIGH LIMIT ANALOG OUTPUT | OUT.AN | R W |

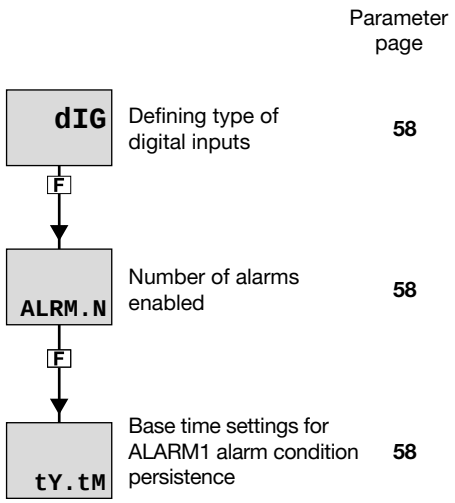
The parameter shows and sets the scale maximum, which corresponds to maximum output value in voltage or current..

***Unit of measurement***: Scale points of quantity assigned to analog output.

***Options***: **-1999...9999**

## 4.10. MODE Submenu – Functionality configuration

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| MODE | FUNCTION MODE MANAGER | Level 2 | Lets you configure the indicator's functioning mode. |



### 4.10.1. dIG - Defining type of digital inputs

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| dIG | DIGITAL INPUT TYPE | MODE | R W |

The parameter shows and sets the type of digital inputs.

***Unit of measurement:*** -

***Options***: **NPN** = NPN digital inputs or dry contact
**PNP** = PNP digital inputs

### 4.10.2. ALRM.N - Number of alarms enabled

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| ALRM.N | NUM OF ENABLE ALARMS | MODE | R W |

The parameter shows and sets the number of alarms enabled.

***Unit of measurement:*** Number

***Options***: **1...4**

### 4.10.3. TY.TM - Base time settings for ALARM1 alarm condition persistence

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| tY.tM | BASE TIME DEFINITION OF ALARM1 TIMER | MODE | R W |

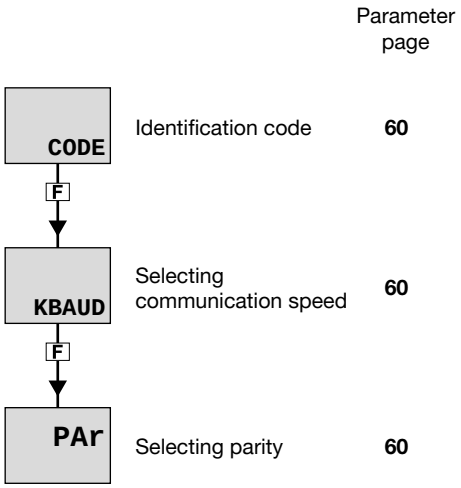
The parameter displays and sets the base times used for ALARM1 alarm condition persistence.

***Unit of measurement:*** -

***Options***: **MM.SS = Base time is calculated and displayed in minutes.seconds**
**HH.MM = Base time is calculated and displayed in hours.minutes**

## 4.11. SERIA Submenu – Configuring serial communication

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| SERIA | SERIAL COMMUNICATION CONFIG | Level 2 | Lets you configure serial communication |



### 4.11.1. CODE - Identification code

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| CODE | INSTRUMENT ID CODE FOR SERIAL COMM | SERIA | R W |

The parameter shows and sets the identifying address of the indicator in a Modbus serial network. Generally should not be set to “1”

***Unit of measurement:*** Number

***Options***: **1...247**

### 4.11.2. KBAUD - Selecting communication speed

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| KBAUD | COMMUNICATION SPEED | SERIA | R W |

The parameter shows and sets the communication speed for the serial port.

***Unit of measurement***: kbaud

***Options***:
**1.2** = 1200 baud
**2.4** = 2400 baud
**4.8** = 4800 baud
**9.6** = 9600 baud
**19.2** = 19200 baud
**38.4** = 38400 baud
**57.6** = 57600 baud
**115.2** = 115200 baud

### 4.11.3. PAr - Selecting parity

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| PAr | PARITY | SERIA | R W |

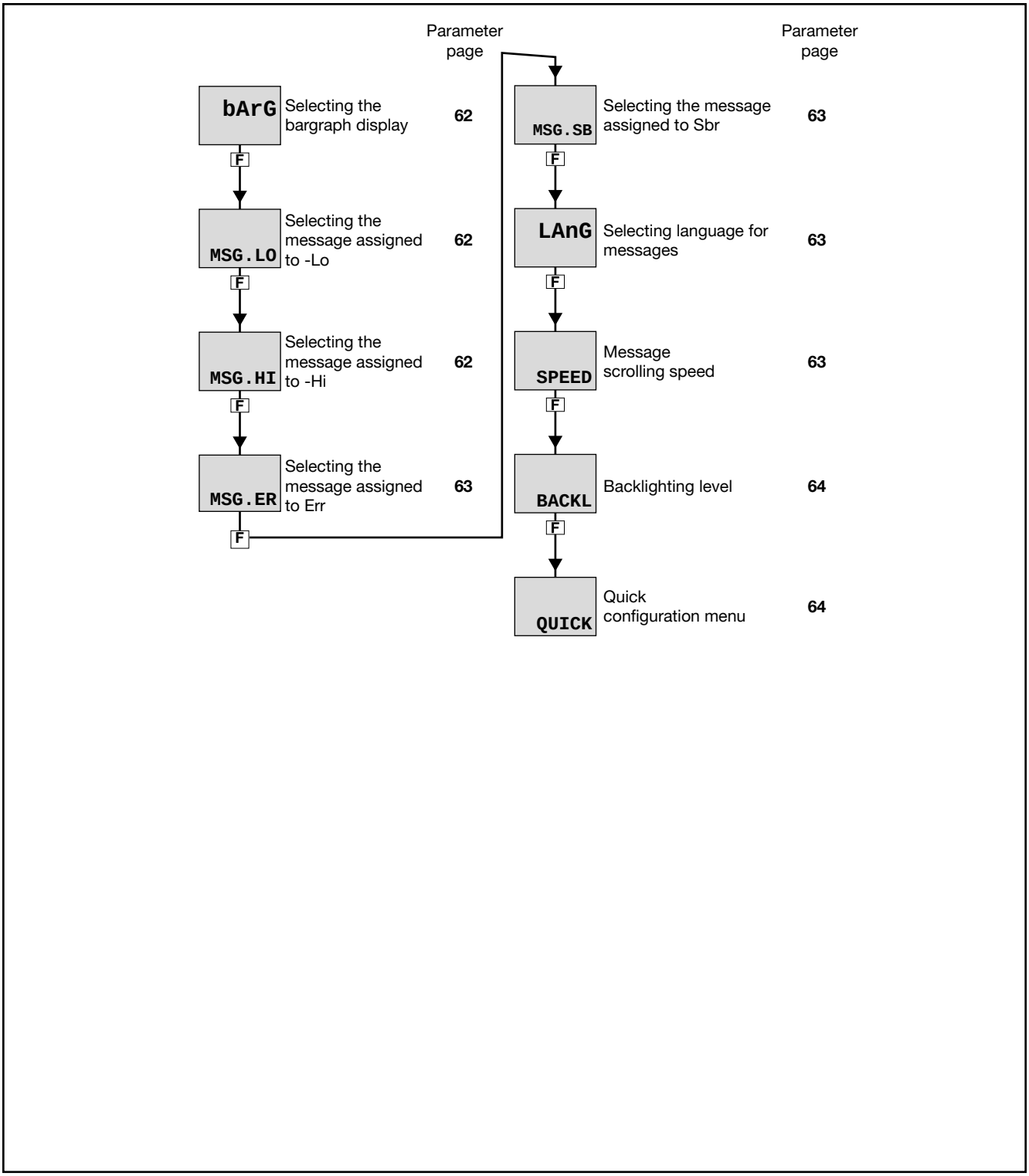
The parameter shows and sets the parity used in serial communication.

***Unit of measurement***: -

***Options***:
**NONE** = No parity
**ODD** = Odd parity
**EVEN** = Even parity

## 4.12. HMI Submenu – Configuring the display and keypad

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| HMI | DISPLAY AND KEYBOARD | Level 2 | Lets you configure the indicator's display and keys |



### 4.12.1. bArG - Selecting the bargraph display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| bArG | BARGRAPH FUNCTION | HMI | R W |

The parameter displays and sets the view associated with the bar graph.
The parameter only appears if the indicator is 1250 L.

***Unit of measurement***: -

***Options***:

**NONE** = No indication (bar graph off)

**AL1-PV** = Deviation between AL1 and PV

The bar graph turns on from the left when the difference is less than 10% of the maximum scale limit associated with the alarm. The bar graph will be fully on when the % difference is less than or equal to zero of the maximum scale limit associated with the alarm

Example:
With 1000 maximum alarm limit:

- the first mark on the bar graph will turn on when AL1-PV<[10% di 1000] => AL1-PV<100
- the second mark on the bar graph will turn on when AL1-PV<[9% di 1000] => AL1-PV<90
- ....
- ....
- the second to last mark on the bar graph will turn on when AL1-PV<[1% di 1000] => AL1-PV<10
- the last mark on the bar graph will turn on when (AL1-PV) is less than or equal to [0% di 1000] => (AL1-PV) less than or equal to 0

### 4.12.2. MSG.LO - -Lo message display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.LO | NUM SCROLLING MSG WHEN MAIN INPUT IS LOW ERR | HMI | R W |

The parameter shows and sets the number of the message assigned to -Lo (process variable < minimum scale limit), i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed for -Lo.

As default, MSG.LO is assigned the message “1” (for LANG1 corresponds to “PROCESS VALUE UNDER LOW LIMIT”, for LANG2 corresponds to “PV AL MINIMO”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.12.3. MSG.HI - -Hi message display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.HI | NUM SCROLLING MSG WHEN MAIN INPUT IS HI ERR | HMI | R W |

The parameter shows and sets the number of the message assigned to -Hi (process variable > maximum scale limit), i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed for -Hi.

As default, MSG.HI is assigned the message “2” (for LANG1 corresponds to ““PROCESS VALUE OVER HIGH LIMIT”, for LANG2 corresponds to “PV SUPERIORE AL MASSIMO”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.12.4. MSG.ER - Err message display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.ER | NUM SCROLLING MSG WHEN MAIN INPUT IS ERR ERR | HMI | R W |

The parameter shows and sets the number of the message assigned to Err (Pt100 in short circuit or input values below minimum limit), i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed for Err.

As default, MSG.ER is assigned the message “3” (for LANG1 corresponds to “INPUT SENSOR FAIL CONNECTION”, for LANG2 corresponds to “ERRATA CONNESSIONE SONDA”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.12.5. MSG.SB - Sbr message display

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MSG.SB | NUM SCROLLING MSG WHEN MAIN INPUT IS SB ERR | HMI | R W |

The parameter shows and sets the number of the message assigned to Err (sensor break in short circuit or input values above maximum limit), i.e., the scrolling message shown on the display.
For more information on scrolling messages, see paragraph “3.1.2.2. Scrolling messages” on page 24.
If the parameter is set to “0” no message will be displayed for Sbr.

As default, MSG.SB is assigned the message “4” (for LANG1 corresponds to ““SENSOR BROKEN”, for LANG2 corresponds to “SONDA APERTA”).

***Unit of measurement***: Message number

***Options***: **0...25**

### 4.12.6. LAnG - Display language

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| LAnG | MESSAGE LANGUAGE | HMI | R W |

The parameter shows and sets the language for the scrolling messages.

***Unit of measurement***: -

***Options***: **LANG1** = Language 1 (English)
**LANG2** = Language 2 (Italian)
**LANG3** = Language 3

### 4.12.7. SPEED - Message scrolling speed

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| SPEED | SCROLLING MESSAGE SPEED | HMI | R W |

The parameter shows and sets the message scrolling speed.
“1” corresponds to maximum scrolling speed, “10” to minimum speed.
With “0” the message does not scroll and the display shows first 5 characters or the first 7 characters (on model 1250).

***Unit of measurement***: -

***Options***: **0...10** (default = 3)

**Note**: Descriptive messages of the parameters always flow at a constant speed.

### 4.12.8. BACKL - Backlighting level

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| BACKL | BACKLIGHT LEVEL | HMI | R W |

The parameter shows and sets the backlight level on the display (when the indicator is on) 10 seconds after the last key has been pressed.
With “0,” the backlight does not switch off, but goes to the minimum useful level for reading the display.
The backlight goes to maximum level when any key is pressed.

***Unit of measurement***: -

***Options***: **0...10** (default = 8)

### 4.12.9. QUICK - Quick configuration menu

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| QUICK | QUICK CONFIG ENABLE | HMI | R W |

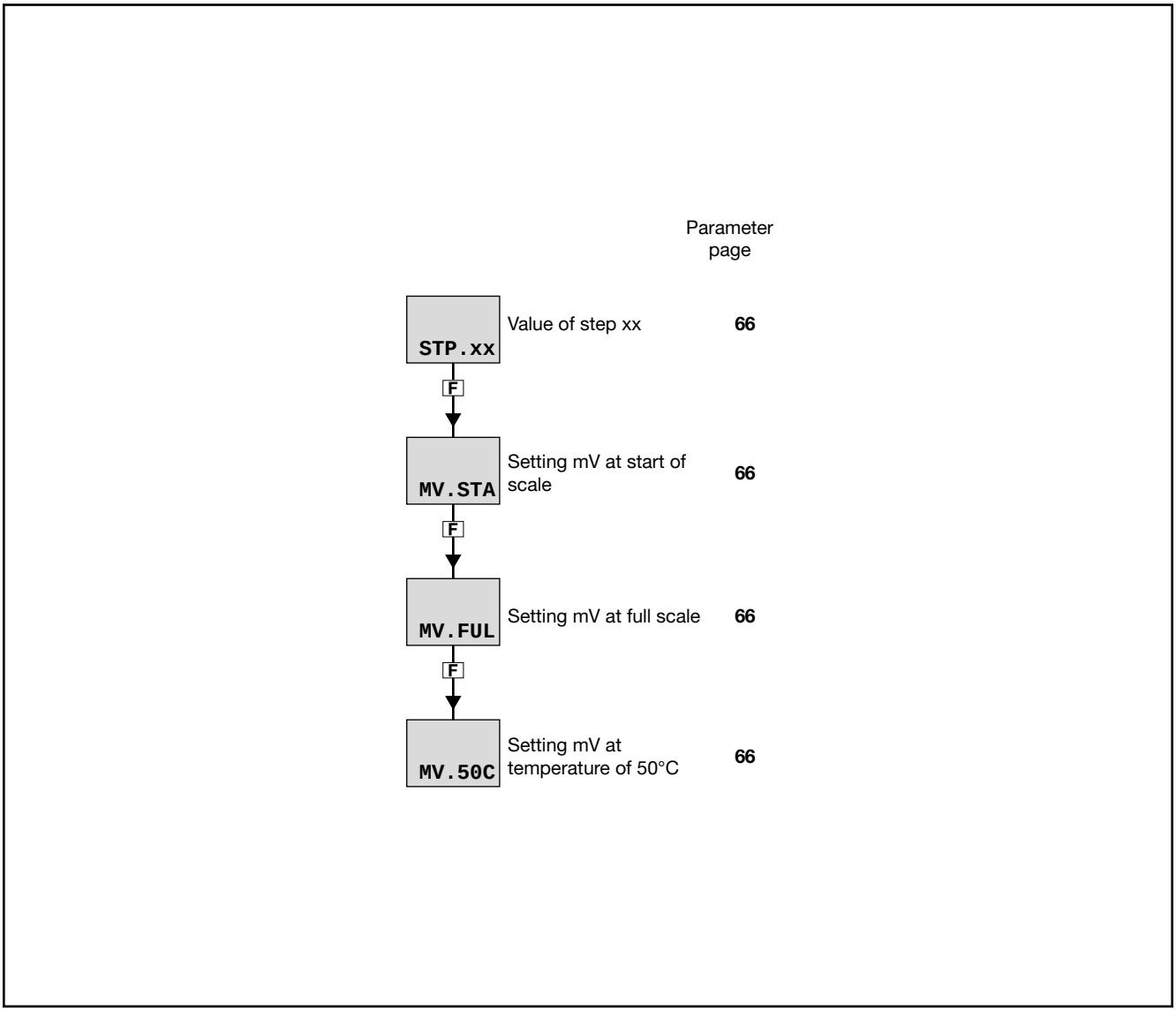
The parameter shows and sets enabling of the quick configuration menu.

***Unit of measurement:*** -

***Options***: **OFF** = Quick configuration menu is not displayed
**On** = Quick configuration menu is displayed

## 4.13. LINRZ Submenu – Configuring custom linearization

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| LINRZ | CUSTOM LINEARIZATION CONFIG | Level 2 | Lets you configure the parameters for custom linearization in 32 steps or 4 points.<br><br>The submenu is visible only if custom linearization was enabled in the configuration of the main input or of the setpoint input.<br>You can set only one linearization, but it can be assigned to the main input, the setpoint input, or both. |



### 4.13.1. STP.xx - Value of step xx

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| STP.xx | CUSTOM LINEARIZATION STEP | LINRZ | R W |

The parameter shows and sets the value of the various steps, with xx from 0 to 32.
The low scale value goes in STP.00 and the full-scale value in STP.32.

The value of the nth step corresponds to the input: mV start scale + n*ΔmV con ΔmV = (mV full scale - mV start scale)/32.

***Unit of measurement***: Scale points

***Options***: **-1999...9999**

### 4.13.2. MV.STA - Setting mV at start of scale

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MV.STA | MV START SCALE | LINRZ | R W |

The parameter shows and sets the value in millivolts at start of scale if the input is a thermocouple.

***Unit of measurement***: mV

***Options***: **-19.99...99.99**

### 4.13.3. MV.FUL - Setting mV at full scale

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MV.FUL | MV FULL SCALE | LINRZ | R W |

The parameter shows and sets the value in millivolts at full scale if the input is a thermocouple.

***Unit of measurement***: mV

***Options***: **MV.STA + 1...99.99**

### 4.13.4. MV.50C - Setting mV at temperature of 50 °C

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| MV.50C | MV AT 50 ‘C | LINRZ | R W |

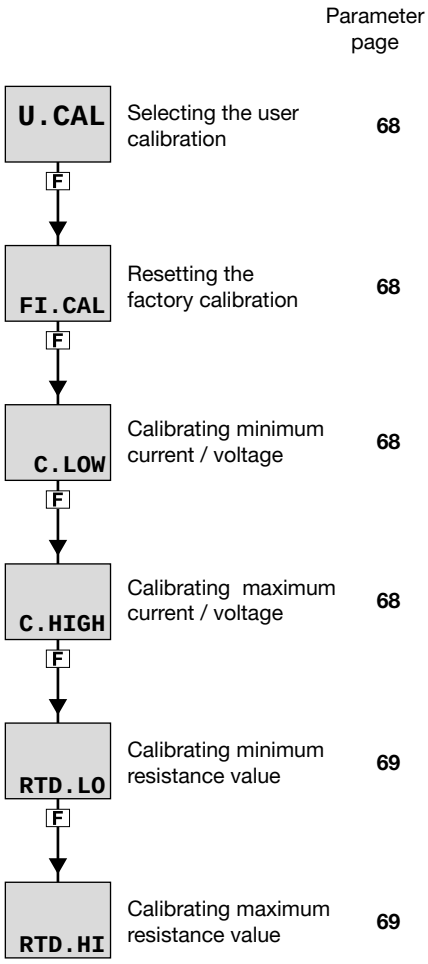
The parameter shows and sets the value in millivolts at 50°C if the input is a thermocouple.

***Unit of measurement***: mV

***Options***: **-1.999...9.999**

## 4.14. US.CAL Submenu – User calibrations

| Acronym | Scrolling message | Password | Description |
|---|---|---|---|
| US.CAL | USER CALIBRATION MANAGER | Level 2 | Lets the user calibrate the indicator with regard to Custom main input, HB alarm setpoints, energy reset, and partial day count. |



### 4.14.1. U.CAL - Selecting the user calibration

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| U.CAL | USER CALIBRATION TYPE | US.CAL | R W |

The parameter shows and sets the parameter, input or output to which calibration will be applied.

***Unit of measurement***: -

***Options***:
**NONE** = No calibration
**P.DAYS** = Reset partial day count
**I.MAIN** = Calibration of custom main input (selected with parameter tyPE on I.MAIN menu)
**OUT.A1** = Custom re-transmission output calibration (selected with parameter t.o.A1 in menu OUT.AN)

### 4.14.2. FI.CAL - Resetting the factory calibration

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| FI.CAL | FACTORY CALIBRATION | US.CAL | R W |

The parameter shows and sets resetting of the factory calibration.
This operation can be done only for inputs and outputs, if U.CAL corresponds to I.MAIN, OUT.A1.

***Unit of measurement***: -

***Options***:
**NO** = Keep user calibration
**YES** = Reset factory calibration

### 4.14.3. C.LOW - Calibrating minimum current / voltage

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| C.LOW | | US.CAL | R W |

The parameter appears if you are calibrating a custom I.MAIN input in current or voltage.
To calibrate:
- apply the current or voltage value corresponding to minimum scale value to the selected input;
- press the F key to acquire the calibration value.

***Unit of measurement***: -

***Options***: -

### 4.14.4. C.HIGH - Calibrating maximum current / voltage

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| C.HIGH | | US.CAL | R W |

The parameter appears if you are calibrating a custom I.MAIN input in current or voltage.
To calibrate:
- apply the current or voltage value corresponding to maximum scale value to the selected input;
- press the F key to acquire the calibration value.

***Unit of measurement***: -

***Options***: -

### 4.14.5. RTD.LO - Calibrating minimum resistance value

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| RTD.LO | | US.CAL | R W |

The parameter appears if you are calibrating a custom I.MAIN RTD input.
To calibrate:
- apply a resistance corresponding to minimum scale value to the main input (for example, 18.52 Ω for Pt100 ;
- press the F key to acquire the calibration value.

***Unit of measurement***: -

***Options***: -

### 4.14.6. RTD.HI - Calibrating maximum resistance value

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| RTD.HI | | US.CAL | R W |

The parameter appears if you are calibrating a custom I.MAIN RTD input.
To calibrate:
- apply a resistance corresponding to maximum scale value to the main input (for example, 390.48 Ω for Pt100);
- press the F key to acquire the calibration value.

***Unit of measurement***: -

***Options***: -

### 4.14.7. C.LO - Setting analog output minimum

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| C.LO | | US.CAL | R W |

The parameter shows and sets the minimum analog output value.
You can change the displayed value with the △ and ▽ keys.
To check the real voltage/current value on the output during calibration, measure it with a voltmeter/ammeter.

***Unit of measurement***: Converter points

***Options***: **0...65535**

### 4.14.8. C.HIG - Setting analog output maximum

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| C.HIG | | US.CAL | R W |

The parameter shows and sets the maximum analog output value.
You can change the displayed value with the △ and ▽ keys.
To check the real voltage/current value on the output during calibration, measure it with a voltmeter/ammeter.

***Unit of measurement***: Converter points

***Options***: **0...65535**

## 4.15. PASC0 – Setting level 0 password

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| PASC0 | SET PASS0 | Level 2 | R W |

The parameter is used to set the password to access User Menu parameters.
Default code = 10

***Unit of measurement***: Number

***Options***: **0...9999**

## 4.16. PASC1 - Setting level 1 password

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| PASC1 | SET PASS1 | Level 2 | R W |

The parameter lets you set the password for accessing level 1 configuration submenus.
Default code = 1

***Unit of measurement***: Number

***Options***: **0...9999**

## 4.17. PASC2 - Setting level 2 password

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| PASC2 | SET PASS2 | Livello 2 | R W |

The parameter lets you set the password for accessing level 2 configuration submenus.
Default code = 2

***Unit of measurement***: Number

***Options***: **0...9999**

## 4.18. FI.CFG - Entering the reset code

| Acronym | Scrolling message | Submenu | Attributes |
|---|---|---|---|
| FI.CFG | ENTER DEFAULT CONFIGURATION PASS | Livello 2 | R W |

The parameter lets you set the code for resetting the indicator to factory configuration, which will delete all changes made.
Default code: 99.

ATTENTION! After you have set code 99, when you press the **F** key the indicator runs the Power-on procedure, as described in paragraph “3.2. Power-on sequence” on page 24.”

***Unit of measurement***: Number

***Options***: **0...9999**

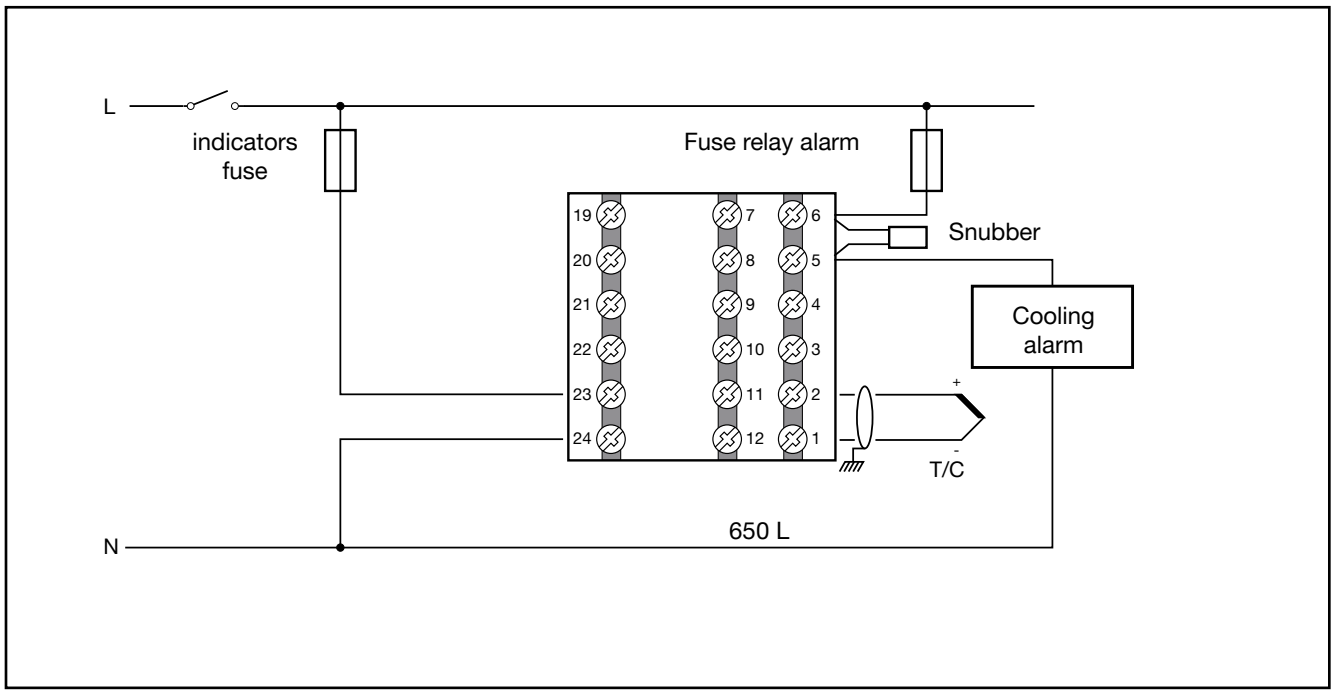
# 5. EXAMPLES AND APPLICATION NOTES

## 5.1. Control application

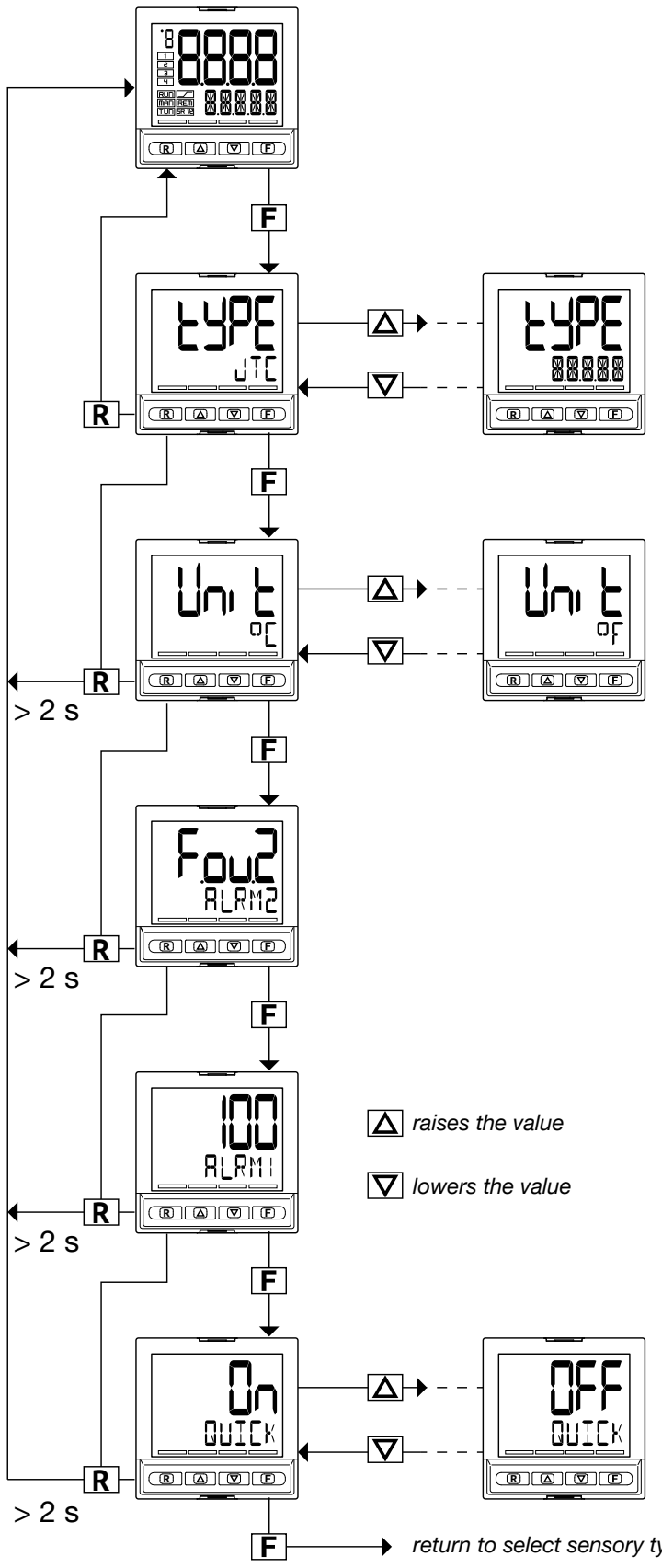
A TC measures temperature. Each branch of the circuit is protected by a fuse and the alarm relay is protected with a snubber circuit. Keep in mind one switch can control multiple indicators.
The diagram below shows the various connections.

With Quick Configuration you set:
- sensor type (TC);
- engineering units of temperature (°C);
- the temperature value that trips the alarm (ALRM1).

### 5.1.1. Connection diagram



### 5.1.2. Quick configuration procedure for model 650L - R-RR0-00000-1-G



## 5.2. 4-point input correction

The 4-point input correction lets you correct the reading of the main input and/or of the remote setpoint input by setting four values: A1, B1, A2 and B2.
To enable the function, set parameter Lin to 4.POIN (I.MAIN menu).

The limitations are:
- B1 must always be larger than A1;
- B1-A1 must be 25% larger than the full scale of the selected sensor.

The setting is limited to the preset scale LO.SCL... HI.SCL on the I.MAIN menu. The offset function (parameter OF. SCL, I.MAIN menu) remains active.

By using this function for linear scales (60 mV, 1 V, 5 V, 10 V, 20 mA) you can invert the scale.
The four values are set on the LINRZ menu as follows:
- A1 = STP.00
- B1 = STP.01
- A2 = STP.02
- B2 = STP.03

**Example**
*Select Pt100 input with Lin = 4.POIN to obtain an RTD sensor with 4-point input correction.*

Input Pt100 with:
- Lin = 4.POIN (Pt100 natural scale -200...850),
- DEC.P = 0
- LO.SCL = 0
- HI.SCL = 400

The reference points on the real curve (input) are:
- A1 = STP.00 = 50,
- B1 = STP.01 = 350,

B1-A1 = 300, which is larger by 212,5 (25% of 850).

The corresponding points on the corrected curve (indication) are:
- A2 = STP.02 = 120,
- B2 = STP.03 = 220.

With the corrected curve an input value of 200 is displayed as 170.

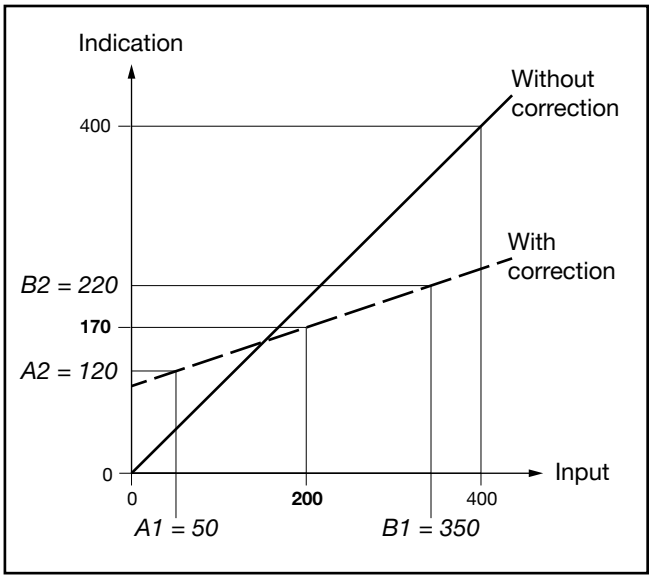
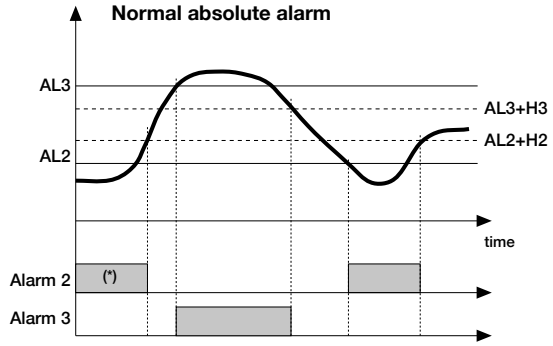



Figure 14 - Diagram of 4-point input correction, for the example (Pt100 input)

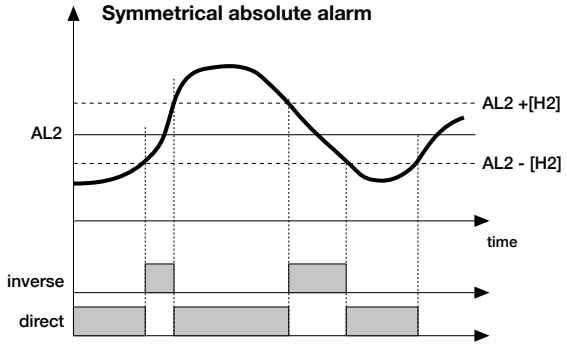
## 5.3. Alarms

### 5.3.1. Generic alarms AL2-4

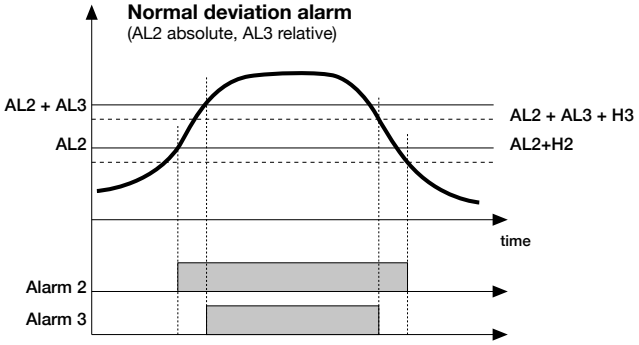
Note: AL1 is latched and only used for high limit control. Reset is required



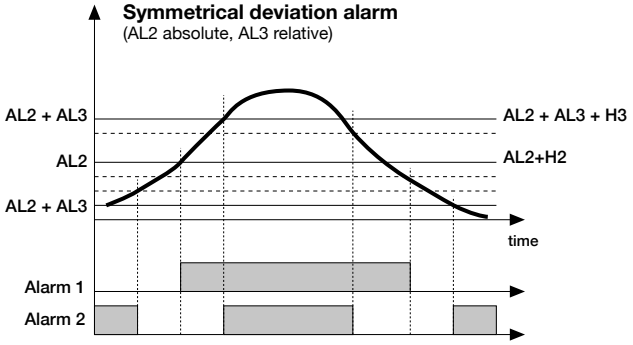

For AL2 inverse absolute alarm (min.) with positive H2, A2 t = 1
(*) = OFF if disabling on power-on exists
For AL3 direct absolute alarm (max) with negative H3, A3 t = 0




For AL2 inverse absolute, symmetrical alarm with hysteresis H2, A2 t = 5
For AL2 direct absolute, symmetrical alarm with hysteresis H2, A2 t = 4




For AL2 direct absolute alarm (max) with negative H2, A2 t = 0
For AL3 direct relative alarm (max) with negative H3, A3 t = 2




For AL2 direct absolute alarm (max) with negative H2, A2 t = 0
For AL3 symmetrical deviation alarm H3, A3 t = 6

# 6. PROGRAMMING WITH PC

## 6.1. Indicator-PC connection

The indicator has a port to connect the device to a PC.
The following photos show where the port is located on the different models.

The connection requires a special accessory cable (code F060800), which acts as a USB-serial interface/converter and communicates as a Virtual COM Port with a USB port on the computer.

**Attention!** To use this interface you have to install the VCP driver, downloadable from:
**www.gefran.com/en/products/261-gf_express**

When the indicator is connected to the PC you can configure it without applying power.
The instrument configuration memory is powered by the USB connection.
Connecting the indicator to the primary power supply while the USB cable is still connected DOES NOT activate normal Power-on. You must first disconnect the indicator from the PC and then apply primary power.

**Note**: Leaving the USB connected to the PC while the indicator is booting up with cause the unit to fail to boot. The cable must be disconnected when powering on the unit.

## 6.2. Programming Tool

### 6.2.1. GF_eXpress

The GF_eXpress software lets you:
- read and write the configuration of the indicator (set of parameters);
- save recipes on the PC (recipe archive);
- set the user configuration menu sequence and parameters;
- set message strings (3 selectable languages);
- transfer firmware updates.

The software is available on CD-ROM (code F043958).
The program can be updated automatically from www.gefran.com.

#### 6.2.1.1. System requirements

| | Minimum | Recommended |
|---|---|---|
| **Operating system** | Windows XP SP2 or Windows Vista or Windows 7 (32 bit) | Windows 7 (64 bit) |
| **Processor** | Intel Pentium 1 GHz | Intel Core i5 2,5 Ghz or higher |
| **RAM** | 2 GB | 4 GB or higher |
| **Free space on Hard Disk** | 2 GB | 4 GB or higher |
| **Resolution** | XGA (1024 x 768 pixel) | SXGA (1280 x 1024 pixel) or higher |
| **Browser** | Microsoft Internet Explorer 8.0 | Microsoft Internet Explorer 9.0 or higher |
| **Serial port** | RS232 | RS232 |
| **DVD reader** | Yes | Yes |
| **USB port** | 1 USB 2.0 | 1 USB 2.0 |

# 7. OPERATOR GUIDE

## 7.1. Displays and keys

The display and keys for each model are described in paragraphs “1.3.1. Display and keys 650 L” on page 8 for the 650 L, “1.4.1. Display and keys 1250 L” on page 10 for the 1250 L.

### 7.1.1. Navigating the menus

Keys are used for navigating menus and submenus, changing parameters, and confirming choices.
Their function depends on the context and on how long they are pressed.

The LEDs above the keys not only give confirmation that each key has been pressed (by flashing), but also show which keys can be used in each situation.

The following navigation functions are assigned to the keys:

**F** Scroll User Configuration menu (Setpoint, Alarm setpoints, Control output, etc.).
Each time the key is pressed, it confirms the value of the displayed parameter and goes to the next item on the menu.
Keep the key pressed for more than 2 seconds to enter the Programming/Configuration Menu.

**R** Each time the key is pressed, you go back to the previous menu item or to the higher menu level, according to the context.
Keep the key pressed for more than 2 seconds to return to the Home page.

Press the key to enter a submenu or to lower the displayed parameter value, according to the context.

Press the key to raise the value of the displayed parameter.

When the process variable is displayed, if held down for at least 3 seconds in standard configuration the R mutes alarms.

## 7.2. Power-on

The indicator runs a self-diagnostics test immediately after power-on.
During the test all segments of the display flash and a checksum is run.
The hardware resources present are also acquired.

If the self-diagnostics test detects no errors, the indicator enters normal functioning state (display shows Home page).

If any system errors are detected, the indicator displays the related information.
If the error is caused by a damaged program, update the firmware.
If the error is caused by incorrect configuration, reconfigure the indicator with PC and GF_eXpress software.

Errors are saved in a register and can be displayed with the Error function on the INFO menu.

## 7.3. Operation as indicator

The device’s normal operating mode is indicator-only.

The display shows the following information:
- PV displays the process variable value;
- SV displays alarm 1 limit value
- by pressing the F key the PV display shows, in sequence the significant values that condition indicator function:, alarm setpoints, etc., which can be changed if necessary (parameters in the user menu).

Keep the F key pressed for more than 2 seconds to enter the Programming/Configuration menu.

## 7.4. Errors during operation

If errors occur during normal operation, the display shows:
• the identifying code of the error on the PV display;

If provided during configuration of the indicator, a specific scrolling message appears on the SV display (model 650 L) or on the F display (model 1250 L).

The most common error messages are:

**-Lo** Process variable is below minimum scale limit (parameter LO.SCL on I.MAIN).

**-Hi** Process variable is above maximum scale limit (parameter HI.SCL on I.MAIN).

**Err** PT100 in short circuit or input values below minimum limits (for example, thermocouple with incorrect connection) or 4...20 mA transmitter broken or not powered.

**Sbr** Sensor broken or input values above maximum limit.

## 7.5. Configuration (User menu)

Every operator has a freely accessible menu (no password required) on which he can configure indicator parameters.

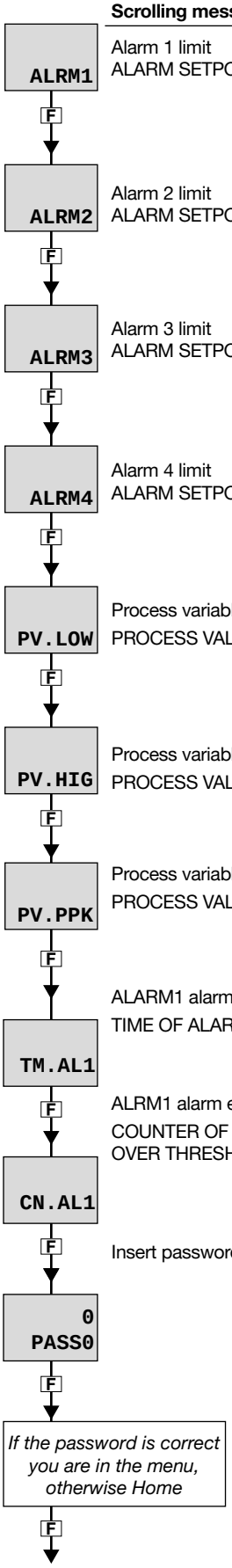
The User Configuration menu can be customized with the GF_express software, grouping up to 50 parameters from those available for indicators configuration (see chapter “4. Configuration” on page 30).

Among the parameters available are PASS0 and PASS1; you can add password entry to the user menu. In the example (p. 81) a password entry is used to allow alarms settings to be changed.

The indicator leaves the factory with a preconfigured user configuration menu (shown below for models 650L-x-xxx-00000-x-xxx and 1250L-x-xxx-00000-x-xxx). This menu can subsequently be modified. The related parameters are shown for models with options; the complete list of parameters is shown on the GF_eXpress user menu page.

Press the F key to access the User Configuration menu. GF_eXpress can be used to set the time delay before returning the menu to Home when no user activity is detected.

Example Menu user parameter PASS 1
Display / setting of alarm thresholds are subject to setting




| Description/ Scrolling message | Unit of measurement | Valid values | Note |
|---|---|---|---|
| Alarm 1 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL | Read-only value |
| Alarm 2 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | Read-only valuey<br>If absolute alarm.<br>If deviation alarm. |
| Alarm 3 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | Read-only value<br>If absolute alarm.<br>If deviation alarm. |
| Alarm 4 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | Read-only value<br>If absolute alarm.<br>If deviation alarm. |
| Process variable minimum peak value<br>PROCESS VALUE MINIMUM PEAK | scale points | LO.SCL…HI.SCL | Read-only value<br>Reset by holding down △ + ▽ for a time > 2 seconds (**) or digital input function |
| Process variable maximum peak value<br>PROCESS VALUE MAXIMUM PEAK | scale points | LO.SCL…HI.SCL | Read-only value<br>Reset by holding down △ + ▽ for a time > 2 seconds (**) or digital input function |
| Process variable maximum peak value<br>PROCESS VALUE PEAK-PEAK | scale points | LO.SCL…HI.SCL | Read-only value<br>Reset by holding down △ + ▽ for a time > 2 seconds (**) or digital input function |
| ALARM1 alarm condition persistence (*)<br>TIME OF ALARM1 OVER THRESHOLD | mm.ss or hh.mm (see parameter tY.tM) | 00.00…99.59 | Read-only value |
| ALRM1 alarm event count (*)<br>COUNTER OF ALARM1 OVER THRESHOLD | - | 0…9999 | Read-only value |
| Insert password 0 | | | |

PASS 1

| | Description/ Scrolling message | Unit of measurement | Valid values | Notes |
|---|---|---|---|---|
| ALRM1 | Alarm 1 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL | |
| ALRM2 | Alarm 2 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | If absolute alarm.<br>If deviation alarm. |
| ALRM3 | Alarm 3 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | If absolute alarm.<br>If deviation alarm. |
| ALRM4 | Alarm 4 limit<br>ALARM SETPOINT | scale points | LO.AL...HI.AL<br>-999...999 | If absolute alarm.<br>If deviation alarm. |
| TM.AL1 | ALARM1 alarm condition persistence (*)<br>TIME OF ALARM1 OVER THRESHOLD | mm.ss or hh.mm (see parameter tY.tM) | 00.00…99.59 | Read-only value<br>Reset by holding down △ + ▽ for a time > 2 seconds (**) or digital input function |
| CN.AL1 | ALRM1 alarm event count (*)<br>COUNTER OF ALARM1 OVER THRESHOLD | - | 0…9999 | Read-only value<br>Reset by holding down △ + ▽ for a time > 2 seconds (**) or digital input function |

*Home page*

(*) the value is saved when the instrument is turned off
(**) Key reset can be inhibited using the Read-only option in the user menu definition from GF_eXpress

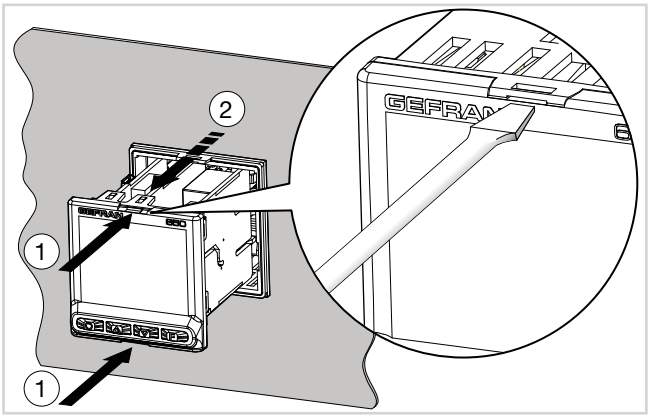
# 8. MAINTENANCE

**Attention!** The indicator must only be repaired by technicians trained and authorized by Gefran. Any attempt by unauthorized personnel to repair or change the hardware characteristics of the indicator will void the warranty.

## 8.1. Replacing the indicator

The instrument (display + electronic circuits) can be replaced without having to remove the entire indicator from the panel and disconnect its wiring.

First remove power to the indicator and to any devices connected to it.
Then release the top and bottom of the faceplate and remove the instrument (see figure).
Insert the new instrument and restore power.




**Attention!** Replace the entire indicator if the blade contacts inside the instrument or the protective case show evidence of burns or are not in perfect condition.

## 8.2. Replacing the gasket

The gasket may lose resiliency over time and due to environmental conditions.

To maintain IP65 faceplate protection, replace the gasket (between faceplate and case and between case and panel) at regular intervals.

To replace the gasket between the case and the panel you have to disassemble the indicator from the panel and then reassemble it; to replace the gasket between the faceplate and the case, follow the instructions for replacing the indicator).

## 8.3. Cleaning

To clean the faceplate and the case, use only a soft cloth dampened with water or alcohol. DO NOT use hydrocarbon solvents (trichloroethylene, gasoline, etc.).

Do not use compressed air to remove dust from the electronic cards. If necessary, use a clean brush with soft bristles.

You can also clean the inside of the indicator if necessary.
To do this, first remove power to the indicator and to any devices connected to it.
Then slide out the indicator as explained in paragraph ”8.1. Replacing the indicator” to access and clean the inside of the case “8.1. Replacing the indicator” on page 81).

## 8.4. Disposal

The 650 L, 1250 L indicators must be disposed of in conformity to current laws and regulations.

If not correctly disposed of, some of the components used in the devices may harm the environment.

# 9. TECHNICAL DATA

| *OPERATOR INTERFACE* | | *650 L* | *1250 L* |
|---|---|---|---|
| **DISPLAY** | Type | LCD black background | |
| | Screen area (L x H) | 35×30 mm (1.38” x 1.18”) | 37×68 mm (1.46” x 2.68”) |
| | Lighting | Backlit with LEDs, life > 40.000 hours @ 25 °C<br>* with brightness level BACKL=0.8 | |
| | PV Display | Number of digits: 4 to 7 segments, with decimal point<br>Digit height: 17 mm<br>Color: white or “custom” | |
| | SV Display | Number of digits: 5 to 14 segments, with decimal point<br>Digit height: 7.5 mm (0.29”)<br>Color: green or “custom” | Number of digits: 4 to 7 segments, with decimal point<br>Digit height: 14 mm<br>Color: green or “custom” |
| | F Display | | Number of digits: 5 to 14 segments, with decimal point<br>Digit height: 9 mm<br>Color: ambra or “custom” |
| | Engineering units | Selectable, °C, °F or custom [1]<br>Color: same as PV display | |
| | Alarms state signals | Number: 4 (1, 2, 3, 4)<br>Color: red | |
| | Bargraph indicator, configurable | | Type: graphic bargraph,11 segments<br>Deviation between AL1 and PV |
| **KEYPAD** | | Keys number: 4, silicone ( R, INC,DEC,F)<br>Type: mechanical | |

1) Programming is done with the GF_eXpress configuration program.

| *INPUTS* | | *650 L* | *1250 L* |
|---|---|---|---|
| **MAIN INPUT** | Sensor type | TC, RTD (PT100, JPT100), infrared sensor (only for 1250L), DC linear sensor | |
| | Accuracy | **TC inputs:**<br>Calibration accuracy: < +/- (0.25% of reading value in °C +0.1°C)<br>Linearization accuracy: 0.1% of reading value<br>Cold junction accuracy: < +/- 1.5°C a 25°C room temperature)<br>Cold junction compensation: > 30:1 rejection to the change of the room<br>**RTD input:**<br>Calibration accuracy: < +/- (0.15% of reading value in °C +0.4°C)<br>Temperature drift: < +/- (0.005% of reading value in °C +0.015°C )/°C from 25°C room temperature<br>Linearization accuracy: 0.1% of reading value<br>**Linear inputs:**<br>Calibration accuracy:< 0.1% full scale<br>Temperature drift: < +/- 0.005% full scale /°C at 25°C room temperature | |
| | Sampling time | 60 ms / 120 ms, selectable | |
| | Digital filter | 0.0...20.0 s | |
| | Temperature unit of measurement | Degrees C / F, selectable from keypad | |
| | Signal interval | Type: linear<br>Scale: -1999...9999, settable decimal point | |
| | TC (thermocouple) input | Thermocouple: J, K, R, S, T, C, D, B, E, L, L GOST, U, G, N, Pt20Rh-Pt40Rh<br>Linearization: ITS90 or custom | |
| | RTD (resistance thermometer) input | Resistance thermometer: PT100, JPT100<br>Input impedance (Ri): ≥ 30 kΩ<br>Linearization: DIN 43760 or custom<br>Max. line resistance: 20 Ω | |
| | DC linear input | 0...60 mV input impedance (Ri): > 70 kΩ<br>0...1 V input impedance (Ri): > 15 kΩ<br>0...5 V / 0...10 V input impedance (Ri): > 30 kΩ<br>0/4...20 mA input impedance (Ri): 50 Ω<br>Linearization: linear or custom | |
| **DIGITAL INPUTS** | Type | voltage dry contact, or<br>NPN 24 V - 4.5 mA, or<br>PNP 12/24 V - max 3.6 mA<br>*(for detail see electrical connections)* | |
| | Isolation | 500 V | |
| | Number | 1 max | 5 max |

| *OUTPUTS* | | *650 L* | *1250 L* |
|---|---|---|---|
| | Relay (R) | Number: 4 max<br>Type of relay contact: NO<br>Max. current: 5 A, 250 VAC | Number: 4 max<br>Type of relay contact: NO<br>Max. current: 5 A, 250 VAC / 30 VDC, cosφ = 1 |
| | | Minimum load: 5 V, 10 mA<br>Life cycle: > 100,000 operations<br>Double isolation | |
| | Analog retransmission (A1) | Number: 1 max<br>0...10 V, max 20 mA, $R_{out}$: > 500 Ω<br>0...20 mA, 4...20 mA, $R_{out}$: < 500 Ω<br>Resolution: 12 bit<br>Isolated from main input | |
| **ALARMS** | Number of alarm functions | 4 max, assignable to an output | |
| | Possible configurations | Maximum, minimum, symmetric, absolute/relative, exclusion at firing, memory, reset from keypad and/or contact, | |

## 9. TECHNICAL DATA

| *CONTROL FUNCTIONS* | | *650 L* | *1250 L* |
|---|---|---|---|
| **DIAGNOSTIC** | | Short circuit or open circuit | |
| **RETENTIVE MEMORY** | Type | EEPROM | |
| | Max. number of writes | 1,000.000 | |
| ***SERIAL INTERFACE*** | | ***650 L*** | ***1250 L*** |
| | | Type: RS485<br>Baudrate: 1200, 2400, 4800, 9600, 19.200, 38.400, 57.600,115.200 bit/s<br>Protocoll: MODBUS RTU<br>Isolated from main input | |

1) Programming is done with the GF_eXpress configuration program.

| *GENERAL DATA* | | *650 L* | *1250 L* |
|---|---|---|---|
| **POWER SUPPLY** | Operating voltage | 100...240 VAC/VDC ±10%, 50/60 Hz<br>(on request 20...27 VAC/VDC ±10%) | |
| | Power dissipation | 5 W max | 10 W max |
| | Protections | Overvoltage 300 V / 35 V | |
| | Connection | Screw terminals and crimp connector, max. wire section 1 $mm^2$ | |
| **CONNECTIONS** | Serial configuration port (for USB connection) | Connector: microUSB | |
| | Inputs and outputs | Screw terminals and crimp connector, max. wire section 2,5 $mm^2$ | |
| **AMBIENT CONDITIONS** | Use | Indoor | |
| | Altitude | 2000 m max | |
| | Operating temperature | -10 ... +55 °C (as per IEC 68-2-14) | |
| | Storage temperature | -20 ... +70 °C (as per IEC 68-2-14) | |
| | Relative humidity | 20...85% RH non-condensing (as per IEC 68-2-3) | |
| **PROTECTION LEVEL** | | IP 65 on front panel (as per IEC 68-2-3) | |
| **ASSEMBLY** | Positioning | On panel, removable faceplate | |
| | Installation regulations | Installation category: II; Pollution degree: 2<br>Isolation: double | |
| **DIMENSIONS** | | 48 × 48 mm (1/16 DIN)<br>(1.89” x 1.89”),<br>Depth: 80 mm (3.15”) | 48 × 96 mm (1/8 DIN)<br>(1.89” x 3.78”)<br>Depth: 80 mm (3.15”) |
| **WEIGHT** | | 0.16 kg (35 lb) | 0.24 kg (53 lb) |
| **CE STANDARDS** | EMC (electromagnetic compatibility) | Conforms to directive 2014/30/EU with reference to standard EN 61326-1<br>emission in industrial environment class A for models 650 LV, 1250<br>emission in residential environment class B for models 650 HV | |
| | Safety LVD | conforms to directive 2014/35/EU with reference to standard EN61010-1 | |

# 10. ORDER METHODS

## 10.1. 650 L model list

**Power supply 100...240 VAC/VDC**

| Code F | Model | Valves | Programmer | Inputs | | | Outputs | | | | | RS485 | Logic functions | Total Number of Outputs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Digital | CT | SPR | Relay | Triac | Logic | Analog I | Analog V/I | | | |
| F068633 | 650L-R-RR0-00000-1-G | | | | | | 3 | | | | | | | 3 outputs |
| F068635 | 650L-R-RR0-01011-1-G | | | 1 | | | 3 | | | | 1 | • | | 4 outputs |

**Power supply 20...27 VAC/VDC**

| Code F | Model | Valves | Programmer | Inputs | | | Outputs | | | | | RS485 | Logic functions | Total Number of Outputs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Digital | CT | SPR | Relay | Triac | Logic | Analog I | Analog V/I | | | |
| F068634 | 650L-R-RR0-00000-0-G | | | | | | 3 | | 1 | | | | | 3 outputs |
| F069116 | 650L-R-RR0-01011-0-G | | | 1 | | | 3 | | | | 1 | • | | 4 outputs |

Please contact GEFRAN for information on additional model codes.

## 10.2. 1250 L model list

**Power supply 100...240 VAC/VDC**

| Code F | Model | Valves | Programmer | Inputs | | | Outputs | | | | | RS485 | Logic functions | Total Number of Outputs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Digital | CT | SPR | Relay | Triac | Logic | Analog I | Analog V/I | | | |
| F068636 | 1250L-R-RR0-00000-1-G | | | | | | 3 | | | | | | | 3 outputs |
| F068638 | 1250L-R-RR0-01051-1-G | | | 5 | | | 3 | | | | 1 | • | | 4 outputs |

**Power supply 20...27 VAC/VDC**

| Code F | Model | Valves | Programmer | Inputs | | | Outputs | | | | | RS485 | Logic functions | Total Number of Outputs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Digital | CT | SPR | Relay | Triac | Logic | Analog I | Analog V/I | | | |
| F068637 | 1250L-R-RR0-00000-0-G | | | | | | 3 | | | | | | | 3 outputs |
| F069117 | 1250L-R-RR0-01051-0-G | | | 5 | | | 3 | | | | 1 | • | | 4 outputs |

Please contact GEFRAN for information on additional model codes.

# 11. ACCESSORIES

| Code | Description |
|---|---|
| **F060800** | Cable for programming with PC, USB-TTL 3 V with USB – microUSB connectors, length 1.8 m |
| **F043958** | “GF_eXpress” software CD |
| **F060909** | Configuration kit for new instruments GF_eXK-3-0-0 |
| **51968** | Rubber gasket 48×48 for display |
| **51969** | Rubber gasket 48×96 for display |
| **51292** | Rubber gasket 48×48 for panel |
| **51068** | Rubber gasket 48×96 for panel |
| **51250** | Fastening clip (model 650 L) |
| **49030** | Fastening clip (models 1250 L) |
| **51294** | Finger safe cover (model 650 L) |
| **51328** | Finger safe cover (models 1250 L) |
| **51454** | 18 replacement terminals (model 650 L) |
| **51738** | 36 replacement terminals (model 1250 L) |

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