mL-PI8 96 x 48 1/8 DIN
Universal Input Process Indicator with Smart Output Module System

- *4 digits Process (PV) Display*
- *Universal Process Input (TC, RTD, mV$\overline{}$, V$\overline{}$, mA$\overline{}$)*
- *Dual or Multi Point Calibration for $\overline{}$Voltage / Current Input*
- *Smart Output Module System*
- *Programmable Alarm Functions*
- *Retransmission of Process Value by Using*
  0/4...20 mA$\overline{}$ Current Output Module
- *Hardware Configuration With Output Modules*
- *RS-485 (standard) Serial Communication With Modbus RTU Protocol*

ABOUT INSTRUCTION MANUAL

Instruction manual of mL-PI8 Process Indicator consists of two main sections. Explanation of these sections are below. Also, there are other sections which include order information and technical specifications of the device. All titles and page numbers in instruction manual are in "**CONTENTS**" section. User can reach to any title with section number.

Installation:

In this section, physical dimensions of the device, panel mounting, electrical wiring, module mounting in the device, physical and electrical installation of the device to the system are explained.

Operation and Parameters:

In this section, user interface of the device, how to access to the parameters, description of parameters are explained.

Also in these sections, there are warnings to prevent serious injury while doing the physical and electrical mounting or using the device.

Explanation of the symbols which are used in these sections are given below.

This symbol is used for safety warnings. User must pay attention to these warnings.

This symbol is used to determine the dangerous situations as a result of an electric shock. User must pay attention to these warnings definitely.

This symbol is used to determine the important notes about functions and usage of the device.

$\sim$ Vac,

$---$ Vdc

$\overline{\sim}$ Vdc or Vac can be applied

CONTENTS

1.Preface

The mL-PI8 series process indicators are designed for measuring temperature and any process value. They can be used in many applications with their universal process input, alarm functions and serial communication unit.

Some application fields which they are used are below:

Application Fields

Glass

Plastic

Petro-Chemistry

Textile

Automotive

Machine production industries

1.1 General Specifications

mL-PI8

Power Supply Input	Universal Supply Input 100-240 V∿, 50/60Hz
	Low Voltage (optional) Supply Input 24VDC
Process Input	Universal Process Input TC, RTD,⎓Voltage/Current
Output Module-1	0/4 - 20 mA Analog Output
Output Module-2	3A Form A Relay (optional)
Output-3(Relay Output)	Alarm Output 5A Form C Relay
Serial Communication	RS-485 — Baud Rate from 1200-19200 Modbus RTU Protocol

1.2 Ordering Information

ORDERING INFORMATION	
Model Number	**Description**
mL-PI8	Process Indicator 1/8 DIN Case Universal Input. Selectable: TC, RTD, mV, VDC, or mA 100 to 240VAC (-15%; +10%) 50/60Hz Relay Output (5A @ 250VAC with Resistive Load) (Form C) RS-485 Serial Communication with Modbus RTU Protocol Analog Output 0/4 - 20mA
Options (add to end of model number)	
RLY	Additional Relay Output (3A @ 250VAC with Resistive Load) (Form A)
24VDC	24VDC (-15%; +10%) Power Input
Accessories	
mL-PI8-gasket	Gasket to provide NEMA4X seal
mL-cable-485	RS485 Serial Cable

1.3 Warranty

Kessler-Ellis Products warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date. This warranty is in force if duty and responsibilities which are determined in warranty document and instruction manual performs by the customer completely.

1.4 Maintenance

Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts.
Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

2.Installation

⚠ **Before beginning installation of this product, please read the instruction manual and warnings below carefully.**

In package ,
- **One piece unit**
- **Two pieces mounting clamps**
- **One piece instruction manual**

A visual inspection of this product for possible damage occurred during shipment is recommended before installation. It is your responsibility to ensure that a qualified mechanical and electrical technicians install this product.

If there is danger of serious accident resulting from a failure or defect in this unit, power off the system and separate the electrical connection of the device from the system.

The unit is normally supplied without a power switch or a fuse. Use power switch and fuse as required.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

Never attempt to disassemble, modify or repair this unit. Tampering with the unit may results in malfunction, electric shock or fire.

Do not use the unit in combustible or explosive gaseous atmospheres.

During installation into a panel cut-out on a metal panel be cautious of metal burrs that can cause injury to hands and/or arms, you must be careful.

Mounting of the product on a system must be done with it's mounting clamp. Do not mount the device with inappropriate mounting clamps. Use the mounting clamps that are provided. Be sure that device will not fall during installation.

It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

2.1 General Description

Product Label

Terminal protection cover

Mounting Clamps

**Front Panel
IP65 protection
NEMA 4X**

**Panel surface
(maximum thickness 15mm / 0.59 inch)**

2.2 Dimensions

Maximum 15mm / 0.59 inch

48mm/ 1.89 inch

96mm / 3.78 inch

10.5 ± 1 mm /0.41 inch   76mm / 2.99 inch

129 mm / 5.08 inch (min)

65 mm / 2.56 inch (min)

46 mm / 1.81 inch (min)

92mm / 3.62 inch
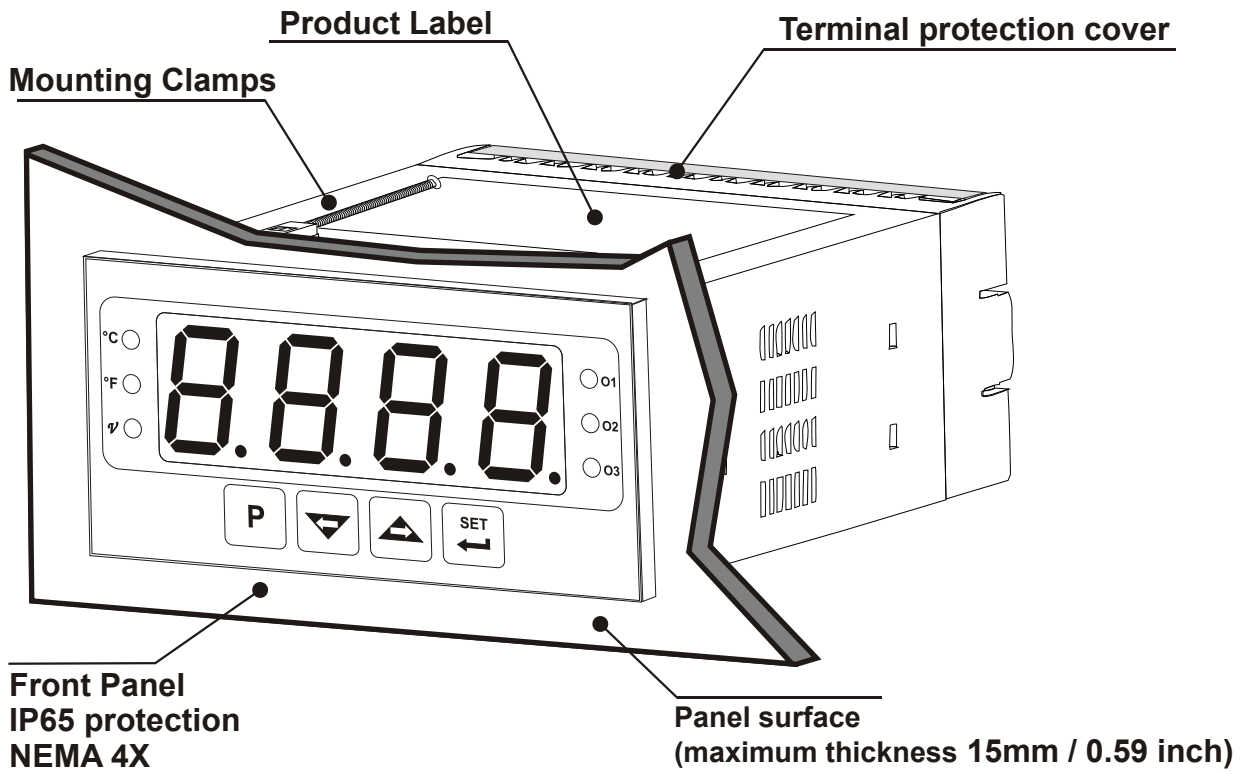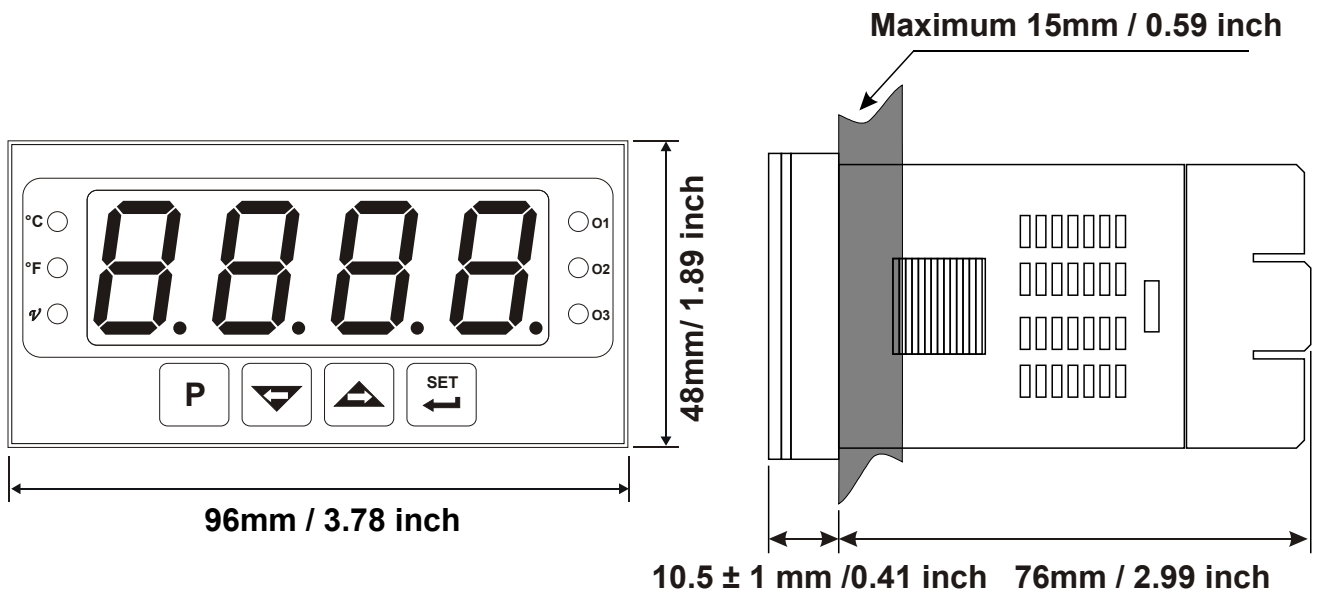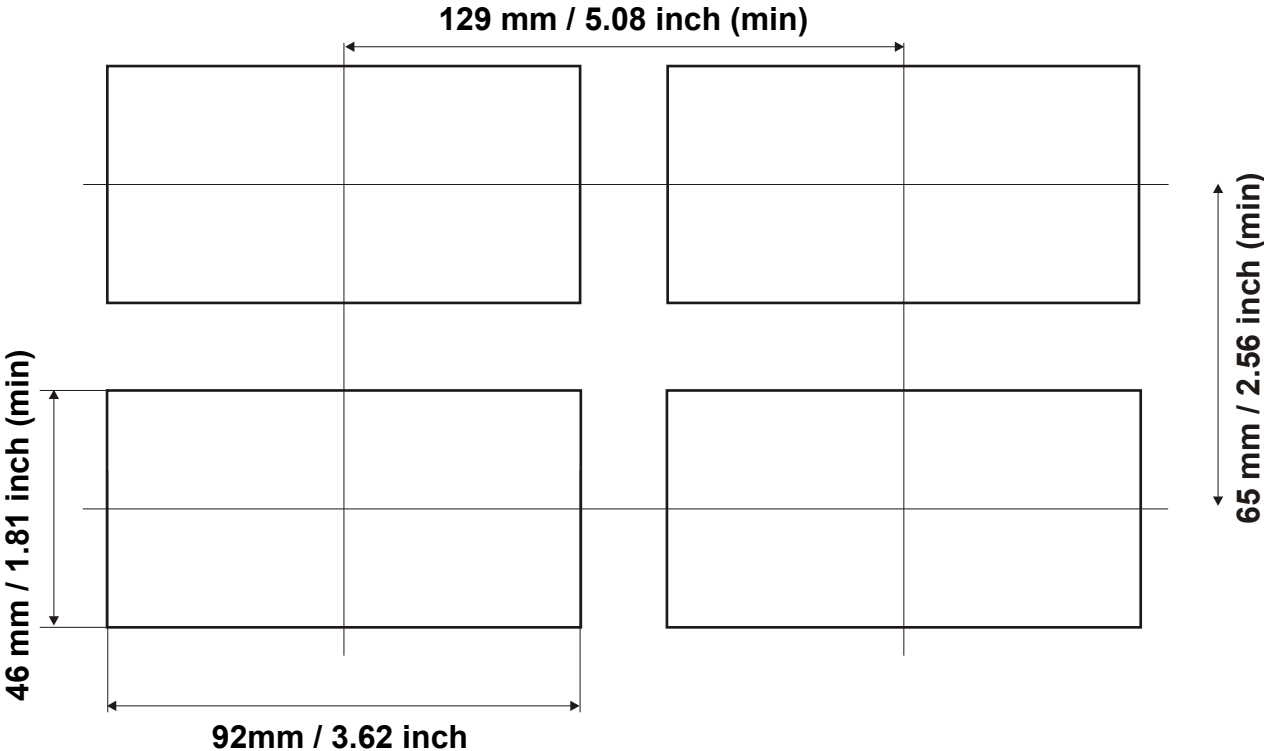
2.4 Environmental Ratings

Operating Conditions

Operating Temperature : 0 to 50 °C

Max. Operating Humidity : 90% Rh (non-condensing)

Altitude : Up to 2000m.

Forbidden Conditions:
Corrosive atmosphere
Explosive atmosphere
Home applications (The unit is only for industrial applications)

2.5 Panel Mounting
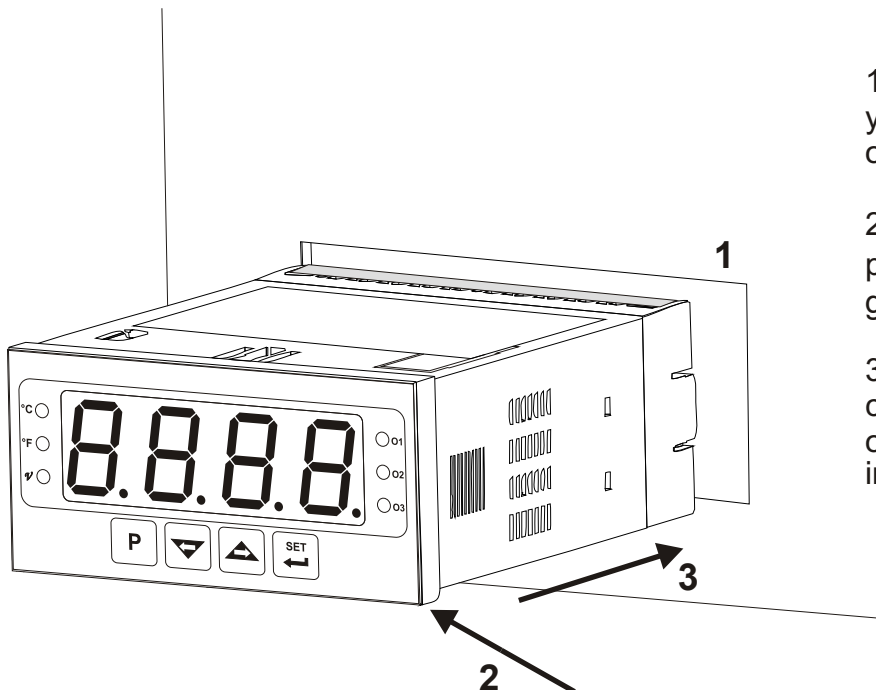
1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

2-Check front panel gasket position (Note: panel sealing gasket is ordered separately)

3-Insert the device through the cut-out. If the mounting clamps are on the unit, put out them before inserting the unit to the panel.

During installation into a metal panel, care should be taken to avoid injury from metal burrs which might be present. The equipment can loosen from vibration and become dislodged if installation parts are not properly tightened. These precautions for the safety of the person who does the panel mounting.

2.6 Installation Fixing Clamp
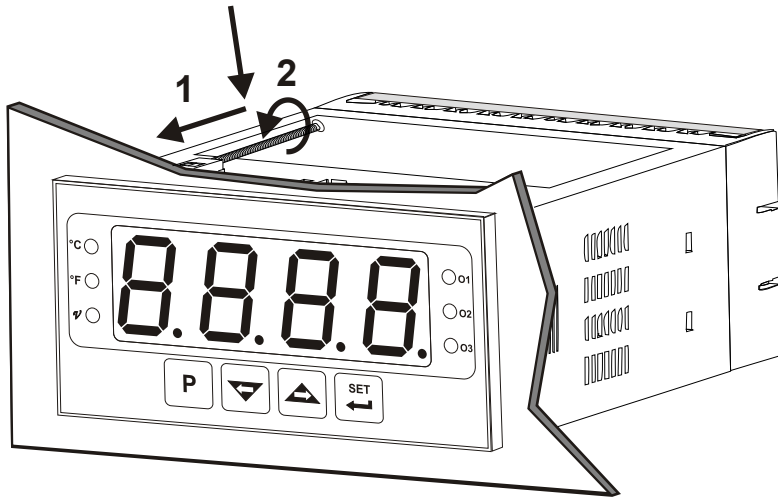
The unit is designed for panel mounting.

1-Insert the unit in the panel cut-out from the front side.

2- Insert the mounting clamps to the holes that located top and bottom sides of device and screw up the fixing screws until the unit completely immobile within the panel

Mounting of the unit to a system must be done with it's own fixing clamps. Do not do the mounting of the device with inappropriate fixing clamps. Be sure that device will not fall while doing the mounting process.

2.7 Removing from the Panel

Before starting to remove the unit from panel, power off the unit and the related system.
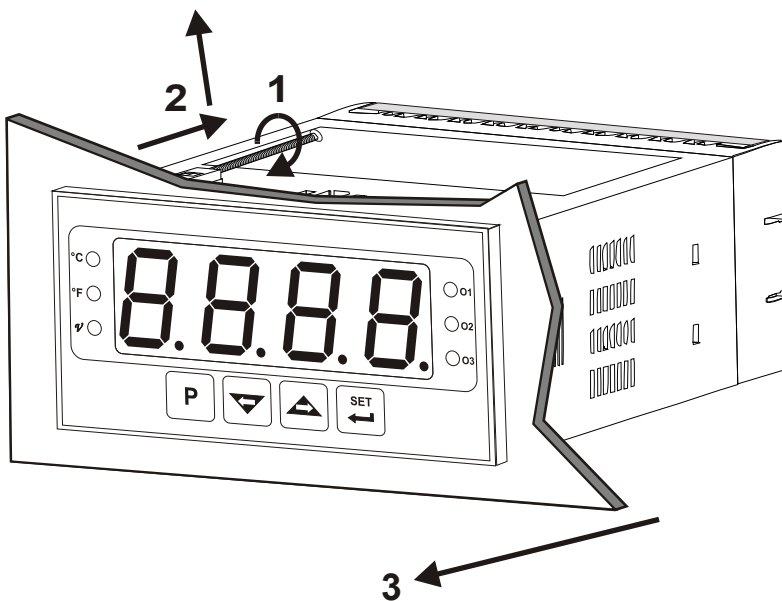
1-Loosen the screws.

2-Pull mounting clamps from top and bottom fixing sockets.

3-Pull the unit through the front side of the panel

3. Electrical Wirings

You must ensure that the device is correctly configured for your application. Incorrect configuration could result in damage to the process being controlled, and/or personal injury. It is your responsibility, as the installer, to ensure that the configuration is correct.
Parameters of the device has factory default values. These parameters must be set according to the system's needs.

Only qualified personnel and technicians should work on this equipment. This equipment contains internal circuits with voltage dangerous to human life. There is severe danger for human life in the case of unauthorized intervention.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

3.1 Terminal Layout and Connection Instructions

6 mm / 0.236 inch
Wire Size:
18 AWG / 1 mm² Solid /Stranded

24 screws terminal M3

Optional Connections

Empty terminals

Torque 0.5 Nm

Screw driver 0.8x3mm

0.5 Nm
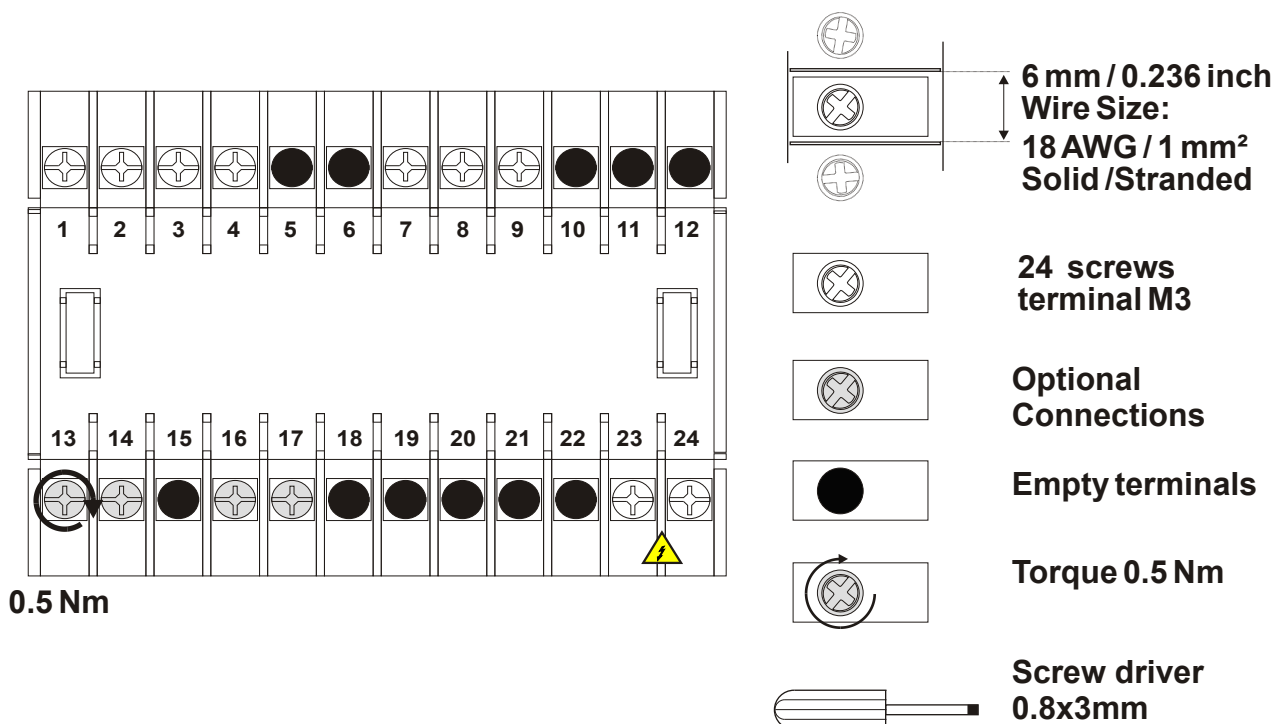
3.2 Electrical Wiring Diagram

⚠ **Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the process being controlled and personnel injury.**

Universal Process Input
(TC, RTD, DC Voltage/Current)

0 to 50mV
0 to 10V
0 to 20mA
Pt-100
TC

Sensor or Transmitter Supply Voltage

24 V Max 50mA

Output-3 Standard Relay Output

1	2	3	4	5	6	7	8	9	10	11	12

NC NO C

RELAY OUTPUT 5A@250VAC

Communication Socket

MODULE - 1   MODULE - 2

c ℝU us C€

⚠ ☐ CAT II

13	14	15	16	17	18	19	20	21	22	23	24

N(−) L(+)

Analog Output 0/4 - 20mA

Optional Relay (3A@250VAC)

Supply Voltage Input 100-240VAC(-15%;+10%) 50/60Hz - 6VA [optional 24VDC (-15%; +10%)]

* External Fuse is recommended (1A T)

ⓘ **Process input is in CAT II class.**

3.3 Supply Voltage Input Connection of the Device

Connection of Universal Supply Voltage Input

Connection of 24VDC Option

N **L**
23 24

External Fuse (1 A∼ T)

Power Supply Switch

Supply Voltage 100 - 240 V∼ (-15%;+10%) 50/60Hz

− **+**
23 24

Power Supply Switch

Supply Voltage 24VDC(-15%;+10%)

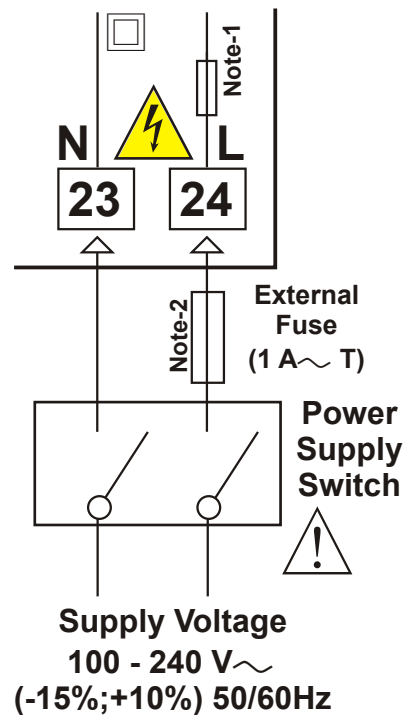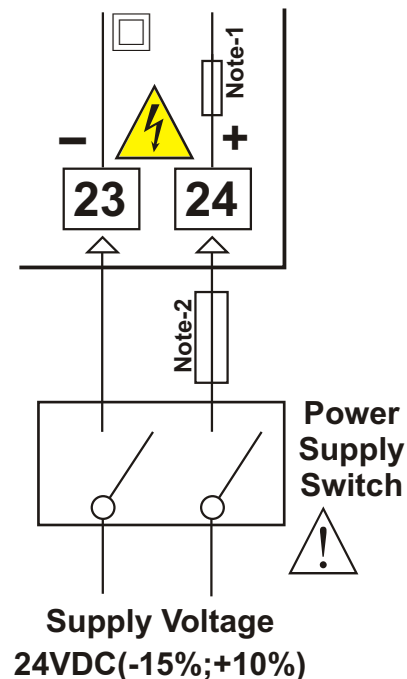**Note-1 :** There is an internal 33R   fusible flameproof resistor in 100-240 V∼   50/60Hz supply voltage input

Note-2 : External fuse is recommended.

Make sure that the power supply voltage is the same indicated on the instrument.
Switch on the power supply only after all the electrical connections have been completed.
Supply voltage range must be determined in order. While installing the unit, supply voltage range must be controlled and appropriate supply voltage must be applied to the unit. Controlling prevents damages in unit and system and possible accidents as a result of incorrect supply voltage.

There is no power supply switch on the device. So a power supply switch must be added to the supply voltage input. In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument. Power supply switch shall be easily accessible by the user.
Power switch must be two poled for separating phase and neutral. On/Off condition of power switch is very important in electrical connection. On/Off condition of power switch must be signed for preventing the wrong connection.
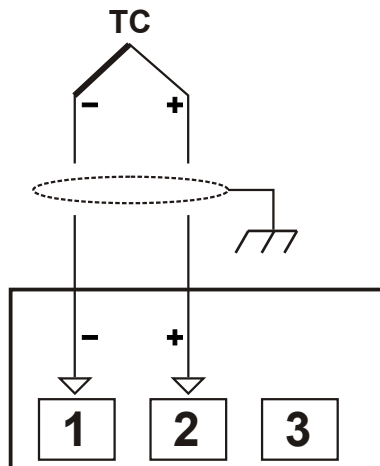
If an external fuse is used, it must be on phase connection in ∼ supply input.

The instrument is protected with an internal fuse (Please refer to Note1 for information). In case of failure it is suggested to return the instrument to the manufacturer for repair.

3.4 Process Input Connection

3.4.1 TC (Thermocouple) Connection

Connect the wires with the polarity as shown in the figure at left.

ⓘ **Always use compensation wire corresponding to the thermocouple used. If present, the shield must be connected to a proper ground.**

ⓘ **Input resistance is greater than 10M**

3.4.2 RTD Connection
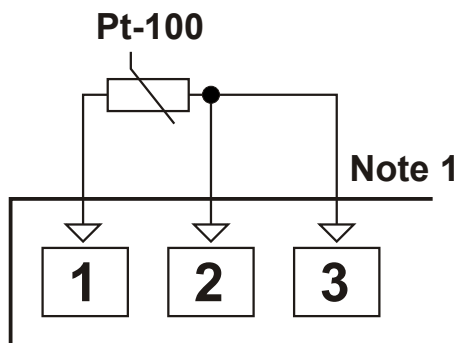
3-wire Pt-100 connection
(with line compensation)
(Max. Line impedance is 10   )
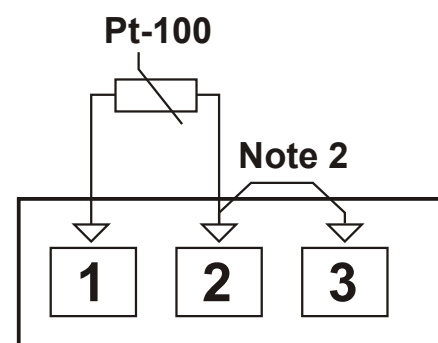
2-wire Pt-100 connection
(without line compensation)

Note 1 : In 3-wire system, use always cables of the same diameter (min 1mm²) Always use wires of the same gauge and type whether a 2-wire or 3-wire system.
Note 2 : Install a jumper between terminals 2 and 3 when using a 2-wire RTD.
Note 3 : If the distance is longer than 10 meters, use 3-wire system

ⓘ **Input resistance is greater than 10M**

3.4.3 Process Input Connection of Serial Transmitters with Current Output (Loop Powered)

Transmitter connection by using supply voltage on the device

Transmitter connection by using external supply voltage source.

Note 1 : External power supply must be selected according to supply voltage range and required current for transmitter.

i   **Input resistance is 70   (terminals 1 to 3).**

3.4.4 Process Input Connection of 3-Wire Transmitters with Current Output

Transmitter connection by using supply voltage on the device
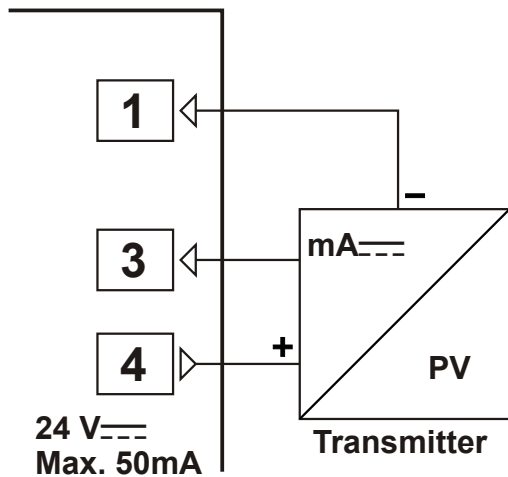
Transmitter connection by using external supply voltage source.

Note 1 : External power supply must be selected according to supply voltage range and required current for transmitter.

i   **Input resistance is 70   (terminals 1 to 3).**

3.4.5 Connection of Transmitters with Voltage Output to Process Input

Transmitter connection by using supply voltage on the device
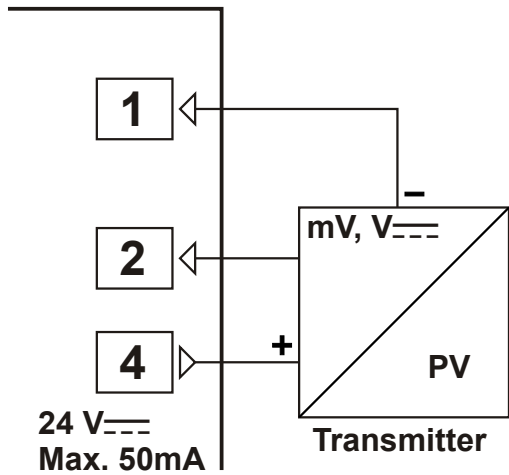
Transmitter connection by using external supply voltage source.
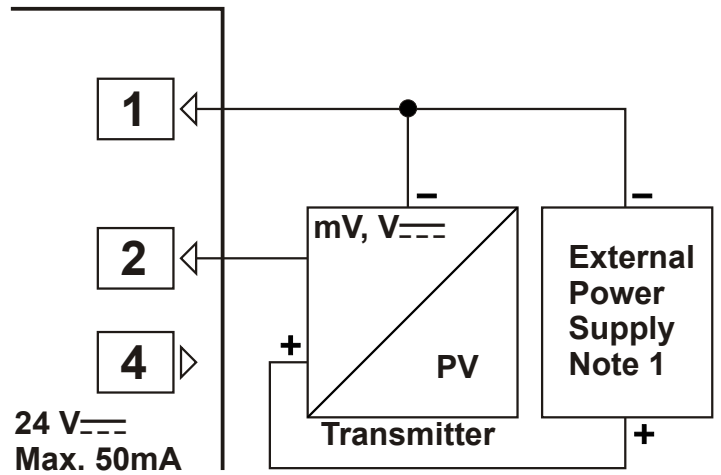
Note 1 : External power supply must be selected according to supply voltage range and required current for transmitter.

Input resistance is greater than 10M for **0...50mV** (terminals 1 to 2)
Input resistance is 43K for **0...10V** (terminals 1 to 2)

3.5 Relay Output Connection
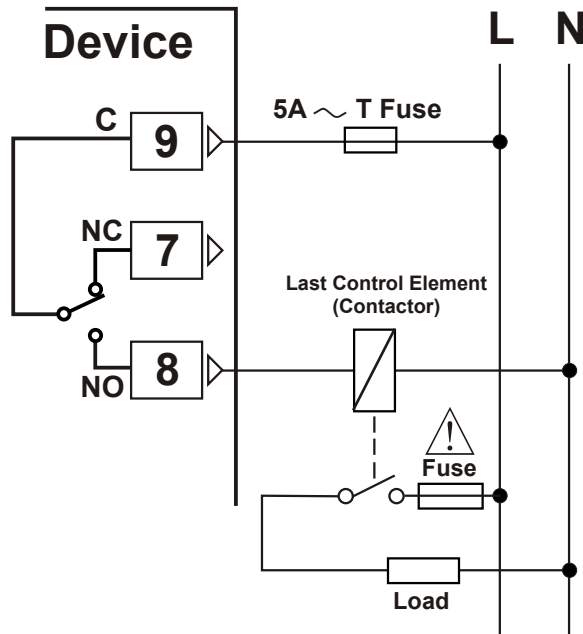
Fuses must be selected according to the application.

## 3.6 Galvanic Isolation Test Values of mL-PI8 Process Indicator and Output Modules

2000V ∿ (For 100 - 240 VAC Supply Input)

| Supply Input | 23 24 | | Input Signal Ground | 1 |

2000V ∿ |7 8 9| **Output-3 Relay Output** |7 8 9| 2000V ∿

2000V ∿ |13 16 / 14 17| **mL-CO4/20 0/4...20mA━ Current Output Module** |13 16 / 14 17| 500V ∿

2000V ∿ |2 3| **analog Inputs** |2 3|

2000V ∿ |4| **24V ━ Voltage Output** |4|

2000V ∿   **RS-485 Serial Communication Module**   500V ∿
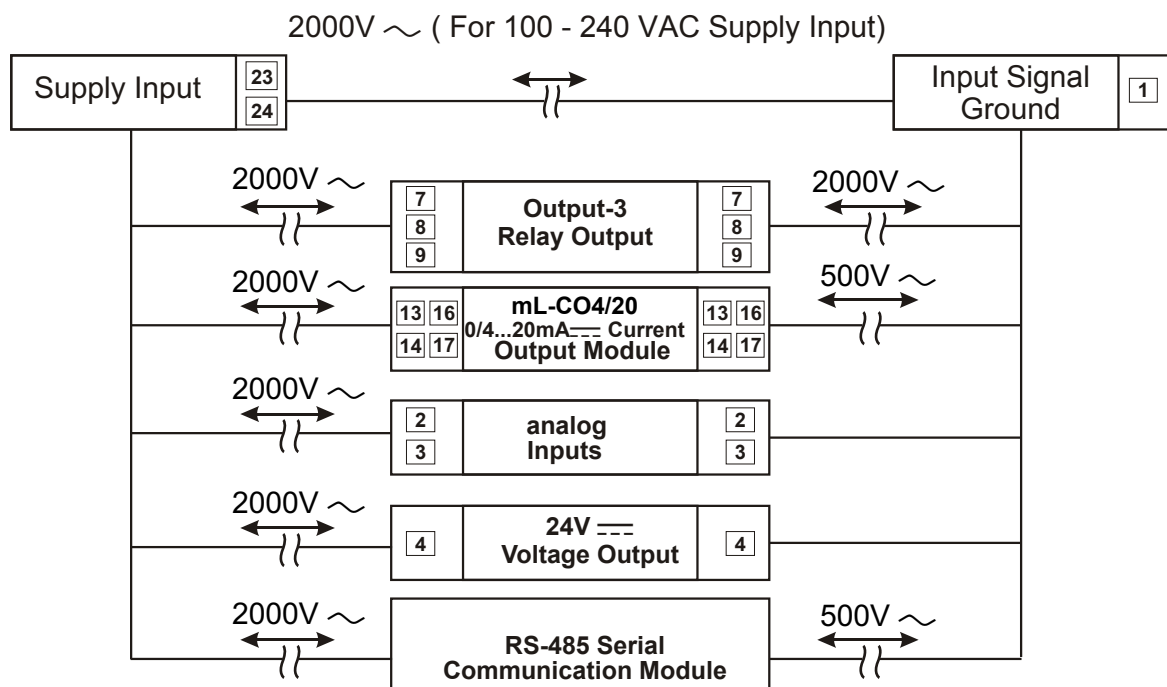
4.Definitions and Specifications of Modules

mL-PI8 Process Indicator is a modular product which is designed to operate with additional analog and digital output units.

The mL-PI8 is equipped with one output module (Module -) for Analog Output.

4.1 Output Modules

Dimensions of Output Modules
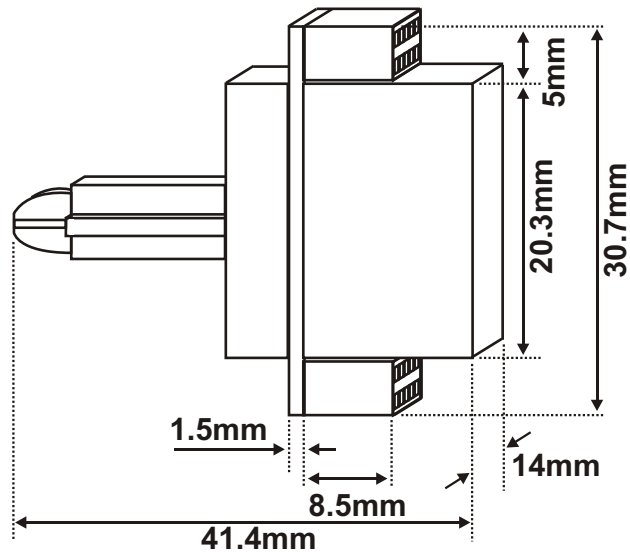
4.1.1 0 / 4 ...20mA══ Current Output Module (mL-CO4/20)

mL-CO4/20 0/4...20mA══ Current Output Module is plugged in to Module-1 to use functions which are defined for current or voltage output. (It is defined as Analog Output Module in some sections)

Specifications of mL-CO4/20 0/4...20mA══ Current Output Module

Output   : 0/4...20mA══ current output
Accuracy   : 1%
Note : To get 0...10V══ , 500   resistor with 0.05% tolerance must be connected in parallel as a shunt resistor to module output (Please refer to Section 5.1.5 for detailed information)
Maximum load impedance   : 600
Dimensions   : 14x30.7x41.4mm

Applications of mL-CO4/20 0/4...20mA══ Current Output Module

Process value, difference between process and set value or set value can be retransmitted to the system as 0...20mA══ or 4...20mA══ output. Retransmission is explained in parameters section.

ⓘ **Detailed information about functions of mL-CO4/20 Current Output Module are given in parameters section. For using these functions mL-CO4/20 0/4...20mA current Output Module must be installed to Module-1 or Module-2 socket.**

4.1.2 mL-CO4/20   0/4... 20 mA⎓ Current Output Module Connection

Module-1

Other Device

14 +

13 −

+
Shunt (Max. 600)
−
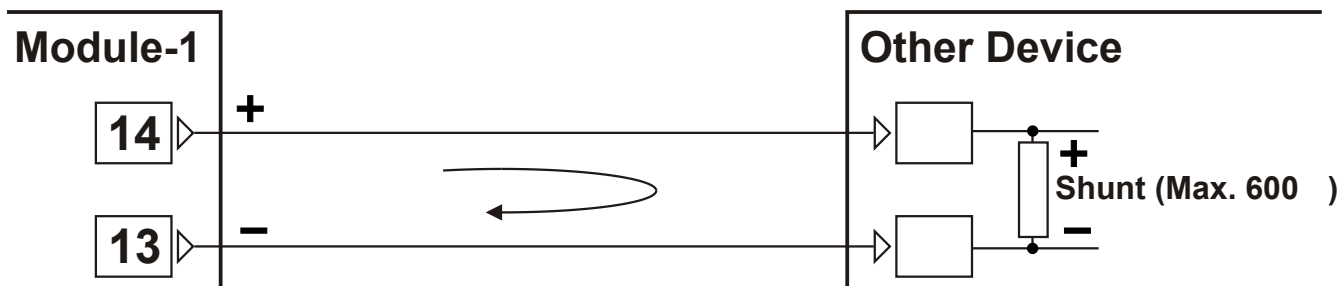
4.1.3 How to Get 0...10V⎓ with mL-CO4/20 Current Output Module

Module-1

Other Device

14 +

+

13 −

−

0...10V⎓ Output

Shunt = 500.0
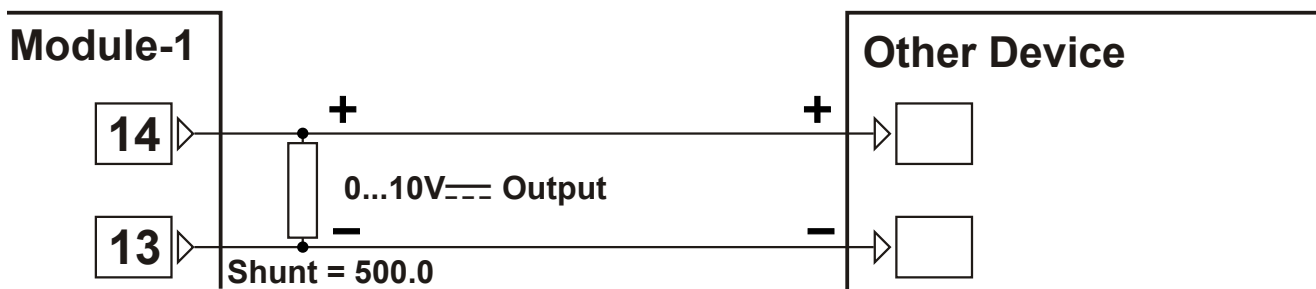
RS-485 Terminal Definitions
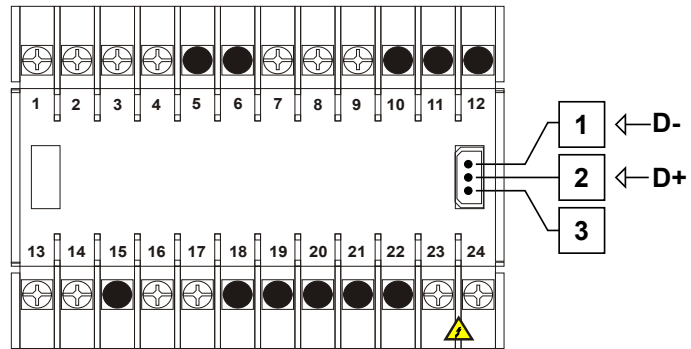
5.1 Connection for RS-485 Serial Communication

PC(Personal Computer)

**RS-232   RS-485
Convertor**

D+   D-

**RS-232
Connection
Cable**

Rt

MASTER

SLAVE-1

D-
D+

32 devices can be connected in RS-485 line

Rt resistor = 120

For communication connection Twisted Pair cable must be used

Cable length can be maximum 1000 meters in 9600 baud rate.

When baud rate increases, cable length must decrease.

SLAVE-2

D-
D+

SLAVE-N

D-
D+

Rt
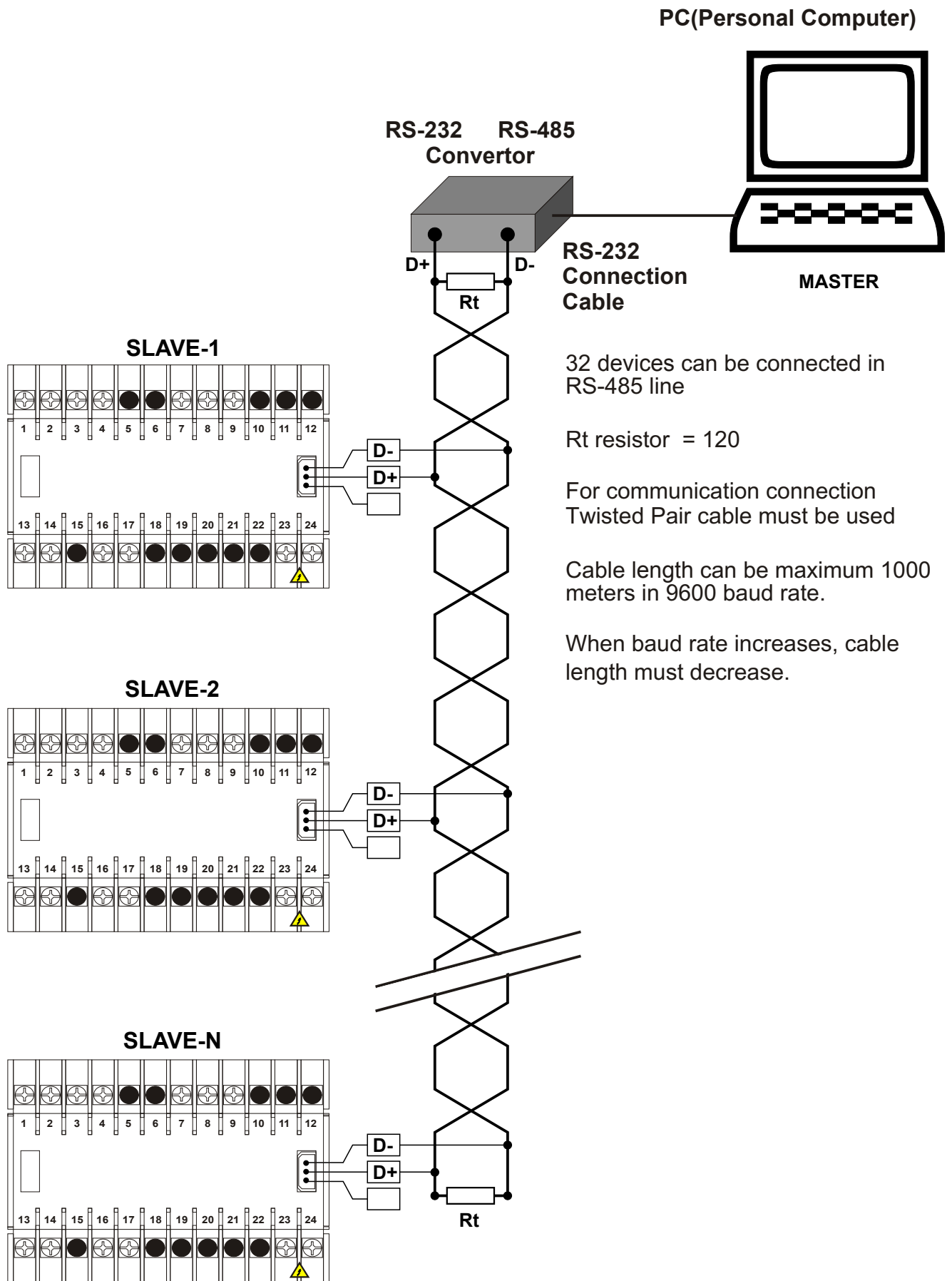
6.Definition of Front Panel and Accessing to the Parameters

6.1 Definition of Front Panel

**Displays
Process Value (PV)
and Parameter**

**LED indication of units
other than °C and °F**

**LED indication of °F
Fahrenheit Unit**

**LED indication of °
C:Centigrade Unit**

**LED indication of
Relay (Output-3)
Status**

LED 02 Not Used

**LED indication of
Analog Output Status,
LED blinks to show
output is updating
correctly**

**Menu button
This button is used
to access to the all
menus and to
move up to another
menu in the menu
list**

**Note-1
This button is used
to decrease the
values, access to
the menu pages,
cancel alarm
latching**

**Note-1
This button is used
to increase the
value and access to
the menu pages**

**This button is used
to access to the
process set value
and use as OK
button in program
parameters.**

**Note-1: If increment or decrement button is pressed for 5 seconds continuously,
increment and decrement number become 10, if increment or decrement button is
pressed for 10 seconds continuously, increment and decrement number become 100.**

6.2 Observation of Optional Modules and Software Revision on the Displays

There are two sockets for plugging optional modules to the device. These modules are recognized by the device automatically. When the power is applied to the device all led indicators and display segments are momentarily illuminated for testing. Software revision number of the controller on the bottom display and module definition codes on the top display are momentarily illuminated. Module definiton codes and how to observe these codes of optional modules in Module-1 and Module-2 socket are explained below :

" rU"   Revision

Revision number

Optional Input/Output module code for Module-1

Optional Input/Output module code for Module-2

o𝐴   **0/4...20mA⎓Current Output Module (mL-CO4/20)**

There is no module in Module-2 socket   𝐸
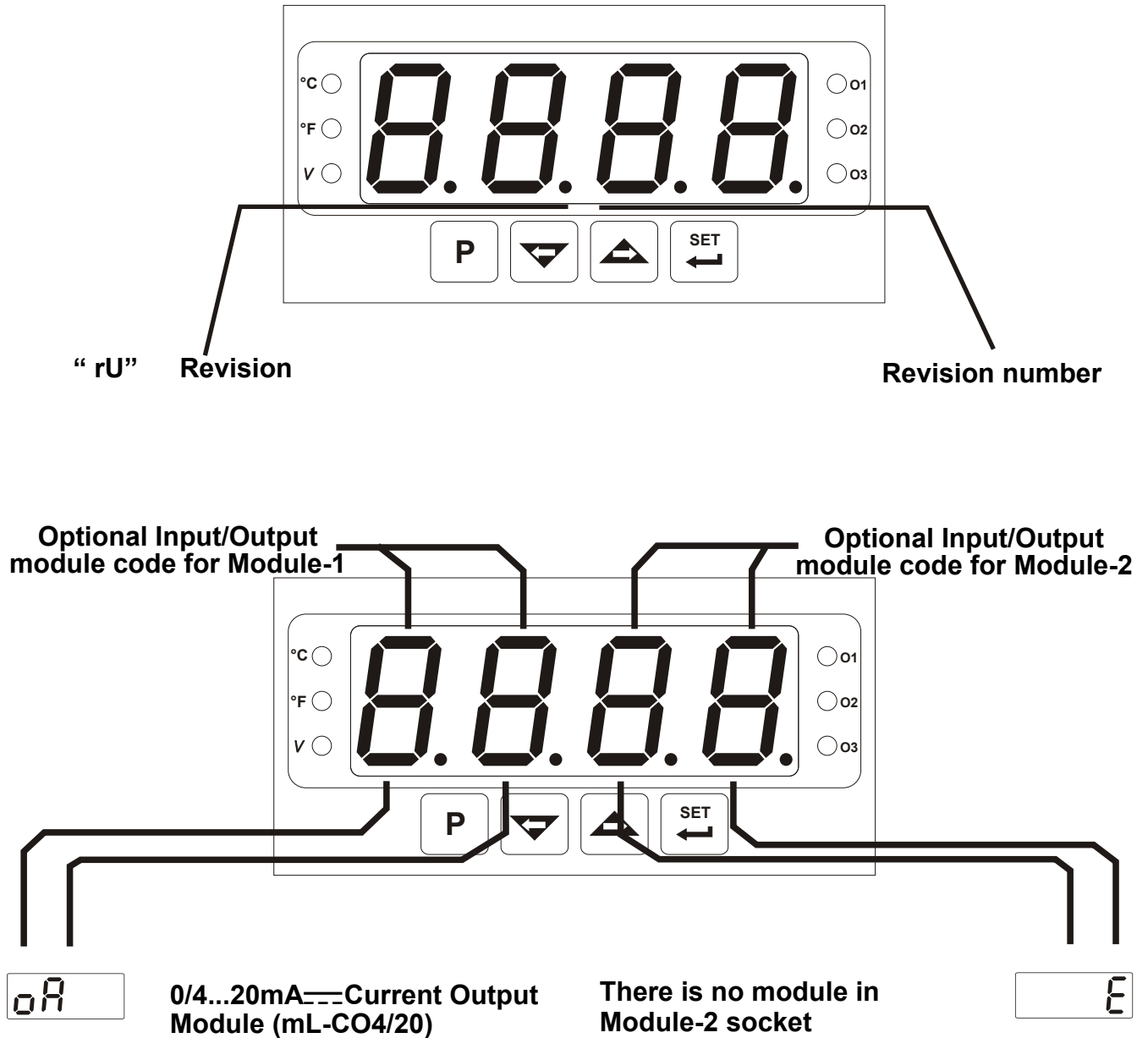
When power is on, display of the indicator is like below:
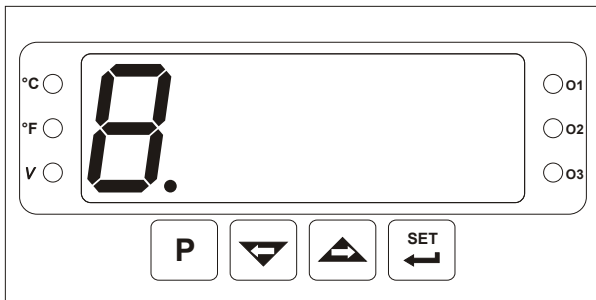
First segments of top and bottom displays are tested
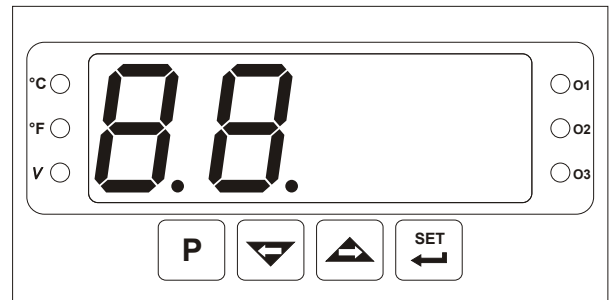
Second segments of top and bottom displays are tested.
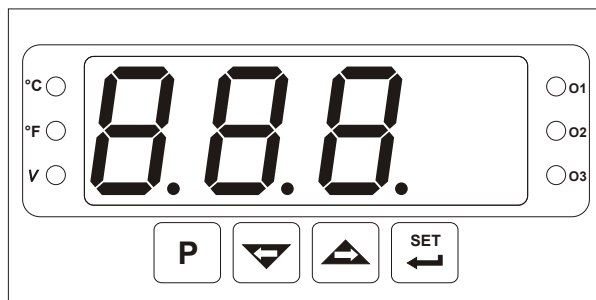
Third segments of top and bottom displays are tested.
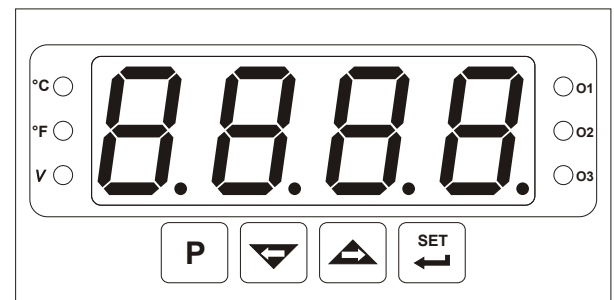
Fourth segments of top and bottom displays are tested.
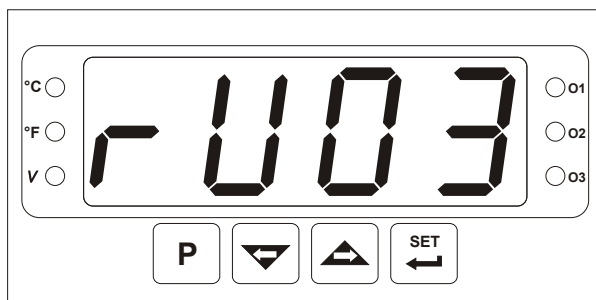
Revision number is shown. Revision number is "03".
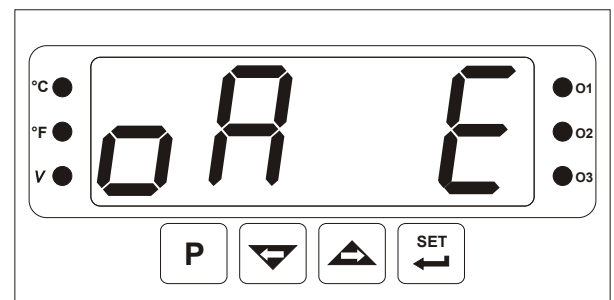
On display which modules are plugged in Module-1 and Module-2 socket is shown. All leds are energised. Above, there is Analog Output on Module-1, Modue-2 is empty (Not Used)
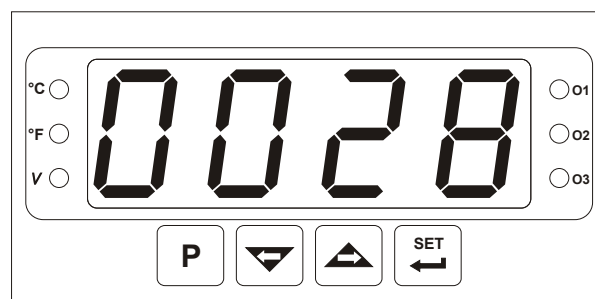
Main operation screen is shown

⚠ **If there is an unexpected situation while powering up the device, turn power off to the device and inform qualified personnel.**

6.3 Adjustment of Alarm Set Values

If standard output (Output-3) is configured as alarm output, this is how to access these alarm set values::

Operation Screen
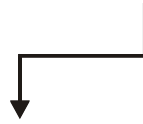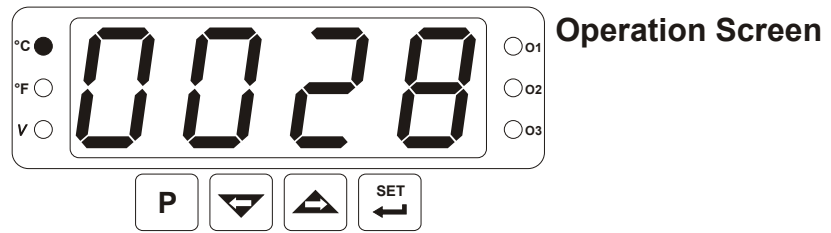
Continue to Alarm 3 on next page

Alarm-3 Set Value

This parameter is not accessible, if Output-3 is not an Alarm output

Press Menu button to exit from Set menu

Press Menu button to exit from Set menu

```
°C ○        ┌─┐ ┌─┐ ┌─┐ ┌─┐     ○ O1
°F ○        ├─┤ │ │ │─  ─┤      ○ O2
 v ○        ┴ ┴ └─┘ └─┘ ─┘      ○ O3
```
A L r 3

P ▽ △ SET

Press increment button to see set value

Value on the display starts to flash

```
°C ○        ┌─┐ ┌─┐ ┌─┐ ┌─┐     ○ O1
°F ○        │ │ ├─  ├─┐ │ │      ○ O2
 v ○        └─┘ └─┘ └─┘ └─┘      ○ O3
```
0 6 5 0

P ▽ △ SET

Press Menu button to exit without saving Set value

Set value can be changed with increment and decrement buttons

Press Set button for saving the Set value

```
°C ○        ┌─┐ ┌─┐ ┌─┐ ┌─┐     ○ O1
°F ○        │ │ ├─  ├─┐ │ │      ○ O2
 v ○        └─┘ └─┘ └─┘ └─┘      ○ O3
```
0 6 6 0

P ▽ △ SET

Press Menu button to exit without saving Set value

```
°C ●        ┌─┐ ┌─┐ ┌─┐ ┌─┐     ○ O1
°F ○        │ │ │ │ ├─┐ └─┤      ○ O2
 v ○        └─┘ └─┘ └─┘ ──┘      ○ O3
```
0 0 2 8

P ▽ △ SET

Operation Screen

6.4 Easy Access Diagram for Technician Parameters

Main Operation Screen `0028`
Press menu button for accessing to the technician parameters (P)

Technician Menu Entering Screen `tECH`
Press SET/OK button for accessing to the password entering screen.

Technician Password Entering Screen `tCPS`
Press increment button for entering the password.

Technician Password Entering Screen `0000`
Enter the password with increment and decrement buttons

PinP menu `PinP` `ConF`

Out1 menu `out1` `ConF`

Out2 menu `out2` `ConF`
Not Used

`iSSL` — Process input type Selection

`tCSL` — TC input type selection — Note-1

`unit` — Unit selection — Note-3

`LoL` — Operation Scale Low Limit — Note-3

`uPL` — Operation Scale High Limit

`PVoF` — Process Display Offset

`iFLt` — Input Filter Time

`CJnC` — Cold Junction Compensation Selection — Note-1

`oAt1` — Configuration selection

Note-1 : According to the `iSSL` parameter selection, another parameter can be observed instead of `tLUL` parameter and `CJnC` parameter can not be observed.

Note-2 : It can be observed if logic output function `Lou1` is selected `0000` as alarm output.

Note-3 :

`LoL` is analog output zero process variable and below which the blinking warning display ⊔⊔⊔⊔ appears

`uPL` is analog output full scale process variable and above which the blinking warning display ⊓⊓⊓⊓ appears

6.4 Easy Access Diagram for Technician Parameters

$\boxed{0850}$ **Technician Password Entering Screen**

[SET] Confirm the password with SET/OK button

Returning to the beginning of the menu list

Out3 Menu

$\boxed{out3}$ $\boxed{ConF}$

[▲] [SET]

$\boxed{Lou3}$ **Out3 Logic Output**

[SET]

$\boxed{ALt3}$ **Alarm3 Type Selection**

Note-5 [SET]
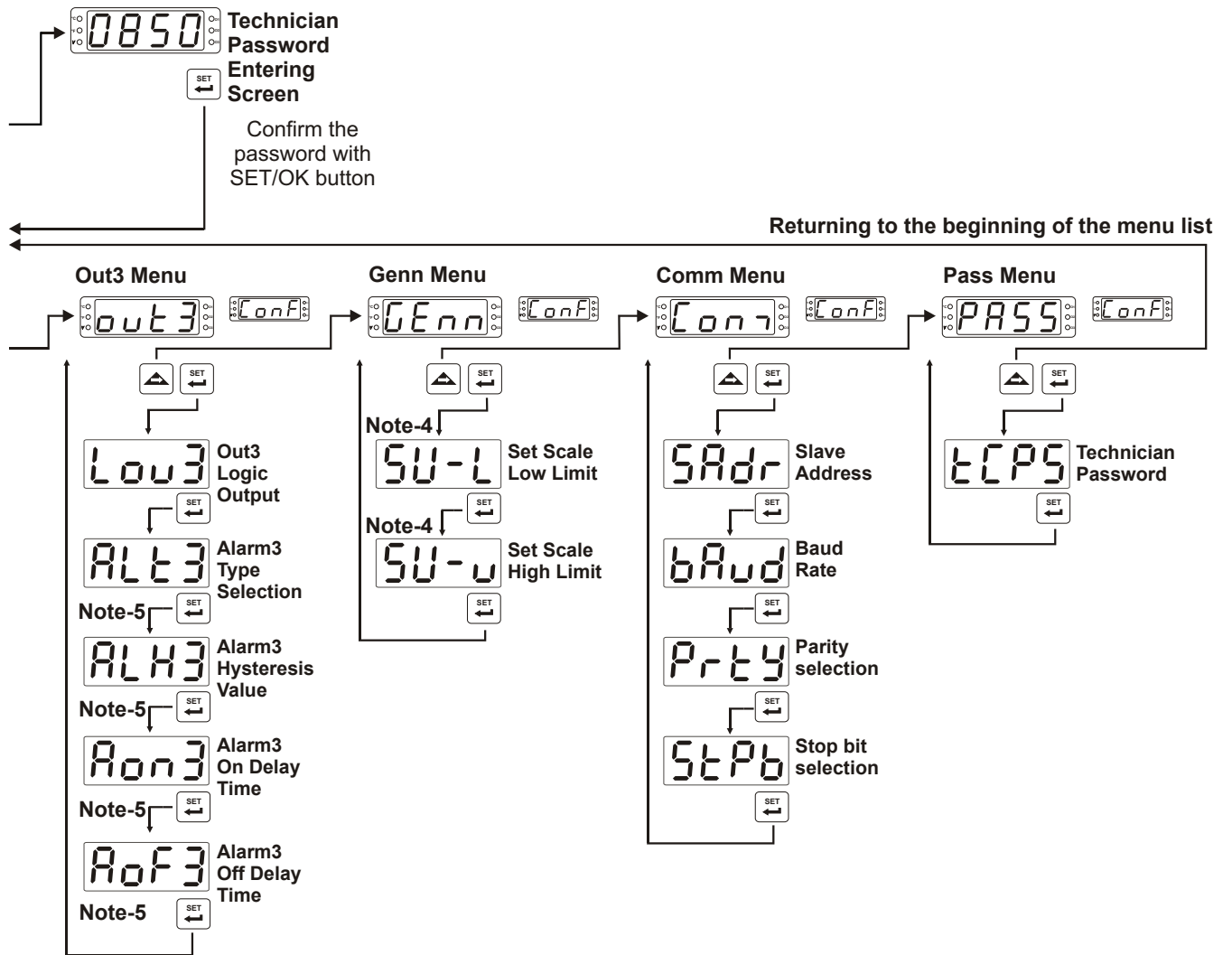
$\boxed{ALH3}$ **Alarm3 Hysteresis Value**

Note-5 [SET]

$\boxed{Aon3}$ **Alarm3 On Delay Time**

Note-5 [SET]

$\boxed{AoF3}$ **Alarm3 Off Delay Time**

Note-5 [SET]

Genn Menu

$\boxed{GEnn}$ $\boxed{ConF}$

[▲] [SET]

Note-4 ↓

$\boxed{SU-L}$ **Set Scale Low Limit**

[SET]

Note-4 ↓

$\boxed{SU-u}$ **Set Scale High Limit**

[SET]

Comm Menu

$\boxed{Con7}$ $\boxed{ConF}$

[▲] [SET]

$\boxed{SAdr}$ **Slave Address**

[SET]

$\boxed{bAud}$ **Baud Rate**

[SET]

$\boxed{Prty}$ **Parity selection**

[SET]

$\boxed{StPb}$ **Stop bit selection**

[SET]

Pass Menu

$\boxed{PASS}$ $\boxed{ConF}$

[▲] [SET]

$\boxed{tCPS}$ **Technician Password**
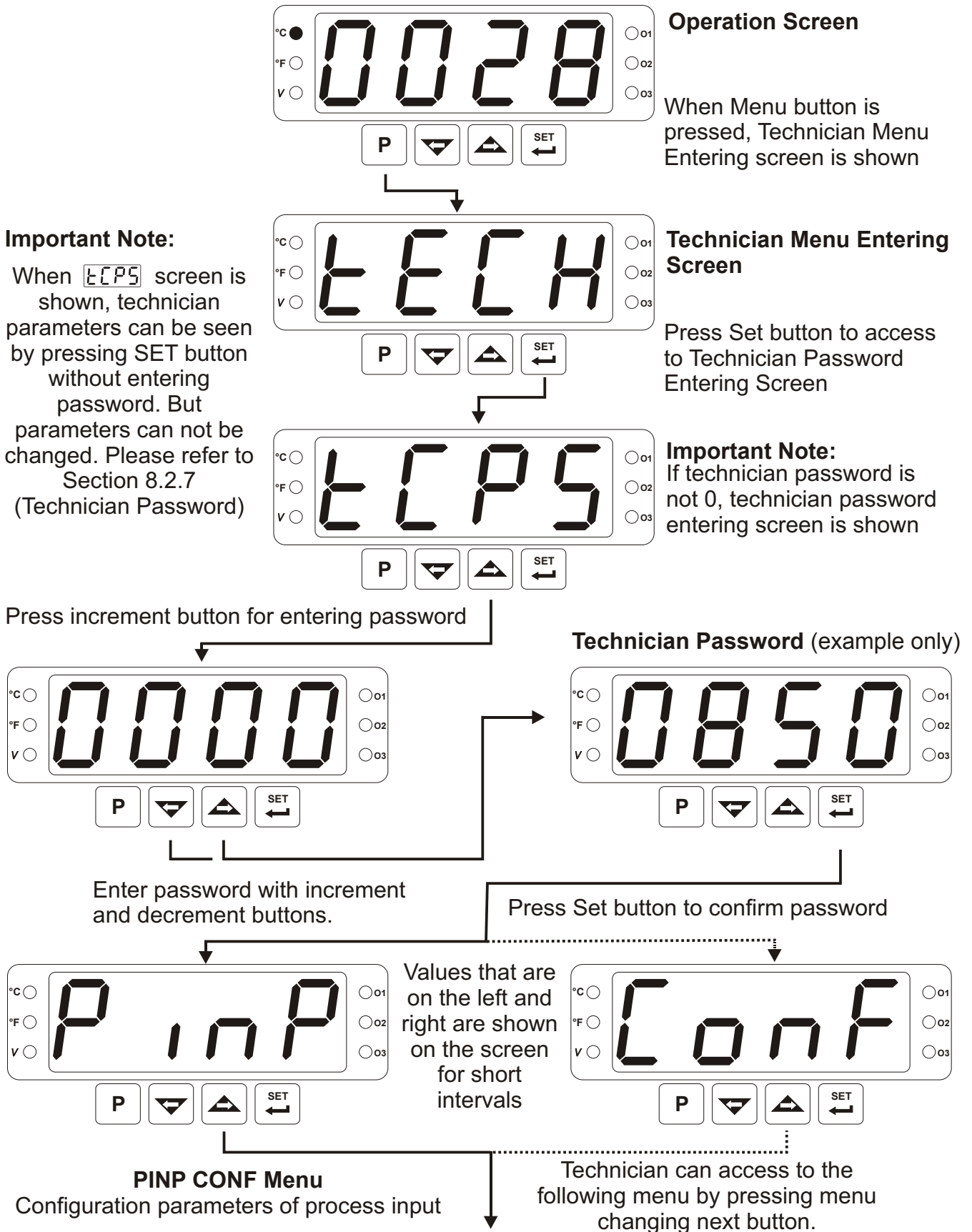
[SET]

Note-4 :

$\boxed{SU-L}$ defines the operators minimum permitted setpoint value for the process variable

$\boxed{SU-u}$ defines the operators maximum permitted setpoint value for the process variable
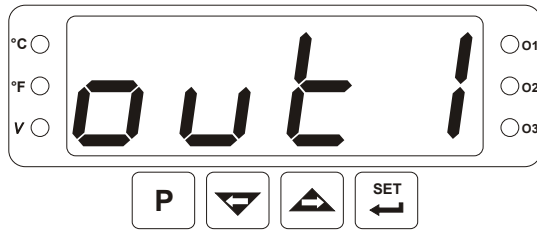
Note-5 : It can be observed if logic output function $\boxed{Lou3}$ is selected $\boxed{0000}$ as alarm output
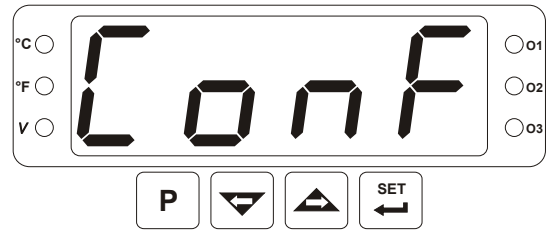
6.5 Accessing to the Technician Menu

The parameters have been divided into groups (sub-menus) according to their functions. Every group has a title and the first user must determine the title (menu) for accessing to the parameters. Refer to the parameters section for detailed information about parameters.

Operation Screen

When Menu button is pressed, Technician Menu Entering screen is shown

Important Note:

When `tCPS` screen is shown, technician parameters can be seen by pressing SET button without entering password. But parameters can not be changed. Please refer to Section 8.2.7 (Technician Password)

Technician Menu Entering Screen

Press Set button to access to Technician Password Entering Screen

Important Note:
If technician password is not 0, technician password entering screen is shown

Press increment button for entering password

Technician Password (example only)

Enter password with increment and decrement buttons.

Press Set button to confirm password
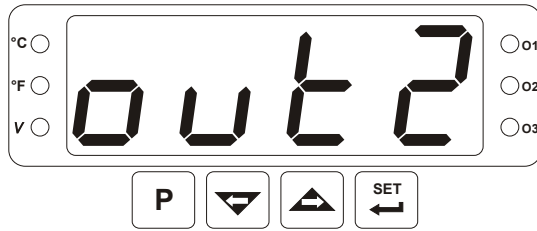
Values that are on the left and right are shown on the screen for short intervals

PINP CONF Menu
Configuration parameters of process input

Technician can access to the following menu by pressing menu changing next button.

This menu is not accessible if there is no module in Module-1 socket

out1

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

Values that are on the left and right are alternately shown on the screen for short intervals

ConF

°C ○ ○o1
°F ○ ○o2
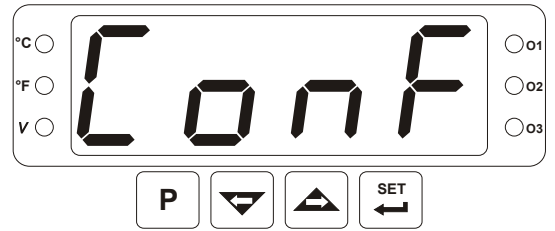V ○   ○o3

P | ▽ | △ | SET ↵

out1 CONF Menu
Configuration parameters of output module in Module-1 socket

Technician can access to the following menu by pressing menu changing next button.

out2

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

Values that are on the left and right are alternately shown on the screen for short intervals

ConF

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

out3

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

Values that are on the left and right are alternately shown on the screen for short intervals

ConF

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

out3 CONF Menu
Configuration parameters of Output-3

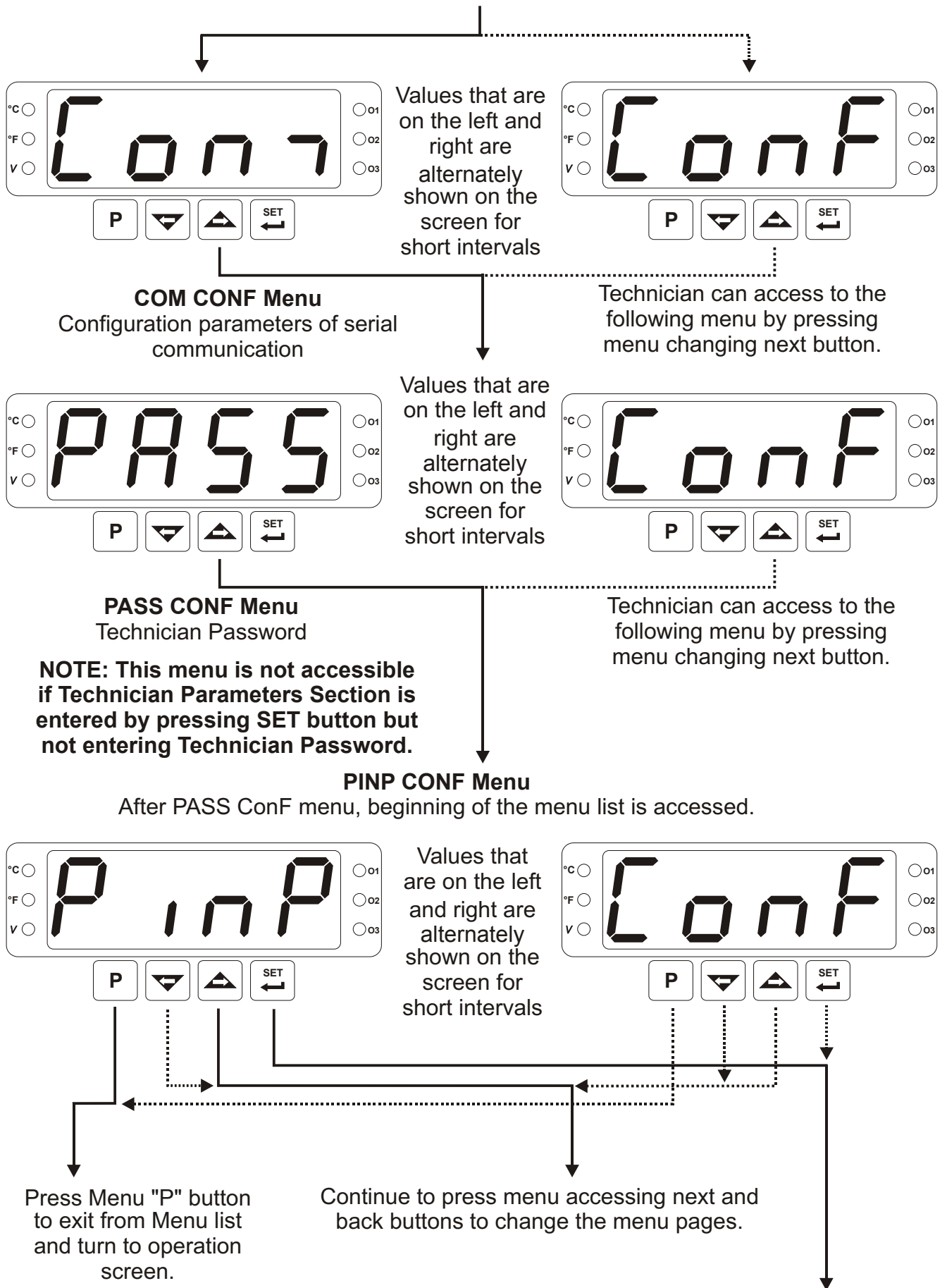Technician can access to the following menu by pressing menu changing next button.

GEnn

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

Values that are on the left and right are alternately shown on the screen for short intervals

ConF

°C ○ ○o1
°F ○ ○o2
V ○   ○o3

P | ▽ | △ | SET ↵

GENN CONF Menu
General Parameters

Technician can access to the following menu by pressing menu changing next button.

Values that are on the left and right are alternately shown on the screen for short intervals

COM CONF Menu
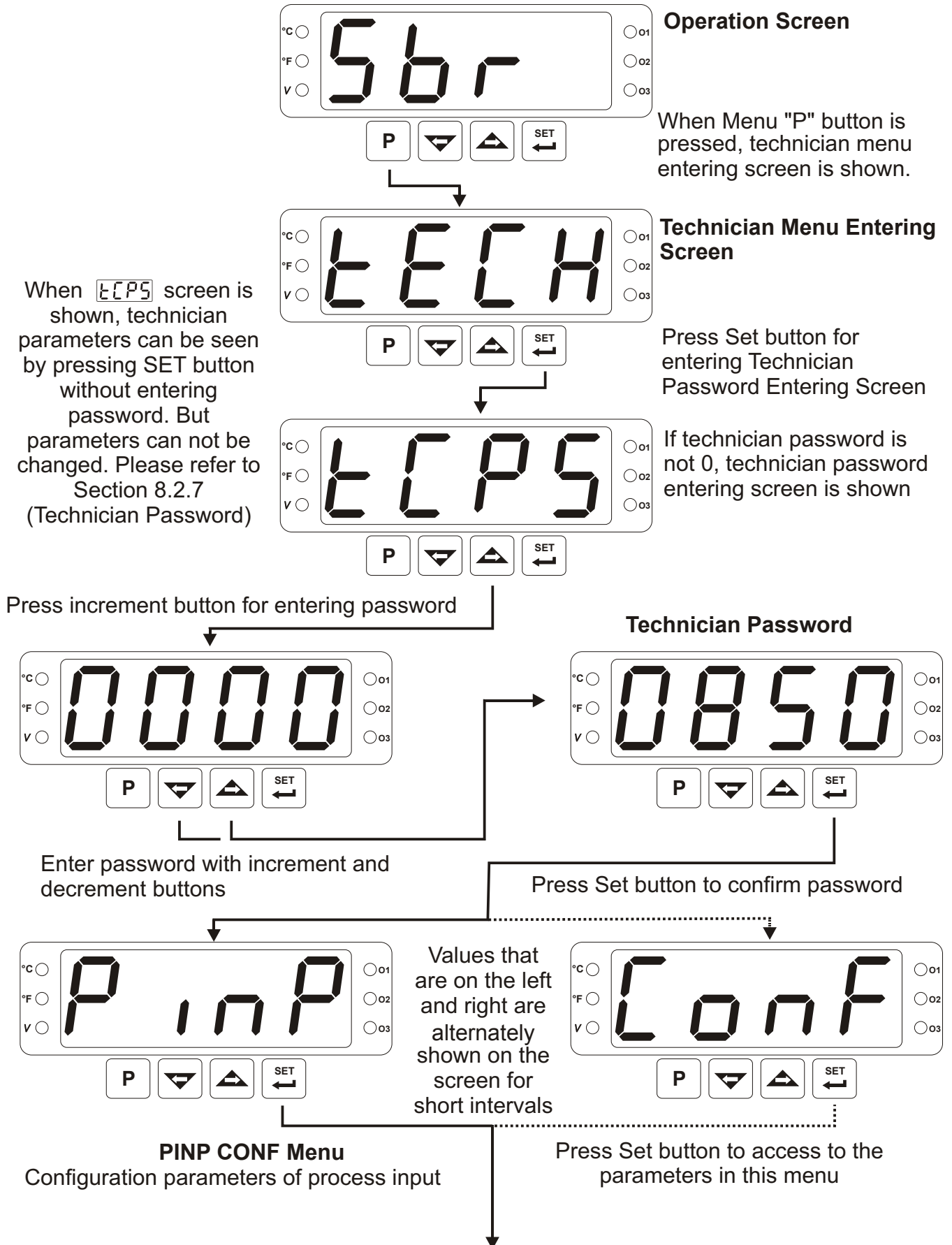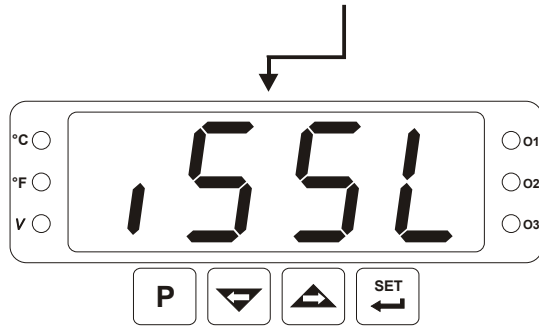Configuration parameters of serial communication

Technician can access to the following menu by pressing menu changing next button.

Values that are on the left and right are alternately shown on the screen for short intervals

PASS CONF Menu
Technician Password

NOTE: This menu is not accessible if Technician Parameters Section is entered by pressing SET button but not entering Technician Password.

Technician can access to the following menu by pressing menu changing next button.

PINP CONF Menu
After PASS ConF menu, beginning of the menu list is accessed.

Values that are on the left and right are alternately shown on the screen for short intervals

Press Menu "P" button to exit from Menu list and turn to operation screen.

Continue to press menu accessing next and back buttons to change the menu pages.

By pressing Set button, user accesses to the menu page and to all parameters in this menu page.

6.6 Changing and Saving Parameters

Example-1 : To change Process Input Type parameter `ıSSL` in "PınP Conf" menu, user must access to PınP ConF menu first.
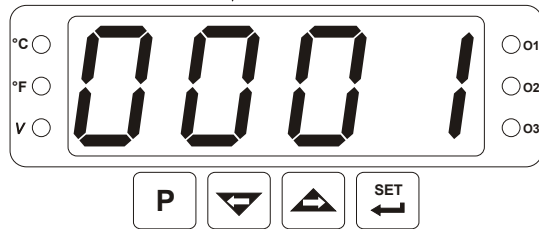
Operation Screen

When Menu "P" button is pressed, technician menu entering screen is shown.
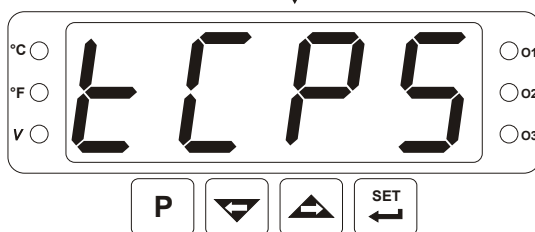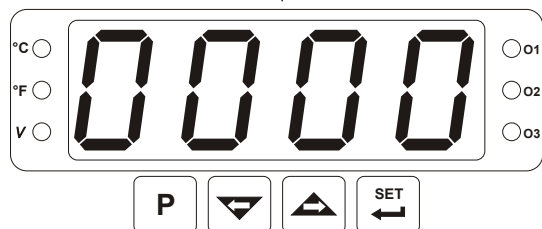
Technician Menu Entering Screen

When `tCPS` screen is shown, technician parameters can be seen by pressing SET button without entering password. But parameters can not be changed. Please refer to Section 8.2.7 (Technician Password)

Press Set button for entering Technician Password Entering Screen

If technician password is not 0, technician password entering screen is shown

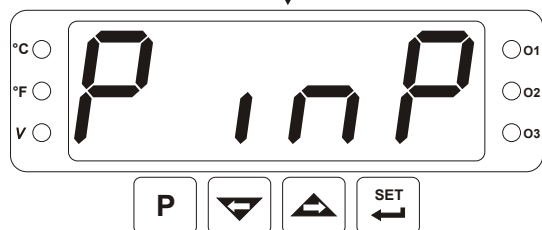Press increment button for entering password
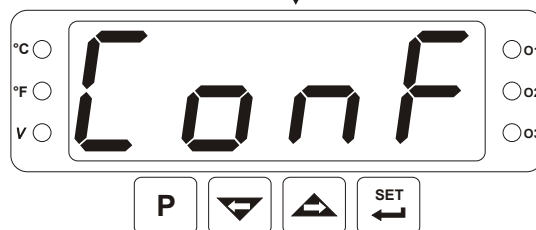
Technician Password

Enter password with increment and decrement buttons

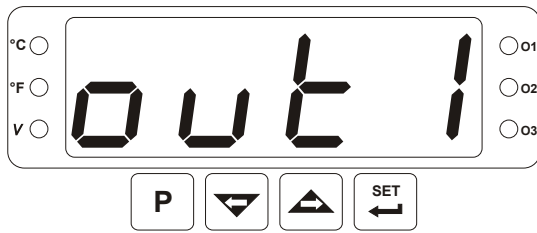Press Set button to confirm password

Values that are on the left and right are alternately shown on the screen for short intervals

PINP CONF Menu
Configuration parameters of process input

Press Set button to access to the parameters in this menu

Process Input Type Selection

```
°C ○                    ○ O1
°F ○    i 5 5 L         ○ O2
 V ○                    ○ O3
      [ P ][ ▽ ][ △ ][ SET ]
```

Press increment button to access to the parameter

Value on the display starts to flash

```
°C ○                    ○ O1
°F ○    0 0 0 1         ○ O2
 V ○                    ○ O3
      [ P ][ ▽ ][ △ ][ SET ]
```

Selection of Process Input Type
`i55L` is `0001` means, input type is RTD.

Parameter can be changed with increment and decrement buttons

Value on the display starts to flash

```
°C ○                    ○ O1
°F ○    0 0 0 0         ○ O2
 V ○                    ○ O3
      [ P ][ ▽ ][ △ ][ SET ]
```
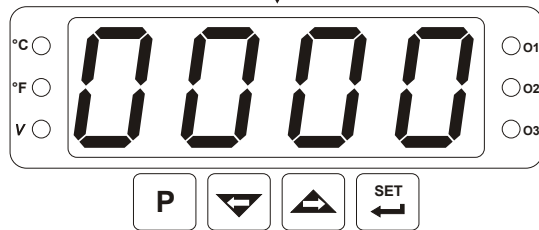
Process Input Type Selection
TC input type is selected

Press Set button to confirm the parameter and access to the next parameter

```
°C ○                    ○ O1
°F ○    t C 5 L         ○ O2
 V ○                    ○ O3
      [ P ][ ▽ ][ △ ][ SET ]
```

TC Input Type Selection

If Menu "P" button is pressed again, operation screen is shown.

Press Set button to access to the next parameter

```
°C ○                    ○ O1
°F ○    u n  i t        ○ O2
 V ○                    ○ O3
      [ P ][ ▽ ][ △ ][ SET ]
```

Unit Selection

PINP CONF Menu
Press Menu "P" button to access to
the menu pages

°C ○	○ O1
°F ○	○ O2
V ○	○ O3

P ▽ △ SET

Values that
are on the left
and right are
alternately
shown on the
screen for
short intervals

°C ○	○ O1
°F ○	○ O2
V ○	○ O3

P ▽ △ SET

Press menu changing next or menu changing back
button to access to the other menus

If Menu "P" button is pressed
again, operation screen is
shown.

°C ●	○ O1
°F ○	○ O2
V ○	○ O3

P ▽ △ SET
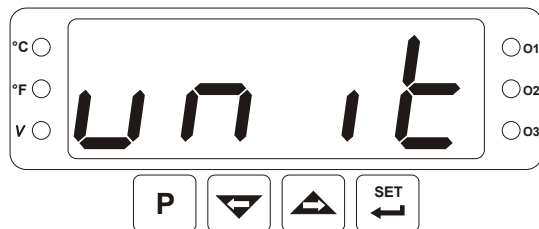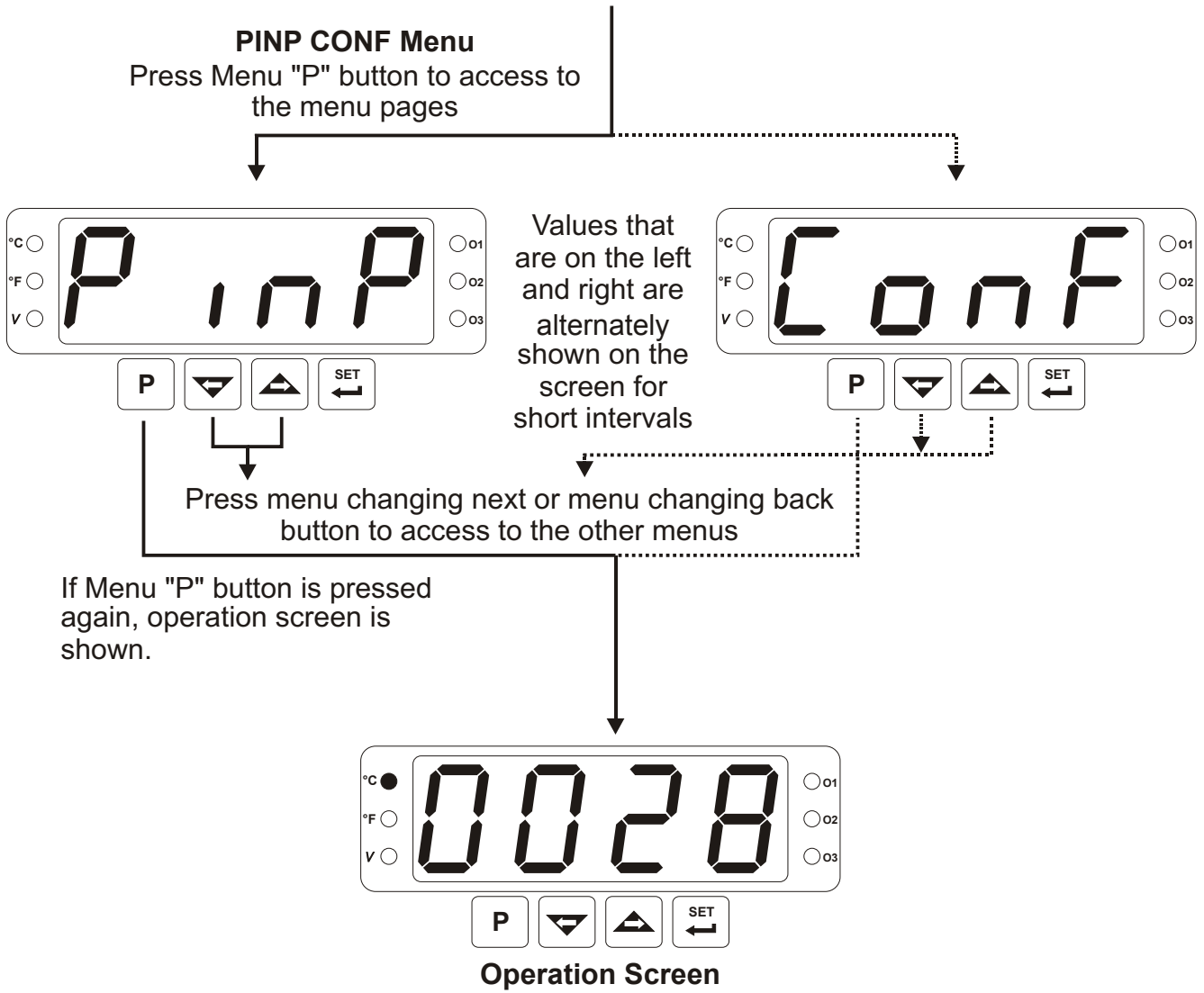
Operation Screen

EXAMPLE-2 : To change Alarm Type parameter $\boxed{RLt3}$ in "out3 Conf" menu, user must access to out3 Conf menu first.

Operation Screen

When Menu "P" button is pressed, technician menu entering screen is shown.

Technician Menu Entering Screen

Important Note: When $\boxed{tCPS}$ screen is shown, technician parameters can be seen by pressing SET button without entering password. But parameters can not be changed. Please refer to Section 8.2.7 (Technician Password)

Press Set button for accessing Technician Password Entering Screen

Note: If technician password is not 0, technician password entering screen is shown

Press increment button for entering password

Technician Password

Enter password with increment and decrement buttons

Press Set button to confirm password

Values that are on the left and right are alternately shown on the screen for short intervals

PINP CONF Menu
Configuration parameters of process input

Technician can access to the following menu by pressing menu changing next button.

This menu is not accessible if there is no module in Module-1 socket

out 1

Values that are on the left and right are alternately shown on the screen for short intervals
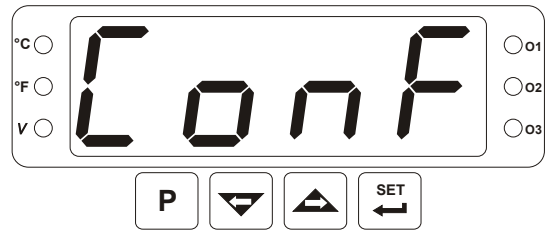
ConF

out1 CONF Menu
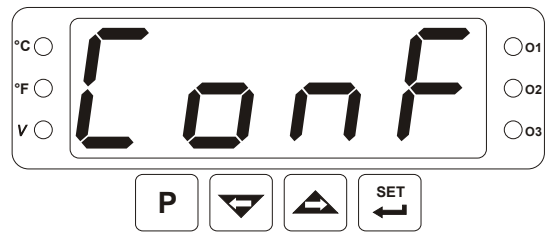Configuration parameters of output module in Module-1 socket

Technician can access to the following menu by pressing menu changing next button.
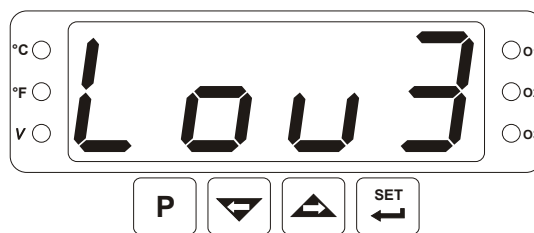
out2

Out 2 is not used on this model

ConF

Values that are on the left and right are alternately shown on the screen for short intervals

out3

ConF

out3 CONF Menu
Configuration parameters of Output-3

Press Set button to access to the parameter

Lou3

Logic Output Function Selection

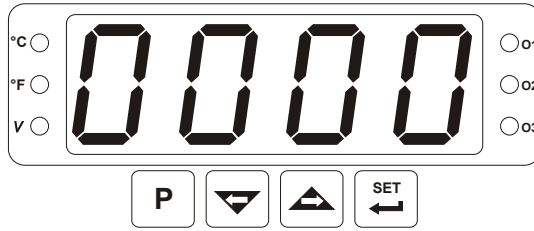Logic Output Function Selection must be 0000

Press Set button to access to the next parameter

ALt3

Alarm Type Selection

Press increment button to access to the parameter

39

**Value on the display
starts to flash**

```
[ 0000 ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```
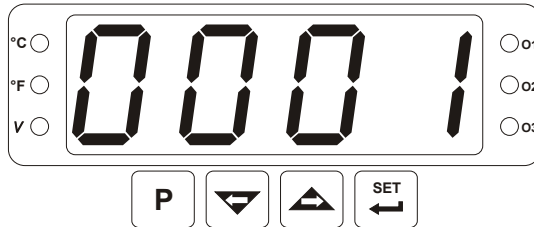
Alarm Type Selection

Process high alarm

Parameter can be changed
with increment and
decrement buttons

**Value on the display
starts to flash**

```
[ 0001 ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

Alarm Type Selection

Process Low alarm

Press Set button to confirm
the parameter and access
to the next parameter

```
[ ALH3 ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

**Alarm Hysteresis
Selection**

Press Set button to access
to the next parameter

**Out3 CONF
Menu**
Press Menu "P"
button to access
to the menu
pages

```
[ Aon3 ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

Alarm On Delay Time

```
[ out3 ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

Values that
are on the left
and right are
alternately
shown on the
screen for
short intervals

```
[ ConF ]
°C ○   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

Continue to press menu accessing next and
back buttons to change the menu pages.

If Menu "P" button is
pressed again, operation
screen is shown.
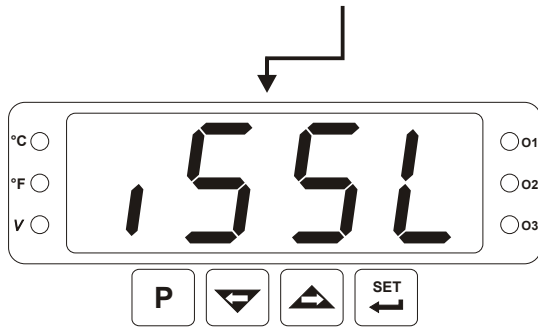
```
[ 0028 ]
°C ●   ○ O1
°F ○   ○ O2
V ○    ○ O3
[P] [▽] [△] [SET↵]
```

Operation Screen

Example-3 : To change $\overline{\underline{\underline{}}}$ Voltage/Current Input Calibration Type parameter `uCAL` in "PınP Conf" menu

`uCAL` Parameter is on "PınP ConF" menu. For accessing to this parameter, technician must access to "PınP ConF" menu first. In this example, changing input type of a device from thermocouple to $\overline{\underline{\underline{}}}$Voltage/Current and dual point calibration selection is shown.

Operation Screen

When Menu "P" button is pressed, technician menu entering screen is shown.

Important Note:

When `tCPS` screen is shown, technician parameters can be seen by pressing SET button without entering password. But parameters can not be changed. Please refer to Section 8.2.7 (Technician Password)

Technician Menu Entering Screen

Press Set button for accessing Technician Password Entering Screen

Note: If technician password is not 0, technician password entering screen is shown

Press increment button for entering password

Technician Password (example only)

Enter password with increment and decrement buttons

Press Set button to confirm password

Values that are on the left and right are alternately shown on the screen for short intervals

PINP CONF Menu
Configuration parameters of process input

Press Set button to access to the parameters in this menu

Process Input Type Selection

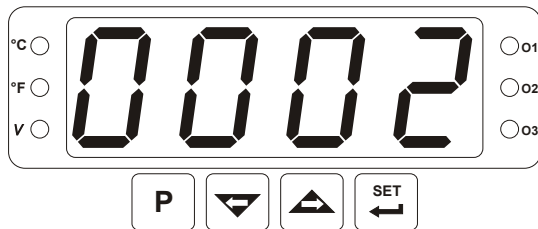Press increment button to access to the parameter

Value on the display starts to flash

Process Input Type Selection

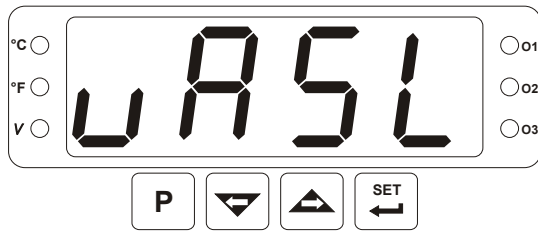Parameter can be changed with increment and decrement buttons

Value on the display starts to flash
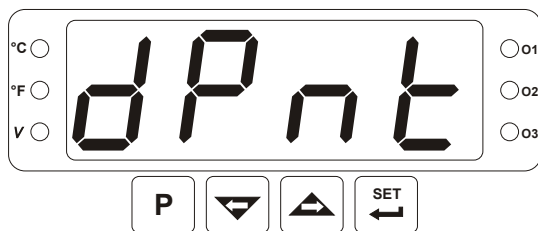
Process Input Type Selection

For accessing to `uCAL` Parameter, `iSSL` parameter must be `0002`. If it is not `0002` change the parameter as `0002` with increment button
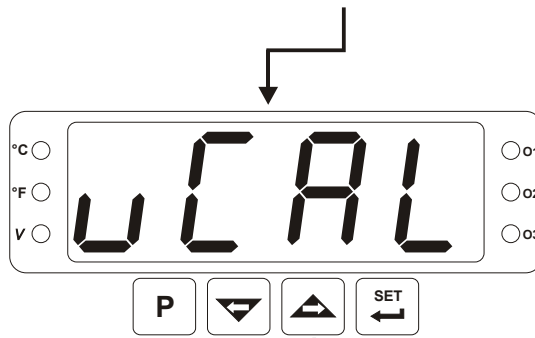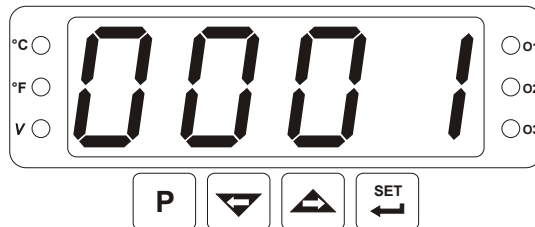
Press Set button to confirm the value and access to the next parameter

═Voltage / Current Input Type Selection

Press Set button to access to the next parameter

Decimal Point Position

Press Set button to access to the next parameter

--- **Voltage/Current Input Calibration Type Selection**

Press increment button to access to the parameter

Value on the display starts to flash

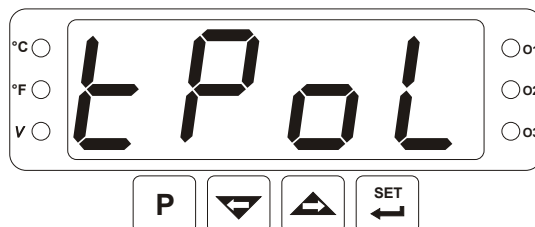--- **Voltage/Current Input Calibration Type Selection**

Parameter can be changed with increment and decrement buttons

Value on the display starts to flash
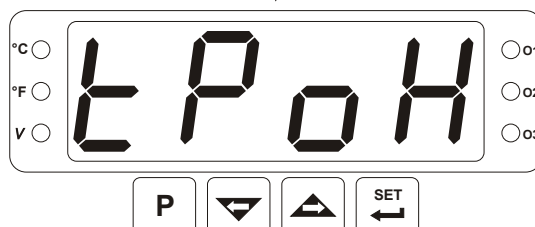
--- **Voltage/Current Input Calibration Type Selection**

Press Set button to confirm the value and access to the next parameter

Minimum value for selectable dual point calibration (zero)

Press Set button to access to the next parameter

Press Menu button to access to menu pages

Maximum value for selectable dual point calibration (full scale)

NOTES

$\boxed{tPoL}$ is analog input zero process variable

$\boxed{tPoH}$ is analog input full scale process variable

PINP CONF Menu
If Menu button is pressed again,
operation screen is shown.

```
°C ○   P ı n P   ○ o1
°F ○            ○ o2
v ○            ○ o3
     P  ▽  △  SET↵
```

Values that
are on the left
and right are
alternately
shown on the
screen for
short intervals

```
°C ○   C o n F   ○ o1
°F ○            ○ o2
v ○            ○ o3
     P  ▽  △  SET↵
```

Continue to press menu accessing next and back
buttons to change the menu pages.

If Menu "P" button is pressed
again, operation screen is
shown.

```
°C ●  -199.9  ○ o1
°F ○          ○ o2
v ○          ○ o3
    P  ▽  △  SET↵
```

Operation Screen

7. Parameters

Parameters are divided into two groups. These are Alarm Set and Technician parameters. Technician parameters are groupped into subgroups according to their functions. The subgroups are named as menu pages.

7.1 Alarm SET Parameters

`ALr3` If OUTPUT-3 relay output module is configured as alarm output, this parameter defines the set value of the alarm output.

`ALr3` Set value can be adjusted from minimum value of set scale
`SU-L` to maximum value of set scale `SU-u`

NOTES

`SU-L` defines the operators minimum permitted setpoint value for the process variable

`SU-u` defines the operators maximum permitted setpoint value for the process variable

7.2 Technician Parameters

`P inP` `ConF`

7.2.1 Process Input Type and Relevant Parameters with Process Input

`iSSL` Defines the process input type.

`0000` TC input type selection

`0001` RTD input type selection

`0002` ===Voltage/Current input type selection.

`iSSL` `0000` → `tCSL` Defines type and scale of the thermocouple for TC input. It is active if TC input type is selected.

`0000` L (-100°C;850°C) or (-148°F;1562°F)

`0001` L (-100.0°C;850.0°C) or (-148.0°F;999.9°F)

`0002` J (-200°C;900°C) or (-328°F;1652°F)

`0003` J (-199.9°C;900.0°C) or (-199.9°F;999.9°F)

`0004` K (-200°C;1300°C) or (-328°F;2372°F)

`0005` K (-199.9°C;999.9°C) or (-199.9°F;999.9°F)

`0006` R (0°C;1700°C) or (32°F;3092°F)

`0007` R (0.0°C;999.9°C) or (32.0°F;999.9°F)

`0008` S (0°C;1700°C) or (32°F;3092°F)

`0009` S (0.0°C;999.9°C) or (32.0°F;999.9°F)

`0010` T (-200°C;400°C) or (-328°F;752°F)

`0011` T (-199.9°C;400.0°C) or (-199.9°F;752.0°F)

`0012` B (44°C;1800°C) or (111°F;3272°F)

`0013` B (44.0°C;999.9°C) or (111.0°F ; 999.9°F)

`0014` E (-150°C;700°C) or (-238°F;1292°F)

`0015` E (-150.0°C;700.0°C) or (-199.9°F;999.9°F)
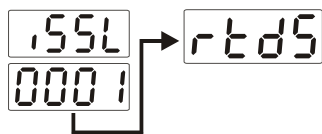
`0016` N (-200°C;1300°C) or (-328°F;2372°F)

`0017` N (-199.9°C;999.9°C) or (-199.9°F;999.9°F)
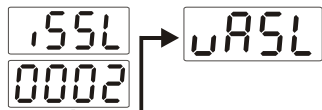
`0018` C (0°C;2300°C) or (32°F;3261°F)

`0019` C (0.0°C;999.9°C) or (32.0°F;999.9°F)

`ıSSL` `0001` → `rtdS`	Defines type and scale of sensor for RTD input. It is active if RTD input is selected.

`0000` Sensor type : PT-100
Scale: -200°C to 650°C (If unit is °C)
Scale: -328°F to 1202°F (If unit is °F)

`0001` Sensor type : PT-100
Scale: -199.9°C to 650.0°C (If unit is °C)
Scale: -199.9°F ile 999.9°F (If unit is °F)

`ıSSL` `0002` → `uASL` Defines input range and scale of ▬▬Voltage/Current input.It is active if ▬▬Voltage/Current is selected.

`0000` 0...50mV▬▬ (-1999 ; 9999)

`0001` 0...5V▬▬ (-1999 ; 9999)

`0002` 0...10V▬▬(-1999 ; 9999)

`0003` 0...20mA▬▬ (-1999 ; 9999)

`0004` 4...20mA▬▬ (-1999 ; 9999)

→ `dPnt` Defines point position for displays. It is active if ▬▬Voltage/Current input is selected.

`0000` No point

`0001` 000.0

`0002` 00.00

`0003` 0.000

→ `uCAL` It is active when ▬▬Voltage/Current input is selected. It determines calibration type.

`0000` Fixed dual point calibration is done. It does not allow to adjust minimum and maximum value of calibration points. It can be adjusted from -1999 to 9999.

`0001` It allows to do selectable dual point calibration. (i.e. zero and full scale)

`0002` It allows to define 16 calibration points.
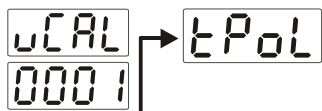
`uCAL` `0001` → `tPoL` * It defines minimum value (zero) for selectable dual point calibration. It is active if ▬▬Voltage/Current input is selected. It can be adjusted from -1999 to 9999.
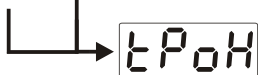
→ `tPoH` * It defines maximum value (full scale) for selectable dual point calibration. It is active if ▬▬Voltage/Current is selected. It can be adjusted from -1999 to 9999.

`uCAL` `0002` → `Po00` ⋮ → `Po16`
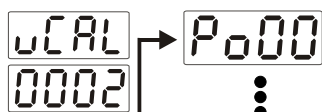
In multi point calibration, calibration points are defined with these parameters. It is active if ▬▬Voltage /Current is selected. It can be adjusted from -1999 to 9999.
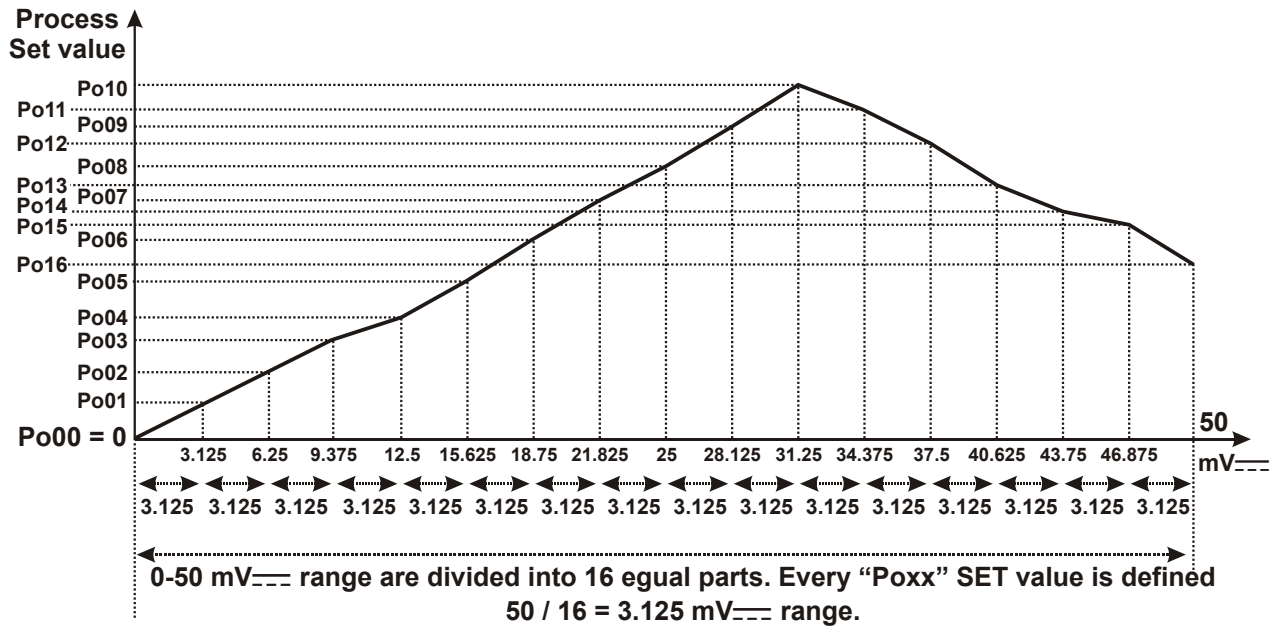
In multi point calibration operation, defined scale is divided into 16 calibration points.

For example : `uASL` is, `0000` (0-50 mV▬▬) .

*NOTES

`tPoL` is analog input zero process variable

`tPoH` is analog input full scale process variable

Process Set value

Po10
Po11
Po09
Po12
Po08
Po13
Po07
Po14
Po15
Po06
Po16
Po05
Po04
Po03
Po02
Po01
Po00 = 0

3.125 6.25 9.375 12.5 15.625 18.75 21.825 25 28.125 31.25 34.375 37.5 40.625 43.75 46.875

50

mV═

3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125 3.125

0-50 mV═ range are divided into 16 egual parts. Every "Poxx" SET value is defined
50 / 16 = 3.125 mV═ range.

---

iSSL 0002 → CoEF	Coefficient value for ═Voltage/Current input. Process value is multiplied with this value.

It is active if ═Voltage/Current input is selected. It can be adjusted from 1.000 to 9.999. (default = 1.000)

unit — Unit selection

°C — Unit is °C

°F — Unit is °F

iSSL 0002	U — Unit is U. It is active if ═Voltage/Current input is selected
	- — No unit. It is active if ═Voltage/Current input is selected

LoL — Minimum value of operating scale. It can be changed according to input type and scale of the process. (zero for analog out)

uPL — Maximum value of operating scale. It can be changed according to input type and scale of the process. (full scale for analog out)

PUoF — Display offset for process value. It can be adjusted -10% to +10% of scale. The defined value is added to process value.

iFLt — Defines filter time for input signal. It can be adjusted from 0.0 to 900.0.

iSSL 0000 → CJnC	It is active if process input is selected TC input. It decides if cold junction compensation is active or not.

YES — Cold junction compensation is active.

no — Cold junction compensation is not active.

| `out 1`	**7.2.2 MODULE-1 Configuration Parameters**
`ConF`	**Module-1 configuration parameters are arranged automatically by the device according to the module type in Module-1 socket. These parameters are not accessible if there is no module in Module-1 socket.**

`Lou 1` **It determines logic output function of the output module in Module-1 socket**

`oАt 1` **Configuration of analog output module**

`out 1 ConF`

(i) **These parameters are active if mL-CO4/20 (0/4...20 mA⎓ Current Output) module is plugged in Module-1 socket.**
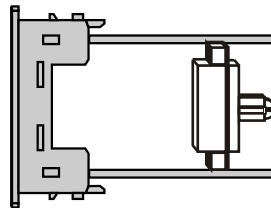
mL-CO4/20

`out 1`
`ConF`

`oАt 1`   Configuration of analog output module in Module-1 socket.

`0000`   0...20mA output or 0...10V⎓ according to Section 5.1.5 is selected.

`0001`   4...20mA output or 2...10V⎓ according to Section 5.1.5 is selected.

Scale

Re-transmission

UPL

LOL

0   20   mA
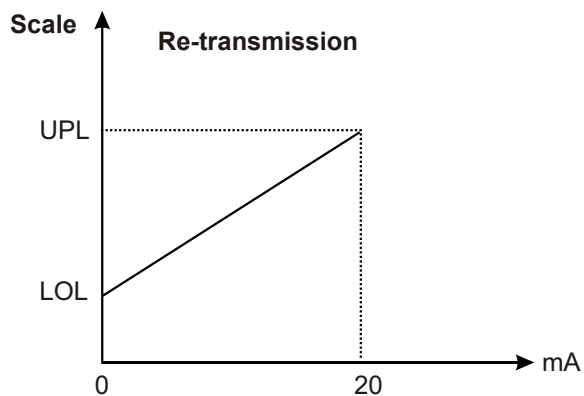
7.2.3 OUTPUT-3 Configuration Parameters

| Lou3 | **It determines logic output function of Output-3** |

| 0000 | Alarm output |

| 0001 | Sensor break alarm output |

| 0002 | Output is active when the process value is out of the band which is defined with minimum value of operating scale LoL and maximum value of operating scale uPL |

Lou3 0000 → ALt3

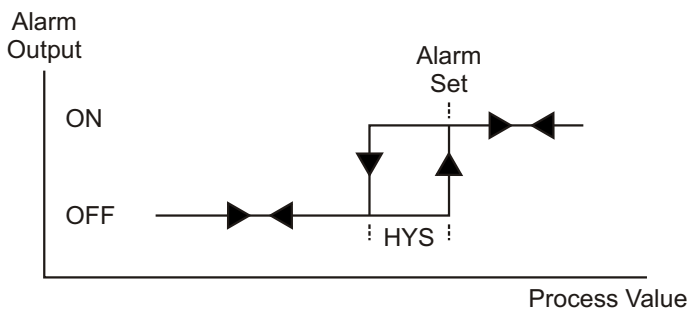It determines alarm type. It is active if logic output function of Output-3 is alarm output.
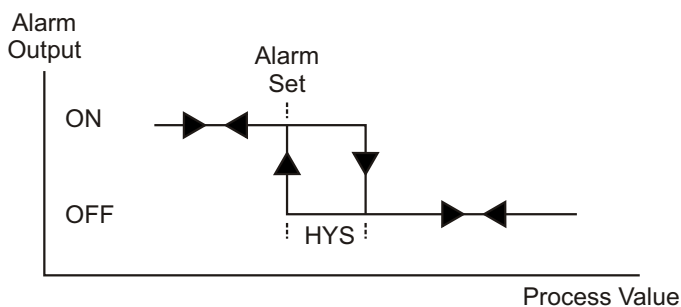
| 0000 | Process high alarm |

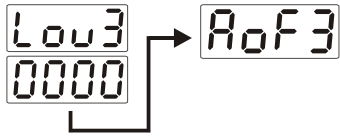| 0001 | Process low alarm |

Process high alarm


Process low alarm

Lou3 0000 → ALH3

Alarm- 3 hysteresis value. It is active if logic output function of Output-3 is alarm output.

It can be adjusted from 0% to 50% of process input scale (uPL - LoL)

→ Aon3

Alarm on delay time. It can be adjusted from 0 to 9999 seconds. It is active if logic output function of Output-3 is alarm output.

`Lou3` `0000` → `AoF3` Alarm off delay time. It can be adjusted from 0 to 9998 seconds. When the value is greater than 9998, `LtCH` is seen on the display. It means alarm latching output is selected. It is active if logic output function of Output-3 is alarm output.
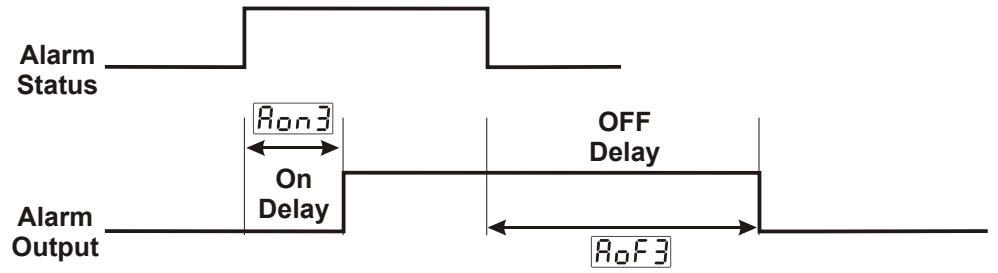
`GEnn`
`ConF`

7.2.4 General Parameters

`SU-L` Minimum value for process set and alarm set values. It is named as low limit of set scale.
It can be adjusted from low limit of input selected with `iSSL` parameter to `SU-u` parameter.
Please refer to Section 8.2.1 Process Input Type and Relevant Parameters with Process Input for `iSSL` parameter

`SU-u` Maximum value for process set and alarm set values. It is named as high limit of set scale.
It can be adjusted from `SU-L` to high limit of input selected with `iSSL` Parameter.
Please refer to Section 8.2.1 Process Input Type and Relevant Parameters with Process Input for `iSSL` parameter

Note: Operator entry of alarms are restricted to be between `SU-L` and `SU-u`

`Conn`
`ConF`

7.2.5 Parameters for Configuration of Serial Communication

`SAdr` **Communication Accessing Address**

Communication accessing address of device. It can be adjusted from 1 to 247.

`bAud` **Communication Baud Rate**

`0000` 1200 Baud Rate

`0001` 2400 Baud Rate

`0002` 4800 Baud Rate

`0003` 9600 Baud Rate

`0004` 19200 Baud Rate

`Prty` **Parity Selection for Communication**

`0000` No parity

`0001` Odd Parity

`0002` Even Parity

`StPb` **Stop Bit Selection for Communication**

`0000` 1 Stop Bit

`0001` 2 Stop Bits

`PASS` `ConF`

`tCPS` It is used for accessing to the technician parameters.
It can be adjusted from 0 to 9999.

If it is `0000`; there is no password protection while entering to the technician parameters.

If it is different from "0" and user wants to access to the technician parameters;
1- If user does not enter `tCPS` password correctly:
It turns to operation screen without entering to operator parameters.

2- When `tCPS` in top display and `0000` in bottom display, if user presses SET button without entering `tCPS` password (For observing parameters)
User can see all menus and parameters except Operator and Technician Password menu ("Pass Conf") but parameters can not be changed.
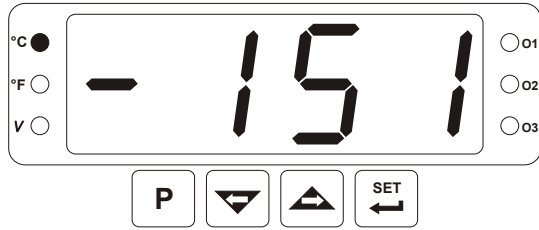(Please refer to Section 9. Failure Messages (4) in mL-PI8 Process Indicators)

3- Consult factory if password is lost and unit is locked.

8..Failure Messages in mL-PI8 Process Indicator
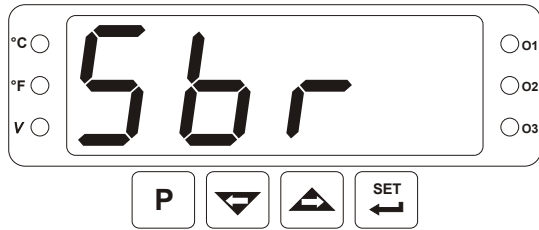
1 - Sensor failure in analog inputs. Sensor connection is wrong or there is no sensor connection.
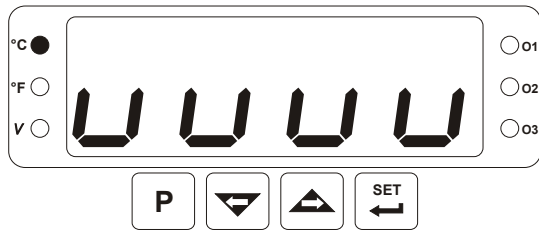

2 - If display blinks : If analog input value is less than minimum value of operating scale $\boxed{LoL}$ then display starts to blink. (out of range - below zero)
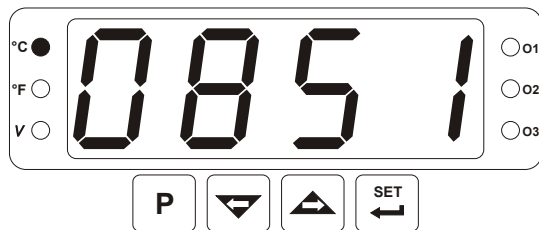
In "PınP Conf" Menu suppose that;

$\boxed{iSSL}$ $\boxed{0000}$; $\boxed{tCSL}$ $\boxed{0002}$; $\boxed{unit}$ $\boxed{°C}$;
$\boxed{LoL}$ $\boxed{-200}$; $\boxed{uPL}$ $\boxed{0900}$ are defined.
Adjust $\boxed{LoL}$ $\boxed{-150}$

If analog input value is less than minimum value of operating scale $\boxed{LoL}$, then display starts to blink.

 Please refer to Section 8.2.1 for detailed information about this parameter.

3 - If display blinks : If analog input value is greater than maximum value of operating scale $\boxed{uPL}$, then display starts to blink.
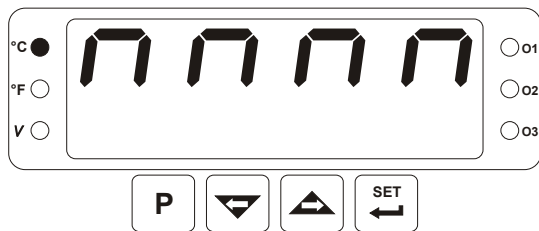
In "PınP Conf" Menu ;

$\boxed{iSSL}$ $\boxed{0000}$; $\boxed{tCSL}$ $\boxed{0002}$; $\boxed{unit}$ $\boxed{°C}$;
$\boxed{LoL}$ $\boxed{-200}$; $\boxed{uPL}$ $\boxed{0900}$
Adjust $\boxed{uPL}$ $\boxed{0850}$

If analog input value is greater than maximum value of operating scale $\boxed{uPL}$ then display starts to blink. (out of range - above full scale)

 Please refer to Section 8.2.1 for detailed information about this parameter.
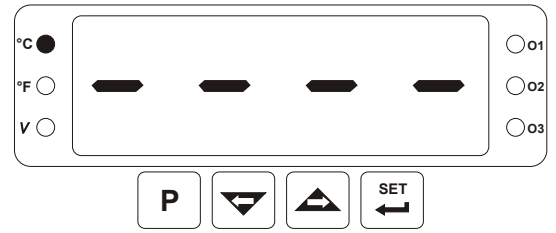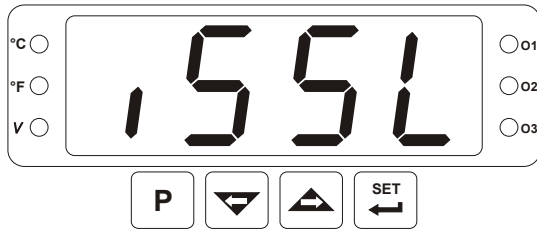
4 - If technician password is different from "0" and user accesses to the parameter by Set button without entering the technician password and wants to change a parameter, the warning message is shown on the display as shown on the left. Device does not allow to do any changes without entering the password correctly.

5 - If user does not do anything for 120 seconds while device is on Set or Technician menus, device returns to operation screen.

9. Specifications

Device Type	: Process Indicator
Housing&Mounting	: 96mm x 48mm x 86.5mm 1/8 DIN 43700 plastic housing for panel mounting. Panel cut-out is 92x46mm. Type-1 Enclosure Mounting.
Protection Class	: NEMA 4X (IP65 at front, IP20 at rear).
Weight	: Approximately 0.21 Kg.
Environmental Ratings	: Standard, indoor at an altitude of less than 2000 meters with none condensing humidity.
Storage/Operating Temperature	: -40 $^{\circ}$C to +85 $^{\circ}$C / 0 $^{\circ}$C to +50 $^{\circ}$C
Storage/Operating Humidity	: 90 % max. (None condensing)
Installation	: Fixed installation
Over Voltage Category	: II
Pollution Degree	: II, office or workplace, none conductive pollution :
Operating Conditions	Continuous
Supply Voltage and Power	: 100 - 240 V $\sim$ (-15% / +10%) 50/60 Hz. 6VA (standard) 24 V $=$ (-15% / +10%) 6W (optional)
Process Inputs	: Universal input TC, RTD, $=$Voltage/Current
Thermocouple Input Types	: Selectable by parameters L (DIN43710) , J ,K ,R ,S ,T ,B ,E ,N (IEC584.1)(ITS90) , C (ITS90)
Thermoresistance (RTD) Input Types	: PT 100 (IEC751) (ITS90)

▬ **Voltage Input Types**	: Selectable by parameters 0...50mV ▬, 0...5V ▬, 0...10V ▬
▬ **Current Input Types**	: Selectable by parameters 0...20mA ▬, 4...20mA ▬
Accuracy	: ± 0.25% of full scale for thermocouple, thermoresistance and voltage,
	± 0.70% of full scale for current.
Cold Junction Compensation	: Automatically ± 0.1°C/1°C.
Line Compensation	: Maximum 10 . (RTD lead wire compensation)
Sensor Break Protection	: Upscale
Sampling Cycle	: 3 samples per second
Input Filter	: 0.0 to 900.0 seconds
Control Form	: Programmable ON / OFF.
Standard Relay Output	: 5A@250V∿ at resistive load (Programmable control or alarm output) (Electrical Life : 100,000 Operation (Full Load))
Optional Relay Output	: Optional Form A Relay Output (3A@250V∿at resistive load)
Analog Output	: 0/4...20 mA Current Output
Standard Communication Module	: mL--410 RS-485 Communication Module
Optional Communication Module	: mL--400 RS-232 Communication Module
Communication Protocol	: MODBUS-RTU
Process Display	: 20.3 mm Red 4 digit LED display
Led Indicators	: O1 / 2 / 3 (Outputs) LEDs, °C / °F / V unit LEDs
Approvals	: UL Recognized Component (File No : E 254103), ЕАЭ, C E

10. Other Informations

Company Information:
Kessler-Ellis Products
10 Industrial Way East
Eatontown, NJ 07724

Phone:	800-631-2165 or 732-649-7100
Fax:	732-649-7099
Email:	info@kep.com
Web:	www.kep.com

KEPmLINE