⊕EMKO

ESM-7700 72 x 72 DIN Size
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 or Process Control by Using 0/4...20 mA$\overline{}$ Current Output Module*
- *Hardware Configuration With Output Modules*
- *RS-232 (standard) or RS-485 (optional) Serial Communication With Modbus RTU Protocol*

ABOUT INSTRUCTION MANUAL

Instruction manual of ESM-7700 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.
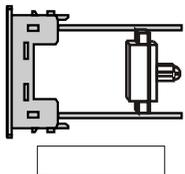
In parameters section, for making relevant parameters to be active, determined module must be installed to Module-1 or Module-2 socket.

CONTENTS

EU DECLARATION OF CONFORMITY

Manufacturer Company Name : Emko Elektronik A.S.

Manufacturer Company Address: DOSAB, Karanfil Sokak, No:6, 16369 Bursa, Turkiye

The manufacturer hereby declares that the product conforms to the following standards and conditions.

Product Name : **Process Indicator**

Model Number : **ESM-7700**

Type Number : **ESM-7700**

Product Category : **Electrical equipment for measurement, control and laboratory use**

Conforms to the following directives :

2006 / 95 / EC   The Low Voltage Directive

2004 / 108 / EC   The Electromagnetic Compatibility Directive

has been designed and manufactured to the following specifications :

EN 61000-6-4:2007   EMC Generic Emission Standard for the Industrial Environments

EN 61000-6-2:2005   EMC Generic Immunity Standard for the Industrial Environments

EN 61010-1:2001   Safety Requirements for electrical equipment for measurement, control
                                 And laboratory use

When and Where Issued

16th October 2009

Bursa-TURKEY

Authorized Signature

Name   : Serpil YAKIN

Position   : Quality Manager

1.Preface

ESM 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

Automative

Machine production industries

1.1 General Specifications

ESM-7700

Power Supply Input

Standard

Universal Supply Input
100-240 V~, 50/60Hz

Low Voltage (optional)
Supply Input
24V~ 50/60Hz, 24V===,

Process Input

Universal Process Input
TC, RTD,===Voltage/Current

Relay, SSR Driver ,
Digital (Transistor) ,
Current Output Module

Optional
Output Module-1

Optional
Output Module-2

Alarm Output
Retransmission Output

Standard
Output-3(Relay Output)

Alarm Output

Serial Communication

Standard
RS-232

Optional
RS-485

Baud Rate from 1200-19200

Modbus RTU Protocol

1.2 Ordering Information

ESM-7700 (72x72 DIN SIZE)	A	BC	D	E	/	FG	HI	/	U	V	W	Z
				1	/			/				

A	Supply Voltage
1	100-240V~ (-15%;+10%) 50/60Hz
2	24 V~(-15%;+10%) 50/60Hz 24V⎓(-15%;+10%)
9	Customer (Maximum 240V~ (-15%;+10%)) 50/60Hz

BC	Input Type	Scale
20	Configurable(Table-1)	Table-1

D	Serial Communication	Product Code
0	None	-
1	RS-232	EMC-700
2	RS-485	EMC-710

E	Output-1
1	Relay Output

FG	Module-1	Product Code
00	None	-
01	Relay Output Module	EMO-700
02	SSR Driver Output Module	EMO-710
03	Digital (Transistor) Output Module	EMO-720
04	Current Output Module (0/4 ...20 mA⎓)	EMO-730

HI	Module-2	Product Code
00	None	-
01	Relay Output Module	EMO-700
02	SSR Driver Output Module	EMO-710
03	Digital (Transistor) Output Module	EMO-720
04	Current Output Module (0/4 ...20 mA⎓)	EMO-730

All order information of ESM-7700 are given on the table at left. User may form appropriate device configuration from information and codes that at the table and convert it to the ordering codes.

Firstly, supply voltage then output modules and other specifications must be determined. Please fill the order code blanks according to your needs.

Please contact us, if your needs are out of the standards.

⚠ ～ Symbol means Vac,
⎓ Symbol means Vdc
≂ Symbol means Vac and Vdc

Table-1

BC	Input Type(TC)	Scale(°C)	Scale(°F)
21	L ,Fe Const DIN43710	-100°C,850°C	-148°F ,1562°F
22	L ,Fe Const DIN43710	-100.0°C,850.0°C	-148.0°F,999.9°F
23	J ,Fe CuNi IEC584.1(ITS90)	-200°C,900°C	-328°F,1652°F
24	J ,Fe CuNi IEC584.1(ITS90)	-199.9°C,900.0°C	-199.9°F,999.9°F
25	K ,NiCr Ni IEC584.1(ITS90)	-200°C,1300°C	-328°F,2372°F
26	K ,NiCr Ni IEC584.1(ITS90)	-199.9°C,999.9°C	-199.9°F,999.9°F
27	R ,Pt13%Rh Pt IEC584.1(ITS90)	0°C,1700°C	32°F,3092°F
28	R ,Pt13%Rh Pt IEC584.1(ITS90)	0.0°C,999.9°C	32.0°F,999.9°F
27	S ,Pt10%Rh Pt IEC584.1(ITS90)	0°C,1700°C	32°F,3092°F
28	S ,Pt10%Rh Pt IEC584.1(ITS90)	0.0°C,999.9°C	32.0°F,999.9°F
29	T ,Cu CuNi IEC584.1(ITS90)	-200°C,400°C	-328°F,752°F
30	T ,Cu CuNi IEC584.1(ITS90)	-199.9°C,400.0°C	-199.9°F,752.0°F
31	B ,Pt30%Rh Pt6%Rh IEC584.1(ITS90)	44°C,1800°C	111°F,3272°F
32	B ,Pt30%Rh Pt6%Rh IEC584.1(ITS90)	44.0°C,999.9°C	111.0°F,999.9°F
33	E ,NiCr CuNi IEC584.1(ITS90)	-150°C,700°C	-238°F,1292°F
34	E ,NiCr CuNi IEC584.1(ITS90)	-150.0°C,700.0°C	-199.9°F,999.9°F
35	N ,Nicrosil Nisil IEC584.1(ITS90)	-200°C,1300°C	-328°F,2372°F
36	N ,Nicrosil Nisil IEC584.1(ITS90)	-199.9°C,999.9°C	-199.9°F,999.9°F
37	C , (ITS90)	0°C,2300°C	32°F,3261°F
38	C , (ITS90)	0.0°C,999.9°C	32.0°F,999.9°F

BC	Input Type(RTD)	Scale(°C)	Scale(°F)
39	PT 100 , IEC751(ITS90)	-200°C,650°C	-328°F,1202°F
40	PT 100 , IEC751(ITS90)	-199.9°C,650.0°C	-199.9°F,999.9°F

BC	Input Type (⎓ Voltage and Current)	Scale	
41	0...50 mV⎓	-1999	9999
42	0...5 V⎓	-1999	9999
43	0...10 V⎓	-1999	9999
44	0...20 mA⎓	-1999	9999
45	4...20 mA⎓	-1999	9999

1.3 Warranty

EMKO Elektronik 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 occured during shipment is recommended before installation. It is your responsibility to ensure that 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 the equipment is putted in hole on the metal panel while mechanical installation some metal burrs can cause injury on hands, you must be careful.

Montage of the product on a system must be done with it's mounting clamp. Do not do the montage of the device with inappropriate mounting clamp. Be sure that device will not fall while doing the montage.

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

2.1 General Description

Mounting Clamps   **Product Label**

Terminal protection cover

ESM-7700

Process Indicator

**Front Panel
IP65 protection
NEMA 4X**

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

2.2 Dimensions

Maximum 15mm / 0.59 inch

EMKO   ESM-7700

°C
°F
ν
OP1
OP2
OP3

SET

Process Indicator

72mm / 2.83 inch

72mm / 2.83 inch

11.5 ± 1 mm /0.45 inch   **76mm / 2.99 inch**

97 mm / 3.82 inch (min)

97 mm / 3.82 inch (min)

69mm / 2.72 inch

69mm / 2.72 inch
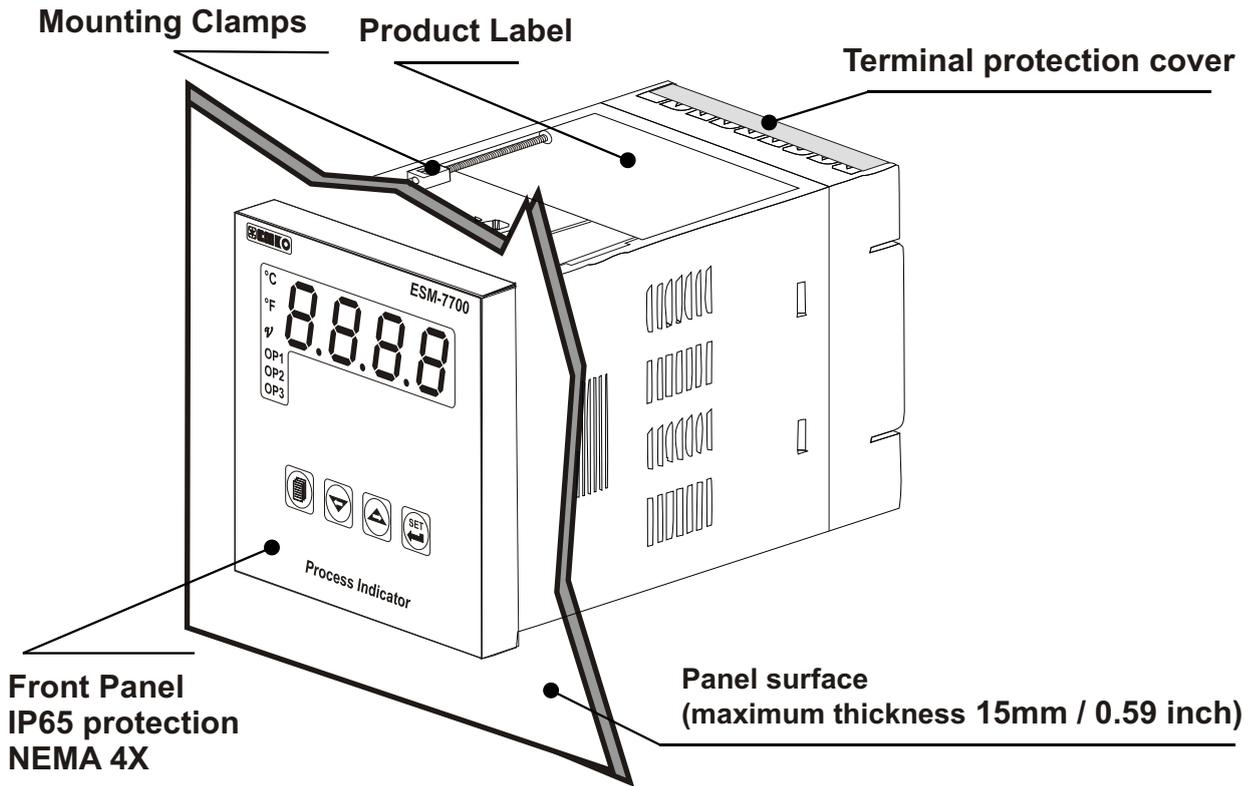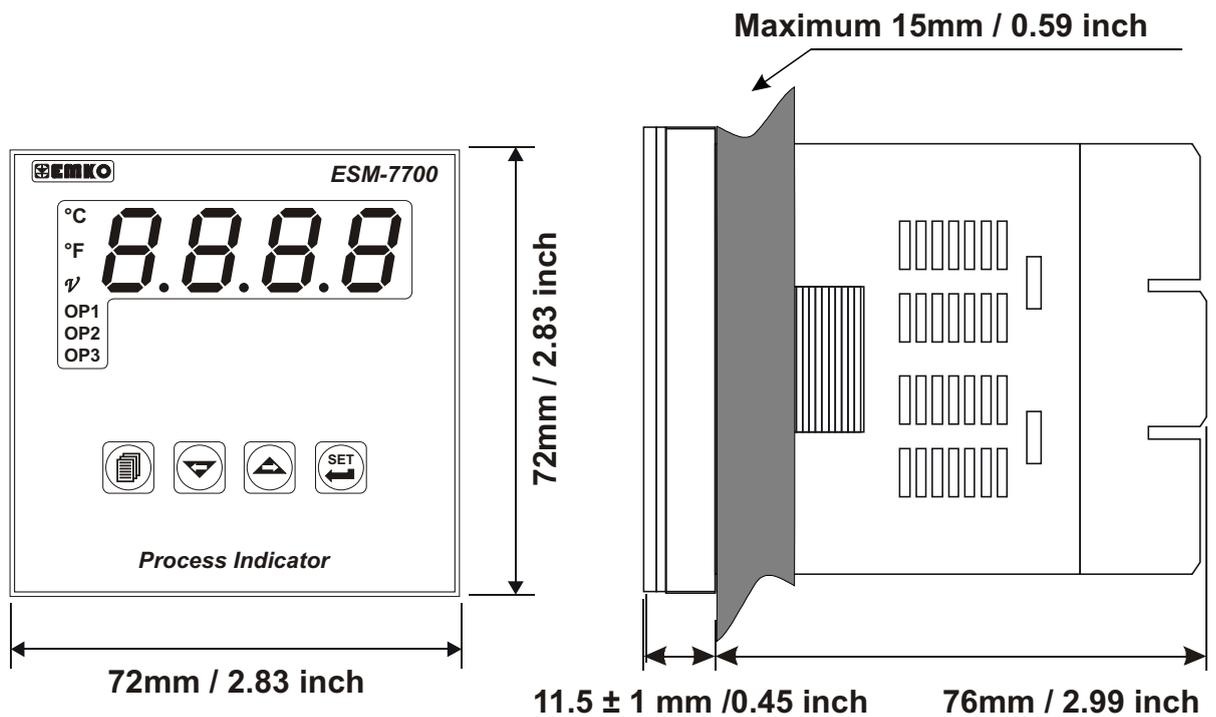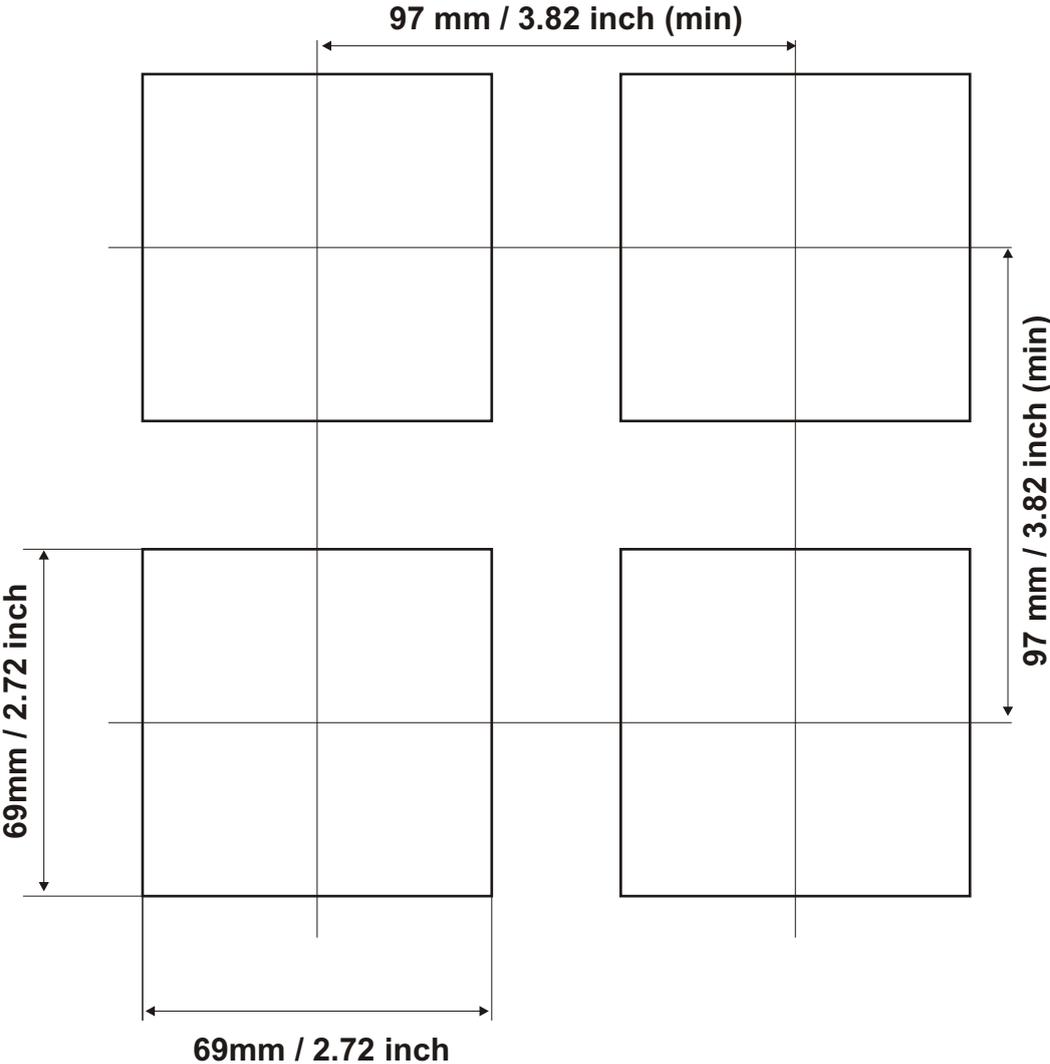
2.4 Environmental Ratings

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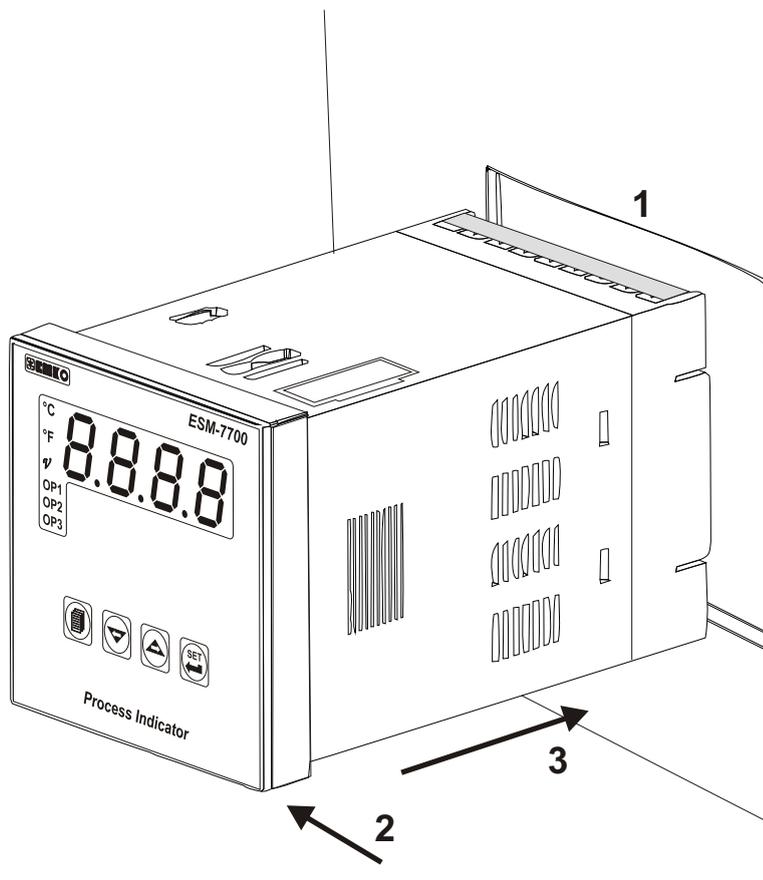
1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

2-Check front panel gasket position

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
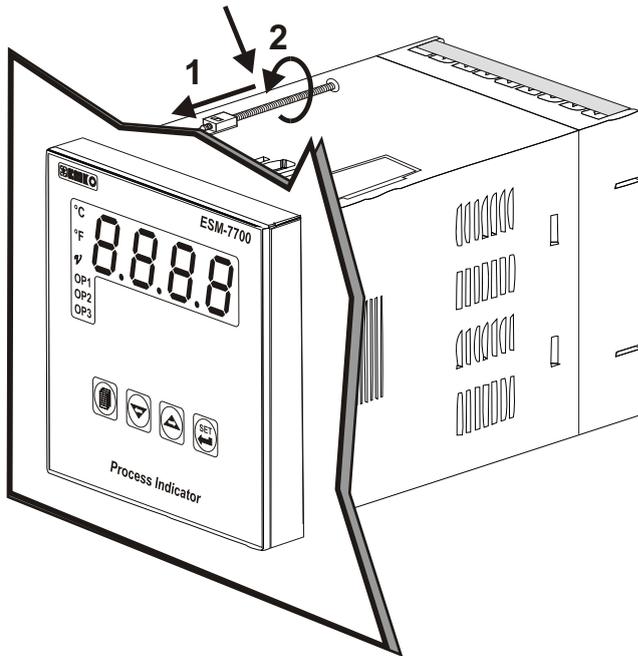
The unit is designed for panel mounting.

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

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

2.7 Removing from the Panel

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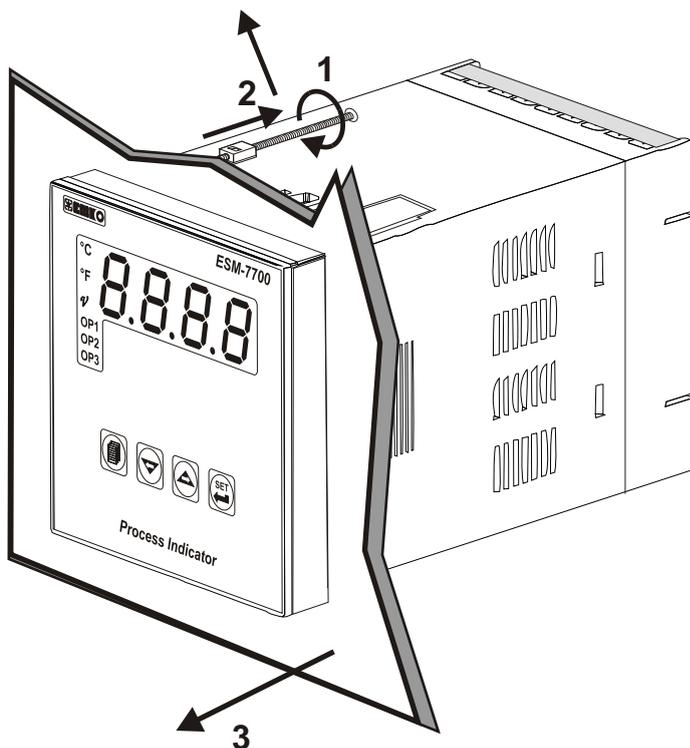
1-Loosen the screws.

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

18 screws
terminal M3

Optional
Connections

Empty terminals

Torque 0.5 Nm

Screw driver
0.8x3mm

0.5Nm
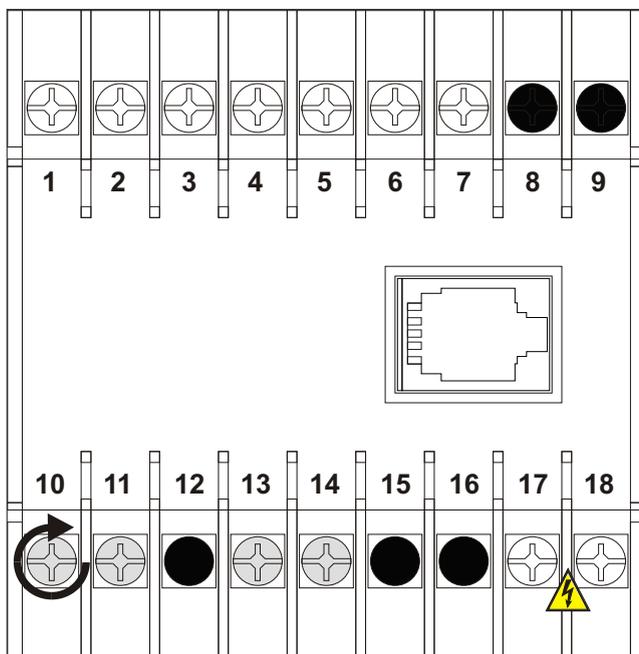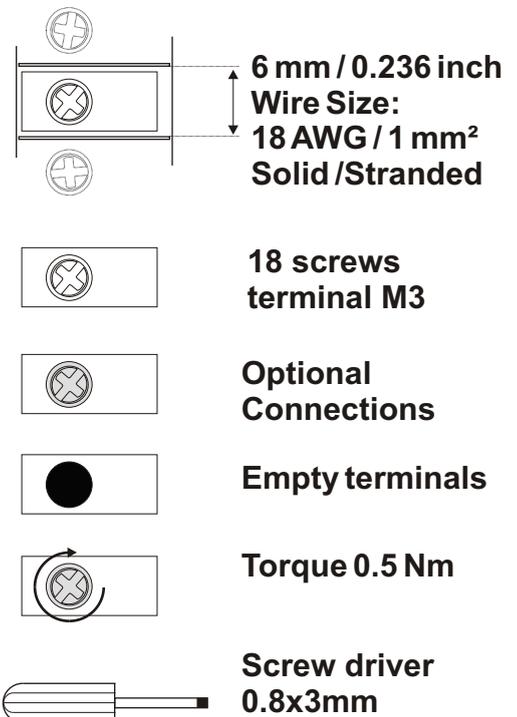
Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the process being controlled and personnel injury.

Universal Process Input(TC, RTD, voltage/ Current)

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

24 V Max 50mA

Sensor or Transmitter Supply Voltage

Output-3 Standard Relay Output

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

NO   NC   C

OUTPUT - 3 5A@250V

EMKO
P/N : ESM-7700 CE
CAT II

Communication Socket

MODULE-1   **MODULE-2**

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

Optional Output Module Terminals Relay, SSR Driver, Digital or Current Output Module

Supply Voltage Input
100-240V (-15%;+10%) 50/60Hz - 6VA
24 V (-15%;+10%) 50/60Hz - 6VA
24V (-15%;+10%) - 6W
(It must be determined in order)

Process input is in CAT II class.

3.3 Supply Voltage Input Connection of the Device

Connection of Universal Supply Voltage Input
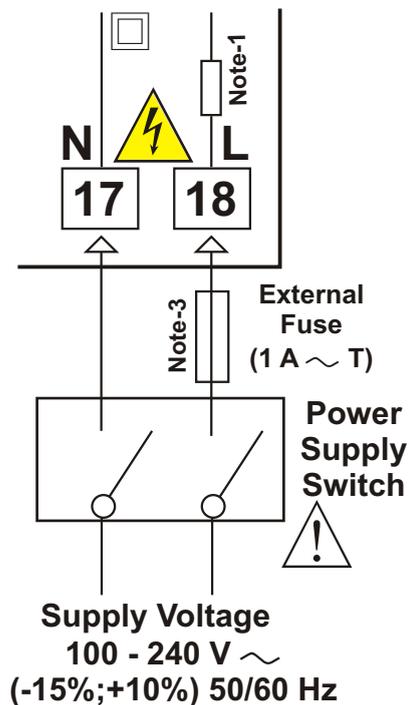
Connection of Low Voltage 24 V~ Supply Voltage Input

N L
17 18

Note-1

Note-3

External Fuse (1 A ~ T)

Power Supply Switch

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

N L
17 18

Note-1

Note-2

Note-3

External Fuse
(24V ~ : 1 A ~ T)
(24V --- : 1 A --- T)

Power Supply Switch

Supply Voltage
24V ~ (-15%;+10%) 50/60Hz
or 24V --- (-15%;+10%)
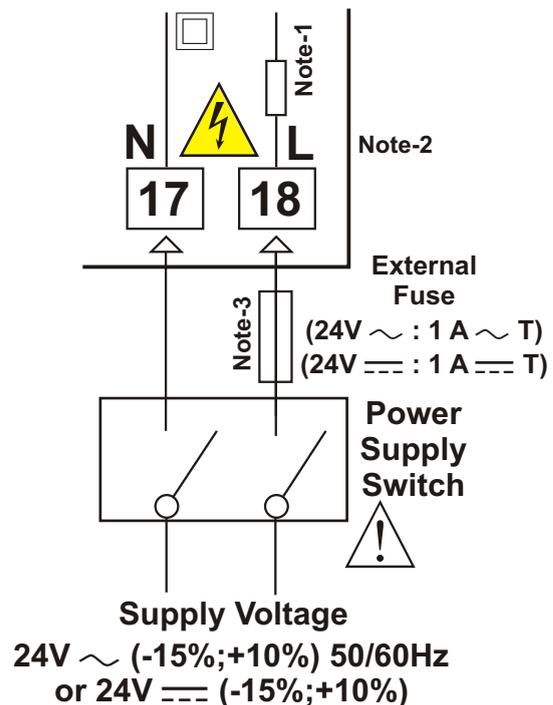
Note-1 : There is an internal 33R fusible flameproof resistor in 100-240 V~ 50/60Hz supply voltage input

There is an internal 4R7 fusible flameproof resistor in 24V~ 50/60Hz , 24V--- supply voltage input

Note-2 : "L" is (+) ," N" is (-) for 24V --- supply voltage

Note-3 : 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 that 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 seperating 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.
If an external fuse is used, it must be on (+) line 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
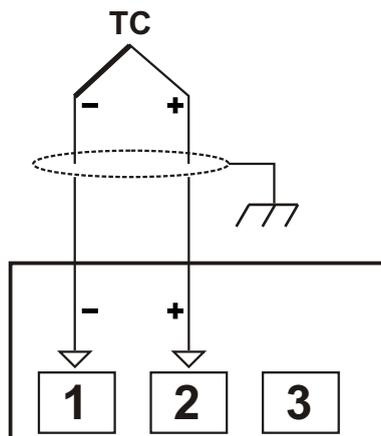
Connect the wires with the polarity as shown in the figure left.

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

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

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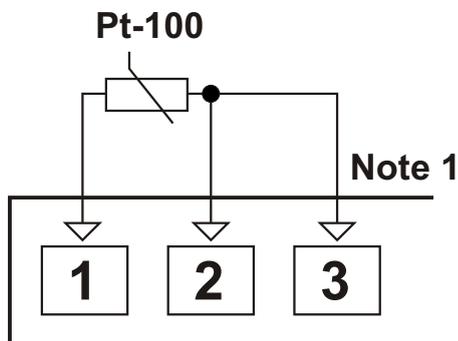
3-wire Pt-100 connection
(with line compensation)
(Max. Line impedance is 10)
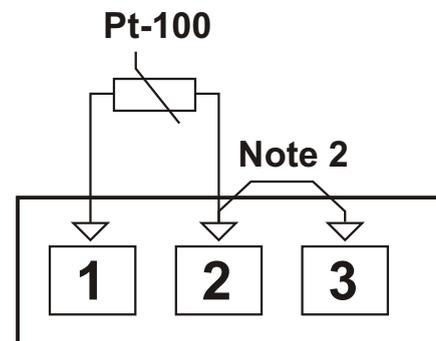
2-wire Pt-100 connection
(without line compensation)

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

i **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 2R7   .**

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

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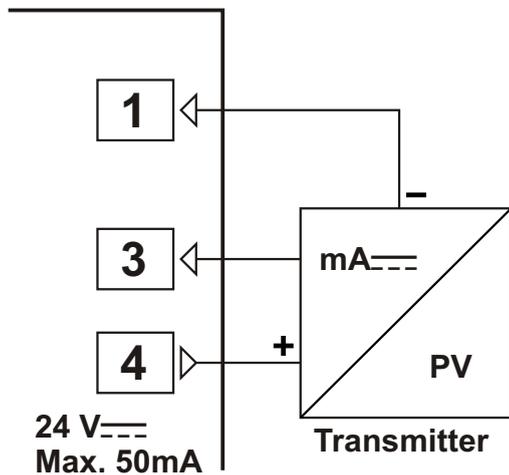
Transmitter connection by using external supply voltage source.

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

i **Input Resistance is 2R7   .**

3.4.5 Connection of Transmitters with Voltage Output to Process Input

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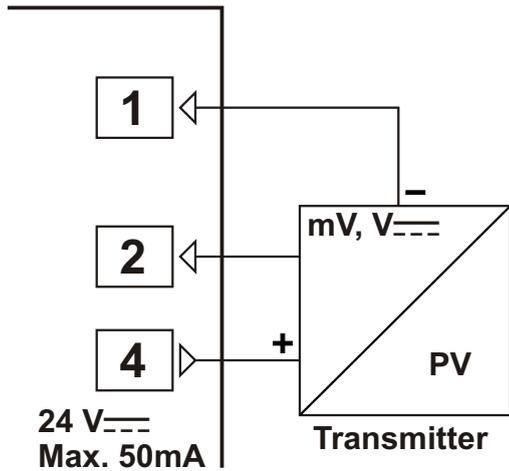
Transmitter connection by using external supply voltage source.
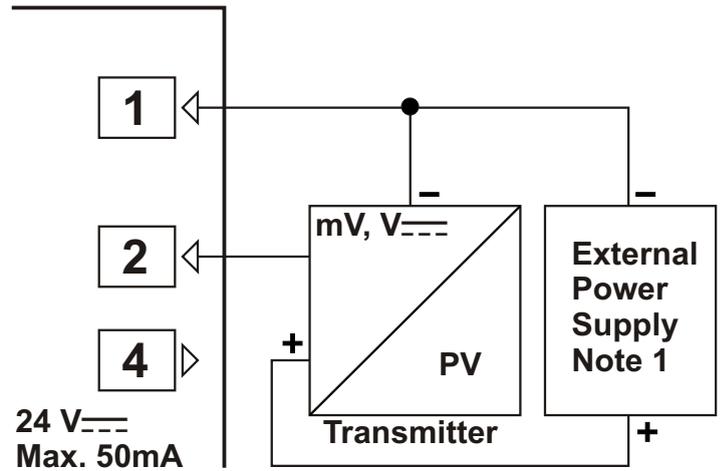
Note 1 : External power supply must be selected according to supply voltage range and required current for transmitter.

Input resistance is greater than 10M   for 0...50mV ⎓
Input resistance is 43K   for 0...10V ⎓

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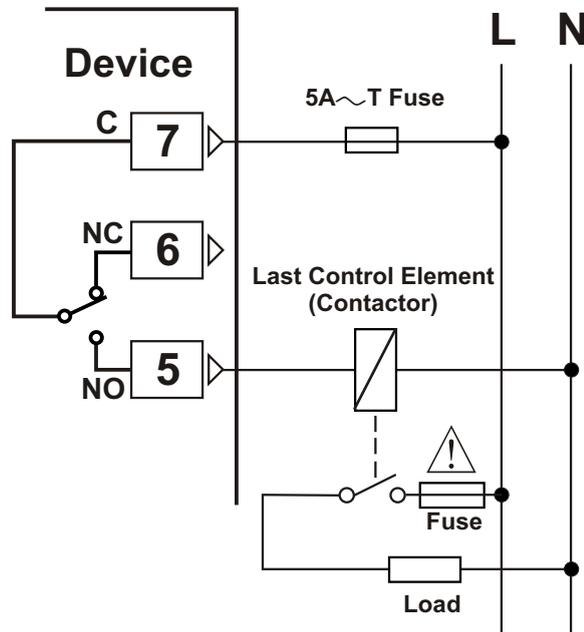
⚠ **Fuses must be selected according to the application.**

3.6 Galvanic Isolation Test Values of ESM-7700 Process Indicator and Output Modules

2000V ∿ (For ESM-7700.1......)
500V ∿ (For ESM-7700.2......)

| Supply Input | 17 | | Ground | 1 |

2000V ∿ | Output-3 Relay Output | 5 6 7 | 2000V ∿

2000V ∿ | EMO-700 Relay Output Module | 10 13 / 11 14 | 2000V ∿

2000V ∿ | EMO-710 SSR Driver Module | 10 13 / 11 14 | 500V ∿

2000V ∿ | EMO-720 Digital Output Module | 10 13 / 11 14 | 500V ∿

2000V ∿ | EMO-730 0/4...20mA ̶ Current Output Module | 10 13 / 11 14 | 500V ∿

2000V ∿ | Analogue Inputs | 2 3 |

2000V ∿ | 24V ̶ Voltage Output | 4 |

2000V ∿ | EMC-710 RS-485 Serial Communication Module | 500V ∿

2000V ∿ | EMC-700 RS-232 Serial Communication Module |

4.Definitions and Specifications of Modules

ESM-7700 Process Indicator is a modular product which is designed to operate with additional analogue and digital output units which user may need.

Two output modules can be plugged in the device by the user. User may configure the product for different applications according to the system requirements with the output modules which are described in this section.

4.1 Output Modules

Dimensions of Output Modules
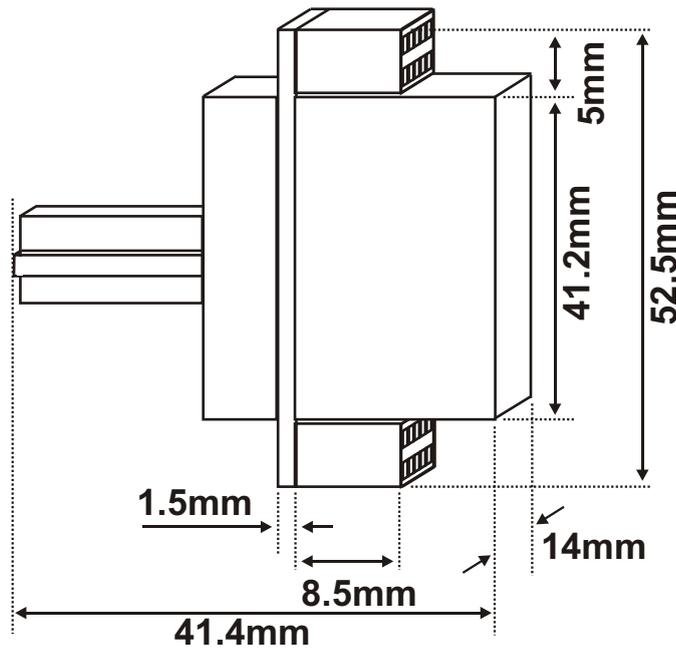
4.1.1 EMO-700 Relay Output Module

EMO-700 Relay output module can be plugged in Module-1 or Module-2 socket to use functions which are defined for relay output.

Specifications of EMO-700 Relay Output Module

Output   : 5A @ 250V∼, Open or Close Contact
Dimensions   : 14x52.5x41.4mm
Electrical Life   : 100.000 Operation (Full Load)

Applications of EMO-700 Relay Output Module
It can be used with heating or cooling functions as process control output, as alarm output by programmable different alarm functions, as logic output to transfer some datas on the device to the system. These alternatives are explained in parameters section as logic output function.

ⓘ   **Detailed information about functions of EMO-700 Relay Output Module are given in parameters section. For using these functions EMO-700 Relay Output Module must be installed to Module-1 or Module-2 socket.**

4.1.2 EMO-710 SSR Driver Output Module

EMO-710 SSR Driver Output Module can be plugged in Module-1 or Module-2 socket to use functions which are defined for SSR driver output.

Specifications of EMO-710 SSR Driver Module
Output : Maximum 26 mA, Max. 22V‐‐ ±10%, isolated
Dimensions : 14x52.5x41.4mm

Applications of EMO-710 SSR Driver Output Module
It can be used with heating or cooling functions as process control output, as alarm output by programmable different alrm functions, as logic output to transfer some datas on the device to the system.

Note 1 : If short output period is needed in a system, using SSR Driver output module is recommended. (Relay must not be used for short output periods because of limited life of their relay contact (open/close events))

> ⓘ **Detailed information about functions of EMO-710 SSR Driver Output Module are given in parameters section. For using these functions EMO-710 SSR Driver Output Module must be installed to Module-1 or Module-2 socket.**

4.1.3 EMO-720 Digital (Transistor) Output Module

EMO-720 Digital (Transistor) Output Module can be plugged in Module-1 or Module-2 socket to use functions which are defined for digital output.

Specifications of EMO-720 Digital (Transistor) Output Module
Output : Maximum 40 mA, 15-18V‐‐ ±10%, isolated
Dimensions : 14x52.5x41.4mm

Applications of EMO-720 Digital (Transistor) Output Module
It can be used with heating or cooling functions as process control output, as alarm output by programmable different alarm functions, as logic output to transfer some datas on the device to the system. These alternatives are explained in parameters section as logic output function.

> ⓘ **Detailed information about functions of EMO-720 Digital (Transistor) Output Module are given in parameters section. For using these functions EMO-720 Digital (Transistor) Output Module must be installed to Module-1 or Module-2 socket.**

4.1.4 EMO-730 0 / 4 ...20mA⎓ Current Output Module

EMO-730 0/4...20mA⎓ Current Output Module can be plugged in Module-1 or Module-2 socket to use functions which are defined for current or voltage output. (It is defined as Analogue Output Module in some sections)

Specifications of EMO-730 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 : 14x52.5x41.4mm

Applications of EMO-730 0/4...20mA⎓ Current Output Module

It can be used in heating or cooling functions as process control output.
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.

i **Detailed information about functions of EMO-730 Current Output Module are given in parameters section. For using these functions EMO-730 0/4...20mA⎓ current Output Module must be installed to Module-1 or Module-2 socket.**

4.2 Installing and Pulling Out Input/Output Modules

First, detach all cable connections from the device and uninstall it from the panel.

Suppress to the lock pins where top and bottom of the device
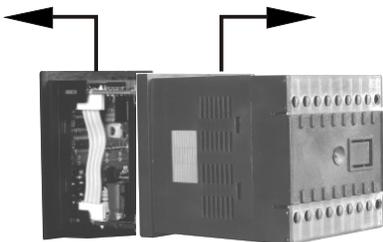
Pull the cover case with your other hand from front panel to rear side.
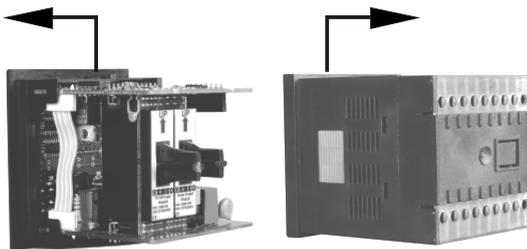
Pull out the cover case from the device
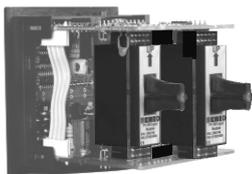
Slide input/output modules into socket.
Pull out the module from it's socket, instead of this module install the new one or other module user wants to use.
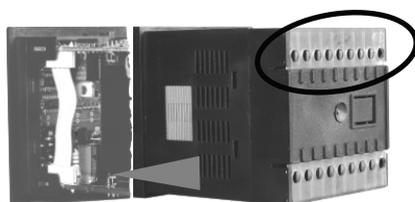
Replace the cover case by taking care of the terminal numbers should be at right position.

After adding or changing modules to the unit, these changes must be taken into consideration while mounting of the unit to the system. If mounting is incorrect, it can cause accidents to harm system, operator or person who does the mounting. Responsibility of these kind of harmful events belongs to the user.

4.3 To Stick Output Modules' Labels to the Device

Every module which is plugged in Module-1 or Module-2 socket has labels' for showing the relation between connection terminal and the device. These labels are attached to empty boxes which are separated for Module-1 and Module-2 on the device. Labels for all modules and attachment places are shown below.

Label which describes terminal connection of module that is plugged in Module-2 socket is attached to this area.
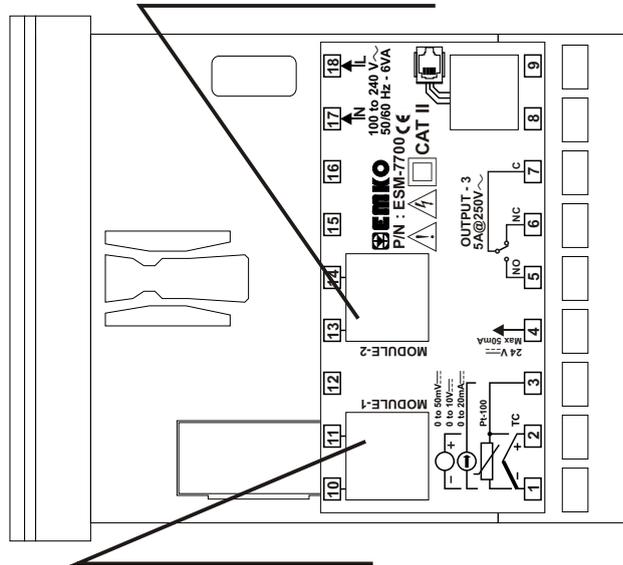
Label which describes terminal connection of module that is plugged in Module-1 socket is attached to this area.

LABELS FOR OUTPUT MODULES
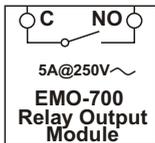
Label for EMO-700 Relay Output Module
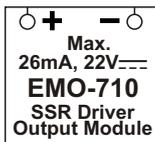
Label for EMO-710 SSR Driver Output Module
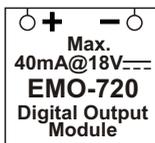
Label for EMO-720 Digital Output Module
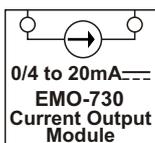
Label for EMO-730 0/4...20mA Current Output Module

Example : If user installs EMO-700 Relay Output Module to Module-1 socket, EMO-730 0/4...20mA⎓ Current Output Module to Module-2 socket and attach the appropriate labels on the device view will be like below :
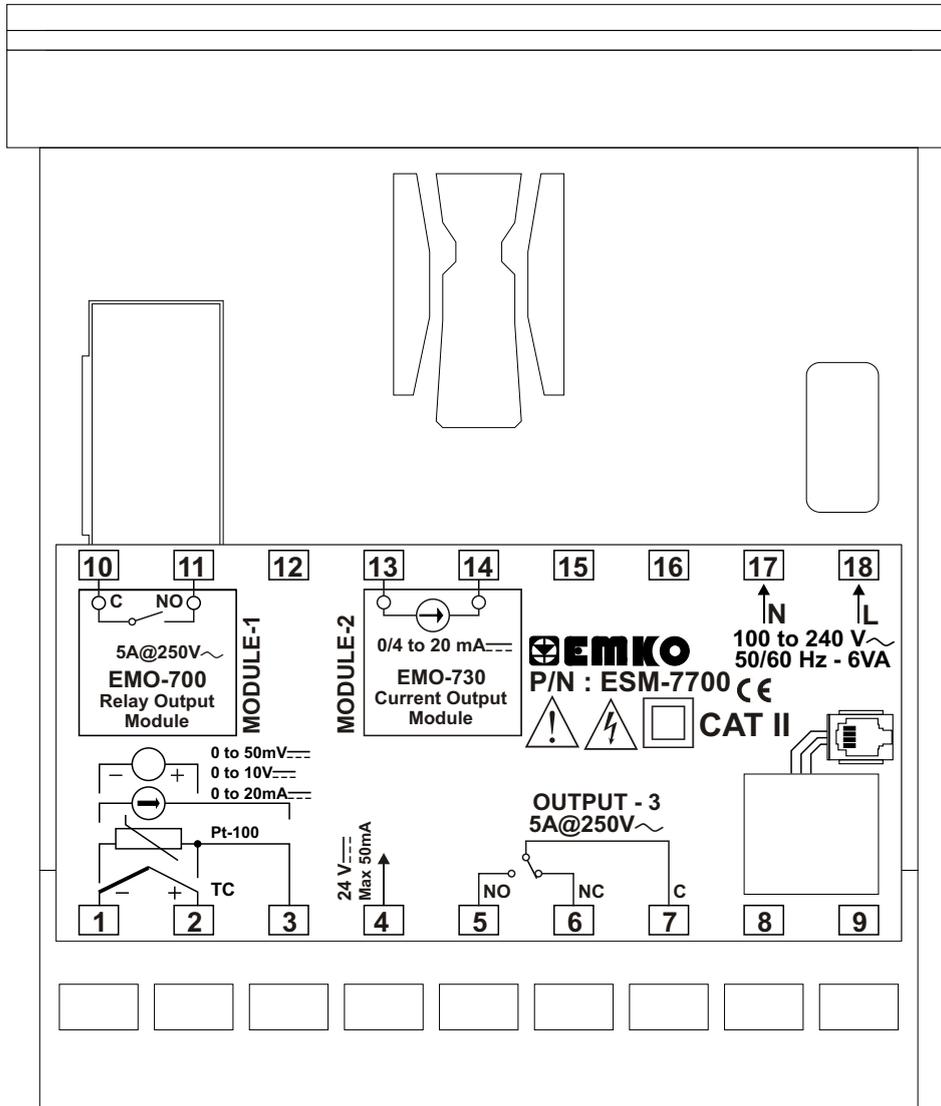
5. Connection Terminals of Output Modules and Connection Wirings

Module-1 / Module-2 Optional Output Modules

EMO-700 Relay Output Module 5A@250V ~	EMO-710 SSR Driver Output Module Max. 26mA, 22V ---	EMO-720 Digital Output Module Max. 40mA@18V ---	EMO-730 Current Output Module 0/4 to 20 mA ---
C NO	+ −	+ −	
10 11	10 11	10 11	10 11
13 14	13 14	13 14	13 14

Module-1 Connection Terminals

Module-2 Connection Terminals
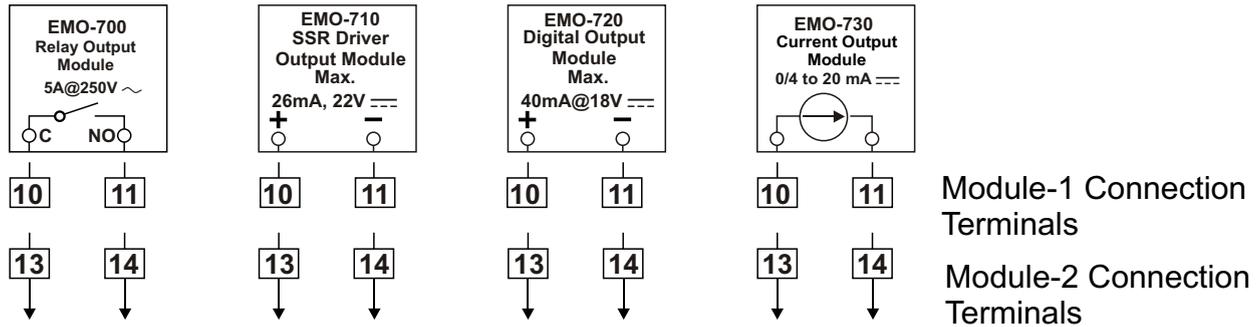
5.1 Connection Wirings for Output Modules

5.1.1 EMO-700   Relay Output Module Connection

Module-1

C **10**   5A ~ T Fuse

Last Control Element (Contactor)

NO **11**

! Fuse

Load

Module-2

C **13**   5A ~ T Fuse

Last Control Element (Contactor)

NO **14**

! Fuse

Load

! **Fuses must be selected according to the applications.**
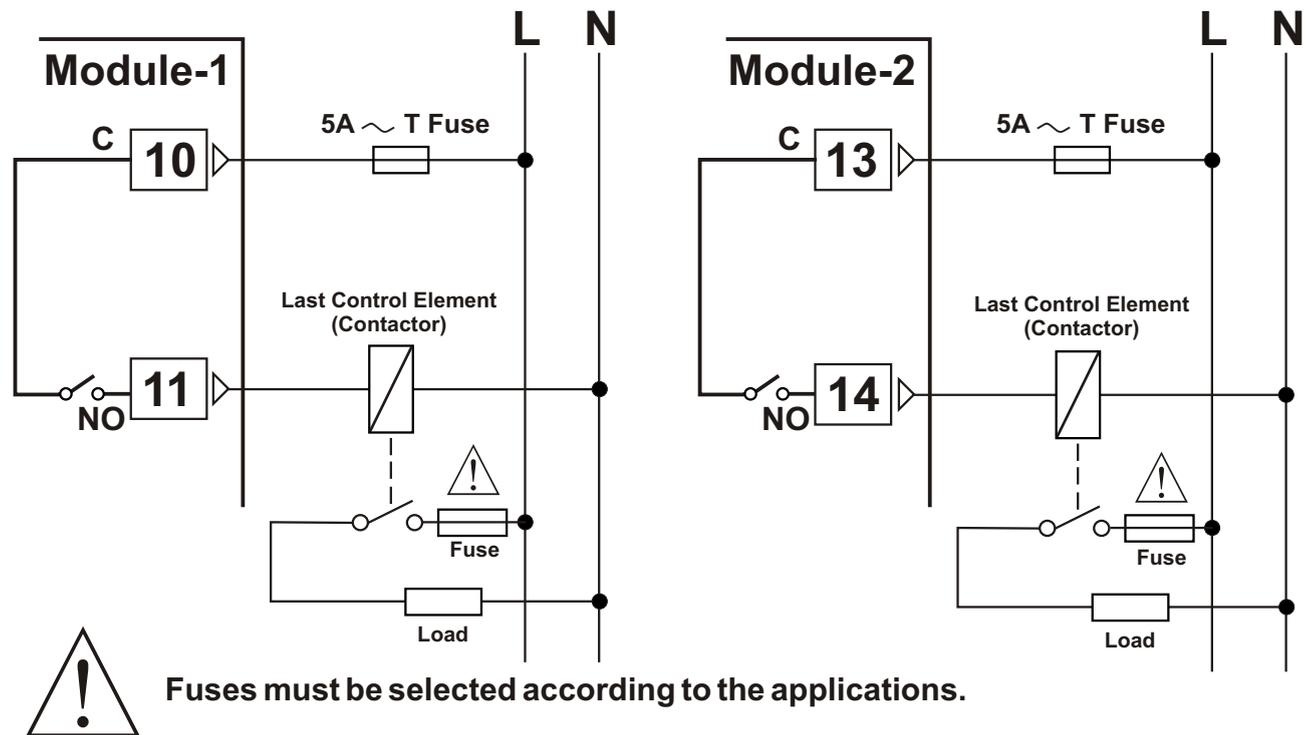
5.1.2 EMO-710   SSR Driver Module Connection
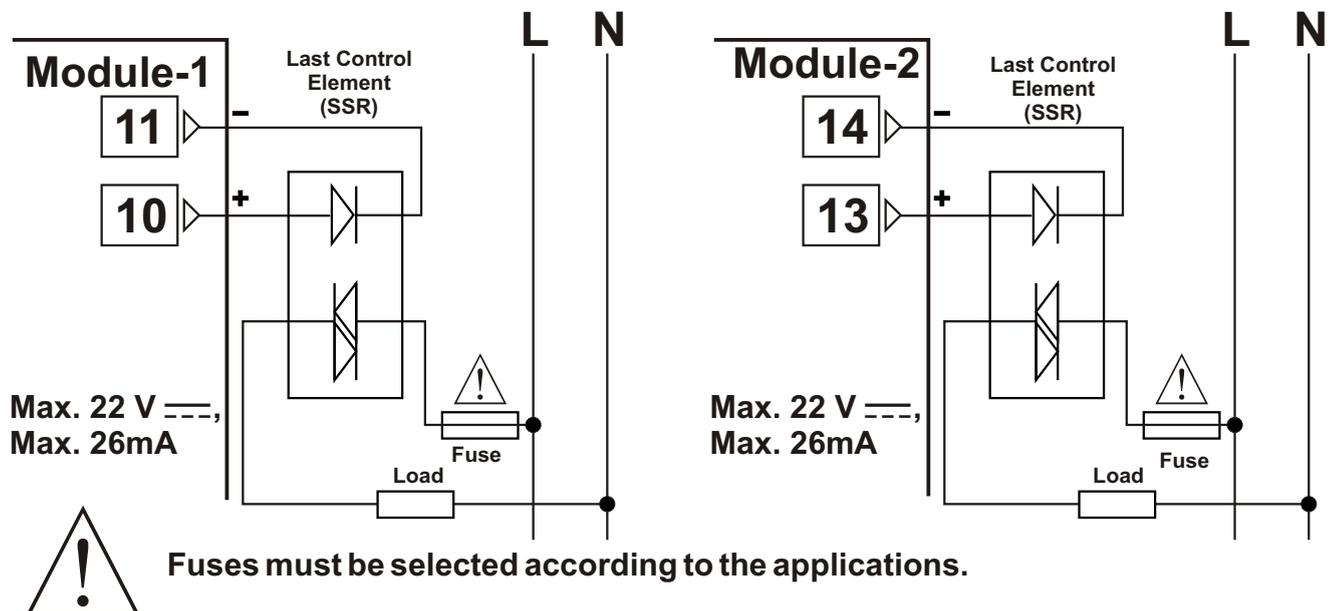
Module-1

11 −   Last Control Element (SSR)

10 +

Max. 22 V ---,
Max. 26mA

! Fuse

Load

Module-2

14 −   Last Control Element (SSR)

13 +

Max. 22 V ---,
Max. 26mA

! Fuse

Load

! **Fuses must be selected according to the applications.**

5.1.3 EMO-720 Digital (Transistor) Output Module Connection

Module-1

11	−
10	+

Load

15-18 V⎓
Maximum 40mA

Module-2

14	−
13	+

Load

15-18 V⎓
Maximum 40mA

5.1.4 EMO-730   0/4... 20 mA⎓   Current Output Module Connection

Module-1

10	+
11	−

Other Device

Shunt (Max. 600)
+
−

Module-2

13	+
14	−

Other Device

Shunt (Max. 600)
+
−

5.1.5 To Get 0...10V⎓ with EMO-730   0/4...20 mA⎓ Current Output Module

Module-1

10	+
11	−

0...10V ⎓ Output

Shunt = 500.0

Other Device

+

−

Module-2

13	+
14	−

0...10V⎓ Output

Shunt = 500.0

Other Device

+

−

RS-232 Terminal Definitions

+5Vdc ——— ◁ 1
TX ———→ ▷ 2
RX ———→ ◁ 3
GND ———→ ◁ 4

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
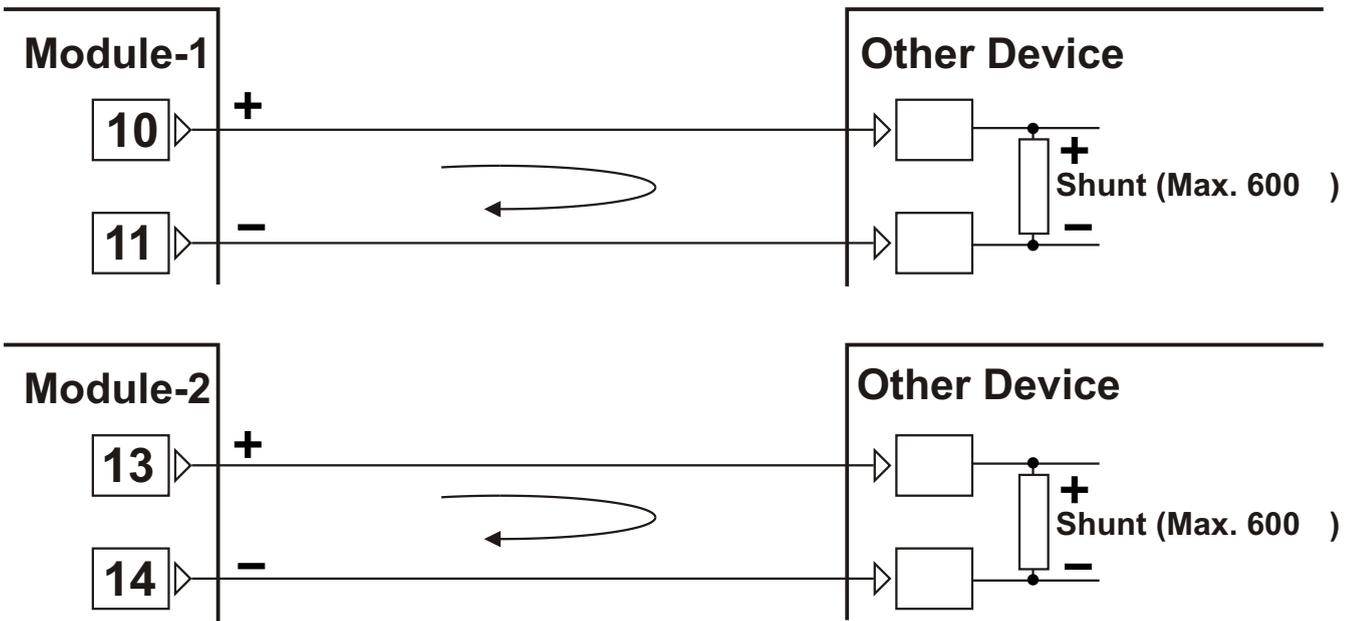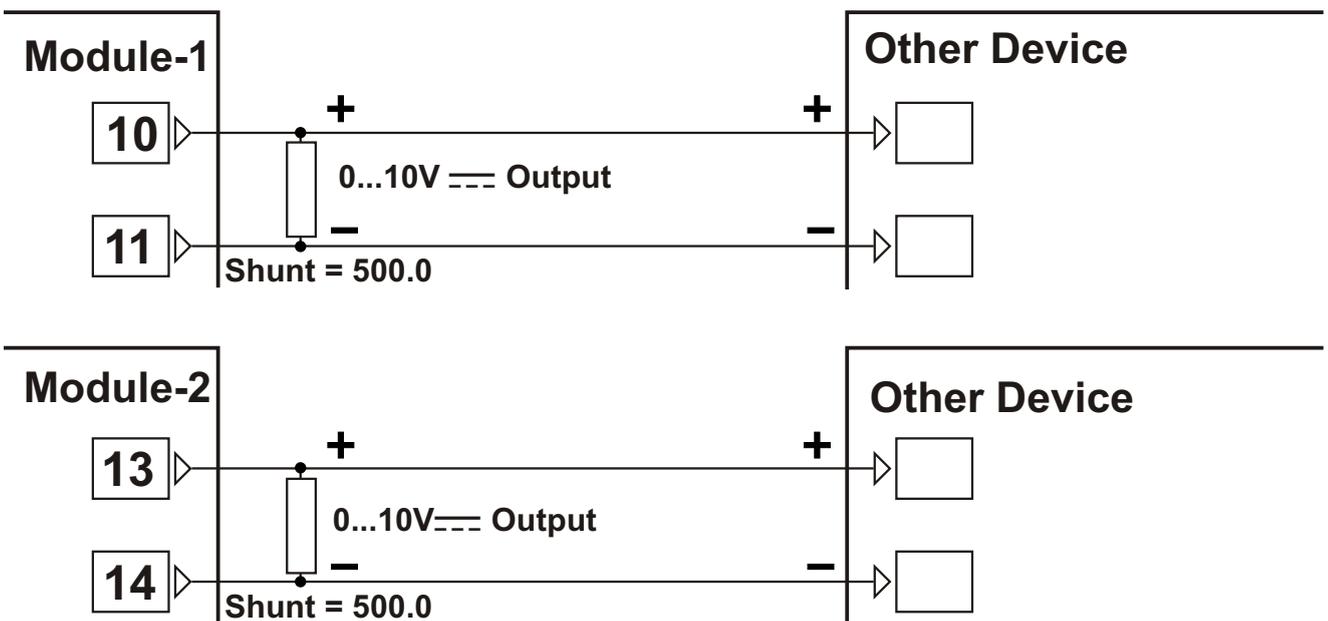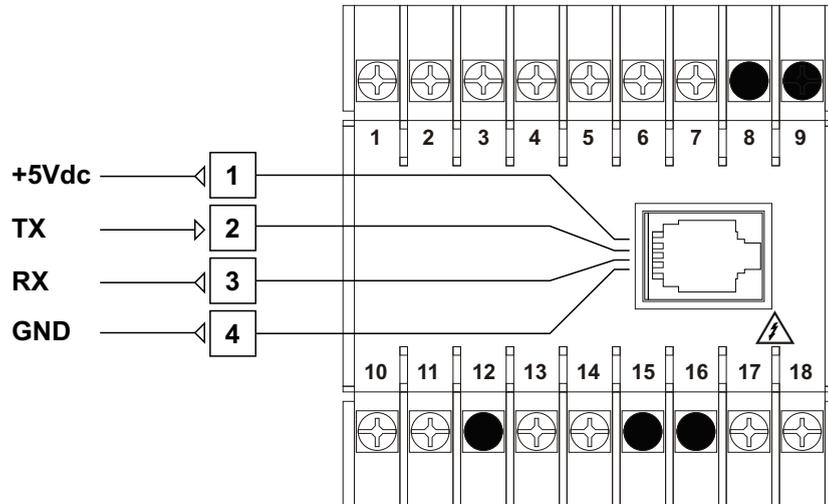
RS-485 Terminal Definitions

1
D+ ———→ ▷ 2
D- ———→ ▷ 3
4

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

ESM-7700

PC (Personal Computer) 9 Pin DCON connection

Cable Lenght must be max. 12 meters for 9600 baud rate

RX

TX

GND

TX

RX

GND
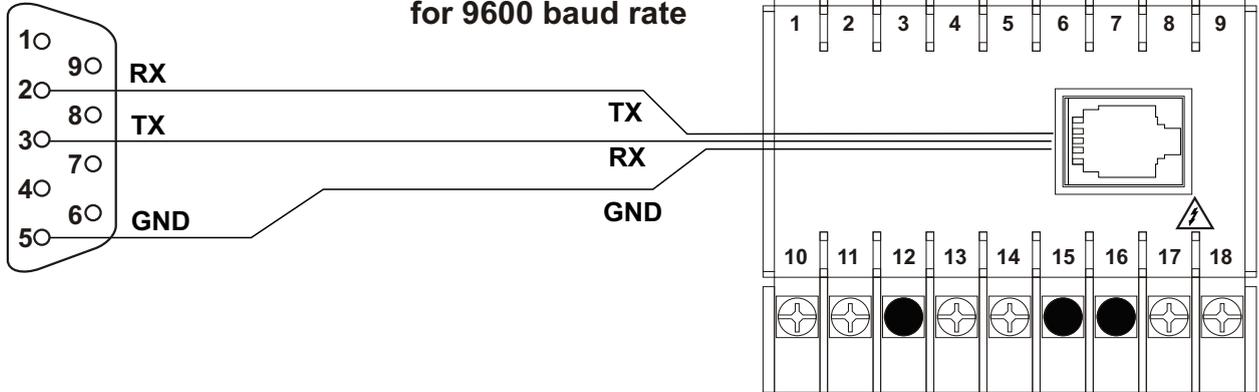
PC (Personal Computer) 25 Pin DCON connection

Cable Lenght must be max. 12 meters for 9600 baud rate

ESM-7700

TX

RX

GND

TX

RX
GND
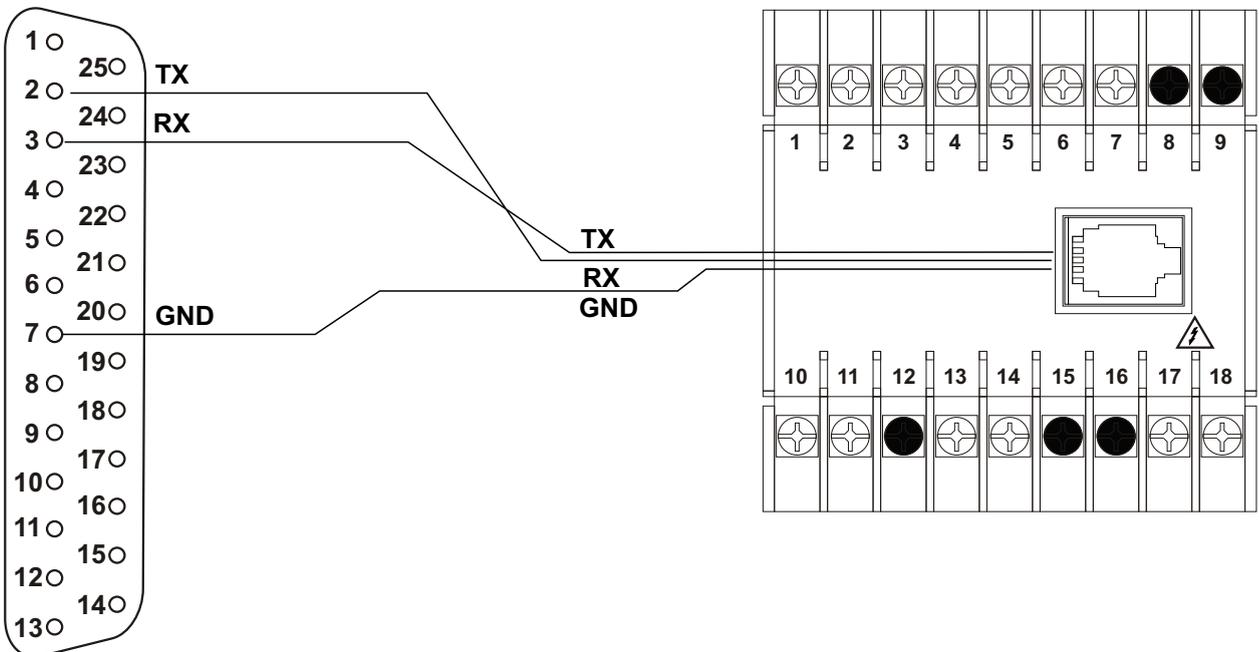
6.2 Connection for RS-485 Serial Communication

PC(Personal Computer)

RS-232   RS-485
Convertor

RS-232
Connection
Cable

MASTER

D-   **D+**

Rt

SLAVE-1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

D+
D-

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
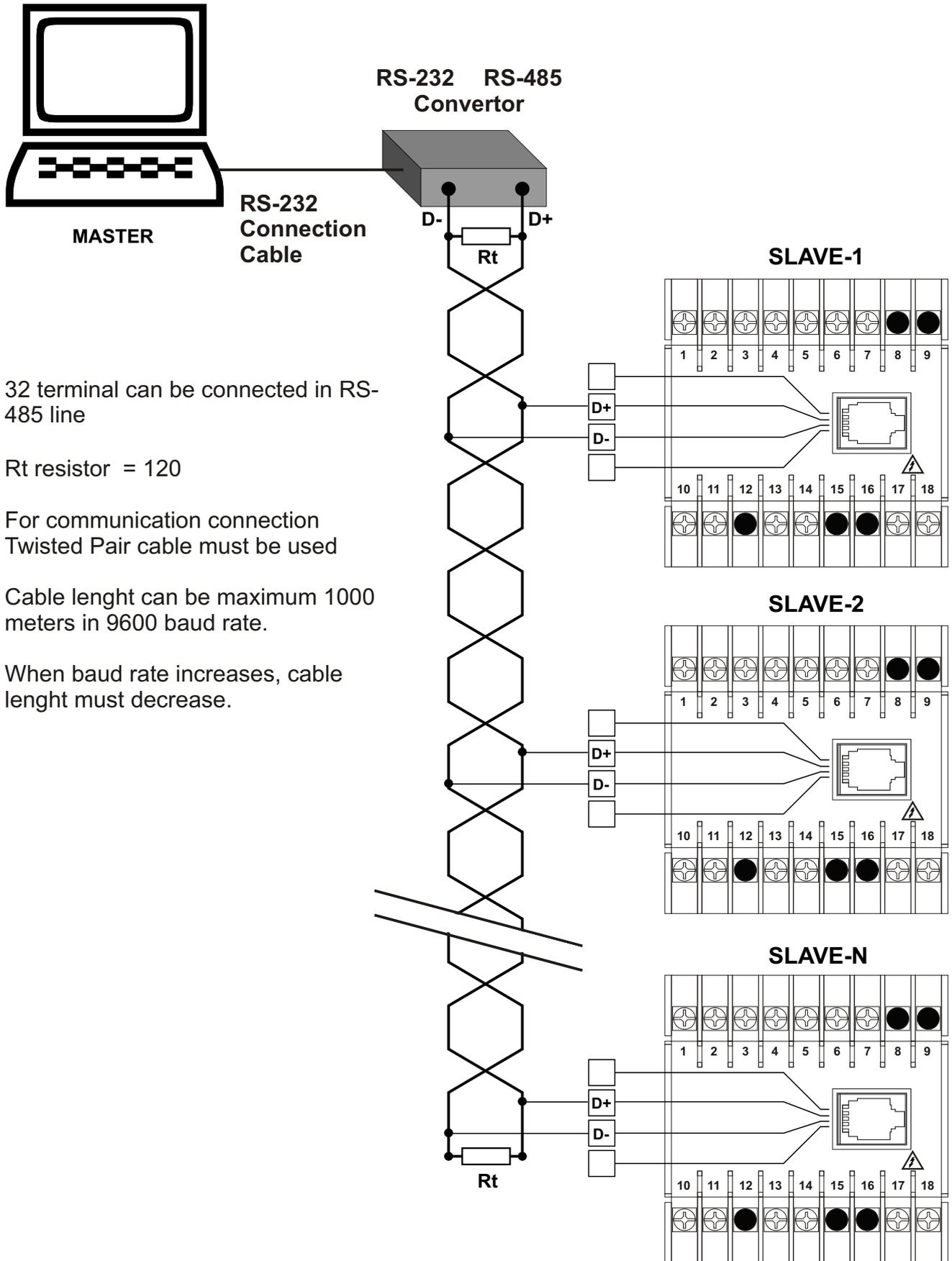
32 terminal can be connected in RS-485 line

Rt resistor = 120

For communication connection Twisted Pair cable must be used

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

When baud rate increases, cable lenght must decrease.

SLAVE-2

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

D+
D-

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

SLAVE-N

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

D+
D-

Rt

| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

6.3 Installing RS-232 / RS-485 Serial Communication Modules to the Device

Pull the cover case with your hand through rear side as explained in "Installing and Pulling Out Output Modules" section. Pull the modules in Module-1 and Module-2 socket through rear side. Separate supply card which is at the bottom of the equipment by lifting the locking tabs located on front panel. Pay attention to cable connection between top and bottom cards. Damages in this cable makes the equipment not to work.

RS-232 or RS-485 module is plugged into socket signed as A and B. Hold the equipment to be it's front panel is on your right, communication socket is on your left and module connection socket with 5 terminals on above. Plug in module connection socket with 5 terminals to the socket on Top Card. Do the same things for terminal socket in bottom card and connection socket with 3 terminals. Plug in bottom card to the place in front panel. Install the modules which are pulled out to Module-1 and Module-2 socket. Replace the cover case by taking care of the terminal numbers should be at right position.

Top Card

A

B

Bottom Card

Top Card

A

RS-232
or
RS-485
module

B **Bottom Card**

Top Card

A

RS-232
or
RS-485
module

B

Bottom Card
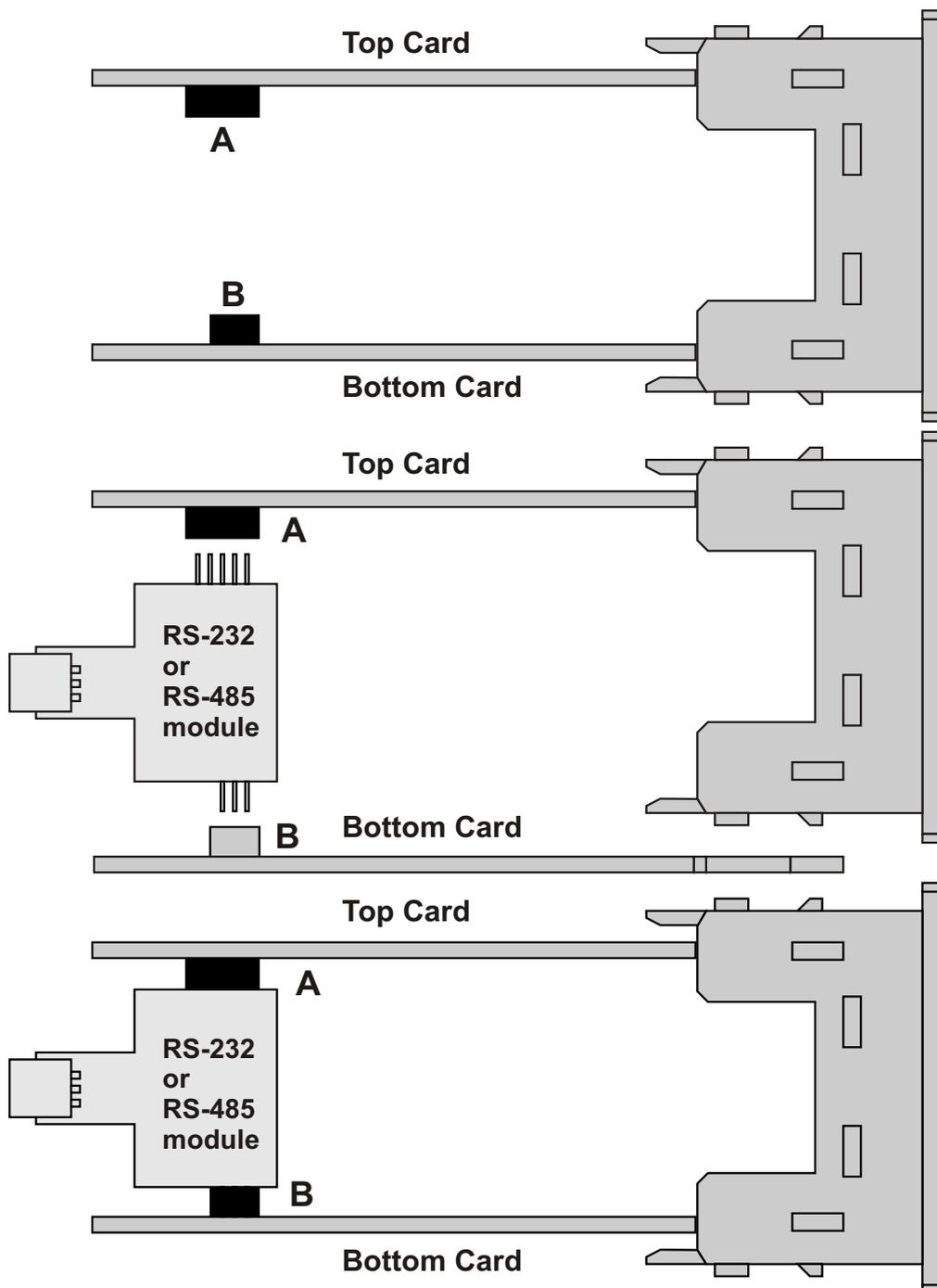
7.Definition of Front Panel and Accessing to the Parameters

7.1 Definition of Front Panel

LED indication of °C : Centigrade Unit

LED indication of °F Fahrenheit Unit

LED indication of units other than °C and °F

LED indication of Output-1 Status

LED indication of Output-2 Status

LED indication of Output-3 Status

EMKO   ESM-7700

°C
°F
𝒱
OP1
OP2
OP3
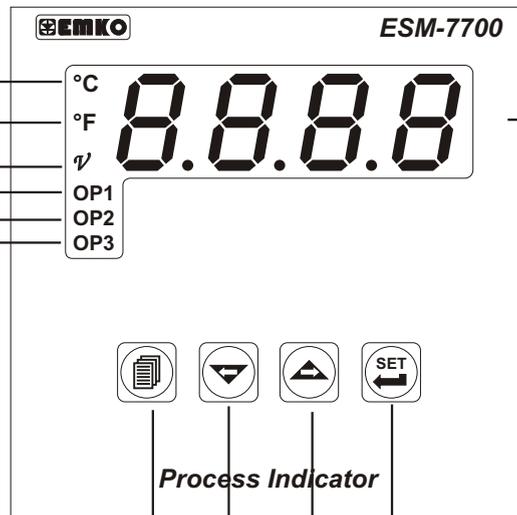
Displays Process Value (PV) and Parameter

Process Indicator

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 decrase 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.

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 :

⊕EMKO   *ESM-7700*

B.B.B.B

Process Indicator

" rU"   **Revision**   **Revision number**

Optional Input/Output   **Optional Input/Output**
module code for Module-1   **module code for Module-2**

⊕EMKO   *ESM-7700*

B.B.B.B

Process Indicator
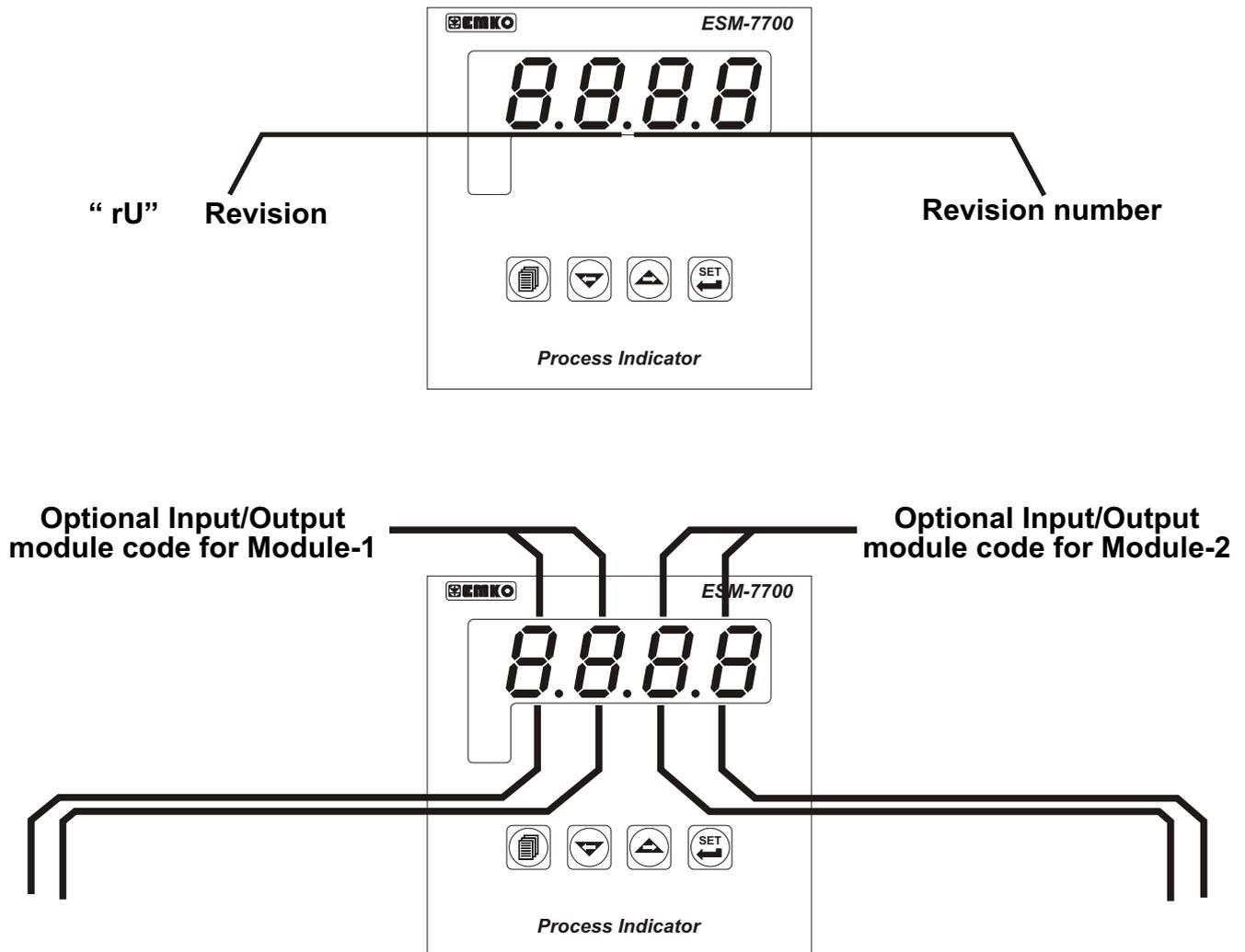
o r	**Relay Output** Module (EMO-700)	**Relay Output** Module (EMO-700)
o 5	**SSR Driver and Digital Output** Module (EMO-710 ,EMO-720)	**SSR Driver and Digital Output** Module (EMO-710 ,EMO-720)
o A	**0/4...20mA Current Output** Module (EMO-730)	**0/4...20mA Current Output** Module (EMO-730)
E	**There is no module in** Module-1 socket	**There is no module in** Module-2 socket

Right column codes: o r , o 5 , o A , E

When power on, display of the indicator is like below:

ESM-7700	ESM-7700	ESM-7700
8.	**8.8.**	**8.8.8.**
Process Indicator	*Process Indicator*	*Process Indicator*
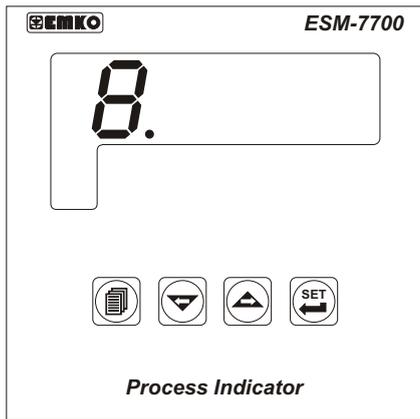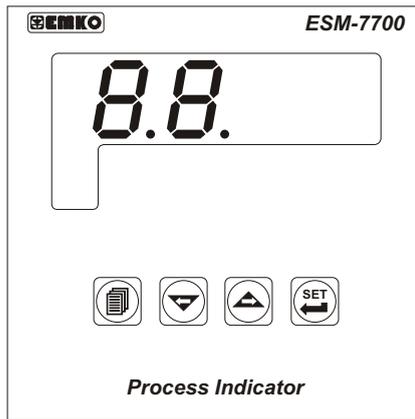
First segments of top and bottom displays are tested	Second segments of top and bottom displays are tested.	Third segments of top and bottom displays are tested.

ESM-7700	ESM-7700	ESM-7700
8.8.8.8	**rU03**	°C °F 𝒱 OP1 OP2 OP3 **oSor**
Process Indicator	*Process Indicator*	*Process Indicator*
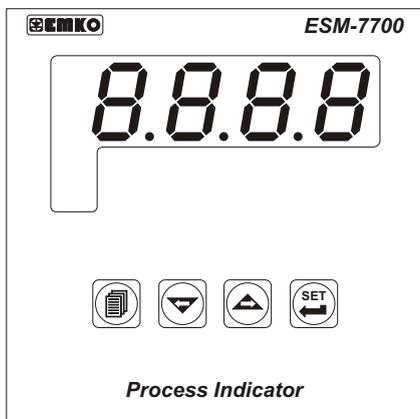
Fourth segments of top and bottom displays are tested.	Revision number is shown. Revision number is "02".	On display which modules are plugged in Module-1 and Module-2 socket is shown. All leds are energised. Above, there is EMO-710 SSR Driver Output module in Module-1 socket and EMO-700 Relay Output Module in Module-2 socket.
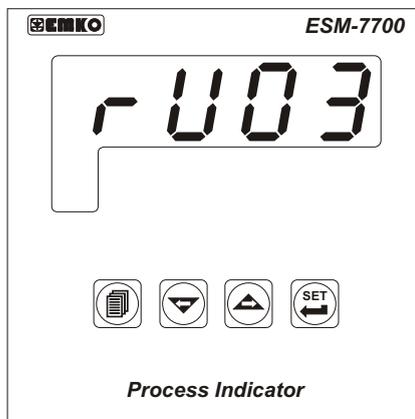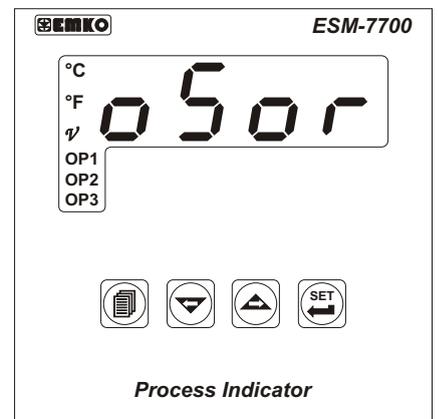
ESM-7700
°C **0028** OP1
Process Indicator
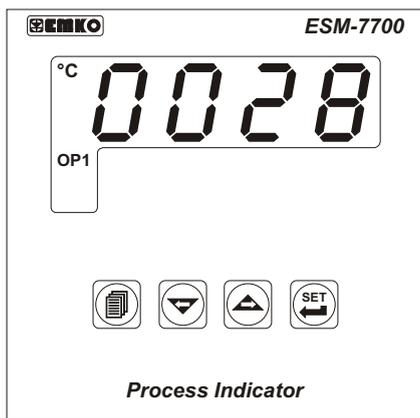
Main operation screen is shown

⚠ **If there is an unexpected situation while opening the device, power off the device and inform a qualified personnel.**

7.3 Adjustment of Alarm Set Values

If standard output (Output-3) or any output module in Module-1 or Module-2 socket are configured as alarm output, how to access to these alarm set values are explained below:

°C `0028` OP1

Operation Screen

Press Set button

°C `ALr1`

Alarm 1 Set Value

This parameter is not accessible, if there is no module in Module-1 socket or the module is not an alarm output

Press Menu button to exit from Set menu

Press Set button to access to the other Set value

°C `0550`

Press increment button to see set value

Value on the display starts to flash

Press Menu button to exit without saving Set value

Set value can be changed with increment and decrement buttons

°C `0028` OP1

Operation Screen

°C `0560`

Press Set button for saving the Set value

Press Menu button to exit without saving Set value

°C ALr2

Alarm-2 Set Value

This parameter is not accessible, if there is no module in Module-2 socket or the module is not an alarm output

Press Menu button to exit from Set menu

Press Set button to access to the other Set value

°C 0600

Press increment button to see set value

Value on the display starts to flash

Press Menu button to exit without saving Set value

Set value can be changed with increment and decrement buttons

°C 0028
OP1

Operation Screen

°C 0610

Press Set button for saving the Set value

Press Menu button to exit without saving Set value

°C ALr3

Alarm-3 Set value

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

Press Menu button to exit from Set menu

Press Set button to exit from Set menu

°C 0650

Press increment button to see set value

Value on the display starts to flash

Press Menu button to exit without saving Set value

Set value can be changed with increment and decrement buttons

°C 0660

Press Menu button to exit without saving Set value

Press Set button for saving the Set value

°C 0028 OP1

Operation Screen

7.4 Easy Access Diagram for Technician Parameters

`°C 0028` **Main Operation Screen** → `°C tECH` **Technician Menu Entering Screen** → `°C tCPS` **Technician Password Entering Screen** → `°C 0000` **Technician Password Entering Screen**

Press Menu button for accessing to the Technician parameters

Press SET/OK buton for accessing to Password entering screen

Press Increment buton for entering Password

Enter the Password with Increment and Decrement buttons

PınP Menu

`°C PınP` `°C ConF`

Out1 Menu **Note-4**

`°C out1` `°C ConF`

Out2 Menu **Note-4**

`°C out2` `°C ConF`

`ıSSL`	**Process Input Type Selection**
`tCSL`	**TC Input Type Selection** Note-1
`unıt`	**Unit Selection**
`LoL`	**Operation Scale Low Limit**
`uPL`	**Operation Scale High Limit**
`PVoF`	**Process Display Offset**
`ıFLt`	**Input Filter Time**
`CJnC`	**Cold Junction Compensation Selection** Note-1

If EMO-700,710 or 720 Output Module is plugged in Module-1 socket

`Lou1`	**Out1 Logic Output**
`ALt1`	**Alarm1 Type Selection** Note-2
`ALH1`	**Alarm1 Hysteresis Value** Note-2
`Aon1`	**Alarm1 On Delay Time** Note-2
`AoF1`	**Alarm1 Off Delay Time** Note-2

If EMO-730 Output Module is plugged in Module-1 socket

`oAt1`

Configuration Selection

If EMO-700,710 or 720 Output Module is plugged in Module-2 socket

`Lou2`	**Out2 Logic Output**
`ALt2`	**Alarm2 Type Selection** Note-3
`ALH2`	**Alarm2 Hysteresis Value** Note-3
`Aon2`	**Alarm2 On Delay Time** Note-3
`AoF2`	**Alarm2 Off Delay Time** Note-3

If EMO-730 Output Module is plugged in Module-2 socket

`oAt2`

Configuration Selection

Note-1 : According to the `ıSSL` parameter selection, another parameter can be observed instead of `tCSL` 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 : It can be observed if logic output function `Lou2` is selected `0000` as alarm output.
Note-4 : This menu can not be observed if there is no module in the module socket.

7.4 Easy Access Diagram for Technician Parameters

`°C 0850` **Technician Password Entering Screen**

[SET] Confirm the Password with SET/OK button

Turning to the beginning of the Menu List.

Out3 Menu

`°C out3` `°C ConF`

[▲] [SET]

`Lou3` **Out3 Logic Output**

[SET]

`ALt3` **Alarm3 Type Selection**

Note-5 [SET]

`ALH3` **Alarm3 Hysteresis Value**

Note-5 [SET]

`Aon3` **Alarm3 On Delay Time**

Note-5 [SET]

`AoF3` **Alarm3 Off Delay Time**

Note-5 [SET]

Genn Menu

`°C GEnn` `°C ConF`

[▲] [SET]

`SU-L` **Set Scale Low Limit**

[SET]

`SU-u` **Set Scale High Limit**

[SET]

Comm Menu

`°C Corn` `°C ConF`

[▲] [SET]

`SAdr` **Slave Address**

[SET]

`bAud` **Baud Rate**

[SET]

`PrtY` **Parity Selection**

[SET]

`StPb` **Stop Bit Selection**

[SET]

Pass Menu

`°C PASS` `°C ConF`

[▲] [SET]

`tCPS` **Technician Password**

[SET]

Note-5 : It can observed if logic output function `Lou3` is selected `0000` as alarm output

7.5 Accessing to the Technician Menu

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

Operation Screen

°C **0028** OP1

Technician Menu Entering Screen

°C **tECH**

°C **tCPS**

When Menu button is pressed, Technician Menu Entering Screen is shown.

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

°C **0000**

Value on the display starts to flash

°C **0850**

Technician Password

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)

Enter Password with Increment and Decrement buttons.

Press Set button to confirm password

°C **P inP**

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

°C **ConF**

PINP CONF Menu
Configuration parameters of process input

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

Technician can access to the former menu by pressing menu changing back button.

°C **out 1**

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

°C **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.

This menu is not accessible

If there is no module in Module-1 socket

This menu is not accessible | **If there is no module in Module-2 socket**

°C **out2**

[menu changing back button, down, up, SET buttons]

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

°C **ConF**

[menu changing back button, down, up, SET buttons]

out2 CONF Menu
Configuration parameters of output module in Module-2 socket

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

Technician can access to the former menu by pressing menu changing back button.

°C **out3**

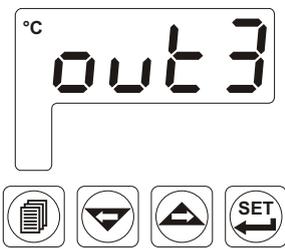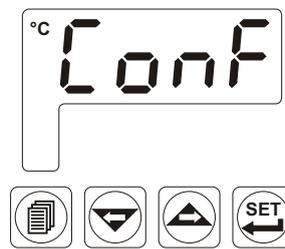[menu changing back button, down, up, SET buttons]

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

°C **ConF**

[menu changing back button, down, up, SET buttons]

out3 CONF Menu
Configuration parameters of Output-3

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

Technician can access to the former menu by pressing menu changing back button.

°C **GEnn**

[menu changing back button, down, up, SET buttons]

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

°C **ConF**

[menu changing back button, down, up, SET buttons]

GENN CONF Menu
General Parameters

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

Technician can access to the former menu by pressing menu changing back button.

°C **Conꓵ**

[menu changing back button, down, up, SET buttons]

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

°C **ConF**

[menu changing back button, down, up, SET buttons]

COM CONF Menu
Configuration parameters of serial communication

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

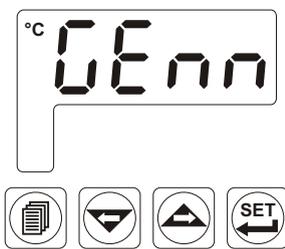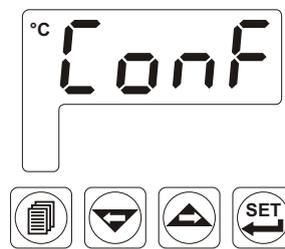Technician can access to the former menu by pressing menu changing back button.

℃ PASS

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

℃ ConF

PASS CONF Menu
Technician Password

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

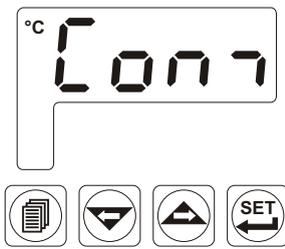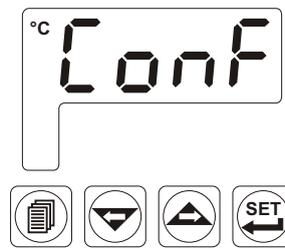Technician can access to the former menu by pressing menu changing back button.

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

℃ PinP

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

℃ ConF

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

Press Menu 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 ENTER button, user accesses to the menu page and to all parameters in this menu page.

7.6 Changing and Saving Parameters

Example-1 : To change Process Input Type parameter `ı55L` in **"PınP Conf"** menu, user must access to PınP ConF menu firstly.

`Sbr` **Operation Screen**

`tECH` **Technician Menu Entering Screen**

`tCPS`

When Menu button is pressed, Technician Menu Entering Screen is shown.

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

`0000` Value on the display starts to flash

`0850` **Technician Password**

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)

Enter password with increment and decrement buttons

Press Set button to confirm password

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

`ConF` **PINP CONF Menu** Configuration parameters of process input
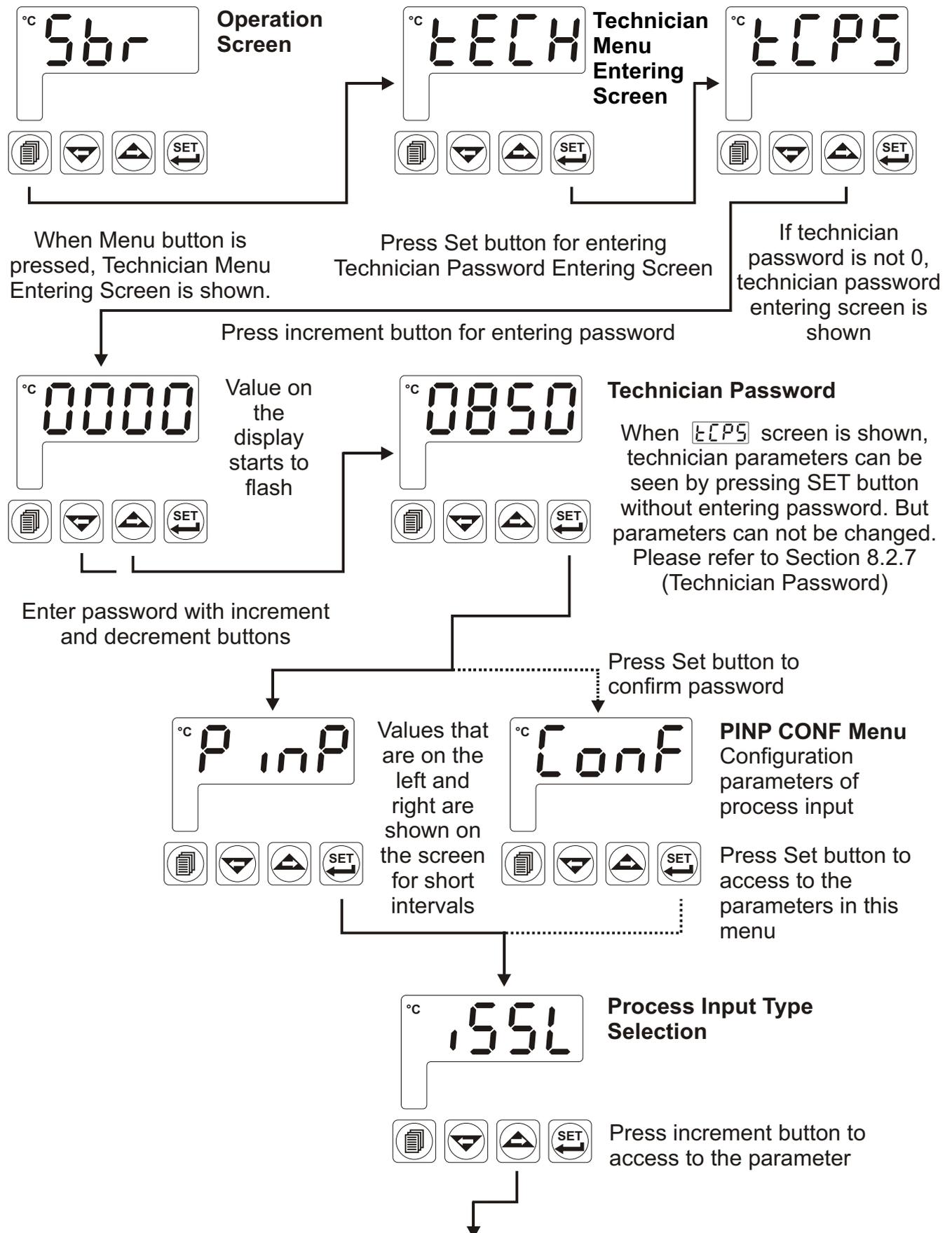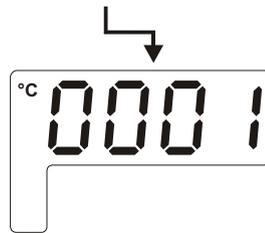
Press Set button to access to the parameters in this menu

`ı55L` **Process Input Type Selection**

Press increment button to access to the parameter
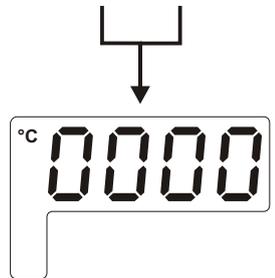
Value on the display starts to flash

`°C 0001`

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

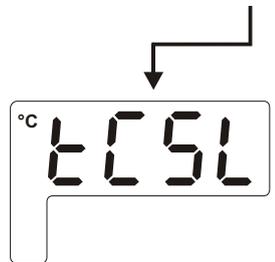Parameter can be changed with increment and decrement buttons

Value on the display starts to flash

`°C 0000`

Process Input Type Selection
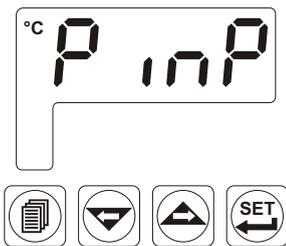TC input type is selected

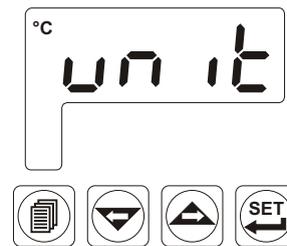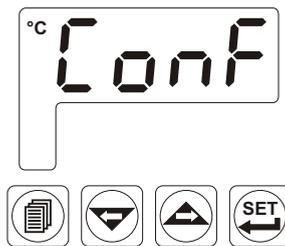Press Set button to confirm the parameter and access to the next parameter

`°C tCSL`

TC Input Type Selection

Press Set button to access to the next parameter

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

`°C PinP`

Values that are on the left and right are shown on the screen for short intervals
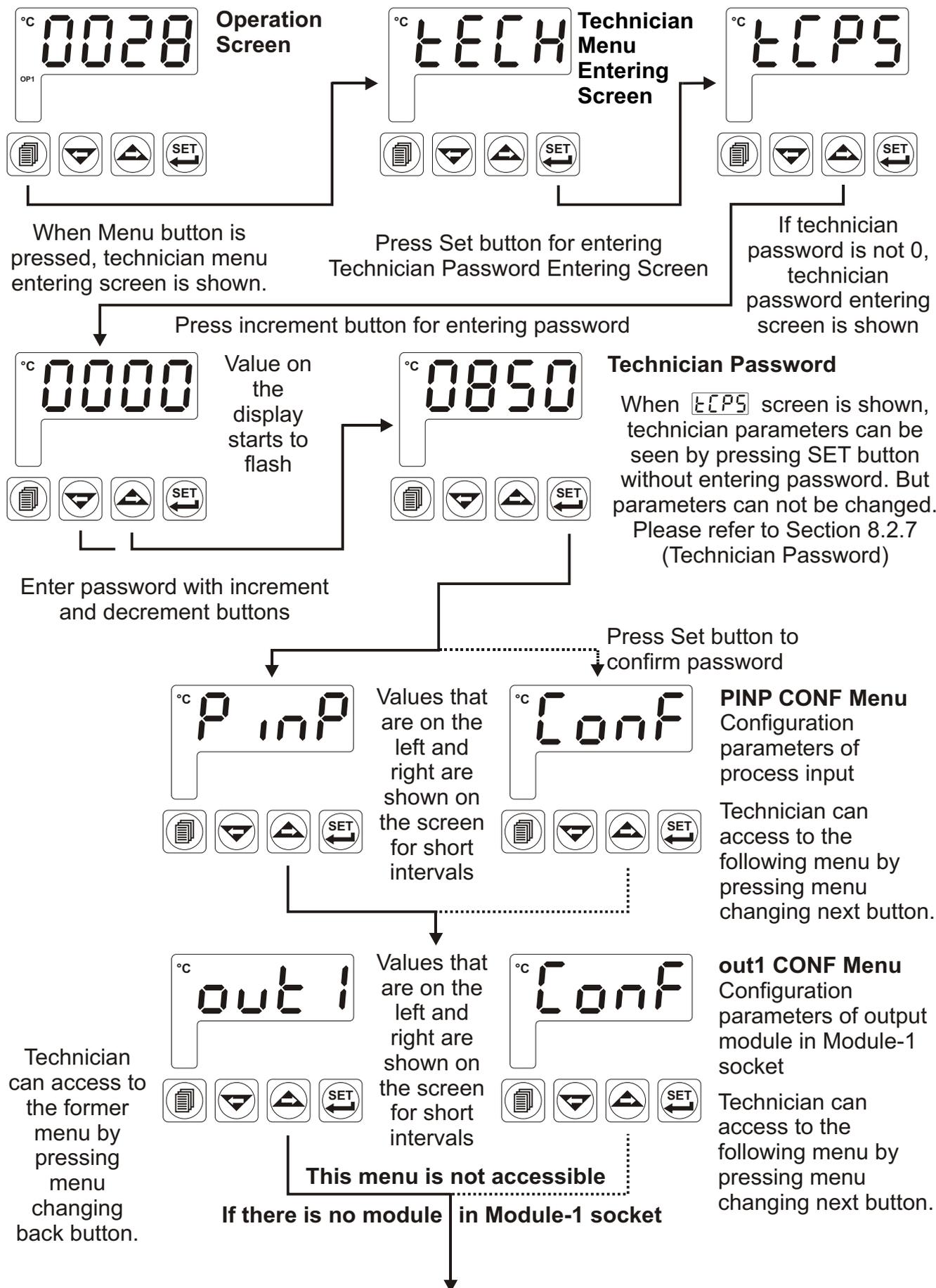
`°C ConF`

`°C unit`

Unit Selection

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

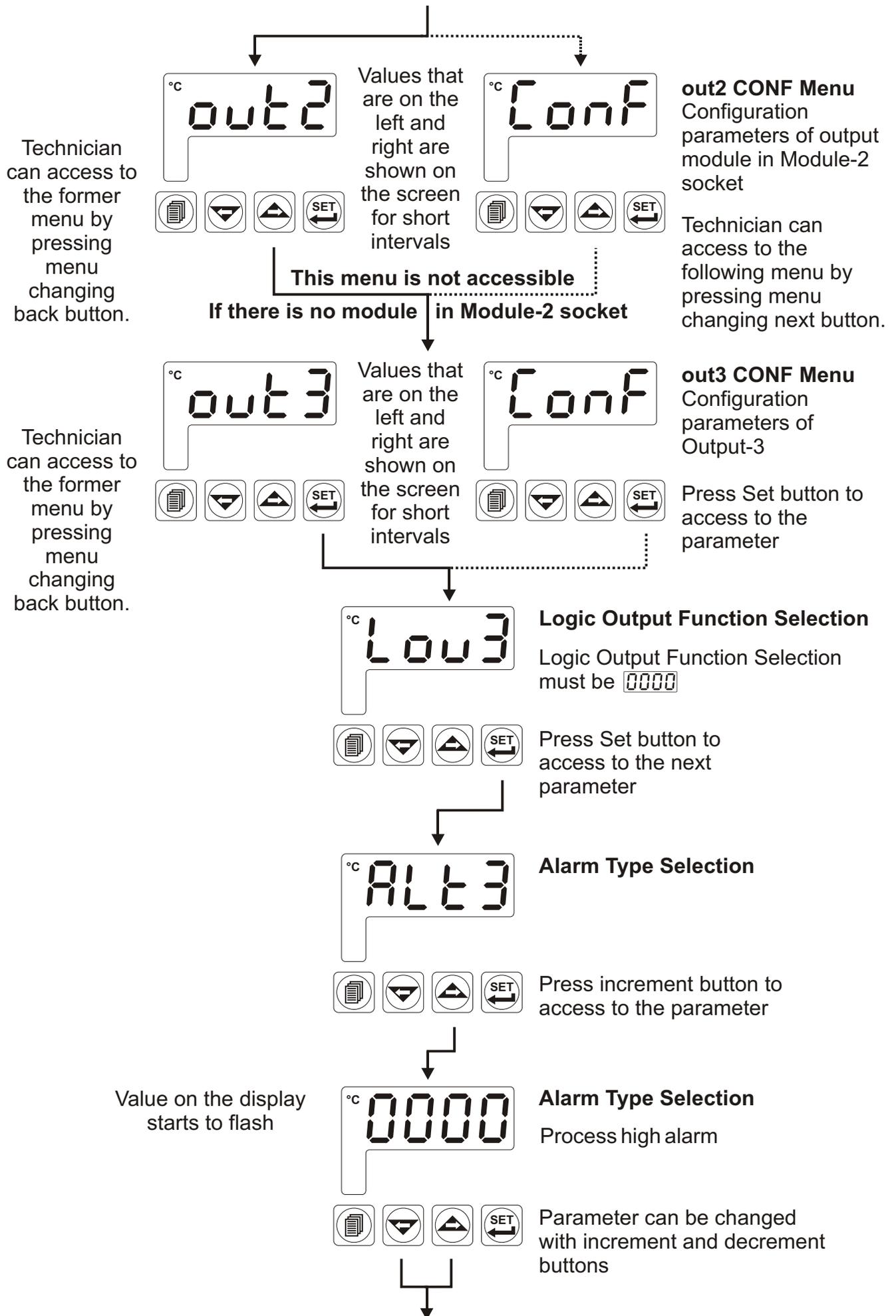If Menu button is pressed again, operation screen is shown.

`°C 0028`
`OP1`

Operation Screen

Example-2 : To change Alarm Type parameter $\boxed{ALt3}$ in "out3 Conf" menu, user must access to out3 Conf menu firstly.

°C $\boxed{0028}$ OP1 [menu] [▽] [△] [SET]	**Operation Screen**

Technician Menu Entering Screen

°C $\boxed{tECH}$ [menu] [▽] [△] [SET]

°C $\boxed{tCPS}$ [menu] [▽] [△] [SET]

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

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

°C $\boxed{0000}$ [menu] [▽] [△] [SET]

Value on the display starts to flash

°C $\boxed{0850}$ [menu] [▽] [△] [SET]

Technician Password

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)

Enter password with increment and decrement buttons

Press Set button to confirm password

°C $\boxed{PinP}$ [menu] [▽] [△] [SET]

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

°C $\boxed{ConF}$ [menu] [▽] [△] [SET]

PINP CONF Menu
Configuration parameters of process input

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

°C $\boxed{out1}$ [menu] [▽] [△] [SET]

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

°C $\boxed{ConF}$ [menu] [▽] [△] [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.

Technician can access to the former menu by pressing menu changing back button.

This menu is not accessible

If there is no module in Module-1 socket

```
°C  out2
```
[menu] [▼] [▲] [SET]

Technician can access to the former menu by pressing menu changing back button.

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

This menu is not accessible
If there is no module in Module-2 socket

```
°C  ConF
```
[menu] [▼] [▲] [SET]

out2 CONF Menu
Configuration parameters of output module in Module-2 socket

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

```
°C  out3
```
[menu] [▼] [▲] [SET]

Technician can access to the former menu by pressing menu changing back button.

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

```
°C  ConF
```
[menu] [▼] [▲] [SET]

out3 CONF Menu
Configuration parameters of Output-3

Press Set button to access to the parameter

```
°C  Lou3
```
[menu] [▼] [▲] [SET]

Logic Output Function Selection

Logic Output Function Selection must be `0000`

Press Set button to access to the next parameter

```
°C  ALt3
```
[menu] [▼] [▲] [SET]

Alarm Type Selection

Press increment button to access to the parameter

Value on the display starts to flash

```
°C  0000
```
[menu] [▼] [▲] [SET]

Alarm Type Selection

Process high alarm

Parameter can be changed with increment and decrement buttons

Value on the display flashes

Alarm Type Selection

Process low alarm

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

Alarm Hysteresis Selection

Press Set button to access to the next parameter

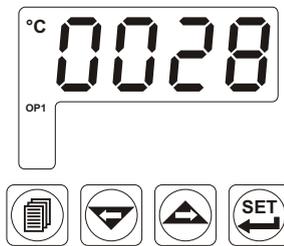**Out3 CONF Menu**
Press Menu button to access to the menu pages

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

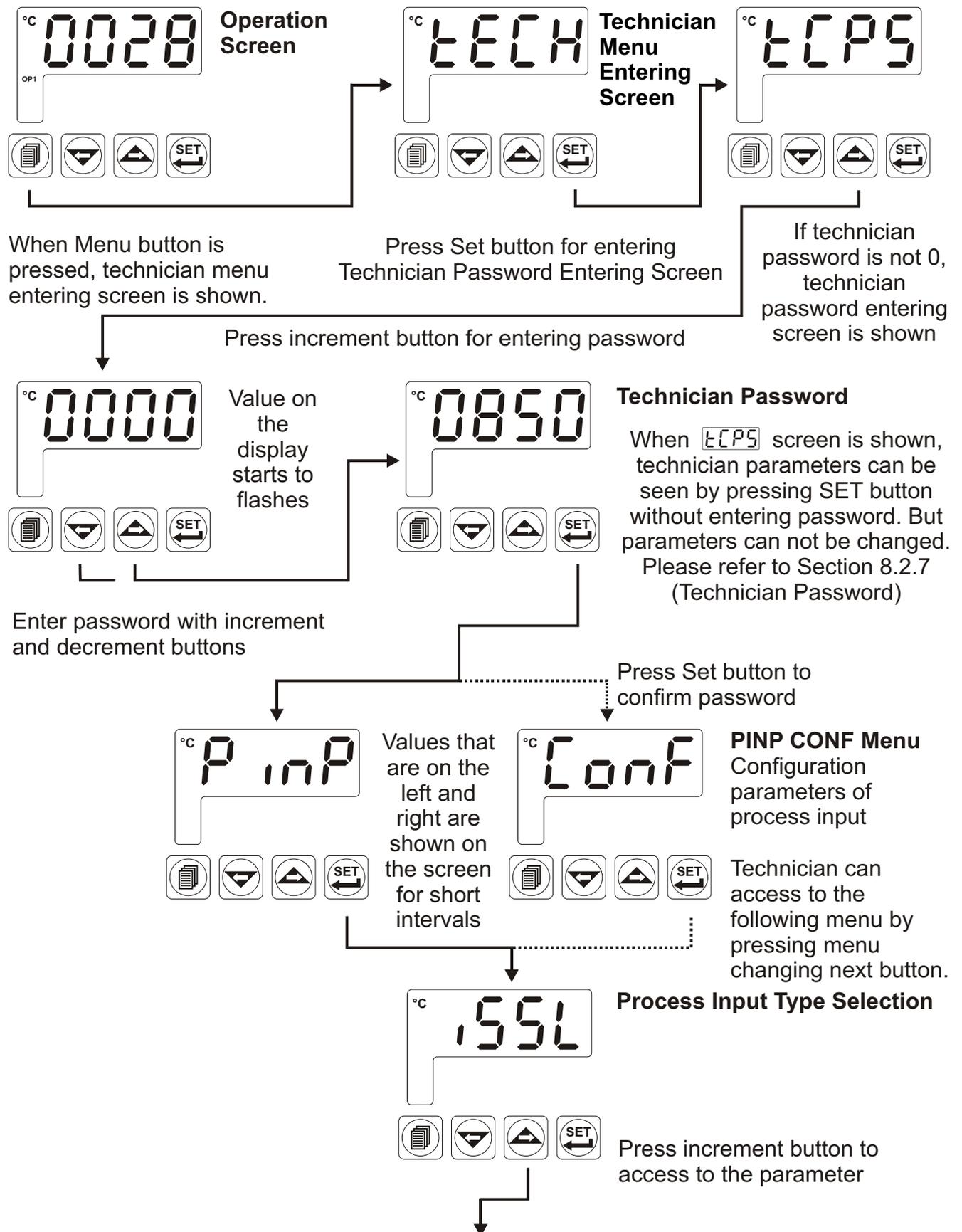Continue to press menu accessing next and back buttons to change the menu pages.

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

Alarm On Delay Time

Operation Screen

Example-3 : To change $---$ Voltage/Current Input Calibration Type parameter `υCAL` in "PınP Conf" menu

`υCAL` Parameter is on "PınP ConF" menu. For accessing to this parameter, technician must access to "PınP ConF" menu firstly. In this example, changing input type of a device from thermocouple to $---$Voltage/Current and dual point calibration selection is shown.

°C `0028` **Operation Screen**

OP1

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

°C `tECH` **Technician Menu Entering Screen**

Press Set button for entering Technician Password Entering Screen

°C `tCPS`

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

Press increment button for entering password

°C `0000` Value on the display starts to flashes

Enter password with increment and decrement buttons

°C `0850` **Technician Password**

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 to confirm password

°C `PınP` Values that are on the left and right are shown on the screen for short intervals

°C `ConF` **PINP CONF Menu** Configuration parameters of process input

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

°C `ıSSL` **Process Input Type Selection**

Press increment button to access to the parameter

Value on the display
starts to flash

°c **0000**

**Process Input Type
Selection**

Parameter can be changed
with increment and decrement
buttons

Value on the display
flashes

°c **0002**

**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
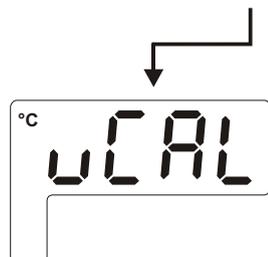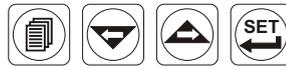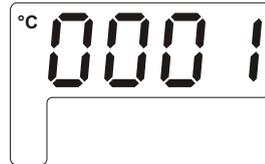next parameter

°c **uASL**

═ **Voltage / Current Input
Type Selection**

Press Set button to access to
the next parameter

°c **dPnt**
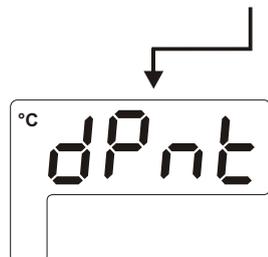
Decimal Point Position

Press Set button to access to
the next parameter

°c **uCAL**

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

Press increment button
to access to the
parameter

Value on the display starts to flash

°C `0000`

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

[MENU] [▼] [▲] [SET]

Parameter can be changed with increment and decrement buttons

Value on the display flashes

°C `0001`

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

[MENU] [▼] [▲] [SET]

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

°C `tPoL`
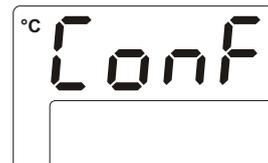
Minimum value for selectable dual point calibration

[MENU] [▼] [▲] [SET]

Press Set button to access to the next parameter

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

°C `PinP`

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

°C `ConF`

°C `tPoH`

[MENU] [▼] [▲] [SET]

[MENU] [▼] [▲] [SET]

[MENU] [▼] [▲] [SET]

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

Maximum value for selectable dual point calibration

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

°C `-199.9`

Operation Screen

[MENU] [▼] [▲] [SET]

Parameters are divided into two groups. These are Alarm Set and Technician parameters. Technician parameters are grouped into subgroups according to their functions. The subgroups are named as menu pages.
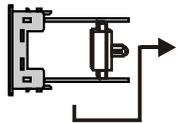
8.1 Alarm SET Parameters
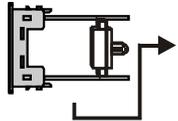
EMO-700
EMO-710
EMO-720

`ALr 1` If EMO-700 Relay, EMO-710 SSR Driver or EMO-720 Digital (Transistor) output module is plugged in Module-1 socket and output is configured as an alarm output, this parameter defines the set value of the alarm output.

`ALr 1` Set value can be adjusted from minimum value of set scale `SU-L` To maximum value of set scale `SU-u`

EMO-700
EMO-710
EMO-720

`ALr2` If EMO-700 Relay, EMO-710 SSR Driver or EMO-720 Digital (Transistor) output module is plugged in Module-2 socket and output is configured as an alarm output, this parameter defines the set value of the alarm output.

`ALr2` Set value can be adjusted from minimum value of set scale `SU-L` To maximum value of set scale `SU-u`

`ALr3` If OUT-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 to maximum value of set scale

8.2 Technician Parameters

`P inP` `ConF`

8.2.1 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)
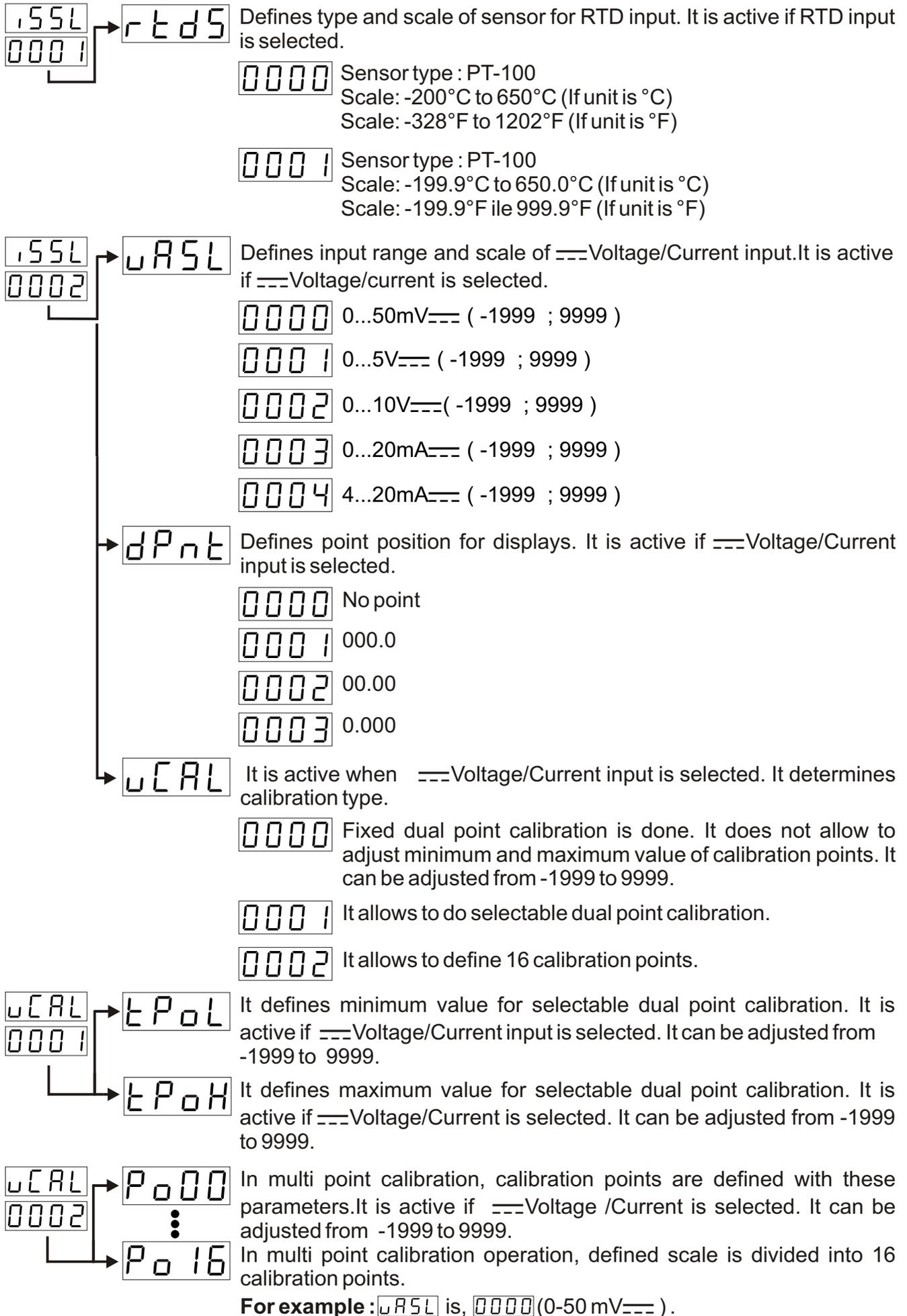
`0016` N (-200°C;1300°C) or (-328°F;2372°F)

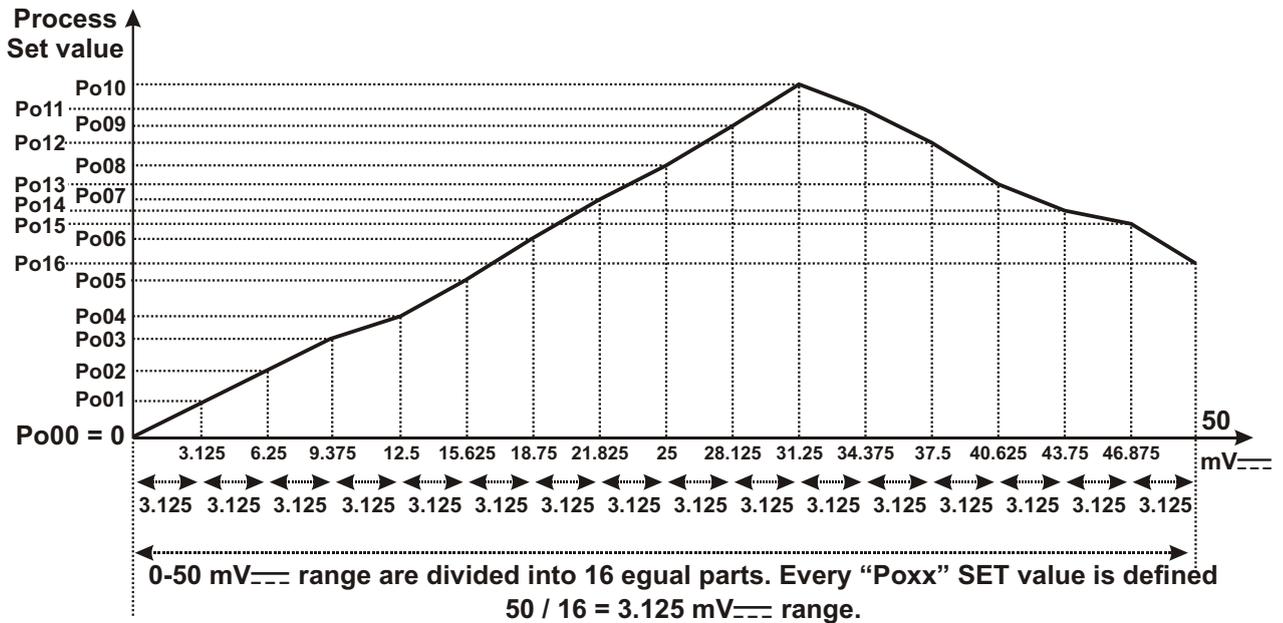`0017` N (-199.9°C;999.9°C) or (-199.9°F;999.9°F)

`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)

`i55L` `0001`	→	`rtd5`	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)

`i55L` `0002`	→	`uA5L`	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.

`0002` It allows to define 16 calibration points.

`uCAL` `0001`	→	`tPoL`	It defines minimum value 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 for selectable dual point calibration. It is active if ===Voltage/Current is selected. It can be adjusted from -1999 to 9999.

`uCAL` `0002`	→	`Po00` ⋮	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.
	→	`Po 16`	In multi point calibration operation, defined scale is divided into 16 calibration points.

For example : `uA5L` is, `0000`(0-50 mV===) .

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

uCAL
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.

un it Unit selection

oC Unit is °C

oF 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.

uPL Maximum value of operating scale. It can be changed according to input type and scale of the process.

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`	
`ConF`	**8.2.2 MODULE-1 Configuration Parameters**

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.
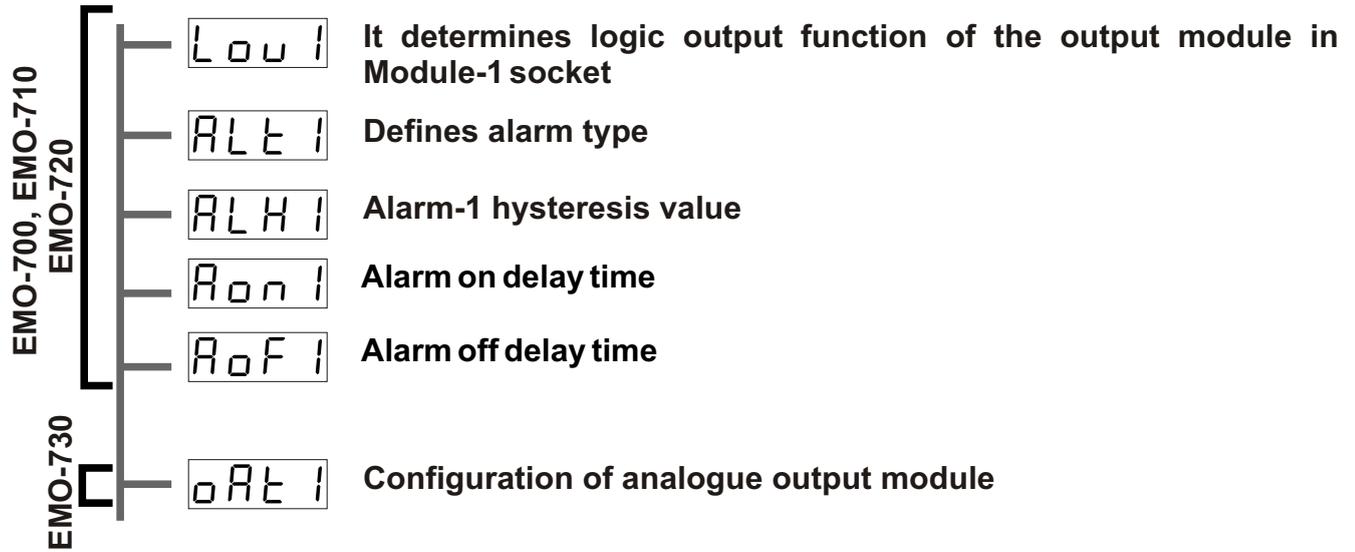
EMO-700, EMO-710 EMO-720

| `Lou 1`	It determines logic output function of the output module in Module-1 socket
`ALt 1`	**Defines alarm type**
`ALH 1`	**Alarm-1 hysteresis value**
`Aon 1`	**Alarm on delay time**
`AoF 1`	**Alarm off delay time**

EMO-730

`oAt 1`	**Configuration of analogue output module**

Module-1 configuration parameters are defined according to which output modules are plugged in Module-1 socket.

`out 1`	`ConF`

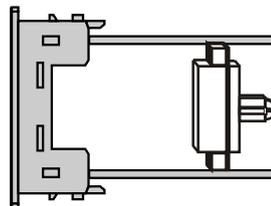ⓘ **These parameters are active if EMO-700 (Relay Output) , EMO-710 (SSR Driver) or EMO-720 (Digital Output) module is plugged in Module-1 socket.**

EMO - 700
EMO - 710
EMO - 720

`out 1`
`ConF`

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

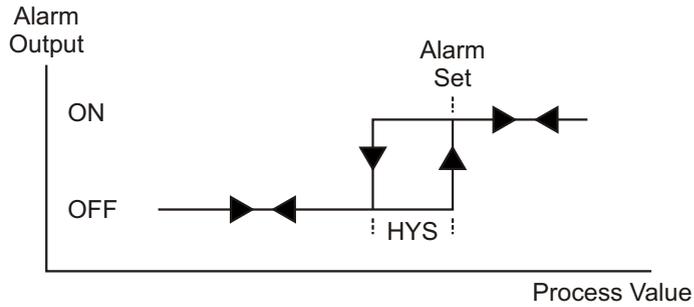| `0000`	Alarm output
`0001`	Sensor break alarm output
`0002`	Output is active when the process value is out of the band which is defined with minimum value of operating scale `LoL` And maximum value of operating scale `uPL`
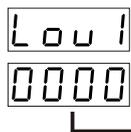
| `Lou 1` `0000` → `ALt 1`	It determines alarm type. It is active if logic output function of Module-1 is adjusted alarm output.

`0000`	Process high alarm
`0001`	Process low alarm

Process high alarm

Process low alarm

`Lou 1` / `0000` → `ALH1` Alarm- 1 hysteresis value. It is active if logic output function of Module-1 is selected alarm output.

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

→ `Aon 1` Alarm on delay time. It can be adjusted from 0000 to 9999 seconds. It is active if logic output function of Module-1 is alarm output.

→ `AoF 1` Alarm off delay time. It can be adjusted from 0000 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 Module-1 is alarm output.

ⓘ **These parameters are active if EMO-730 (0/4...20 mA⎓ Current Output) module is plugged in Module-1 socket.**

EMO-730

| out 1 |
| ConF |

| oAt 1 | Configuration of analogue 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.
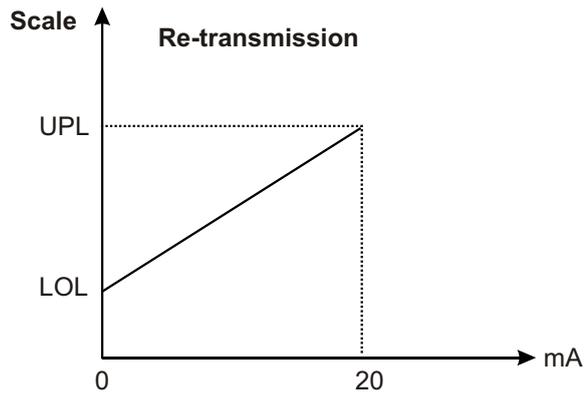
`out2`	**8.2.3 MODULE-2 Configuration Parameters**
`ConF`	**Module-2 configuration parameters are arranged automatically by the device according to the module type in Module-2 socket. These parameters are not accessible if there is no module in Module-2 socket.**
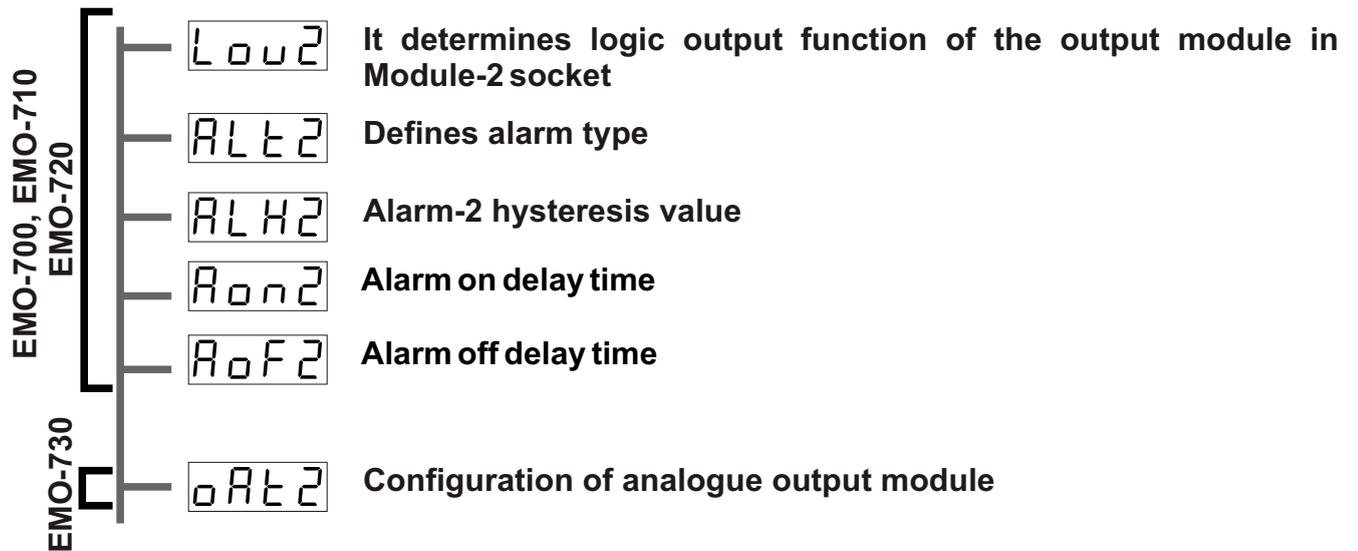
EMO-700, EMO-710 EMO-720

`Lou2`	**It determines logic output function of the output module in Module-2 socket**
`ALt2`	**Defines alarm type**
`ALH2`	**Alarm-2 hysteresis value**
`Aon2`	**Alarm on delay time**
`AoF2`	**Alarm off delay time**

EMO-730

`oAt2`	**Configuration of analogue output module**

Module-2 configuration parameters are defined according to which output modules are plugged in Module-2 socket.

`out2` `ConF`

i **These parameters are active if EMO-700 (Relay Output) , EMO-710 (SSR Driver) or EMO-720 (Digital Output) module is plugged in Module-2 socket.**

EMO - 700
EMO - 710
EMO - 720

`out2` `ConF`	
`Lou2`	It determines logic output function of the output module in Module-2 socket

`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`

`Lou2` `0000` → `ALt2`	It determines alarm type. It is active if logic output function of Module-2 is adjusted alarm output.

`0000`	Process high alarm
`0001`	Process low alarm

Process high alarm

Process low alarm
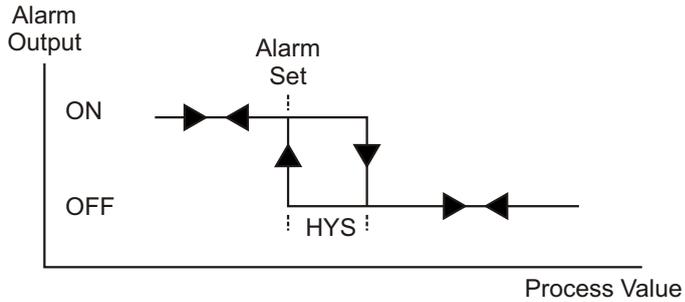
`Lou2` `0000` → `ALH2` Alarm- 2 hysteresis value. It is active if logic output function of Module-2 is selected alarm output.

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

→ `Aon2` Alarm on delay time. It can be adjusted from 0000 to 9999 seconds. It is active if logic output function of Module-2 is alarm output.
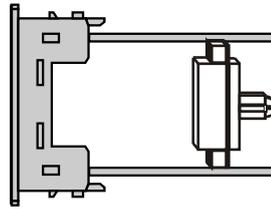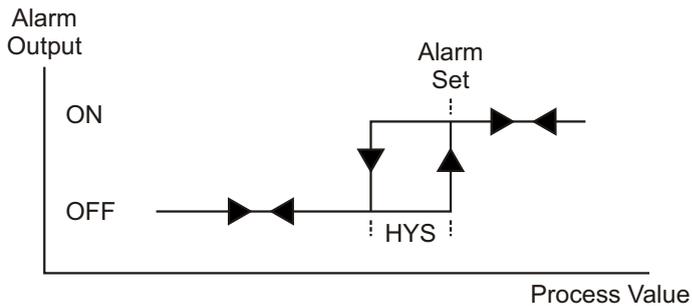
→ `AoF2` Alarm off delay time. It can be adjusted from 0000 to 9998 seconds. When the value is greater than 9998, `LtCH` is seen on the display. It means alarm latching output is selected. It is active if logic output function of Module-2 is alarm output.

out2 ConF

These parameters are active if EMO-730 (0/4...20 mA $---$ Current Output) module is plugged in Module-2 socket.

EMO-730

out2
ConF

oAt2   Configuration of analogue output module in Module-2 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
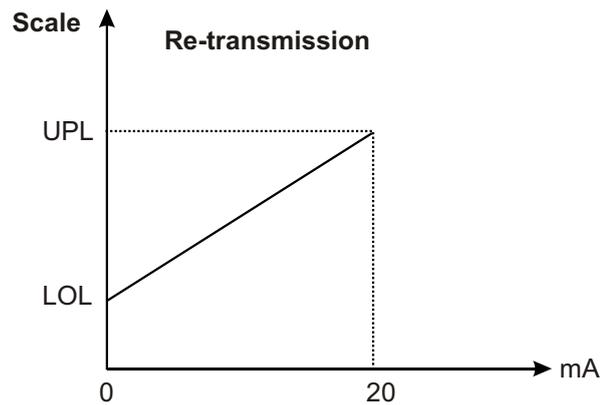
8.2.4 OUTPUT-3 Configuration Parameters

`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
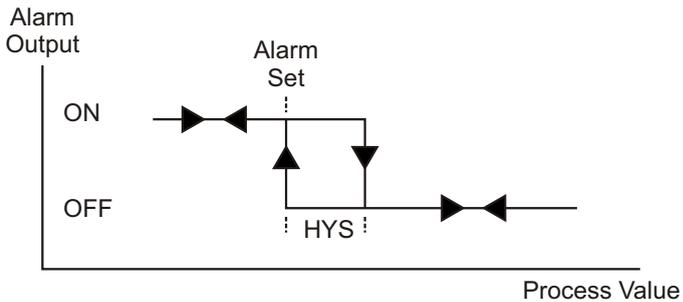
`Lou3` `0000` → `ALH3` Alarm- 3 hysteresis value. It is active if logic output function of Output-3 is alarm output.

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

→ `Aon3` Alarm on delay time. It can be adjusted from 0000 to 9999 seconds. It is active if logic output function of Output-3 is alarm output.
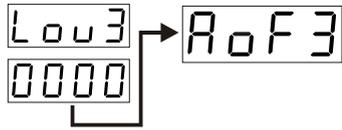
`LoU3` `0000` → `AoF3` Alarm off delay time. It can be adjusted from 0000 to 9998 seconds. When the value is greater than 9998, `LECH` is seen on the display. It means alarm latching output is selected. It is active if logic output function of Output-3 is alarm output.

Alarm Status

Alarm Output

`Aon3`
On Delay

OFF Delay

`AoF3`
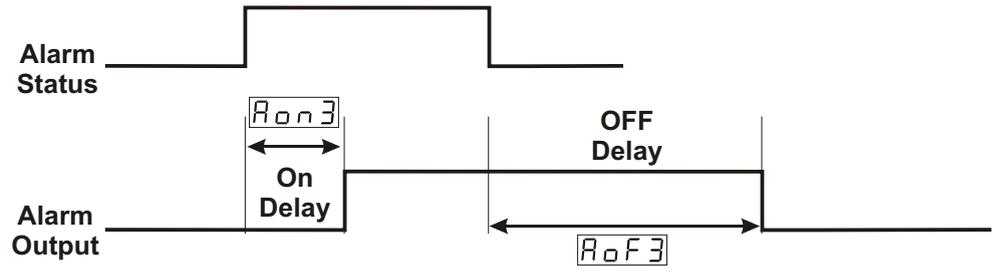
`GEnn` `ConF`	**8.2.5 General Parameters**

`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

`Conn` `ConF`	**8.2.6 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 ESM-7700 Process Indicators)

**1 -** Sensor failure in analogue inputs. Sensor connection is wrong or there is no sensor connection.

2 - If display blinks : If analogue input value is less than minimum value of operating scale `LoL` display starts to blink.

In "PınP Conf" Menu if;

`ı55L` `0000` ; `ECSL` `0003` ; `un ıE` `ºC` ;
`LoL` `-199.9` ; `uPL` `900.0` are defined.
Adjust `LoL` `-150.0`

If analogue input value is less than minimum value of operating scale `LoL` , display starts to blink.

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

3 - If display blinks : If analogue input value is greater than maximum value of operating scale `uPL` , display starts to blink.

In "PınP Conf" Menu ;
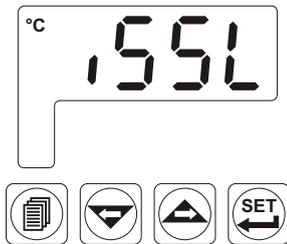
`ı55L` `0000` ; `ECSL` `0003` ; `un ıE` `ºC` ;
`LoL` `-199.9` ; `uPL` `900.0`
Adjust `uPL` `850.0`
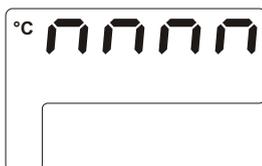
If analogue input value is greater than maximum value of operating scale `uPL` , display starts to blink.

i 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 display as shown on the left. Device does not allow to do any changes without entering the password correctly.
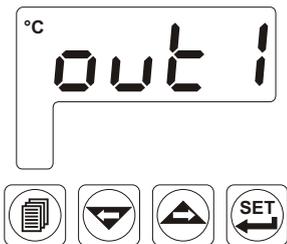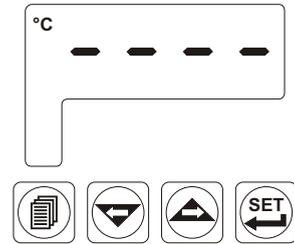
5 - If user does not do anything for 120 seconds while device is on Set or Technician menus, device turns to operation screen.
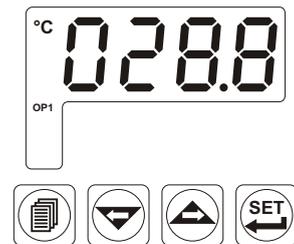
10. Specifications

Device Type	: Process Indicator
Housing&Mounting	: 72mm x 72mm x 87.5mm DIN Size 43700 plastic housing for panel mounting. Panel cut-out is 69x69mm. Type-1 Enclosure Mounting.
Protection Class	: NEMA 4X (IP65 at front, IP20 at rear).
Weight	: Approximately 0.25 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
	24 V $\sim$ (-15% / +10%) 50/60 Hz. 6VA
	24 V $\overline{}$ (-15% / +10%) 6W
Process Inputs	: Universal input TC, RTD, $\overline{}$ Voltage/Current
Thermocouple Input Types	: Selectable by parameters L (DIN43710) , J ,K ,R ,S ,T ,B ,E ,N (IEC584.1)(ITS90) , C (ITS90)
Thermoresistance 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 .	
Sensor Break Protection	: Upscale	
Sampling Cycle	: 3 samples per second	
Input Filter	: 0.0 to 900.0 seconds	
Control Forms	: Programmable ON / OFF.	
Standard Relay Output	: 5A@250V∼ (Programmable control or alarm output) (Electrical Life : 100.000 Operation (Full Load))	
Output Modules	:-EMO-700 Relay Output Module (5A@250V∼) -EMO-710 SSR Driver Output Module (Max. 26mA, Max. 22V ---) -EMO-720 Digital (Transistor) Output Module (Max 40mA@18V ---) -EMO-730 0/4...20mA --- Current Output Module	
Standard Communication Module	: EMC-700 RS-232 Communication Module	
Optional Communication Module	: EMC-710 RS-485 Communication Module	
Communication Protocol	: MODBUS-RTU	
Process Display	: 14 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), EHC, CE	

11. Other Informations

Manufacturer Information:
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