



### **ESM-7710 72 x 72 DIN Size Digital, On/Off Temperature Controller**

- 3 Digits display
- J type thermocouple or  
K type thermocouple or  
PT-100 2-wire or 3-wire temperature input  
( It must be determined in order )
- ON/OFF control form
- Selectable heating and cooling function
- Operating type selection with hysteresis
- Adjustment of temperature offset value
- Minimum Pulling Time Adjustment for Control Outputs

Instruction manual of ESM-7710 Temperature Controller consists of three 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 are explained.

### Operation and Parameters:

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

### Control Algorithm:

Configurable control function that is on the device is 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.

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## **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** : Temperature Controller

**Model Number** : ESM-7710

**Type Number** : ESM-7710

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

**Conforms to the following directives :**

**73 / 23 / EEC The Low Voltage Directive as amended by 93 / 68 / EEC**

**89 / 336 / EEC The Electromagnetic Compatibility Directive**

**Has been designed and manufactured according to the following specifications**

**EN 61000-6-4:2001 EMC Generic Emission Standard for the Industrial Environment**

**EN 61000-6-2:2001 EMC Generic Immunity Standard for the Industrial Environment**

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

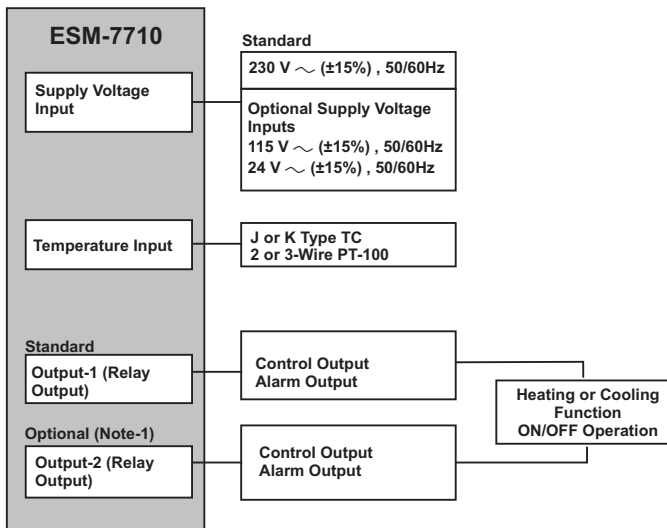
## 1.Preface

ESM series temperature controllers are designed for measuring and controlling temperature. They can be used in many applications with On/Off control form and heating and cooling selection. Some application fields which they are used are listed below:

### Application Fields

Glass  
Plastic  
Petro-Chemistry  
Textile  
Automotive  
Machine Production Industries

## 1.1 General Specifications



Note-1: Optional Relay output is standard in ESM-7710 with two relays

## 1.2 Ordering Information

<b>ESM-7710</b> (72x72 DIN Size)		A	BC	D	E	/	FG	HI	/	U	V	W	Z
				0	1	/		00	/	0	0	0	0
<b>A</b>	<b>Supply Voltage</b>												
3	24V ~ (±15%) 50/60Hz												
4	115V ~ (±15%) 50/60Hz												
5	230V ~ (±15%) 50/60Hz												
9	Customer (Max.240V~ (±15%)) 50/60Hz												
<b>BC</b>	<b>Input Type</b>	<b>Scale(°C)</b>											
09	PT 100 , IEC751(ITS90)	-19.9°C 99.9°C											
03	PT 100 , IEC751(ITS90)	0°C 400°C											
05	J ,Fe CuNi IEC584.1(ITS90)	0°C 800°C											
10	K ,NiCr Ni IEC584.1(ITS90)	0°C 999°C											
<b>E</b>	<b>Output-1</b>												
1	Relay Output ( 7A@250V ~ , 1 NO + 1 NC )												
<b>FG</b>	<b>Output-2</b>												
01	Relay Output ( 7A@250V ~ , 1 NO )												



~ Symbol means Vac,  
 --- Symbol means Vdc

All order information of ESM-7710 Temperature Controller 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 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.

## 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 occurred 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 result in malfunction, electric shock or fire.

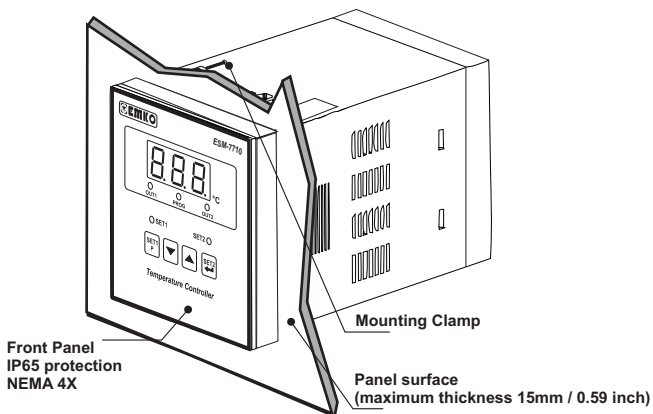
Do not use the unit in combustible or explosive gaseous atmospheres.

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.

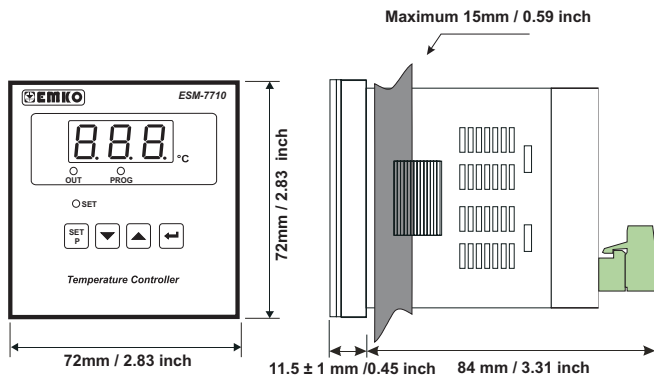
Montage of the product on a system must be done with it's own fixing clamps. Do not do the montage of the device with inappropriate fixing clamp. Be sure that device will not fall while doing the montage.

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

## 2.1 General Description

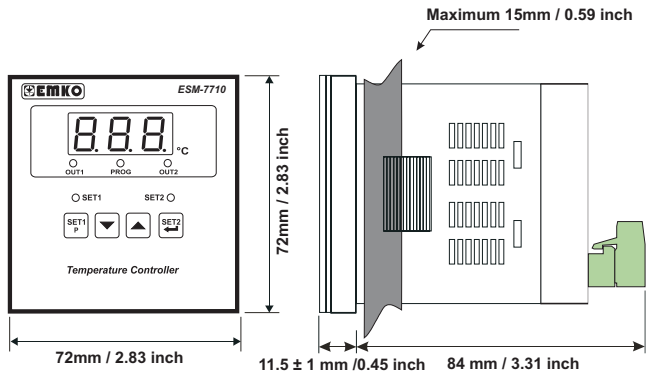


## 2.2 Front View and Dimensions of ESM-7710 Temperature Controller with One Relay

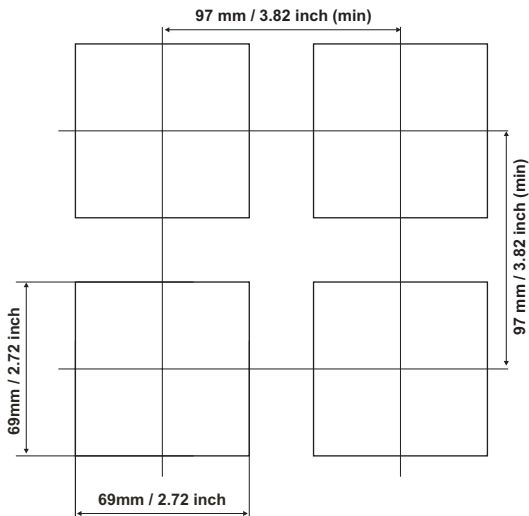




## 2.3 Front View and Dimensions of ESM-7710 Temperature Controller with Two Relays



## 2.4 Panel Cut-Out



## 2.5 Environmental Ratings

### Operating Conditions



**Operating Temperature** : 0 to 50 °C



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



**Altitude** : Up to 2000m.



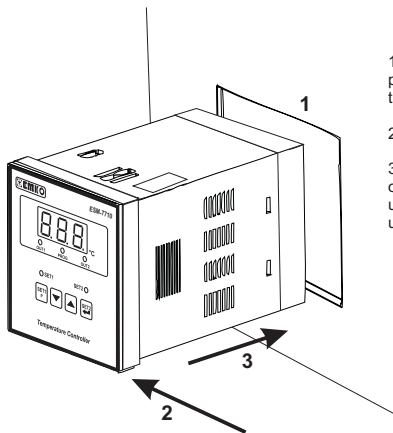
#### Forbidden Conditions:

Corrosive atmosphere

Explosive atmosphere

Home applications (The unit is only for industrial applications)

## 2.6 Panel Mounting



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

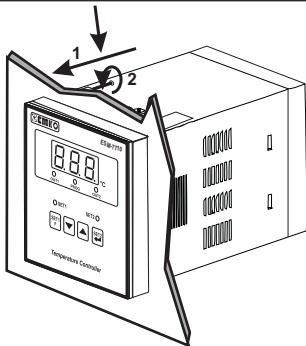
2-Check front panel gasket position

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.

## 2.7 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

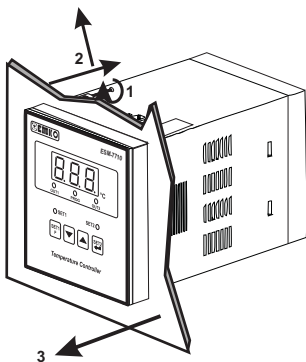


Montage of the unit to a system must be done with it's own fixing clamps. Do not do the montage of the device with inappropriate fixing clamps. Be sure that device will not fall while doing the montage.

## 2.8 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 temperature being controlled, and/or personal injury. It is your responsibility, as the installer, to ensure that the configuration is correct.

Device parameters 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.

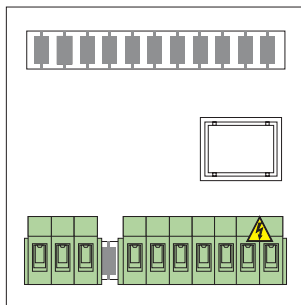


Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.



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



Max. 2.5mm / 0.098 inch  
Wire Size:  
14AWG/1mm<sup>2</sup>  
Solid /Stranded



Torque  
0.5 Nm

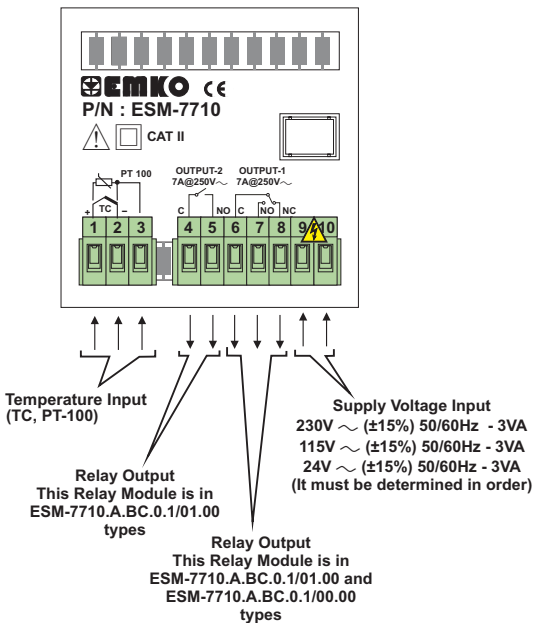


Screw driver  
0.8x3mm

### 3.2 Electrical Wiring Diagram



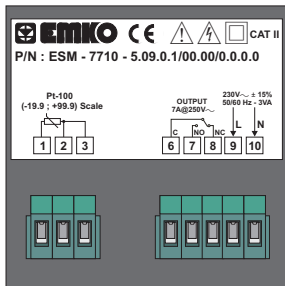
Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the te being controlled and personnel injury.



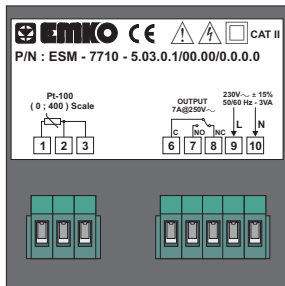
Temperature input is in CAT II class.

### 3.3 Labels for ESM-7710 Temperature Controller with One Relay

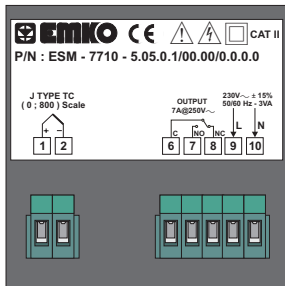
Rear label appearance of the device that have PT-100 (-19.9°C ; + 99.9°C) Scale



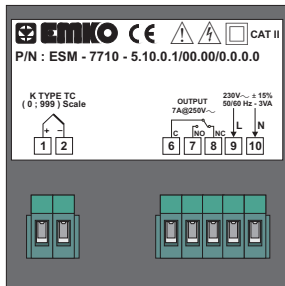
Rear label appearance of the device that have PT-100 (0°C ; 400°C) Scale



Rear label appearance of the device that have J Type Thermocouple (0°C ; 800°C) Scale

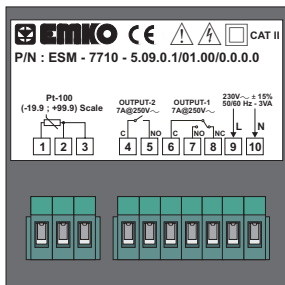


Rear label appearance of the device that have K Type Thermocouple (0°C ; 999°C) Scale

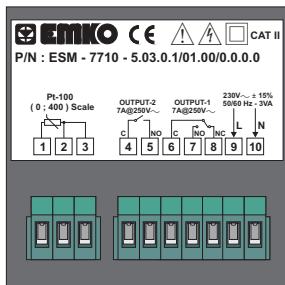


### 3.4 Labels for ESM-7710 Temperature Controller with Two Relays

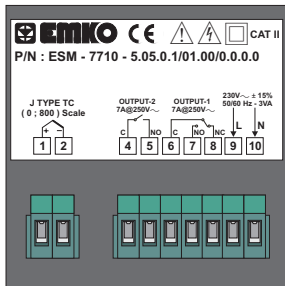
Rear label appearance of the device  
that have PT-100  
(-19.9°C ; + 99.9°C) Scale



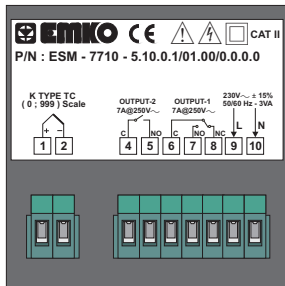
Rear label appearance of the device  
that have PT-100 (0°C ; 400°C) Scale



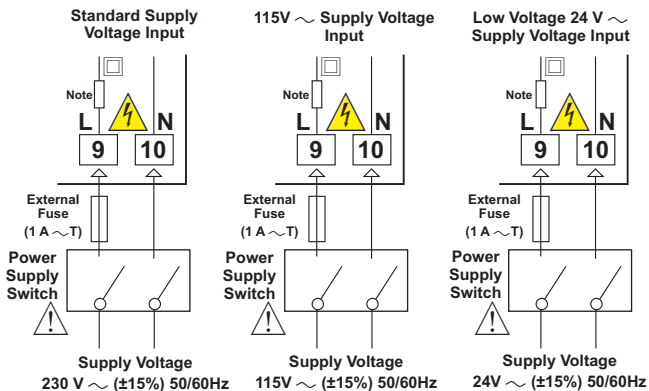
Rear label appearance of the device  
that have J Type Thermocouple  
(0°C ; 800°C) Scale



Rear label appearance of the device  
that have K Type Thermocouple  
(0°C ; 999°C) Scale



### 3.5 Supply Voltage Input Connection of the Device



#### Note :

There is an internal 33R  $\Omega$  fusible flameproof resistor in 115V ~ and 230V ~ 50/60Hz  
There is an internal 4R7  $\Omega$  fusible flameproof resistor in 24V ~ 50/60Hz



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 switch or fuse on the device. So a power switch and a fuse must be added to the supply voltage input. Power switch and fuse must be put to a place where user can reach easily.



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.

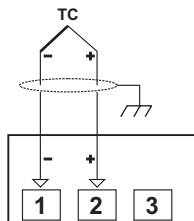


External fuse must be on phase connection in ~ supply input.



### 3.6 Temperature Input Connection

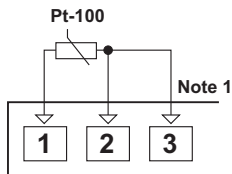
#### 3.6.1 TC (Thermocouple) Connection



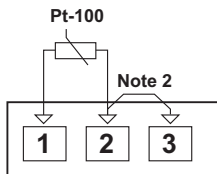
Connect the wires with the polarity as shown in the figure left.

- 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  $10\text{M}\Omega$ .

#### 3.6.2 RTD Connection



3-wire Pt-100 connection  
(with line compensation)  
(Max. Line impedance is  $10\ \Omega$ )



2-wire Pt-100 connection  
(without line compensation)

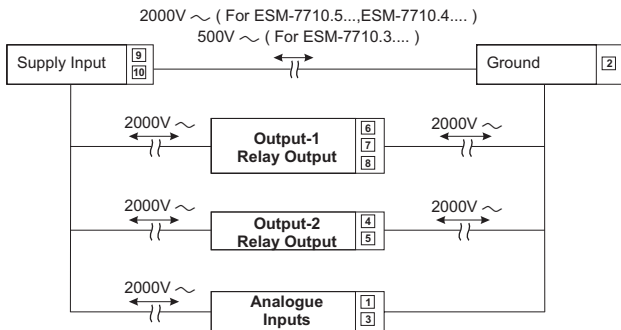
**Note 1 :** In 3-wire system, use always cables of the same diameter (min  $1\text{mm}^2$ ) Always use wires of the same gauge and type whether a 2-wire or 3-wire system.

**Note 2 :** Install a jumper between terminals 2 and 3 when using a 2-wire RTD.

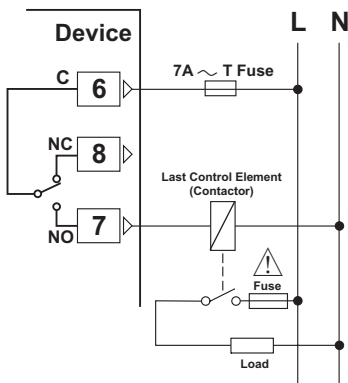
**Note 3 :** If the distance is longer than 10 meters, use 3-wire system

- i** Input resistance is greater than  $10\text{M}\Omega$ .

### 3.7 Galvanic Isolation Test Values of ESM-7710 Temperature Controller

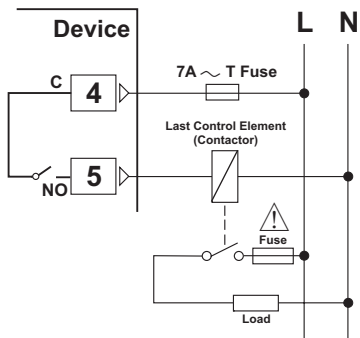


### 3.8 Output-1 (Relay Output) Connection



Fuses must be selected according to the application

### 3.9 Output-2 (Relay Output) Connection



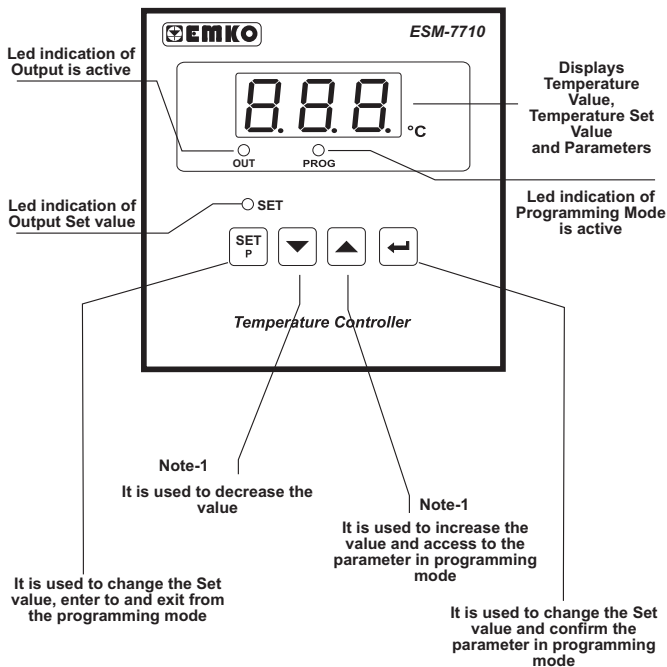
Fuses must be selected according to the application



Output-2 exists in device with two relays

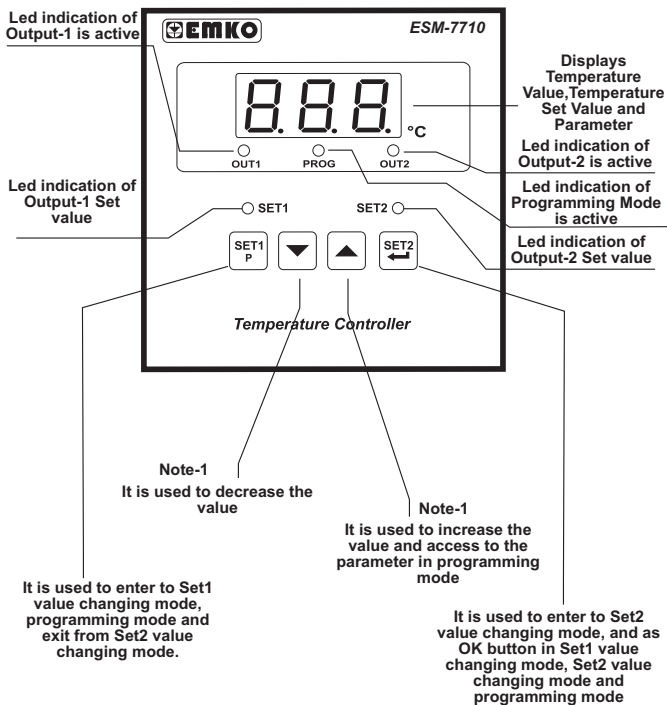
## 4. Front Panel Definition and Accessing to the Menus

### 4.1 Front Panel Definition for ESM-7710 with One Relay



**Note-1:** In Set value or programming mode while changing the parameter, 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.

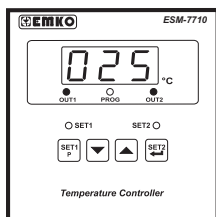
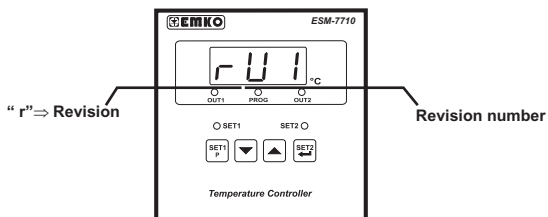
## 4.2 Front Panel Definition for ESM-7710 with Two Relays



**Note-1:** In Set value or programming mode while changing the parameter, 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.

### 4.3 Observation of ESM-7710 Temperature Controller Software Revision

When the power is applied to the device, software revision number is momentarily shown on the display .



Main operation screen is shown



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

## 4.4 Changing and Saving Set Values

### 4.4.1 ESM-7710 with One Relay

Operation Screen



When SET button is pressed, SET LED lights on and SET value is observed on display.

○ SET



SET Value Screen



● SET



SET value can be changed with increment and decrement buttons.

SET Value Screen



● SET



Press SET button again to exit without saving SET value.

Press Enter button for saving SET value.

Operation Screen



For both conditions, SET LED lights off and it turns to main operation screen.

○ SET



If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

Adjustment of SET1 value

Operation Screen



○ SET1      SET2 ○



When SET1 button is pressed, SET1 LED lights on and SET1 value is seen on display.

SET1 Value Screen



● SET1      SET2 ○



SET1 value can be changed with increment and decrement buttons.

SET1 Value Screen



● SET1      SET2 ○



Press SET1 button again to exit without saving SET1 value.

Press SET2/Enter button for saving SET1 value.

Operation Screen



○ SET1      SET2 ○



For both conditions SET1 Led lights off and it turns to main operation screen.



If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.



## Adjustment of SET2 value

Operation Screen



When SET2 button is pressed, SET2 LED lights on and SET2 value is seen on display.

SET2 Value Screen



SET2 value can be changed with increment and decrement buttons.

SET2 Value Screen



Press SET1 button again to exit without saving SET2 value.

Press SET2/Enter button for saving SET2 value.

Operation Screen



For both conditions, SET2 LED lights off and it turns to main operation screen.



If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

## 4.5 Entering to Programming Mode, Changing and Saving Parameters

### 4.5.1 ESM-7710 with One Relay

#### Operation Screen



When SET button is pressed for 10 seconds, Prog Led starts to flash and "Hs1" is seen on screen

○ SET



#### Programming Screen Hysteresis Parameter



Prog Led starts to flash

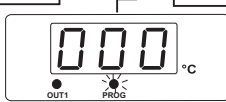
○ SET



Press SET button to exit from programming mode.

If Enter button is pressed next parameter is shown.

#### Value of Hysteresis parameter



Parameter value can be observed by pressing increment button.

If Enter button is pressed next parameter is shown.

Parameter can be changed with increment and decrement buttons.

○ SET



Press SET button to exit without saving parameter value.

#### Programming Screen



#### Value of Hysteresis parameter



Press SET button to exit programming mode.

○ SET



○ SET



#### Operation Screen

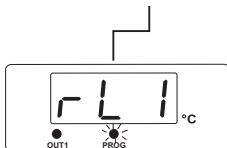
Press Enter button for saving parameter value.

○ SET



### Programming Screen

#### Operation Type Selection Parameter for Output



Press SET button to exit from programming mode.



If Enter button is pressed next parameter is shown.

#### Value of Operation Type Selection Parameter for Output Heating is selected



Press SET button to exit without saving parameter value.



Parameter value can be observed by pressing increment button.

Parameter can be changed with increment and decrement buttons.

### Programming Screen



Press SET button to exit from programming mode.



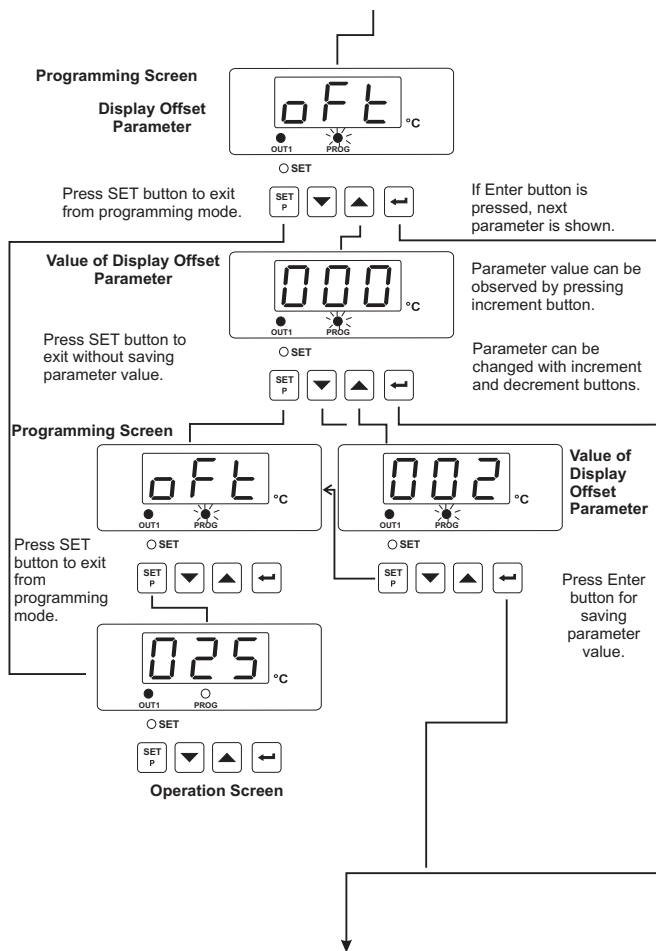
#### Value of Operation Type Selection Parameter for Output

#### Cooling is selected

Press Enter button for saving parameter value.

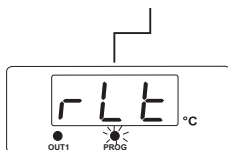


#### Operation Screen



### Programming Screen

Minimum Pulling Time Parameter for Output



○ SET

Press SET button to exit from programming mode.



If Enter button is pressed, next parameter is shown.

Value of Minimum Pulling Time Parameter for Output

Press SET button to exit without saving parameter value.



○ SET

Parameter value can be observed by pressing increment button.



Parameter can be changed with increment and decrement buttons

### Programming Screen



○ SET



Press SET button to exit from programming mode.



○ SET



Value of Minimum Pulling Time Parameter for Output

Press Enter button for saving parameter value.

It turns to "Hs1" parameter.



○ SET



### Operation Screen

Press SET button to exit from programming mode.

Continue to press Enter button to see the parameters.



○ SET



If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

#### 4.5.2 ESM-7710 with Two Relays

Operation Screen



When SET button is pressed for 10 seconds, Prog Led starts to flash and "Hs1" is seen on screen

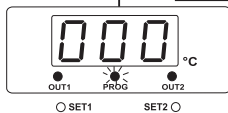
Programming Screen  
Hysteresis parameter for Output-1



Press SET1 button to exit from programming mode.

If SET2/Enter button is pressed, next parameter is shown.

Value of hysteresis parameter for Output-1



Press SET1 button to exit without saving parameter value.

Parameter value can be observed by pressing increment button.  
If SET2/Enter button is pressed, next parameter is shown.  
Parameter can be changed with increment and decrement buttons.

Programming Screen



Value of hysteresis parameter for Output-1

Press SET1 button to exit from programming mode.

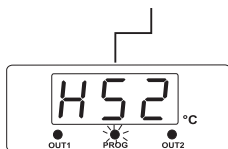
Press SET2/Enter button for saving parameter value.



Operation Screen

### Programming Screen

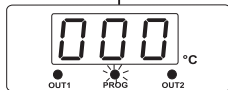
Hysteresis parameter  
for Output-2



Press SET1 button to exit  
from programming mode.

If SET2/Enter button is  
pressed, next  
parameter is shown.

Value of hysteresis  
parameter for Output-2



Press SET1 button to exit  
without saving parameter  
value.

Parameter value can be  
observed by pressing  
increment button.

If SET2/Enter button is  
pressed, next parameter  
is shown.

Parameter can be  
changed with increment  
and decrement buttons.

### Programming Screen



Press SET1  
button to exit  
from  
programming  
mode.



Value of  
hysteresis  
parameter  
for Output-2

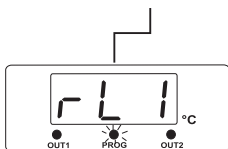
Press  
SET2/Enter  
button for  
saving  
parameter  
value.



### Operation Screen

### Programming Screen

#### Operation Type Selection Parameter for Output-1



○ SET1      SET2 ○

Press SET1 button to exit from programming mode.



If SET2/Enter button is pressed, next parameter is shown.

#### Value of operation type selection parameter for output-1

Heating is selected



○ SET1      SET2 ○

Press SET1 button to exit without saving parameter value.

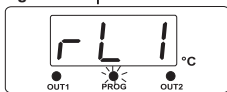


Parameter value can be observed by pressing increment button.

If SET2/Enter button is pressed, next parameter is shown.

Parameter can be changed with increment and decrement buttons.

### Programming Screen



○ SET1      SET2 ○

Press SET1 button to exit from programming mode.



○ SET1      SET2 ○

Value of operation type selection parameter for output-1

Cooling is selected

Press SET2/Enter button for saving parameter value.



○ SET1      SET2 ○

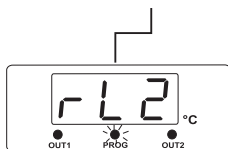


Operation Screen



### Programming Screen

#### Operation Type Selection Parameter for Output-2



○ SET1      SET2 ○

Press SET1 button to exit from programming mode.



If SET2/Enter button is pressed, next parameter is shown.

#### Value of Operation Type Selection Parameter for Output-2

##### Heating is selected

Press SET1 button to exit without saving parameter value.



○ SET1      SET2 ○



Parameter value can be observed by pressing increment button.

If SET2/Enter button is pressed, next parameter is shown.

Parameter can be changed with increment and decrement buttons.

### Programming Screen



○ SET1      SET2 ○

Press SET1 button to exit from programming mode.



○ SET1      SET2 ○



#### Value of operation type selection parameter for output-2

##### Cooling is selected

Press SET2/Enter button for saving parameter value.

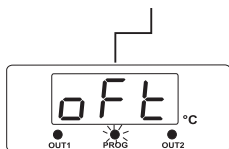


○ SET1      SET2 ○



### Operation Screen

**Programming Screen**  
**Display Offset**  
**Parameter**

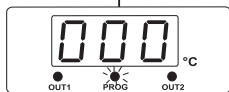


Press SET1 button to exit from programming mode.



If SET2/Enter button is pressed, next parameter is shown.

**Value of Display**  
**Offset Parameter**



Press SET1 button to exit without saving parameter value.



Parameter value can be observed by pressing increment button.

If SET2/Enter button is pressed, next parameter is shown.

Parameter can be changed with increment and decrement buttons.

**Programming Screen**



Press SET1 button to exit from programming mode.



**Value of Display**  
**Offset Parameter**



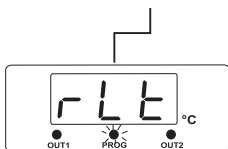
Press SET2/Enter button for saving parameter value.



**Operation Screen**

### Programming Screen

Minimum Pulling Time Parameter for Output-1



Press SET1 button to exit from programming mode.



If SET2/Enter button is pressed, next parameter is shown.

Value of Minimum Pulling Time Parameter for Output-1



Press SET1 button to exit without saving parameter value.



Parameter value can be observed by pressing increment button. If SET2/Enter button is pressed, next parameter is shown.

Parameter can be changed with increment and decrement buttons.

### Programming Screen



Press SET1 button to exit from programming mode.



Value of Minimum Pulling Time Parameter for Output-1

Press SET2/Enter button for saving parameter value.

"Hs1" parameter is shown.



### Operation Screen

Press SET1 button to exit from programming mode.

Continue to press Enter button to see parameters.



If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

## 5. Parameters

Parameters are divided into two groups as SET and PROGRAM parameters.

### 5.1 Set Parameters

#### SET1

SET value for Output-1. Control of output-1 relay is done according to this value.  
This value can be adjusted according to input type, minimum and maximum of scale.

#### SET2

SET value for Output-2. Control of output-2 relay is done according to this value.  
This value can be adjusted according to input type, minimum and maximum of scale.  
**THIS PARAMETER IS NOT ACTIVE IN DEVICES WITH ONE RELAY.**

### 5.2 Program Parameters

Hysteresis value for Output-1.

It can be adjusted from 0.0 to 10.0 for PT-100 ( -19.9 ; +99.9 )°C scaled devices

It can be adjusted from 0 to 100 for PT-100 ( 0 ; 400)°C , J Type Thermocouple ( 0 ; 800)°C , K Type Thermocouple ( 0 ; 999)°C scaled devices

Hysteresis value for Output-2.

**THIS PARAMETER IS NOT ACTIVE IN DEVICES WITH ONE RELAY.**

It can adjusted from 0.0 to 10.0 for PT-100 ( -19.9 ; +99.9)°C.

It can be adjusted from 0 to 100 for PT-100 ( 0 ; 400)°C , J Type Thermocouple ( 0 ; 800)°C , K Type Thermocouple ( 0 ; 999)°C scaled devices

Operation Type Selection parameter for output-1.

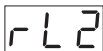
Operation type of output-1 relay can be adjusted as "HEATING". Normally energised.

Operation type of output-1 relay can be adjusted "COOLING". Normally de-energised.



**"Hs2" and "rL2" PARAMETERS ARE ACTIVE IN DEVICES WITH TWO RELAYS.**

If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

The image shows the parameter code 'rL2' displayed in a seven-segment LCD font within a rectangular border.

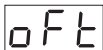
Operation type selection parameter of output-2.  
**THIS PARAMETER IS NOT ACTIVE IN DEVICES WITH ONE RELAY.**

The image shows the parameter value '000' displayed in a seven-segment LCD font within a rectangular border.

Operation Type of Output-2 relay can be adjusted as "HEATING". Normally energised.

The image shows the parameter value '001' displayed in a seven-segment LCD font within a rectangular border.

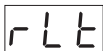
Operation Type of Output-2 relay can be adjusted as "COOLING". Normally de-energised.

The image shows the parameter code 'ofT' displayed in a seven-segment LCD font within a rectangular border.

This parameter can make addition or reduction to the temperature value on the device screen. It has no effect to the control system.

It can be adjusted from -10.0 to 10.0 for PT-100 (-19.9 ; +99.9 )°C scaled devices.

It can be adjusted from -100 to 100 for PT-100 (0 ; 400)°C , J Type Thermocouple (0 ; 800)°C , K Type Thermocouple (0 ; 999)°C scaled devices.

The image shows the parameter code 'rLT' displayed in a seven-segment LCD font within a rectangular border.

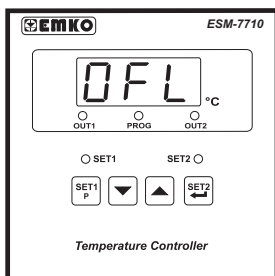
Minimum pulling time parameter for output-1 (Minimum off time). When Output-1 is inactive this time must be expired for Output-1 to become active again. It can be adjusted from 0 to 100 seconds



**"Hs2"** and **"rL2"** PARAMETERS ARE ACTIVE IN DEVICES WITH TWO RELAYS.

If no operation is done in programming or Set value mode for 20 seconds, device turns to main operation screen automatically.

## 6. Failure Message in ESM-7710 Temperature Controllers

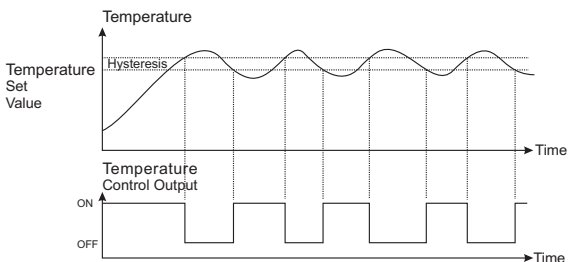


Sensor failure in analogue inputs. It means sensor connection is wrong or there is no sensor.

## 7. Control Algorithm

### 7.1 ON/OFF Control

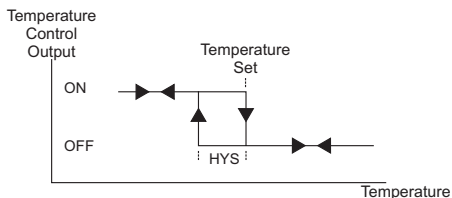
In ON/OFF control algorithm, temperature value is tried to keep equal to set value by opening or closing completely last control element. ON/OFF controlled system, temperature value oscillates continuously. Temperature value's oscillation period or amplitude around set value changes according to controlled system. For reducing oscillation period of temperature value, a threshold zone is formed below or around set value and this zone is named hysteresis. Action of control output is described with figures below.



#### 7.1.1 ON/OFF Control in ESM-XX10 Temperature Controller

##### ON/OFF control algorithm in temperature control output which has heating function

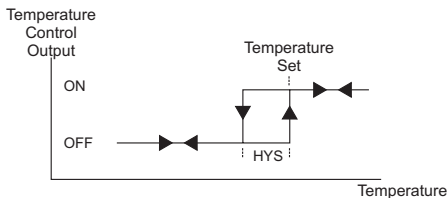
Two different operation according to defined hysteresis mode are explained in graphics below.



Hysteresis is described smaller than temperature set value. Maximum value of oscillation in temperature value is close to temperature set value.

##### ON/OFF control algorithm in temperature control output which has cooling function

Two different operation according to defined hysteresis mode are explained in graphics below.



Hysteresis is described smaller than temperature set value. Maximum value of oscillation in temperature value is close to temperature set value.

## 8. Specifications

<b>Device Type</b>	: Temperature Controller
<b>Housing&amp;Mounting</b>	: 72mm x 72mm x 95.5mm DIN Size 43700 plastic housing for panel mounting. Panel cut-out is 69x69mm.
<b>Protection Class</b>	: NEMA 4X (IP65 at front, IP20 at rear).
<b>Weight</b>	: Approximately 0.21 Kg.
<b>Environmental Ratings</b>	: Standard, indoor at an altitude of less than 2000 meters with non-condensing humidity.
<b>Storage/Operating Temperature</b>	: -40 °C to +85 °C / 0 °C to +50 °C.
<b>Storage/Operating Humidity</b>	: 90 % max. (Non-condensing)
<b>Installation</b>	: Fixed installation
<b>Over Voltage Category</b>	: II
<b>Pollution Degree</b>	: II, office or workplace, none conductive pollution
<b>Operating Conditions</b>	: Continuous
<b>Supply Voltage and Power</b>	: 230V ~ (±15%) 50/60 Hz. 3VA 115V ~ (±15%) 50/60 Hz. 3VA 24V ~ (±15%) 50/60 Hz. 3VA
<b>Temperature Inputs</b>	: TC, RTD
<b>Thermocouple input types</b>	: J, K (IEC584.1)(ITS90)
<b>Thermoresistance input type</b>	: PT 100 (IEC751)(ITS90)
<b>Accuracy</b>	: ± 1% of FS for Thermocouple, Thermoresistance
<b>Cold Junction Compensation</b>	: Automatically ± 0.1°C/1°C.
<b>Line Compensation</b>	: Maximum 10 Ω .
<b>Sensor Break Protection</b>	: Upscale
<b>Sampling Cycle</b>	: 3 samples per second
<b>Control Forms</b>	: ON / OFF
<b>Relay Outputs</b>	: 7A@250V ~ (Electrical Life : 100.000 Operation (Full Load))
<b>Display</b>	: 14 mm Red 3 digits LED display
<b>Led Indicators</b>	: For ESM-7710-A.BC.0.1/00.00 ; SET (Green), OUT (Red), PROG (Red) 3 mm For ESM-7710-A.BC.0.1/01.00; SET1(Green),SET2(Green), OUT1 (Red),OUT2 (Red), PROG (Red) 3 mm