



ESM-3711-H 77 x 35 DIN Size Digital , ON / OFF Temperature Controller

- 3 Digits Display
- PTC Input or ,
J type Thermocouple Input or ,
K type Thermocouple Input or ,
2-wire PT 100 Input (It must be determined in order.)
- ON/OFF Temperature Control
- Adjustable Temperature Offset
- Set Value Boundaries
- Relay or SSR Driver Output
- Heating Function
- Adjustable Cooking Time from Front Panel
- Heating Control According to the Cooking Time
- Starting Cooking Time when Temperature reaches to the Set Value
- Temperature Control with Manual Heating Function
- Alarm Parameters
- Adjustable Internal Buzzer According to Cooking Time , Probe Defect And Alarm Status
- Button Protection
- Programming Section Password Protection

Instruction manual of ESM-3711-H Temperature Controller 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, physical and electrical installation of the device to the system are explained.

Operation and Parameters:

In this section user interface of the device, accessing to the parameters, description of the 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.

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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, Türkiye

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

Product Name : Heating Controller

Model Number : ESM-3711-H

Type Number : ESM-3711-H

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-3711-H series heating controllers are designed for measuring and controlling temperature. They can be used in many applications with their easy use, On/ Off control form and cooking time properties.

Some application fields which they are used are below:

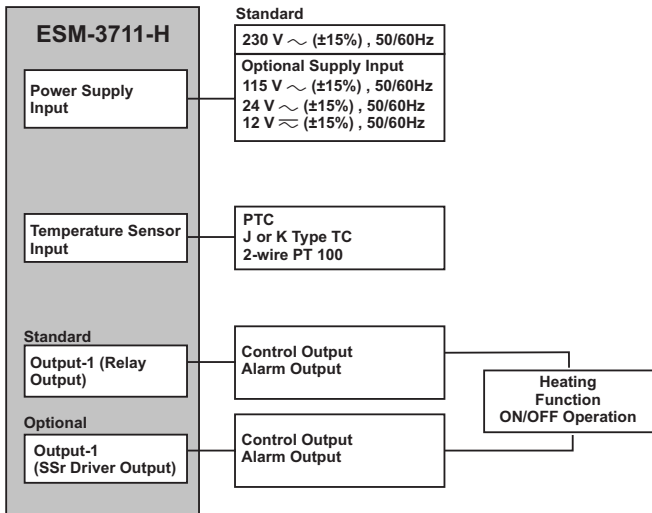
Application Fields

Glass
Food
Plastic
Petro-Chemistry
Textile, Automotive
Machine Production Industries
etc...

Applications

Heating
Baking Ovens
Incubators
Storages
Air Conditioning
Etc...

1.1 General Specifications



1.2 Ordering Information

ESM-3711-H (7x35 DIN Size)	A	B	C	D	E	F	G	H	I	U	V	W	Z
				0			00	00		1		0	0

A Supply Voltage
3 24V $\sim$ ($\pm 15\%$) 50/60Hz
4 115V $\sim$ ($\pm 15\%$) 50/60Hz
5 230V $\sim$ ($\pm 15\%$) 50/60Hz
6 12V $\sim$ ($\pm 15\%$) 50/60Hz
9 Customer

BC Input Type	Scale(°C)
12 PTC (Note-1)	-50°C 150°C
05 J, Fe CuNi IEC584.1(ITS90)	0°C 800°C
10 K, NiCr Ni IEC584.1(ITS90)	0°C 999°C
11 PT 100, IEC751(ITS90)	-50°C 400°C
09 PT 100, IEC751(ITS90)	-19.9°C 99.9°C

Note-1 : If input type is selected PTC (BC = 12), PTC Temperature sensor must be given with the device. For this reason, PTC sensor type (V) must be declared in ordering information.

E Output-1
1 Relay Output (resistive load 10A@250V $\sim$, 1 NO + 1 NC)
2 SSR Driver Output (Maximum 20mA@ 12V $\sim$)

V Temp.Sensor which is given with ESM-3711-H
0 None
1 PTC-M6L50.K1.5(PTC Air probe with 1.5 m silicon cable)
2 PTC-M6L30.K1.5(PTC Liquid probe with 1.5 m silicon cable)
9 Customer

All order information of ESM-3711-H 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.



$\sim$ $\Rightarrow$ Vac,

$\sim\sim$ $\Rightarrow$ Vdc,

$\sim\sim$ $\Rightarrow$ Vdc or Vac can be applied.

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 supply 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.

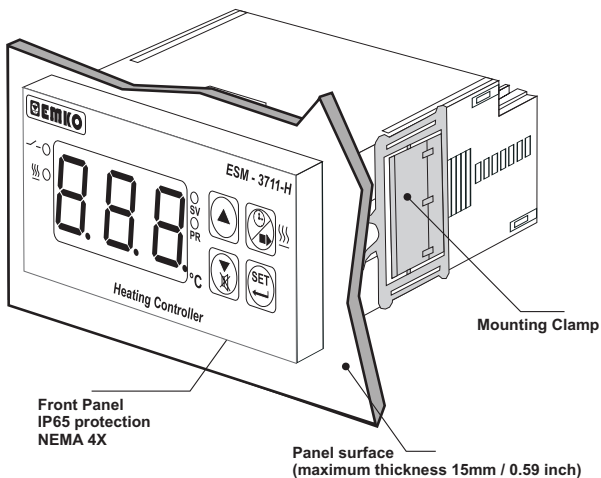
Do not use the unit in combustible or explosive gaseous atmospheres.

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.

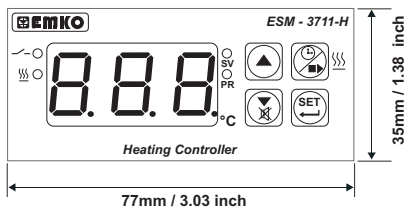
Montage of the product on a system must be done with it's fixing clamps. Do not do the montage of the device with inappropriate fixing clamp. Be sure that device will not fall while doing the montage.

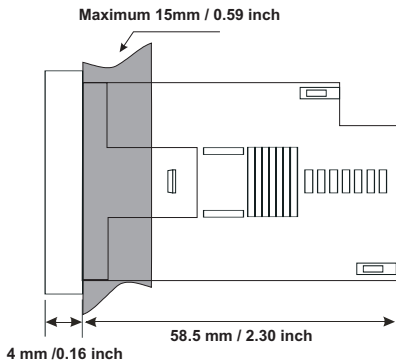
It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

2.1 General Description

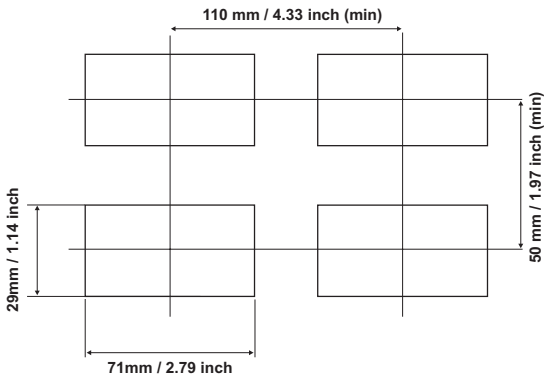


2.2 Front View and Dimensions of ESM-3711-H Temperature Controller





2.3 Panel Cut-Out



2.4 Environmental Ratings

Operating Conditions



Operating Temperature : 0 to 50 °C



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



Altitude : Up to 2000m.



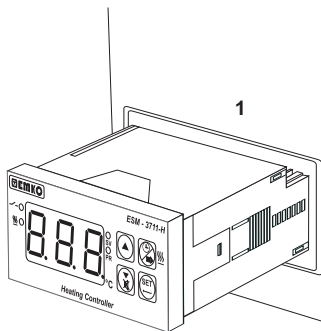
Forbidden Conditions:

Corrosive atmosphere

Explosive atmosphere

Home applications (The unit is only for industrial applications)

2.5 Panel Mounting



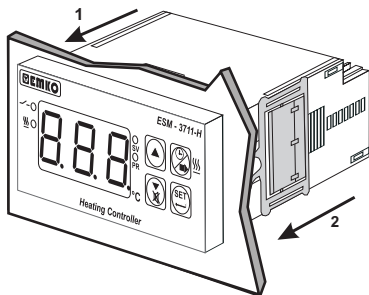
1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

2-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 fixing sockets that located left and right sides of device and make the unit completely immobile within the panel

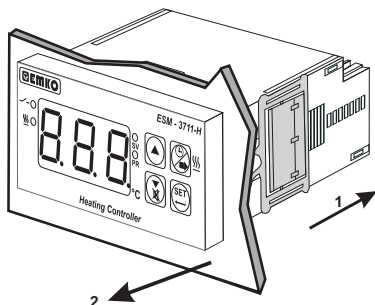


Montage of the unit to a system must be done with it's own fixing clamps. Do not do the montage of the device with inappropriate fixing clamps. Be sure that device will not fall while doing the montage.

2.7 Removing from the Panel



Before starting to remove the unit from panel, power off the unit and the related system.



1-Pull mounting clamps from left and right fixing sockets.

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

3. Electrical Wiring



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.

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.

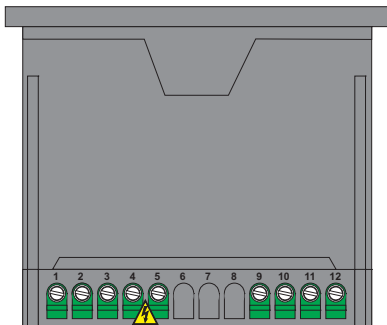


Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.



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



Screw driver
0,8 x3mm



Torque
0,5Nm

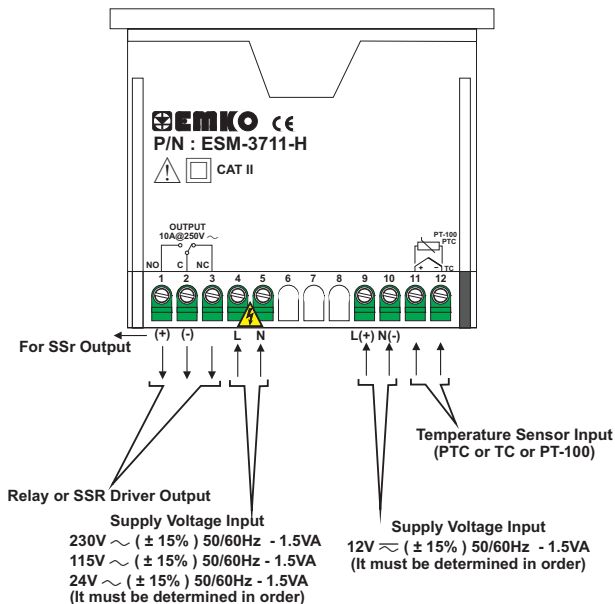


Max. 2.5mm / 0.098 inch
Wire Size:
14AWG/1mm²
Solid /Stranded

3.2 Electrical Wiring Diagram



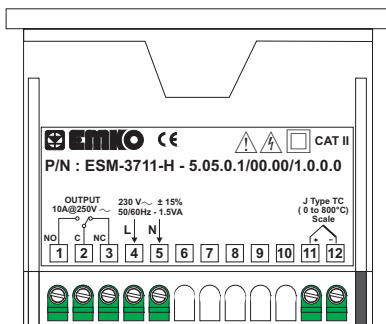
Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the process being controlled and personnel injury.



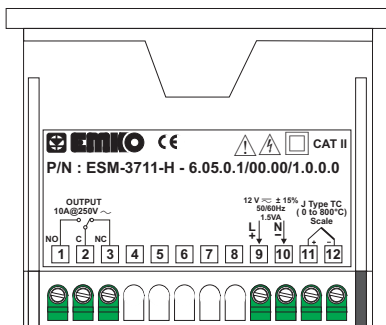
Temperature Sensor Input is in CAT II class.

3.3 View of the Device Label

Device Label for J Type (0 ; 800) scaled, with Thermocouple input , 230V $\sim$ Supply Voltage Input and Relay Output

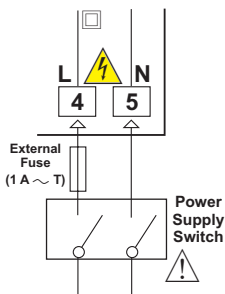


Device Label for J Type (0 ; 800) scaled , with 12V $\sim$ Supply Voltage Input and Relay Output



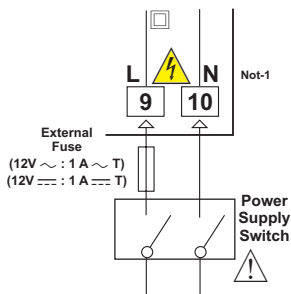
3.4 Supply Voltage Input Connection of the Device

Connection of Supply Voltage Input



Supply Voltage
 230 V ~ ($\pm 15\%$) 50/60 Hz or
 115 V ~ ($\pm 15\%$) 50/60 Hz or
 24 V ~ ($\pm 15\%$) 50/60 Hz

Connection of Supply Voltage Input



Supply Voltage
 12 V ~ ($\pm 15\%$) 50/60 Hz
 Note-1 : "L" is (+), "N" is (-) for 12V ---
 Supply Voltage



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. Device is produced different for low and high voltage. 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 or fuse on the device. So the user must put power supply switch and a fuse 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 and fuse must be put to a place where user can reach easily.



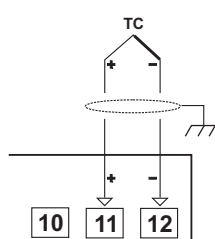
Power supply switch must be two poled for separating phase and neutral. On/Off condition of power supply switch is very important in electrical connection. On/Off condition of power supply switch must be signed for preventing the wrong connection.

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

External fuse must be on (+) line connection in --- supply input.

3.5 Temperature Sensor Input Connection

3.5.1 TC (Thermocouple) Connection



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

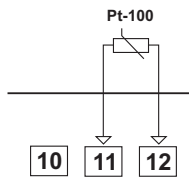
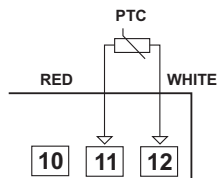


Always use compensation wire corresponding to the thermocouple used. If present, the shield must be connected to a proper ground.



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

3.5 PTC or PT-100 Connection

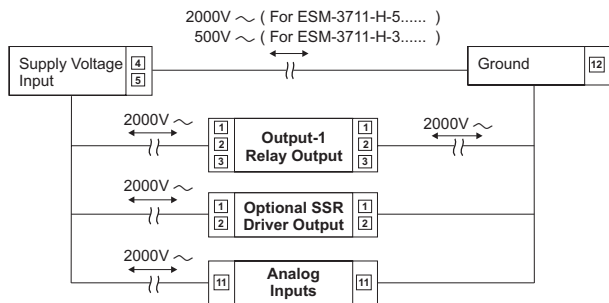


Input resistance is greater than $10\text{M}\Omega$.

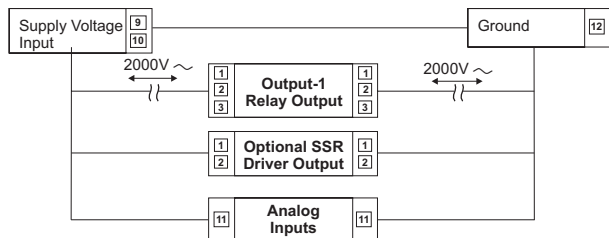


Pay attention the cable colours of PTC probe while doing the PTC probe connection.

3.6 Galvanic Isolation Test Values of ESM-3711-H Temperature Controller

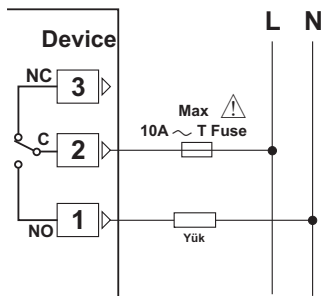


Galvanic Isolation Test Values for the devices with 12 V $\sim$ Supply voltage input:



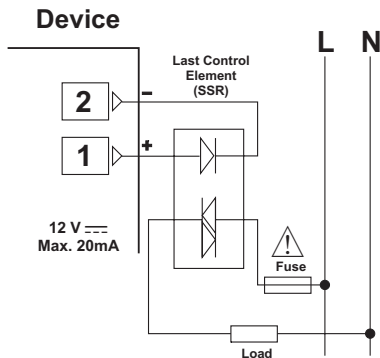
3.7 Output Connections

3.7.1 Relay Output Connection



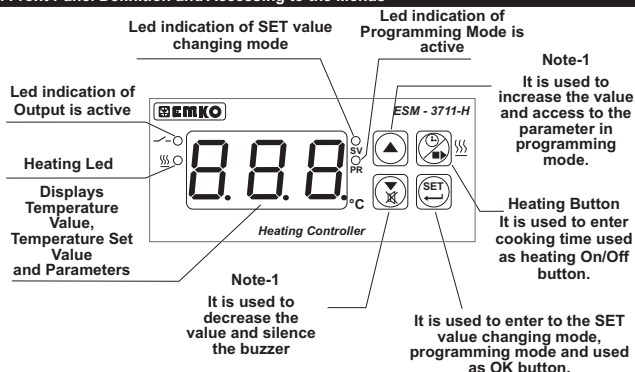
Fuses must be selected according to the application.

3.7.2 Output (SSR Driver Output) Connection



Fuses must be selected according to the application.

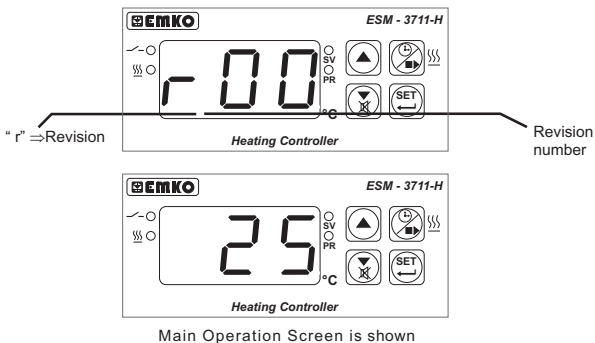
4. Front Panel Definition and Accessing to the Menus



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.

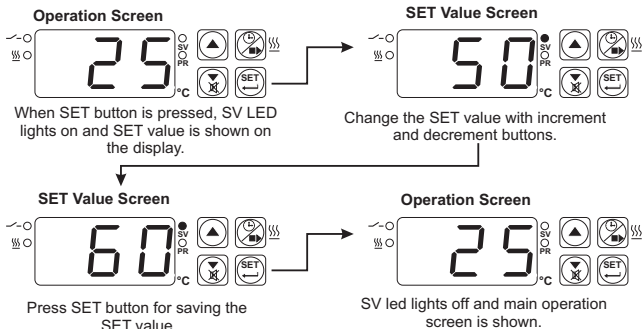
4.1 Observation of Software Revision on the Displays

When power is first applied to the temperature controller, software revision number is shown on the displays.



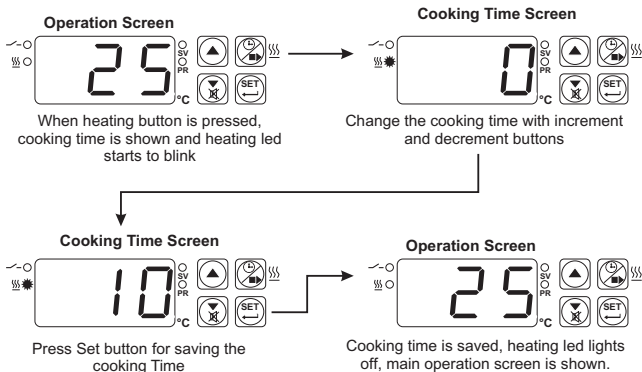
If there is an unexpected situation while opening the device, power off the device and inform a qualified personnel.

4.2 Changing and Saving Set Value



SET value changes according to maximum and minimum value of device type and scale. It can be adjusted from set value minimum parameter (SuL) value to set value maximum parameter (SuH) value.

4.3 Changing and Saving Cooking Time Parameter



If no operation is performed in cooking Time enter mode and Set value enter mode for 20 seconds, device turns to operation screen automatically.

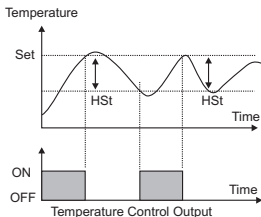
4.4 Programming Section Parameter List

HSt

Hysteresis Parameter for Output (Default = 0)

From 0 to 20 °C for PTC (-50°C, 150°C),
From 0 to 100 °C for TC Type devices,
From 0 to 100 °C for PT-100 (-50°C, 400°C) ,
From 0.0 to 10.0 °C for PT-100 (-19.9°C, 99.9°C)

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.



SuL

Minimum Set Value Parameter (Default = Input Type Minimum Scale)

Set value can not be lower than this value.

It can be adjusted from minimum value of device scale to maximum set value parameter **SuH**

SuH

Maximum Set Value Parameter (Default = Input Type Maximum Scale)

Set value can not be greater than this value.

It can be adjusted from minimum set value parameter **SuL** to maximum value of the device scale.

oFt

Display Offset Parameter (Default = 0)

From -20 to 20 °C for PTC (-50°C, 150°C),
From -100 to 100 °C for TC Tip Cihazlar için ,
From -100 to 100 °C for PT-100 (-50°C, 400°C) ,
From -10.0 to 10.0 °C for PT-100 (-19.9°C, 99.9°C)

PHd

Heating Control Starting Delay at Power On (Default = 0)

It can be adjusted from 0 to 99 minutes.

Ht

Cooking Time Parameter (Default = 45)

It can be adjusted from 1 to 999 minutes. When cooking time is 1, by pressing decrement button, **--** is observed. Then manual control is selected. In manual control, temperature control can be started with heating ON/OFF button. While cooking continues if heating button is pressed for 3 seconds, cooking is finished and heating led lights off.

PHS

Selection of Temperature Control and Starting Cooking Time Parameter (Default = 0)

☐ 0

Temperature Control and Cooking Time starts at Power On

☐ 1

Temperature Control starts at power on. Cooking Time can be started by pressing heating ON/OFF button.

☐ 2

Temperature Control and cooking time can be started by pressing heating ON/OFF button.

HtS**Cooking Time Starting Conditions Parameter (Default = 0)**If cooking time **HtT** ≥ 1 , then this parameter can be observed.☐ 0

Cooking time starts with heating ON/OFF button.

☐ 1

Cooking time is started when temperature reaches to the set value after pressing heating ON/OFF button.

HCo**Temperature Controlling Continuity Selection Parameter (Default = 0)**Temperature controlling can be continues or stopped according to the selection. This parameter can be observed if cooking time **HtT** is ≥ 1 ☐ 0**Continuous Operation :** Temperature control starts after the delay **PHd** at power on and continues. If buzzer function selection parameter **buzF** is 1 or 4, at the end of the cooking time, internal buzzer operates to indicate cooking time has finished.☐ 1**Interrupted Operation:** Temperature control starts after temperature control starting delay at power on **PHd** is expired . Temperature control can be stopped at the end of the cooking time or by pressing heating ON/OFF button. Temperature control does not start till heating ON/OFF button is pressed again.**ALs****Heating Alarm Function Selection Parameter (Default = 0)**☐ 0

Temperature Alarm function is inactive.

☐ 1Absolute alarm is selected. If temperature is lower than **AuL** and higher than **AuH** , then alarm is on.☐ 2Relative alarm is selected. Alarm operates according to the set value. If temperature is below (Set - **AuL**) or above (Set + **AuH**) , alarm occurs.**AuL****Minimum Alarm Parameter (Default = Input Type Minimum Scale)**

It can be adjusted from minimum scale of the device to maximum alarm value (AuH).

AuH**Maximum Alarm Parameter (Default = Input Type Maximum Scale)**

It can be adjusted from minimum alarm value (AuL) to maximum scale of the device.

AdL**Alarm Delay Parameter (Default = 0)**

If an alarm occurs, delay can be defined with this parameter. It can be adjusted from 0 To 99 minutes.

APd**Alarm Delay After Power On Parameter (Default = 0)**

This parameter defines the delay for the alarm is being active after power on. It can be adjusted from 0 to 99 minutes.

buzF**Buzzer Function Selection Parameter (Default = 1)**☐ 0

Buzzer is inactive.

☐ 1

Buzzer is active at the end of the cooking time.

☐ 2

Buzzer is active if an alarm occurs.

☐ 3

Buzzer is active during sensor failures.

☐ 4

Buzzer is active at the end of the cooking time, alarm or sensor failures.

bon

Buzzer is Active During This Time (Default = ---)

It can be adjusted from 1 to 99 minutes. When this parameter is 1, if decrement button is pressed, --- is observed. Then buzzer becomes active till buzzer silence button is pressed.

Prt

Button Protection Parameter (Default = 0)

0

There is no protection

1

Cooking time can not be changed, heating On/Off operation is not performed.

2

SET value can not be changed

3

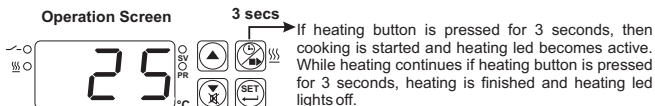
Cooking time and set value can not be changed. Heating ON/OFF operation is not performed.

PAS

Programming Section Accessing Password (Default = 0)

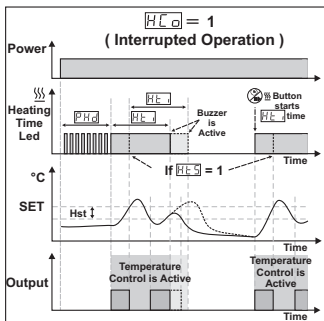
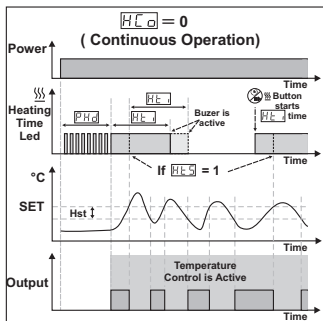
It is used for accessing to the programming section. It can be adjusted from 0 to 999. If it is 0, there is no need to enter password for accessing to the parameters.

4.5 Heating ON/OFF Operation

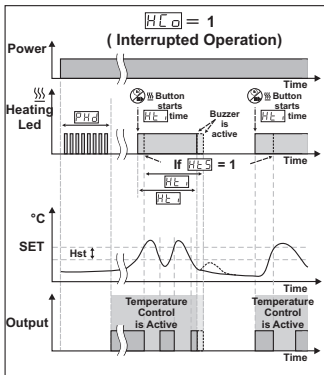
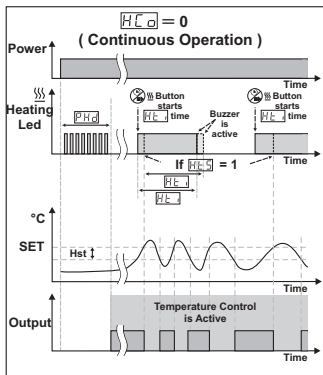


4.6 Operation Graphics of ESM-3711-H Heating Controller

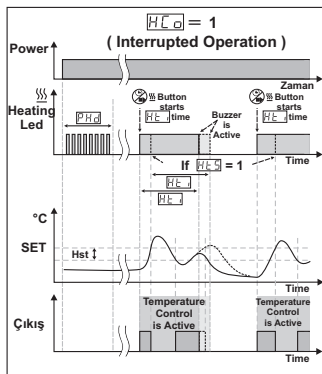
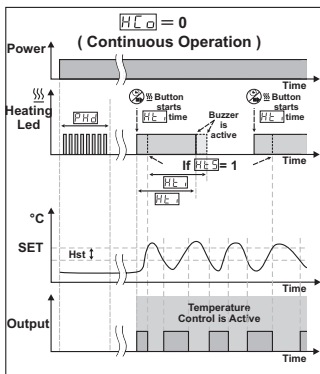
1- When Cooking Time Parameter $[Ht_1] \geq 1$, if Start Heating at Power On Parameter $[PHS]$ Is 0 (Temperature Control and Cooking Time starts at Power On is selected) ;



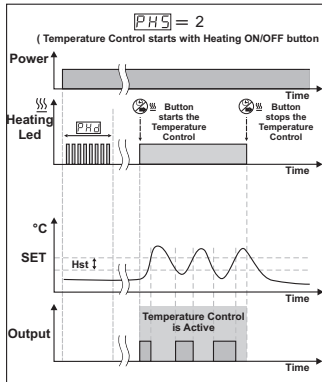
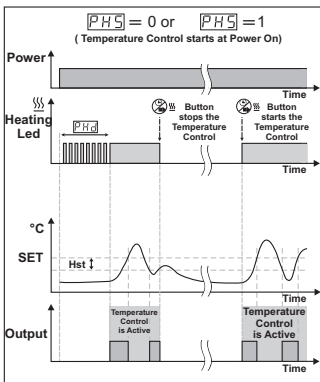
2- When Cooking Time $[Ht_1] \geq 1$, if Heating at Power On Parameter $[PHS]$ is 1 (Temperature Control starts at Power On, Cooking Time starts with Heating ON/OFF button is selected)



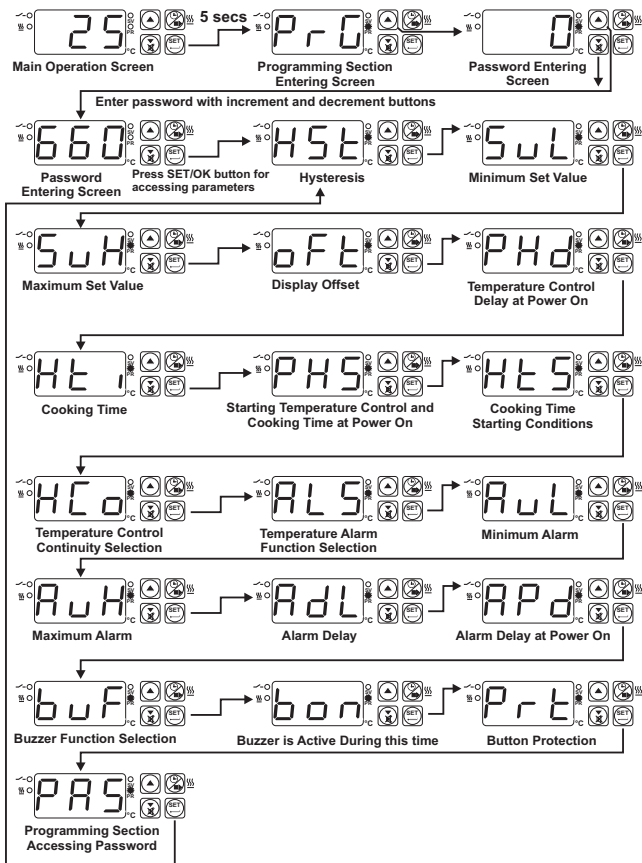
3- If Cooking Time $[H\bar{L}i] \geq 1$, Heating at Power On Parameter $[P\bar{H}S]$ is 2 (Temperature Control and Cooking Time starts by pressing heating ON/OFF button)



4- Manual Control : If Cooking Time $[H\bar{L}i] = ---$;



4.7 Easy Access Diagram of Programming Section Parameters



If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.

4.8 Entering to the Programming Mode, Changing and Saving Parameters

Operation Screen



When SET button is pressed for 5 seconds, "PR" led starts to blink. If programming section entering password is different from 0, programming section entering screen [P r 0] is observed.

Note-1: If programming section accessing password is 0, hysteresis screen [H5L] is observed instead of programming screen accessing password [P r 0].

Programming Section Entering Screen

Press increment button for accessing to the password



Password Entering Screen

Enter Programming Section
Accessing Password with
increment and decrement buttons.



Password Entering Screen

Press SET/OK button for
accessing to the parameters.

Note-2: Parameters can be observed by pressing SET/OK button in password entering screen without entering the programming section entering password. But parameters can not be changed.

Programming Screen



Hysteresis Parameter

Press increment button for accessing to the
parameter value. Press Set button for
accessing to the next parameter.



Hysteresis

Change the value with
increment and decrement
buttons.



Hysteresis

Press Set button for saving
the parameter.

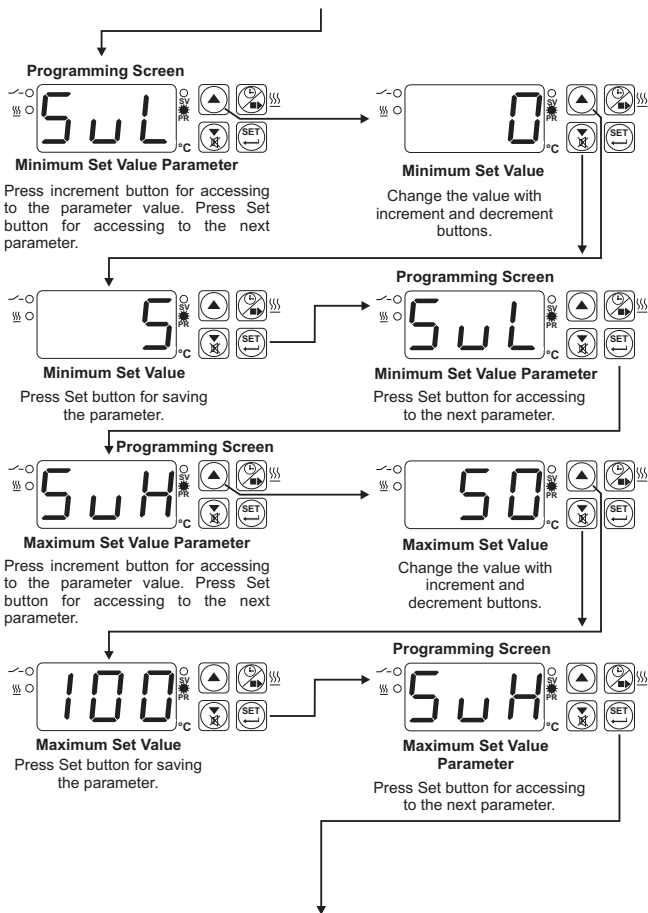


Hysteresis Parameter

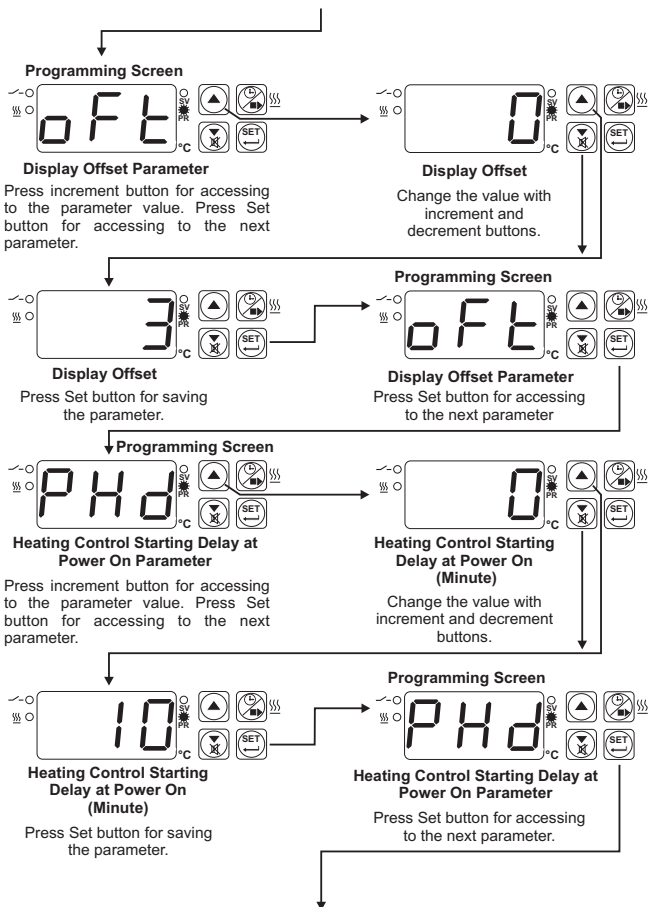
Press Set button for accessing
to the next parameter.



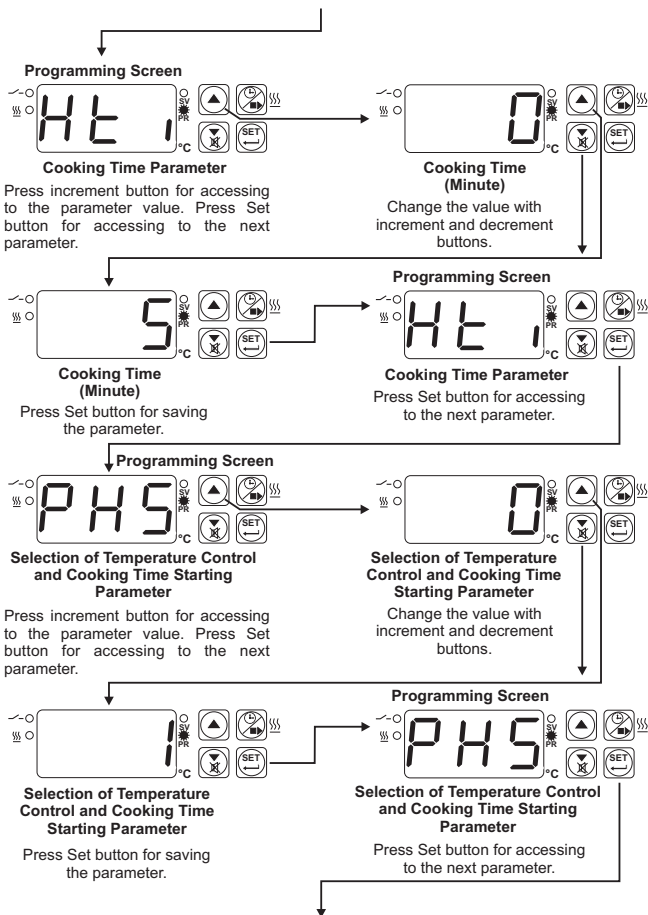
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



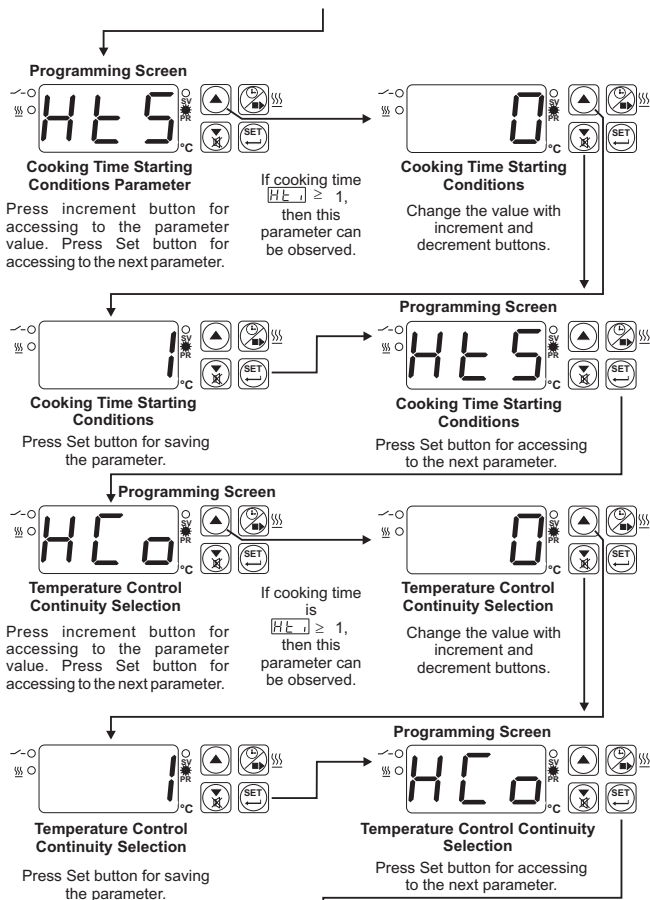
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



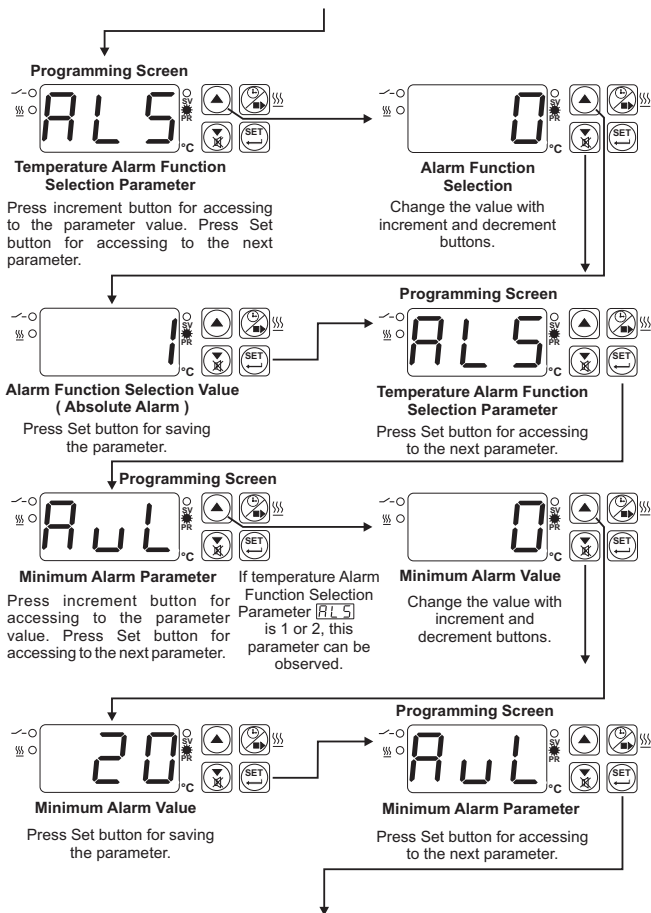
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



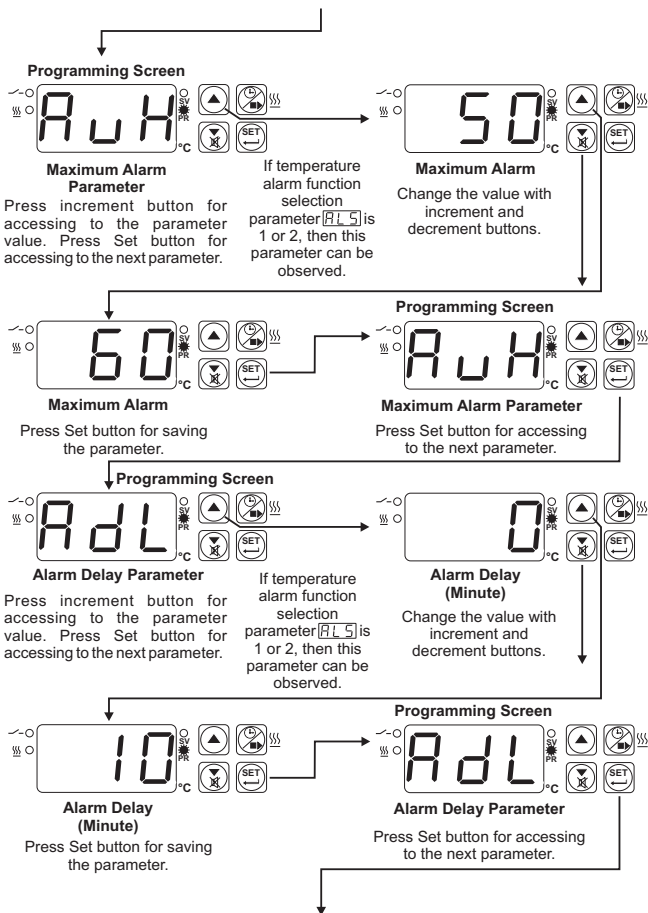
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



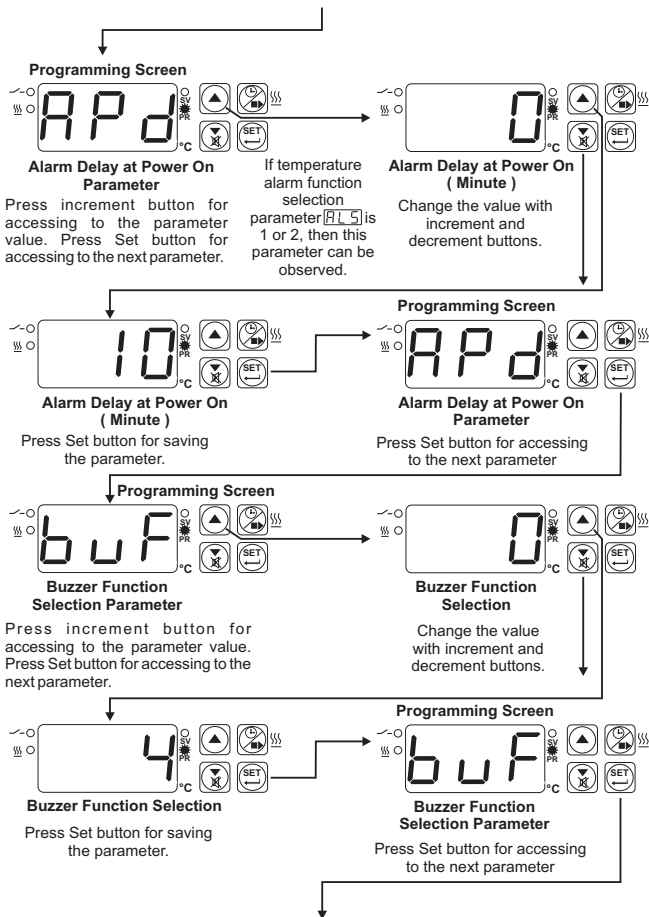
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



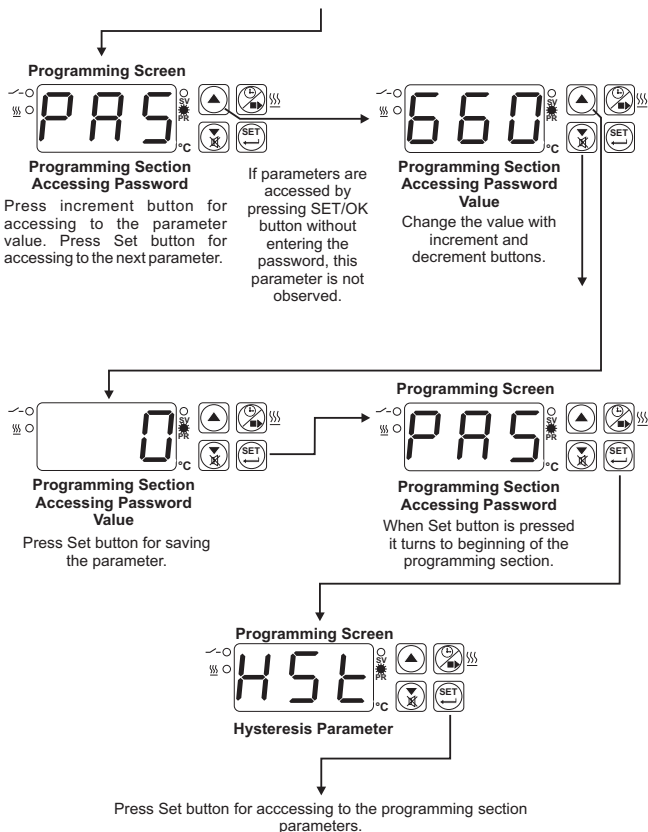
If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.



If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.

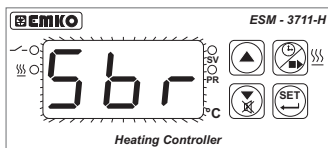


If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.

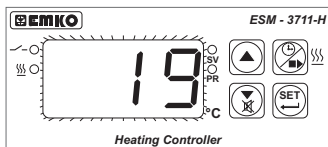


If no operation is performed in programming mode for 20 seconds, device turns to main operation screen automatically.

5. Failure Messages in ESM-3711-H Heating Controller



1- Probe failure in analog inputs. Sensor connection is wrong or there is no sensor connection. When this message is on the screen, if buzzer function selection parameter **b u F** is 3 or 4, internal buzzer starts to operate.



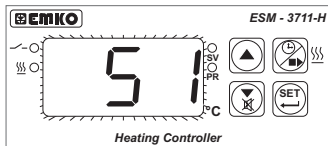
2-Blinking the Screen Value

If temperature higher than the alarm parameters limit, value on the screen starts to blink

Example-1 :

If alarm function selection parameter **A L S** in programming section is 1(Absolute alarm) and minimum alarm parameter **A u L** is 20 ;

When temperature is less than 20°C, value on the screen starts to blink. Also if buzzer function selection parameter **b u F** is 2 or 4, then internal buzzer is on.



Example-2 :

If alarm function selection parameter **A L S** in programming section is 1 (Absolute Alarm) and maximum alarm parameter **A u H** is 50

When temperature is above 50 °C, value on the screen starts to blink. Also buzzer function selection parameter **b u F** is 2 or 4, then internal buzzer is on.

6. Specifications

Device Type	: Heating Controller
Housing&Mounting	: 77mm x 35mm x 62.5mm plastic housing for panel Mounting. Panel cut-out is 71x29mm.
Protection Class	: NEMA 4X (IP65 at front, IP20 at rear).
Weight	: Approximately 0.20 Kg.
Environmental Ratings	: Standard, indoor at an altitude of less than 2000 meters with none condensing humidity.
Storage / Operating Temperature:	-40 °C to +85 °C / 0 °C to +50 °C
Storage / Operating Humidity	: 90 % max. (None condensing)
Installation	: Fixed installation
Overvoltage Category	: II.
Pollution Degree	: II, office or workplace, none conductive pollution
Operating Conditions	: Continuous
Supply Voltage and Power	: 230V ~ (± 15%) 50/60 Hz. 1.5VA 115V ~ (± 15%) 50/60 Hz. 1.5VA 24V ~ (± 15%) 50/60 Hz. 1.5VA 12V ~ (± 15%) 50/60 Hz. 1.5VA 12V --- (± 15%) 1.5W
Temperature Sensor Inputs	: PTC, TC, RTD
PTC Input Type	: PTC (1000 Ω @.25 °C)
Thermocouple Input Types	: J, K (IEC584.1)(ITS90)
Thermoresistance Input Type	: PT-100. (IEC751)(ITS90)
Accuracy	: ±1 % of full scale for thermocouple and thermoresistance
Cold Junction Compensation	: Automatically ± 0.1°C/1°C.
Sensor Break Protection	: Upscale
Sampling Cycle	: 3 samples per second
Control Form	: ON / OFF
Relay Output	: 10A@250V ~ for resistive load (Electrical Life : 100.000 switching at full load)
Optional SSR Output	: Maximum 20mA@12V ---
Display	: 14 mm Red 3 digits LED Display
LED	: SV (Green) , Output (Red) , PR(Red) , heating (Red) 3 mm Led
Internal Buzzer	: ≥83dB