EMKO

Heating Controller

ESM-3712-H 77x35 DIN Size

ESM-3712-H 77 x 35 DIN Size
Digital, ON / OFF Heating Controller
(SET + ALARM)

- 3 Digits Display
- PTC Input or
  J Type Thermocouple Input or,
  K Type Thermocouple Input or,
  2-wire PT-100 Input or,
  2-wire PT-1000 Input (It must be determined in order)
- ON/OFF Control
- Adjustable Temperature Offset
- Temperature Control Output and Alarm Output
- Process and Alarm Set Values Boundaries
- Relay or SSR Driver Output
- Digital Input (Cooking time start/stop input)
- Adjustable Cooking Time (Timer) from Front Panel
- Temperature Control according to the Cooking Time (Timer)
- User can select to start Cooking Time (Timer) when Temperature reaches to the Set Value
- Temperature Control with Manual Heating Function
- Adjustable Internal Buzzer According to Cooking Time (Timer), Probe Defect and Alarm Status
- Button Protection
- Password Protection for Programming Section

ABOUT INSTRUCTION MANUAL

Instruction manual of ESM-3712-H Heating 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.

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 : Heating Controller

Model Number : ESM-3712-H

Type Number : ESM-3712-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.

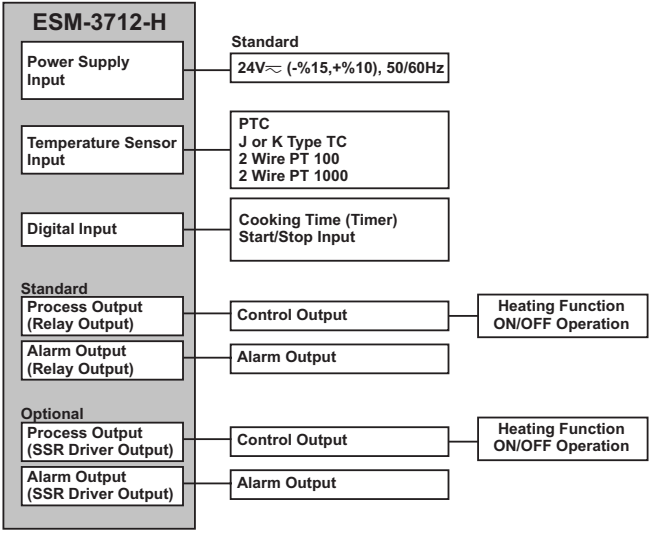
1.Preface

ESM-3712-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, Automative
Machine Production Industries
etc...

Applications
Heating
Baking Ovens
Incubators
Storages
Air Conditioning
Etc...

1.1 General Specifications



1.2 Ordering Information

Ordering Information

ESM-3712-H (77x35 DIN Boyutlu)	A	BC	D	E	/	FG	HI	/	U	V	W	Z
		0		/		00	/	1		0	0	

A	Supply Voltage
2	24V ≂ (-%15, +%10) 50/60Hz

BC	Input Type	Scale(°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
12	PTC (Note-1)	-50°C	150°C
15	PTC (Note-1)	-19.9°C	99.9°C
14	PT 1000, IEC751(ITS90)	-50°C	400°C
13	PT 1000, IEC751(ITS90)	-19.9°C	99.9°C

Note-1 : If input type is selected PTC (BC = 12 or BC = 15), PTC Temperature sensor is given with the device. For this reason, PTC sensor type (V) must be declared in ordering information.

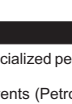
E	FG	Outputs	
1	01	**Process Out**	Relay Output (10A@250V~ at resistive load, 1NO)
		Alarm Out	Relay Output (5A@250V~ at resistive load, 1NO)
2	02	**Process Out**	SSR Driver Output (Max. 10mA@ 24V ⎓)
		Alarm Out	SSR Driver Output (Max. 10mA@ 24V ⎓)

V	Temp.Sensor which is given with ESM-3712-H
0	None
1	PTC-M6L50.K1.5(PTC Air probe with 1.5 m silicon cable)
2	PTCS-M6L30.K1.5.1/8"(PTC Liquid probe with 1.5 m silicon cable)
9	Customer

All order information of ESM-3712-H Heating 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.



~ ⇒ Vac,
⎓ ⇒ Vdc,
≂ ⇒ 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 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 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.

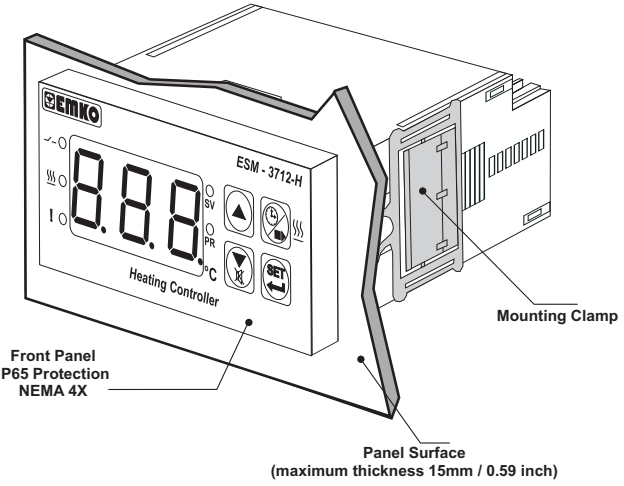
Do not use the unit in combustible or explosive gaseous atmospheres.

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.

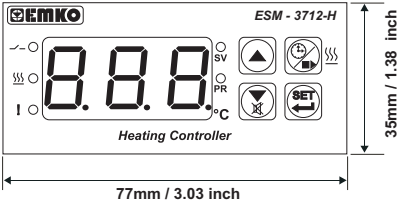
Montage of the product on a system must be done with it's fixing clamps. Do not do the montage of the device with inappropriate fixing clamp. Be sure that device will not fall while doing the montage.

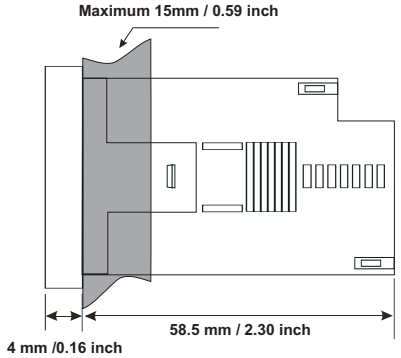
It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

2.1 General Description

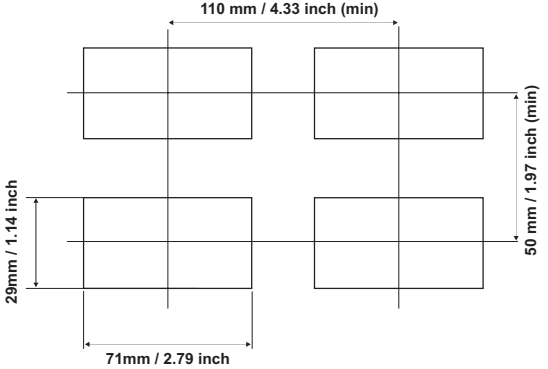


2.2 Front View and Dimensions of ESM-3712-H Heating Controller





2.3 Panel Cut-Out



2.4 Environmental Ratings

Operating Conditions

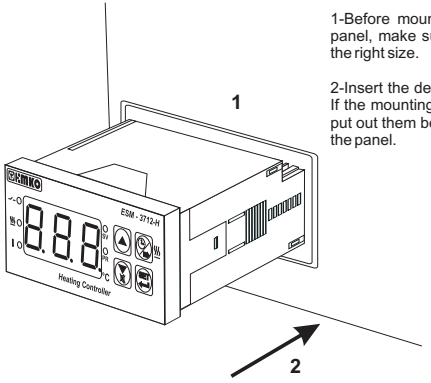
Operating Temperature : 0 to 50 °C

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

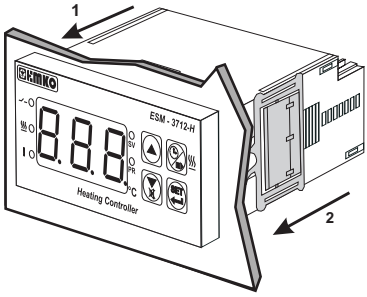


1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

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.

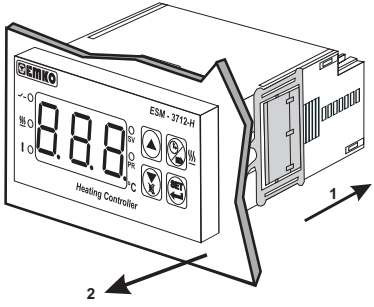
1-Insert the unit in the panel cut-out from the front side.

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

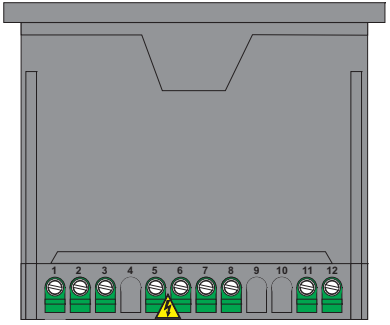
You must ensure that the device is correctly configured for your application. Incorrect configuration could result in damage to the process being controlled, and/or personal injury. It is your responsibility, as the installer, to ensure that the configuration is correct.
Device parameters has factory 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



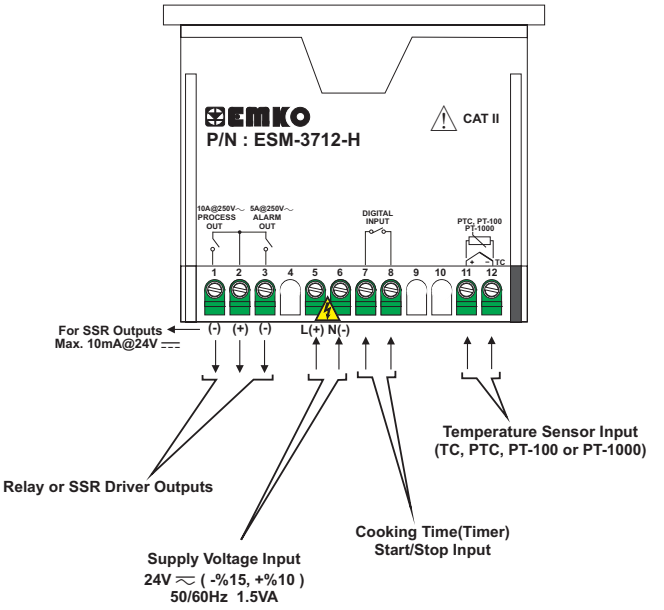
Screw driver
0,8 x3mm

Torque
0,5Nm

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

3.2 Electrical Wiring Diagram

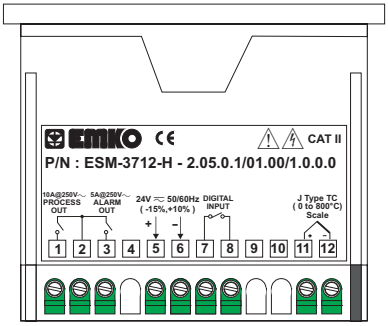
Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the process being controlled and personnel injury.



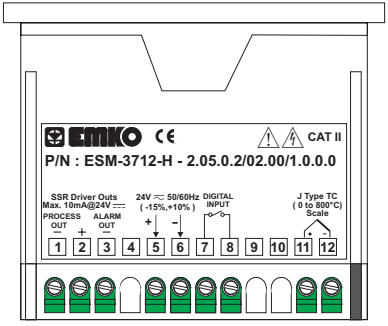
Temperature Sensor Input is in CAT II class.

3.3 View of the Device Label

Device Label for J Type (0 ; 800) scaled, Thermocouple input, 24V ≂ Supply Voltage Input and Relay Outputs

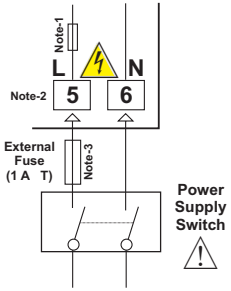


Device Label for J Type (0 ; 800) scaled, Thermocouple input, 24V ≂ Supply Voltage Input and SSR Driver Outputs



3.4 Supply Voltage Input Connection of the Device

Connection of Supply Voltage Input



Note-1 : There is an internal 4R7 Ω fusible flameproof resistor in 24V ≂ 50/60Hz 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 supply switch is very important in electrical connection. On/Off condition of power supply switch must be signed for preventing the wrong connection.

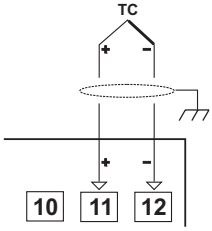
External fuse must be on phase connection in ∿ supply input.

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

The instrument is protected with an internal fuse(Please refer to Note-1 for information). In case of failure it is suggested to return the instrument to the manufacturer for repair.

3.5 Temperature Sensor Input Connection

3.5.1 TC (Thermocouple) Connection

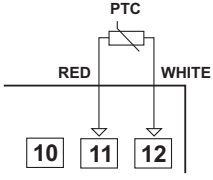


Connect the wires with the polarity as shown in the figure left.

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 10M Ω.

3.5 PTC Connection



Input resistance is greater than 10M Ω.

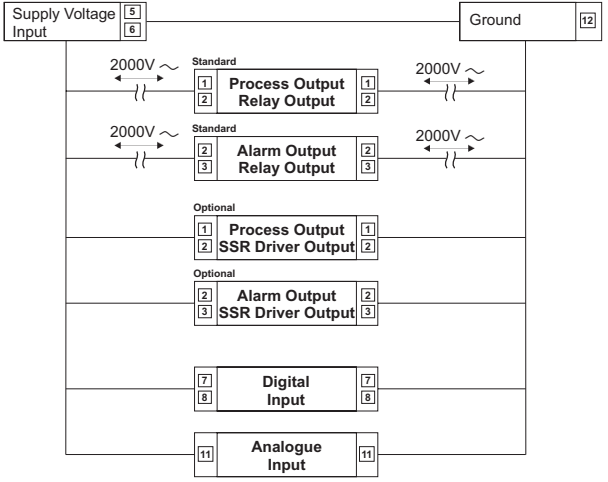
Pay attention the cable colours of PTC probe while doing the PTC probe connection.

3.5.3 PT-100 and PT-1000 Connection

Input resistance is greater than 10M Ω.

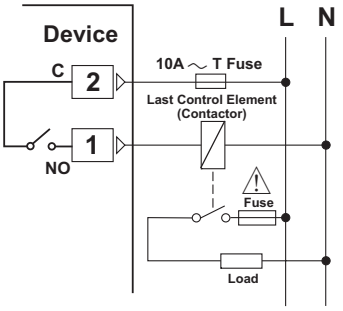
3.6 Galvanic Isolation Test Values of ESM-3712-H Heating Controller

Galvanic Isolation Test Value For 24 V ≂ Power Supply



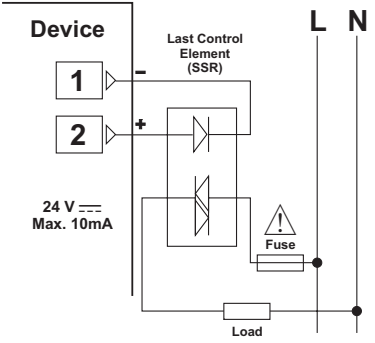
3.7 Output Connections

3.7.1 Process Output (Relay) Connection



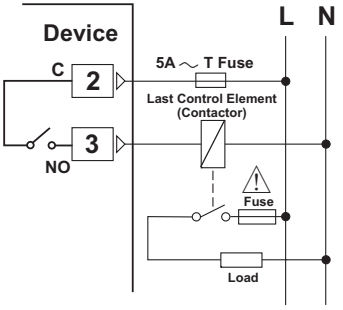
Fuses must be selected according to the application

3.7.2 Process Output(SSR Driver) Connection



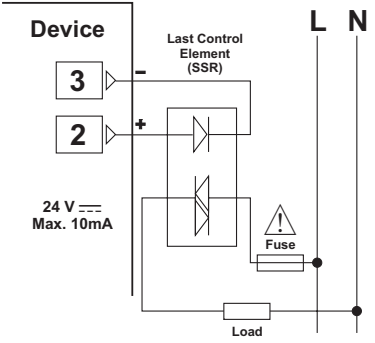
Fuses must be selected according to the application

3.7.3 Alarm Output (Relay) Connection



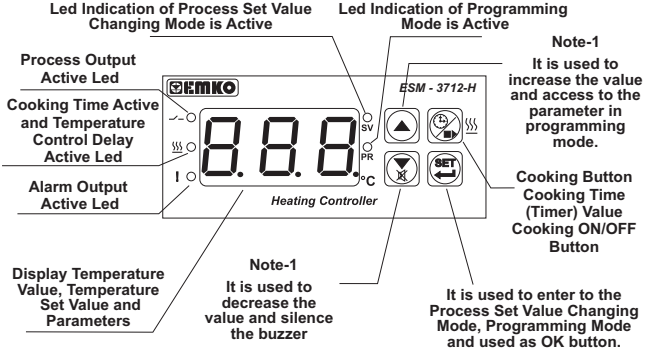
Fuses must be selected according to the application

3.7.4 Alarm Output(SSR Driver) Connection



Fuses must be selected according to the application

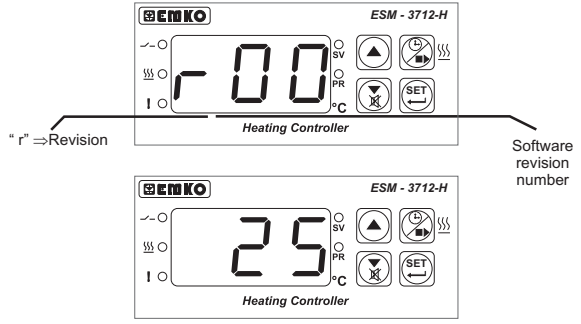
4. Front Panel Definition and Accessing to the Menus



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 Display

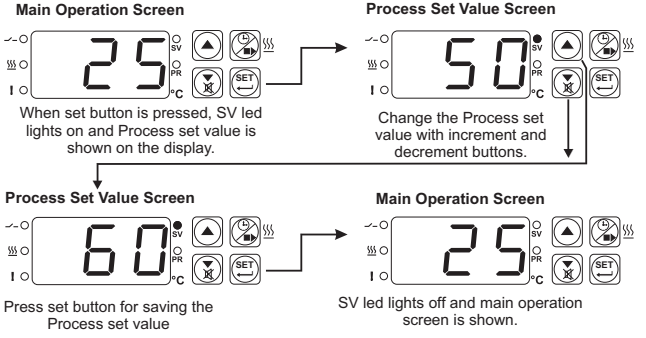
When power is first applied to the temperature controller, software revision number is shown on the display.



Main Operation Screen is shown

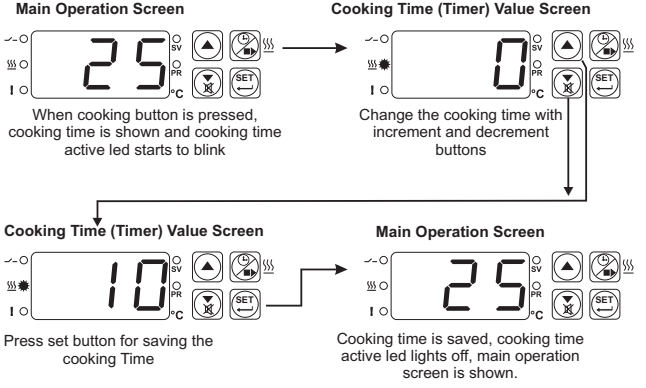
If there is an unexpected situation while opening the device, power off the device and inform a qualified personnel.

4.2 Changing and Saving Proses Set Value



Process set value can be adjusted from process set value minimum parameter [SuL] value to process set value maximum parameter [SuH] value.

4.3 Changing and Saving Cooking Time (Timer) Parameter Value

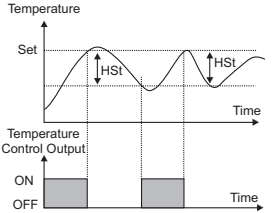


If no operation is performed in cooking time enter mode and Proses set value changing mode for 20 seconds, device turns to main operation screen automatically.

4.4 Programming Mode Parameter List

HSt **Hysteresis Parameter for Process Output (Default = 0)**
From 0 to 100°C for TC Type devices,
From 0 to 100°C for PT-100 (-50°C , 400°C) and PT-1000 (-50°C , 400°C),
From 0.0 to 10.0°C for PT-100 (-19.9°C, 99.9°C) and PT-1000 (-19.9°C, 99.9°C),
From 0 to 20°C for PTC (-50°C, 150°C),
From 0.0 to 10.0°C for PTC (-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 the 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 Process Set Value Parameter**
(Default = Minimum Value of Device Scale)
Process set value can not be lower than this value.
This parameter value can be adjusted from minimum value of device scale to maximum process set value parameter SuH

SuH **Maximum Process Set Value Parameter**
(Default = Maximum Value of Device Scale)
Process set value can not be greater than this value.
This parameter value can be adjusted from minimum process set value parameter SuL to maximum value of the device scale

oFt **Process Offset Parameter (Default = 0)**
From -100 to 100°C for TC Type devices,
From -100 to 100°C for PT-100 (-50°C , 400°C) and PT-1000 (-50°C , 400°C),
From -10.0 to 10.0°C for PT-100 (-19.9°C, 99.9°C) and PT-1000 (-19.9°C, 99.9°C),
From -20 to 20°C for PTC (-50°C, 150°C),
From -10.0 to 10.0°C for PTC (-19.9°C, 99.9°C)

PHd **Temperature Control Delay at Power On (Default = 0)**
It can be adjusted from 0 to 99 minutes.

Ht1 **Cooking Time (Timer) Parameter (Default = 45)**
It can be adjusted from 1 to 999 minutes. When it is 1, --- can be observed by pressing decrement button on the display. So Manual Control is selected. In Manual control, user can start and stop temperature controlling with cooking ON/OFF button or cooking time start/stop input.

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

0 Temperature control and cooking time (Timer) starts at power on

1 Temperature control starts at power on. Cooking time (Timer) can be started by pressing cooking ON/OFF button or when cooking time start/stop input is getting closed condition.

2 Temperature control and cooking time (Timer) can be started by pressing cooking ON/OFF button or when cooking time start/stop input is getting closed condition.

HtS **Cooking Time Starting Conditions Parameter (Default = 0)**
This parameter can be observed if cooking time (Timer) **Ht i** is ≥ 1.

0 Cooking time (Timer) is started with cooking ON/OFF button or when cooking time start/stop input is getting closed condition.

1 Cooking time (Timer) is started when temperature reaches to the process set value after pressing cooking ON/OFF button or when cooking time start/stop input is getting closed condition.

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 (Timer) **Ht i** is ≥ 1

0 **Continuous Operation :** Temperature control starts after the temperature control starting delay at power on **PHd** is expired and continues. If buzzer function selection parameter **buF** Is 1 or 4, at the end of the cooking time, (Timer) 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 (Timer) or by pressing cooking ON/OFF button or when cooking time start/stop input is getting open condition. Temperature control does not start till cooking ON/OFF button is pressed again or when cooking time start/stop input is getting closed condition again.

Lou **Alarm Output Function Selection Parameter (Default = 0)**

0 Alarm output

1 Output is active at the end of the cooking time (Timer)

2 Output is active during the sensor failures

ALH **Alarm Hysteresis Parameter (Default = 0)**
Alarm hysteresis value. This parameter is can be adjusted 0 to %50 of the device scale

AtS **Alarm Type Selection Parameter (Default = 3)**

1 Process High Alarm

2 Process Low Alarm

3 Deviation High Alarm

4 Deviation Low Alarm

5 Deviation Band Alarm

6 Deviation Range Alarm

ALL **Alarm Set Value Low Limit Parameter**
(Default = Minimum Value of Device Scale)
Alarm set value can not be lower than this value.
This parameter value can be adjusted from, minimum process set value parameter to alarm set value high limit parameter value.

ALH, **AtS**, **ALL**, **AuL**, **Aon**, **AoF**, **APd**, **AL5** **Parameters are observed if alarm output function selection parameter** **Lou** **= 0, otherwise these parameters are can not be observed.**

Alarm Set Value High Limit Parameter
(Default = Maximum Value of Device Scale)
Alarm set value can not be greater than this value.
This parameter value can be adjusted from alarm set value low limit parameter value to maximum process set value parameter.

Alarm On Delay Time Parameter (Default =0)
It can be adjusted from 0 to 99 minutes.

Alarm Off Delay Time Parameter (Default =0)
It can be adjusted from 0 to 99 minutes.
When this parameter is 99, if increment button is pressed, LCH is observed and alarm latching output is selected. To make the alarm latching output passive, decrement button must be pressed in main operation screen.

Alarm Delay Parameter After Power On (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.

Alarm Set Value Parameter (Default = 10)
Alarm output is controlled according to this value.
For alarm type selection paramater AtS = 1 or 2, this parameter value is can be adjusted from alarm set value low limit AtL parameter to alarm set value high limit AuL parameter, for alarm type selection paramater AtS = 3,4,5 or 6 this parameter value is can be adjusted from 0 to alarm set value high limit AuL parameter.

Buzzer Function Selection Parameter (Default = 1)

0	Buzzer is inactive.
1	Buzzer is active at the end of the cooking time (Timer)
2	Buzzer is active, if Alarm output function selection parameter Lou =0 and alarm occurs.
3	Buzzer is active during sensor failures.
4	Buzzer is active at the end of the cooking time (Timer), during alarm or sensor failures.

Buzzer is active during this time (Default = ---)
This parameter can be observed if buzzer function selection buF is ≥ 1.
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.

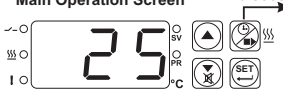
Button Protection Parameter (Default = 0)

0	There is no protection
1	Cooking time(Timer) can not be changed. Cooking ON/OFF operation is not performed.
2	Process set value can not be changed.
3	Cooking time (Timer) and Process set value can not be changed. Cooking ON/OFF operation is not performed.
4	Cooking time (Timer) and Process set value can not be changed. Cooking ON/OFF operation is performed when button is pressed.

Programming Mode Accessing Password (Default = 0)
Password for entering to the programming mode is defined with this parameter.
It can be adjusted from 0 to 999. If it is 0, programming mode accessed without entering password.

4.5 Cooking Time (Timer) ON/OFF Operation

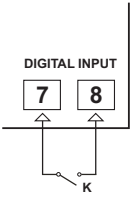
4.5.1 Cooking Time (Timer) ON/OFF Operation with Cooking Button



In main operation screen, If cooking button is pressed for 3 seconds, then cooking time (Timer) is started and cooking time active led becomes active. While cooking time (Timer) continues if cooking button is pressed for 3 seconds, cooking time (Timer) is finished and cooking time active led lights off.

If button protection parameter Prt = 4 cooking time (Timer) ON/OFF operation is performed when button is pressed.

4.5.2 Cooking Time (Timer) ON/OFF Operation with Cooking Time Start/Stop Input

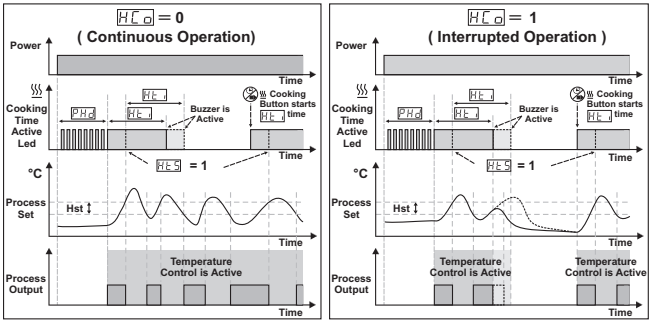


When K switch that is connected to the cooking time start/stop input, getting closed condition, cooking time (Timer) is started and cooking time active led becomes active. While cooking time (Timer) continues if K switch getting open condition, cooking time (Timer) is finished and cooking time active led lights off.

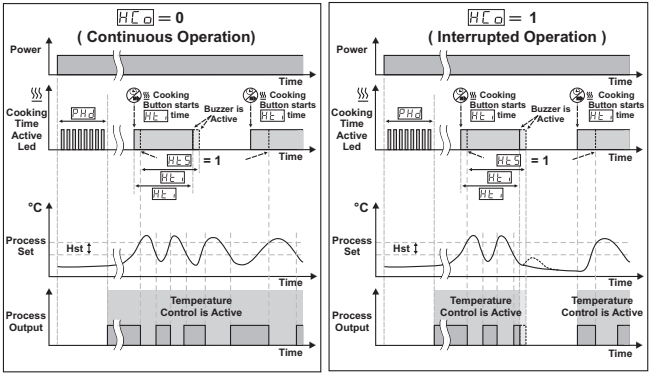
4.6 Operation Graphics of ESM-3712-H Heating Controller

4.6.1 Operation Graphics of Process Output

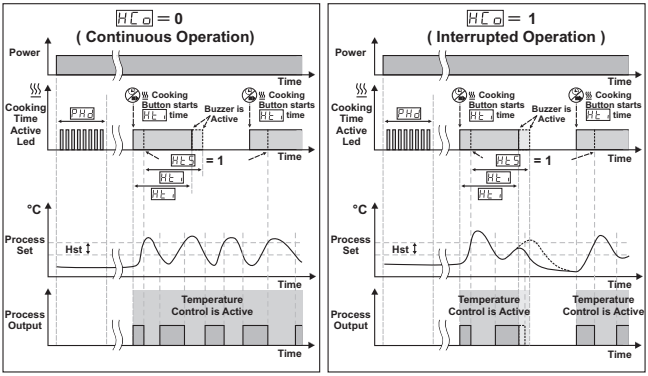
1- When cooking time parameter $\boxed{Ht_1} \geq 1$, if selection of temperature control and starting the cooking time parameter $\boxed{PHS} = 0$ (Temperature control and cooking time starts at power on) is selected;



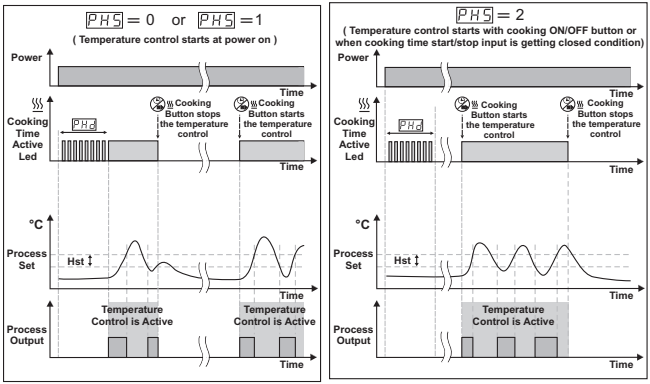
2- When cooking time parameter $\boxed{Ht_1} \geq 1$, if selection of temperature control and starting the cooking time parameter $\boxed{PHS} = 1$ (Temperature control starts at power on. Cooking time (Timer) can be started by pressing cooking ON/OFF button or when cooking time start/stop input is getting closed condition) is selected;



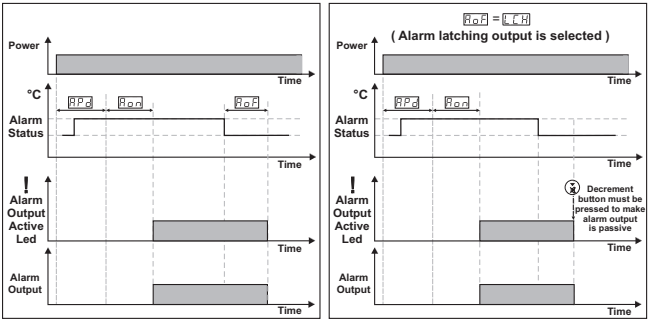
3- When cooking time parameter HE 1 ≥ 1, if selection of temperature control and starting the cooking time parameter PHS = 2 (Temperature control and cooking time (Timer) can be started by pressing cooking ON/OFF button or when cooking time start/stop input is getting closed condition) is selected;



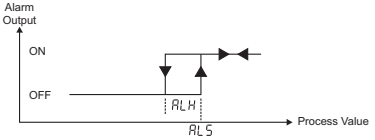
4- Manual Control : If cooking time (Timer) HE 1 = ---



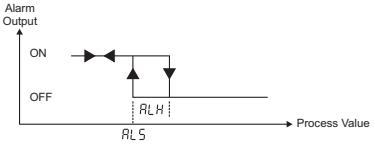
4.6.2 Operation Graphics of Alarm Output and Alarm Types



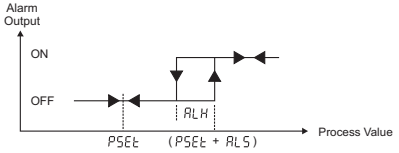
Process High Alarm



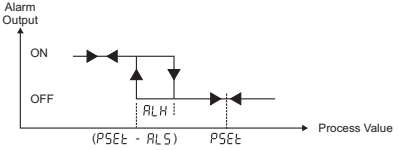
Process Low Alarm



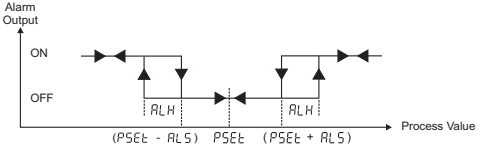
Deviation High Alarm



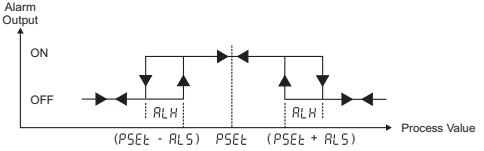
Deviation Low Alarm



Deviation Band Alarm

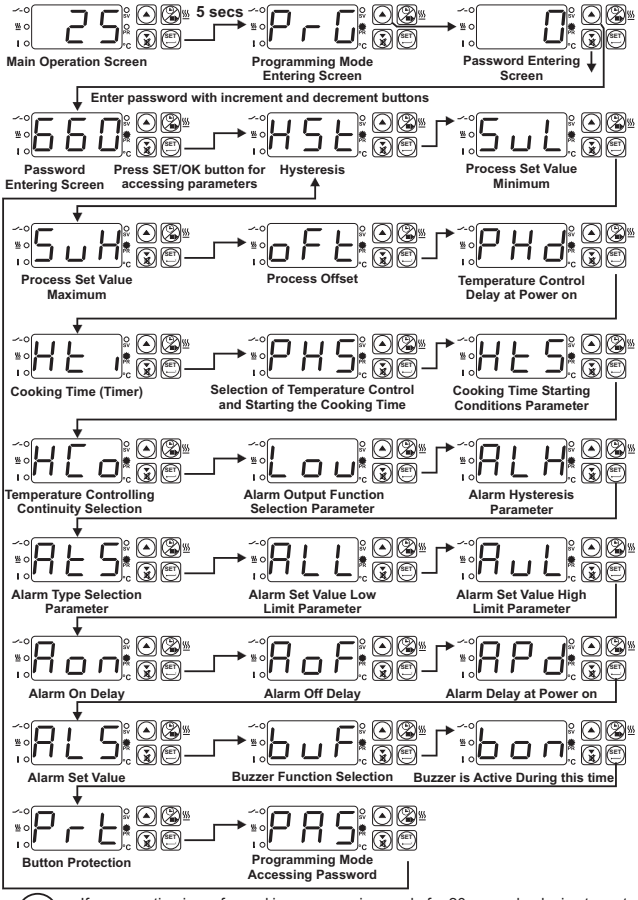


Deviation Range Alarm



PSEt = Process Set Value

4.7 Easy Access Diagram of Programming Mode 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

Main Operation Screen

5 secs

When SET button is pressed for 5 seconds, “PR” led starts to blink. If programming mode entering password is different from 0, programming mode entering screen PrG is observed.

Note-1: If programming mode accessing password is 0, hysteresis screen HSt is observed instead of Programming screen accessing password PrG.

Programming Mode Entering Screen

Press increment button for accessing to the password entering screen.

Password Entering Screen

Enter programming mode 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 mode 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.

Programming Screen

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.

Programming Screen

Minimum Process Set Value Parameter

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

Minimum Process Set Value

Change the value with increment and decrement buttons.

Minimum Process Set Value

Press set button for saving the parameter.

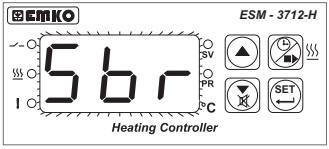
Programming Screen

Minimum Process Set Value Parameter

Press set button for accessing to the next parameter.

Other Programming mode parameters can be accessed with the same method explained above, observed and changed.

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



Probe failure in analogue input. Sensor connection is wrong or there is no sensor connection. When this message is on the screen, if alarm output function selection parameter Lou is 2, alarm output becomes active and if buzzer function selection parameter buF is 3 or 4, internal buzzer starts to operate.

6. Specifications

Device Type	: Heating Controler
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 0.10 Kg.
Environmental Ratings	: Standard, indoor at an altitude of less than 2000 meters with none condensing humidity.
Storage / Operating Temperature	: -40 ℃ to +85 ℃ / 0 ℃ to +50 ℃
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	: 24V ≂ (- %15, + %10) 50/60 Hz. 1.5VA
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, PT-1000 (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 Outputs	: 10A@250V ∼ at resistive load (Process Output) (Electrical Life : 100.000 Operation (Full Load)) 5A@250V ∼ at resistive load (Alarm Output) (Electrical Life : 100.000 Operation (Full Load))
Optional SSR Outputs	: Maximum 10mA@24V ⎓ (Process Output) Maximum 10mA@24V ⎓ (Alarm Output)
Display	: 14 mm Red 3 digits LED Display
LED	: SV (Green) , Process Output Active (Red), PR(Red), Cooking Time Active(Red), Alarm Output Active (Red) 3 mm Led
Internal Buzzer	: ≥83dB
Approvals	: GOST-R, CE