



ESM-3711-C 77 x 35 DIN Size Digital , ON / OFF Cooling Controller

- 3 Digits Display
- PTC Input or 2-wire PT-100 Input (It must be determined in order)
- ON / OFF Control
- Adjustable Temperature Offset
- Set Value Boundaries
- Relay or SSR Driver Output
- Operation Selection of Compressor Operates Continuously,
Stops or Operates Periodically in case of Probe Defect
- Compressor Protection Delays
- Defrost (Off-Cycle) Function
- Adjustable Defrost Time from Front Panel
- Adjustable On/Off Operation from Front Panel
- Defrost Parameters
- Alarm Parameters
- Adjustable Internal Buzzer According to Defrost , Probe Defect
and Alarm Status
- Button Protection
- Password Protection for Programming Section

Instruction manual of ESM-3711-C Cooling 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, Turkiye

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

Product Name : Cooling Controller

Model Number : ESM-3711-C

Type Number : ESM-3711-C

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-C series cooling controllers are designed for measuring and controlling temperature. They can be used in many applications with their easy-use , On / Off control form and defrost properties.

Some application and application fields which they are used are below:

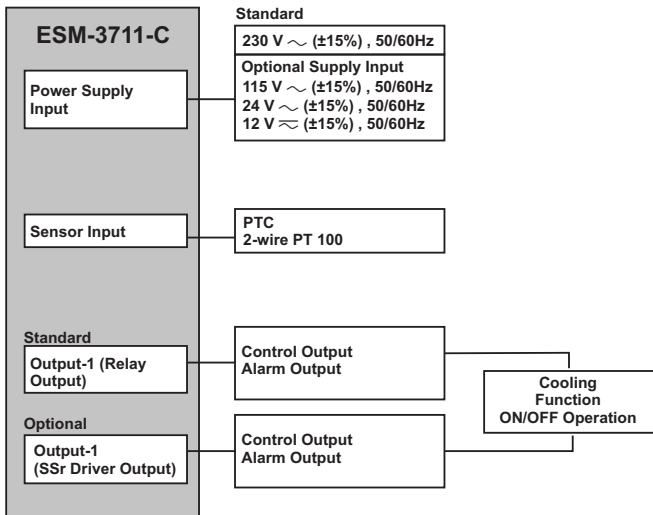
Application Fields

Food
Machine production industries
etc...

Applications

Refrigerators
Air Conditioning
Storages
Freezers
etc...

1.1 General Specifications



1.2 Ordering Information

ESM-3711-C (77x35 DIN Size)	A	BC	D	E	/	FG	HI	/	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
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 is 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 + 1NC)
2	SSR Driver Output (Maximum 20mA@ 12V \sim)

V	Temp.Sensor which is given with ESM-3711-C
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-3711 Cooling 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 \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.

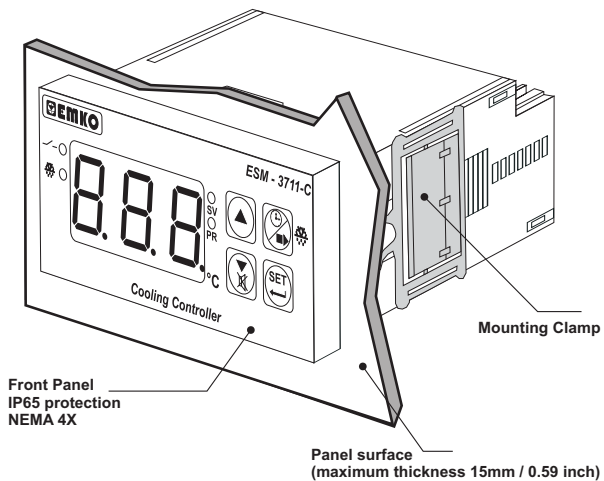
Do not use the unit in combustible or explosive gaseous atmospheres.

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.

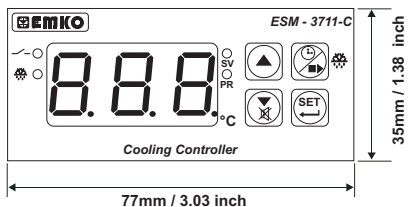
Montage of the product on a system must be done with it's fixing clamps. Do not do the montage of the device with inappropriate fixing clamp. Be sure that device will not fall while doing the montage.

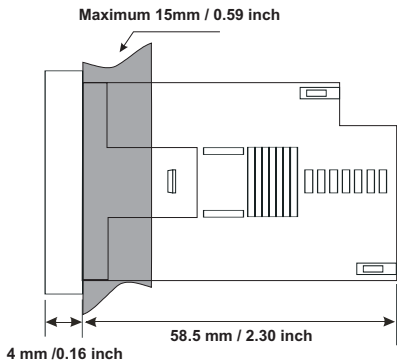
It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

2.1 General Description

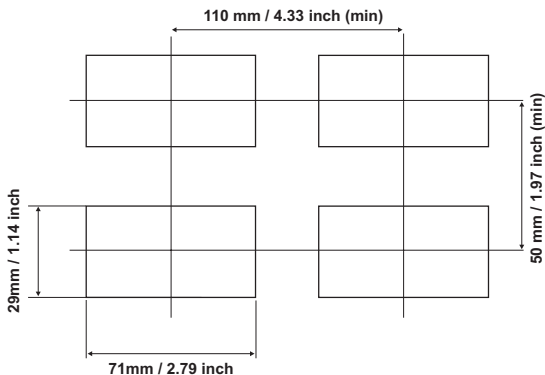


2.2 Front View and Dimensions of ESM-3711 Colling Controller





2.3 Panel Cut-Out



2.4 Environmental Ratings

Operating Conditions



Operating Temperature : 0 to 50 °C



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

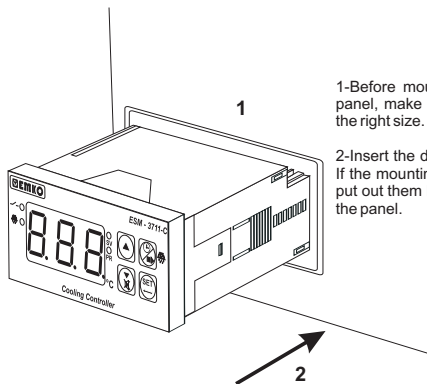


Altitude : Up to 2000m.



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

2.5 Panel Mounting



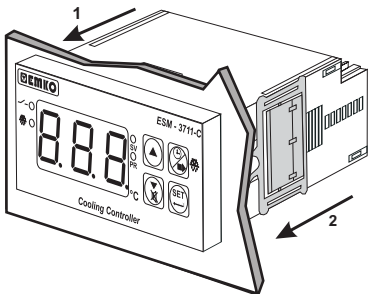
1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

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 the device and make the unit completely immobile within the panel

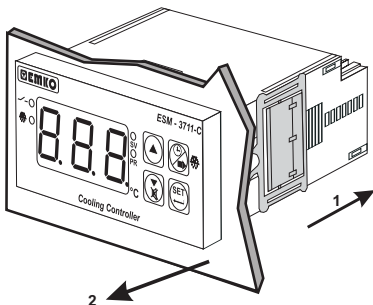


Montage of the unit to a system must be done with it's own fixing clamps. Do not do the montage of the device with inappropriate fixing clamps. Be sure that device will not fall while doing the montage.

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.

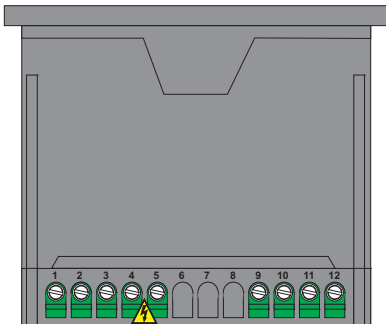


Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.



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

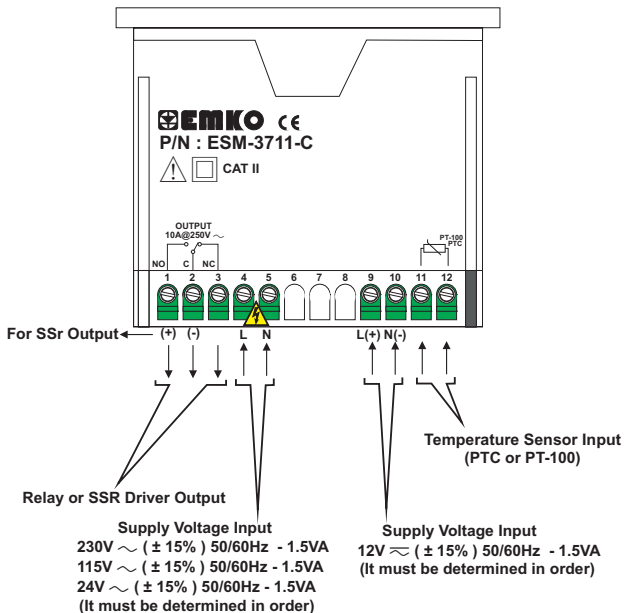


Max. 2.5mm / 0.098 inch
Wire Size:
14AWG/1mm²
Solid /Stranded

3.2 Electrical Wiring Diagram



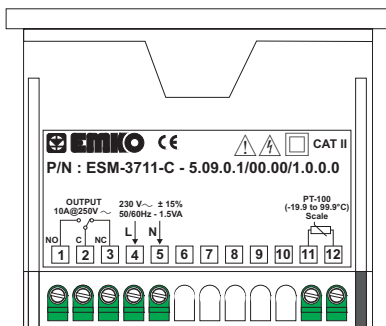
Electrical wiring of the device must be the same as 'Electrical Wiring Diagram' below to prevent damage to the process being controlled and personnel injury.



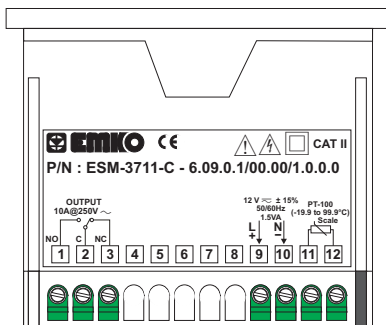
Temperature Sensor Input is in CAT II class.

3.3 View of the Device Label

Device Label for PT-100 Type (-19.9 ; 99.9) scaled, 230V \sim Supply Voltage Input and Relay Output

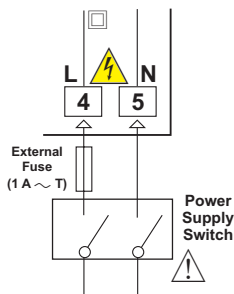


Device Label for PT-100 Type (-19.9 ; 99.9) scaled , 12V \approx Supply Voltage Input and Relay Output



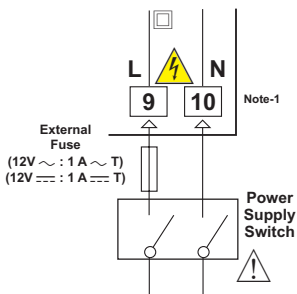
3.4 Supply Voltage Input Connection of the Device

Connection of Supply Voltage Input



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

Connection of Supply Voltage Input



Supply Voltage
 12 V ~ (± 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 PTC or PT-100 Connection

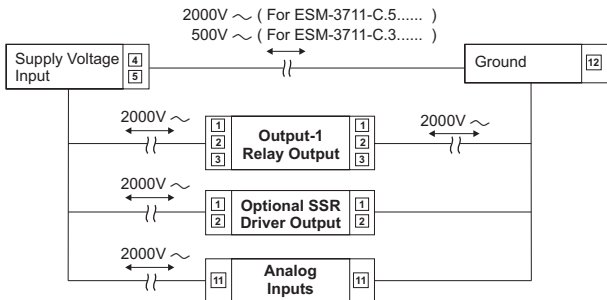


Input resistance is greater than 10MΩ.

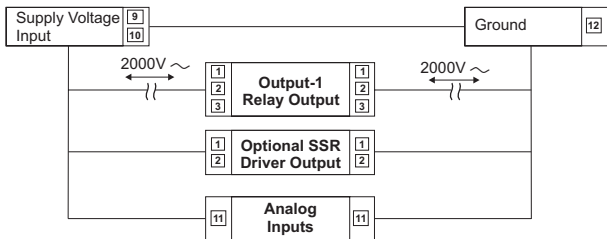


Pay attention the cable colours of PTC probe while doing the PTC probe connection.

3.6 Galvanic Isolation Test Values of ESM-3711-C Cooling Controller

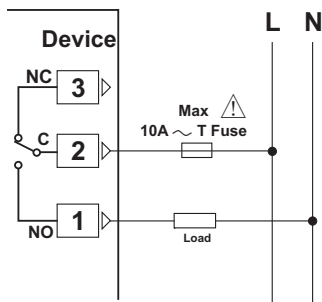


Galvanic Isolation Test Values of 12V AC Supply Voltage Input Devices:



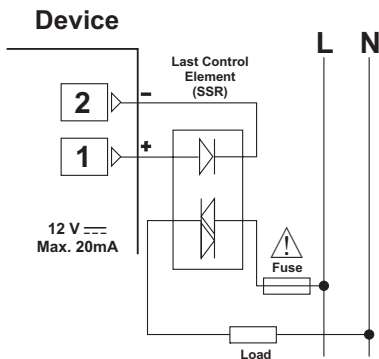
3.7 Output Connections

3.7.1 Relay Output Connection



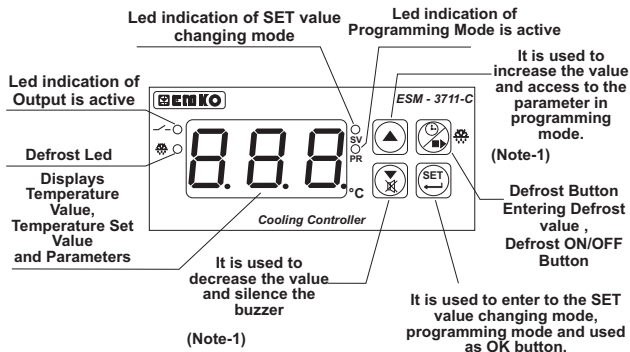
Fuses must be selected according to the application.

3.7.2 Output (SSR Driver Output) Connection



Fuses must be selected according to the application.

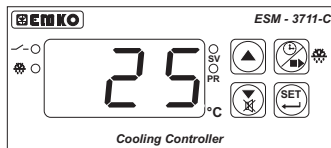
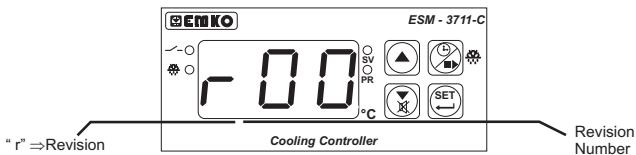
4. Front Panel Definition and Accessing to the Menus



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 ESM-3711-C Cooling Controller Software Revision on the Displays

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

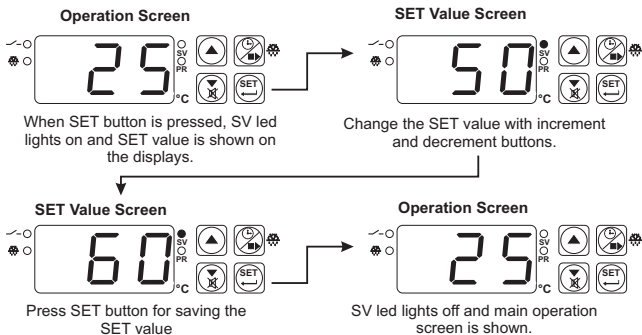


Main Operation Screen is shown



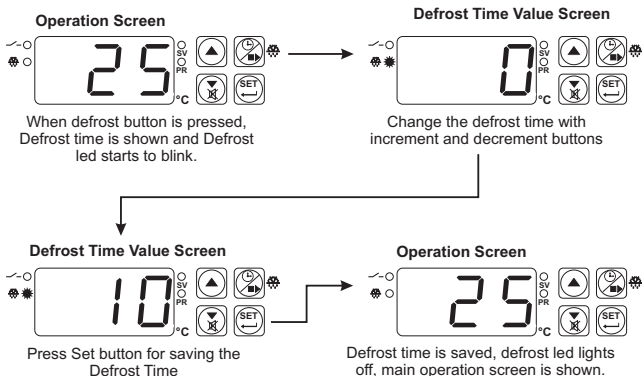
If there is an unexpected situation while opening the device, power off the device and inform a qualified personnel.

4.2 Changing and Saving 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 Defrost Time Parameter



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

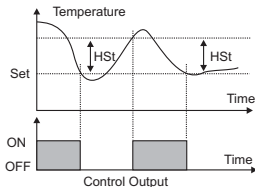
4.4 Programming Section Parameters List

HSt

Hysteresis Parameter for Output (Default = 0)

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

dt

Defrost Time Parameter (Default = 10)

It can be adjusted from 0 to 99 minutes. If it is selected 0, automatic or manual defrost is not performed.

drC

Defrosting Repeat Cycle (Default = 2)

It can be adjusted from 1 to 99 hours.

Pod

Defrost at Power On (Default = 0)

0 System does not go through a defrost cycle at start up

1 System goes through a defrost cycle at start up

Pdd

Defrost Delay at Power On (Default = 0)

It can be adjusted from 0 to 99 minutes. This parameter can be observed if defrost at power on parameter **Pod** is 1.

ddA

Display Status During Defrost Parameter (Default = 0)

0 The temperature is displayed during defrost.

1 Temperature value at the start of a defrost is displayed during defrost.

2 Set value is displayed during defrost.

3 **dEF** Is displayed to indicate a defrost is in progress.

PoS**Compressor Start Delay at Power On Parameter (Default = 0)**

When power is first applied to the device, compressor is on when this time delay is expired. It can be adjusted from 0 to 20 minutes.

SPD**Compressor Stop-Start Delay Parameter (Default = 0)**

When compressor is inactive, this time delay must be expired for activation of the compressor. It can be adjusted from 0 to 20 minutes.

Std**Compressor Start-Start Delay Parameter (Default = 0)**

This time delay must be expired between two activation of the compressor. It can be adjusted from 0 to 20 minutes.

P.dF**Probe Defect Parameter (Default = 0)** 0

Compressor is OFF in case of probe defect.

 1

Compressor is ON in case of probe defect

 2Compressor operates periodically according to **P.on** and **P.oF** Time periods in case of probe defect.**P.on****Compressor is active during this time period in case of probe defect. (Default = 0)**

If probe defect parameter **P.dF** is 2, then this parameter is observed. It can be adjusted from 0 to 99 minutes.

P.oF**Compressor is inactive during this time period in case of probe defect. (Default = 0)**

If probe defect parameter **P.dF** is 2, then this parameter is observed. It can be adjusted from 0 to 99 minutes.

ALS**Cooling Alarm Function Selection Parameter (Default = 0)** 0

Cooling Alarm function is inactive

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

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

RuH**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.

buf**Buzzer Function Selection Parameter(Default = 1)**

- 0 Buzzer is inactive.
- 1 Buzzer is active during defrost operation.
- 2 Buzzer is active if an alarm occurs.
- 3 Buzzer is active during sensor failures.
- 4 Buzzer is active during defrost operation, 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. In this condition buzzer is active till buzzer silence button is pressed.

prt**Button Protection Parameter (Default = 0)**

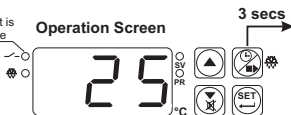
- 0 There is no protection
- 1 Defrost time can not be changed and defrost ON/OFF operation is not performed.
- 2 SET value can not be changed.
- 3 Defrost time and SET value can not be changed. Defrost ON/OFF operation is not performed.

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 selected 0, password is not entered for accessing to the parameters.

4.5 Defrost ON/OFF Operation

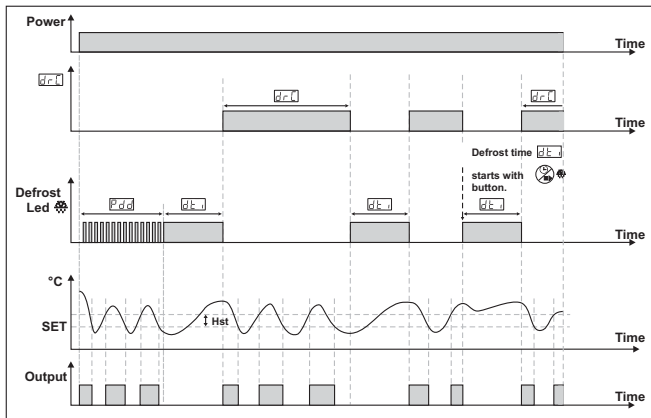
Led indication

of
Output is
active

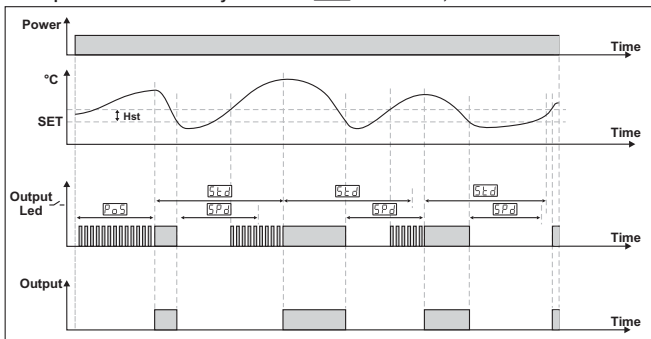
When defrost time is not 0 and cooling operation is performed (output active led is on), if defrost button is pressed for 3 seconds in main operation screen, defrost operation starts and defrost led becomes active. If defrost button is pressed for 3 seconds while defrost continues, defrost is finished and defrost led becomes inactive.

4.6 Operation Graphics of ESM-3711-C Cooling Controller

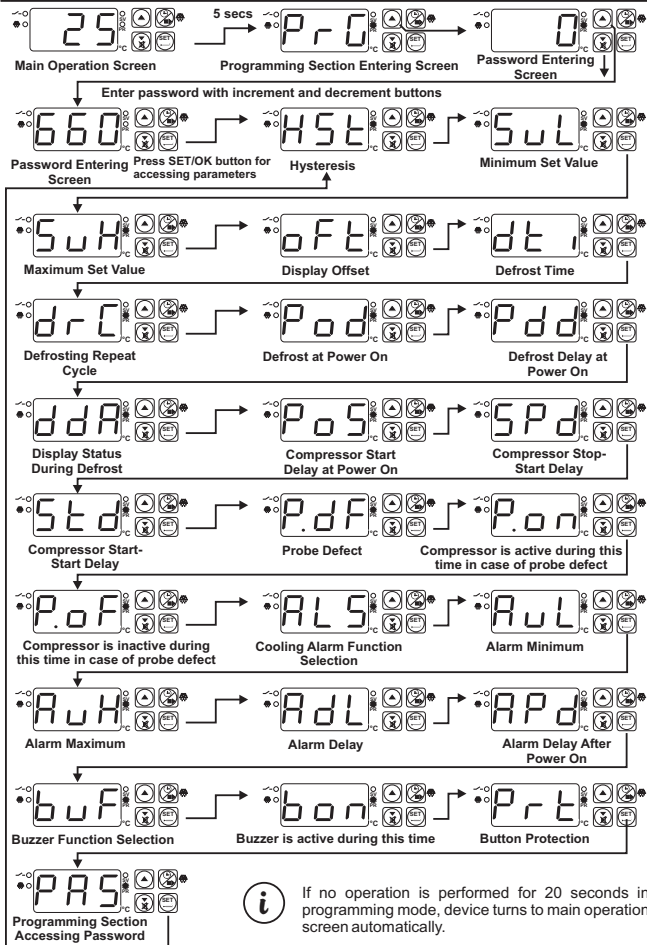
- 1- If defrost time parameter $\overline{dt_u} \geq 1$,
 Defrosting repeat cycle $\overline{dr_c} \geq 1$,
 Defrost at Power On Parameter $\overline{p_{od}} = 1$ and
 Defrost Delay at Power On Parameter $\overline{p_{dd}} \geq 1$;



- 2- If Compressor Start Delay at Power On Parameter $\overline{p_{os}}$ is ≥ 1 ,
 Compressor Stop-Start Delay Parameter $\overline{sp_d}$ is ≥ 1 and
 Compressor Start-Start Delay Parameter $\overline{st_d}$ is ≥ 1 then ;



4.7 Easy Access Diagram of Programming Section Parameters



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 $\overline{P r 0}$ is observed.

Note-1: If programming section accessing password is 0, hysteresis screen $\overline{H 5 L}$ is observed instead of programming screen accessing password $\overline{P r 0}$.

Programming Section Entering Screen

Press increment button for accessing to the password entering screen.



Password Entering Screen

Enter programming section entering 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 Parameter Value



Change the parameter with Increment and decrement buttons.



Hysteresis Value

Press SET button for saving the parameter

Programming Screen

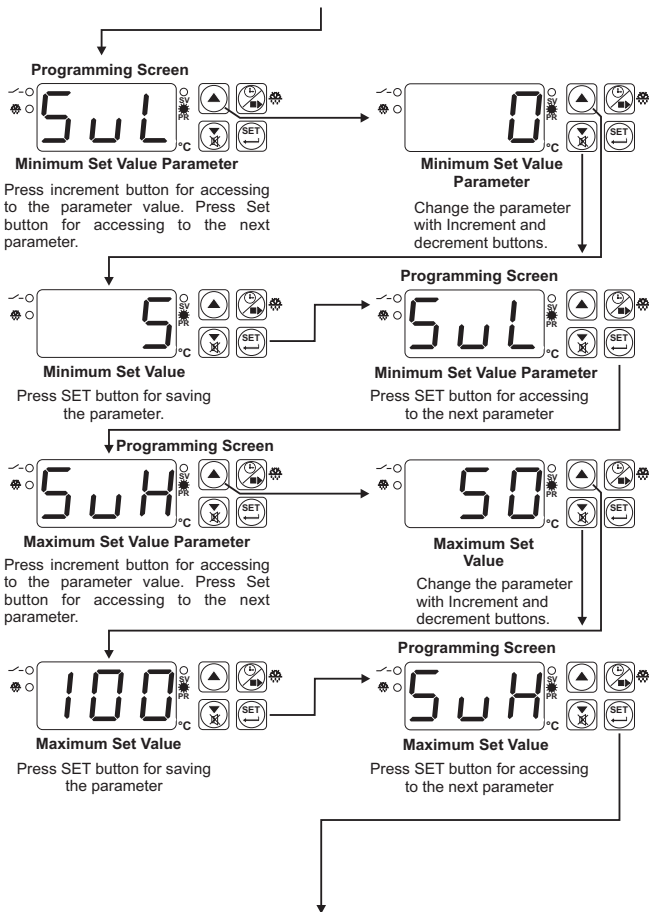


Hysteresis Parameter

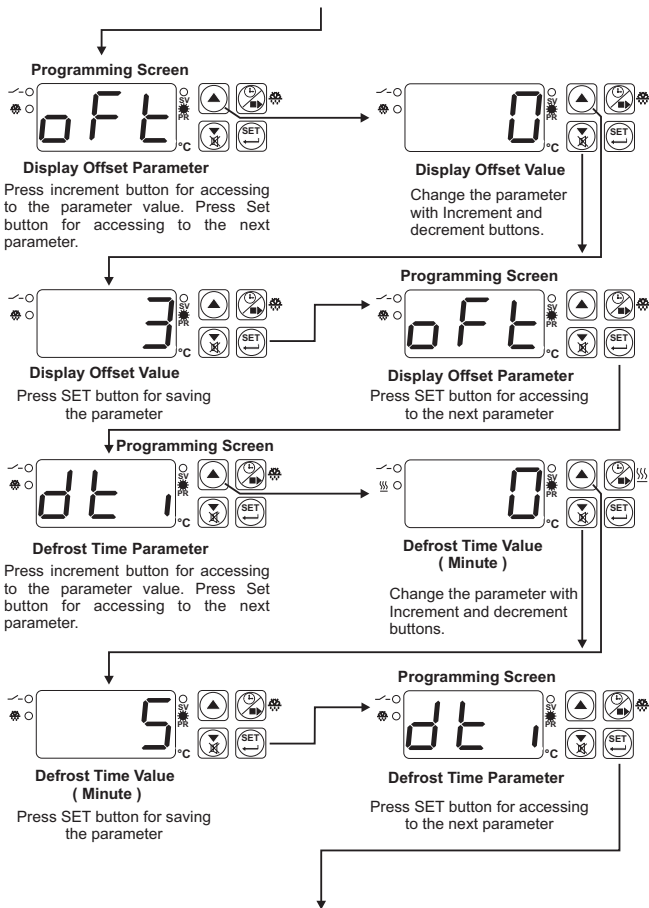
Press SET button for accessing to the next parameter



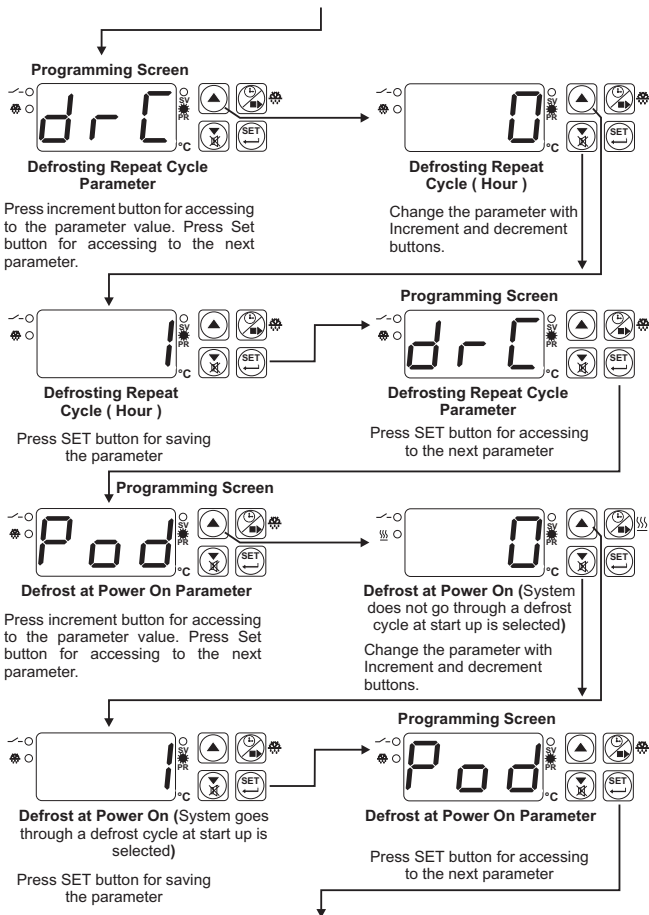
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



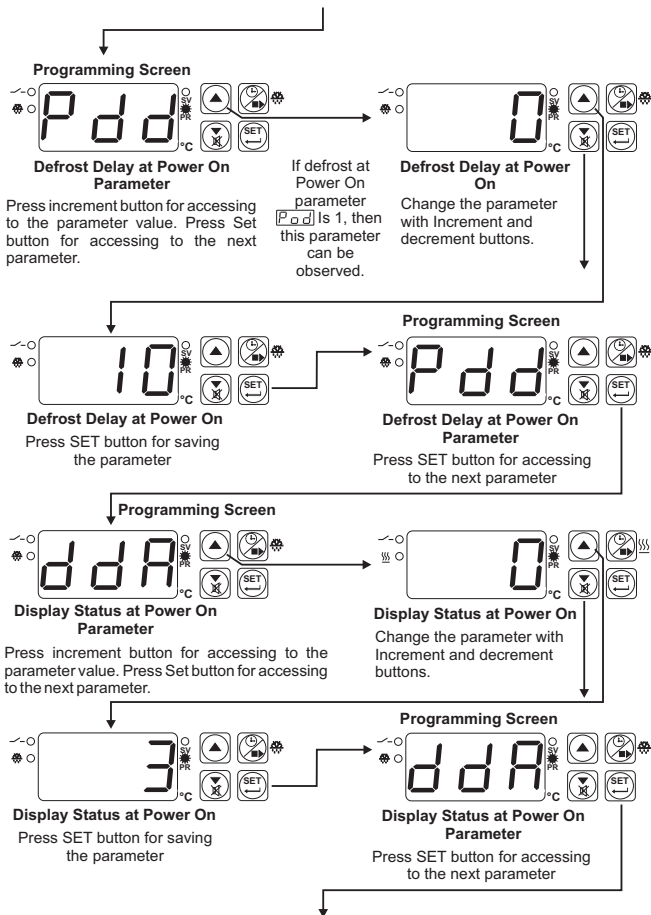
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



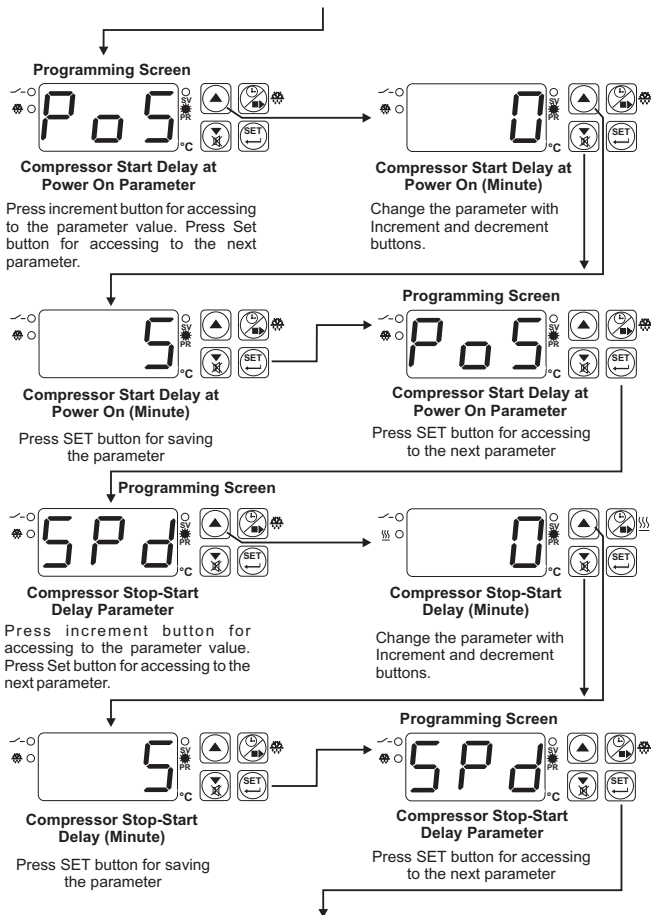
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



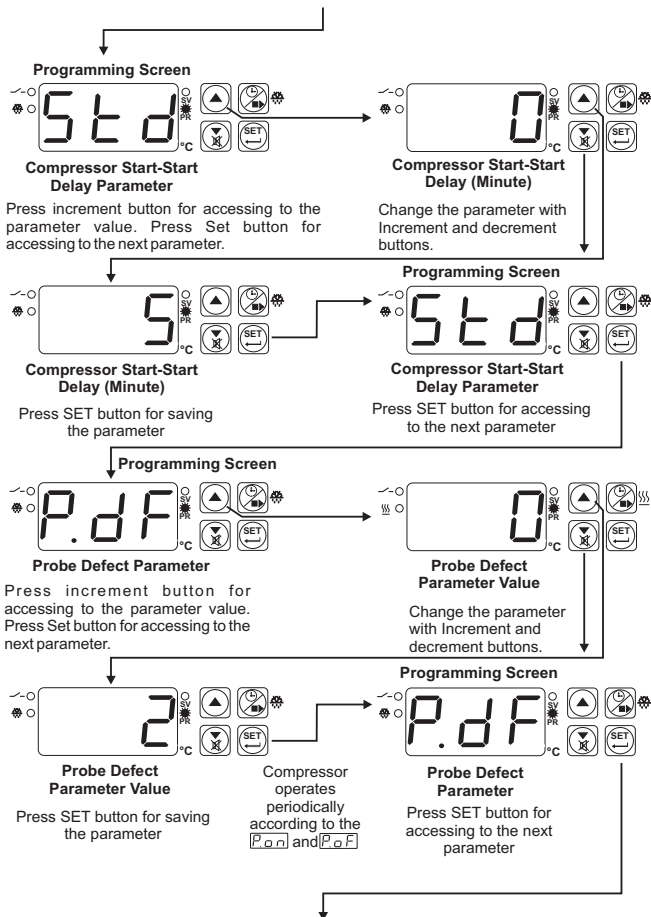
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



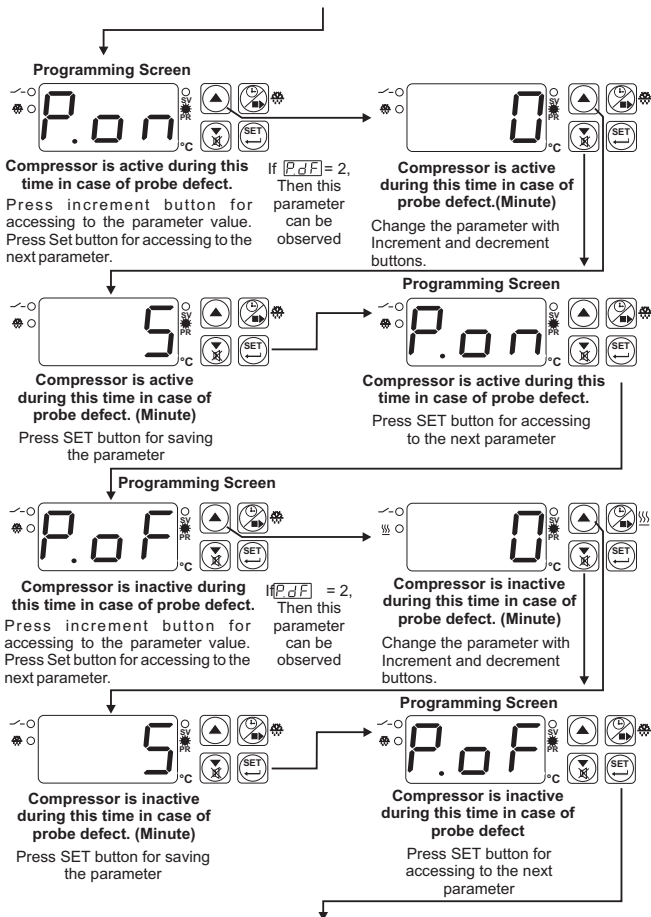
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



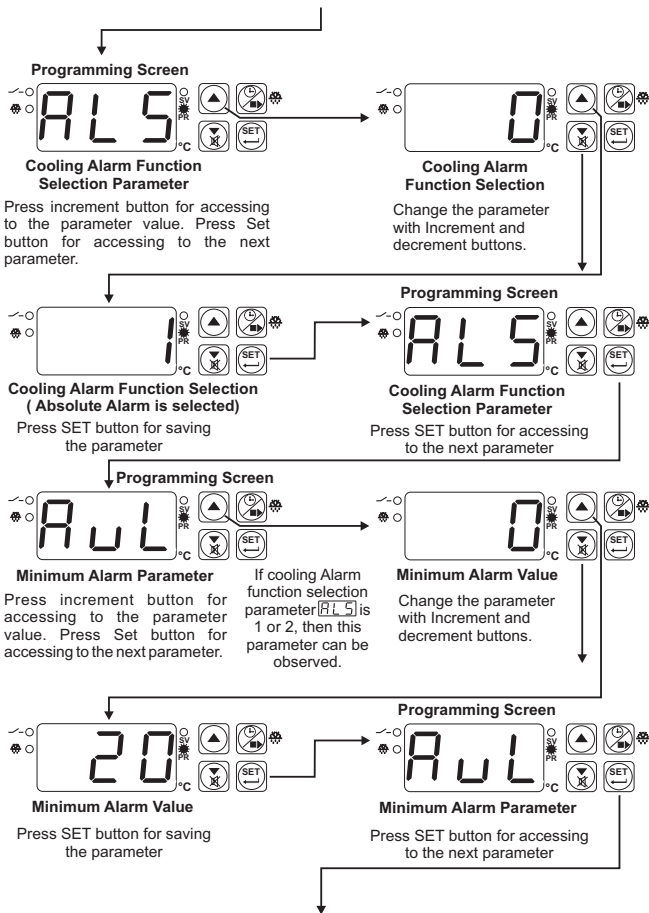
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



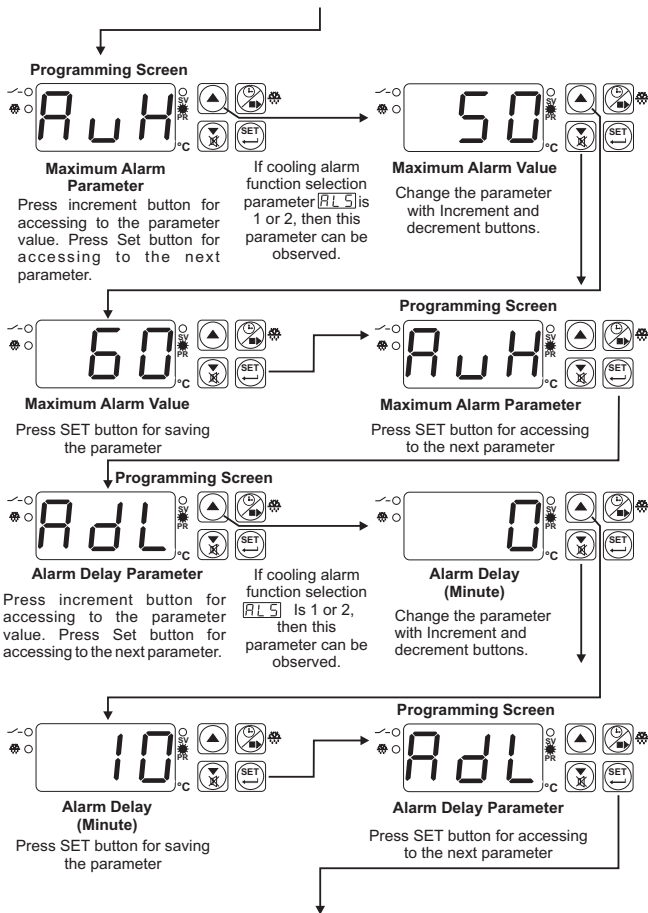
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



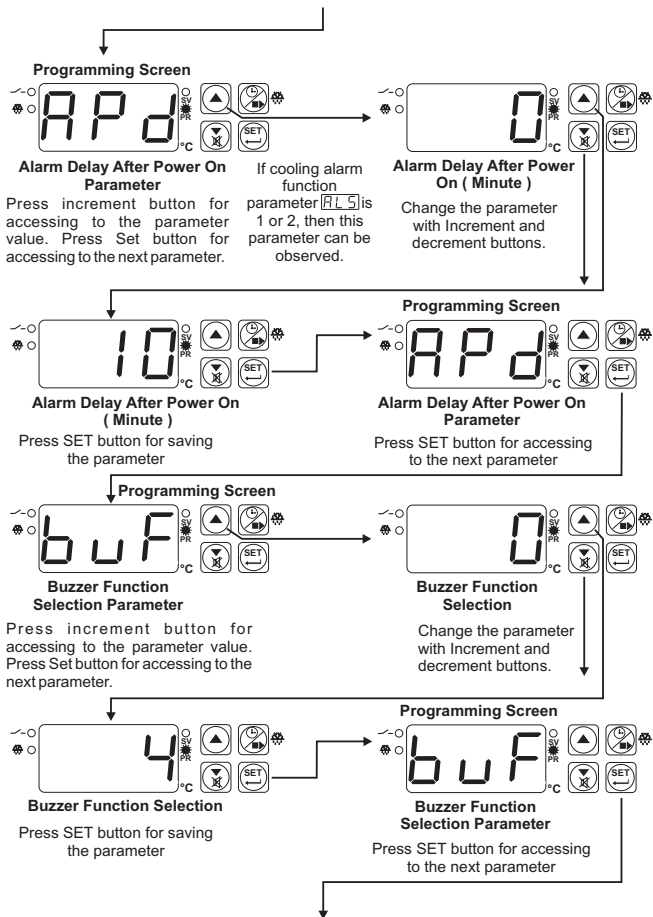
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



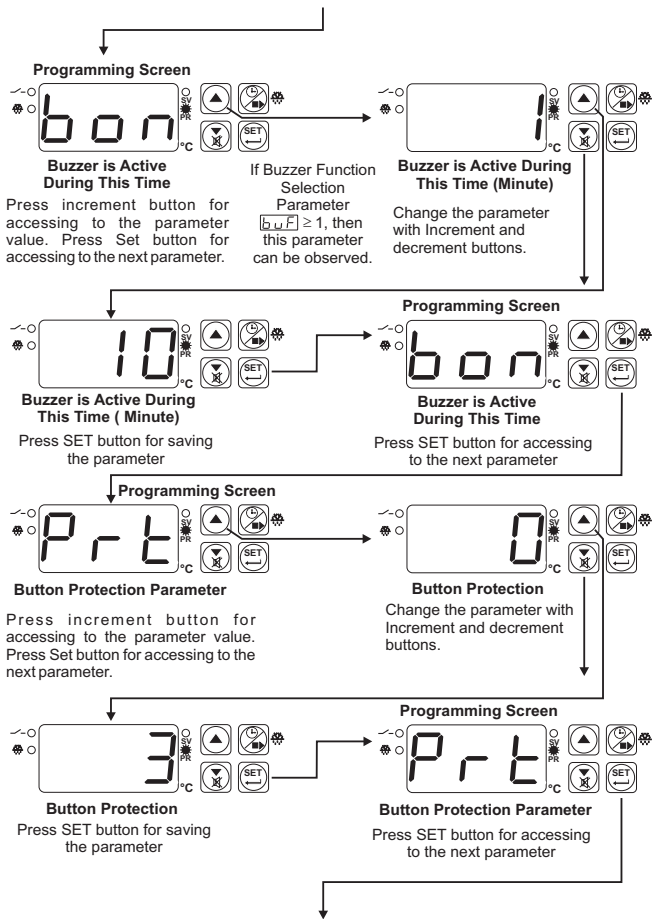
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



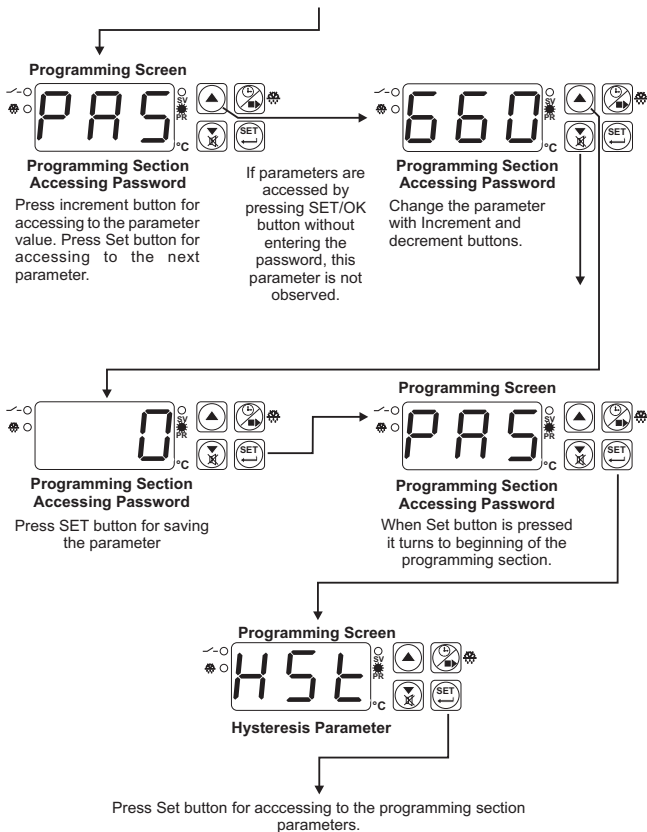
If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.



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

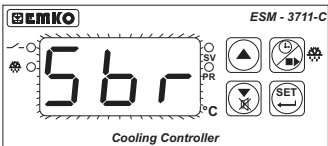


If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.

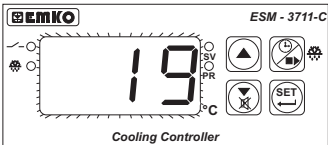


If no operation is performed for 20 seconds in programming mode, device turns to main operation screen automatically.

5. Failure Messages in ESM-3711-C Cooling 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 $\boxed{b u F}$ is 3 or 4, internal buzzer starts to operate.



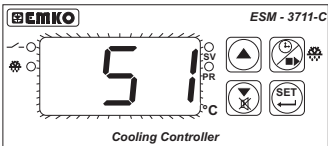
2-Blinking the Screen Value

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

Example-1 :

If alarm function selection parameter $\boxed{A L S}$ in programming section is 1(Absolute alarm) and minimum alarm parameter $\boxed{A u L}$ is 20 ;

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



Example-2 :

If alarm function selection parameter $\boxed{A L S}$ in programming section is 1 (Absolute Alarm) and maximum alarm parameter $\boxed{A u H}$ is 50

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

6. Specifications

Device Type	: Cooling 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, RTD
PTC Input Type	: PTC (1000 Ω @ 25 °C)
Thermoresistance Input Type	: PT-100. (IEC751)(ITS90)
Accuracy	: ± 1 % of full scale for thermoresistance
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) , PR (Red) , Defrost (Red),Output (Red) 3 mm Led
Internal Buzzer	: ≥83dB