

Datasheet

On/Off Temperature Controller, 76 x 34.5mm, NTC Input, 24 V Supply

RS Stock number [798-3494](#)

7. Specifications

Device Type	: Temperature Controller
Housing & Mounting	: 76mm x 34.5mm x 71mm 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 +80 °C / -30 °C to +80 °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) 50/60Hz - 1.5VA : 115V~ (±%15) 50/60Hz - 1.5VA : 24V~ (±%15) 50/60Hz - 1.5VA : 24V~ (±%15) 50/60Hz - 1.5VA
Temperature Sensor Input	: 10 - 30V~ 1.5W
NTC input type	: NTC, PTC, TC, RTD
PTC input type	: NTC (10 kΩ @25 °C)
Thermocouple input type	: PTC (1000 Ω @25 °C)
Thermoresistance input type	: J, K (IEC584.1) (ITS 90)
Accuracy	: PT-100, PT-1000 (IEC751) (ITS 90)
Cold Junction Compensation	: ± 1 % of full scale for thermoresistance
Sensor Break Protection	: Automatically ± 0.1°C / ± 1°C
Sampling Cycle	: Upscale
Control Form	: 3 samples per second
Relay Output	: ON / OFF
Optional SSR Drive Output	: 16(8) A@250 V ~ for Resistive load (Compressor Output) (Electrical life : 100.000 switching at full load)
Display	: Maximum 20mA, Maximum 17V~
LED	: 14 mm Red 4 digits LED Display
Internal Buzzer	: S (Green), P (Green), °C (Yellow), °F (Yellow), Compressor Output (Red), Heating Output (Red)
Approvals	: ≥83dB : ENEC CE

8. Ordering information


ESM-3710-N (77x35 DIN Sizes)		A	B	C	D	E	F	G	H	I	U	V	W	Z
			0				00	00			1		0	0
A	Supply Voltage													
2	24V~ (±%15) 50/60Hz - 1.5VA													
3	24V~ (±%15) 50/60Hz - 1.5VA													
4	115V~ (±%15) 50/60Hz - 1.5VA													
5	230V~ (±%15) 50/60Hz - 1.5VA													
8	10 - 30 V ~													
BC	Input Type	Scale(°C)												
05	J, Fe CuNi IEC584.1(ITS90)	0°C/32°F ; 800°C/1472°F												
10	K, NiCr Ni IEC584.1(ITS90)	0°C/32°F ; 999°C/1830°F												
11	PT 100, IEC751(ITS90)	-50°C/-58°F ; 400°C/752°F												
09	PT 100, IEC751(ITS90)	-19.9°C/-4°F ; 99.9°C/212°F												
14	PT 1000, IEC751(ITS90)	-50°C/-58°F ; 400°C/752°F												
13	PT 1000, IEC751(ITS90)	-19.9°C/-4°F ; 99.9°C/212°F												
12	PTC (NoI-1)	-50°C/-58°F ; 150°C/302°F												
18	NTC (NoI-1)	-50°C/-58°F ; 100°C/212°F												
E	Compressor Output													
1	Relay Output (16(8) A@250 V ~,at resistive Load, 1 NO)													
2	SSR Driver Output (Maximum 20m, Maximum 17V~)													
V	Temp. Sensor which is given with ESM-3710-N													
0	None													
1	PTC-M6L40.K1.5 (PTC Air Probe 1.5 mt Silicon Cable)													
2	PTCS-M6L30.K1.5.1/8" (PTC Liquid Probe 1.5 mt Silicon Cable)													
3	NTC-M5L20.K1.5 (NTC Sensor, thermoplastic moulded with 1.5 m cable for cooling application)													
4	NTC-M6L50.K1.5 (NTC Sensor, stainless steel housing with 1.5 m cable for cooling application)													
9	Customer													

All order information of ESM-3710-N Temperature Controller are given on the table at above. 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.
Note-1: If input type is selected PTC or NTC (BC= 12, 18), Temperature sensor is given with the device. For this reason, if input type is selected as PTC, sensor type (V = 0, 1 or 2) or if input type is selected as NTC, sensor type (V = 0, 3 or 4) must be declared in ordering information.


9. Optional Accessories

1. RS-485 Module




RS-485 Communication Interface

2. PROKEY Programming Module



The device is programmed (Upload or Download) by using the parameters.



~ ⇒ Vac,
 --- ⇒ Vdc
 ~ ⇒ Vdc or Vac can be applied



**ESM-3710-N 77 x 35 DIN Size
Digital , ON / OFF Temperature
Controller**

- 4 Digits Display
- NTC Input or PTC Input or J Type thermocouple Input or, K Type thermocouple Input or, 2-Wire PT-100 Input or, 2-Wire PT-1000 Input (Must be determined in order.)
- Adjustable temperature offset
- ON/OFF temperature control
- Selectable heating or cooling function
- Selection of operation with hysteresis
- Adjustable temperature offset
- Set value low limit and set value high limit boundaries
- Operation selection of compressor operates continuously, stops or operates periodically in case of sensor defect
- Compressor protection delays
- Adjustable internal buzzer according to sensor defect status.
- Password protection for programming section
- Installing parameters using Prokey
- Remote access, data collecting and controlling with Modbus RTU
- Having CE mark according to European Norms





Instruction Manual. ENG ESM-3710-N 01 V04 07/14

1.Preface

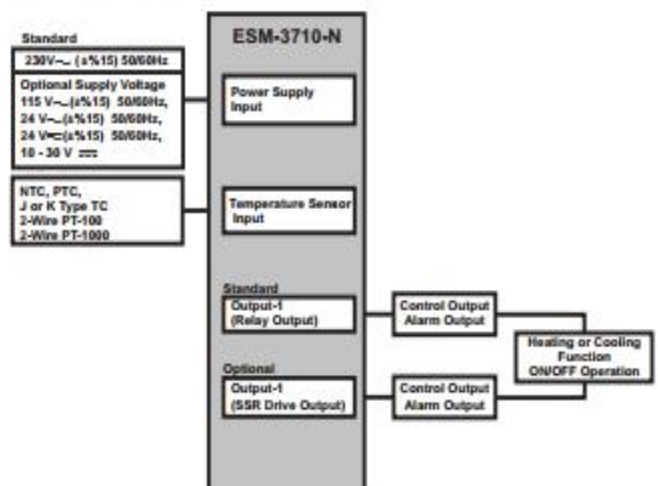
ESM-3710N series temperature controllers are designed for measuring and controlling temperature. They can be used in many applications with their On / Off control form, heating and cooling control form and easy-use properties. Some application fields which they are used are below:

Application Fields	Applications
Glass	Heating
Food	Baking Ovens
Plastic	Incubators
Petro-Chemistry	Storages
Textile,	Automative Air Conditioning
Machine Production Industries Etc...	Etc...

1.1 Environmental Ratings

-  Operating Temperature : 0 to 50 °C
-  Max. Operating Humidity : 90% Rh (non-condensing)
-  Altitude : Up to 2000 m.
-  Forbidden Conditions:
Corrosive atmosphere
Explosive atmosphere
Home applications (The unit is only for industrial applications)

1.2 General Specifications



1.3 Installation

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 result in malfunction, electric shock or fire.

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

During putting equipment 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.

1.4 Warranty

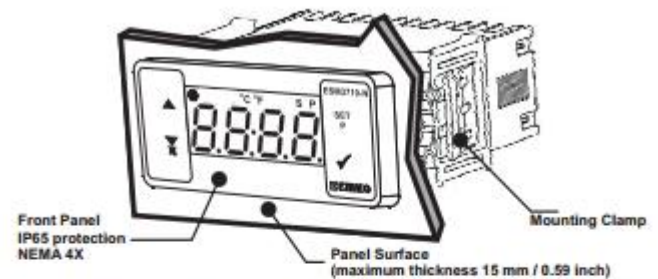
EMKO Elektronik warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date. This warranty is in force if duty and responsibilities which are determined in warranty document and instruction manual performs by the customer completely.

1.5 Maintenance

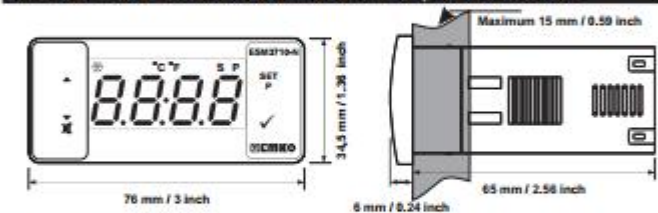
Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts.

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 ethvl alcohol or water to clean the external plastic case.

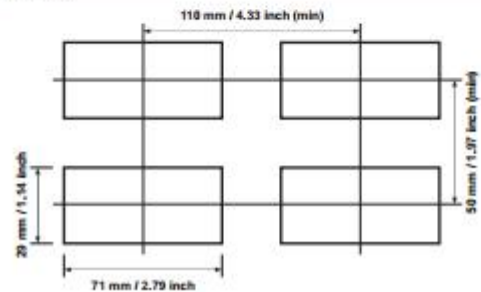
2. General Description



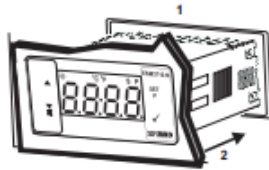
2.1 Front View and Dimensions of ESM-3710-N Temperature Controller



2.2 Panel Cut-Out

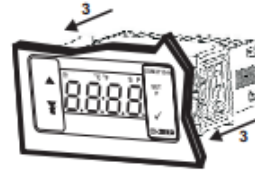


2.3 Panel Mounting



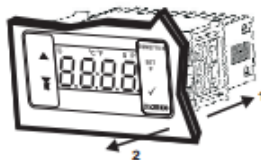
1-Before mounting the device in your panel, make sure that the cut-out is of the right size.

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.



3- 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

2.4 Removing from the Panel



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

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



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

3. Using Prokey

TO USE PROKEY, VALUE OF THE PrC PARAMETER MUST BE '0'. IF PrC=1 AND ▼ BUTTON IS PRESSED [Err] MESSAGE WILL BE SHOWN. 10s. LATER DEVICE TURNS BACK TO THE MAIN OPERATION SCREEN OR YOU CAN PRESS SET BUTTON TO TURN BACK TO MAIN OPERATION SCREEN.

DOWNLOADING FROM DEVICE TO PROKEY

- 1.The device is programmed by using the parameters.
- 2.Energize the device then put in PROKEY and press ▼ button. [vPr] Message is shown on the display. When the loading has finished, [Err] message is shown.
- 3.Press any button to turn back to main operation screen.
- 4.Remove the PROKEY.

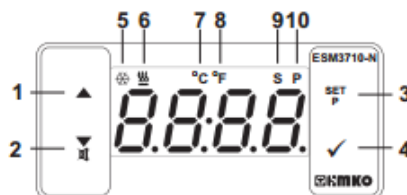
NOTE: [Err] message is shown when an error occurs while programming. If you want to reload, put in PROKEY and press ▼ button. If you want to quit, remove PROKEY and press ▼ button. The device will turn back to main operation screen.

DOWNLOADING FROM PROKEY TO DEVICE

- 1.Switch off the device.
- 2.Put in PROKEY then energize the device.
- 3.When the device is energized, the parameter values in PROKEY, start downloading to the device automatically. At first, [vPr] message is shown on the display, when loading has finished, [Err] message is shown.
- 4.After 10 seconds device starts to operate with new parameter values.
- 5.Remove the PROKEY.

NOTE: [Err] message is shown when an error occurs while programming. If you want to reload, switch off the device and put in PROKEY then energize the device. If you want to quit remove PROKEY and press ▼ button. The device will turn back to main operation screen.

5.Front Panel Definition and Accessing to the Menu



BUTTON DEFINITIONS

1. Increment Button :

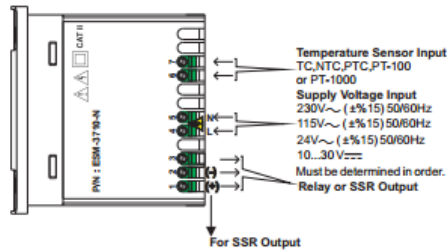
** It is used to increase the value in the Set screen and Programming mode.

2. Decrement, Silencing Buzzer and Downloading to Prokey Button :

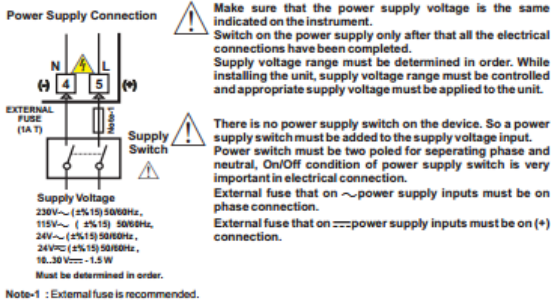
** It is used to decrease the value in the Set screen and Programming mode.

** It is used to silence the buzzer.

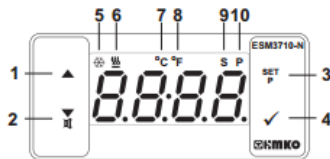
4. Electrical Wiring Diagram



4.1 Supply Voltage Input Connection of the Device



5. Front Panel Definition and Accessing to the Menus



BUTTON DEFINITIONS

- 1. Increment Button :**
** It is used to increase the value in the Set screen and Programming mode.
- 2. Decrement, Silencing Buzzer and Downloading to Prokey Button :**
** It is used to decrease the value in the Set screen and Programming mode.
** It is used to silence the buzzer.
** If Prc = 0, it is used to download from device to prokey.
- 3. Set Button :**
** In the main operation screen; if this button pressed, set value will be displayed. Value can be changed using increment and decrement buttons. When Enter button pressed, value is saved and returns back to main operating screen.
** To access the programming screen; in the main operation screen, press this button for 5 seconds.
- 4. Enter Button :**
** It is used to saving value in the Set screen and programming screen.

LED DEFINITIONS

- 5. Cooling led :**
** This led indicates that cooling control is selected and process output relay is active. If any of compressor protection time active, this led blinks.
- 6. Heating led :**
** This led indicates that heating control is selected and process output relay is active.
- 7. Celsius led :**
** Indicates that device is in °C mode.
- 8. Fahrenheit led :**
** Indicates that device is in °F mode.
- 9. Set led :**
** Indicates that device is in Set value changing mode.
- 10. Program led :**
** Blinks in programming mode.

SuL

Minimum Temperature Set Value Parameter (Default = Minimum Value of Device Scale) MODBUS ADDRESS:40005
Temperature set value can not be lower than this value.
This parameter value can be adjusted from minimum value of device scale to maximum temperature set value parameter [SuH]

SuH

Maximum Temperature Set Value Parameter (Default = Maximum Value of Device Scale) MODBUS ADDRESS:40006
Temperature set value can not be bigger than this value.
This parameter value can be adjusted from minimum temperature set value parameter [SuL] to maximum value of the device scale

oFt

Sensor Offset Parameter (Default = 0) MODBUS ADDRESS:40007
from -20 to 20 °C for NTC(-50°C, 100°C) or PTC(-50°C, 150°C) or J Type TC (0°C,800°C) or J Type TC (0°C,1000°C) or PT-100(+50°C, 400°C) or PT-1000 (-50°C, 150°C) or PT-100 (-20°C, 100°C),
from -36 to 36 °F for NTC(-58°F, 212°F) or PTC(-58°F, 302°F) or J Type TC (32°F,1472°F) or or K Type TC (32°F,1830°F) or PT-100(+58°F, 752°F) or PT-1000(+58°F, 752°F) or PT-100(-4°F, 212°F),
from -10.0 to 10.0°C for NTC(-50.0°C, 100.0°C) or PTC(-50.0°C, 150.0°C) or PT-100 (-19.9°C, 99.9°C),
from -18.0 to 18.0°F for NTC(-58.0°F, 212.0°F) or PTC(-58.0°F, 302.0°F) or PT-100 (-4.0°F, 212.0°F),

HCS

Operating Type Parameter (Default = 0) MODBUS ADDRESS:40008
If parameter value is '0' device skips to [SuL] parameter

- Heating
- Cooling

Pos

Compressor Start Delay at Power On Parameter (Default = 0) MODBUS ADDRESS:40009

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) MODBUS ADRES:40010
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) MODBUS ADRES:40011
This time delay must be expired between two activation of the compressor. It can be adjusted from 0 to 20 minutes.

PdF

Sensor Defect Parameter (Default = 0) MODBUS ADRES:40012

- Compressor is OFF in case of sensor defect.
- Compressor is ON in case of sensor defect.
- Compressor operates periodically according to [Pon] and [Pod]. Time periods in case of sensor defect.

Pon

Compressor is active during this time period in case of probe defect (Default = 0) MODBUS ADRES:40013
If probe defect parameter [Pod] is 2, then this parameter is observed. It can be adjusted from 0 to 99 minutes.

PoF

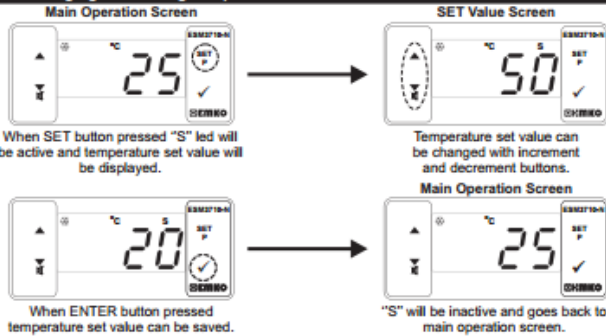
Compressor is inactive during this time period in case of probe defect (Default = 0) MODBUS ADRES:40014
If probe defect parameter [Pod] is 2, then this parameter is observed. It can be adjusted from 0 to 99 minutes.

bUF

Buzzer Function Selection Parameter (Default = 0) MODBUS ADDRESS:40015

- Buzzer is inactive.
- Buzzer is active during sensor failures.

6. Changing and Saving Temperature Set Value



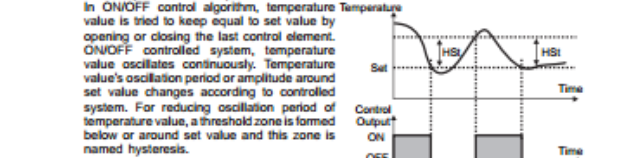
Temperature set value parameter (Default=50) MODBUS ADDRESS:40001
 Temperature set value, can be programmed between minimum temperature set value [5.12] and maximum temperature set value [5.13]

6.1 Programming Mode Parameter List

- C-F** Temperature Unit Selection Parameter (Default = 0) MODBUS ADDRESS:40002
 0 °C selected.
 1 °F selected.
- Pnt** Decimal Separator Enabling Parameter (Default = 0) MODBUS ADDRESS:40003
 0 Disable.
 1 Enable.

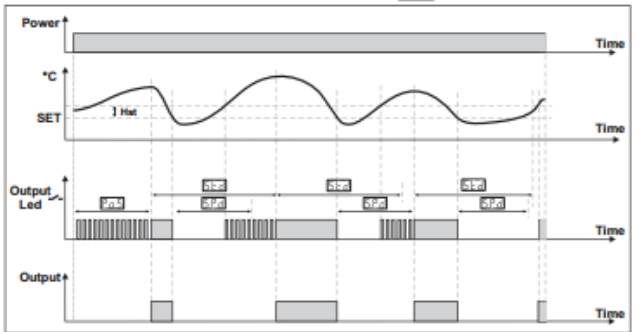
Note: If sensor input type is selected J, K, PT-100 or PT-1000 (BC=05,10,11 or 14) **Pnt** parameter is skipped.

HSE Hysteresis Parameter for Compressor Output (Default = 1)
 MODBUS ADDRESS:40004
 from 1 to 20°C for NTC (-50°C, 100°C) or PTC (-50°C, 150°C) or J Type TC (0°C, 800°C) or K Type TC (0°C, 1000°C) or PT-100 Type (-50°C,400°C) or PT-1000 Type (-50°C,400°C) or PT-100 Type (-20°C,100°C),
 from 1 to 36°F for NTC (-58°F, 212°F) or PTC (-58°F, 302°F) or J Type TC (32°F,1472°F) or K Type TC (32°F,1830°F) or PT-100 Type (-58°F,752°F) or PT-1000 Type (-58°F,752°F) or PT-100 Type (-4°F,212°F)
 from 0.1 to 10.0°C for NTC(-50.0°C,100.0°C) or PTC(+50.0°C,150.0°C) or PT-100(+19.9°C,99.9°C),
 from 0.1 to 18.0°F for NTC (-58.0°F,212.0°F) or PTC (+58.0°F,302.0°F) or PT-100 (-4.0°F,212.0°F).

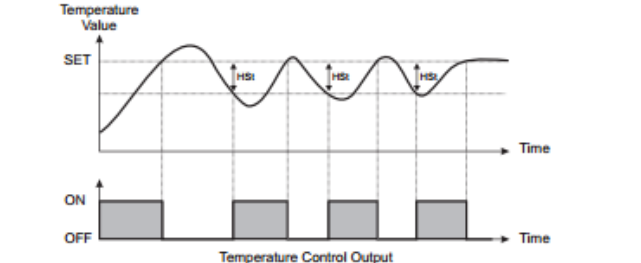


6.3 Operation Graphics of ESM-3710-N Temperature Controller

1-If Operating Type Parameter Value **OTC** = 1 (Cooling),
 Switch On Delay After Power On Parameter Value **POSD** ≥ 1,
 Compressor Stop/Start Time Delay Parameter Value **STPD** ≥ 1 and
 Compressor Start/Start Time Delay Parameter Value **STSD** ≥ 1;



2-If Operating Type Parameter Value **OTC** = 0 (Heating),



i 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. Action of control output is described with figures above.

6.4 Failure Messages in ESM-3710-N Temperature Controller

Screen Blinking
 Sensor failure. Sensor connection is wrong or there is no sensor connection. If buzzer function selection parameter **BUZ** is 1, internal buzzer starts to operate.