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	: -30 °C to +80 °C / -20 °C to +70 °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	: 230VV (±%15) 50/60Hz - 1.5VA
	: 115VV (±%15) 50/60Hz - 1.5VA
	: 24VV (±%15) 50/60Hz - 1.5VA
	: 24VW (±%15) 50/60Hz - 1.5VA
	:10 - 30VZ 1.5W
Temperature Sensor Input	: RTD
Thermoresistance input type	: PT-100 (IEC751) (ITS 90)
Accuracy	: ± 1 % of full scale for thermoresistance
Sensor Break Protection	: Upscale
Sampling Cycle	: 3 samples per second
Control Form	: ON / OFF
Relay Output	: 16(8) A@250 V V for Resistive load (Electrical life : 100.000 switching at full load) or 30(15)A@240 V V for Resistive load (Electrical life : 100.000 switching at full load)
Display	: 14 mm Red 4 digits LED Display
LED	: S (Green), P (Green), °C (Yellow), °F(Yellow), Compressor Output (Red), Heating Output (Red)
Internal Buzzer	: ³83dB
Approvals	: EAC , CE

8.Ordering Information

Model Number	Description
mL-HCC400	Heating / Cooling Temperature Controller
	115 VAC (±15%) 50/60Hz - 1.5VA
	RTD PT100 Input with -50 to 400°C (-58 to 752°F) Scale
	Relay Output (5A @ 250VAC with Resistive Load) (1 NO; 1NC)

⚠ Before commissioning the device, parameters must be set in accordance with desired use. Incomplete or incorrect configuration can cause dangerous situations.

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.

KEPmLINE

Kessler-Ellis Products
10 Industrial Way East, Eatontown, NJ 07724
732-935-1320
www.KEPmLINE.com

KEPmLINE

mL-HCC400

mL-HCC400

CE EAC

mL-HCC400 77 x 35 DIN Size Digital , ON / OFF Temperature Controller

- 4 Digits Display
- 2-Wire PT-100 Input
- Adjustable temperature offset
- ON/OFF temperature control
- Selectable heating or cooling function
- Selection of operation with hysteresis
- 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 (optional accessory)
- Remote access, data collecting and controlling with Modbus RTU (optional accessory)
- Having CE mark according to European Norms

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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 results in malfunction, electric shock or fire.

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

During installation in a metal panel some metal burrs can cause injury on hands, you must be careful.

Mounting of the product on a system must be done with it's fixing clamps. Do not perform the mounting of the device with inappropriate fixing clamp. Be sure that device will not fall while mounting.

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

1.4 Warranty

This product is warranted against defects in materials and workman-ship for a period of two (2) years from the date of shipment to Buyer.
The Warranty is limited to repair or replacement of the defective unit at the option of the manufacturer. This warranty is void if the product has been altered, misused, dismantled, or otherwise abused.

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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 ethyl alcohol or water to clean the external plastic case.
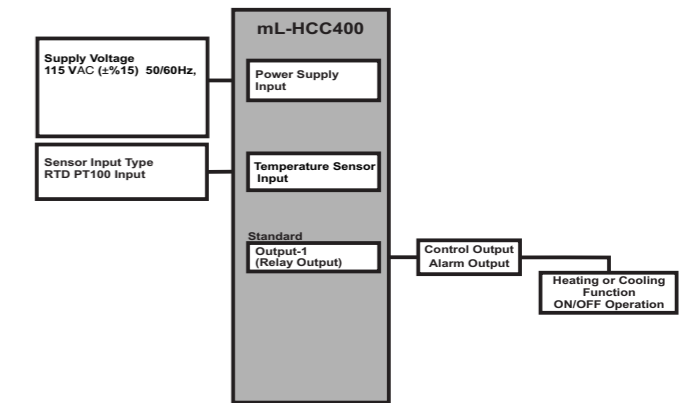

1.Preface

mL-HCC 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:

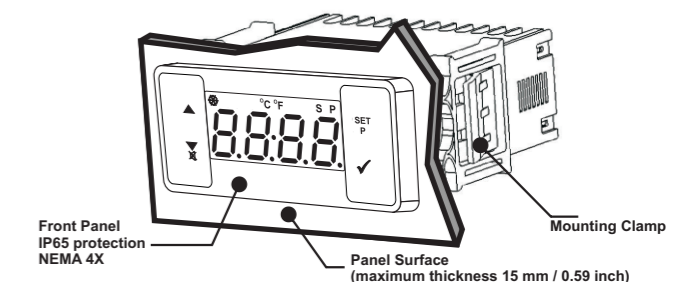| Application Fields	Applications
Glass	Heating
Food	Baking Ovens
Plastic	Incubators
Petro-Chemistry	Storages
Textile,	Automative Air Conditioning
Machine Production Industries Etc...	Etc...

1.1 Environmental Ratings

🌡 **Operating Temperature** : -20 to 70 °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

2. General Description

Front Panel
IP65 protection
NEMA 4X

Panel Surface
(maximum thickness 15 mm / 0.59 inch)

Mounting Clamp

2.1 Front View and Dimensions of mL-HCC400 Temperature Controller

Maximum 15 mm / 0.59 inch

34.5 mm / 1.36 inch

76 mm / 3 inch

6 mm / 0.24 inch

65 mm / 2.56 inch

2.2 Panel Cut-Out

110 mm / 4.33 inch (min)

50 mm / 1.97 inch (min)

29 mm / 1.14 inch

71 mm / 2.79 inch
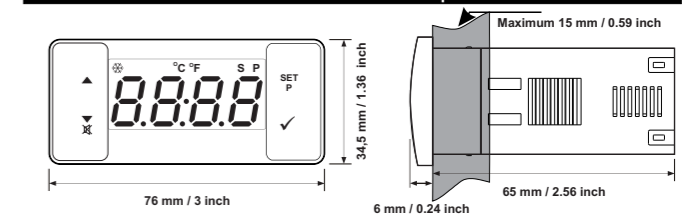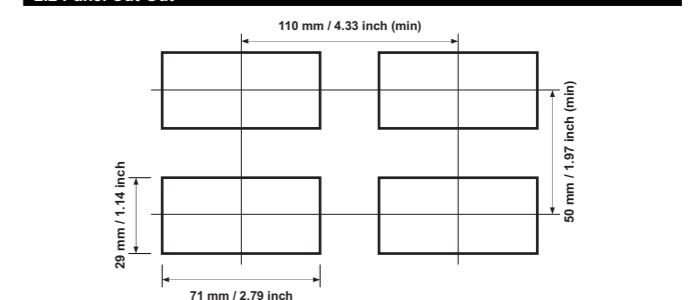
2.3 Panel Mounting

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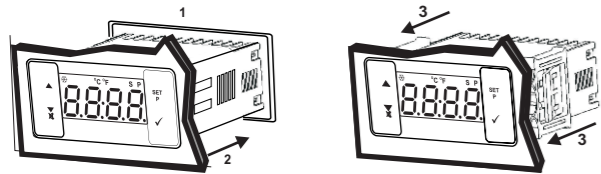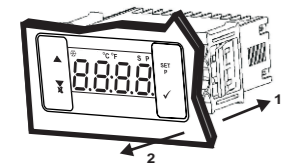
1-Pull mounting clamps from left and right fixing sockets.

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 (Optional Accessory)

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. `uPL` Message is shown on the display. When the loading has finished, `End` message is shown.
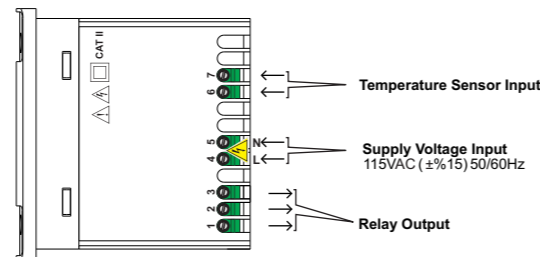3.Press any button to turn back to main operation screen.
4.Remove the PROKEY.
NOTE: `Err` message is shown when an error occurs while programming. If you want to reload, put in PROKEY and press ▼ button. If you want to quit, remove PROKEY and press ▼ button. The device will turn back to main operation 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, `dOL` message is shown on the display, when loading has finished, `End` 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.

---

4. Electrical Wiring Diagram

Temperature Sensor Input

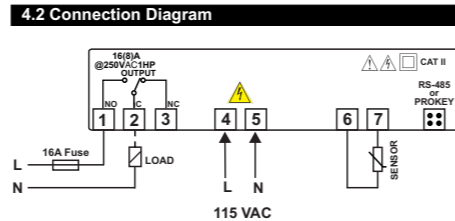**Supply Voltage Input**
115VAC (±%15) 50/60Hz

Relay Output

4.1 Supply Voltage Input Connection of the Device

Power Supply Connection

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.

EXTERNAL FUSE (1 A T)

Supply Switch

Supply Voltage 115VAC (±%15) 50/60Hz,
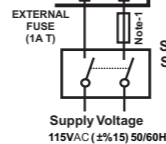
There is no power supply switch on the device. So a power supply switch must be added to the supply voltage input. Power switch must be two poled for seperating phase and neutral, On/Off condition of power supply switch is very important in electrical connection.
External fuse that on AC power supply inputs must be on phase connection.

Note-1 : External fuse is recommended.

4.2 Connection Diagram

16(8)A @250VAC/1HP OUTPUT

CAT II

RS-485 or PROKEY

16A Fuse   LOAD   L   N
115 VAC

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 Seperator Enabling Parameter (Default = 0) MODBUS ADDRESS:40003**
　`0`　Disable.
　`1`　Enable.

Note: `Pnt` is only used for mL-HCC150. `Pnt` parameter is skipped on mL-HCC400 & mL-HCC800.

`HSt` **Hysteresis Parameter for Compressor Output (Default = 1) MODBUS ADDRESS:40004**
from 1 to 20°C for J Type TC (0°C, 800°C)
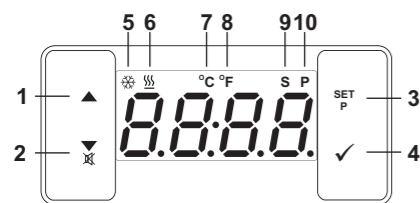from 1 to 36°F for J Type TC (32°F,1472°F)

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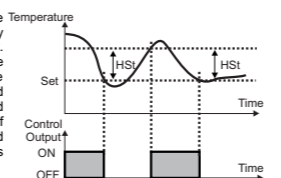
`SuL` **Minimum Temperature Set Value Parameter (Default = Minimum Value of Device Scale) MODBUS ADDRESS:40005**
Temperature set value can not be lower than this value.
This parameter value can be adjusted from minimum value of device scale to maximum temperature set value parameter `SuH`

`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 J Type TC (0°C,800°C)
from -36 to 36 °F for J Type TC (32°F,1472°F)

`HCS` **Operating Type Parameter (Default = 0) MODBUS ADDRESS:40008**
If parameter value is '0' device skips to `buF` parameter
　`0`　Heating
　`1`　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**
　`0`　Compressor is OFF in case of sensor defect.
　`1`　Compressor is ON in case of sensor defect.
　`2`　Compressor operates periodically according to `Pon` and `PoF` 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 `PdF` 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 `PdF` 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**
　`0`　Buzzer is inactive.
　`1`　Buzzer is active during sensor failures.

`bon` **Buzzer is active during this time (Default = `---`) MODBUS ADDRESS:40016**
If buzzer function selection parameter value `buF`=0, this parameter can not be observed. Buzzer stays active during this time. 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.

`PrC` **Communication Mode Selection Parameter (Default = 0) MODBUS ADDRESS:40017**
　`0`　PROKEY communication selected.
　`1`　Rs485 communication selected.

`SAd` **Slave ID Parameter (Default = 1) MODBUS ADDRESS=40018**
Device communication address parameter (1 to 247).

`PAS` **Programming Section Accessing Password (Default = 0) MODBUS ADDRESS:40019**
It is used for accessing to the programming section. It can be adjusted from 0 to 9999. If it is selected 0, password will not be asked.

ⓘ `PoS` `SPd` `Std` `PdF` `Pon` and `PoF` Parameters are observed if Operation type is selected "Cooling". If operation type is selected "Heating", skip to the `buF` parameter.

6.2 Modbus Adresses of Device Status Parameters (Read Input Register)

MODBUS ADDRESS	Parameter
MODBUS ADDRESS:30001	Temperature Value
MODBUS ADDRESS:30002	Led Status : 0.bit °C Led, 6.bit Compressor Led, 13.bit Program Led, 14.bit Set Led
MODBUS ADDRESS:30003	Device Status : 1.bit Buzzer Status 2.bit Sensor Lost Status
MODBUS ADDRESS:30004	Output Status
MODBUS ADDRESS:30005	Device Type and Device Version

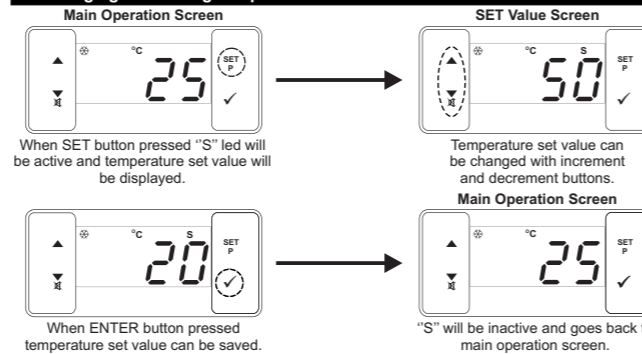## 5.Front Panel Definition and Accessing to the Menus

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.Celcius 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 .

---

6. Changing and Saving Temperature Set Value

Main Operation Screen

When SET button pressed "S" led will be active and temperature set value will be displayed.

SET Value Screen

Temperature set value can be changed with increment and decrement buttons.

Main Operation Screen

When ENTER button pressed temperature set value can be saved.

"S" will be inactive and goes back to main operation screen.

Temperature set value parameter (Default=50) MODBUS ADDRESS:40001
Temperature set value, can be programmed between minimum temperature set value `SuL` and maximum temperature set value `SuH`.

6.3 Operation Graphics of mL-HCC400 Temperature Controller

1-If Operating Type Parameter Value `HCS` = 1 (Cooling),
Switch On Delay After Power On Parameter Value `PoS` ³ 1,
Compressor Stop/Start Time Delay Parameter Value `SPd` ³ 1 and
Compressor Start/Start Time Delay Parameter Value `Std` ³ 1;

Power

°C

SET

Hst

Output Led

PoS   Std   Std   Std
SPd   SPd   SPd

Output

Time
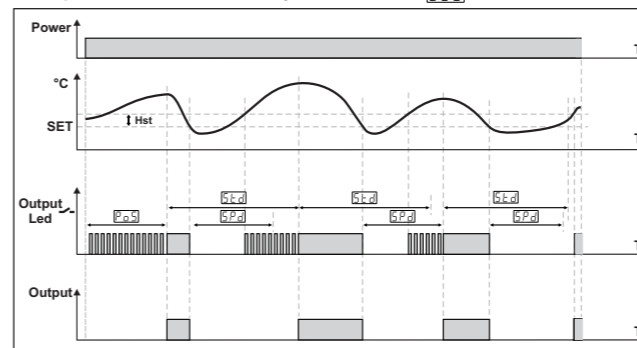
2-If Operating Type Parameter Value `HCS` = 0 (Heating),
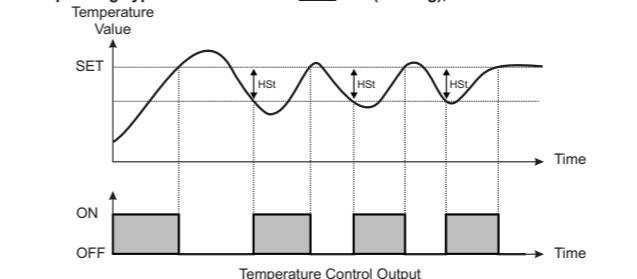
Temperature Value

SET   Hst   Hst   Hst

Time

ON
OFF
Temperature Control Output

Time

ⓘ 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.

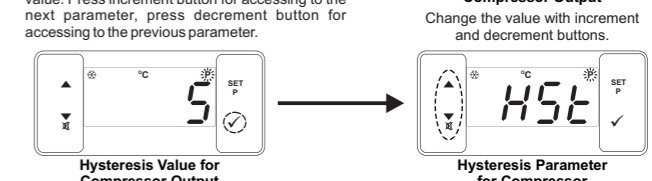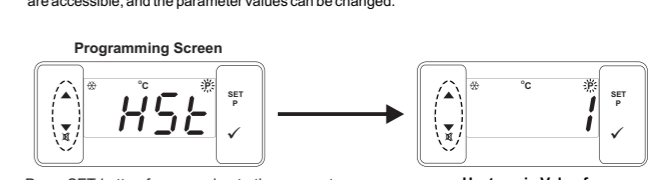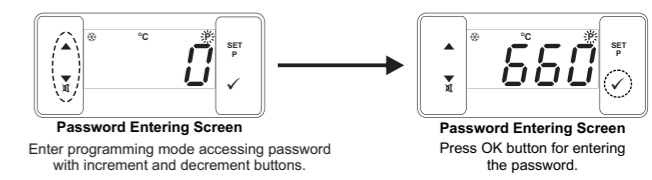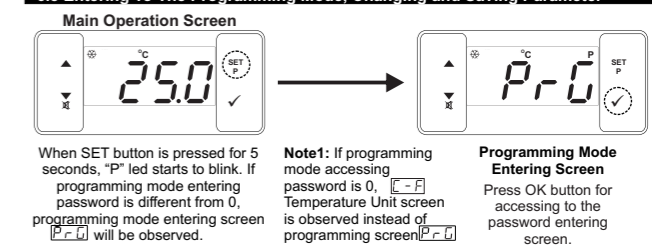## 6.4 Failure Messages in mL-HCC400 Temperature Controller

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

6.5 Entering To The Programming Mode, Changing and Saving Parameter

Main Operation Screen

When SET button is pressed for 5 seconds, "P" led starts to blink. If programming mode accessing password is different from 0, programming mode entering screen `PrG` will be observed.

Note1: If programming mode accessing password is 0, `C-F` Temperature Unit screen is observed instead of programming screen `PrG`

Programming Mode Entering Screen
Press OK 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 OK button for entering the password.

Note2: If programming mode accessing password is 0, only three parameters are accessible, and the parameter values can be changed.

Programming Screen

Press SET button for accessing to the parameter value. Press increment button for accessing to the next parameter, press decrement button for accessing to the previous parameter.

Hysteresis Value for Compressor Output
Change the value with increment and decrement buttons.

Hysteresis Value for Compressor Output
Press OK button for saving the parameter.

Hysteresis Parameter for Compressor
Press increment button for accessing to the next parameter, press decrement button for accessing to the previous parameter

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