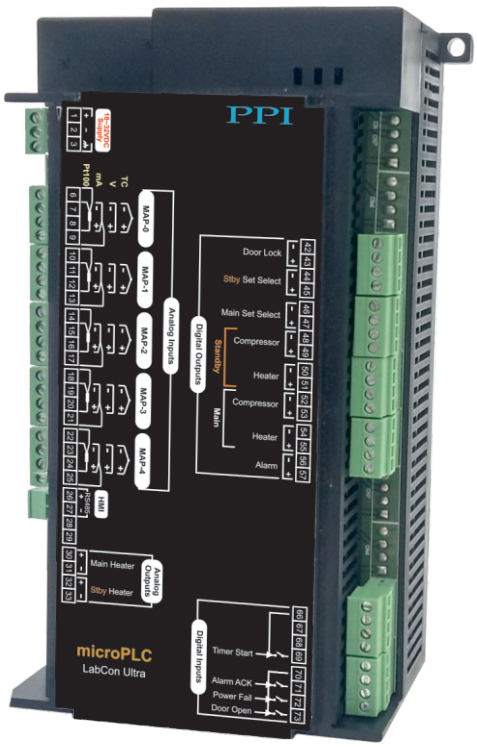
LabCon Ultra

PPI
The Perfection Experts

TOUCH PANEL

Multi-Purpose Temperature Controller with Recording & PC Software



User Manual

CONTENTS

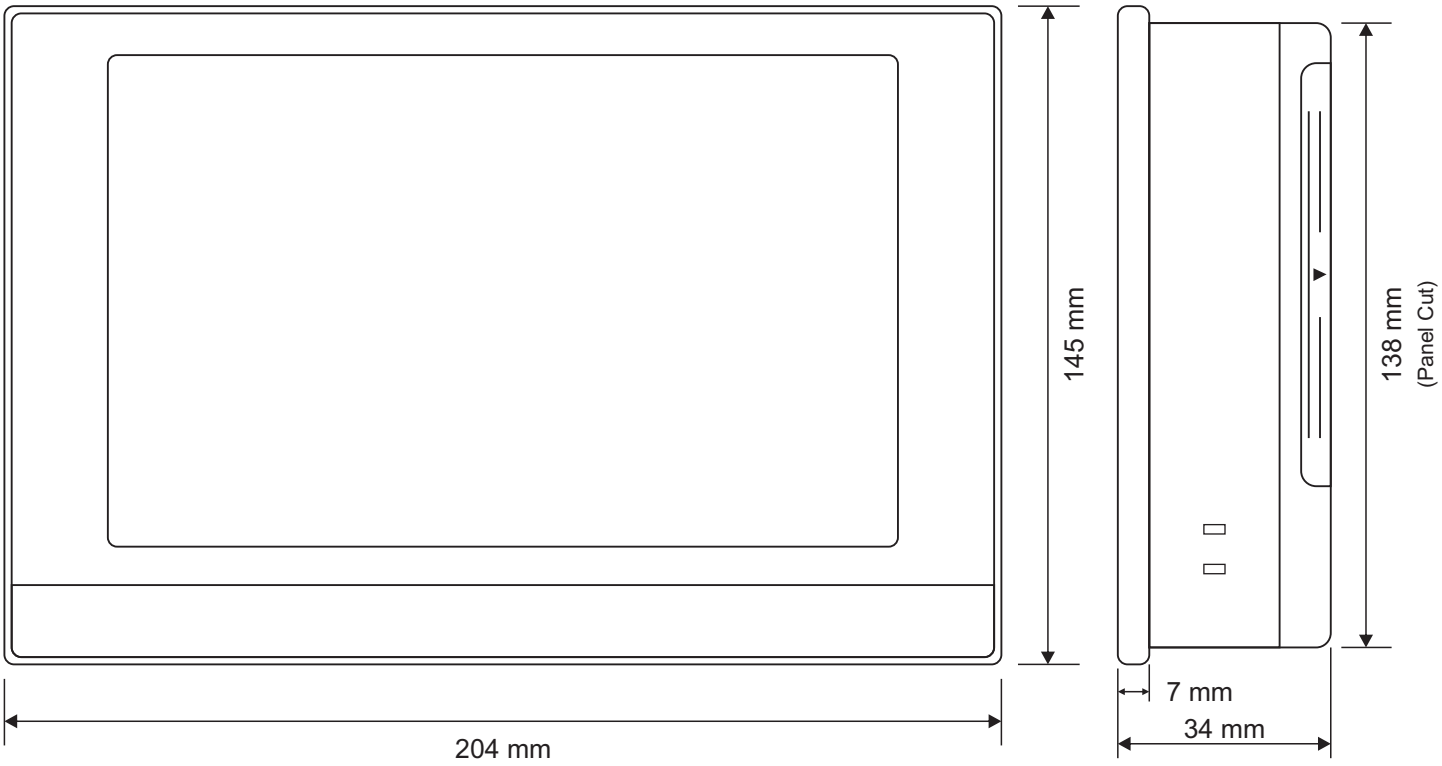
Section 1

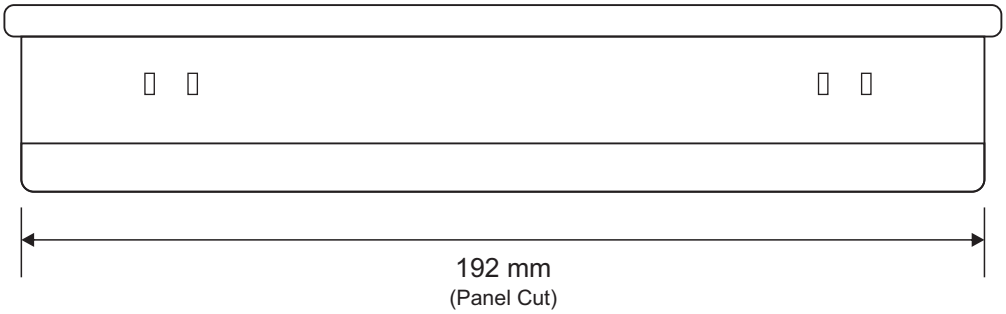
MOUNTING & ELECTRICAL CONNECTIONS : HMI (TOUCH PANEL)

HMI NEW Version

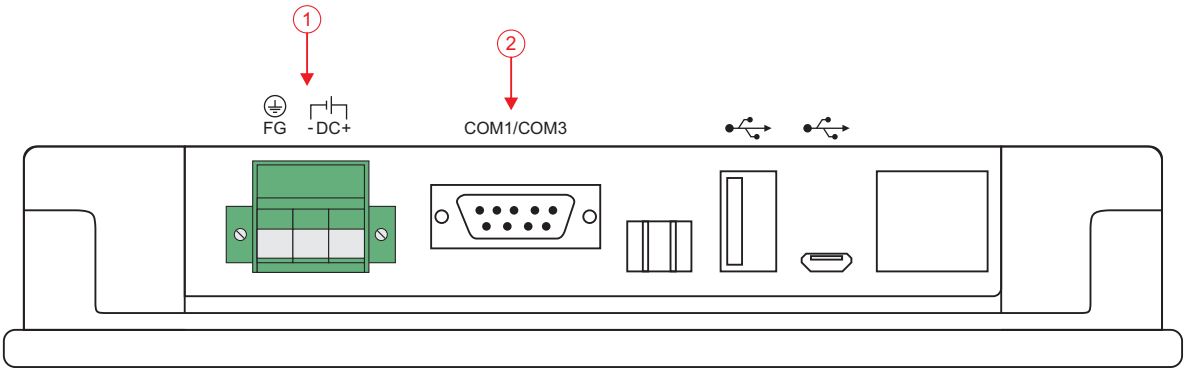
HMI (Touch Panel)

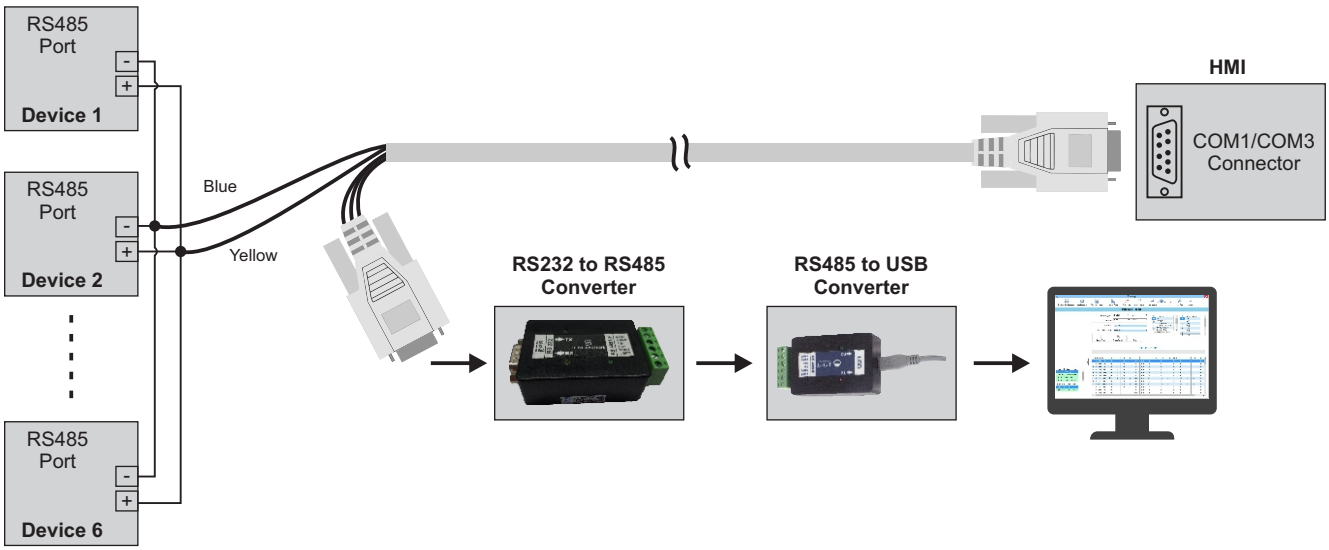
Dimensions	
Overall	204(W) X 145(H) X 34(D), mm
Panel Cutout	192(W) X 138(H), mm

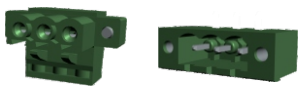




HMI (Touch Panel)





1		**3-Pin Male / Female Connector (5.08 mm pitch)** Supply Voltage : 20 to 28 VDC (24 V Nominal)
2	 9 Pin	**9 Pin D Type Connector** RS485 Serial Communication with Control Unit & PC

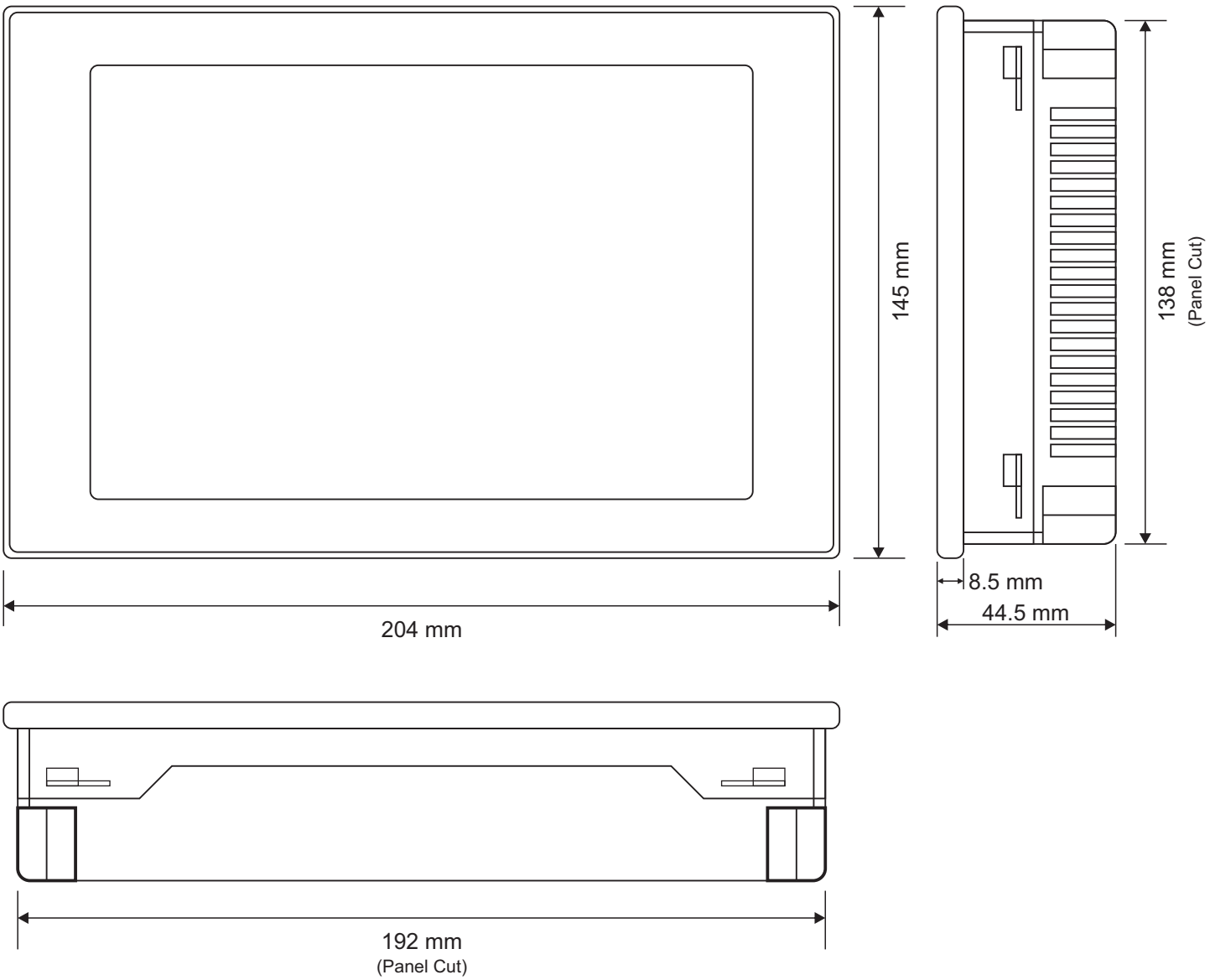
HMI OLD Version

7” Mounting

Table 1.1

Dimensions	
Overall	204(W) X 145(H) X 44.5(D), mm
Panel Cutout	192(W) X 138(H), mm

Figure 1.1



7” Electrical Connections

Figure 1.2

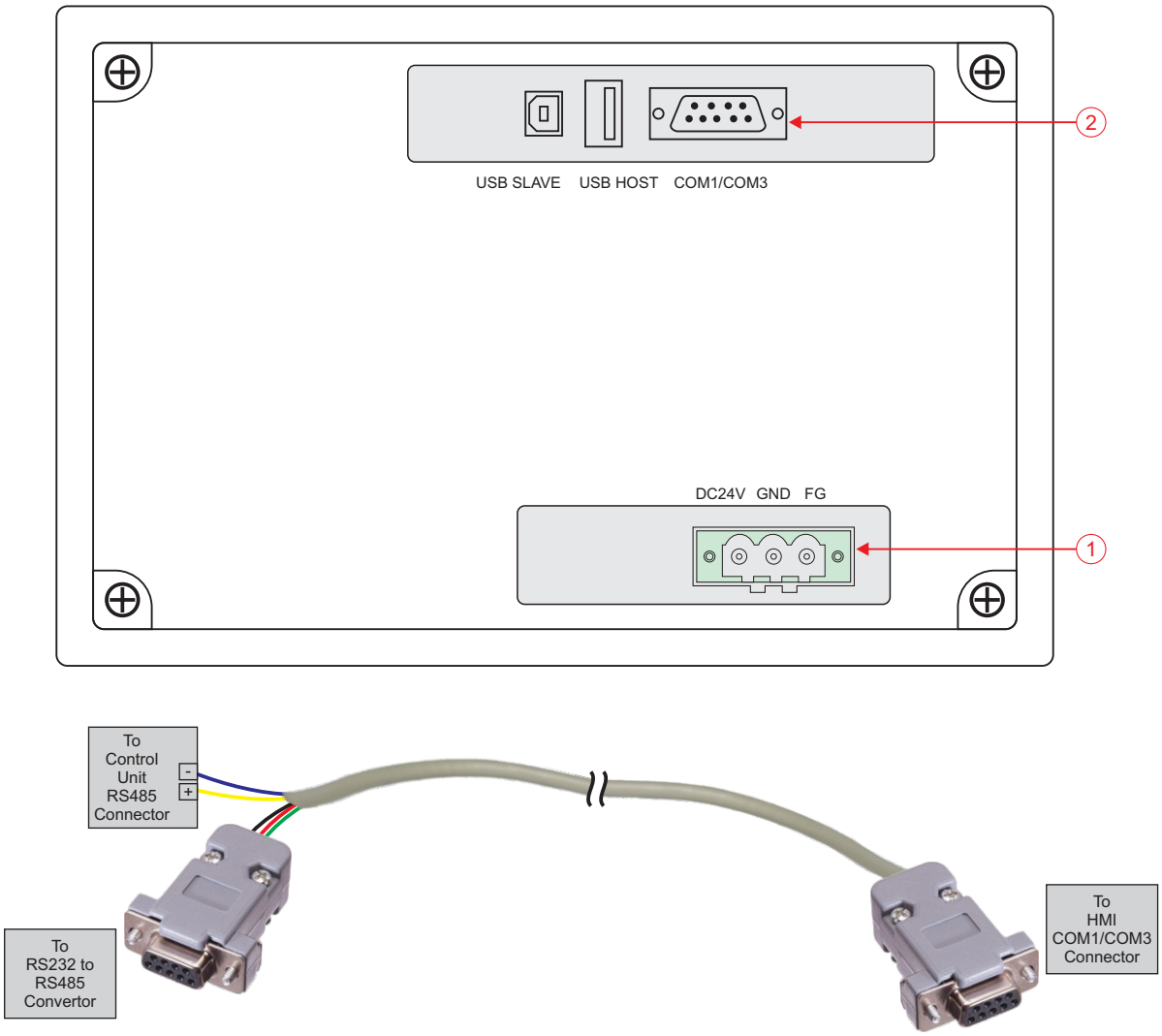
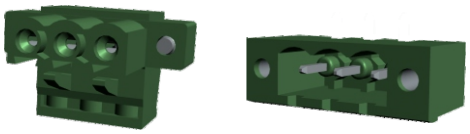


Table 1.2

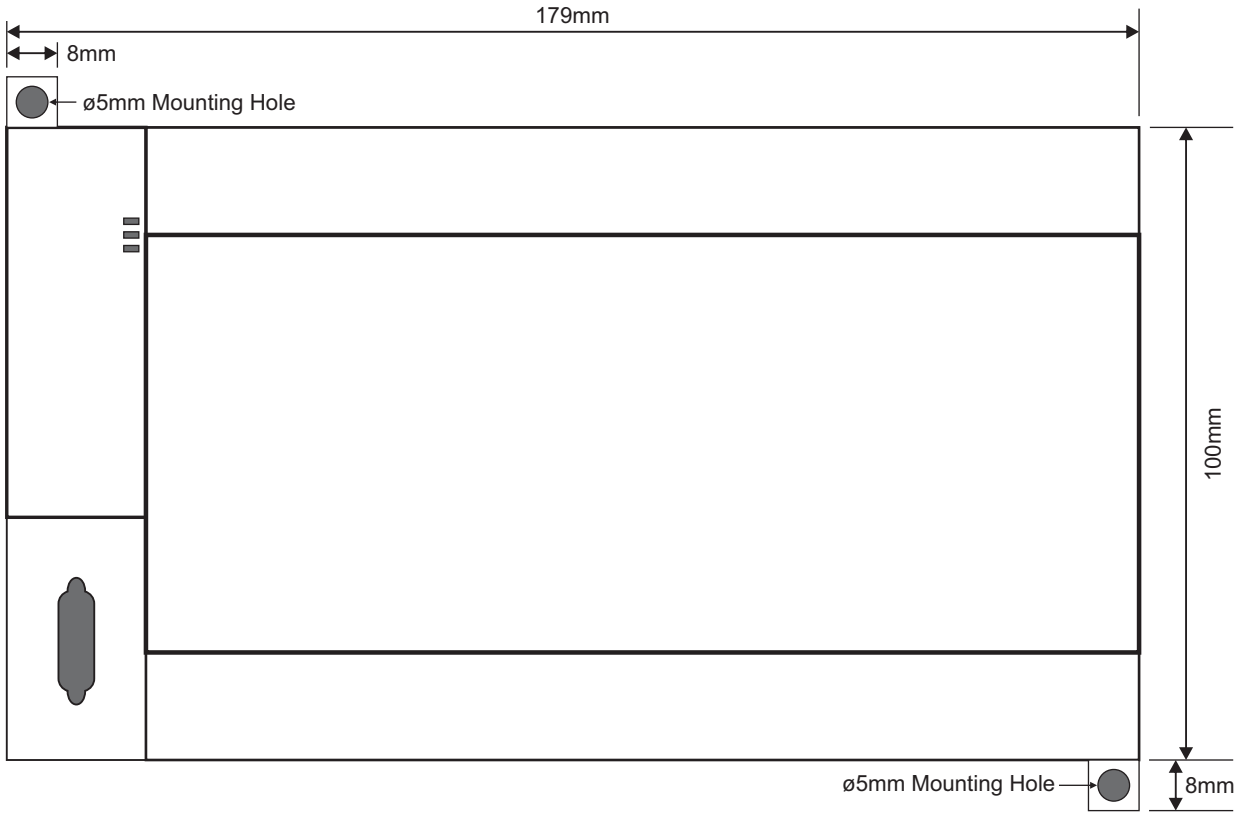
1		**3-Pin Male / Female Connector (5.08 mm pitch)** Supply Voltage : 20 to 28 VDC (24 V Nominal)
2	 **9 Pin**	**9 Pin D Type Connector** RS485 Serial Communication with Control Unit & PC

Section 2

MOUNTING & ELECTRICAL CONNECTIONS : microPLC

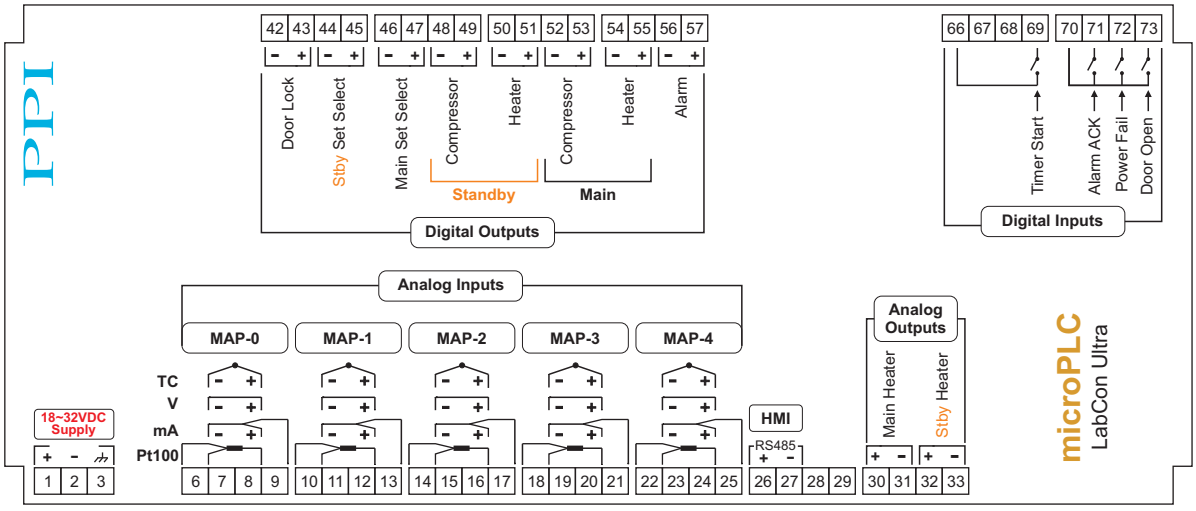
Mounting (Base / Wall Mounting)

Figure 2.1



microPLC Electrical Connections

Figure 2.2



DESCRIPTIONS

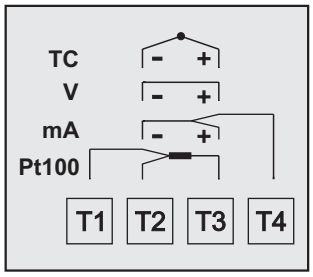
The connections are described as under:

Temperature Sensor / Transmitter Inputs for Control & Mappings (MAP-0 to MAP-4)

The Input for MAP-0 channel is settable as RTD Pt100 (3-wire / 2-wire) or DC Current (mA) / DC Voltage (V) independent of the input type for Mapping channels MAP-1 to MAP-4.

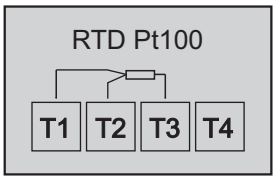
The input type for Mapping channels MAP-1 to MAP-4 must be the same (independent of MAP-0 channel) settable as RTD Pt100 (3-wire / 2-wire) or DC Current (mA) / DC Voltage (V).

Figure 2.3



	MAP-0 Terminals	**MAP-1** Terminals	**MAP-2** Terminals	**MAP-3** Terminals	**MAP-4** Terminals
T1	6	10	14	18	22
T2	7	11	15	19	23
T3	8	12	16	20	24
T4	9	13	17	21	25

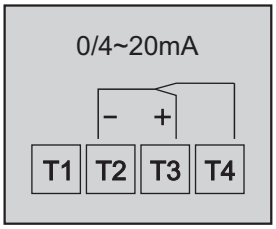
Figure 2.4 (a)



RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal T3 and the double leaded ends to terminals T1 & T2 (interchangeable) as shown in Figure 2.4(a). Use copper conductor leads of very low resistance ensuring that all 3 leads are of the same gauge and length. Avoid joints in the cable.

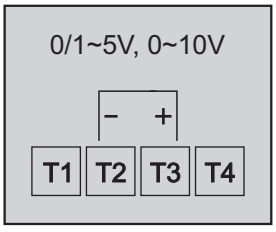
Figure 2.4 (b)



Temperature Transmitter with DC Current (mA) Output

The Figure 2.4(c) depict wiring connections for current output transmitter. Note that terminals T3 & T4 should be shorted. An external Excitation Voltage source should be used for powering the transmitter.

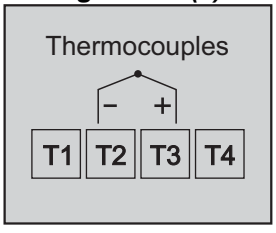
Figure 2.4 (c)



Temperature Transmitter with DC Voltage (V) Output

The Figure 2.4(b) depicts wiring connections for voltage output transmitter. An external Excitation Voltage source should be used for powering the transmitter.

Figure 2.4 (c)



Thermocouple

Connect Thermocouple Positive (+) to T3 and Negative (-) to T2 as shown in Figure 2.4 (d). Use correct type of extension lead wires or compensating cable. Avoid joints in the cable.

[Optional]
Main Heater Analog Output (terminals : 30, 31)
Standby Heater Analog Output (terminals : 32, 33)

The above control outputs are factory configured as either 0 - 5 / 10 VDC or 0 / 4 - 20 mA. The '+' and '-' terminals are for Signal 'Source' and 'Return' paths, respectively.

The Optional Main Heater Analog Output is fitted only if Controller is ordered with Analog Output. The Analog Output for Standby Heater control is fitted only if Standby option is ordered.

[Optional] Door Lock Output (terminals : 42, 43)
[Optional] Standby Set Select Output (terminals : 44, 45)
[Optional] Main Set Select Output (terminals : 46, 47)
[Optional] Standby Compressor Output (terminals : 48, 49)
[Optional] Standby Heater Output (terminals : 50, 51)
Main Compressor Output (terminals : 52, 53)
Main Heater Output (terminals : 54, 55)
Alarm Output (terminals : 56, 57)

All the above control & alarm outputs are Voltage pulses (12VDC @ 40mA) for driving external SSR or Relay. The '+' and '-' terminals are for voltage 'Source' and 'Return' paths, respectively.

The Optional Outputs are fitted only if Controller is ordered with Standby Control Outputs & Door lock Output.

Timer (Soak) Start Digital Input (Terminals 69, 66)
Alarm Acknowledge Digital Input (Terminals 71, 70)
Power Fail Digital Input (Terminals 72, 70)
Door Open Digital Input (Terminals 73, 70)
(Terminals 66 & 70 are Common)

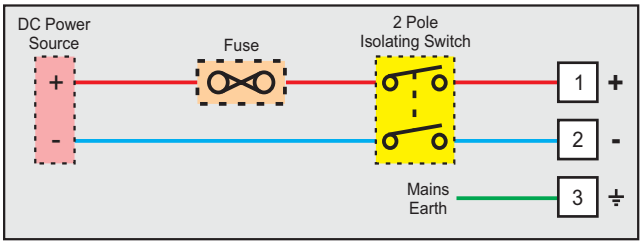
Potential-free contact closure input terminals are provided as digital inputs. An 'Open' or 'Close' switch position is detected as input.

HMI COMMUNICATION PORT (Terminals 26, 27)

The HMI interface is a RS485 Serial Communication Port. For reliable noise free communication, use a pair of twisted wires inside screened cable. The wire should have less than 100 ohms / km nominal DC resistance (Typically 24 AWG or thicker).

POWER SUPPLY (Terminals 1, 2, 3)
As standard, the Module is supplied with power connections suited for 18 to 32 VDC power source. The accuracy / performance of the Module is not affected by the variations in the supply within specified limits of 18 to 32 VDC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm² for power supply connections ensuring proper polarity as shown in Figure 2.5. The Module is not provided with fuse and power switch. If necessary, mount them separately. Use a slow blow fuse rated for 0.5A current.

Figure 2.5

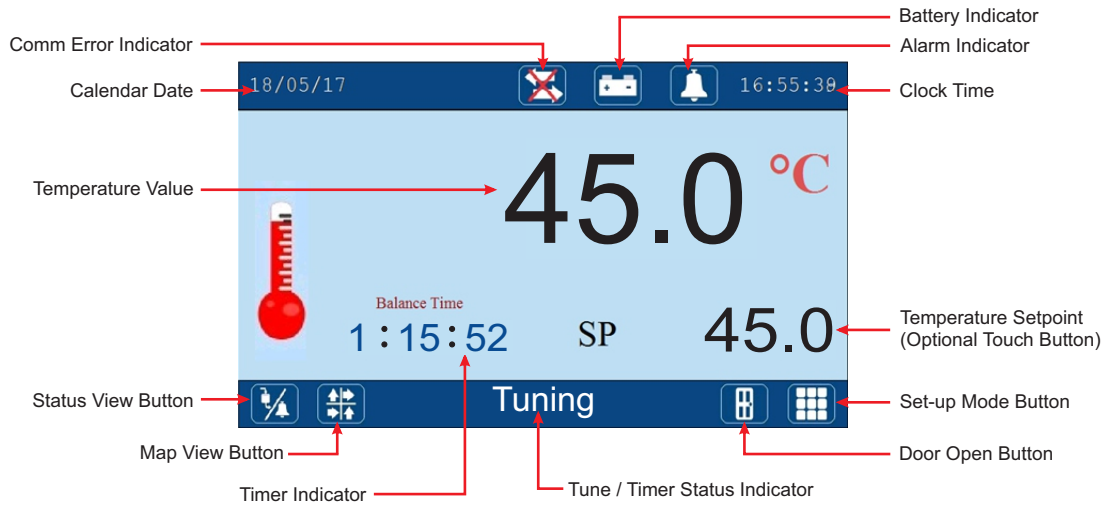


For safety and enhanced electrical noise immunity, it is highly recommended to connect Mains (Utility) Power Supply 'Earth' to terminal 3.

Section 3

BASIC OPERATION & PARAMETER ORGANIZATION

Upon Power up to the HMI, after a few initialization screens, the Main (Home) screen is displayed. This is the screen that shall be used most often and is described below in details.



ALARM INDICATOR

This icon appears if one or more process alarms are active. The Alarm Relay gets activated whenever any alarm becomes active. The user can acknowledge the alarm (de-activate the relay) by touching this icon.

BATTERY INDICATOR

This icon appears if the Mains power has failed and the controller is currently powered through an auxiliary power source like Battery or Inverter.

COMM ERROR INDICATOR

This icon appears if the HMI communication link with Control Unit or GSM Module is broken. Upon touching this icon a message window pops up showing which communication link(s) is broken.

CALENDER DATE & CLOCK TIME

These two fields show the current date (DD/MM/YY) & time (HH:MM:SS, 24 Hours format), respectively.

TEMPERATURE VALUE

This field shows the Temperature Process Values in 0.1 °C resolution. In case of errors the field shows OPEN (Sensor Open), OVER (Process Value above Max Range), UNDR (Process Value below Min Range). The Process Value is shown in Black color under normal condition. The Error Messages are shown in Red color.

TEMPERATURE SETPOINT

This field shows the Temperature Set Value (SP) in 0.1 °C resolution. If enabled, this value can be edited by touching the field. Upon touching a Numeric Keypad pops up for setting.

TUNE / TIMER STATUS INDICATOR

This field displays the message “Tuning” while the controller is performing self-tuning.

This field displays “Timer Hold” if the timer function is enabled & if the time count down is presently in Hold state.

TIMER INDICATOR

If timer function is enabled, this field shows the timer countdown value as balance time in HH:MM:SS.

STATUS VIEW BUTTON

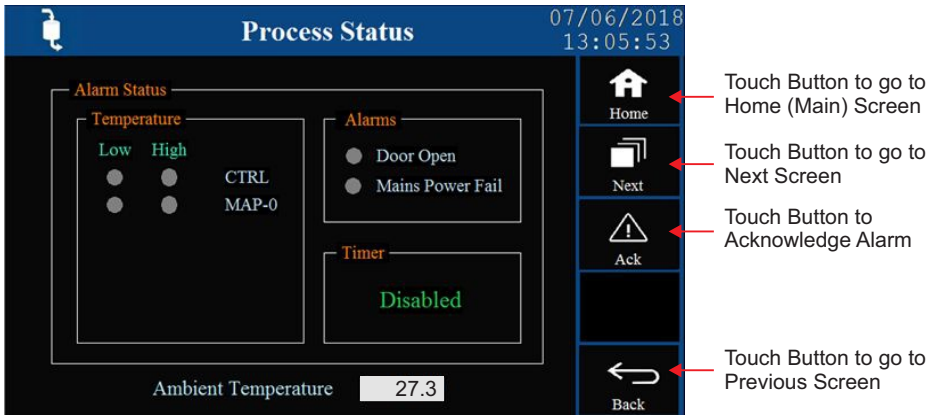
This a touch button that enables navigation through various process status screens. The Screens are shown below.

Process Status Screen

This screen shows various process Alarm status and the information regarding working / failure of Main and Standby Control Gadgets (Heater & Compressor). The contents on this screen are dependent on whether Standby Control Gadgets are installed or not. Accordingly the following two variants of this screen exist:

1. Alarm + Timer Run status
2. Alarm + Timer Run + Standby Control status

Alarm + Timer Run Status



The Timer status is one of the followings :

Disabled
The timer function is disabled.

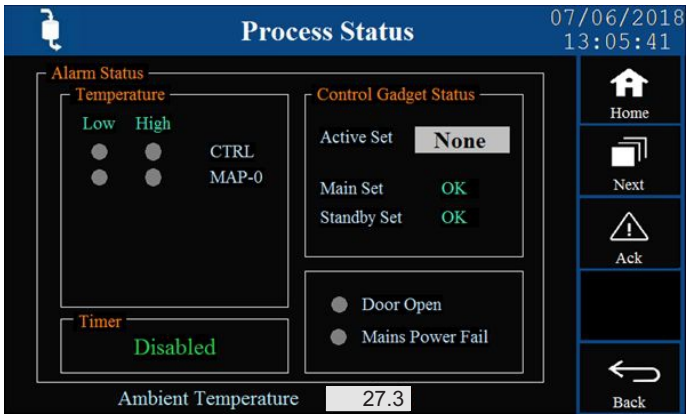
Not Started
Timer start command has not been issued yet.

Outside Start Band
The timer start command has been issued but the countdown has not begun as the process value is yet to reach the temperature band around the setpoint.

Running
The timer has begun counting down.

Over
The set time has elapsed.

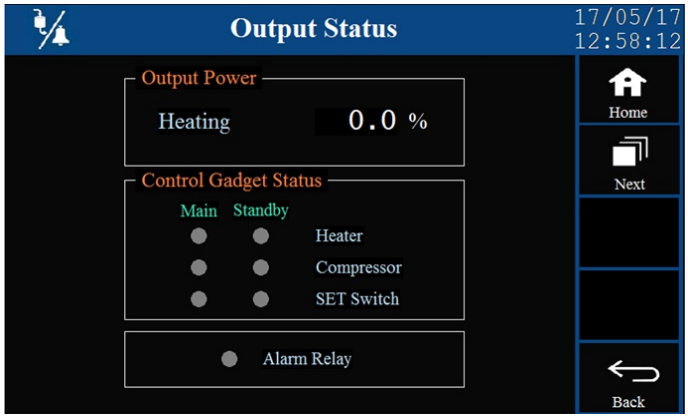
Alarm + Timer Run + Standby Control Status



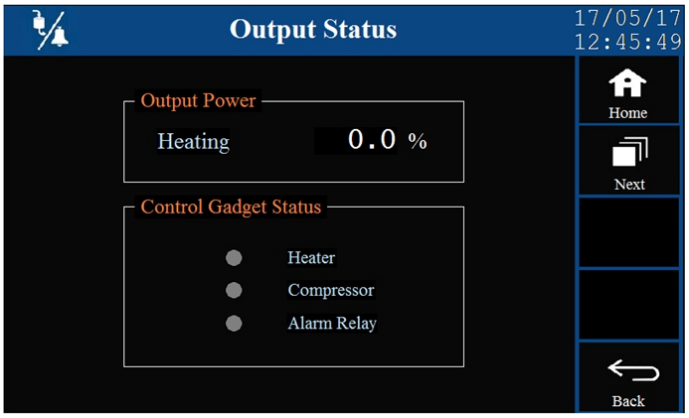
Output Status

This screen shows :
- Heating output power in %
- On-Off Status for Main & Standby (if installed) Heater & Compressor
- Alarm Relay Status

Output Status With Standby Gadgets

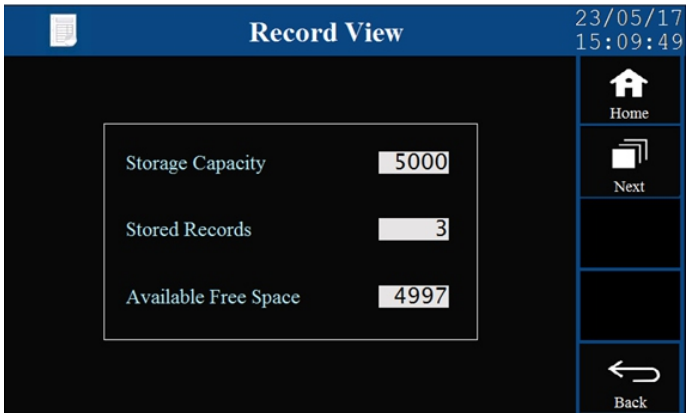


Output Status Without Standby Gadgets



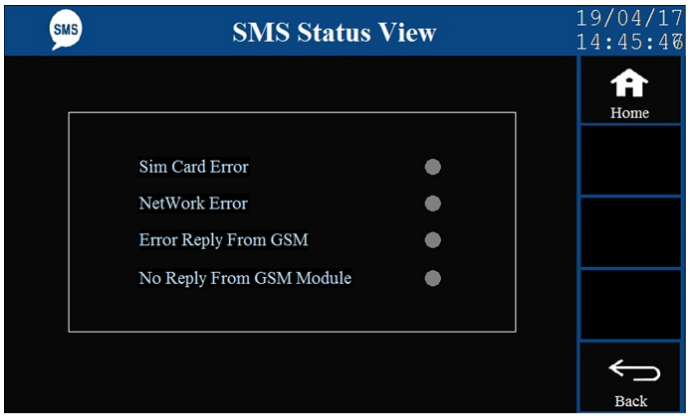
Record Status

This screen shows the total record storage capacity, numbers of current stored records and available free space.



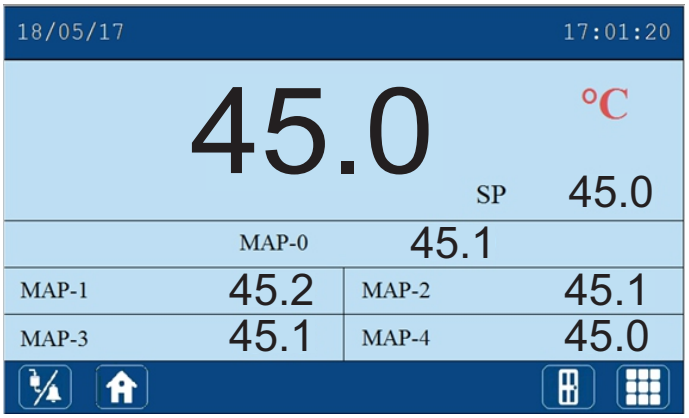
SMS Status

This screen shows the status related to GSM Module (if installed).



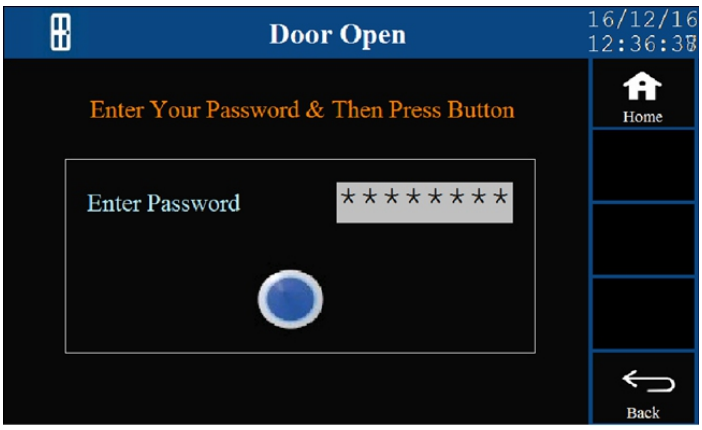
MAP VIEW BUTTON

This is a touch button that opens up screen to view process values for all mapping inputs (MAP-0 to MAP-4) along with the process value used for control & alarm (control PV). The mapping inputs that have not been selected show NA in place of Process Value. Also, the Map View Button is not available if only MAP-0 is selected.



DOOR OPEN BUTTON

If Door Lock is installed, this touch button opens a screen that allows password entry for unlocking the cabinet door by authorised person. Also the authorised person's identity is logged for audit purpose.



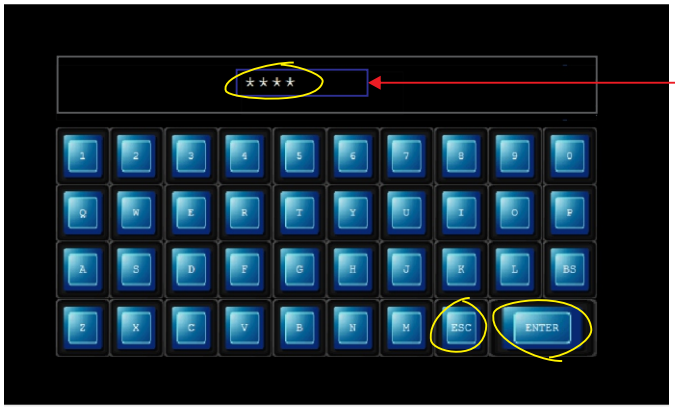
SET-UP MODE BUTTON

This touch button opens a screen that allows access to Operator, Supervisory or Factory Level parameter settings through appropriate **4 character** password entry.

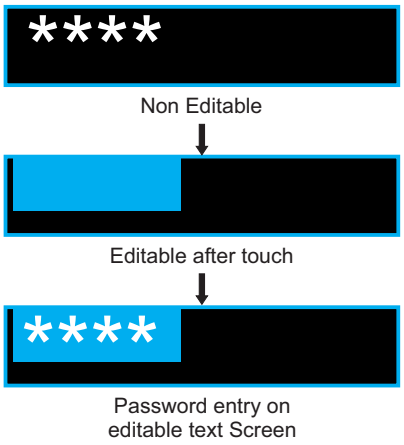
The Factory default passwords are as below :

Access Level	Default Password
Operator	0000
Supervisory	0001
Factory	0002

Upon touching one of the levels, a keyboard for password entry pops-up as shown below.

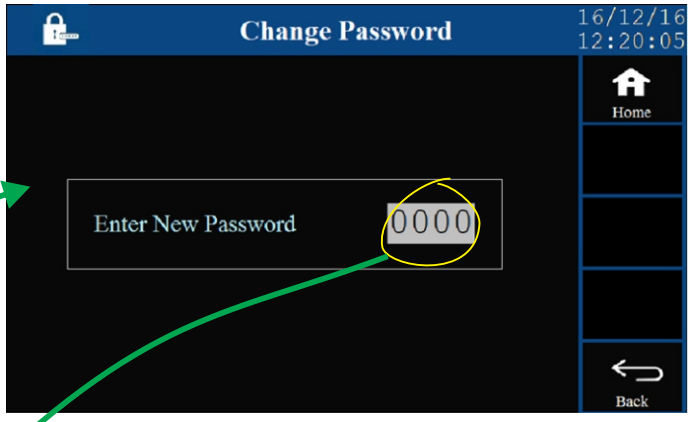


The user must touch the text screen to make it editable. Upon touch, the text screen shows a blue band as shown below.



While the screen is editable, type 4 character password & then press ENTER Key. If the password is correct, the parameter setting screen opens up. Use ESC key (in case password is not known) to pop down the key pad.

Once an access level is entered, the user can change the password for that level as shown below as an example for operator level.



Each access level may have sub levels for convenient parameter grouping. The Table 3.1 lists various parameters with levels and sub levels.

Table 3.1

Level	Sub-Level		Parameters
Operator			**Temperature** Set Value Low Deviation Alarm High Deviation Alarm **SP Edit on Home Screen** **Timer Start / Abort** Start Command Time Interval (HH:MM)
Supervisory	Recording		Recording Interval 'Delete Record' Command
	Clock & Calendar		Calendar Date (DD/MM/YY) Clock Time (HH:MM:SS)
	Control Settings		Heat Zone PID Constants, Cool Zone PID Constants, Output Cycle Time (Sec.), Control SP Setpoint Low Limit, Setpoint High Limit, Overshoot Inhibit (Enable / Disable), Cutoff Factor, Control PV Strategy, Self Tune, Compressor SP, Cool Hysteresis
	SMS Alert		GSM Machine ID Reset GSM Module
	Maintenance		Repair Acknowledge 'Control Gadget'
	Standby Switching		'Switch Main / Standby Outputs'
	Door Lock Access		Lock Position (On / Off) Password Entry
Factory	MAP-0 Sensor		Input Type, Signal Range Low, Signal Range High, Display Range Low, Display Range High, Zero Offset
	Heat-Cool Select		Select Control Strategy : Heat, Cool, Heat + Cool Heat+Cool : Mode (ON, OFF, PV Based, SP Based), Boundary SP, Time Delay, Zone Select (Single, Dual)
	Alarm Settings		Inhibit (Yes / No), Low Alarm Deviation, High Alarm Deviation, Hysteresis
	Timer		Timer (Enable / Disable), On Timer END Hold Band Type, Hold Band Value Start Band Value Power Up Recovery
	Power Fail		Detection Enable (Yes / No), Power Fail Logic (Open / Close)

Level	Sub-Level		Parameters
	Door Open		Detection Enable (Yes / No), Door Open Logic (Open / Close), Alarm Delay (Sec.)
	Mapping	Configuration	Select Mapping Inputs
		Input Settings	Input Type, Signal Range Low, Signal Range High, Display Range Low, Display Range High, Zero Offset
	Standby		Fail Detect Time (Min) Cyclic Time (Hrs.) Inhibit Time (Hrs.)
	Control Settings		Heater Output Type (Main & Standby Heater)

PARAMETER SETTINGS

There are 3 types of parameters; Numeric, String Option and Commands. The setting methods for different types are described below.

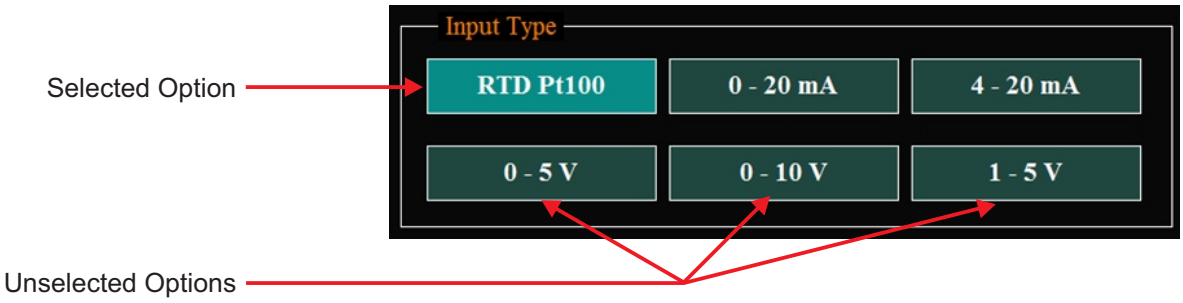
Numeric Parameters

This type of parameter has 2 fields; *Name Field* & *Value Field* as shown in the figure. The value for this type of parameter is set using a Numeric keypad that pops up upon touching the *Value Field* for the parameter. The value can be edited using numeric keys & other functional keys as shown in the figure. Use ENT key for storing the new value or use ESC key to revert without changes. Upon touching ENT or ESC key, the keypad automatically collapses.

> Note that if the modified value falls outside the Minimum or Maximum limits specified for the parameter value then the parameter retains the old value.

String Option Parameters

This type of parameter has 2 or more fixed options to choose from. All the options are shown in rectangular boxes with appropriate texts as shown in the figure. Only one of the several options can be selected. The selected option box is shown in bright ( ) color, while all other unselected options are shown in dark ( ) color. For selecting the desired option. just touch the box and wait for a while until the color changes from unselected to selected.



Command Parameters

This type of parameter is used to perform specific actions like Start / Abort tuning, Delete Records, etc. A touch *Push Button* image is provided for issuance of command as shown in the figure. Usually an acknowledgment window with OK button pops up to indicate the action performed. The window collapses upon touching the OK button.

ALARM MESSAGE WINDOWS

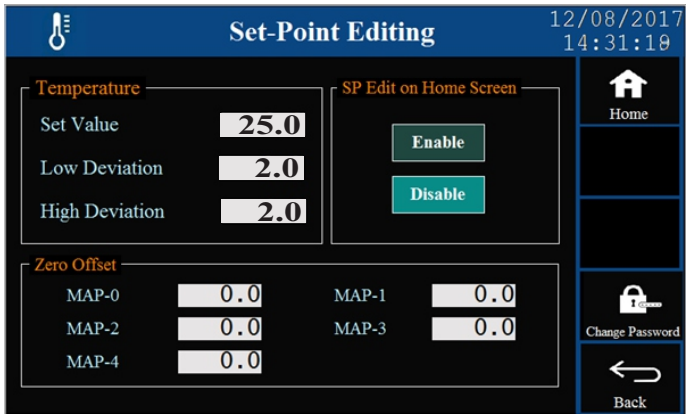
For the Alarms related to gadget failure, door open detection, mains fail detection, etc.; message windows are popped up on the Main (Home) Screen showing the cause of alarm and action taken by the controller. The figure below shows, for example, the message screen that pops up when the controller detects Main Control Gadget Set Failure & changes over to the Standby Set.

Section 4

OPERATOR LEVEL PARAMETERS

Operator

Timer Feature Disabled



Timer Feature Enabled

All the parameter settings, except Zero Offset, on this screen are Common for MAP-1 to MAP-4 Inputs.

Temperature Set Value

Range : Temperature Setpoint Low Limit to Temperature Setpoint High Limit

Default : 25.0 °C

This is the Setpoint Value for temperature control loop. This value can also be set on home screen if enabled through the parameter *SP Edit on Home Screen*.

Temperature Low Deviation Alarm

Range : 0.2 to 99.9 °C

Default : 2.0 °C

This Parameter sets a Negative Deviation (offset) limit with respect to the '*Temperature Set Value*'. The Alarm is activated if the measured temperature value falls below this limit. Example : Temperature Set Value = 25.0 °C, Low Deviation = 0.5 °C; The Alarm is activated if temperature falls below 24.5 °C (25.0 °C - 0.5 °C).

Temperature High Deviation Alarm

Range : 0.2 to 99.9 °C

Default : 2.0 °C

This Parameter sets a Positive Deviation (offset) limit with respect to the '*Temperature Set Value*'. The Alarm is activated if the measured temperature value exceeds this limit. Example : Temperature Set Value = 25.0 °C, High Deviation = 0.5 °C; The Alarm is activated if temperature rises above 25.5 °C (25.0 °C + 0.5 °C).

SP Edit on Home Screen

This parameter allows to Enable or Disable the set value editing for both temperature & %RH on Home (Main) Screen. If Enabled, the temperature & %RH set values can be edited by touching the receptive indicated values on the Home Screen.

'Timer Start / Abort' *(Available only if Timer is Enabled)*
This parameter is a touch button to issue Run command to start a new time cycle or to abort a running time cycle.

Time Interval (HH:MM) *(Available only if Timer is Enabled)*
Range : 0.00 to 500.00 (HH:MM)
Default : 0.10
The set time value for the timer in Hours : Minutes.

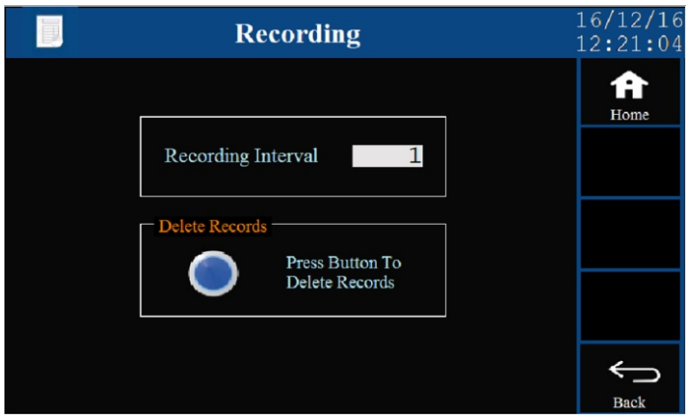
Zero Offset
Range : -50.0 to 50.0 °C
Default : 0.0 °C
This parameter value is individually set for MAP-1 to MAP-4 inputs. This value is algebraically added to the measured Temperature Value to derive the final Value that is displayed and compared for alarm / control. Use this value to nullify any known constant error.

Final Value = Measured Value + Zero Offset

Section 5

SUPERVISORY LEVEL PARAMETERS

Supervisory > Recording



Recording Interval

Range : 0 to 250 Minutes

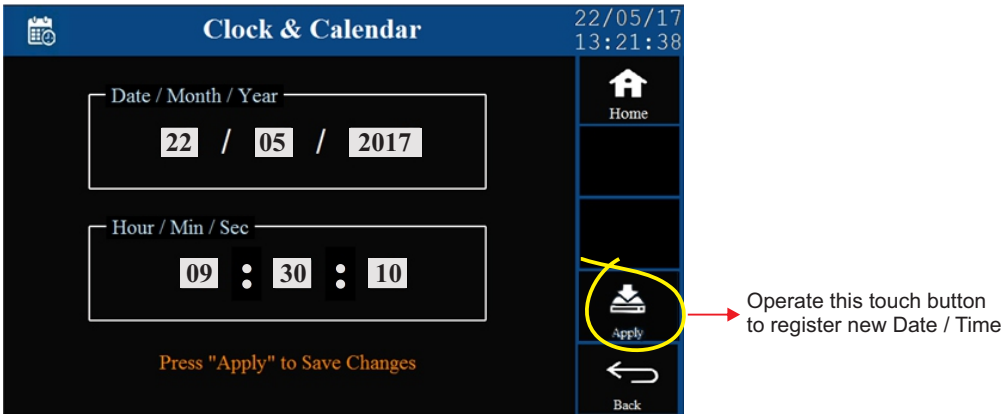
Default : 5 Minutes

The Controller generates and stores periodic records at the interval set by this parameter.

'Delete Record'

This is a touch button to issue command to delete stored records from the memory.

Supervisory > Clock & Calendar



Calendar Date

Clock Time

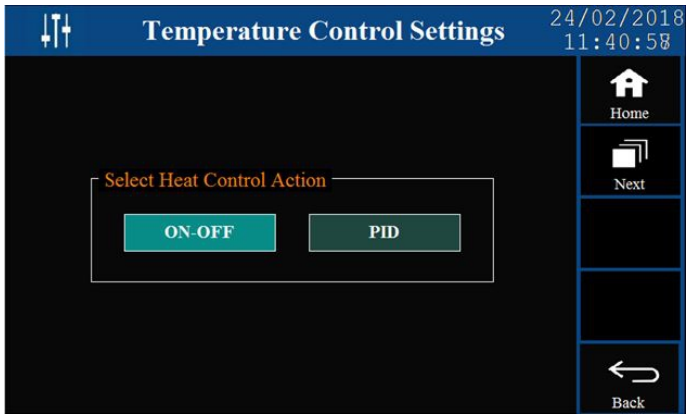
The Calendar Date is set using 3 separate fields; Date (DD), Month (MM) & Year (YY).

The Clock Time is set in 24 Hours format using 3 separate fields; Hours (HH), Minutes (MM) & Seconds (SS).

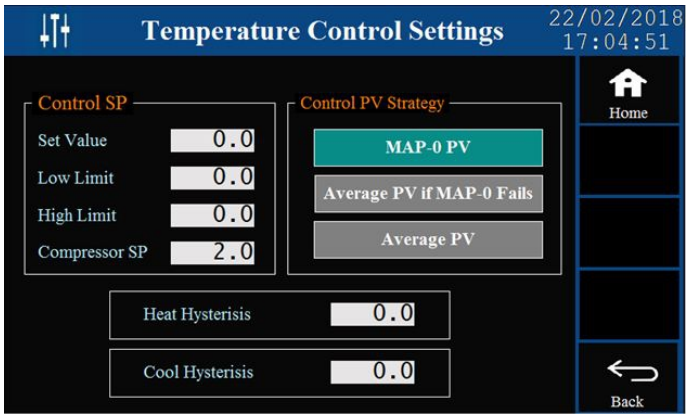
It is a must to operate the 'Apply' touch button in order to register the modified values.

Supervisory > Control Settings

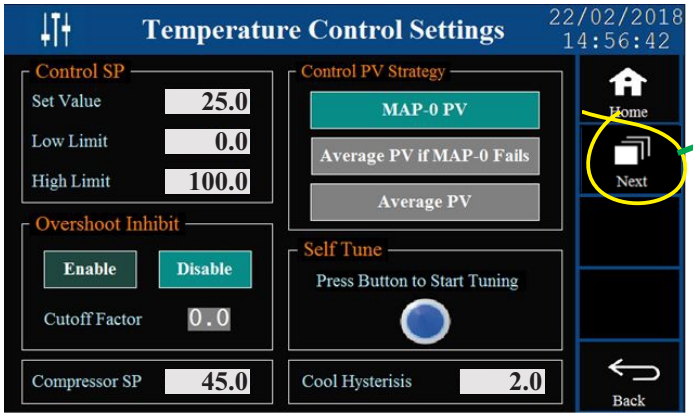
Select Heat Control Action

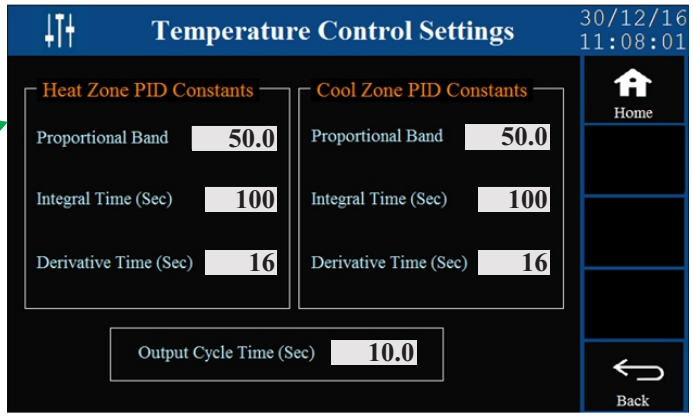


ON-OFF Heat Control Action



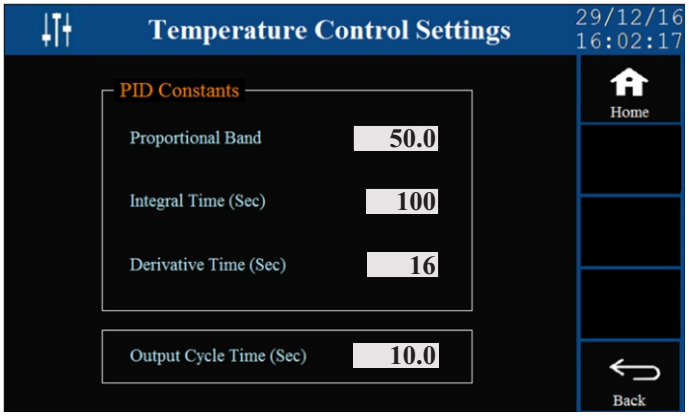
PID Heat Control Action





The control setting parameter screens depend upon the Control Action selected (On-Off Or PID).

The PID parameters are split on two screens shown above. Also the second screen parameters change depending on the selection for the parameter 'Zone Select' (Single or Dual) provided on the screen "Compressor Settings". The Cool Zone and Heat Zone are described in details in **Appendix-B : Compressor Switching Strategies**. The screen for parameters for Dual Zone is shown above and that for Single Zone is shown below.



Set Value (Temperature Control Loop)
Range : Temperature Setpoint Low Limit to Temperature Setpoint High Limit
Default : 25.0
Sets Value for Temperature Control.

Low Limit (for Temperature Control Set Value)
Range : -199.9 to Temperature Setpoint High Limit
Default : 10.0
Minimum permissible setpoint value for Temperature control.

High Limit (for Temperature Control Set Value)
Range : For RTD : Temperature Setpoint Low Limit to 600.0
For mA/V : Temperature Setpoint Low Limit to 999.9
Default : 60.0
Maximum permissible setpoint value for Temperature control.

Overshoot Inhibit
Options : Enable, Disable
Default : Disable
Set this parameter to 'Enable' if the process exhibits unacceptable overshoot upon start-up or a step change in SP. If enabled, the controller controls the rate of change of PV to minimize overshoot while approaching the target SP.

Cutoff Factor
Range : 1.0 to 2.0
Default : 1.2
This parameter adjusts the effectiveness of the Overshoot Inhibit feature. Increase the value if the overshoot is curbed but the PV takes longer to reach the SP. Decreases the value if the overshoot persists.

Control PV Strategy
Options : MAP-0 PV, Average PV if MAP-0 Fails, Average PV
Default : MAP-0 PV
This parameter sets the strategy for computing the final temperature value that is used for Control & Alarm.

MAP-0 PV : The measured MAP-0 sensor value is used as the final temperature value.

Average PV If MAP-0 Fails : This is a mixed strategy. If there is no fault with the MAP-0 sensor, the measured MAP-0 sensor value is used as the final temperature value. If the MAP-0 sensor fails, the average of other selected MAP sensors that are not faulty is used as final temperature.

Average PV : The average of all the selected MAP sensors is used as the final value. The sensor(s) under error are ignored.

Self Tune
This parameter is a command to Start or Abort Self Tuning for automatic computation of PID constants. For Dual Zone setting, the controller needs to be tuned separately for Heat prominent & Cool Prominent zones.

Pressing the touch push button initiates tuning if the controller is already not tuning. However, if the controller is tuning, pressing the touch button causes the controller to abort tuning.

Compressor SP
Range : 0.0 to 100.0
Default : 45.0
(Available for 'Heat + Cool' Control with Compressor PV based Strategy)
This Setpoint Value is compared with the process value to switch the compressor On/Off with the set compressor hysteresis.
Refer ***Appendix-B : Compressor Switching Strategies.***

Heat Hysteresis
Range : 0.1 to 99.9
Default : 2.0
Sets differential (dead) band between On-Off switching for Heater Output. *Refer* ***Appendix-B : Compressor Switching Strategies.***

Cool Hysteresis
Range : 0.1 to 99.9
Default : 2.0
Sets differential (dead) band between On-Off switching for Compressor Output. *Refer* ***Appendix-B : Compressor Switching Strategies.***

The ***Dual Zone*** *PID Constants are described below.*

Heat Zone Proportional Band
Range : 0.1 to 999.9 °C
Default : 50.0 °C
Sets proportional gain for Heat Pre-dominant zone.

Heat Zone Integral Time
Range : 0 to 3600 Sec.
Default : 100 Sec.
Sets integral time constant in Seconds for Heat Pre-dominant zone. Setting the value to 0, cuts-off integral action.

Heat Zone Derivative Time
Range : 0 to 600 Sec.
Default : 16 Sec.
Sets derivative time constant in Seconds for Heat Pre-dominant zone. Setting the value to 0, cuts-off derivative action.

Cool Zone Proportional Band
Range : 0.1 to 999.9 °C
Default : 50.0 °C
Sets proportional gain for Cool Pre-dominant zone.

Cool Zone Integral Time
Range : 0 to 3600 Sec.
Default : 100 Sec.
Sets integral time constant in Seconds for Cool Pre-dominant zone. Setting the value to 0, cuts-off integral action.

Cool Zone Derivative Time
Range : 0 to 600 Sec.
Default : 16 Sec.
Sets derivative time constant in Seconds for Cool Pre-dominant zone. Setting the value to 0, cuts-off derivative action.

The ***Single Zone*** *PID Constants are described below.*

Proportional Band
Range : 0.1 to 999.9 °C
Default : 50.0 °C
Sets proportional gain.

Integral Time
Range : 0 to 3600 Sec.
Default : 100 Sec.
Sets integral time constant in Seconds. Setting the value to 0, cuts-off integral action.

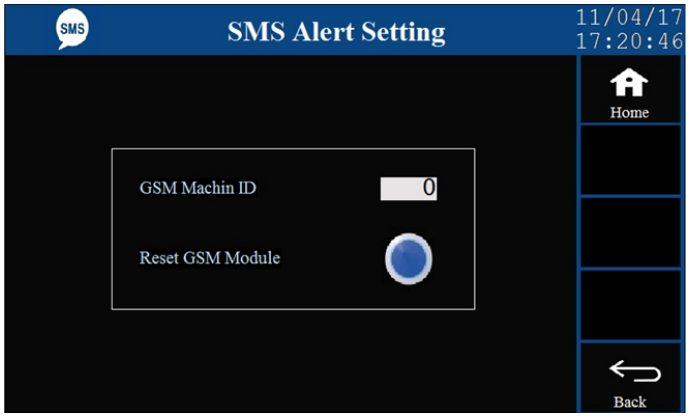
Derivative Time
Range : 0 to 600 Sec.
Default : 16 Sec.
Sets derivative time constant in Seconds. Setting the value to 0, cuts-off derivative action.

*The parameters below are applicable to both **Single Zone** & **Dual Zone**.*

Output Cycle Time (Sec.)
Range : 0.5 to 100.0 Sec.
Default : 10.0 Sec.
Sets the total 'On + Off' time in seconds for time proportional power output for Air Heater through Relay / SSR.

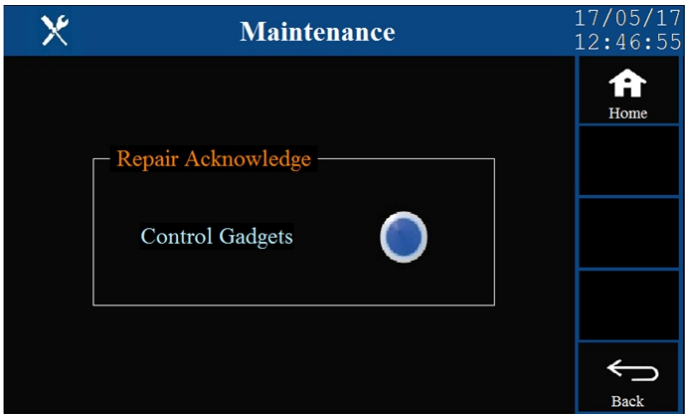
Supervisory > SMS Alert

(Available only if the controller is supplied with GSM Module Version)



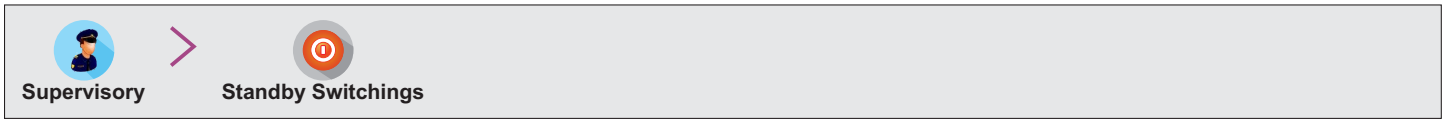
GSM Machine ID
Range : 1 to 128
Default : 1
This parameter can be used to assigned a unique ID to the machine (chamber) to identify the source of SMS alert.

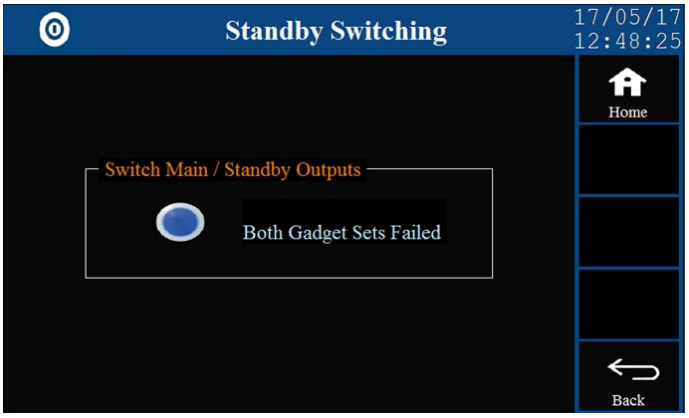
'Reset GSM Module'
Use this touch button if for any reason the GSM module fails to send SMS alerts.



Repair Acknowledge

In case the control system is installed with standby set of control gadgets, the controller automatically switches to the Standby set should any of the control gadgets of the Main set fail. After fixing the fault / failure, the user must acknowledge the same to the controller for resuming the operation with the main set.

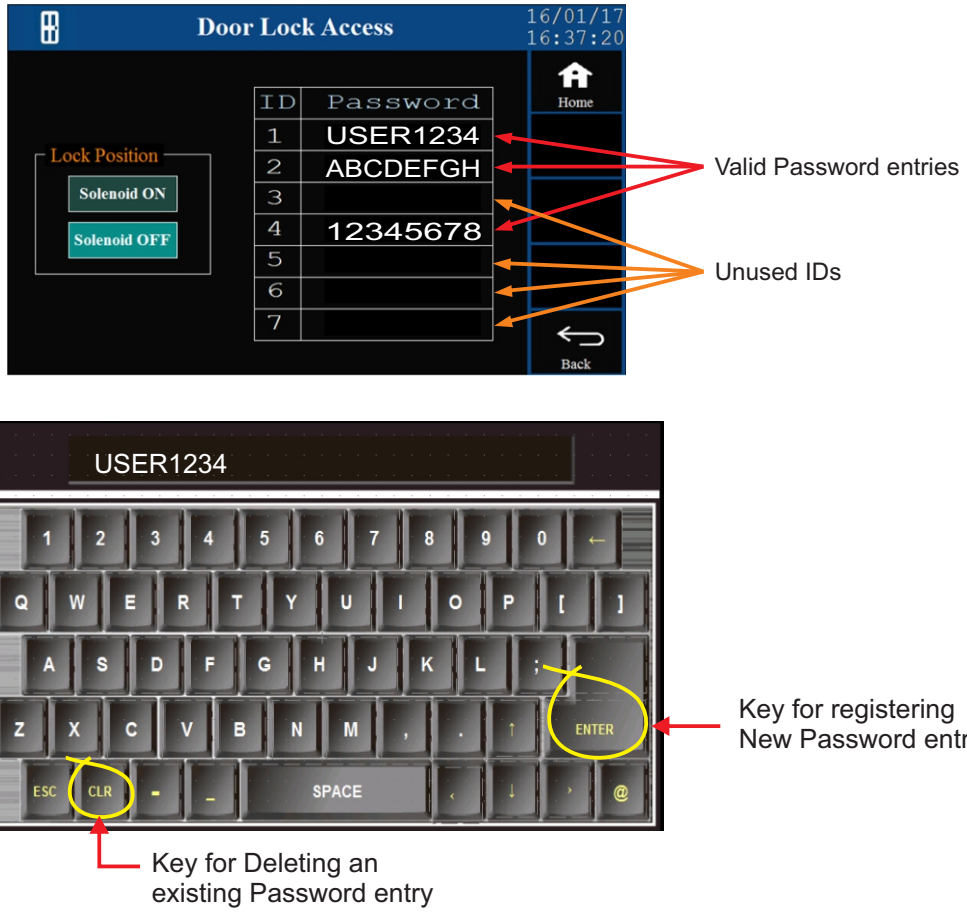




Switch Main / Standby Outputs

If the controller is installed with standby control gadget set, the user can manually switch between the Main and the Standby set by using the touch push button. The switching is permitted / performed only if both sets are working.

Supervisory > Door Lock Access



Lock Position

Options : Solenoid ON, Solenoid OFF

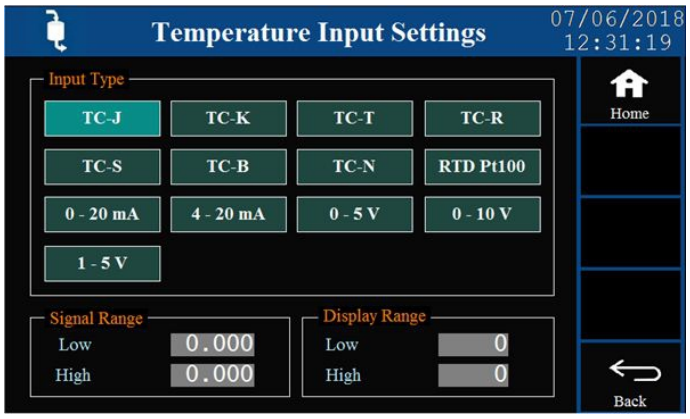
Default : Solenoid OFF

Set this parameter to 'Solenoid ON', if the equipment door is locked when the solenoid is turned ON (energized). Set this parameter to 'Solenoid OFF', if the equipment door is locked when the solenoid is turned OFF (de-energized).

Password Entry

The Supervisor can Authorize up to 7 Persons by assigning them their respective **8 Character Alpha-Numeric Password**. A table with 2 columns (ID & PASSWORD) is provided for password entries. The ID numbers are fixed from 1 to 7 and correspond to the **Name Entries** made in the PC Software (HumiLog). The Password against each ID can be entered / edited / deleted by touching the table cell provided for the ID. Upon touching the cell, an alpha numeric keypad pops up. Use alpha numeric keys to assign a new password (or edit the existing password) and then press ENTER key. To delete an exiting password use CLR key and then press ENTER key. The passwords can be entered / deleted in any order of ID. The password fields for unused Ids must be cleared (empty).

Section 6
FACTORY LEVEL PARAMETERS



Input Type

Options : TC-J, TC-K, TC-T, TC-R, TC-S, TC-B, TC-N, RTD Pt100, 0 to 20 mA, 4 to 20 mA, 0 to 5 V, 0 to 10 V, 1 to 5 V
(TC stands for Thermocouple. That is, TC-J is Type J Thermocouple, TC-K is Type K Thermocouple & so on.)

Default : RTD Pt100

Select Input type for MAP-0 in accordance with the type of Temperature sensor / transmitter connected for measurement.

Signal Range Low

(Available for DC Linear Volts & mA Inputs only)

Input Type	Settings	Default
0 to 20 mA	0.00 to Signal High	0.00
4 to 20 mA	4.00 to Signal High	4.00
0 to 5 V	0.000 to Signal High	0.000
0 to 10 V	0.00 to Signal High	0.00
1 to 5 V	1.000 to Signal High	1.000

This parameter is the transmitter output signal value that corresponds to the Range Low process value. Refer *Appendix-A : DC Linear Signal Interface* for details.

Signal Range High

(Available for DC Linear Volts & mA Inputs only)

Input Type	Settings	Default
0 to 20 mA	Signal Low to 20.00	20.00
4 to 20 mA	Signal Low to 20.00	20.00
0 to 5 V	Signal Low to 5.000	5.000
0 to 10 V	Signal Low to 10.00	10.00
1 to 5 V	Signal Low to 5.000	5.000

This parameter is the transmitter output signal value that corresponds to the Range High process value. Refer *Appendix-A : DC Linear Signal Interface* for details.

Display Range Low

(Available for DC Linear Volts & mA Inputs only)

Range : -199.9 to Range High

Default : 0.0

This parameter is the Process Value that corresponds to the Signal Low value from the transmitter. Refer *Appendix-A : DC Linear Signal Interface* for details.

Display Range High

(Available for DC Linear Volts & mA Inputs only)

Range : Range Low to 999.9

Default : 100.0

This parameter is the Process Value that corresponds to the Signal High value from the transmitter. Refer *Appendix-A : DC Linear Signal Interface* for details.

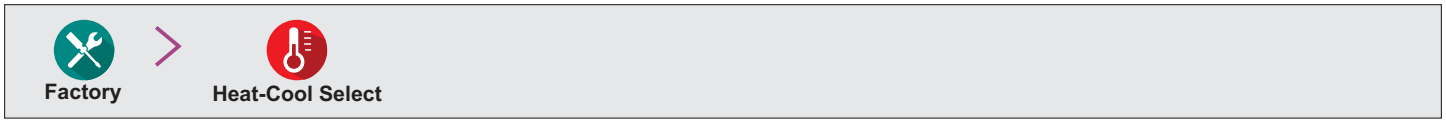
Zero offset

Range : -50.0 to 50.0 °C

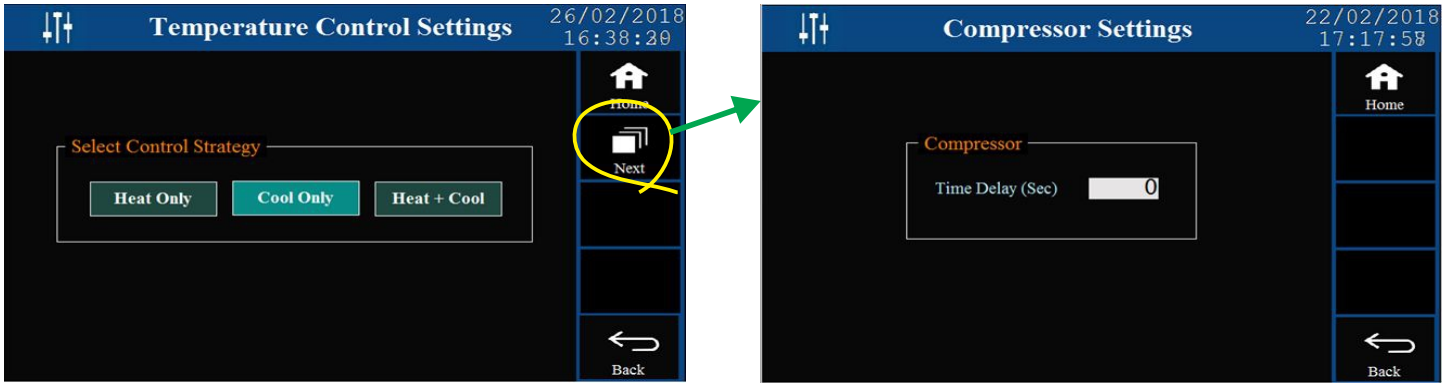
Default : 0.0 °C

This value is algebraically added to the measured Temperature Value to derive the final Value that is displayed and compared for alarm / control. Use this value to nullify any known constant error.

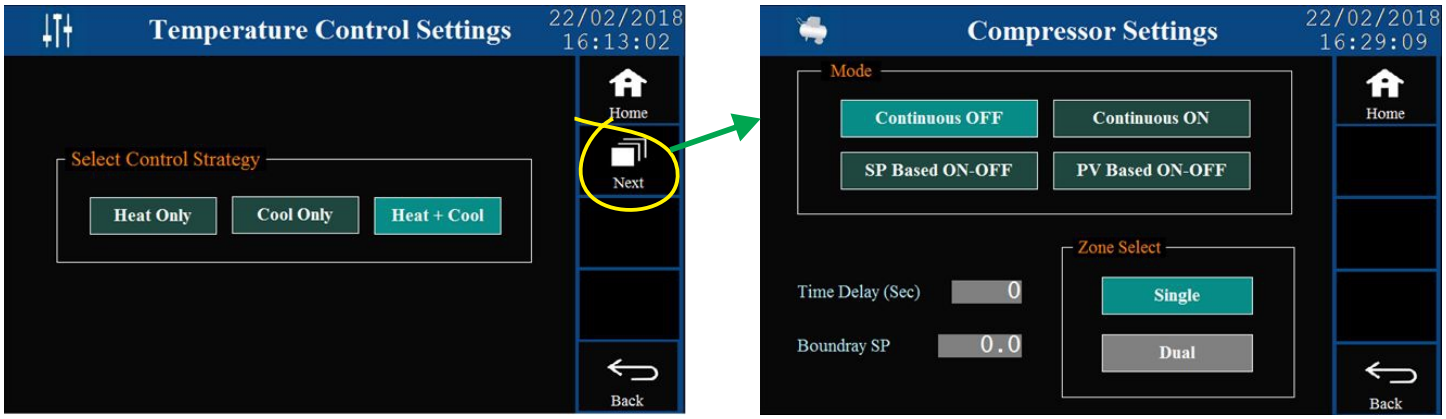
Final Value = Measured Value + Offset



Cool Only



Heat + Cool



For detailed description and functioning of the parameters related to compressor operation, refer ***Appendix-B : Compressor Switching Strategies.***

Mode

Options : Continuous OFF, Continuous ON, SP Based ON-OFF, PV Based ON-OFF

Default : Continuous OFF

Time Delay

Range : 0 to 1000 Sec.

Default : 200 Sec.

Boundary SP

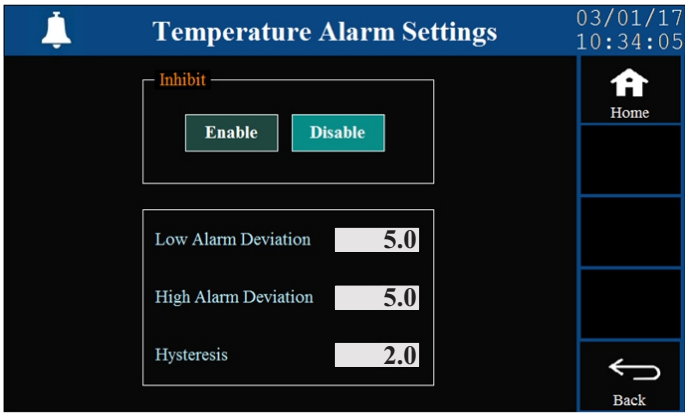
Range : 0.0 to 100.0

Default : 45.0

Zone Select

Options : Single, Dual

Default : Single



Inhibit

Options : Enable, Disable

Default : Enable

If this parameter is set to 'Enable', the Alarm activation is suppressed until the Temperature value is within Alarm limits from the time the controller is switched ON. This allows suppressing the Alarm during the start-up Alarm conditions.

If this parameter is set to 'Disable', the Alarm is not suppressed during the start-up Alarm conditions.

Low Alarm Deviation

Range : 0.2 to 99.9 °C

Default : 2.0 °C

This parameter sets the maximum permissible process value deviation **below** the temperature setpoint. If the temperature exceeds this deviation, the alarm is activated.

High Alarm Deviation

Range : 0.2 to 99.9 °C

Default : 2.0 °C

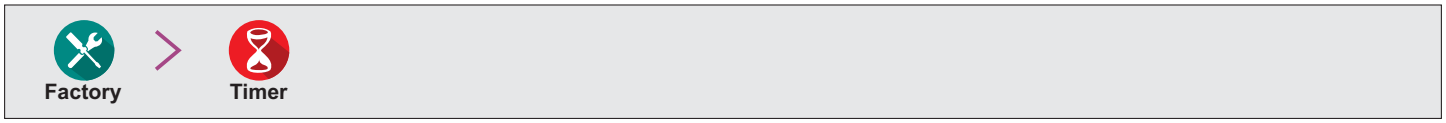
This parameter sets the maximum permissible process value deviation **above** the temperature setpoint. If the temperature exceeds this deviation, the alarm is activated.

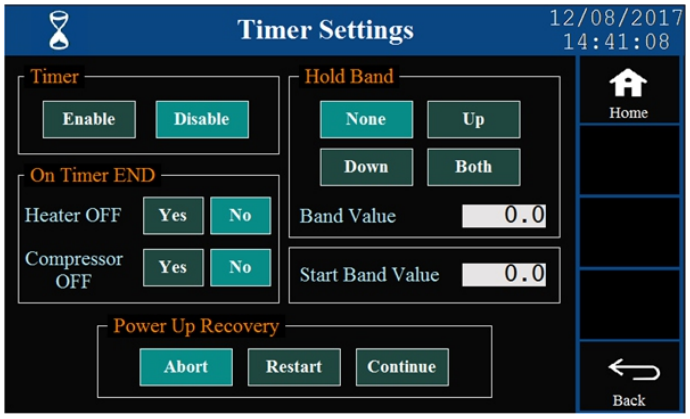
Hysteresis

Range : 0.1 to 99.9

Default : 0.2

This parameter sets a differential (dead) band between the ON and OFF Temperature Deviation Alarm status change. Keep it large enough to avoid frequent switching of the Alarm Status/Relay.





Timer Enable / Disable

Options : Enable, Disable

Default : Disable

Set this parameter to 'Disable' if the timer feature is not required.

On Timer END Heater Off

Options : Yes, No

Default : Yes

If this parameter value is set to 'Yes', the heater is force off upon the set time interval is over. If this parameter value set to 'No', the heater on-off operation continues based on comparison between control PV & SP.

On Timer END Compressor Off

Options : Yes, No

Default : Yes

If this parameter value is set to 'Yes', the compressor is force off upon the set time interval is over. If this parameter value set to 'No', the compressor on-off operation depends on the selected compressor mode.

Hold Band Type
Options : None, Up, Down, Both
Default : None

None : PV based timer pause is not required.

Up : Timer is paused if PV is outside holdband *above* SP.

Down : Timer is paused if PV is outside holdband *below* SP.

Both : Timer is paused if PV is outside holdband either *above* or *below* SP.

Hold Band Value
Range : 0.1 to 999.9 °C
Default : 0.5 °C
Sets the temperature band around the SP (Above, Below or Both) for the timer to pause. The timer pauses counting down should the PV fall outside the band.

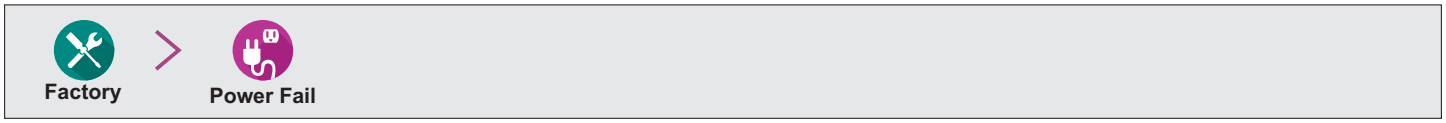
Start Band Value
Range : 0 to 999.9 °C
Default : 0.5 °C
After issuance of start command, the timer starts counting down once the PV enters the process band around SP defined by this parameter value. For example, if the SP is 100.0 °C & Start Band is 0.5 °C; the timer starts counting down once the PV reaches within 99.5 °C (100.0 - 0.5) & 100.5 (100.0 + 0.5).

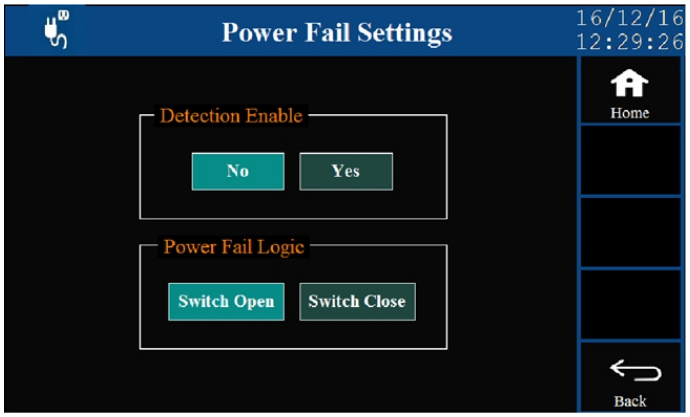
Power Up Recovery
Option : Abort, Restart, Continuous
Default : Abort
This parameter states the strategy how the timer would resume operation if interrupted due to power failure.

Abort : The timer operation is suspended until a new start command is issued.

Re-Start : The timer re-runs the complete set time interval.

Continue : The timer runs the balance time.





Detection Enable

Options : No, Yes

Default : No

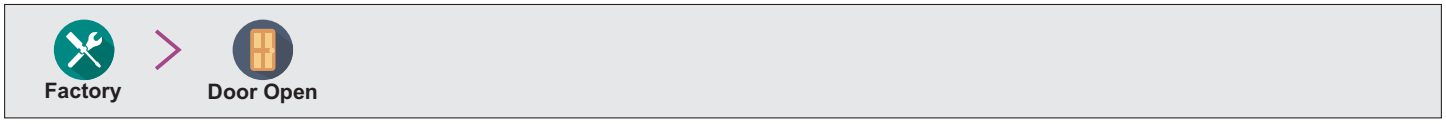
Set to 'Yes' if provision is made for running the controller on an auxiliary power sources like battery or inverter and a Switch is mounted for detecting main (utility) power source failure.

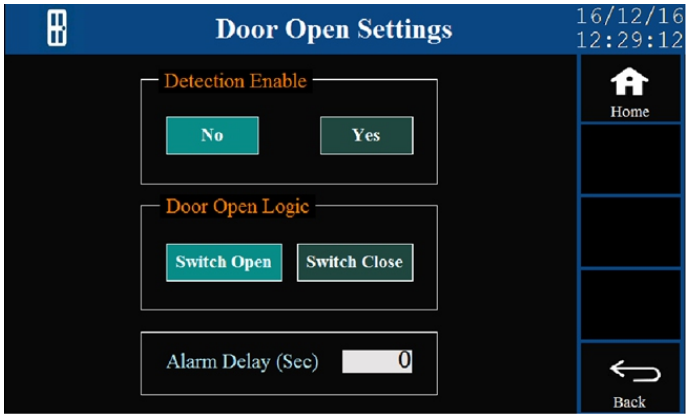
Power Fail Logic

Options : Switch Open, Switch Close

Default : Switch Close

If set to 'Switch Close', the CLOSE switch position indicates that the Mains Power has failed and the Controller is operating on auxiliary power source. If set to 'Switch Open', the OPEN switch position indicates that the Mains Power has failed and the Controller is operating on auxiliary power source.





Detection Enable

Options : No, Yes

Default : No

Set to 'Yes' if Door Open detection switch is mounted.

Door Open Logic

Options : Switch Open, Switch Close

Default : Switch Close

If this parameter is set to 'Switch Close', the door is detected as *Open* if the switch is CLOSE. If this parameter is set to 'Switch Open', the door is detected as *Open* if the switch is OPEN.

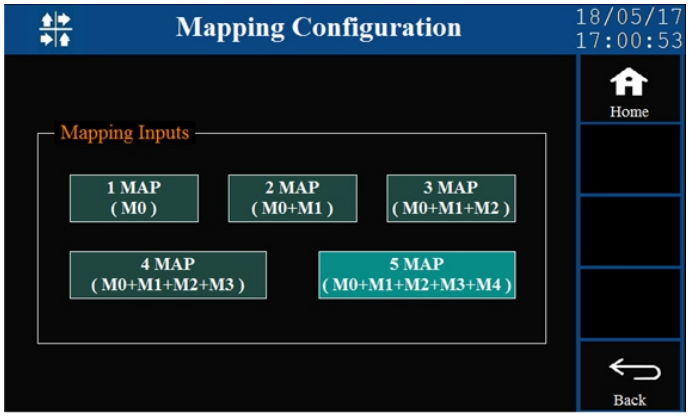
Alarm Delay (Sec.)

Range : 0 to 1000 Sec.

Default : 60 Sec.

This parameter sets a timer. From the time the door is opened, the timer begins counting down. If the door is not closed before the timer reaches 0, the *Door Open* alarm is activated.

Factory > Mapping > Configuration



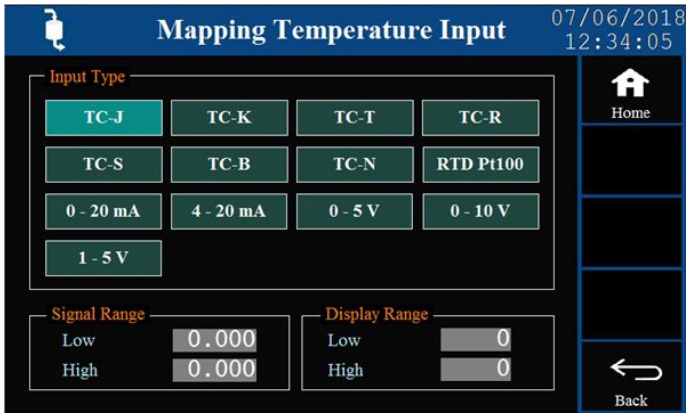
Select Mapping Inputs

Options : 1 MAP (M0), 2 MAP (M0+M1), 3 MAP (M0+M1+M2), 4 MAP (M0+M1+M2+M3), 5 MAP (M0+M1+M2+M3+M4)

Default : 1 MAP (M0)

Select this parameter depending upon the numbers of Mapping Inputs connected. M0 to M4 denote MAP-0 to MAP-4 Inputs.

Factory > Mapping > Input Settings



Input Type (for MAP-1 to MAP-4)

Options : TC-J, TC-K, TC-T, TC-R, TC-S, TC-B, TC-N, RTD Pt100, 0 to 20 mA, 4 to 20 mA, 0 to 5 V, 0 to 10 V, 1 to 5 V
(TC stands for Thermocouple. That is, TC-J is Type J Thermocouple, TC-K is Type K Thermocouple & so on.)

Default : RTD Pt100

Select Input type for MAP-0 in accordance with the type of Temperature sensor / transmitter connected for measurement.

Signal Range Low

(Available for DC Linear Volts & mA Inputs only)

Input Type	Settings	Default
0 to 20 mA	0.00 to Signal High	0.00
4 to 20 mA	4.00 to Signal High	4.00
0 to 5 V	0.000 to Signal High	0.000
1 to 5 V	1.000 to Signal High	1.000
0 to 10 V	0.00 to Signal High	0.00

This parameter is the transmitter output signal value that corresponds to the Range Low process value. Refer *Appendix-A : DC Linear Signal Interface* for details.

Signal Range High

(Available for DC Linear Volts & mA Inputs only)

Input Type	Settings	Default
0 to 20 mA	Signal Low to 20.00	20.00
4 to 20 mA	Signal Low to 20.00	20.00
0 to 5 V	Signal Low to 5.000	5.000
1 to 5 V	Signal Low to 5.000	5.000
0 to 10 V	Signal Low to 10.00	10.00

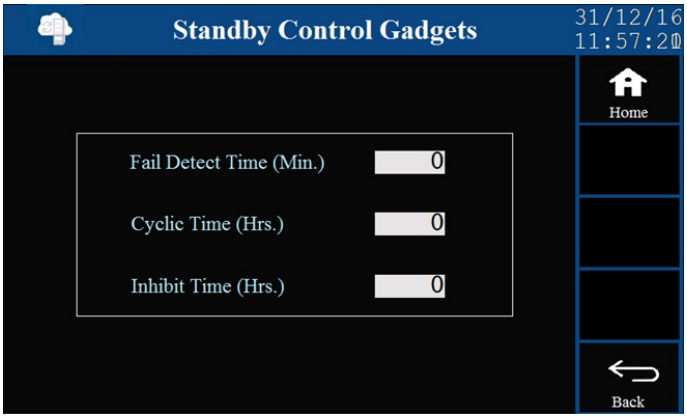
This parameter is the transmitter output signal value that corresponds to the Range High process value. Refer *Appendix-A : DC Linear Signal Interface* for details.

Display Range Low

(Available for DC Linear Volts & mA Inputs only)
Range : -199.9 to Range High
Default : 0.0
This parameter is the Process Value that corresponds to the Signal Low value from the transmitter (0 mA or 0 mV or 0/1 V).

Display Range High

(Available for DC Linear Volts & mA Inputs only)
Range : Range Low to 999.9
Default : 100.0
This parameter is the Process Value that corresponds to the Signal High value from the transmitter (20 mA or 50/200 mV or 5/10V).



Fail Detect Time (Min)

Range : 0 to 250 Min.

Default : 10 Min

This parameter sets a timer. If the temperature value (Control PV) exceeds the “High Alarm Deviation” limit, the timer starts counting down. If the process value does not return below the “High Alarm Deviation” limit before the timer reaches 0, the working control gadget set is detected as failed. The controller then switches to the alternate control gadget set.

Cyclic Time (Hrs.)

Range : 0 to 500 Hrs.

Default : 48 Hrs.

If both, Main & Standby, control gadget sets are in working condition, the controller keeps switching between these two sets periodically with a time interval set by this parameter value.

Inhibit Time (Hrs.)

Range : 0 to 250 Hrs.

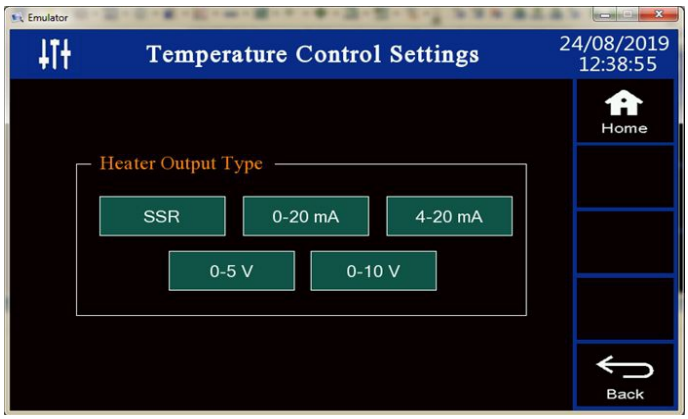
Default : 1 Hrs.

This parameter sets a time interval for which the controller stops monitoring the control gadget fail detection condition (described under parameter “Fail Detect Time”). This time interval is usually applied under following conditions.

1. System is powered (Start Up)
2. Change-over from Auxiliary Power source (Battery / Inverter) to Mains Power
3. After recovery from Door Open Alarm
4. Change-over from Main to Standby Control gadget Set or vice-a-versa

This feature suppresses false detection of control gadget failure.

Factory > Control Settings



Heater Output Type for Main & Standby Gadgets

Options : SSR, 0-20 mA, 4-20 mA, 0-5 V & 0-10 V

Default : SSR

This parameter selects the output type for Controlling Heating Gadget(s). Note that the selected output is applied to both, Main & Standby, Heating Source.

APPENDIX - A

DC LINEAR SIGNAL INTERFACE

This appendix describes the parameters required to interface process transmitters that produce Linear DC Voltage (mV/V) or Current (mA) signals in proportion to the measured process values. A few examples of such transmitters are;

1. Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**
2. Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**
3. Temperature Transmitter producing **0 to 20 mA** for **-50 to 250 °C**

The instrument (indicator/controller/recorder) that accepts the linear signal from the transmitter computes the measured process value by solving the mathematical equation for Straight-Line in the form:

$$Y = mX + C$$

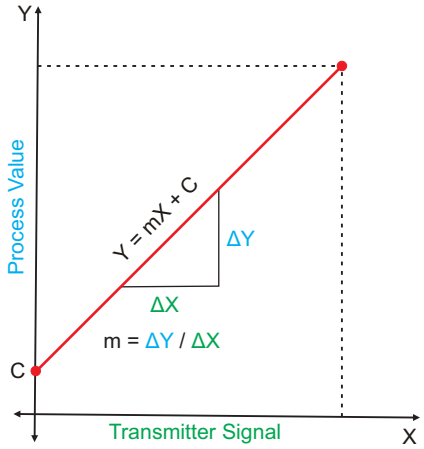
Where;

X : Signal Value from Transmitter

Y : Process Value Corresponding to Signal Value X

C : Process Value Corresponding to X = 0 (Y-intercept)

m : Change in Process Value per unit Change in Signal Value (Slope)



As is evident from the aforementioned transmitter examples, different transmitters produce signals varying both in *Type* (mV/V/mA) and *Range*. Most PPI instruments, thus, provide programmable Signal Type and Range to facilitate interface with a variety of transmitters. A few industry standard signal types and ranges offered by the PPI instruments are: 0-50mV, 0-200mV, 0-5 V, 1-5 V, 0-10V, 0-20 mA, 4-20 mA, etc.

Also, the output signal range (e.g. 1 to 4.5 V) from different transmitters corresponds to different process value range (e.g. 5 to 95 %RH); the instruments thus also provide facility for programming the measured process value range with programmable Resolution.

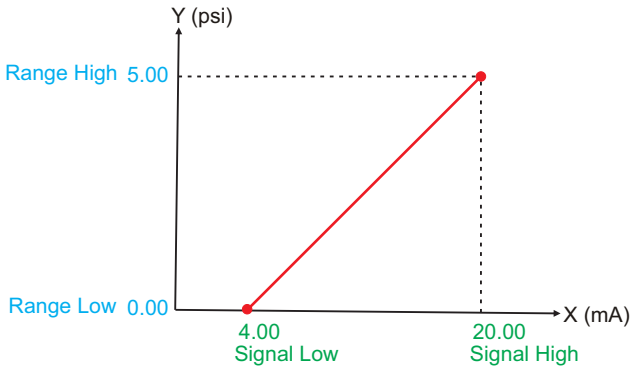
The linear transmitters usually specify two signal values (Signal Low and Signal High) and the corresponding Process Values (Range Low and Range High). In the example Pressure Transmitter above; the Signal Low, Signal High, Range Low & Range High values specified are: 4 mA, 20 mA, 0 psi & 5 psi, respectively.

In summary, the following 6 parameters are required for interfacing Linear Transmitters:

1. Input Type : Standard DC Signal Type in which the transmitter signal range fits (e.g. 4-20 mA)
2. Signal Low : Signal value corresponding to Range Low process value (e.g. 4 mA)
3. Signal High : Signal value corresponding to Range High process value (e.g. 20 mA)
4. PV Resolution : Resolution (least count) with which to compute process value (e.g. 0.01)
5. Range Low : Process value corresponding to Signal Low value (e.g. 0.00 psi)
6. Range High : Process value corresponding to Signal High value (e.g. 5.00 psi)

The following examples illustrate appropriate parameter value selections.

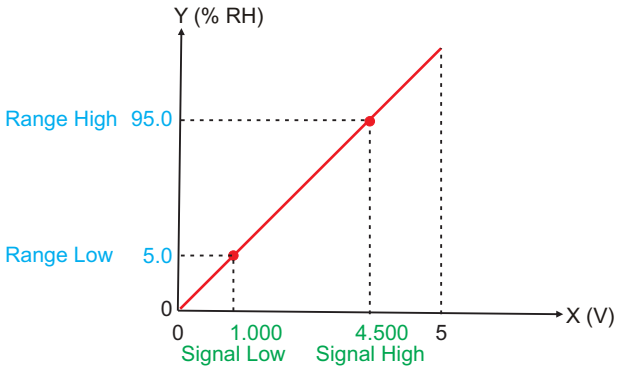
Example 1: Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**



Presume the pressure is to be measured with 0.01 Resolution, that is 0.00 to 5.00 psi.

Input Type	:	4-20 mA
Signal Low	:	4.00 mA
Signal High	:	20.00 mA
PV Resolution	:	0.01
Range Low	:	0.00
Range High	:	5.00

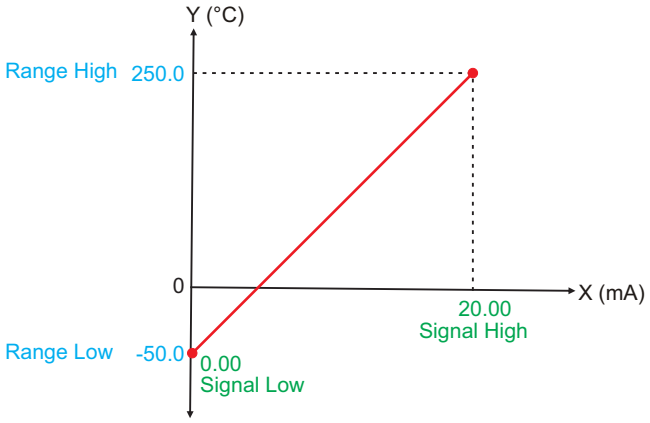
Example 2: Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**



Presume the humidity is to be measured with 0.1 Resolution, that is 0.0 to 100.0 %.

Input Type	:	0-5 V
Signal Low	:	1.000 V
Signal High	:	4.500 V
PV Resolution	:	0.1
Range Low	:	5.0
Range High	:	95.0

Example 3: Temperature Transmitter producing **0 to 20 mA** for **-50 to 250 °C**



Presume the Temperature is to be measured with 0.1 Resolution, that is -50.0 to 250.0°C.

Input Type	:	0-20 mA
Signal Low	:	0.00 mA
Signal High	:	20.00 mA
PV Resolution	:	0.1
Range Low	:	-50.0
Range High	:	250.0

APPENDIX - B

COMPRESSOR SETTING PARAMETERS

Compressor Switching Strategies

The controller provides a digital output to switch the compressor. The controller offers different programmable strategies for compressor switching to meet different design approaches. The various strategies and the implementations are described here.

1. **Compressor Off**

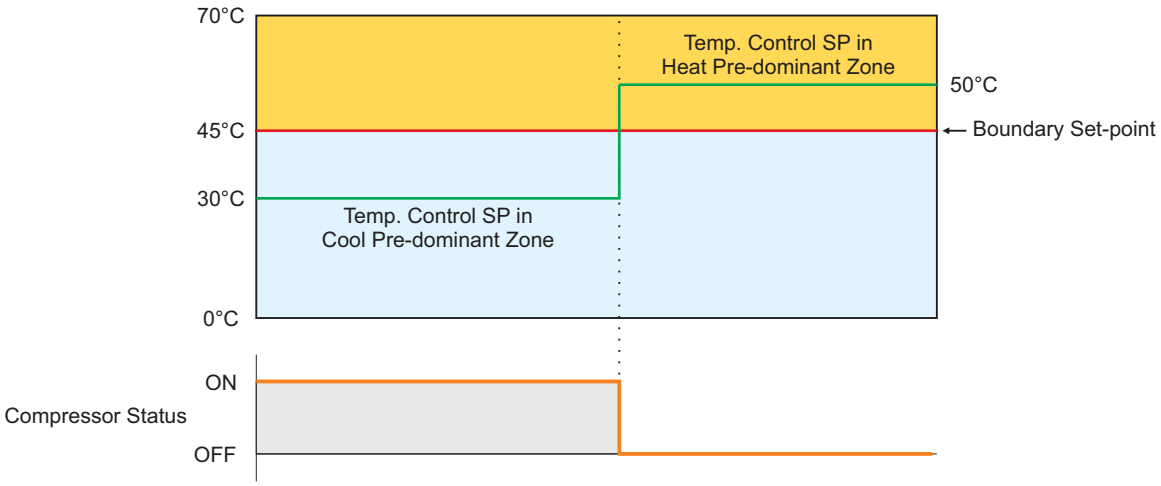
   The compressor is kept Off. This strategy is usually selected for applications where the temperature values are required to be maintained significantly above the ambient temperature.

2. **Compressor On**

   The compressor is kept On regardless of the measured or set temperature value. This strategy is usually selected for applications where the temperature values are required to be maintained significantly below the ambient temperature.

3. **SP Based Strategy**

   In this strategy, the equipment temperature range is split in two zones by setting the parameter 'Boundary Set-point' (BSP). Refer Figure below.



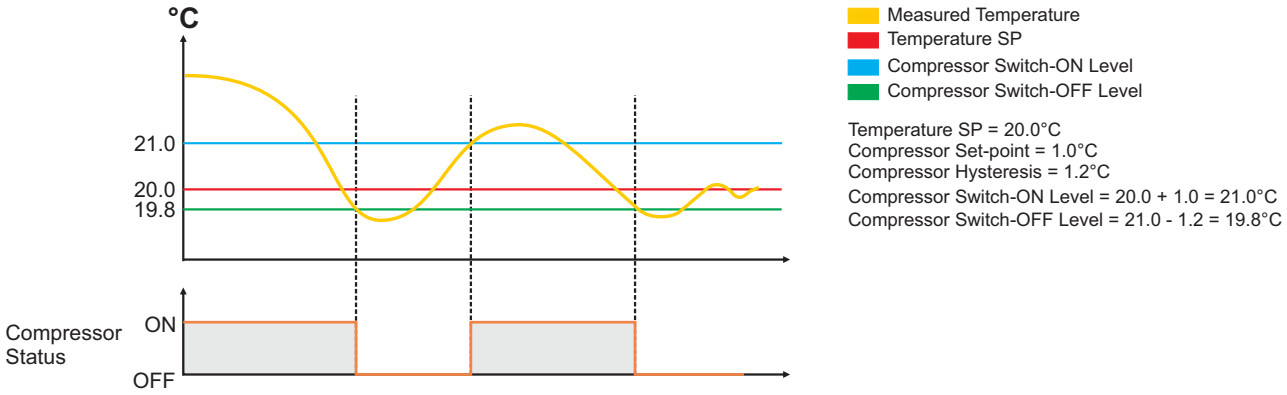
The zone at and above the boundary SP ( ) is referred as Heat Pre-dominant zone and that below the boundary SP ( ) is referred as Cool Pre-dominant zone. The controller automatically switches between the two zones depending upon the Temperature SP. If the Temperature SP is below boundary SP, Cool Pre-dominant zone is active and the compressor is kept ON. If the Temperature SP is at or above boundary SP, Heat Pre-dominant zone is active and the compressor is kept OFF. This strategy eliminates the need for the user to manually switch the compressor ON or OFF.

If the parameter *Control Zones* is set to “Dual”; separate tuning can be performed in the Cool and Heat Pre-dominant zones for accurate control in each zone. The controller maintains separate sets of Proportional Band, Integral Time & Derivative Time constants for each zone that are automatically selected and used by the controller depending upon the active zone.

However, if the parameter *Control Zones* is set to “Single”; the controller uses a single set of Proportional Band, Integral Time & Derivative Time constants for both zones.

4. PV Based Strategy

In this strategy, the compressor is switched to cool down the equipment air temperature. The controller switches the compressor ON or OFF based on the comparison between the equipment temperature value and the Temperature SP. Refer Figure below.



The compressor is turned ON if the equipment air temperature value is above the Temperature SP by an amount set by the parameter 'Compressor Set-point'. That is;

Compressor Switch - ON Level = (Temperature SP) + (Compressor Set-point)

Once the air temperature falls below Compressor Switch-ON Level by an amount set by the parameter 'Compressor Hysteresis', the compressor is turned OFF. That is;

Compressor Switch - OFF Level = (Compressor Switch-ON Level) – (Compressor Hysteresis)

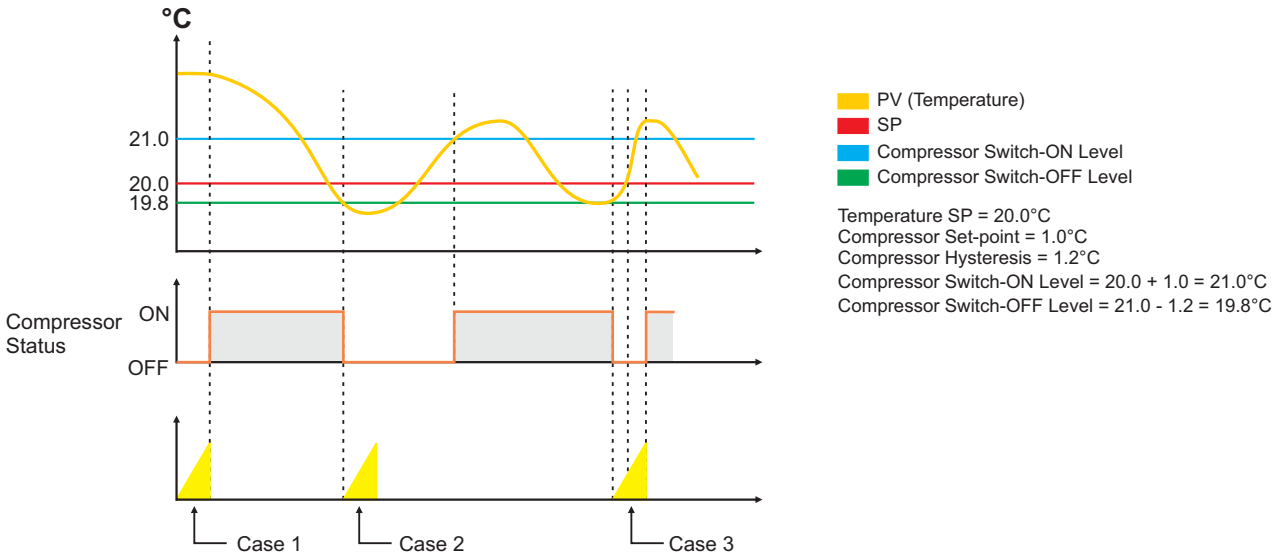
The hysteresis inserts a dead band between the Compressor Switch-ON Level and Compressor Switch-OFF Level to avoid frequent switching of the compressor.

Compressor Time Delay

Once the compressor is switched off, a time delay is desired before it is turned ON again. The time delay prevents the possible damage due to short cycling. When the compressor switches off, it spins backward as pressure equalizes. If compressor is energized while it is still spinning backward, it continues to run backward until it trips on internal overloads. This may cause damage to the compressor.

The time delay cycle is executed every time the compressor is turned off. The compressor turning off may be a result of power failure or the on-off control algorithm executed by the controller. The controller in “Auto Mode” monitors the Process Value (PV) against the Set-Point (SP) and attempts to switch the compressor *ON* or *OFF* depending upon whether the PV is *above* or *below* the SP.

The time delay starts counting down from the instance the compressor is switched off. The compressor is inhibited from switching-on until the delay elapses regardless of the difference between the PV and SP. Once the time delay is elapsed, the control algorithm switches the compressor ON as and when the PV is above SP.



The figure above illustrates 3 cases. Case (1) illustrates power-up delay. In case (2); the time elapses before PV rises above the SP. The compressor is thus switched ON as soon as the PV rises above the SP. In case (3); the PV rises above the SP while the time delay is still in progress. The compressor is switched ON as soon as the delay time elapses.

The following table list various parameters related to Compressor Switching Mode / Operation & their respective locations.

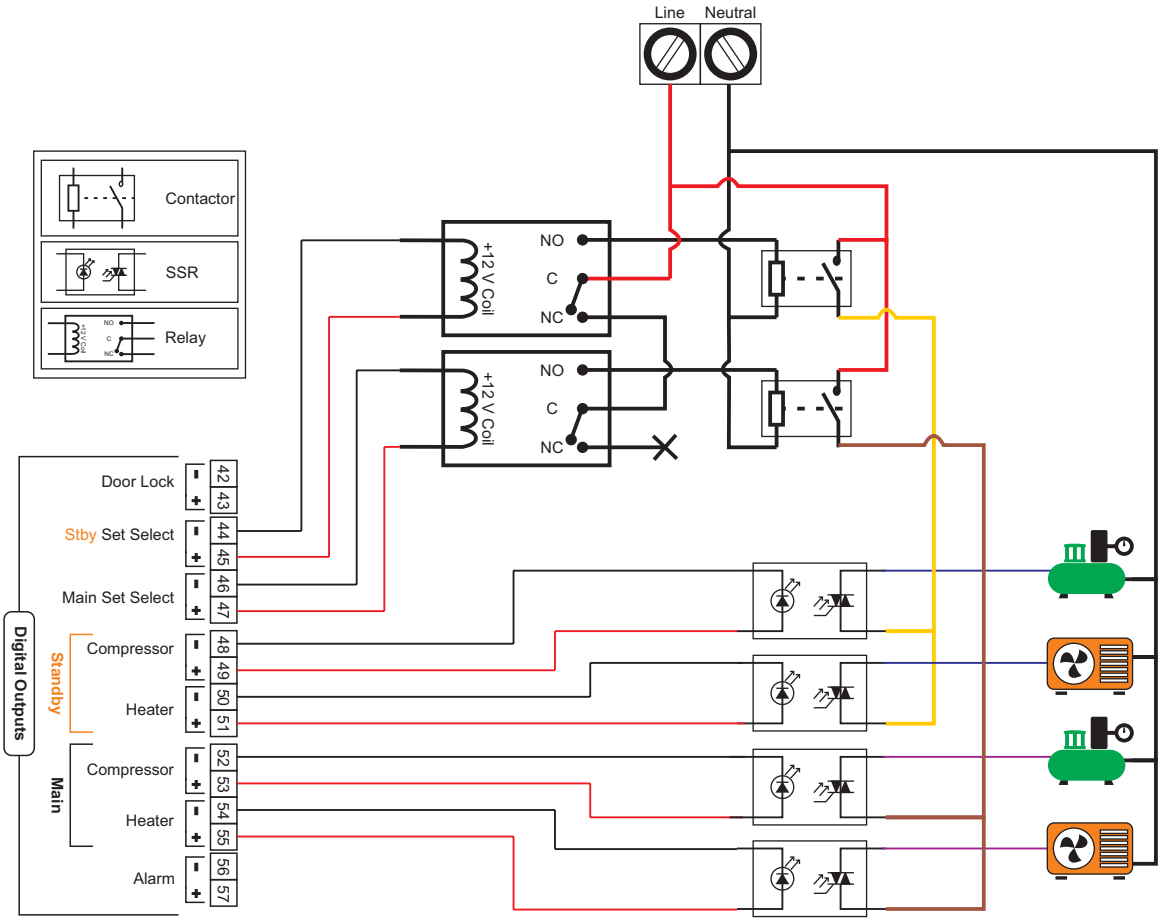
Parameter Name	Navigation (Where to Locate)
Mode Boundary SP Time Delay Hysteresis Zone Select	Factory > Compressor

APPENDIX - C

STANDBY CONTROL GADGETS

If the Controller is supplied with Standby Control Gadgets option, 4 additional digital outputs are provided for interfacing an additional set of Control Gadgets as standby. That is, there are two sets of Control Gadgets; Main & Standby.

The additional 4 outputs (besides 2 standard outputs, viz., Main Heater & Main Compressor) are; Standby Heater, Standby Compressor, Main Set Select & Standby Set Select. The Main Set Select & the Standby Set Select outputs are used to drive two external gadgets (usually electromechanical relays) that switch power to SSRs that drive Main & Standby gadgets respectively. Refer generic electrical connection diagram below.



Control Gadget Fail Detection

The term control gadget failure applies to the complete set (Main or Standby) rather than an individual gadget. The failure may arise due to reasons like heater-break, compressor tripping / failure, SSR output short circuiting, etc. The failure of any gadget is treated as a set failure and the entire set is switched to the working set.

The Measured Temperature (Control PV), the High Deviation Alarm & a Programmable Fail Detect Time (Minutes) are used for detecting the control gadget failure. If the measured temperature value crosses the High Deviation Limit & remains there for the set programmed Fail Detect time then the condition is treated as control gadget failure.

Time Based Cyclic Switching
When both, Main & Standby, sets are in working condition, the controller periodically switches between the Main & Standby sets. The periodic time is user settable in Hours.

Note that both, the working set and the elapsed time are stored in the memory upon power fail. Upon power resumption, the controller switches the set that was in operation at the time of power failure and executes the balance time.

Main Set Failure
Upon detecting the Main set failure, the controller automatically switches to the Standby set provided the Standby set is in working condition. The controller stores in its non-volatile memory the Main Set Failure condition. The controller continues to work with Standby Set until the Main Set Failure condition is cleared from its memory through Repair Acknowledge button (explained later).

If the Main Set failure is detected while the Standby set is already failed, the controller switches off all outputs and acts as an indicator.

Standby Set Failure
Upon detecting the Standby set failure, the controller automatically switches to the Main set provided the Main set is in working condition. The controller stores in its non-volatile memory the Standby Set Failure condition. The controller continues to work with Main Set until the Standby Set Failure condition is cleared from its memory through Repair Acknowledge button (explained later).

If the Standby Set failure is detected while the Main set is already failed, the controller switches off all outputs and acts as an indicator.

Main & Standby Sets Failure
As long as this condition prevails, the controller behaves like an indicator by keeping all its outputs off. Replace / repair the faulty control gadget(s) and then use Repair Acknowledge button to bring controller to its normal operation mode.

Manual Switch-over
If both, Main & Standby, sets are in working condition, the user can switch from Main to Standby Set or vice-a-versa by using touch push button provided for this purpose.

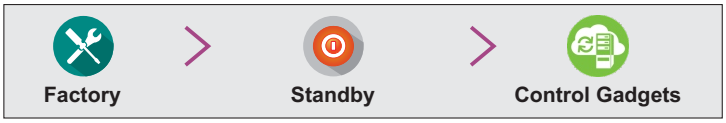
Repair Acknowledge
Once the Main Set and / or Standby Set Failure condition is stored in memory, the only way to clear the same is through Repair Acknowledge touch button. This feature avoids continuous toggling between Main & Standby Sets should both fail.

Note that Repair Acknowledge button clears both Main & Standby Set Failure conditions from memory.

Inhibit Timer
The controller provides a programmable timer (in hours) for setting a time interval during which the controller ignores the *Control Gadget Fail Detection*. This timer is activated upon the following conditions.

1. After recovery from Door Open Alarm
2. Switching over from Auxiliary Power Source (Battery / Inverter) to Mains Power Source
3. System Power-up
4. After automatic / manual changeover from Main control set to Standby control set or vice-a-versa
5. After Repair Acknowledgment
6. After completion of Auto Tuning

The following table list various parameters related to Standby Sensors & their respective locations.

Parameter Name	Navigation (Where to Locate)
Switch Main / Standby Output	
Control Gadgets Repair Acknowledge	
Standby Control Gadgets Fail Detect Time (Min) Cyclic Time (Hrs.) Inhibit Time (Hrs.)	

APPENDIX - D

DOOR LOCK

If the Controller is supplied with Door Lock option, an additional digital output is provided for operating an electro-mechanical (Solenoid driven) locking system through an external relay / contactor. For automatic operation of the lock by the controller, the cabinet door must also be installed with Door Open detect switch that should be connected to the controller digital input labeled 'Door Open'.

Door "Lock" Operation

Upon power up if the cabinet door is detected *closed,* the controller locks the door. However if the door is detected *open* upon power up, the controller waits until the door is detected *closed* before applying the lock.

Similarly, when the cabinet door is closed after opening (through appropriate password entry by authorized person) the controller immediately applies the lock.

Door "Unlock" Operation

The HMI provides independent password entry for up to 7 authorized persons. Each person is identified by a unique ID (1 to 7) and a corresponding 8 character alpha-numeric password as shown below.

ID	Password
1	ABCDEFGH
2	12345678
3	WXYZ9876
4	
5	
6	
7	

If less than 7 persons need to be authorized then the password field for the unused ID must be left blank. The figure above shows only three persons authorized to open door.

The unique ID on the HMI side is mapped with a corresponding entry describing person's name / position on the PC software (ProLog).

For unlocking the cabinet door the authorized person must enter his password on the HMI screen. Upon correct password entry the door lock is opened and an Event Record is generated by the HMI containing the authorized person's ID. The Event Record thus generated is used by the PC software to describe the door open action along with the name / position of the responsible person in Audit Trail Report.

APPENDIX - E

DIGITAL INPUTS & OUTPUTS

DIGITAL INPUTS

The microPLC Control Unit incorporates interfaces for potential-free digital inputs for various functions described below.

Timer Start
This Digital Input is used to issue the timer start command. An OPEN to CLOSE switch transition is detected as start command. If the timer is already started, this switch input is ignored.

Power Fail
This Digital Input is used if provision is made for running the controller on an auxiliary power sources like battery or inverter and a Switch is mounted for detecting main power source failure. This input detects whether the controller is being powered from Main or Auxiliary power source.

Door Open
This Digital Input is used to warn if the equipment door is left open for more than a user programmed time period by activating the Alarm. Also a record is generated each time the door is opened or closed.

Alarm Acknowledge
This Digital Input can be used to mute the Alarm Output Relay.

DIGITAL OUTPUTS

The microPLC Control Unit provides several digital outputs for Alarm & Process Control.
The outputs are voltage levels rated 12 VDC @ 40 mA each.

Heater
This Digital Output switches in accordance with the output power computed by PID loop or On-Off control action. The output drives the heating element through external Relay / SSR.

Compressor
This Digital Output switches in accordance with the On-Off Strategy & Time-Delay set for the compressor operation for cooling / de-humidification. The output drives the power to compressor through external Relay / SSR.

Main Set Select
Standby Set Select
These Digital Output are fitted and functional only if controller is supplied with Standby Output feature. The digital outputs control external electrical switches (like contactors) that, in turn, control the power to the relay / SSR sets that drive control gadgets (Heater, Humidifier & Compressor).

Door Lock
This Digital Output can be used to switch an electro-mechanical (magnetic) lock for cabinet door opening. The door usually remains locked and is opened only upon correct password entry by the authorized person.

Alarm
This Digital output can be used to activate an audio / visual device under process alarm condition.

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