

Neuro 102EX



PPI

The Perfection Experts

Enhanced Universal Process Controller



User Manual

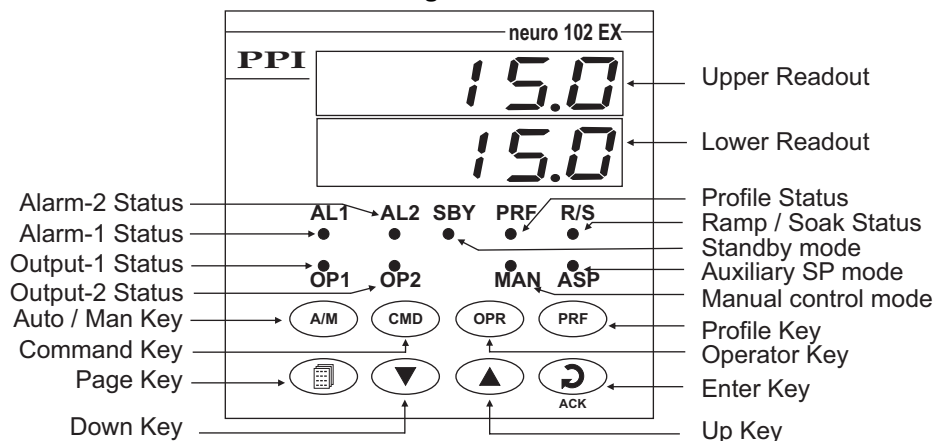
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Section 1 FRONT PANEL LAYOUT

The controller front panel comprises of digital readouts, LED indicators and membrane keys as shown in Figure 1.1 below.

Figure 1.1



READOUTS

The Upper Readout is a 5 digit, 7-segment bright red LED display and usually displays the PV (Process Value). In Set-up Mode, the Upper Readout displays parameter values/options.

The Lower Readout is a 5 digit, 7-segment bright green LED display and usually displays Setpoint Value. In Program Mode, the Lower Readout displays the names (identifier tags) for the parameters.

INDICATORS

The front panel comprises 9 LED indicators that show the status related to control, alarm and operation mode. Refer Table 1.1 below for details.









Table 1.1

LED	Status
OP1	Indicates Control Output-1 ON/OFF Status in Uni or Bi-Directional Control mode.
OP2	Indicates Control Output-2 ON/OFF Status in Bi-Directional Control mode.
AL1	Flashes while Alarm-1 is active.
AL2	Flashes while Alarm-2 is active.
MAN	Glowes if MANUAL control mode is active.
ASP	Glowes if the Auxiliary Setpoint is active.
*PRF	<ul style="list-style-type: none"> Flashes while the Ramp/Soak profile is in progress. Glowes if profile is in PAUSE/ HOLD state. Remains OFF if profile is not in progress.
*R/S	<ul style="list-style-type: none"> Flashes while the Ramp (Setpoint changing) segment is in progress . Glowes continuously while the Soak (Setpoint at rest) segment is in progress.
SBY	Flashes if STANDBY mode is active.

KEYS

There are eight tactile keys provided on the front panel for configuring the controller, setting-up the parameter values and selecting Operation / Display Modes. Refer Table 1.2 below.

Table 1.2

Symbol	Key	Function
	PAGE	Press to enter or exit set-up mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; keeping pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count; keeping pressed speeds up the change.
 ACK	ENTER OR ALARM ACKNOWLEDGE	Set up Mode : Press to store the set parameter value and to scroll to the next parameter on the PAGE. Run Mode : Press to acknowledge any pending Alarm(s). This also turns off the Alarm relay.
	AUTO MANUAL	Press to toggle between Auto or Manual Control Mode.
	(1) COMMAND	Press to access parameters that are used as Commands.
	(1) OPERATOR	Press to access 'Operator-Page' parameters.
	(2) PROFILE	Press to access 'Profile Run-Time Variables'.

(1) The parameters are listed and described in section 2 : Basic Operations.

(2) The parameters are listed and described in section 8 : Profile Parameter. This key is non-functional if the controller is order with User Linearisation feature.

* The **PRF & R/S** LEDs remain off if the controller is order with 'User Linearisation' feature.



Section 2 BASIC OPERATION

POWER-UP

Upon power-up, all displays and indicators are lit on for approximately 3 seconds. This is followed by the indication of the controller model name `102.P` (for Ramp / Soak Profile Version) or `102.L` (for User Linearisation Version) on the Upper Readout and the firmware version `05.02` on the Lower Readout, for approx. 1 second.

MAIN DISPLAY MODE

After the Power-up display sequence, the Upper Readout starts showing the measured PV (Process Value) and the Lower Readout displays the Setpoint Value. This is the MAIN Display Mode that shall be used most often.

% Output Power Indication

In PID control mode, the Lower Readout can be toggled using ENTER key to indicate either % output power or setpoint value SP. The output power is indicated with the left most digit showing 'P', 'H' or 'C' depending upon uni-directional (Heat or Cool) or bi-directional (Heat and Cool) control mode. Refer Figure 2.1 below.

Figure 2.1



Adjusting SP (Control Setpoint)

If permitted at Supervisory Level, the SP value can be directly adjusted on the Lower Readout in the MAIN Display Mode. While the Lower Readout is showing SP value, step through the following sequence for adjusting the SP value :

1. Press and release UP or DOWN key once. The Lower Readout starts flashing.
2. Use UP/ DOWN keys to adjust the SP value.
3. Press and release ENTER key. The Lower Readout stops flashing and the new set value is registered and stored.

Tune Mode Indication

The Lower Readout flashes `TUNE` while the controller is Tuning. Do not disturb the process or alter any parameter values while Tuning is in progress. The "Tune" message automatically disappears upon completion of Tuning procedure.

Profile Mode Indications

(The profile mode indication is not applicable if the controller is order with 'User Linearisation' feature.)

While a Profile Cycle is in progress, the front panel indicator 'PRF' flashes or glows steadily. The steady glowing indicates that though the profile is active, it is currently in HOLD state. Also, the Lower Readout shows the Profile Setpoint (Ramping or Soaking) instead of the control setpoint SP. The % Output Power (if PID Control) can be viewed by toggling the Lower Readout using ENTER key.

Note :
While Profile Cycle is in progress, the Control Setpoint SP can still be adjusted on Lower Readout. While the Lower Readout shows Profile Setpoint, use UP/DOWN keys to adjust the control setpoint SP as described earlier.

PV Error Indications

The PV Error type is flashed on the Upper Readout. For different errors and the causes, refer Table 2.1 below.

Table 2.1

Message	Error Type	Cause
	Over-range	PV above Max. Range
	Under-range	PV below Min. Range
	Sensor Open	Thermocouple / RTD broken

CONTROL / ALARM STATUS UNDER PV ERROR CONDITIONS

- The tuning, if in progress, is aborted.
- The Profile Cycle, if in progress, enters in HOLD state.
- Under *Over-range* or *Under-range* error condition, all the control outputs are switched off. However, under *Sensor Open* error, the PID control output power depends upon the power - fail strategy and the user set default power value.
- For Alarm activation, the under-range condition is treated as minimum PV, whereas the over-range and open conditions are treated as maximum PV. Thus, Process High, positive Deviation Band and Window Band alarms activate under *Over-range/Open error*. Similarly, Process Low, negative Deviation Band and Window Band alarms activate under *Under-range error*.

• MANUAL MODE OPERATION

This operation mode is available only if the control action is PID and if the manual mode operation is permitted at supervisory level. In this mode, the controller operates in Open loop mode wherein the % Output Power is manually adjusted by the operator. This mode is often used for process start-up to make sure that the process equilibrium is achieved before the control is transferred for subsequent automatic (closed loop) control. The controller ensures a *bumpless* Auto / Manual transfer.

The Manual mode can be activated or de-activated using A/M key. While in Manual mode, the Upper Readout shows PV while the Lower Readout shows % Power that can be adjusted using UP/DOWN keys.

Pressing and Releasing A/M key switches the mode from Auto to Manual and vice-a-versa. While the controller is in Manual mode the front panel indicator MAN glows. Use UP/DOWN keys to adjust the power. In Unidirectional mode, the Output Power is adjustable between the set Power Low and Power High limits. However, in Bi-directional mode, the Output Power is adjustable from -100% to +100%. The power range from -100% to 0 is Cool Power (with the leftmost digit indicating C) and 0 to +100% is Heat Power (with the leftmost digit indicating H).

Notes:

- If the Manual mode is activated while a Profile Cycle is in progress; the profile segment (Ramp or Soak) continues to run uninterrupted. However, the % output power is in accordance with the user set value. The PV, thus may not follow the setpoint profile closely.
- The Manual mode Activation / De-activation is suppressed while the Tuning is in progress. However, the Tuning procedure can be activated regardless of whether the controller is in Auto or Manual control mode.
- The Standby Mode (explained later in this section) over-rides the Manual control mode (if active).
- If the power fails while the Manual Control Mode is active; upon resumption of power the controller continues to remain in Manual control mode with the last user set power.

• STANDBY MODE

This mode allows the operator to put the controller in '*indication-only*' mode wherein all the output control signals are forced OFF while keeping the alarm system enabled. This may be desired prior to the start of a new process batch.

If enabled at supervisory level, the standby mode can be activated or de-activated by setting the parameter 'Standby' to 'Yes' or 'No' respectively. The standby parameter can be accessed using the front panel 'CMD' key, explained later in this section. The front panel indicator SBY flashes while the controller is in Standby mode.

- Notes:**
1. The Standby and Tuning modes are mutually exclusive. If Tune command is issued while the Standby mode is active, the controller exits Standby mode and starts Tuning. Similarly, if Standby mode is activated while the controller is tuning, the controller aborts tuning operation and enters Standby mode.
 2. If the Power Supply to the controller is switched-off or a Power-failure occurs while the controller is operating in Standby mode; upon resumption of power, the controller continues to operate in Standby mode.

OPERATOR PAGE AND PARAMETERS

The parameters that require frequent settings are organized on a separate page, called the Operator Page. The availability of operator parameters is controlled at supervisory level and the parameter setting cannot be locked by the Master Lock.

Accessing Operator Page & Adjusting Parameters

Step through the following sequence to open the operator page and to adjust the operator parameter values.

1. Press and release 'OPR' key. The Lower Readout shows prompt for the first available operator parameter and the Upper Readout shows value for the parameter.
2. Use UP / DOWN keys to adjust the value and then press ENTER key to store the set value and scroll to next parameter.

The controller automatically reverts to MAIN Display Mode upon scrolling through the last operator parameter. Alternatively, use PAGE key to return to MAIN Display Mode.

Note:
The Operator Page can also be accessed through PAGE-0. (The pages and parameters are explained in next section).








The operator parameters are described in Table 2.2. Note that the parameters presented on Operator Page depend upon the functions selected/enabled and supervisory level permissions.

The operator parameter list mainly includes :

- a) Control Setpoint (SP) or Auxiliary Control Setpoint value.
- b) Alarm-1 Setpoint / Band values.
- c) Alarm-2 Setpoint / Band values.

Table 2.2

Parameter Description	Settings (Default Value)
<p>CONTROL SETPOINT SP</p> <p>This is the Setpoint value that the controller respects for the control purpose while it is not running a profile or not in standby / tuning mode.</p>	<p>Setpoint Low Limit to Setpoint High Limit (Default : -200.0)</p>

Parameter Description	Settings (Default Value)
AUXILIARY CONTROL SETPOINT  The alternate control setpoint that the controller respects for control purpose when selected through remote input terminals. This parameter is available only if the parameter <i>Auxiliary Setpoint</i> is enabled.	Setpoint Low Limit to Setpoint High Limit (Default : -200.0)
ALARM-1 SETPOINT  The setpoint / Band value (depending upon the type of Alarm) for Alarm-1. This parameter is not available if the selected Alarm type is 'None'.	Throughout the range for the selected Input Type (Default : For Process Low : -200.0 For Process High : 1376.0)
ALARM-1 DEVIATION BAND  Same as Alarm-1 Setpoint	-999.9 to 999.9 (Default : 5.0)
ALARM-1 WINDOW BAND  Same as Alarm-1 Setpoint	0.3 to 999.9 (Default : 5.0)
ALARM-2 SETPOINT  The setpoint / Band value (depending upon the type of Alarm) for Alarm-2. This parameter is not available if the selected Alarm type is 'None'.	Throughout the range for the selected Input Type (Default : For Process Low : -200.0 For Process High : 1376.0)
ALARM-2 DEVIATION BAND  Same as Alarm-2 Setpoint	-999.9 to 999.9 (Default : 5.0)
ALARM-2 WINDOW BAND  Same as Alarm-2 Setpoint	0.3 to 999.9 (Default : 5.0)

'COMMAND' PAGE AND PARAMETERS

The parameters that the operator can use to control the Profile and Standby operation mode are called 'Operator Commands' and are accessible using the front panel CMD Key.

Step through the following sequence to access and issue the operator commands.

1. Press and release 'CMD' key. The Lower Readout shows prompt for the first available command parameter and the Upper Readout displays 'No' or 'Yes'.
2. Use UP / DOWN keys to select 'Yes' (for issuing/enabling a command) or 'No' (for disabling a command) and then press ENTER key.

The controller reverts to MAIN Display Mode upon :

- (a) Issuing a Command
- (b) Scrolling through the last command parameter
- (c) Pressing PAGE Key

Note:

The Command Parameters can also be accessed through PAGE-2. (The pages and parameters are explained in next section).

The command parameters are described in Table 2.3. Note that the commands available to the Operator depends upon the feature selected and supervisory permission.



















The command parameter list mainly includes :

- a) Profile related commands like Start, Abort, Pause, Skip etc.

Note that, these parameters are not available if the controller is order with 'User Linearisation' feature.

- b) Standby mode entry / exit.

Table 2.3

Parameter Description	Settings (Default Value)
END OF PROFILE ACKNOWLEDGE  This parameter is available after end of the running Profile, if Output-2(OP2) and/or Output-3(OP3) Relay/SSR is programmed as an 'End-Of-Profile' signal. Set this parameter to 'Yes' to acknowledge the alarm and to turn OFF the output.	 No  Yes (Default : No)
PROFILE START COMMAND  These parameters are mutually exclusive. Use Start command to commence a new Profile Cycle and Abort command to abort / terminate a running Profile cycle. Set the value to 'Yes' to issue the command. The Abort Command is available if permitted at supervisory level.	 No  Yes (Default : No)
PROFILE ABORT COMMAND  These parameters are mutually exclusive. Use Start command to commence a new Profile Cycle and Abort command to abort / terminate a running Profile cycle. Set the value to 'Yes' to issue the command. The Abort Command is available if permitted at supervisory level.	 No  Yes (Default : No)
PROFILE PAUSE COMMAND  This parameter is available while a profile cycle is in progress and can be used to Pause (halt) the profile as long as desired. Set the command to 'Yes' for Pausing and 'No' to continue. Under Pause state, the ramp segment stops ramping while the soak segment stops counting down the timer. The Pause Command is available if permitted at supervisory level.	 No  Yes (Default : No)
SEGMENT SKIP COMMAND  Use this command to terminate a running profile segment and to move to the next segment. Skipping the last segment will result in completion of the current profile cycle. The Skip Command is available if permitted at supervisory level.	 No  Yes (Default : No)
(DE)ACTIVATE STANDBY MODE  This parameter is available and applicable only if Standby mode is enabled at supervisory level. Set the parameter value to 'Yes or 'No' for entering and exiting the Standby mode, respectively.	 No  Yes (Default : No)

Section 3

SET-UP MODE : ACCESS AND OPERATION

The various parameters are arranged in different groups, called PAGES, depending upon the functions they represent. Each group is assigned a unique numeric value, called PAGE NUMBER, for its access.

The parameters are always presented in a fixed format: The Lower Readout displays the parameter prompt (Identification Name) and the Upper Readout displays the set value. The parameters appear in the same sequence as listed in their respective sections.

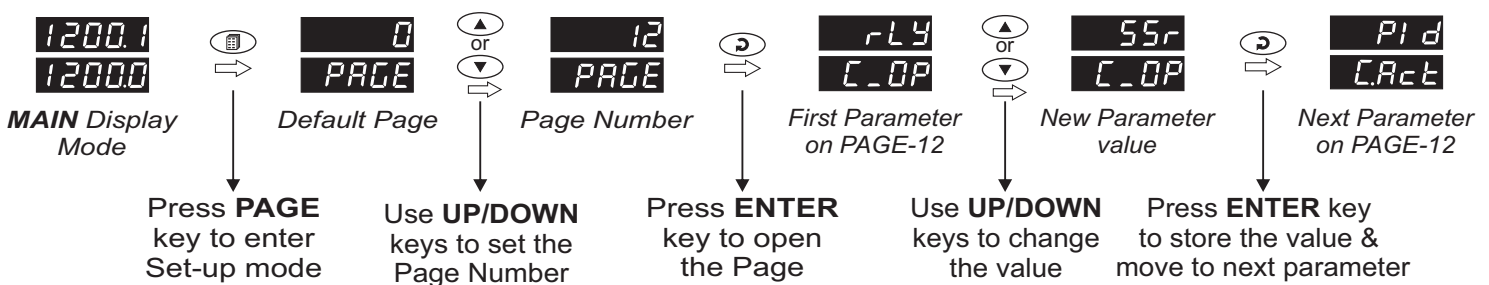
SET-UP MODE

The Set-up Mode allows the user to view and modify the parameter values. Follow the steps below for setting the parameter values:

1. Press and release PAGE key. The Lower Readout shows PAGE and the Upper Readout shows page number 0. Refer Figure 3.1.
2. Use UP / DOWN keys to set the desired PAGE NUMBER.
3. Press and release ENTER key. The Lower Readout shows the prompt for the first parameter listed in the set PAGE and the Upper Readout shows its current value. If the entered PAGE NUMBER is invalid (contains no parameter list or any associated function), the controller reverts to the MAIN Display Mode.
4. Press and release the ENTER key until the prompt for the required parameter appears on the Lower Readout. (The last parameter in the list rolls back to the first parameter).
5. Use UP / DOWN keys to adjust the parameter value. (The display flashes if UP key is pressed after reaching the maximum value or DOWN key is pressed after reaching the minimum value).
6. Press and release the ENTER key. The new value gets stored in the controller's non-volatile memory and the next parameter in the list is displayed.

The Figure 3.1 illustrates the example of altering the value for the parameter 'Control Output'.

Figure 3.1



Notes

1. Each page contains a fixed list of parameters that are presented in a pre-determined sequence. Note however that availability of a few parameters, called Conditional Parameters, depend upon the settings for some other parameters. For example, the parameter 'Control Hysteresis' for Output-1 is available only if, the set value for the parameter 'Control Action' is 'On-Off'.
2. To exit the set-up mode and return to the MAIN Display Mode, press and release PAGE key.
3. If no key is pressed for approximately 30 seconds, the set-up mode times out and reverts to the MAIN Display Mode.

MASTER LOCKING

The controller facilitates locking all the PAGES (except Operator PAGE) by applying Master Lock Code. Under Locking, the parameters are available for *view only* and cannot be adjusted. The Master Lock, however, does not lock the operator parameters. This feature allows protecting the rather less frequently used parameters against any inadvertent changes while making the frequently used operator parameters still available for any editing.

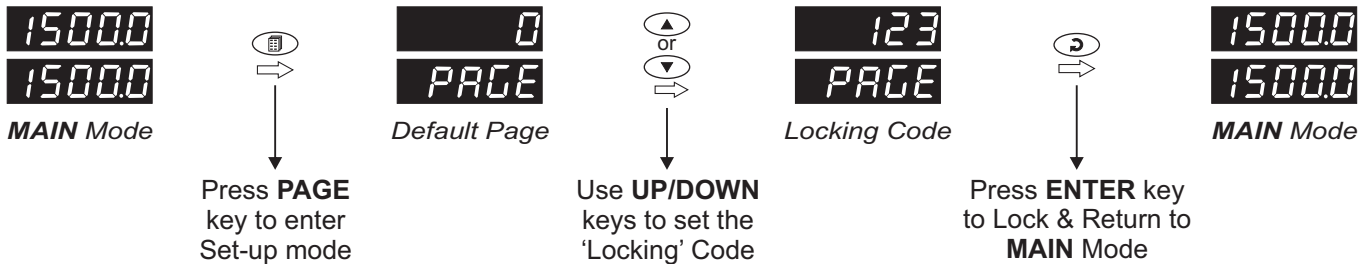
For enabling / disabling the Lock, step through the following sequence:

Locking

1. Press and release PAGE key while the controller is in the MAIN Display Mode. The Lower Readout shows PAGE and the Upper Readout shows 0.
2. Use UP / DOWN keys to set the Page Number to 123 on the Upper Readout.
3. Press and release ENTER key. The controller returns to the MAIN Display Mode with the Lock enabled.

The Figure 3.2 below illustrates the Locking procedure.

Figure 3.2



UnLocking

Repeat the Locking procedure twice for unlocking.

Section 4 CONTROL PARAMETERS

Visit www.ppiindia.net for technical notes on CONTROL and TUNING for detailed understanding of the parameters / terminologies used for describing control parameters in this section.

The parameters presented on PAGE-10 depend upon the type of algorithm selected for the control purpose, viz., On-Off, Pulsed On-Off and PID. The parameter list further extends if the selected control mode is bi-directional (that is, heat-cool control). Refer Table 4.1 for the parameter descriptions and settings.

Table 4.1

Parameter Description	Settings (Default Value)
PROPORTIONAL BAND Pb <i>(Available for PID Control only)</i> Sets proportional gain (% power per unit error). Defined in same units and resolution as that for PV.	0.1 to 999.9 Units (Default : 50.0)
INTEGRAL TIME It <i>(Available for PID Control only)</i> Sets integral time constant in Seconds. Setting the value to 0, cuts-off the integral action.	0 to 3600 Seconds (Default : 100 sec.)
DERIVATIVE TIME dt <i>(Available for PID Control only)</i> Sets derivative time constant in seconds. Setting the value to 0, cuts-off the derivative action.	0 to 600 Seconds (Default : 16 sec.)
CYCLE TIME Ct <i>(Available for PID Control only)</i> Sets the total 'On + Off' time in seconds for time proportional power output through Relay / SSR for OP1.	0.5 to 100.0 Seconds (in steps of 0.5 secs.) (Default : 10.0 sec.)
RELATIVE COOL GAIN rELC <i>(Available for PID Control with bi-directional, that is, Heat-Cool mode)</i> Sets the ratio of cooling power to the heating power.	0.1 to 10.0 (Default : 1.0)
COOL CYCLE TIME CCt <i>(Available for PID Control with bi-directional, that is, Heat-Cool mode)</i> Sets the On + Off cycle time in seconds for time proportional power output through Relay / SSR for OP2.	0.5 to 100.0 Seconds (in steps of 0.5 secs.) (Default : 10.0 sec.)
HYSTERESIS HYSt <i>(Available for On-Off or Pulsed On-Off Control only)</i> Sets differential (dead) band between On-Off switching for OP1.	1 to 999 or 0.1 to 999.9 (Default : 2.0)
PULSE TIME PLt <i>(Available for Pulsed On-Off Control only)</i> Sets the total 'On + Off' pulse time in seconds for Relay / SSR output for OP1.	Pulse ON Time to 120.0 Seconds (Default : 2.0 sec.)

Parameter Description	Settings (Default Value)
(PULSE) ON TIME On.t <i>(Available for Pulsed On-Off Control only)</i> Sets the ON pulse time in seconds for Relay/SSR output for OP1.	0.1 to Value set for Pulse Time (Default : 1.0)
COOL HYSTERESIS CHYS <i>(Available for On-Off or Pulsed On-Off Control with bi-directional mode)</i> Sets differential (dead) band between On-Off switching for OP2.	1 to 999 or 0.1 to 999.9 (Default : 2.0)
COOL PULSE TIME CPLT <i>(Available for On-Off or Pulsed On-Off Control with bi-directional mode)</i> Sets the total 'On + Off' pulse time in seconds for Relay / SSR output for OP2.	Cool ON Time to 120.0 Seconds (Default : 2.0)
COOL (PULSE) ON TIME COnt <i>(Available for On-Off or Pulsed On-Off Control with bi-directional mode)</i> Sets the ON pulse time in seconds for Relay/SSR output for OP2.	0.1 to Value set for Cool Pulse Time (Default : 1.0)
HEAT POWER LOW PL <i>(Available for PID Control only)</i> Sets the minimum % output power limit for OP1.	0 to Heat Power High (Default : 0.0)
HEAT POWER HIGH PH <i>(Available for PID Control only)</i> Sets the maximum % output power limit for OP1.	Heat Power Low to 100.0% (Default : 100.0)
COOL POWER LOW CPL <i>(Available for PID Control with bi-directional, that is, Heat-Cool mode)</i> Sets the minimum % output power limit for OP2.	0 to Cool Power High (Default : 0.0)
COOL POWER HIGH CPH <i>(Available for PID Control with bi-directional, that is, Heat-Cool mode)</i> Sets the maximum % output power limit for OP2.	Cool Power Low to 100.0% (Default : 100.0)

Section 5 ALARM PARAMETERS

Visit www.ppiindia.net for technical notes on ALARM for detailed understanding of the parameters / terminologies used for describing the Alarm parameters in this section.

The parameters required for configuring Alarm-1 and Alarm-2 are grouped on PAGE-11. The configuration includes selecting the type of Alarm, setting the hysteresis value, enabling / disabling start-up Alarm suppression, etc. Refer Table 5.1 for parameter description & settings.

Table 5.1

Parameter Description	Settings (Default Value)
ALARM-1 TYPE AL_1 Select the Alarm-1 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-1.	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">nonE None</div> <div style="display: flex; align-items: center;">P_Lo Process Low</div> <div style="display: flex; align-items: center;">P_hI Process High</div> <div style="display: flex; align-items: center;">dE Deviation Band</div> <div style="display: flex; align-items: center;">bAnd Window Band</div> </div> <p style="text-align: center;">(Default : None)</p>
ALARM-1 SETPOINT A 1SP <i>(Available for Process High or Process Low Alarm-1 Type)</i> Sets Alarm limit independent of control setpoint.	Min. to Max. Range specified for the selected Input Type (Default : Min or Max Range)
ALARM-1 DEVIATION BAND A 1dE <i>(Available for Deviation Band Alarm-1 Type)</i> Sets positive or negative deviation (offset) limit from control setpoint for High or Low Alarm-1 activation, respectively.	-999 to 999 or -999.9 to 999.9 (Default : 5.0)
ALARM-1 WINDOW BAND A 1bA <i>(Available for Window Band Alarm-1 Type)</i> Sets symmetrical positive and negative deviation (offset) limits from control setpoint for both High and Low Alarm-1 activation.	3 to 999 or 0.3 to 999.9 (Default : 5.0)
ALARM-1 HYSTERESIS A 1HY Sets differential (dead) band between Alarm-1 switching ON and OFF states.	1 to 999 or 0.1 to 999.9 (Default : 2.0)
ALARM-1 INHIBIT A 1h Set to Yes to suppress Alarm-1 activation upon power-up or process start-up.	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">no No</div> <div style="display: flex; align-items: center;">YES Yes</div> </div> <p style="text-align: center;">(Default : Yes)</p>

Parameter Description	Settings (Default Value)
<p>ALARM-2 TYPE AL_2</p> <p>Select the Alarm-2 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-2.</p>	<p>nonE None</p> <p>P_Lo Process Low</p> <p>P_hi Process High</p> <p>dE Deviation Band</p> <p>bAnd Window Band</p> <p>(Default : None)</p>
<p>ALARM-2 SETPOINT A2SP</p> <p><i>(Available for Process High or Process Low Alarm-2 Type)</i></p> <p>Sets Alarm limit independent of control setpoint.</p>	<p>Min. to Max. Range specified for the selected Input Type</p> <p>(Default : Min or Max Range)</p>
<p>ALARM-2 DEVIATION BAND A2dE</p> <p><i>(Available for Deviation Band Alarm-2 Type)</i></p> <p>Sets positive or negative deviation (offset) limit from control setpoint for High or Low Alarm-2 activation, respectively.</p>	<p>-999 to 999 or -999.9 to 999.9</p> <p>(Default : 5.0)</p>
<p>ALARM-2 WINDOW BAND A2bA</p> <p><i>(Available for Window Band Alarm-1 Type)</i></p> <p>Sets symmetrical positive and negative deviation (offset) limits from control setpoint for both High and Low Alarm-2 activation.</p>	<p>3 to 999 or 0.3 to 999.9</p> <p>(Default : 5.0)</p>
<p>ALARM-2 HYSTERESIS A2HY</p> <p>Sets differential (dead) band between Alarm-2 switching ON and OFF states.</p>	<p>1 to 999 or 0.1 to 999.9</p> <p>(Default : 2.0)</p>
<p>ALARM-2 INHIBIT A2, h</p> <p>Set to Yes to suppress Alarm-2 activation upon power-up or process start-up.</p>	<p>no No</p> <p>YES Yes</p> <p>(Default : Yes)</p>

Section 6 CONFIGURATION PARAMETERS

The controller is provided with a variety of hardware options and software features to cater to a host of applications. The controller thus needs to be appropriately configured in terms of inputs / outputs and other features like control algorithm, digital filter etc.





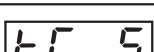
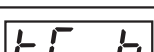

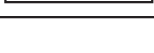
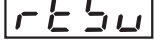



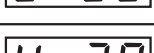
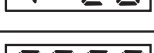


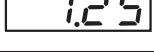
The PAGE-12 presents configuration parameters that are listed below in Table 6.1 .

Table 6.1

Parameter Description	Settings (Default Value)
CONTROL OUTPUT (OP1) TYPE C_OP Select the output type in accordance with the hardware configuration for Output-1 (OP1).	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">rLy Relay</div> <div style="display: flex; align-items: center;">SSr SSR</div> <div style="display: flex; align-items: center;">0-20 0 - 20mA</div> <div style="display: flex; align-items: center;">4-20 4 - 20mA</div> <div style="display: flex; align-items: center;">0-5 0 - 5V</div> <div style="display: flex; align-items: center;">0-10 0 - 10V</div> </div> <p style="text-align: center;">(Default : Relay)</p>
CONTROL ACTION CAct Select appropriate Control Algorithm suited for process requirement.	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">On,OF On-Off</div> <div style="display: flex; align-items: center;">PULS Pulse</div> <div style="display: flex; align-items: center;">PId PID</div> </div> <p style="text-align: center;">(Default : PID)</p>
CONTROL LOGIC CtRL Select Reverse (<i>heat</i> logic) or Direct (<i>cool</i> logic).	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">rEu Reverse</div> <div style="display: flex; align-items: center;">di r Direct</div> </div> <p style="text-align: center;">(Default : Reverse)</p>
INPUT TYPE i nPt Select Input type in accordance with the type of Thermocouple or RTD , sensor or transducer output connected for process value measurement. Ensure proper hardware jumper settings, if required.	Refer Table 6.2 (Default : Type K)
PV RESOLUTION rSLn (Not Available for Thermocouple Inputs) Sets the process value indication resolution (decimal point). All the resolution based parameters (control setpoint, hysteresis, alarm setpoints etc.) then follow this resolution setting.	Refer Table 6.2 (Default : 1)
PV UNITS Un, t (Available for Thermocouple / RTD Inputs) Selects temperature measurement units in °C or °F.	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">°C °C</div> <div style="display: flex; align-items: center;">°F °F</div> </div> <p style="text-align: center;">(Default : °C)</p>

Parameter Description	Settings (Default Value)
PV RANGE LOW r.Lo <i>(Available for DC Linear Inputs)</i> Sets process value corresponding to minimum DC Linear signal input (e.g., 0V, 0mA, 4mA, etc.)	-19999 to PV Range High (Default : 0.0)
PV RANGE HIGH r.hi <i>(Available for DC Linear Inputs)</i> Sets process value corresponding to maximum DC Linear signal input (e.g., 5V, 10V, 20mA, etc.)	PV Range Low to 99999 (Default : 100.0)
SETPOINT LOW LIMIT SP.Lo Sets minimum permissible control setpoint value.	Min. Range to Setpoint High for the selected Input Type (Default : -200.0)
SETPOINT HIGH LIMIT SP.hi Sets maximum permissible control setpoint value.	Setpoint Low to Max. Range for the selected Input Type (Default : 1376.0)
OFFSET FOR PV OFSE This value is algebraically added to the measured PV to derive the final PV that is displayed and compared for alarm / control. Final PV = Measured PV + Offset	-1999 to 9999 or -1999.9 to 9999.9 (Default : 0)
DIGITAL FILTER TIME CONSTANT F.Lt Sets the time constant, in seconds, for the low-pass digital filter applied to the measured PV. The filter helps smoothing/averaging the signal input and removing the undesired noise.	0.5 to 60.0 Seconds (in steps of 0.5 Seconds) (Default : 2.0 sec.)
SENSOR BREAK OUTPUT POWER SB.OP <i>(Available for PID control only)</i> In case of Thermocouple / RTD broken or disconnected, the controller outputs this power value under open loop condition.	0.0 to 100.0 or -100.0 to 100.0 (Default : 0.0)

Table 6.2

Option	What it means	Range (Min. to Max.)	Resolution
	Type J Thermocouple	0.0 to +960.0°C / +32.0 to +1760.0°F	1 °C/°F or 0.1 °C/°F
	Type K Thermocouple	-200.0 to +1376.0°C / -328.0 to +2508.0°F	
	Type T Thermocouple	-200.0 to +385.0°C / -328.0 to +725.0°F	
	Type R Thermocouple	0.0 to +1770.0°C / +32.0 to +3218.0°F	
	Type S Thermocouple	0.0 to +1765.0°C / +32.0 to +3209.0°F	
	Type B Thermocouple	0.0 to +1825.0°C / +32.0 to +3092.0°F	
	Type N Thermocouple	0.0 to +1300.0°C / +32.0 to +2372.0°F	
	Reserved for customer specific Thermocouple type not listed above. The type shall be specified in accordance with the ordered (optional on request) Thermocouple type.		
	3-wire, RTD Pt100	-199 to +600°C / -3280 to +1112°F or -199.9 to +600.0°C / -3280.0 to +1112.0°F	1 °C/°F or 0.1 °C/°F
	0 to 20mA DC current	-19999 to 30000 units	1 0.1 0.01 0.001 units
	4 to 20mA DC current		
	0 to 50mV DC voltage		
	0 to 200mV DC voltage		
	0 to 1.25V DC voltage		
	0 to 5.0V DC voltage		
	0 to 10.0V DC voltage		
	1 to 5.0V DC voltage		

Section 7 SUPERVISORY PARAMETERS

The supervisory level responsibilities include exercising control over operator, making process related decisions and controlling the availability of process data for remote use. The PAGE-13 parameters allow implementation of supervisory level decisions. The Table 7.1 below list supervisory parameters.

Table 7.1

Parameter Description	Settings (Default Value)
SELF-TUNE COMMAND TUNE Set to 'Yes' to initiate a new tuning cycle or set to 'No' to abort a tuning operation in progress.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">no</div> No </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">YES</div> Yes </div> <p style="text-align: center;">(Default : No)</p>
OVERSHOOT INHIBIT OS.I <i>(Available for PID control only)</i> Enabling this feature controls the PV rise or fall upon process start-up in order to reach the control setpoint with as minimum overshoot as possible.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">d5bL</div> Disable </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EnbL</div> Enable </div> <p style="text-align: center;">(Default : Disable)</p>
OVERSHOOT INHIBIT FACTOR OS.I.F <i>(Available for PID control with Overshoot Inhibit enabled)</i> This value governs the effectiveness of Overshoot inhibit feature by controlling the brake applied to the PV rise or fall. Increase the value if overshoot persist. Decrease the value if PV rise / fall has slowed down considerably.	1.0 to 2.0 (Default : 1.0)
AUXILIARY SETPOINT AUSP Supervisory permission for change-over from Main to Auxiliary Setpoint and vice-a-versa.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">d5bL</div> Disable </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EnbL</div> Enable </div> <p style="text-align: center;">(Default : Disable)</p>
RECORDER (RETRANSMISSION) OUTPUT REC Supervisory permission for enabling recorder (retransmission) output.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">d5bL</div> Disable </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EnbL</div> Enable </div> <p style="text-align: center;">(Default : Disable)</p>
SP ADJUSTMENT ON LOWER READOUT SP.Lr Supervisory permission for control setpoint editing on Lower Readout. Set to 'Enable' for permission.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">d5bL</div> Disable </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EnbL</div> Enable </div> <p style="text-align: center;">(Default : Enable)</p>
SP ADJUSTMENT ON OPERATOR PAGE SP.OP Supervisory permission for control setpoint editing on Operator Page. Set to 'Enable' for permission.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">d5bL</div> Disable </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EnbL</div> Enable </div> <p style="text-align: center;">(Default : Enable)</p>

Parameter Description	Settings (Default Value)
MANUAL MODE HAnd Supervisory permission for Manual mode operation. Set to 'Enable' for permission.	d5bL Disable EnbL Enable (Default : Disable)
ALARM SP ADJUSTMENT ON OPERATOR PAGE ALSP Supervisory permission for Alarm setpoint adjustments on Operator Page. Set to 'Enable' for permission.	d5bL Disable EnbL Enable (Default : Disable)
STANDBY MODE Stby Supervisory control over availability of Standby command on Operator Page. 'Enable' for availability.	d5bL Disable EnbL Enable (Default : Disable)
PROFILE ABORT COMMAND ON OPERATOR PAGE Abrt Supervisory control over availability of Profile Abort command on Operator Page. 'Enable' for availability.	d5bL Disable EnbL Enable (Default : Disable)
BAUD RATE baud Communication speed in 'Bits per Second'. Set the value to match with the host baud rate.	4.8 4800 9.6 9600 19.2 19200 38.4 38400 57.6 57600 (Default : 9.6)
COMMUNICATION PARITY PAR. One of the communication error trapping features. Select the data packet parity as implemented by the host protocol.	nOnE None EvEn Even Odd Odd (Default : Even)
CONTROLLER ID NUMBER id Unique numeric code assigned to the controller for identification by the host. Set the value as required by the host.	1 to 127 (Default : 1)
COMMUNICATION WRITE ENABLE CoñE Setting to 'No' disallows the host to set / modify any parameter value. The host, however, can read the value.	no No yEs Yes (Default : No)

Section 8 PROFILE PARAMETERS

The Section is not applicable (and the parameters are not available) if the controller is order with 'User Linearisation' feature.

The profile utility requires profile configuration and profile settings. Also, the utility facilitates viewing the various status related information and allows on-line alterations of the operation parameters. To simplify profile operation, the rather large list of parameters has been split in multiple pages as under.

PAGE-16 : Profile Configuration

Configure profile for the number of segments, number of cycles (repeats), output status upon profile completion and power fail recovery method. (Refer Table 8.1).

PAGE-14 : Profile Settings

Set individual profile segment for the Target Setpoint, Time Interval, Holdback Type and Holdback Value. (Refer Table 8.2).

PAGE-1 : Status Information & On-Line Alterations

(Note : The front panel PRF key can be used as a short-cut to access PAGE-1).

View the current status of a running profile such as, the Segment Type in progress, the current Ramp Setpoint Value, the balance Soak Time, the number of repeats remaining, etc. (Refer Table 8.3).

The profile facilitates altering the running segment of the profile for the current execution without affecting the profile settings on PAGE-14. That is, the changes made to the parameter values become applicable for the current execution of the segment only. This allows adjusting the profile, if required, in accordance to some unexpected process changes. (Refer Table 8.4).






PAGE-2 : Profile Commands

(Note : The front panel CMD key can be used as a short-cut to access PAGE-2. Refer "Section 2 : Basic Operations" for parameter listing and definitions).

Start a new profile cycle or abort a running profile cycle. Also, a running segment can be paused or skipped.

Profile Configuration Parameters : PAGE 16

Table 8.1

Parameter Description	Settings (Default Value)
PROFILE MODE SELECTION  Enable or Disable the setpoint profile feature. <i>Disabling the feature will suppress all other profile related parameters.</i>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;"></div> Disable </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;"></div> Enable </div> (Default : Disable) </div>
NUMBER OF SEGMENTS  Set the number of segments to constitute the setpoint profile.	1 to 16 (Default : 16)
NUMBER OF REPEATS  Set the number of times the profile is to be repeated before end of profile. The last segment of the profile cycle is followed by the first segment for the next repeat.	1 to 9999 (Default : 1)

Parameter Description	Settings (Default Value)
COMMON HOLDBACK [Ca.Hb] The profile allows either <i>Common</i> or <i>Independent</i> Holdback type and value for each of the profile segments. Set this parameter to 'Yes' if common settings are desired for the Holdback feature.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">no</div> No </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">YES</div> Yes </div> <p>(Default : Yes)</p> </div>
OUTPUT OFF [OP.OF] Set to 'Yes' if after the end of profile, all the control outputs are to be <i>forced Off</i> till the issuance of next profile Start command.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">no</div> No </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">YES</div> Yes </div> <p>(Default : No)</p> </div>
POWER FAIL STRATEGY [Pr.FL] Selecting Abort shall terminate a running profile in case of power failure. Selecting Continue shall resume (a) the ramp segment execution with the profile setpoint prevailing at the time of power failure. (b) the soak segment execution for the balance time.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">Abt</div> Abort </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">Cont</div> Continue </div> <p>(Default : Continue)</p> </div>

Profile Setting Parameters : PAGE 14

Table 8.2

Parameter Description	Settings (Default Value)
SEGMENT NUMBER [SEG.n] Select profile segment number for editing the Target Setpoint / Time Interval values.	1 to 16 (Default : 1)
TARGET SETPOINT [t.SP] Set the Target (End) value for the selected profile segment number.	Min. to Max. Range specified for the selected Input Type (Default : -199)
TIME INTERVAL [t.inE] Set the time duration of ramping or soaking for the selected profile segment number.	0 to 9999 Minutes (Default : 0)
HOLDBACK TYPE [Hb.tY] Disable the Holdback Band or set the scope (up, down or both) for the profile holdback feature.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">none</div> None </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">UP</div> Up </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">dn</div> Down </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">both</div> Both </div> <p>(Default : None)</p> </div>
HOLDBACK VALUE [Hb.vL] Set the band (deviation from profile setpoint) value for the profile holdback feature.	1 to 999 (Default : 1)

Table 8.3

PAGE 1 ('CMD' Key)	
Profile Status Information	
Lower Readout Prompt	Upper Readout Information
A.SEG	ACTIVE SEGMENT NUMBER The current profile segment (ramp / soak) is in progress, 1 to 16.
S.TYP	SEGMENT TYPE RAMP The current segment is Ramp. SOAK The current segment is Soak.
t.SP	TARGET SETPOINT Target setpoint value for the current segment.
r.SP	RAMPING SETPOINT The instantaneous Ramping Setpoint value, if the current segment type is Ramp.
t.t̄	BALANCE TIME The remaining time, in minutes, that the current segment shall take for completion.
b.rPt	BALANCE REPEATS The remaining profile repeats.

Table 8.4

PAGE 1 ('CMD' Key)	
On-Line Alterable Parameters	
Parameter	Effect on the running segment
t̄.t̄E TIME INTERVAL	The time interval for a <i>Ramp</i> segment actually determines the RATE at which the setpoint steps towards the target setpoint. Thus, altering the time interval shall immediately affect the 'Ramp Rate' for the current segment. If the time interval is modified for the <i>Soak</i> segment then the elapsed time so far is ignored and the soak timer starts counting down to 0 from the altered time interval value.
Hb.ty HOLDBACK TYPE	The modified Holdback Band Type is applied immediately on the current segment.
Hb.vL HOLDBACK VALUE	The modified Holdback Band Value is applied immediately on the current segment.

Note: The 'Profile Status' and 'On-Line Alterable' parameters are presented in a sequence.

Section 9 OP2, OP3, OP4 & OP5 PARAMETERS

The controller is supplied with four optional hardware plug-in modules, viz., OP2, OP3, OP4 & OP5 .

The OP2 module is factory configured for either Relay / SSR (jumper selectable) or DC Linear Voltage or DC Linear Current. It can be programmed to function as Event Output for End-of-Profile or Cool Control Output for Bi-directional Control.

The OP3 module is supplied as Relay / SSR (jumper selectable) and can be programmed to function as Alarm-1 Output or Event Output for End-of-Profile.

The OP4 module is supplied as Relay / SSR (jumper selectable) and can be programmed to function as Alarm-2 Output.


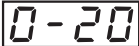





The OP5 module is supplied as DC Linear Voltage or DC Linear Current and can be programmed to function as PV / SP Retransmission Output.

The Table 9.1 below lists the parameters for various outputs depending upon the function selected.

Table 9.1

Parameter Description	Settings (Default Value)
<p>OUTPUT-2 FUNCTION SELECTION OP2F</p> <p><i>(Applicable for OP2 hardware module)</i> Select the function / feature for which the OP2 module is to be used.</p>	<p>nonE None</p> <p>EOP End Of Profile</p> <p>CCon Cool Control</p> <p>(Default : None)</p>
<p>OUTPUT-2 TYPE OP2t</p> <p>Select type for Output-2 (OP2) in accordance with the hardware module fitted and / or the jumper settings.</p>	<p>rLY Relay</p> <p>SSr SSR</p> <p>0-20 0 - 20mA</p> <p>4-20 4 - 20mA</p> <p>0-5 0 - 5V</p> <p>0-10 0 - 10V</p> <p>(Default : Relay)</p>
<p>OP2 EVENT STATUS 02ES</p> <p><i>(Available if OP2 function is End of Profile)</i> Selecting 'ON' keeps the OP2 OFF while profile is in progress and turns ON at the end of profile.</p> <p>Selecting 'OFF' keeps the OP2 ON while profile is in progress and turns OFF at the end of profile.</p>	<p>On ON</p> <p>OFF OFF</p> <p>(Default : ON)</p>
<p>OP2 EVENT TIME 02Et</p> <p><i>(Available if OP2 function is End of Profile)</i> Set the time (in selected units) for which the OP2 status after the End of Profile is to be maintained. (For indefinite time interval, set the value to 0).</p>	<p>0 to 9999</p> <p>(Default : 0)</p>

Parameter Description	Settings (Default Value)
OP2 EVENT TIME UNITS 02.UT <i>(Available if OP2 function is End of Profile)</i> Select time units for the parameter 'OP2 Event Time'.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">SEC</div> Seconds </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">n in</div> Minutes </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">Hour</div> Hours </div> </div> (Default : Seconds)
OUTPUT-3 FUNCTION SELECTION OP3F <i>(Applicable for OP3 hardware module)</i> Select the function / feature to which the OP3 module is to be logically attached for activation.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">none</div> None </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">ALr n</div> Alarm </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">EOP</div> End Of Profile </div> </div> (Default : Alarm)
ALARM-1 LOGIC A1LG <i>(Available if OP3 function is Alarm)</i> Select 'Normal' if Alarm-1 is to activate an Audio / Visual alarm. Select 'Reverse' if Alarm-1 is to Trip the system.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">norm n</div> Normal </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">rEv</div> Reverse </div> </div> (Default : Normal)
OP3 EVENT STATUS 03ES <i>(Available if OP3 function is End-of-Profile)</i> Definition same as OP2 Event Status .	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">On</div> ON </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">OFF</div> OFF </div> </div> (Default : ON)
OP3 EVENT TIME 03Et <i>(Available if OP3 function is End of Profile)</i> Definition same as OP2 Event Time.	0 to 9999 (Default : 0)
OP3 EVENT TIME UNITS 03.UT <i>(Available if OP3 function is End of Profile)</i> Definition same as OP2 Event Time Units.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">SEC</div> Seconds </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">n in</div> Minutes </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">Hour</div> Hours </div> </div> (Default : Seconds)
ALARM-2 LOGIC A2LG <i>(Applicable only if OP4 module fitted)</i> Select 'Normal' if Alarm-2 is to activate an Audio / Visual alarm. Select 'Reverse' if Alarm-2 is to Trip the system.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">norm n</div> Normal </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">rEv</div> Reverse </div> </div> (Default : Normal)
RECORDER TRANSMISSION TYPE trnS <i>(Available if OP3 function is recorder)</i> Select the parameter (process value or setpoint) which is to be transmitted for remote recording / control.	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">Pv</div> Process Value </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">SP</div> Setpoint </div> </div> (Default : Process Value)

Parameter Description	Settings (Default Value)
<p>RECORDER OUTPUT TYPE </p> <p><i>(Available if OP3 function is recorder)</i> Select type for Output-3 (OP3) in accordance with the hardware module fitted.</p>	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 2px;"> 0 - 20 mA</div> <div style="display: flex; align-items: center; margin-bottom: 2px;"> 4 - 20 mA</div> <div style="display: flex; align-items: center; margin-bottom: 2px;"> 0 - 5 Volts</div> <div style="display: flex; align-items: center; margin-bottom: 2px;"> 0 - 10 Volts</div> <p>(Default : 0 to 20 mA)</p> </div>
<p>RECORDER LOW </p> <p><i>(Available if OP3 function is recorder)</i> Set the minimum parameter value (SP or PV) that shall correspond to the minimum recorder output signal level (0mA or 4 mA or 0V).</p>	<p>Min. to Max. Range Specified for the Selected Input Type (Default : -199)</p>
<p>RECORDER HIGH </p> <p><i>(Available if OP3 function is recorder)</i> Set the maximum parameter value (SP or PV) that shall correspond to the maximum recorder output signal level (20mA or 10 V or 5V).</p>	<p>Min. to Max. Range Specified for the Selected Input Type (Default : 1376)</p>



Section 10 USER LINEARISATION PARAMETERS

The Section is applicable (and the parameters are available) only if the controller is order with 'User Linearisation' feature.

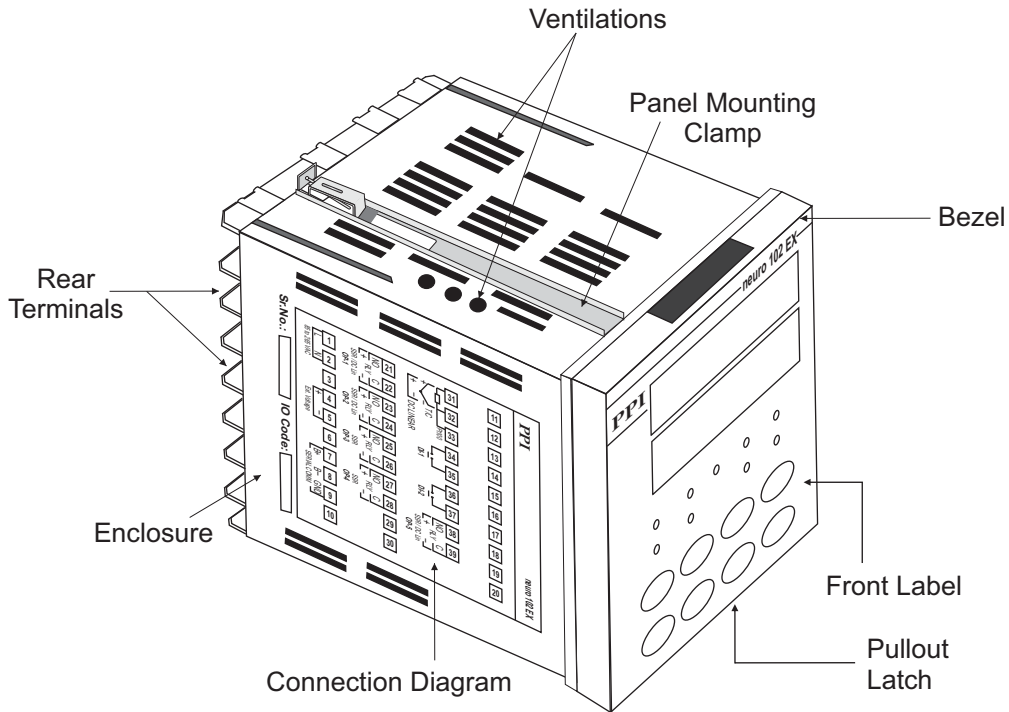
The parameters listed on this page are used to implement the linearisation curve on the process value represented by the DC linear output of a transmitter. The parameters affect the measured PV only if the 'User Linearisation' feature is 'Enabled' and if the input type is DC Linear. That is, the PV measured using thermocouple or RTD is not affected by the linearisation parameters. The Table 10.1 below lists the user linearisation parameters.

Table 10.1

Parameter Description	Settings (Default Value)
CODE CODE Protection password for access to the linearisation related parameters.	0 to 9999 (Default : 0)
USER LINEARISATION U.L.in Enable / Disable user linearisation feature.	d5bL Disable EnbL Enable (Default : Disable)
TOTAL BREAK POINTS Pnt5 Select number of segments for the purpose of input PV curve linearisation by setting the number of total break points.	1 to 32 (Default : 2)
BREAK POINT NUMBER Co.or Select the break point for which the X, Y co-ordinates are to be set.	1 to 32 (Default : 1)
ACTUAL VALUE FOR BREAK POINT (X CO-ORD) APnt Set the actual measured (X co-ordinate) value.	-1999 to 9999 (Default : Undefined)
DERIVED VALUE FOR BREAK POINT (Y CO-ORD) dPnt Set the computed or derived (Y co-ordinate) value.	-1999 to 9999 (Default : Undefined)

Section 11 HARDWARE ASSEMBLY AND CONFIGURATIONS

Figure 11.1



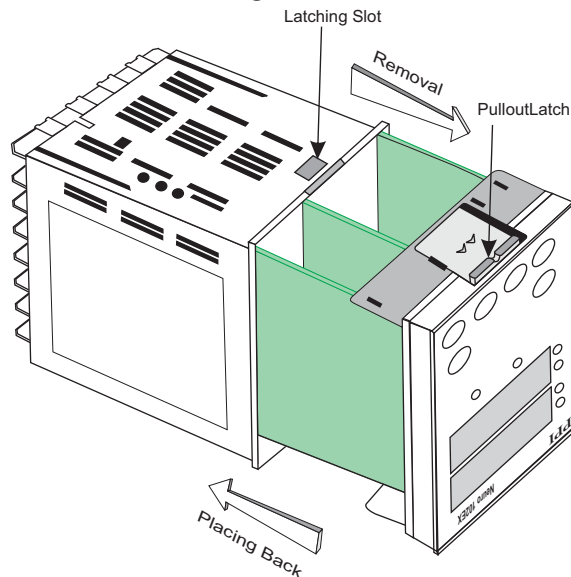
The Figure 11.1 above shows the controller outer-case viewed with front label upright.

ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 4 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the left, Power-supply PCB is to the right, Output PCB is in the center and the Display PCB is behind the bezel.

The electronic assembly can be removed from the plastic enclosure and placed back as described and illustrated in Figure 11.2.

Figure 11.2

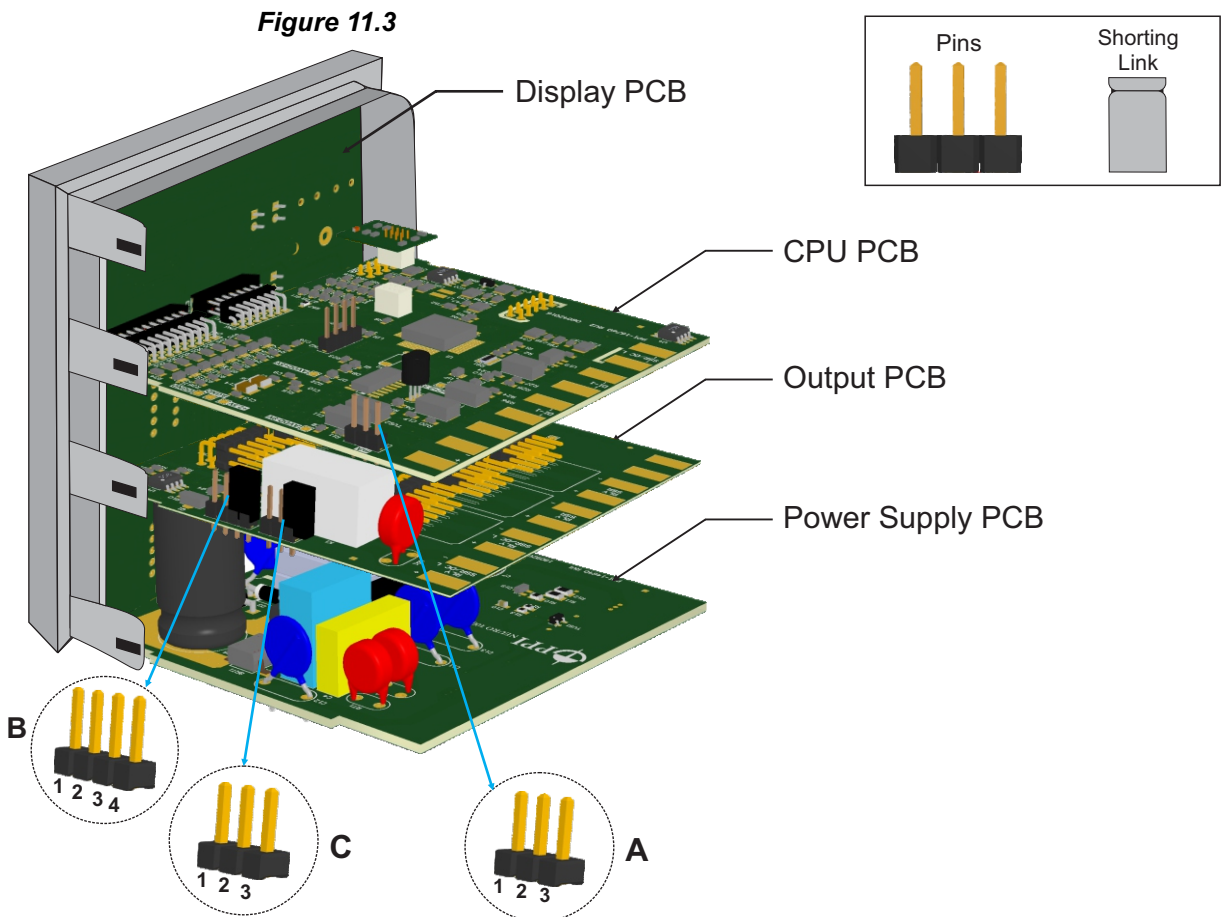


Removing Assembly from Enclosure

Hold the controller upside down and press the pullout latch to unlock the front bezel from the enclosure (Refer Figure 11.2). Pull the bezel outward. The electronics assembly comes out with the bezel.

Placing Assembly Back into Enclosure

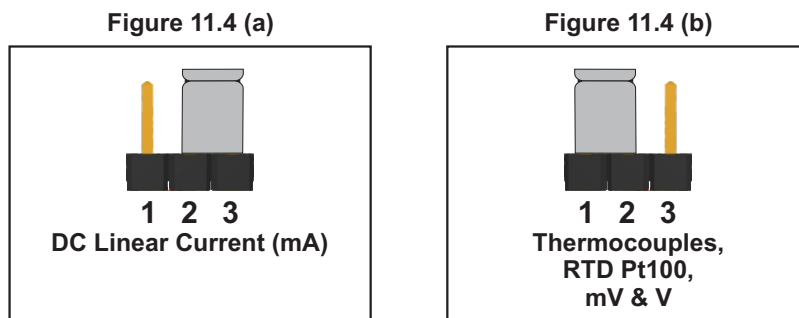
Hold the Enclosure and the Bezel such that the Latching Slot on the Enclosure and the Pullout Latch on the Bezel face upward (See Figure 11.2). Insert the bezel gently into the Enclosure Until the Bezel snap fits.



INPUT : Jumper Settings

In addition to parameter setting, the Input Type selection also requires proper jumper settings. For the jumper settings; Pins & Shorting-Link arrangement, marked 'A', is provided on the CPU PCB as shown in Figure 11.3.

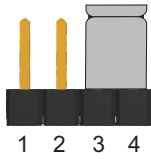
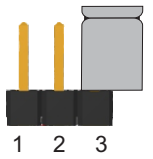
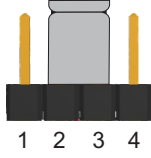
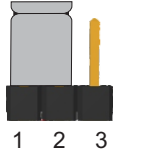
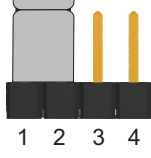
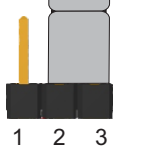
For DC Linear Current Inputs (0-20mA or 4-20mA), short Pins 2 & 3 using Shorting-Link as shown in Figure 11.4 (a). For all other Input types, short Pins 1 & 2 using Shorting-Link as shown in Figure 11.4 (b).



OUTPUT-1 : Jumper Settings

The Output-1 Type is user selectable as Relay, SSR, DC Volts or DC Current. Besides the parameter settings, the Output-1 configuration requires proper jumper settings. The jumper settings are provided as Pins & Shorting Link arrangement (marked 'B' & 'C') on Output PCB, as shown in Figure 11.3 and listed in Table 11.1 below.

Table 11.1 : Output-1 Jumper Settings

Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		
DC Linear Current (or Voltage)		

OUTPUT PLUG-IN MODULES (OP2, OP3, OP4 & OP5)

The controller supports 3 types of 'Plug-in Modules' that can be used as outputs OP2, OP3, OP4 & OP5. The 3 types are; (a) Relay /SSR Module, (b) DC Linear Voltage Module and (c) DC Linear Current Module. Each Module is provided with two 10-Pin Female Sockets that can directly fit into corresponding male plugs provided on either *Output PCB (OP2, OP3 & OP4)* or *CPU PCB (OP5)*. Refer Figure 11.5(a) & 11.5(b). These modules are either pre-fitted while the controller is shipped from the factory or can be fitted later by the user.

The Figure 11.5(a) shows two 10 Pin Female Sockets mounted on the bottom side of the output modules. The Figure 11.5(b) shows two 10 Pin Male Plugs Mounted on the CPU & Output PCBs.

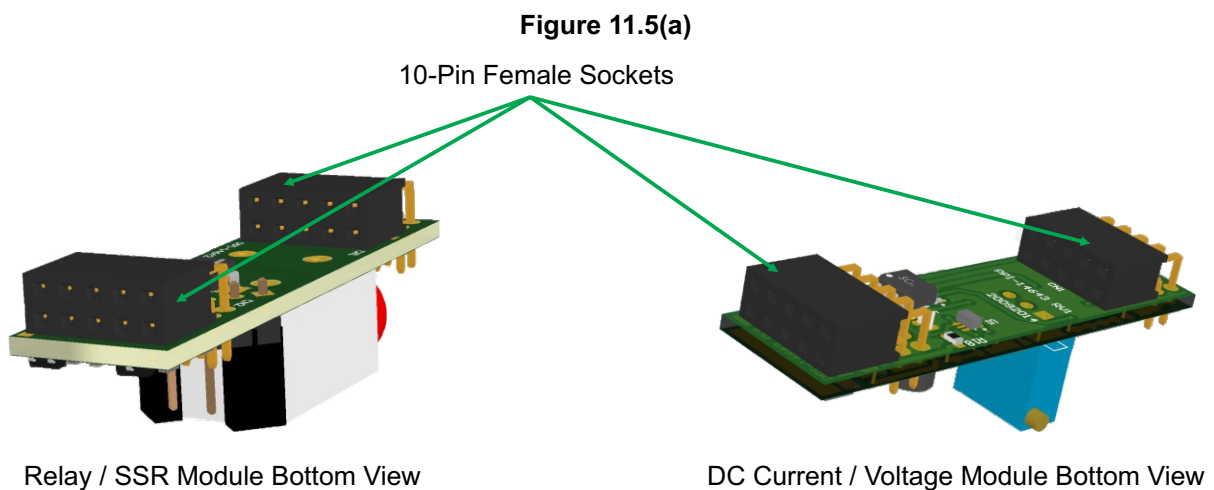
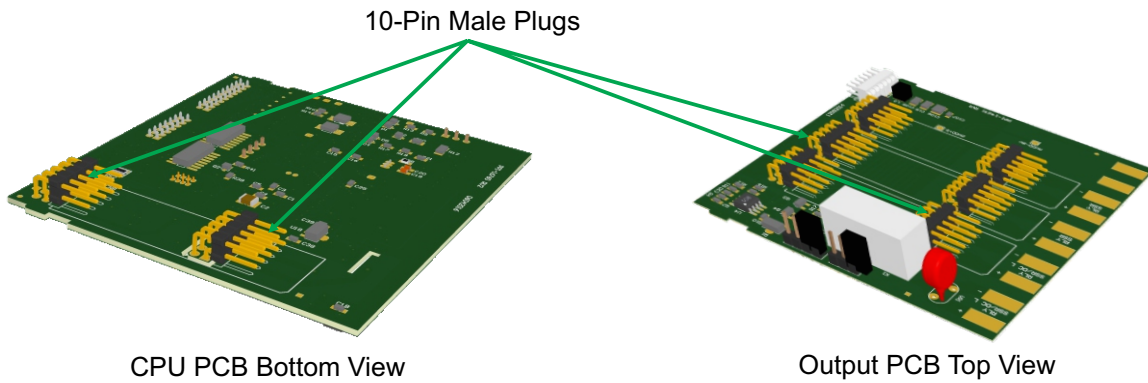


Figure 11.5(b)



Push the modules towards front for mounting and pull the modules towards back for removal.

(a) Relay/SSR Module

The Relay/SSR Module is supported by OP2, OP3 & OP4. The module can be configured to function as either Relay or SSR output by appropriate jumper settings 'A' & 'B' as shown in Figure 11.6 and Table 11.2 below. Use *Shorting - Link* for jumper settings.

Figure 11.6

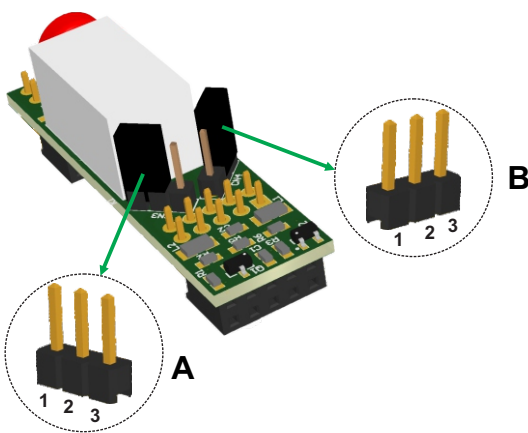


Table 11.2

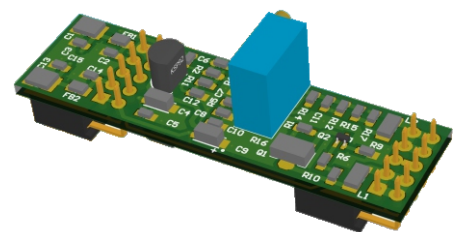
Output Type	Jumper Setting - A	Jumper Setting - B
Relay		
SSR		

(b) DC Linear Voltage Module

(c) DC Linear Current Module

The DC Linear Module, shown in Figure 11.7, is factory configured for either Current or Voltage output and is supported by OP2 & OP5. The DC Current Module can be configured to output either 0-20 mA or 4-20 mA by appropriate parameter setting. Similarly, the DC Voltage Module can be configured to output either 0-5 V or 0-10 V by appropriate parameter settings.

Figure 11.7

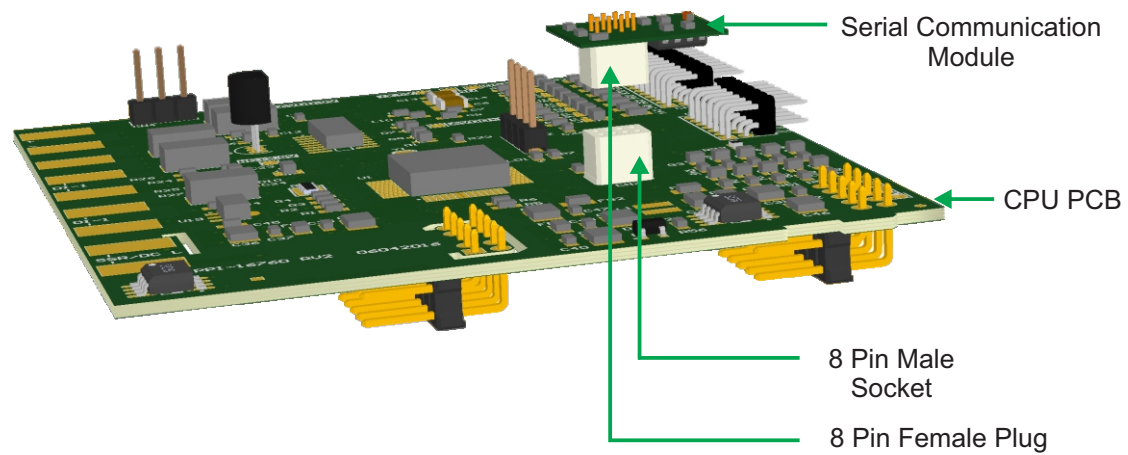


Serial Communication Plug-in Module

The 8-Pin miniature Male Plug for mounting the Serial Communication Module is located on the CPU PCB, as shown in the Figure 11.8 below. The Serial Communication Module is provided with 8-Pin miniature female sockets on the bottom side for the mounting purpose. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Mounting Serial Communication Module

Figure 11.8



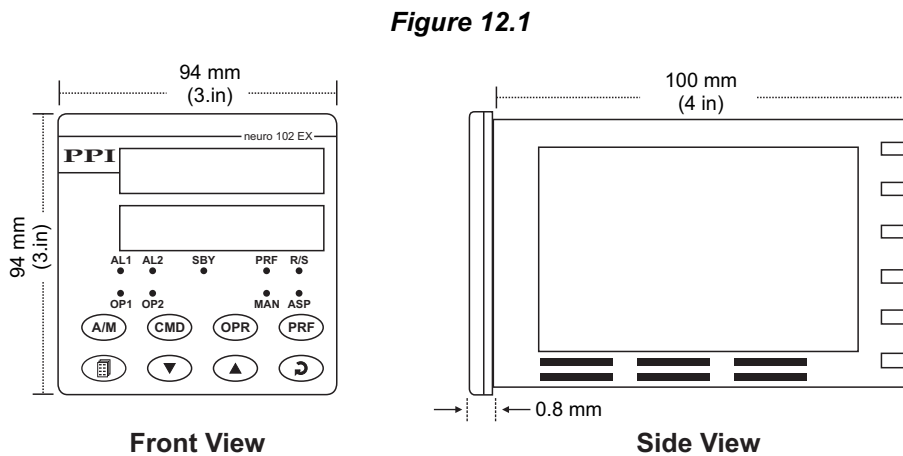
Section 12 MECHANICAL INSTALLATION

The following precautions should be strictly observed while installing the controller:

1. The place of installation should be free of corrosive/combustible gases and electrically conductive pollution.
2. Ensure that the place of installation is not subject to rapid ambient changes that can cause condensation. Also the Ambient Temperature and Relative Humidity surrounding the controller should not exceed the maximum specified for the proper operation of the controller.
3. The place of installation should be adequately protected against excessive electrostatic or electromagnetic interference.
4. The controller should not be subject to direct vibration or shock.
5. The controller should not be exposed to dust, salt air, direct sunlight or radiant heat.

OUTER DIMENSIONS

The Figure 12.1 shows the outer dimensions of the controller.



PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 12.2 shows the panel cutout requirements for a single controller and also the minimum spacing recommended if several controllers are required to be mounted on a single panel.

PANEL MOUNTING

Follow the steps below for mounting the controller on panel:

1. Prepare a square cutout to the size shown in Figure 12.2.
2. Remove the Mounting Clamps from the controller Enclosure.
3. Insert the rear of the controller housing through the panel cutout from the front of the mounting panel.
4. Hold the controller gently against the mounting panel such that it positions squarely against the panel wall, see Figure 12.3. Apply pressure only on the bezel and not on the front label.
5. Fix the Mounting Clamps (one after the other) such that the metallic projection fits in the square hole provided on the top and bottom sides of the enclosure. Tighten the clamp screw until the clamps firmly secures against the panel wall.

Figure 12.2

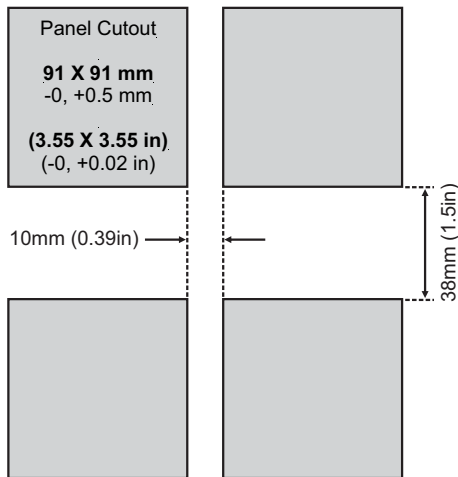
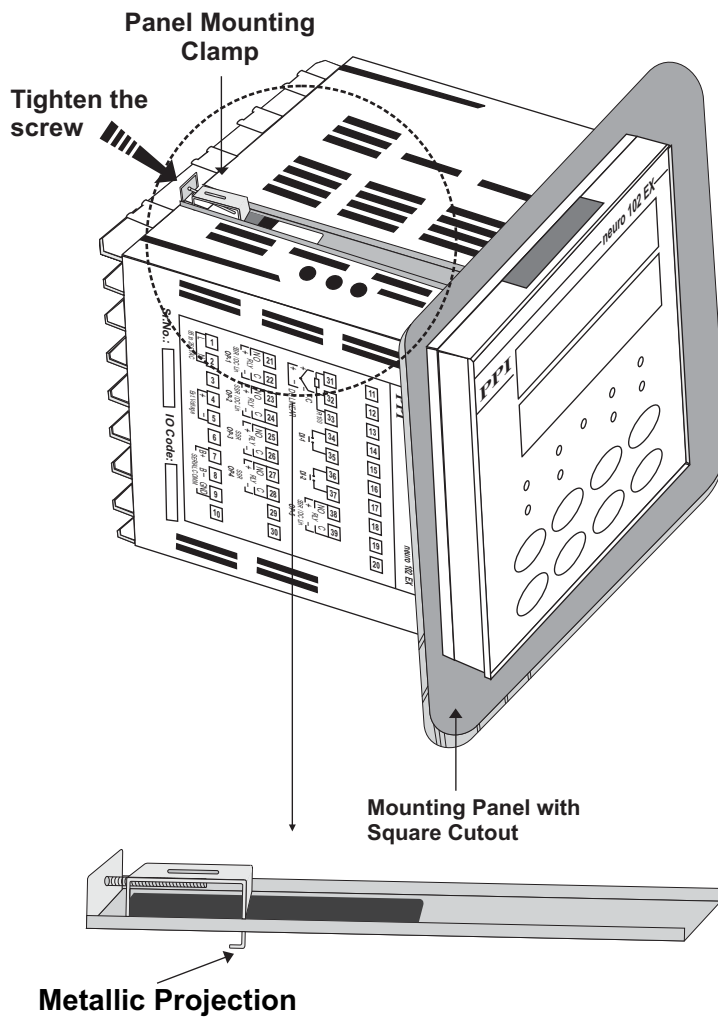
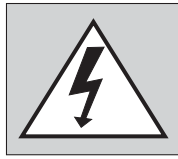


Figure 12.3



Section 13 ELECTRICAL CONNECTIONS



WARNING
MISHANDLING / NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

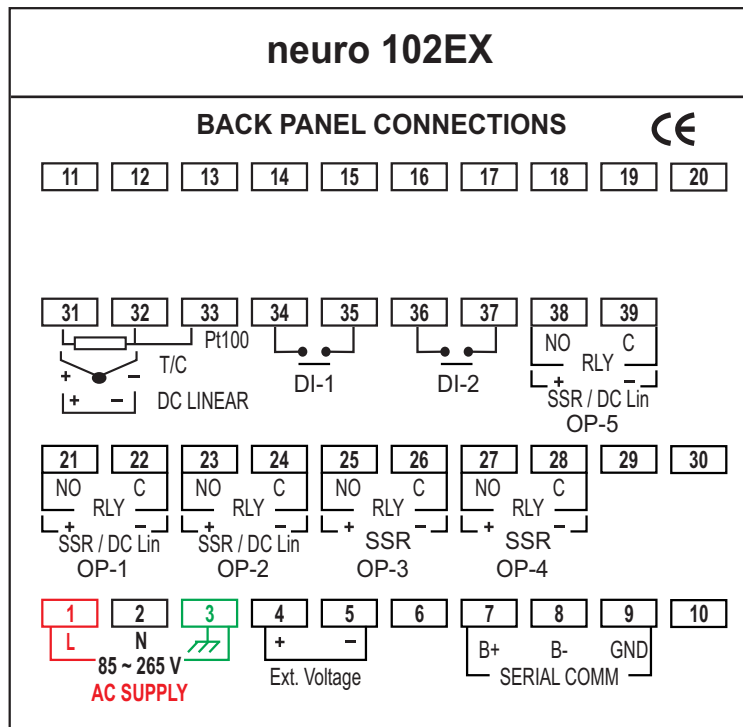
1. The user must rigidly observe the Local Electrical Regulations.
2. Do not make any connections to the unused terminals for making a tie-point for other wires (or for any other reasons) as they may have some internal connections. Failing to observe this may result in permanent damage to the controller.
3. Run power supply cables separated from the low-level signal cables (like Thermocouple, RTD, DC Linear Current/Voltage, etc.). If the cables are run through conduits, use separate conduits for power supply cable and low-level signal cables.
4. Use appropriate fuses and switches, wherever necessary, for driving the high voltage loads to protect the controller from any possible damage due to high voltage surges of extended duration or short-circuits on loads.
5. Take care not to over-tighten the terminal screws while making connections.
6. Make sure that the controller supply is switched-off while making/removing any connections or removing the controller from its enclosure.

CONNECTION DIAGRAM

The Electrical Connection Diagram is shown on the left side of the controller enclosure. The diagram shows the terminals viewed from the REAR SIDE with the controller label upright. The Connection Diagram is a generic one; the connections shown for optional modules are applicable only if the modules are fitted.

The rear panel electrical wiring connection diagram is shown in Figure 13.1 below.

Figure 13.1



DESCRIPTIONS

The back panel connections are described as under:

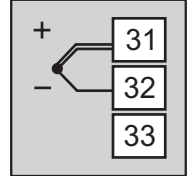
INPUT (Terminals : 1, 2, 3)

The controller accepts Thermocouples (J, K, T, R, S, B, N), 3-wire RTD Pt100 and DC Linear Current/Voltage (mV/V/mA) as input.

Thermocouple

Connect Thermocouple Positive (+) to terminal 31 and Negative (-) to terminal 32 as shown in Figure 13.2 (a). Use the correct type of Thermocouple extension lead wires or compensating cable for the entire distance ensuring the correct polarity throughout. Avoid joints in the cable.

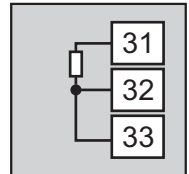
Figure 13.2 (a)



RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal 31 and the double leaded ends to terminal 32 and 33 (interchangeable) as shown in Figure 13.2 (b). 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.

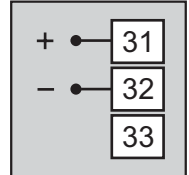
Figure 13.2 (b)



DC Linear Voltage (mV / V)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mV / V source. Connect common (-) to terminal 32 and the signal (+) to terminal 31, as shown in Figure 13.2 (c).

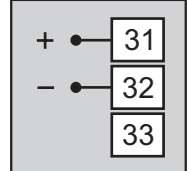
Figure 13.2 (c)



DC Linear Current (mA)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mA source. Connect common (-) to terminal 32 and the signal (+) to terminal 31, as shown in Figure 13.2 (d).

Figure 13.2 (d)



Make sure that the Jumper Pins for Input selection are shorted using the Shorting-Link (Refer Section 11 Hardware Assembly and Configurations, Input-Jumper Settings).

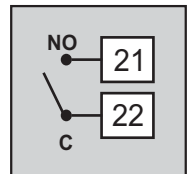
OUTPUT-1 (Terminals 21 & 22)

The Output-1 can be configured (through jumper settings) as either Relay, SSR Drive or DC Linear Current (or Voltage).

Relay

Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 2A/240 VAC (resistive load) are provided as Relay output. Use external auxiliary device like contactor with appropriate contact rating for driving the actual load.

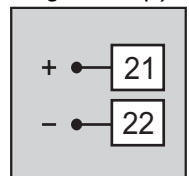
Figure 13.3 (a)



Drive for SSR

DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to controller terminals 21 and 22, respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR, rated approximately 1.5 times the actual load rating. Use appropriate Heat Sink for load rating exceeding 10A.

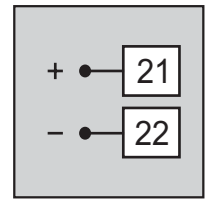
Figure 13.3 (b)



DC Linear Current / Voltage Output

The DC Linear (0/4-20 mA) Current or (0-5/10V) Voltage output is also available at Terminal 21 (+) and Terminal 22 (-) if the Output-1 is configured for DC Linear.

Figure 13.3 (c)

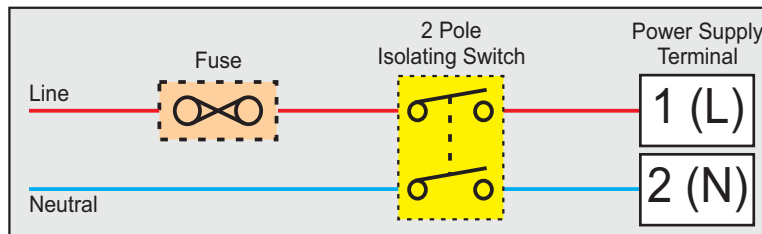



- OUTPUT-2** (Terminals 23 & 24) **OUTPUT-3** (Terminals 25 & 26)
- OUTPUT-4** (Terminals 27 & 28) **OUTPUT-5** (Terminals 38 & 39)

The Output-2, Output-3, Output-4 and Output-5 are available through plug-in modules. The modules are factory configured for either Relay / SSR or DC Linear Voltage or DC Linear Current. The connection descriptions are the same as those described for Output-1.

POWER SUPPLY (Terminals 1 & 2)

Figure 13.4



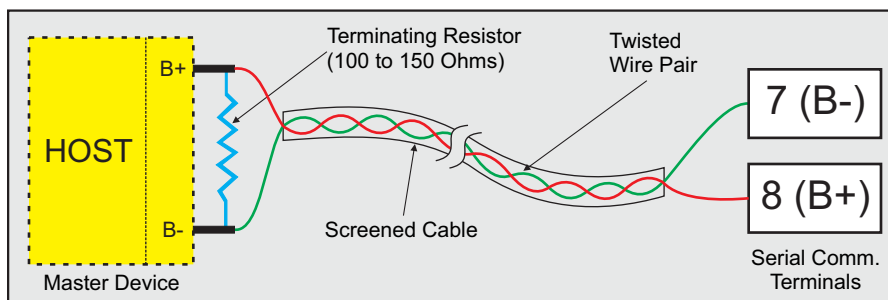


Caution The controller is designed for installation in an enclosure which provides adequate protection against electric shock. Local regulations regarding electrical installation should be rigidly observed. Consideration should be given to prevention of access to the Power Supply terminals by unauthorized personnel.

As standard, the controller is supplied with power connections suited for 85 to 264 VAC line supply. Use well-insulated copper conductor wire of the size not smaller than 0.5mm² for power supply connections. Connect Line (Phase) supply line to terminal 1 and the Neutral (Return) supply line to terminal 2 as shown in Figure 13.4. The controller is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

SERIAL COMMUNICATION PORT (Terminals 7 & 8)

Figure 13.5



If the Optional plug-in communication board is fitted, connect terminal 7 and 8 of the controller to (+) and (-) terminals of the Master device.

For reliable noise free communication, use a pair of twisted wires inside screened cable as shown in Figure 13.5. The wire should have less than 100 ohms / km nominal DC resistance (Typically 24 AWG or thicker). Connect the terminating resistor (Typically 100 to 150 ohms) at one end to improve noise immunity.

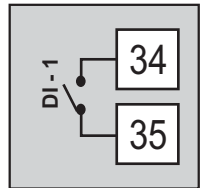
DIGITAL INPUT FOR AUXILIARY SP SELECTION (Terminals 34 & 35)

The Digital Input-1(DI-1) is a potential-free contact closure input provided for connecting a remote switch for the purpose of toggling between the Main and Auxiliary Setpoints.

Switch OPEN : Main SP selected

Switch CLOSE : Auxiliary SP selected

Figure 13.6

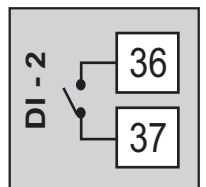


DIGITAL INPUT FOR PROFILE START COMMAND (Terminals 36 & 37)

(This Digital Input is non functional if the controller is order with 'User Linearisation' feature.)

The Digital Input-2(DI-2) is a potential-free contact closure input provided for connecting a remote switch for the purpose of issuing the Profile START command. An 'OPEN' to 'CLOSE' change over of the contacts causes a Profile to start. Once the Profile starts, the change in the contact status has no effect.

Figure 13.7



APPENDIX-A

MODBUS COMMUNICATION ADDRESSES

Notes :

1. Protocol implemented : Modbus RTU over Serial.
2. All controller parameters/variables are implemented using INPUT or HOLDING Registers. DISCRETE INPUT and COILS not implemented.
3. Both Input and Holding registers are assigned unique ModbusAddresses, starting from 1.
4. The following 4 functions are supported :
 - Function Code 3 : Read Multiple Holding Registers
 - Function Code 4 : Read Multiple Input Registers
 - Function Code 6 : Write Single Holding Register
 - Function Code 16 : Write Multiple Holding Registers
5. Response Time : 400 milliseconds, max.
6. While writing multiple holding registers, a register having invalid (out of range) data value may result in partial writing. That is, all the registers with valid data upto the register with invalid data get successfully written before the error response is sent.
 For example: Consider a data packet with Start Address 10 & Quantity 12. Assume register having Address 16 has invalid data. The controller successfully writes and stores the values for Registers having addresses from 10 to 15. Upon validating Register having Address 16, the controller responds with an EXCEPTION ERROR (error #3).
7. An attempt to write an Input Register (Read Only) results in 'Function Code Exception Error' (error #1).
8. If the controllers serial port is configured as Read Only (using the parameter 'Comm. Write Enable'), the controller returns 'Device Exception Error' (error #4) if an attempt is made to write any registers.
9. The protocol only supports Integer values (fractional values not supported). Make use of the 'Resolution' parameter value for the interpretation of *Resolution Based Parameters* such as Process Value, Setpoints etc. For e.g. An Integer value that reads 1000 should be interpreted as 10.00 if the resolution is 0.01 and as 100.0 if the resolution is 0.1. Similarly, write a value of 1000 if setting 10.00 (0.01 resolution) and write a value 100 if setting 10.0 (0.1 resolution).

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
1	Input	1 : Modified 0 : Not Modified
Slave side Parameter modify flag		
2	Input	<i>Resolution Based Parameter</i> Error Condition:- Open: 32767 Under-range: -32768 Over-range: 32752 Normal Condition:- Min, to Max. Range specified or the selected Input Type
Process Value		
3	Input	1 : On 0 : Off
Alarm-1 Status		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
<input type="text" value="4"/>	<input type="text" value="Input"/>	1 : On 0 : Off
Alarm-2 Status		
<input type="text" value="5"/>	<input type="text" value="Input"/>	-20.0°C to 80.0°C
Ambient Temperature in °C Integer value to be interpreted with fixed 0.1 resolution. e.g. Interpret 300°C as 30.0°C.		
<input type="text" value="6"/>	<input type="text" value="Input"/>	1 : On 0 : Off
Output-1 Status		
<input type="text" value="7"/>	<input type="text" value="Input"/>	1 : On 0 : Off
Output-2 Status		
<input type="text" value="8"/>	<input type="text" value="Input"/>	-100.0 % to 100.0 %
Control Output Power Integer value to be interpreted with fixed 0.1 resolution. e.g. Interpret 526 as 52.6%.		
<input type="text" value="9"/>	<input type="text" value="Input"/>	1 to 16
Profile Running Segment Number		
<input type="text" value="10"/>	<input type="text" value="Input"/>	1 : Ramp 0 : Soak
Profile Running Segment Type		
<input type="text" value="11"/>	<input type="text" value="Input"/>	<i>Resolution Based Parameter</i> Min. to Max. Range specified for the selected Input Type
Profile Run Time Target Setpoint		
<input type="text" value="12"/>	<input type="text" value="Input"/>	<i>Resolution Based Parameter</i> Min. to Max. Range specified for the selected Input Type
Ramping Setpoint		
<input type="text" value="13"/>	<input type="text" value="Input"/>	1 : Hold 0 : Running
Balance Soak Time		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
14	Input	1 : Write is Permitted 0 : Write not Permitted
Profile Hold Status		
15	Input	1 : Write is Permitted 0 : Write not Permitted
Serial Write Permission		
16 to 24	Input	Read Operation : 0 Write Operation : Error
The above Modbus Addresses are Reserved for future implementation of INPUT Registers.		
25	Holding	0 to 9999 Minutes
Profile RunTime Interval		
26	Holding	0 - None 1 - Up 2 - Down 3 - Both
Profile RunTime Band Type		
27	Holding	<i>Resolution Based Parameter</i> 0.1 to 999.9
Profile RunTime Band Value		
28	Holding	1 to 9999
Profile RunTime Repeat Counter		
29 to 39	Holding	Read Operation : 0 Write Operation : Ignored
The above Modbus Addresses are Reserved for future implementation of HOLDING Registers.		
40	Holding	Read Operation 1 : Profile Started 0 : Profile Not Started Write Operation 129 : Start Profile 128 : Abort Profile Other Values : Don't Care
Profile Start Command		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
41	Holding	Read Operation 1 : Tuning 0 : Not Tuning Write Operation 129 : Start Tuning 128 : Abort Tuning Other Values : Don't Care
42	Holding	<i>Resolution Based Parameter</i> Min. to Max. Range specified for the selected Input Type
43	Holding	<i>Resolution Based Parameter</i> Min. to Max. Range specified for the selected Input Type
44	Holding	0 : J 1 : K 2 : T 3 : R 4 : S 5 : B 6 : N 7 : Reserve 8 : RTD 9 : 0-20mA 10 : 4-20mA 11 : 0-5mV 12 : 0-200mV 13 : 0-1.25V 14 : 0-5V 15 : 0-10V 16 : 1-5V
45	Holding	0 : °C 1 : °F
46	Holding	0 : 1 1 : 0.1 2 : 0.01 3 : 0.001
47	Holding	<i>Resolution Based Parameter</i> -1999 to 9999
48	Holding	<i>Resolution Based Parameter</i> -1999 to 9999
49	Holding	<i>Resolution Based Parameter</i> -1999 to 9999
50	Holding	<i>Fixed 0.1 Resolution</i> 0.5 to 60.0 Seconds (in steps of 0.5 sec.)

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
51	Holding	0 : None 1 : Process Low 2 : Process High 3 : Deviation Band 4 : Window Band
52	Holding	<i>Resolution Based Parameter</i> 1 to 9999
53	Holding	1 : Yes 0 : No
54	Holding	0 : Normal 1 : Reverse
55	Holding	0 : None 1 : Process Low 2 : Process High 3 : Deviation Band 4 : Window Band
56	Holding	<i>Resolution Based Parameter</i> 1 to 9999
57	Holding	1 : Yes 0 : No
58	Holding	0 : Normal 1 : Reverse
59	Holding	0 : On-Off 1 : Pulsed On-Off 2 : PID
60	Holding	0 : Direct 1 : Reverse
61	Holding	0 : Relay 1 : SSR 2 : 0-20mA 3 : 4-20mA 4 : 0-5V 5 : 0-10V

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
<input type="text" value="62"/>	<input type="text" value="Holding"/>	0 : Relay 1 : SSR 2 : 0-20mA 3 : 4-20mA 4 : 0-5V 5 : 0-10V
OP2 (Cool) Type		
<input type="text" value="63"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> Min. PV Range to Control Setpoint High
Control SetPoint Low		
<input type="text" value="64"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> Control Setpoint Low to Max. PV Range
Control SetPoint High		
<input type="text" value="65"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> Control Setpoint Low to Control Setpoint High
Control SetPoint		
<input type="text" value="66"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> 1 to 9999
Heat Hysteresis		
<input type="text" value="67"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> 1 to 9999
Cool Hysteresis		
<input type="text" value="68"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Second resolution</i> 0.1 to 120.0 Seconds
Heat Pulse Time		
<input type="text" value="69"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Second resolution</i> 0.1 to value set for Heat Pulse Time
Heat Pulse On Time		
<input type="text" value="70"/>	<input type="text" value="Holding"/>	0.1 to 120.0 Seconds
Cool Pulse Time		
<input type="text" value="71"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Second resolution</i> 0.1 to value set for Cool Pulse Time
Cool Pulse On Time		
<input type="text" value="72"/>	<input type="text" value="Holding"/>	<i>Resolution Based Parameter</i> 1 to 9999
Proportional Band		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
<input type="text" value="73"/>	<input type="text" value="Holding"/>	0 to 3600 Seconds
Integral Time		
<input type="text" value="74"/>	<input type="text" value="Holding"/>	0 to 600 Seconds
Derivative Time		
<input type="text" value="75"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 resolution</i> 0.1 to 10.0
Relative Cool Gain		
<input type="text" value="76"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1% resolution</i> 0.0% to Heat Power High
Heat Power Low Limit		
<input type="text" value="77"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1% resolution</i> Heat Power Low to 100.0%
Heat Power High Limit		
<input type="text" value="78"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1% resolution</i> 0.0% to Cool Power High
Cool Power Low Limit		
<input type="text" value="79"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1% Resolution</i> Cool Power Low to 100.0%
Cool Power High Limit		
<input type="text" value="80"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Seconds Resolution</i> 0.5 to 120.0 Seconds (in steps of 0.5 sec.)
Heat Cycle Time		
<input type="text" value="81"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Seconds Resolution</i> 0.5 to 120.0 Seconds (in steps of 0.5 sec.)
Cool Cycle Time		
<input type="text" value="82"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1% Resolution</i> -100.0% to 100.0%
Sensor Break Output Power		
<input type="text" value="83"/>	<input type="text" value="Holding"/>	1 : Enable 0 : Disable
Cutoff Enable		
<input type="text" value="84"/>	<input type="text" value="Holding"/>	<i>Fixed 0.1 Resolution</i> 1.0 to 3.0
Cutoff Factor		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
85	Holding	1 : Enable 0 : Disable
Manual Control Enable		
86	Holding	<i>Fixed 0.1% Resolution</i> -100.0% to 100.0%
Manual PID Power		
87	Holding	1 : Enable 0 : Disable
Standby Mode Enable		
88	Holding	1 : Enable 0 : Disable
Profile Enable		
89	Holding	1 to 16
Numbers of Profile Segments		
90	Holding	1 to 9999
Number of Repeats		
91	Holding	1 : Yes 0 : No
Profile Common / Individual Band		
92	Holding	Read Operation : 0 Write Operation : Ignored
Segment End SP PV Offset Base		
93	Holding	1 : Yes (Outputs Off) 0 : No
Profile End Strategy		
94	Holding	0 : Abort 1 : Continue
Profile Power Fail Recovery		
95	Holding	Read Operation Returns 0 Write Operation 1 : Pause Profile 0 : Don't Care
Profile Pause Command		
96	Holding	Read Operation Returns 0 Write Operation 1 : Advance to next segment 0 : Don't Care
Profile Segment Advance Command		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
97	Holding	Read Operation Returns 0 Write Operation 1 : Acknowledged 0 : Don't Care
98, to 161	Holding	Min. to Max. Range specified for the selected Input Type
Profile Segment Parameters (Class Segment) <ul style="list-style-type: none"> • Target SetPoint • Time Interval • Band Type • Band Value 4 parameters per Segment Maximum 16 Segments Total Parameters = 64 (Max)		
162	Holding	0 : None 1 : Alarm 2 : End Of Profile 3 : Cool Control
163	Holding	1 : On 0 : Off
164	Holding	0 to 9999
165	Holding	0 : Seconds 1 : Minutes 2 : Hour
166	Holding	0 : None 1 : Alarm 2 : End Of Profile 4 : Retransmission
167	Holding	1 : On 0 : Off
168	Holding	0 to 9999
169	Holding	0 : Seconds 1 : Minutes 2 : Hour

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
170	Holding	0 : Process Value 1 : Setpoint
Retransmission base PV / SP		
171	Holding	0 : 0 - 20mA 1 : 4 - 20mA 2 : 0 - 5V 3 : 0 - 10V
Retrans Output Type		
172	Holding	Min. Range to Recorder High
Recorder Low		
173	Holding	Recorder Low to Max. Range
Recorder High		
174	Holding	1 : Enable 0 : Disable
Control SP on Lower Read Out		
175	Holding	1 : Enable 0 : Disable
Control SP on Operator Page		
176	Holding	1 : Enable 0 : Disable
Auxiliary SP Enable		
177	Holding	1 : Enable 0 : Disable
Auxiliary SP		
178	Holding	1 : Enable 0 : Disable
Retransmission Enable		
179	Holding	1 : Enable 0 : Disable
Manual Power on Lower Readout		
180	Holding	1 : Enable 0 : Disable
Profile Abort on Operator		
181 to 200	Holding	Read Operation : 0 Write Operation : Ignored
Standby on Operator		
182	Holding	Read Operation : 0 Write Operation : Ignored
Alarm SP on Operator		

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
183 Master Lock	Holding	1 : Enable 0 : Disable
184 to 200 Reserve Write/Read	Holding	1 to 32
201 User Linearization Enable / Disable	Holding	-1999 to 9999
202 Linearization Points	Holding	-1999 to 9999
203 to 234 X_Co_ordinate	Holding	-1999 to 9999
235 to 266 Y_Co_ordinate	Holding	-1999 to 9999
267 Factory Cal Yes / No	Holding	-1999 to 9999
268 Ambient Cal Yes / No	Holding	-1999 to 9999
269 Ambient Hex Counts	Holding	1 : Enable 0 : Disable
270 User Ambient Setting	Holding	1 to 32
271 Input Group Selection	Holding	-1999 to 9999
272 Scale Low Calibration	Holding	-1999 to 9999
273 Scale High Calibration	Holding	-1999 to 9999

PARAMETER		SETTINGS
Reg. Address	Reg. Type	
<input type="text" value="274"/>	<input type="text" value="Holding"/>	-1999 to 9999
End Calibration		
<input type="text" value="275"/>	<input type="text" value="Holding"/>	-1999 to 9999
Factory Cal Yes / No		
<input type="text" value="276"/>	<input type="text" value="Holding"/>	-1999 to 9999
Factory Write		
<input type="text" value="277"/>	<input type="text" value="Holding"/>	1 : Enable 0 : Disable
Extended Table (Demark)		
<input type="text" value="278"/>	<input type="text" value="Holding"/>	1 to 32
DAC Testing		
<input type="text" value="279"/>	<input type="text" value="Holding"/>	-1999 to 9999
PWM Testing		
<input type="text" value="280"/>	<input type="text" value="Holding"/>	-1999 to 9999
DAC Calibration Yes / No		
<input type="text" value="281"/>	<input type="text" value="Holding"/>	-1999 to 9999
DAC Cal. Counts Saveing		
<input type="text" value="282"/>	<input type="text" value="Holding"/>	-1999 to 9999
PWM Calibration Yes / No		
<input type="text" value="283"/>	<input type="text" value="Holding"/>	-1999 to 9999
DAC Caibration Counts		
<input type="text" value="284"/>	<input type="text" value="Holding"/>	-1999 to 9999
Relay / SSR Testing Yes / No		
<input type="text" value="285"/>	<input type="text" value="Holding"/>	1 : Enable 0 : Disable
PV Edit		



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