

zenex



PPI

The Perfection Experts

Universal Self-Tune PID Temperature Controller with Programmable Timer



User Manual

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For Size 48X48

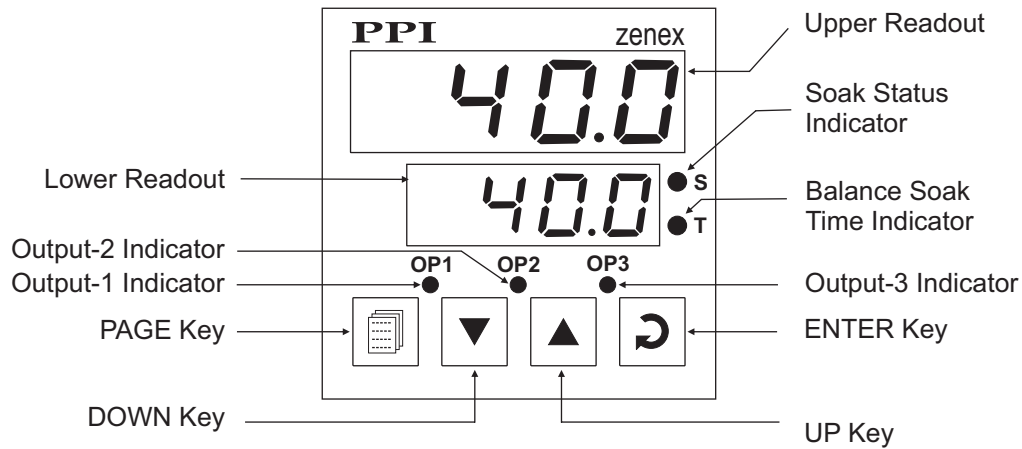
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Section 1 FRONT PANEL LAYOUT

Figure 1.1



The front panel contains digital readouts, LED indicators and keys.

READOUTS

The Upper Readout is a 4 digit, 7-segment bright red LED display and usually displays the PV (Process Value). In Program Mode, the Upper Readout displays parameter values/options.

The Lower Readout is a 4 digit, 7-segment bright green LED display and usually displays SP (Control Setpoint) Value. In Program Mode, the Lower Readout displays parameter names (prompts).

INDICATORS

The Table 1.1 lists each front panel LED and the associated status.





Table 1.1

Indicator	Status
S	<ul style="list-style-type: none"> Flashes while the Soak Timer is counting down. Glow steadily while the Soak Timer is outside the Timer Start Band or Hold Band (that is, HOLD state).
T	Glow while the Lower Readout shows the Balance Soak Time in Main display mode.
OP1	<ul style="list-style-type: none"> Indicates Output-1 ON/OFF status if the Control Output is Relay or SSR drive. Remains OFF if the Control Output is DC Linear.
OP2	<ul style="list-style-type: none"> Indicates Output-2 status if OP2 function is Auxiliary / Blower Control. Flashes Alarm-1 status if OP2 function is Alarm.
OP3	<ul style="list-style-type: none"> Indicates Output-3 status if OP3 function is Auxiliary Control. Flashes Alarm-2 status if OP3 function is Alarm.

KEYS

The Table 1.2 lists the four front panel keys and the associated function.

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; holding pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.



Section 2

BASIC OPERATIONS

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 **ZEn** on the Upper Readout and the firmware version **02.02** on the Lower Readout, for approximately 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 SP (Control Setpoint). This is the MAIN Display Mode that shall be used most often.

Adjusting SP (Control Setpoint)

The SP value can be directly adjusted on the Lower Readout while the controller is in the MAIN Display Mode.

If permitted at Supervisory Level, step through the following sequence for adjusting the SP value :

1. While the Lower Readout shows SP value, 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 / Optimize Indication

The controller self detects the events such as new installation, significant change in SP, etc. for auto tuning itself to the process under control. Also, the controller can be issued 'Optimize' command by the user for optimization of the PID constant values.

While the controller is Tuning/Optimizing, the Lower Readout flashes the message **BUSY** (Busy). The user is advised not to disturb the process or alter any parameter values while the "Busy" message is being flashed. The "Busy" message automatically disappears upon completion of Tuning/Optimization.

Timer (Soak) Mode Indication

While Soak Timer is in progress, the front panel indicator 'S' flashes if the timer is counting down or glows steadily if the timer is in wait / hold state.

The Lower Readout can be toggled to display either Balance Soak Time or Control Setpoint (SP), using ENTER key. While the Lower Readout shows balance soak time the indicator 'T' glows.



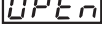
The Balance Soak time is in either 'Minutes : Seconds' or 'Hours : Minutes' or 'Hours', depending upon the time units selected for the Soak Timer. If the selected time units are 'Hours', then (a) If the balance time is greater than 100 Hours, the time is shown in 'Hours'. (b) If the balance time is less than 100 Hours, the time is shown in 'Hours : Minutes'.

PV Error Indications

The process value is said to be in error if it exceeds the minimum / maximum range specified for the selected Input sensor type or if the sensor is disconnected (Open or Broken).

The PV Error type is indicated (flashing) on the Upper Readout. For different errors and the causes refer Table 2.1 below.

Table 2.1

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

CONTROL/ALARM STATUS UNDER PV ERROR CONDITIONS



- The tuning, if in progress, is aborted.
- The Soak Timer, if in progress, enters in Pause (halt) state.
- All the control outputs are switched off.
- 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*.

OPERATOR PAGE AND PARAMETERS

The controller provides a separate page that contains parameters that require frequent settings by the operator. The page is called Operator Page and the parameters are called Operator Parameters. The availability of operator parameters is controlled at supervisory level and these parameters are not affected by the master lock status.

Accessing Operator Page & Adjusting Parameters

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

- Press and release PAGE key. The Lower Readout shows  (PAGE) and Upper Readout shows  (0).
- Press ENTER key. The Lower Readout shows prompt for the first available operator parameter and the Upper Readout shows value for the parameter.
- 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.

The Operator Parameters are described in Table 4. Note that the parameters presented on operator page depend upon the functions selected / enabled.

The operator parameter list mainly includes :

- Soak Start / Abort Command, if Soak Time feature is enabled.
- The Control Setpoint (SP).
- Alarm-1 Setpoint or Blower Setpoint or Auxiliary Control Setpoint for OP2 depending upon the function selected.
- Alarm-2 Setpoint or Auxiliary Control Setpoint for OP3 depending upon the function selected.
- Lock for Setpoint Editing on Lower Readout.

Table 2.2

Parameter Description	Settings
TIMER START COMMAND StRT Set to Yes to start Soak Timer. Not available if timer already running.	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <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;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">YES</div> Yes </div> </div>
TIMER ABORT COMMAND AbRT Set to Yes to abort a running timer.	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <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;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">YES</div> Yes </div> </div>
TIME DURATION SoPt The set time value for the soak timer in the selected time units.	00.05 to 60.00 M:S or 00.05 to 99.55 H:M or 1 to 999 Hours

OP2 Function : Alarm-1

Parameter Description	Settings
ALARM-1 SETPOINT A 1SP Process High / Process Low Alarm-1 Setpoint.	Min. to Max. Range for the Input Type
ALARM-1 DEVIATION BAND A 1dE Positive (+) or Negative (-) Alarm-1 deviation band.	-1999 to 9999 or -199.9 to 999.9
ALARM-1 WINDOW BAND A 1bA Symmetrical Alarm-1 window band.	3 to 999 or 0.3 to 99.9

OP2 Function : Auxiliary Control

Parameter Description	Settings
AUXILIARY CONTROL SETPOINT SP2 Positive (+) or Negative (-) offset to Control Setpoint (SP) for defining Auxiliary Setpoint.	(Min. Range - SP) to (Max. Range - SP) for selected Input

OP2 Function : Blower / Compressor Control

Parameter Description	Settings
BLOWER / COMPRESSOR SETPOINT 6L5P Positive (+) offset to Control Setpoint (SP) for defining Blower / Compressor Setpoint.	0 to 250 or 0.0 to 25.0

OP3 Function : Alarm-2

Parameter Description	Settings
ALARM-2 SETPOINT A25P Process High / Process Low Alarm-2 Setpoint.	Min. to Max. Range for the Input Type
ALARM-2 DEVIATION BAND A2dE Positive (+) or Negative (-) Alarm-2 deviation band.	-1999 to 9999 or -199.9 to 999.9
ALARM-2 WINDOW BAND A2bA Symmetrical Alarm-2 window band.	3 to 999 or 0.3 to 99.9

OP3 Function : Auxiliary Control

Parameter Description	Settings
AUXILIARY CONTROL SETPOINT SP3 Positive (+) or Negative (-) offset to Control Setpoint (SP) for defining Auxiliary Setpoint.	(Min. Range - SP) to (Max. Range - SP) for selected Input

Control Setpoint (SP) Locking

Parameter Description	Settings
SETPOINT LOCKING SL0C Set to Yes to lock the SP editing on the Lower Readout.	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">no</div> <div style="margin-bottom: 5px;">No</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">YES</div> <div>Yes</div> </div>



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.

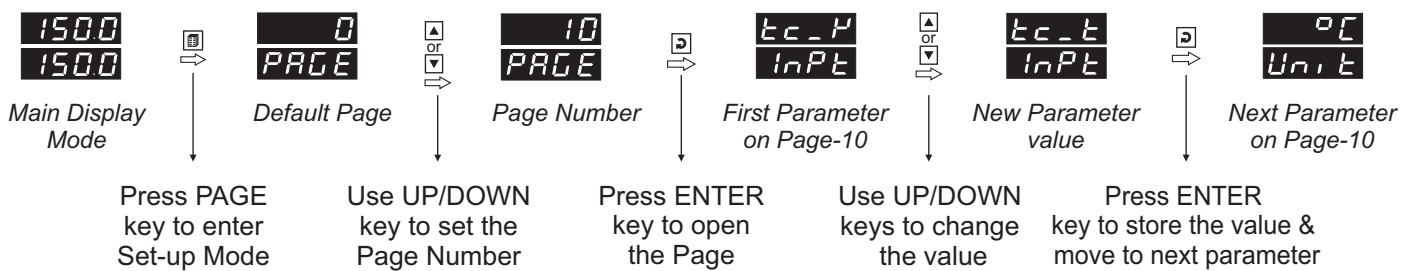
SET-UP MODE

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 'Input Type'.

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.

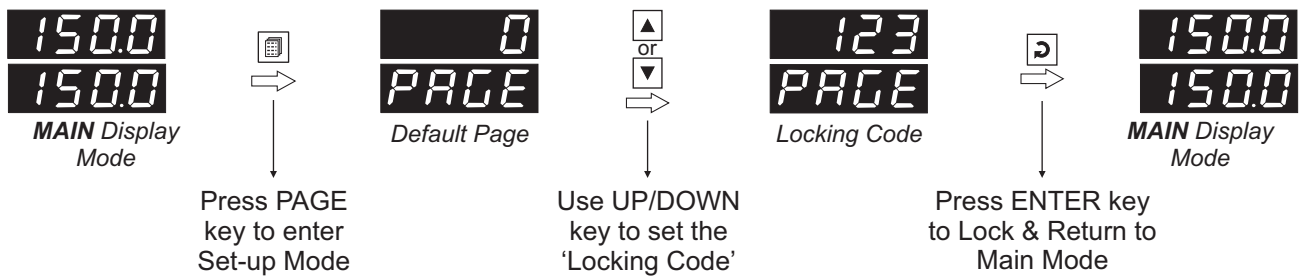
For enabling / disabling the Lock, step through the following sequence:

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 I / O CONFIGURATION PARAMETERS

Table 4.1

Parameter Description	Settings Default Value
<p>INPUT TYPE InPt</p> <p>Refer Table 4.2 for various available 'Input Types' along with their respective Ranges and Resolutions.</p>	<p>Refer Table 4.2 (Default : Type K)</p>
<p>TEMPERATURE DISPLAY UNITS Unit</p> <p>Select as "°C" (Centigrade) or "°F" (Fahrenheit).</p>	<p>°C °C °F °F (Default : °C)</p>
<p>TEMPERATURE RANGE rAng</p> <p>This parameter value must be set in accordance with the Maximum Temperature Range for which the equipment / machine is designed. Set this parameter value appropriately as the same is used by the controller to determine whether or not to Self-Tune / Optimize the controller upon detecting the "Tune at Setpoint Change" condition.</p>	<p>Min. to Max. specified for the selected Input Type (Refer Table 4.2) (Default : 1375)</p>
<p>CONTROL OUTPUT TYPE C.OP</p> <p>Refer Table 4.3 for the available options.</p>	<p>Refer Table 4.3 (Default : Relay)</p>
<p>CONTROL MODE Ctrl</p> <p><i>On-Off</i> The control algorithm tends to maintain the PV at SP by either switching the output (say, Heater) fully OFF or fully ON. The On and Off switching is differentiated by the user settable 'Hysteresis Band'.</p> <p><i>PID</i> The control algorithm uses a 2nd order equation to compute the '% Output Power' required to maintain the PV at SP. The constants P, I, D are automatically set by the controller.</p>	<p>On.Off On-Off PID PID (Default : PID)</p>
<p>CONTROL LOGIC C.LOG</p> <p><i>Direct</i> Cooling Control (Output Power increases with increase in PV).</p> <p><i>Reverse</i> Heating Control (Output Power decreases with increase in PV).</p>	<p>dir Direct rEv Reverse (Default : Reverse)</p>
<p>HYSTERESIS HYST</p> <p>(For ON-OFF Control only) Sets a differential (dead) band between the ON and OFF states. Keep it large enough to avoid frequent switching of the load without losing the desired control accuracy.</p>	<p>1 to 999°C or 0.1 to 99.9°C (Default : 2 or 0.2)</p>

Parameter Description	Settings Default Value
SETPOINT LOW LIMIT SPLO This parameter sets the minimum limit on the Control Setpoint value.	Min. Range to Setpoint High for the selected Input Type (Default : -200)
SETPOINT HIGH LIMIT SPHI This parameter sets the maximum limit on the Control Setpoint value.	Setpoint Low to Max. Range for the selected Input Type (Default : 1375)

Table 4.2

Option	What it means	Range (Min. to Max.)	Resolution (Fixed or settable)
tc_u	Type J Thermocouple	0 to +960°C / +32 to +1760°F	Fixed 1°C / 1°F
tc_k	Type K Thermocouple	-200 to +1375°C / -328 to +2508°F	
tc_t	Type T Thermocouple	-200 to +385°C / -328 to +725°F	
tc_r	Type R Thermocouple	0 to +1770°C / +32 to +3218°F	
tc_s	Type S Thermocouple	0 to +1765°C / +32 to +3209°F	
tc_b	Type B Thermocouple	0 to +1825°C / +32 to +3092°F	
tc_n	Type N Thermocouple	0 to +1300°C / +32 to +2372°F	
rtd	3-wire, RTD Pt100	-199 to +600°C / -328 to +1112°F	0.1°C / 0.1°F
rtd.1	3-wire, RTD Pt100	-199.9 to 600.0°C / -199.9 to 999.9°F	

Table 4.3

Option	What it means	Remarks
rlY	Relay	Applicable for OP1 as Relay / SSR
SSr	SSR (Solid State Relay)	
0-20	0 to 20 mA current	Applicable for OP1 as DC Linear Current
4-20	4 to 20 mA current	
0-5	0 to 5 Volts	Applicable for OP1 as DC Linear Voltage
0-10	0 to 10 Volts	

Section 5 OP2 FUNCTION PARAMETERS

Table 5.1

Parameter Description	Settings Default Value
<p>OUTPUT-2 FUNCTION SELECTION OP2F</p> <p><i>None</i> OP2 module not installed or function not used.</p> <p><i>Alarm</i> OP2 relay activates as Alarm status.</p> <p><i>Auxiliary Control</i> OP2 relay activates as Auxiliary control status.</p> <p><i>Blower</i> OP2 relay activates as Blower / Compressor control status.</p>	<p style="text-align: center;"> nonE None ALrā Alarm Ctrl Control bLDr Blower (Default : None) </p>

OP2 Function : Alarm-1

Parameter Description	Settings Default Value
<p>TYPE AL_1</p> <p><i>Process Low</i> The alarm activates for PV less than or equal to Alarm Setpoint.</p> <p><i>Process High</i> The alarm activates for PV greater than or equal to Alarm Setpoint.</p> <p><i>Deviation Band</i> The alarm activates if the PV deviation from SP is greater than the set positive or negative 'Deviation Band' value.</p> <p><i>Window Band</i> The alarm activates if the PV deviation from SP is greater than the set 'Window Band' value in either direction.</p> <p><i>End Of Soak</i> The OP2 Relay / SSR is switched ON for the time duration set for the parameter 'Alarm Timer'.</p>	<p style="text-align: center;"> P_Lo Process Low P_Hi Process High dEv Deviation Band bAnd Window Band EoS End of Soak (Default : Process Low) </p>
<p>SETPOINT A1SP</p> <p>Available for 'Process High' or 'Process Low' Alarms. Sets the Upper (Process High) or Lower (Process Low) Alarm Limit.</p>	<p style="text-align: center;">Min. to Max. Range for the selected Input type (Default : 0)</p>
<p>DEVIATION BAND A1dE</p> <p>Available for 'Deviation Band' Alarm. Sets a deviation band above (Positive value) or below (Negative value) the SP for alarm activation.</p>	<p style="text-align: center;">-1999 to 9999 or -199.9 to 999.9 (Default : 0)</p>
<p>WINDOW BAND A1bA</p> <p>Available for 'Window Band' Alarm. Sets a symmetrical band above and below the SP for alarm activation.</p>	<p style="text-align: center;">3 to 999 or 0.3 to 99.9 (Default : 3)</p>

Parameter Description	Settings Default Value
<p>LOGIC A I L O</p> <p><i>Normal</i> The Alarm output (Relay/SSR) remains ON under alarm condition; OFF otherwise. Useful for Audio / Visual Alarm.</p> <p><i>Reverse</i> The Alarm output (Relay / SSR) remains OFF under alarm condition; ON otherwise. Useful for Tripping the system under control.</p>	<p>n o r n Normal</p> <p>r e v Reverse (Default : Normal)</p>
<p>INHIBIT A I I H</p> <p><i>No</i> Alarm is not suppressed for start-up condition.</p> <p><i>Yes</i> The Alarm activation is inhibited (suppressed) until the PV is found within alarm limits from the time the controller is switched ON.</p>	<p>y e s Yes</p> <p>n o No (Default : Yes)</p>
<p>ALARM TIMER A I L t n</p> <p>Available for End of Soak Alarm. Sets time duration in seconds for which the alarm shall activate upon end of soak timer.</p>	<p>5 to 250 Seconds (Default : 10)</p>

OP2 Function : Auxiliary Control

Parameter Description	Settings Default Value
<p>OFFSET VALUE S P 2</p> <p>Offset value for the Auxiliary Control Setpoint. Can be set as positive value or negative value.</p> <p>Auxiliary Control Setpoint = Control Setpoint (SP) + Offset Value</p>	<p>(Min. Range - SP) to (Max. Range - SP) specified for the selected Input Type (Default : 0)</p>
<p>HYSTERESIS H Y S . 2</p> <p>Sets a differential (dead) band between the ON and OFF control states.</p>	<p>1 to 999 or 0.1 to 99.9 (Default : 2 or 0.2)</p>
<p>CONTROL LOGIC L O O . 2</p> <p><i>Normal</i> The Output remains ON for PV <i>below</i> Setpoint and OFF otherwise.</p> <p><i>Reverse</i> The Output remains ON for PV <i>above</i> Setpoint and OFF otherwise.</p>	<p>n o r n Normal</p> <p>r e v Reverse (Default : Normal)</p>

OP2 Function : Blower / Compressor Control

Parameter Description	Settings Default Value
<p>OFFSET VALUE bL.SP</p> <p>Sets a positive (+) offset to the SP to define the 'Blower / Compressor Setpoint'.</p> <p>Blower / Compressor Setpoint = Control Setpoint (SP) + Offset Value</p>	<p>0 to 250 or 0.0 to 25.0 (Default : 0)</p>
<p>HYSTERESIS bL.HY</p> <p>Differential (dead) band between the blower ON and OFF states.</p>	<p>1 to 250 or 0.1 to 25.0 (Default : 2 or 0.2)</p>
<p>TIME DELAY t.dLY</p> <p>This parameter is mainly used for Compressor Load. The set time delay is elapsed each time before the compressor is switched ON. Set the value to 0 if no Time Delay is required.</p>	<p>00.00 to 10.00 Min. Sec (in steps of 5 Seconds) (Default : 00.00)</p>



Section 6 OP3 FUNCTION PARAMETERS

Table 6.1

Parameter Description	Settings Default Value
<p>OUTPUT-3 FUNCTION SELECTION OP3F</p> <p><i>None</i> OP2 module not installed or function not used.</p> <p><i>Alarm</i> OP2 relay activates as Alarm status.</p> <p><i>Auxiliary Control</i> OP2 relay activates as Auxiliary control status.</p>	<p>nonE None</p> <p>ALrā Alarm</p> <p>Ctrl Control (Default : None)</p>

OP3 Function : Alarm-2

Parameter Description	Settings Default Value
<p>TYPE AL_2</p> <p><i>Process Low</i> The alarm activates for PV less than or equal to Alarm Setpoint.</p> <p><i>Process High</i> The alarm activates for PV greater than or equal to Alarm Setpoint.</p> <p><i>Deviation Band</i> The alarm activates if the PV deviation from SP is greater than the set positive or negative 'Deviation Band' value.</p> <p><i>Window Band</i> The alarm activates if the PV deviation from SP is greater than the set 'Window Band' value in either direction.</p> <p><i>End Of Soak</i> The OP2 Relay / SSR is switched ON for the time duration set for the parameter 'Alarm Timer'.</p>	<p>P_Lo Process Low</p> <p>P_Hi Process High</p> <p>dEv Deviation Band</p> <p>bAnd Window Band</p> <p>EoS End of Soak (Default : Process Low)</p>
<p>SETPOINT A2SP</p> <p>Available for 'Process High' or 'Process Low' Alarms. Sets the Upper (Process High) or Lower (Process Low) Alarm Limit.</p>	<p>Min. to Max. Range for the selected Input type (Default : 0)</p>
<p>DEVIATION BAND A2dE</p> <p>Available for 'Deviation Band' Alarm. Sets a deviation band above (Positive value) or below (Negative value) the SP for alarm activation.</p>	<p>-1999 to 9999 or -199.9 to 999.9 (Default : 0)</p>
<p>WINDOW BAND A2bA</p> <p>Available for 'Window Band' Alarm. Sets a symmetrical band above and below the SP for alarm activation.</p>	<p>3 to 999 or 0.3 to 99.9 (Default : 3)</p>

Parameter Description	Settings Default Value
<p>LOGIC A2LG</p> <p><i>Normal</i> The Alarm output (Relay/SSR) remains ON under alarm condition; OFF otherwise. Useful for Audio / Visual Alarm.</p> <p><i>Reverse</i> The Alarm output (Relay / SSR) remains OFF under alarm condition; ON otherwise. Useful for Tripping the system under control.</p>	<p>nor\bar{n} Normal</p> <p>rE\bar{u} Reverse (Default : Normal)</p>
<p>INHIBIT A2,h</p> <p><i>No</i> Alarm is not suppressed for start-up condition.</p> <p><i>Yes</i> The Alarm activation is inhibited (suppressed) until the PV is found within alarm limits from the time the controller is switched ON.</p>	<p>YES Yes</p> <p>no No (Default : Yes)</p>
<p>ALARM TIMER A2,t\bar{n}</p> <p>Available for End of Soak Alarm. Sets time duration in seconds for which the alarm shall activate upon end of soak timer.</p>	<p>5 to 250 Seconds (Default : 10)</p>

OP3 Function : Auxiliary Control

Parameter Description	Settings Default Value
<p>OFFSET VALUE SP3</p> <p>Offset value for the Auxiliary Control Setpoint. Can be set as positive value or negative value.</p> <p>Auxiliary Control Setpoint = Control Setpoint (SP) + Offset Value</p>	<p>(Min. Range - SP) to (Max. Range - SP) specified for the selected Input Type (Default : 0)</p>
<p>HYSTERESIS HY5.3</p> <p>Sets a differential (dead) band between the ON and OFF control states.</p>	<p>1 to 999 or 0.1 to 99.9 (Default : 2 or 0.2)</p>
<p>CONTROL LOGIC LOG.3</p> <p><i>Normal</i> The Output remains ON for PV <i>below</i> Setpoint and OFF otherwise.</p> <p><i>Reverse</i> The Output remains ON for PV <i>above</i> Setpoint and OFF otherwise.</p>	<p>nor\bar{n} Normal</p> <p>rE\bar{u} Reverse (Default : Normal)</p>

Section 7 PID CONTROL PARAMETERS

Table 7.1

Parameter Description	Settings Default Value
<p>% OUTPUT POWER OUT.P</p> <p>This is a view only parameter that facilitates the indication of ‘% Output Power’ computed by the controller PID algorithm. The computed value lies between Min. power (0.0%) and Max. power (100.0%).</p>	<p>Not Applicable (Default : Not Applicable)</p>
<p>CYCLE TIME CT</p> <p>(For ‘PID’ Control) For time-proportionating PID control, the output power is implemented by adjusting the ratio of ON : OFF to a fixed time interval, called ‘Cycle Time’. The larger the power the larger the ON time and vice-a-versa.</p> <p>Larger Cycle time ensures longer Relay/SSR life but may result in poor control accuracy and vice-a-versa. <i>The recommended Cycle Time values are; 20 sec. for Relay and 1 sec. for SSR.</i></p>	<p>0.5 to 120.0 Seconds (in steps of 0.5 secs.) (Default : 0.5)</p>
<p>PROPORTIONAL BAND Pb</p> <p>(For ‘PID’ Control) The Proportional band is defined in terms of process value deviation from the setpoint (also known as process error). Within the band the output power is varied from maximum (100%) at maximum deviation to minimum (0%) at minimum deviation. The process value thus tends to stabilize at a point within the band where the power input equal losses. Larger Band results in better stability but larger deviation.</p> <p>The Proportional Band value is automatically calculated by controller’s Self-Tune feature and seldom requires any manual adjustment.</p>	<p>0.1 to 999.9 (Default : 10.0)</p>
<p>INTEGRAL TIME IT</p> <p>(For ‘PID’ Control) The application of proportional band alone results in process value stability within the band but away from the setpoint. This is called steady state Offset Error. The integral action is incorporated for automatic removal of offset error with minimum oscillations.</p> <p>The Integral Time value is automatically calculated by controller’s Self-Tune feature and seldom requires any manual adjustments.</p>	<p>0 to 1000 Seconds (Default : 100)</p>

Parameter Description	Settings Default Value
<p>DERIVATIVE TIME <i>dt</i></p> <p>(For 'PID' Control) It is desired that the controller should respond to any dynamic changes in the process conditions (like variations in load, power supply fluctuations, etc.) fast enough so as retain the process value near the setpoint. The derivative time determines how strong the output power will change in response to the rate of change of measured PV.</p> <p>The Derivative Time value is automatically calculated by controller's Self-Tune feature and seldom requires any manual adjustments.</p>	<p>0 to 250 Seconds (Default : 25)</p>



Section 8 SOAK TIMER PARAMETERS

(Refer end of this section for detailed Soak Timer Operation)

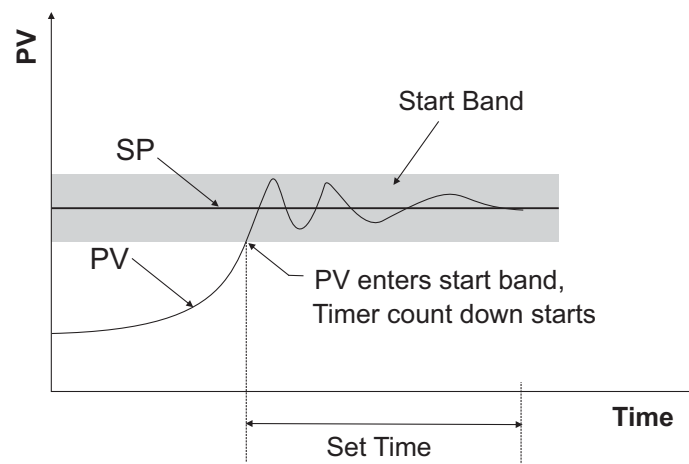
Table 8.1

Parameter Description	Settings Default Value
<p>TIMER ENABLE SEnb</p> <p>Yes Soak Timer function and Start / Abort commands are enabled. No Soak Timer function and Start / Abort commands are disabled.</p>	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <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>
<p>TIME UNITS UnIt</p> <p>Select the time units depending on the minimum and/or maximum time value required.</p>	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">nn.ss</div> Min:Sec </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">HH.nn</div> Hours:Min </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> <p>(Default : Min: Sec)</p> </div>
<p>TIME DURATION SoPt</p> <p>The preset time value in selected units for the Soak Timer.</p>	<p>00.05 to 60:00 Min:Sec 00.05 to 99:55 Hrs:Min 1 to 999 Hours (Default : 00.10 Min:Sec)</p>
<p>TIMER-START BAND Sbnd</p> <p>After issuance of start command, the timer starts counting down once the PV enters the process band around SP defined by this parameter value.</p>	<p>0 to 9999 or 0.0 to 999.9 (Default : 5 or 0.5)</p>
<p>HOLDBACK STRATEGY HOLD</p> <p>None PV based timer pause is not required. Up Timer is paused if PV is outside holdband <i>above</i> SP. Down Timer is paused if PV is outside holdband <i>below</i> SP. Both Timer is paused if PV is outside holdband both <i>above</i> and <i>below</i> SP.</p>	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <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>
<p>HOLD BAND Hbnd</p> <p>Sets the temperature limit(s) with respect to the SP for the timer to pause. The timer holds on counting should the PV cross the limit(s).</p>	<p>1 to 9999 or 0.1 to 999.9 (Default : 5 or 0.5)</p>
<p>SWITCH-OFF CONTROL OUTPUT AT TIMER END OP.OF</p> <p>Yes The control output (OP1) is forced off upon completion of timer. No The control output state is not forced.</p>	<div style="display: flex; flex-direction: column; align-items: flex-end;"> <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>

Parameter Description	Settings Default Value
<p>POWER-FAIL RECOVERY METHOD Pr.FL</p> <p><i>Continue</i> The Soak Timer resumes operation for the balance time.</p> <p><i>Start</i> The timer re-runs the complete soak time.</p> <p><i>Abort</i> The timer operation is suspended until a new start command is issued.</p>	<p>Cont Continue</p> <p>Start (Re)Start</p> <p>Abt Abort (Default : Continue)</p>

Figure 8.1

SOAK TIMER OPERATION



Basic Operation

The Soak Timer is essentially a *preset timer* that can be configured to run as :

- A Free Running Timer by setting timer 'Start Band' to 0. That is, the timer starts counting down immediately upon issuance of Start Command by the user and continues until set time is elapsed.
- A Setpoint Dependent Timer. That is, after issuance of Start Command, the count down starts only after the PV reaches within timer 'Start Band'. The timer start band is a symmetrical band centered around the SP. For example, for a start band of 2°C and SP value of 100°C, the count down begins once the PV reaches a value within 98°C (SP - Start Band) to 102°C (SP + Start Band). Note that, once the PV enters 'Start Band', the timer continues to run regardless of whether the PV remains within or outside the 'Start Band'.

Hold Band Operation

The timer is also provided with a 'Hold Band' that can be enabled to make sure that the timer counts down *only while* the PV is within the 'Hold Band'. That is, the timer pauses (holds counting down) whenever the PV is outside the 'Hold Band'. The 'Hold Band' is set with respect to the SP and can be set above or below or above and below the SP. For example, a 5 °C Hold Band below the SP (say, 100°C) will force the timer in pause state whenever the PV is equal or less than 95°C (SP - Hold Band).

Power-fail Recovery Modes

The timer facilitates 3 different power-fail recovery modes, viz., *Continue*, *Re-start* and *Abort*. In *Continue* mode, the timer resumes to execute the balance soak time once the PV is detected within Hold Band. In *Re-start* mode, the timer executes the complete set time all over again. In *Abort* mode, the timer stops execution until a start command is issued.

End-of-Soak Events

The output Relay/SSR modules, OP2 and/or OP3, can be configured as End-of-Soak Alarm with a settable alarm duration. That is, upon completion of Soak Time execution, the Relay energizes (say, to activate a buzzer) for the set alarm duration.

Additionally, the controller provides 'Output-Off' strategy that can be enabled to force the control output OP1 off upon End-of-Soak. The output becomes active again after issuance of Start Command for the execution of a new Soak Time Cycle.






Section 9 SUPERVISORY PARAMETERS

Table 9.1

Parameter Description	Settings Default Value
<p>TUNE / OPTIMIZE COMMAND OPT</p> <p>(For PID Control Mode only) Set to 'Yes' for initiating Tune / Optimize operation.</p>	<p>no No YES Yes (Default : No)</p>
<p>TUNE / OPTIMIZE ABORT COMMAND Abt</p> <p>(For PID Control Mode only) Set to 'Yes' for terminating Tune / Optimize operation in progress.</p>	<p>no No YES Yes (Default : No)</p>
<p>OVERSHOOT INHIBIT OSH</p> <p>(For PID Control Mode only) Set this parameter to 'Enable' if the process exhibits unacceptable overshoot upon start-up or a step change in SP. If enabled, the controller controls the rate of change of PV to minimize overshoot.</p>	<p>Enbl Enable d5bl Disable (Default : Disable)</p>
<p>OVERSHOOT INHIBIT FACTOR 0.HF</p> <p>This parameter adjusts the effectiveness of the Overshoot Inhibit feature. Increase the value if the overshoot is curbed but the PV takes longer to reach the SP. Decreases the value if the overshoot persists.</p>	<p>1.0 to 2.0 (Default : 1.2)</p>
<p>SELF-TUNE ON SETPOINT CHANGE tn.SP</p> <p><i>Enable</i> Re-tune the controller if there is a substantial (large) change in the SP value. The P, I, D values are optimized. <i>Disable</i> Ignore any change in SP value and continue with the existing P, I, D values.</p>	<p>Enbl Enable d5bl Disable (Default : Disable)</p>
<p>OFFSET FOR PV OFSt</p> <p>This parameter adds positive or negative offset to the measured PV for removal of thermal gradient or known sensor error.</p>	<p>-1999 to 9999 or -199.9 to 999.9 (Default : 0)</p>
<p>DIGITAL FILTER FOR PV FLtr</p> <p>This value determines the averaging rate of measured PV and thus helps removing undesired rapid changes in the measured PV. The higher the filter value the better the averaging but the slower the response to actual changes.</p>	<p>0.5 to 25.0 Seconds in steps of 0.5 Seconds (Default : 1.0)</p>

Parameter Description	Settings Default Value
<p>PERMISSION FOR OP2/OP3 SETPOINT EDITING ON OPERATOR PAGE SP0P</p> <p>This parameter allows the user to enable (permit) or disable (restrict) the adjustment of the Setpoint for OP2 / OP3 functions.</p>	<p>Enbl Enable dSbl Disable (Default : Enable)</p>
<p>SOAK ABORT COMMAND ON OPERATOR PAGE SOXA</p> <p>This parameter allows the user to enable (permit) or disable (restrict) the issuance of 'Abort' command from operator page to Abort (Stop) the running Soak Timer.</p>	<p>Enbl Enable dSbl Disable (Default : Enable)</p>
<p>SOAK TIME ADJUSTMENT ON OPERATOR PAGE SOXt</p> <p>This parameter allows the user to enable (permit) or disable (restrict) the adjustment of the 'Soak Time Duration' on Operator Page.</p>	<p>Enbl Enable dSbl Disable (Default : Enable)</p>
<p>UTILITY OPTION OPTn</p> <p><i>None</i> No optional utility module is fitted / functional.</p> <p><i>Serial Communication</i> The optional utility module is RS485/RS232 serial communication port.</p> <p><i>Soak Start</i> The optional utility module is Digital Input (potential-free contact closure) for Soak Start Command. An open to close contact will initiate the Soak Timer.</p> <p><i>(The following parameters are available and applicable for utility option serial communication)</i></p>	<p>nonE None SrLc Serial Comm. Strt Soak Start (Default : None)</p>
<p>SLAVE ID 1d</p> <p>This parameter assigns a unique identification number that the Master Device can use to address the instrument for any communication data transactions. The settable values are from 1 to 127.</p>	<p>1 to 127 (Default : 1)</p>
<p>BAUD RATE bAUD</p> <p>This parameter defines the communication speed expressed in "Bits per second". The Baud Rate must be set to match the Baud Rate set for the Master Device.</p>	<p>12 1200 24 2400 48 4800 96 9600 (Default : 9600)</p>

Parameter Description	Settings Default Value
<p>COMMUNICATION WRITE ENABLE </p> <p><i>Yes</i> The Read/Write parameters can be accessed for both reading and writing.</p> <p><i>No</i> The Read/Write parameters can only be accessed for reading. That is, the parameter values cannot be altered through serial communication.</p>	<p> Yes</p> <p> No</p> <p>(Default : Yes)</p>



Section 10 HARDWARE ASSEMBLY AND CONFIGURATIONS

The Figure 10.1 below shows the controller outer-case viewed with front label upright.

ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 3 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the right, Power-supply PCB is to the left 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 10.2

Figure 10.1

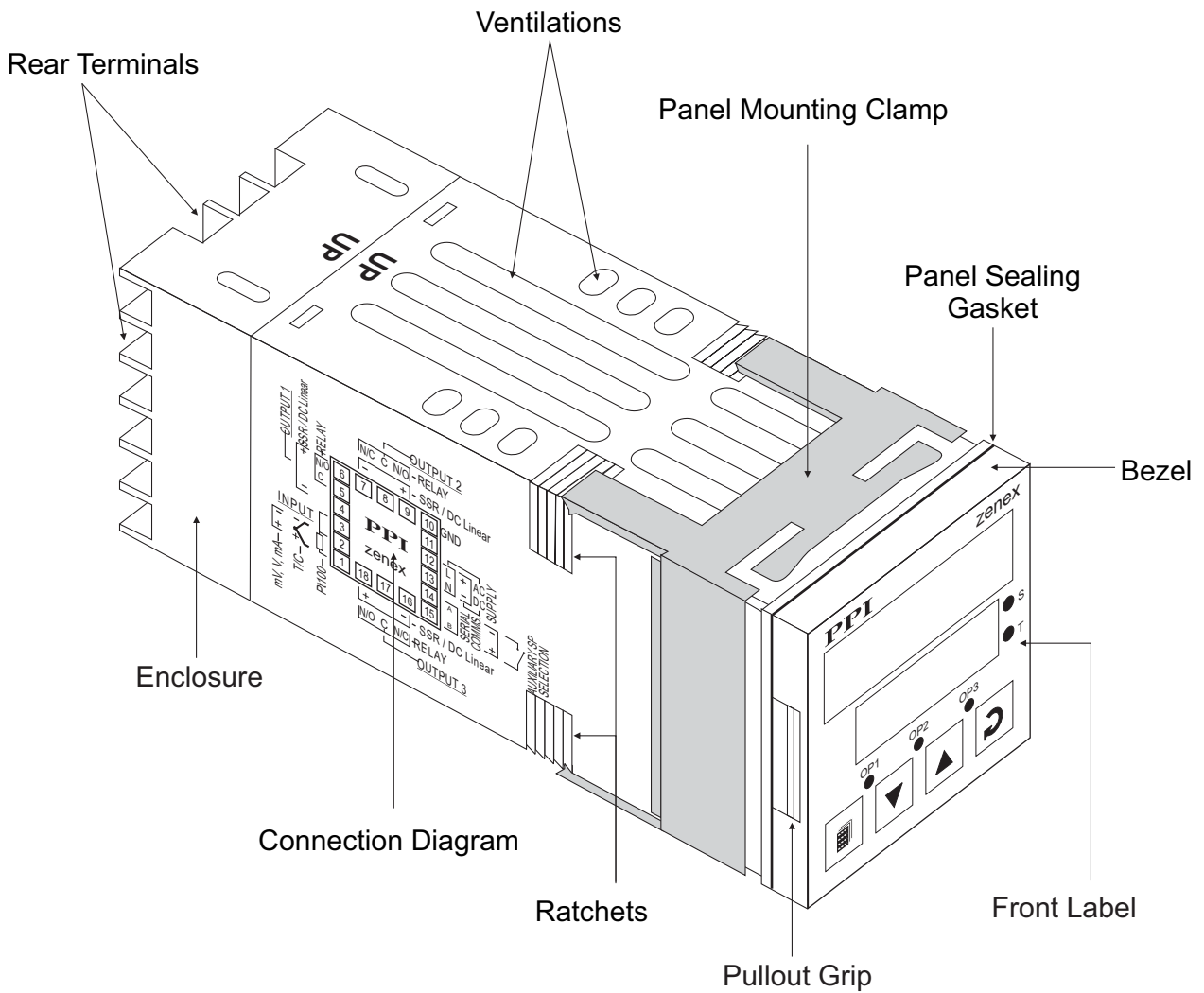
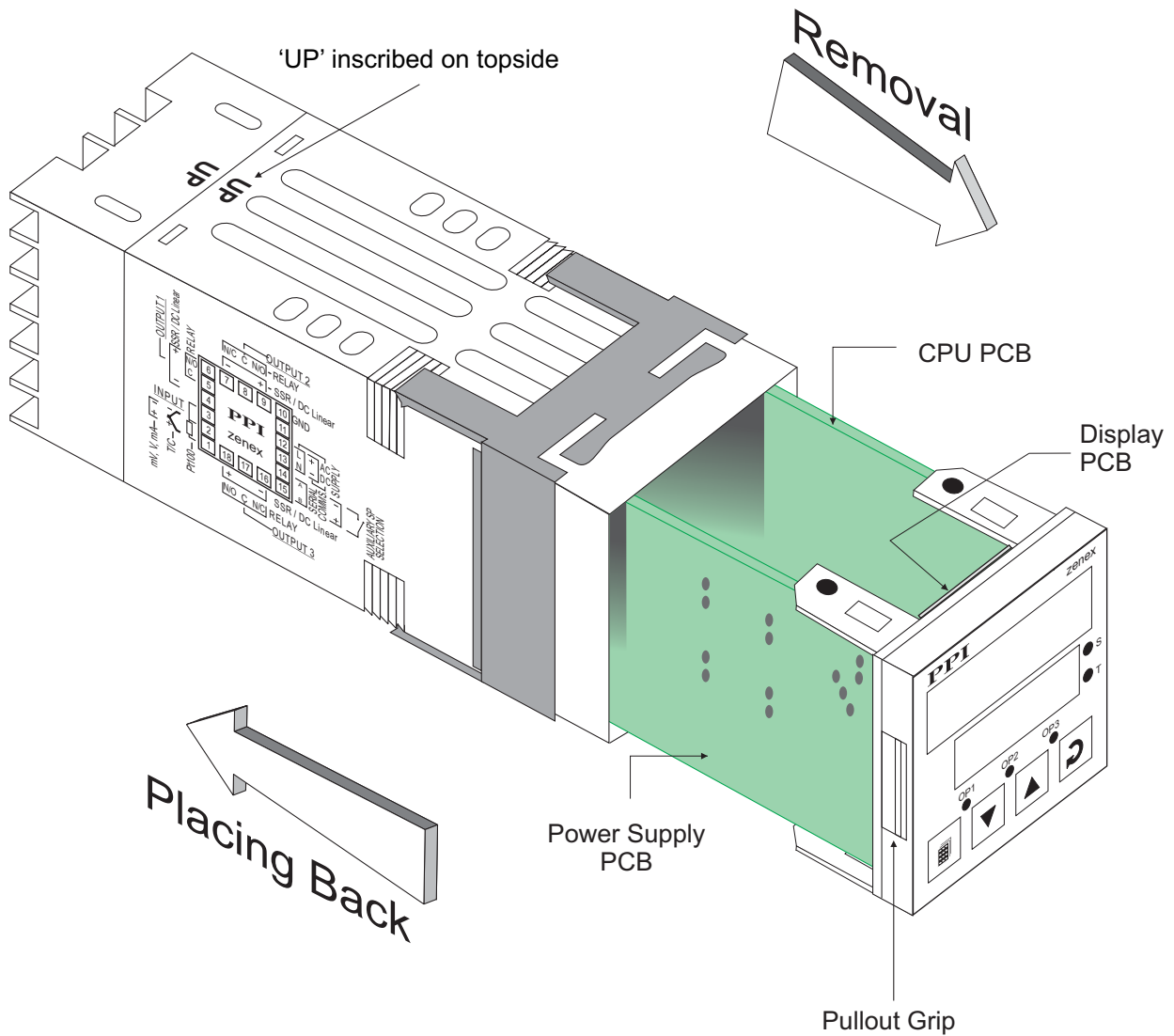


Figure 10.2



Removing Assembly from Enclosure

With the controller upright, hold the Bezel with the fingers on the pullout grips provided on the left and right sides of the bezel. Pull the bezel outward. The assembly comes out with the bezel.

Placing Assembly Back into Enclosure

With the controller upright (the UP inscribed on the Enclosure is on the topside), insert the bezel gently with the boards on either side sliding into the guides provided inside of the Enclosure. Ensure that the bezel fits in tight on the Enclosure-front to secure the panel-sealing gasket.

MOUNTING PLUG-IN MODULES

The controller supports up to 3 plug-in modules, viz. *Output-2 Module* (Relay / SSR or DC Linear), *Output-3 Module* (Relay / SSR or DC Linear) and *Option Module* (RS485 Serial Port or Digital Input for Auxiliary Setpoint selection). These modules are either pre-fitted while the controller is shipped from the factory or can be fitted by the user later.

All 3 plug-in modules are provided with female socket that directly fits into the corresponding male plug provided on either Power-supply PCB or CPU PCB. The *Output-2* and *Option* Modules fit into plugs provided on Power-supply PCB whereas the *Output-3* Module fits into plug provided on the CPU PCB.

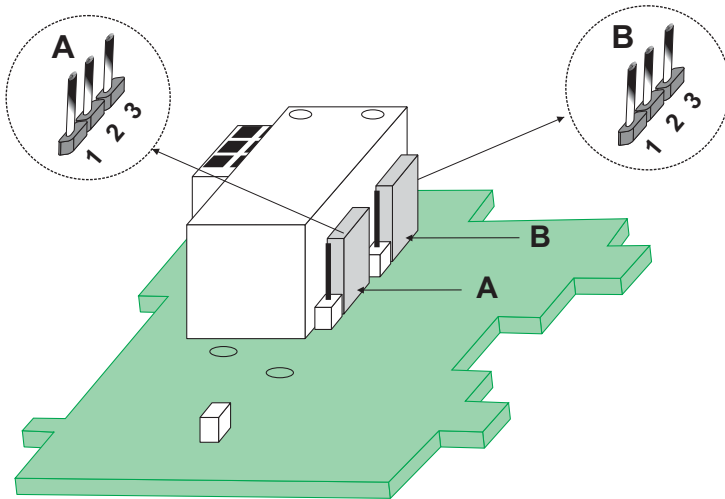
OUTPUT-2 & OUTPUT-3 : Modules and Jumper Settings

The *Output-2* and *Output-3* Modules come in three versions, viz., Relay / SSR, DC Linear Voltage and DC Linear Current. The two modules are identical and, thus, can be fitted interchangeably in Output-2 or Output-3 positions.

Relay / SSR Module

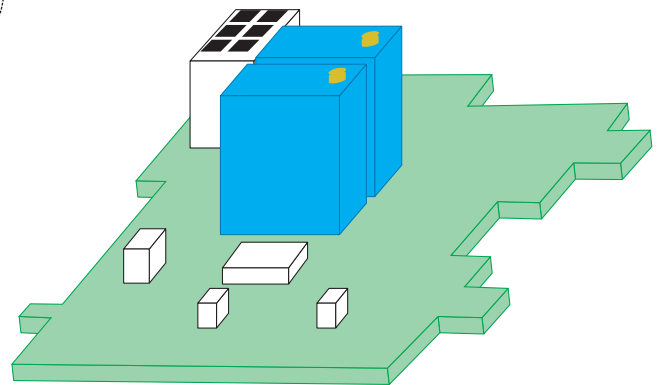
This module can be configured for either Relay or SSR output through proper jumper selection. Two jumper settings A and B, as shown in Figure 10.3 and Table 10.1, are required for Relay or SSR selection.

Figure 10.3



Relay/SSR Module

Figure 10.4



DC Voltage/Current Module

Table 10.1

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

DC Linear Voltage / Current Module

The DC Linear Module is factory configured for either Current or Voltage output. The current output can be configured for 0-20 mA or 4-20 mA and similarly the voltage output can be configured for 0-5 V or 0-10 V through parameter settings.

MOUNTING / UN-MOUNTING OF MODULES

The Figures 10.5 & 10.6 illustrates how to mount the plug-in Output-2 & Output-3 module, respectively. Notice the orientation of the controller and a few identifying components shown in figures to help locate the plugs for the modules. Ensure that the socket snap-fits into the plug and the 2 projected parts on the module fit into the 2 slots provided on the Power-Supply / CPU PCB for proper electrical contacts and secured fitting.

For plugging out the module(s), follow the steps below:

1. Gently pull apart the Power-supply board and the CPU board until the projections of the module board come out of the slots.
2. Pull the module outward to unlock the socket from the plug.

Figure 10.5
Mounting Output-2 Module

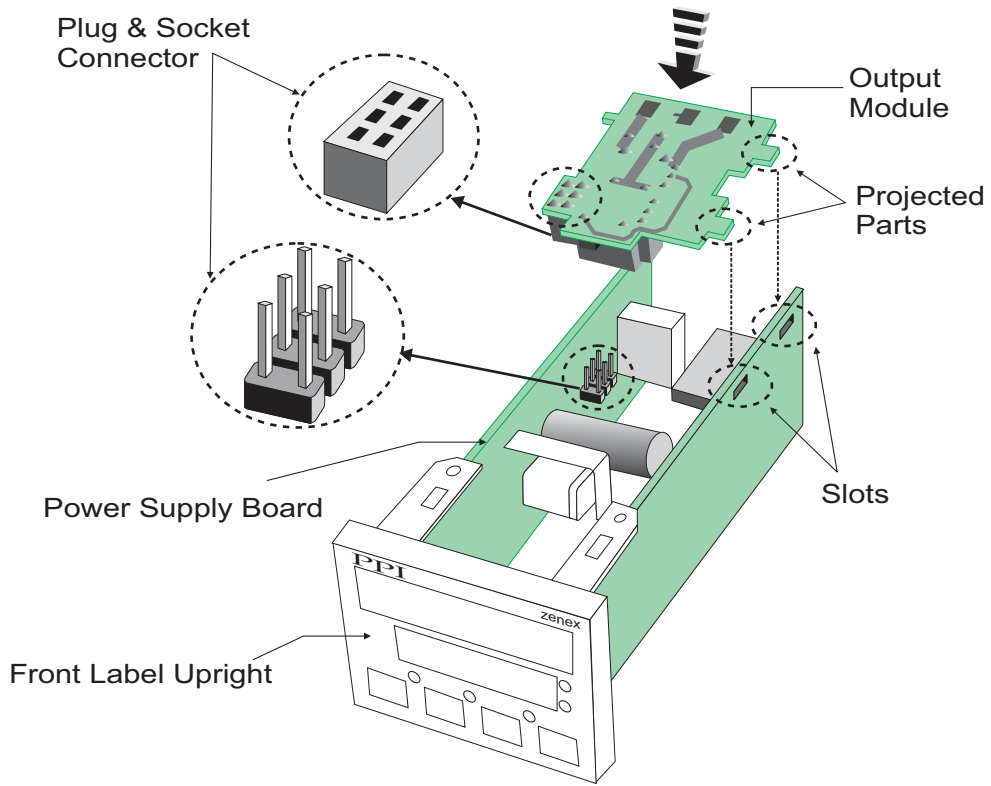
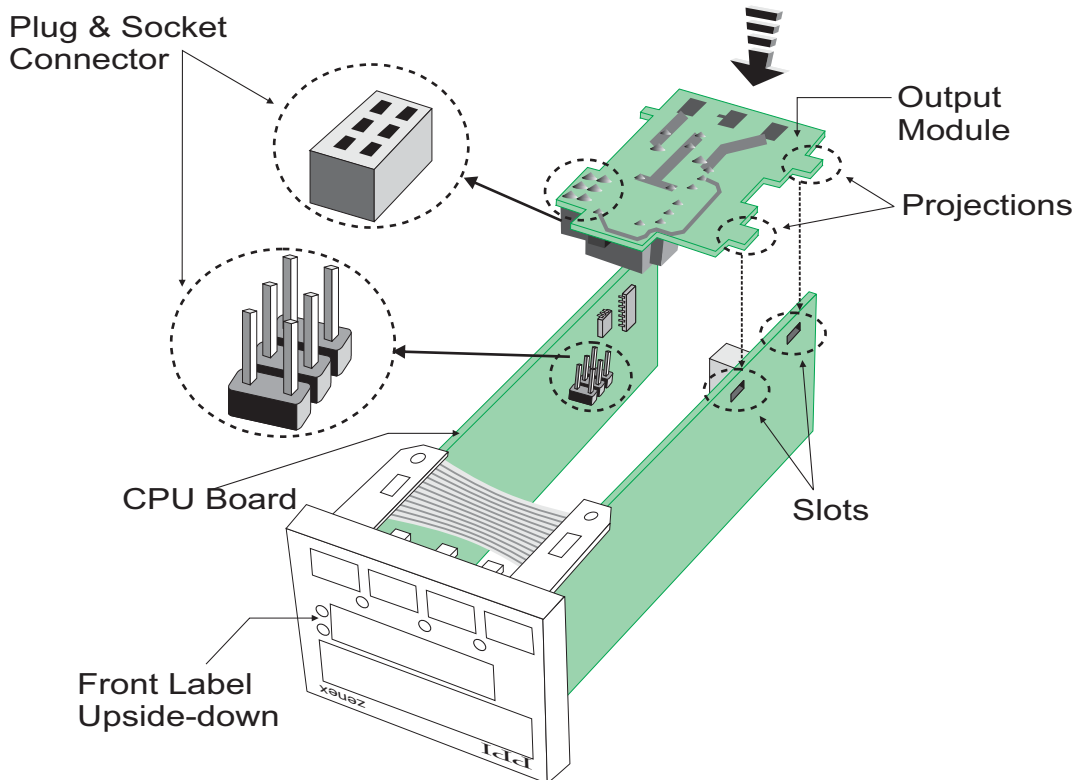


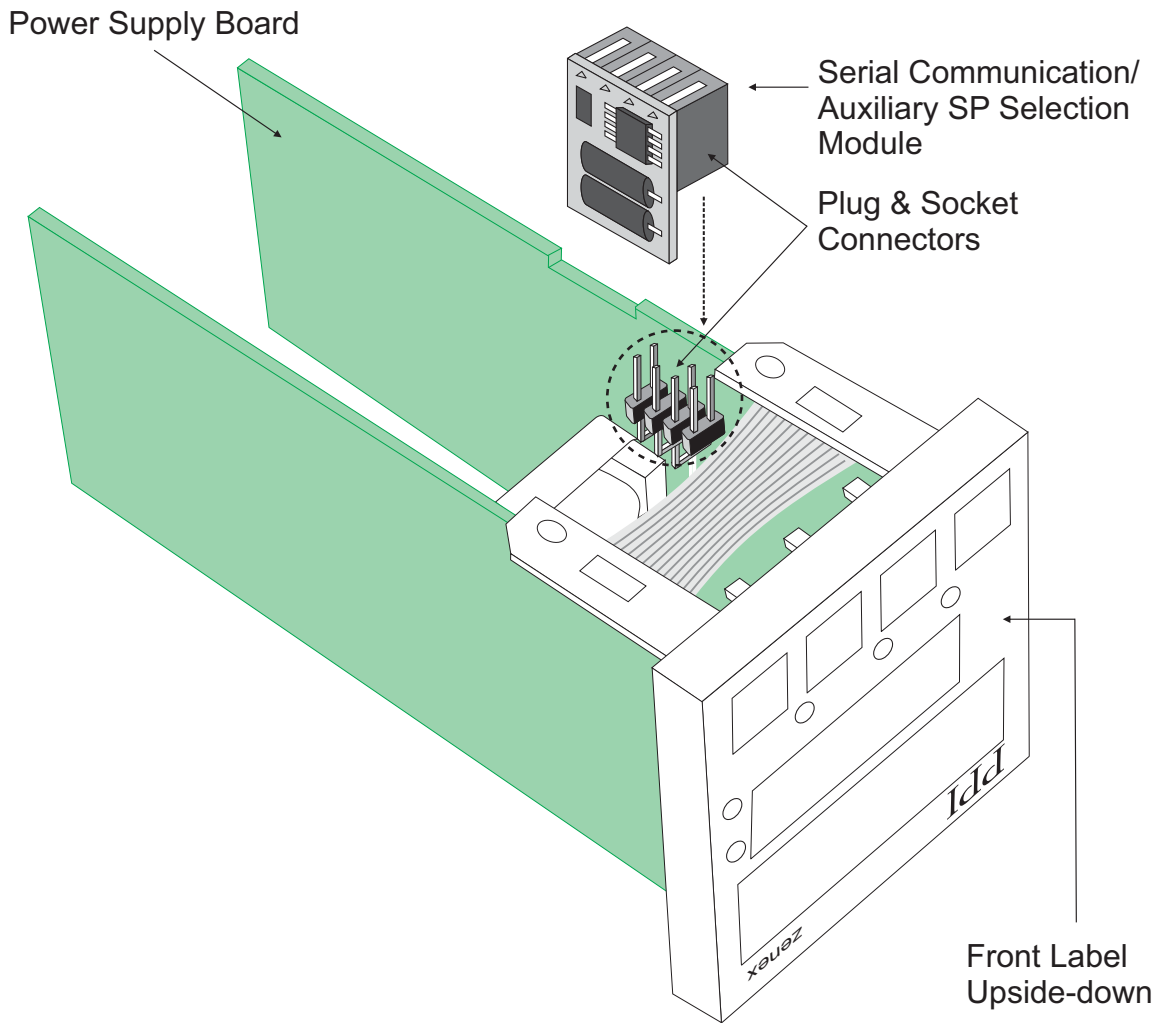
Figure 10.6
Mounting Output-3 Module



The plug for the Serial Communication or Auxiliary SP Selection module is located on the Power-supply PCB. The Figure 10.7 below illustrates how to plug-in the Serial Communication/Auxiliary SP module. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Figure 10.7

Mounting Serial Communication/Auxiliary SP Selection Module



Section 11

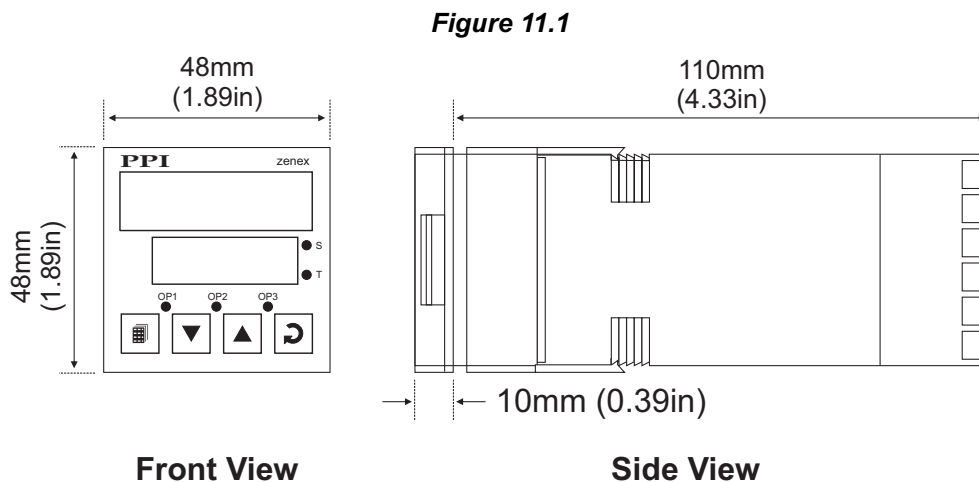
MECHANICAL INSTALLATION

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.

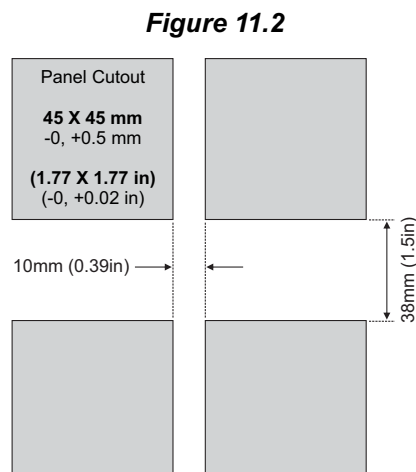
OUTER DIMENSIONS

The Figure 11.1 shows the outer dimensions of the controller.



PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 11.2 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.

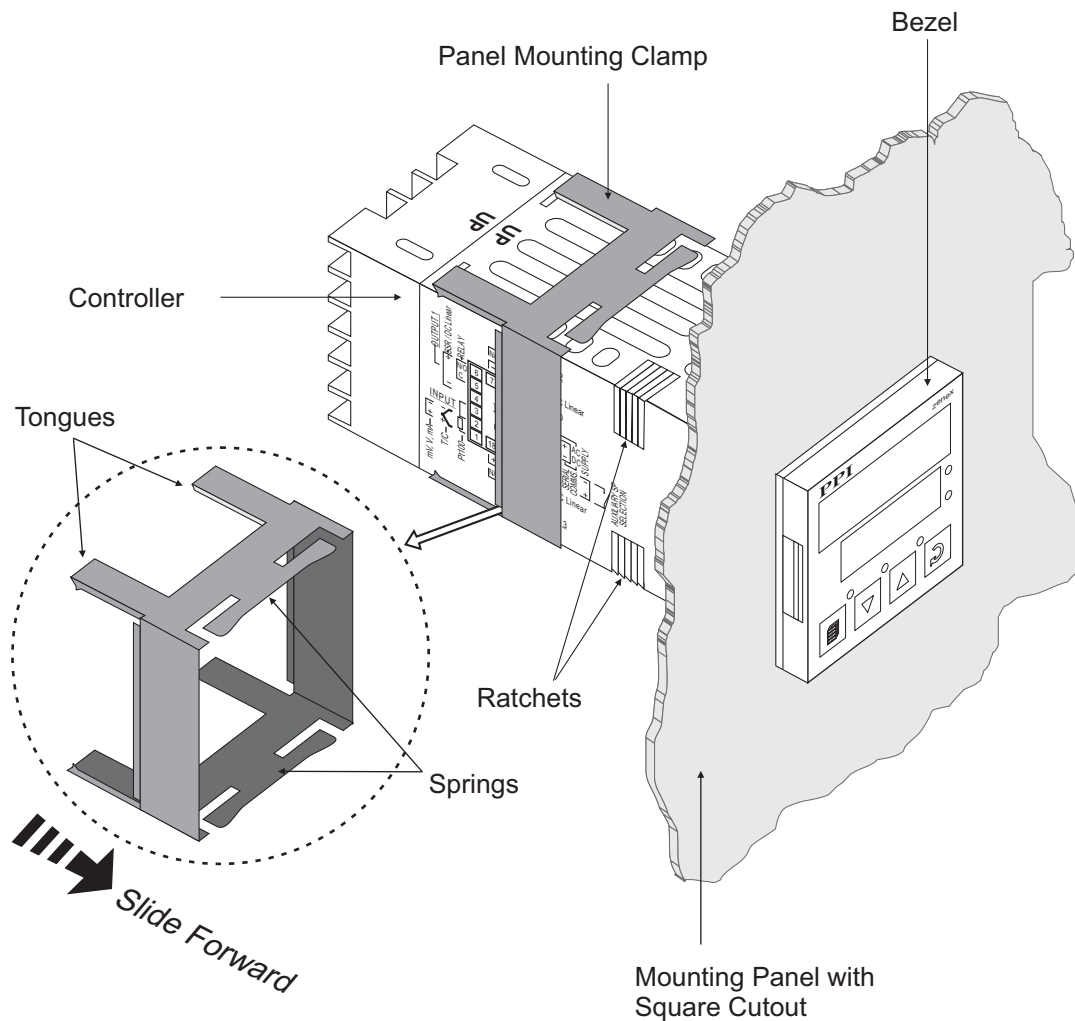


PANEL MOUNTING

Follow the steps below for mounting the controller on panel:

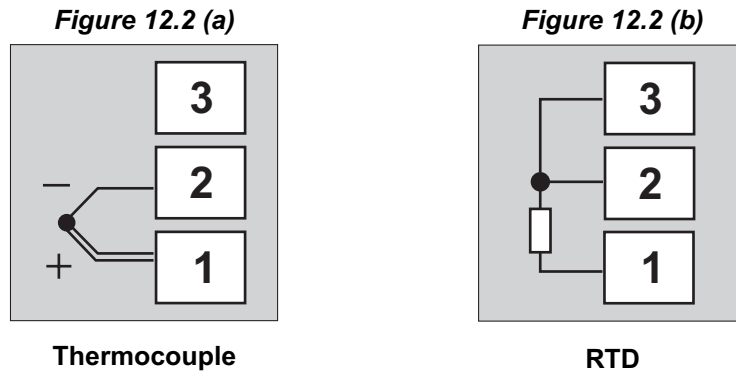
1. Prepare a square cutout to the size shown in Figure 11.2.
2. Remove the Panel Mounting Clamp from the controller Enclosure.
3. Insert the rear of the controller housing through the panel cutout from the front of the mounting panel.
4. Hold the controller gently against the mounting panel such that it positions squarely against the panel wall, see Figure 11.3. Apply pressure only on the bezel and not on the front label.
5. Slide the mounting clamp forward until it is firmly in contact with the rear face of the mounting panel and the tongues of the clamp engage in the ratchets on the controller enclosure, as shown in Figure 11.3. Ensure that the springs of the clamp push firmly against the rear face of the mounting panel for secured mounting.

Figure 11.3



TEMPERATURE SENSOR INPUT

Connect Thermocouple or 3-wire RTD Pt100 sensor as shown below.



Thermocouple

Connect Thermocouple Positive (+) to terminal 1 and Negative (-) to terminal 2 as shown in Figure 12.2 (a). Use correct type of extension lead wires or compensating cable. Avoid joints in the cable.

RTD Pt100, 3-wire

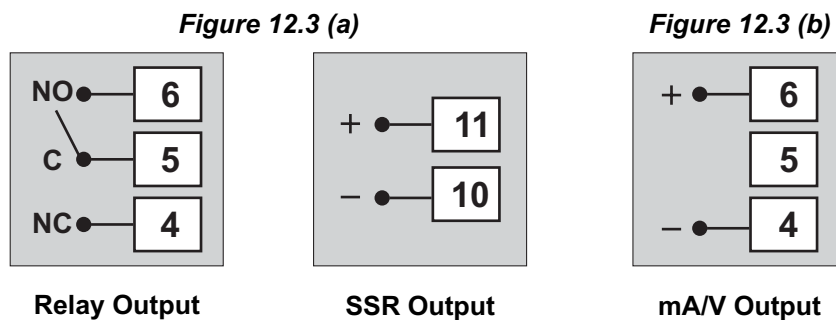
Connect single lead end of RTD bulb to terminal 1 and the double lead ends to terminal 2 and 3 (interchangeable) as shown in Figure 12.2 (b). Use low resistance copper conductor leads of the same gauge and length. Avoid joints in the cable.

OUTPUT-1 (Control Output)

The Output-1 is factory configured as either Relay / SSR Drive or DC Linear mA/V.

Note that Relay / SSR outputs are simultaneously provided on separate terminals. Refer Figure 12.3 (a).

For DC Linear mA/V, use terminals 4 & 6 as shown in Figure 12.3 (b).



Relay Output

Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 10A/240 VAC (resistive load).

SSR Output

Connect (+) and (-) terminals of SSR to terminals 11 & 10, respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR.

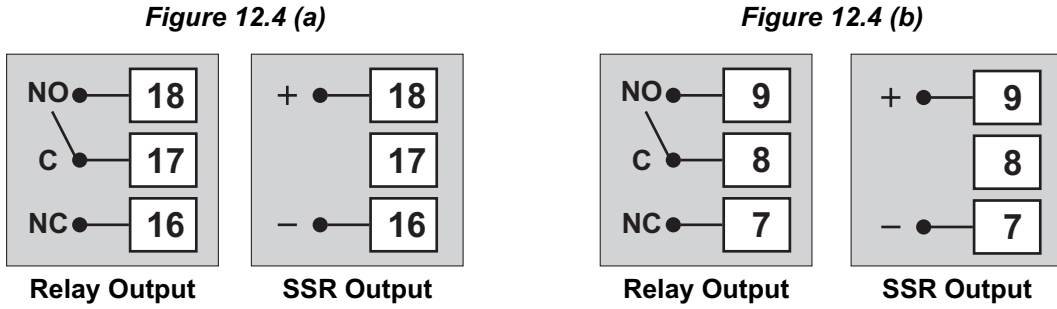
mA/V Output

The Positive (+) of mA/V is available at Terminal 6 & the Negative (-) at Terminal 4.

OUTPUT-2 (Alarm / Blower / Auxiliary Control)

OUTPUT-3 (Alarm / Auxiliary Control)

The numbers in brackets indicates the terminal numbers for Output-3.

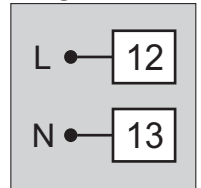


Refer Figure 12.4(a) for Output-2 & Figure 12.4(b) for Output-3 connections.

POWER SUPPLY

The controller accepts single phase, 50/60 Hz Line Voltage ranging from 85 VAC to 264 VAC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm² for power supply connections. Connect Line Voltage as shown in Figure 12.5.

Figure 12.5

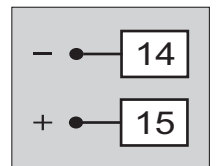


SERIAL COMMUNICATION PORT

Connect terminal 15 and 14 of the controller to the positive (+) and negative (-) terminals of the master device.

Note that, PC as a master device cannot be connected (wired) directly to the instrument as PC is equipped with RS232C serial port which is not directly compatible with RS485 port on instrument side. In such cases use RS232/RS485 converter as a bridge.

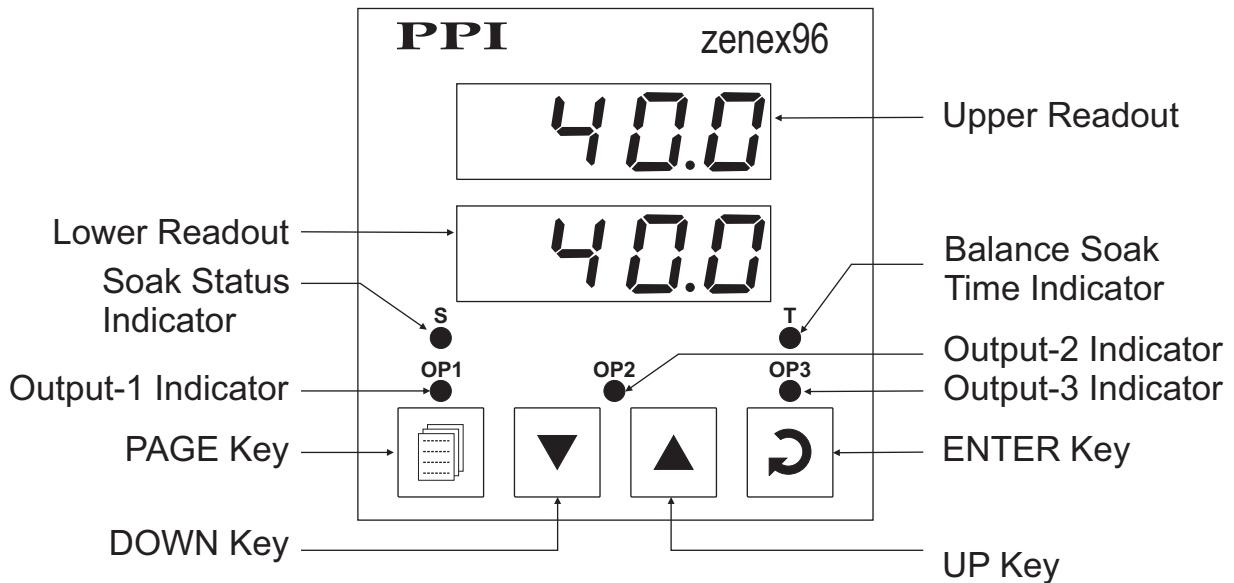
Figure 12.6



zenex 96X96

Section 1 FRONT PANEL LAYOUT

Figure 1.1



The front panel contains digital readouts, LED indicators and keys.

READOUTS

The Upper Readout is a 4 digit, 7-segment bright red LED display and usually displays the PV (Process Value). In Program Mode, the Upper Readout displays parameter values/options.

The Lower Readout is a 4 digit, 7-segment bright green LED display and usually displays SP (Control Setpoint) Value. In Program Mode, the Lower Readout displays parameter names (prompts).

INDICATORS

The Table 1.1 lists each front panel LED and the associated status.





Table 1.1

Indicator	Status
S	<ul style="list-style-type: none"> Flashes while the Soak Timer is counting down. Glow steadily while the Soak Timer is outside the Timer Start Band or Hold Band (that is, HOLD state).
T	Glow while the Lower Readout shows the Balance Soak Time in Main display mode.
OP1	<ul style="list-style-type: none"> Indicates Output-1 ON/OFF status if the Control Output is Relay or SSR drive. Remains OFF if the Control Output is DC Linear.
OP2	<ul style="list-style-type: none"> Indicates Output-2 status if OP2 function is Auxiliary / Blower Control. Flashes Alarm-1 status if OP2 function is Alarm.
OP3	<ul style="list-style-type: none"> Indicates Output-3 status if OP3 function is Auxiliary Control. Flashes Alarm-2 status if OP3 function is Alarm.

KEYS

The Table 1.2 lists the four front panel keys and the associated function.

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; holding pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.



OUTPUT-2 & OUTPUT-3 : Jumper Settings

The Output-2 & Output-3 can be configured for either SSR Output or Relay Output by setting appropriate parameter value & hardware jumpers.

Refer Figure 2.2 & Table 2.2 below for Output-2 Jumper Settings.

Figure 2.2 : Output-2 Jumper Setting

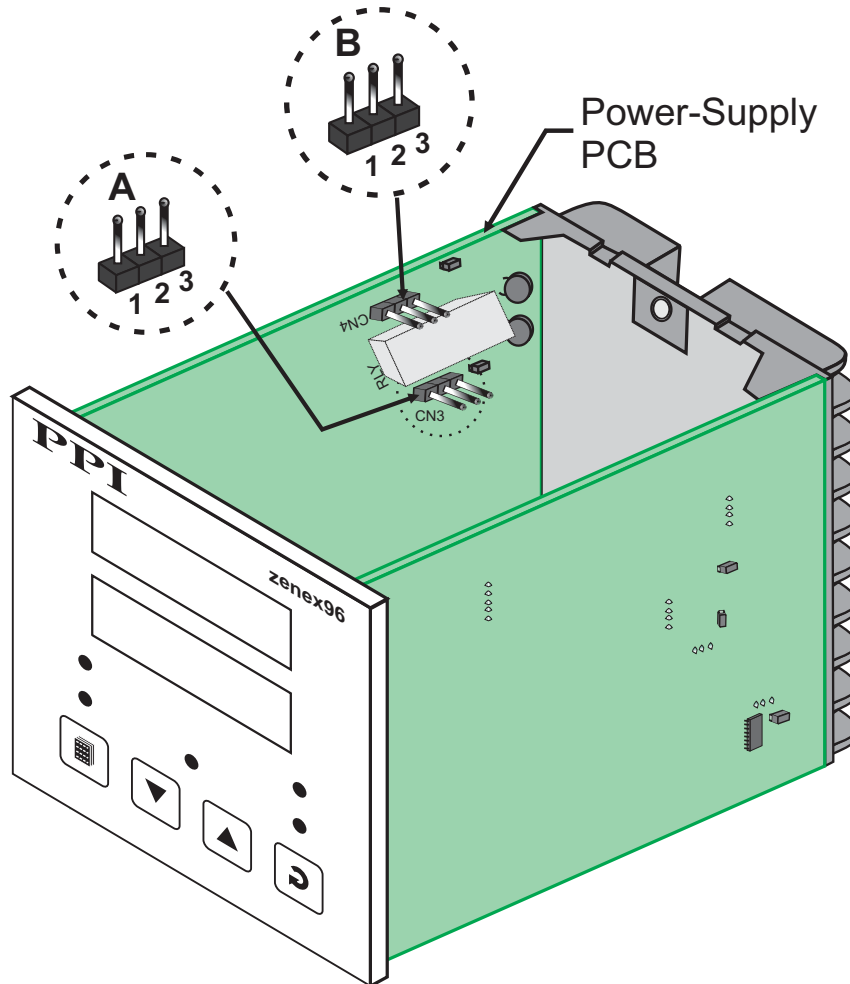


Table 2.2 Output-2 Jumper Settings

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

Refer Figure 2.3 & Table 2.3 below for Output-3 Jumper Settings.

Figure 2.3 : Output-3 Jumper Setting

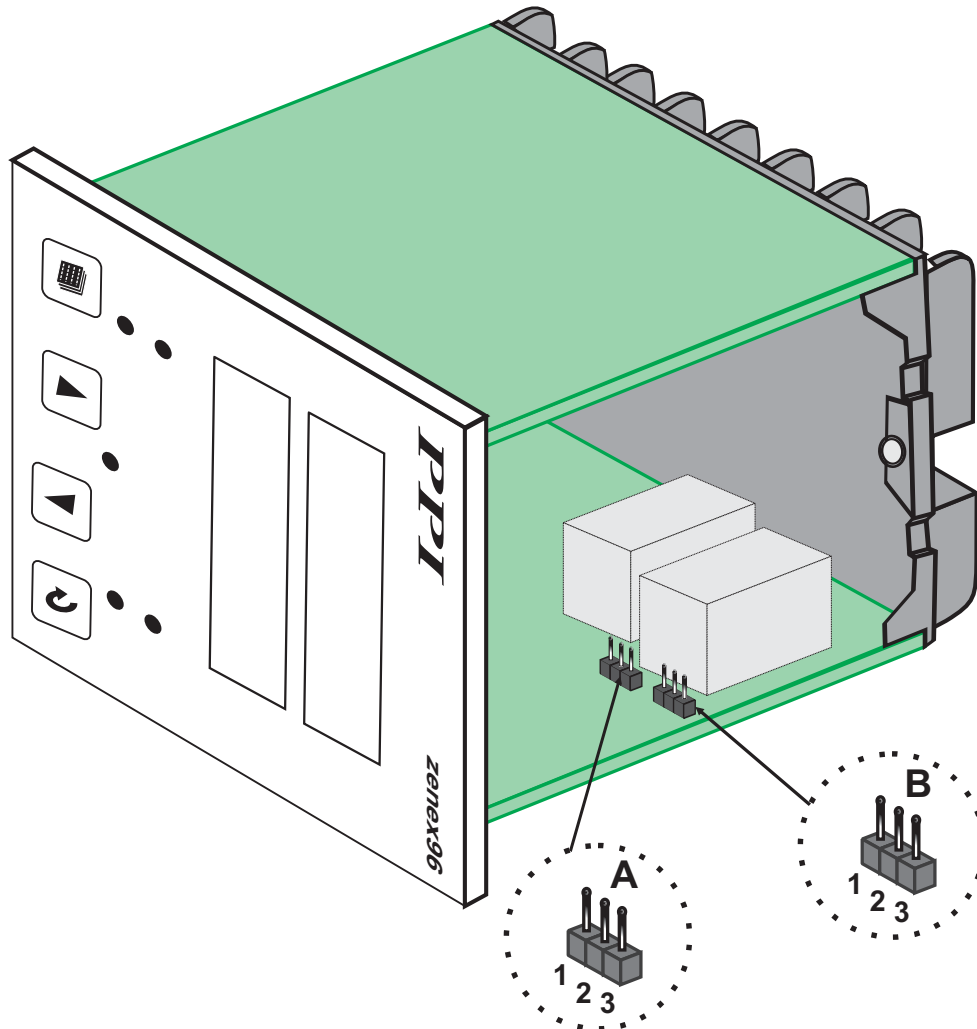
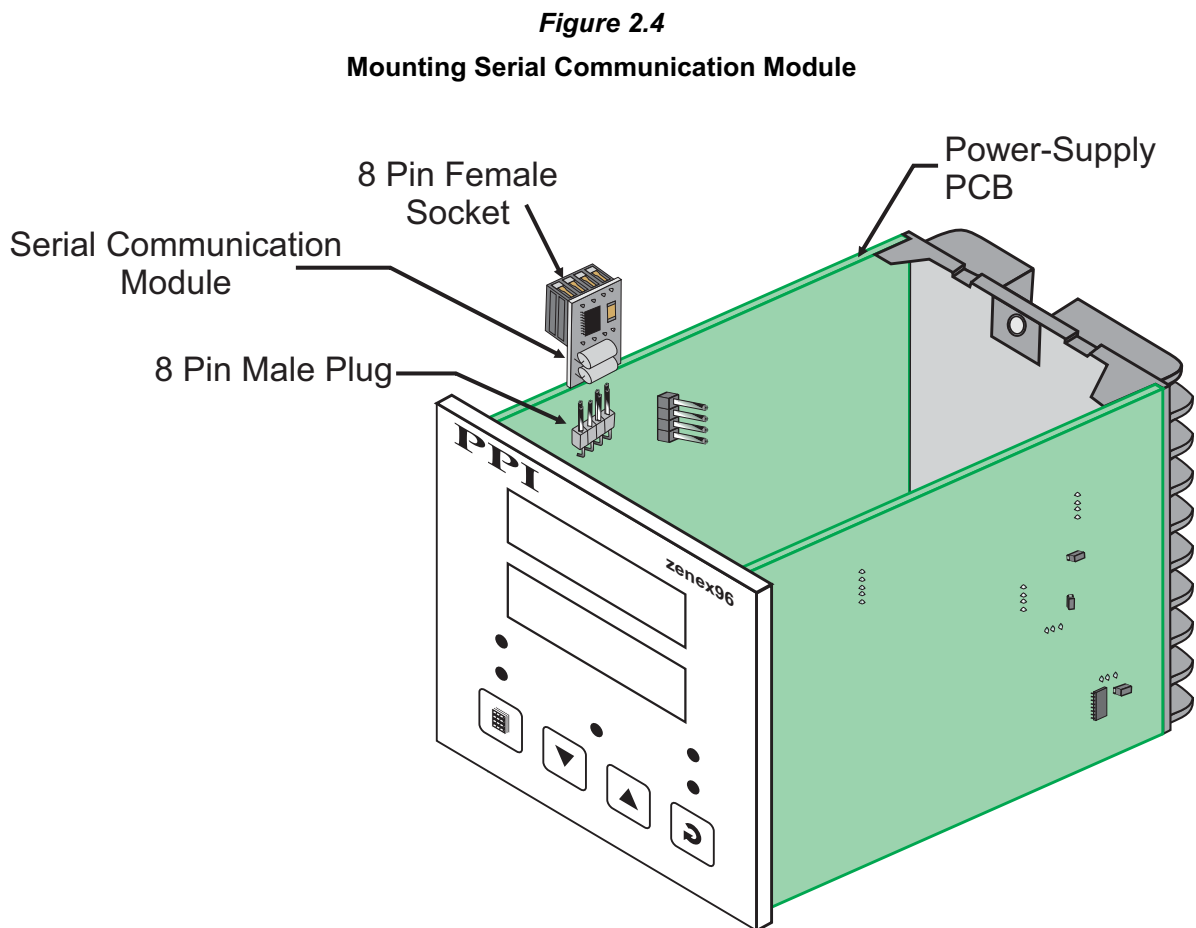


Table 2.3 Output-3 Jumper Settings

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

Plug-in Serial Communication Module

The 8-pin male plug for the Serial Communication module is located on the Power-supply PCB. The Figure 2.4 below illustrates how to plug-in the Serial Communication module. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

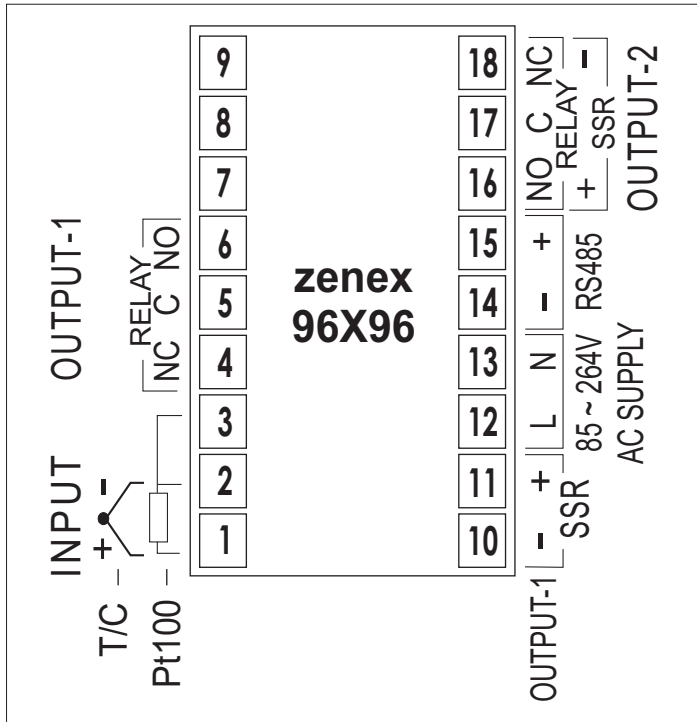


Section 3 ELECTRICAL CONNECTIONS

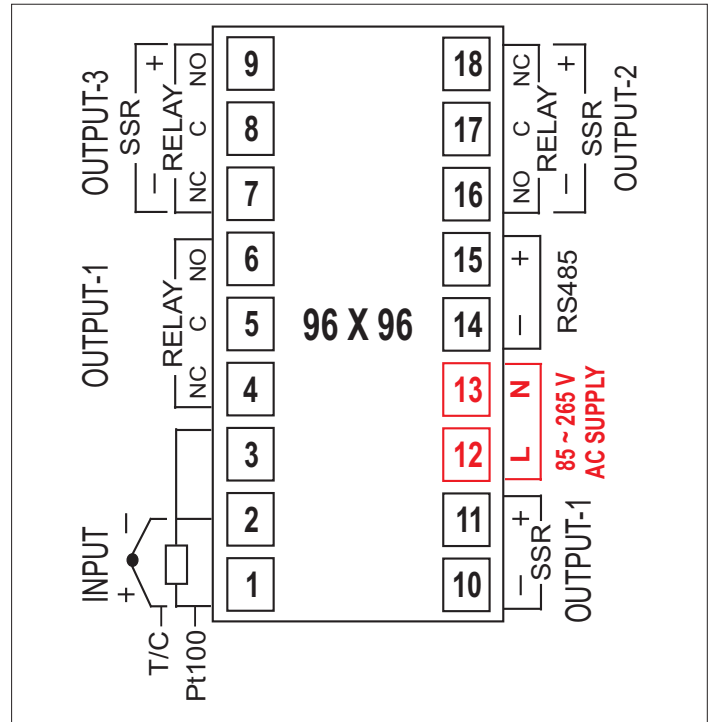
Refer connection diagram shown on the left side of the enclosure. The diagram shows the terminals viewed from the REAR SIDE with the controller label upright.

Figure 3.1

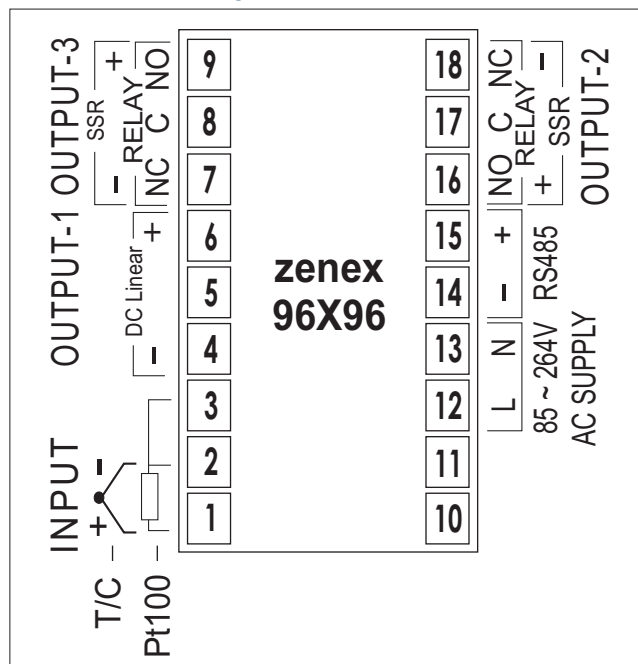
2 Output Version



3 Output Version Output-1 : Relay / SSR

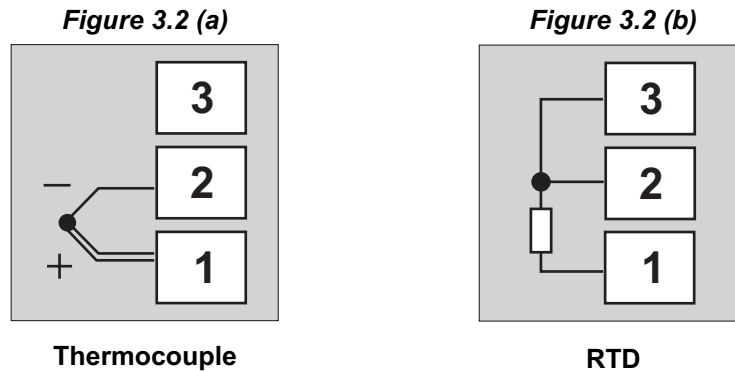


3 Output Version Output-1 : DC Linear



TEMPERATURE SENSOR INPUT

Connect Thermocouple or 3-wire RTD Pt100 sensor as shown below.



Thermocouple

Connect Thermocouple Positive (+) to terminal 1 and Negative (-) to terminal 2 as shown in Figure 3.2 (a). Use correct type of extension lead wires or compensating cable. Avoid joints in the cable.

RTD Pt100, 3-wire

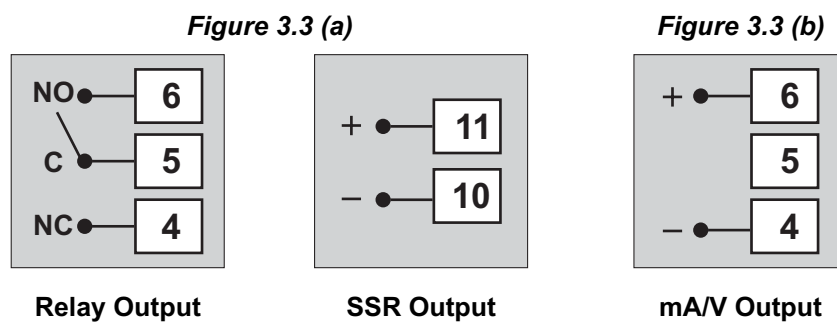
Connect single lead end of RTD bulb to terminal 1 and the double lead ends to terminal 2 and 3 (interchangeable) as shown in Figure 3.2 (b). Use low resistance copper conductor leads of the same gauge and length. Avoid joints in the cable.

OUTPUT-1 (Control Output)

The Output-1 is factory configured as either Relay / SSR Drive or DC Linear mA/V.

Note that Relay / SSR outputs are simultaneously provided on separate terminals. Refer Figure 3.3 (a).

For DC Linear mA/V, use terminals 4 & 6 as shown in Figure 3.3 (b).



Relay Output

Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 10A/240 VAC (resistive load).

SSR Output

Connect (+) and (-) terminals of SSR to terminals 11 & 10, respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR.

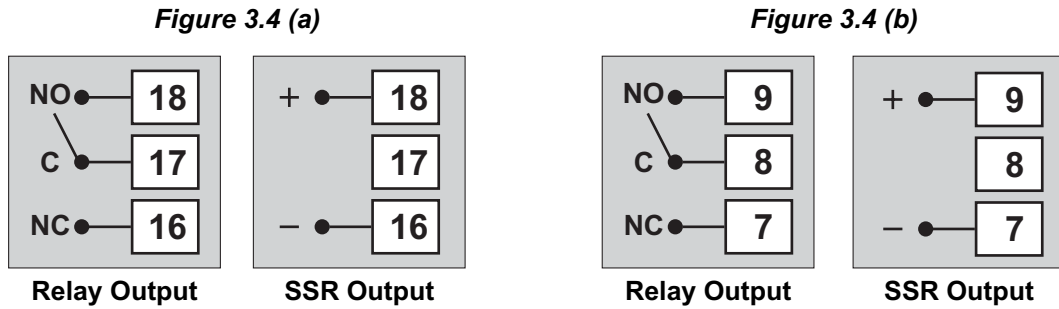
mA/V Output

The Positive (+) of mA/V is available at Terminal 6 & the Negative (-) at Terminal 4.

OUTPUT-2 (Alarm / Blower / Auxiliary Control)

OUTPUT-3 (Alarm / Auxiliary Control)

The numbers in brackets indicates the terminal numbers for Output-3.

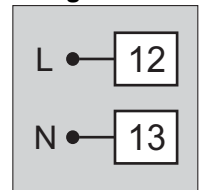


Refer Figure 3.4(a) for Output-2 & Figure 3.4(b) for Output-3 connections.

POWER SUPPLY

The controller accepts single phase, 50/60 Hz Line Voltage ranging from 85 VAC to 264 VAC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm² for power supply connections. Connect Line Voltage as shown in Figure 3.5.

Figure 3.5

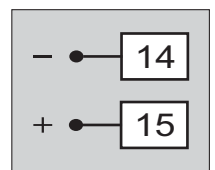


SERIAL COMMUNICATION PORT

Connect terminal 15 and 14 of the controller to the positive (+) and negative (-) terminals of the master device.

Note that, PC as a master device cannot be connected (wired) directly to the instrument as PC is equipped with RS232C serial port which is not directly compatible with RS485 port on instrument side. In such cases use RS232/RS485 converter as a bridge.

Figure 3.6





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