



epsilon_48x48 Self Tune PID Process Controller with Ramp / Soak Profile User Manual

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EPSILONTM

PPI

48×48 Self Tune PID Process
Controller with Ramp / Soak Profile
Operation Manual

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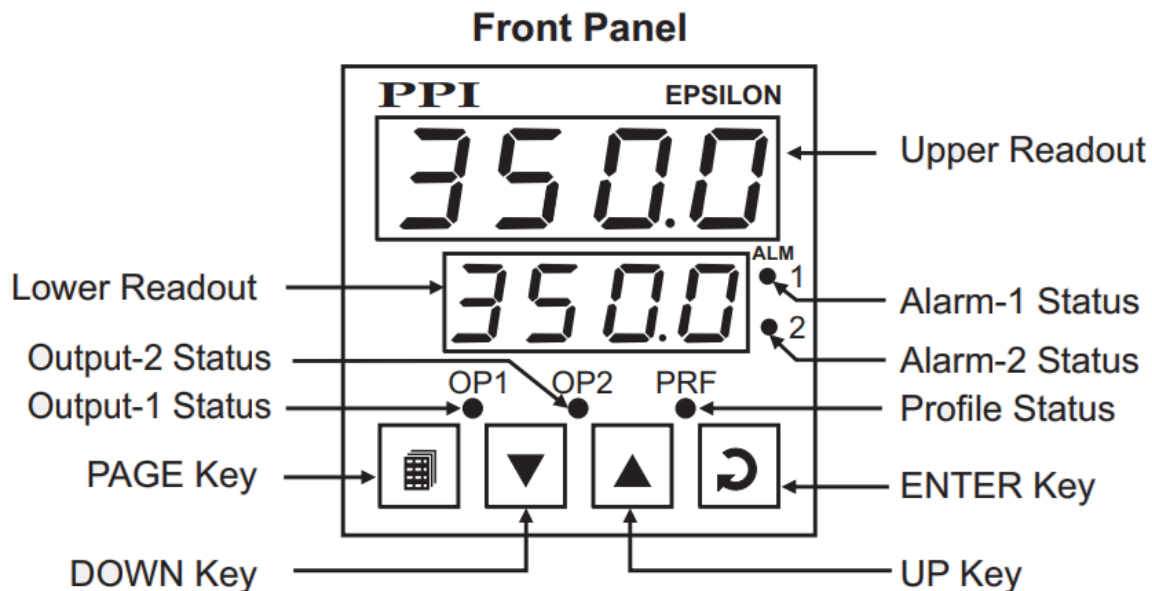
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This brief manual is primarily meant for quick reference to wiring connections and parameter searching. For more details on operation and application; please log on to www.ppiindia.net

FRONT PANEL LAYOUT



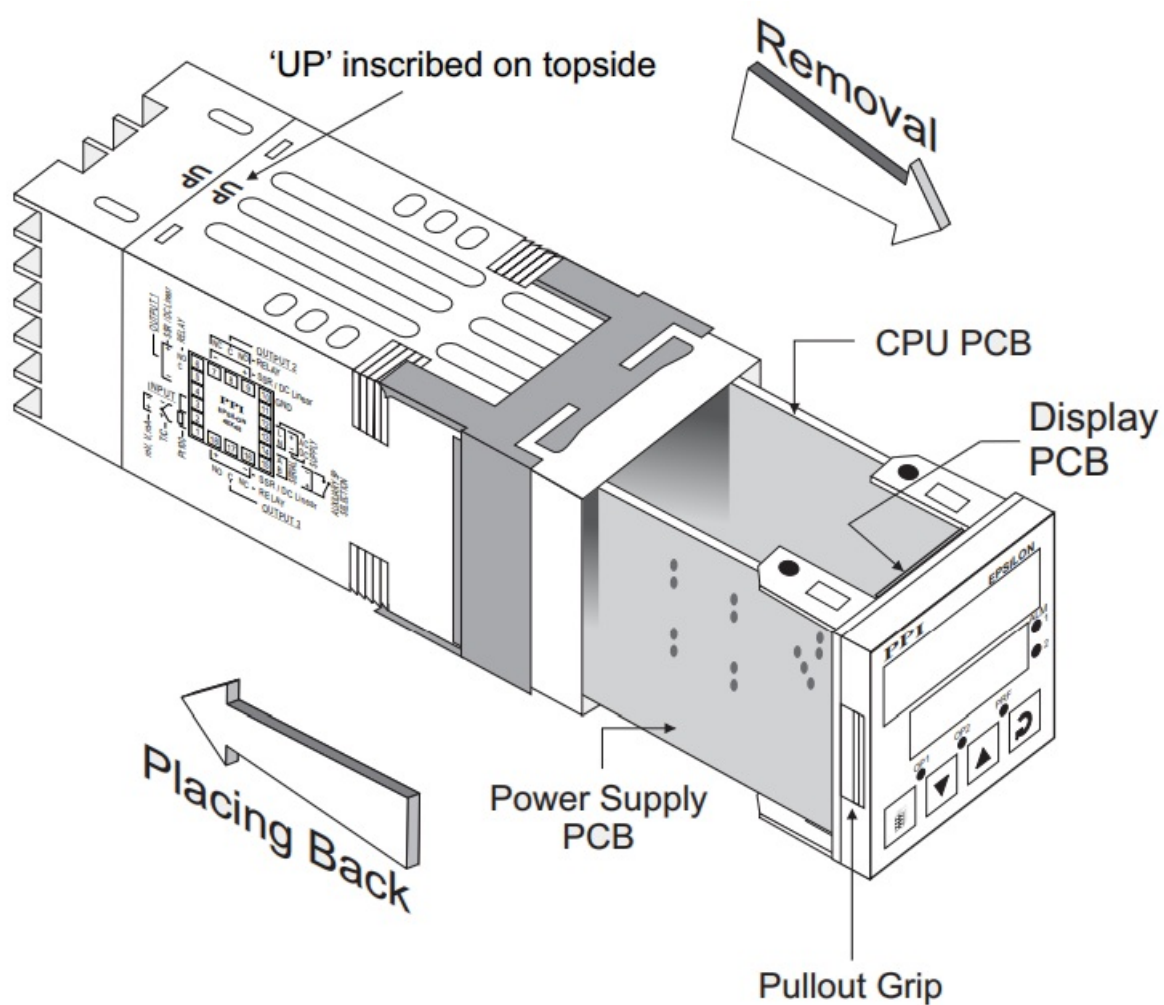
Keys Operation

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.

PV Error Indications

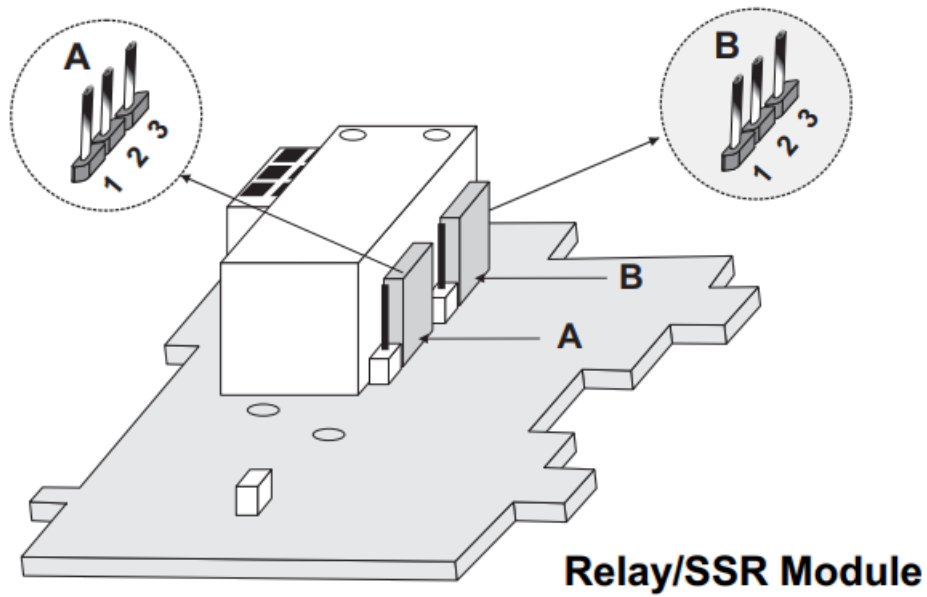
Message	PV Error Type
	Over-range (PV above Max. Range)
	Under-range (PV below Min. Range)
	Open (Sensor open / broken)

ENCLOSURE ASSEMBLY



JUMPER SETTINGS

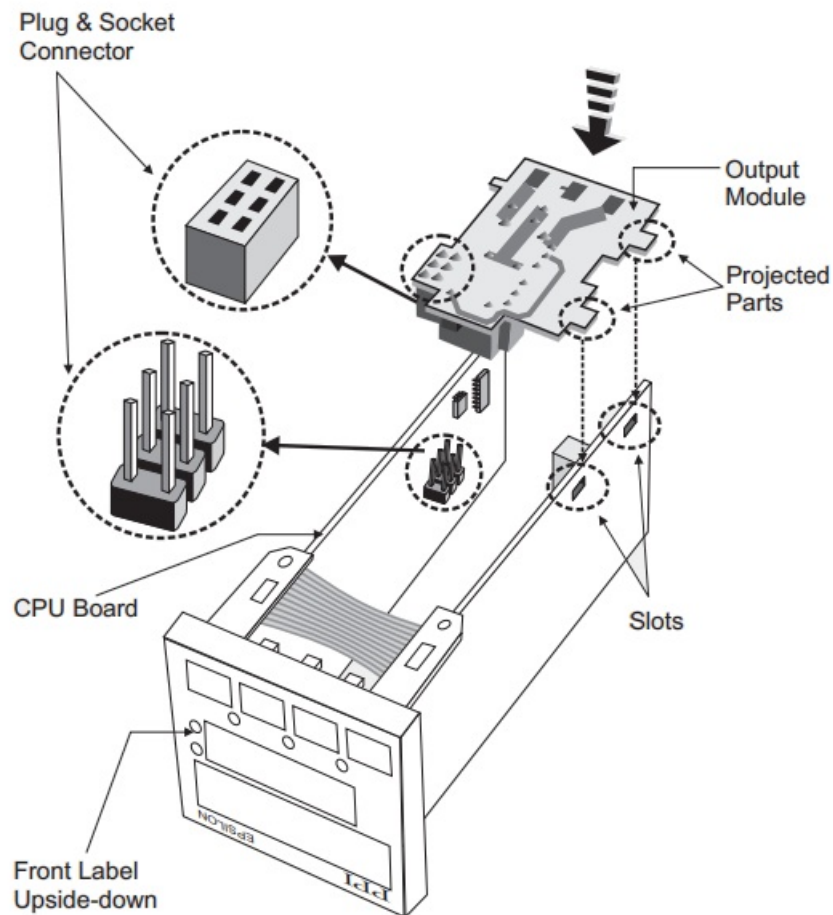
OUTPUT-2 & OUTPUT-3



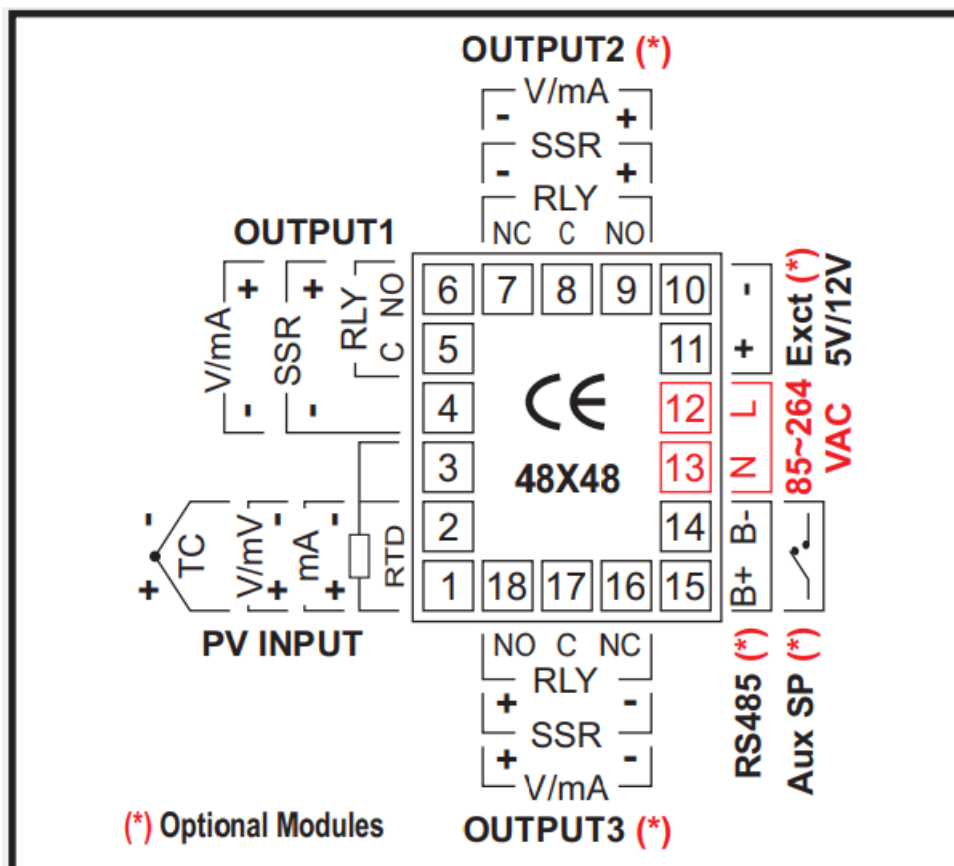
Output Type	Jumper Setting - A	Jumper Setting - B
Relay		
SSR		

MOUNTING DETAILS

OUTPUT-3 MODULE

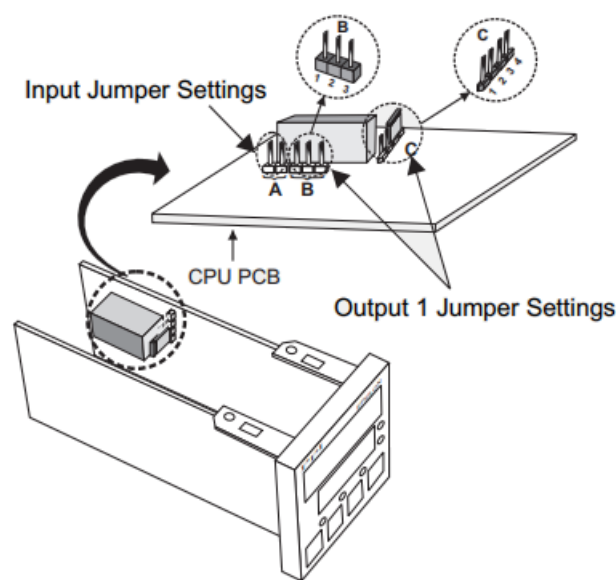


ELECTRICAL CONNECTIONS



JUMPER SETTINGS

INPUT & OUTPUT-1



Input Jumper Settings

A
Pins Shorted
DC Linear Current (mA)

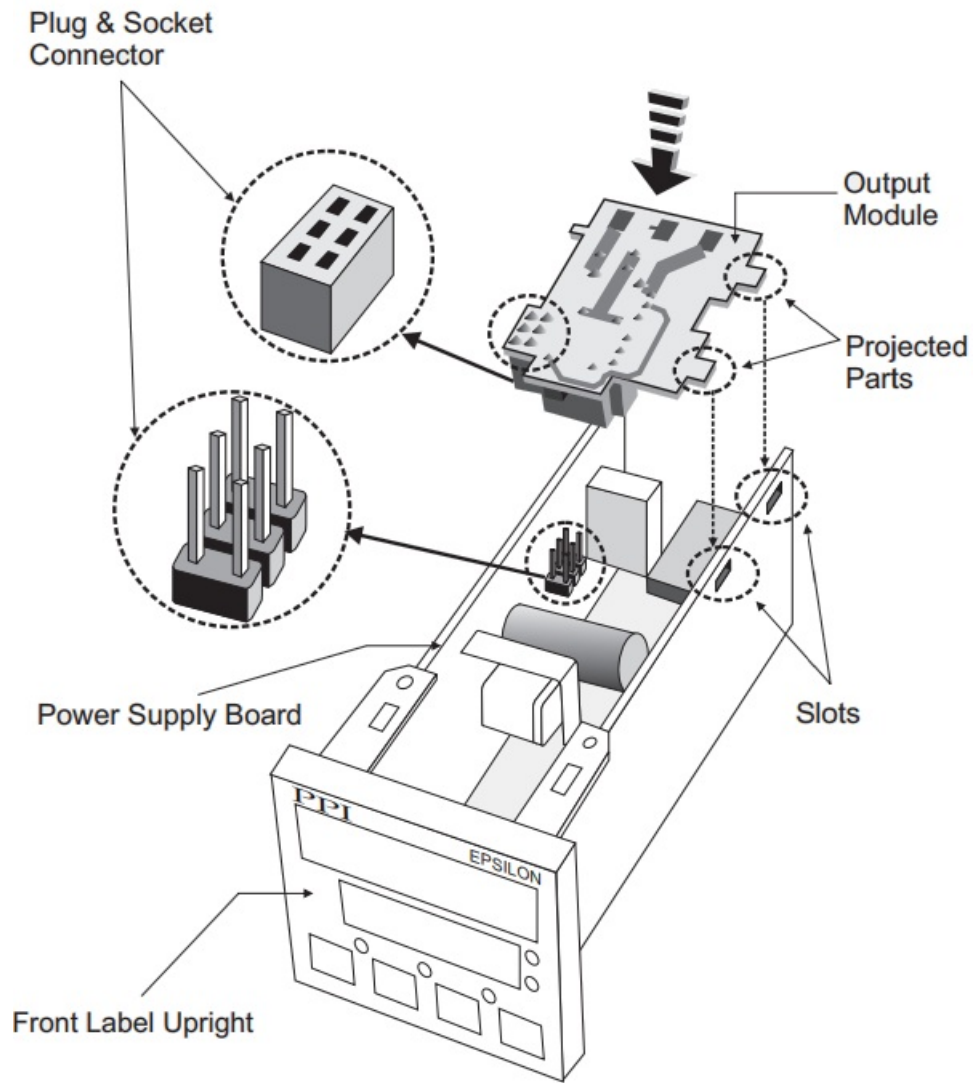
A
Link Parked
All Other Input Types

Output - 1 Jumper Settings

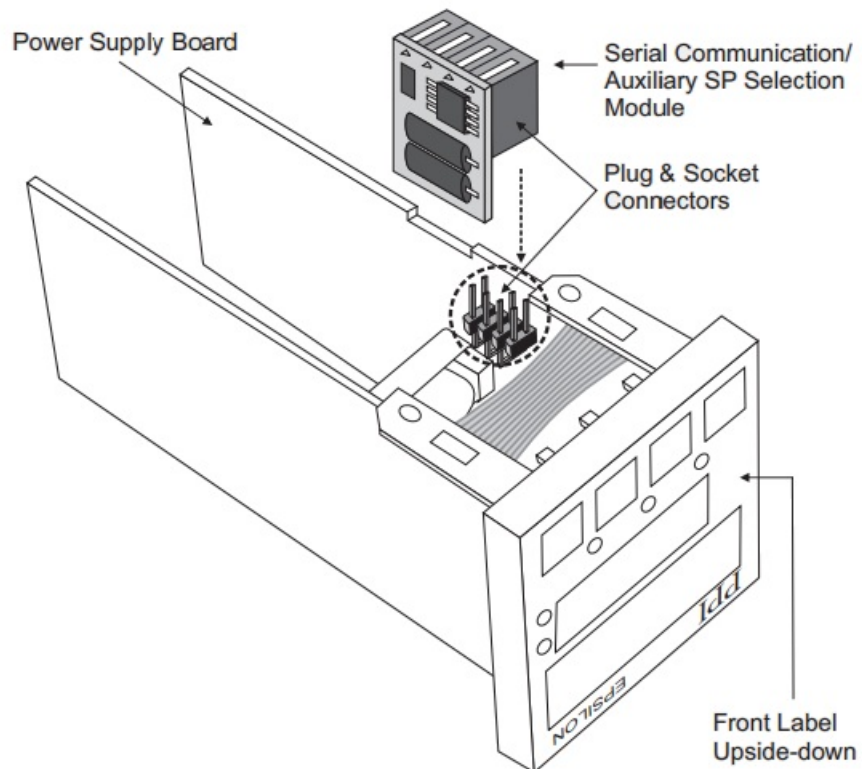
Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		
DC Linear Current (or Voltage)		

MOUNTING DETAILS

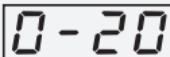
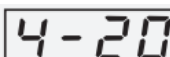
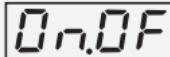
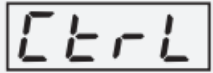
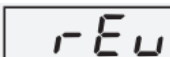
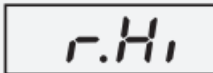
OUTPUT-2 MODULE

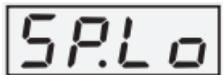
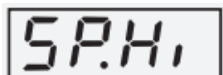
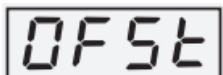
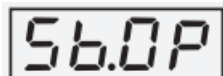


SERIAL COMM. MODULE

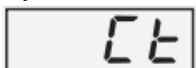
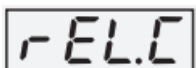


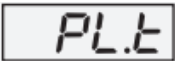
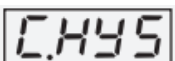
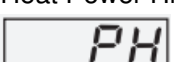
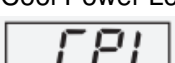
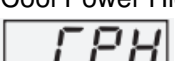
CONFIGURATION PARAMETERS

Parameters	Settings (Default Value)
Control Output (OP1) Type 	 Relay  SSR  0 – 20 mA  4 – 20 mA  0 – 5 V  0 – 10 V (Default : Relay)
Control Action 	 On-Off  Pulse  PID (Default : PID)
Control Logic 	 Reverse  Direct (Default : Reverse)
Input Type 	Refer Table 1 (Default : Type K)
PV Resolution 	Refer Table 1 (Default : 1)
PV Units 	 °C  °F (Default : C)°
PV Range Low  PV Range High 	-1999 to 9999 (Default : 0) -1999 to 9999 (Default : 1000)

Setpoint Low Limit 	Min. Range for the (Default : -199) selected Input Type to Setpoint High Limit
Setpoint High Limit 	Setpoint Low Limit to Max. Range for the selected Input Type (Default : 1376)
Offset for PV 	-199 to 999 or -199.9 to 999.9 (Default : 0)
Digital Filter Time Constant 	0.5 to 60.0 Seconds (in steps of 0.5 Seconds) (Default : 2.0 Sec.)
Sensor Break Output Power 	-100 to 100 (Default : 0)

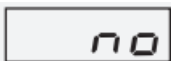
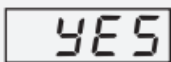
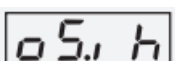
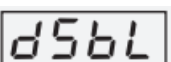
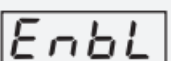
CONTROL PARAMETERS

Parameters	Settings (Default Value)
Proportional Band 	1 to 999 Units (Default : 50 units)
Integral Time 	0 to 3600 Seconds (Default : 100 Sec.)
Derivative Time 	0 to 600 Seconds (Default : 16 Sec.)
Cycle Time 	0.5 to 100.0 Seconds (in steps of 0.5 secs.) (Default : 10.0 Sec.)
Relative Cool Gain 	0.1 to 10.0 (Default : 1.0)
Cool Cycle Time 	0.5 to 100.0 Seconds (in steps of 0.5 secs.) (Default : 10.0 Sec.)
Hysteresis 	1 to 999 (Default : 2)

Pulse Time 	Pulse ON Time to 120.0 Seconds (Default : 2.0 sec.)
ON Time 	0.1 to Value set for Pulse Time (Default : 1.0)
Cool Hysteresis 	1 to 999 (Default : 2)
Cool Pulse Time 	Cool ON Time to 120.0 Seconds (Default : 2.0)
Cool ON Time 	0.1 to Value set for Cool Pulse Time (Default : 1.0)
Heat Power Low 	0 to Power High (Default : 0)
Heat Power High 	Power Low to 100 (Default : 100)
Cool Power Low 	0 to Cool Power High (Default : 0)
Cool Power High 	Cool Power Low to 100 (Default : 100)

Controller supplied with Bi-Directional control (Heat + Cool) mode option.

SUPERVISORY PARAMETERS

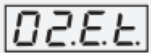
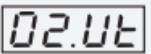
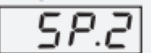
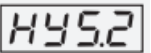
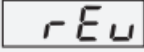
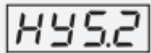
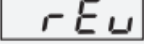
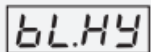
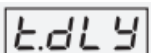
Parameters	Settings (Default Value)
Self-Tune Command 	 No  Yes (Default : No)
Overshoot Inhibit 	 Disable  Enable (Default : Disable)

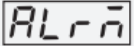
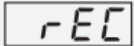
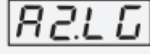
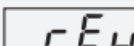
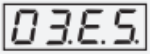
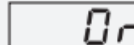
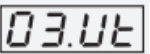
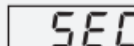
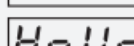
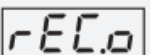
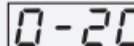
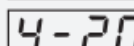
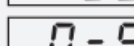
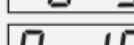
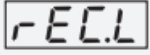
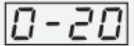
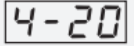
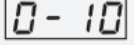
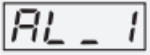
Overshoot Inhibit Factor 0.4F	1.0 to 2.0 (Default : 1.0)
SP Adjustment on Lower Readout SP.Lr	d5bL Disable EnbL Enable (Default : Enable)
SP Adjustment on Operator Page SP.OP	d5bL Disable EnbL Enable (Default : Enable)
Alarm SP Adjustment on Operator Page AL.SP	d5bL Disable EnbL Enable (Default : Disable)
Standby Mode Stby	d5bL Disable EnbL Enable (Default : Disable)
Profile Abort Command on Operator Page Abt	d5bL Disable EnbL Enable (Default : Disable)
Utility Option Selection OPTn	nonE None SrLC Serial Comm. AU.SP Auxiliary Setpoint (Default : Serial Comm.)
Baud Rate bAUD	4800 9600 19200 38400 57600 (Default : 9.6)
Communication Parity PAR.	nonE None EuEn Even Odd Odd (Default : Even)

Controller ID Number 1d	1 to 127 (Default : 1)
Communication Write Enable Con.E	no No YES Yes (Default : No)

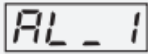
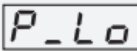
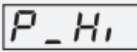
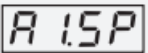
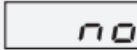
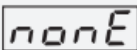
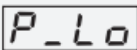
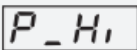
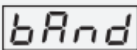
OP2 & OP3 FUNCTION PARAMETERS

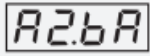
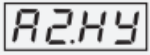
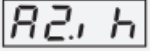
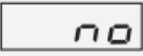
Parameters	Settings (Default Value)
Output-2 Function Selection OP2.F	none None ALrñ Alarm CCon Cool Control EOP End Of Profile CtñL Auxiliary Control blor Blower (Default : None)
Alarm-1 Logic A1LG	norñ Normal rev Reverse (Default : Normal)
Output-2 Type OP2.t	RLY Relay SSR SSR 0-20 0 - 20mA 4-20 4 - 20mA 0-5 0 - 5 V 0-10 0 - 10 V (Default : Relay)
OP2 Event Status OP2.E.S	On ON OFF OFF (Default : ON)

OP2 Event Time 	0 to 9999 (Default : 0)
OP2 Event Time Units 	 Seconds  Minutes  Hours (Default : Seconds)
Offset Value for Auxiliary Control Setpoint 	-199 to 999 or -199.9 to 999.9 (Default : 0)
Auxiliary Control Hysteresis 	1 to 999 or 0.1 to 999.9 (Default : 2)
Auxiliary Control Logic 	 Normal  Reverse (Default : Normal)
Offset Value for Blower Control Setpoint 	0 to 25 or 0.0 to 25.0 (Default : 0)
Auxiliary Control Hysteresis 	1 to 999 or 0.1 to 999.9 (Default : 2)
Auxiliary Control Logic 	 Normal  Reverse (Default : Normal)
Offset Value for Blower Control Setpoint 	0 to 25 or 0.0 to 25.0 (Default : 0)
Blower Control Hysteresis 	1 to 25 or 0.1 to 25.0 (Default : 2)
Blower Control Time Delay 	0.00 to 10.00 Min. Sec (in steps of 5 Seconds) (Default : 0.00)

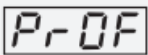
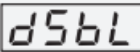
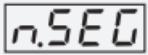
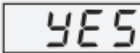
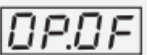
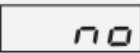
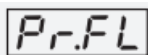
Output-3 Function Selection 	 None  Alarm  End Of Profile  Recorder (Default : Alarm)
Alarm-2 Logic 	 Normal  Reverse (Default : Normal)
OP3 Event Status 	 ON  OFF (Default : ON)
OP3 Event Time 	0 to 9999 (Default : 0)
OP3 Event Time Units 	 Seconds  Minutes  Hours (Default : Seconds)
Select PV or SP for Recorder Transmissio n 	 0 - 20mA  4 - 20mA  0 - 5 V  0 - 10 V (Default : Process Value)
Recorder Output Type 	 0 – 20mA  4 – 20mA  0 – 5 V  0 – 10 V (Default : 0 to 20mA)
Recorder Low 	Min. to Max. Range Specified for the Selected Input Type (Default : -199)
Recorder High 	Min. to Max. Range Specified for the Selected Input Type (Default : 1376)

ALARM PARAMETERS

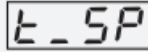
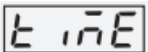
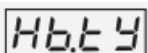
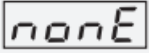
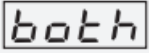
Parameters	Settings (Default Value)
Alarm-1 Type 	 None  Process Low  Process High  Deviation Band  Window Band (Default : None)
Alarm-1 Setpoint 	Min. to Max. Range specified for the selected Input Type (Default : Min or Max Range)
Alarm-1 Deviation Band 	Min. to Max. Range specified for the selected Input Type (Default : Min or Max Range)
Alarm-1 Window Band 	3 to 999 (Default : 5)
Alarm-1 Hysteresis 	1 to 999 (Default : 2)
Alarm-1 Inhibit 	 No  Yes (Default : No)
Alarm-2 Type 	 None  Process Low  Process High  Deviation Band  Window Band (Default : None)
Alarm-2 Setpoint 	Min. to Max. Range specified for the selected Input Type (Default : Min or Max Range)

Alarm-2 Deviation Band 	-999 to 999 or -999.9 to 999.9 (Default : 5)
Alarm-2 Window Band 	3 to 999 (Default : 5)
Alarm-2 Hysteresis 	1 to 999 (Default : 2)
Alarm-2 Inhibit 	 No  Yes (Default : No)

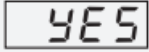
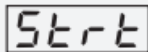
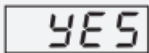
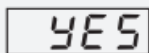
PROFILE CONFIGURATION PARAMETERS

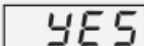
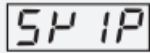
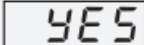
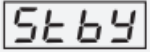
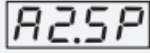
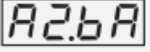
Parameters	Settings (Default Value)
Enabling Profile Feature 	 Disable  Enable (Default : Disable)
Number of Segments 	1 to n (n = 4, 8, 12 or 16 depending on factory configuration) (Default : n)
Number of Repeats 	1 to 9999 (Default : 1)
Common Holdback 	 No  Yes (Default : Yes)
Output Off 	 No  Yes (Default : No)
'Power Fail Recovery' Strategy 	 Abort  Continue (Default : Continue)

PROFILE SETTING PARAMETERS

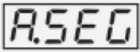
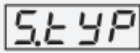
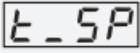
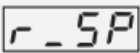
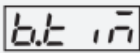
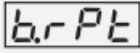
Parameters	Settings (Default Value)
Segment Number 	1 to n (n = 4, 8, 12 or 16 depending on factory configuration) (Default : 1)
Target Setpoint 	Min. to Max. Range specified for the selected Input Type (Default : -199)
Time Interval 	0 to 9999 Minutes (Default : 0)
Holdback Type 	 None  Up  Down  Both (Default : None)
Holdback Value 	1 to 999 (Default : 1)

OPERATOR PAGE PARAMETERS

Parameters	Settings (Default Value)
End of Profile Acknowledge 	 No  Yes (Default : No)
Profile Start Command 	 No  Yes (Default : No)
Profile Abort Command 	 No  Yes (Default : No)

Profile Pause Command 	 No  Yes (Default : No)
Segment Skip Command 	 No  Yes (Default : No)
(De)Activate Standby Mode 	 No  Yes (Default : No)
Control Setpoint 	Setpoint Low Limit to Setpoint High Limit (Default : -199)
Auxiliary Control Setpoint  Alarm-1 Setpoint 	Setpoint Low Limit to Setpoint High Limit (Default : -199) Throughout the range for the selected Input Type (Default : For Process Low : -199 For Process High : 1376)
Alarm-1 Deviation Band 	-999 to 999 (Default : 5)
Alarm-1 Window Band 	3 to 999 (Default : 5)
Alarm-2 Setpoint 	Throughout the range for the selected Input Type (Default : For Process Low : -199 For Process High : 1376)
Alarm-2 Deviation Band 	-999 to 999 (Default : 5)
Alarm-2 Window Band 	3 to 999 (Default : 5)

PROFILE STATUS INFORMATION

Lower Readout Prompt	Upper Readout Information
	Active Segment Number
	Segment Type  
	Target Setpoint
	Ramping Setpoint
	Balance Time
	Balance Repeats

ON-LINE ALTERATION PARAMETERS

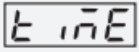
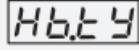
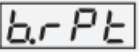
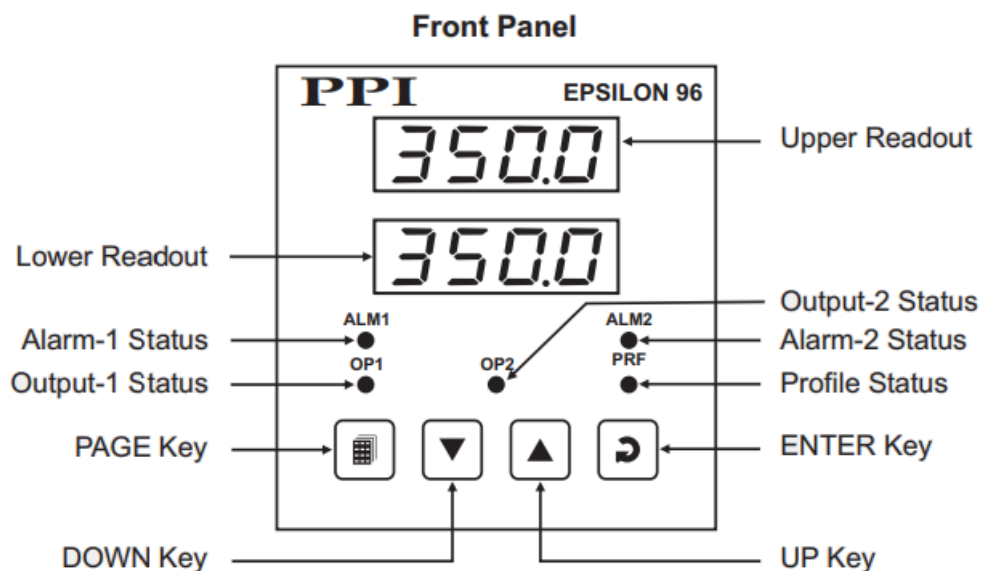
Parameters	Effect on the running segment
Time Interval 	RAMP:- Altering the time interval shall immediately affect the 'Ramp Rate' for the current segment. SOAK:- Elapsed time so far is ignored and the soak timer starts counting down to 0 from the altered time interval value.
Holdback Type 	The modified Holdback Band Type is applied immediately on the current segment.
Holdback Value 	The modified Holdback Band Value is applied immediately on the current segment.
Balance Repeats 	The modified repeats become the new target repeats with immediate effect.

TABLE- 1

Option	Range (Min. to Max.)	Resolution
	0 to +960°C / +32 to +1760°F	Fixed 1°C / 1°F
	-200 to +1376°C / -328 to +2508°F	
	-200 to +385°C / -328 to +725°F	
	0 to +1770°C / +32 to +3218°F	
	0 to +1765°C / +32 to +3209°F	
	0 to +1825°C / +32 to +3218°F	
	0 to +1300°C / +32 to +2372°F	

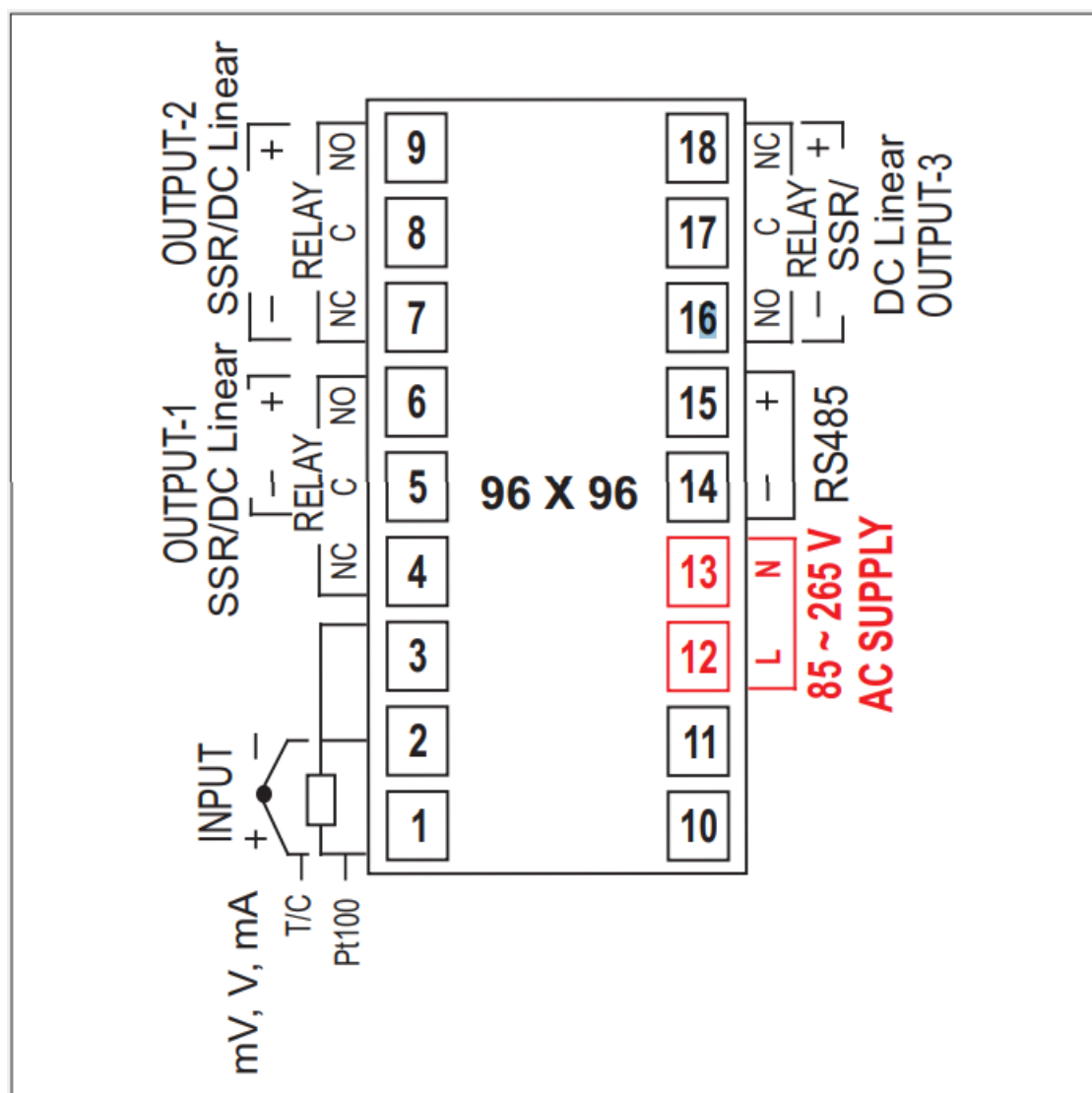
tc - J J Type T/C tc - K K Type T/C tc - T T Type T/C tc - R R Type T/C tc - S S Type T/C tc - B B Type T/C	Reserved for customer specific Thermocouple type not listed above. -199 to +600°C / -328 to +1112°F or -199.9 to 600.0°C / -199.9 to 999.9°F	User settable 1°C / 1°F or 0.1°C / 0.1°F
0 - 20 0 to 20mA DC 4 - 20 4 to 20mA DC 0.050 0 to 50mV DC 0.200 0 to 200mV DC 1.25 0 to 1.25V DC 5.0 0 to 5.0V DC 10.0 0 to 10.0V DC 1 - 5 1 to 5.0V DC	-1999 to +9999 units	User settable 1 / 0.1 / 0.01/0.001 units

FRONT PANEL LAYOUT

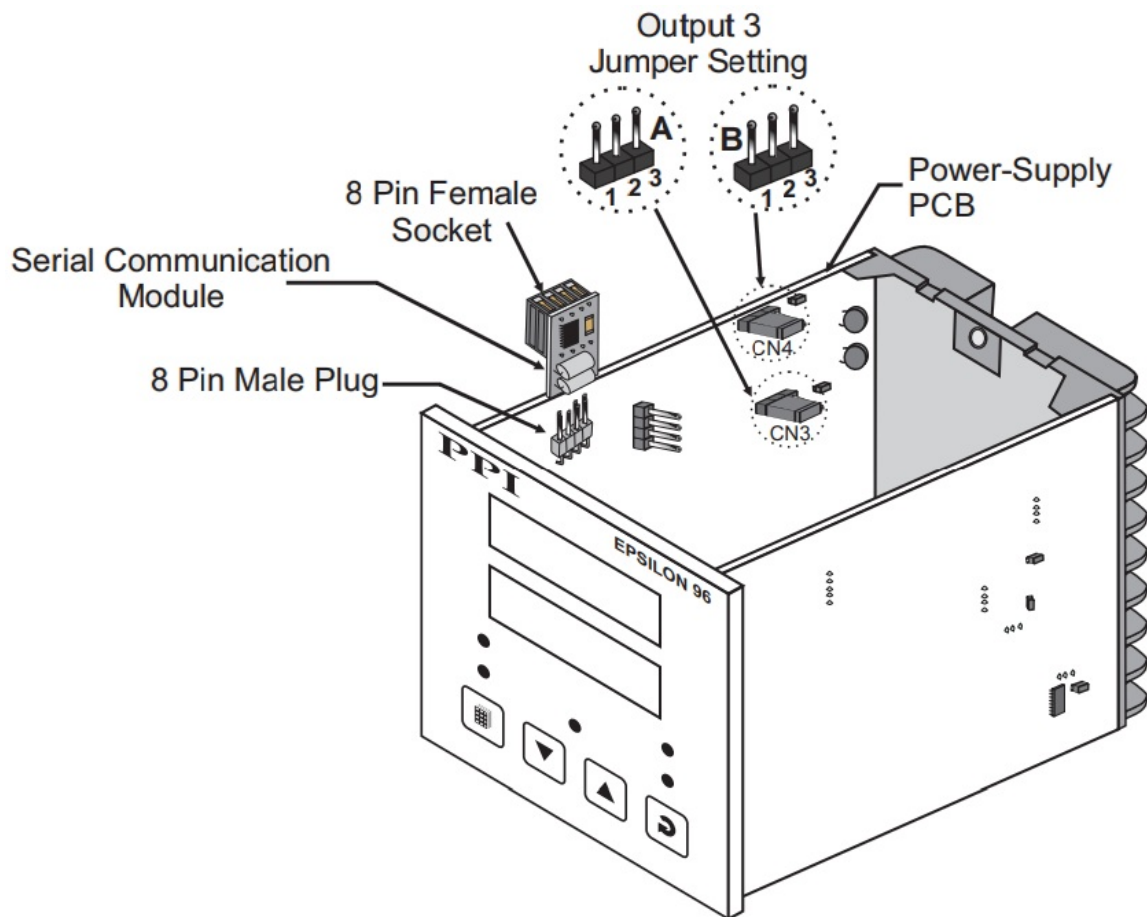


Symbol	Key	Function
	PAGE	Press to enter or exit set-up mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; keeping pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count; holding pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.

ELECTRICAL CONNECTIONS



SERIAL COMMUNICATION MODULE



INPUT & OUTPUT HARDWARE JUMPER SETTINGS

Input

Input Type	Jumper 'A' Setting
Thermocouple, RTD Pt100, mV & V	
DC Linear Current (mA)	

Output-1

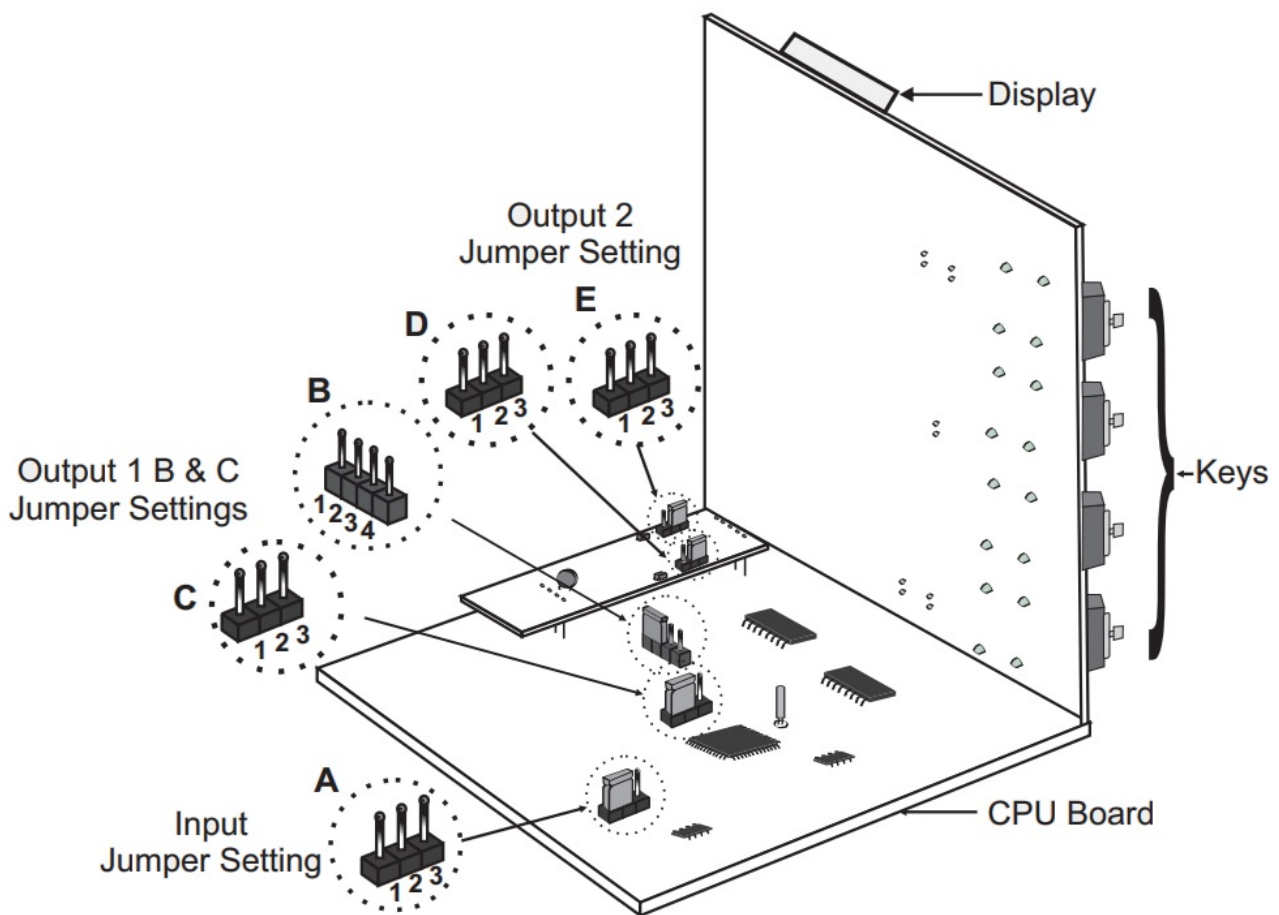
Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		
DC Linear Current (or Voltage)		

Output-2

Output Type	Jumper Setting - D	Jumper Setting - E
Relay		
SSR		

Output-3

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



PPI

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Support : 07498799226 / 08767395333

E: sales@ppiindia.net,

support@ppiindia.net

Jan 2022

Documents / Resources

	EPSILON epsilon_48x48 Self Tune PID Process Controller with Ramp / Soak Profile [pdf] User Manual epsilon_48x48 Self Tune PID Process Controller with Ramp Soak Profile, epsilon_48x48, Self T une PID Process Controller with Ramp Soak Profile, Process Controller with Ramp Soak Profile , Ramp Soak Profile, Soak Profile
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References

- [Factory Automation Products India | Automation Solutions in India](#)