

TEMPERATURE CONTROLLER: ON-OFF/PROPORTIONAL SERIES: PR-433 & PR-434

Dear Customer,
Thank you for purchasing 'Temperature Controller: ON-OFF /Proportional' from GIC. To avoid problems & damages, please read leaflet carefully before operating the unit. In case of complaint please contact our customer support number.

ORDERING INFORMATION:

151G11B (Relay Output: Series PR-433)

151H11B (SSR Drive Output: Series PR-434)



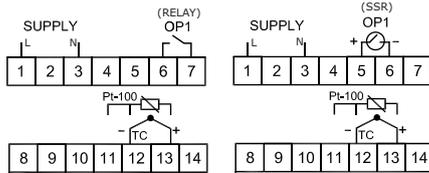
Features:

- Highly Accurate Performance.
- Luxurious Single 3-digit LED Display.
- Wide supply range: 110-240VAC (Un), -20 to +10% of Un.
- Front keypad with 4 keys.
- Thermocouple (J & K)/RTD 3-wire (Pt-100) sensor inputs.
- Control Modes: Proportional, ON-OFF Asymmetric, ON-OFF Symmetric.
- °C & °F temperature unit selectable
- Control Output: Relay & SSR Drive (Individual products)

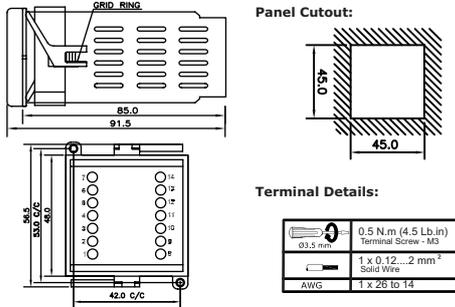
Connection Diagram:

151G11B

151H11B



Mechanical Dimensions (in mm):



Caution:

- Installation should be done by skilled person only.
- When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring. For RTD sensor, use a wiring material with a small lead resistance (5Ω max per line) & no resistance differentials among 3 wires.
- Product should be cleaned regularly to avoid blockage of ventilating parts.
- Clean the product with a clean soft cloth. Do not use isopropyl alcohol or any other cleaning agent.
- Use of contactors is recommended if load exceeds the contact rating. Please see Inductive load category.
- For Thermocouple (J & K): To make output ON ensure that, CJC setting is ON.
- When replacing the sensor, please turn OFF the power.

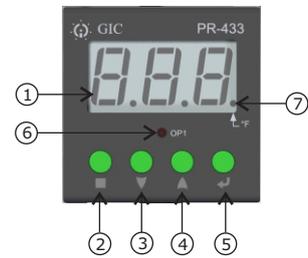
Note:

- Product innovation being a continuous process, we reserve the right to alter specifications without any prior notice.
- User is recommended to ensure the suitability of the product for the intended application

Technical Specifications:

	151G11B	151H11B
Supply Characteristics:		
Supply Voltage (Un)	110 - 240 VAC	
Supply Tolerance	-20% to +10% of Un	
Supply Frequency	50/60 Hz	
Power Consumption	6 VA @ 265 VAC	
Reset Time	50 to 500 ms	
Functional Characteristics:		
Menu Password	60 (To change settings)	
Sensor Inputs (IEC)	Thermocouple (J & K) RTD (Pt-100, 3-wire)	
Sensor Measurement Range	TC (J-type): -5 to 750°C OR 23 to 999°F	
	TC (K-type): -20 to 850°C OR -4 to 999°F	
	RTD (Pt-100): -100 to 650°C OR -148 to 999°F	
	1°C Fixed	
Resolution	1°C Fixed	
Measurement Accuracy	+/-0.5% of full scale	
Temperature Unit	°C/°F selectable	
Signal Sampling Time	2 ms	
Front Keypad	4 Keys as ESC (■), DOWN (▼) UP (▲), ENTER (↵)	
Key de-bounce time	≥ 40 ms	
Control output	Relay	SSR Drive
Error Indications	5br	Sensor open/Break error
	our	Over range error
	Unr	Under range error
LED Indications:		
OP1 (Red LED)	Continuous ON	Relay output ON
'°F' (Red LED)	Continuous ON	Display '°F' value
'°C' (Red LED)	Continuous OFF	Display '°C' value
Relay Output Characteristics:		
Contact Arrangement	1 NO (SPST)	
Contact Rating	5A @ 250 VAC / 30 VDC (RES)	
Contact Material	Ag Alloy	
Utilization Category (AC-15)	Ue Rated Voltage (V) : 120 / 240 Ie Rated Current (A) : 3.0 / 1.5	
Switching Frequency	1800 Operations/Hour	
Electrical Life	50,000 Operations	
Mechanical Life	5,000,000 Operations	
SSR Output Characteristics:		
Output Voltage	12 VDC (13.82 V Max.)	
Load Current	30 mA (Max)	
Series Resistance	270 Ω (Internal)	
Environmental Characteristics:		
Operating Temperature	0 to 50 °C	
Storage Temperature	-20 to 60 °C	
Operating Humidity	5 to 80 % RH (Non-Condensing)	
Operating Altitude	2000 m (max)	
Pollution Degree	II	
Degree of Protection	IP 20: Terminal & Enclosure IP 40: Front Facial	
Enclosure	Flame Retardant (UL 94-V0)	
Other Characteristics:		
Mounting	'48 x 48' mm Panel Mounting	
Weight (Un-Packed)	120 gm	
Operating Position	Horizontal (Readable)	
EMI/EMC Compliance:		
Harmonic Current Emission	IEC 61000-3-2 (Class A) Ed. 3.2 (2009-04)	
Voltage Flicker	IEC 61000-3-3 (Class A) Ed. 3.0 (2013-05)	
ESD	IEC 61000-4-2 (Level II) Ed. 2.0 (2008-12)	
Radiated Susceptibility	IEC 61000-4-3 (Level III) Ed. 3.2 (2010-04)	
Electrical Fast Transients (Power Ports)	IEC 61000-4-4 (Level IV) Ed. 3.0 (2012-04)	
Surge	IEC 61000-4-5 (Level IV) Ed. 2.0 (2005-11)	
Conducted Susceptibility	IEC 61000-4-6 (Level III) Ed. 3.0 (2008-10)	
Power Frequency Magnetic Field	IEC 61000-4-8 (Class 4) Ed. 2.0 (2009-09)	
Voltage Dips/Interruption	IEC 61000-4-11 Ed. 2.0 (2004-03)	
Conducted & Radiated Emission	CISPR 14-1 (Class A) Ed. 5.2 (2011-11)	
Product Standard	IEC 61326-1 (Ed. 2.0 2012-07)	
Safety Compliance:		
Dielectric Strength (Input & Output)	IEC 60974-5-1 (2 kV) Ed. 3.0 (2003-11)	
Impulse (Input & Output)	IEC 60974-5-1 (Level IV) Ed. 3.0 (2003-11)	
Single Fault	IEC 61010-1 Ed. 3.0 (2010-06)	
Insulation Resistance	UL 508 (>50 kΩ)	
Leakage Current	UL 508 (< 3.5 mA)	
Environmental Compliance:		
Cold Heat	IEC 60068-2-1 Ed. 6.0 (2007-03)	
Dry Heat	IEC 60068-2-2 Ed. 5.0 (2007-07)	
Vibration	IEC 60068-2-6 (5g) Ed. 7.0 (2007-12)	
Repetitive Shock	IEC 60068-2-27 (40g, 6ms) Ed. 4.0 (2008-02)	
Non-Repetitive Shock	IEC 60068-2-27 (30g, 15ms) Ed. 4.0 (2008-02)	

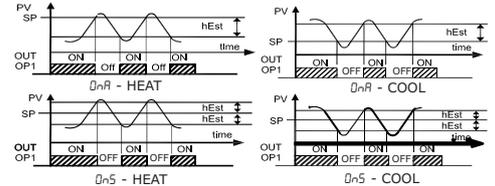
Front Facial:



1. Displays the 'Process Value' & 'Menu'.
2. ■ :ESC key (Press for >3sec to view set point).
3. ▼ :Scroll down key.
4. ▲ :Scroll up key (Press for >3sec to view controller output).
5. ↵ :Enter key.
6. OP1: LED indication for relay output.
7. °F: This LED indicates °F unit setting.

Mode Functionality:

ON/OFF Control: Parameters regarding ON/OFF control are listed in group "rEg". This type of control can be set by programming parameter "con" = 0n5 for ON-OFF action with symmetric hysteresis OR 0nR for ON-OFF action with asymmetric hysteresis. It drives the output programmed as cOP [in OP 1], depending on the measured temperature value, on set point, function mode (FUn) and on the hysteresis (H55). In case of reverse action i.e. HEAT being set on par. "FUn" in "rEg" menu, the controller activates the output when the process value "Pv" goes below [5P-H55]. It deactivates the output when the Pv goes above "5P+H55" in case of symmetric ON-OFF control and above "5P" in case of Asymmetric ON-OFF control. Similarly in case of direct action i.e. COOL being set on par. "FUn", the controller activates the output when the process value "Pv" goes below '5P-H55' & deactivates the output when "Pv" goes above '5P+H55' in case of symmetric ON-OFF control & "5P" in case of Asymmetric ON-OFF control.



Proportional Control: Parameters regarding proportional control are listed in group "rEg". This type of control can be set by programming parameter "con" = P for proportional action.

A proportional controller decreases average power supplied to the Heater/Cooler as temperature approaches setpoint. This has effect of slowing down heater/Cooler so that it will not overshoot the setpoint, but will approach setpoint & maintain a stable temperature. This proportional action can be accomplished by turning the output ON & OFF for short time intervals. This "time proportioning" varies the ratio of "ON" time to "OFF" time to control the temperature. Proportional action occurs within a "Proportional Band (Pb)" around the setpoint temperature. Outside this band, the controller functions as an ON-OFF unit, with the output either fully on (below 'Pb') or fully OFF (above 'Pb').

Proportional band (Pb) is the area around set point where controller is actually controlling the process; output is at some level other than 100 or 0%. 'Pb' is expressed in terms of °C/°F. If controlling is not Satisfactory by using default 'Pb' value, following adjustment can be done in 'Pb'.

Parameter	Problem Occured	Adjustment
Proportional Band (Pb)	PV not reach SP/Slow response High overshoot or Oscillations	Decrease 'Pb' Increase 'Pb'

Cycle time (Ct): Also known as duty cycle; Total length of time for controller to complete one ON/OFF cycle.

E.g.: If Ct=20 sec, TON=10 sec & TOFF=10 sec, then it represents a 50 % power output. In this case, controller will cycle ON & OFF while within the set proportional band 'Pb'.

Rate (rE) & Offset (oFt): Product can be re-calibrated according to application needs, by using par. "oFt" and "rE". If "rE" = 1.00, then using par "oFt", it is possible to set positive or negative offset that is simply added to the value read by the probe.

If the offset set is not to be constant for all measurements, it is possible to operate the calibration on any of two points. In this case, in order to decide which values to program on par. "oFt" and "rE", the following formulae must be applied:

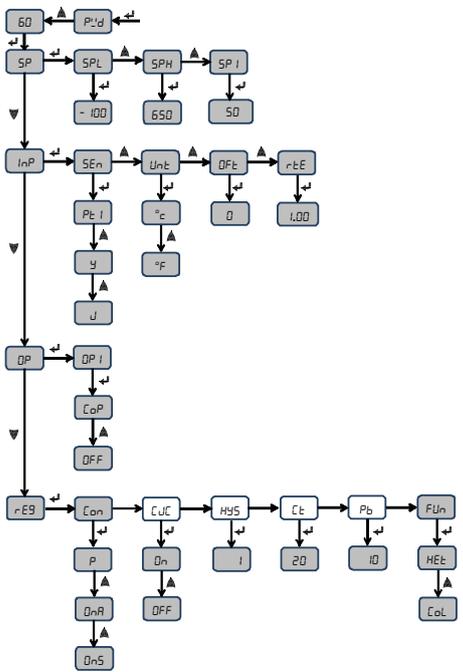
$$rE = (y2-y1)/(x2-x1)$$

$$oFt = y2 - rate*x2$$

Where,
y1 = Measured temperature 1
x1 = temperature displayed by instrument
y2 = Measured temperature 2
x2 = temperature displayed by instrument.
The instrument thus visualizes the temperature as:
 $y = x * rE + oFt$
where y = displayed value and x = measured value.

Cold Junction Compensation (CJC): The cold junction, or reference junction, is the one that connects the thermocouple to the product. The product itself measures the cold junction temperature and adds it to the temperature differences measured from the thermocouple. CJC allows product to convert temperature differences to actual temperature. For compensation, CJC should kept 'ON' when thermocouple (J & K) is connected as a sensor.

Function Menu:



NOTE: Non-hilited parameters are visible only for settings given in 'Functional Parameters' table given below.

Functional Parameters:

Parameter	Description	Default
Product Version:		
0nF	ON-OFF Controller	-
189	Version '18.9'	-
Error Indications:		
our	Over range (If PV > Specified Range)	-
unr	Under range (If PV < Specified Range)	-
Sbr	Sensor Break/Open	-
SP Menu:		
SPL	Set Point LOW range settable as, TC (J-type):-5°C (23°F) to SP1' TC (K-type):-20°C (-4°F) to SP1' RTD (Pt-100):-100°C (-148°F) to SP1'	- 100
SPH	Set Point HIGH range settable as, TC (J-type):SP1 to 750°C (999°F) TC (K-type):SP1 to 850°C (999°F) RTD (Pt-100):SP1 to 650°C (999°F)	650
SP1	'Set point 1' settable as 'SPL to SPH'	50
InP Menu:		
SEn	Sensor input setting	
Pt1	Pt-100	Pt1
J	J-type	
K	K-type	
UnT	Temperature Unit	
°C	°C Unit	°C
°F	°F Unit	
OFF	Offset (Range: -100 to 100)	0
rEE	Rate (Range: 0.01 to 2.00)	1.00
DP Menu:		
DP1	Relay output setting	
CoP	Controller output	
OFF	Output OFF	OFF
rE9 Menu:		
Con	Controlling action	
P	Proportional	P
OnA	On-off Asymmetrical	
OnS	On-off Symmetrical	
CJC	CJC Settings (Only for 'J' & 'K' type)*	
On	CJC ON	On
OFF	CJC OFF	
Fun	Controlling mode	
HEt	Heat mode	HEt
CoL	Cool mode	
Pb	Proportional band(Only for 'P' action)* Range:1 to 850	ID
Ct	Cycle Time (Only for 'P' action)* Range:1 to 130 sec	20
HYS	Hysteresis (Only for 'OnA' & 'OnS')* Range: OFF (0) to 100	I

* Parameters are visible only for mentioned settings.

Frequently Asked Questions (FAQ's):

Q.1: Which parameters can affect the product accuracy?

- A.1:** a. Check whether the correct sensor input is selected on product (Check 'SEn' parameter in 'InP' menu)
 b. Check whether power lines & Sensor lines are routed through the same conduit, Due-to this, the sensor wires can get affected by noise from the power line (Route the sensor lines & power lines separate)
 c. If thermocouple wires are extended with copper wires, product accuracy can affect (Either connect thermocouple leads directly or use suitable compensating conductors).

Q.2: What is 'rtE' and 'oFt' parameter in the 'Inp' menu?

- A.2:** If it is required to apply slope and/or offset to the temperature measured by the instrument, it can be done by using the above parameters. Any value set on above parameter allows device to see temperature as below:
 Display temp. = rtE * Measured Temp + oFt
 This helps to re-calibrate the instrument.

Q.3: Output not operates when Thermocouple input is configured?

- A.3:** CJC is Cold Junction Compensation given for thermocouple. It can be enabled or disabled during the thermocouple configuration. To make output ON with thermocouple configuration, CJC parameter in 'rEg' menu should be enabled (ON).