

ETR-9100 Series Auto-Tune PID Temperature Controller

Specifications

Power

90-250 VAC, 47-63 Hz, 12VA, 5W maximum
11-26 VAC / VDC, 12VA, 5W maximum

Signal Input

Resolution: 18 bits

Sampling Rate: 5 times / second

Maximum Rating: -2 VDC minimum, 12 VDC maximum (1 minute for mA input)

Temperature Effect: $\pm 1.5 \mu\text{V}/^\circ\text{C}$ for all inputs except mA input
 $\pm 3.0 \mu\text{V}/^\circ\text{C}$ for mA input

Sensor Lead Resistance Effect:

T/C: $0.2 \mu\text{V}/\text{ohm}$

3-wire RTD: $2.6^\circ\text{C}/\text{ohm}$ of resistance difference of 2 leads

2-wire RTD: $2.6^\circ\text{C}/\text{ohm}$ of resistance sum of 2 leads

Burn-out Current: 200nA

Common Mode Rejection Ratio (CMRR): 120dB

Normal Mode Rejection Ratio (NMRR): 55dB

Sensor Break Detection:

Sensor open for TC, RTD and mV inputs,
Sensor short for RTD input,
below 1 mA for 4-20 mA input,
below 0.25V for 1 - 5 V input,
unavailable for other inputs.

Sensor Break Responding Time:

Within 4 seconds for TC, RTD and mV inputs,
0.1 second for 4-20 mA and 1 - 5 V inputs.

Characteristics

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C-1000°C (-184°F-1832°F)	$\pm 2^\circ\text{C}$	2.2M Ω
K	-200°C-1370°C (-328°F-2498°F)	$\pm 2^\circ\text{C}$	2.2M Ω
T	-250°C-400°C (-418°F-752°F)	$\pm 2^\circ\text{C}$	2.2M Ω
E	-100°C-900°C (-148°F-1652°F)	$\pm 2^\circ\text{C}$	2.2M Ω
B	0°C-1800°C (32°F-3272°F)	$\pm 2^\circ\text{C}$ (200°C-1800°C)	2.2M Ω
R	0°C-1767.8°C (32°F-3214°F)	$\pm 2^\circ\text{C}$	2.2M Ω
S	0°C-1767.8°C (32°F-3214°F)	$\pm 2^\circ\text{C}$	2.2M Ω
N	-250°C-1300°C (-418°F-2372°F)	$\pm 2^\circ\text{C}$	2.2M Ω
L	-200°C-900°C (-328°F-1652°F)	$\pm 2^\circ\text{C}$	2.2M Ω
PT100 (DIN)	-210°C-700°C (-346°F-1292°F)	$\pm 0.4^\circ\text{C}$	1.3K Ω
PT100 (JIS)	-200°C-600°C (-328°F-1112°F)	$\pm 0.4^\circ\text{C}$	1.3K Ω
mV	-8mV - 70mV	$\pm 0.05\%$	2.2M Ω
mA	-3mA - 27mA	$\pm 0.05\%$	70.5 Ω
V	-1.3V - 11.5V	$\pm 0.05\%$	650K Ω

Output 1 / Output 2

Relay Rating: 2A/240 VAC, life cycles 200,000 for resistive load

Pulsed Voltage: Source Voltage 5V,
current limiting resistance 66 Ω .

Linear Output Characteristics

Type	Zero Tolerance	Span Tolerance	Load Capacity
4-20 mA	3.6-4 mA	20-21 mA	500 Ω max.
0-20 mA	0 mA	20-21 mA	500 Ω max.
0-5 V	0 V	5-5.25 V	10 K Ω min.
1-5 V	0.9-1 V	5-5.25 V	10 K Ω min.
0-10 V	0 V	10-10.5 V	10 K Ω min.

Linear Output

Resolution: 15 bits

Output Regulation: 0.02 % for full load change

Output Settling Time: 0.1 sec. (stable to 99.9%)

Isolation Breakdown Voltage: 1000 VAC

Temperature Effect: ± 0.01 % of SPAN / $^\circ\text{C}$

Triac (SSR) Output

Rating: 1A / 240 VAC

Inrush Current: 20A for 1 cycle

Min. Load Current: 50 mA rms

Max. Off-state Leakage: 3 mA rms

Max. On-state Voltage: 1.5 V rms

Insulation Resistance: 1000 Mohms min. at 500 VDC

Dielectric Strength: 2500 VAC for 1 minute

Alarm

Alarm Relay: Form C, Max. rating 2A/240VAC,
life cycles 200,000 for resistive load.

Alarm Functions: Dwell timer,
Deviation High/Low Alarm,
Deviation Band High/Low Alarm,
Process High / Low Alarm

Alarm Mode: Normal, Latching, Hold,
Latching/ Hold.

Dwell Timer: 0.1 - 4553.6 minutes

Data Communication

Interface: RS-232 (1 unit), RS-485 (up to 247 units)

Protocol: Modbus Protocol RTU mode

Address: 1 - 247

Baud Rate: 2.4 ~ 38.4 Kbits/sec

Data Bits: 7 or 8 bits

Parity Bit: None, Even or Odd

Stop Bit: 1 or 2 bits

Communication Buffer: 160 bytes

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Specifications (cont'd.)

Analog Retransmission

Output Signal: 4-20mA, 0-20mA, 0-5V, 1-5V, 0-10V

Resolution: 15 bits

Accuracy: $\pm 0.05\%$ of span $\pm 0.0025\%/^{\circ}\text{C}$

Load Resistance: 0-500 ohm (for current output)
10K ohm min. (for voltage output)

Output Regulation: 0.01% for full load change

User Interface

Dual 4-digit LED Displays:

ETR-4100

Upper 0.55" (14mm)

Lower 0.4" (10 mm)

ETR-8100, ETR-9100

Upper 0.4" (10 mm)

Lower 0.31" (8 mm)

Keypad: 4 keys

Programming Port: For automatic setup, calibration and testing

Communication Port: Connection to PC for supervisory control

Control Mode

Output 1: Reverse (heating) or direct (cooling) action

Output 2 : PID cooling control, cooling P band
50~300% of PB, dead band 36.0~36.0% of PB

ON-OFF: 0.1-90.0($^{\circ}\text{F}$) hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PI : Fuzzy logic modified

Proportional band 0.1 ~ 900.0 $^{\circ}\text{F}$.

Integral time 0 - 1000 seconds

Derivative time 0 - 360.0 seconds

Cycle Time: 0.1 - 90.0 seconds

Manual Control: Heat (MV1) and Cool (MV2)

Auto-tuning: Cold start and warm start

Failure Mode: Auto-transfer to manual mode while sensor break or A-D converter damage

Ramping Control: 0 - 900.0 $^{\circ}\text{F}$ /minute or
0 - 900.0 $^{\circ}\text{F}$ /hour ramp rate

Digital Filter

Function: First order

Time Constant: 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds programmable

Environmental & Physical

Operating Temperature: -10 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$

Storage Temperature: -40 $^{\circ}\text{C}$ to 60 $^{\circ}\text{C}$

Humidity: 0 to 90% RH (non-condensing)

Altitude: 2000m maximum

Pollution: Degree 2

Insulation Resistance: 20 Mohms min. (at 500 VDC)

Dielectric Strength: 2000 VAC, 50/60 Hz for 1 min.

Vibration Resistance: 10-55Hz, 10m/s² for 2 hours

Shock Resistance: 200 m/s² (20 g)

Moldings: Flame retardant polycarbonate

Dimensions:

ETR-4100	96mm(W) X 96mm(H) X 65mm(D), 53 mm depth behind panel
ETR-8100	48mm(W) X 96mm(H) X 80mm(D), 65 mm depth behind panel
ETR-9100	48mm(W) X 48mm(H) X 116mm(D), 105 mm depth behind panel

Mounting:

ETR-4100	panel mount, cutout 92 X 92 (mm)
ETR-8100	panel mount, cutout 45 X 92 (mm)
ETR-9100	panel mount, cutout 45 X 45 (mm)

Weight :

ETR-4100	250 grams
ETR-8100	210 grams
ETR-9100	150 grams

Third Party Approvals

Safety : UL61010C-1

CSA C22.2 No. 24-93

EN61010-1 (IEC1010-1)

Protective Class:

IP65 front panel with additional option,

IP50 front panel without additional option,

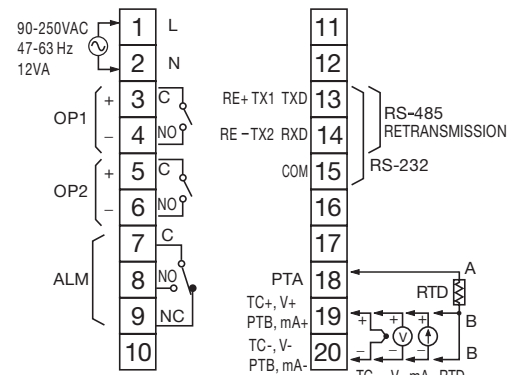
all indoor use,

IP 20 housing and terminals with protective cover.

EMC: EN61326

Connection Diagrams

ETR-4100, 8100



ETR-9100

