

Laureate™ Thermocouple & RTD Temperature Panel Meters

High accuracy plus linearized transmitter & control outputs



Features

- Input for thermocouple types J, K, T, E, N, R, S.
- Input for 100 ohm platinum RTDs with DIN and ANSI curves.
- High accuracy & repeatability.
- Celsius, Fahrenheit, Kelvin or Rankine scales.
- Selectable 1° or 0.1° resolution.
- 2, 3 or 4-wire RTD connection with lead resistance compensation.
- Upscale or downscale open sensor indication.
- Up to 60 conversions per second.
- Peak value display.
- AC or DC powered.
- Green or red display.
- Choice of isolated plug-in options for control and computer interface:
[dual relays](#), [4-20 mA & 0-10 V analog output](#), [RS-232/485 I/O](#), [parallel BCD output](#), [low voltage AC & DC power](#).
- [NEMA 4X, 1/8 DIN case](#).
- Certified to UL 3101-1, CAN/CSA-C22.2, EN 61010-1 (CE Mark).

Description



Laureate™ panel meters with the temperature signal conditioner board provide highly accurate, stable and repeatable temperature indication for multiple thermocouple types and 100 Ohm platinum RTDs. The meter accepts the outputs of types J, K, T, E, N, R and S thermocouples, plus 100 ohm platinum RTD's with DIN alpha of 0.00385 and ANSI alpha of 0.003925. The thermocouple or RTD type, range and resolution (1° or 0.1°) are selectable from

the front panel or via the serial interface. Display in Kelvin or Rankine can be selected by offsetting the Celsius or Fahrenheit range.

Cold junction compensation automatically corrects for temperature variations at the thermocouple reference junction at the meter. Open sensor indication is standard and may be set up to indicate either upscale or downscale. RTD excitation is provided by the meter. RTD connections can be of the 2-, 3- or 4-wire type. For 3- and 4-wire connections, the meter automatically compensates for lead resistance of the sensor.

All ranges for all temperature sensor types are digitally calibrated at the factory. This eliminates the need for field calibration or drift caused by potentiometers found in non-microcomputer based meters.



All Laureate meters allow exceptionally fast read rates. Concurrent Slope (Pat 5,262,780) is a method of analog-to-digital conversion that allows up to 60 conversions per second while integrating the input over a full power cycle. Fast read rates provide true readings and fast response for control applications. Display of peak value is standard.

Plug-in [isolated analog output](#), [dual-setpoint controller](#), [RS-232/485 communications](#), and [parallel BCD output](#) boards can upgrade the Laureate from stand-alone monitor to system interface and control. The Laureate temperature meter can serve as a highly accurate, isolated, 4-20 mA transmitter.

Laureate panel meters are available with a red or green LED display. Blanking of leading, non-significant zeros simplifies reading. The [1/8 DIN case](#) is water tight to NEMA 4X (IP-65) from the front when panel mounted.

Specifications

Thermocouple Input

TC Type	Range	Conformity Error
J	-210°C to +760°C -347°F to +1400°F	0.09°C 0.16°F
K	-244°C to +1372°C -408°F to +2501°F	0.1°C 0.17°F
T	0°C to +400°C -257°C to 0°C +32°F to 752°F -430°F to +32°F	0.03°C 0.2°C 0.05°F 0.36°F
E	-240°C to +1000°C -400°F to +1830°F	0.18°C 0.32°F
N	-245°C to +1300°C -410°F to +2370°F	0.10°C 0.17°F
R	-45°C to +1768°C -49°F to +3214°F	0.17°C 0.31°F
S	-46°C to +1768°C -51°F to +3213°F	0.12°C 0.22°F

Applicable to all TC types	
Calibration	NIST Monograph 125 (IPTS-68)
Input resistance	1 Gohm
Input current	100 pA
Max lead resistance	1 Gohm max for rated accuracy
Span tempco	±0.003% of reading/°C

Reference junction tempco	±0.02 deg/deg
Span tempco	±0.003% of reading/°C
Overvoltage protection	125 Vac
NMR at 50/60 Hz	80 dB plus selectable digital filter from 80 ms to 9.6 s time constant
CMR, DC-60 Hz	120 dB with 500 W imbalance
CMV, DC-60 Hz	250 Vac from power and earth grounds
Open sensor indication	Flashes full-scale

Pt 100 RTD Input

RTD Alpha	Range	Conformity Error
DIN .00385	-202°C to +850°C -331°F to +1562°F	0.03°C 0.05°F
ANSI .003925	-202°C to +631°C -331°F to +1168°F	0.04°C 0.07°F

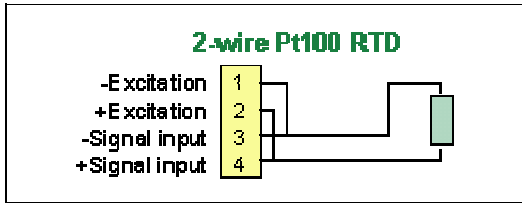
Applicable to all RTD types	
Calibration, DIN	IEC 751 (IPTS-68)
Calibration ANSI	NIST Monograph 126
Configuration	2, 3 or 4-wire connection
Excitation current	0.2 mA
Span tempco	±0.003% of reading/°C
Zero tempco	±0.03 deg/deg
Sensor lead resistance	2-wire, 10 mdeg/W/deg up to 10 W
tempco per conductor	3 & 4-wire, 10 mdeg/W/deg up to 100 W
Overvoltage protection	125 Vac
Open sensor indication	Flashes full-scale

Thermocouple & RTD

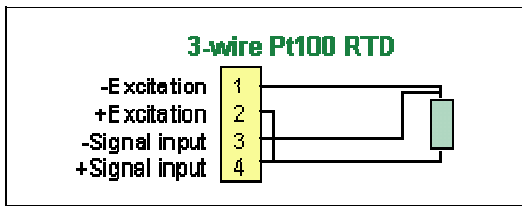
Display	
Readout	5 digits, 7-segment, 14.2 mm (.56")
Color	Red or green LED
Indicators	Minus sign, 2 red LED lamps
A-to-D Conversion	
Technique	Concurrent Slope™ (Pat 5,262,780)
A-to-D Rate	60/s at 60 Hz, 50/s at 50 Hz
Output Update	56/s at 60 Hz, 47/s at 50 Hz
Display Update	3.5/s at 60 Hz, 3/s at 50 Hz
Power	
Voltage, std.	85-264 Vac and 90-370 Vdc
Voltage, opt.	8-28 Vac and 9-37 Vdc
Frequency	DC or 49-440 Hz
Power isolation	Safety-rated to 250 Vac, meter ground to earth ground, DC to 60 Hz, 4.2 kVp per High Voltage Test
Environmental	
Operating Temperature	0°C to 55°C -40°C to 85°C
Storage	95% at 40°C, non-condensing

Temperature Relative Humidity Protection	NEMA-4X (IP-65) when panel mounted
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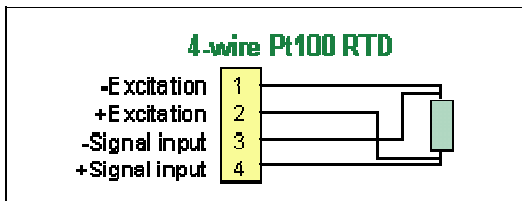
RTD Connections with Excitation & Lead Compensation



The Laureate temperature meter allows 2-, 3- and 4-wire RTD hookup to the J5 connector. The meter applies an excitation current of 0.2 mA, which it monitors to make ratiometric corrections for excitation supply variations.



In 2-wire hookup, the meter senses the voltage drop across the 100 ohm RTD and both lead wires. The effect of the lead wires can be measured and subtracted by shorting out the RTD during meter setup.



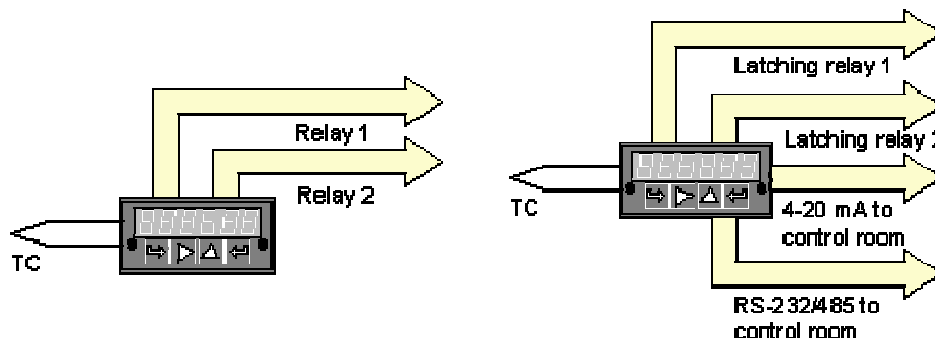
In 3- and 4-wire hookup, the meter senses the voltage drop across the 100 ohm RTD and both lead wires as well as the voltage drop across the RTD and one lead wire. This allows the meter to determine the effect of one lead wire and mathematically subtract the effect of both lead wires.

Sample Applications



Operation as a 4-20 mA Transmitter

With the optional analog output board, Laureate temperature meters can serve as superb, isolated 4-20 mA transmitters. The analog output is scaled to the display, which is linearized to °C or °F and is exceptionally accurate. The analog output further tracks the high read rate of the meter, at up to 60 readings per second at 60 Hz power. Fast update rates are beneficial in many closed-loop and PID control applications.



Operation as a Fast Controller

With the optional dual contact relay or dual solid state relay output board options, Laureate temperature meters can serve as extremely fast and accurate ON/OFF controllers for closed-loop temperature control.

Multiple setpoint operating modes are individually selectable for each relay, as explained in the dual-setpoint controller section. Relay duty cycles and chatter can be minimized with programmable hysteresis and time delays. High duty cycles and extremely fast response times are possible with the solid state relay, which has a typical response time of only 17 ms.

Operation as a Supervisory Monitor
















By using the optional dual contact relay or dual solid state relay output options, Laureate temperature meters can monitor processes and provide alarms or shutoffs when these processes exceed normal limits.

A band deviation operating mode can be selected for each relay, where an alarm is generated whenever the reading is a selected number of counts above or below the setpoint. Relay operation can be selected as latching or non-latching. When an alarm or shutdown condition is reached, a latched output will remain in the alarm condition until it is reset by a front panel pushbutton, via the serial interface, or via the rear connector.

Ordering Guide

Laureate™ Thermocouple & RTD Temperature Panel Meters

Create a model number in this format: **L10010JC**. This example calls out a Laureate panel meter with a standard main board with green LEDs, 85-264 Vac & 90-370 Vdc power, no setpoint output, 0-20 mA & 0-10 V analog outputs, no digital interface, and a temperature signal conditioner set for Type J thermocouples with readout in °C. Includes plug-in screw terminals.

DPM Type	 L Digital Panel Meter.	\$210
Main Board	 1 Standard Main Board, Green LEDs.	NC
	 2 Standard Main Board, Red LEDs.	NC
Power	 0 Isolated 85-264 Vac & 90-370 Vdc	NC
	 1 Isolated 8-28 Vac & 9-37 Vdc.	\$30
Setpoint Output	 0 None.	NC
	 1 Dual 10A Contact Relays.	\$80
	 2 Isolated Dual Solid State Relays.	\$55
Analog Output	 0 None.	NC
	 1 Isolated 0-20 mA & 0-10 V.	\$90
Digital Interface	 0 None.	NC
	 1 Isolated RS-232.	\$60
	 2 Isolated RS-485.	\$80
	 3 Isolated Parallel BCD Output.	\$105
Signal Input	Thermocouples	NC
	 JC Thermocouple Type J, -210°C to 760°C.	

- JF** Thermocouple Type J, -347°F to 1400°F.
- KC** Thermocouple Type K, -347°C to 1372°C.
- KF** Thermocouple Type K, -408°F to 2501°F.
- TC** Thermocouple Type T, -257°C to 400°C.
- TF** Thermocouple Type T, -430°F to 752°F.
- EC** Thermocouple Type E, -240°C to 1000°C.
- EF** Thermocouple Type E, -400°F to 1830°F.
- NC** Thermocouple Type N, -240°C to 1000°C.
- NF** Thermocouple Type N, -410°F to 2370°F.
- SC** Thermocouple Type S, -46°C to 1768°C.
- SF** Thermocouple Type S, -51°F to 3214°F.
- RC** Thermocouple Type R, -45°C to 1768°C.
- RF** Thermocouple Type R, -49°F to 3213°F.

RTDs (100 Ohm Platinum)

- P385C** RTD Alpha .00385, -202°C to 850°C.
- P385F** RTD Alpha .00385, -331°F to 1562°F.
- P392C** RTD Alpha .003925, -202°C to 631°C.
- P392F** RTD Alpha .003925, -331°F to 1168°F.

NC

Note: The same temperature signal conditioner board can be user configured for all thermocouple and RTD types listed. Temperatures for each type are spanned by a single range.

Add-on Options

- EB** Extra Bright Red LED Display. Unselected.
- BL** Blank Lens without Button Pads. Unselected.

\$30
NC