

4-20 mA & Serial Data Output Transmitter for Pt100, Cu10 and Ni120 RTD Input



Features

- 4-20 mA, 0-20 mA, 0-10V or -10V to +10V transmitter output, 16 bits, isolated
- RS232 or RS485 serial data output, Modbus or Laurel ASCII protocol, isolated
- Dual 120 mA solid state relays for alarm or control, isolated
- Factory calibrated for 100Ω platinum, 10Ω copper and 120Ω nickel RTDs
- 2, 3 or 4-wire RTD connection with lead resistance compensation
- User selectable input span from entire RTD range down to 15.0°
- Analog output resolution 0.0015% of span (16 bits), accuracy ±0.02% of span
- Universal 85-264 Vac / 90-300 Vdc or 10-48 Vdc / 12-32 Vac power
- DIN rail mount housing only 22.5 mm wide, detachable screw-clamp connectors



Description

The Laureate RTD temperature transmitter provides a linearized, highly accurate, stable and repeatable transmitter output for 100 ohm platinum, 10 ohm copper and 120 ohm nickel RTDs. Pt 100 platinum RTDs can have a DIN alpha of 0.00385 or ANSI alpha of 0.00392. The RTD type and temperature range, specified in °C or °F, are user-selectable. The temperature range can be as wide as the entire span of the RTD type or as narrow as 150 counts (such as 15.0°), limited only by considerations of electrical noise and digital filtering time constants.

Digital calibration of all RTD ranges is performed the factory, with calibration data stored in EEPROM on the signal conditioner board. This allows signal conditioner boards and ranges to be changed in the field with no need for recalibration.

RTD connections can be via 2, 3 or 4wires. With 3- and 4-wire connections, the transmitter automatically compensates for lead resistance of the sensor.

Fast read rate at up to 50 or 60 conversions per second while integrating the signal over a full power line cycle is provided by Concurrent Slope (Pat 5,262,780) analog-to-digital conversion. High read rate is ideal for peak or valley capture and for real-time computer interface and control.

Open sensor indication is standard and may be set up to indicate either upscale or downscale. RTD excitation is provided by the transmitter.

Standard features of Laureate transmitters include:

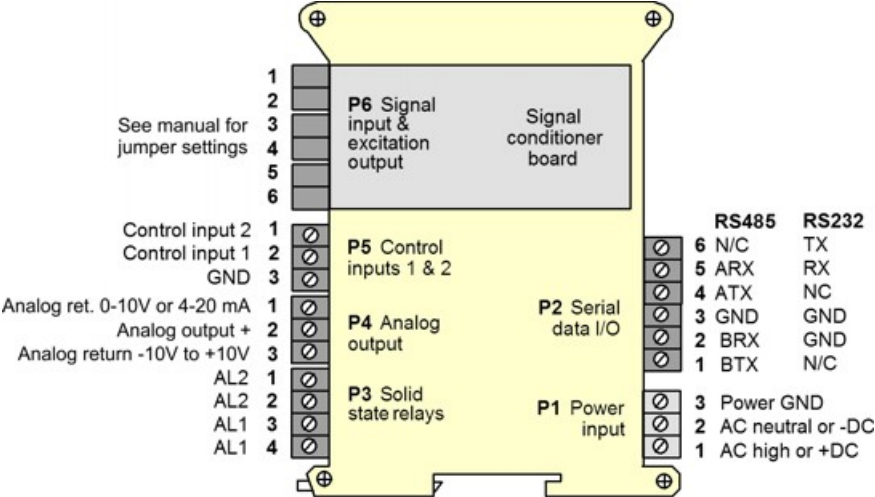
- **4-20 mA, 0-10V or -10V to +10V analog transmitter output**, isolated, jumper-selectable and user scalable. All selections provide 16-bit (0.0015%) resolution of output span and 0.02% output accuracy of a reading from -99,999 to +99,999 counts that is also transmitted digitally. Output isolation from signal and power grounds eliminates potential ground loops.
- **Serial communications output**, isolated. User selectable RS232 or RS485, half or full duplex. Three protocols are user selectable: Modbus RTU, Modbus ASCII, or Laurel ASCII. Modbus operation is fully compliant with Modbus Over Serial Line Specification V1.0 (2002). The Laurel ASCII protocol allows up to 31 Laureate devices to be addressed on the same RS485 data line. It is simpler than the Modbus protocol and is recommended when all devices are Laureates.
- **Dual solid state relays**, isolated. Available for local alarm or control. Rated 120 mA at 130 Vac or 170 Vdc.
- **Universal 85-264 Vac power.** Low-voltage 10-48 Vdc or 12-32 Vac power is optional.

Easy Transmitter programming is via Laurel's Instrument Setup Software, which runs on a PC under MS Windows. This software can be downloaded from our website at no charge. The required transmitter-to-PC interface cable is available from Laurel (P/N CBL04).

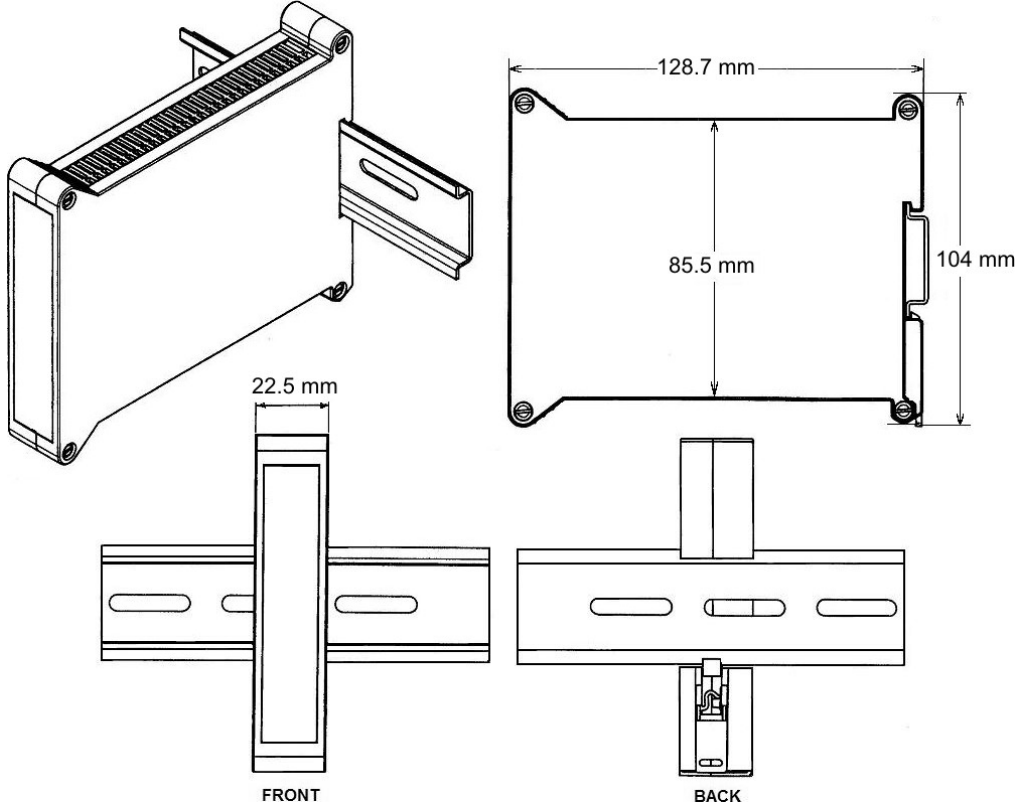
Specifications

RTD Metal	Alpha	R at 0°C	R at top of range	Excitation Current	Range	Conformity Error
Platinum	0.003850 (DIN)	100Ω	390.48Ω at 850°C	196 μA	-200°C to +850°C -328°F to +1562°F	±0.03°C ±0.05°F
Platinum	0.003902 (ANSI)	100Ω	394.36Ω at 850°C	196 μA	-200°C to +850°C -328°F to +1168°F	±0.04°C ±0.07°F
Nickel	0.00672	120Ω	380.31Ω at 260°C	196 μA	-80°C to +260°C -112°F to +500°F	±0.05°C ±0.09°F
Copper	0.00427	9.035Ω	19.116Ω at 260°C	5.0 mA	-97°C to +260°C -143°F to +500°F	±0.05°C ±0.09°F
RTD Input						
Calibration, Pt 100 DIN Calibration, Pt 100 ANSI Calibration, Ni 120 Max error at 25°C, Pt100 Span tempco Zero tempco Provision for calibration Connection Overvoltage protection Open sensor indication Sensor lead resistance Tempco per conductor		Per IEC 751 (ITS-90) NIST Monograph 126 DIN 43760 ± 0.04°C (±0.07°F) ± 0.01% of reading ± 0.003% of reading/°C ± 0.03 deg/deg Multiplier of RTD resistance plus offset in degrees 2, 3 or 4-wire 125 Vac 0 mA or > 20mA output, user selectable 2-wire, 10 mdeg/Ω/deg up to 10Ω 3 & 4-wire, 10 mdeg/Ω/deg up to 100Ω				
Analog Output (standard)						
Output Levels Compliance, 4-20 mA Compliance, 0-10V Output Resolution Output Accuracy Output Isolation Step Response Time		4-20 mA, 0-20 mA, 0-10 Vdc, -10 to +10Vdc (user selectable) 10V (0-500Ω m load) 2 mA (5 kΩ load) 16 bits (65,536 steps) ±0.02% of output span 250V rms working, 2.3 kV rms per 1 minute test 50 ms				
Serial Communications (standard)						
Signal Types Data Rates Output Isolation Serial Protocols Modbus Modes Modbus Compliance Digital Addresses		RS232 or RS485 (half or full duplex) 300, 600, 1200, 2400, 4800, 9600, 19200 baud 250V rms working, 2.3 kV rms per 1 min test Modbus RTU, Modbus ASCII, Laurel ASCII RTU or ASCII Modbus over Serial Line Specification V1.0 (2002) 247 with Modbus. Up to 31 devices on an RS485 line w/o a repeater.				
Dual Relay Output (standard)						
Relay Type Load Rating		Two solid state relays, SPST, normally open, Form A 120 mA at 140 Vac or 180 Vdc				
Power Input						
Standard Power Low Power Option Power Frequency Power Isolation Power Consumption		85-264 Vac or 90-300 Vdc 10-48 Vdc or 12-32 Vac DC or 47-63 Hz 250V rms working, 2.3 kV rms per 1 min test 2W typical, 3W with max excitation output				
Mechanical						
Dimensions Mounting Electrical Connections		129 x 104 x 22.5 mm case 35 mm rail per DIN EN 50022 Plug-in screw-clamp connectors				
Environmental						
Operating Temperature Storage Temperature Relative Humidity Cooling Required		0°C to 55°C -40°C to 85°C 95% at 40°C, non-condensing Mount transmitters with ventilation holes at top and bottom. Leave 6 mm (1/4") between transmitters, or force air with a fan.				

Pinout



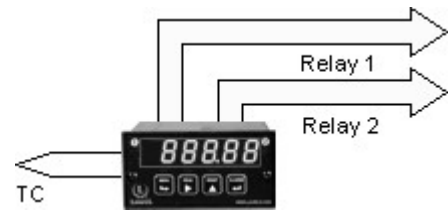
Mechanical



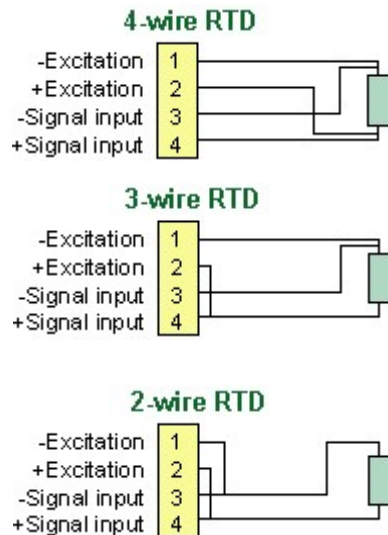
Operation as a Fast ON/OFF Controller or Supervisory Monitor

With the optional dual solid state relay output option, which has a typical response time of only 17 ms, Laureate temperature meters and transmitters can serve as extremely fast and accurate ON/OFF controllers for closed-loop temperature control. They can also serve as supervisory process monitors and provide alarms or shutoffs when processes exceed normal limits.

Multiple setpoint operating modes are individually selectable for each relay. Relay duty cycles and chatter can be minimized with programmable hysteresis and time delays. 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. The relay modes are non-latching.



RTD Hookup



In 4-wire hookup, different pairs of leads are used to apply the excitation current and sense the voltage drop across the RTD, so that the IR drop across the excitation leads is not a factor.

In 3-wire hookup, the transmitter senses the combined voltage drop across the RTD plus two excitation leads. It also senses the voltage drop across one excitation lead, and then subtracts twice this voltage from the combined total. This technique effectively subtracts all lead resistance and compensates for ambient temperature changes if the two excitation leads are identical.

In 2-wire hookup, the transmitter senses the combined voltage drop across the RTD and both lead wires. The voltage drop across the lead wires can be measured by shorting out the RTD during transmitter setup, and this voltage is then automatically subtracted from the combined total. However, changing resistance of the lead wires due to ambient temperature changes will not be compensated.

Ordering Guide

Create a model a model number in this format: **LT20P385C**

Transmitter Type	LT Laureate 4-20 mA & RS232/RS485 Transmitter
Main Board	2 Standard Main Board
Power	0 Isolated 85-264 Vac or 90-300 Vdc 1 Isolated 10-48 Vdc or 12-32 Vac
RTD Input	P385C Pt100 DIN RTD, -202°C to 850°C P385F Pt100 DIN RTD, -331°F to 1562°F P392C Pt100 ANSI RTD, -202°C to 631°C P392F Pt100 ANSI RTD, -331°F to 1168°F N672C Ni120 RTD, -100°C to +260°C N672F Ni120 RTD, -148°F to +500°F C427C Cu10 RTD, -100°C to +260°C C427F Cu10 RTD, -148°F to +500°F Note: The same signal conditioner board can be user configured for all RTD types listed and °C or °F, as well as for resistance measurement.
Accessories	CBL04 RS232 cable, 7ft. Connects RS232 screw terminals of LT transmitter to DB9 port of PC. CBL02 USB to RS232 adapter cable. Combination of CBL02 and CBL04 connects transmitter RS232 terminals to PC USB port.