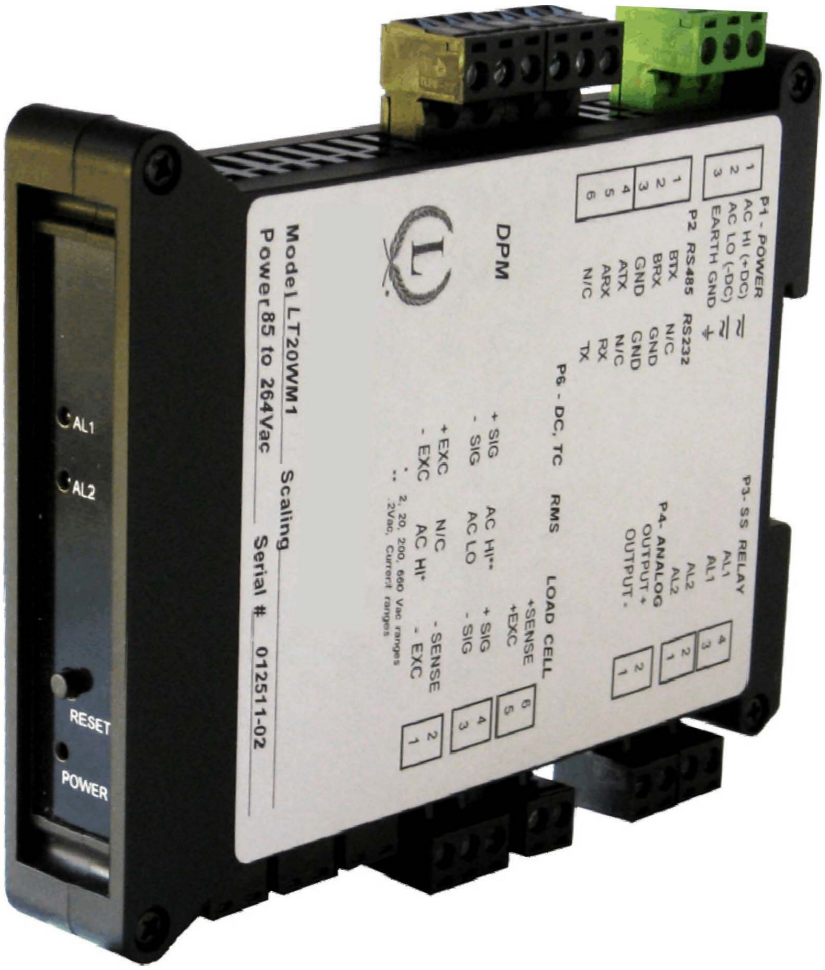
LT SERIES TRANSMITTERS

ANALOG INPUT
4-20 MA OUTPUT & RS232 / RS485 I/O

SPECIFICATIONS & GENERAL INFORMATION



Intertek
4006497

ISE, Inc., 10100 Royalton Rd, Cleveland, OH USA 44133 Tel: 440-237-3200 Fax: 440-237-1744 www.ISEinc.com

PRODUCT OVERVIEW

This document covers LT Series DIN rail transmitters with isolated analog and RS232/RS485 outputs, dual relays, and an analog input signal conditioner. A separate manual covers **LTE Series** DIN rail transmitters with isolated 4-20 mA and Ethernet outputs, dual relays, and an analog input signal conditioner.

LT Series transmitters duplicate the signal conditioning and signal processing features of their 1/8 DIN panel-mounted digital panel meter counterparts for exceptional accuracy at high read rate. A wide range of analog signal sources are accommodated by five analog signal conditioners:

- **DC input** for volts, amps, process signals (e.g., 4-20 mA), and strain gauges. Most sensitive full scale input range of 200 mV. Built-in 5A current shunt.
- **AC rms input** for volts and amps. Can be AC or DC coupled. Built-in 5A current shunt.
- **Load cell or microvolt input** with selectable full scale input ranges from 20 mV to 500 mV.
- **Thermocouple temperature input** for seven thermocouple types.
- **RTD temperature or Ohms input** for Pt100, Ni120 or Cu10 RTDs, or 20Ω-200 kΩ resistance.

A 4-20 mA, 0-20 mA, 0-10V, or -10V to +10V isolated analog output is standard. This output is generated by an ultra-linear 16-bit digital-to-analog converter which tracks an internal linearized digital reading.

Isolated serial communications are standard. The transmitter serial port is default jumpered for RS232 or full-duplex RS485 (same jumper settings). Half-duplex RS485 is also selectable either via internal or external jumpers. Three serial protocols are software selectable: Modbus RTU, Modbus ASCII and Custom ASCII. Modbus allows devices by different manufacturers to be addressed on the same data line. The simpler Custom ASCII protocol is recommended when there are no devices by other manufacturers on the data line.

An isolated transducer excitation output is standard, in DC, process and load cell input models. Three output levels are jumper selectable: 5V at 100 mA, 10V at 120 mA, or 24V at 50 mA. The factory default setting is 10V and can power up to four 350 ohm load cells in parallel.

Two isolated solid state relays are standard. These are rated 120 mA at 140 Vac or 180 Vdc.

Isolation to 250V rms is provided for power, signal input, analog output, relay outputs, and communications. Isolation adds safety and avoids possible ground loops. The transducer excitation output is isolated to ±50V from signal ground.

Internal jumpers are used to select the signal range, analog output type, communication type, and excitation level. The transmitter configuration is specified by the model number on the transmitter label. A user can reconfigure the transmitter by opening the case and moving jumpers.

Transmitter scaling is via serial connection to a PC using MS Windows based Instrument Setup Software, which can be downloaded at no charge. The required transmitter-to-PC interface cable is available for purchase.

ORDERING GUIDE

Configure a model number in this format: **LT20DCV1, CBL04**

Transmitter Type

LT.....4-20 mA, 0-20 mA, 0-10V, or -10V to +10V isolated analog output, isolated RS232/RS485 serial data output, two 120 mA solid state relays, and isolated transducer excitation output.

LTE.... 4-20 mA, 0-20 mA, 0-10V or -10V to +10V isolated analog output, isolated Ethernet output, two 120 mA solid state relays, and isolated transducer excitation output.

Main Board

2.....Standard main board
4.....Extended main board

Note: Extended main board adds rate of change and custom curve linearization. Not applicable to temperature.

Power

0..... 85-264 Vac or 90-300 Vdc
1..... 12-32 Vac or 10-48 Vdc

Input Type

DC Volts

DCV1.....200.00 mV
DCV2.....2.0000 V
DCV3.....20.000 V
DCV4.....200.00 V
DCV5*.....600.0 V
DCV6.....300.0 V

DC Amperes

DCA1.....2.0000 mA
DCA2.....20.000 mA
DCA3.....200.00 mA
DCA4.....5.000 A

RMS Volts

RMV1 ..... 200.00 mV
RMV2 ..... 2.0000 V
RMV3 ..... 20.000 V
RMV4 ..... 200.00 V
RMV5* ..... 600.0 V
RMV6 ..... 300.0 V

RMS Amperes

RMA1 ..... 2.0000 mA
RMA2 ..... 20.000 mA
RMA3 ..... 200.00 mA
RMA4 ..... 5.000 A

* Range not ETL certified

Process & Ratio Signals

4-20 mA, 0-10V, etc.

P.....4-20 mA in = 4-20 mA out
P1.....Custom Scaling

Specify min input and output, max input and output.

Load Cell & Strain Gauge

4- or 6-wire ratio. Full scale ranges from 20 to 500 mV.

WM1..... -99,999 to +99,999

Specify min input and output, max input & output.

RTD Temperature

Pt100, P385C..... -202 to 850°C
Pt100, P385F....-331 to 1562°F
Pt100, P392C.... .-202 to 850°C
Pt100, P392F....-331 to 1562°F
Ni120, 672C..... .-80 to 260°C
Ni120, 672F.....-112 to 500°F
Cu10, 427C ..... .-97 to 260°C
Cu10, 427F ..... -143 to 500°F

Thermocouple Temperature

JC .....-210 to 760°C
JF..... -347 to 1400°F
KC.....-244 to 1372°C
KF ..... -408 to 2501°F
TC.....-257 to 400°C
TF ..... -430 to 752°F
EC.....-240 to 1000°C
EF ..... -400 to 1830°F
NC.....-245 to 1300°C
NF..... .-410 to 2370°F
SC.....-46 to 1768°C
SF ..... -51 to 3214°F
RC..... .-45 to 1768°C
RF..... -49 to 3213°F

Resistance

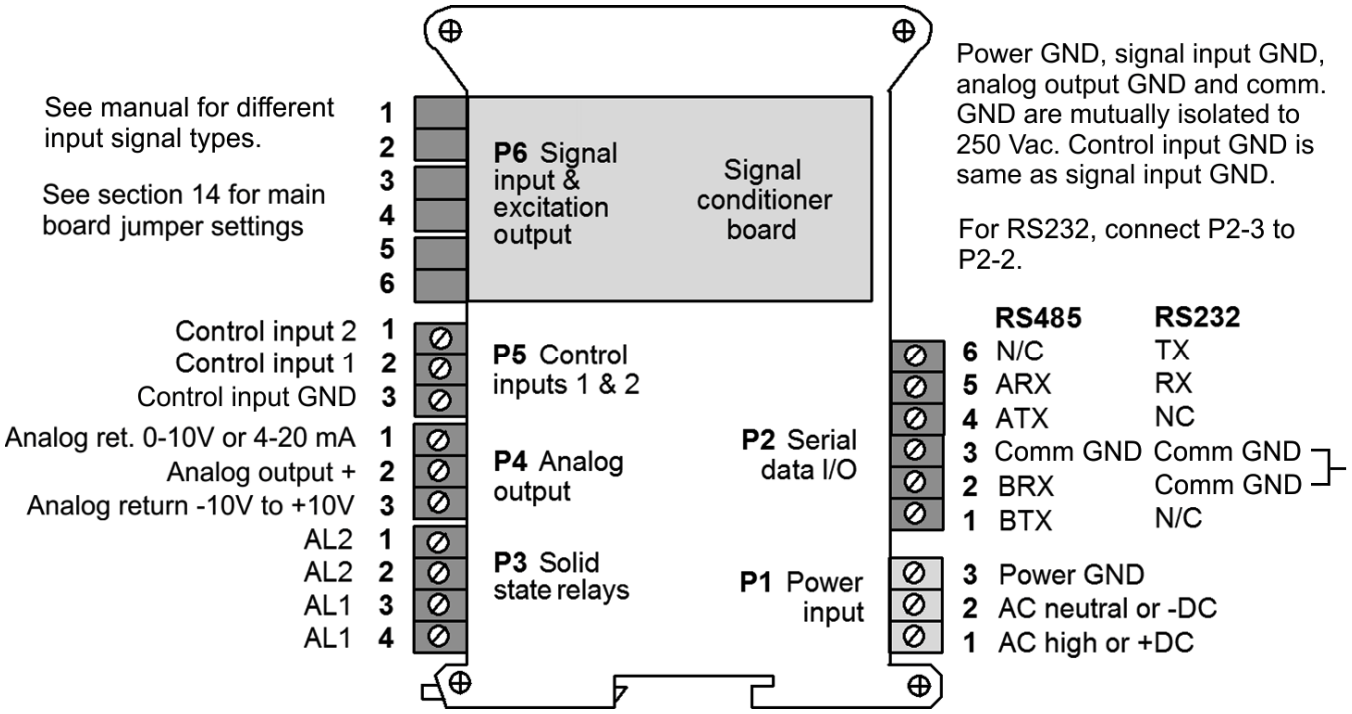
R0.....0-2 ohms (fixed range)
R1.....0-20 ohms
R2.....0-200 ohms
R3.....0-2 kohms
R4.....0-20 kohms
R5.....0-200 kohms
R6.....0-2 Mohms (fixed range)

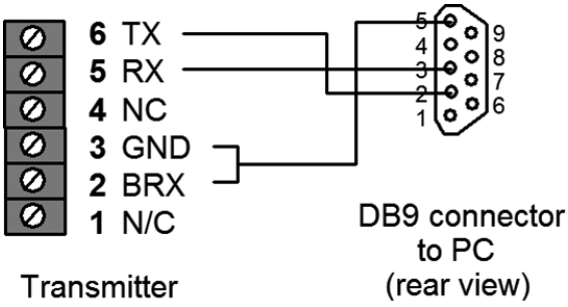
ACCESSORIES

CBL04.....RS232 cable, transmitter to computer

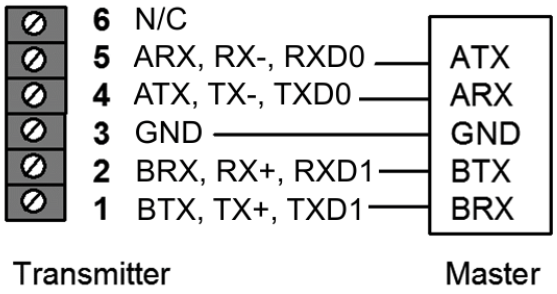
CBL02.....USB to DB9 adapter cable

TRANSMITTER FIELD WIRING

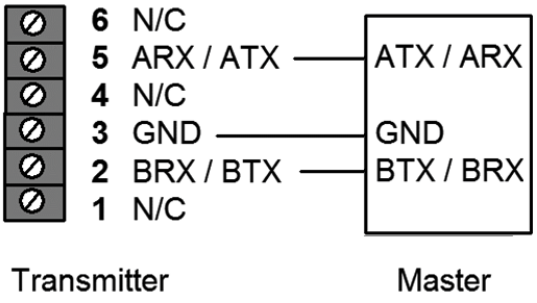




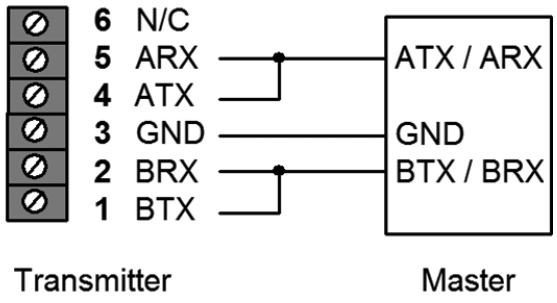
RS232 wiring



RS485 wiring, full duplex



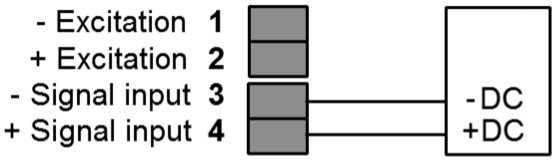
RS485 wiring, half duplex
with internal jumpers.



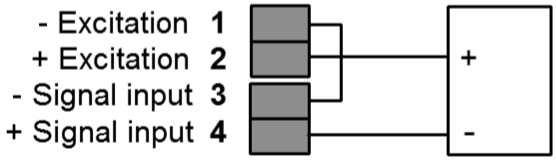
RS485 wiring, half duplex
with external jumpers.

P6 - SIGNAL INPUT DETAIL

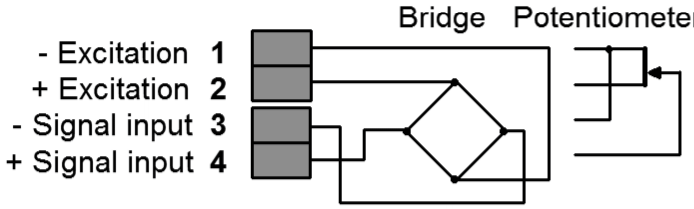
DC & Externally Powered Process



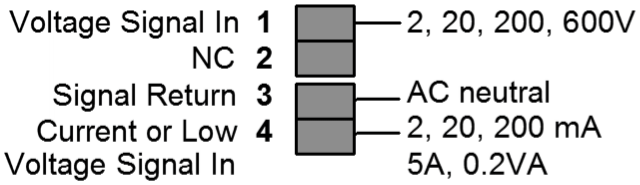
2-Wire Process Transmitter



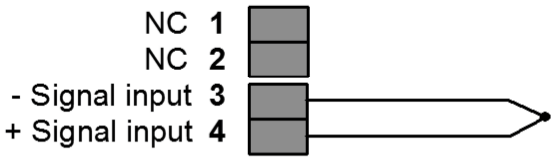
DC Ratio



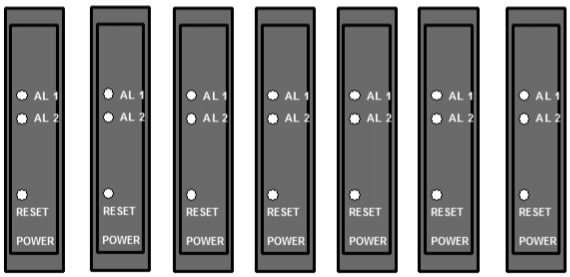
AC & AC+DC True RMS



Thermocouple

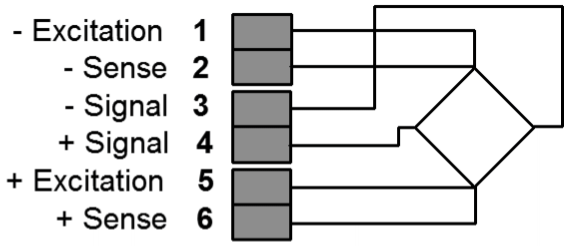


MOUNTING FOR COOLING



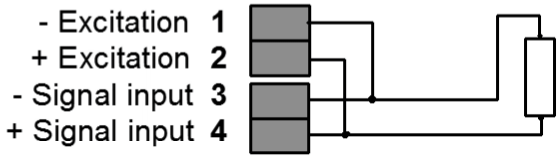
Mount transmitters with ventilation holes at top and bottom. Leave minimum of 6 mm (1/4") between transmitters, or force air with a fan.

Load Cell

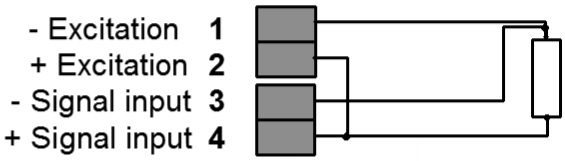


For 4-wire load cell connection, jumper Pin1 to Pin 2, and Pin 5 to Pin 6.

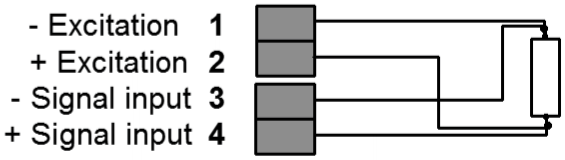
RTD or Resistance - 2 Wire



RTD or Resistance - 3 Wire

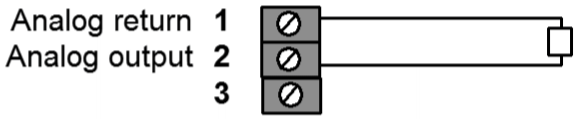


RTD or Resistance - 4 Wire

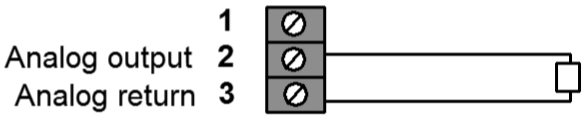


P4 - ANALOG OUTPUT DETAIL

Unipolar Output (0-10V, 4-20 mA)



Bipolar Output (-10V to +10V)



500 Ohms max load for 4-20 mA,
5 kOhms min for 0-10V or -10V to +10V

Analog output is sourcing. Do not apply external voltage. External 24 Vdc power will damage the analog output section.

LT SERIES ANALOG INPUT TRANSMITTER SPECIFICATIONS

Mechanical

Case dimensions.....120 x 101 x 22.5 mm
Case mounting.....35 mm DIN rail per EN 50022
Electrical connections..... Detachable screw plug connectors

Environmental

Operating temperature.....0°C to 55°C
Storage temperature.....-40°C to 85°C
Relative humidity..... 95% from 0°C to 40°C, non-condensing

Power & Electrical

Power to Transmitter.....85-264 Vac or 90-300 Vdc
12-32 Vac or 10-48 Vdc (low voltage power option)
Power Isolation.....250 Vrms between power, signal input, analog output, relays, and serial I/O

Transmitter Setup

Selection of signal ranges & temperature sensors .....Jumpers on signal conditioner board
Selection of serial format, excitation output, analog output.....Jumpers on main board
Programming.....Via PC using Instrument Setup software and serial cable

Analog to Digital Conversion)

Conversion rate..... 60/sec at 60 Hz power, 50/sec at 50 Hz power
Input resolution .....16 bits (65,536 steps)

Analog Output (standard)

Output Levels.....4-20 mA, 0-20 mA, 0-10V, -10V to +10V
Compliance at 20 mA.....10V (0 to 500Ω load)
Compliance at 10V.....2 mA (5 kΩ load or higher)
Output resolution.....16 bits (65,536 steps)
Output accuracy.....±0.02% of full span for DC inputs, ±0.1% for AC RMS inputs

Serial I/O (standard)

Serial formats ..... RS232 or RS485 (half or full duplex), selectable
Serial protocol ..... Custom ASCII or Modbus (RTU or ASCII)
Serial connector..... Detachable screw terminal plugs

Transducer Excitation Output (standard for DC, process, strain gauge, load cell inputs)

Output Isolation .....± 50 Vdc to meter ground
Selectable levels ..... 5 Vdc ± 5%, 100 mA; 10 Vdc ± 5%, 120 mA; 24 Vdc ± 5%, 50 mA

Dual Relay Output (standard)

Relay type .....Two solid state relays, SPST, normally open, Form A
Load rating ..... 120 mA at 140 Vac or 180 Vdc

Input Signal Noise Rejection

CMV, DC to 60 Hz ..... 250V RMS
CMR, DC to 60 Hz ..... 130 dB
NMR at 50/60 Hz ..... 90 dB with no digital filtering
Input filtering ..... Programmable digital time constants from 80 ms to 9.6 s

Overvoltage Protection

Voltage input ranges of 2V and above (AC or DC) ..... 600 Vrms
Voltage input ranges of 200 mV (AC or DC), load cell, thermocouple, RTD ..... 100 Vrms

DC Volts, DC Amps, Process and DC Ratio Input

Range	Input Resistance	Input Error
±200.00 mV ±2.0000 V ±20.000 V ±200.00 V	1 GΩ 1 GΩ 10 MΩ 10 MΩ	0.01% of full scale ± 2 counts
±300.0 V & ±600.0 V*	10 MΩ	±0.4 V
±2.0000 mA ±20.000 mA ±200.00 mA	100 Ω 10 Ω 1 Ω	0.01% of full scale ± 2 counts
±5.000 A	0.01 Ω	±10 mA

True AC RMS Volts & Amps

Range	Input Resistance	Input Error
200.00 mV 2.0000 V 20.000 V 200.00 V	1 MΩ 1 MΩ 1 MΩ 1 MΩ	0.03% of full scale ± 2 counts
300.0 V & 600.0 V*	1 MΩ	±0.8 V
2.0000 mA 0.000 mA 200.00 mA	100 Ω 10 Ω 1 Ω	0.03% of full scale ± 2 counts
5.000 A	0.01 Ω	±20 mA

Coupling ..... AC or AC + DC (jumper selectable)
AC Frequency Range ..... 10 Hz to 15 kHz, crest factor to 3.0
* 600V ranges are only ETL certified to 300V.

Load Cell, Strain Gauge & Microvolt Input

Range	1 Count	Input Resistance	Input Error
±20.000 mV ±50.000 mV ±100.00 mV ±250.00 mV ±500.00 mV	1 µV 1 µV 10 µV 10 µV 10 µV	1 GΩ	0.01% of full scale ± 2 counts for absolute voltage readings 0.01% of reading ± 2 counts for ratiometric bridge readings

RTD Input (1°, 0.1° or 0.01° resolution)

Type	Excitation	Range	Conformity Error
Platinum, Pt100 α =.00385 (DIN)	256 µA	-202 to 850°C -331 to 1562°F	0.03°C 0.05°F
Platinum, Pt100 α =.003925 (ANSI)	256 µA	-202 to 631°C -331 to 1168°F	0.04°C 0.07°F
Nickel, Ni120 α =.00672	256 µA	-80°C to +260°C -112°F to +500°F	±0.05°C ±0.09°F
Copper, Cu10 α =.00427	5.0 mA	-97°C to +260°C -143°F to +500°F	±0.05°C ±0.09°F

RTD connection: .....2, 3 or 4 wire
Span tempco.....±0.003% of reading/°C
Zero tempco .....±0.03 deg/deg
Sensor lead resistance tempco per conductor, 2-wire..... 10 µdeg / Ω / deg up to 10 Ω
Sensor lead resistance tempco per conductor, 3 & 4-wire ..... 10 µdeg / Ω / deg up to 100 Ω
Over-voltage protection .....125 Vac
Open sensor indication .....0 mA or > 20 mA output, jumper selectable

Thermocouple Input (1° or 0.1° resolution)

Selection of signal ranges & temperature sensors .....Via jumpers and software
Selection of serial format, excitation output, analog output.....Via jumpers on main board
Programming..... Via PC using Instrument Setup software and serial cable
Input resistance ..... 1 GΩ
Overall input accuracy .....± 0.01% of full span ±2 counts
Max lead resistance .....1 kΩ max for rated accuracy
Span tempco.....±0.003% of reading/°C
Reference junction tempco .....±0.02 deg/deg
Over-voltage protection .....125 Vac
Open sensor indication .....0 mA or > 20 mA output, jumper selectable

Type	Range	Conformity Error
J	-210 to 760°C -347to 1400°F	0.09°C 0.16°F
K	-244 to 1372°C -408to 2501°F	0.10°C 0.17°F
T	0 to 400°C -257 to 0°C 32 to 752°F -430 to 32°F	0.03°C 0.20°C 0.05°F 0.36°F
E	-240 to 1000°C -400 to 1830°F	0.18°C 0.32°F
N	-245 to 1300°C -410 to 2370°F	0.10°C 0.17°F
S	-46 to +68°C -51 to +213°F	0.12°C 0.22°F
R	-45 to 1768°C -49 to 3214°F	0.17°C 0.31°F

Resistance Input

Range	1 Count	Excitation	Input Error
0-20.000 Ω	1 mΩ	5 mA	0.01% of range ± 2 counts
0-200.00 Ω	10 mΩ	500 µA	
0-2000.0 Ω	100 mΩ	50 µA	
0-20000 Ω	1 Ω	5 µA	
0-200.00 kΩ	10 Ω	500 nA	
0-2.0000 MΩ*	100 Ω	500 nA	

* Factory special fixed range

Load connection: .....2, 3 or 4 wire
Span tempco.....±0.003% of reading/°C
Over-voltage protection .....125 Vac
Open sensor indication .....0 mA or > 20 mA output, jumper selectable