RANGEABLE PLATINUM ROOM TEMPERATURE TRANSMITTER

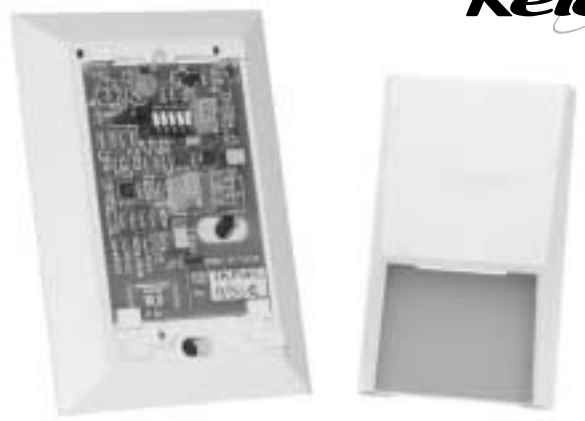
MODEL ST-T91E

DESCRIPTION

The **Model ST-T91E Rangeable Platinum Room Temperature Transmitter** provides stable, accurate room sensing for temperature control and Building Automation Systems, and it is CE approved for level one applications. The attractive vented housing mounts easily and is constructed of a durable plastic with a tan enameled aluminum faceplate.

The **Model ST-T91E** has a loop-powered 4-20 mA output with a standard temperature range of 40° to 90°F (4° to 32°C), although other ranges can be field calibrated between -30° to 250°F (-34° to 121°C). To adjust the **Model ST-T91E**, set the DIP switches to match the desired range, and use the zero and span pots to fine tune. A high accuracy digital ohmmeter and decade box are required.

The **Model ST-T91E** has a special 20 mA loop calibration test signal to provide easy system verification. Simply move the bottle plug jumper from norm to 20, and the transmitter will output a constant 20 mA. The loop up LED provides power indication for the 4-20 mA output.

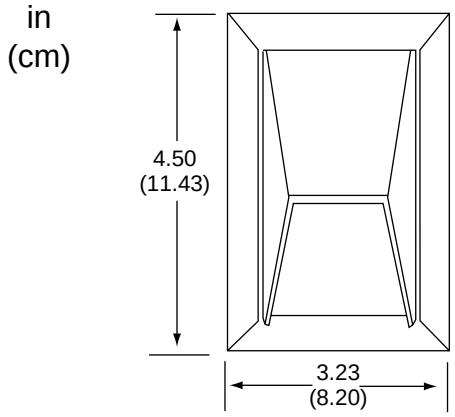


CE

FEATURES

- ***High accuracy***
- ***No-drift platinum***
- ***Loop calibration test signal***
- ***Low cost***
- ***Decorative enclosure***
- ***Loop-powered LED indication***
- ***CE approved***
- ***18-month warranty***

DIMENSIONS



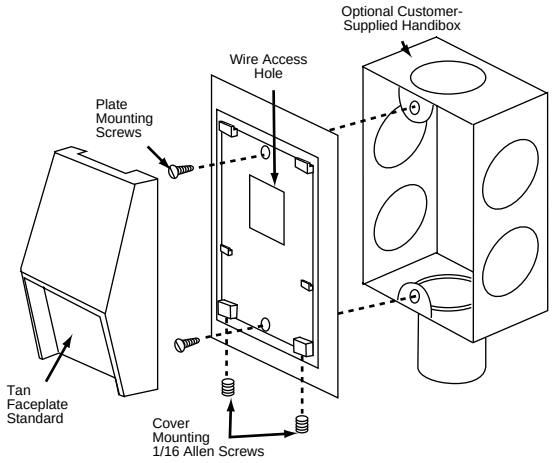
SPECIFICATIONS

Sensing element	1000Ω thin film platinum TCR 0.00375Ω/Ω/°C	**Standard range**	40° to 90°F (4° to 32°C) Max 0° to 140°F (-18° to 60°C)
Ice point resistance (R_0)	1000 ±2Ω (±0.2%)	**Supply voltage**	10.5-45 VDC
Rangeability limits	-30° to 250°F (34° to 121°C)	**Max impedance**	675Ω @ 24 VDC
Min span	40°F (22°C)	**Ambient temp**	0° to 140°F (-18° to 60°C)
Configuration	Two-wire, loop-powered	**Humidity**	0% to 95% noncondensing
Output	4-20 mA	**Transmitter accuracy**	0.1°F or 0.2% of span
Output limit	25 mA (sensor leads open)	**Sensor accuracy**	±0.2% of 1000Ω @ 0°C
Loop calibration output	20 mA ±0.2%	**Approx sensitivity**	2.1Ω/°F @ 32°F

MOUNTING

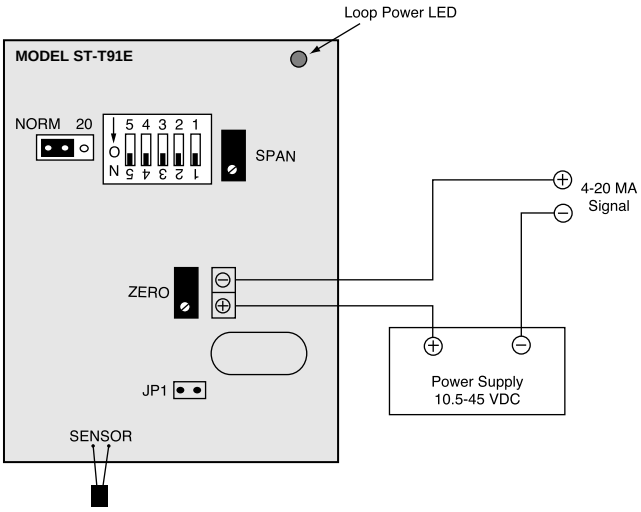
Toggle bolts or other direct wall-mount screws can be used where conduit is not required. Adapters are not required when mounting directly to electrical outlet boxes.

Basic model comes with screw terminal block, tan decorator faceplate, two #6-32 screws for handibox mounting, and two #6 x 1 screws for direct wall mounting. Cover screws are #6-32 with a 1/16 allen key head.



The sensor should be mounted approximately 5' (1.5m) above the floor, on an interior wall, and away from any heating or cooling generating devices.

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION	
ST-T91E	4-20 mA Platinum Room Temperature Transmitter, 4-20 mA 40° to 90°F (4.4° to 32.2°C)	
	OPTIONS	
	XGR	Gray decorator faceplate
	XK	Customization (logo or special feature), consult Kele
	XME	Membrane override switch (tan faceplate only)
	XR	Custom range (specific range)
	XR1	Range option = 20° to 120°F (-6.7° to 48.8°C)
	XR2	Range option = 0° to 100°F (-17.7° to 37.8°C)
	XR3	Range option = 30° to 100°F (-1.1° to 37.8°C)

ST-T91E **XR1**

Example: **ST-T91E-XR1** Rangeable platinum room temperature transmitter with calibration 20° to 120°F

Related Products

KT1 **Mounting screwdriver 1/16 allen key**

RANGE CALIBRATION (All units are factory calibrated before shipping)

The **T91U** RTD transmitter can be field-calibrated by using the ZERO and SPAN potentiometers and DIP switches. Use the step-by-step instructions below to calibrate the **T91U** to the desired temperature range. For information about accuracy, see Special Notes on Field Calibration on the reverse side.

Step 1 Assemble required equipment: temperature transmitter, 24 VDC power supply, decade box [Model RSU- 280 (Newark) or equal], digital VOM [Fluke Model 87 (Newark) or equal], trim screwdriver, RTD Resistance vs.Temperature Chart (see Temperature section of Kele catalog).

Step 2 Using the RTD Resistance vs. Temperature Chart for 1000Ω Platinum 375 Curve, select and record the resistance values for the high and low temperatures in the desired range. Designate these values as LOW TEMP OHMS and HIGH TEMP OHMS.

Step 3 Calculate the calibration factor using the ohms recorded in Step 2:

$$\text{CAL FACTOR} = \frac{\text{HIGH TEMP OHMS} - \text{LOW TEMP OHMS}}{16}$$

Step 4 Using the resistance decade box, select a resistance value within one ohm of the low temperature ohms in Step 2. **Do not use a lower value.** Measure this resistance with the VOM and record the actual value accurate to hundredths of an ohm. This value will be referred to as MIN REF OHMS.

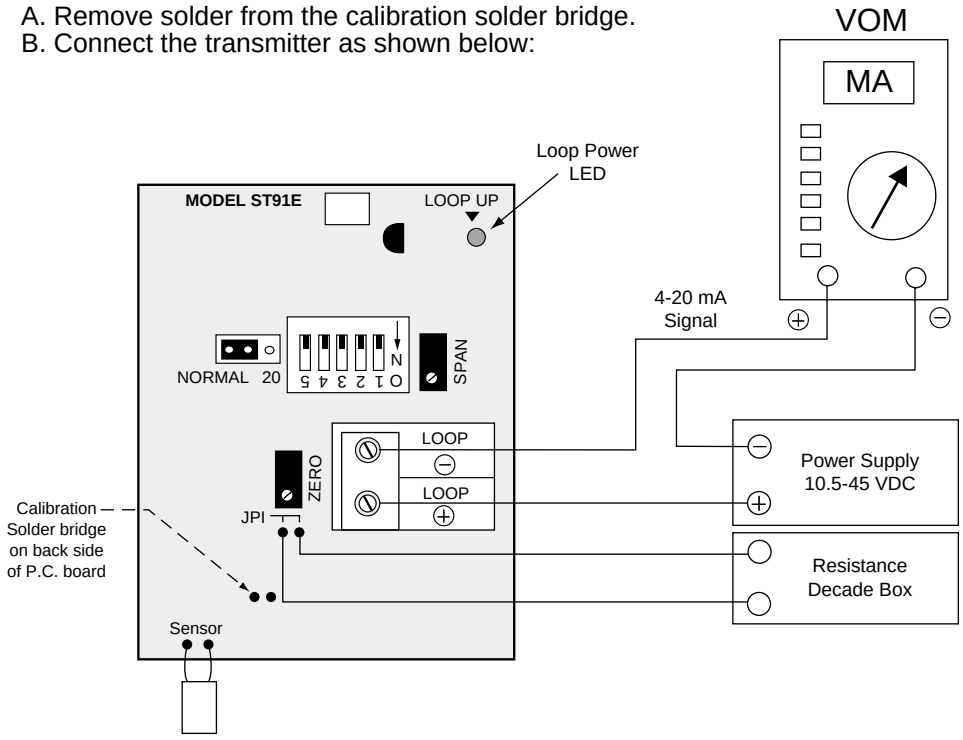
Select a resistance value within one ohm of the high temperature ohms in Step 3. **Do not use a higher value.** Measure this resistance with the VOM and record the actual value accurate to hundredths of an ohm. This value will be referred to as MAX REF OHMS.
Calculate the low mA reference:

$$\text{LOW MA REF} = \frac{\text{MIN REF OHMS} - \text{LOW TEMP OHMS}}{\text{CAL FACTOR}} + 4$$

Calculate the high mA reference:

$$\text{HIGH MA REF} = \frac{\text{MAX REF OHMS} - \text{LOW TEMP OHMS}}{\text{CAL FACTOR}} + 4$$

Step 5 A. Remove solder from the calibration solder bridge.
B. Connect the transmitter as shown below:



Step 6 Set DIP switches 1-5 by following these two steps:

(1) Set DIP switches 1 and 2 according to desired ZERO setting (LEFT position is ON and RIGHT position is OFF.):

DESIRED ZERO	SWITCH 1	SWITCH 2
-30° to 30°F (-34° to -1°C)	OFF	OFF
30° to 90°F (-1° to 32°C)	OFF	ON
90° to 150°F (32° to 66°C)	ON	OFF
150° to 210°F (66° to 99°C)	ON	ON

Example setting is 0° to 100°F

Note: If the desired ZERO is very close to a range boundary and after step 7 you cannot adjust the ZERO to the desired setting, change the switch setting to the next range and readjust the potentiometer.

(2) Set DIP switches 3, 4, and 5 according to desired SPAN (HIGH TEMP - LOW TEMP) setting:

DESIRED SPAN (HI-LO) = SPAN	SWITCH 3	SWITCH 4	SWITCH 5
40° to 90°F (22° to 50°C)	ON	ON	ON
90° to 120°F (50° to 67°C)	ON	ON	OFF
120° to 150°F (67° to 83°C)	ON	OFF	ON
150° to 180°F (83° to 100°C)	ON	OFF	OFF
180° to 200°F (100° to 111°C)	OFF	ON	ON
200° to 230°F (111° to 128°C)	OFF	ON	OFF
230° to 250°F (128° to 139°C)	OFF	OFF	ON
250° to 280°F (139° to 156°C)	OFF	OFF	OFF

Note: If the desired SPAN is very close to a range boundary and you cannot adjust the SPAN to the desired setting, change the switch setting to the next range and readjust the potentiometer.

Examples: **Desired Range:**
0° to 100°F (-18° to 38°C) Set switches 1-5; 00110
-20° to 140°F (-29° to 60°C) Set switches 1-5; 00100
30° to 240°F (-1° to 116°C) Set switches 1-5; 00010
-10° to 90°F *-23° to 32°C Set switches 1-5; 00110

Preset: ST-T91E-XR1 (00110), ST-T91E-XR2 (00110), ST-T91E-XR3 (00111).

Step 7 Set the ZERO and SPAN potentiometers:

A. Set the MIN REF OHMS on the decade box and adjust the ZERO potentiometer on the transmitter for the LOW MA REF calculated in Step 4.
B. Set the MAX REF OHMS on the decade box and adjust the SPAN potentiometer on the transmitter for the HIGH MA REF calculated in Step 4.
C. Repeat A and B and Step 6 as necessary.

Step 8 Resolder the calibration solder bridge.

Special Notes on Field Calibration

The accuracy of a field-calibrated RTD transmitter is highly dependent on the accuracy of the ohmmeter used to measure the sensor substitution resistances (MIN and MAX REF OHMS). **The percent accuracy of the calibrated RTD transmitter is <u>not</u> the same as the percent accuracy of the ohmmeter.**

OHMMETER ACCURACY (% of reading)	TRANSMITTER ACCURACY LOW TEMP	HIGH TEMP
1%	±4°F	±7°F
0.5%	±2°F	±3.5°F
0.25%	±1°F	±1.8°F
0.1%	±0.4°F	±0.7°F
0.05%	±0.2°F	±0.36°F

A Fluke Model 87 should provide an accuracy of approximately ±1.4°F at low temperatures and ±1.9°F at high temperatures.
A Fluke Model 8060 should provide an accuracy of approximately ±0.4°F at low temperatures and ±0.6°F at high temperatures.