



Technical User Guide

TT881

Explosionproof Temperature Sensor Assembly

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Introduction

TT881 includes a Minco AS7220 FM and CSA certified temperature transmitter sub-assembly for use in hazardous areas. The platinum sensing element provides optimum stability, and the TT518 Temptan™ 4-20mA transmitter can be reconfigured for a variety of temperature ranges. Minco's model TT518 is programmable (via an optional USB programming accessory), allowing users to change the configuration of the transmitter. Configurable values include 4-20mA temperatures, input type, output limits, sensor error action, calibration, and tag number (identification).

Installation

Installation of Connection Head, Sensor, and Transmitter

1. Unscrew the connection head from the fitting.

NOTE: It is hand-tight and should not require tools.

NOTE: The sensor fitting is factory welded in the correct position and cannot be removed from or repositioned on the probe.

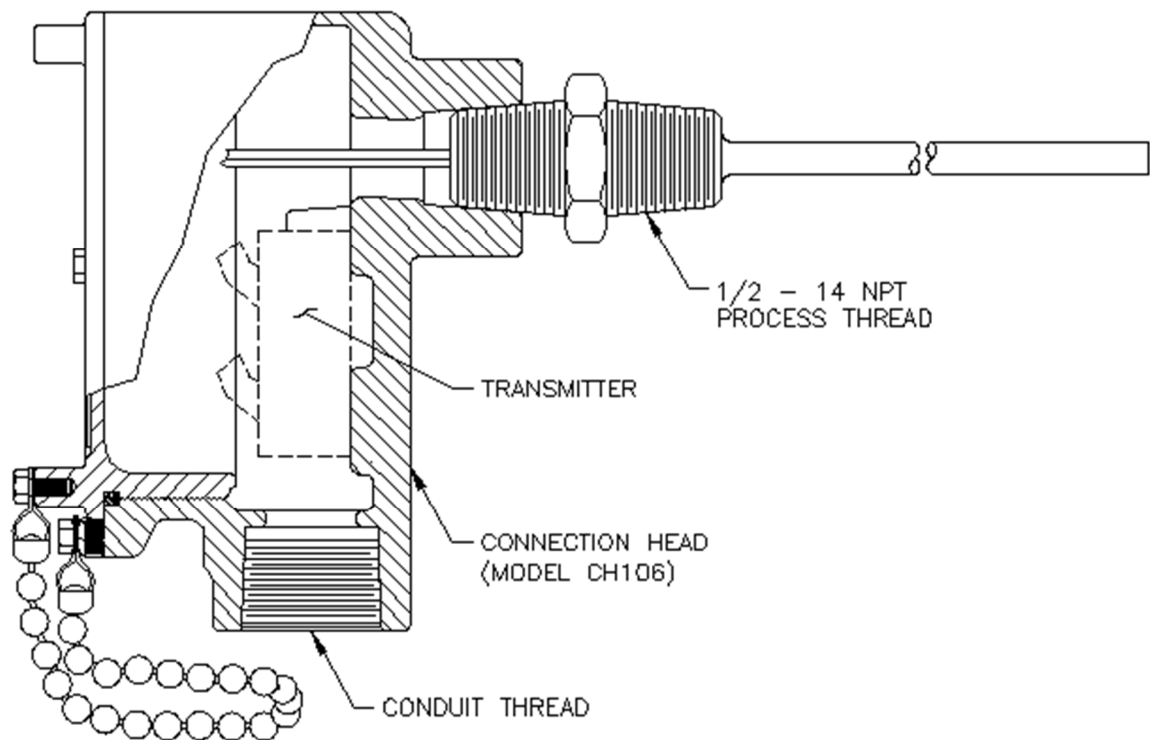


Figure 1

2. Slide the probe, tip first, into position and thread the fitting into the process connection. Tighten using a 7/8" open-end or adjustable wrench.
3. Screw the connection head onto the back of the fitting and thoroughly tighten by hand. Use caution, so the leadwires don't get pinched, twisted, or damaged.

4. Connect the Transmitter as shown in Figure 2, observing the +/- polarity of the current loop. Maximum DC supply voltage = 30 VDC. The RTD leads of the same color should be connected to terminal block positions "3" and "4" and remaining RTD lead should be connected to position "6" for the transmitter to function properly.

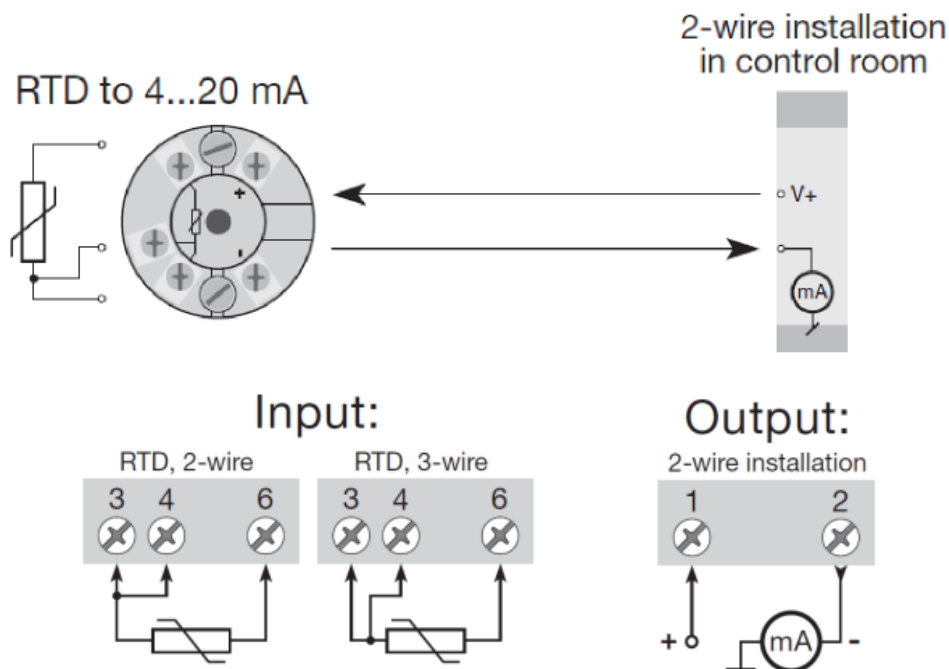


Figure 2

Configuration

Changing the Transmitter Temperature Range (Programming)

- Loop Link is a communications interface that is necessary to reconfigure the TT518 temperature transmitter.
- Use Minco AC205817, Loop Link Programmer USB accessory.
- For programming please refer to the drawing below. TT508-TT531 Transmitter Programmer Software, Temptran Utilities, is used with a PC and the AC205817 to allow the user to modify the configuration of the transmitter.
- **Loop link is not approved for communication with modules installed in hazardous (Ex) areas.**

Calibrating the Transmitter

5. Connect a 24 VDC power supply and an accurate milliammeter (5½ digit preferred) as shown in Figure 3, or use a loop calibrator instead of the DC power supply and milliammeter.

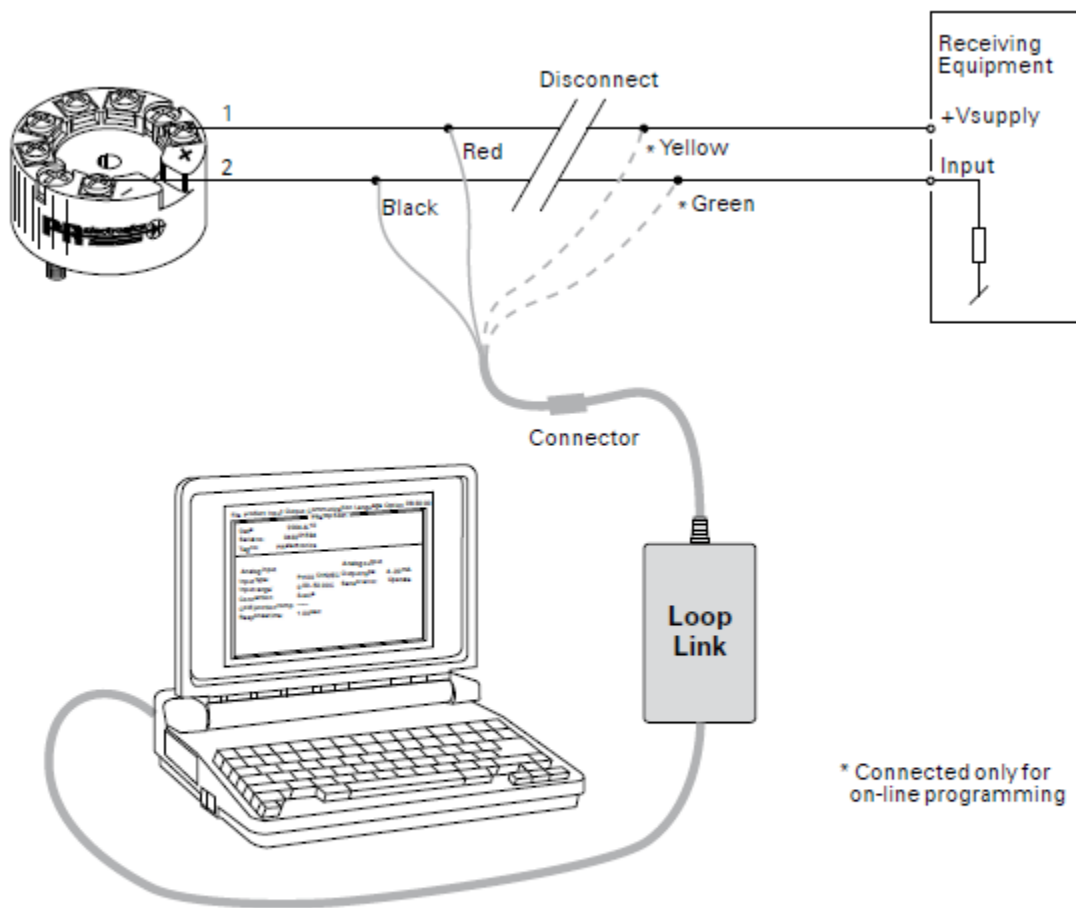


Figure 3

Troubleshooting

Symptom	Cause	Solution	Page
Temperature reading is "stuck" below minimum temperature (less than 4 mA output)	Measured temperature is below calibrated 4 mA temperature	Change the transmitter temperature range and calibration	6
	RTD wired incorrectly	Connect red RTD wire to terminal block position 6, and white wires to terminal positions 3 and 4	5
	RTD short circuited (resistance less than 80Ω)	Replace RTD probe or entire assembly	n/a
	Less than 8 VDC supply voltage	Increase power supply voltage and/or reduce loop resistance	6

	Polarity reversed	Switch power supply leads	5
Temperature reading is “stuck” above maximum temperature (more than 20 mA output)	Measured temperature is above calibrated 20 mA temperature	Change the transmitter temperature range and calibration	4
	Poor RTD connection	Connect red RTD wire to terminal block position 6, and white wires to terminal positions 3 and 4	5
	RTD open circuited (resistance more than 2k Ω)	Replace RTD probe or entire assembly	n/a
Temperature reading is significantly different than expected	Controller is programmed to a different temperature range than transmitter	Program the controller to the same temperature range as the transmitter	n/a
	Improper calibration	Change the transmitter temperature range and calibration	6
	Less than 8 VDC supply voltage	Increase power supply voltage and/or reduce loop resistance	4
	Damaged RTD	Replace RTD probe or entire assembly	n/a

Frequently Asked Questions (FAQ)

How do I install a TT881 to maintain hazardous area certification?

Assemble and install per installation instructions herein, and follow appropriate electrical codes for the hazardous area classification and protection method.

Why wasn't the RTD wired to the transmitter when I received it?

Installation herein requires removal of the connection head. The RTD wires would have to be disconnected anyway, to avoid twisting.

Why is my 4-20mA transmitter labeled as a TT881 and how do I get its specifications?

Effective April 1, 2018, the TT881 Temperature Sensor Assembly was updated to utilize the TT518 programmable 4-20mA transmitter instead of the TT881 4-20mA transmitter, which resulted in many improvements for the user. Specifications for the assembly with the TT881 4-20mA transmitter are available in the Revision A version of this document.

Specifications

Temperature range:	Probe: -50 to 260°C (-58 to 500°F). Transmitter Operating: -40 to 85°C (-40 to 185°F). Transmitter Storage: -40 to 85°C (-40 to 185°F).
Material:	Probe/fitting: 316 stainless steel. Connection head: 316 stainless steel.
Pressure rating:	200 psi (13.8 bar).
Agency Approvals (Assembly):	Minco AS7220 sub-assembly only National and Canadian Electrical Code (FM and CSA): XP: Class I, Divisions 1 and 2, Groups B, C, and D, DIP: Class II, Groups E, F, and G, T6 (Ta = 40°C), T2 (Ta = 260°C), Ta limited to 160°C for CSA Class II. National Electrical Code (Article 505): Class I, Zones 1 and 2, AEx d IIC, T6 (Ta = 40°C), T2 (Ta = 260°C). Canadian Electrical Code (IEC 60079): Zones 1 and 2, Ex d IIC, T6 (Ta = 40°C), T2 (Ta = 260°C).
Transmitter Input:	3-wire 100 ohm, 1000 ohm platinum RTD.
Output:	4 to 20 mA DC over specified range.
Calibrated Accuracy:	±0.1% of span when factory calibrated.
Linearity:	±0.1% of span.
Adjustments:	Transmitter configuration is user-programmable.
Ambient Temperature Effects:	±0.01 °C/°.
Warmup Drift:	±0.1% of span max., assuming V _{SUPPLY} = 24 VDC and R _{LOOP} = 250 ohms. Stable within 15 minutes.
Supply Voltage:	8 to 30 volts DC with no loop resistance, reverse polarity protected.
Voltage Effect:	±0.005% of span per volt.
Lead Wire Compensation (3-wire RTD):	±0.002 ohms per ohm, up to 10 ohms in each leg.
Maximum Load Resistance:	The maximum allowable resistance of the signal-carrying loop is given by this formula: $R_{LOOP\ MAX} = \frac{(V_{SUPPLY} - 8)}{0.023\ amps}$ Example: With supply voltage 24 VDC, maximum loop resistance is 695 ohms
Minimum Output Current:	3.5 mA.
Maximum Output Current:	23 mA.
Connections:	Screw terminals, max 1x1.5mm ² stranded wire.
Weight:	2.5 lbs (1145 g).

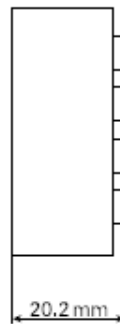
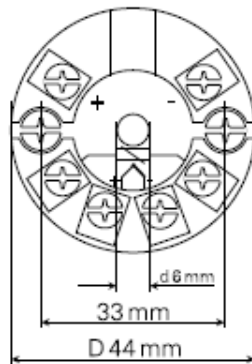
For complete TT518 transmitter specifications, see TT518 Specification Drawing and TT518 Manual.

Dimensions

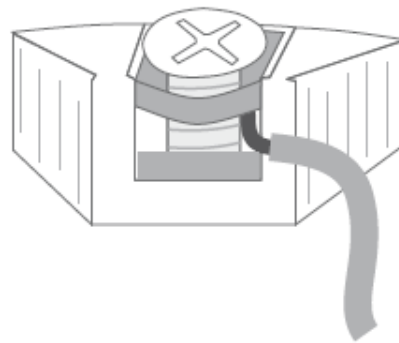
Transmitter:

All dimensions are in millimeters.

Mechanical specifications



Mounting of sensor wires



Wires must be mounted between the metal plates.

Figure 4

Probe Assembly:

All dimensions are in inches [millimeters].

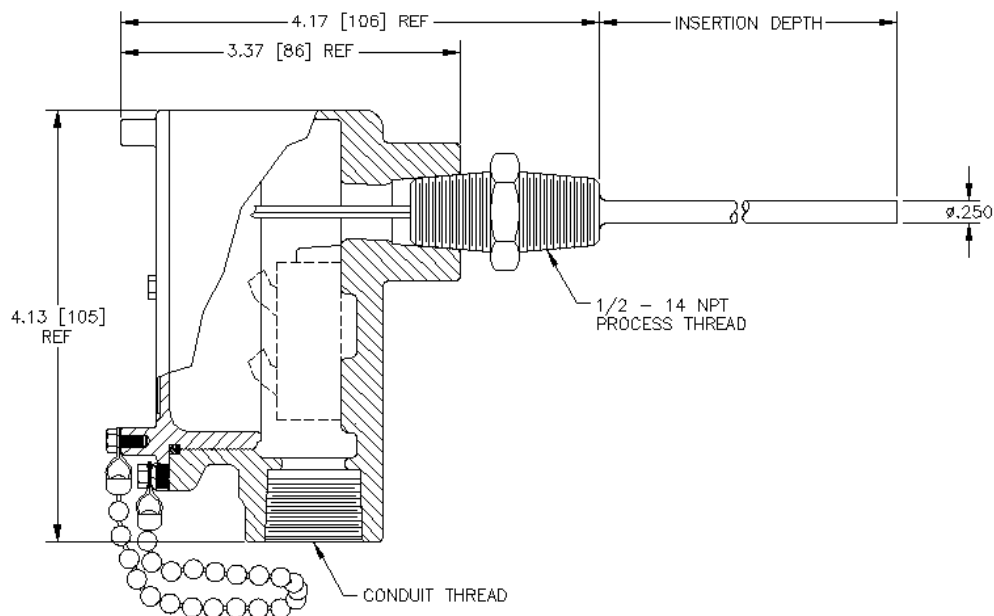


Figure 5

How to Order

TT881	Model Number: TT881 = RTD Temperature Transmitter in Explosionproof Housing
PW	RTD Element Code: PA = 100 Ω platinum (0.00392 $\Omega/\Omega/^\circ\text{C}$) PB = 100 Ω platinum (0.00391 $\Omega/\Omega/^\circ\text{C}$) PD = 100 Ω platinum (0.00385 $\Omega/\Omega/^\circ\text{C}$) PE = 100 Ω platinum (0.00385 $\Omega/\Omega/^\circ\text{C}$) PF = 100 Ω platinum (0.00385 $\Omega/\Omega/^\circ\text{C}$) PW = 100 Ω platinum (0.00375 $\Omega/\Omega/^\circ\text{C}$)
080	Probe Length: LLL in 0.1" increments (040 = 4.0"; 120 = 12.0"; 000 for "W" without sensor)
E	Form: E = Duct mount P = Immersion W = Wall mount
1	Output: 1 = 4 to 20 mA DC
S	Transmitter Temperature Range: EN = -20°F to 140°F S = 0°F to 100°F A = 20°F to 120°F BI = 30°F to 130°F N = 32°F to 122°F (0°C to 50°C) H = 40°F to 90°F C = 32°F to 212°F (0°C to 100°C) BW = 32°F to 482°F (0°C to 250°C) SX = Special range as defined on job order – must fall within adjustment limits on transmitter. Consult factor for current list of available ranges.
1	Calibration: 1 = No calibration data, sensor or transmitter 2 = Sensor/Transmitter matched at 0°C with NIST/SI cert 3 = Sensor/Transmitter matched at 0, 100, & 260°C with NIST/SI cert
TT881PW080E1S1 ← Sample part number	

Warranty

Minco's warranty policy is specified in our Terms and Conditions, available at www.minco.com.