

# TEM213P User Manual

## DIN RAIL PUSH BUTTON TRANSMITTER

RTD INPUT

TWO WIRE (4 to 20) mA OUTPUT



**Important - Please read this document before commencing installation.**

Every effort has been taken to ensure the accuracy of this document, however we do not accept responsibility for damage, injury, loss or expense resulting from errors and omissions, and we reserve the right of amendment without notice.



### IMPORTANT - CE & SAFETY REQUIREMENTS

Product must be mounted, inside a suitable enclosure providing environmental protection to IP65 or greater.

To maintain CE EMC requirements, input wires must be less than 30 metres.

The product contains no serviceable parts, or internal adjustments, no attempt must be made to repair this product. Faulty units must be returned to supplier for repair.

This product must be installed by a qualified person. All electrical wiring must be carried out in accordance with the appropriate regulations for the place of installation.

Before attempting any electrical connection work, please ensure all supplies are switched off.

**ABSOLUTE MAXIMUM CONDITIONS** (To exceed may cause damage to the unit) :-

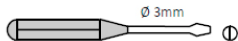
Supply Voltage	± 30 V dc (Protected for over voltage and reverse connection)
Current with over voltage	± 100 mA
Input Voltage	± 3 V between any terminals
Ambient	Temperature (-20 to 70) °C Humidity (10 to 95) % RH (Non condensing)

## ELECTRICAL INSTALLATION



TURN OFF SUPPLY BEFORE WORKING ON ANY ELECTRICAL CONNECTION

Screw Driver



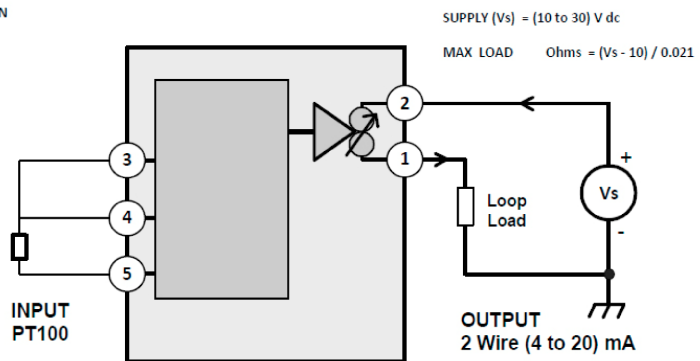
### INPUT CONNECTION

PT100 wire must be equal length and type.

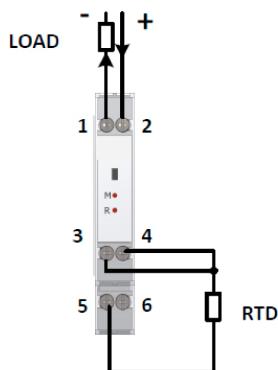
To maintain CE compliance cable length must be less than 30 Metres, and cables must be internal to the building.

### OUTPUT CONNECTION

Use twisted pair or screened cables for cable lengths greater than 30 Metres. Max cable length 1000 Metres. Ensure loop is grounded at one point.



## MECHANICAL INSTALLATION



Tempatron: Eltime House, Hall Road, Maldon, Essex, CM9 4NF UK.

# TEMPATRON

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# TEM213P User Manual

## 1.0 RECEIVE AND UNPACK

Please inspect the packaging and instrument thoroughly for any signs of transit damage. If the instrument has been damaged please notify your supplier immediately.

## 2.0 USER RANGING

The transmitter may be purchased pre-configured, if specified at the time of order. User ranging is provided to allow the temperature range of the transmitter to be set to a custom range. This configuration level cannot change the input type. If the input type or other parameters require change, then please refer to the advanced configuration section. To confirm input type set on the transmitter is correct for your application, count the number of flashes of the range "R" LED at power up then refer to the chart in "Menu 1 Input type" to establish the type set.

The push button is located under the slot in the key hole label, the slot is located above to the menu "M" LED. To press the button use a 3 mm screw driver (flat blade), inserted into the slot. The button has a slight click action.

It may be worth noting at this stage the advanced user configuration provides the user with the option of selecting fixed ranges, this may be a more attractive option if a suitable range is available, as no calibration equipment will be required.

Configuration will require the following tools and equipment :-

- DC Supply (12 to 30) V @ 30 mA
- Precision resistance box to simulate RTD (Do not use electronic calibrator)
- Connecting wire
- Screw driver flat blade 3mm wide
- Resistance tables for the sensor type to be used

To re-range the temperature scale, follow the following instructions:-

- Connect R Box to Unit input terminals using correct cables.
- Connect the output terminals to the DC supply, observe polarity.
- Turn DC supply on.
- Allow 1 minute warm up period.
- Set resistance box to the required low scale temperature (resistance). Allow 20 seconds settling time before entering range. **Note** Range "R" LED if on indicates input connection error or input out of range, please check input.
- To "Enter" ranging, press and hold the push button until Range "R" LED flashes at a slow rate.
- The "R" LED will flash at a slow rate for a approximately one second during which period the low scale range is stored. Once the store is complete the "R" LED will flash at a medium rate indicating the transmitter is ready to store the high range setting. Release button.
- Set the resistance box to the required high range temperature (resistance) and allow twenty seconds settling time.
- Press and release button to store high range setting, the "R" LED will flicker for one second before the transmitter returns to normal operation. The transmitter is now re-ranged.

## 3.0 ADVANCED USER CONFIGURATION

The advanced user configuration option is based on five menus, each menu Sets a different parameter:-

Menu 1	Selects one of eight RTD input types
Menu 2	Selects either custom user range or one of seven fixed range
Menu 3	Selects the output direction sensor burnout
Menu 4	Provide User trim at 4 mA and 20 mA.
Menu 5	Reset to factory default setting

The advance configuration menus are navigated using the push button, menu "M" LED and range "R" LED. The push button is located underneath the slot in the key hole label, located just above the "M" LED. To press the button use a 3 mm screw driver (flat blade) inserted into the slot. The button has a slight click action.

Three commands are used to navigate menus, performed by clicking the button as follows:-

- Advance Single button press or click
- Escape or change direction Double press or click within 0.5 seconds
- Enter Press and hold button > two seconds

When a menu is selected the "M" LED will flash a burst of 1 to 5 flashes, the number of flashes represents the menu number.

Note the range "R" LED will only operate when a selected menu has been entered, then the "R" LED uses a series of flashes or toggle flash rates to indicate the state or stage of the open menu.

### Navigating the menus (Read all of this section before attempting configuration)

To access the advanced user menus press and hold down the button during SEM213P power up. The advance user menu will now be enabled and remain enabled until transmitter power is removed. Note the "USER RANGING" level will not be active at this stage, the push button will now serve to navigate "advance user menus" as follows:-

To "enter" menu press and hold button for > 2 seconds. The "M" LED will then starts to flash, rate one flash per burst (indicating menu 1).

To "advance" to the next menu use single button press, the "M" LED will advance to two flashes per burst, indicating menu 2 is selected. Repeated single presses will advance the menu, once menu 5 is reached, the next press will return to menu 1, for a repeat cycle around the menus.

To "escape" from menus back to normal operation use a double click of the button or remove transmitter power. Note menus have no timeout escape and therefore will remain selected indefinitely.

To "enter" a selected menu press and hold button for two seconds, at which stage the "R" LED will start to flash between bursts of the "M" LED, indicating the state of the opened menu.

MENUS (First Select the required menu and open as described above.)

### Menu 1 Input type

On Entry "M" LED single flash every burst (menu 1), followed by a burst of between 1 to 8 "R" LED flashes, flash count represents the input type as listed below. Timeout is 10 seconds so be sure to act quickly if the type needs changing.

"R" LED Flashes	Input Type
1	PT100 IEC Alpha 0.003851
2	PT100 IPTS-68 Alpha 0.00391
3	PT100 IPTS-68 Alpha 0.00392
4	Ni100 Alpha 0.00618
5	Ni120 Alpha 0.00672
6	Cu100 Alpha 0.00427
7	Cu53
8	( 0 to 400 ) ohms

Single button press to "advance" to the next input type, when type 8 is reached the next "advance" will cycle back to type 1. To ensure valid indication of input menu, allow one to two burst cycle after "advance", before counting the "R" LED flashes. Once the desired type is selected, allow 10 seconds with no button action, the transmitter will then store the selected input type, (indicated by flicker of "R" LED) before return back to normal operation.

### Menu 2 Fixed ranges

On "Entry" the "M" LED flashes twice every burst (menu2), followed by a "R" LED flashes between 1 to 8 , flash count represents the range selected as described below. Timeout is 10 seconds so be quick to act.

Range 1 is allocated for the user custom push button set range. When a new custom range (see USER RANGING) is entered, the range selected will automatically return to 1.

Range "R" LED Flashes	Inputs PT100 (°C)	Input Ni100 Cu53 (°C)	Inputs Ni120 Cu100 (°C)	Input ohms ohms
1	User Ranged			
2	0 to 50	0 to 50	0 to 50	0 to 50
3	0 to 100	0 to 100	0 to 100	0 to 100
4	0 to 200	0 to 150	0 to 150	0 to 150
5	0 to 500	0 to 180	0 to 260	0 to 200
6	-20 to 40	-20 to 40	-20 to 40	0 to 250
7	-30 to 70	-30 to 70	-30 to 70	0 to 300
8	-100 to 100	-50 to 100	-50 to 100	0 to 400

Single button press to "advance" to the next range, once range 8 is reached, the next "advance" will cycle range back to 1. To ensure valid indication of range menu, allow one to two burst cycle after "advance", before counting flashes. Once the desired range is selected allow for 10 seconds with no button action, the transmitter will then store new range (indicated by flicker of "R" LED) before returning to normal operation.

### Menu 3 Burnout Selection

On "Entry" - "M" LED, three flash every burst (menu 3), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate. Be quick to act as timeout is 10 seconds.

Slow rate indicated low scale burnout , fast rate indicates upscale burnout.

To "advance" to the the other burnout direction press button.

To store new setting allow 10 seconds with no button action, the burn out selection menu will then timeout, store new setting, (indicated by a flicker of the "R" LED), before returning back to normal operation.

### Menu 4 User trim

This menu allows the user to trim the output current at zero and span, (similar function to trim potentiometers) and is very useful for trimming out sensor errors. The input of the transmitter must be connected to either a Resistance Box or a sensor held at a known temperature. The (4 to 20) mA loop current will also need to be monitored with a current meter. This menu has extended timeout of 20 seconds.

The trim action will only operate within certain output current bands, the zero will be trimmed when the out current is between (3.8 to 6.0) mA, and the span will be trimmed when the output current is between (18.0 to 21.5) mA.

On "Entry" - "M" LED, four flash every burst (menu 4), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate.

Slow rate indicates trim direct down, whilst fast rate indicate trim direction up.

To "change direction" the trim direction double click button.

To trim, single press button to "advance" current by 2 uA, or press and hold button to auto advance, after two seconds the trim will adjust automatically at a rate of 3 uA per second until the button is released. Note after approximately 20 seconds of continuous button press, the auto trim rate will speed up to a rate of 10 uA per second.

To store new setting allow 20 seconds with no button action, the User Trim menu will then timeout and store any new setting(s), (indicated by a flicker of the "R" LED), before returning back to normal operation.

### Menu 5 Set factory default

On "Entry" - "M" LED, five flashes every burst (menu 5), followed by "R" LED toggle flash at a slow rate (every second).

To set factory default and zero any user trim, press button. Default setting will then be loaded and stored into the transmitter, indicated by a flicker of the "R" LED. The transmitter will then return to normal operation.

To avoid any action, allow 10 seconds with no button action, Set factory default menu will then timeout, without storing any default configuration. The transmitter will then return to normal operation.

### Default

- Input PT100 0.003851 IEC
- Range ( 0 to 100 ) °C
- Burnout Up-Scale

Tempatron: Eltime House, Hall Road, Maldon, Essex, CM9 4NF UK.

# TEMPATRON

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# TEM213T User Manual

**DIN RAIL PUSH BUTTON TRANSMITTER  
UNIVERSAL TC INPUT  
TWO WIRE (4 to 20) mA OUTPUT**



Important - Please read this document before commencing installation.

Every effort has been taken to ensure the accuracy of this document, however we do not accept responsibility for damage, injury, loss or expense resulting from errors and omissions, and we reserve the right of amendment without notice.



## IMPORTANT - CE & SAFETY REQUIREMENTS

Product must be mounted, inside a suitable enclosure providing environmental protection to IP65 or greater.  
To maintain CE EMC requirements, input wires must be less than 30 metres.  
The product contains no serviceable parts, or internal adjustments, no attempt must be made to repair this product. Faulty units must be returned to supplier for repair.  
This product must be installed by a qualified person. All electrical wiring must be carried out in accordance with the appropriate regulations for the place of installation.  
Before attempting any electrical connection work, please ensure all supplies are switched off.

**ABSOLUTE MAXIMUM CONDITIONS** (To exceed may cause damage to the unit) :-  
Supply Voltage  $\pm 30$  V dc (Protected for over voltage and reverse connection)  
Current with over voltage  $\pm 100$  mA  
Input Voltage  $\pm 3$  V between any terminals  
Ambient Temperature (-20 to 70) °C Humidity (10 to 95) % RH (Non condensing)

## ELECTRICAL INSTALLATION



TURN OFF SUPPLY BEFORE WORKING ON ANY ELECTRICAL CONNECTION

Screw Driver

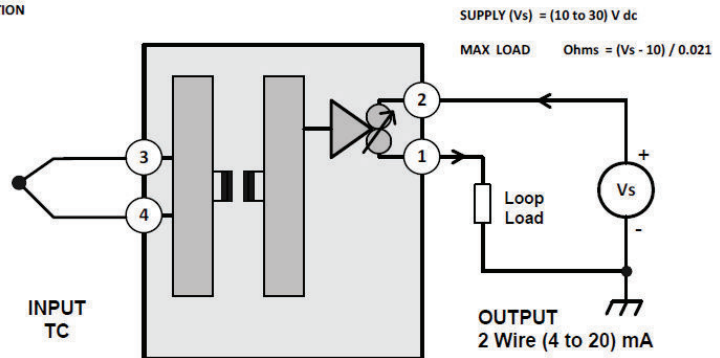


### INPUT CONNECTION

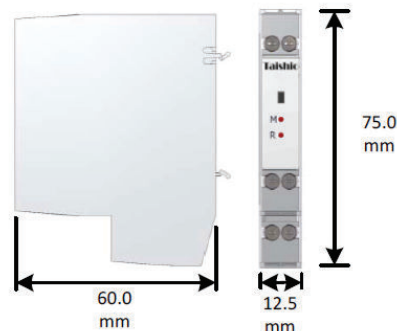
Correct TC compensating wire must be used.  
To maintain CE compliance cable length must be less than 30 Metres, and cables must be internal to the building.

### OUTPUT CONNECTION

Use twisted pair or screened cables for cable lengths greater than 30 Metres. Max cable length 1000 Metres. Ensure loop is grounded at one point.



## MECHANICAL INSTALLATION



Tempatron: Eltime House, Hall Road, Maldon, Essex, CM9 4NF UK.

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# TEM213T User Manual

## INSTRUCTIONS

### 1.0 SPECIFICATION

Please refer to data sheet for full specification

### 2.0 RECEIVE AND UNPACK

Please inspect the packaging and instrument thoroughly for any signs of transit damage. If the instrument has been damaged please notify your supplier immediately.

### 3.0 USER RANGING

The transmitter may be purchased pre-configured, if specified at the time of order. User ranging is provided to allow the temperature range of the transmitter to be set to a custom range. This configuration level cannot change the input type, if the input type or other parameters require change, then please refer to the advances configuration section. To confirm the present input type set on the transmitter is correct for your application, count the number of flashes of the range "R" LED at power up then refer to the chart in "Menu 1 Input type" to establish the type set.

The push button is located under the slot in the key hole label, the slot located above to the menu "M" LED. To press the button use a 3 mm screw driver (flat blade), inserted into the slot. The button has a slight click action.

It may be worth noting at this stage the advance user configuration provides the user with the option of selecting fixed ranges, this may be a more attractive option if a suitable range is available, as no calibration equipment will be required.

Configuration will require the following tools and equipment :-

- DC Supply (12 to 30) V @ 30 Ma
- Thermocouple Calibrator
- Connecting wire (including the Correct compensation wire for thermocouple)
- Screw driver flat blade 3mm wide

To re-range the temperature scale, follow the following instructions:

- Connect TC calibrator to the units input terminals using correct compensating cable.
- Connect the output terminals to the DC supply, observe polarity.
- Turn DC supply on.
- Set calibrator to the required low scale temperature Note Range "R" LED if on indicates input connection error or input out of range, please check input.
- Allow 1 minute warm up period.
- To "Enter" ranging, press and keep pressed and hold the push button until Range "R" LED flashes at a slow rate.
- The "R" LED will flash during which period the low scale range is stored. Once the store is complete the "R" LED will flash at a medium rate indicating the transmitter is ready to store the high range setting.
- Set the calibrator to the required high range temperature and allow ten seconds.
- Press button to store high range setting, the "R" LED will flicker for one second before the transmitter returns to normal operation. The transmitter is now re-ranged.

The above procedure also applies to mV input.

### 4.0 ADVANCED USER CONFIGURATION

The advanced user configuration option is based on five menus, each menu Sets a different parameter:-

- Menu 1 Selects one of seven TC input types or mV input
- Menu 2 Selects either custom user range or one of seven fixed range
- Menu 3 Selects the output direction sensor burnout
- Menu 4 Provide User trim at 4 mA and 20 mA.
- Menu 5 Reset to factory default setting

The advance configuration menus are navigated using the push button, menu "M" LED and range "R" LED. The push button is located underneath the slot in the key hole label, located just above the "M" LED. To press the button use a 3 mm screw driver (flat blade) inserted into the slot. The button has a slight click action.

Three commands are used to navigate menus, performed by clicking the button as follows:-

- Advance Single button press or click
- Escape or change direction Double press or click within 0.5 seconds
- Enter Press and hold button > two seconds

When a menu is selected the "M" LED will flash a burst of 1 to 5 flashes, the number of flashes represents the menu number.

Note the range "R" LED will only operate when a selected menu has been entered, then the "R" LED uses a series of flashes or toggle flash rates to indicate the state or stage of the open menu.

### Navigating the menus (Read all of this section before attempting configuration)

To access the advanced user menus press and hold down the button during the units power up. The advance user menus will now be enabled and remain enabled until transmitter power is removed. Note the "USER RANGING" level will not be active at this stage, the push button will now serve to navigate "advance user menus" as follows:-

To "enter" menus press and hold button for > 2 seconds. The "M" LED will then starts to flash, rate one flash per burst (indicating menu 1).  
To "advance" to the next menu use single button press, the "M" LED will advance to two flashes per burst, indicating menu 2 is selected. Repeated single presses will advance the menu, once menu 5 is reached, the next press will return to menu 1, for a repeat cycle around the menus.  
To "escape" from menus back to normal operation use a double click of the button or remove transmitter power. Note menus have no timeout escape and therefore will remain selected indefinitely.  
To "enter" a selected menus press and hold button for two seconds, at which stage the "R" LED will start to flash between bursts of the "M" LED, indicating the state of the opened menu.

**MENUS (First Select the required menu and open as described above.)**

#### Menu 1 Input type

On Entry "M" LED single flash every burst (menu 1), followed by a burst of between 1 to 8 "R" LED flashes, flash count represents the input type as listed below. Timeout is 10 seconds so be sure to act quickly if the type needs changing.

"R" LED flashes	Input Type
1	K
2	J
3	E
4	N
5	T
6	R
7	S
8	mV

Single button press to "advance" to the next input type, when type 8 is reached the next "advance" will cycle back to type 1. To ensure valid indication of input menu, allow one to two burst cycle after "advance", before counting the "R" LED flashes.  
Once the desired type is selected, allow 10 seconds with no button action, the transmitter will then store the selected input type, (indicated by flicker of "R" LED) before return back to normal operation.

#### Menu 2 Fixed ranges

On "Entry" the "M" LED flashes twice every burst (menu2), followed by a "R" LED flashes between 1 to 8, flash count represents the range selected as described below. Timeout is 10 seconds so be quick to act.  
Range 1 is allocated for the user custom push button set range. When a new custom range (see USER RANGING) is entered, the range selected will automatically return to 1.

Range "R" LED flashes	Inputs K,J,E,N (°C)	Input T (°C)	Input R,S (°C)	Input mV (mV)
1	User Ranged			
2	0 to 1000	0 to 400	800 to 1760	0 to 70
3	0 to 1200	0 to 250	800 to 1600	0 to 5
4	0 to 600	0 to 200	800 to 1400	0 to 10
5	0 to 500	0 to 150	1000 to 1760	0 to 20
6	0 to 250	0 to 100	1000 to 1600	0 to 25
7	0 to 100	0 to 50	1000 to 1400	0 to 50
8	-100 to 100	-100 to 150	0 to 1600	-10 to 10

Single button press to "advance" to the next range, once range 8 is reached, the next "advance" will cycle back to 1. To ensure valid indication of range menu, allow one to two burst cycle after "advance", before counting flashes.  
Once the desired range is selected allow for 10 seconds with no button action, the transmitter will then store new range (indicated by flicker of "R" LED) before returning to normal operation.

#### Menu 3 Burnout Selection

On "Entry" - "M" LED, three flashes every burst (menu 3), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate. Be quick to act as timeout is 10 seconds.

Slow rate indicated low scale burnout, fast rate indicates upscale burnout.

To "advance" to the other burnout direction press button.

To store new setting allow 10 seconds with no button action, the burn out selection menu will then timeout, store new setting, (indicated by a flicker of the "R" LED), before returning back to normal operation.

#### Menu 4 User trim

This menu allows the user to trim the output current at zero and span, (similar function to trim potentiometers) and is very useful for trimming out sensor errors.  
The input of the transmitter must be connected to either a tc calibrator or a sensor held at a known temperature. The (4 to 20) mA loop current will also need to be monitored with a current meter. This menu has extended timeout of 20 seconds.

The trim action will only operate within certain output current bands, the zero will be trimmed when the output current is between (3.8 to 6.0) mA, and the span will be trimmed when the output current is between (18.0 to 21.5) mA.

On "Entry" - "M" LED, four flashes every burst (menu 4), followed by a "R" LED toggle flash, either at a slow rate (every second) or a faster medium rate.

Slow rate indicates trim direction down, whilst fast rate indicate trim direction up.

To "change direction" the trim direction double click button.

To trim, single press button to "advance" current by 2 uA, or press and hold button to auto advance, after two seconds the trim will adjust automatically at a rate of 3 uA per second until the button is released. Note after approximately 20 seconds of continuous button press, the auto trim rate will speed up to a rate of 10 uA per second.

To store new setting allow 20 seconds with no button action, the User Trim menu will then timeout and store any new setting(s), (indicated by a flicker of the "R" LED), before returning back to normal operation.

#### Menu 5 Set factory default

On "Entry" - "M" LED, five flashes every burst (menu 5), followed by "R" LED toggle flash at a slow rate (every second).

To set factory default and zero any user trim, press button. Default settings will then be loaded and stored into the transmitter, indicated by a flicker of the "R" LED. The transmitter will then return to normal operation.

To avoid any action, allow 10 seconds with no button action, Set factory default menu will then timeout, without storing any default configuration. The transmitter will then return to normal operation.

#### Default

- Input Type K
- Range (0 to 1000) °C
- Burnout Up-Scale

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