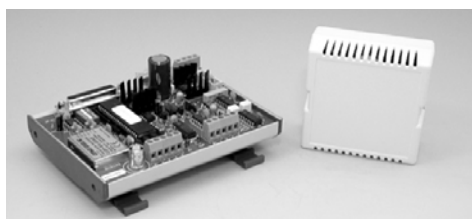


Temperature Radio Sensors

Features



- Up to 16 channels per receiver module
- local or remote aerial options
- 0-10Vdc outputs

Specification

Accuracy	±0.5°C
Output resolution	0.625°C (transmitted)
Housing material	ABS (flame retardant)
Dimensions:	
Tx housing	83 x 83 x 36mm
Transmitted value	-10°C to +40°C
Power supply:	
TT-PR-8RXM	24Vac ±10%
TT-RP-TSX	1 x PP3 battery (not supplied)
Fuse	F1A
Transmission interval	5 minutes
Transmit frequency	434.075MHz
FM bandwidth	20kHz
Transmit power	10mW
Aerial	¼l wire
Battery life	Approx. 2 years
Country of origin	UK

Product Codes

TT-RP-TSX	Temperature radio sensor
TT-RP-8RXM	Receiver module
TT-RP-8XM	4 analogue expansion module
TT-RP-RCM	Receiver configuration module
TT-RP-WA	Whip antenna
TT-RP-XA	External whip antenna c/w coax cable

NB Low battery indication causes a 100mS alarm beep to be sounded every 5 seconds.

Technical Overview

The TT-RP series is a technologically advanced system which allows up to 16 separate sensor parameters to be sent *via* radio transmission to a central receiver module, obviating the need for costly and sometimes impractical cable connections between sensors and a BEMS controller. Each temperature sensor can measure and transmit temperature to the TT-RP-8RXM, which then processes the signals and outputs a separate 0-10Vdc signal for each parameter to the controller, which typically would be situated in the same panel.

Application Notes

The basic operation of the radio sensor system is to eliminate the wiring between a sensor and its associated controller. This is achieved by the sensor transmitting its value to a remote receiver module, which can then pass this value to the controller via standard 0-10VDC wire link. Because the link between the sensor and the receiver is via UHF radio, some limitations are inherent in the system.

General guide to limitations:

1. There is a power restriction of 10mW maximum on the transmission frequency.
2. UHF radio signals are affected by any obstruction between transmitter and receiver.
3. The more metal between the transmitter and receiver, the worse reception will be.
4. Generally speaking, the higher the aerials (both transmitter and receiver) the better.
5. Radio signals in the 433MHz UHF band may be subject to interference by other systems and services
6. From this it can be seen that planning where the sensors are located and where the receiver and its aerial can be located are important if successful operation is to be achieved.

In open air, clear of restrictions, the radio sensor system can be reasonably expected to operate over distances of 100m or greater. This distance will decrease as obstructions are placed between the transmitter and receiver, so try to choose positions for both sensor and receivers which offer the clearest path between the two.

If the sensors are placed high up on a wall, try to ensure that the receiver's aerial is placed as high as possible, too.

Application Notes (continued)

Where the receiver is to be mounted in a panel, use the RP-XA external aerial option. This allows the receiver aerial to be mounted in the optimum position for reception and then connected by a length of low-loss co-axial cable to the receiver module, using the 50ohm BNC socket provided.

Where several sensors are transmitting to the same receiver (including expansion modules, if used), try to ensure that the receiver's aerial is as equidistant between the sensors as possible.

Paradoxically, if a sensor is too close to the receiver its signal can overload the receiver input. Ensure that sensors are at least 3 metres from the receiver where possible.

Aerial polarisation can also have a pronounced effect on reception quality. Experiment by rotating the receiver aerial through 90° from horizontal to vertical and notice the change in range achievable.

External aerials can overcome poor reception in many cases. This may, however, require the aerial being mounted some distance from the receiver module. Where possible, this distance must be kept to a minimum. If a long run, (say 20 metres) of cable between receiver and aerial, it is essential to use the correct type of cable.

A recommended type is RG-400 (the type supplied in a 3-metre length with the RP-XA). This is 50 low-loss co-ax suitable for use with BNC connectors. Other type of 50 ohm low-loss co-ax are available, but ensure that it can physically be used with the BNC, as this type of connector is restrictive in the diameter of cable it can use. This problem would occur if RG-8 were used, for example.

It is important NOT to use cable with the wrong impedance, ie 75 (typically used on UHF television aerials) or 93, which is also commonly available.

Some 50ohm cables are not suitable because they lose too much signal over long cable lengths. Such a cable would be RG-58, which is fine for lower frequencies, but not for UHF.

Application Notes (continued)

Where is it a good idea to use radio sensors?

1. Where the distance between sensors and the receiver is short, say less than 20m
2. In an open-plan office where partitions may be moved frequently.
3. In buildings where disruption to the building fabric is prohibited or unacceptable.

Where is it NOT a good idea to use radio sensors?

1. Where the distance between sensors and the receiver is long, say more than 50m.
2. In closed-plan offices where walls and partitions may screen reception.
3. Spread over several floors of a building.
4. Where local sources of interference are likely (i.e. where there are sensitive electronic devices present or where other radio emission sources are likely).

Setting up sensors and receivers

A common problem, which can occur when "learning" sensors to a receiver, happens when the setup is down in the convenience of an office prior to installation on site. The problem occurs when the sensors being "learnt" are too close to the receiver. This can cause the receiver input to overload when a sensor transmits. The simple answer to this is to remove the aerial from the receiver before learning sensors. (Don't forget to re-connect it later!)

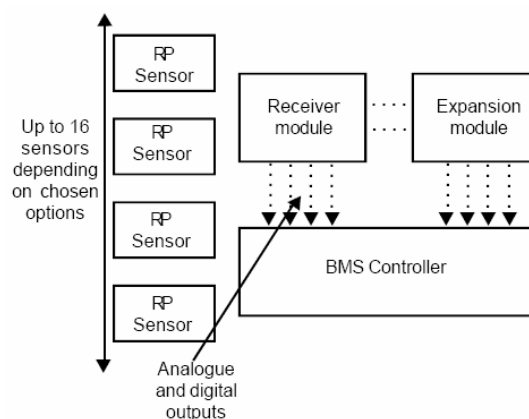
NB Each sensor has a unique serial number and cannot be "learnt" by a receiver more than one at a time.

To speed up the process of "learning" sensors, it is strongly advised that only one sensor is powered up (i.e. its battery is connected) at a time. When one sensor has successfully been learnt, remove its battery and power up the next one and so on. This prevents several sensors transmitting at a time when sensor learning is taking place.

How It Works

Signals from the TT-RP-TSX are transmitted to a DIN rail mounted TT-RP-8RXM. This module is fitted with a simple wire aerial to enable radio reception, this can be changed to a TT-RP-XA external aerial with 3m of coax cable. Allowing it to process and then output these transmissions as separate 0-10Vdc signals for each parameter to a stand-alone or BMS controller, typically situated in the same control panel.

Using a simple hand-help configuration tool TT-RP-RCM, the receiver module can be set quickly and easily. One module can handle up to 4 analogue parameters, allowing it to receive signals from up to 4 different sensors within the building if only one parameter is being monitored (i.e. temperature).



The receiver has 4 analogue (0-10Vdc) outputs as standard. Up to 3 extension cards can be connected to the main receiver module.

TT-RP-8XM 4 analogue outputs (All analogue outputs are 0-10Vdc type).

Up to 3 extension cards can be added in any combination, giving a total receiver output capability of up to:

16 analogue.

(1 x TT-RP-8RXM + 3 x TT-RP-8XM)

Analogue outputs can be configured in any one of the following options:

Temperature outputs:
-10°C to +40°C

Each output channel can be configured to output any specific sensor parameter.

How It Works (continued)

During installation, the receiver module “learns” each sensor from which it will receive data. Each sensor has it's own unique serial number and ID number. These values are in non-volatile memory in the receiver. As each sensor is “learned” by the receiver, a database of sensor information is built up.

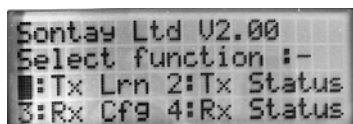
After the receiver has completed it's learning process, output channels can be configured to correspond to any of these sensor's parameters.

Dip switch

To reset the RX configuration, power OFF the receiver module, set the DIP switch section 6 to ON and power up again. You will be given the option to reset the configuration.

Configuration

The receiver can be configured using the TT-RP-RCM module. This simply plugs on to the main receiver PCB (prior to switch-on). It can be used to make the receiver learn sensors, configure outputs, display sensor information (ID number and serial number) or display receiver status. Configuration is accomplished *via* simple menu options. When the receiver module is switched on with the TT-RP-RCM connected, the following menu options are displayed:

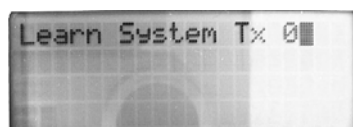


- 1 Learn Tx
- 2 Tx Status
- 3 Rx CFG
- 4 Rx Status

Use the “Select” UP/DOWN buttons to move through the menu options, and the “Step Enter” UP/DOWN buttons to select an option.

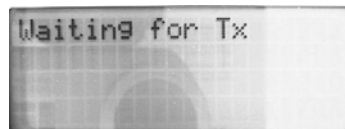
Learn Tx:

Using the “Select” buttons, choose menu option 1 (Learn Tx) and press the “Step Enter” UP button. If required, use the “Select” buttons to change the number of the sensor the receiver is required to learn, normally 1 for the first sensor, then 2, 3 etc

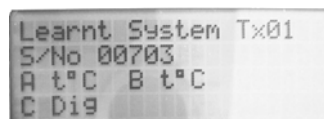


Configuration (continued)

Press the “Step Enter” UP button. The unit is now waiting for the sensor to transmit to the receiver.

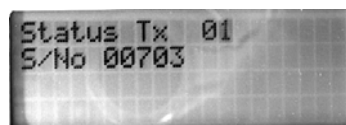


Wait until the display shows that the sensor has been learnt. The sensor ID number and serial number will be displayed. Press “Step Enter” UP to return to the main menu.



Tx Status:

Displays the ID number and serial number of all the sensors currently learnt by the receiver. Select “Tx Status” from the main menu using the “Select” buttons, press “Step Enter” UP, then scroll through the sensor numbers using the “Select” buttons. Press “Step Enter” UP to return to the main menu.



Rx CFG: (Receiver Configuration)

The Rx CFG is used to configure the outputs of the receiver module.

Select “Rx CFG” from the main menu using the “Select” buttons then press “Step Enter” UP.

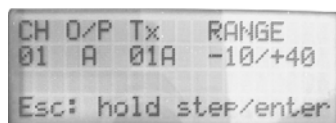
The display now shows the configuration for **output channel 1**.

Receiver output channel configuration:

Where TT-RP-8XM expansion modules are fitted, the receiver output channels are grouped as follows:

CH1 to CH4	Analogue outputs 1 - 4 on the TT-RP-8RXM
CH5 to CH8	Not Used
CH9 to CH12	Analogue outputs 1 - 4 on TT-RP-8XM No. 1
CH13 to CH16	Not Used
CH17 to CH20	Analogue outputs 1 - 4 on TT-RP-8XM No. 2
CH21 to CH24	Not used
CH25 to CH28	Analogue outputs 1 - 4 on TT-RP-8XM No. 3
CH29 to CH32	Not Used

Configuration (continued)



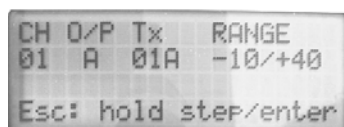
Rx CFG: (Receiver Configuration)

The cursor will be flashing on the Tx option. Use the "Select" buttons to choose which sensor the output will be associated with the output channel. For example, if output channel 1 is required to be used by Sensor 1, ensure Tx has a value of 1. Press the "Step Enter" UP button.

The cursor now moves to the Tx Sub option. Use the "Select" buttons to choose A.

Tx Sub categories are as follows: -

- | | |
|---|--------------------|
| A | Temperature Output |
| B | Not used |
| C | Not used |
| D | Not used |



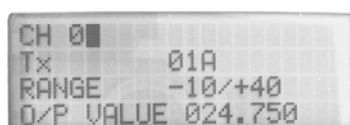
Press the "Step Enter" UP button. The unit is now waiting for the sensor to transmit to the receiver.

If output channel 1 is required to be the temperature output of sensor 1, choose Tx Sub A, if it is required to be the humidity output of sensor 1 choose Tx Sub D. Press the "Step Enter" UP button. The cursor will now flash on the Range option. Use the "Select" buttons to choose the -10 to +40°C range.

When the required range has been selected press the "Step Enter" UP button. The cursor now increments to output channel 2. Follow the same procedure to configure output channel 2 if required.

Rx Status:

This displays the last transmitted value, in the example below it shows Tx01 with an output range of -10 to +40 and the temperature is 24.75°C.

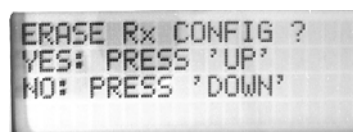


Configuration (continued)

Resetting the RX configuration:

To reset the RX configuration, power OFF the receiver module, set the DIP switch section 6 to ON and power up again. You will be given the option to reset the configuration.

- Press the Step/Enter UP button to reset
- Press the Step/Enter DOWN button to continue without resetting.



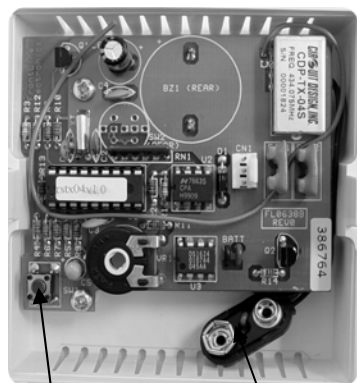
Setup Hints & Tips

1. When "learning" multiple sensors, it is easier if only one sensor is powered on at a time. This prevents other sensors transmitting before the one currently being "learned".
2. NB Only one instance of a sensor can be "learned" by a receiver module. If an attempt is made to "learn" a sensor more than once in the same receiver module, an error message "Sensor Already Used" will appear.

Pressing the "TX" button forces the sensor to transmit. This is useful when "learning" sensors.

Connections

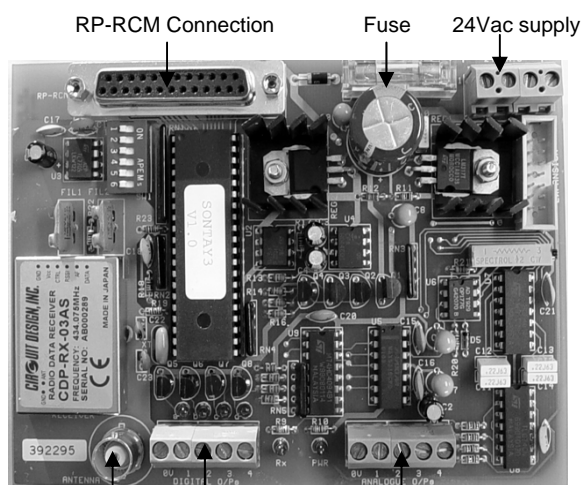
TT-RP-TSX:



TX button

Transmitter battery

TT-RP-8RXM:

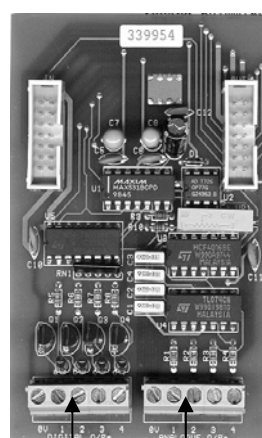


Aerial
connector

Not used

0-10Vdc outputs

TT-RP-8XM:



Not used

0-10Vdc outputs