TempSens User Guide

General Description

The TempSens system consists of three device types to remotely monitor temperature readings and provide the data to a PC for formal presentation and reporting. Sensor devices will be placed in all locations requiring local monitoring of temperature. The Sensors will transmit time stamped temperature data to the single Base device in the system, which receives the data and forwards it to the host PC via a USB interface. For sensors that are out of range from the base, Repeater devices can be added in appropriate locations to relay the data between sensors and the base.

The system will operate in the 865MHz (Europe/Asia) and 915Mhz (US) ISM bands using off the shelf FSK RFIC radios. The system will operate over 60 narrow band frequency channels with a baud rate of 4800bps, incorporating a bidirectional communication link with Acknowledge (ACK) messages to ensure all data reaches the base. The sensors are battery operated, bursting data packets at pre-programmed times then shutting down to conserve battery life, estimated to exceed 2 years. The repeaters will be line powered, while the base unit will be powered via line or USB interface used to communicate with the PC.

With an average sensor transmission rate of four per hour, a single Base can accommodate many sensors. Through the use the ACK messages and local memory in both the sensors and repeaters (to store transmitted data that has not been confirmed as received by the base via an ACK message), the number of sensors supported can approach the theoretical maximum. There is no limit to the number of repeaters, though an average installation may require 1 repeater for every 10-15 sensors.
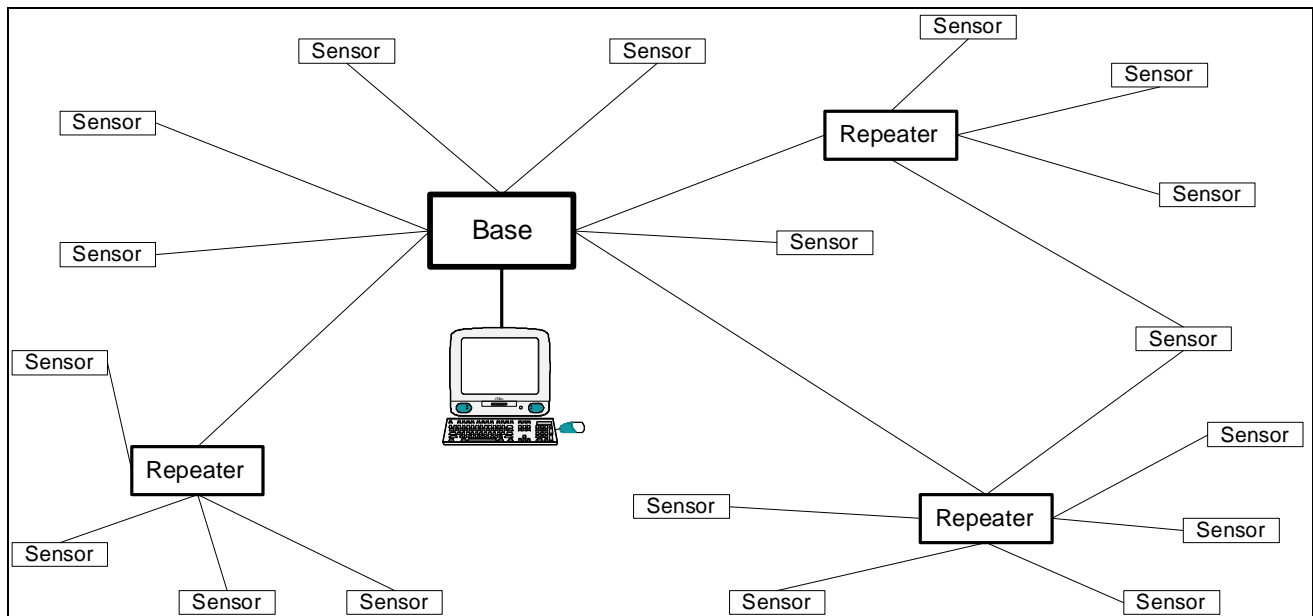

Figure 1: Typical System

A system consists of two or three types of hardware, and two pieces of software:

- PC Database Software
- Tehama Configuration Utility
- One Base Unit with USB cable
- A variable number of Sensors radios, each with 2 AA batteries
- A variable number of Repeater radios (optional, depending on size of installation) with external DC power supply

Warning

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT

Tehama Configuration Utility

The following discussion assumes the base is connected a PC via the USB cable, and both the PC Database Software and the Tehama Configuration Utility are installed.

This utility can be run on the PC either prior to or during a site installation, or when new sensors are added to a system. All sensors come from the factory with a default configuration, and the utility need not be run if no sensors are required to deviate from the default.

The Utility will allow the following options to be configured on a sensor:

- *Transmit Interval*, defined as the time between scheduled transmissions of temperature data. A temperature measurement is taken every *Transmit Interval*, and the data transmitted within 60 seconds after the measurement. The units for this parameter are seconds, and the default value is 900 seconds (15 minutes).

- *Measure Interval*, defined as the time between scheduled temperature measurements. This is used in conjunction with *Temperature Change* (see below) and must be smaller than the *Transmit Interval* time. A value of 0 for this parameter will disable measurements in between the *Transmit Interval*. The units for this parameter are in seconds, with default set to 0.

- *Temperature Change*, defined as a percentage change in the Thermistor resistance value (i.e. temperature) detected by the sensor. A *Delta Temp* alarm will be generated within the PC Software if a Sensor reading taken at a *Measure Interval* is more than *Temperature Change* percent from the prior *Transmit Interval* value. The units for this parameter are Percent (%), with the default value set to 0.

No other parameters are configurable on the sensors. Absolutely no parameters are configurable on the Base or Receiver.

Usage

With the Configuration Utility running on the PC, the user will install batteries into the sensor to be configured and set the Power jumper (orange). This will cause the sensor to communicate to the base and provide the currently configured parameters along with the Sensor's unique ID number. This information will be displayed in the *Config Sensor* tab of the Utility.

The user should change the parameters as necessary, then hit the *Set* button to send the changes to the Sensor. The Sensor will receive the new data and store that data in non-volatile memory.

Once a sensor has been configured, it will begin to operate normally, trying to send data as programmed and sleeping otherwise, however the PC software will not receive any data from the sensors until the Configuration Utility is closed. If the configuration is being performed away from the installation site, the battery or the orange jumper may be removed for shipment, as the new settings are stored permanently in the unit.

Sensor Placement

With the Base Unit plugged into the PC and the PC Software running, the Sensor placement phase begins. All the Sensors should be placed at the necessary locations, then the PC program should be checked to verify which Sensors are within range of the Base Unit. Alternatively an Installation monitor may be used that pings the base and all repeaters, providing audible and visual feedback of the signal strength. With this and/or a rough drawn map of each sensor's location, the need for repeater placement is easily identified.

After the repeater(s) have been installed, the user will again check the PC program to see an updated list unseen sensors. If there are still unseen sensors, but they are close to repeaters, then subtle movement of the sensors could allow them to see the repeater. Refer to the placement guidelines below. If Sensors are still not able to talk to the base, then additional repeaters may be required.

Guidelines

Sensors can be mounted in a number of ways by utilizing the reversible hook on the enclosure. Units may be mounted to the wall or other flat surfaces with screws or industrial double sided tape. Units can also be strapped to pipes or posts by placing ties through the two slots formed by the hook. The units may also be hung from a ledge using the hook in the outward position.

Units should not be placed directly on the metal surface (as used by most industrial refrigerators) unless no other option is available. Mounting on a flat metal surface will significantly affect the performance of the sensor. Use of the Installation monitor will help determine the optimal placement of the sensors.