

Operational Description Kiln Data Transmitter

Circuit functions:

The Kiln Data Transmitter determines physical properties present in dry kilns for wood. Several models are available of the device. They differ in the type and configuration of external sensors/transducers that are connected to it via short cables.

Sensors:

#1. Wood or other natural materials:

The device measures the electrical resistance between two electrodes connected to wood or other natural materials.

#2. Thermistor:

The device measures the electrical resistance of a thermistor. This sensor can either be installed internally or externally of the device.

#3. Transducer for air temperature (T) and humidity (RH):

The device reads digital data from an external transducer. This transducer is powered by the device and converts the signals generated by an integrated humidity and temperature sensor into serially transmitted digital data.

#4. Load cell:

The device measures the midpoint voltage of the Wheatstone Bridge contained in a load cell.

Available models:

- a. Sensors #1 and #2 and transducer #3: Model MCT&RH-TX
- b. Sensors #1 and #2 only (sensor #2 installed internally or externally): Model MCT-TX
- c. Sensor #2 only (sensor #2 installed externally): Model WT-TX
- d. Transducer #4 only: Model W-TX

Description of circuitry:

The device is powered by one or two Lithium batteries. A voltage detector chip monitors the voltage level of the battery.

Normally the microcontroller is in "Sleep"-mode (oscillator off) and doesn't do anything. An internal wake-up feature of the microcontroller activates the device in constant time intervals.

Approximately every 40sec the microcontroller controls the measuring circuitry and interprets the measuring signals to determine new readings.

Approximately every 20sec the microcontroller sends the digital values serially to the hybrid transmitter chip at 2400Bd (6 bytes total).

Every byte consists of 14 bits: Start and Stop bit, 8 data bits and 4 balance bits. Individually for every byte, the balance bits are determined by the microcontroller to achieve a duty cycle of 50%.

In the worst case, when all data bits of all bytes are high, the duty cycle of the transmitter chip operated in on-off keyed modulation (OOK) will be less than 67%.

Operating frequency of the transmitter chip is 916.5MHz at a typical peak output power of 0.54mW.

A permanently attached $\frac{1}{4}$ -wave length stub is used as antenna.