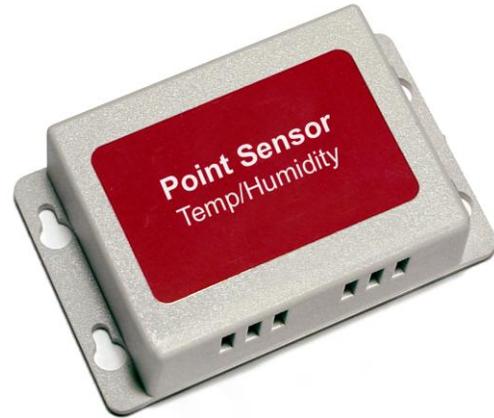# *418 MHz Transmitter*

FEATURES

- **Measures Temperature and Relative Humidity**
- **Up to 600 foot transmission range**
- **Transmission rates from 10 to 17 seconds random**
- **Up to 100 sensors can coexist**
- **Battery lasts from 2 to 5 years**
- **Very small (1.3" X 2.1" X .6") ABS Enclosure**
- **Broad operating temperature range**
- **Complies with part 15 of the FCC rules**
- **Water resistant coating on PCB**
- **CRC-16 checked Status, ID, Temperature and %RH**
- **Internal Loop antenna**
- **Low Cost**

DESCRIPTION

The Point Sensor Wireless Temperature and Relative Humidity sensor is a battery operated digital temperature and relative humidity sensor with a microprocessor controlled 418 MHz. FCC certified radio transmitter. It has an on board time of day clock that allows it to spend most of the time in a low power quiescent state. At predetermined time intervals the clock will wake up the onboard microprocessor. Unique serial number information digital temperature and relative humidity data are read from a Dallas Semiconductor DS18B20 digital temperature sensor and the Honeywell relative humidity sensors. This information is combined with a CRC-16 error check and transmitted in a very short data packet that results in a transmitter on time of only 15 milliseconds. This architecture allows the Sensor to consume very low energy resulting in a battery life of up to 5 years.

The electronics are coated with a conformal material that provides a moisture barrier against condensation. Submersion in water is not recommended. A hole in the top ABS cover permits a special tool to be inserted to activate the service switch. The Sensor is shipped with the transmitter turned off (anytime the Sensor is to be shipped the transmitter should be turned off or must be placed in a shielded container to prevent interference that might cause shipping problems). Start the Sensor by momentarily pushing the service switch (you will feel the button click). When the service switch is pushed a data transmission occurs immediately and a special mark is introduced in the ID field of the transmitted data packet to indicate which sensor is in service or installation. The service switch is also used to put the Sensor in a quiescent mode (no transmissions and very low power consumption). This is the state the Sensor is in when you receive it from the manufacturer. Push and hold the service switch for 5 seconds or more to enter this powered down state.

Transmission rate	10-17 seconds random
Shelf life with battery installed	5 Years in quiescent mode (10 years with optional battery)
Dimensions (enclosure)	1.5 W X 2.1 H X .6 D (inches)
Weight	1.5 oz.
Storage Temperature	-40° to 70° C
Operating Temperature	-40° to 70° C
Temperature Accuracy (-10 to 85 Deg. C)	+/-0.5 Deg. C
Humidity	0% to 100% non-condensing
Humidity Accuracy at 25 Deg. C	+/-5 % Full Scale
Battery life with transmissions	2-5 years with tx period of 10-17 seconds
Battery	3.6 volt Lithium
FCC Certified	FCC ID: M5ZWOWTHL

Point Sensor Temp/Humidity
Wireless Temperature/%RH Sensor.
Installation and Operation Instructions

The Point Sensor wireless temperature/%RH sensor transmits a digital temperature and %RH and a unique serial number to a 418 MHz receiver. The Point Sensor Temp/Humidity is enclosed in a high impact ABS enclosure for direct surface mounting in the environment to be measured. Point Sensor Temp/Humidity is battery operated. Transmission times of from 10 to 17 seconds random are available, specify when ordering.

Application: Apply the sensor to a surface in the environment to be monitored with double-sided adhesive tape. Make sure that the side with the access screw is away from any metal surfaces.

Start/Stop Function: The sensor has an installation mode switch (accessed through a small hole in the front cover, use a blunt object like a toothpick). A momentary push of this switch will start the convert/transmit cycles. When new the device is in a quiescent mode and will not transmit. The device will transmit a special installation status mark in the data packet immediately after the start/stop switch is released. The immediate transmission of temperature, ID and installation status mark will occur anytime this switch is activated for less than 5 seconds. The Point Sensor Temp/Humidity may be placed in a quiescent state (no transmission and battery life greater than 5 years) by holding the installation switch for more than 5 seconds.

Battery: A 3.6 Volt lithium battery powers the wireless temperature/%rh sensor. The battery will last for more than 5 years in the quiescent state (as shipped from the manufacturer). The device will transmit data for as long as 3 years at a rate of once each minute once started. The electronic components are completely covered with a water resistant rubber coating to protect from condensation. The user cannot replace the battery.

The Point Six, Inc. 418 MHz wireless temperature transmitters require a compatible receiver with the ability to receive, error check and provide RS232 and RS422/485 interface. This document describes the data format provided by the **Point Host** 418 MHz. Receiver.

The transmit packet from a receiver is approximately 15 milliseconds in duration and consists of 13 bytes of data:

1-byte ID/Mode field
8-byte serial number
9-bit temperature data and 7-bit $Relative Humidity
2-byte CRC-16 error check

The Point Host receiver processes this packet. The receiver performs a CRC-16 error check on the packet. If the data is not accurate it is discarded. When a packet is received that is error free it is converted to a 29-character packet and transmitted out the serial port at **19,200 Baud**. The data is transmitted serially in ASCII Hex format and terminated with a CR character. This format requires two bytes for each byte of data; 14 data bytes x 2=28 plus the CR is 29 characters

The resulting binary data format of the packet is:

1-byte ID field	this field will contain a byte whose LSBit indicates the service state of the transmitter, 0=normal, 1=service mode. **Note** that the CRC-16 is calculated with the MSBit of the ID field set low, the data is received with the MSBit of the ID field set high. Proper CRC-16 calculation requires that the MSBit be assumed to be low even though it is received set high.
8-byte serial#	this field contains the serial number of the 1-Wire sensor.
16-bit data field	this field contains 9-bit temperature data stored in 1/2 deg. C units and 7-bit relative humidity stored in % 0-100.
2-byte CRC-16	this is the originally received data packet CRC-16 as described above.
1-byte checksum	the checksum is a mod 256 sum of all the ASCII character values in the response but does not include the CR; the checksum is added by the HA9 and is not a part of the transmitted data.

Example:
482817040B0000004B3D2EB08783

482817040B0000004B3D2EB08783<CR>

> This field is the device type and mode indicator, the **47** or **48** indicates that this is a WOWTHL temperature/%RH sensor. **47** indicates the service state of the transmitter.

48**2817040B0000004B**3D2EB08783<CR>

> This field is the unique serial number of the WOWTHL sensor.

482817040B0000004B**3D2E**B08783<CR>

> This is the %RH and Temperature data field. This field is 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. The MSBit (bit-15) is the sign Bit for the temperature field (bits 7-0). The %RH is stored in bits bit14-bit 8. The %RH will always be a number between 0-100 (0-64hex) in %RH. The Temperature sign bit (bit15) is set if the temperature is below 0 C. For values above zero C the temperature is (bit7-bit0)/2 in C.   For values below zero C the temperature is (bit7-bit0)/2-128 C. In the above example the relative humidity is 61% and the temperature is 23 C.

482817040B0000004B3D2E**B087**83<CR>

> This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the type/mode byte and ending with inclusion of the temperature data. For proper calculation of the CRC the MSBit of the first byte should be assumed to be zero instead of the 1 value that is actually transmitted.

482817040B0000004B3D2EB087**83**<CR>

> This field is the mod 256 sum of all the ASCII character values in the response but does not include the <CR>.

482817040B0000004B3D2EB08783**<CR>**

> This is the CR terminator, 0Dhex.

See the HA9-WOW receiver specification for detailed operations of the receiver.

FCC Radio Frequency Interference Statement

Wireless Temperature/%RH Sensor   FCC ID: M5ZWOWTHL

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15, Subpart B, of the FCC Rules. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause interference to radio communications.

The limits are designed to provide reasonable protection against such interference in a residential situation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- _Reorient or relocate the receiving antenna of the affected radio or television_
- _Increase the separation between the equipment and the affected receiver._
- _Connect the equipment and the affected receiver to power outlets on separate circuits._
- _Consult the dealer or an experienced radio/TV technician for help._

MODIFICATIONS

Changes or modifications not expressly approved by **_Point Six Inc_**_._ could void the user's authority to operate the equipment.

Humidity Sensors HIH Series
Relative Humidity

PERFORMANCE SPECIFICATIONS

Parameter Conditions

RH Accuracy   ±2% RH, 0-100% RH non-condensing, 25°C
RH Linearity   ±0.5% RH typical
RH Hysteresis   ±1.2% of RH span maximum
RH Repeatability   ±0.5% RH
RH Response Time,   15 sec in slowly moving air at 25°C
RH Stability   ±1% RH typical at 50% RH in 5 years

True RH = (Sensor RH)/(1.0546-0.00216T), T in °C
Effect @ 0% RH ±0.007% RH/°C (negligible)
Effect @ 100% RH -0.22% RH/°C (<1% RH effect typical in systems above 15°C)

Humidity Range   Operating 0 to 100% RH, non-condensing

Notes:

1. Extended exposure to 90% RH causes a reversible shift of 3% RH.
2. This sensor is light sensitive. For best results, shield the sensor from bright light.