TS-WS-07 Wireless Indoor/Outdoor 8-Channel Thermo-Hygrometer with Jumbo Display User Manual

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1. Introduction

Thank you for your purchase of the TS-WS-07 Wireless Indoor/Outdoor 8-Channel Thermo-Hygrometer with Jumbo Display. The following user guide provides step by step instructions for installation, operation and troubleshooting.

2.Getting Started

Note: The power up sequence must be performed in the order shown in this section (insert batteries in the remote transmitter(s) first, Display Console second).

The unit consists of a display console (receiver), and a thermo-hygrometer (remote transmitter).

2.1 Parts List

QTY	Item
1	Display Console Frame Dimensions (LxHxW): 11.4x12.7x2.5cm LCD Dimensions (LxW): 9.5x8.9cm LCD Segment Height: 3.2cm
1	Thermo-hygrometer transmitter Dimensions (LxHxW): 11.4x5x2.0cm

2.2 Recommend Tools

Hammer and nail for hanging remote thermo-hygrometer transmitter.

2.3 Thermo-Hygrometer Sensor Set Up

1. Remove the battery door on the back of the sensor by removing the set screw, as shown in **Figure 1** .

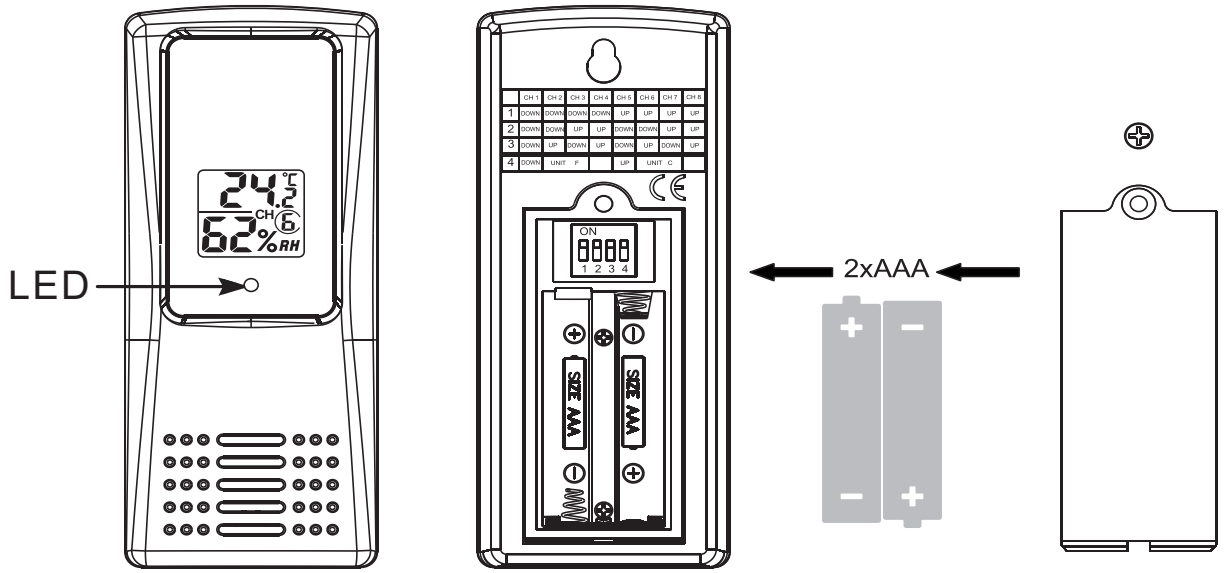

Figure 1

2. **BEFORE** inserting the batteries, locate the dip switches on the inside cover of the lid of the transmitter.

Figure 2 displays all four switches in the OFF position (factory default setting).

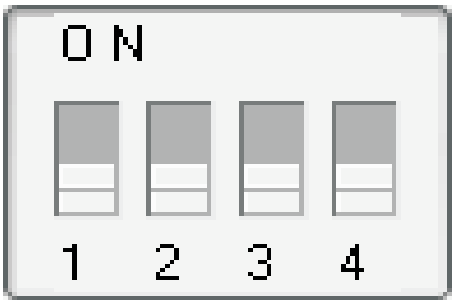

Figure 2

3. **Channel Number:** The TS-WS-07 supports up to eight transmitters. To set each channel number (the default is Channel 1), change Dip Switches 1, 2 and 3, as referenced in **Table 1**.

4. **Temperature Units of Measure:** To change the transmitter display units of measure (°F vs. °C), change Dip Switch 4, as referenced in **Table 1**.

DIP SWITCH				FUNCTION
1	2	3	4	
DOWN	DOWN	DOWN		Channel 1
DOWN	DOWN	UP		Channel 2
DOWN	UP	DOWN		Channel 3
DOWN	UP	UP		Channel 4
UP	DOWN	DOWN		Channel 5
UP	DOWN	UP		Channel 6
UP	UP	DOWN		Channel 7
UP	UP	UP		Channel 8
			DOWN	°F
			UP	°C

Table 1

5. Insert two AAA batteries.

6. After inserting the batteries, the remote sensor LED indicator will light for 4 seconds, and then flash once per 60 seconds thereafter. Each time it flashes, the sensor is transmitting data.

7. Verify the correct channel number (CH) and temperature units of measure (°F vs. °C) are on the display, as shown in **Figure 3**.

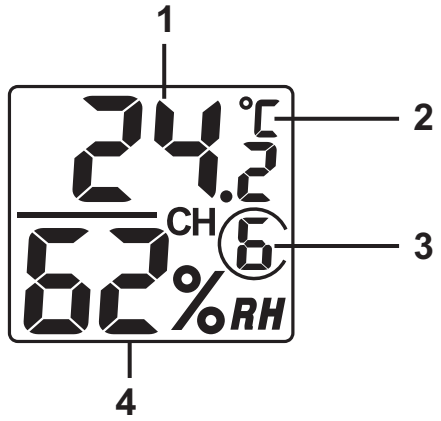

Figure 3

(1) temperature
(2) temperature units (°F vs. °C)
(3) channel number
(4) relative humidity

8. Close the battery door. Make sure the gasket (around the battery compartment) is properly seated in its trace prior to closing the door. Tighten the set screw.

2.4 Display Console Set Up

1. Move the remote thermo-hygrometer(s) about 1.5m to 3m away from the display console (if the sensor is too close, it may not be received by the display console). If you have more than one thermo-hygrometer, make sure they are all powered up and transmitting on different channels.
2. Remove the battery door on the back of the display, as shown in **Figure 4**. Insert four AAA (alkaline or lithium, avoid rechargeable) batteries in the back of the display console

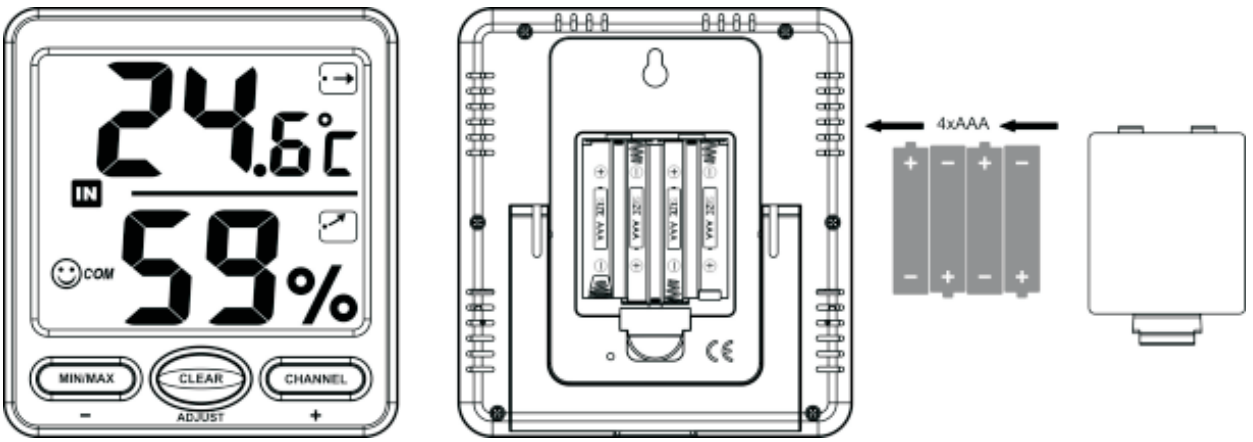

Figure 4

All of the LCD segments will light up for a few seconds to verify all segments are operating properly.

3. Replace the battery door, and fold out the desk stand and place the console in the upright position.

   The console will instantly display indoor temperature and humidity as designated by the **IN** icon. The remote temperature and humidity will update on the display within a few minutes on the appropriate channel.

While in the search mode, the remote search icon will be constantly displayed.

If you have more than one remote sensor (up to eight remotes are supported), the display will automatically toggle between sensors until all sensors have reported in.

Do not touch any buttons until the remote sensor has reported in, or the radio search icon is no longer on, otherwise the remote sensor search mode will be terminated. When the remote sensor temperature and humidity has been received, the console will automatically switch to the normal mode, and all further settings can be performed.

If the remote does not update, please reference the troubleshooting guide in Section 8 .

2.4.1 Display Console Layout

Note: The following illustration shows the full segments of the LCD for description purposes only and will not appear like this during normal operation.

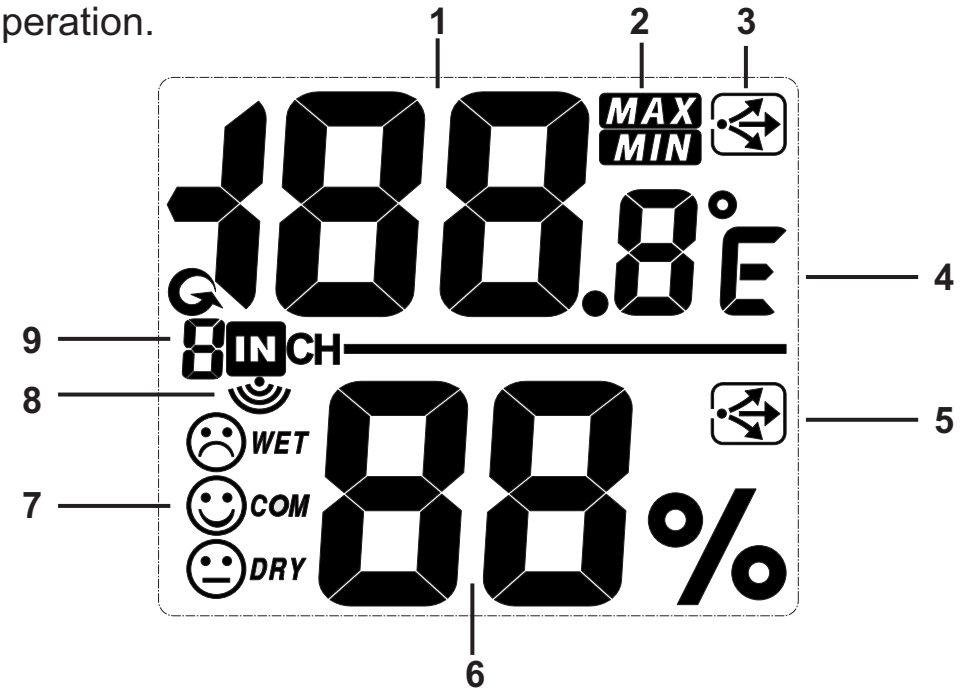

Figure 5

1. Temperature
2. Min/Max Record mode

3. Temperature, Rate of Change indicator
4. Temperature units (°F or °C)
5. Humidity, Rate of Change indicator
6. Relative Humidity (%)
7. Humidity Comfort Icon
8. Reception Icon (solid when searching, flashes when updating)
9. Channel 1,2,3,4,5,6,7,8, IN indicator

2.4.2 Sensor Operation Verification

Verify the indoor and outdoor humidity match closely with the console and sensor array in the same location (about 1.5 to 3 meters apart). The sensors should be within 10% (the accuracy is ± 5%). Allow about 30 minutes for both sensors to stabilize. The humidity can be adjusted or calibrated later to match each other a known source.

Verify the indoor and outdoor temperature match closely with the console and sensor array in the same location (about 1.5 to 3 meters apart). The sensors should be within 2°C (the accuracy is ± 1°C). Allow about 30 minutes for both sensors to stabilize. The temperature can be adjusted or calibrated later to match each other or a known source.

3. Remote Sensor Installation

It is recommended you mount the remote sensor on a north facing wall, in a shaded area. Direct sunlight and radiant heat sources will result in inaccurate temperature readings. Although the sensor is water resistant, it is best to mount in a well protected area, such as under an eve. Use a screw or nail (not included) to affix the remote sensor to the wall, as shown in **Figure 6.**

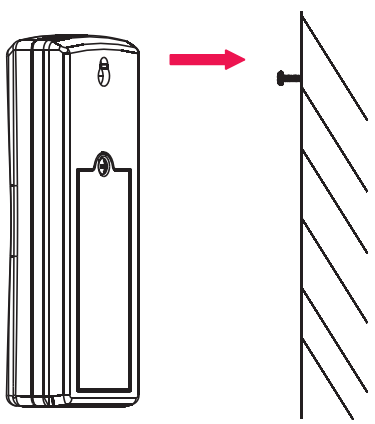

Figure 6

4. Display Features

4.1 Comfort Icon

The comfort icon is based on humidity ranges specified in **Figure 7** . The icon is displayed for indoor humidity, remote channel 1 humidity and optional remote channels 2 through 8 humidity.

RH<45%	RH45%~65%	RH>65%
		
Dry	Comfortable	Wet

Figure 7

4.2 Rate of Change Icon

The rate of change icon  detects rapid changes in temperature and humidity. If the arrow points upward, the temperature is increasing at a rate of +2°C per 30 minutes (or greater), or humidity is increasing at a rate of +5% per 30 minutes (or greater). If the arrow points downward, the temperature is decreasing at a rate of -2°C per 30 minutes (or less), or humidity is decreasing at a rate of -5% per 30 minutes (or less).

5. Console Operation

 **Note:** The console has three buttons for easy operation: **MIN/MAX/-** button, **CLEAR/ADJUST** button, and **CHANNEL/+** button.

5.1 Min/Max Mode

The Min/Max mode displays the minimum and maximum temperature and humidity (since reset of the unit) for the indoor, remote channel 1 through 8 sensors.

Prior to entering the **MIN/MAX** mode, press the **CHANNEL/+** button to select the temperature and humidity values you wish to view.

1. **Display Maximum.** Press the **MIN/MAX** button once to display the maximum. The **MAX** icon will be displayed.
2. **Clear Maximum.** To reset the maximum values to the current values, press and hold the **CLEAR** button for 3 seconds.

3. **Display Minimum.** Press the **MIN/MAX** button again to display the minimum. The **MIN** icon will be displayed.
4. **Clear Minimum.** To reset the minimum values to the current values, press and hold the **CLEAR** button for 3 seconds.
   To return to normal mode, press the **MIN/MAX** button again.

5.2 Indoor/Outdoor Channel Selection

Press the **CHANNEL/+** button to switch the display between the indoor temperature and humidity IN, remote sensors 1 through 8, and scroll mode. In scroll mode, all of the indoor and detected outdoor sensors will be displayed in five second intervals.

5.3 Temperature Units of Measure

The default temperature units of measure are degrees Celsius. To toggle between degrees Celsius and degrees Fahrenheit, press and hold the **MIN/MAX** button for 3 seconds.

5.4 Sensor Search Mode

If any of the sensor communication is lost, dashes (--.-) will be displayed on the screen. To reacquire the signal:

1. If a specific channel is lost, press the **CHANNEL/+** button to display this channel, then Press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed.
2. If new sensors are added, subtracted, or multiple sensor channels are lost, press the **CHANNEL/+** button until the indoor channel is IN displayed. Press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon will be constantly displayed for up to 10 minutes. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed.

5.5 Best Practices for Wireless Communication

Wireless communication is susceptible to interference, distance, walls and metal barriers. We recommend the following best practices for trouble free wireless communication.

1. **Electro-Magnetic Interference (EMI).** Keep the console several feet away from computer monitors and TVs.
2. **Radio Frequency Interference (RFI).** If you have other 433 MHz devices and communication is intermittent, try turning off these other devices for troubleshooting purposes. You may need to relocate the transmitters or receivers to avoid intermittent communication.
3. **Line of Sight Rating.** This device is rated at 90 meters line of sight (no interference, barriers or walls) but typically you will get 30 meters maximum under most real-world installations, which include passing through barriers or walls.
4. **Metal Barriers.** Radio frequency will not pass through metal barriers such as aluminum siding. If you have metal siding, align the remote and console through a window to get a clear line of sight .

5.6 Adjustment or Calibration

Note: The calibrated value can only be adjusted on the console. The remote sensor(s) always displays the un-calibrated or measured value.

Note: The measured humidity range is between 10 and 99%. Humidity cannot be accurately measured outside of this range.

The purpose of calibration is to fine tune or correct for any sensor error associated with the devices margin of error. The measurement can be adjusted from the console to calibrate to a known source.

Calibration is only useful if you have a known calibrated source you can compare it against, and is optional. This section discusses practices, procedures and sources for sensor calibration to reduce manufacturing and degradation errors. Do not compare your readings obtained from sources such as the internet, radio, television or newspapers. They are in a different location and typically update once per hour.

The purpose of your weather station is to measure conditions of your surroundings, which vary significantly from location to location.

5.6.1 Humidity Calibration

Prior to entering the calibration mode, press the **CHANNEL/+** button to select the humidity sensor you wish to adjust.

To enter the humidity calibration mode, press and hold the **ADJUST and MIN/MAX** buttons at the same time for 5 seconds and the humidity value will begin flashing. Press the **CHANNEL/+** button to increase the humidity and the **MIN/MAX/-** button to decrease the humidity reading in 1% increments. To rapidly increase (or decrease) the humidity reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

To return the humidity to the actual or uncalibrated measurement, press the **ADJUST** button.

Once the displayed humidity equals the calibrated source, press and hold the **ADJUST** button for three seconds, or wait 15 seconds for timeout, and the humidity value will stop flashing.

5.6.2 Temperature Calibration

Prior to entering the calibration mode, press the **CHANNEL/+** button to select the temperature you wish to adjust.

To enter the temperature calibration mode, press and hold the **ADJUST** button for 5 seconds and the temperature value will begin flashing. Press the **CHANNEL/+** button to increase the temperature and the **MIN/MAX/-** button to decrease the temperature reading in 0.1°C increments. To rapidly increase (or decrease) the temperature reading, press and hold the **CHANNEL/+** or **MIN/MAX/-** button.

To return the temperature to the actual or uncalibrated measurement, press the **ADJUST** button.

Once the displayed temperature equals the calibrated source, press and hold the **ADJUST** button for three seconds, or wait 15 seconds for timeout, and the temperature value will stop flashing.

6. Glossary of Terms

Term	Definition
Accuracy	Accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured.
Hygrometer	A hygrometer is a device that measures relative humidity. Relative humidity is a term used to describe the amount or percentage of water vapor that exists in air.
Range	Range is defined as the amount or extent a value can be measured.

7. Specifications

7.1 Wireless Specifications

- Line of sight wireless transmission (in open air): 90 meters, 30 meters under most conditions.
- Frequency: 433 MHz
- Update Rate: 60 seconds

7.2 Measurement Specifications

The following table provides specifications for the measured parameters.

Measurement	Range	Accuracy	Resolution
Indoor Temperature	0 to 60°C	± 1°C	0.1°C
Outdoor Temperature	-40 to 60°C	± 1°C	0.1°C
Indoor Humidity	10 to 99 %	± 5% (only guaranteed between 20 to 90%)	1%
Outdoor Humidity	10 to 99 %	± 5% (only guaranteed between 20 to 90%)	1%

7.3 Power Consumption

- Base station (display console): 4 x AAA 1.5V Alkaline or Lithium batteries (not included)
- Remote sensor : 2 x AAA 1.5V Alkaline or Lithium batteries (not included)

- Battery life: Minimum 12 months for base station with one sensor and excellent reception. Intermittent reception and multiple sensors may reduce the battery life.

  Minimum 12 months for thermometer-hygrometer sensor (use lithium batteries in cold weather climates less than -20°C)

8. Troubleshooting Guide

If your question is not answered here, you can contact us as follows:

Problem	Solution
Wireless remote (thermo-hygrometer) not reporting in to console.	If any of the sensor communication is lost, dashes (--.-) will be displayed on the screen. To reacquire the signal, press and hold the **CHANNEL/+** button for 3 seconds, and the remote search icon will be constantly displayed. Once the signal is reacquired, the remote search icon will turn off, and the current values will be displayed.
There are dashes (--.-) on the display console.	The maximum line of sight communication range is 100 meters and 30 meters under most conditions. Move the sensor assembly closer to the display console. If the sensor assembly is too close (less than 5'), move the sensor assembly away from the display console. Make sure the remote sensor LCD display is working and the transmitter light is flashing once per 60 seconds. Install a fresh set of batteries in the remote thermo-hygrometer. For cold weather environments, install lithium batteries. Make sure the remote sensors are not transmitting through solid metal (acts as an RF shield), or earth barrier (down a hill).

Problem	Solution
	Move the display console around electrical noise generating devices, such ascomputers, TVs and other wireless transmitters or receivers. Move the remote sensor to a higher location. Move the remote sensor to a closer location
Temperature sensor reads too high in the day time.	Make sure the thermo-hygrometer is mounted in a shaded area on the north facing wall.
Indoor and Outdoor Temperature do not agree	Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor temperature sensors should agree within 2 °C (the sensor accuracy is ± 1 °C). Use the calibration feature to match the indoor and outdoor temperature to a known source. .
Indoor and Outdoor Humidity do not agree.	Allow up to one hour for the sensors to stabilize due to signal filtering. The indoor and outdoor humidity sensors should agree within 10 % (the sensor accuracy is ± 5 %). Use the calibration feature to match the indoor and outdoor humidity to a known source.
Display console contrast is weak	Replace console batteries with a fresh set of batteries. .