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ENVIROMUX® Series

Temperature/Humidity Sensor Installation Manual

E-STSM-E7, STHSM-E7
Temperature/Humidity Sensors

E-STHS-LCDW
Temperature/Humidity Sensor w/LCD Display

E-PLSD
Programmable LED Sensor Display

E-STHSB
Temperature/Humidity Sensor

E-STHS-LSH
Low Self-Heating Temperature/Humidity Sensor

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INTRODUCTION

Many different sensors can be connected to the ENVIROMUX Series Enterprise Environment Monitoring Systems. Series models covered by this manual include ENVIROMUX-SEMS-16U and E-16D/5D/2D. A complete listing of available sensors and accessories can be found at

http://www.networktechinc.com/enviro-rems.html for the ENVIROMUX-SEMS-16U,

http://www.networktechinc.com/environment-monitor-16d.html for the E-16D,

http://www.networktechinc.com/environment-monitor-5d.html for the E-5D,

http://www.networktechinc.com/environment-monitor-2d.html for the E-2D, and Manuals for each Environment Monitoring System covering installation and configuration for all features can also be found at these websites.

This manual is only provided to instruct how to install the ENVIROMUX temperature and humidity sensors to these systems.

MOUNTING

Most of the ENVIROMUX Temperature and Humidity sensors are intended for indoor use only. These sensors can be mounted in any position but include a keyhole slot on the back to enable quick wall-mounting if desired.

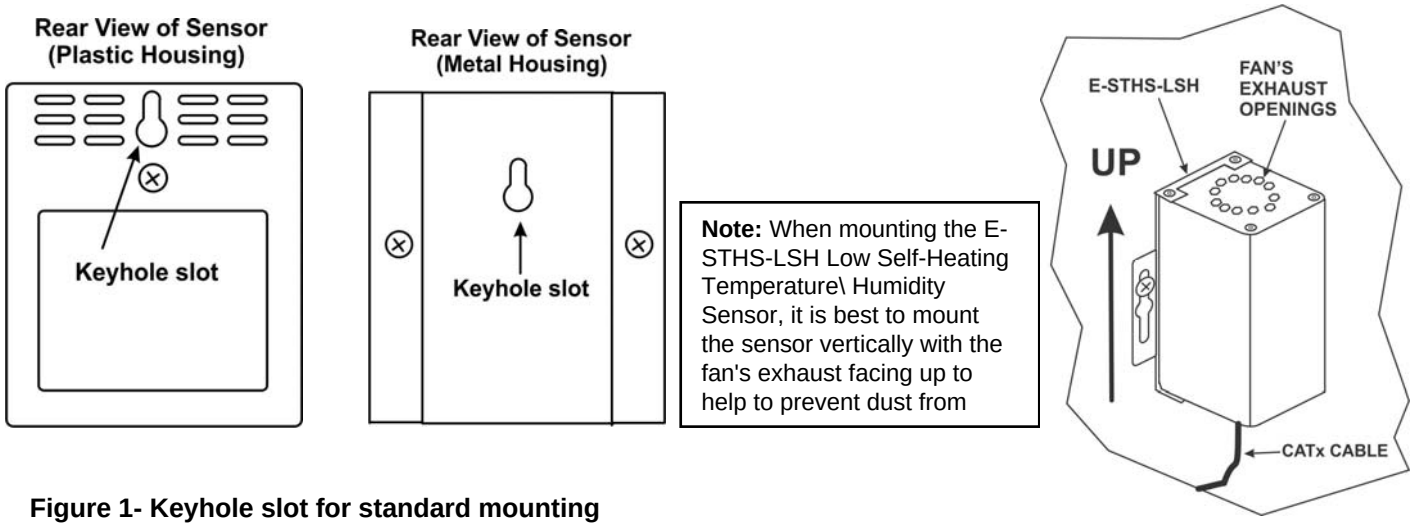


Figure 1- Keyhole slot for standard mounting

If you have purchased an ENVIROMUX Sensor with a DIN rail clip for DIN rail mounting, see the drawing (page 2) for instructions to install the sensor to the DIN rail.

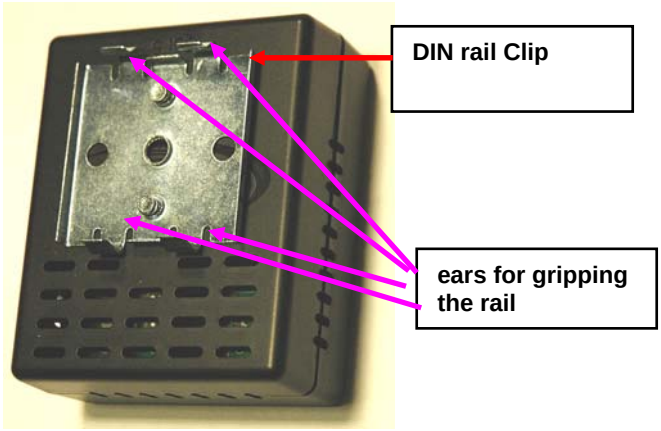
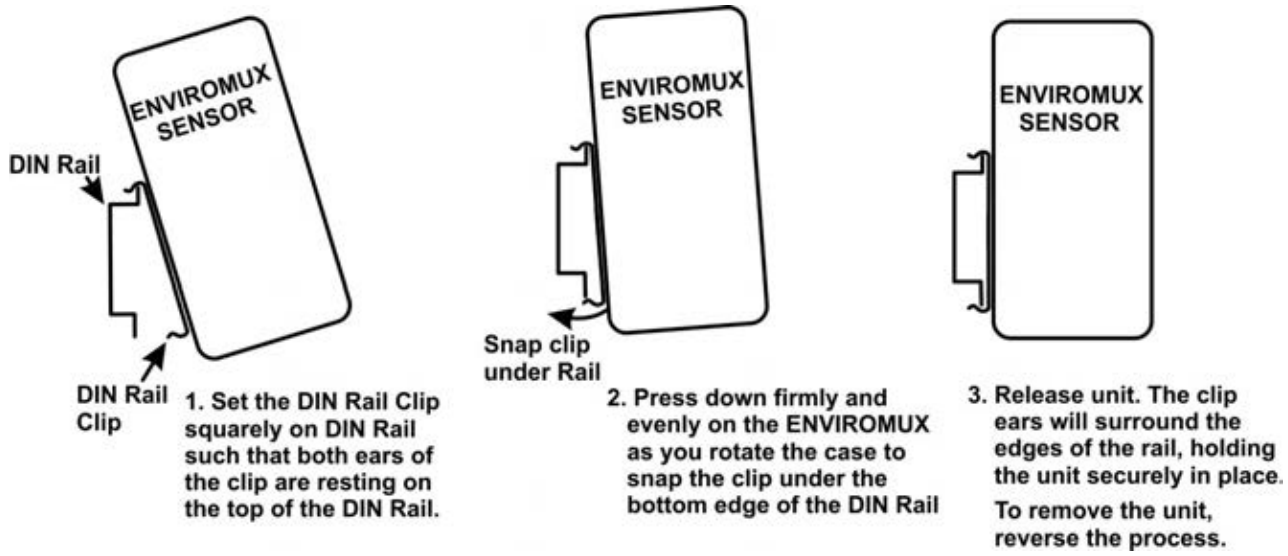


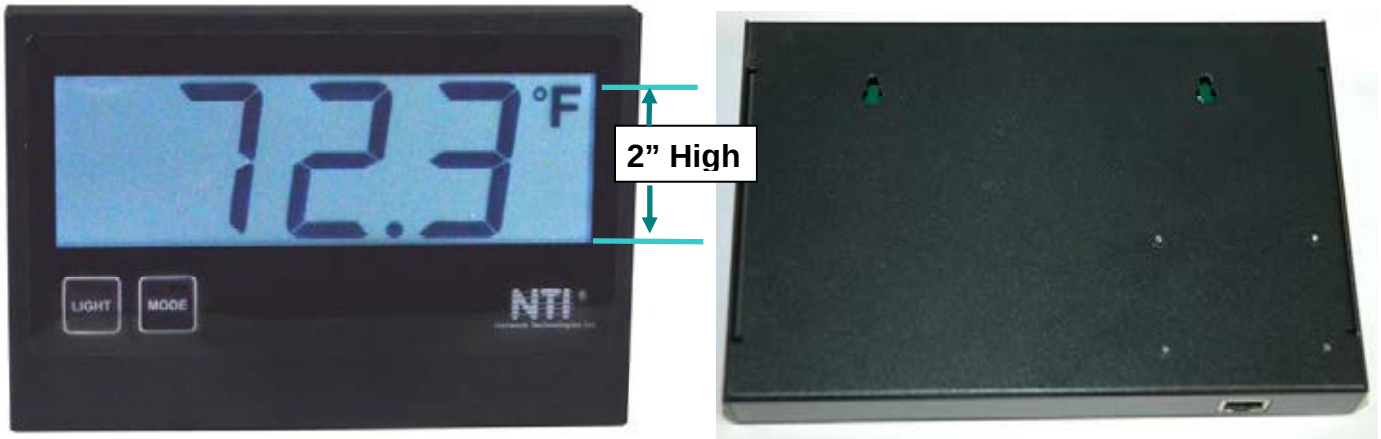
Figure 2- DIN rail clip

NTI ENVIROMUX TEMPERATURE/HUMIDITY SENSOR ATTACHMENT



E-STHS-LCDW

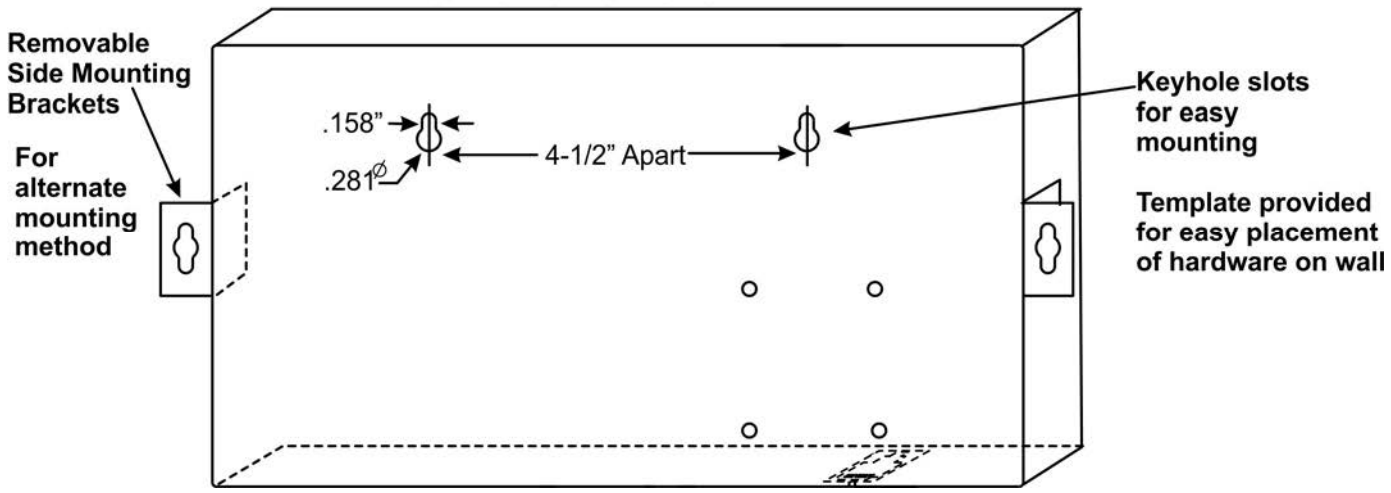
The E-STHS-LCDW is a Temperature and Humidity sensor built into a large wall-mount LCD display with 2" character height for easy viewing from a distance. There are two key-hole slots on the back, 4-1/2" apart, for hanging the sensor on the wall. A template has been provided to make placement and hardware location easy. There are also two brackets (with screws) that can be mounted to the sides. These are provided for an alternate method of mounting.

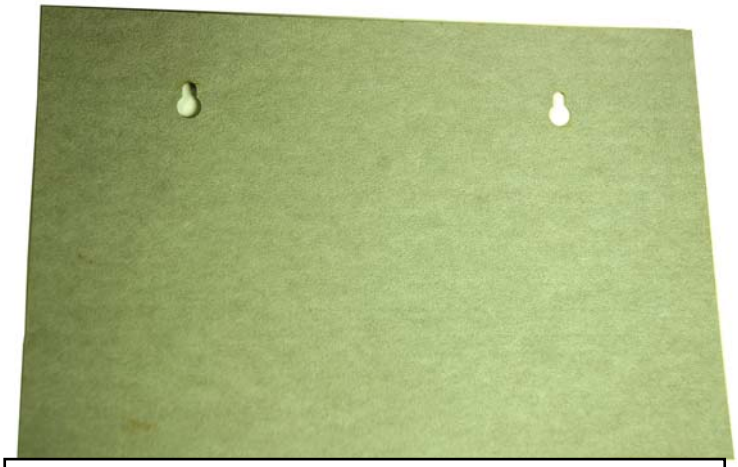


Frontview of E-STHS-LCDW
(Shown without side mounting brackets)

Rearview of E-STHS-LCDW

Rear View of E-STHS-LCDW





Template for easy mounting the E-STHS-LCDW

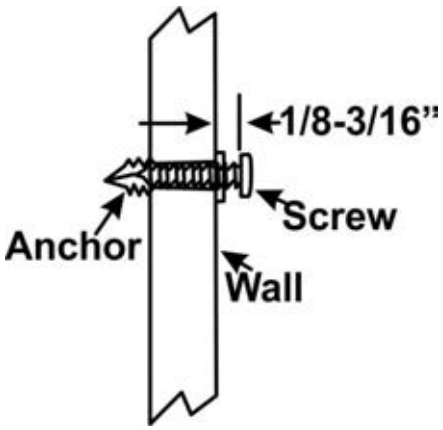
Mounting Instruction

Using Side Brackets

1. Mount one side bracket to each side of the sensor with the screws provided.
2. Position sensor and mark top of keyholes.
3. Drill two 3/16" diameter holes where top of keyholes were marked.
4. Insert wall anchors (provided) and start the mounting screws.
5. Hang the sensor on the screws and snug down the screws.

Using Rear Keyhole Slots

1. Position template at mounting location and mark top of keyholes.
2. Drill two 3/16" diameter holes where top of keyholes were marked.
3. Insert wall anchors (provided) and start the mounting screws.
4. Screw in until head of screw is approximately 1/8-3/16" " from the wall.
5. Hang the sensor on the screws.



CONNECT SENSORS

RJ45 Sensors

The temperature and humidity sensors for the E-16D/5D/2D and E-SEMS-16(U) Enterprise Environment Monitoring Systems have RJ45 connection ports. Connect each sensor to one of the female connectors labeled "RJ45 Sensors" on the ENVIROMUX using CAT5 cable. The male RJ45 connectors should snap into place. (See page 12 for wiring specification and pinout.) The CAT5 cable that connects the sensor to the ENVIROMUX can be up to 1000 feet in length (except for E-STHS-LCDW, which is limited to 150 feet).

Note: It is very important to locate the temperature and/or humidity sensors away from ventilation sources and fans.

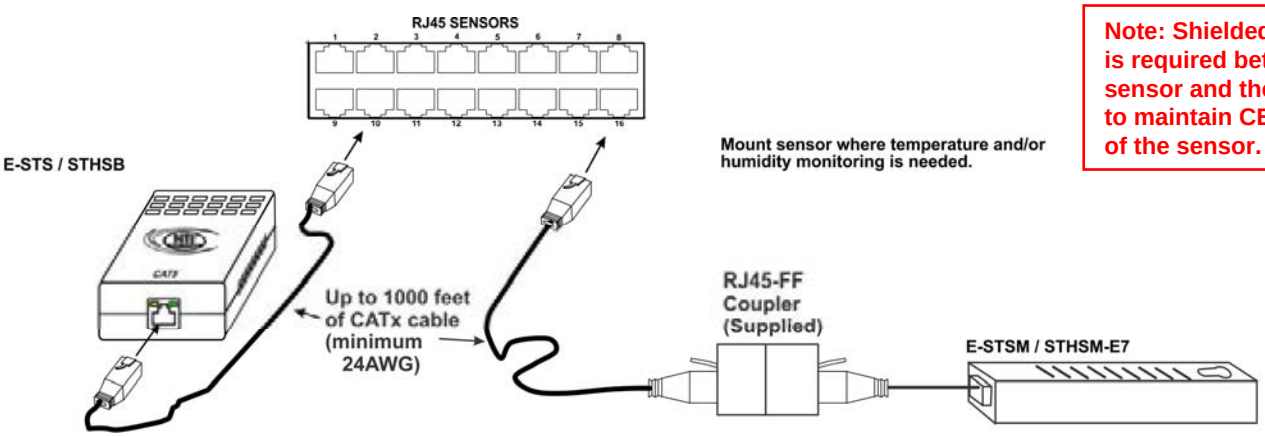


Figure 3- Connect Sensors using CAT5 cable with RJ45 connectors

Application Note:

When connecting temperature and humidity sensors to the ENVIROMUX, the web interface will identify the sensor accordingly for the type of sensor it is. The status bar and configuration page will enter the maximum and minimum range that this type of sensor can display if used with the ENVIROMUX, not necessarily the operating range of the sensor itself. The various temperature and humidity sensor models offered by NTI have varying ranges of performance capabilities, as indicated in the table on page 14. Be sure to match the sensor installed to the operating range of the environment it will be expected to work in. Using a sensor outside of its intended temperature range may result in damage to the sensor.

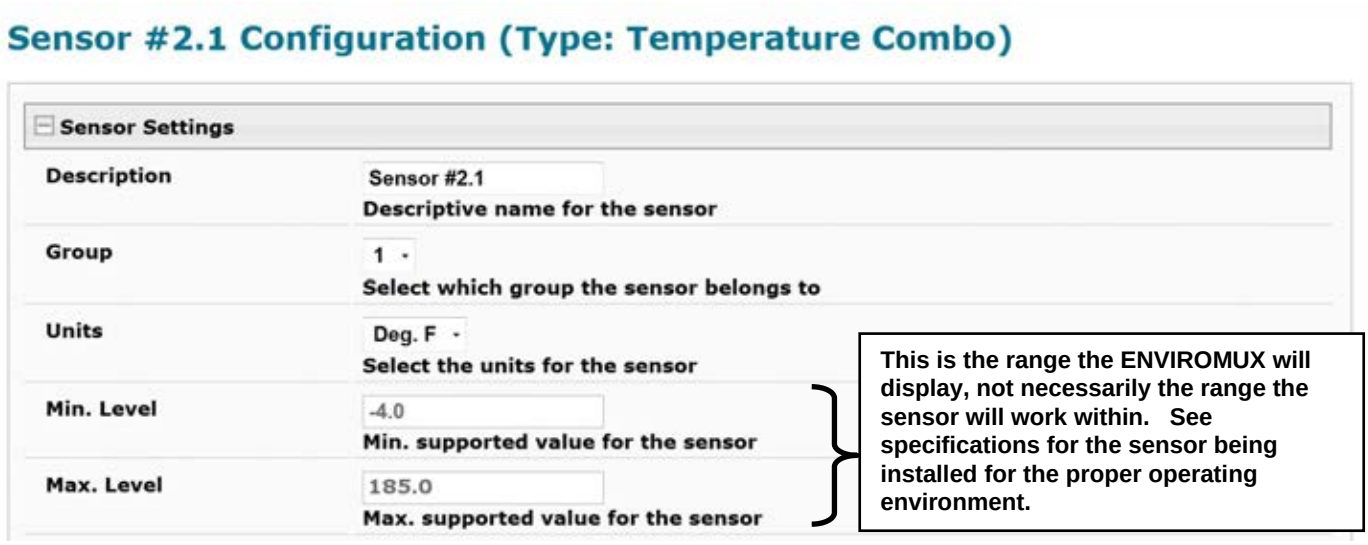


Figure 4- A portion of the sensor configuration page

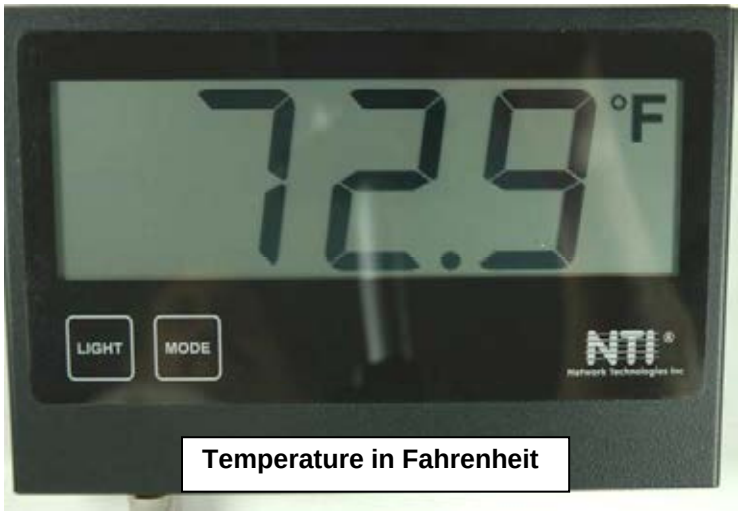
E-STHS-LCDW

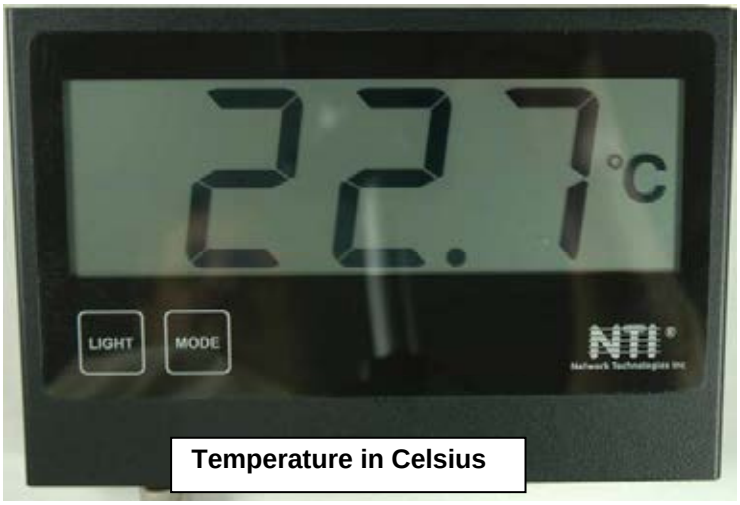
E-xD firmware version 2.31 or later is required to support this sensor.

The E-STHS-LCDW is a temperature/humidity sensor with built-in LCD display that has 2" tall characters for easy viewing from greater distances. . It has a temperature range of -4 to 140°F (-20 to 60°C) ±0.7°F (±0.4°C) and will sense 0 to 90% relative humidity ±4% RH (30°C). It includes two touch-sensitive buttons. One to control the LCD display illumination, and the other to cycle the display mode between temperature in degrees Fahrenheit, temperature in degrees Celsius, and percentage of humidity. The E-STHS-LCDW includes slots on the back for hidden mounting hardware and two brackets for alternative mounting from the sides.

To use the **MODE** button, touch and release to cycle the display from Degrees F. to Degrees C, and to percentage of Humidity, and once again to return to Degrees F. The display will hold the mode set, each time, until MODE is touched again.

To use the **LIGHT** button, touch to illuminate the display for 5 seconds. To keep the display illuminated, touch and hold the LIGHT button for at least 6 seconds. Touch and release again to have illumination stop after 5 more seconds.





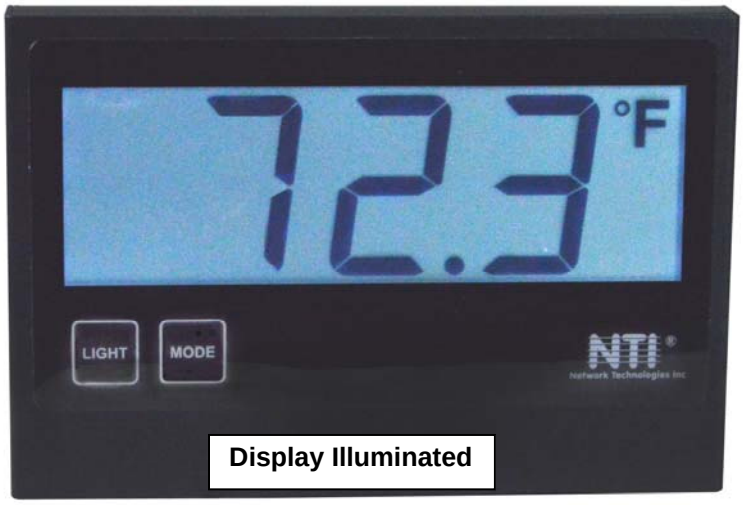


Figure 5- E-STHS-LCDW

To mount the sensor, use the hardware provided to secure the sensor to the wall (see pages 2- 3). Once it is mounted, connect a CATx cable between the RJ45 connector and the ENVIROMUX monitoring system.

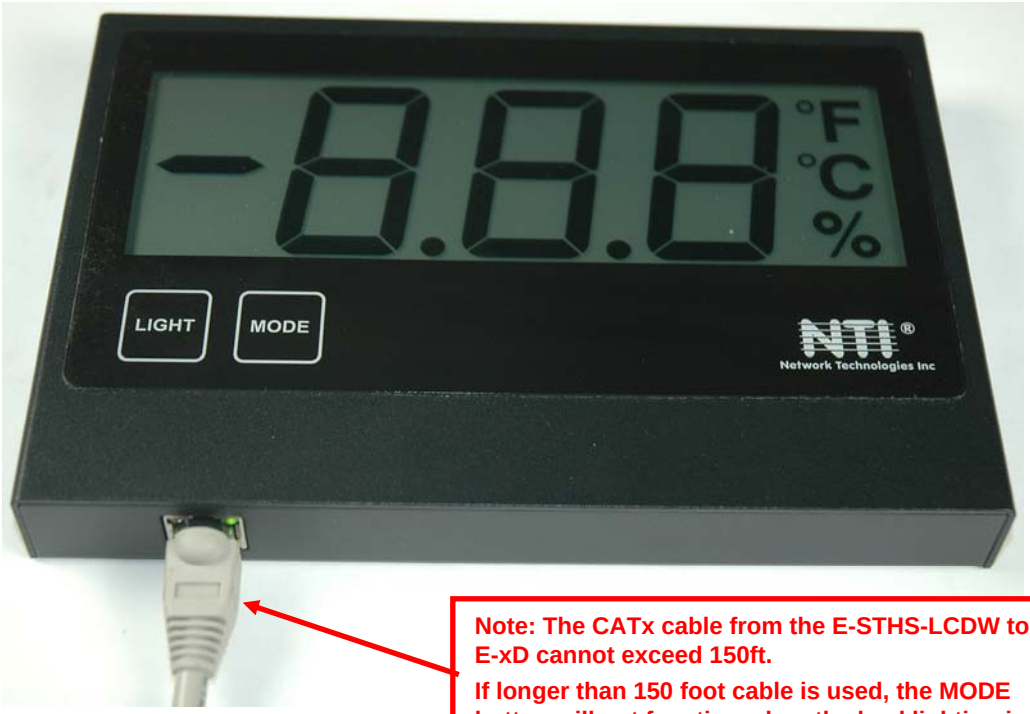


Figure 6- CATx cable connection

The cable from the ENVIROMUX will attach to the sensor at the RJ45 port on the bottom of the E-STHS-LCDW. The E-STHS-LCDW will be powered by the ENVIROMUX Monitoring System through the CATx cable. We recommend using CAT5/5e/6/6a cable (minimum 24 AWG) up to 150 ft (45.7 m) long.

Note: If a longer cable is used (up to 1000ft), the MODE button will not work when the display is illuminated by pressing the LIGHT button.

Alternate Display (E-xD firmware version 3.0 or later required)

The E-STHS-LCDW can be configured to display the sensor readings from other RJ45 sensors or from a Digital Sensor with an numeric display output (like a Winds Speed sensor (E-WSS), Barometric Pressure Transmitter (E-BPT) or Ultrasonic Level Transmitter (E-ULT).

When an E-STHS-LCDW is connected, the sensor configuration menu includes a field "Display Option". Within the drop down menu (see image on next page), all sensors that are eligible to have data displayed in the LED will be available for selection. Only the LCD display will be effected. The remaining settings will still pertain to the E-STHS portion of the E-STHS-LCDW.

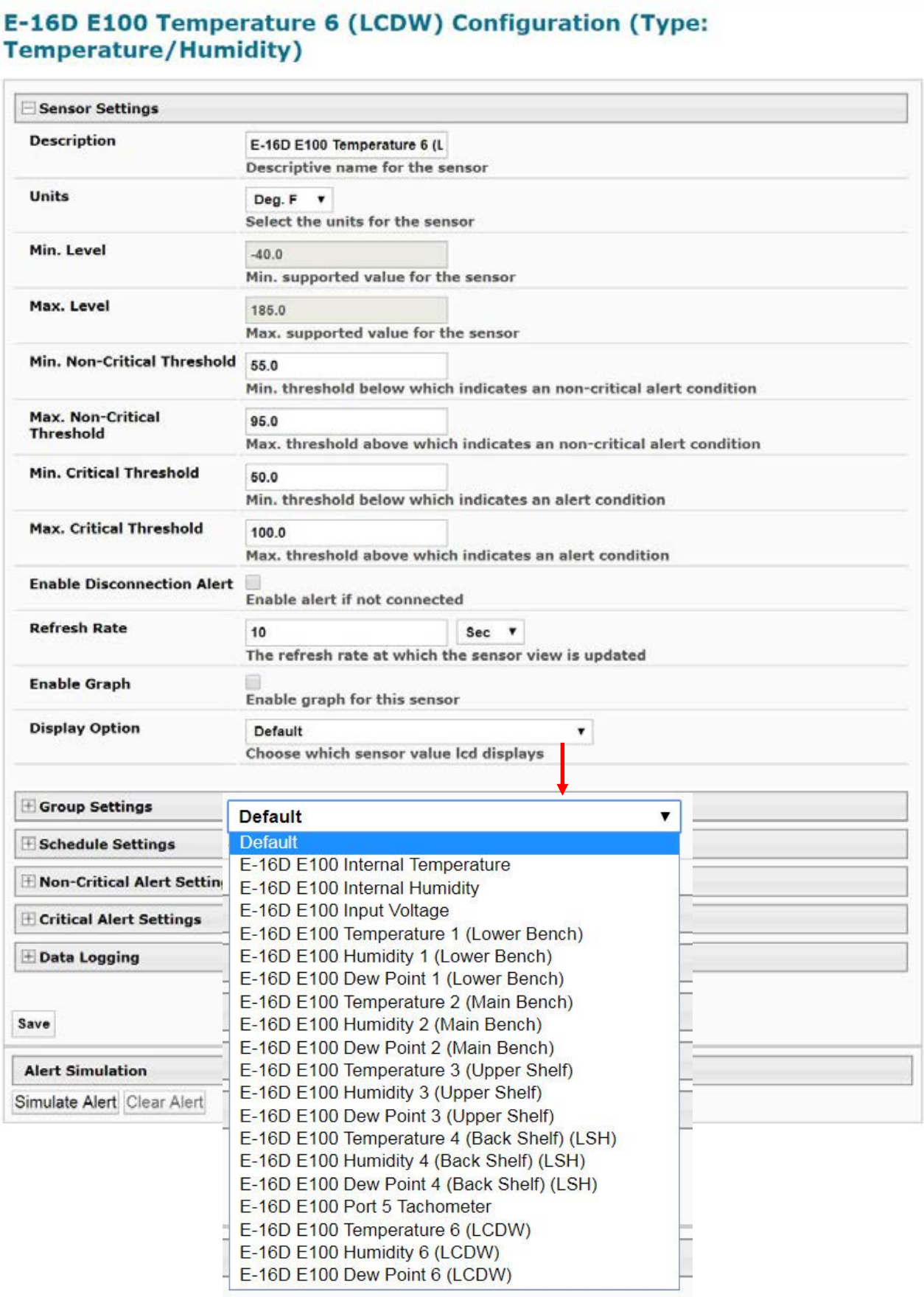


Figure 7- Select which sensor to display in LCD

E-PLSD

The E-PLSD is a programmable LED Sensor Display with 2" tall status display characters to show the sensor value and 0.68" characters to indicate which sensor data is being displayed and the unit of measure. It includes three touch-sensitive buttons.

- "Brightness" to control the LED display illumination (sliding with your finger left to right)
- "Sensor" to select the sensor data to be displayed
- "Mode" to cycle the display mode between temperature in degrees Fahrenheit and temperature in degrees Celsius.

The LED display characters will be Green when sensor status is normal, Yellow when a sensor is in non-critical alert, and Red when in critical alert status.

The E-PLSD includes mounting flanges with slots for mounting to your desired surface.

Figure 8- E-PLSD Programmable LED Sensor Display

Note: The E-PLSD only supports English characters.

There are also two keyhole slots on the rear of the case should you prefer to use them for mounting.

Figure 9- Rear View of E-PLSD

There are three connection ports on the bottom of the E-PLSD. One for power connection, another for CATx cable connection to the E-xD RJ45 Sensor port (up to 1000 feet long using 24AWG cable), and a third for an additional E-TRHM-E7 Temperature, Humidity and Dewpoint sensor (optional) that will be recognized by the E-xD as soon as it is connected. **Only this kind of sensor can be connected.** The E-TRHM-E7 can be extended from the E-PLSD up to 500 feet using 24AWG cable.

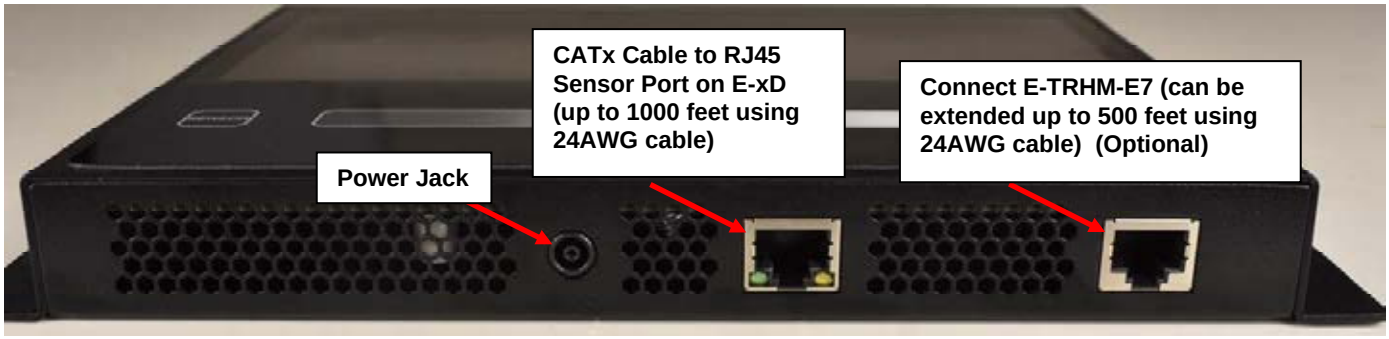


Figure 10- Bottom View of E-PLSD

Note: The LED Display will not turn ON unless 1) the power is connected to it and 2) the CATx cable is connected between the E-PLSD and the E-xD.

The E-PLSD has settings that can be configured from the E-xD web interface **(firmware version 4.7 or later).** In the Monitoring list, select LED Displays, and click Edit (or Delete if you want to remove it from your list). Up to 10 E-PLSD can be connected to the E-16D, E-5D or E-2D. (E-RJ8-RS485 RJ45 RS485 Sensor Port Hub (sold separately) can be used.)

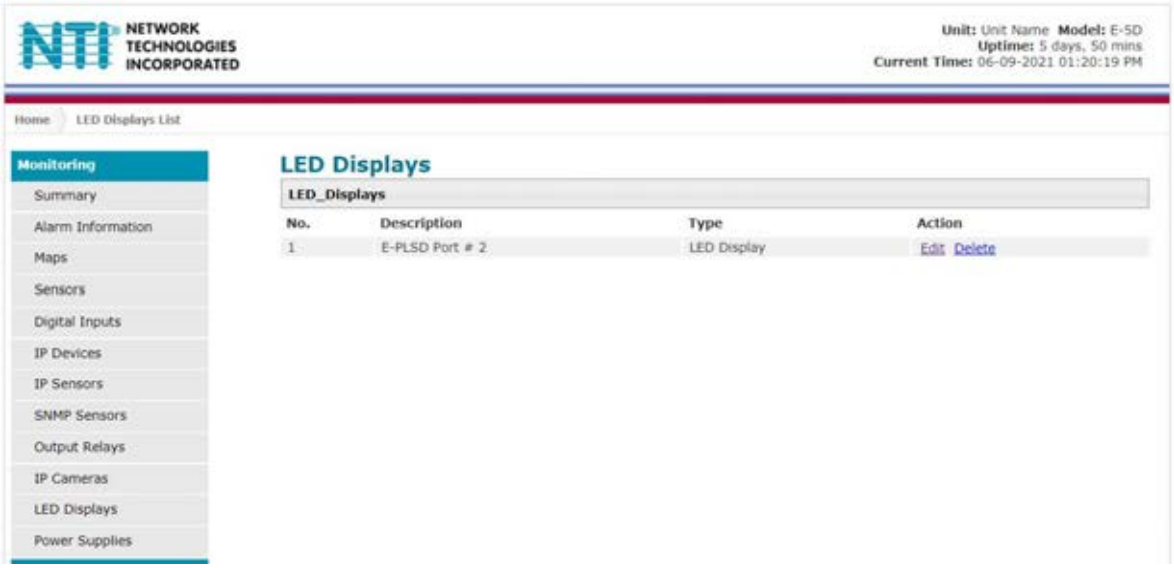


Figure 11- Select LED display to be configured

Data from all of the sensors connected to the E-xD can be selected for display by the E-PLSD.

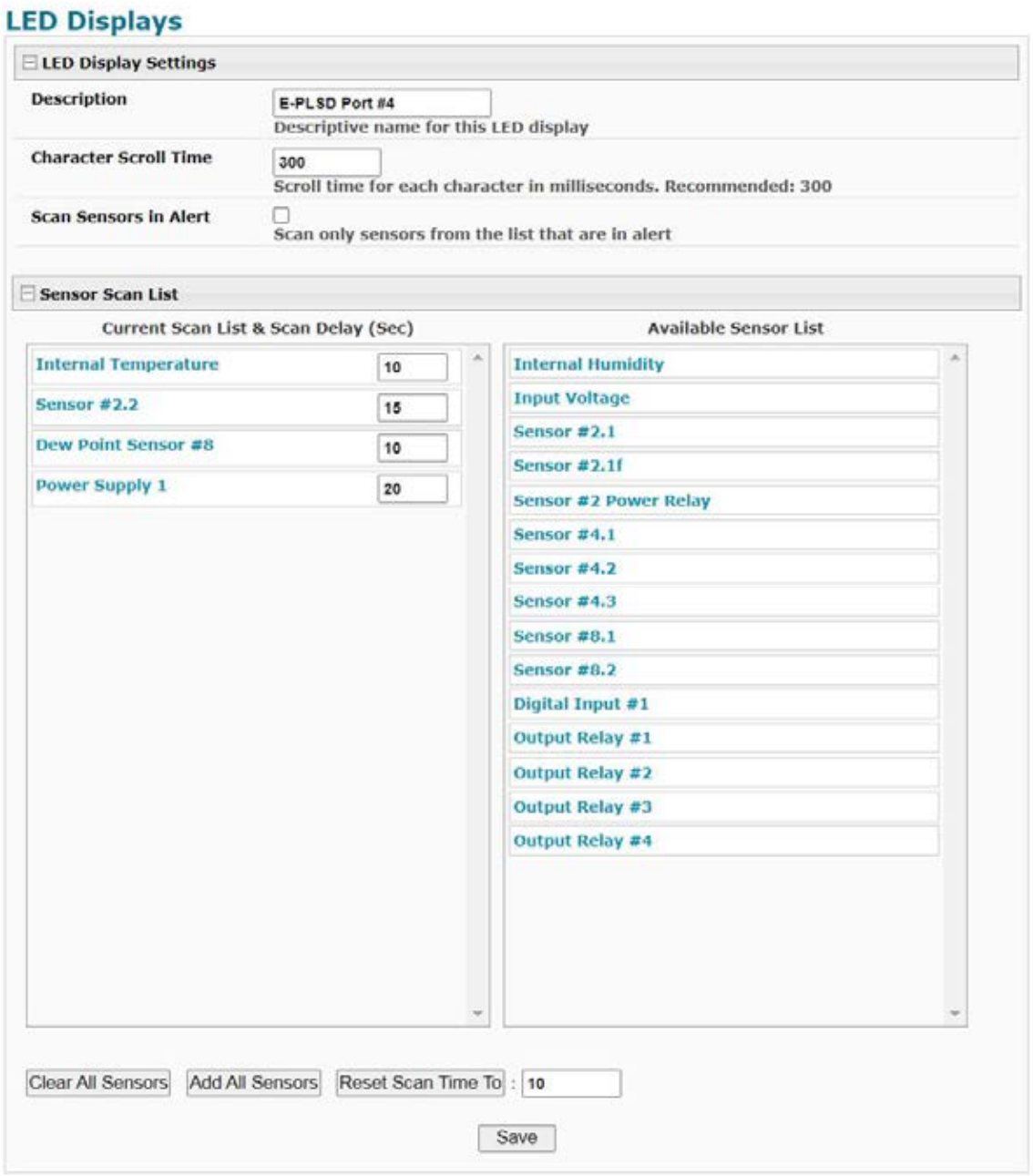


Figure 12- Configuration options for E-PLSD

The **Description** can be changed to anything you like. This will be the E-PLSD Description as displayed in the E-xD monitoring list.

Character Scroll Time can be set for between 200 and 1000 milliseconds (0.2 to 1 second). This is the amount of time it will take to display the next character when scrolling the name of the sensor. (This is for sensors that have more than 14 characters in their name. If a sensor has a name that is 14 characters or less in length, the E-PLSD will simply display the name and will not need to scroll it.)

A short name (a.k.a. nickname) can be assigned for viewing only on the LED display that is up to 14 characters in length. This can be configured and selected in the sensor configuration (see Figure 13).

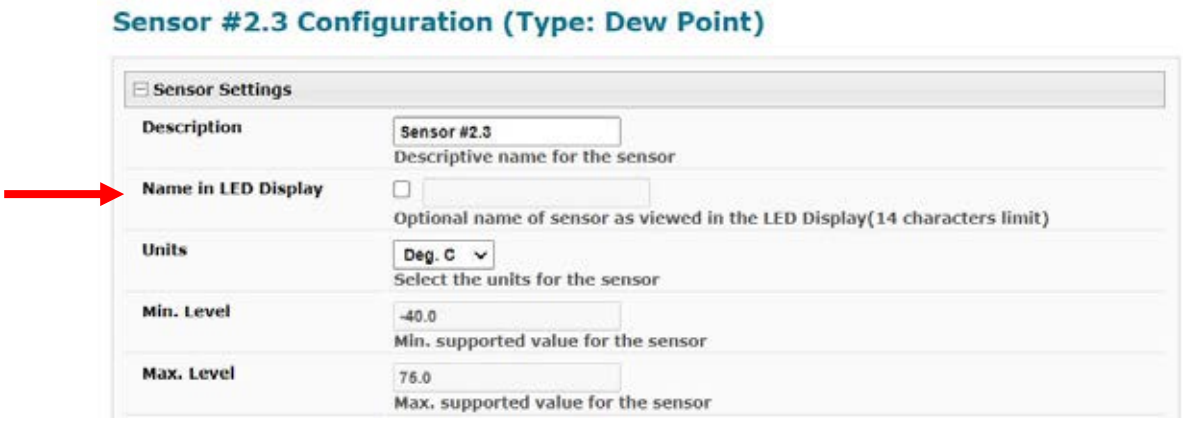


Figure 13- Assign name to be displayed in E-PLSD

If you select **Scan Sensors in Alert**, only sensors from the Current Scan List that are in alert will be displayed (yellow or red characters). If no sensors are in alert, all sensors will be scanned (green characters).

Reset Scan Time sets the length of time that each sensor will appear on the display. The acceptable range is 5 to 1000 seconds. Numbers entered that are less than 5 will automatically be changed to 5, and numbers greater than 1000 will be changed to 1000.

After selecting a value, click "Reset Scan Time" and all sensors in the "Sensor Scan List will have their scan time values changed to that number.

Press **Clear All** to remove all sensors from the Sensor Scan List.

Press **Add All** to add all available sensors to the Sensor Scan List.

To remove an individual sensor from the list, or add an individual sensor to the list, simply drag and drop the sensor from one list to the other. Scan time values can be assigned once a sensor is in the Sensor Scan List.

If you want to change the order in which they are scanned, simply drag sensors up or down to different positions in the list.

Whatever changes you make to this page, be sure to click the "Save" button when you are done to have the changes take effect in the E-PLSD. When "Save" is clicked, the E-PLSD will automatically restart scanning from the top of the current scan list.

Sensor Button

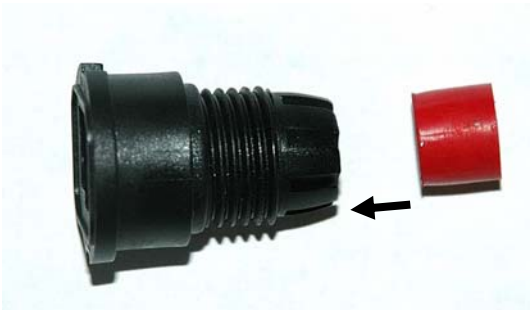
If the Sensor button is pressed, the display will advance to the next sensor on the list and display that sensor reading for 30 seconds before continuing the scan. However, if the sensor scan time (see Figure 12) is greater than 30 seconds the display will hold for the configured scan time before continuing the scan.

E-STS-O/-IP67 Outdoor Temperature Sensor

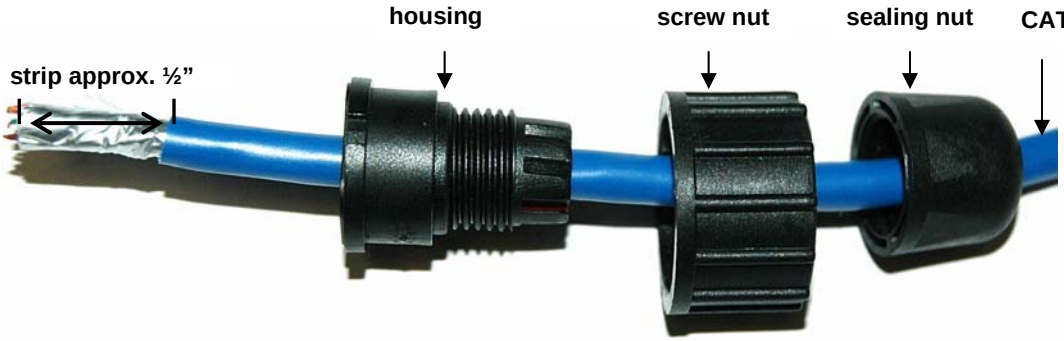
Cable Restraint Assembly Procedure

The E-STS-O and E-STS-IP67 Outdoor Temperature Sensor includes a water-tight cable restraint to be applied to the Cat5/5e/6/6a shielded cable to be used to connect the sensor to an E-16D/5D/2D and E-SEMS-16(U) unit. To make sure the connection is water-tight upon completion, follow the steps below.

1. Insert the seal ring into the housing.

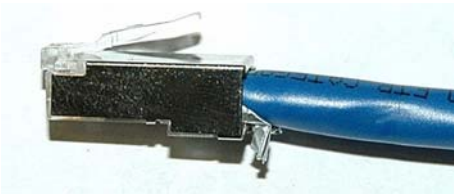


2. Strip the CATx shielded cable jacket (6mm-7mm O.D.) approximately ½" and insert the cable through the sealing nut, screw nut, and housing. (Note: Heat shrink tubing can be applied to cable to increase the O.D. of the CATx cable to 6mm-7mm.)

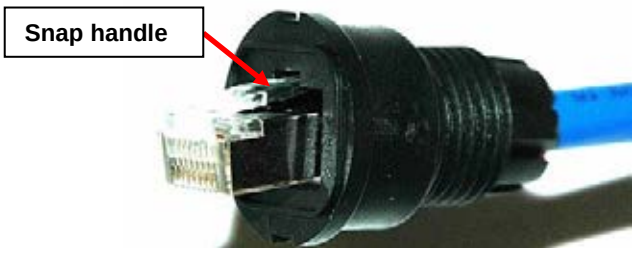


Note: CATx cable used must be shielded cable.

3. Terminate the CATx shielded cable with an RJ45 connector.

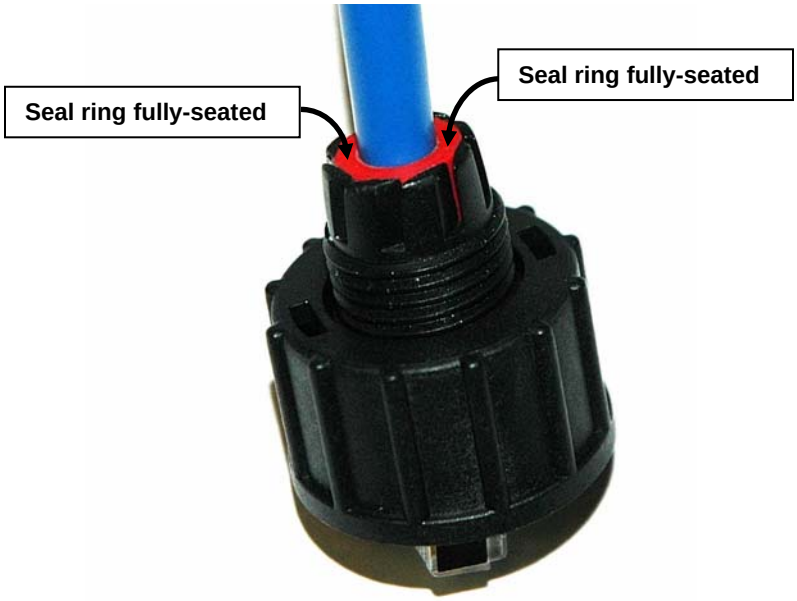


4. Set the RJ45 connector into the housing such that the snap handle is in the notch.



5. Make certain that the seal ring is fully-seated into the housing.

THIS STEP IS EXTREMELY IMPORTANT TO ENSURE A WATER-TIGHT SEAL!



6. Plug the assembly into the socket on the E-STS-O and secure the screw nut. Then apply the sealing nut and securely tighten.

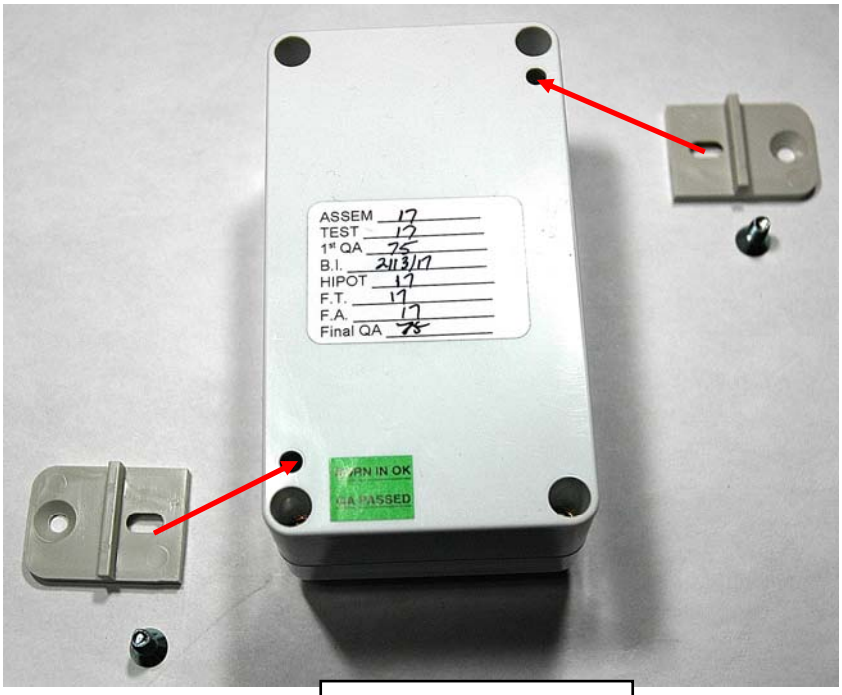
Mounting

To mount the E-STS-O, two brackets have been provided that are each secured with a screw (provided).

Install each bracket with the raised ridge towards the front of the sensor, so that the bracket sits flat and squarely against the sensor case.

Do not over tighten screws or stripping of the case will occur.

E-STS-IP67 includes two metal brackets instead of plastic, but attach to the 4 holes in the rear of the case. As with the E-STS-O, be careful not to over tighten the screws provided or stripping of the case will occur.



Brackets and screws ready to install.

Brackets and screws installed.

Sensor ready to mount

TEMPERATURE AND HUMIDITY SENSORS

SENSOR MODEL	OPERATING TEMPERATURE RANGE	HUMIDITY RANGE	ACCURACY
E-STS	32 to 122°F (0 to 50°C)	n/a	±0.9°F (±0.5°C)
E-STS-O / E-STS-IP67	-40°F to 185°F (-40°C to +85°C)	n/a	±0.9°F (±0.5°C)
E-STSM-E7	-4 to 140°F (-20 to 60°C)	n/a	±1.26°F (±0.70°C) for -4 to 41°F (-20 to 5°C) ±0.72°F (±0.40°C) for 41 to 140°F (5 to 60°C)
E-STHS-LSH	-4 to 140°F (-20 to 60°C)	0 to 90% RH	±1.44°F (±0.80°C) for -4 to 41°F (-20 to 5°C) ±0.72°F (±0.40°C) for 41 to 140°F (5 to 60°C) Inflation due to self-heating <0.9°F (0.5°C) typical, 2.3°F (1.3°C) max. 0 to 20% RH, ±4% 20 to 80% RH, ±3% 80 to 90%RH, ±4%
E-STHSB	-4 to 185°F (-20 to 85°C)	0 to 90% RH	±1.44°F (±0.80°C) for -4 to 41°F (-20 to 5°C) ±0.72°F (±0.40°C) for 41 to 140°F (5 to 60°C) ±1.62°F (±0.90°C) for 140 to 185°F (60 to 85°C) 0 to 20% RH, ±4% 20 to 80% RH, ±3% 80 to 90%RH, ±4% (at 77°F/25°C)
E-STHSM-E7	-4 to 140°F (-20 to 60°C)	0 to 90% RH	±1.44°F (±0.80°C) for -4 to 41°F (-20 to 5°C) ±0.72°F (±0.40°C) for 41 to 140°F (5 to 60°C) 0 to 20% RH, ±4% 20 to 80% RH, ±3% 80 to 90%RH, ±4% (at 77°F/25°C)
E-STHS-LCD(W)	-4 to 140°F (-20 to 60°C)	0 to 90% RH	±1.44°F (±0.80°C) for -4 to 41°F (-20 to 5°C) ±0.72°F (±0.40°C) for 41 to 140°F (5 to 60°C) 0 to 20% RH, ±4% 20 to 80% RH, ±3% 80 to 90%RH, ±4% (at 77°F/25°C)

SENSOR MODEL	OPERATING TEMPERATURE RANGE	HUMIDITY RANGE	ACCURACY
E-STHS-PRC	32 to 140°F (0 to 60°C)	10% to 80% RH	± 0.4°F(±0.2°C) ± 1.8%RH@86°F (30°C)
E-STSP E-STSP-SL-7	-40 to 185°F (-40 to 85°C)	n/a	±1.0°F (±0.5°C).

Sensor Calibration

All temperature/humidity combination sensors and humidity-only sensors are designed to be accurate within the specifications stated in the chart above. They are not designed to be re-calibrated. In the event you want the calibration of your sensor to be checked, please contact NTI for an RMA to return your sensor. Sensor accuracy will be checked for a nominal charge. Sensors within warranty that are found to be out of factory specification will be repaired or replaced at no additional charge. Normal labor or replacement charges will apply to sensors out of warranty and out of specification.

Power Consumption

All of our temperature and temperature/humidity sensors operate at 5VDC and draw between 10-56mA (the highest being the E-STHS-LCDW).

Accuracy

The reported accuracy of these sensors is based on an environment of moving air. In a stagnant air environment, the sensor may read higher than actual temperature.

Coverage

The coverage area for temperature/humidity sensors cannot be specified as there are too many variables that can affect the range in a sensor's environment.

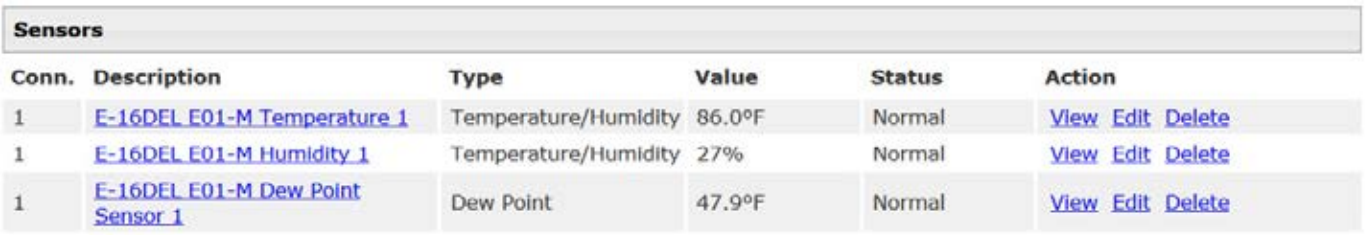
Behavior

When an E-STHS-xx, E-STHSB or E-STHSM-E7 is connected to an ENVIROMUX system, three sensors values will be reported for the connected port;

First will be displayed the observed temperature value of the sensor.

Second will be displayed the observed humidity value of the sensor.

Third, is a calculated value using the observed Temp and Humidity values called Dew Point. Dew point temperature is the value where 100% humidity would be achieved. If air and/or surface temperatures are below this value, condensation will occur.



Sensors

Conn.	Description	Type	Value	Status	Action
1	E-16DEL E01-M Temperature 1	Temperature/Humidity	86.0°F	Normal	View Edit Delete
1	E-16DEL E01-M Humidity 1	Temperature/Humidity	27%	Normal	View Edit Delete
1	E-16DEL E01-M Dew Point Sensor 1	Dew Point	47.9°F	Normal	View Edit Delete

NTI ENVIROMUX TEMPERATURE/HUMIDITY SENSOR ATTACHMENT

E-CO2-THS

Carbon Dioxide (CO2)/Temperature/Humidity/Dew Point Sensor

- Measures CO2 in a range of 400 to 2,000 ppm.
  - Accuracy: ±(5% of reading + 50ppm) at 77°F (25°C)
  - Sensing element: Single Beam Non-Dispersive Infrared (NDIR)
- Measures temperature from 14 to 140°F (-10 to 60°C) and relative humidity from 0 to 100%.
  - Temperature accuracy:
    - ±1.44°F (±0.80°C) for 59 to 95°F (15 to 35°C).
    - ±2.7°F (±1.50°C) for 14 to 140°F (-10 to 60°C).
  - Humidity accuracy:
    - ±6% RH for 20 to 65% RH at 59 to 95°F (15 to 35°C)
    - ±9% RH for 0 to 100% RH at 14 to 140°F (-10 to 60°C)
- Supports dew point measurement.
- RJ45 connector.
- Voltage supply: 5VDC
- Communication type: RS485
- Data rate: 96kbps
- High resistance to external influences on the cable due to digital output signal.
- Supports CAT5/5e/6/6a cable (24 AWG) up to 50 ft (15 m) (not included).
  - Use E-RJ8-RS485 Sensor Port Hub to extend the sensor up to 1,000 feet (305 m) from the ENVIROMUX unit via CAT5/5e/6 cable.
  - Use E-FSC Fiber Converter/Extender to extend the sensor up to 1.2 miles (2 km) from the ENVIROMUX unit via fiber optic cable.
- Powered by E-2D/5D/16D.
- Compatible with E-2D/5D/16D.
- Regulatory approvals: CE, RoHS

E-CO2-THS

Dew Point Measurement as it relates to Electronic Equipment

The dew point is the temperature at which air becomes saturated with water vapor.

When further cooled, the airborne water vapor will condense to form liquid water (Dew is an example).

The two primary factors influencing the Dew Point is Temperature and Relative Humidity. As the humidity rises the closer the Dew Point will be to the current temperature.

In a controlled environment it is important to keep condensation away from electronic equipment. Most electronic equipment will be susceptible to failure in a condensing environment.

Also in very low Dew Point environments static discharge events are more likely to occur, again putting electronic equipment at risk.

Note: For people, Dew Points higher then 21°C (70°F) and below -22°C (-8°F) are uncomfortable environments.

Warnings and Alerts from the ENVIROMUX

Setting the Dew Point alerts will depend upon the environment that is being monitored.

An example would be an equipment room that normally operates at 21°C (70°F).

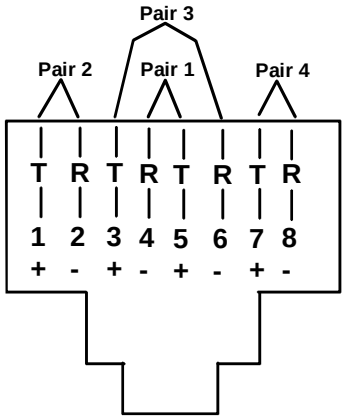
It may be desirable to be warned when the Dew Point reaches 19°C (66°F) and alerted when the Dew Point reaches 21°C (70°F) as condensation would become a high probability.

For low Dew Points, it may be desirable to be warned when the Dew Point reaches -1°C (30°F) and alerted when the Dew Point reaches -4°C (25°F) as these conditions would be perfect for static discharge events.

RJ45 Sensor Cable

The CAT5 connection cable between the ENVIROMUX and connected external sensors is terminated with RJ45 connectors and must be wired according to the EIA/TIA 568 B industry standard. Wiring is as per the table and drawing below. The sensors that connect to “RJ45 Sensor” ports (E-16(U)/xD) are all designed to use cables wired to this standard.

Pin	Wire Color	Pair
1	White/Orange	2
2	Orange	2
3	White/Green	3
4	Blue	1
5	White/Blue	1
6	Green	3
7	White/Brown	4
8	Brown	4



(View Looking into RJ45 Socket)

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