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BLACK BOX NIST2 Temperaturel Humidity Sensor

INTRODUCTION

The NIST2 sensors feature two NIST traceable, calibrated temperature sensors and an internal calibration integrity check.

With this technology, the sensors operate in pairs, with the values compared once a

second. If a difference greater than the stated tolerance of the sensor is detected, an alarm is raised to warn that the sensor is out of calibration.

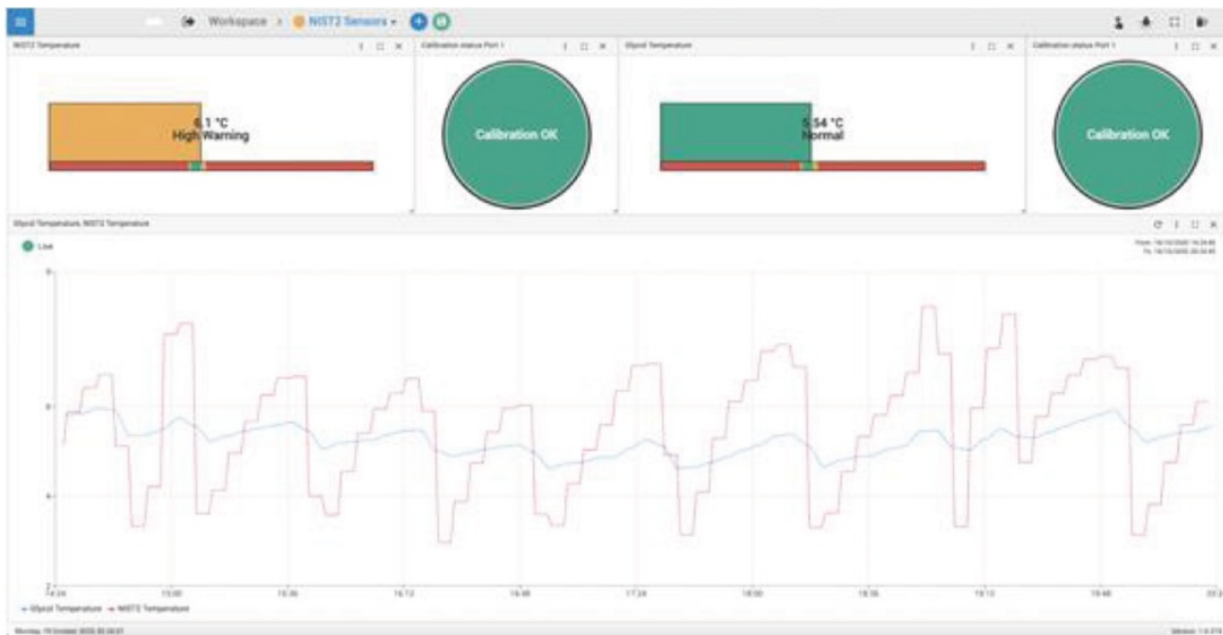**Figure 1-1 shows a NIST Sensor on AlertWerks Plus.**

FIGURE 1-1: NIST SENSOR ON ALERTWERKS PLUS

Sensor features:

- MULTIPLE TRACEABLE, CALIBRATED TEMPERATURE SENSORS
- VALUE AVERAGING BETWEEN TEMPERATURE SENSORS FOR BETTER ACCURACY
- INTERNAL CALIBRATION INTEGRITY CHECKING

NIST SENSOR COMPATIBILITY

The NIST2 sensors are compatible with the AlertWerks Plus Gateways with F7 and H7 processors. The NIST2 sensors will not work on the older AlertWerks Plus Gateways with F4 processors.

The NIST2 sensors are compatible with the AlertWerks V4E and V4EL Gateways, but they are not supported on the 8-port sensor expansion modules. The firmware on the V4E and V4EL units needs to be upgraded to the latest version that is available.

NOTE: When used with the V4E and V4EL Gateways, the sensors do not show the additional "Calibration Status" and "Operable Sensors Count" data. Only one temperature data point will be functional.

EXTENDING THE EME1TH00C SENSORS

The sensor can be extended up to 50 m (165 ft.) using CAT5 cable.
We recommend using shielded type cable as the sensor is susceptible to
Electromagnetic interference (EMI). We also recommend not running the extension
cable near any type of power supply or other equipment that will emit EMI.

EXTENDING THROUGH PATCH PANELS AND RJ-45 COUPLERS

We do not recommend connecting the any of the AlertWerks sensors though patch
panels or using the RJ-45 couplers to extend them.
Although this may work, the connection may be inconsistent. This is due to the low
signal strength from the sensor to the base unit. The resistance of the extra connectors
in a patch panel or couplers is often enough to prevent the sensor from functioning
properly.

SPECIFICATIONS

TABLE 2-1. SPECIFICATIONS

SPECIFICATION	DESCRIPTION
Temperature	
Celsius Measurement range	-55 to +75° C
Celsius Measurement resolution	1° C
Celsius Measurement accuracy	±0.2°C accuracy from -10 to +75° C
Fahrenheit Measurement range	-67 to +167°F

Fahrenheit Measurement resolution	1° F increments
Fahrenheit Measurement accuracy	±0.4° F accuracy from 14 to 167°F
Humidity	
Measurement range	0 to 100% Relative humidity
Sensor element wettable?	Wettable without damage
Resolution	0.5%
Accuracy at 25°C	±5%
Working Range	-20 to +60°C
Physical	
Extension Cable	CATx cable
Power source	Powered by the Gateway (no additional power needed)

OPERATION

After plugging the NIST2 sensor into a sensor port on the Gateway, the following sensors will be shown on the unit:

TEMPERATURE SENSOR

The Temperature sensor uses value averaging from the NIST calibrated temperature sensors for the displayed value.
If any temperature sensor value pair has a value difference of more than 1° C, it will be excluded from the averaging calculation.

HUMIDITY SENSOR (TH NIST SENSORS ONLY)

The Humidity sensor displays the humidity reading from the NIST calibrated sensor.

OPERABLE SENSORS COUNT

This sensor status shows the number of sensors that are working (sensors which have successful communications with the base unit).

CALIBRATION STATUS

This sensor status shows the calibration status of the temperature sensors.

When all sensor readings are within 1° C, the status will be: "Calibration OK". When sensor readings differ more than 1° C, the status will be: "Calibration Check x" (where x is the number of invalid sensor readings).

Figure 3-1 below shows the status of sensors and their calibration.
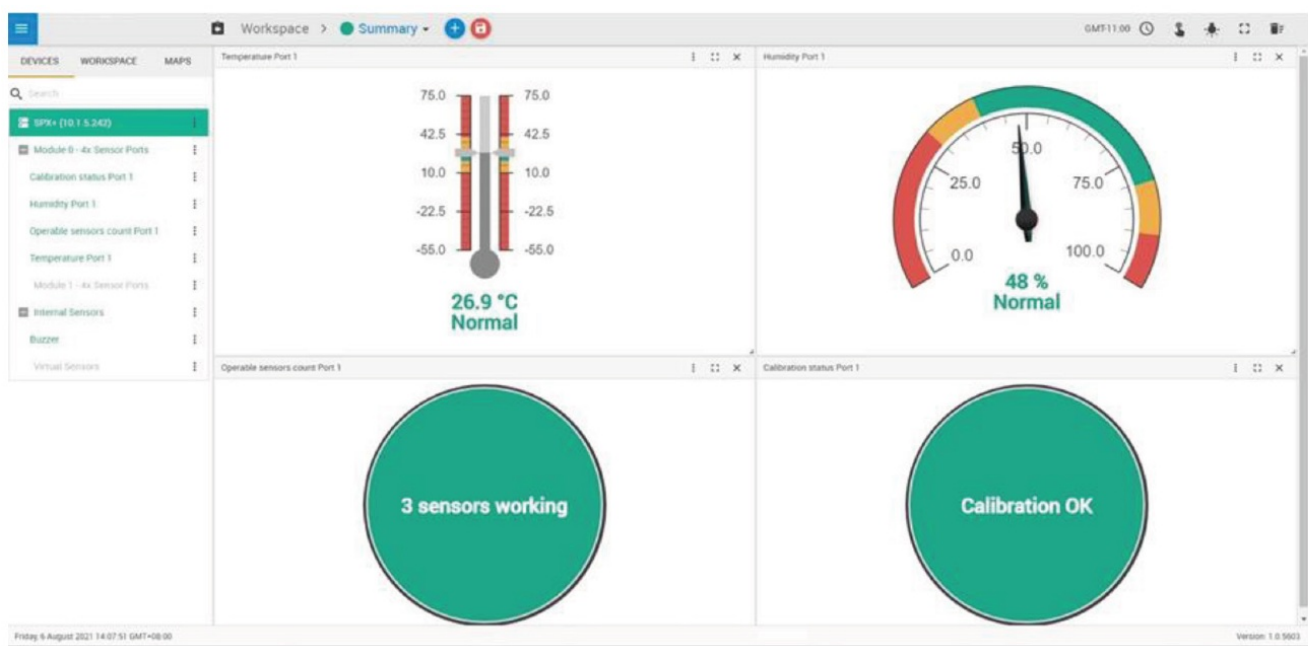
FIGURE 3-1: SENSOR AND CALIBRATION STATUS

Figure 3-2 below shows sensor port information:

FIGURE 3-2: SENSOR PORT INFORMATION

RE-CALIBRATION DETAILS

If the NIST sensors are detected as out of calibration, they can be replaced, or they can be re-calibrated. There is also an offset setting in the web UI that can be used to offset the value. This is covered in the Gateway manual.

GET SNMP OID

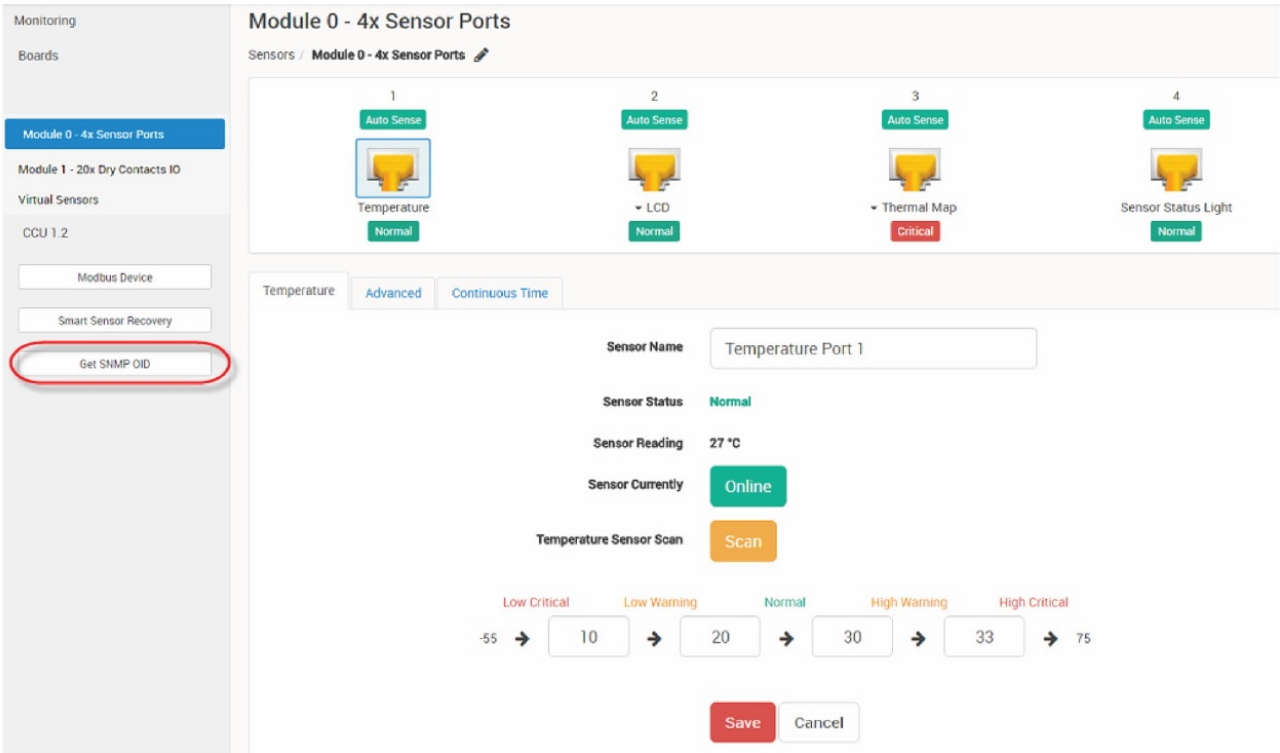The GET SNMP OID button, shown in Figure 3-3 below, allows you to view all of the Temperature sensors OIDs.

FIGURE 3-3: GET SNMP OID BUTTON

From the page shown in Figure 3-3, you can view and configure the sensor options.

Sensor Name

The sensor can be named as needed for the application.

Status

When communication with the temperature sensor is lost, the status of the temperature sensor is changed to sensorError. When communication with the temperature sensor is reestablished, the status will be determined by comparing the Degree to the high and low thresholds.

Sensor Reading

The current sensor reading.

Sensor Currently

Displays the sensor's current status.

Thresholds

You can re-configure the Thresholds for each sensor state. After changing a threshold value, click "Save" for the changes to take effect.

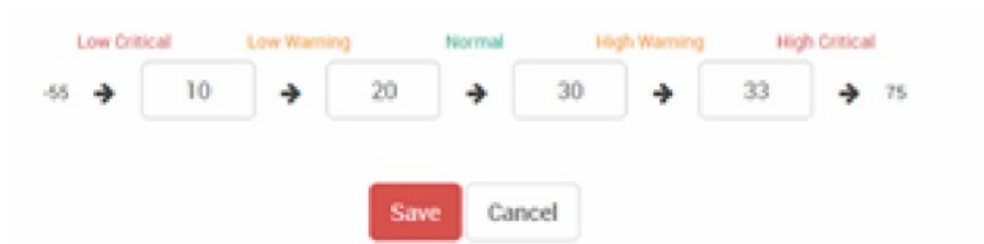An example of threshold settings is shown in Figure 3-4.

FIGURE 3-4: THRESHOLD SETTINGS

ADVANCED TAB

Figure 3-5 below shows options on the Advanced Tab.

FIGURE 3-5: ADVANCED TAB OPTIONS

Degree Type

The Degree Type can be set to Fahrenheit or Celsius. The system stores the thresholds

for both Celsius and Fahrenheit independently, allowing you to switch between the two degree types. When the Degree Type is changed, all threshold fields will change their values automatically.

Reading Offset

The Reading Offset parameter can be used to calibrate temperature and humidity sensors. For example, if the actual reading of a sensor is 28 degrees Celsius and the Reading Offset is set to 2, the temperature will be displayed as 30 degrees Celsius.

Ream

The Rearm parameter is useful for sensors whose values can vary, such as temperature and humidity sensors. It is used to prevent the sensor from rapidly changing between two states. For example, if the Warning High threshold for the temperature sensor is set to 80 degrees and the sensor varied between 79 and 80, there would be a large number of emails, traps, and events logged. The Rearm parameter prevents this by forcing the temperature to drop by the Rearm value before changing the state back to normal. In this example, if Rearm is set to 2 then the sensor would have to drop from 80 down to 77 before the status would change from "Warning High" back to normal.

Calibration Factor

This is a Calibration tool. If you wish to calibrate the temperature sensor, for example, you could enter an offset value of 5. In this example, if the sensor reads 20 degrees then it would record as 25 degrees. This figure can also be a minus figure (for example,. -5 would show 15 degrees instead of 20).

Data Collection Type

This refers to the data collection from the sensor and how the data is then displayed on the graphs. There are four options for the collection of data: Average, Highest, Lowest and Instantaneous. The default setting is "Average." When the data collection type is set to "Average," the averaged value between 2 graph intervals is stored, and output graphs for the daily, monthly, and yearly all have the same size on the screen. For the daily graph, each data point on the graph is one data point collected from the sensor. But for the monthly and yearly graph, in order to display more data into the same size as the daily graph, some consolidation on the data is needed. One data point on the monthly and yearly graph is an average of the sensor data in a range.

The maximum and minimum values showing on the monthly and yearly graphs are the value of this consolidated data and not the raw data over that period of that time. The When the Data Collection Type is set to the Highest setting,

you will get the graphing output displaying the sensors highest average readings during sampling. This is the same for the Lowest setting (lowest average). With the Instantaneous setting you can store the actual value of the sensor at the sampling interval without averaging.

Enable Calendar

This allows you to schedule when the notifications will be active.

Graph Enable

In order to save the data from the sensors on the unit you will need to enable the Graphing feature on the unit. You need to change the "Enable Graph" to the On position and click on the Save button to enable the graphing.

Note: You could also enable the graphing from the Summary page.

Filter Status

The Sensor Filter Status is a feature that you can Enable or Disable. When enabled, it will check the sensor status. If the status of the sensor changes very rapidly, it will report how many times the sensor status changed, instead of having multiple separate entries in the syslog. When enabled, this will report the changes and status of a sensor only once.

EXAMPLE OF NIST SENSOR ALERTS

Figure 3-6 below is an example of the NIST2 sensor with a temperature sensor value difference of more than 1° C.
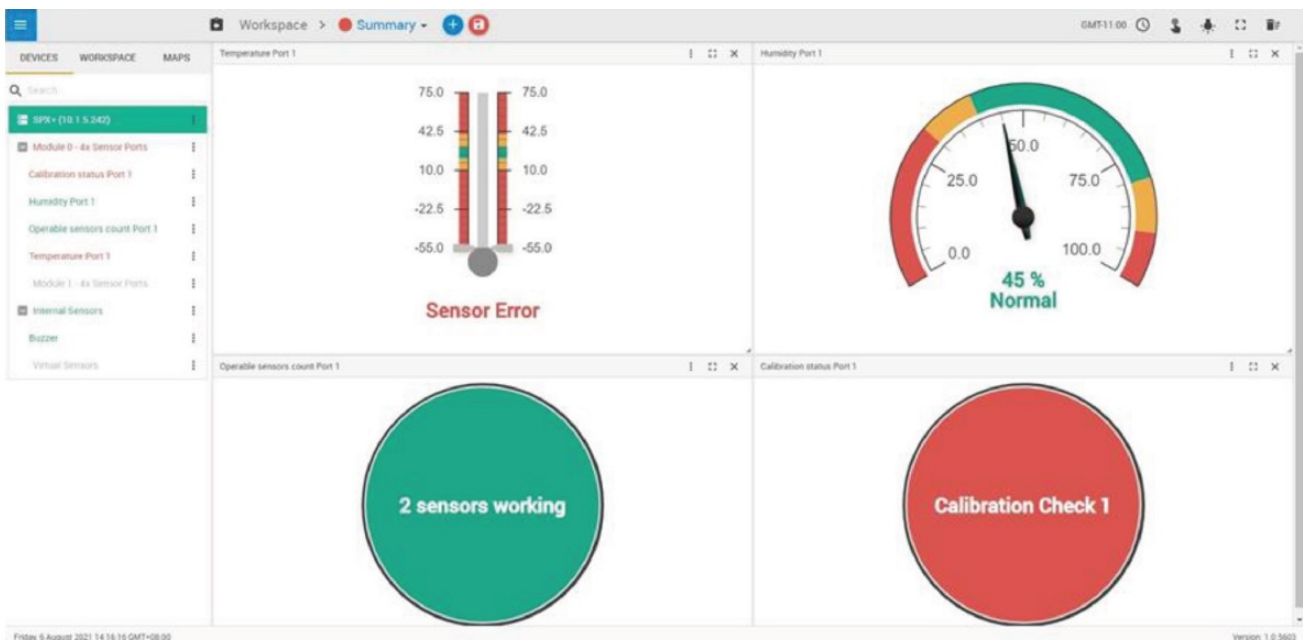
FIGURE 3-6: NIST SENSOR ALERT EXAMPLE

Figure 3-6 shows a Temperature Sensor error. This example shows that two sensors are working. The calibration status is "Calibration Check 1," which indicates that one value pair difference is more than 1° C.

NIST2 SENSORS ON THE ALERTWERKS V4E AND V4EL

The NIST2 sensors feature two NIST-traceable, calibrated temperature sensors.

With our provided Virtual Sensor script, users can set customizable thresholds to raise an alarm to warn that the sensor is out of calibration.

Figure 3-7 below shows information about the connected sensors, including the current reading, status, and sensor online/offline status.
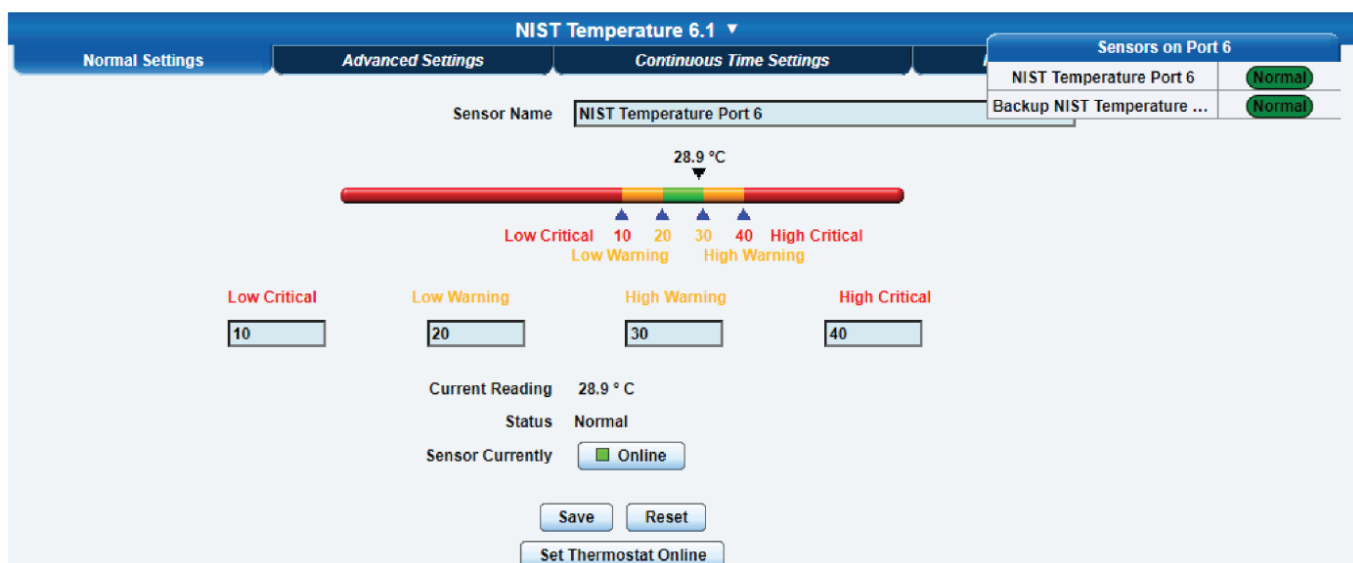
FIGURE 3-7: SAMPLE CONNECTED SENSOR SCREEN

Sensor features:

- MULTIPLE TRACEABLE, CALIBRATED TEMPERATURE SENSORS
- VALUE AVERAGING BETWEEN TEMPERATURE SENSORS FOR MORE
  ACCURACY (VIA CUSTOM SCRIPT VS)
- FAILOVER FUNCTION (VIA CUSTOM SCRIPT VS)

Configuration of Temperature Sensor Subports

To configure temperature sensors, refer to the "Specifications Features and
Configuration" section of the EME134A-R3 user manual.

Virtual Sensor Custom Script

We provide two scripts to be used with the NIST2 sensor:

1. Value averaging (For more accurate value representation)
2. Value difference (For sensor accuracy check)

Contact Black Box Support to download both scripts in a compressed file format (ZIP).
NOTE: These script files are also included at the end of this manual.
To create a Custom Script Virtual Sensor for the Value averaging script:

1. Access the Virtual Sensor setting page via Sensor => Virtual Sensors and then select
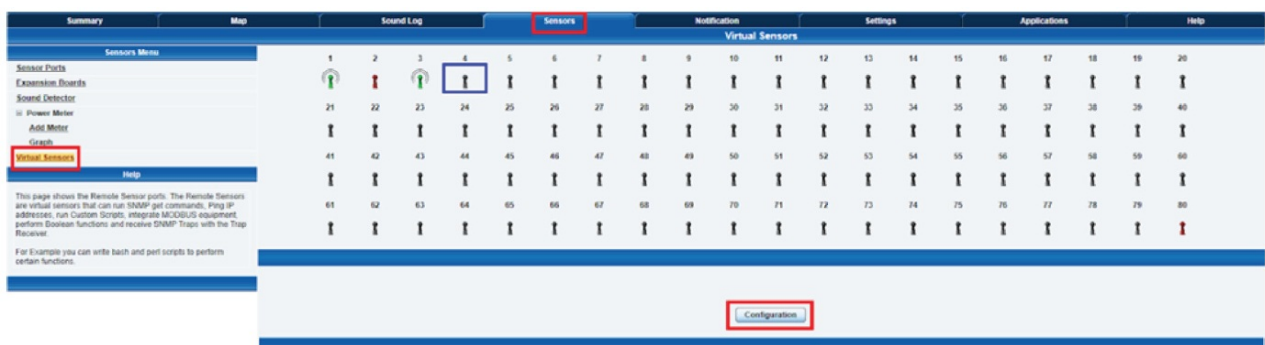   the desired free Virtual Sensor port as shown below in Figure 3-8.
2.

FIGURE 3-8: SENSORS TAB SHOWING VIRTUAL SENSORS OPTION

Click "Configuration" to start configuring the sensor.

3. Choose Source: Custom Script, and then click "Next."
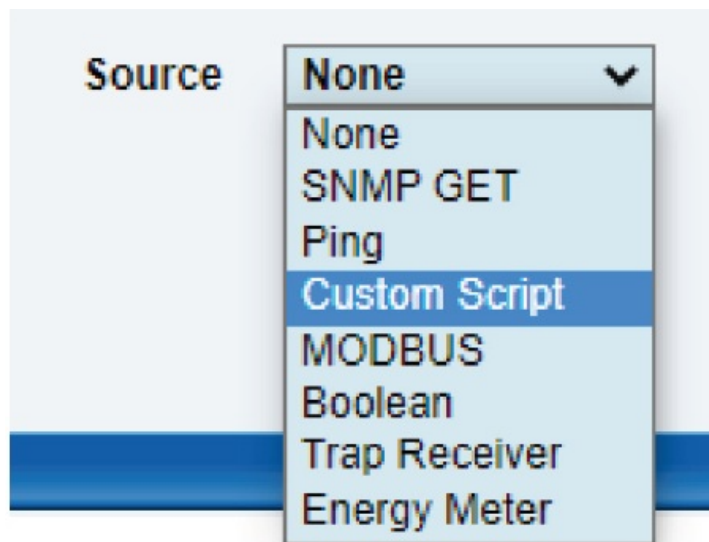   Figure 3-9 shows the Custom Script source option.

FIGURE 3-9: CUSTOM SCRIPT SOURCE OPTION SELECTED

4. Click on "Add Your Own Script."

Figure 3-10 shows the "Add Your Own Script" button.

FIGURE 3-10: ADD YOUR OWN SCRIPT BUTTON HIGHLIGHTED

5. In the popup window, click Choose File => Browse to the script => Add File => Close

Figure 3-11 below shows the "Add File" button.

FIGURE 3-11: ADD FILE BUTTON

FIGURE 3-11: ADD FILE BUTTON

6. Configure the sensor as desired using the following fields and options:

Sensor Name

Configure the sensor name as desired.

Script Name

Select the desired script.

Script Parameters

Set the sensor port where you plugged in the NIST2 sensor.

Sensor Style

Analog

Value Factor

10

Unit Text

Configure according to the sensor unit of the NIST2 sensors (°C / °F)

Value Range for Slider Bar

Configure as desired

NOTE: For Value difference script, we recommend -5 to 5.

After you finish configuring the sensor options, click "Next."

Figure 3-12 below shows the sensor settings screen:

Sensor Name	Average temperature value of NIST2 port 6
Script Name	temp_average.sh ⌄
Script Parameters	6
	Add Your Own Script
Sensor Style	Analog ⌄
Value Factor	10 (x0.1)
Unit Text	°C ⊕°F
Value Range for Slider Bar	0 To 100

FIGURE 3-12: SENSOR SETTINGS SCREEN

7. Configure the sensor thresholds as desired.

   NOTE: For the Value difference script, we recommend -5, -1, 1, 5

   Click "Next."

   Figure 3-13 below shows the sensor threshold screen:

Low Critical 10   20   30   40 High Critical
Low Warning   High Warning

Low Critical	Low Warning	High Warning	High Critical
10	20	30	40

FIGURE 3-13: SENSOR THRESHOLDS SCREEN

8. Configure the Virtual Sensor execution settings as shown in Figure 3-14 below:

| Polling Interval	5	5 secs
Execute Time Out	5	5 secs
Retry	3	Times

FIGURE 3-14: SENSOR EXECUTION SETTINGS

NOTE: The Minimum Polling Interval of the Virtual Sensor is 5 seconds. This means that

the value averaging and value difference scripts can update the Virtual Sensors value at a maximum rate of 5 seconds.

Click on "Finish" to create the virtual sensor.

Figure 3-15 shows an example of the configured value averaging virtual sensor for the NIST2 sensor that is plugged on sensor port 6.
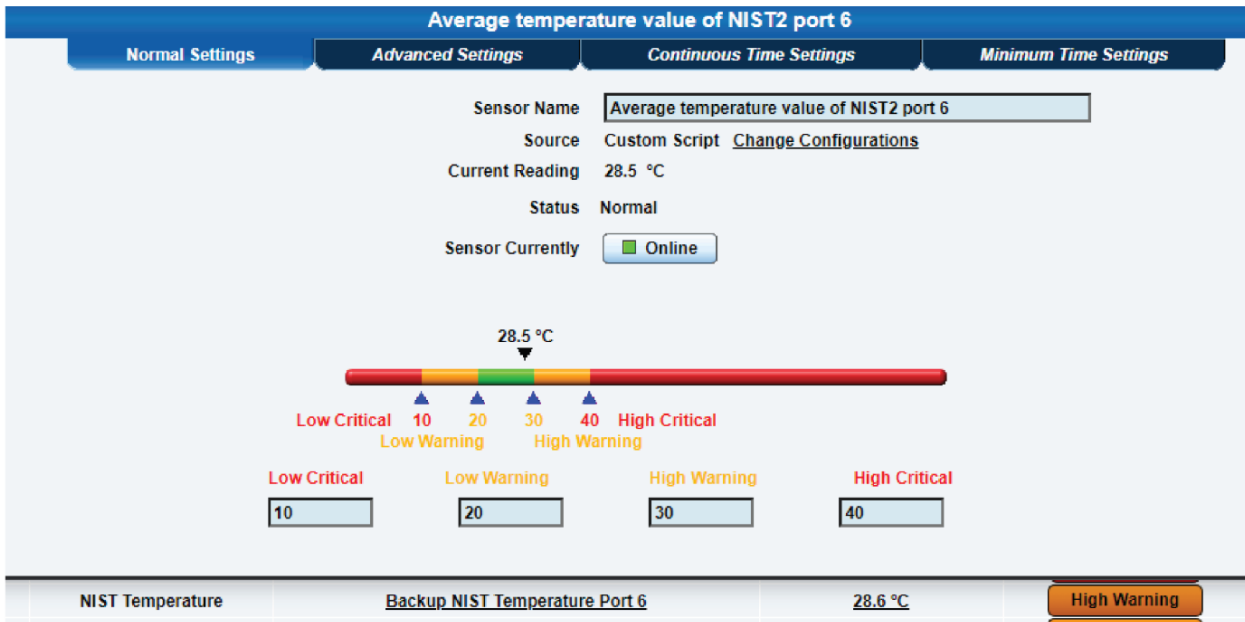
REFERENCE

Note: In case of "sensor error" reading, the NIST2 scripts display an error in the following format:

Error Message: NIST2 sensors on RJ45 port {Port} have invalid status ({MainSensorStatus}, {BackupSensorStatus}) EXAMPLE: "NIST2 sensors on RJ45 port 6 have invalid status (7, 7)" will be shown if the NIST2 port 2 is unplugged.

QUICK REFERENCE FOR SENSOR STATUS VALUES:

2 => Normal, 3 => High Warning, 4 => High Critical, 5 => Low Warning, 6 => Low Critical, 7 => Sensor Error

CUSTOM SCRIPTS FOR REFERENCE

VALUE AVERAGING

- This script is used for the NIST2 sensor to provide more accurate value representation
  #!/bin/sh

```bash
IP_ADDRESS="127.0.0.1"
PORT=$1
OID_BASE=".1.3.6.1.4.1.3854.2.5.2.1"
T1_OID_STATUS=${OID_BASE}".6.0.0."${PORT}".1"
T2_OID_STATUS=${OID_BASE}".6.0.0."${PORT}".2"
T1_OID_VALUE=${OID_BASE}".20.0.0."${PORT}".1"
T2_OID_VALUE=${OID_BASE}".20.0.0."${PORT}".2"
T1_STATUS=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T1_OID_STATUS}`
T2_STATUS=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T2_OID_STATUS}`
T1_VALUE=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T1_OID_VALUE}`
T2_VALUE=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T2_OID_VALUE}`
# Output the value averaging if both NIST2 sensors are in good sensor status
(Normal/HighWarning/HighCritical/LowWarning/LowCritical).
if [ ${T1_STATUS} -ge 2 -a ${T1_STATUS} -le 6 -a ${T2_STATUS} -ge 2 -a ${T2_STATUS} -le 6 ];
then
awk "BEGIN {printf \"%.2f\",(${T1_VALUE}+${T2_VALUE})/2}";
exit 0;
elif [ ${T1_STATUS} -ge 2 -a ${T1_STATUS} -le 6 ]; # Output main sensor value if the backup failed.
then
echo ${T1_VALUE};
exit 0;
elif [ ${T2_STATUS} -ge 2 -a ${T2_STATUS} -le 6 ]; # Output backup sensor value if the main failed. then
echo ${T2_VALUE};
exit 0;
else
echo "NIST2 sensors on RJ45 port $PORT have invalid status ($T1_STATUS, $T2_STATUS)"; # Output error message to "Error Message" section on the Virtual Sensor setting page.
exit 1;
fi
```

VALUE DIFFERENCE

- This script is used for the NIST2 sensor's accuracy check #!/bin/sh
- # Value preparation
- IP_ADDRESS="127.0.0.1"
- PORT=$1
- OID_BASE=".1.3.6.1.4.1.3854.2.5.2.1"
- T1_OID_STATUS=${OID_BASE}".6.0.0."${PORT}".1"
- T2_OID_STATUS=${OID_BASE}".6.0.0."${PORT}".2"
- T1_OID_VALUE=${OID_BASE}".20.0.0."${PORT}".1"
- T2_OID_VALUE=${OID_BASE}".20.0.0."${PORT}".2"
- T1_STATUS=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T1_OID_STATUS}`
- T2_STATUS=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T2_OID_STATUS}`
- T1_VALUE=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T1_OID_VALUE}`
- T2_VALUE=`snmpget -v1 -Oqv -c public ${IP_ADDRESS} ${T2_OID_VALUE}`
- # Only output the difference if both NIST2 sensors are in good sensor status (Normal/HighWarning/HighCritical/LowWarning/LowCritical).
- if [${T1_STATUS} -ge 2 -a ${T1_STATUS} -le 6 -a ${T2_STATUS} -ge 2 -a ${T2_STATUS} -le 6];
- then
- expr ${T1_VALUE} – ${T2_VALUE}
- exit 0
- else
- echo "NIST2 sensor(s) on RJ45 port $PORT have invalid status ($T1_STATUS, $T2_STATUS)"; # Output error message to "Error Message" section on the Virtual Sensor setting page.
- exit 1
- fi

APPENDIX A: REGULATORY INFORMATION

FCC STATEMENT

This equipment has been tested and found to comply with the regulations for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to

provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this Quick Installation Guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case, the user will be required to correct the interference at his/her own expense.

CE STATEMENT

This is a Class B product in a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

ROHS

This product is RoHS compliant.

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TECH SUPPORT/CONTACT INFORMATION

Visit blackbox.com/discover-bb/global-presence for regional technical support and contact information.

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Documents / Resources

	BLACK BOX NIST2 Temperaturel Humidity Sensor [pdf] User Manual NIST2, NIST2 Temperaturel Humidity Sensor, Temperaturel Humidity Sensor, Humidity Sensor, Sensor

References

- User Manual

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🏷 BLACK BOX, Humidity Sensor, NIST2, NIST2 Temperaturel Humidity Sensor, Sensor, Temperaturel Humidity Sensor

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