

ELS Electrolyte Level Sensor and ELSi Electrolyte Level Sensor Interface

Product Description and Installation Guide



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1. Product Description

The ELS Electrolyte Level Sensor is a non-invasive level sensor designed for quick installation and easy set up. This device complies with the NERC PRC-005 requirements for electrolyte level inspection. With this sensor, you eliminate unnecessary remote site visits. This device will eliminate the required quarterly inspection of battery electrolyte levels in your battery string.

1.1 ELS Sensor Module System Features

Features for the ELS Sensor module includes:

- Equipped with two RJ11 connectors for system interface and alarm notification
- Front panel status indicators for easy alarm identification and system functional status
 - low electrolyte levels
 - power loss
- Automatic reset of alarms
- Easily integrates into Vertiv Battery Monitors (UXIM, BDS Series) or Building Management Systems.

1.2 ELSi Interface Module System Features

Features for the ELSi interface module includes:

- Equipped with two Form C relay contacts, (2A at 30Vdc) for system interface and alarm notification
- Front panel status indicators for easy alarm identification

These alarms include:

- low electrolyte levels
 - power loss
 - system bus integrity
- Automatic or manual reset of alarms
 - Easily integrates into Vertiv Battery Monitors (UXIM, BDS Series) or Building Management Systems

Note: Before connecting the ELSi interface module, decide if you want the alarms to be latched or automatically reset. The ELSi interface module includes a JP1 jumper which is used to automatically reset the alarms once all the ELS sensor module alarms are cleared. The default on the JP1 jumper is set to out. This allows all alarms to be latched and will not be reset until you manually reset the alarms on the ELSi interface module by pressing the button on the right side of the module. All alarms on the ELS sensor modules must be cleared before resetting the alarm on the ELSi interface module.



Figure 1 - ELSi Interface Module Calibration Button

1.3 ELS Temperature Control Module (ETCM) System Features

The ELS Temperature Control Module (ETCM) is an optional module for cold climates which includes the following features:

- Equipped with an ambient temperature sensor to detect uncontrolled cold temperatures for interruption of false alarm notifications.
- Easy to view and set temperature settings for trigger points to cut off false alarms via a rotary switch.
- Easily integrates into Vertiv Battery Monitors (UXIM, BDS Series) or Building Management Systems via the ELSi.

2. Materials Received List

The following is a list of materials received with your shipment. Refer to the packing slip delivered with the equipment for a complete list of materials supplied. Vertiv suggests you inventory all materials to ensure the order is complete. Report any shortages to Vertiv immediately.

The model number is in the format of PPPP-COB, where PPPP is 1010 and C, O, and B are described below.

PPPP—	C	O	B	Description	Choices
1108	C			Communications	0 = RS-485 Only 1 = Network 2 = Fiber Optic 3 = Network and Fiber Optic
1108		O		Options	0 = None 1–9 = Reserved
1108			B	Branding	0 = OEM 1–9 = Reserved

Table 1 - Model Number Description

2.1 Parts List

The following is a list of all the parts associated with the UXCT battery monitor installation. If any parts are missing please contact your Vertiv representative.

Part Number	Photo/Drawing	Description
1108-150		Electrolyte level sensor module Up to 60 modules per system
1108-151		ELSi Controller module One module per system

Table 2 - Inventory List

Part Number	Photo/Drawing	Description
1108-160-RXX		6P/4C RJ11 12" Cross Up to 58 wires per system RXX = Length in inches
1108-161-XX		6P/4C RJ11 10' Cross One wire per system 6P/4C RJ11 20' Cross Two wires per system XX = Length in feet
1108-162-XX		ELSi alarm interface 25' cable One cable per system
1600-006		Acoustic couplant adhesive, 90 ml tube One tube per system
4000-041		115Vac to 12 VDC Power adapter One power supply per system
6003-001		Power cord One power cord per system
590-2112-501A/ SL-29427/ 4200-117		ELS Product Description Guide and Installation Guide One guide per system

Table 2 - Inventory List (Continued)

2.2 Optional Parts List

The following are optional parts when the battery system is located in an uncontrolled cold environment. If these parts are needed, please contact your Vertiv representative.

Part Number	Photo/Drawing	Description
1008-153	 A black, octagonal-shaped module with a white label. The label features a central red dial with temperature markings in Fahrenheit and Celsius. To the left of the dial are two green indicator lights labeled 'POWER' and 'ALARM INTERRUPT'. The text 'ALBER ELS TEMPERATURE CONTROL MODULE' and 'IN OUT' are printed at the bottom of the label.	ELS Temperature Control Module One module per system
1108-160-RXX	 A short, black, flexible cable with RJ11 connectors at both ends.	6P/4C RJ11 12" Cross Up to 2 wires per system RXX = Length in inches
1108-164-50	 A long, grey, flexible cable with a yellow connector at one end and a blue connector at the other.	ELS Temperature Control Module ambient temperature sensor 1 sensor per system 50 feet

3. ELSi Interface and ELS Sensor Module Connection

3.1 Connecting the ELSi Interface Module

The table below describes where the connections go on the ELSi interface module.



Figure 2 - ELSi Interface Module

Power source	Connect the supplied power supply to the power jack on the side of the ELSi interface module.
Ground cable	The ground on the ELSi must be connected to earth ground to ensure the proper operation of the ELS sensor module. Note: This ground cable is not a safety related ground.
ELS “Out” jack	The RJ11 ELS “Out” jack connects the cross-over 4 pin phone cable from the ELSi interface module to the “In” jack on the first ELS sensor module.
ELS “In” jack	The RJ11 ELS “In” jack connects the cross-over 4 pin phone cable from the ELSi interface module to the “Out” jack on the last ELS sensor module for a continuous loop.
Alarm Contacts jack	There are two sets of form “C” Contacts and can be connected directly to a Vertiv monitoring system or Building Management System. See figure 3 ELSi Interface Module Alarm Contacts Jack for more detail. Note: - For connecting to BDS-256 battery monitors, the optional digital input module will need to be installed. - For connecting to UXIM or UXTM battery monitors, the optional digital inputs should be configured as dry contact inputs.

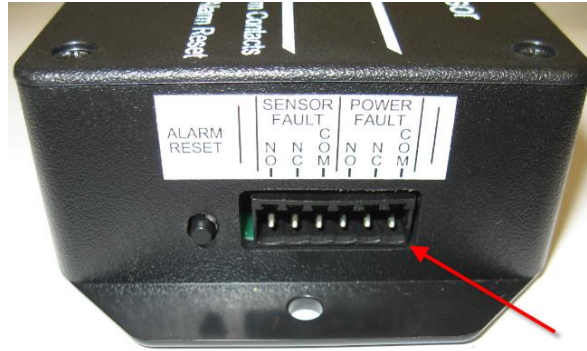


Figure 3 - ELSi Interface Module Alarm Contacts Jack

3.2 Mounting the ELS Sensor on the Battery Case

Use the ELS sensor module “LOW LEVEL TRIGGER” graphic on the label to position and mount the ELS sensor module even with the low electrolyte level line on the battery case. To attach the ELS sensor modules to the batteries, use a small amount of the provided adhesive and a thin strip of 3m gel tape as a temporary support to mount the ELS sensor modules to the side of the batteries.

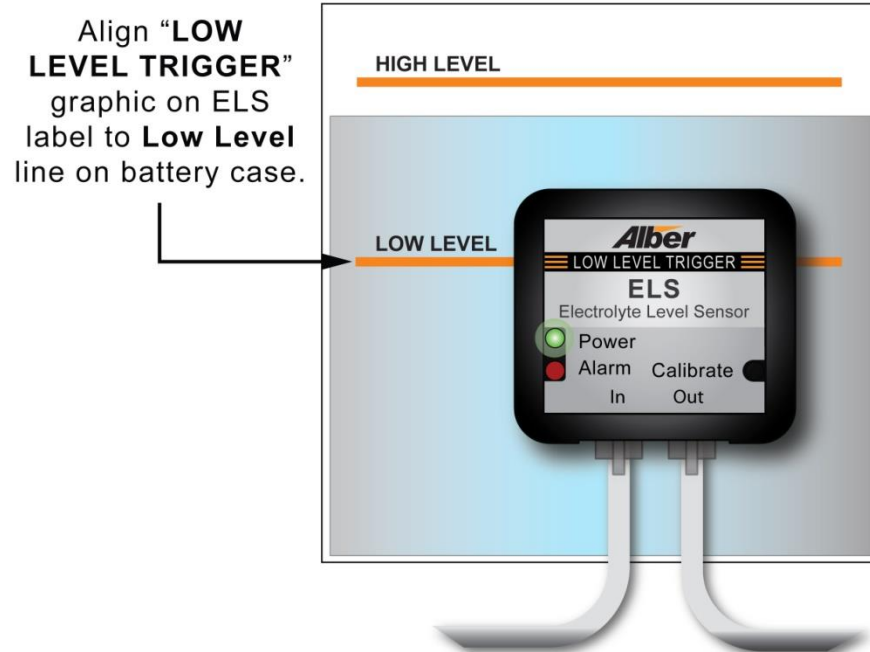


Figure 4 - Positioning the ELS Sensor Module on Battery Case

1. **For mounting the ELS sensor, follow these steps:**
Verify the electrolyte level in the battery is over the middle level between the low and high-level lines. If the electrolyte is below the average level, add more distilled water.
2. Clean battery case surface where sensor will be mounted.
 - a. Remove moisture, dirt, oil, grease and dust using baking soda and water.
 - b. Remove any excess baking soda and water using a rubbing alcohol and wipe it dry.
3. Clean the surface of the ELS module with rubbing alcohol and wipe dry.

-
4. Place a thin strip of the 3m gel tape on the bottom of the sensor, and apply a small amount of the adhesive (3/4 " Length by 1/4" Width by 1/4 " depth) on the side of the sensor that is facing the battery case. See Figure 5 Adding Bonding adhesive to the ELS Sensor Module and attach to Battery Case for details.



Figure 5 - Adding Bonding Adhesive to the ELS Sensor Module and attach to Battery Case

5. Peel off the protective cover on the gel tape.
6. Place the sensor on the battery case.
 - a. When mounting the sensor, apply firm pressure in order to push out any air bubble that could exist inside the adhesive layer.
 - b. Check to make sure that the trigger level line in the sensor is aligned correctly with the low-level line on the battery case.
7. Connect power to the sensor.
8. Press the calibration button twice.
 - a. The ELS will calibrate by performing 16 readings of the base line signal. The green LED will blink showing the occurrence of those readings.
 - b. The red LED indicates the quality of the bonding that was just applied as follows:
 - **OFF:** Good coupling.
 - **FAST blink:** Coupling is not good, but the device is able to work. Recommended to reseal the sensor.
 - **Solid ON:** Bad acoustic coupling. Sensor needs to be resealed.
 - c. After the calibration process finishes, the sensor will continue its normal operation. If the electrolyte level is below the lower limit for 1 hour, the red light comes on indicating additional electrolyte need to be added.
9. After finishing the installation of all sensors, press the calibration button three times for three or more seconds each time.. The red LED flashes, indicating the ELS is currently in self-calibration mode. In this mode of operation, the sensor will perform a calibration every 10 minutes for 24 hours (this happens during the adhesive's curing time).

3.3 Connecting the ELS Sensor Module

The following table describes where the connections go on the ELS sensor module.



Figure 6 - ELS Sensor Module Connectors

"In" jack	The RJ11 "In" jack on the first ELS sensor module connects the cross-over 4 pin phone cable from the ELSi interface module "Out" jack.
"Out" jack	The RJ11 "Out" jack connects the cross-over 4 pin phone cable from the first ELS sensor module to the "In" jack on the second ELS sensor module. This is the same for each additional ELS sensor module on the battery string. For example, The "Out" jack on the second ELS sensor module goes to the "In" jack on the third ELS sensor module. The RJ11 "In" jack connects the cross-over 4 pin phone cable from the ELSi interface module to the "Out" jack on the last ELS sensor module for a continuous loop.

The following diagram illustrates how the ELSi interface module and ELS sensor modules are connected on a string of batteries.

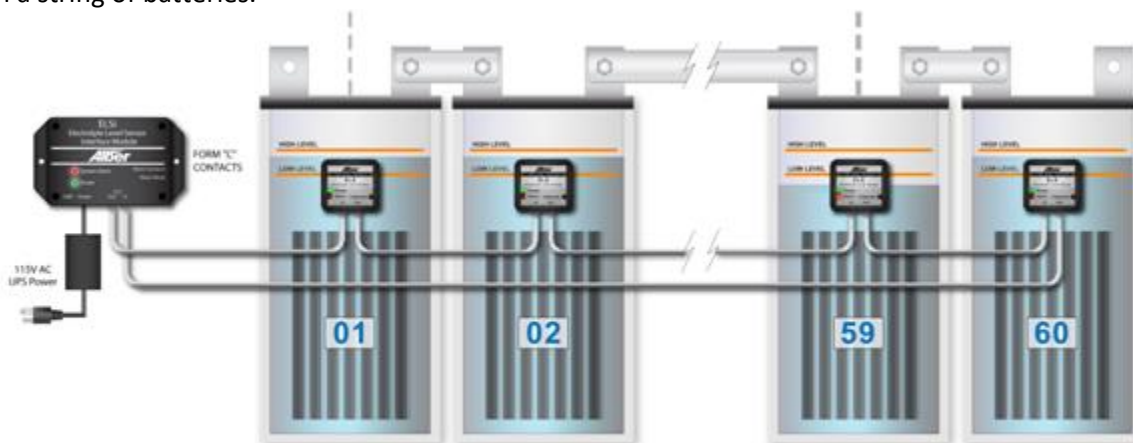


Figure 7 - ELSi Interface and ELS Sensor Module Connections

3.4 Calibrating the ELS Sensor module

Use the Calibration button on the ELS sensor module to calibrate the ELS sensor alarms. This provides an indication of the quality of the acoustic coupling. Do this by pressing the **Calibrate** button twice on each ELS sensor module.

During the calibration process, the red LED indicates the quality of the acoustic coupling as follows:

- **Off:** Good coupling.
- **Fast blink:** Coupling is not good, but the device is able to work. It is recommended to reseat the sensor.
- **Solid On:** Bad acoustic coupling. Sensor must be reseated.



Note: Prior to calibration, the green LED is pulsing. The red LED may or may not be off. Ensure electrolyte level is at a normal level.

During setup, press the Calibrate button twice, the green LED will start to blink rapidly. After calibration, the green LED will pulse normally. Every 10 seconds the ELS sensor module will take a reading. While the readings are being taken, the green LED will be steady for about one second and then will continue to pulse normally until the next reading occurs.

During the reading if the red LED lights up, the electrolyte level is low. If the red light does not light up, the electrolyte level is in the normal (or calibrated) level

Figure 8 - ELS Electrolyte Level Sensor Module Calibration Button

3.5 Testing the ELS Sensor Module

1. Verify there are no active alarm conditions by confirming that no red LEDs are active on any of the ELS sensor modules. If there are, ensure the electrolyte level is at a normal level and retry the calibration on the ELS sensor module.
2. Reset any active or latched alarms that may be occurring due to the initial setup and calibration. To reset active alarms, press the reset button on the side of the unit. See Figure 9.

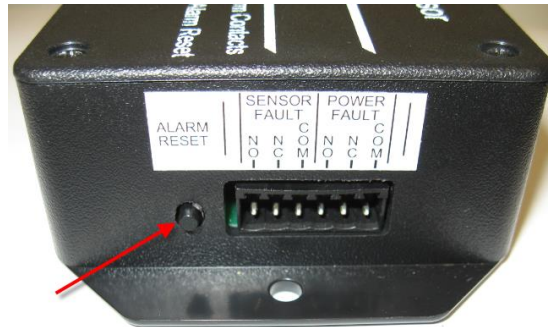


Figure 9 - ELSi Interface Module Alarm Reset Button

3. Apply power to the ELS module while pressing and holding the calibration button. The red LED will start to flash quickly indicating the ELS is test mode.



Figure 10 - ELS Module Test Mode Button

4. Lower the electrolyte level in the battery cell so the electrolyte goes below the trigger line on the ELS sensor module. The Alarm LED will turn red once the unit performs the test.
5. Verify the system alarm LED activates on the ELSi interface module.

Note: During the active alarm, the Sensor Fault relay is activated.

6. Clear the alarm condition on the ELS module by returning the electrolyte back to a normal level. The red alarm LED will turn off on the ELS sensor module.
7. If JP1 is installed, the alarm LED and alarm relay on the ELSi interface module will turn off at the same time the ELS module returns to normal.

If JP1 is not installed, the alarm LED and alarm relay on the ELSi interface module will remain on when the electrolyte level is returned to normal. To reset the alarm, press the reset button on the side of the ELSi interface module. See Figure 9.

8. After completing the test, turn **Off** then **On** the power to all the sensors, which allows each sensor to leave test mode and enter into normal mode of operation.

3.6 Troubleshooting

If the ELS sensor module does not activate an alarm when the electrolyte level is lowered, there could be air bubbles in the adhesive applied in-between the ELS sensor module and the battery. To confirm this, remove the ELS sensor module from the battery, remove any residue of adhesive from the battery case and sensor and reapply new adhesive. After the new adhesive is installed, double check that the electrolyte level is at the proper level and recalibrate the ELS sensor module.

Note: Alarms on all ELS sensor modules must be cleared before you can reset the system alarm on the ELSi interface module.

4. Monitoring the ELSi Interface Module and ELS Sensor Configuration

4.1 ELSi Interface Module and ELS Sensor Configuration Diagram

This diagram shows how the ELS sensor indicates an alarm when the electrolyte level in the battery gets too low.

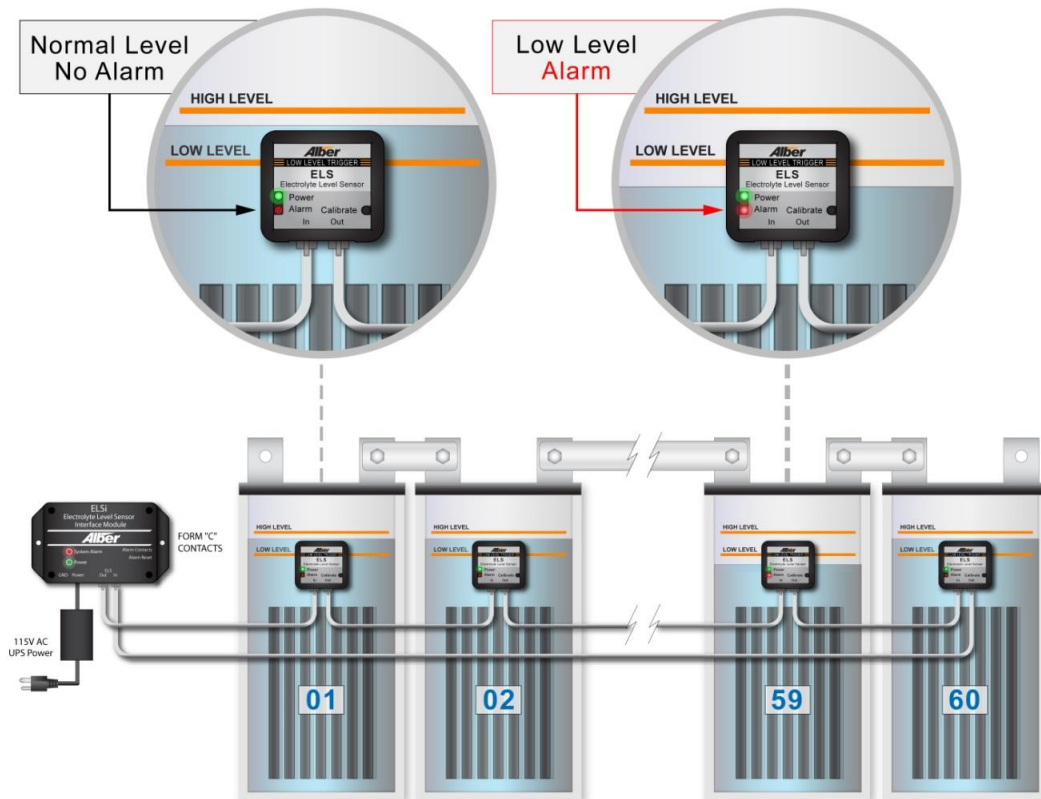


Figure 11 - ELSi Interface and ELS Sensor Module Configuration Diagram

The following Monitoring scenarios will occur after the installation and calibration are complete. On the ELSi interface module, the panel indicators will show the following:

- **Green LED** – indicates power to the ELSi interface module.
- **Red LED** – indicates that one or more of the batteries in the string does not have the proper electrolyte level and received a system alarm from one of the ELS sensor modules. It could also be that the system bus has a connection failure or loss of power.

On the ELS sensor module, the panel indicators will show the following:

- **Green LED** – pulsing green LED indicates proper operation of the ELS sensor module. Every 10 seconds the green LED stays lit to show that the ELS sensor module is taking an electrolyte reading.
- **Red LED** – indicates that the battery does not have the proper electrolyte level and received a system alarm.

5. Optional ELS Temperature Control Module

5.1 About the ELS Temperature Control Module

The ELS system has an optional ELS Temperature Control module that is used in cold climates. The ELS Temperature Control module allows you to prevent false alarms to the ELSi module in an uncontrolled cold climate. When the ELS Temperature Control module is set on a specific temperature and meets that setting, the module blocks all false alarms when the ambient temperature reaches the set temperature. The temperature setting can range from 8°C to 15°C (46°F to 59°F). When the temperature warms up, the ELS Temperature Control module will no longer block alarms. The ELSi module will return back to its normal operating mode.

5.2 Connecting the ELS Temperature Control Module

The following table describes how to connect the ELS Temperature Control module.



Figure 12 - ELS Temperature Control Module Connections

"In" jack	The RJ11 "In" jack on the ELS Temperature Control module connects to the ELSi interface module "Out" jack.
"Out" jack	The RJ11 "Out" jack connects on the ELS Temperature Control module and connects to the first ELS sensor module to the "In" jack.
Ambient temperature sensor connections	The 2 wire temperature sensor connects to the screws on the left hand side of the ELS Temperature Control module. The Temperature sensor comes with a 50 foot cable to be placed in the desired location in the battery room.

5.3 ELS Temperature Control Module Configuration Diagram

The following diagram illustrates how the ELSi interface module, ELS Temperature Control module and ELS sensor modules are connected on a string of batteries.

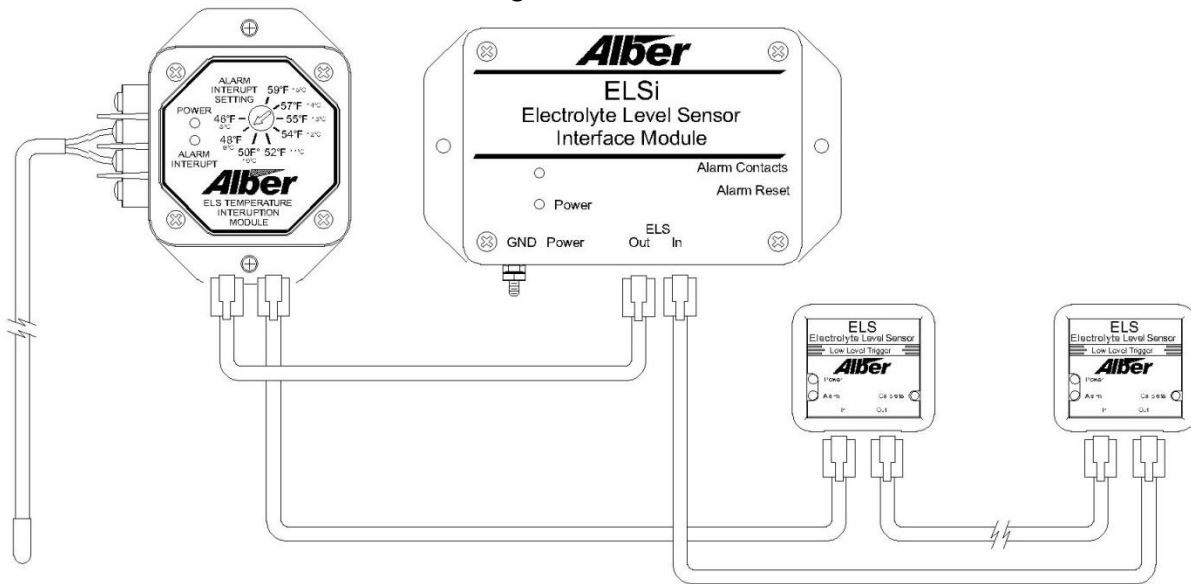


Figure 13 - ELSi Interface, ELS Temperature Control and ELS Sensor Module Connections

The following Monitoring scenarios will occur after the installation and calibration are complete. On the ELS Temperature Control Module, the panel indicators will show the following:

- **Power Green/Off LED** – Green indicates power to the ELS Temperature Control Module. Off indicates no power is connected to the module.
- **Alarm Interrupt Blue/Off LED** – Blue indicates that an uncontrolled cold temperature is detected and the ELS Temperature Control will not allow false alarms to trigger the ELSi. Off indicates that alarms are not blocked and running in normal operation mode.

6. Specifications

6.1 ELSi Interface Module

LEDs

Red LED – System Alarm

Green LED – Status/Power

Alarms

2 Form C relay contacts (2A at 30Vdc)

Alarm reset button

Input Power

AC Powered – 100V - 240V AC 0.5A/12VDC

Output Power

DC Powered – 12V DC 1.25A

Grounding

Earth to ground cable

Communications

RJ11 to ELSi interface module

Packaging

ABS Plastic Housing

4.25" W (5.25" w/flange) x 1.45" H x 3.00" D

Mounting: Two .20" holes located 4.75" or 3M adhesive gel tape.

6.2 ELS Sensor Module

LEDs

Red LED – Low Level Alarm

Green LED – Status / Power

Input Power

12VDC via RJ11 from the ELSi interface module

Communications

RJ11 to ELS sensor module

Packaging

ABS Plastic Housing

1.80" W x 1.59" H x 0.5" D

Mounting: Adhesive (Contact your Vertiv Sales Representative for the correct part number for your specifically required adhesive.)

Operating Environment

Temperature range: 10°C to 40°C (60°F to 110°F)

Humidity range: 0% to 80% RH (non condensing) at 10°C to 31°C.

0% to 50% RH (non condensing) at 32°C to 40°C.

Indoor use only.

6.3 Optional ELS Temperature Control Module

LEDs

Green LED – Status / Power

Blue LED – Uncontrolled cold climate alarm

Input Power

12VDC via RJ11 from the ELSi interface module

Communications

RJ11 to ELSi and ELS sensor module

Packaging

ABS Plastic Housing

4.25" W (5.25" w/flange) x 1.45" H x 3.00" D

Mounting: Two .20" holes located 4.75" or 3M adhesive gel tape.

Operating Environment

Temperature range: 8°C to 15°C (46°F to 59°F)

Humidity range: 0% to 80% RH (non condensing) at 10°C to 31°C.

0% to 50% RH (non condensing) at 32°C to 40°C.

Indoor use only.