PRODUCT MANUAL

Communications Device

ALERT200X

ALERT and ALERT2 Flood Warning System



11/2026
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RELIABLE MONITORING SINCE 1974

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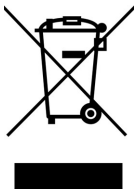
Please read first

About this manual

Please note that this manual was produced by Campbell Scientific Inc. primarily for the North American market. Some spellings, weights and measures may reflect this. In addition, while most of the information in the manual is correct for all countries, certain information is specific to the North American market and so may not be applicable to Europe, Middle East, and Africa (EMEA) or Asia Pacific (APAC) users. Differences include the U.S. standard external power supply details where some information (for example the AC transformer input voltage) will not be applicable for EMEA or APAC use. Please note, however, *that when a power supply adapter is ordered from Campbell Scientific it will be suitable for use in your country*.

Reference to some radio transmitters, digital cell phones and aerials (antennas) may also not be applicable according to your locality. Some brackets, shields and enclosure options, including wiring, are not sold as standard items in the EMEA or APAC market; in some cases alternatives are offered.

Recycling information for countries subject to WEEE regulations 2012/19/EU



At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the product's life should be removed from the product and sent to an appropriate recycling facility, per The Waste Electrical and Electronic Equipment (WEEE) Regulations 2012/19/EU. Campbell Scientific can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories. For further support, please contact Campbell Scientific, or your local agent.

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1. Introduction

> NOTE:
> An online version of this manual is available at help.campbellsci.com/alert200x.

The ALERT200X is a remote data transmitter for flood warning stations that collect and report hydrologic and meteorologic measurements in real time. It supports both legacy ALERT and ALERT2 protocols, allowing the same hardware platform to be deployed in existing networks and reconfigured later to meet updated system requirements.

> NOTE:
> For more information on the ALERT2 protocol, refer to the National Hydrologic Warning Council ALERT2 Technical Working Group website: www.hydrologicwarning.org.

At the core of the ALERT200X, the AL200X operates in measurement and control mode, providing VHF network data transmission, onboard data logging, sensor input for data acquisition, and configurable control outputs to operate connected field devices. Expanded input and output capability allows the unit to interface with common field sensors and station equipment, making it suitable for most remote monitoring installations. Configuration is designed to be straightforward for technicians familiar with existing ALERT and ALERT2 systems, while providing the additional features required for modern flood warning networks.

The transmitter is available in multiple packaging option configurations to support new installations and retrofit upgrades.

Packaging options include:

- Canister
- Enclosure
- Panel

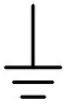
The canister option is typically installed in a weather sealed standpipe. The enclosure and panel share the same panel layout with the enclosure allowing for outdoor installation. The panel option is suitable for installations that have an existing weatherproof enclosure.

2. Precautions

READ AND UNDERSTAND the Safety section.

- GPS input gain, antenna gain less conductor losses, should not exceed 25 dB.
- If protecting GPS input with coaxial surge protector, ensure the protector does NOT block DC voltages.
- Ensure maximum protection against electrical transients/surges. Install coaxial surge protection on all antenna runs.
- The canister should be installed in a weatherproof enclosure. It is designed to protect against light drips of water and small amounts of dust, but it is not rated for outdoor stand-alone use.
- USB is sufficient to power the AL200X for configuration. If power is only supplied over USB, the AL200X will not power up either the radio or attached 12 V sensors.
- The device driver for the AL200X must be installed on your computer before you can connect to the AL200X using USB. See AL200X USB-driver installation for instructions on installing the device driver.
- ***Device Configuration Utility*** software 2.35.02 or newer is required to configure the AL200X. Some features may not be visible if you are using older versions. It is good practice to download the latest version. The latest ***Device Configuration Utility*** can be downloaded from our website, www.campbellsci.com/downloads.

Table 2-1: Symbols used on the ALERT200X

Symbol	Description
	Earth (ground) terminal, see Installation.
	Caution, see Installation (p. 8), Maintenance (p. 46), and Safety.

3. Initial inspection

Inspect the ALERT200X for any obvious signs of damage upon receipt. For each ALERT200X, the following items should be accounted for:

Table 3-1: Parts list

Quantity	Part
1	ALERT200X
1	Humidity indicator card
2	Desiccant bag
5	Cable tie
1	Cable tie mount
1	USB-C cable

4. Overview

The ALERT200X combines the AL200X modem and sensor interface with a Maxon SD-125EL V2 VHF radio, power distribution, and sensor termination in a single, field-ready package. It supports both the ALERT and ALERT2 protocols, logs measurements onboard, and provides sensor input and output to operate connected field devices. The system is powered from 9 to 18 VDC, or from 13.2 to 13.8 VDC supplied by an external charge controller when the internal battery is fitted.

The ALERT200X is available in a canister, enclosure, and panel options depending on your installation application. All three options share the same AL200X transmitter and radio, so the choice depends on the mounting environment at the site and on how sensor wiring is terminated.

4.1 Canister

The canister option is designed to fit in a standard standpipe with or without an access door. Power input, VHF and GPS antenna, and sensor input and output are made available on the canister lid. Also included is a grounding lug and two extra cable entry points for convenient access to the inside of the canister.

The ALERT200X canister option includes space for up to a 24 Ah battery. The canister includes a battery cable with spade connectors and a 5 amp fuse installed on the positive lead. It also includes a strap to secure the battery inside the canister. The raw battery option can be ordered for installation into the canister.

- 12 Ah battery part number: 8054
- 24 Ah battery part number: 10072

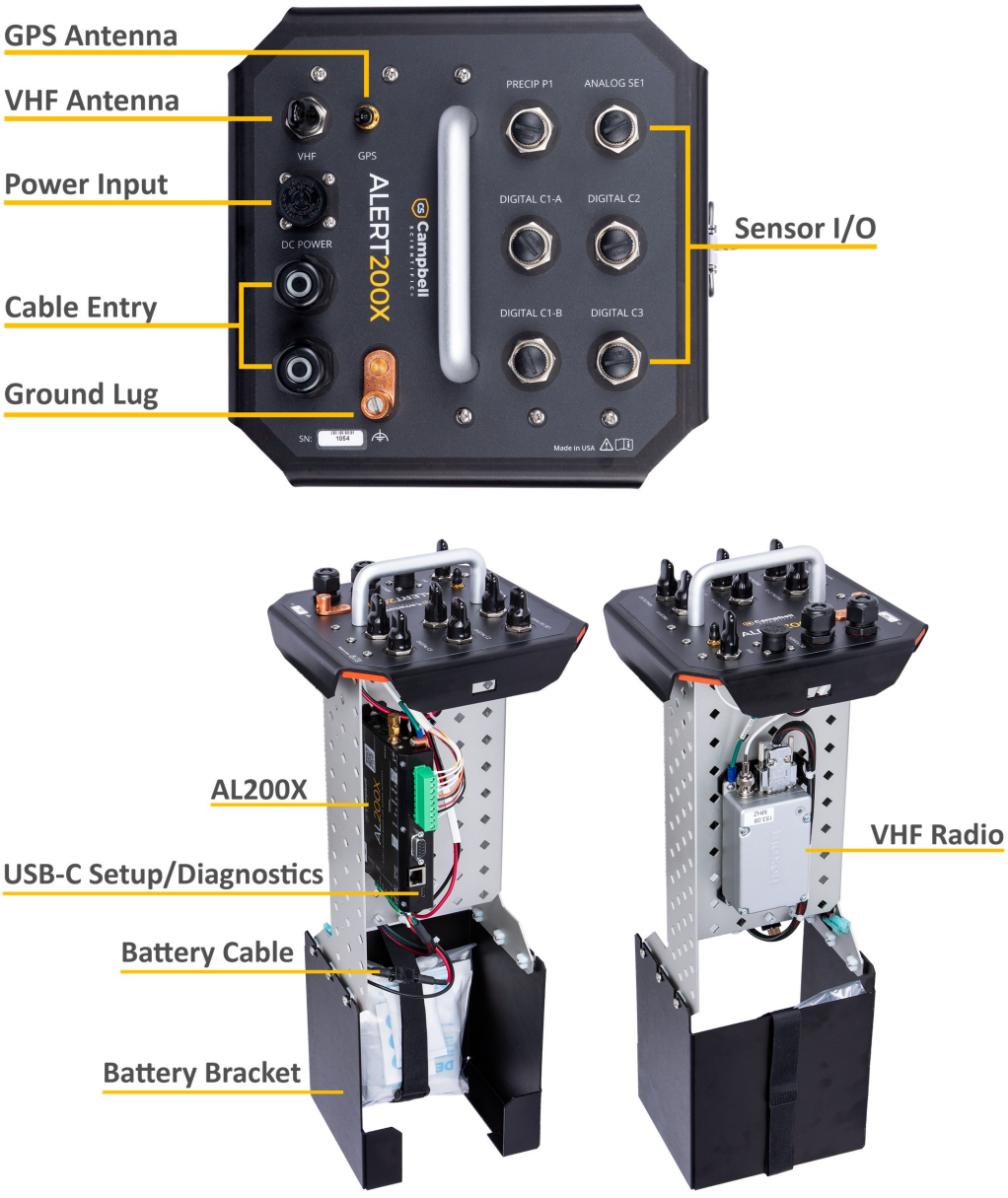


Figure 4-1. ALERT200X canister configuration

4.2 Enclosure and panel

The enclosure option is designed to be mounted to a tripod mast or small vertical pole, a lattice tower, or a large vertical pole. Mounting brackets are ordered separately and are selected by mounting structure. The power input, sensor input and output, and grounding are brought into the enclosure via grommets at the bottom of the enclosure. Terminations are made available on DIN rail terminal block on an angled bracket. The BNC VHF antenna and SMA GPS antenna connections are made available at the bottom of the enclosure.

The ALERT200X enclosure option requires purchasing mounting brackets for the intended mounting structure. The following table will outline what to order for the intended installation.

Table 4-1: Mounting bracket options for ALERT200X enclosure

Part	Part number	Description
Small pole	19002	The 19002 is used to mount an enclosure to a tripod mast or to a user-supplied pole with a 1.25" to 2.1" outer diameter
UT tower	19017	The 19017 is used to mount an enclosure to a UT6, UT10, UT20, or UT30 tower
Large pole	27390	The 27390 provides mounting hardware for attaching an enclosure to a pole with a 4" to 10" outer diameter

The panel option shares the same panel as the enclosure without the bulkhead connections for the VHF and GPS antennas.

The ALERT200X enclosure and panel options include space for up to a 24 Ah battery. The enclosure and panel include DIN rail terminals for installation of the battery. It is recommended to order the BP line of battery products properly sized for your installation. These battery options include a mounting bracket compatible with the panel, a strap for securing the battery, and a cable to connect the battery to the DIN terminals.

- 12 Ah battery part number: BP12 (8065)
- 24 Ah battery part number: BP24 (10074)

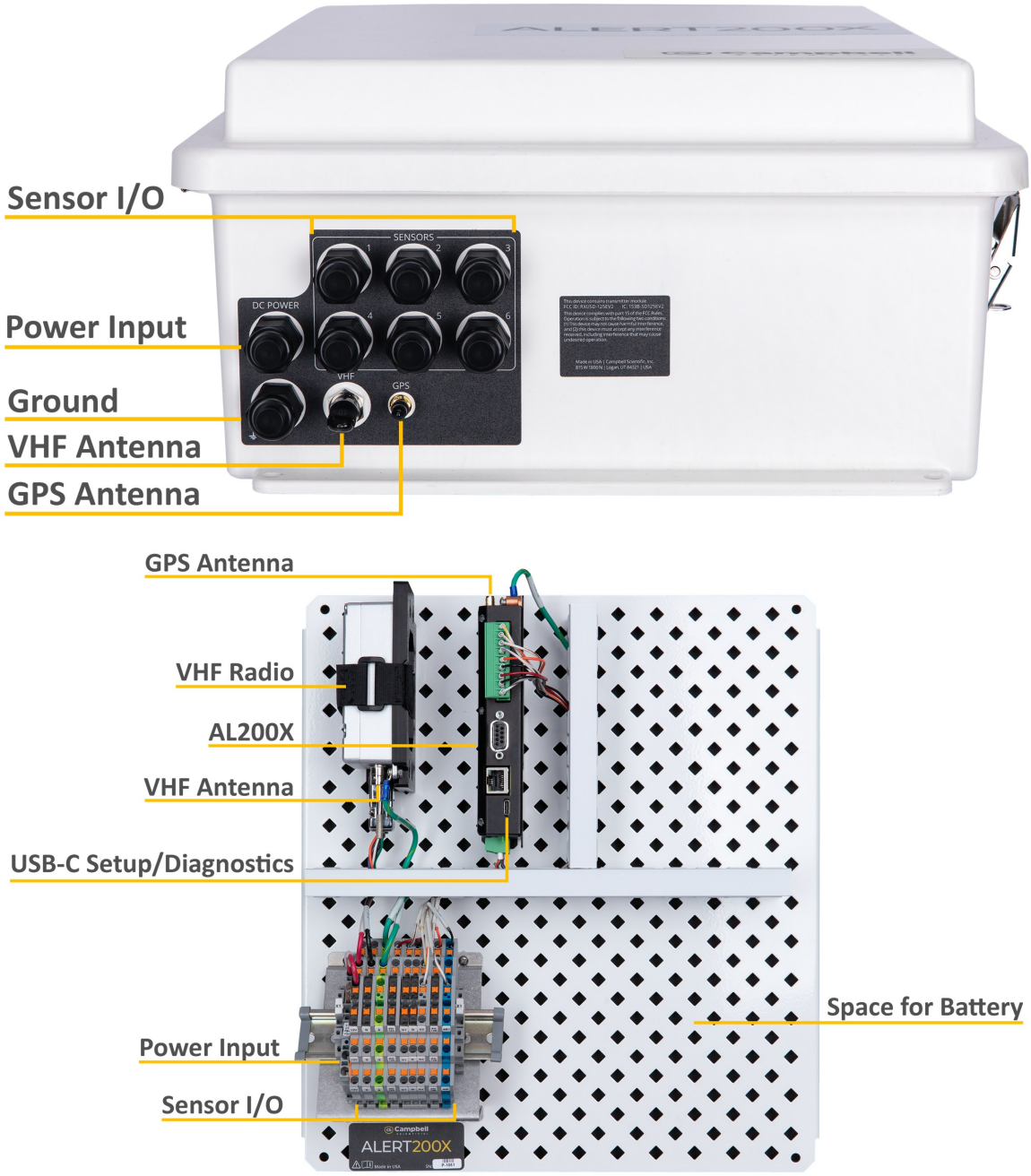


Figure 4-2. ALERT200X enclosure and panel configurations

4.3 VHF radio

The ALERT200X systems include a Maxon SD-125EL V2 radio with a frequency range of 148 to 174 MHz. This is a licensed frequency that requires registration with the appropriate authority. It is the customer's responsibility to license the frequency being used. The radios are programmed to the customer supplied frequencies during the manufacturing process. The customer frequencies

should be communicated at the time of order. Up to 16 frequencies can be programmed on a single radio.

The recommended VHF antenna kit is Campbell Scientific part number 35539. The VHF antenna kit includes all the necessary cables, mounts, connectors, and antenna for typical VHF radio applications. The whip-style omni antenna and ground radials are field-tunable for a specific frequency, and the stainless-steel mounting hardware allows for easy installation atop a mast. Coaxial cables are included to connect the VHF radio to the surge suppressor, and the surge suppressor to the antenna.

4.4 GPS

The GPS interface is built directly into the AL200X. It requires an active GPS antenna connected to the SMA port typically through a surge protector. A GPS antenna is recommended for ALERT installations to create correct time stamps of logs and allow setting the transmission times to minimize interfering with transmission from other field stations. See GPS and clock considerations section of the AL200X manual for more details. A GPS antenna is required for ALERT2 installations.

It is recommended to install a surge suppressor in-line with the GPS antenna. Refer to Radio and GPS antenna (p. 28) for the recommended parts for your installation.

5. Specifications

Operating temperature:	-30 to 60°C (-22 to 140°F)
Sensor I/O connection	
Canister:	6x M12 8-pin
Enclosure:	6x strain relief plugs, DIN rail terminals
Panel:	DIN rail terminals
GPS connector:	SMA
VHF antenna connector:	BNC
Power connector	
Canister:	MS connector 3-pin
Enclosure:	Strain relief plug, DIN rail terminals
Panel:	DIN rail terminals

Power input	
Without internal battery:	9 to 18 VDC
With internal battery:	13.2 to 13.8 VDC (sourced from external charge controller)
Radio:	Maxon SD-125EL V2 VHF Radio 148-174MHz
Dimensions	
Canister:	20.3 x 20.3 x 57.2 cm (8.0 x 8.0 x 22.5 in)
Enclosure:	40.6 x 45.7 x 20.3 cm (16.0 x 18.0 x 8.0 in)
Panel*:	34.3 x 38.1 x 12.7 cm (13.5 x 15.0 x 5.0 in)
Weight	
Canister:	5.3 kg (11.7 lbs)
Enclosure:	6.5 kg (14.25 lbs)
Panel:	2.1 kg (4.6 lbs)

*Panel part number 18823 Universal Backplate for ENC14/16 Enclosure; for panel dimensions please reference the product webpage for drawings.

See AL200X and 44566 Maxon Radio specifications for more detailed specifications.

6. Installation

This section describes the physical installation of the ALERT200X at a field site. The physical attachment of power, antennas, and sensors will depend on the form factor of the system ordered. It is good practice to connect all components, configure the system, and test in the office before deploying the system in the field.

The following installation instructions will assume the use of a backup battery in the system. This is the typical configuration in the field. It is possible to connect the system to AC mains by using an appropriate AC to DC converter.

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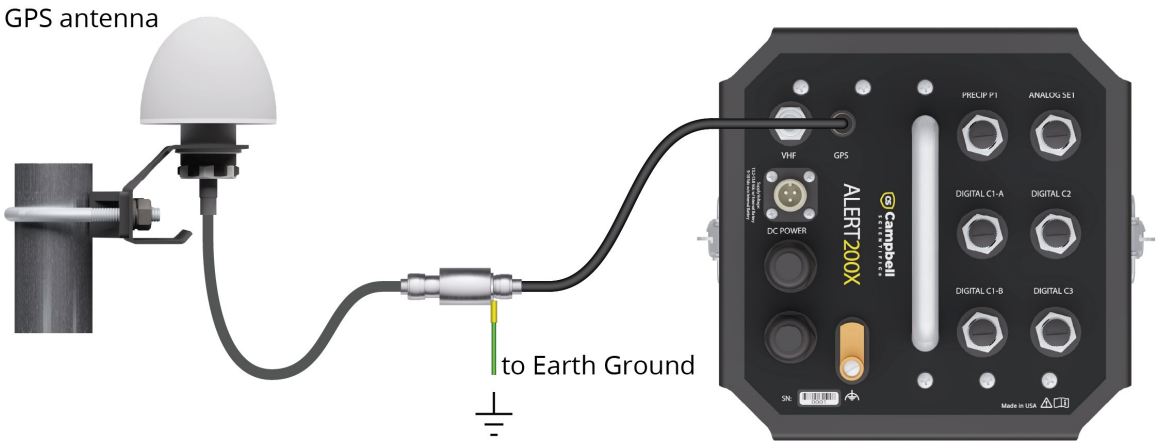
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6.1 Canister

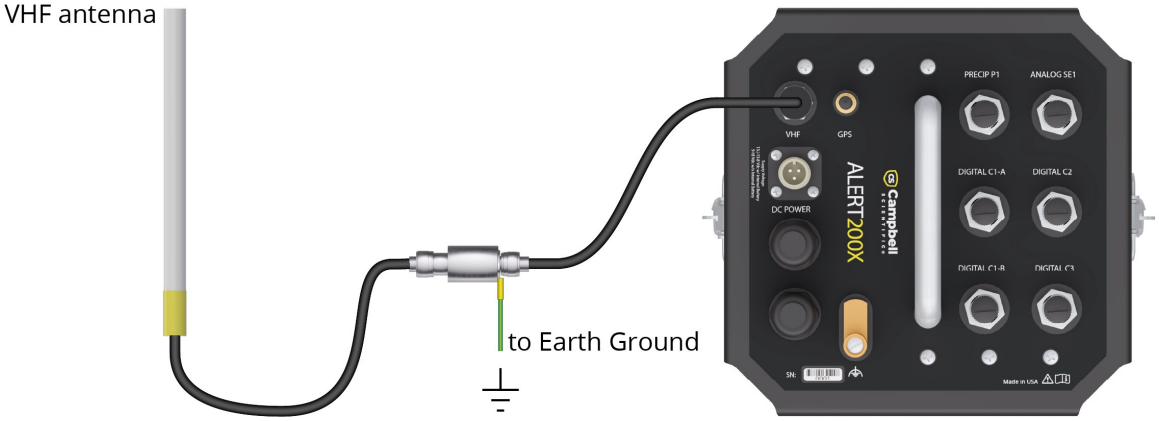


Figure 6-1. ALERT200X canister lid connectors

1. Attach a GPS antenna to the GPS SMA connector located at the top of the canister lid. This is also recommended for ALERT operation, to create correct time stamps of logs and allow setting the transmission times to minimize interfering with transmission from other field stations. See GPS and clock considerations section of the AL200X manual for more details. It is recommended to connect the GPS antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.

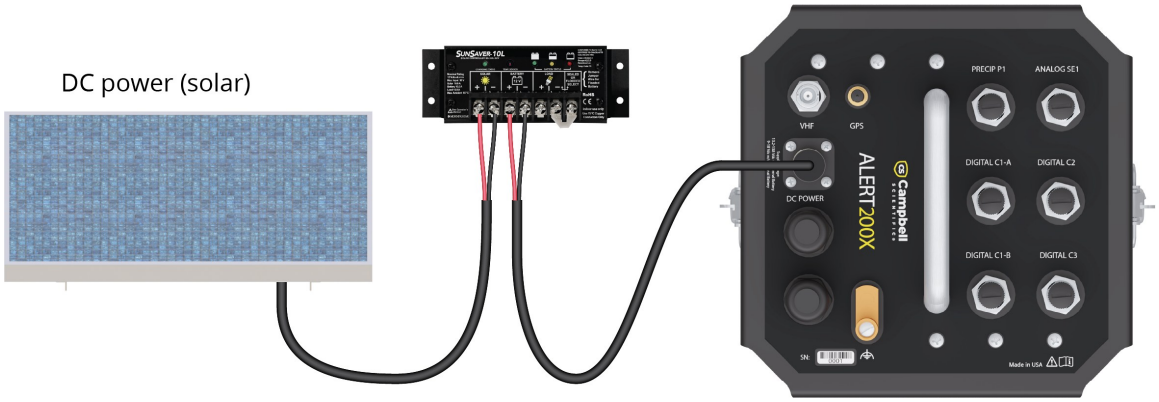


2. Attach a VHF antenna to the VHF BNC connector located at the top of the canister lid. It is advisable to connect a 50-ohm dummy load if powering the system without a VHF antenna. It is recommended to connect the VHF antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.



3. Attach the desired sensors to the appropriate M12 connector port located at the top of the canister lid. See System connections (p. 30) for more details on the connector requirements and pinouts.
4. Attach an Earth ground to the ground lug located at the top of the canister lid.
5. Install an appropriately sized 12 VDC battery. Use the hook and loop strap around the battery to secure. Attach the black wire to the negative terminal of the battery using the spade connector. Attach the red wire to the positive terminal of the battery using the spade connector.

6. Attach DC power cable to a 9 to 18 VDC source. This connection typically comes from a solar regulator load.



6.2 Enclosure

The ALERT200X enclosure option is ideal for installations that require a weatherproof solution for an ALERT or ALERT2 field station. It uses the same internal layout as the panel option, with DIN rail terminals for sensor, ground, and power connections, six sensor strain relief plugs, and separate fittings for the ground and DC power cables. The GPS (SMA) and VHF antenna (BNC) connectors are located on the bottom of the enclosure. The system accepts 9 to 18 VDC, or 13.2 to 13.8 VDC, from an external charge controller when the internal battery is fitted.

The enclosure can be mounted to a tripod mast or small vertical pole, a lattice tower, or a large vertical pole. Mounting brackets are ordered separately and are selected by mounting structure.

The ALERT200X enclosure option requires purchasing mounting brackets for the intended mounting structure. The following part will outline what to order for your installation.

Table 6-1: Mounting bracket options for ALERT200X enclosure

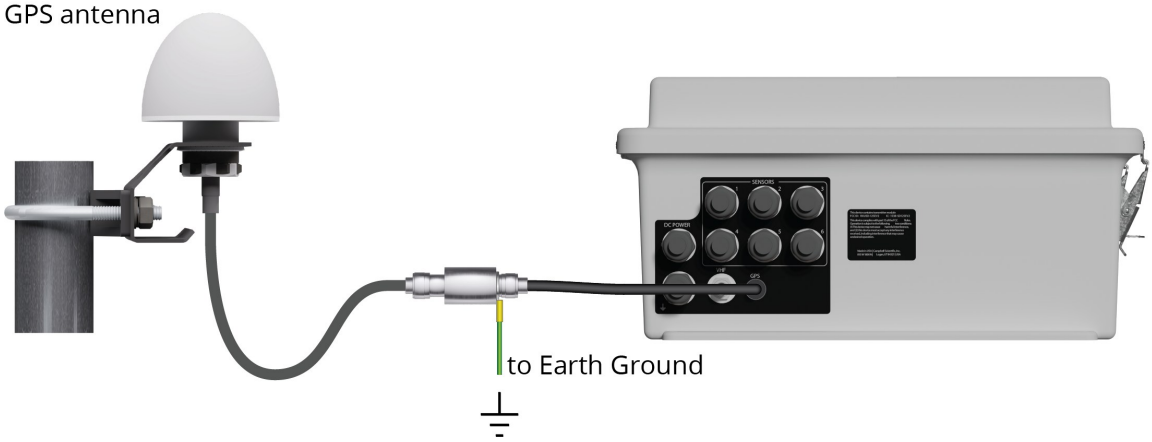
Part	Part number	Description
Small pole	19002	The 19002 is used to mount an enclosure to a tripod mast or to a user-supplied pole with a 1.25" to 2.1" outer diameter
UT tower	19017	The 19017 is used to mount an enclosure to a UT6, UT10, UT20, or UT30 tower
Large pole	27390	The 27390 provides mounting hardware for attaching an enclosure to a pole with a 4" to 10" outer diameter

6.2.1 Enclosure connections

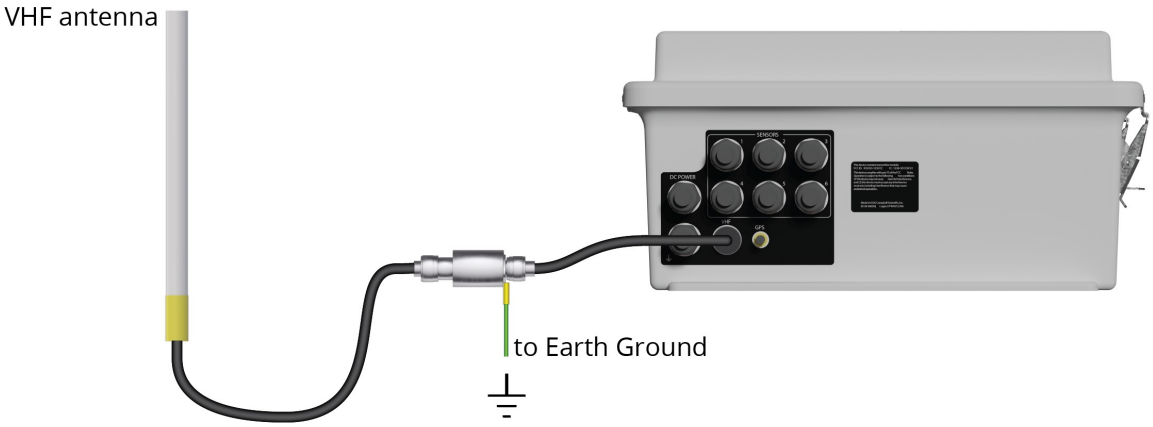


Figure 6-2. ALERT200X enclosure connectors

1. Attach a GPS antenna to the GPS SMA connector located at the bottom of the enclosure. This is also recommended for ALERT operation, to create correct time stamps of logs and allow setting the transmission times to minimize interfering with transmission from other field stations. See GPS and clock considerations section of the AL200X manual for more details. It is recommended to connect the GPS antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.



2. Attach a VHF antenna to the VHF BNC connector located at the bottom of the enclosure. It is advisable to connect a 50-ohm dummy load if powering the system without a VHF antenna. It is recommended to connect the VHF antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.



3. Route the cable inside the enclosure using the available sensor wire compression fittings on the bottom side of the enclosure. Terminate the sensor wire to the appropriate port on the DIN rail termination block. The enclosure and panel share the same panel layout. See Sensors for more details on the sensor termination requirements.

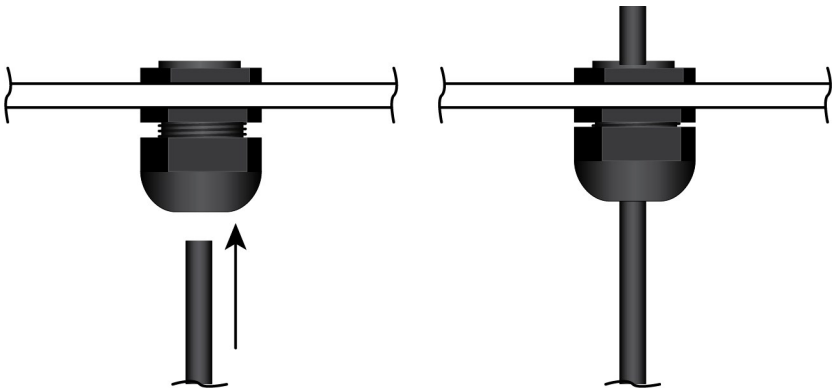


Figure 6-3. Cable inserted into compression fitting

4. Route an Earth ground cable inside the enclosure using the ground wire compression fitting and terminate in the appropriate port on the DIN rail termination block. See Sensors for more details on the termination requirements.

5. Route the DC power cable from a 9 to 18 VDC source, or 13.2 to 13.8 VDC from an external charge controller when the internal battery is fitted, inside the enclosure using the DC POWER wire compression fitting and terminate in the appropriate port on the DIN rail termination block. This connection typically comes from a solar regulator load.



WARNING:
The radio can be damaged if it transmits without a proper dummy load or antenna.

6.2.2 Attaching an enclosure to a tripod mast

The mast mount part is intended for mounting the ALERT200X enclosure to the mast of a tripod. The mounting bracket will be shipped with a three-piece bracket that will need to be mounted to the top and bottom of the enclosure (see Figure 6-4 [p. 15], Figure 6-5 [p. 15], and Figure 6-6 [p. 16]).

Attach the enclosure to the mast as follows:

1. Position the enclosure on a side of the mast facing away from the equator.
2. Place the enclosure at the desired height, typically 1-2 m (3-6 ft) from the ground.
3. Use the furnished 2-inch U-bolts to secure the enclosure to the tripod mast.
4. Route the 14 AWG wire from the brass tripod ground clamp to the enclosure ground terminal. Strip 2.5 cm (1 in) of insulation from each end of the wire and insert the end of the wire into the ground terminal.



Figure 6-4. An enclosure with the "–MM" mounting option attaches to a tripod mast via U-bolts



Figure 6-5. This exploded view shows the components of a "–MM" bracket



Figure 6-6. An enclosure attached to a tripod mast

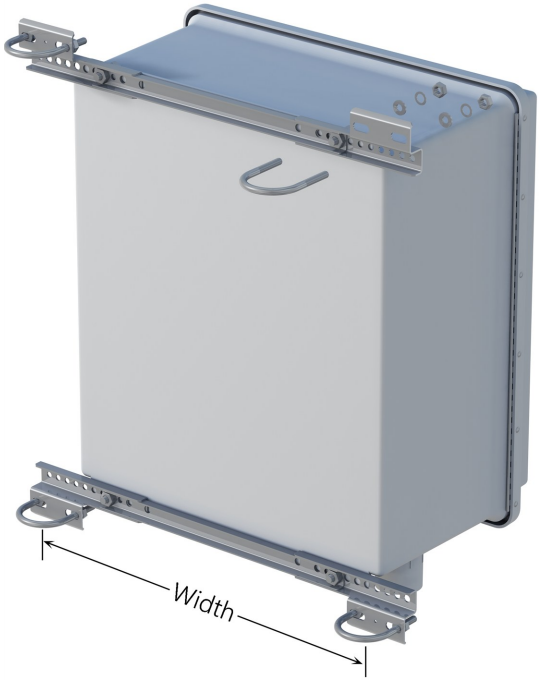
6.2.3 UT6, UT10, UT20, and UT30 tower installation

The tower mount bracket is used to attach the ALERT200X enclosure to a tower. The mounting bracket will be shipped with a three-piece bracket that needs to be mounted to the top and bottom of the enclosure. This mounting bracket option uses the same three-piece brackets as the mast mount bracket, except the pieces are rearranged so that the flanges are on the side of the bracket instead of in the middle. The distance between the centers of each flange needs to be 26 cm (10.25 in) for the UT6 and UT10, or 43 cm (17 in) for the UT20 and UT30 (see Figure 6-7 [p. 17], Figure 6-8 [p. 18], and Figure 6-9 [p. 18]).

Attach the enclosure to the tower legs as follows:

1. Remove the bolts and nuts connecting the bracket to the enclosure.
2. Slide out the flange sections so the distance between the centers of each flange is set for the correct tower (see Figure 6-7 [p. 17]).
3. Reattach the bracket to the enclosure using the original bolts and nuts.
4. Position the enclosure on a side of the tower facing away from the equator.
5. Place the enclosure at the desired height, typically 1 m (3 ft) from the ground.

6. Use the furnished 1.5-inch U-bolts to secure the enclosure to the tower legs.
7. Route the 14 AWG wire from the brass tower ground clamp to the enclosure ground terminal. Strip 2.5 cm (1 in) of insulation from each end of the wire and insert the end of the wire into the ground terminal.



Tower	Width
UT6	26 cm (10.25 in)
UT10	26 cm (10.25 in)
UT20	43 cm (17 in)
UT30	43 cm (17 in)

Figure 6-7. Enclosure brackets configured for a tower mount



Figure 6-8. This exploded view shows the components of a "–TM" bracket option



Figure 6-9. An enclosure attached to two tower legs

6.2.4 Pole mount

The pole mount bracket is intended for mounting an enclosure to a vertical pole. An ALERT200X enclosure ordered with this option will be shipped with brackets, metal bands, and mounting hardware needed to secure the enclosure. The metal bands are routed through the brackets, and then around a vertical pole. They are anchored in place using screw clamps.

Attach the enclosure to a vertical tube as follows:

1. Position a bracket at the top of the enclosure as shown in Figure 6-10 (p. 19). Secure it with a bolt, washer, and locknut at each end. Attach the lower bracket in the same manner, rotating the bracket so it extends below the enclosure.

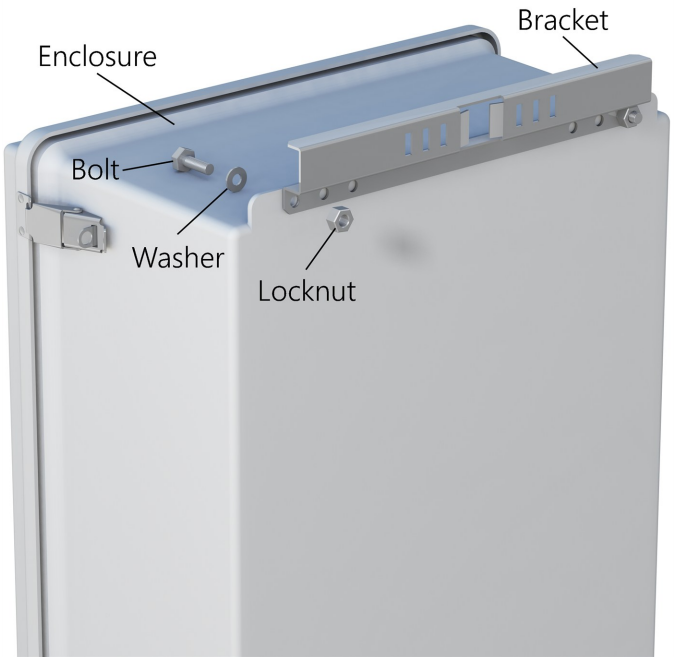


Figure 6-10. Attaching the pole mount bracket

2. Feed a metal band through the openings in each bracket as shown in Figure 6-11 (p. 20). Use the closest set of holes for smaller poles and the farthest set of holes for larger poles.

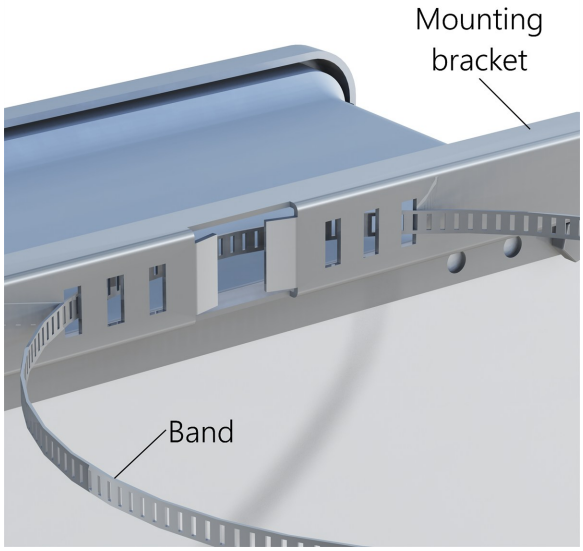


Figure 6-11. Inserting the metal band

3. Position the enclosure on the side of the pole facing away from the equator.
4. Place the enclosure at the desired height. Please note that the recommended cable lengths for the sensors assume the bottom of the enclosure is mounted 1 m (3 ft) from the ground.

5. Insert the tab on the end of the screw threads (Figure 6-12 [p. 21]) into the hole at one end of the upper strap.

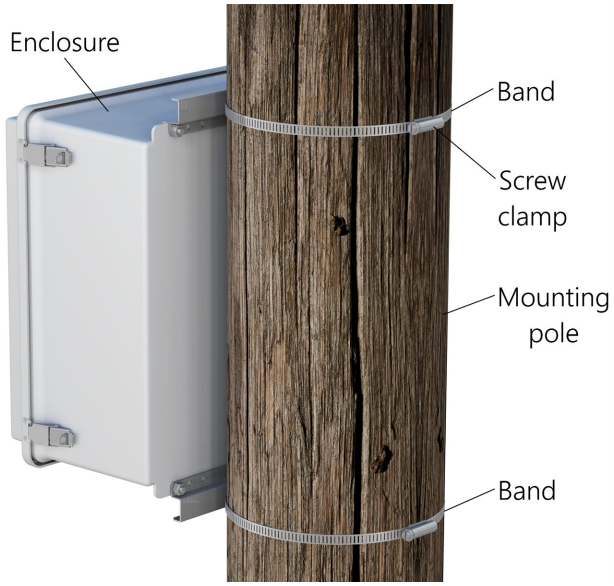


Figure 6-12. Securing the enclosure to a pole

6. Pull the strap tight around the pole to determine which hole to insert the screw clamp at the other end of the strap. Insert the clamp into this hole.
7. Use metal shears to remove any excess strap, leaving a small amount for adjustments.
8. Insert the screw threads into the screw clamp and tighten, using a flathead screwdriver or nut driver.
9. Repeat steps 5–8 for the lower strap.
10. Ensure the enclosure is properly grounded through the use of a ground rod or similar device.

6.3 Panel

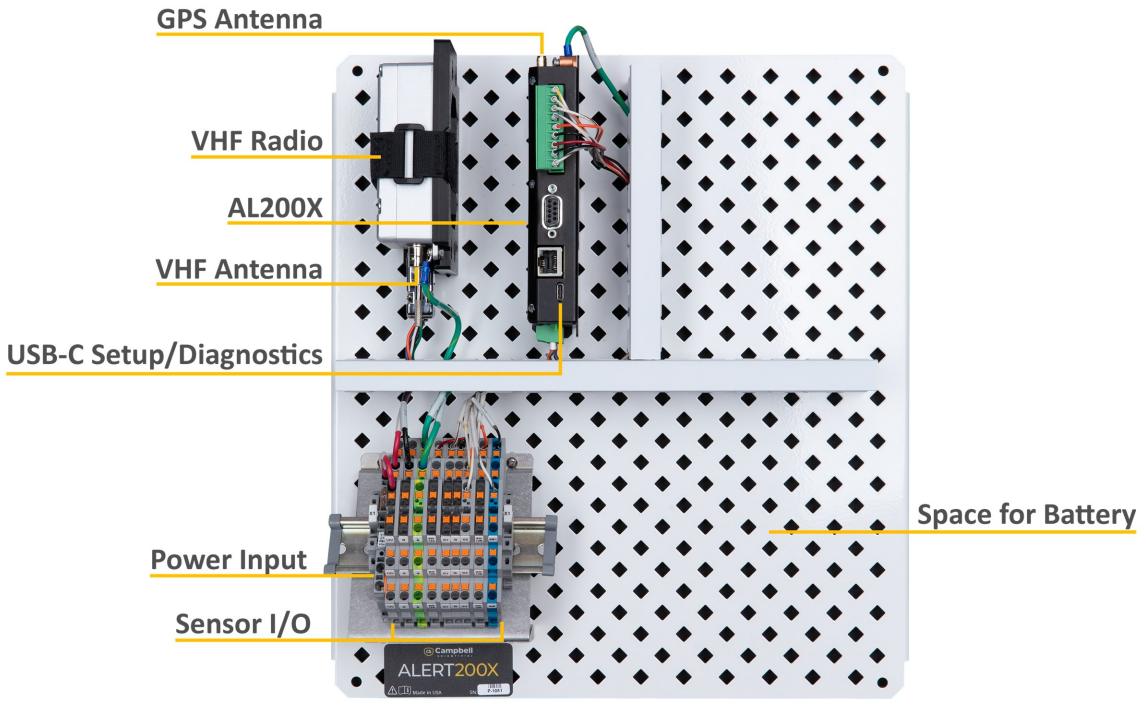
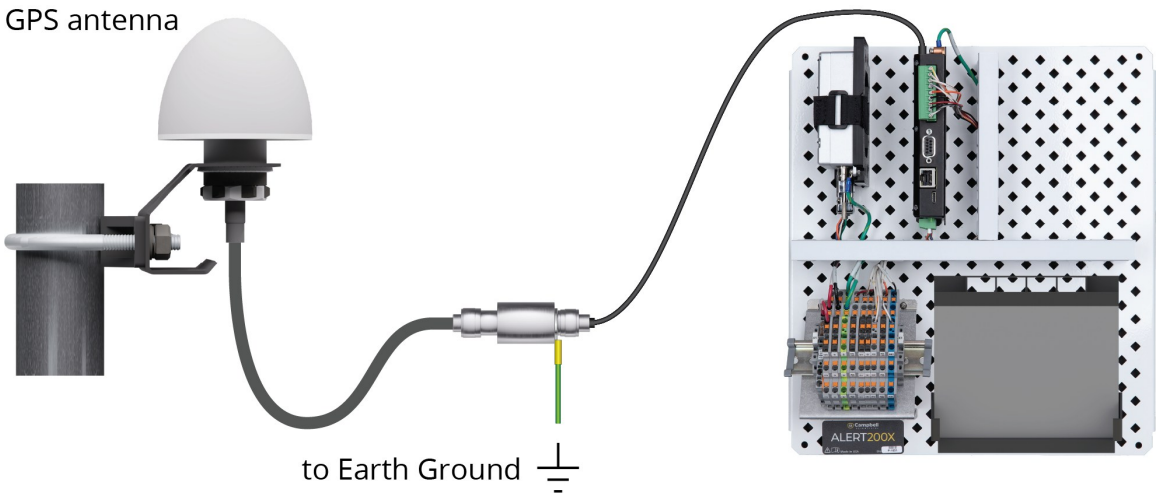
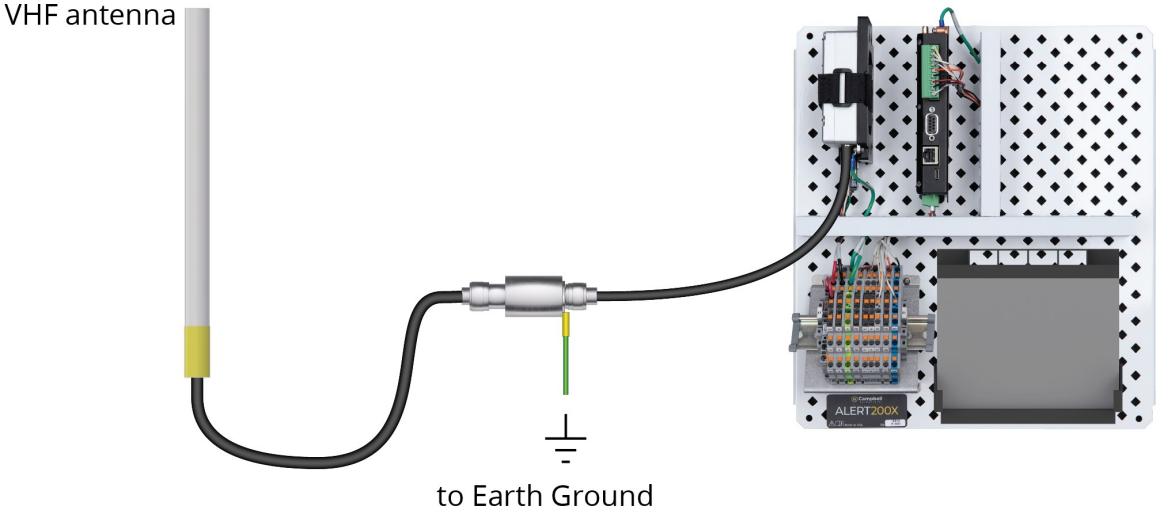


Figure 6-13. ALERT200X panel connectors

1. Attach a GPS antenna to the GPS SMA connector located on the AL200X GPS port. This is also recommended for ALERT operation, to create correct time stamps of logs and allow setting the transmission times to minimize interfering with transmission from other field stations. See GPS and clock considerations section of the AL200X manual for more details. It is recommended to connect the GPS antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.

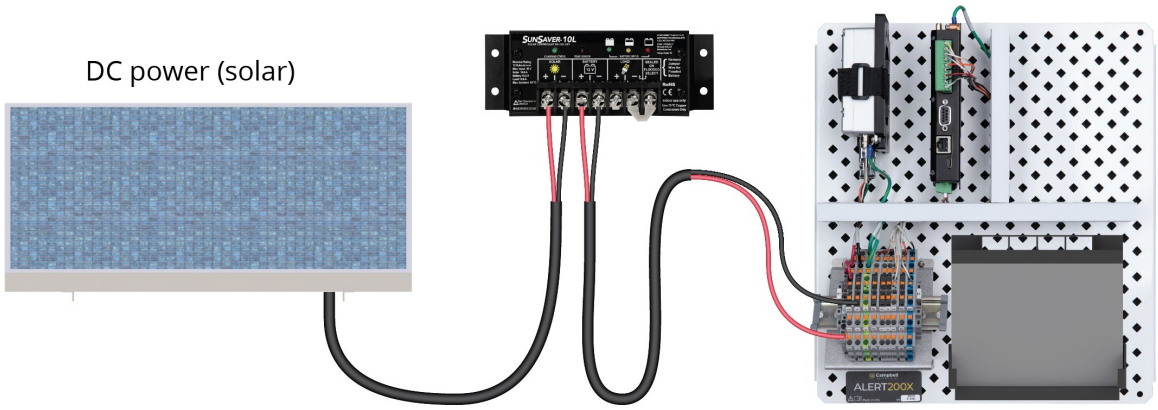


2. Attach a VHF antenna to the VHF BNC connector located on the VHF radio. It is advisable to connect a 50-ohm dummy load if powering the system without a VHF antenna. It is recommended to connect the VHF antenna with appropriate surge suppression. Reference Radio and GPS antenna for options.



3. Terminate the sensor wire to the appropriate port on the DIN rail termination block. The enclosure and panel share the same panel layout. See Sensors (p. 36) for more details on the sensor termination requirements.
4. Terminate a wire from Earth ground to the appropriate port on the DIN rail termination block. See Enclosure and panel terminals (p. 34) section for more details on the termination requirements.

5. Route the DC power cable from a 9 to 18 VDC source and terminate in the appropriate port on the DIN rail termination block. This connection typically comes from a solar regulator load.



7. Operation

The operation and configuration of the ALERT200X is done through the interface of the AL200X. This section will provide steps to getting your ALERT200X operational. Please refer to the AL200X manual for more detailed description of settings or the operation of the ALERT200X.

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7.3 System connections 30
7.3.1 Canister field wirable connector 30
7.3.2 Enclosure and panel terminals 34
7.4 Sensors 36
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7.4.2 LevelVue B10 bubbler water level 37
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7.1 Configuration

> **NOTE:**
> The device driver for the AL200X must be installed on your computer before you can connect to the AL200X using USB. See AL200X USB-driver installation instructions in the AL200X manual, for instructions on installing the device driver.

1. Connect the supplied USB cable between a USB port on your computer and the USB port on the AL200X.
2. Open ***Device Configuration Utility***.
3. Under **Device Type**, select AL200X.
4. Click the down arrow to the right of **Communication Port** and select the port associated with the AL200X.
5. Click **OK**.
6. The **Baud Rate** must be 57600. If it is other than that, set it to 57600.
7. Click **Connect**.
8. Specify the settings on each tab to the following:

   > **NOTE:**
   > If either ALERT or ALERT2 mode is selected, settings for each mode will initially be visible, but settings that do not apply to the selected mode will be grayed out. After the **Operation Mode** is applied, the inapplicable settings (and tabs) will not be displayed.

   Main

   a. Set **Operation Mode** to **ALERT** or **ALERT2 Field Station**. It is important to select this first, as it will determine which of the following settings are available.

   b. When ALERT2 is selected and the ***Device Configuration Utility*** is connected, the AL200X can be configured to transmit normally either with the **Test Flag** set, without the **Test Flag** set, or muting all transmissions. Setting the **Test Flag** may allow the data collection software to handle maintenance reports appropriately. Select the desired behavior from the drop-down list. The test button will continue to send test transmissions, independent of this setting.

> NOTE:
> When using the **Terminal** tab, the ***Device Configuration Utility*** does not maintain communications without user interaction. Accordingly, the **Test Flag** functionality only operates in the **Settings Editor** tab.

COM1

a. Use default values.

ALERT

a. Configure settings to match your ALERT network.

ALERT2

a. Configure settings to match your ALERT2 network.

Radio Settings

a. For Campbell Scientific RF320 series radios (Ritron DTX-L series) and the included Maxon SD-125EL V2, use the default settings. For other radios, check with the manufacturer for the necessary radio settings. If a power amplifier will be used at this site, additional time may be required at the start of the transmission for the amplifier to detect the transmission and switch in the amplifier.

b. Some settings are specific to ALERT or ALERT2 transmissions. These are noted in the help panel at the bottom of the ***Device Configuration Utility*** screen, and ones that do not apply to your selected mode will be grayed out.

Encryption (ALERT2 only)

a. Refer to Encryption in the AL200X manual for details. For initial configuration, it is recommended to set the **Encrypt Outgoing Messages** to **False**. If determined to be appropriate, enable and check encrypted transmissions before deployment.

GPS Settings

a. Use default settings. If good GPS reception is not available, temporarily transport the AL200X, GPS antenna, and battery to a location that can receive a good GPS signal. After powering, obtaining a GPS lock to determine UTC time may require up to 13 minutes (to acquire the current value for **Leap Seconds**) and the GPS LED will go out. If the AL200X is powered, its clock will continue to run unless reset by sending a diagnostic command via the terminal or loading an OS. When checking a transmitter's timed transmissions, use a UTC reference like www.time.gov.

b. GPS is also recommended for ALERT operation. This allows for correct time stamps of logs and setting the transmission times to minimize interfering with transmission from other field stations (this is discussed in detail in GPS settings in the AL200X manual).

Measurement and Control

The sensors are configured in the **Measurement and Control** table. It is recommended to start from one of the **Load Group** templates, and then add or delete from there.

a. The **Load Group** provides predefined groups of measurement and control definitions to load into the builder as a template. The values are then edited to create the required setup.

> NOTE:
> It may be necessary to click **Apply** and then **Connect** to display the configuration options for the **Load Group** that can be edited.

b. Click **Edit** to configure the sensor group to fit your application.

c. If **ALERT** mode is selected, **ALERT Sensor Scan Interval** and **Offset** are settable. It is recommended to leave these at their default values. The purpose and details of these settings are discussed in Terminal interface commands in the AL200X manual.

> NOTE:
> The **Offset** will differ on different transmitters; it is based on the serial number.

d. The **P1 Accumulator** counts the number of pulses, typically from a tipping bucket causing a temporary connection to ground as it tips. Depending on the **Measurement and Control** Configuration, this value can be transmitted, or a scaled value can be reported.

e. **ALERT2** mode can send precipitation reports in TBRG format (with a selectable number of bytes) or GSR. GSR will be appropriate if the P1 tips are scaled in the **Measurement and Control** Configuration, resulting in a **Floating Point** value. If GSR is being used, it may be desired to set a rollover for the scaled accumulator value. When GSR format is used, no tip offset times are transmitted, only the total accumulator value at the measurement time for the configured ALERT2 time slot.

f. If ALERT2 **Multi-Sensor Report** is enabled, any sensor with an ID of 1 to 8 will be sent in MSR format. If MSR is not selected, all sensors (other than Rain, which is ID 0) will be sent in General Sensor Report (GSR) format. ALERT2 also offers Multi-Sensor

Reports for IND reports (status reports for the device itself, e.g. battery, clock status, etc).

9. Click the **Apply** button at the bottom of the window. It is good practice to save the configuration file for later reference.

> CAUTION:
> The **Test Button** may be pressed for up to 5 s to trigger a data transmission. If pressed for 5 to 10 s, it will transmit a 5 s tone used for radio and antenna checks and adjustments. These transmissions may interfere with reports from other stations. Do not cause radio transmissions without being connected to either an antenna or a dummy load.

> TIP:
> When pressing the **Test Button**, the green serial LED flashes once per second. Counting the LED flashes is a good method to know how many seconds you have pressed the button.

7.2 Radio and GPS antenna

There are two types of antennas that are needed for proper operation of the ALERT200X system. A VHF radio antenna is used to broadcast data over the VHF radio network and a GPS antenna is used to keep accurate time.

It is important to attach an appropriate antenna to properly communicate over the VHF network. The ALERT series of systems all come standard with the Maxon model SD-125EL V2 VHF modem. The frequency range of the Maxon VHF radio is between 148 to 174 MHz. The radios can be programmed by Campbell Scientific with customer supplied frequencies. Up to 16 frequencies can be programmed with channel one selected unless otherwise specified. Once multiple frequencies are programmed, the frequency can be changed by removing the lid of the radio via four Phillips screws and then changing the dip switches to the desired channel.

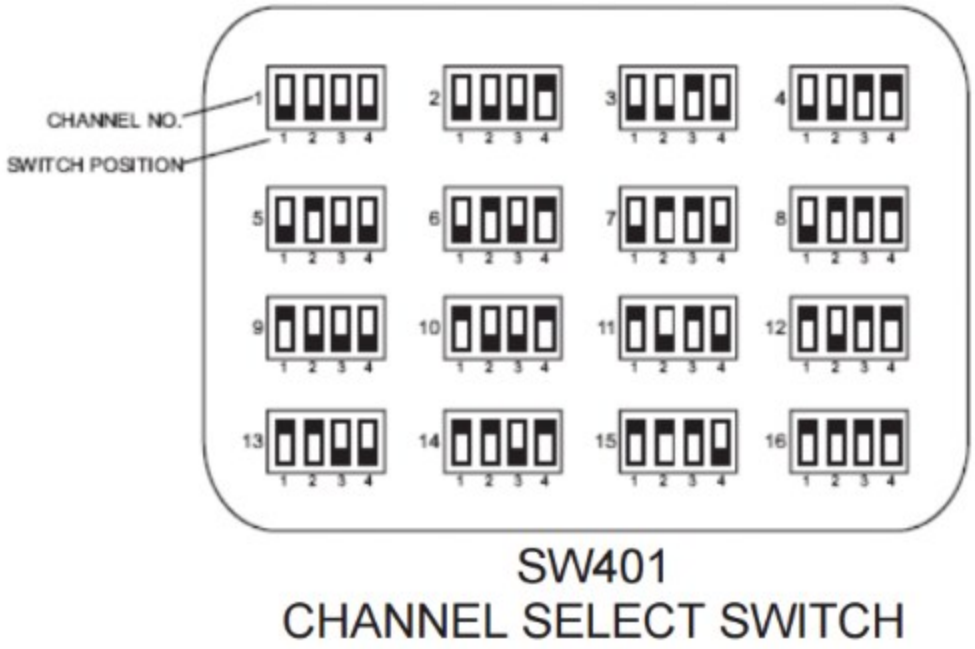


Figure 7-1. Channel select switch

When connecting an antenna, it is recommended to include surge suppression. The recommended GPS and VHF antenna kits come with appropriate surge suppression devices and all the required cables for making the connections.

GPS antenna parts

Table 7-1: Recommended GPS antenna parts for order

Part	Part #	Description
GPS Antenna	17992	28 dBi 3.3 V active GPS Antenna without Cable
Surge Protection Kit	31326	Includes: • 31180 surge suppressor • 29553 bulkhead grounding cable • 31316 antenna cable type N pin (male) to SMA pin (male) • 43529 surge suppressor mounting bracket • 14464 nylon grommet and 15763 screws
GPS Antenna Cable	45040	COAX3NT antenna cable Type N Pin (Male) and TNC Pin (Male) Connectors, various lengths

VHF antenna parts

Table 7-2: Recommended VHF antenna parts for order		
Part	Part #	Description
VHF Omni Antenna Kit	35539	Includes: • 29549 Surge suppressor type N • 35535 Cable type N to type N • 35536 Cable type N to BNC • 35534 VHF/UHF antenna base • 35533 VHF 5/8 wave screw on whip antenna

Antenna mounting options

Table 7-3: Mounting options for antenna		
Part	Part #	Description
GPS antenna mounting stand	30626	3/4 in. IPS or GPS Antenna Mounting Stand
Pipe mount	7623	3/4 IPS 10 in. Aluminum Pipe with Threads

7.3 System connections

System connections differ depending on which ALERT200X option you have. Canister systems have M12 8-pin connectors for sensor I/O, while panel and enclosure systems land them on DIN rail terminals. The sections below cover the M12 connector and pin assignments, then the wiring, power, and sensor connection details specific to each configuration. Follow the section that matches your system.

7.3.1 Canister field wirable connector 30
7.3.2 Enclosure and panel terminals 34

7.3.1 Canister field wirable connector

Traditionally ALERT-style canisters have used Mil-spec (MS) connectors for interfacing with sensors in the field. The ALERT200X canister uses the Campbell Scientific standard M12 8-Pin A-coded connector for ease of use with new and existing sensors, better weather protection, and the ability to use field wirable connectors.

This section will go over the installation of existing sensors in the field using the 44328 field wirable connector.

For more information, see this field wirable connector installation video. Note this video is for another product line and uses a slightly different connector.

Wiring an existing sensor in the field or a sensor with bare leads to the canister M12 connector:

1. Route the cable through the pressing screw, followed by the clamping basket, seal, and then coupling sleeve.
2. Strip the main cable jacket 20 mm exposing the individual sensor wires.
3. Strip the individual sensor wires 5 mm exposing the conductors.
4. Wire each sensor conductor to the corresponding port to the plug insert. See Campbell Scientific M12 8-pin standard pin assignments (p. 32) table for the pin assignment locations. A 2 mm flat blade screwdriver is required (CSI part # 31608). Take care not to back out the set screw all the way.
5. Attach the coupling sleeve to the main connector housing by aligning the notch or key and screwing together. Screw in the pressing screw. Hand tighten all connections.

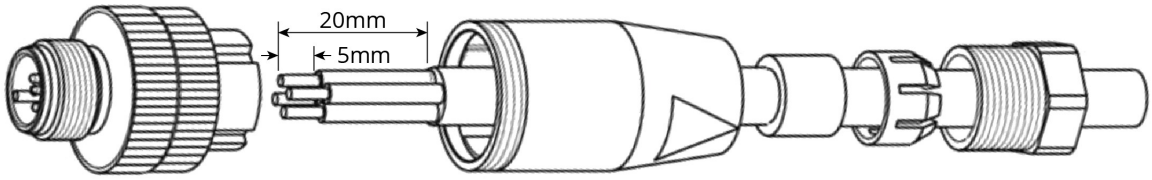


Figure 7-2. Wiring bare leads to an M12 connector



Figure 7-3. M12 connector as viewed from wire end of adapter

Table 7-4: Campbell Scientific M12 8-pin standard pin assignments		
M12 pin #	Signal	Color (CSI typical)
1	Universal 2	Blue
2	Analog 1 (or Universal 3)	Orange
3	Analog 2 (or Universal 4)	Purple
4	Detect	Gray
5	Power	Brown
6	SDI-12 / Identify	White
7	Universal 1	Yellow
8	Ground	Black

7.3.1.1 Sensor interface M12 8-pin connector pin assignments

This section provides the pin assignments for the M12 8-pin connectors of the sensor I/O on the top of the canister. The pinout follows a standard set by Campbell Scientific using a standard M12 8-pin A coded connector. The tables below also list the matching Mil-spec connector pin assignments, which are standard across many vendors. Use these when converting an existing installation to M12 connectors.

Table 7-5: Precip P1				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
1	Universal 2 even	Blue	P1	A
8	Ground/shield	Black	G	D
*Mil-spec connector 5-pin precipitation				

Table 7-6: Analog SE1				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
2	Analog1	Orange	SE1	A
5	Power (12VDC)	Brown	SW12A	C
8	Ground/shield	Black	G	D
*Mil-spec connector 4-pin-R				

Table 7-7: Digital C1-A				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
5	Power (12VDC)	Brown	SW12B	E
6	SDI-12/Identify	White	C1	A
8	Ground/shield	Black	G	D
*Mil-spec connector 5-pin-R				

Table 7-8: Digital C2				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
5	Power (12VDC)	Brown	12V	E
6	SDI-12/Identify	White	C2	A
8	Ground/shield	Black	G	D
*Mil-spec connector 5-pin-R				

Table 7-9: Digital C1-B				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
5	Power (12VDC)	Brown	12V	E
6	SDI-12/Identify	White	C1	A
8	Ground/shield	Black	G	D
*Mil-spec connector 5-pin-R				

Table 7-10: Digital C3				
Pin #	Description	Standard wire color	Termination AL200X	Mil-spec connector pin*
5	Power (12VDC)	Brown	12V	E
6	SDI-12/Identify	White	C3	A
8	Ground/shield	Black	G	D
*Mil-spec connector 5-pin-R				

Power to ALERT200X canister sensor connectors	
Connector	Pin 5 powered from
Precip P1	+12V
Digital C1-A	SW12B
Digital C1-B	+12V
Analog SE1	SW12A
Digital C2	+12V
Digital C3	+12V

Analog sensor input is limited to 0 – 5V, with slope and offset computations. Accordingly, RTD sensors like the TempVue 10 are not able to be measured. A sensor that has a linear voltage output is suitable.

7.3.2 Enclosure and panel terminals

The enclosure and panel share the same power and sensor I/O termination on a terminal block that is DIN rail mounted to an angle bracket, which makes the port labels easier to see. The port labels match the AL200X with an additional 12V port which is powered directly from the battery.

The 12V DIN rail provides access to fused 12V. However, if powering a sensor continuously, and one of the SW12A or B connections is available, it is recommended to connect the sensor power lead to the appropriate SW12 terminal on the DIN rail. Then, configure the AL200X **Measurement and Control** for a warm time of -1.

This will supply continuous power to the sensor and provide the benefit of the protection circuits designed into the AL200X. This assumes the current drawn will be within the range of the AL200X SW12 outputs, which is listed in the AL200X specifications. These supplies will provide sufficient power for most sensors.

Connect Earth ground to the green/yellow terminal with the ⏚ ground label.

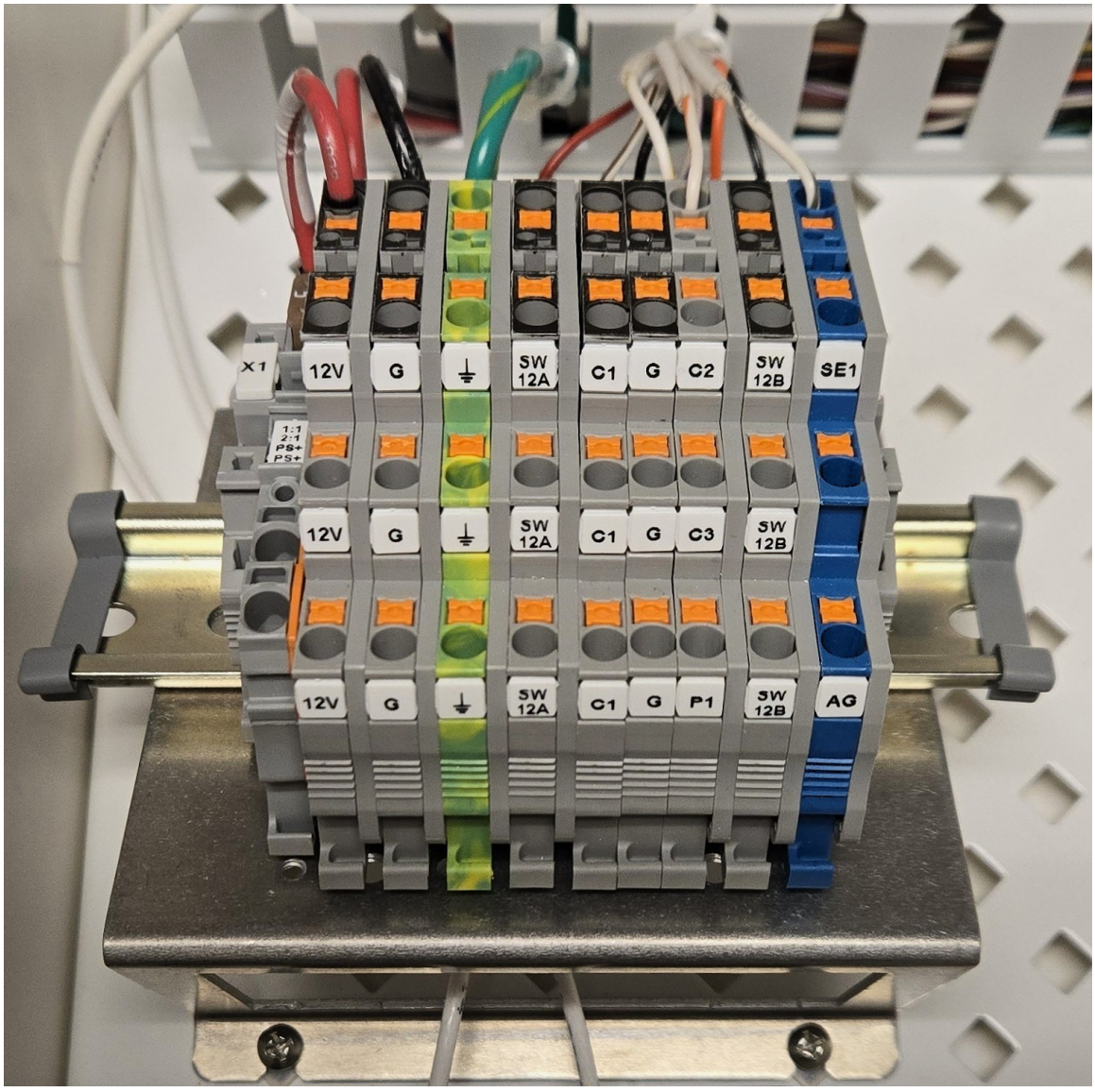


Figure 7-4. ALERT200X terminal block

7.4 Sensors

The following sections highlight recommended sensors for the ALERT200X system deployment and considerations for installation. Refer to the respective sensor manuals for detailed information about the sensors.

> NOTE:
> The sensors should be configured for the ALERT200X system prior to installation. The SDI-12 addresses and communications protocol settings must match the configuration settings in the user interface.

7.4.1 SDI-12 watch 36
7.4.2 LevelVue B10 bubbler water level 37
7.4.3 RangeVue 15/30 radar water level sensors 40
7.4.4 CS451 and CS456 pressure transducers 41
7.4.5 RainVue series rain gauges 42
7.4.6 Tipping bucket rain gauges 44

7.4.1 SDI-12 watch

The SDI-12 watch function was added in OS 1.23 and allows the AL200X to read SDI-12 sensor data from another data logger or controller. A typical application is to sniff SDI-12 data from another manufacturer's data logger and sensor. The AL200X is connected to the other data logger's SDI-12 measurement port via a lead wire to one of the control ports of the AL200X. The AL200X should also be electrically grounded to the other data logger. The same AL200X port can be used for multiple SDI12Watch instructions.

Do not connect any power terminal on the AL200X to a sensor being powered by another device.

To use the SDI-12 watch feature:

1. Connect to the AL200X that is set to **ALERT Field Station** or **ALERT2 Field Station** Mode. Set the **Configuration Mode** in the **Measurement and Control** tab to **Advanced** and click **Apply** to set the mode.
2. After reconnecting, click on **Edit** for the **Measurement and Control Configuration** to add a new sensor.

3. Setup the sensor normally. To activate the watch feature, enter **Watch** in the **Scan** option.

Name	ID	Port	Command	Power	Warmup	Item	Multipler	Offset	Scan	Report	Format	Event	Action	Log
Clock	201	IND	Clock	None	0	1	1	0	Slot	12h	GSR	1	Report	Report
Battery	8	IND	Battery	None	0	1	1	0	Slot	12h	GSR		None	Report
Precip	0	P1	Closes	None	0	1	1	0	Slot	6h	TBR	1	Report	Report
Stage	7	C1	0M!	None	0	1	1	0	Watch	Scan	GSR	0.250	Report	Report
RadarDist	21	C1	0M!	None	0	2	1	0	Watch	Scan	GSR		None	Report

Table 7-11: ALERT200X connections

Option	Recommended Cable	Connection Port
Canister	VueCBL2	DIGITAL C1-A (SW12B)
Enclosure / Panel	VueCBL1	C1, C2, or C3

Table 7-12: SDI-12 watch

Wire color	Function	Panel terminal block	Canister connector pin
White	SDI-12 signal	C1, C2, or C3	6
Black	Signal ground	G	8

7.4.2 LevelVue B10 bubbler water level

The LevelVue B10 is a bubbler water-level measurement sensor based on a non-submersible pressure transducer system. Bubblers accurately measure the pressure it takes to create a continuous airflow in an airline submerged in water. The LevelVue B10 is designed for ease of use while providing long-term performance and accuracy. With a built-in keypad and display, you can complete your setup and site visit tasks using the LevelVue B10. The LevelVue B10 interfaces with the ALERT200X using SDI-12.

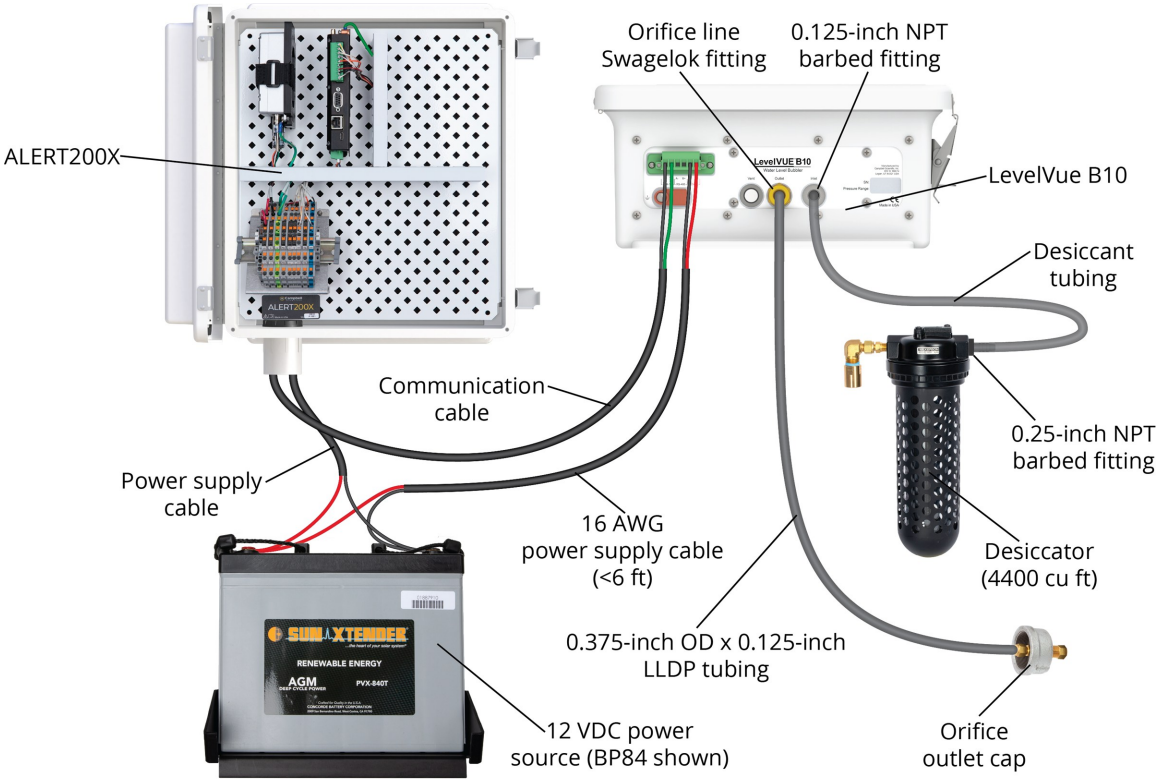


Figure 7-5. Example of LevelVue B10-based system using an ALERT200X panel or enclosure configuration

As shown in the above image, the LevelVue B10 needs to be powered directly from a high capacity 12 V battery. This battery may also supply power to the ALERT200X through separate power wires connected at the battery terminals. However, the ALERT200X SDI-12 connections should not include power from the ALERT200X sensor port on a canister, or from any connection on the DIN rail on a panel or enclosure.

The AL200X is connected to the LevelVue's SDI-12 **Data** port via a wire to one of the control ports of the ALERT200X.

Table 7-13: ALERT200X connections		
Option	Recommended Cable	Connection Port
Canister	CABLE8PIN-LITE (SDI-12) CABLEPCBL (Power)	DIGITAL C1-A (SW12B), C1-B, C2, C3*
Enclosure / Panel	VueCBL1 CABLEPCBL (Power)	C1, C2, or C3*
*Do not power the LevelVue B10 from the ports on the ALERT200X. Power must be sourced from a large capacity battery.		

LevelVue B10 bubbler water level sensor		
Function	Panel terminal block	Cannister connector pin
SDI-12 signal	C1, C2, C3	6
Ground	G	8

See SDI-12 wiring section in the LevelVue B10 manual for more information.

Example measurement and control

Stage	7	C1	0M!	None	0	1	1	0	2h	0.080	Report
LinePressure	21	C1	0M!	None	0	2	1	0	2h		None
TankPressure	22	C1	0M!	None	0	3	1	0	2h		None
Temp	23	C1	0M!	None	0	4	1	0	2h		None
Batt	24	C1	0M!	None	0	5	1	0	2h	<11.5	Report
Error	25	C1	0M!	None	0	6	1	0	2h		None
StageCrest	26	C1	0M!	None	0	7	1	0	2h		None
CrestTime	27	C1	0M!	None	0	8	1	0	2h		None

7.4.3 RangeVue 15/30 radar water level sensors



Figure 7-6. RangeVue 15/30 radar water level sensors

The recommended radar water level sensor for the ALERT200X is the RangeVue 15 or RangeVue 30. As a non-contact, radar water-level sensor, you can use the RangeVue™15/30 to monitor the water level of rivers, lakes, and reservoirs. With 80 GHz radar technology, the RangeVue 30 directly measures the distance between the sensor face and the water surface. This distance can be used to determine water level or stage. The sensor is ideal for areas where submersible sensors can be damaged due to corrosion, contamination, flood-related debris, or lightning.

The RangeVue line of sensors uses SDI-12 for communication with the ALERT200X. It is recommended to use a switched 12 volt source using the **Sensor Warm-up Time** setting for the input power with a warmup period of at least 7 seconds, with 10 seconds recommended. Cycling power can conserve power and allows the system to respond to extremely rapid water level changes like those occurring during flash flood conditions. See Focus window section in the RangeVue 15/30 manual for more information about the focus window.

> NOTE:
> All other **Digital** ports on the canister besides the **Digital C1-A** port are continuously powered.

> TIP:
> When cycling power on the RangeVue sensor, it is recommended to not connect any other sensors to the same SDI-12 signal port the RangeVue is using. The RangeVue may load down the **C** data line when its power is off.

Table 7-14: ALERT200X connections		
Option	Recommended Cable	Connection Port
Canister	VueCBL2	DIGITAL C1-A (SW12B)
Enclosure / Panel	VueCBL1	C1, C2, or C3

RangeVue 15/30 radar water level sensor			
Wire color	Function	Panel terminal block	Canister connector pin
White	SDI-12 signal	C1, C2, or C3	6
Clear	Shield	G	8
Brown	Power	SW12A or SW12B	5
Black	Power ground	G	8

Example Measurement and Control Configuration for the RangeVue 15/30:

In this example, the RangeVue sensor is set to default units in meters.

Name	ID	Port	Command	Power	Warmup	Item	Multipler	Offset	Report	Event	Action
Clock	201	IND	Clock	None	0	1	1	0	12h	1	Report
Battery	8	IND	Battery	None	0	1	1	0	12h		None
Precip	0	P1	Closes	None	0	1	1	0	12h	1	Report
Stage	7	C1	0M!	SW12B	7	1	1	0	2h	0.080	Report
SNR_Ratio	20	C1	0M!	SW12B	7	4	1	0	2h		None
Status	21	C1	0M!	SW12B	7	5	1	0	2h		None

7.4.4 CS451 and CS456 pressure transducers



Figure 7-7. CS451 Stainless-Steel Pressure Transducer

The CS451/CS456 Submersible Pressure Transducer provides pressure and temperature measurements for determining water level or stage height. The CS451/CS456 consist of a piezoresistive sensor and a temperature sensor housed in a 316L stainless-steel or titanium case. The cable incorporates a vent tube to compensate for atmospheric pressure fluctuations. The

vent tube terminates inside a desiccant tube or the A151 vented termination case, which prevents water vapor from entering the inner cavity of the transducer.

Table 7-15: ALERT200X connections

Option	Recommended Cable	Connection Port
Canister	A151	DIGITAL C1-A (SW12B)
Enclosure / Panel	Included cable with desiccant tube	C1, C2, or C3

Table 7-16: CS451 and CS456 pressure transducer water level sensors

Wire color	Function	Panel terminal block	A151 terminal block	Canister connector pin
White	SDI-12 signal	C1, C2, or C3	4	6
Clear	Shield	⏚ (analog ground)	1	8
Red	Power	12V, SW12A, SW12B	3	5
Black	Power ground	G	2	8
Blue	Ground	G	2	8
Yellow	Ground	G	2	8

Example Measurement and Control Configuration for the CS451/456:

In this example, the pressure transducer is set to default with PSIG for pressure/level and °C for temperature. It uses a multiplier of 2.3066 to convert PSIG to feet and a change in water level of 0.25 ft or 3 inches will report.

Name	ID	Port	Command	Power	Warmup	Item	Multipler	Offset	Report	Event	Action
Clock	201	IND	Clock	None	0	1	1	0	12h	1	Report
Battery	8	IND	Battery	None	0	1	1	0	12h		None
Precip	0	P1	Closes	None	0	1	1	0	12h	1	Report
Stage	7	C1	0M!	SW12A	-1	1	2.3066	0	4h	0.250	Report
Wtr_temp	20	C1	0M!	SW12A	-1	2	1	0	2h		None

7.4.5 RainVue series rain gauges

The RainVue-series rain sensors are an ideal solution for many hydrological or meteorological applications, such as weather stations and flood warning systems.

Advanced algorithms and digital processing within the sensor compensate for errors caused by high-intensity rain and provide accurate precipitation and intensity measurements. Constructed

of an aerodynamic funnel, the RainVue is robust and minimizes the amount of liquid precipitation that is lost due to the effects of wind.

The models differ in their body material:

- The RainVue™10 has a molded UV-stabilized plastic body
- The RainVue™20 has a rugged aluminum body

Each model can be ordered in 0.01 inch or 0.1 mm options.



Figure 7-8. RainVue-series rain sensors

Example Measurement and Control Configuration for the RainVue series:

In this example, the rain gauge is a 0.1 mm per tip version and is connected to the **C2** channel. The SDI-12 command is set to **0M!** and is collecting the third parameter: total intensity corrected accumulation. The total intensity corrected accumulation value will only reset with a command. The gauge will report its value every hour and every tip at 0.1 mm.

Measurement and Control Configuration

Name	ID	Port	Command	Power	Warmup	Item	Multipler	Offset	Report	Event	Action
Clock	201	IND	Clock	None	0	1	1	0	12h	1	Report
Battery	8	IND	Battery	None	0	1	1	0	12h		None
RainVue_accum	20	C2	0M!	None	0	3	1	0	1h	0.100	Report

Table 7-17: ALERT200X connections		
Option	Recommended Cable	Connection Port
Canister	CABLE8T8PIN	DIGITAL C1-A (SW12B), C1-B, C2, C3
Enclosure / Panel	CABLE8PIN-LITE	C1, C2, or C3

Table 7-18: RainVue 10/20 tipping bucket rain gauge			
Wire color	Function	Panel terminal block	Canister connector pin
White	SDI-12 signal	C1, C2, or C3	6
Clear	Shield	G	8
Brown	Power	12V, SW12A, SW12B	5
Black	Power ground	G	8

7.4.6 Tipping bucket rain gauges

There are many options for tipping bucket rain gauges that are compatible with the ALERT series of systems. Each system includes a pulse input port that records tips from tipping bucket rain sensors using a variety of mechanisms such as a magnetic reed switch or dual reed switch. A few choices include the TE525, TE525WS, TE525MM, CS700, TB4, TB4MM, CS700H. More information can be found on their respective webpages.



Figure 7-9. TE525, CS700, and TB4 rain gauges

Table 7-19: ALERT200X connections		
Option	Recommended Cable	Connection Port
Canister	44328 Field Wirable Connector	PRECIP P1
Enclosure / Panel	N/A	P1

Table 7-20: TB4, TB4M, CS700, or TE525 tipping bucket rain gauge			
Wire color	Function	Panel terminal block	Canister connector pin
Black	Rain signal	P1	1
White	Rain signal reference	G	8
Clear	Shield	G	8

Name	ID	Port	Command	Power	Warmup	Item	Multipler	Offset	Report	Event	Action
Clock	201	IND	Clock	None	0	1	1	0	12h	1	Report
Battery	8	IND	Battery	None	0	1	1	0	12h		None
Precip	0	P1	Closes	None	0	1	1	0	12h	1	Report
Stage	7	C1	0M!	SW12A	-1	1	2.3066	0	4h	0.250	Report
Wtr_temp	20	C1	0M!	SW12A	-1	2	1	0	2h		None

8. Maintenance and troubleshooting

NOTE:
Please see the Maintenance and Troubleshooting section in the AL200X manual for more information about the AL200X.

NOTE:
The ALERT200X is designed to provide years of trouble-free service with reasonable care. However, if factory repair is needed, first contact a Campbell Scientific application engineer to obtain an RMA (Return Materials Authorization) number. An RMA number and product-safety documents are required prior to any repair shipments being accepted at Campbell Scientific. See Assistance for more information.

8.1 Maintenance

Periodically check the sensor inputs against known values to ensure that the device is still within the specified accuracy ranges. The AL200X within the ALERT200X will normally scan each sensor every frame. This can be changed in the **Measurement Configuration Advanced** settings. Campbell Scientific recommends not changing the default setting of **Slot** without consulting Campbell Scientific, since there can be important side effects. The current **Raw** and **Scaled** readings can be observed in the **Data Monitor**, along with a log of the last three transmissions for each sensor.

Pressing the **Test Button** for one to five seconds will trigger a test transmission containing the latest data available to the AL200X within the ALERT200X. Pressing the button for 5 to 10 seconds will cause the AL200X within the ALERT200X to generate a test tone and sustain it for five seconds. This test tone can be used to check the forward and reflected power of the radio, as well as channel frequency error and proper deviation level. Always confirm that a dummy load or properly tuned antenna is connected to the radio when transmissions may occur.

> TIP:
> When pressing the **Test Button**, the green serial LED flashes once per second. Counting the LED flashes is a good method to know how many seconds you have pressed the button.

Consult your sensor and radio manufacturer manuals for recommended maintenance of these devices.

8.1.1 When to replace desiccant

The humidity indicator card or optional CS211 Smart Enclosure Sensor indicates when the desiccant needs to be replaced.

> CAUTION:
> Because desiccant is inexpensive, Campbell Scientific recommends replacing desiccant packets rather than attempting to reactivate the desiccant.

8.1.1.1 Humidity indicator card

The humidity indicator card has three colored circles that indicate the percentage of humidity. Desiccant packets inside the enclosure should be replaced with fresh packets when the upper dot on the indicator begins to turn pink. The indicator card does not need to be replaced unless the colored circles overrun.

8.1.1.2 Optional CS211 smart enclosure sensor

The CS211 Smart Enclosure Sensor monitors temperature and humidity levels inside enclosures. The CS211 includes an LED indicator to signal enclosure wetness and when desiccant needs to be replaced. Refer to the CS211 manual for sensor specifications, installation procedures, and programming information.

> NOTE:
> The CS211 Smart Enclosure Sensor is compatible with enclosure or panel configurations only.

8.2 Troubleshooting

Operating system version

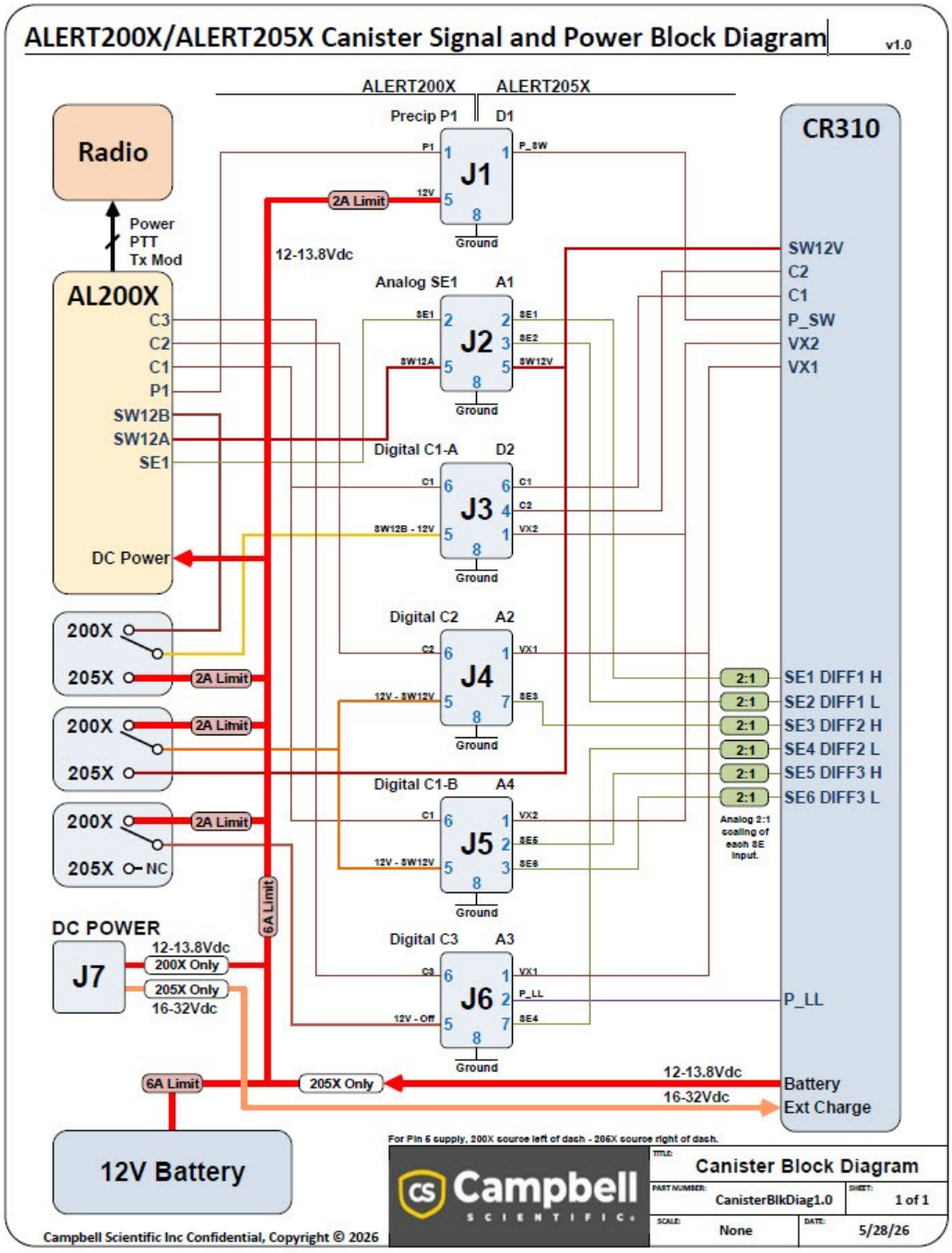
Verify the device is running one of the following minimum operating system (OS) versions:

- AL200X v1.23 or later

GPS issues

The AL200X provides GPS debug capabilities described in the Terminal interface commands section of the AL200X manual.

Appendix A. Canister signal and power block diagram



Limited warranty

Covered equipment is warranted/guaranteed against defects in materials and workmanship under normal use and service for the period listed on your sales invoice or the product order information web page. The covered period begins on the date of shipment unless otherwise specified. For a repair to be covered under warranty, the following criteria must be met:

1. There must be a defect in materials or workmanship that affects form, fit, or function of the device.

2. The defect cannot be the result of misuse.

3. The defect must have occurred within a specified period of time; and

4. The determination must be made by a qualified technician at a Campbell Scientific Service Center/ repair facility.

The following is not covered:

1. Equipment which has been modified or altered in any way without the written permission of Campbell Scientific.

2. Batteries; and

3. Any equipment which has been subjected to misuse, neglect, acts of God or damage in transit.

Campbell Scientific regional offices handle repairs for customers within their territories. Please see the back page of the manual for a list of regional offices or visit www.campbellsci.com/contact to determine which Campbell Scientific office serves your country. For directions on how to return equipment, see Assistance.

Other manufacturer's products, that are resold by Campbell Scientific, are warranted only to the limits extended by the original manufacturer.

CAMPBELL SCIENTIFIC EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTIES OF

MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Campbell Scientific hereby disclaims, to the fullest extent allowed by applicable law, any and all warranties and conditions with respect to the products, whether express, implied, or statutory, other than those expressly provided herein.

Campbell Scientific will, as a default, return warranted equipment by surface carrier prepaid. However, the method of return shipment is at Campbell Scientific's sole discretion. Campbell Scientific will not reimburse the claimant for costs incurred in removing and/or reinstalling equipment. This warranty and the Company's obligation thereunder is in lieu of all other

warranties, expressed or implied, including those of suitability and fitness for a particular purpose. Campbell Scientific is not liable for consequential damage.

In the event of any conflict or inconsistency between the provisions of this Warranty and the provisions of Campbell Scientific's Terms, the provisions of Campbell Scientific's Terms shall prevail. Furthermore, Campbell Scientific's Terms are hereby incorporated by reference into this Warranty. To view Terms and conditions that apply to Campbell Scientific, Logan, UT, USA, see Terms and Conditions. To view terms and conditions that apply to Campbell Scientific offices outside of the United States, contact the regional office that serves your country.

Assistance

Products may not be returned without prior authorization. Please inform us before returning equipment and obtain a **return material authorization (RMA) number** whether the repair is under warranty/guarantee or not. See Limited warranty for information on covered equipment.

Campbell Scientific regional offices handle repairs for customers within their territories. Please see the back page of the manual for a list of regional offices or visit www.campbellsci.com/contact to determine which Campbell Scientific office serves your country.

When returning equipment, a RMA number must be clearly marked on the outside of the package. Please state the faults as clearly as possible. Quotations for repairs can be given on request.

It is the policy of Campbell Scientific to protect the health of its employees and provide a safe working environment. In support of this policy, when equipment is returned to Campbell Scientific, Logan, UT, USA, it is mandatory that a "Declaration of Hazardous Material and Decontamination" form be received before the return can be processed. If the form is not received within 5 working days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. For details on decontamination standards specific to your country, please reach out to your regional Campbell Scientific office.

> NOTE:
> All goods that cross trade boundaries may be subject to some form of fee (customs clearance, duties or import tax). Also, some regional offices require a purchase order upfront if a product is out of the warranty period. Please contact your regional Campbell Scientific office for details.

Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Protect from over-voltage.
- Protect electrical equipment from water.
- Protect from electrostatic discharge (ESD).
- Protect from lightning.
- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a hardhat and eye protection, and take other appropriate safety precautions while working on or around tripods and towers.
- Do not climb tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- You can be killed or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in contact with overhead or underground utility lines.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, whichever is greater, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.
- Only use power sources approved for use in the country of installation to power Campbell Scientific devices.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Internal Battery

- Be aware of fire, explosion, and severe-burn hazards.
- Misuse or improper installation of the internal lithium battery can cause severe injury.

- Do not recharge, disassemble, heat above 100 °C (212 °F), solder directly to the cell, incinerate, or expose contents to water. Dispose of spent batteries properly.

Use and disposal of batteries

- Where batteries need to be transported to the installation site, ensure they are packed to prevent the battery terminals shorting which could cause a fire or explosion. Especially in the case of lithium batteries, ensure they are packed and transported in a way that complies with local shipping regulations and the safety requirements of the carriers involved.
- When installing the batteries follow the installation instructions very carefully. This is to avoid risk of damage to the equipment caused by installing the wrong type of battery or reverse connections.
- When disposing of used batteries, it is still important to avoid the risk of shorting. Do not dispose of the batteries in a fire as there is risk of explosion and leakage of harmful chemicals into the environment. Batteries should be disposed of at registered recycling facilities.

Avoiding unnecessary exposure to radio transmitter radiation

- Where the equipment includes a radio transmitter, precautions should be taken to avoid unnecessary exposure to radiation from the antenna. The degree of caution required varies with the power of the transmitter, but as a rule it is best to avoid getting closer to the antenna than 20 cm (8 inches) when the antenna is active. In particular keep your head away from the antenna. For higher power radios (in excess of 1 W ERP) turn the radio off when servicing the system, unless the antenna is installed away from the station, e.g. it is mounted above the system on an arm or pole.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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Brazil

Location:	São Paulo, SP Brazil
Phone:	11.3732.3399
Email:	vendas@campbellsci.com.br
Website:	www.campbellsci.com.br

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Website:	www.campbellsci.ca

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Location:	Beijing, P. R. China
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Website:	www.campbellsci.com.cn

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Location:	San Pedro, Costa Rica
Phone:	506.2280.1564
Email:	info@campbellsci.cc
Website:	www.campbellsci.cc

France

Location:	Montrouge, France
Phone:	0033.0.1.56.45.15.20
Email:	info@campbellsci.fr
Website:	www.campbellsci.fr

Germany

Location:	Bremen, Germany
Phone:	49.0.421.460974.0
Email:	info@campbellsci.de
Website:	www.campbellsci.de

India

Location:	New Delhi, DL India
Phone:	91.11.46500481.482
Email:	info@campbellsci.in
Website:	www.campbellsci.in

Japan

Location:	Kawagishi, Toda City, Japan
Phone:	048.400.5001
Email:	jp-info@campbellsci.com
Website:	www.campbellsci.co.jp

South Africa

Location:	Stellenbosch, South Africa
Phone:	27.21.8809960
Email:	sales@campbellsci.co.za
Website:	www.campbellsci.co.za

Spain

Location:	Barcelona, Spain
Phone:	34.93.2323938
Email:	info@campbellsci.es
Website:	www.campbellsci.es

Thailand

Location:	Bangkok, Thailand
Phone:	66.2.719.3399
Email:	info@campbellsci.asia
Website:	www.campbellsci.asia

UK

Location:	Shepshed, Loughborough, UK
Phone:	44.0.1509.601141
Email:	sales@campbellsci.co.uk
Website:	www.campbellsci.co.uk

USA

Location:	Logan, UT USA
Phone:	435.227.9120
Email:	info@campbellsci.com
Website:	www.campbellsci.com