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GOES.hopper

Installation Manual

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Contents

1 COMPONENTS

1.1 G6 GOES TRANSMITTER

The G6 GOES transmitter is the most important component in the system. The GOES transmitter is responsible for initiating communications to the attached SDI-12 sensor(s) as well as performing the GOES transmissions.

Figure 1-1: G6 HDR GOES Transmitter complete with HDR GOES cable:

1.2 GOES ANTENNA

The Eon GOES Antenna is used to transmit the signal from the transmitter to the GOES satellite. It is mounted in a vertical position in most locations, unlike Yagi antennas.

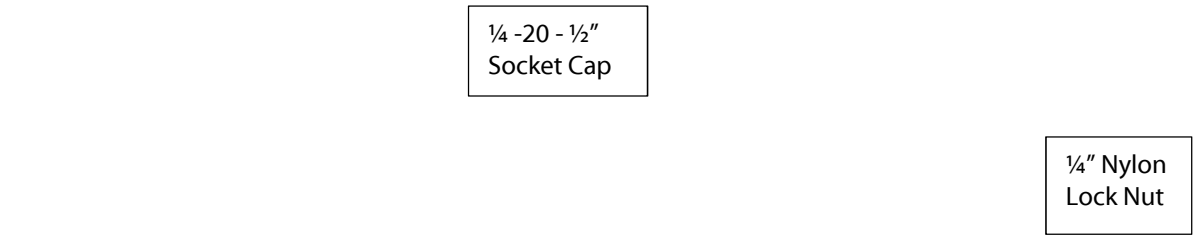


Figure 1-2: Eon GOES Antenna complete with connector cable

1.3 GPS ANTENNA

Communication with a GPS satellite is used to maintain accuracy of the internal clock in the G6, ensuring that GOES transmissions occur within the allotted 10-second window. The GPS antenna is attached to the outside of the enclosure.

Figure 1-3: GPS Antenna with cable

1.4 MOUNTING AND KEYWAY PLATES

One or two (depending on model of enclosure) aluminum plates are available for installation of the GOES Transmitter and other items listed below. The keyway plate is designed to be mounted inside the enclosure and has keyway slots specifically designed to fit the four mounting studs on the back of the GOES transmitter.

Figure 1-4: Keyway plate mounted in white enclosure with grounding straps

1.5 TERMINAL STRIP

The terminal strip is for connecting SDI-12 Sensors or SDI sensor interfaces to the GOES transmitter.

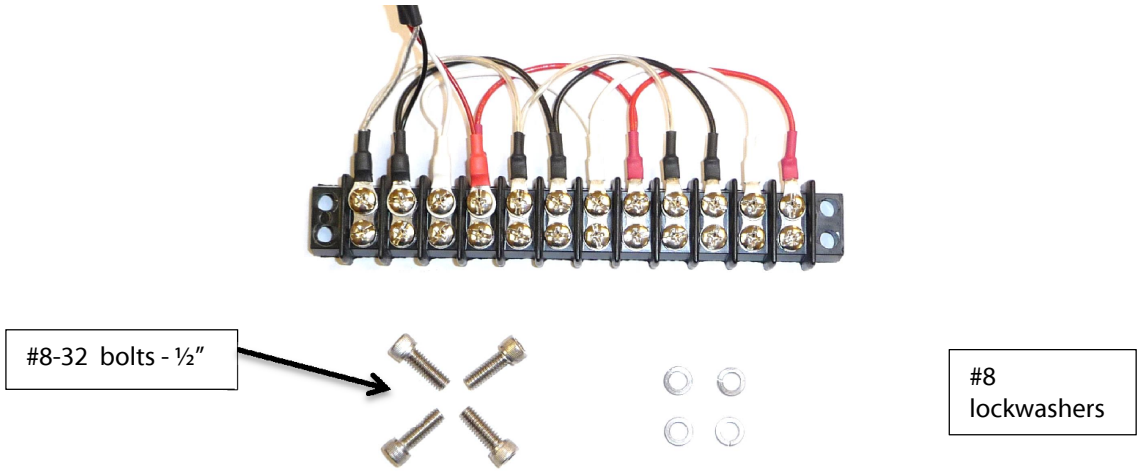


Figure 1-5: Terminal Strip with mounting hardware

1.6 ENCLOSURE PORT

A 90° port used to guide the sensor cables into the enclosure. A foam insert holds the cables in place while minimizing the ingress of insects and dirt.

Figure 1-6: Enclosure port with mounting hardware

1.7 BATTERY

Power is supplied by heavy duty, field-proven batteries. Several options are available, including photovoltaic, rechargeable lead-acid batteries with solar panel and solar charge regulator. Your needs and the power draw of the SDI-12 sensor(s) attached will determine the most suitable type of battery. The most common ones supplied range from 44 Ah to 105 Ah.

1.8 SOLAR PANEL AND REGULATOR (optional)

The standard solar panel and regulator for GOES.hopper is the 20-watt panel with a fixed mount and an ASC temperature compensated regulator. A 50 watt panel is also available.

Figure 1-7: 20 watt solar panel and ASC solar charge regulator (optional)

1.9 POLE MOUNT ASSEMBLY (for solar panel)

The solar panel is normally mounted on a pole (supplied by the customer). The pole should be secured at its base and mounting hardware is included to help support the pole, either by attaching it to the enclosure or other structure, depending on pole position.

Figure 1-8: U Bolt mounting assembly and hardware

1.10 ENCLOSURE (optional)

Two enclosure options are available from FTS for GOES.hopper. The first is the green groundwater enclosure (Figure 1-9) and the second is the white standard FTS Small Equipment enclosure (Figure 1-10).

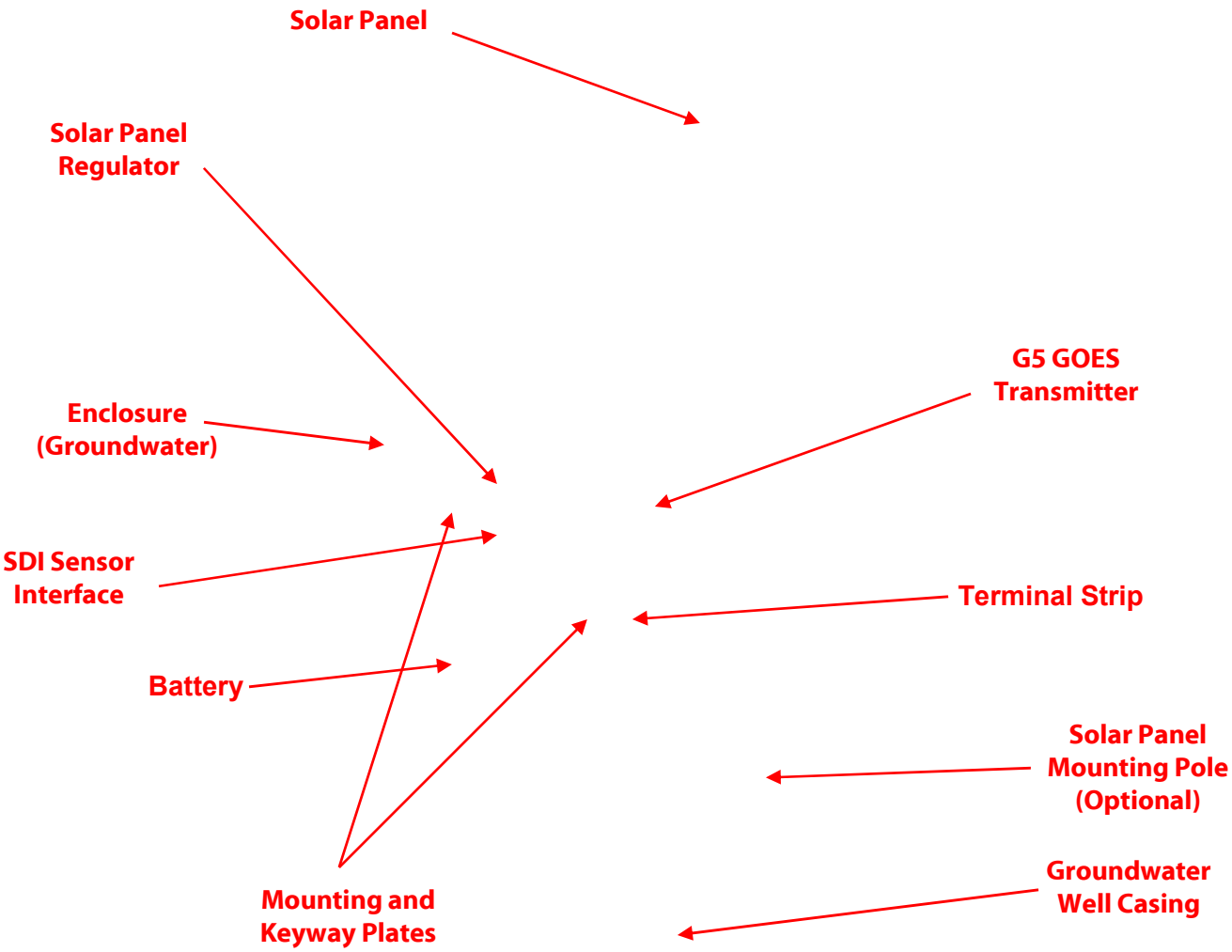


Figure 1-9: A GOES.hopper system in a green groundwater enclosure

Figure 1-10: A GOES.hopper system in a white Small Equipment Enclosure

The green enclosure (Figure 1-9) is best suited to groundwater applications where the enclosure can be mounted on top of the well casing. Please note that customers will need to supply their own well casing flange to securely connect this enclosure to the well casing. The Small Equipment enclosure can be used in most other applications and is versatile in mounting options, including mounting inside a shelter or building, on a pole driven into the ground, or affixed to some other exterior fixture.

2 GOES.hopper STATION ASSEMBLY

2.1 TOOLS

In order to assemble the GOES.hopper Station you will need the following tools:

- 9/64 Allen Key/Hex screwdriver
- # 2 Phillips screwdriver
- ¼" flathead (slot) screwdriver
- ¼" wrench
- 11/16 " wrench

2.2 PREPARING THE ENCLOSURE

The FTS enclosure normally comes pre-drilled with antennae and cable ports. If you are utilizing a different enclosure, you will need to drill holes for the GPS antenna (½"), the Eon GOES antenna (¾") and its mounting hardware (¼"), and the enclosure port (3.75"). Sweep the metal shavings out of the enclosure as they can interfere with equipment performance.

2.3 SECURING THE ENCLOSURE

Prior to installing the GOES.hopper Station, inspect the site and ensure that the enclosure can be placed so that there are no obstructions that could impede the Eon GOES antenna from acquiring its satellite link. Also ensure that the solar panel can be placed to maximize efficiency in accordance with the manufacturer's instructions without impeding the Eon GOES antenna.

NOTE: Placement is important! If the solar panel obstructs the line-of-sight between the Eon GOES Antenna and the GOES satellite (East or West), the transmitter's signal can be disrupted.

Secure the enclosure to the well casing or other structure ensuring that the Eon Goes antenna will not be obstructed. See the attached diagrams for acceptable solar mast placement locations.

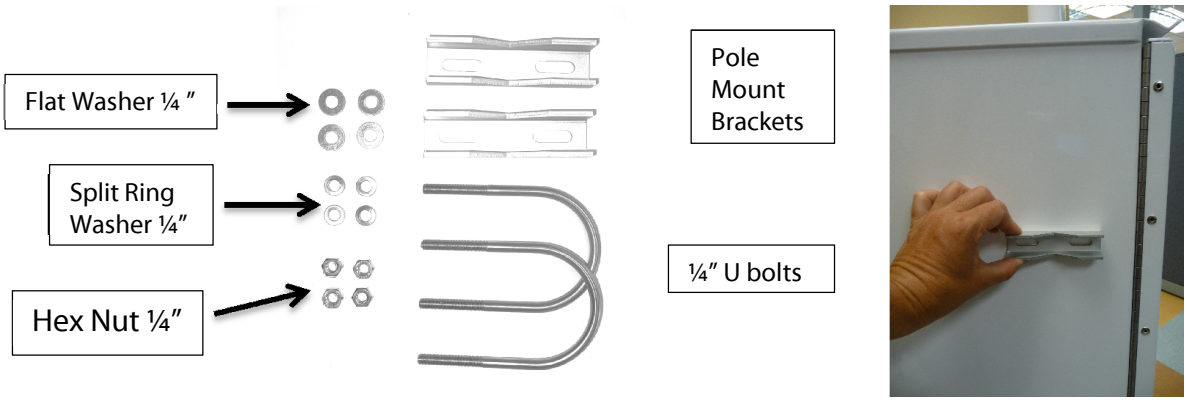
2.4 MOUNTING THE EXTERIOR EQUIPMENT

Once the site has been inspected prepare to mount and assemble the GOES.hopper system.

2.4.1 Solar Panel Pole

Determine where the pole will be secured such that it aligns with the enclosure. Determine where to place the pole mount brackets. They should be placed horizontally ideally with at

least 8 inches of separation between them and aligned vertically with the lay of the pole. Using the brackets as a guide, mark where to drill holes for the ¼" U bolts (centred on 2.7").



Pole Mount Assembly Hardware

Pole Mount Bracket horizontal placement

Figure 2-1: Mounting the solar panel pole

Secure the base of the pole in the ground next to the enclosure such that it aligns with the side of the enclosure.

Place one U bolt around the pole and through the slots on the mounting bracket. Thread the U bolt through the drilled holes and secure loosely on the interior of the enclosure with a flat washer, a split ring washer, and a hex nut.

Repeat the process with the second mounting bracket and U bolt. Adjust the pole as required and tighten in place.

Mount the solar panel on the pole in accordance with its manufacturer's directions.

2.4.2 GPS Antenna

Remove the locking washer (A) and hex nut (B) from the GPS assembly. Feed the GPS cable through the GPS port and seat the GPS. Secure it using the locking washer (A) and hex nut (B).

Seating the GPS Antenna

Securing the GPS Antenna

Figure 2-2: Mounting the GPS Antenna

2.4.3 EON Antenna

Full details of mounting the EON Antenna, including the drilling template, are available from Technical Bulletin 700-AN-128 found on the FTS Support Website, https://s3.amazonaws.com/Product_Technical_Bulletin/700-AN-128.pdf.

MOUNTING THE ANTENNA

Vertical surfaces too close to the antenna act as reflectors and can degrade or interfere with signal strength. These effects are reduced as separation between the reflector and the antenna is increased but they are still detectable out to 15m (49.2 ft).

There should be a separation of 75 cm (29.5") or greater between the antenna and the metal surface parallel to the axis of the antenna. If necessary, the EON2 Antenna Tower Mounting Arm is available as an optional accessory.

Should it not be possible to mount the antenna at the recommended distance from the metal post or other reflector, the following guidelines should be followed:

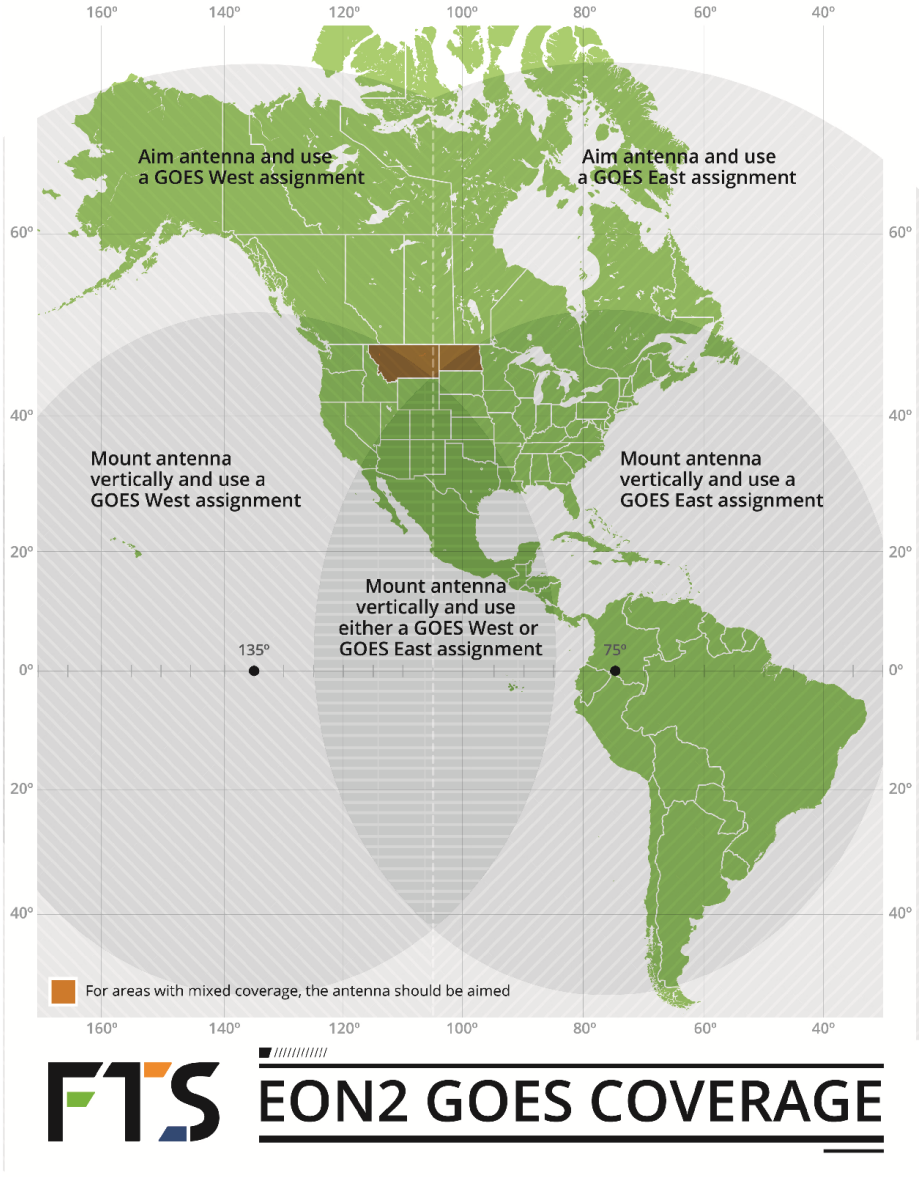
D= distance between EON2 antenna and metal post (or other reflector)

1) D < 18 cm (7"): Not recommended.
2) D = 18 cm (7"): Acceptable if the reflector is not between the antenna and the satellite.
3) D = 37.5 cm (14.5"): Not recommended, as it causes a large null in front of the antenna.
4) D = 56 cm (22"): Acceptable if the reflector is directly behind the antenna relative to the satellite. Not recommended if the reflector is 45 degrees to either side behind the antenna relative to the satellite.

AIMING THE ANTENNA

The procedure to position your EON22 antenna will vary depending on your geographical location. If the antenna should be aimed, aim it an angle towards the GOES satellite's position. Ensure the transmission path is free from obstruction, including the mounting pole and any potential tree canopy.

Refer to the following image to determine the recommended action for your location.



Seat the Eon antenna in its port and attach it using the ¼" Socket Cap bolts (½" long) (A) and secure them with the ¼" nylon lock nuts (B).

Seated Eon Antenna

A

B

Eon Antenna Cable

Eon Antenna Hardware

Figure 2-3: Mounting the Eon Antenna

2.4.4 Enclosure Port

Unscrew the steel locknut (A) from the 2″ adaptor (B) and seat the adaptor through the port on the enclosure. Secure it with the steel locknut. Ensure the foam insert remains in place.

Enclosure Port with steel locknut

Enclosure port placement

Figure 2-4: Mounting the Enclosure Port

2.5 MOUNTING INTERIOR EQUIPMENT AND SENSORS

Every enclosure will be unique, dependent upon individual requirements. However, the general positioning of equipment and sensors detailed below should satisfy most customers' requirements. During the set up process, refer to Figure 1-9 for visual guidelines on equipment positioning.

Caution: When mounting equipment on the keyway plate do not over tighten screws as this can damage the keyway plate.

2.5.1 GOES Transmitter

Mount the GOES transmitter in an upper corner of the keyway plate and ensure the mounting studs on the back of the transmitter slide down and lock in position. It is easier to attach the terminal strip and other sensors when the GOES transmitter is not mounted, so consider marking its placement boundaries and removing it before moving on to the next steps.

Figure 2-5: Mounting the G6 GOES Transmitter in the keyway plate

2.5.2 Terminal Strip

Attach the terminal strip below the GOES transmitter position on the keyway plate using the ½ " #8 bolts (A) and #8 lock washers (B).

Figure 2-6: Terminal strip and mounting hardware

2.5.3 Solar Charge Regulator

If using the Solar Charge Regulator, mount it at the top of the mounting plate beside the GOES transmitter.

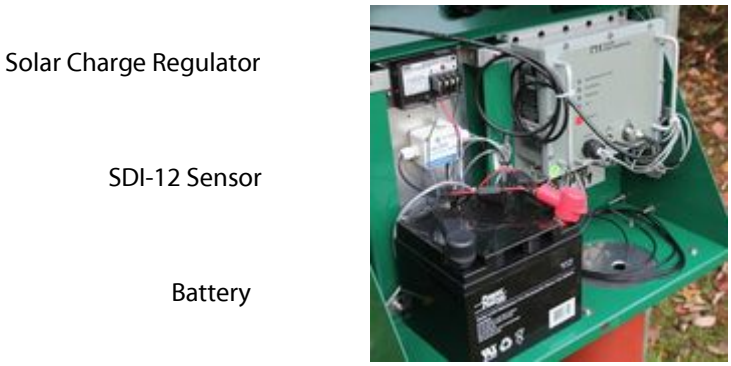


Figure 2-7: Solar Charge Regulator Mounting Position

2.5.4 SDI-12 Sensors

Determine where the battery will rest on the bottom of the enclosure (usually the side opposite the G6 GOES transmitter) as the SDI-12 sensor(s) will be mounted between the solar panel regulator and the battery position. Mount sensors in accordance with manufacturer's directions.

2.5.5 Battery

Place the battery in the bottom of the enclosure.

2.6 CONNECTING EQUIPMENT AND SENSORS

Feed the Solar Panel cable and any SDI-12 sensor cables through the foam insert in the enclosure port (or flange in groundwater applications) and connect them to their corresponding equipment in accordance with the manufacturers' instructions. Use the cable ties and mounts to secure excess cable

2.6.1 GOES Transmitter

Mount the GOES transmitter in an upper corner of the keyway plate and ensure the mounting studs on the back of the transmitter slide down and lock in position. Attach a grounding strap to the grounding lug on the transmitter.

Figure 2-8: Grounding Lug

2.6.2 Eon Antenna

Connect one end of the Eon Antenna cable to the Eon Antenna and the other end to the GOES Antenna Connector on the GOES Transmitter. Ensure the cable is threaded correctly and no more than finger tight.

2.6.3 GPS Antenna

Connect the GPS Antenna to the GPS Antenna Connector (SMA) on the GOES transmitter. Ensure the cable is threaded correctly and no more than finger tight.

2.6.4 Battery Connections

Ensure the Deutsch connector on the GOES.hopper HDSR cable is not connected.

If connecting a Solar Charge Regulator, refer to the manufacturer's instructions for detailed instructions. However, when wiring the system connect the wires to the solar charge regulator terminals marked "BATT" on the solar charge regulator first **{red to (+) positive, black to (-) negative}** then run them to the battery.

Connect the battery leads from the GOES.hopper HDSR cable and the Solar Charge Regulator to the battery terminals **{red to (+) positive, black to (-) negative}**.

Figure 2-9: Solar Charge Regulator connections

Then connect the solar panel cables to the "ARRAY" terminals on the Solar Charge Regulator in accordance with the manufacturer's directions. Attach the thermistor (temperature sensor) from the Solar Charge Regulator to the side of the battery using the supplied foam tape.

Connect the Deutsch connector on the GOES.hopper HDSR cable to complete the power flow between the solar panel, sensors and the G6 transmitter. Ensure it is locked in position.

Figure 2-10: Battery cable /GOES Transmitter cable connection

2.6.6 Grounding

Ground your unit using the best procedure for your site and geography.

2.6.5 SDI-12 Sensors/Terminal Strip

SDI-12 sensors will have four wires to be connected to the terminal strip (positive, negative power ground, data, and sensor ground). Confirm your sensor's wire colour code with the sensor's manufacturer or the sensor manual before connecting to the terminal strip as not all manufacturers use the same colour scheme for their SDI-12 sensor interface. Refer to the sensor's manual for detailed directions for connection

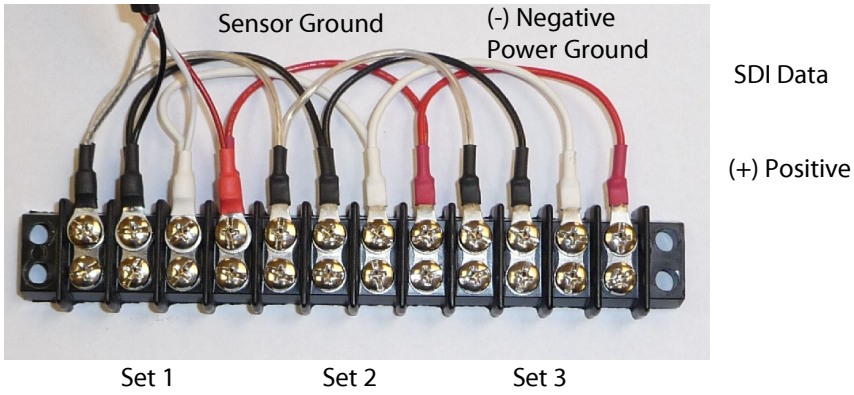


Figure 2-11: Terminal Strip showing the three sets of connections

The terminal strip has three sets of four connections: red is for (+) positive 12 volts; black is for (-) negative power ground; white is for SDI-12 data; and clear (or grey) is for sensor ground. Ensure one SDI-12 is connected to one set of terminal strip connections. Incorrect connection could harm your sensor.

Connect the SDI-12 interface wires to their counterpart on the terminal strip in accordance with the manufacturer's directions. Complete the connection with a crimp-type connector as bare wire connections can degrade equipment performance or data transfer.

IMPORTANT! SDI-12 sensors should be connected one at a time and then assigned an address BEFORE the next sensor is attached. See the GOES.hopper.Operating Manual for detailed instructions of this step.

3 GOES.hopper CONFIGURATION

If you are configuring or reconfiguring a transmitter, transmit parameters need to be entered through the Command Port by connecting a laptop to the RS-232 Serial Port Cable on the GOES.hopper HDSR cable. See the GOES.hopper Operating Manual for detailed configuring instruction.

List of Revisions

Revision	Date	Comments
1.0	18 Aug 2014	
2	15 June 2015	Updated for G6
3	28 Aug 2017	Added EON Ae mounting information