

ST 6100 terminals are integrated IsatData Pro communications terminals manufactured by ORBCOMM. ORBCOMM distributes the terminals through Solution Providers who activate the terminal on the IsatData Pro network. The terminals are available with side or bottom connectors.

This guide provides information required for a successful, reliable installation of the terminal on a vehicle, boat or other platform. This guide does not address the terminal's commissioning procedures as these procedures vary depending upon the Solution Provider and their specific application.

View of ST 6100 side connector



Required Tools

Installation of the terminal requires the following tools:

- Drill and 5.5 mm drill bit
- 30 mm diameter hole punch or hole saw (bottom connector version only)
- Screwdriver
- Socket wrench set

Required Materials

Installing a terminal requires the following recommended materials. These materials do not ship with the terminal because they differ for each installation.

- Qty 4 - M4 (8-32) 18-8 stainless steel screws (length depends on mounting surface thickness)
- Qty 4 - M4 (8-32) nuts with 18-8 stainless steel flat and lock washers
- Waterproof sealing tape
- Dielectric grease
- Qty 1 - Custom cable provided by your Solution Provider
- Mating connector kit (ST100030-001)

Cable

The Solution Provider may provide a custom cable to connect to the terminal. Contact your Solution Provider if you did not receive a cable.

Record the Mobile ID

Each terminal has a unique serial number, termed a mobile ID, used by ORBCOMM to register it on the IsatData Pro network. This is a 15-digit alphanumeric identifier in the format "NNNNNNNNNSKYXXXX". The mobile ID is located on the bottom of the terminal and on the shipping box. Record this number before the terminal is mounted. You need it later for commissioning the terminal on the network.

Installation Steps

CAUTION *Most users install the terminals on a vehicle. It is very important for installers to install the terminals in a safe and secure way to avoid danger or damage to persons or property.*

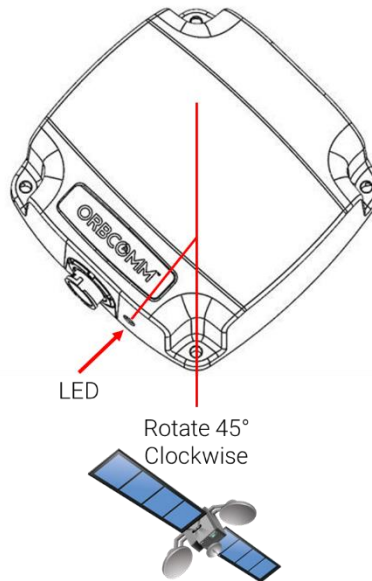
Select the Mounting Location

- Mount the terminal where it has a clear view of the sky/satellite. For a mobile installation, this means that it is preferable to install at the highest point on the vehicle or vessel where it has a clear view of the sky in all directions.

- Mount the terminal on a flat surface for mobile installations such that the elevation angle does not change with rotation.

Note: *For fixed installations and maximum antenna gain, point the terminal's LED in the direction of the satellite, and then rotate it 45 degrees clockwise.*

Figure 1 Recommended Direction for Maximum Antenna Gain



- Mount the terminal so that the terminal's line-of-sight with the sky is clear of obstructions.
- Fasten the terminal securely so that it is not loose and does not move easily.
- Mount the terminal on a solid, stable surface. If necessary, use a mounting bracket (not supplied) or other suitable support.
- Ensure that any paint above the terminal is non-metallic and non-metallic flake, if the installation is under fiberglass or composite wind fairings.
- Check that the terminal's cable reaches the power source before you drill any mounting holes.
- Mount the terminal on the driver's side of the vehicle, if possible, when there is a possibility of strikes by overhanging tree branches.
- Mount the terminal on a flat surface that is parallel to the ground but visible to the sky, for proper operation of the internal accelerometer. Record the position of the top surface (ORBCOMM logo) and connector face relative to the ground and the front or side of the vehicle as if you were sitting in the driver's seat. This information is used later to set up the accelerometer service.

Example: If the terminal is mounted horizontally on the vehicle roof such that the ORBCOMM logo is facing up and the cables are exiting towards the back of the driver, then record "top facing up and connectors facing back".

Refer to the latest version of [T405] *IsatData Pro Service API Ref* for more details.

- Mount the terminal on a surface that does not get hotter than the maximum operating temperature (+85°C). If the surface may get hotter, mount the terminal with a thermal barrier between it and the mounting surface.

CAUTION *Mount the terminal at least 20 cm (8 in.) away from humans.*

- **DO NOT** mount the terminal close to other electrical equipment due to possible radiated and/or conducted electromagnetic interference.
- **DO NOT** mount the terminal close to radar or other communications antennas. Use the following guidelines:
 - > 1 m from VHF/UHF antenna
 - > 3 m from loop antenna
 - > 4 m from MF/HF antenna
 - > 5 m from other satellite antennas
 - Not within a radar beam
- **DO NOT** mount the terminal where water may build-up or collect.
- **DO NOT** mount the terminal close to an exhaust pipe due to the excessive heat and the potential for the exhaust pipe causing satellite blockage.

- DO NOT mount the terminal close to air horns or any tractor roof hardware (for example, emergency lights) that could interfere with satellite communications.
- DO NOT install the terminal inside the truck under the roof liner.

Install the Terminal

Once you have selected the mounting location, mount the terminal. Select either bottom connector mounting (Figure 2) or the side connector mounting (Figure 3) depending on the terminal's connector type.

The duplicate mobile ID labels, shipped with the terminal, can be placed on the asset where the terminal is mounted and/or on any customer paperwork. For outdoor applications these labels should be protected by applying the clear overlays provided.

In some cases, the Solution Provider may provide a mounting bracket with the terminal. In this case, the following instructions are not required. Refer to the instructions with the mounting bracket.

- 1) Use the drill template (Figure 8) to mark the location of the four mounting holes and the connector hole (if bottom connector). The orientation of the terminal with a bottom connector is not important.
- 2) Fill the ribbed channel around the connector (Figure 4) with waterproof sealing compound (bottom connector only). You can also apply waterproof sealing compound to the drilled mounting holes before inserting the screws.
- 3) Secure the terminal in place with the mounting hardware using the screwdriver and socket set.

CAUTION Do not over-tighten.

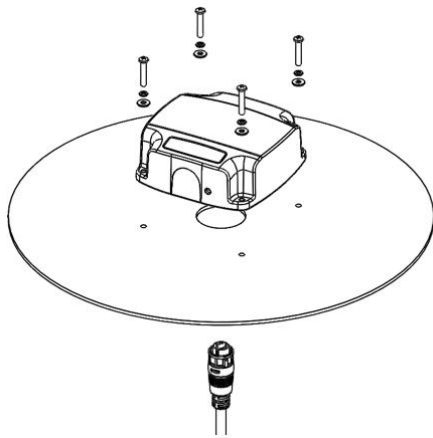


Figure 2
Bottom Connector ST 6100 Shown

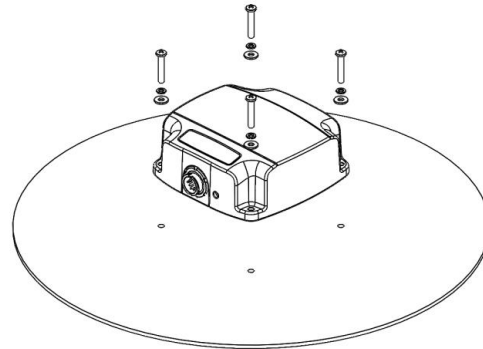


Figure 3
Side Connector ST 6100 Shown

- 4) Cut off one end of the tube of dielectric grease. Adding the dielectric grease makes sure that there is a watertight seal.
- 5) Insert the tube into the male end of the mating connector and squeeze the dielectric grease into the mating connector opening (Figure 4) until it is full. Some dielectric grease will spill out.

CAUTION Do not apply pressure to the cable/connector during the installation.

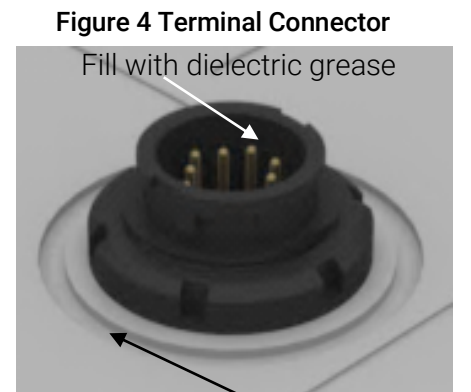


Figure 4 Terminal Connector

- 6) Connect the cable connector to the terminal by aligning the corresponding connector key slot (Figure 5) and gently squeezing together.

CAUTION Do not force the connector pins to mate since this may damage the pins.

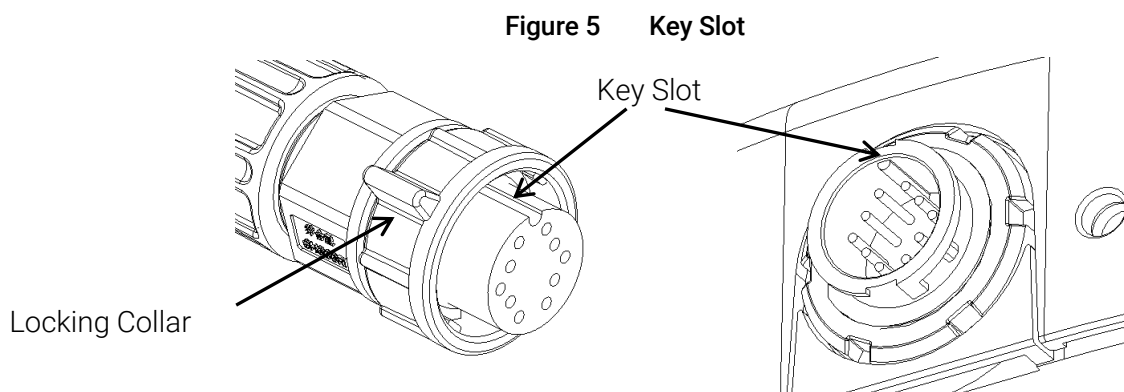


Figure 5 Key Slot

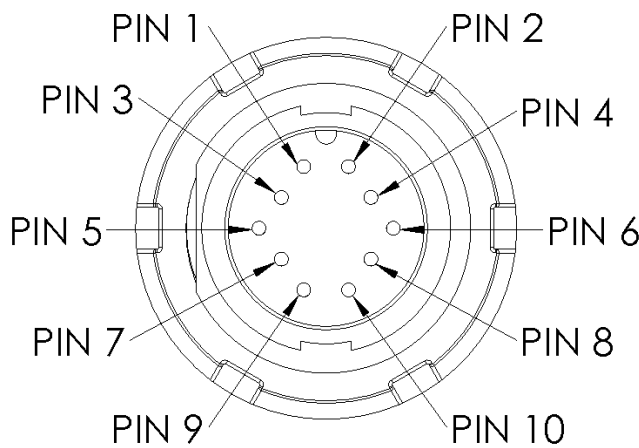
- 7) Tighten the cable connector with hand pressure by rotating the locking collar on the cable connector clockwise. **Do not use a wrench.** A tactile click is felt when the collar is properly engaged.
- 8) Wipe off any extra grease around the connector and wrap the mating connector with waterproof sealing tape if using the connector in changing weather conditions.

Apply Power

Before connecting the terminal to an external voltage source, ensure that the polarity is correct, and the voltage source is between 9 and 32 VDC. Refer to the connector pin assignment description. Connect the ground connection at the same time or before applying power. This is especially true when using the RS-232 lines along with power and ground.

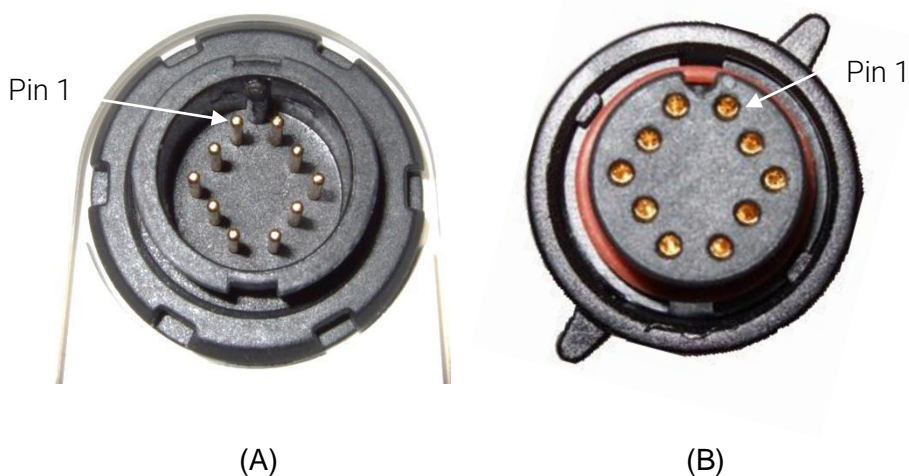
The terminal has an integral LED to indicate that the terminal has successfully powered on. The visual indicator (LED) does not indicate satellite status. Its only purpose is to confirm terminal power-on.

Figure 6 Pin Assignments



Pin	Functionality	Pin	Functionality
1	RS-485 A	2	RS-485 B
3	GND	4	VIN (9 to 32 VDC)
5	I/O 02	6	I/O 03
7	I/O 01	8	I/O 04
9	RS-232 Tx (Output)	10	RS-232 Rx (Input)

Figure 7 View of Terminal Male Connector (A) and Front View of Mating Connector (B)



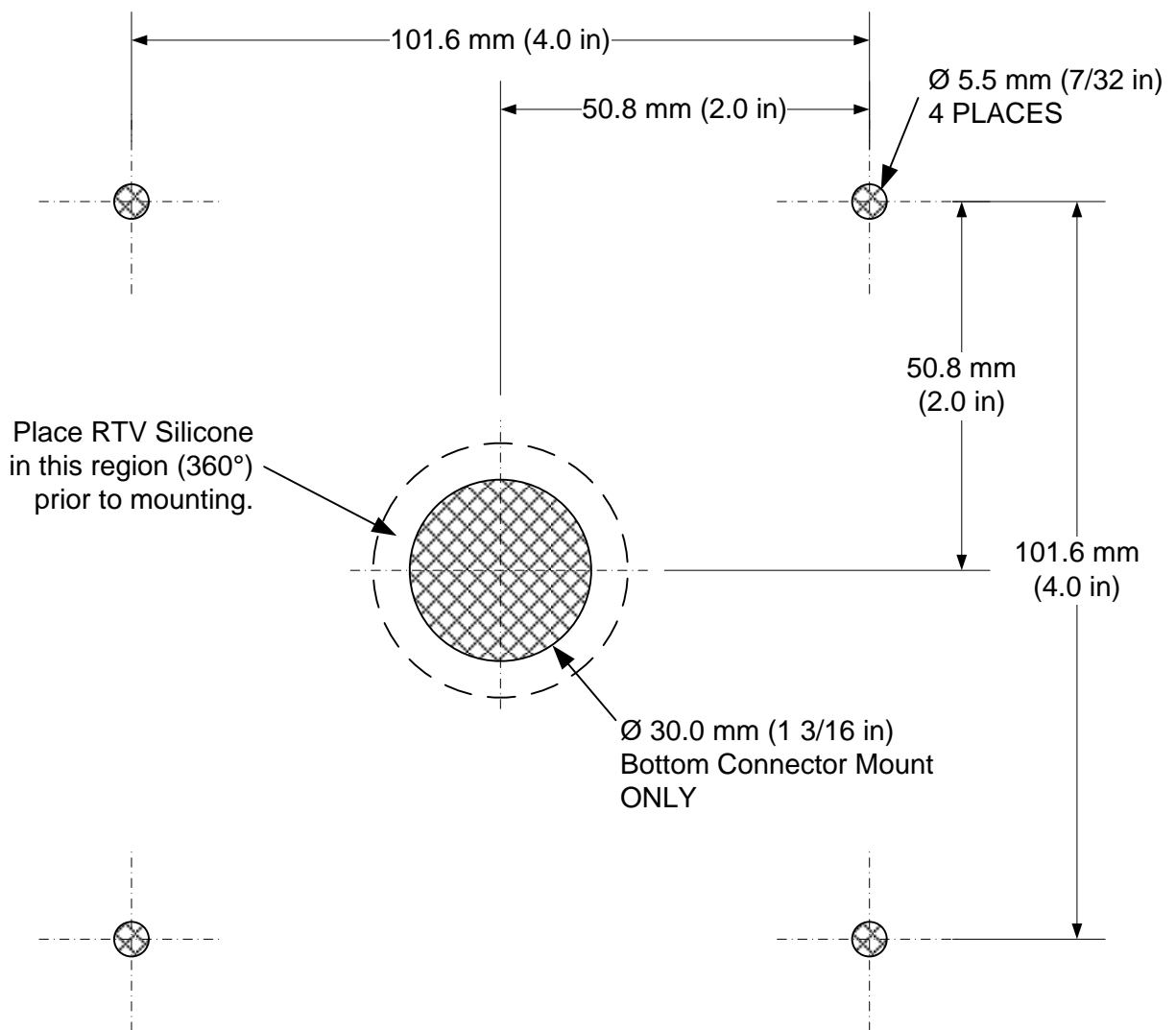
Register the Terminal

Once you apply power, the terminal goes into satellite search mode to acquire the IsatData Pro network. This activity may take a few minutes to complete. The terminals must complete registration to operate. Once the terminal synchronizes itself with the network, it sends a registration message to the IsatData Pro network. The terminal will not register until it has a clear line-of-sight to the satellite. The IsatData Pro network records the registration message and forwards the registration message to the user’s application. The IsatData Pro network sends an acknowledgement message over the satellite to the terminal. The terminal is now available to send and receive messages via satellite.

Remember to indicate the orientation of the terminal’s accelerometer in the terminal firmware.

Figure 8 Drill Template ST 6100

CAUTION Before drilling check the template against actual hardware for dimensional accuracy. If it is not correct, DO NOT USE THIS TEMPLATE.



Nominal Dimensions Shown

Cable Assembly Instructions

This section provides the information necessary for the Solution Provider to assemble ST power/interface cables for the end-user. The mating connector kit (ST100030-001) does not ship with the terminal.

The cable assembly procedures in this section are adequate for most installations. For particularly harsh environments such as maritime installations, use a cable with molded backfill as described in the Blunt Cut cable section later in this document. Please contact Customer Support if you need recommendations for a cable manufacturer.

Note: *It is recommended you choose a raw cable with the following properties:*

** The terminal accepts input ranges of 9 to 32 VDC. If your application requires extended cable lengths, it is necessary to calculate the cable voltage drop to determine if the terminal is receiving at least 9 V (with 1.7 A draw). Large cable voltage drops might adversely affect terminal operation.*

** Cable jacket and internal conductor installation rated for minimum temperature range of -40°C to 85°C (-40° to +185°F), and UV compliant where exposure to UV is expected.*

Note: *For reliable operation, shield all cables used for power and data connections to the terminal.*

Figure 9 Basic Connector Parts for Soldering Configuration



Required Tools and Materials

The following tools and materials are required to build the cable using this method:

- A cable¹ appropriate for the terminal's environment
- A knife
- A wire stripper
- Solder
- A fine-tip soldering iron
- A flexible high temperature silicone sealant for outdoor exposure

Cable Assembly Steps

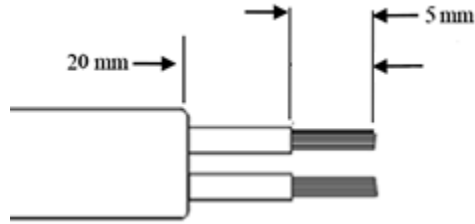
- 1) Use a knife to cut and remove the outer jacket of the cable, 20 mm from the end (Figure 10) and remove any foil shielding.

CAUTION *Be careful not to nick the wire insulation.*

- 2) Use a wire stripper to remove 5 mm of insulation from the wires (Figure 10).

¹ For cables exposed to extreme temperatures and sun, select a cable with a thermal rating of -40°C to +85°C (-40 to +185°F) and a UV resistant jacket.

Figure 10 Recommended Stripping Length



- 3) Twist the ends tightly to prevent stranded wires from fraying.

CAUTION Do not solder dip.

- 4) Slide the following items over the cable in sequence and as shown in Figure 11: a sealing nut, a back shell and a coupling ring.

Figure 11 Cable with Sealing Nut, Back Shell and Coupling Ring



CAUTION Ensure that the black back shell cable grommet is present inside the cable grip area (Figure 12) and the red gasket is present and oriented with flat face visible as shown in Figure 13.

Figure 12 Cable Grommet

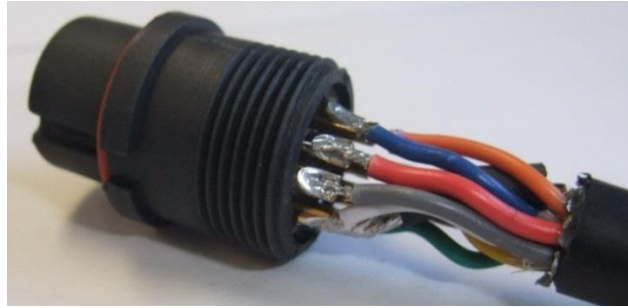


Figure 13 Red Gasket



- 5) Using a soldering iron and solder, tin the wires and solder them to the connector solder cups (Figure 14) as per the proper pinout.

Figure 14 Wires and Solder Cups



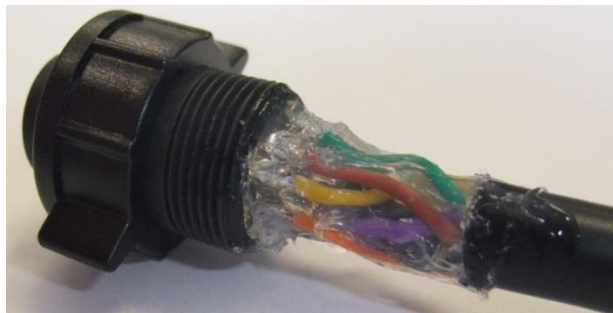
- 6) Ensure the O-ring is in place over the connector body.

Figure 15 O-Ring over Connector Body



- 7) Slide the coupling ring over the connector body and give it a twist to prevent it from falling off.
- 8) Use silicone sealant to completely fill the end of the connector and the area between the wires.

Figure 16 Silicone in the Connector



- 9) Slide the back shell up the cable as close as possible to the connector body and fill it with silicone sealant.

Figure 17 Silicone in the Grommet



- 10) Assemble the back shell to the connector body and wipe away any excess sealant. To aid in tightening the back shell, align the coupling ring key feature with the slot in the connector body (Figure 18).

Figure 18 Key Features in the Coupling Ring and Connector Body



- 11) Apply sealant over the cable exit area.

Figure 19 Cable Exit Area



- 12) Assemble the sealing nut over the back shell until the cable grip makes full contact with the perimeter of the cable jacket. Wipe away any excess sealant.

Figure 20 Assembled Sealing Nut



This cable connects the ST terminal to external I/O lines and serial ports. There are 10 pins on this blunt cut cable; two connect the terminal to an RS-232 console serial port or an RS-485, four wires to connect to external I/O lines, and one each for ground and voltage. The cable has an over-molded connector, a floating drain wire and is available in two models, either terminated or unterminated to ground.

Specifications

Parameter	Value
Part Number: ST301005	Cable drain wires (outer shield and I/O – Figure 22) terminated to ground at ST terminal connector (PIN 3 – Figure 21).
Part Number: ST301025	Cable drain wires unterminated/not connected (outer shield and I/O – Figure 22) to ground.
Length	5 m, 10 m, and 25 m For additional lengths, contact your Account Executive.
Temperature	-40°C to +85°C (-40° to +185°F)
Ultraviolet rating	UV stabilized

Figure 21 Face View of Terminal Blunt Cut Cable Connector

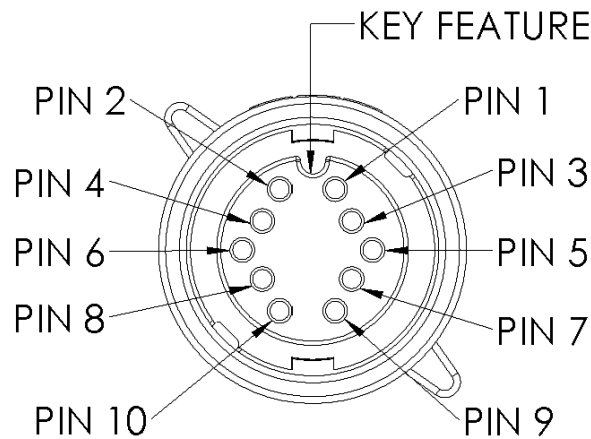
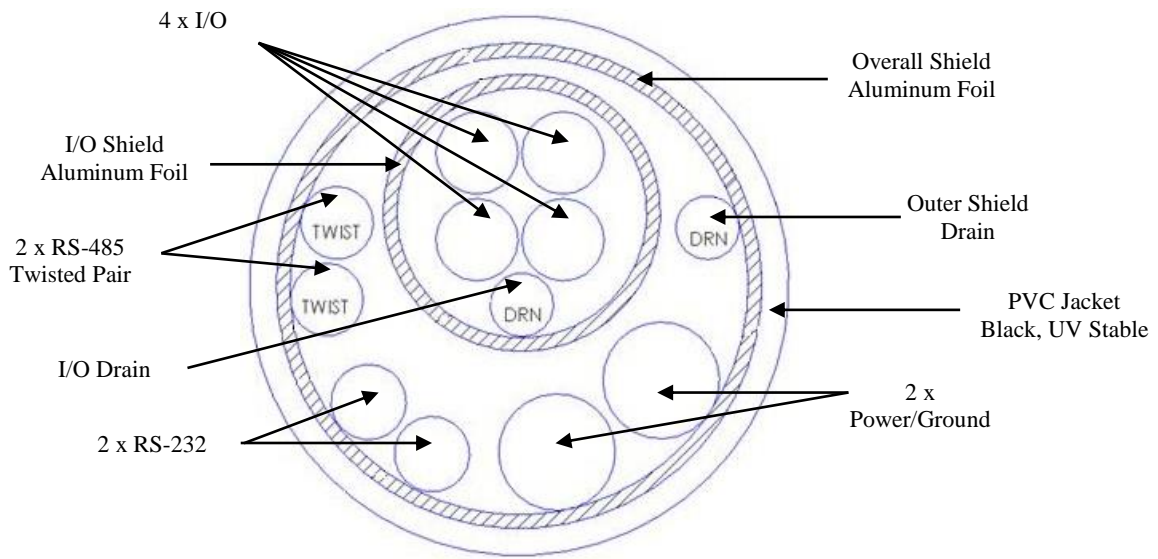


Table 1 Terminal Mating Blunt Cut Cable Color Code

Position	Color	Wire Gauge	Functionality
1	White	22 AWG	RS-485_A
2	Grey	22 AWG	RS-485_B
3	Black	20 AWG	Ground
4	Red	20 AWG	VIN (Vbatt)
5	Green	22 AWG	I/O 02
6	Blue	22 AWG	I/O 03
7	Brown	22 AWG	I/O 01
8	Purple	22 AWG	I/O 04
9	Orange	22 AWG	RS-232 Tx (output)
10	Yellow	22 AWG	RS-232 Rx (input)

Figure 22 Raw Cable Details



www.ORBCOMM.com
+1.613.836.2222
support@skywave.com