



C200M GMDSS Installation Guide

Serial number of the product

This serial number will be required for all troubleshooting or service inquiries.



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Disclaimer

The information in this user guide is subject to change without prior notice throughout the product life cycle. The printed version of the guide is periodically updated, but it may contain inaccuracies or omissions compared to the most recent product information. The most up-to-date information is always available on our website at www.intelliantech.com.

Document Information (HW/SW Version)

This manual applies to the following HW and SW versions. Please note that the contents may be updated without notice and could differ from the actual product.

HW Version

SDT	V0.6	Handset	V0.4
Alarm Box	V0.6	SSAS Box Alert/Test	V0.5
Junction Box	V0.4	Alarm Unit*	V5.0

* The Alarm Unit's version is the main control version because the alarm unit has four types of PCBAs inside.

SW Version

SDT	1.0.7	SSAS Box Alert/Test	1.1.1
Alarm Box #1, #2, #3	1.1.1	BDU	2.0.1
Alarm Unit	1.0.2	ADU	1.0.5

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Chapter 1. Precautions

1.1 Warnings, Cautions, and Notes

WARNING, CAUTION, and NOTE statements are used throughout this manual to emphasize important and critical information. You must read these statements to help ensure safety and to prevent product damage. The statements are defined below.

	WARNING WARNING indicates a potentially hazardous situation that if not avoided, could result in death or serious injury.
	CAUTION CAUTION indicates a potentially hazardous situation that if not avoided, could result in minor or moderate injury or damage to equipment. It may also be used to alert users about unsafe practices.
	NOTE A NOTE statement is used to notify people of installation, operation, programming, or maintenance information that is important, but not hazard-related.

1.2 General Precautions

Before you use the antenna, make sure that you have read and understood all safety requirements.

	THIS WAY UP Place the boxes/crates on the floor with the arrow pointing up.
	FRAGILE Since the Radome is fragile, handle it with care. Do not apply excessive pressure or shock. These may cause surface cracking or other damage.
	DO NOT STACK MORE THAN FOUR UNITS Do not stack boxes/crates more than four units as there is a risk boxes/crates may fall and be damaged.
	KEEP DRY - Always make sure the antenna is stored on a dry surface in a dry, well-ventilated area. - The antenna is designed to withstand a normal rain shower; however, water resistance cannot be guaranteed if the antenna is submerged.

- * **DO NOT SHIP VIA RAIL:** Ensure systems are not shipped via rail.
- * **Shock Hazard:** To minimize shock hazard and to protect against lightning, you must connect the equipment chassis and cabinet to an electrical ground. Make sure the system is correctly grounded and power is off when installing, configuring, and connecting components.
- * **Do not operate in an explosive atmosphere:** Do not operate the equipment in explosive environments or in the presence of flammable gases. Operating this equipment in such an environment causes a definite safety hazard.
- * **Keep away from live circuits:** Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustment inside the equipment with any power supply turned on. Under certain conditions, dangerous voltage may exist in the power supplies even with the power cable removed. To avoid injuries, always remove the power and discharge a circuit before touching it.

Chapter 2. Certifications

This device complies with Part 15 of the FCC Rules, Industry Canada licence-exempt RSS standard(s), as well as MED, MER, and other national regulatory requirements.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Changes or modifications made to this equipment not expressly approved by Intellian Technologies, Inc. may void the FCC authorization to operate this equipment.

Radiofrequency radiation exposure Information:

This equipment complies with MED and FCC, IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 1.5 m between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Chapter 3. Introduction

3.1 Introduction of C200M GMDSS System

Intellian's C200M GMDSS System is comprised of three core products that can be augmented with a range of accessories. The three core products are the ADU (above deck unit) and BDU (below deck unit) that comprise the C200M Standard System and the Safety Display Terminal (SDT).

The C200M Standard System is an L-band terminal designed by Intellian to connect to Iridium's constellation of 66 active LEO satellites that provide truly global coverage. The Iridium Certus® 200 service provides three high-quality voice lines with concurrent IP data. The maximum data speeds are 176 kbps for both downlink and uplink. The RF architecture includes dedicated interference blocking elements, making the C200M GMDSS terminal inherently resilient against interference from terrestrial cellular equipment and other sources of radio interference off or on board the vessel

The Safety Display Terminal (SDT) includes a 7" touchscreen and a dedicated handset that ship staff can use to access the GMDSS services

Intellian offer a full range of MED certified accessories to provide additional capabilities, including:

- AC/DC Power Supply Unit: Supports inputs from the vessel's AC distribution systems (110V/220V) or from the battery backup for the bridge communication equipment.
- GMDSS Alarm Box: Using these devices, a GMDSS DISTRESS Alert can be sent using the C200M GMDSS System from locations other than the GMDSS console. Typical locations include the conning position, Ship's Office & Captain's cabin.
- GMDSS Alarm Unit: Using this device, GMDSS DISTRESS Alerts can be sent using all of the available GMDSS communications devices (VHF, MF/HF & C200M GMDSS) from a location other than the GMDSS console.
- SSAS Box Alert: Using this device an SSAS Alert can be discreetly sent to the Company Security Officer at the vessel operator's shore offices
- SSAS Box Test: This device is used to test the SSAS communication system

The C200M GMDSS System can also be used for non-emergency communications. IP phones can be connected to the BDU, and devices, such as laptops can either be connected to the ethernet ports at the back of the BDU or connected using the WiFi router. The Iridium network prioritizes emergency communication to ensure that GMDSS services are always available. Consequently a single C200M GMDSS System can be used to provide both GMDSS services and also act as a companion terminal or provide OOBM, for other connected devices.

3.2 Iridium Satellite Network

The Iridium satellite network is comprised of 66 low-earth orbiting (LEO), cross-linked satellites, providing voice and data coverage over Earth's entire surface.

At only 476 mile (780 km) from the earth, the proximity of Iridium's LEO network means pole-to-pole coverage, a shorter transmission path, stronger signals, lower latency, and shorter registration time than with GEO satellites. The network is considered a meshed constellation of interconnected, cross-linked satellites so that each satellite "talks" with the other nearby satellites in front, behind, and adjacent orbits.

In space, each Iridium satellite is linked to up to four others creating a dynamic network that routes traffic among satellites to ensure global coverage, even when traditional local systems are unavailable.



Figure 1: Earth Showing Iridium Satellites in Six Defined Orbital Planes

The Iridium GMDSS Service provides essential maritime safety communications using the Iridium satellite network. It is the only GMDSS solution offering global satellite coverage, including the polar regions. This service integrates multiple functions, including GMDSS, the Ship Security Alert System (SSAS), Long Range Identification and Tracking (LRIT), auxiliary data services, and voice communication, within a single terminal for efficient operation.

3.3 Iridium Certus GMDSS SIM Card

The C200M GMDSS system requires a valid Iridium Certus GMDSS SIM Card to utilize GMDSS communication services via the Iridium satellite network. This SIM Card can be obtained from authorized Iridium GMDSS Service Providers. Link the Iridium website page that shows a list of their maritime Certus Service Providers: <https://www.iridium.com/services/certus-gmdss>.

During service enrollment, registration documents containing the ship's main information (Ship Name, IMO No., MMSI No., Vessel Call Sign, etc.) will be submitted to the service provider. Upon successful registration, a SIM card specifically configured for the registered ship will be issued. This SIM card is uniquely identified by its physically-assisted ICCID (Integrated Circuit Card Identifier) and MSISDN (Mobile Station International Subscriber Directory Number), which serves as the intrinsic Iridium satellite number used within the Iridium GMDSS service. The registered ship's main information will be verified during the Installation Wizard process for the C200M GMDSS.

If any information contains errors, the user must contact the service provider to modify it before activating or installing the GMDSS system.

The SIM card type is Mini-SIM (dimensions: 25mm x 15mm). It will be provided attached to a plastic card. Before inserting the SIM card into the equipment, detach the Mini-SIM portion from the plastic card.



Chapter 4. Planning Installation

The antenna installation requires precaution and safety measures to be followed. Failure to follow the correct installation process may lead to injury of the installer and/or cause damage to the system. To maximize the performance of the system, a thorough review of this installation guide is strongly recommended. In addition, you should follow the installation process as it is described in this manual.

4.1 Selecting Installation Site

The antenna should be placed in an area on-board the vessel with an unobstructed view extending from (at least) 8° above the horizontal surface in all azimuth directions. Maximizing visibility to 17° below the horizon is recommended to ensure a stable connection during vessel motion.

When the antenna is transmitting, obstacles in the beam path will cause decreased satellite signal strength. The antenna unit requires direct line-of-sight with the desired satellite without any obstacles in the beam path.

Do not place the antenna near to a funnel because smoke deposits can cause corrosion of the antenna. In addition, the deposit can impact performance or cause malfunctions.

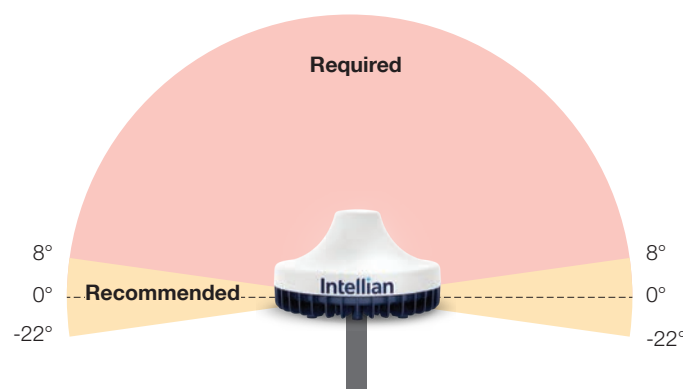
Do not place the antenna where there is direct seawater spray of.

4.1.1 Required Visibility for Iridium satellites

The antenna requires line-of-sight visibility to the satellite to maintain the connection. For best performance, it's recommended to install the ADU at the highest possible position on the vessel.

The minimum elevation angle for Iridium satellites is 8° above the horizon. The ADU requires visibility to the sky with as few blockages as possible in the "Required Zone" in Figure 1.

Vessel motions will lower this value. Our recommendation is to minimize blockages to 22° below the horizon, to ensure reliable performance for up to 30° roll.

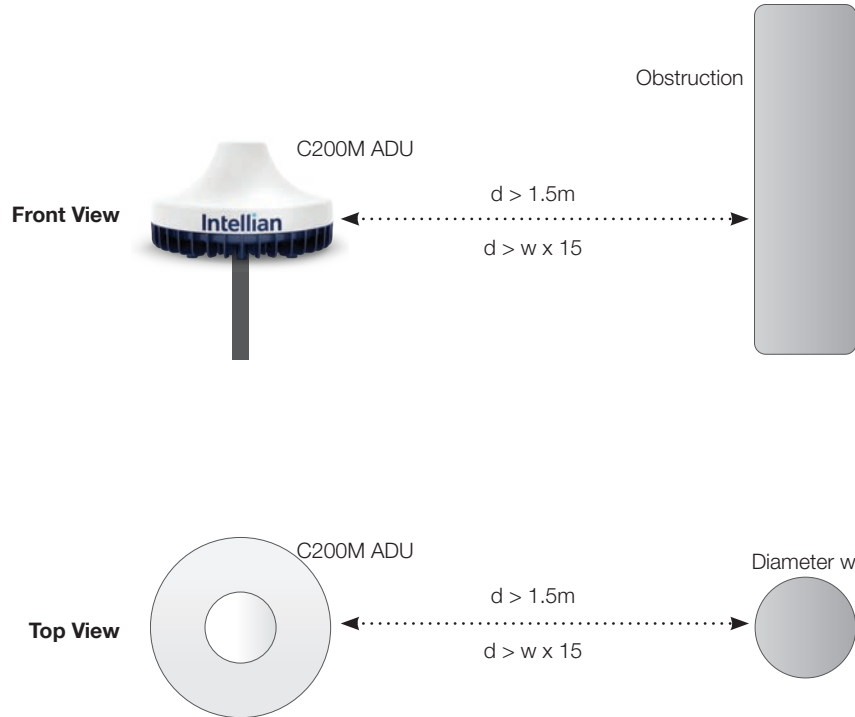


4.1.2 Separation to Obstacles

Obstructions between the ADU and satellite will interrupt the connection, and should be minimized as much as possible.

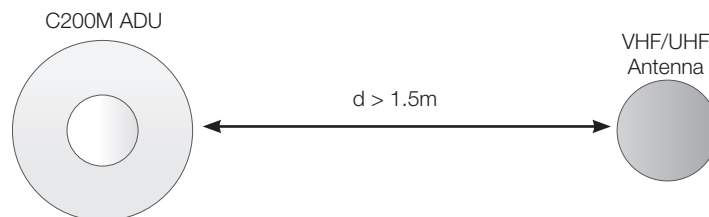
The distance from the ADU to any obstruction should be at least 1.5m (above 8° from horizon).

Small obstructions will not significantly impact performance. Our recommendation is to ensure the distance to any obstruction is greater than 15 times the effective diameter of the obstruction.



4.1.3 Separation to other antennas (eg UHF, VHF)

The ADU should be kept at least 1.5m away from any other antennas (eg VHF, UHF, Starlink, cellular).



4.1.4 Co-existing with Inmarsat and Iridium L-Band terminals

It is possible to install the C200M GMDSS system on-board a vessel that already has an Inmarsat or Iridium L-Band equipment installed.

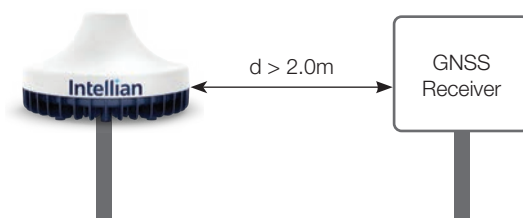
It is advised that the C200M GMDSS is installed as far away as possible, however if location is constrained then the C200M GMDSS ADU must be mounted below the other terminal antenna unit below an angle of 15 degrees and at the minimum horizontal distance specified below when co-locating is required.

- Install the C200M GMDSS ADU at a minimum horizontal distance of:

- 1m from an Inmarsat C antenna
- 5m from an Inmarsat Fleet Broadband antenna
- 1m from a Certus 100 antenna
- 2m from a Certus 200 antenna
- 5m from a Certus 700 antenna

It is advised that the units are separated by the maximum possible distance, irrespective of the guidance above. As this is an Iridium Certus GMDSS installation, we recommend a survey by a qualified installer.

Intellian also recommends that the GMDSS C200M Antenna Unit be installed with a minimum distance of 2 meters from any receivers and transmitters operating on the listed frequencies below:



Receivers adjacent to Iridium Transmission band	
GNSS	1563.0 -1587.0 MHz
Glomass	1593.0 -1610.0 MHz
GALILEO	1559.0 -1591.0 MHz
BeiDou	1559.05 -1563.15 MHz

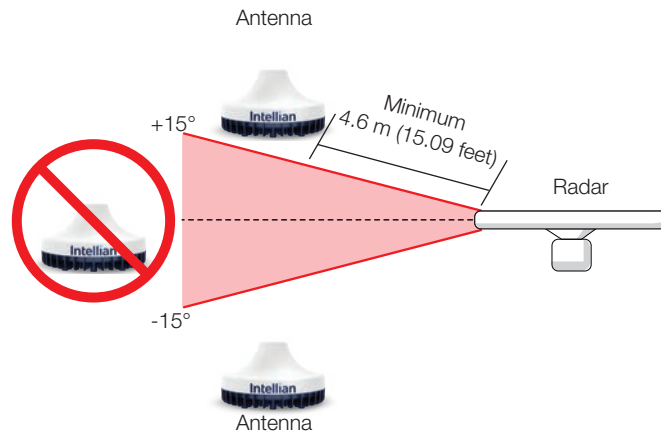
Transmitters and receivers adjacent to Iridium Transmission band	
Inmarsat Tx	1626.5 – 1675.0 MHz
Iridium Tx/Rx	1610.0 – 1626.5 MHz

4.1.5 Avoiding Radar Interference

Do not install the antenna near a high power shortwave radar. Most radar transmitters emit RF energy within an elevation range of -15° to $+15^{\circ}$. For this reason, you should position the antenna at least 4.6 m (15.09 feet) away from any radars (S-band and X-band Radar up to 50kW).

**WARNING**

Never place the antenna in the beam path of the radar, regardless of distance. The high power shortwave radar may impair its performance or permanently damage the antenna.

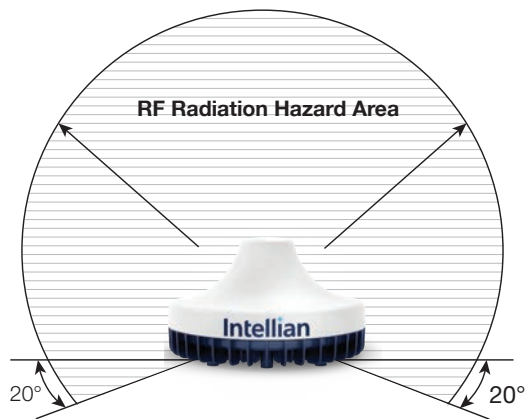


4.1.6 RF Hazard Precautions

The antenna is designed to be used with radiation transmitting equipment manufactured by others. Exposure to RF radiation, including exposure associated with improper use of the transmitting equipment, may be hazardous to people who work close to the Above Deck Unit. Ensure the safety of personnel who work with on the system.

During transmission, ensure to keep the minimum safety distance. The recommended minimum safety distance to the antenna on the focal line is as follows. It is based on a Radiation Exposure Level of W/m² that applies under an uncontrolled environment. No hazard exists >20° below the antenna's mounting plane.

Radiation Exposure Level	Recommended Minimum Safety Distance
10 W/m ²	more than 20cm
25 W/m ²	more than 13cm
100 W/m ²	more than 7cm



4.2 System Package

4.2.1 Above Deck Unit (ADU)

The Above Deck Unit (ADU) is an antenna unit with an omni-directional antenna, active RF circuitry, BCX (L-band modem), and a GNSS module. The radome protects the antenna unit from the marine environment. All signals (and DC power) pass through the single coaxial antenna cable, which connects the ADU to the BDU.



4.2.2 Below Deck Unit (BDU)

The Below Deck Unit (BDU) supports voice and data communications in a marine environment. The BDU is the main control unit of an antenna system that monitors and controls the antenna operation through Intellian's web-based software. The BDU contains user interfaces and controls all communication between the ADU and the local communication devices such as phones, and computers, etc.



4.2.3 Safety Display Terminal

The Safety display terminal(SDT7000C) functions as the display unit and controls the GMDSS system, supporting external interfaces and an operational user interface designed for safe and reliable maritime communication. It is intended for indoor mounting to ensure optimal performance and compliance with maritime safety standards.



4.2.4 Packing List

Before beginning installation, make sure you have all the included components.

Basic System including		
Item	Description	
C200 ADU with BDU(MED)	C200M	
Safety Display Terminal	SDT7000C	
Handset w/o PTT	HS7000	
Handset Cradle	HC7000	
Shielded Lan 3m Cable for BDU to SDT	RJ45 CAT6 -3	
Data & Power 12P 3M cable for SDT7000C	DPC12-3	
4 tapping screws & bolts	Installation material	
Operaion Manual	OM-S	

Option		
Item	Description	
Intellian AC/DC Power Supply 180W/24VDC	PSU180D	
Junction Box Unit for Navtex and sat GMDSS	JB1000	
Data 14P 3M cable for IN3000R to JB1000	DC14-3	
Intellian AB1000 Alarm Box with Distress	AB1000	
Intellian AU1000 Alarm Unit with Distress	AU1000	
SSAS Box Alert	SB7000A	
SSAS Box Test	SB7000T	
SRP-350 PLUS III Serial and Lan interface printer 24V	SRP-350 PLUS III	
3M DC Power and data cable for Printer	PDCP-3	
Intellian HC2500 Handset w/o PTT	HS7000	
Intellian HC2500 Handset Cradle	HC7000	
Intellian EDS-205 MOXA Switch 5 Port	ISW205	
Extended Warranties 3year for sat GMDSS series (Part & Labour)	ISEXT3	
Extended Warranties 4year for sat GMDSS series (Part & Labour)	ISEXT4	
Extended Warranties 5year for sat GMDSS series (Part & Labour)	ISEXT5	

Equipment		
Item	Description	
C200 ADU with BDU(MED)	C1-20-A00S	
Safety Display Terminal (Iridium)	SDT7000C	
Handset w/o PTT and cradle	HSC7000	
Junction Box	JB1000	
Handset w/o PTT	HS7000	
Handset Cradle	HC7000	
GMDSS Alarm Unit (Multiple system)	AU1000	
GMDSS Alarm Box (Single system)	AB1000	
SSAS Box (Alert)	SB7000A	
SSAS Box (Test)	SB7000T	
AC/DC Power Supply Unit (180W)	PSU180D	
Serial & LAN Interface Printer 24V	SRP350 PLUS III	
EDS-205 MOXA Switch 5 Port	ISW205	
Keyboard	SPR-8695TU	

4.3 System Cables (Customer Supplied)

4.3.1 Antenna RF Cable (Customer Supplied)

The model does not come with an Antenna RF Cable (LMR 200, 25m), and you will need to purchase it separately. Due to the signal losses across the length of the RF coax on L-Band, it must only use RF cables with 50 Ω impedance coaxial cable types for standard system installation. The use of different type of cables (75 Ω coaxial types etc.) can cause problems. Check the instructions from the cable supplier. The table below shows the recommended cable types and maximum cable lengths for the antenna system.

Coaxial Cable Type	Attenuation (@ 900 MHz)	*Max. Cable Length (17.5 dB loss @ 900 MHz)	Min. Bend Radius
LMR200	0.326 dB/1 m	50 m	Installation 12.7 mm (0.5 in.)
LMR300	0.199 dB/1 m	60 m	Installation 22.2 mm (0.88 in.)
LMR400	0.128 dB/1 m	100 m	Installation 25.4 mm (1 in.)

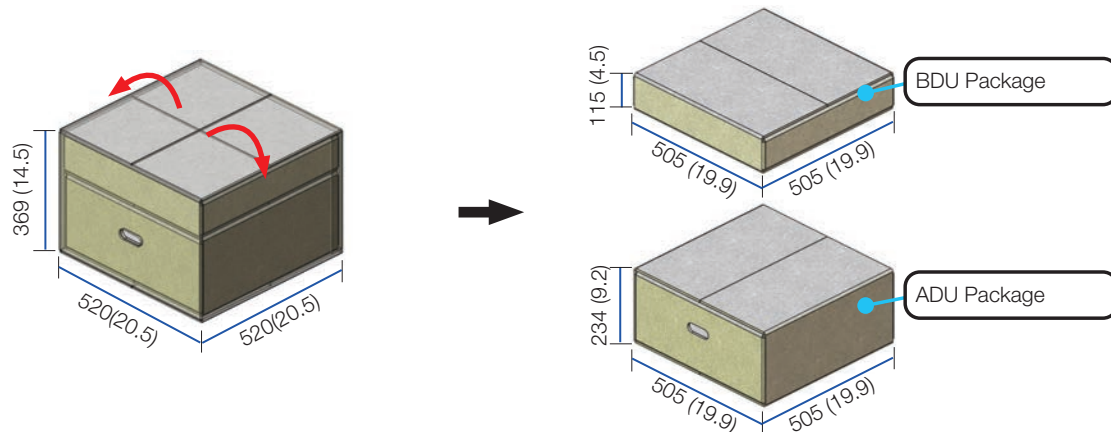
- Connector type: TNC
- Optimal tightening torque: 1.5 N-m
- Maximum DC resistance of RF cable: 1.3 Ω
- *Maximum RF loss at 900MHz: 17.5 dB including connector

4.4 Unpacking Package

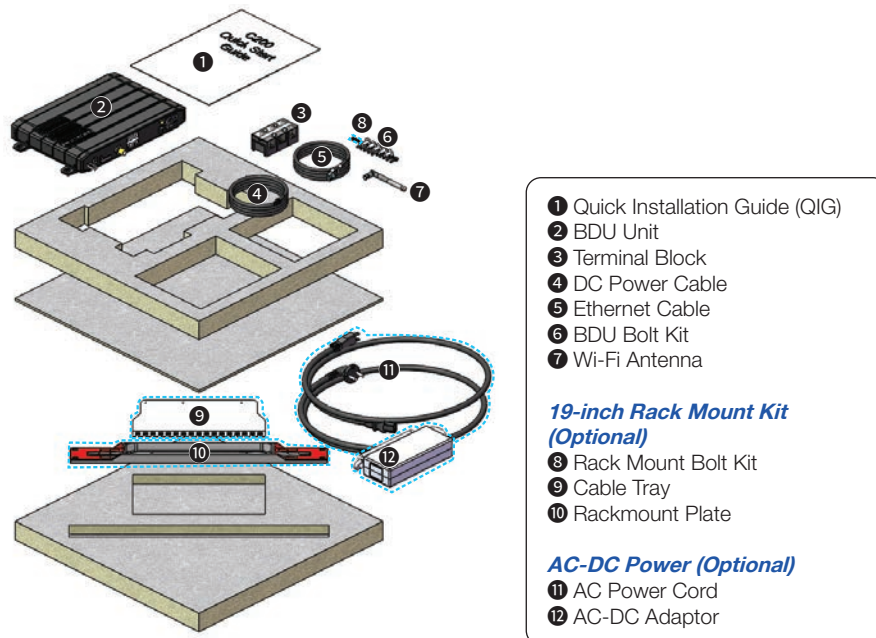
4.4.1 Unpacking Antenna Package

Follow the steps for easy and safe unpacking. The system package consists of two sub-packages comprising an ADU Package and a BDU Package.

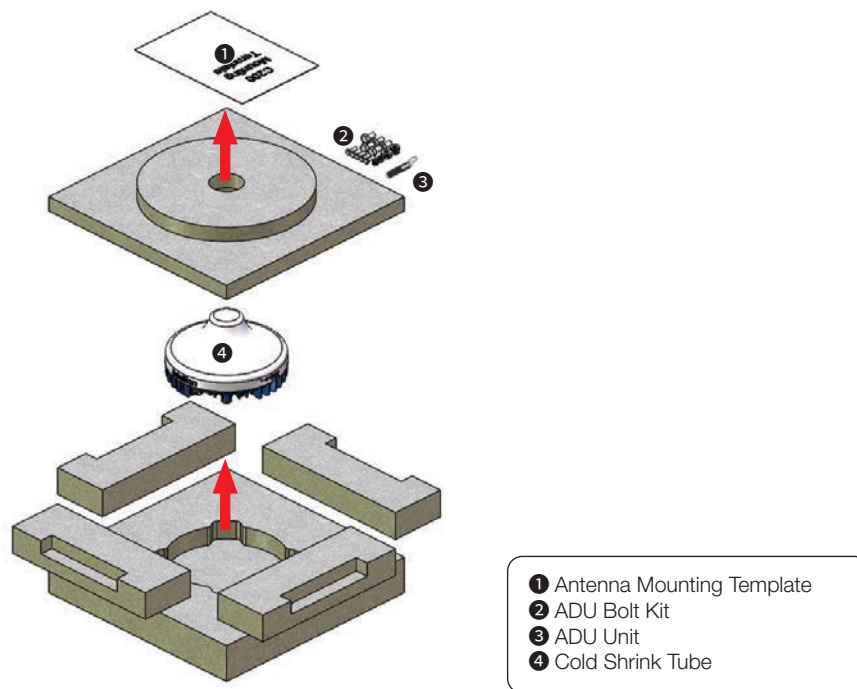
Unit: mm (inches)



1. Remove the top cover and take out the BDU package including a Quick Installation Guide, a BDU Unit, a Wi-Fi Antenna, a DC Power Cable, an Ethernet Cable, a BDU Bolt Kit, and a Terminal Block. The 19-inch Rack Mount Kit (Optional) and AC-DC Power (Optional) can be purchased separately.



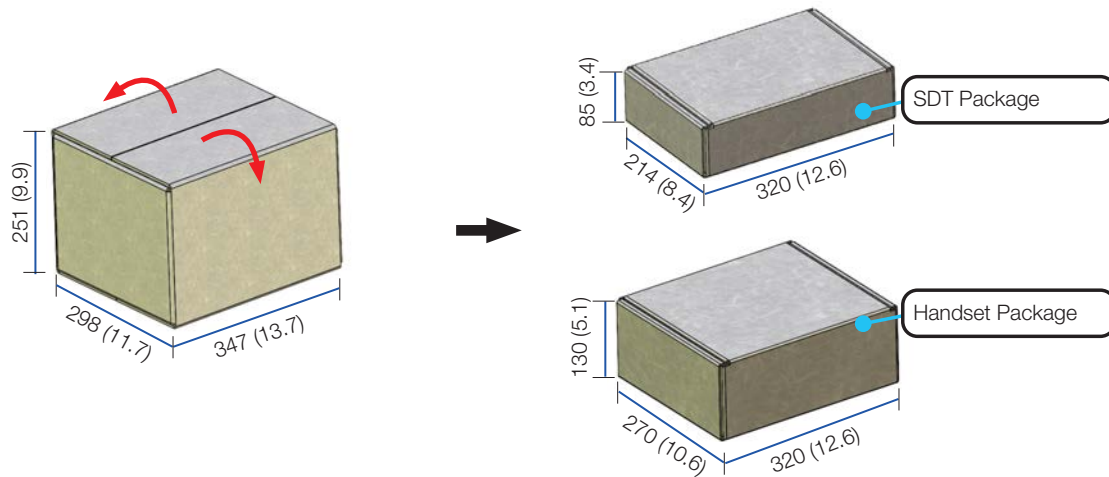
2. Take out the ADU package including an Antenna Mounting Template, an ADU Bolt Kit and an ADU Unit.



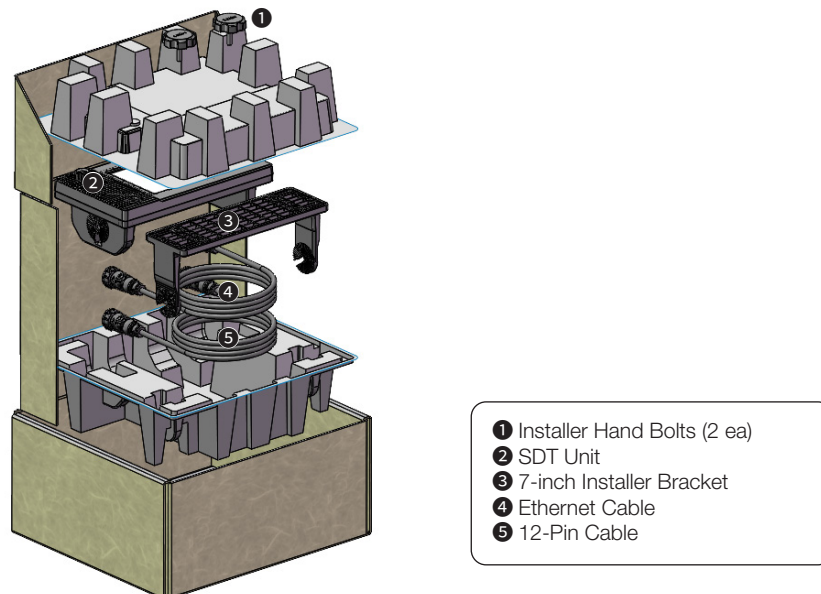
4.4.2 Unpacking SDT Package

Follow the steps for easy and safe unpacking. The SDT package consists of two sub-packages: an SDT Package and a Handset Package.

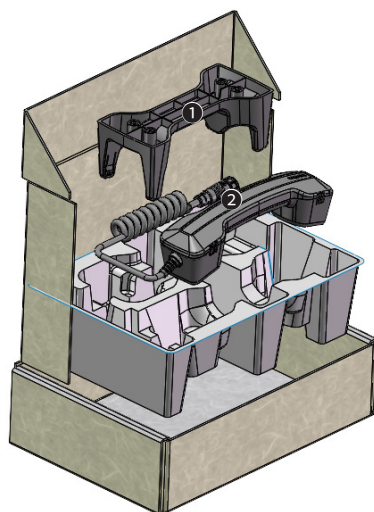
Unit: mm (inches)



1. Open the package and take out the SDT package, which includes bracket mounting knobs (2 ea), an SDT Unit, a 7-inch bracket, an Ethernet cable, and a 12-pin cable.



2. Open the package and take out the handset package, which includes a handset bracket and a Handset Unit.



- ❶ Handset Bracket
- ❷ Handset Unit.

4.5 Procedure for upgrading an in-service C200M installation to C200M GMDSS

An in-service C200M terminal (comprising an ADU and BDU) can be upgraded to a GMDSS system. Refer to the Intellian C200M GMDSS Declaration of Conformity and the Module B and Module D Type Certificates for details on the regulatory approval of this upgrade.

The process for completing an in-service upgrade of a standalone system to a GMDSS compliant installation is:

1. Assess the installation for compliance against the GMDSS requirements (refer to Section 4, 5, 6 of this document and associated regulations) and modify if required.
2. Affix the new RF Hazard label to the ADU on the opposite side to the existing label.
1. Update the software to version V2.0.1. (or later if available)
2. Replace the existing SIM card with new GMDSS SIM.
3. Complete installation of SDT and handset (mandatory) and desired accessories (optional), and commission the system following the normal process. (see section 7 and later of this document)

4.5.1 Assessing an existing installation

An existing installation must be assessed against the requirements and recommendations contained within this document, alongside any other relevant regulations. In particular, the ADU installation should be assessed against the guidelines prescribed in section 4 of this document.

The existing installation may need to be modified if it does not meet the more stringent requirements necessary for forming part of a compliant GMDSS system.

This process must be completed by a person trained in the installation of the Intellian C200M GMDSS system.

4.5.2 New RF Hazard Label

A new RF hazard label must be affixed to the ADU for compliance to the GMDSS regulations. Specifically, the new label prescribes microwave hazard safe distances at three radiation intensities (10, 25 & 100 W/m²)

Existing Label	New Label
	

The new RF hazard label should be applied on the opposite side of the radome to the existing label. Ensure the surface is clean and dry before affixing the new label.

4.5.3 Software Update

The standalone software must be upgraded to support GMDSS usage. The lowest version to be used is the C200M unified binary V2.0.1 (containing BDU version 2.0.1 and ADU version 1.0.5). Please refer to Intellian technical support or your service provider to obtain the latest version of the software.

The procedure for updating the software to support GMDSS usage is as follows:

Step 1. Connect the laptop and the BDU using the Ethernet cable. Make sure that the BDU is not connected to the SDT.

Step 2. Login the Web UI in the BDU with the proper ID/PW from the laptop.

Step 3. Start the upgrade under the Web UI menu, TOOLS → Software Upgrade, with the new SW package binary from the laptop.

Step 4. After reboot completion, make sure the SW binary version is correctly changed in the Web page.

Step 5. Power off the BDU.

Step 6. Connect the BDU to the SDT with the Ethernet cable, assuming the all GMDSS devices are connected correctly.

Step 7. Turn on the PSU for the power-on to the SDT and the BDU at the same time.

Step 8. Do the Intellian GMDSS installation wizard from the SDT LCD screen.

For the detailed description for SW upgrade in the C200M (Step #1 - #3 above), see the user guide of C200M, chapter 8.2 (accessing Web page) and chapter 8.9.1 (Software upgrade via Web UI).

For the detailed description for the GMDSS installation (Step #6 - #8 above), see the installation guide of GMDSS C200M, Chapter 7. (Installing the SDT) and Chapter 9 (Operating Install Wizard).

4.5.4 SIM card

The SIM card must be replaced with a new SIM capable of GMDSS operation. The new SIM will need to be provisioned for the terminal and vessel. Please contact your service provider and Iridium for support.

4.5.5 Installation of the SDT, accessories and GMDSS system commissioning

The installation of the SDT and handset (mandatory) and desired accessories units (optional) should be completed following Chapter 7 and later of this document. The system must be powered by the approved Intellian PSU180D power supply or a suitable alternative must power the system.

Chapter 5. Installing ADU

5.1 Antenna Dimensions

Before installing the antenna unit, confirm its height and diameter (see figure below). To protect the cable connectors on the bottom of radome, the antenna is shipped from the factory with protective stickers on the Inner Holes and protective covers on the Outer Holes .

Unit: mm (inches)

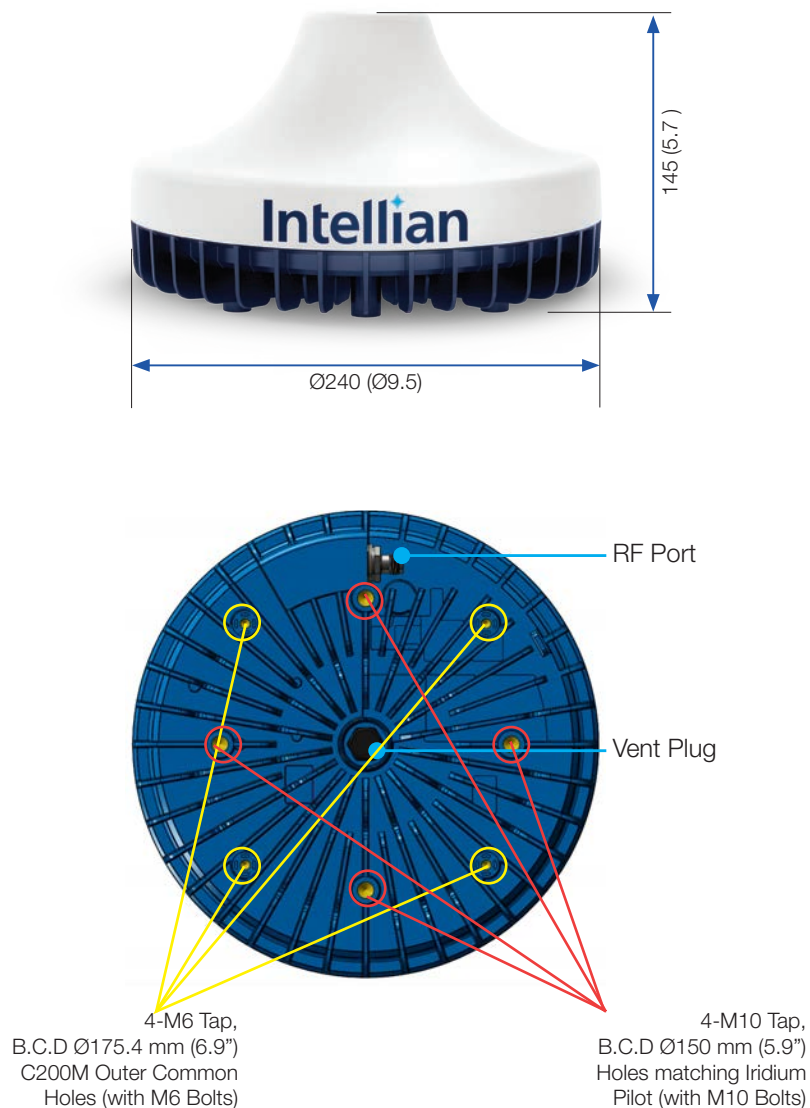


Figure 2: Antenna Dimensions

5.2 ADU Mounting Hole Pattern

Use the supplied mounting template when drilling mounting holes on the mast. The hole placement for the antenna must match the mounting hole pattern on the template.

The lower radome has two types of industry-standard mounting holes, each with four mounting points. This hole pattern is compatible with other companies' mounting holes. Select one of the two mounting types to secure the antenna to the desired mounting surface.

- **C200M Outer Common Holes:** Mount the antenna using 'C200M Outer Common Holes' (with M6 Bolts). Intellian offers the Antenna Pole Mount Kit (separate purchase) that uses C200M Outer Common Holes (with M6 Bolts) to mount the antenna on a pole.



WARNING

When reusing an existing mast, make sure the location of the holes on the mast correspond to the hole locations and sizes printed on the mounting template.

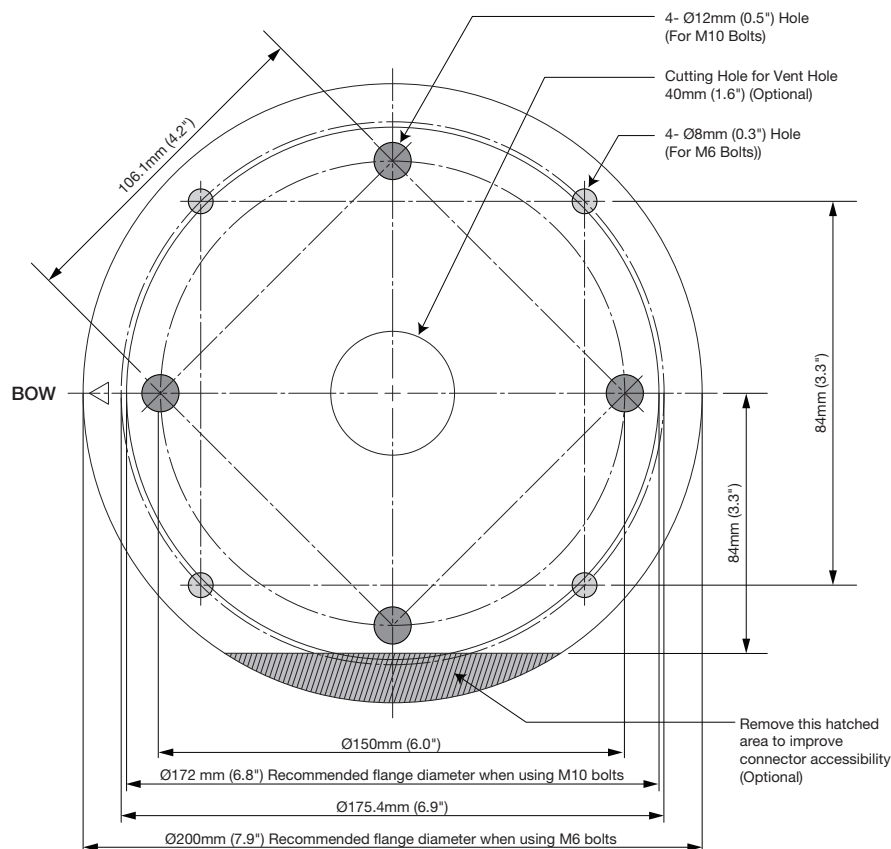


Figure 3: ADU Mounting Hole Pattern

5.3 Mounting Antenna on Pole (Optional: MC-0003)

Intellian offers the Antenna Pole Mount Kit (separate purchase) to mount the antenna on the pole. The kit is designed to work on the 40A pole. The kit has mounting holes that match the inner hole with M6 bolts on the bottom of the antenna.

Name	Diameter (inch)	External Diameter (mm)
40A	1½	48.6

- When mounting antenna on the 40A pole, the 40A pole bushing needs to be installed inside pole tube additionally. Place the 40A pole bushing inside pole tube, then tighten them on the top end of the 40A pole using bolts. Before assembling bolts, apply Loctite #263 to the bolt's threads to ensure the bolts are fastened firmly.

*The pole tube Inner Diameter is Ø52 mm.

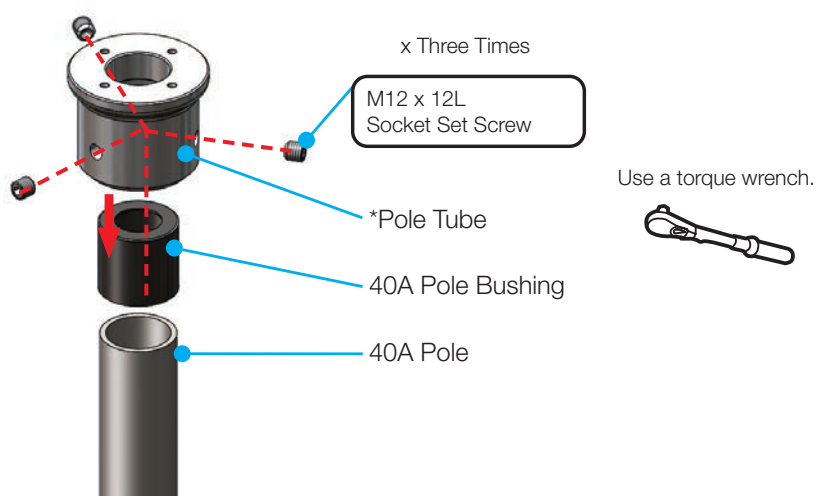


Figure 4: Installing 40A Pole Bushing inside Pole Tube

- A** The end of one leg of the pole bracket must be aligned with the BOW direction. Place the pole bracket onto the pole tube then tighten them using bolts. Before assembling bolts, apply Loctite #263 to the bolt's threads to ensure the bolts are fastened firmly.

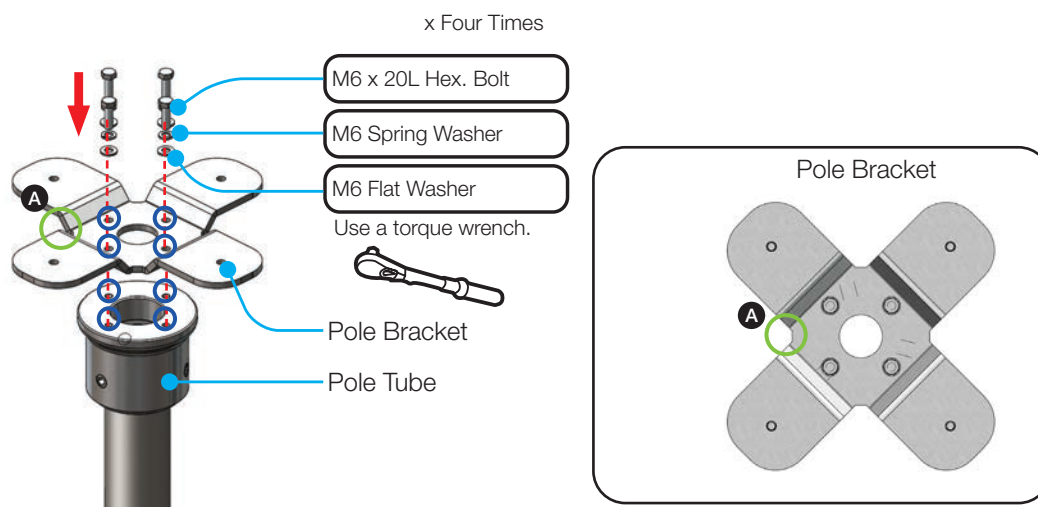


Figure 5: Installing Pole Bracket

- Place the antenna on the pole-mounted bracket then tighten them using bolts. Before assembling bolts, apply Loctite #263 to the bolt's threads to ensure the bolts are fastened firmly.

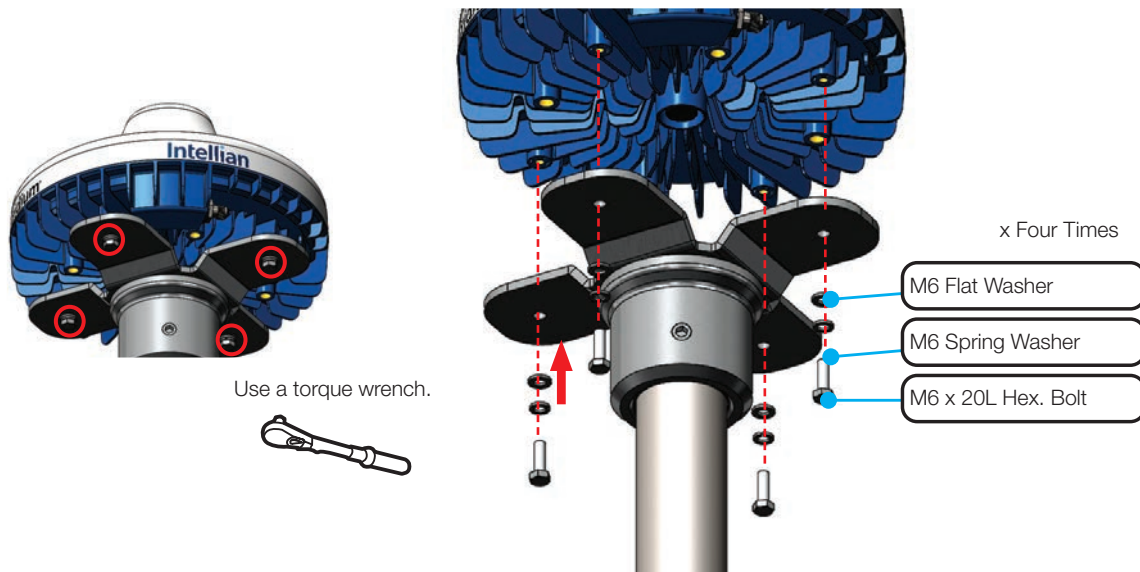


Figure 6: Mounting Antenna on Pole Mounted Bracket

5.4 Vent Hole

In some weather conditions, there may occur condensation and moisture inside the ADU. The vent hole is designed to allow easy air exchange and thus ensures that the enclosed area remains dry, and prevent water condensation. There is no need to open the vent hole assembled at the factory.

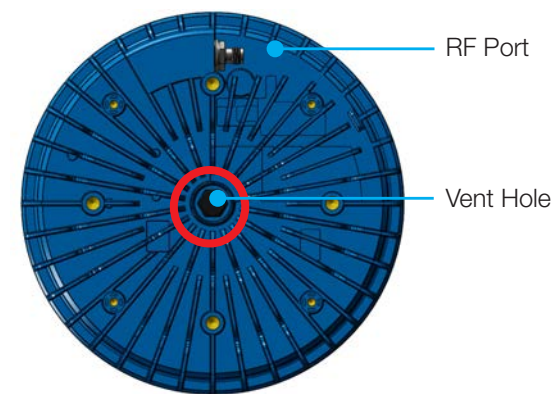


Figure 7: Vent Hole

5.5 Connecting Antenna RF Cable

The cable must be routed from the antenna and through various areas of the ship to end up at the Below Deck Unit. When pulling the cables in place, avoid sharp bends, kinking, and excessive force. After placement, seal the deck penetration gland and tie the cable securely in place. The cable bracket must be installed on the mast to fix the relevant cable. The gooseneck must be installed on the side of the mast to protect the relevant cable against water. Intellian recommends using an RF cable connector with a rubber grommet to protect the inside of the ADU from any water ingress.



NOTE

Make sure of the following before installing system cables.

1. All cables need to be well clamped and protected from physical damage and exposure to heat and humidity.
 2. Don't use any acutely bent cable.
 3. Use watertight glands or swan neck tubes at exposed bulkheads or deck heads where the cable passes through.
 4. Install recommended size cables. See section 4.1 for cable requirements.
1. Route the RF cable from the gooseneck placed on the deck to the antenna. Maintain a cable length at least 2 m considering service loops when routing the cable on the mast.
 2. Connect the RF cable to the RF port on the antenna and the **Antenna** port of the BDU. After connecting the cable, use a cable tie to secure the cable to the underside of the ADU using the slot provided in one of the cooling fins.

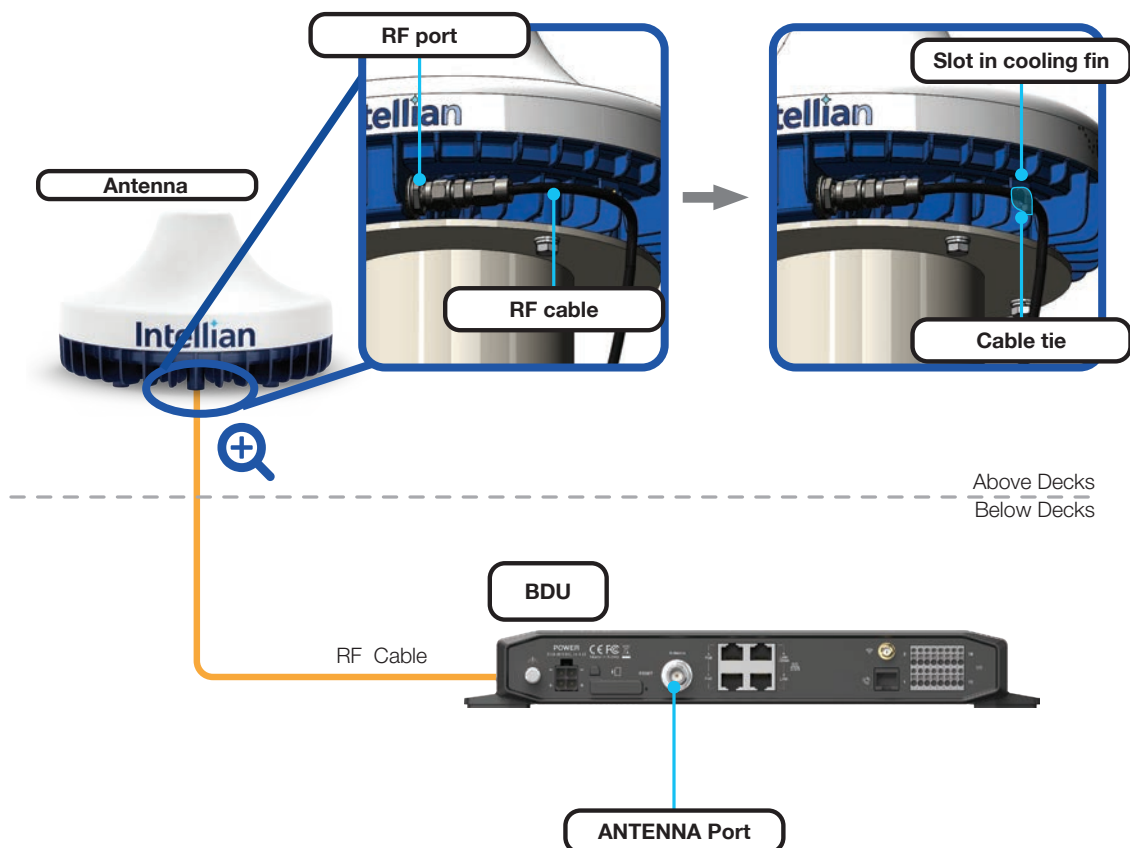


Figure 8: Connecting Antenna RF Cable

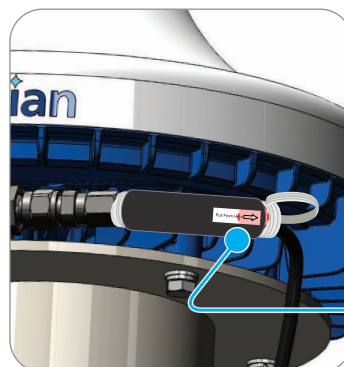
3. Adjust the cable lengths, and then securely fix the cables on the mast cable brackets using the cable ties. Since the cable connector at the bottom of radome is waterproofed at the factory, there is no need to work waterproofing.

5.6 Important Notice of Waterproofing Connector

5.6.1 Installing the Cold Shrink Tube on the Cable

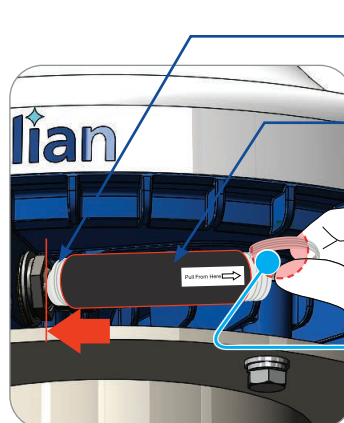
To prevent cable damage, use the supplied cold shrink tube when wrapping the cable and connector by following the steps below.

1. Ensure there are no sharp or acute edges on the cable part where the cold shrink tube is to be installed.
2. Be careful not to damage the cold shrink tube with sharp objects when taking it out of the PE bag.
3. Place the shrink wrap tube over the end of the antenna cable with the arrow pointing point away from the ADU.
4. Plug the cable connector into the RF port on the antenna



Arrow should point away from the ADU

5. Pull the plastic strap downward lightly, aligning the edge of the outer tube with the inside plastic core.

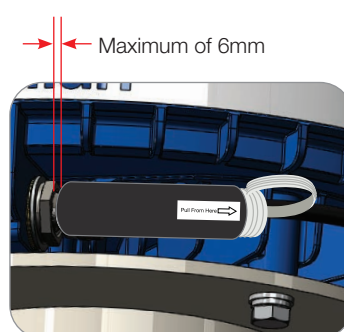


Inside Plastic Core

Outer Tube

Pull the plastic strap downward.

6. Leave space between the cable connector and the end edge of the tube (a maximum of 6mm).



Maximum of 6mm

7. Pull the plastic strap downward slowly until the cable and connector are wrapped.



Pull the plastic strap downward.

8. After the tube shrinkage is complete, check whether the installed tube has any external damage or lifting. If there is damage or lifting, wrap the cable with rubber or tape.



5.6.2 Installing Waterproof Tape on the Cable (Optional)

During antenna installation, make sure that, once the cable is connected to the antenna, proper waterproofing of the connector is done with self-amalgamating tape.

If you need any assistance, please contact Intellian Technical Support (support@intelliantech.com).

Outline of Taping

Self-amalgamating tape comes with a protective plastic peel-away layer that allows the tape to be rolled and shipped. To waterproof a connector, first peel away a portion of this protective plastic layer, and then start wrapping the tape around the cable to be protected.



Procedure

1. Connect the cable to the connector where it is to be fully secured.

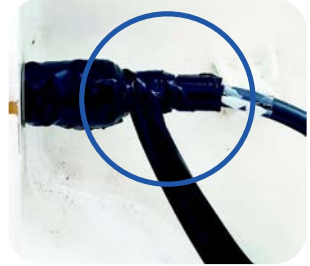


CAUTION

- DO NOT over-tighten the connector, nuts, or screws when mounting the antenna to avoid damage.
- DO NOT leave any cables loosened or non-fixed, especially those installed outside of the antenna.

2. Apply tape over the connector.

It is best practice is to wrap the tape over itself by 50%. This means that, once you wrap your first layer, your second layer should overlap half of the first layer, and so on. This ensures that you get a strong bond between the different layers of tape by having them properly adhere to one another.



3. Ensure that the entire RF connector is taped up as shown in the picture on the right.



WARNING

- Note that you cannot use ordinary electrical tape to waterproof the RF connector. Only self-amalgamating tape is able to waterproof the connector properly.
- Failure to properly wrap cabling will result in rust and corrosion to the cable and its connector, and this might end up damaging the antenna.

Chapter 6. Installing BDU

The Intellian offers two versions of BDU installation, one can be installed to the surface of the wall or desktop, and one can be installed to the 19-inch rack frame using the BDU Rack Mount Kit (separate purchase).

6.1 Selecting BDU Installation Site

The BDU should be installed below the deck in a location that is dry, cool, and ventilated. The front panel of BDU should be easily accessible to users.

6.2 BDU Dimensions

Confirm the dimensions of the BDU before installing it.

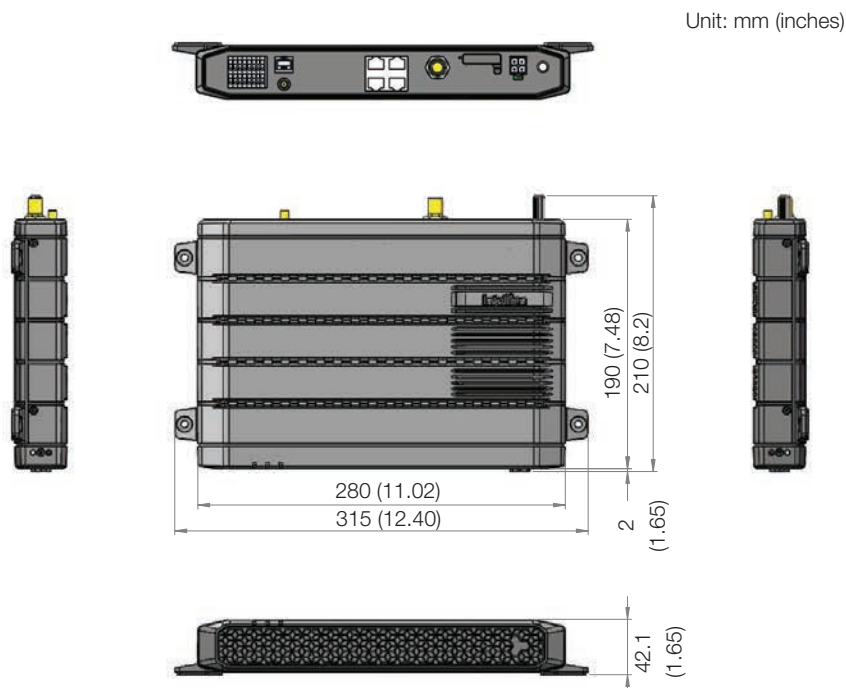


Figure 9: BDU Dimensions (Direct Mounting Type)

Unit: mm (inches)

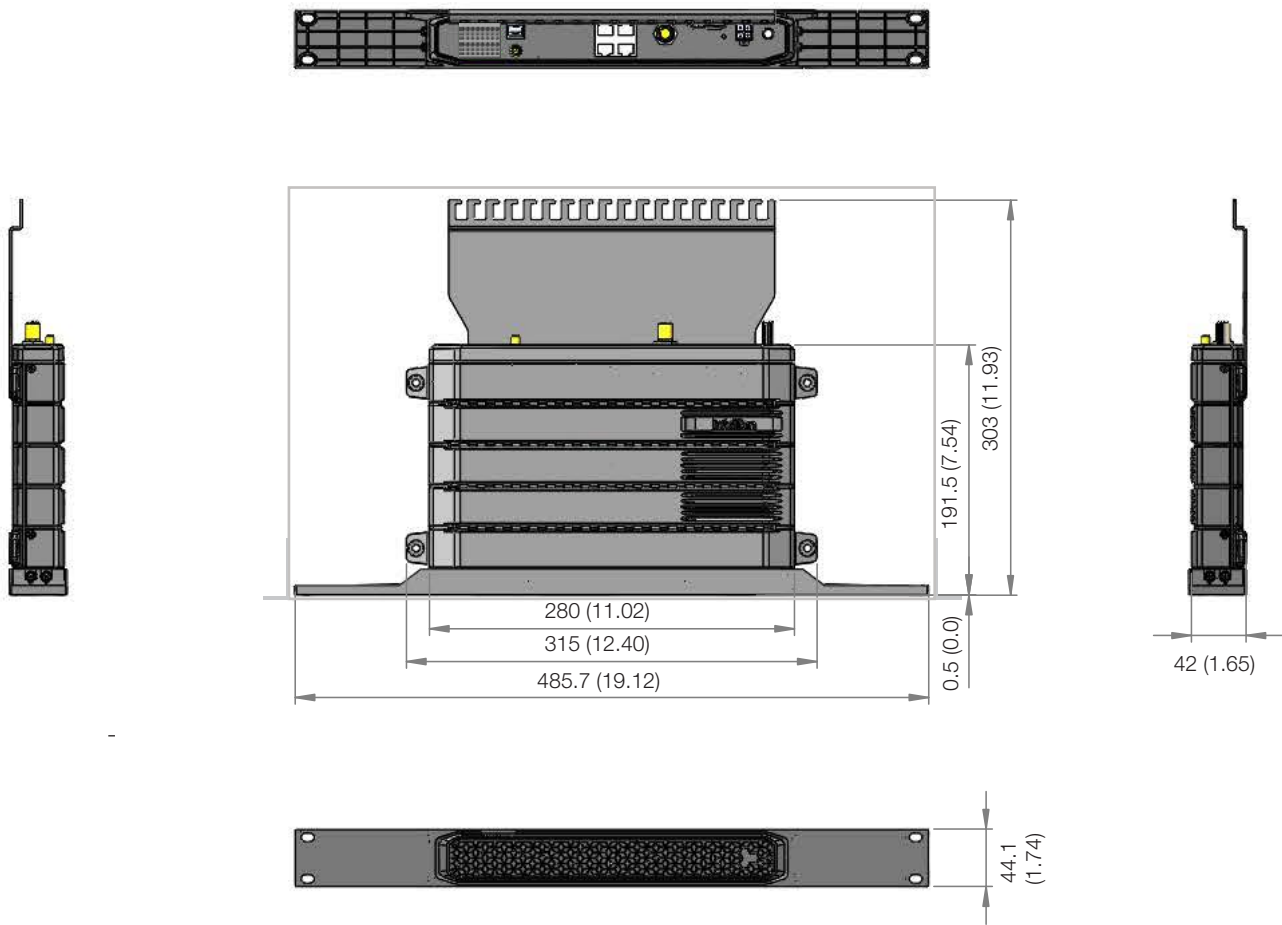


Figure 10: BDU dimensions (installed using 19-inch BDU Rack Mount Kit)

6.3 BDU Mounting Template

The BDU mounting holes must be in the exact same place as shown in the provided mounting template below.

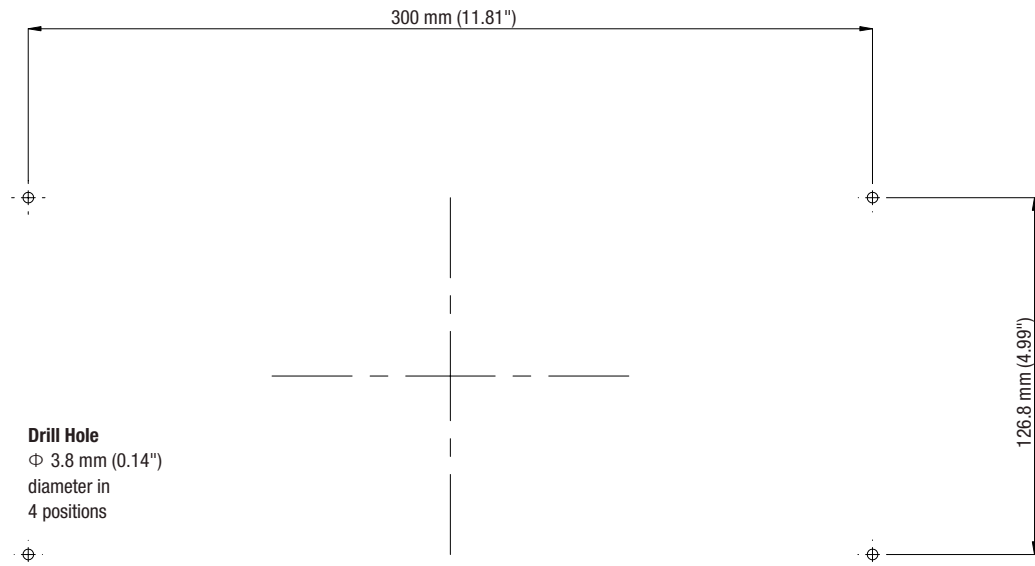


Figure 11: BDU Mounting Template

6.4 Mounting BDU

The BDU can be mounted in any orientation but for best performance, Intellian recommends that it is mounted horizontally.



WARNING

Ensure that the cables connected to the BDU are long enough to prevent damage when the BDU is pulled out from the rack.

6.4.1 Direct Mounting Type

The BDU is designed with four corner mounting holes to make direct mounting on the wall or desktop easily.

1. Mount the BDU on the mounting surface by inserting four screws through the mounting holes.

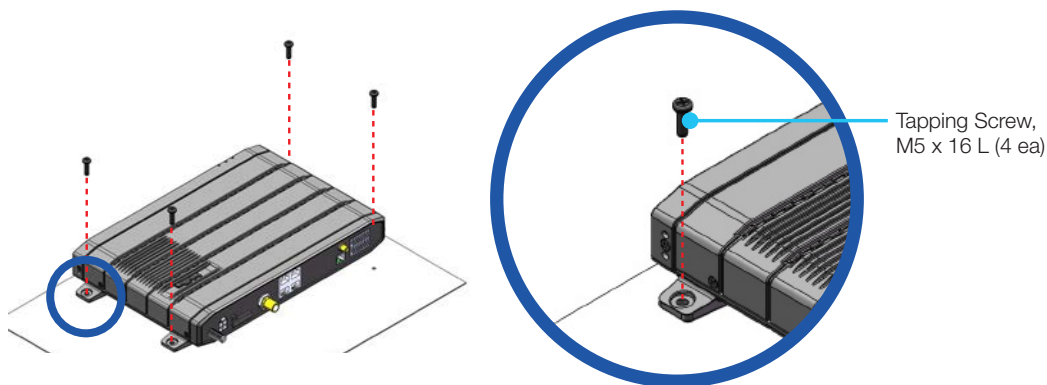


Figure 12: Direct Mounting of BDU

6.4.2 19" Rack Mounting Type (Optional)

Intellian offers the BDU Rack Mount Kit (separate purchase) including the rackmount plate and cable tray to mount the BDU in a 19-inch rack. Intellian recommends using a 19-inch rack shelf (not supplied) to support the BDU in the rack.

1. Using the Screws supplied, attach the cable tray to the BDU.

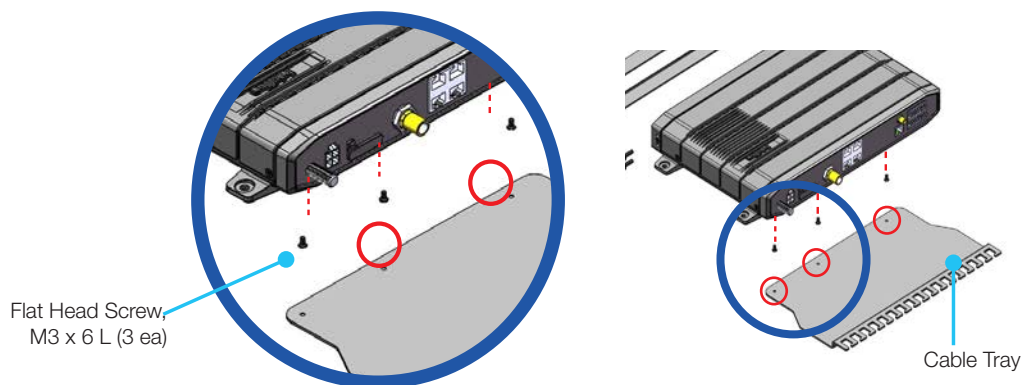


Figure 13: Attach Cable Tray to BDU

2. Using the Screws supplied, attach the rackmount plate to the BDU.

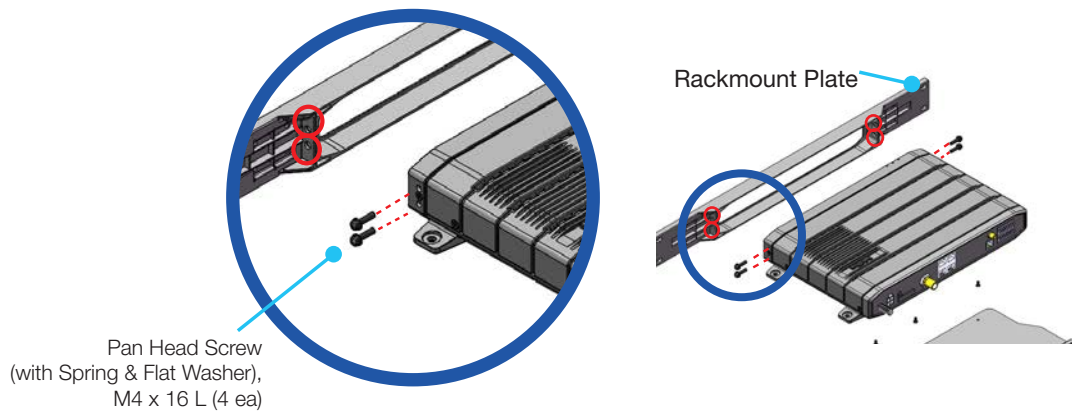


Figure 14: Attach Rackmount Plate to BDU

3. Slide the BDU assembly into a 19" rack frame. Mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the BDU assembly is mounted securely according to the requirements for your 19" rack. In case of using a provided AC-DC adapter for AC power connection, mount it securely in a safe place. After connecting all cables, fix the cables on the end of the cable tray using cable ties.

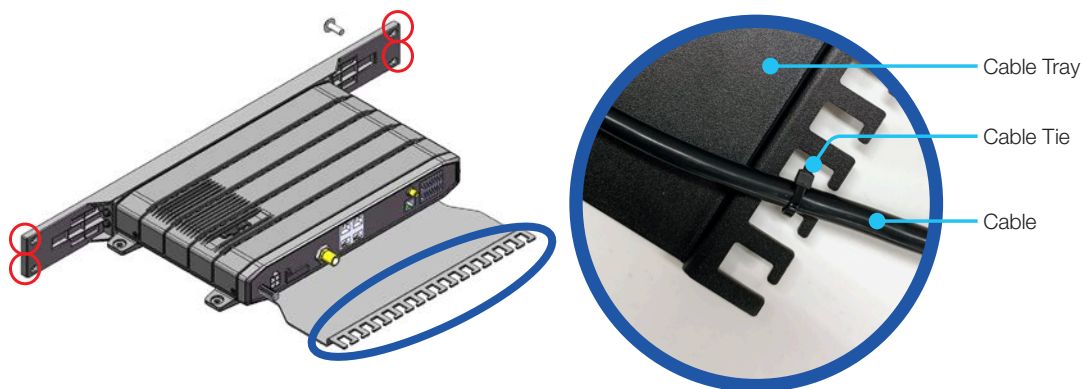
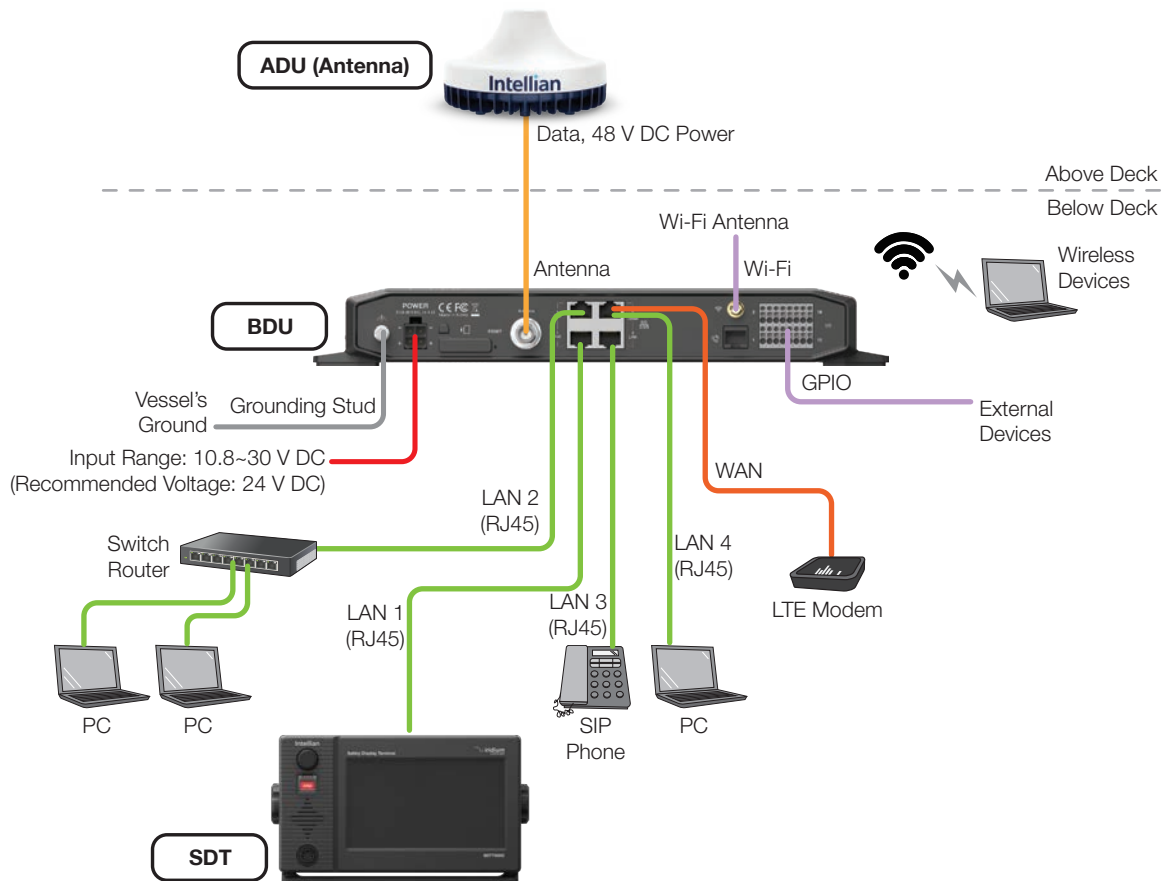


Figure 15: Mount BDU Assembly into 19" Rack

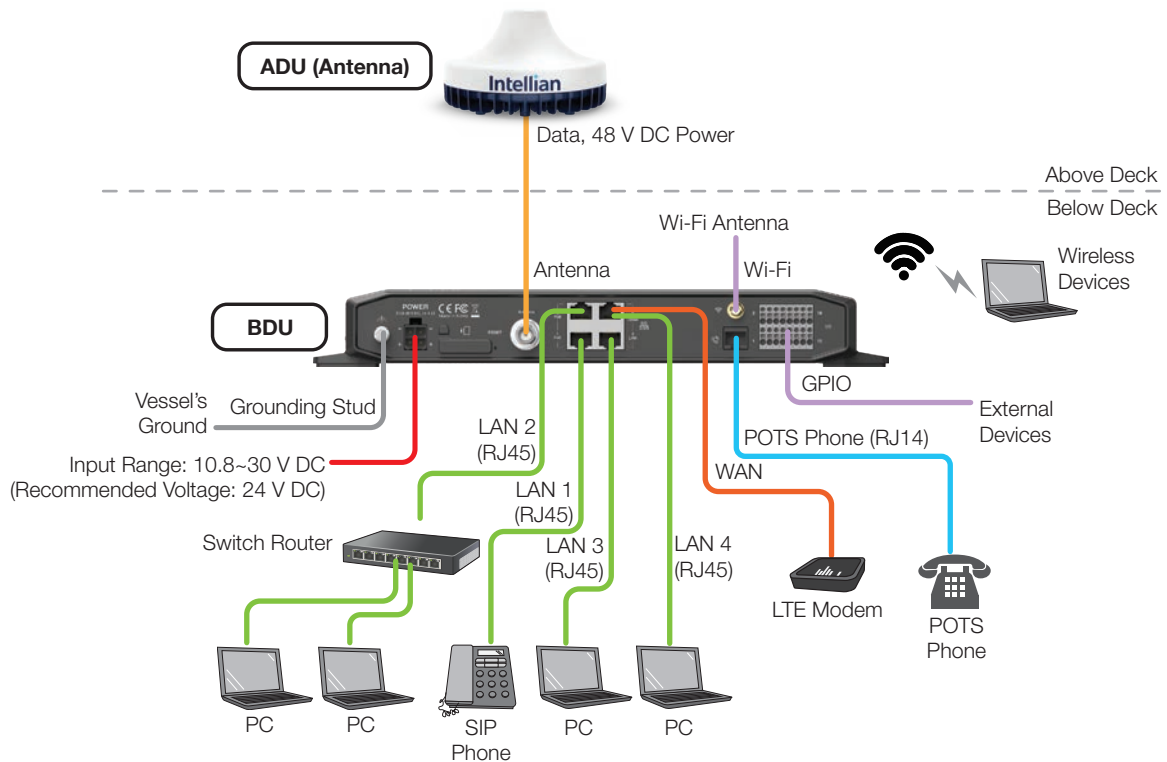
6.5 Antenna System Configuration

The basic system consists of one antenna and one BDU. Separate purchase of standard items including POTS phones, SIP phones, computers, etc. may be needed. A modem can be connected to the WAN port for data at least-cost routing operations. Voice calls are always routed through the Iridium system unless using a data call application. For your satellite communication system to work properly, connect the cables according to the configuration below.

C200M Antenna System with GMDSS System



C200M Antenna System without GMDSS System



6.5.1 Data Sessions and Voice Calls

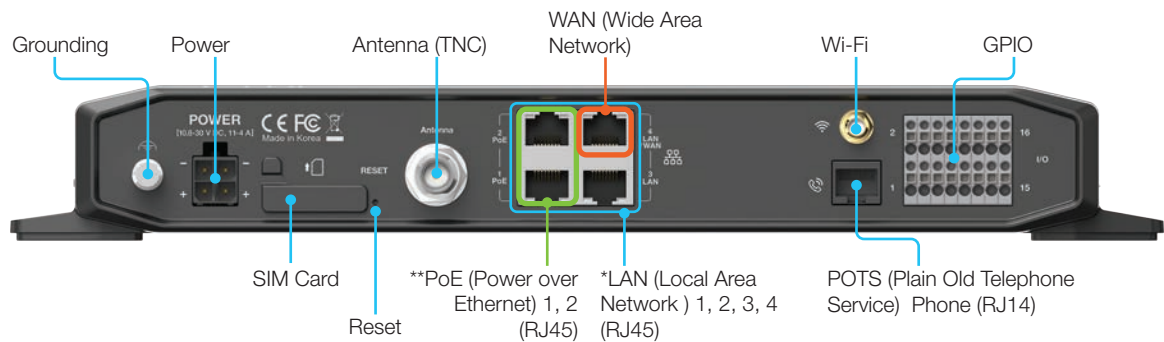
The System provides up to 3 high-quality voice calls, multiple data sessions, Wi-Fi, and supports up to 18 extensions (including 2 analog phones and 16 sip phones).

The BDU communicates directly with SIP phones on any of the 4 LAN user ports (LAN 1, 2, 3, or 4). The SIP phones register directly to the SIP server in the BDU.

6.6 BDU Cable Connection

6.6.1 BDU Back Panel View

The following figure shows the BDU back panel connectors.



* All LAN ports are IEEE 802.3 compliant.

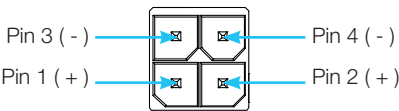
** Each PoE Port is designed to use 7.5W power. When using over 12.5W in one port, the PoE function will be stopped in port 1 or port 2.

Figure 16: BDU Back Panel View

6.6.2 BDU Connector Pinout Guide

The BDU connector pins and their corresponding descriptions are shown in the following figures and tables.

Power Connector (DC Power)



4 Contact Power Plug Male

Pin	Signal
1	+
2	+
3	-
4	-

Figure 17: DC Power Connector Pinout

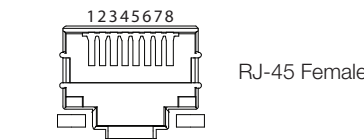
Antenna Connector (TNC)



Conductor	Function
Inner	Data, 48 V DC Power
Outer	Ground

Figure 18: Antenna Connector (TNC) Pinout

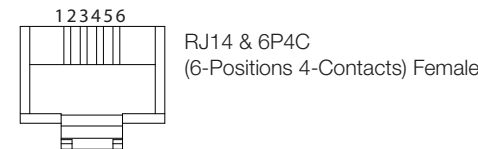
LAN Connectors (1~4) (RJ45)



Pin	Signal
1	Tx+
2	Tx-
3	Rx+
4	N/C
5	N/C
6	Rx-
7	N/C
8	N/C

Figure 19: LAN Connector (RJ45) Pinout

POTS Phone Connector (RJ14)

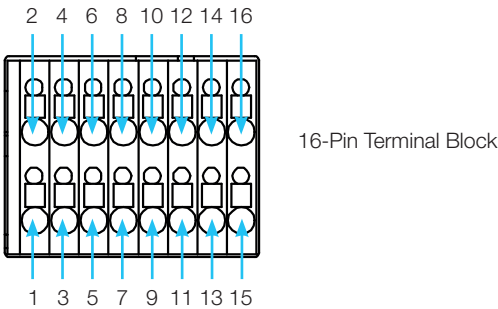


Pin	Signal
1	N/C
2	T2+ (POTS Phone 2, no. 102)
3	R1- (POTS Phone 1, no. 101)
4	T1+ (POTS Phone 1, no. 101)
5	R2- (POTS Phone 2, no. 102)
6	N/C

Figure 20: POTS Phone Connector (RJ14 & 6P4C) Pinout

General Purpose Inputs/Outputs (GPIO) Connector

The BDU has a dedicated 16-pin connector to provide a GPIO (General Purpose Input/Output) interface to the external devices. All wires for the GPIO connector must use AWG 24 unscreened wire type.

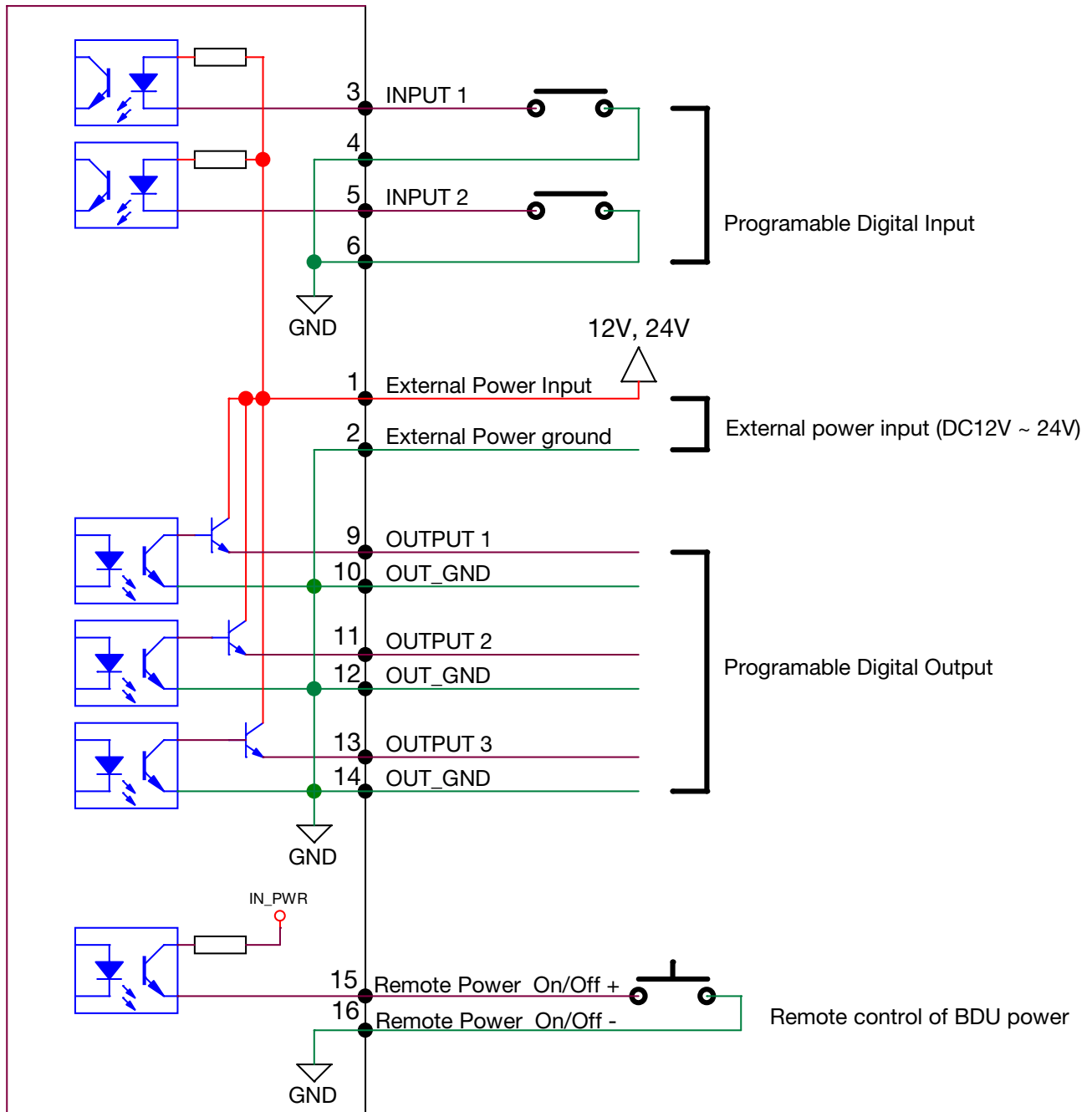


Pin	Signal	Explanation	Pin	Signal	Explanation
1	External Power Input	Power Input (DC 12 V ~ DC 24 V)	2	External Power Ground	Input/Output Ground
3	Input 1	• Satellite Data Prevention	4		
5	Input 2	• Force Prevent RF Activity	6		
7	N/A		8		
9	Output 1	• Incoming Call Alarm	10		
11	Output 2	• Data Connection Indication	12		
13	Output 3	• System Event Indication	14		
15	Remote Power On/Off +	Remote Control of BDU Power +	16	Remote Power On/Off -	Remote Control of BDU Power -

Figure 21: GPIO Connector Pinout

To use External GPIO, connect the external power (DC 12V ~ 24V). Refer to the External GPIO Block Diagram below.

External GPIO Block Diagram



6.6.3 Connecting DC Power to BDU

You can supply DC power to the BDU in the following methods depending on the power supply available in the vessel. Intellian provides a DC Power Cable, an AC-DC Adapter* (optional), and a Terminal Block for the power connections.

* When the AC-DC adaptor is used the grounding can be connected between the Ground stud on the BDU and the vessel ground.
The spare part number is MC-0001 (AC-DC adaptor)

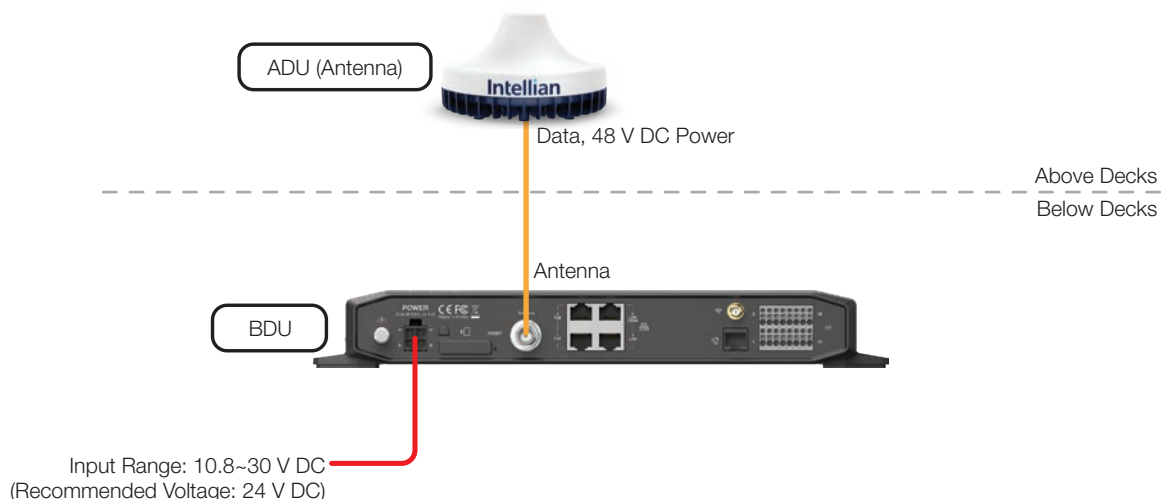


Figure 22: DC Power to BDU Connection

1. Connecting to Battery (default): Using the DC power cable (1 m), supply the DC power to the BDU from the battery. The power cable is installed with the Molex connector (P/No. 1716920204, Max. AWG 12). Use 1~2 m (3.28~6.56 ft) length wire for the power supply to prevent voltage drop. If you need an extended length of power cable, refer to the following table to choose a correct size cable. Check with your cable supplier for more information.

Cable Length	Maximum Wire Size	
	AWG	mm ²
5 m (16.40 ft)	13	2.62
10 m (32.80 ft)	11	4.17
20 m (65.61 ft)	9	6.63

BDU Power Input Range: 10.8~30 V DC

2. Connecting to AC Power Source (optional): Using the AC-DC adapter (110~220V Input, 24 V DC output) and power cord, supply the DC power to the BDU from the AC power source. (You can find the AC-DC adapter in the 19-inch Rack Mount Kit).



NOTE

To connect multiple power cables from the power source, use a Terminal Block (supplied). Refer to the following page "How to Use Terminal Block" for more details.

How to Use Terminal Block

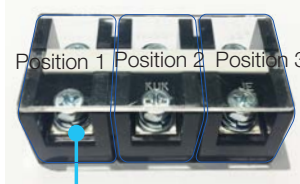


WARNING

Turn off the power before installing the wire nut connector.

Intellian provides a 3-position double-row barrier terminal block as below.

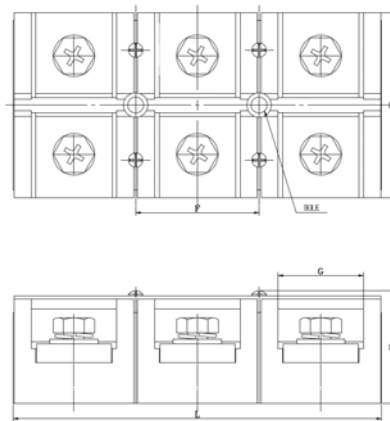
Terminal Block: KH-6060-3P



Barrier type terminal strip:
3 positions, 6 contacts

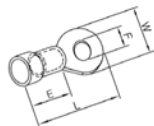
KH-6060-3P Specification	
Rated Voltage	600 V
Rated Current	60A (250 V)
Insulation Resistance	100M Ω min.
Dielectric Strength	2,500 VAC for 1min.
Wire	22 mm ²
Terminal Screw	M6

Terminal Blocks Dimension

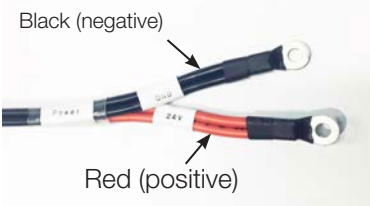
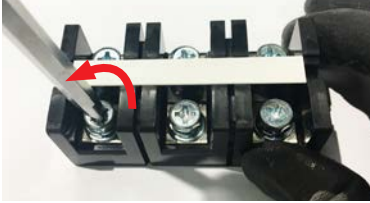
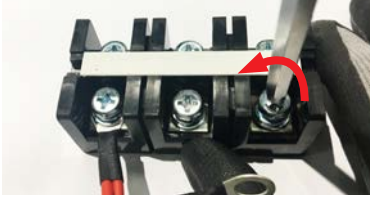
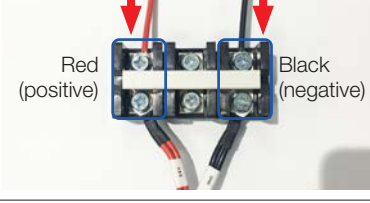
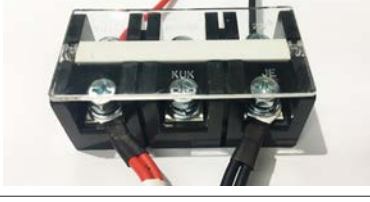


Rating/Pole	F(mm)	G(mm)	Hole(Ø)	L(mm)	W(mm)	H(mm)	Weight
60A 3P	28	16	5.2	85	40	36	142 g

Wiring Lug Dimension



E	14.5 mm
F	Min. Ø 6.1
W	Max. 16.8 mm
L	35.5 mm

	For the DC power wires, Red (positive) and Black (negative), you can connect each wire with other wires using the terminal block.
	1. Open the top cover of the terminal block.
	2. Unscrew the 1st position terminal using a Phillips screwdriver. Insert the ring connector of the Red (positive) wire to the terminal and tighten the screw back into the terminal.
	
	3. Unscrew the 3rd position terminal using a Phillips screwdriver. Insert the ring connector of the Black (negative) wire to the terminal and tighten the screw back into the terminal.
	
	4. Connect wires for distribution to the terminals on the opposite side of each connected wires. CAUTION: DO NOT switch positions of the Red (positive) and Black (negative) wires. Switching the polarity of power may damage the product.
	5. Close the top cover of the terminal block.

6.6.4 Connecting BDU to ADU (Antenna)

The model does not come with an Antenna RF Cable, and you will need to purchase it separately. Connect the **Antenna RF Cable** from the **Antenna** port on the back of the BDU to the RF port on the bottom of radome (Antenna).

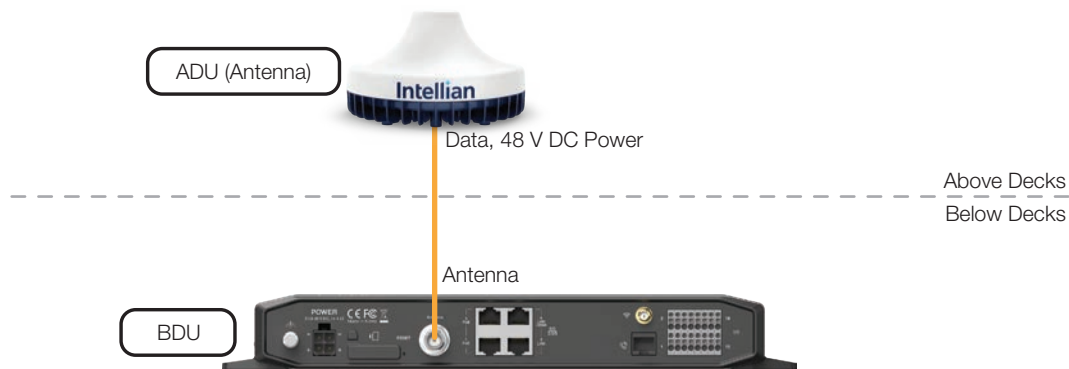


Figure 23: BDU to Antenna Cable Connection

6.6.5 Connecting BDU to Devices using LAN Port (RJ45)

Intellian provides the Ethernet Cable. Connect the **Ethernet Cable** from the **Port 1, Port 2, Port 3, or Port 4** on the back of the BDU to the **LAN** port on the devices such as SIP Phone or Computer. Only the **Port 1** and **Port 2** are LAN port includes Power over Ethernet (PoE).

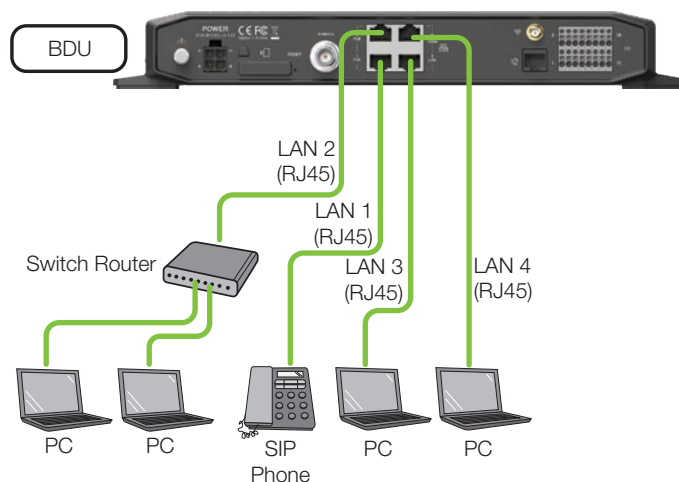


Figure 24: BDU to Devices Cable Connection using LAN Port (RJ45)

6.6.6 Connecting BDU to Device using WAN Port

Intellian provides the Ethernet Cable. Connect the **Ethernet Cable** from the **WAN port** on the back of the BDU to the **RJ-45 port** on the devices such as LTE modem.



Figure 25: BDU to Device Cable Connection using WAN Port

6.6.7 Connecting BDU to POTS Phone (RJ14)

Connect the standard phone cord (customer supplied) from the **POTS Phone port** on the back of the BDU to the **RJ-14 port** on the POTS phone as default.

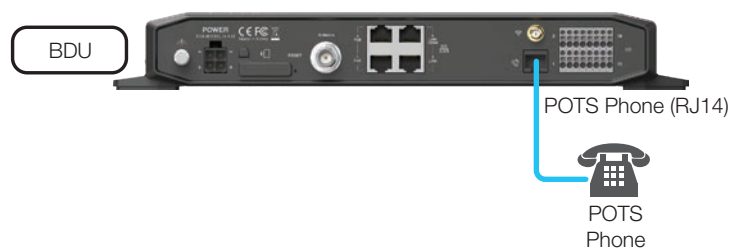


Figure 26: BDU to POTS Phone (RJ14) Cable Connection

Up to 2 POTS Phones can be connected to the BDU using a RJ14 Cable Splitter (customer supplied). Using a RJ14 Cable Splitter, the two POTS phones can each have a separate phone line (not two phones using the same phone line). The POTS phone 1 (no. 101) is connected to a pair of Pin 3 (R1-) and Pin 4 (T1+) wires. The POTS phone 2 (no. 102) is connected to a pair of Pin 5 (R2-) and Pin 2 (T2+) wires.

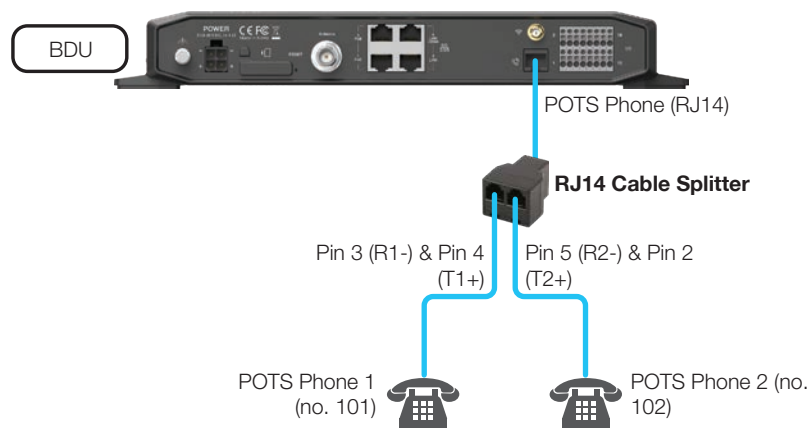


Figure 27: Using Cable Splitter with POTS Phones (RJ14)



NOTE

POTS phones can only be used when not supported to a GMDSS system.

6.6.8 Connecting BDU to External Devices

The BDU has a dedicated 16-pin connector to provide a GPIO (General Purpose Input/Output) interface to the external devices. All wires for the GPIO port must use AWG 24 unscreened wire type. Connect the end of these AWG 24 wires to the GPIO port's Pin A (point 1) and Pin B (point 2) respectively.



Figure 28: BDU to External Devices Connection

6.6.9 Connecting Wi-Fi Antenna to BDU

Intellian provides the Wi-Fi Antenna for Wi-Fi connection. Plug the **Wi-Fi Antenna** into the **Wi-Fi** port on the back of the BDU.

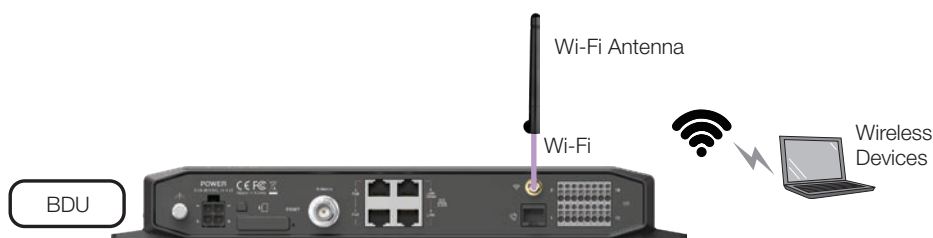


Figure 29: Wi-Fi Antenna to BDU Connection

6.6.10 Grounding Stud

The BDU should be grounded. Use a heavy ground cable (customer supplied) to connect the BDU to the vessel's ground during normal use. A safety grounding system is necessary to protect your radio hardware from lightning strikes and the build-up of static electricity. The grounding system must comply with the safety standards that apply in your country.

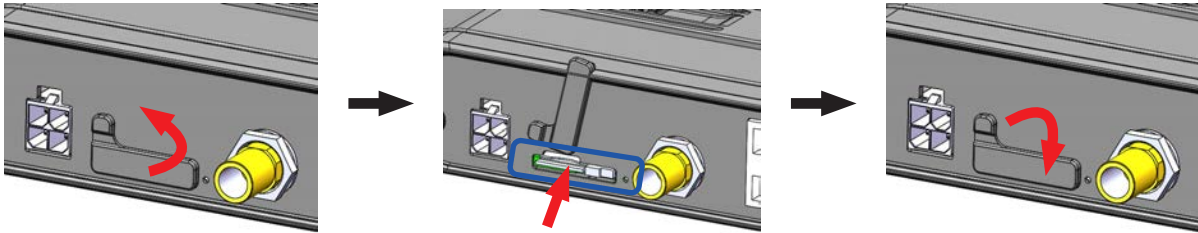
Ground the BDU using a heavy ground cable (not included) from the **Grounding Stud** of the BDU back panel to the vessel's ground to protect the system from unwanted surges and voltage differentials.



Figure 30: Grounding Stud Connection

6.6.11 Inserting SIM Card

The system requires a SIM card from the service provider to use the terminal and configure the settings of the BDU.



1. Find the SIM card slot on the BDU and open the cover.
2. Insert the SIM card into the slot until it clicks. Face the contact surface down when inserting it.
3. After the SIM Card is placed in the slot, close the cover.

**NOTE**

If the SIM card is not detected properly ("NO USIM" message is displayed on the dashboard), remove and re-insert the SIM card or turn the BDU power off and on again with the SIM card inserted.

6.7 DC Isolation Resistance

For some installations it is required that the power supply to the BDU is galvanically isolated from the vessel's power supply. Guidance for these installations is as follows:

When the terminal is connected to the vessel's AC distribution system, Intellian's AC/DC Adapter (Part No. MC-0001) provides the required galvanic isolation and has the correct DC termination to connect to the BDU. Use of other, non-Intellian, AC/DC Adapters is not recommended and voids the terminal's warranty.

When the terminal is connected to the vessel's DC distribution system (including installations that are covered by a battery back-up) a 3rd party galvanically isolated DC-DC converter is required. The Mastervolt DC Master 24/24-7 (Isolated) is a suitable DC-DC Converter for this purpose.

6.7.1 Grounding the system

We recommend using an Intellian's AC/DC Adapter or a galvanically isolated DC/DC converter to eliminate the risk of a current leak to the vessel's ground. Additionally, do not use the ground connection on the BDU.

Isolated AC/DC Power Supply

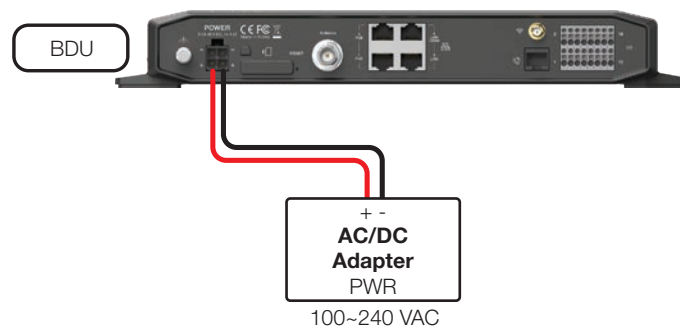


Figure 31: Isolated AC/DC Power Supply

Isolated DC/DC Power Supply

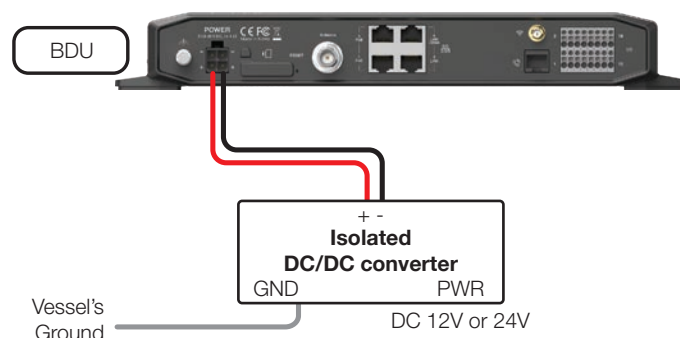


Figure 32: Isolated DC/DC Power Supply

In a very few cases, the installation of the terminal has caused a low earth insulation alarm. If this happens then check that the power supply is galvanically isolated. If this doesn't resolve the issue contact Technical Support for further assistance.

Chapter 7. Installing the SDT

7.1 Selecting SDT Installation Site and Cautions

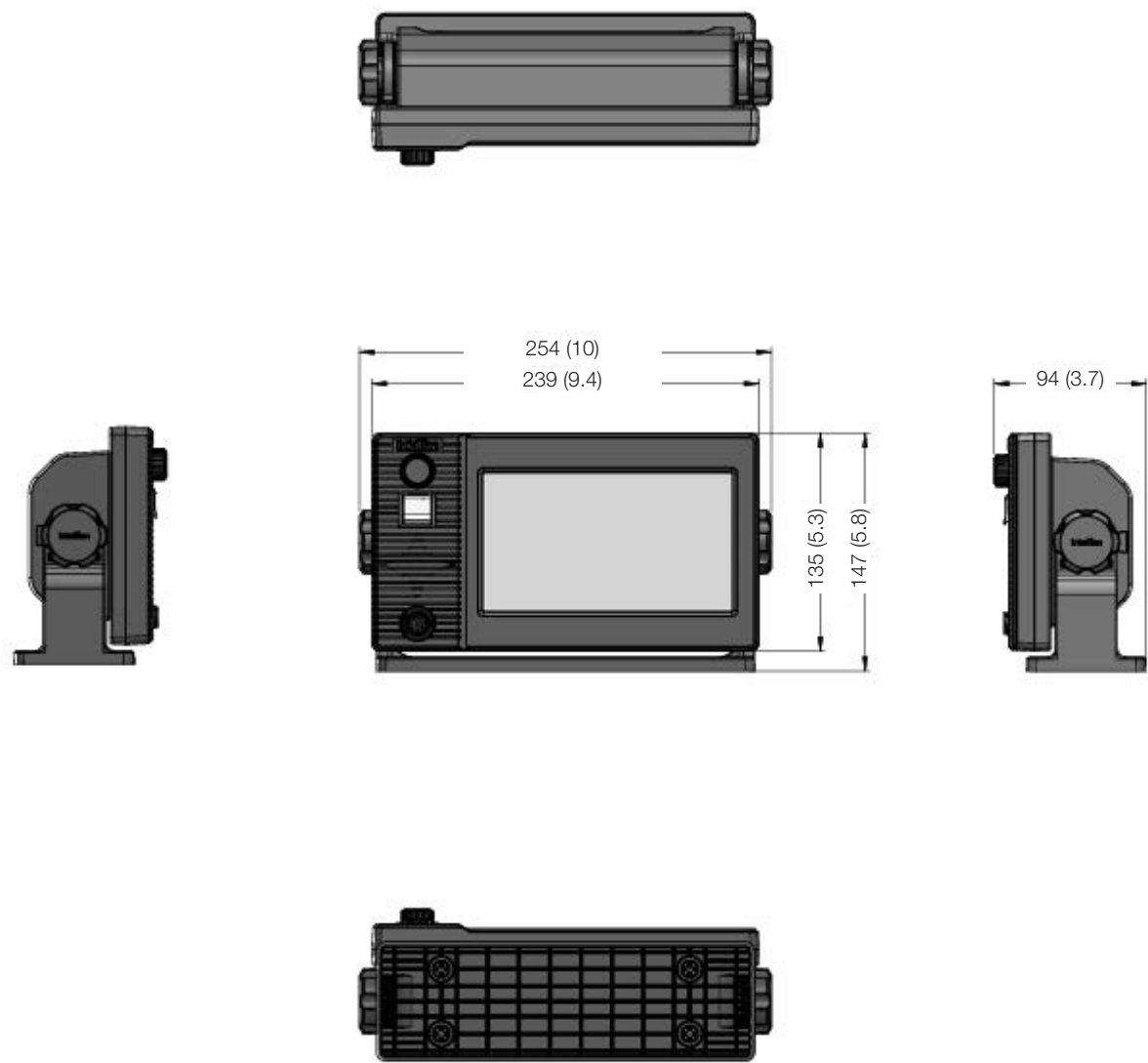
For optimum system performance, the following guidelines on where to install and mount the SDT must be followed. It is recommended to mount the unit in a location that fulfills these requirements:

- Mount the unit indoors (not exposed to direct water).
- Maintain a compass safe distance of 0.6m.
- Do not turn on the system power to prevent electric shock if the front and rear panels are damaged during shipping.
- Read the precautions on the title page of the user guide before installing or operating the system.
- Mount the unit using either the bracket mount or flush mount.
- Mount the unit on a rigid structure with minimal exposure to vibration and shock.
- Mount the unit in an area with an ambient temperature between -15°C and +55°C (+5°F and +131°F).

7.2 SDT Dimensions

Confirm the dimensions of the BDU before installation.

Unit: mm (inch)



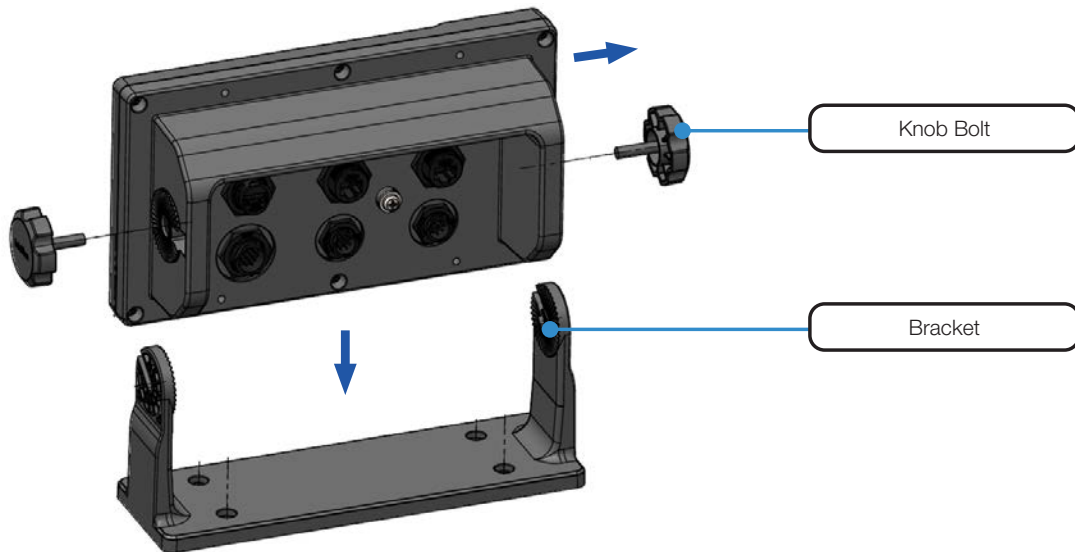
7.3 Mounting SDT

The SDT offers two mounting options. It can be installed on a desktop or mounted flush, typically within a console. If needed, a cable strain relief can also be used.

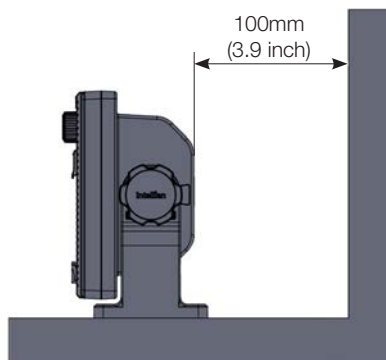
7.3.1 Bracket Mounting Type

The SDT is equipped with a fixing bracket, which is designed with four corner holes for easy direct mounting on a wall or desktop.

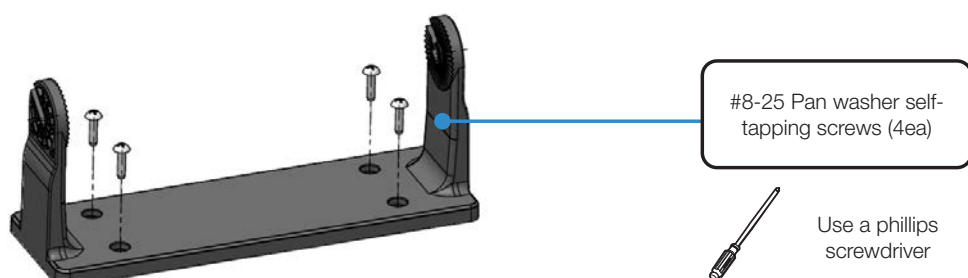
1. Turn knob bolts anticlockwise to detach the display from the bracket.



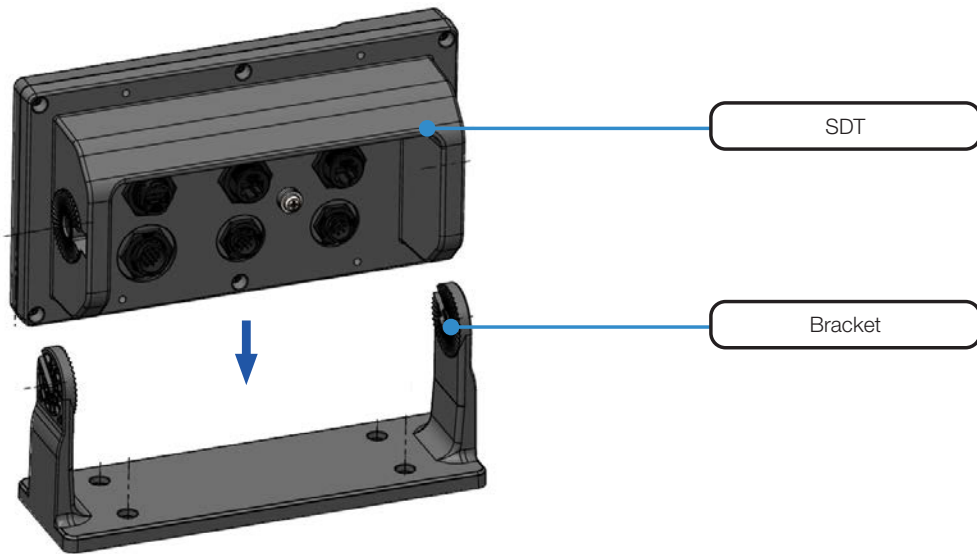
2. Place the SDT in the bracket. Position the SDT mounting bracket to ensure at least 100mm of clearance behind the SDT for cable access.



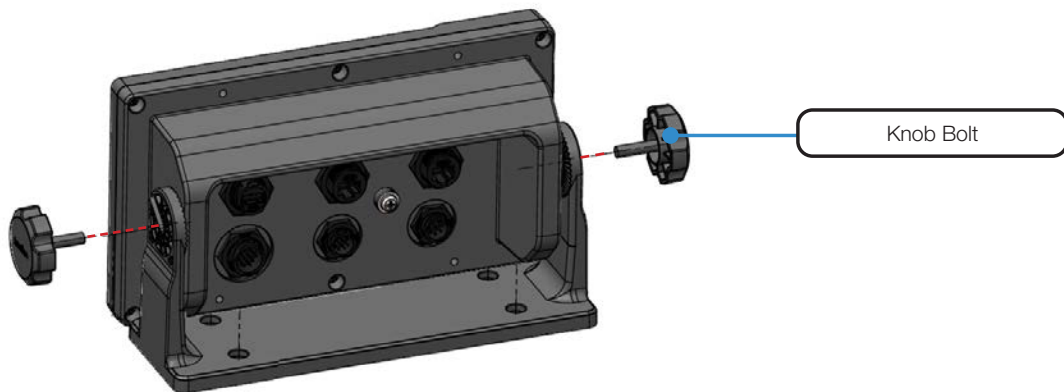
3. Insert the #8-25 Pan washer self-drilling screws (4ea) through the holes in the bracket, then tighten using a Phillips screwdriver.



4. Connect the cables. See section 7.5.
5. Align the grooves on the SDT with those on the bracket, then insert the SDT into the bracket.



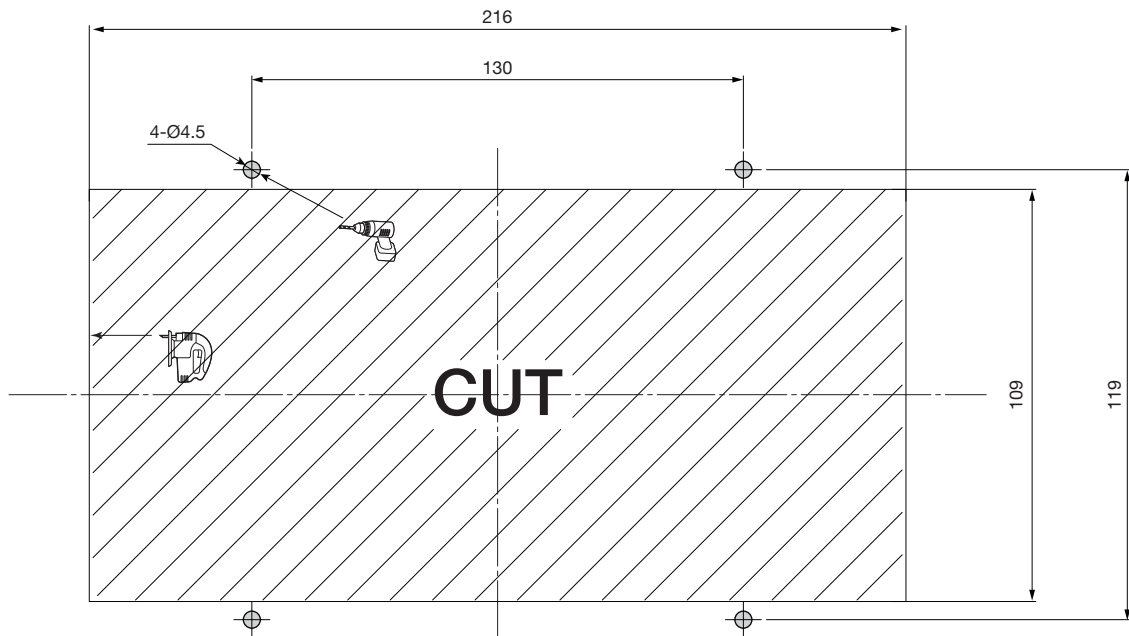
6. Adjust the SDT angle to the desired position.
7. Turn knob bolts clockwise to attach the display to the bracket.



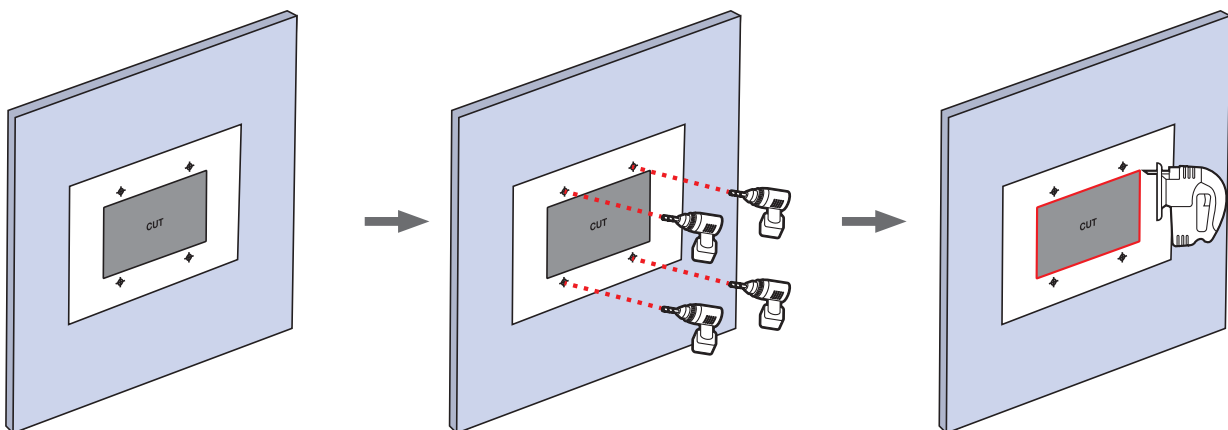
7.3.2 Flush Mounting Type

This method involves embedding the indicator inside the ship's hull by cutting a hole in the ship panel to match the indicator's size, inserting the indicator, and securing it with bolts from the rear.

1. Print out the mount cutout template. When printing the template, set the print scale to 200% in the print setup.



2. Making the cutout for flush mounting
 - a. Secure the template to the ship's panel.
 - b. Drill four 4.5mm clearance holes using a 6mm drill bit.
 - c. Using a jigsaw or rotary cutting tool, cut along the inside of the solid line indicated on the template.



- d. Insert the device into the cutout to check the fit.

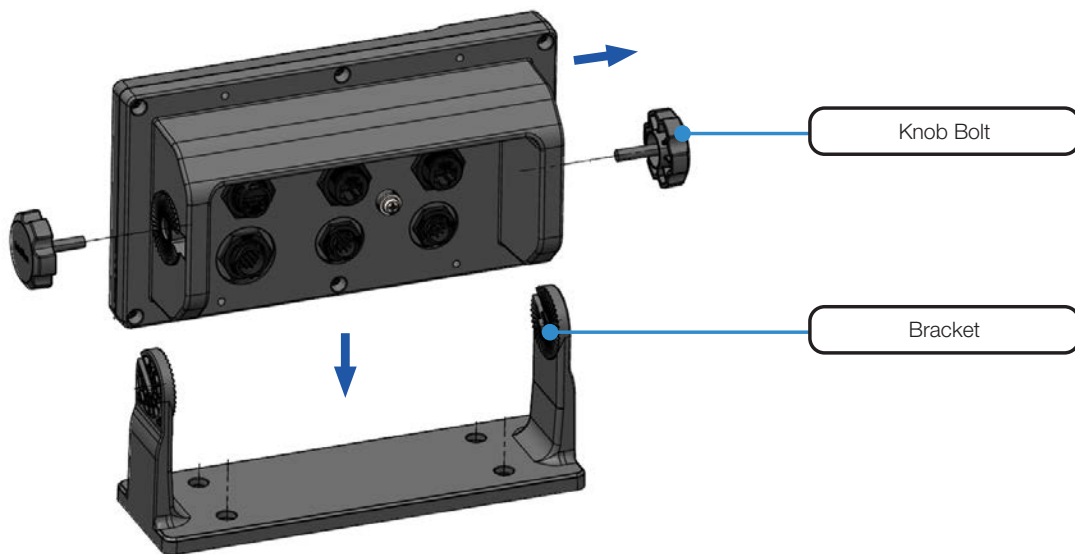


NOTE

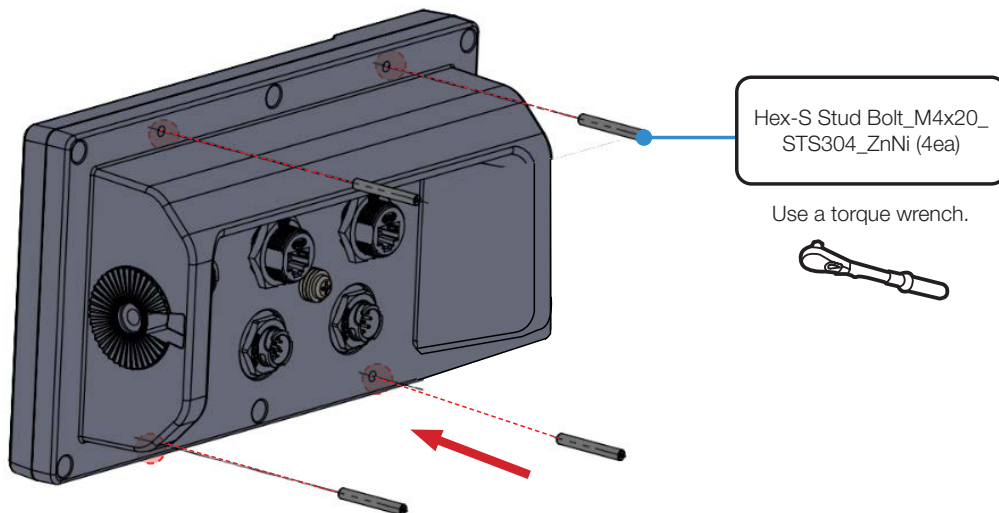
If necessary, use a file or sandpaper to adjust the hole size.

- e. Remove the template from the mounting surface.

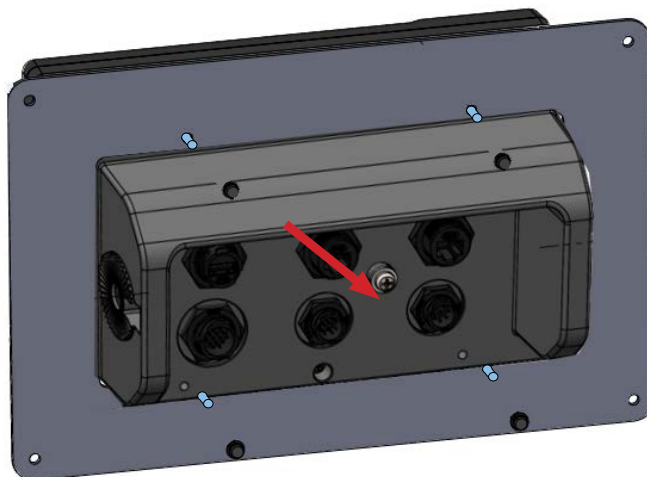
3. Turn knob bolts anticlockwise to detach the display from the bracket.



4. Connect the cables. See section 7.5.
5. Install the M4x20L Hex-S Stud Bolts (4 ea) as shown in the figure.
- a. Insert the Hex-S Stud Bolts into the built-in nuts on the back of the SDT.
 - b. Tighten them by hand.
 - c. After installing all 4 bolts, fully tighten them.

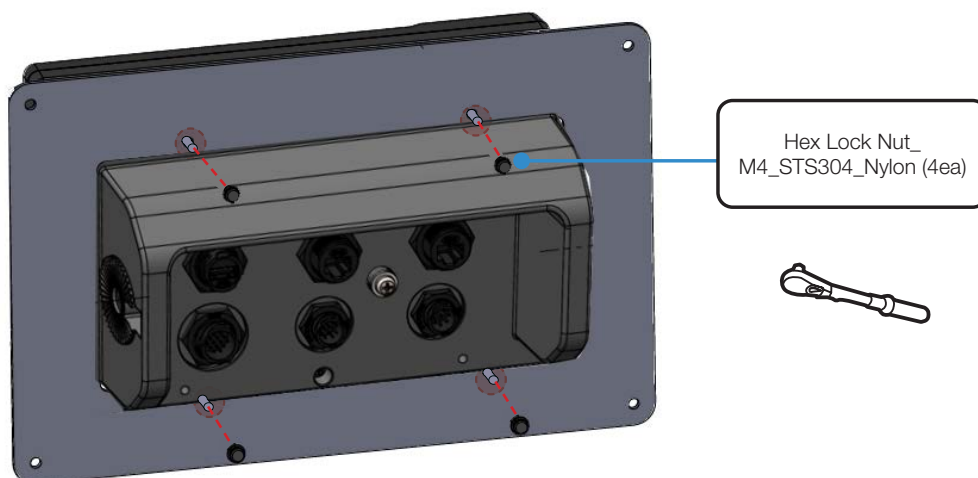


6. Insert the SDT into the bezel cutout.

**NOTE**

If access to the back of the device will be restricted after installation, connect all necessary cables to the cradle and secure them with the locking bracket or locking rings before inserting the device.

7. Insert the M4 hex lock nuts (4 ea) onto the Hex-S Stud Bolts and tighten the nuts, being careful not to over-tighten.



7.4 SDT System Configuration

7.4.1 Basic Configuration

