



ALPHATRON
Marine



Alphatron LT-3100 Iridium

Installation / Operation Manual

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I. Preface

The Alpatron LT-3100 Iridium is a maritime satellite communication product. The Alpatron LT-3100 Iridium is designed for the professional market (deep sea, fishing, and workboats), but can be used for the leisure market as well. The Alpatron LT-3100 Iridium meets all standards and certification requirements needed for worldwide maritime satellite communication equipment.

The Alpatron LT-3100 Iridium is a high quality, easy to install Satellite Navigation System.

- Thoroughly read this instruction manual before installation and operation of the equipment.
- We recommend keeping this manual nearby the equipment to ensure ready access to it.



Revision History

Revision No.	Date	Description	Author
1.0	28-07-2020	First release	J. Kreeft

Glossary

The glossary contains a list of abbreviations and a list of definitions.

Abbreviations

Abbreviations as used in this manual are explained in the table below.

DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
I/O	Input/Output
IEC	International Electrotechnical Commission
ICC-ID	Integrated Circuit Card Identifier
ISP	Iridium Service Provider
LCD	Liquid Crystal Display
MO	Mobile Originating
MSISDN	Mobile Station Integrated Services Digital Network
PCB	Printed Circuit Board
PIN	Personal Identification Number
PUK	Personal Unblocking Key
RX	Receiver
SIM	Subscriber Identity Module
TFT	Thin Film Transistor
TX	Transmitter
UI	User Interface
VSAT	Very Small Aperture Terminal
W	Watt

Definitions

The meaning of standard definitions as used in this manual are explained in the table below.

DHCP	A network management protocol used on Internet Protocol networks whereby a DHCP server dynamically assigns an IP address and other network configuration parameters to each device on a network so they can communicate with other IP networks.
IEC	A non-profit, non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic, and related technologies.
MSISDN	A number uniquely identifying a subscription in a mobile network. It is the mapping of the telephone number to the subscriber identity module in a device.
PIN	A numeric or alpha-numeric password used in the process of authenticating a user accessing a device.
SIM	An integrated circuit that is intended to securely store the international mobile subscriber identity number and its related key, which are used to identify and authenticate subscribers on devices.

II. Safety Information

The signal words DANGER, WARNING and CAUTION used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as follows:



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The signal word NOTICE used in this manual indicates information considered important but not related to injury. It is typically used to prevent damage to equipment or property.

To safely install, service, repair and operate this system, the following DANGERS, WARNINGS, and CAUTIONS must be adhered to. Failure to comply with the precautions or with specific dangers, warnings, and cautions elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. ALPHATRON MARINE assumes no liability for the customer's failure to comply with these requirements.



WARNING

Keep away from live circuits. Otherwise, it may cause a fire, or you may suffer an electrical shock.



WARNING

Under certain conditions, dangerous voltages may exist even with the cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them. Otherwise, it may cause a fire, or you may suffer an electrical shock.



WARNING

Do not disassemble or modify the equipment. Otherwise, it may cause a fire, or you may suffer an electrical shock.



WARNING

Do not insert or remove the power cord or operate switches with a wet hand. Otherwise, you may suffer an electrical shock.

**WARNING**

Operate the equipment only at the power supply voltage of 24 Vdc. Otherwise, it may cause a fire, or you may suffer an electrical shock.

**WARNING**

Do not scratch, damage, modify, heat, pull, excessively bend, or heavily load the power supply cables. Otherwise, it may cause a fire, or you may suffer an electrical shock.

**WARNING**

Immediately turn off the power and disconnect the power supply cable if the equipment is generating any smoke or odour, or is overheated. Immediately inform your local service agent of the symptom to have it repaired. Prolonged equipment operation under such a condition can cause a fire or electric shock.

**WARNING**

Do not place a vessel containing liquid on the equipment. Otherwise, it may cause a fire, or you may suffer an electrical shock if knocked over.

**WARNING**

When unplugging the instrument, be sure to remove the cord terminal correctly. If the cord is pulled, the cord may get damaged resulting in a fire or an electrical shock.

III. Warranty

To not to adversely affect the warranty, the following notices must be adhered to.

NOTICE Operating personnel must not remove equipment covers. Only personnel trained and certified by ALPHATRON MARINE must make component replacement and internal adjustment.

NOTICE Non-compliance with the installation, operation and maintenance requirements may void the warranty.

NOTICE Do not disassemble or modify the equipment. Failure to observe this instruction may cause equipment failure, and it will void the warranty.

NOTICE The system components are sensitive to humidity, temperature fluctuations and aggressive substances. Store them appropriately. If the instruments are not stored as described, it will void the warranty.

NOTICE Any modification to this equipment without prior written permission from ALPHATRON MARINE will void the warranty.

NOTICE Installation of this product shall only be done by a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor. Acting otherwise will void the warranty.

NOTICE To This product must be installed in accordance with the installation methods described in this manual. Acting otherwise will void the warranty.

NOTICE Operate the equipment only at the power supply voltage of 24 Vdc. Failure to observe this instruction may cause equipment failure, and it will void the warranty.

NOTICE This product contains no operator serviceable parts. Service and repair shall only be carried out by personnel trained and certified by ALPHATRON MARINE.

NOTICE Do not place a vessel containing liquid on the equipment. The equipment can be damaged if knocked over.



NOTICE Do not allow the instrument to fall or immerse into water. The equipment can be damaged.

NOTICE When cleaning the surface, do not use any organic solvent such as thinner or benzine. Otherwise, the paint and markings on the surface may get damaged. For cleaning the surface, remove the dust and debris and wipe with a clean dry cloth.

Contact the Alpatron dealer regarding the terms of the warranty.

IV. About the manual

Intended readers

This is an Installation and Operation Manual for the Alpatron LT-3100 Iridium. The manual is primarily intended for installers and service personnel.

Personnel installing or servicing the system should be professionals with technical expertise, properly trained, and likewise authorized.

All safety instructions and guidelines in this manual must be observed. The safety instructions are listed in the beginning of the manual. The guidelines are to be found in the separate chapters, where it is needed.

Manual overview

This manual has the following chapters:

- **Introduction** contains an introduction of the system.
- **Unpacking (in-the-box)** lists the part numbers and describes initial inspection the individual components.
- **Accessories** lists accessory parts that are not part of the basic system and must be ordered separately, if needed.
- **System overview** contains a description of system.
- **Installation and Mounting** explains how to mount the system components, and how to connect the components in the system.
- **Interfaces** describes the external interfaces to Control Unit, including the coaxial cable interface to the Antenna Unit.
- **User Interface (UI)** describes the user interface for operating and configuring the system.
- **Web server** describes the webpages provided (i.e. Dashboard, Software update, and Diagnostic report)
- **Service & Repair** describes what the end-user must do in case of required service or repair.

Software version

This manual is applicable to software version 1.01.



1 Introduction

The Alpatron LT-3100 Iridium is a maritime satellite communication product. The Alpatron LT-3100 Iridium is designed for the professional market (deep sea, fishing, and workboats), but can be used for the leisure market as well. The Alpatron LT-3100 Iridium meets all standards and certification requirements needed for worldwide maritime satellite communication equipment.

The Alpatron LT-3100 Iridium has voice and data capabilities with 100% global coverage provided by the Iridium® Communications Network. The Alpatron LT-3100 Iridium consists of a control unit, antenna unit, handset, and cradle. A single coaxial cable connects the control unit with the antenna unit. Using a standard coaxial cable, up to 500 meters of separation between the units can be obtained, giving freedom to mount the antenna unit in the best possible location, with free line of sight to the satellites.

The Alpatron LT-3100 Iridium can be used as the primary satellite communication product on vessels, covering the basic communication needs in terms of connectivity between the ship and shore.

2 Unpacking (in-the-box)

Unpack the Alpatron LT-3100 Iridium Basic set (P/N: G-007784) and check that the following items are present in the box:

- LT-3110 Control Unit (P/N: G-004717)
- LT-3120 Handset (P/N: G-007781)
- LT-3121 Handset cradle (P/N: G-007782)
- LT-3130 Antenna Unit (P/N: G-007783)
- Bracket Mount, Control Unit
- Power Cable, 3m (P/N: G-007773)
- 4 x Stainless steel A4 screws (for Bracket Mount, Control Unit)
- 2 x Stainless steel A4 screws (for Handset cradle)
- 4 x Unit Test Sheets
- Alpatron LT-3100 Iridium Installation and Operation Manual

NOTICE

Antenna unit mounts (bracket and pole mount) are not included in the Alpatron LT-3100 Iridium and must be ordered separately. The antenna unit must only be mounted, using the bracket or pole mounted. The antenna unit mounts are listed with part numbers (P/N) in Accessories on page 14.

Inspection

Inspect the shipping cartons and/or wooden box immediately upon receipt for evidence of damage during transport. If the shipping material is severely damaged or water stained, request that the carrier's agent be present when opening the cartons and/or wooden box. Save all box packing material for future use.

After unpacking the system and opening the cartons, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.



WARNING

To avoid electric shock, do not apply power to the Alpatron LT-3100 Iridium system components if there is any sign of shipping damage to any part of a unit or the outer cover. Read the Safety Information at the front of this manual before installing or operating the unit.

3 Accessories

Mounts

The following accessory parts are not part of the basic system and must be ordered separately:

- G-007771 Bracket Mount (1.5" to 2.5" tube), Antenna Unit
- G-007772 Pole Mount (1.5" tube), Antenna Unit

Cable and connectors

The following cable and connector parts are not part of the basic system and must be ordered separately:

- G-007774 Aux Cable, 3m
- G-007775 Coaxial cable Ø4.9mm, 10m
- G-007776 Coaxial cable Ø4.9mm, 25m
- G-007777 Coaxial Cable Ø10.3mm 10m
- G-007778 Coaxial Cable Ø10.3mm 25m
- G-007779 Coaxial Cable Ø10.3mm 50m
- N Conn. (male) for Coaxial Cable Ø4.9mm
- N Conn. (male) for Coaxial Cable Ø10.3mm
- Crimping Tool for Coaxial cable Ø4.9mm
- Crimping Tool for Coaxial cable Ø10.3mm

Coaxial cables are delivered with one fixed N connector (outdoor mounting), another loose N connector and crimp parts come with the cable. It is required to use an appropriate crimping tool for attaching the loose N connector.

NOTE

For further details on the cable and connectors, please contact Alpatron Marine. A coaxial cable up to a length of 500 meters can be used for connecting the LT-3110 Control Unit and the LT-3130 Antenna Unit. Details about the coaxial cable, specification and cable lengths, are described in section Antenna on page 29.

4 System overview

The Alpatron LT-3100 Iridium is a standalone communication product, which is using the Iridium® satellite constellation. The Alpatron LT-3100 Iridium is working on the Iridium® legacy satellites as well as the new Iridium® NEXT satellites, which are taking over the Iridium services throughout 2018. An overview of the Alpatron LT-3100 Iridium is illustrated in Figure 1.

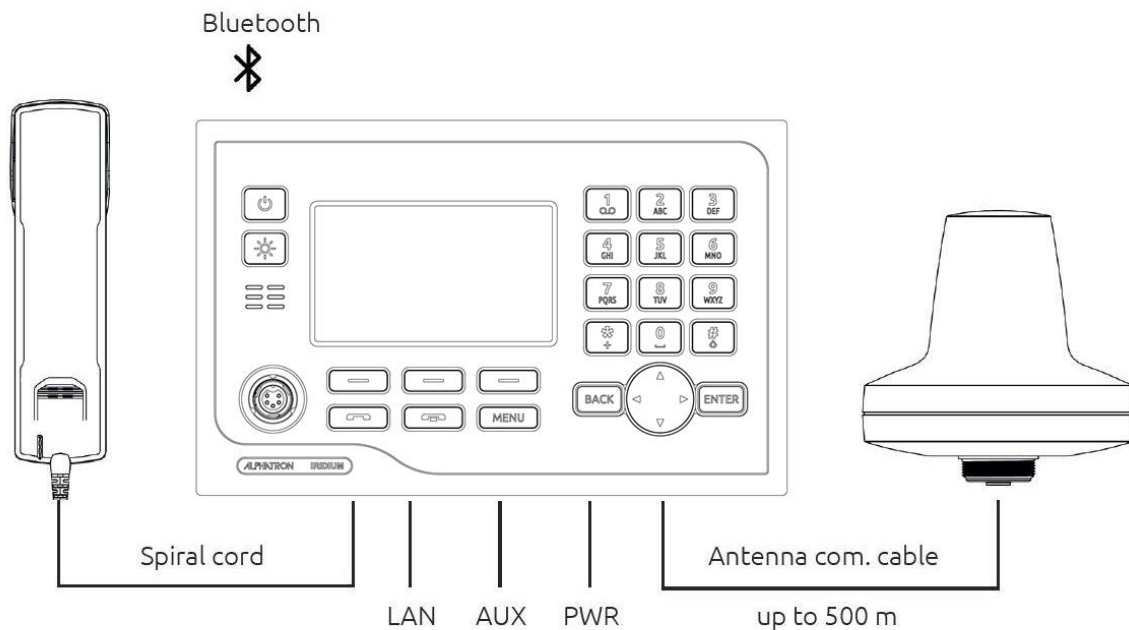


Figure 1: Alpatron LT-3100 Iridium - Basic components and interfaces

The LT Alpatron LT-3100 Iridium consists of the following units, provided by Alpatron Marine:

- LT-3110 Control Unit
- LT-3120 Handset
- LT-3121 Cradle
- LT-3130 Antenna Unit

NOTE The Alpatron LT-3100 Iridium was released to customers with the initial software version 1.01. Software version 1.01 includes basic voice functionality, together with basic functionality for operating the system. During 2018, software releases will be available, supporting the Iridium® legacy services. Please contact Alpatron Marine for details about future software releases and features.

5 Installation and Mounting

5.1 LT-3110 Control Unit

The LT-3110 Control Unit is the master unit in the system, supporting all external interfaces and the operational user interface. The LT-3110 Control Unit is designed for indoor mounting. Check the specifications in Appendix A: Specifications on page 45.

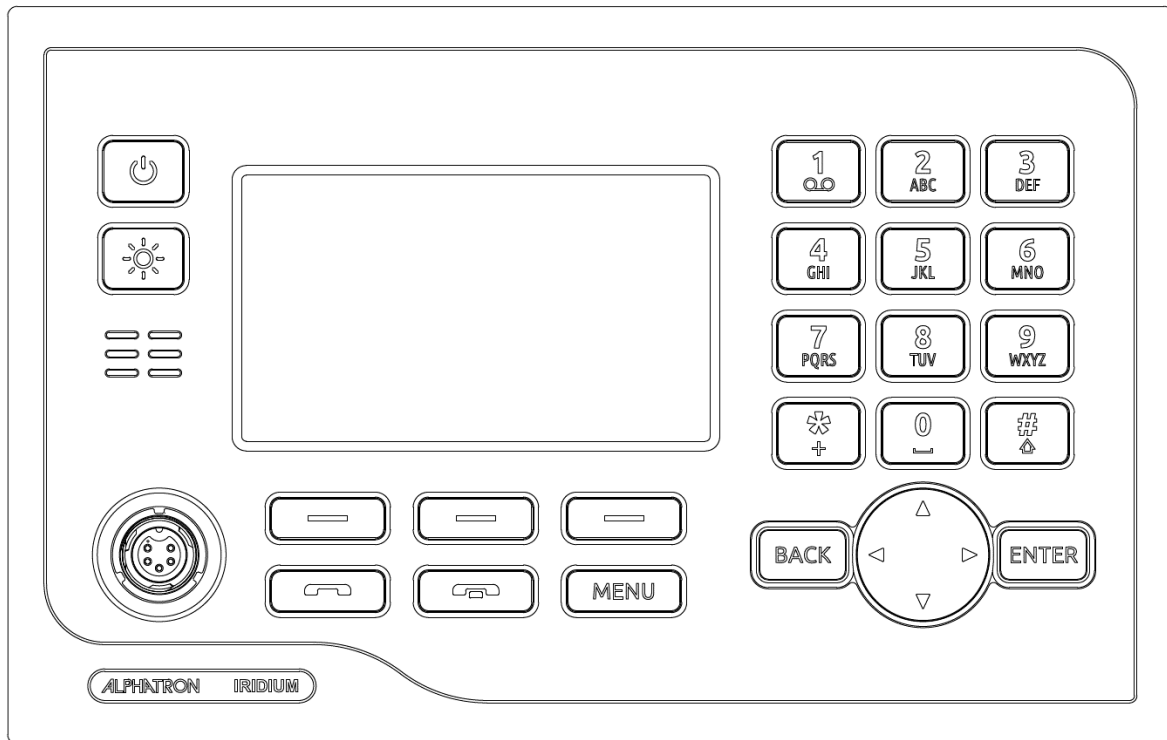


Figure 2: LT-3110 Control Unit (front view)

The LT-3110 Control Unit has the following interfaces:

- 2-pin power connector (male), marked 'PWR'
- Chassis ground connector, marked 'GNDC'
- N connector (female) for coaxial cable to the LT-3130 Antenna Unit, marked 'ANT'
- Ethernet (RJ-45) connector, marked 'LAN'
- 10-pin auxiliary connector (male), marked 'AUX'
- SIM card, marked 'SIM'
- 5-pin connector (female) for LT-3120 Handset (front of the control unit)

The LT-3110 Control Unit interfaces are described in Interfaces on page 27. The LT-3110 Control Unit, front view and backside view, are illustrated in Figure 2 and Figure 3.

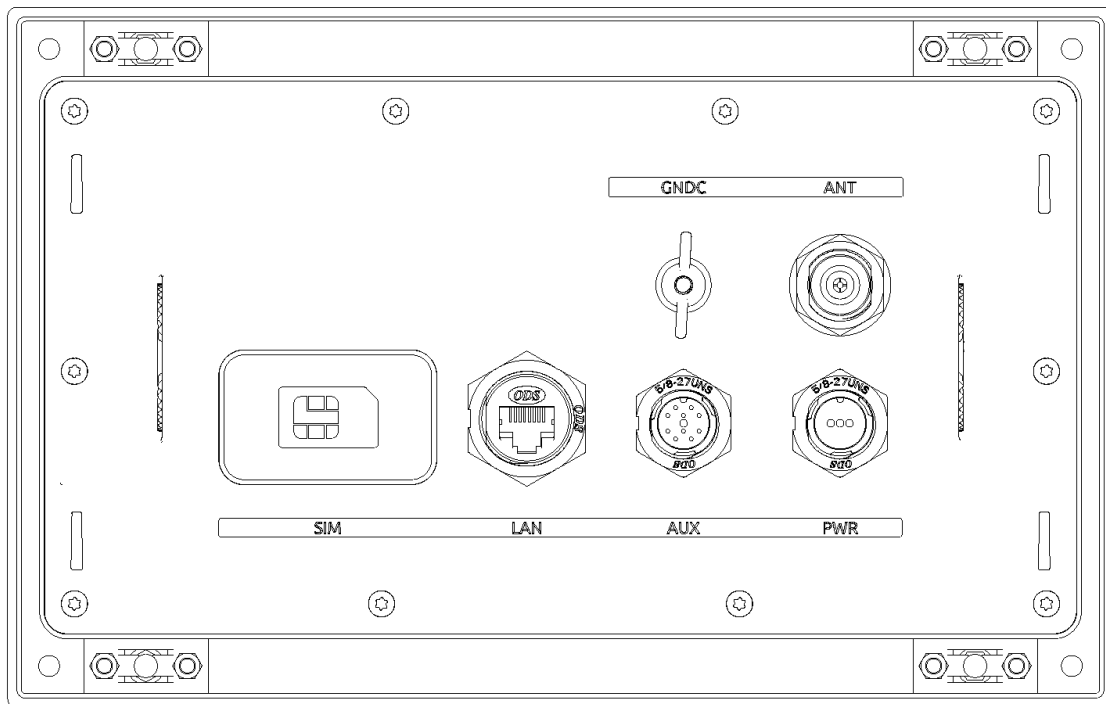


Figure 3: LT-3110 Control Unit (backside view)

The LT-3110 Control Unit user interface, display and buttons, are described in User Interface (UI) on page 32.

NOTE The LT-3110 Control Unit must be mounted as Console Mount or Bulkhead.

Mounting and installation considerations:

For optimum system performance, some guidelines on where to install or mount the LT-3110 Control Unit must be followed. It is recommended to mount the unit in a location, which fulfils these requirements:

- Mount the unit indoor (not exposed to direct water)
- Mount the unit using the supplied material
- Mount the unit on a rigid structure with a minimum of exposure to vibration and shock
- Mount the unit in an area with an ambient temperature between -15°C to +55°C (+5°F to +131°F)

5.2 LT-3120 Handset

The LT-3120 Handset is the primary voice interface for the Alpatron LT-3100 Iridium. The LT-3120 Handset must be connected on the front of the LT-3110 Control Unit. The connector is illustrated in Figure 2 on page 16.

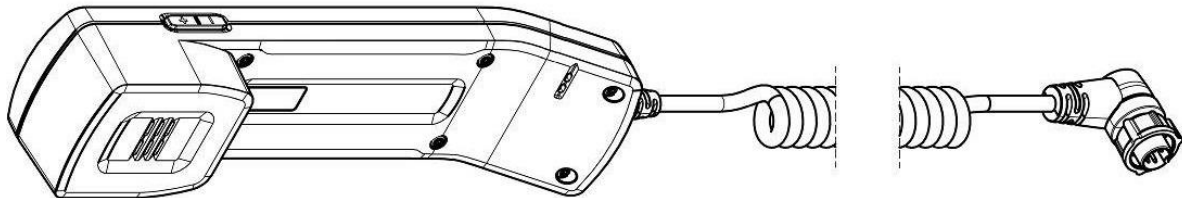


Figure 4: LT-3120 Handset (front view)

The LT-3120 Handset is connected to the LT-3110 Control Unit via a 5-pin proprietary angle connector. The spiral cord, fixed to the LT-3120 Handset is ~0.4 m from handset to connector, when coiled. The spiral cord can be stretched to a maximum of 2 m. The LT-3120 Handset is designed for indoor mounting. Check the specifications in Appendix A: Specifications on page 45.

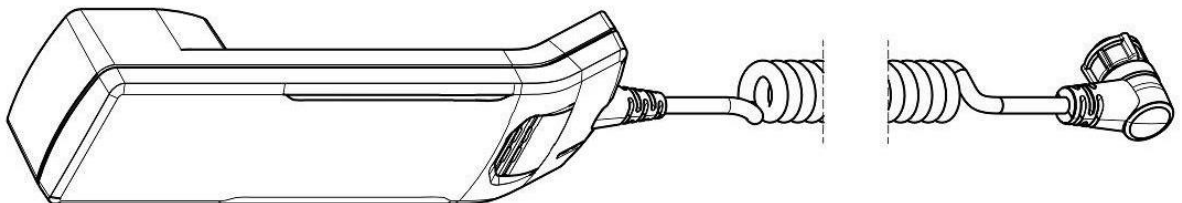


Figure 5: LT-3121 Handset (backside view)

The LT-3120 Handset has the following characteristics:

- High-performance audio speaker and microphone
- Separate ringer (buzzer)
- Speaker volume control (double-button, marked with '+' and '-', for volume up and down)
- Built-in off-hook detection circuit

NOTE The LT-3110 Control Unit will inform the user if the LT-3120 handset is not properly connected to the LT-3110 Control Unit. The following user information will be showed in the display: 'Handset not connected'.

NOTE The LT-3120 Handset must be operated together with the LT-3121 Cradle, for the off-hook detection circuit to work. The LT-3121 Cradle is described in section LT-3121 Cradle on page 19.

5.3 LT-3121 Cradle

The LT-3121 Cradle is used together with the LT-3120 Handset. The LT-3121 Cradle should be mounted next to the LT-3110 Control Unit, supporting the LT-3120 Handset. The LT-3121 Cradle specifications are available in Appendix A: Specifications on page 45.

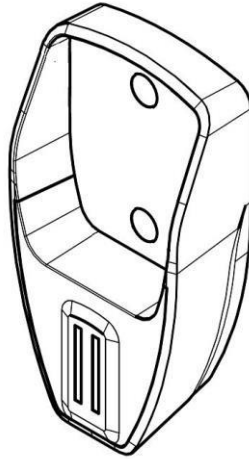


Figure 6: LT-3121 Cradle (front view)

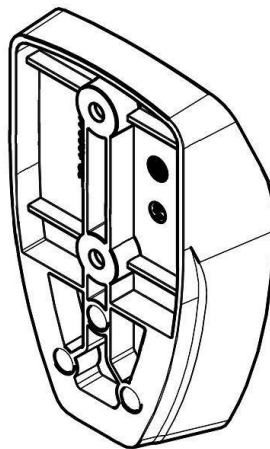


Figure 7: LT-3121 Cradle (backside view)

NOTICE The LT-3121 Cradle contains a magnet, to hold on to the LT-3120 Handset. Make sure that other electronic equipment is installed in a distance respecting the compass safe distance of 0.4 m (1.3 ft).

An outline drawing for the LT-3121 Cradle is available in Appendix G: Outline Drawing: LT-3121 Cradle on page 51.

5.4 LT-3130 Antenna Unit

The LT-3130 Antenna Unit is designed for outdoor mounting and connected to the LT-3110 Control Unit via a coaxial cable. The LT-3130 Antenna Unit specifications are available in Appendix A: Specifications on page 45. The LT-3130 Antenna Unit has an N connector (female) mounted, centred at the bottom of the antenna.

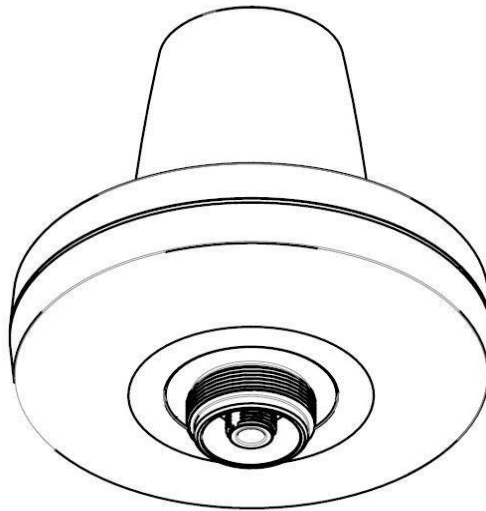


Figure 8: LT-3130 Antenna Unit

Mounting and installation considerations:

- Mount the unit vertically (with the N connector pointing down)
- Mount the unit with free line of sight to the Iridium® and GNSS satellites. Make sure that the unit can receive signals from the Iridium® and GNSS satellites (satellite reception information is available in the LT-3110 Control Unit user interface display, see Figure 21 on page 34)
- Mount the unit on a rigid structure with a minimum of exposure to vibration and shock
- Mount the unit using either the Bracket Mount or Pole Mount provided by Alpatron Marine
- Mount the unit outdoor with an ambient temperature between -25°C to +55°C (-13°F to +131°F)
- Mount the unit with a minimum angle of 20 degrees towards a radar antenna (above or below) and keep a minimum distance of 2.5 m (8 ft)
- Mount the unit at least 1 m (3 ft) away from radio transmitting antennas (VHF, UHF, MF-HF)
- Mount the unit away from Inmarsat and transmitting VSAT antennas



WARNING

The safety distance from the LT-3130 Antenna Unit, is 0.1 m (0.3 ft), in order to comply with the regional regulations.

NOTICE Due to the adjacency of the Iridium and Inmarsat frequency bands, the Alpatron LT-3100 Iridium System may not co-operate in the proximity of active Inmarsat equipment.

The LT-3130 Antenna Unit must be installed outside the radar main beam. Typically, this is in the order of 20 degrees. To avoid near field antenna coupling, a minimum distance of 2.5 m (6 ft) between the radar antenna and the LT-3130 Antenna Unit must be obeyed. Figure 9 is illustrating how the LT-3130 Antenna Unit should be mounted to avoid interference from radars.

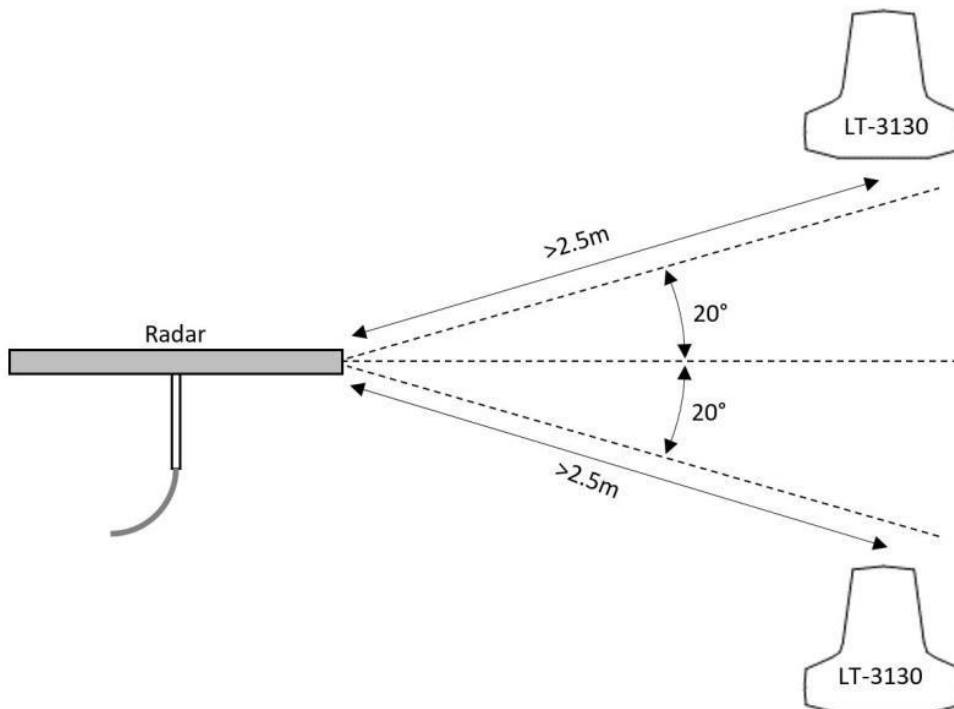


Figure 9: LT-3130 Antenna Unit – Avoid Radar Beam

NOTICE Failing to obey the specified installation conditions will void the warranty. However, depending on the specific radar frequency and power level, the separation distance between the radar and the LT-3130 Antenna Unit may be reduced, with no impact on the antenna performance. The performance of the LT-3130 Antenna Unit should be validated when the Alpatron LT-3100 Iridium is installed.

The LT-3130 Antenna Unit shall be mounted minimum 1 m from MF-HF, VHF, and UHF antennas.

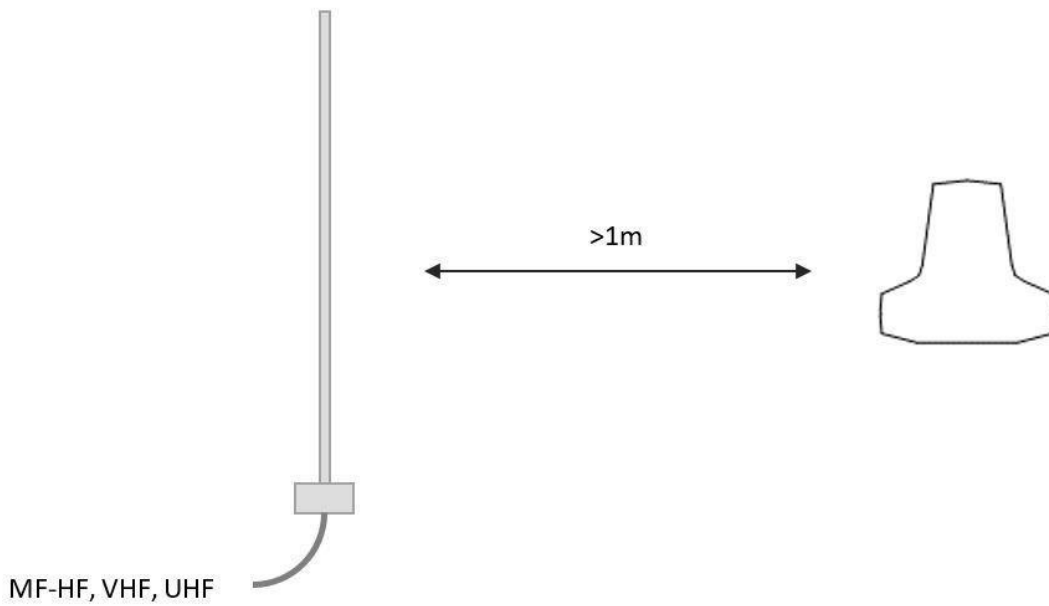


Figure 10: LT-3130 Antenna Unit – Separation to MF-HF, VHF, and UHF antennas

The LT-3130 Antenna Unit must be installed with a 360° clear view of the sky. However, minor obstructions such as a mast will not degrade the antenna performance severely, if a separation distance larger than 15 times the diameter of the obstruction is kept.

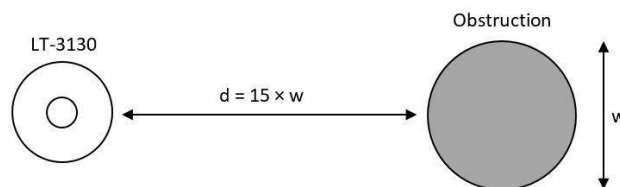


Figure 11: LT-3130 Antenna Unit – Separation distance to minor obstructions

The LT-3130 Antenna Unit must be mounted using one of the following antenna mounts:

- G-007771 Bracket Mount (1.5" to 2.5" tube), Antenna Unit
- G-007772 Pole Mount (1.5" tube), Antenna Unit

5.5 Bracket Mount, Antenna Unit

The Bracket Mount (1.5" to 2.5" tube), Antenna Unit installation options are illustrated in Figure 12 and Figure 13.

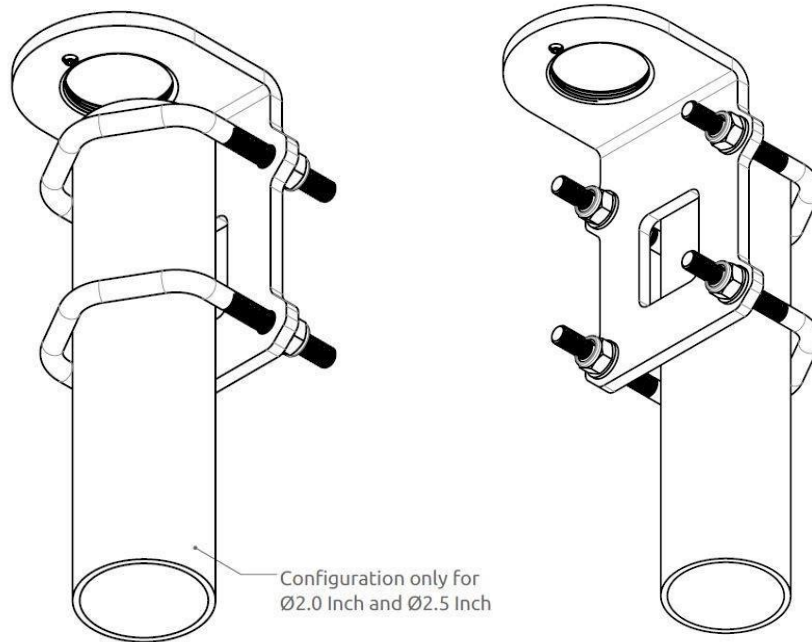


Figure 12: Bracket Mount (1.5" to 2.5" tube), Antenna Unit – vertical tube mount

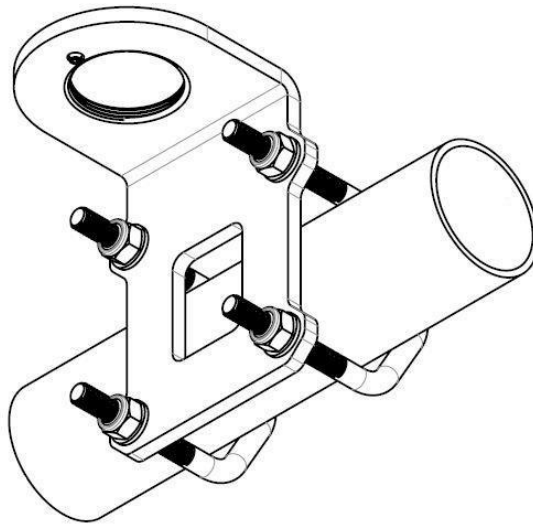


Figure 13: Bracket Mount (1.5" to 2.5" tube), Antenna Unit – horizontal tube mount

Bracket mount installation procedure:

1. Fasten the bracket mount to a tube (max. 2.5" tube) by using the two V-bolts and the M8 prevailing nuts, as illustrated in Figure 14 (max torque = 5.5 Nm)
2. Screw on the LT-3130 Antenna Unit and secure the antenna lock pinot (max torque = 1.2 Nm)
3. Fasten the coaxial cable to the LT-3130 Antenna Unit (N connector)
4. Apply self-volcanic tape on the N connector and cable to protect against saltwater and corrosion

NOTE Always fasten the Bracket Mount, Antenna Unit (1.5" to 2.5" tube) to the tube, before installing the LT-3130 Antenna Unit (the antenna unit and bracket mount are fastened together by the thread lock). Remember to secure the pinot screw after the antenna unit has been fastened. The torques are specified in Figure 14.

NOTE The Bracket Mount (1.5" to 2.5" tube), Antenna Unit interfaces to a tube of maximum 2.5" (63.5 mm), measured outer diameter

The Bracket Mount (1.5" to 2.5" tube), Antenna Unit can support tubes in the interval 1.5" to 2.5". The torques are specified in Figure 14. The bracket mount, V-bolts, and nuts are made of A4 stainless steel.

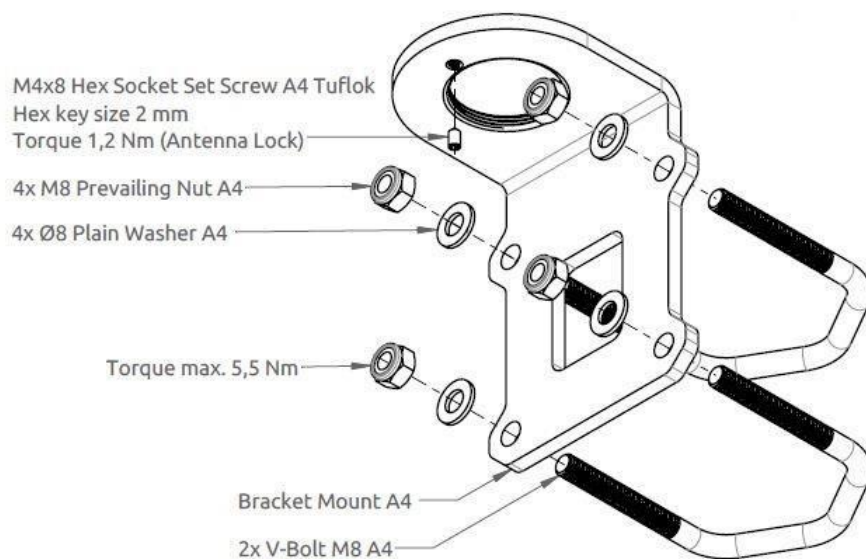


Figure 14: Bracket Mount (1.5" to 2.5" tube), Antenna Unit – horizontal tube mount

5.6 Pole Mount, Antenna Unit

The Pole Mount (1.5" tube), Antenna Unit is illustrated in Figure 15.

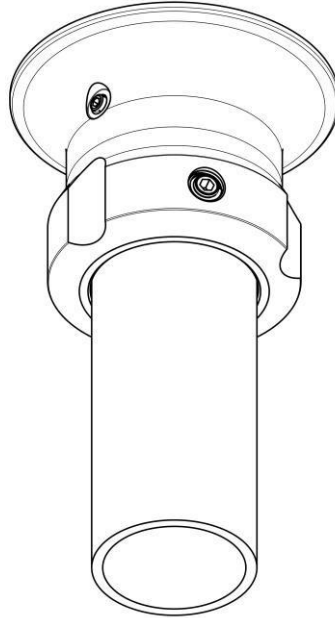


Figure 15: Pole Mount (1.5" tube), Antenna Unit

Pole mount installation procedure:

1. Feed the coaxial cable through the pole mount
2. Fasten the coaxial cable to the LT-3130 Antenna Unit (N connector)
3. Apply self-vulcanic tape on the N connector and cable to protect against saltwater and corrosion
4. Screw the pole mount (clockwise) on the LT-3130 Antenna Unit, and fasten the antenna lock pinot screw, as illustrated in Figure 16 on page 26 (max torque = 1.2 Nm)
5. The LT-3130 Antenna Unit and pole mount can now be mounted on the 1.5" tube. Fasten the three pole lock pinot screws, as illustrated in Figure 16 on page 26 (max torque = 4.5 Nm)

NOTE Remember to fasten the antenna lock pinot screw (1.2 Nm) after the pole mount and antenna unit have been screwed together.

NOTE The Pole Mount (1.5" tube), Antenna Unit interfaces to a tube of maximum 1.5" (38.1 mm), measured outer diameter.

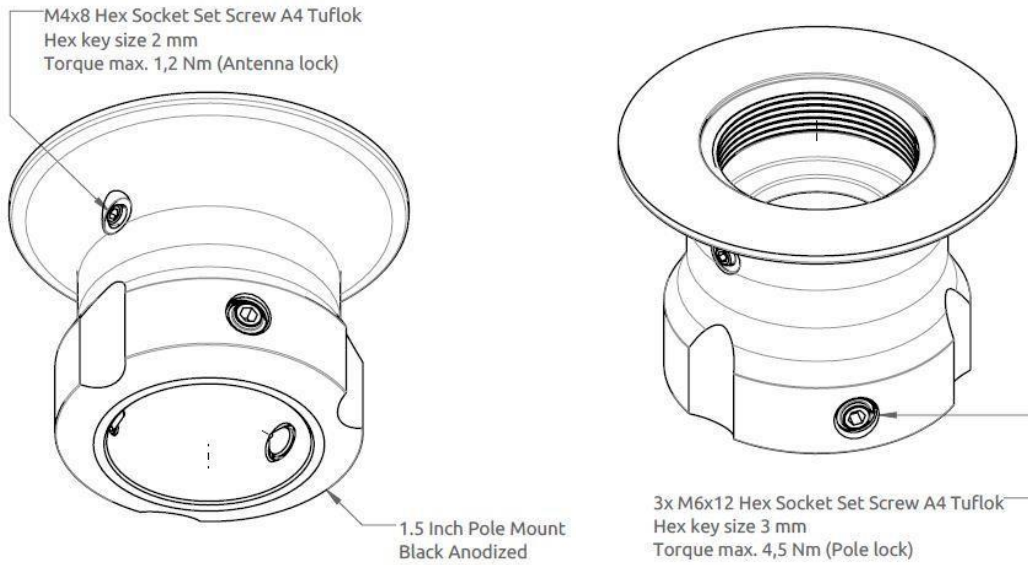


Figure 16: Pole Mount (1.5" tube), Antenna Unit

NOTE

The Pole Mount (1.5" tube), Antenna Unit only support a 1.5" tube. The pinot screws (antenna and pole lock) torques are specified in Figure 16. The pole mount is made of milled aluminium (anodized). The pinot screws are made of A4 stainless steel.

6 Interfaces

This chapter describes the external interfaces to the LT-3110 Control Unit, including the coaxial cable interface to the LT-3130 Antenna Unit.

6.1 DC input

The Alpatron LT-3100 Iridium is designed to be used on 12 Vdc and 24 Vdc power buses (nominal). External DC power to the system is provided by connecting the 3 m power cable delivered by Alpatron Marine. The power connector is mounted on the back side of the LT-3110 Control Unit and marked 'PWR', see Figure 3 on page 17.

NOTE The input voltage range is: 10 - 32 Vdc. The LT-3110 Control Unit DC input connector and circuit is protected and certified for Reverse Polarity Protection. Use only the 3 m power cable delivered by Alpatron Marine.

6.2 Chassis ground

The chassis ground connector is placed on the back side of the LT-3110 Control Unit and marked with 'GNDC', see Figure 3 on page 17.

6.3 SIM card

The Alpatron LT-3100 Iridium requires a SIM card to be operated with the Iridium® satellite services. The Iridium® SIM card must be bought from one of the official Iridium® Service Providers. A list of Iridium® Service Providers can be found at the Iridium® website: <https://www.iridium.com> (select 'Services', and hereafter 'Voice').

The Alpatron LT-3100 Iridium is supporting pre- and post-paid SIM card subscriptions.

The SIM card must be inserted in the LT-3110 Control Unit behind the rubber dust cover. Make sure that the LT-3110 Control Unit is powered off before opening the rubber dust cover. When the SIM card is properly inserted in the slot, and the rubber dust cover is secured, the LT-3110 Control Unit can be powered up. The rubber dust cover is illustrated in Figure 3 on page 17 and marked with 'SIM'.

The following procedure must be followed when inserting, replacing, or removing the SIM card:

1. Turn off the power to the LT-3110 Control Unit
2. Remove the rubber dust cover on the back side of the LT-3110 Control Unit
3. Slide the SIM card holder as illustrated with the arrows on the PCB print, to unlock
4. Open the SIM card holder and insert or remove the SIM card
5. Close the SIM card holder
6. Slide the SIM card holder as illustrated with the arrows on the PCB (opposite direction), to lock
7. Re-insert the rubber dust cover
8. Turn on power to the LT-3110 Control Unit

NOTE

The LT-3110 Control Unit must be powered off when inserting, changing, or removing the SIM card. The SIM card is hidden behind the rubber dust cover on the back side of the LT- 3110 Control Unit.

Figure 17 shows an Iridium SIM card. The format is Mini-SIM (2FF) 25 x 15 mm. The SIM card must be removed from the full-sized card carrier by breaking the Mini-SIM out. The full-sized card carrier contains the MSISDN number, while the SIM card itself contains the ICC-ID.



Figure 17: Iridium SIM card example

The SIM card will be delivered from the Iridium Service Provider (ISP) together with the essential information:

- MSISDN number (the Iridium voice number)
- ICC-ID
- PIN codes
- PUK codes

The SIM card will be delivered with the SIM lock feature disabled. Thus, the Alpatron LT-3100 Iridium will be operational as soon as the SIM card is inserted. If the user decides to activate the SIM lock function from the UI display, then the PIN code is required next time the Alpatron LT-3100 Iridium is powered up.

NOTE

Change of the SIM card PIN code can only be performed if the PIN lock is enabled. If changing the SIM card PIN code, then the SIM card default PIN code cannot be restored, and the new PIN code must be used to unlock the SIM card and the Iridium services.

6.4 Ethernet (RJ45)

The LT-3110 Control Unit has an Ethernet LAN (RJ-45) interface, currently supporting service & maintenance. The Ethernet interface must be used to access the built-in web server, which is further described in section Web server on page 40. The LT-3110 Control Unit will automatically request and obtain an IP address when connected to a Local Area Network (LAN) with a DHCP server (e.g. a router). If connecting the LT-3110 Control Unit directly to a PC, the two will automatically negotiate an IPv4 Link-Local address. The current IP address can be found in the user interface display (Menu -> System -> Network: IP Address).

6.5 Auxiliary

The auxiliary connector is a 10-pin connector (male) mounted on the backside of the LT-3110 Control Unit as illustrated in Figure 3 on page 17 and marked with 'AUX'. The auxiliary connector supports the following interfaces:

- RS-422 serial interface
- 2 x Input/output (I/O)

The auxiliary interface is not supported in software version 1.01.

NOTE

Use only the G-007774 Auxiliary Cable, 3m delivered by Alphasatron Marine for connecting to the auxiliary connector on the backside of the LT-3110 Control Unit. The Auxiliary Cable, 3m is an accessory part and must be acquired separately.

6.6 Antenna

The LT-3110 Control Unit and the LT-3130 Antenna Unit must be connected using a coaxial cable. Both the control unit and the antenna unit have a N connector (female) mounted. This section will specify the requirements to the coaxial cable. The minimum set of requirements are specified in Table 1 and Figure 18 on page 30.

Cable impedance	50 Ω
Maximum signal loss	47.7 dB/100 m @ 1.5 GHz
Maximum DC resistance	See Figure 18 on page 30

Table 1: Minimum requirements for the coaxial cable connecting the LT-3110 Control Unit and LT-3130 Antenna Unit

In most cases it will be the DC resistance that will determine the maximum length of the coaxial cable. It is important to note that the input voltage of the control unit is important for the length of the coaxial cable that can be used. The following formula can be used to calculate the length of the coaxial cable:

$$Cable\ Length\ (m) = \frac{U^2 * 1000}{4 * P_D * R_{Cable}}$$

where U is the control unit input voltage [V], P_D is the antenna unit power (10 W), and R_{Cable} is the total DC resistance [Ω/km] (sum of inner and outer conductor resistance).

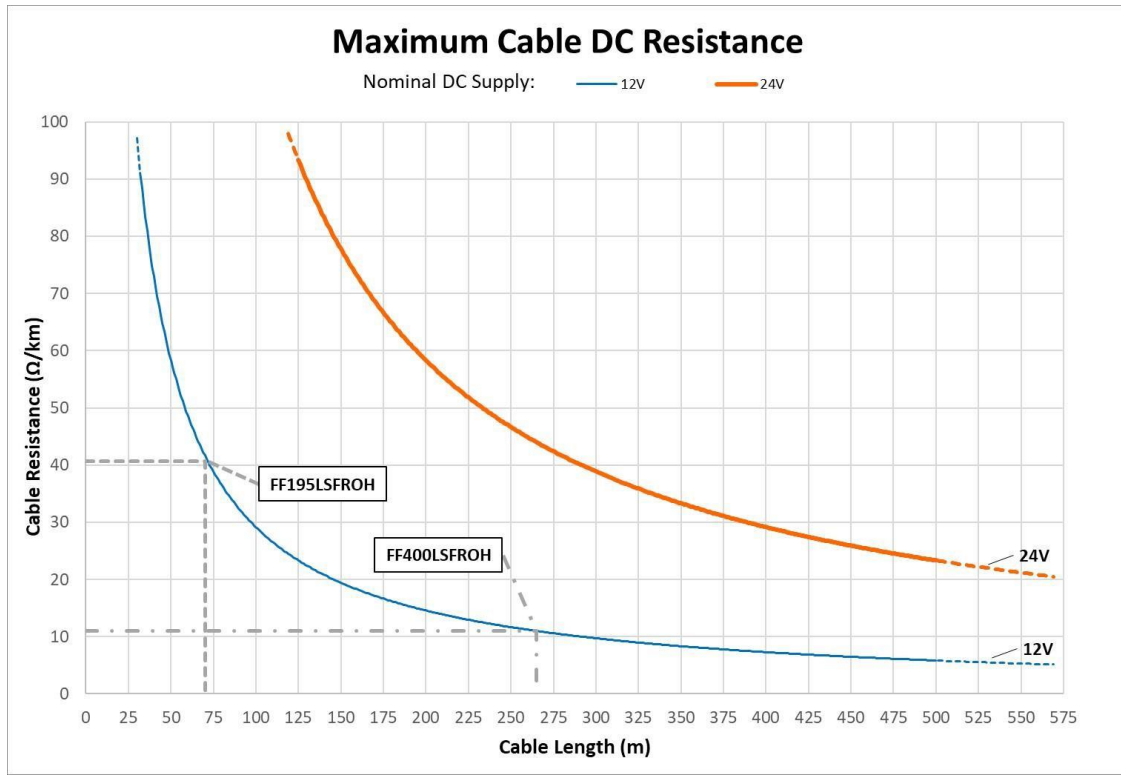


Figure 18: Coaxial Cable Total DC Resistance vs. Cable Length (12 Vdc and 24 Vdc)

In Figure 18 two different input voltages (12 Vdc and 24 Vdc) illustrate the maximum length of the coaxial cable as a function of the DC cable resistance.

NOTE

The DC cable resistance that is illustrated in Figure 22 and used to calculate the maximum cable length is the sum of the DC inner conductor resistance and the DC outer conductor resistance. Some data sheets are not providing sufficient information about the DC resistance, in which cases, the cable manufacture must be approached to obtain this information.

Table 2 lists two coaxial cables and their maximum allowed cable lengths.

Coaxial cable	12 Vdc Supply Max Cable Length	24 Vdc Supply Max Cable Length
RG58	70 m	285 m
RG214	265 m	500 m

Table 2: Maximum coaxial cable length to be used on 12 Vdc and 24 Vdc (cable examples)

The cable lengths in Table 2 are calculated and corrected by reducing the input voltage by 10% (10.8 Vdc and 21.6 Vdc) to compensate for variation in the power source. The total DC resistance for the two cables shown in Table 3.

Cable Type	Inner Conductor DC Resistance [Ω /km]	Outer Conductor DC Resistance [Ω /km]	Total DC Resistance [Ω /km]
RG58	24.9	15.8	40.7
RG214	4.5	6.5	11

Table 3: Total DC resistance (cable examples)

NOTICE If using a coaxial cable that is different to what is specified in this section (RG58 and RG214), then verify that the coaxial cable maximum signal loss (listed in Table 1 on page 29) is respected and calculate the maximum cable length as a function of the input voltage and the total DC resistance. Contact Alpatron Marine to get assistance on selection and acceptance of a specific coaxial cable.

NOTE The LT-3110 Control Unit must be powered off when connecting or disconnecting the LT- 3130 Antenna Unit.

7 User Interface (UI)

The Alpatron LT-3100 Iridium is controlled from the LT-3110 Control Unit, which has the user interface for operating and configuring the system. The control unit has a 4.3" TFT-LCD display, supporting day and night modes. The layout of the display and buttons is illustrated in Figure 19.

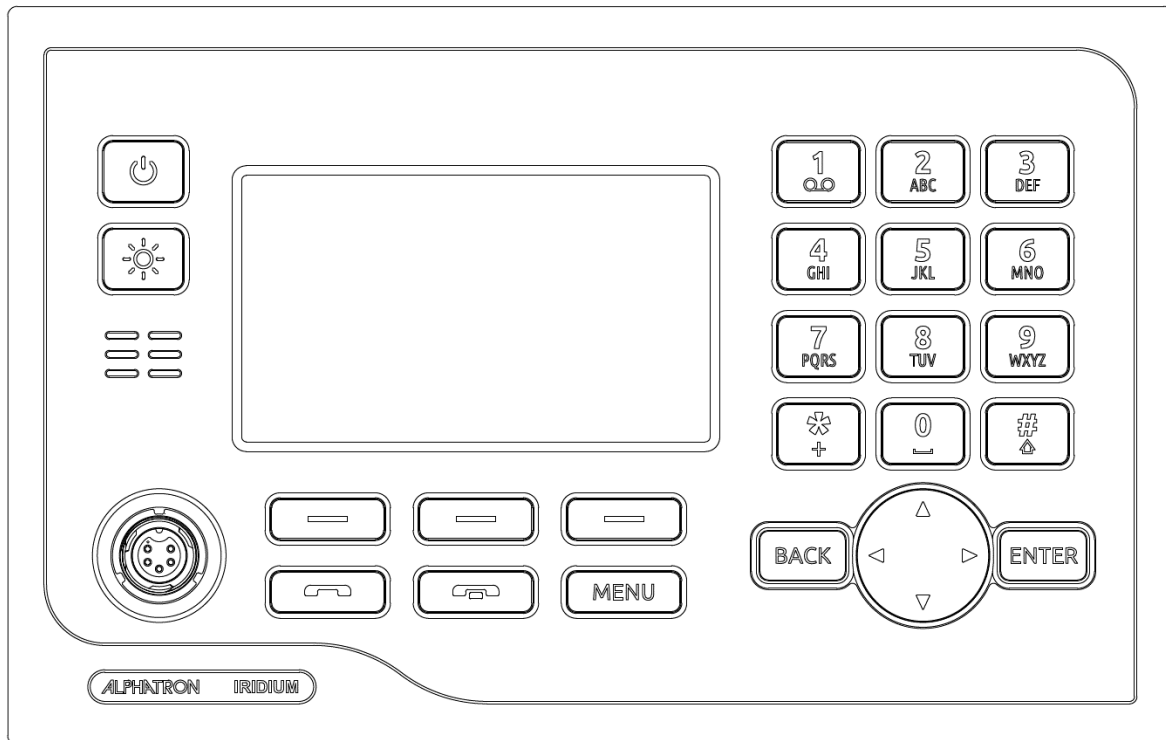


Figure 19: Control Unit (front view) – user interface display and buttons

The control unit buttons, function and features, are described in the following groups:

- **Power button:** The power button can power off the system by pressing the button for 5 seconds. A pop-up box will show the action, and a counting is showing the count down until the system is powered off. If the external power source to the system is re-powered, then the system will power on.
- **Brightness button:** The brightness button has two functions – change of brightness level and change of display mode (day and night). When changing the brightness level, the keypad backlight will be changed as well. Short press (< 1 s); brightness level will change between 7 levels. Long press (≥ 1 s); will change display mode. The display brightness level and display mode can be changed from the UI menu as well (Menu -> Settings -> Display).
- **Off-hook button:** The button is illustrated with a green coloured handset. The off-hook buttons function is to activate a call, if the dialled number is available in the display or a contact is selected in the Call History. The off-hook button can also be used to accept an incoming call. The alternative to use the off-hook button is to lift the handset out of the cradle. If the off-hook button is used and the handset remain in the cradle, the phone audio will be available in the control unit speaker.
- **On-hook button:** The button is illustrated with a red coloured handset. Pressing the on-hook button will terminate an active call.

- **MENU button:** The MENU button is used to open the main menu, as illustrated in Figure 20. The BACK, arrows, and ENTER buttons are used to navigate in the menu layout. Press the MENU button to exit the menu from anywhere in the menu tree (instead of multiple BACK button presses).
- **Soft keys buttons:** Three soft keys are available below the display. The soft keys are used for different purposes and their functions will change in the operation modes of the system.
- **Navigation buttons:** The navigation buttons (BACK, arrows, and ENTER) are used for navigation purposes in the menu layout. In context of user input or when making selections, the BACK button will erase input or cancel editing respectfully, the ENTER button will end input or apply selection respectfully.
- **Numeric Keypad buttons:** The numeric keypad buttons, the '*' button, and the '+' button can be used for entering digits, letters, and special characters. Depending on context, pressing one button in rapid succession (< 1s) will cycle through a selection of letters, digits and/or special characters (e.g. when entering a phone number, pressing the '*' character twice in succession will result in one '+' character and not two '*' characters). An icon in the status bar will show the current input mode, which determines which characters can be cycled - if any. In text mode, the '#' key is used to change between capital and lowercase letters.

7.1 Menu

The main menu is accessed by pressing the MENU button on the keypad. The user will be presented with a layout as illustrated in Figure 20.

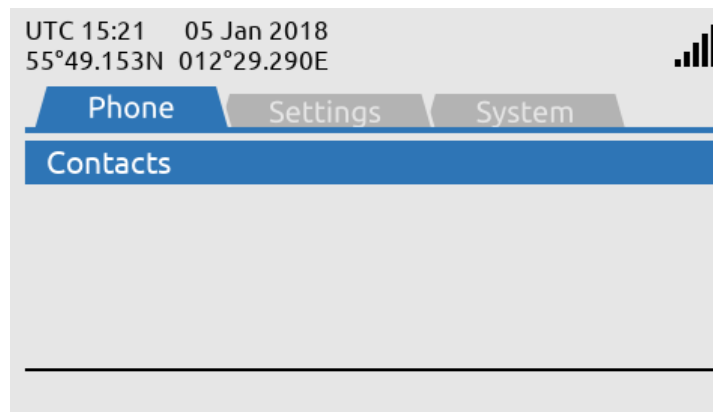


Figure 20: LT-3110 Control Unit - UI display (main menu)

The main menu is represented by three sub-menus: Phone, Settings, and System. The three sub-menus are listed in Table 4.

Sub-menus	Entries
Phone	Contacts
Settings	Audio Display
System	Information Network Security

Table 4: LT-3110 Control Unit, sub-menu layout

7.2 System information

The Alpatron LT-3100 Iridium installation and mounting is described in the previous sections. After the Alpatron LT-3100 Iridium has been installed and properly connected, the system will automatically start-up and register on the Iridium® Network and be ready for use. The Alpatron LT-3100 Iridium will inform the user, if the system is not properly installed, or the system cannot register onto the Iridium® Network. Figure 21 is illustrating a Alpatron LT-3100 Iridium, which is registered on the Iridium® Network and ready to use. The Alpatron LT-3100 Iridium will provide user information in the status bar and status text (e.g. ‘Registered’ showed below the Iridium® connected logo).



Figure 21: LT-3110 Control Unit - UI display (status view)

The signal strength icon will be showed with a signal strength between 0 and 5 (where 5 is the maximum signal strength), when the Alpatron LT-3100 Iridium is registered on the network and ready to use. If no signal is available, the signal bar symbol will be showed with no highlighted bars and a small cross. The status text will show ‘Registered’ if the system is ready to use. Table 5 gives an overview of the possible combinations, of the signal strength icon, and the status text that the Alpatron LT-3100 Iridium can represent.

Signal Bar	System Text	System Status
0 to 5	Registered	Ready to use
0 to 5	Registering...	Not ready
No bars (with cross)	Searching for Iridium...	Not ready

Table 5: LT-3110 Control Unit – Registration status

Additional user information is available in the system and represented as a system text or as an icon in the status bar. Table 6 is listing the system text and describing the status of the Alpatron LT-3100 Iridium.

System Text	Description	System Status
Initializing, please wait...	The Alpatron LT-3100 Iridium is starting up. Please wait until the system text is updated.	Not ready
Searching for Iridium...	The Alpatron LT-3100 Iridium is searching for the Iridium satellites signal. Make sure that the LT-3130 Antenna Unit has free line of sight to the Iridium® satellites.	Not ready
Registering...	The Alpatron LT-3100 Iridium is registering onto the Iridium® Network.	Not ready
Registered	The Alpatron LT-3100 Iridium is registered on the Iridium® Network.	Ready to use
Antenna not connected	The LT-3110 Control Unit and LT-3130 Antenna Unit is not connected via the coaxial cable. Verify coaxial cable connections, specifications, and details in section Antenna on page 29.	Not ready
Handset not connected	The LT-3120 Handset is not connected to the LT- 3110 Control Unit. Phone calls cannot be performed from the LT-3120 Handset.	(Not ready)
SIM card missing	The LT-3110 Control Unit cannot identify a SIM card in the SIM slot. Check that a SIM card has been inserted behind the rubber dust cover on the back side of the control unit. For further details, see section SIM card on page 27.	Not ready
SIM card locked	The SIM lock has been enabled by the user (or SIM lock is default enabled in the SIM card). Type in the SIM card PIN code. The SIM lock can be disabled by the user from the UI display (Menu -> System -> Security).	Not ready
SIM card blocked	The SIM card PIN code has been typed in incorrect three consecutive times. Type in the SIM card PUK code to deactivate the SIM card blocked mode.	Not ready
SIM card error	The SIM card error might appear, if the SIM card is detected, but the SIM card format or data is wrong. Please power down the LT-3110 Control Unit, verify correct SIM card re-insert, and re- power the system again.	Not ready

Table 6: LT-3110 Control Unit – System Text

The Alpatron LT-3100 Iridium can in addition to the system text also show an icon, which might be related to the status text, but not necessarily. The icon will be available in the icon line and might indicate a problem, but can also indicate a status of the system, or a service information to the user. Table 7 is providing an overview of the available icons.













Status Icon	Description
	The Alpatron LT-3100 Iridium has no satellite signal and cannot register on the Iridium® Network. No satellite services available.
	The Alpatron LT-3100 Iridium has satellite signal = 0 and is registered on the Iridium® Network. Check system text for registration status.
	The Alpatron LT-3100 Iridium has satellite signal = 1 and registered on the Iridium® Network. Check system text for registration status.
	The Alpatron LT-3100 Iridium has satellite signal = 5 and registered on the Iridium® Network. Check system text for registration status.
	The handset icon indicates that the Alpatron LT-3100 Iridium is in off-hook mode and that a potential call is active.
	The mute icon indicates that the microphone on the handset is muted. Mute and unmute is activated from a soft key (below the display) during a call.
	The ringer mute icon is showed when the ringer volume is configured to off.
	The numeric icon is showed when the user is writing a numeric number in the display.
	The alphanumeric icon (capital letter) is showed when the user is writing a capital alphabetic letter in the display. Change between normal and capital letter by using the # key.
	The alphanumeric icon is showed when the user is writing a normal alphabetic letter in the display. Change between normal and capital letter by using the # key.
	The no SIM card icon is showed if the LT-3110 Control Unit is powered up without having a SIM card inserted, or the SIM card has not been detected.
	The warning symbol is showed if something is wrong with the system. Check system text for further information or action.

Table 7: LT-3110 Control Unit – Status Icons

7.3 Make a voice call

The Alpatron LT-3100 Iridium must be properly installed, connected, and configured before trying to establish a phone call. The Alpatron LT-3100 Iridium will inform the user about the status of the system, and whether the system is ready to initiate a call.

NOTE Verify that the LT Alpatron LT-3100 Iridium is ready for making a voice call. Check that the system status (system text and icons), as described in section System overview on page 15, shows the correct system information.

Dialling a mobile originating (MO) voice call can be established in the two following modes:

- On-hook mode (dial the number, and then off-hook)
- Off-hook mode (lift the handset, get ready tone, and dial the number)

7.3.1 On-hook mode

In on-hook mode the user types in the called number, using the numeric keypad, without lifting the handset out of the cradle or initially pressing the off-hook button. The typed in called number can be edited until the user decides to press the off-hook button or lifting the handset out of the cradle.

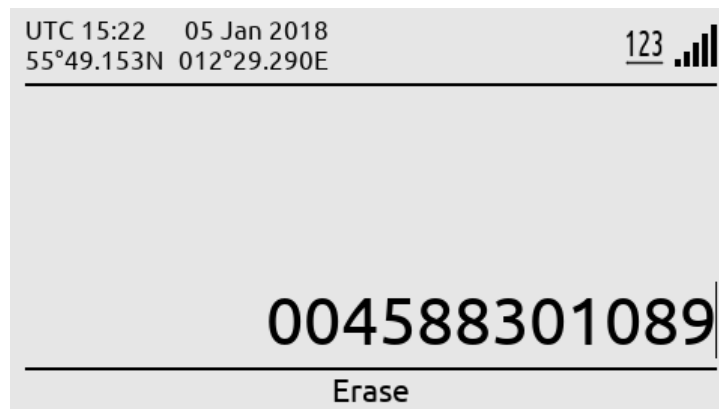


Figure 22: LT-3110 Control Unit – voice call (on-hook mode)

Step-by-step instructions:

1. Type in the called number (e.g. 004588301089) using the numeric keypad
2. When the called number is complete:
 - a. Lift the handset out of the cradle or
 - b. Press the off-hook button (green handset button)
3. The Alpatron LT-3100 Iridium will now establish a connection to the dialled number

7.3.2 Off-hook mode

In off-hook mode, the user starts to place the Alpatron LT-3100 Iridium into off-hook mode (ready tone available). The off-hook mode can be obtained in two ways: lifting the handset out of the cradle or pressing the green off-hook button, prior to typing any digits of the called number. In off-hook mode, the user will be met by a ready tone and the help text 'Please enter number' – hereafter, the called number can be dialled, using the numeric keypad. It is not possible to regret, if one or more wrong digits are typed in, for the dialled number. In this case, the user must on-hook the phone, and dial the correct number again.

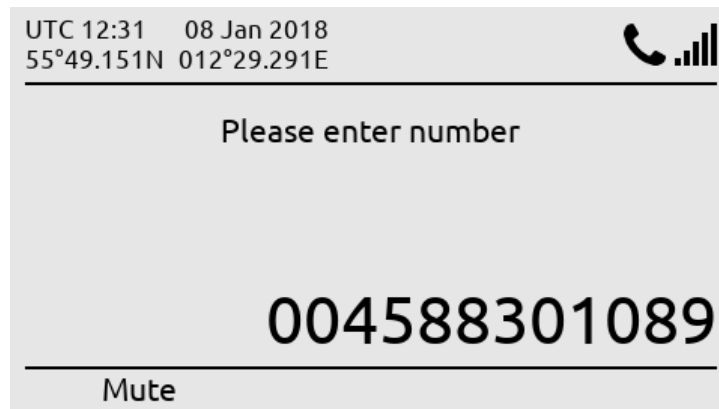


Figure 23: LT-3110 Control Unit – voice call (off-hook mode)

Step-by-step instructions:

1. Lift the handset out of the cradle or press the off-hook button (green handset button)
2. Confirm that a ready tone is available in the handset, or in the control unit speaker
3. 'Please enter number': user can now enter the called number
4. When the called number is complete, the user has three options:
 - a. Wait 12 seconds, hereafter the system will try to call the number
 - b. Press #, hereafter the call will be established immediately
 - c. Press the off-hook button
5. The Alpatron LT-3100 Iridium will now establish a connection to the called number

NOTE

The Alpatron LT-3100 Iridium will provide the user with information, while connecting and throughout the voice call. In case of problems with the satellite network or connection to the called party (far-end), the user will be informed through a voice prompt, and by status cause codes, that will be presented on the display (e.g. 'Temporary link failure').

The voice call connection can be described with the following states:

- State 1: Type in number
- State 2: 'Connecting...'
- State 3: 'Duration: MM:SS' – (if call is successfully connected) where MM are minutes and SS are seconds.

The 'Connecting...' and 'Duration: MM:SS' states are illustrated in Figure 24 and Figure 25.



Figure 24: LT-3110 Control Unit – voice call connecting...



Figure 25: LT-3110 Control Unit – voice call successfully connected

8 Web server

The LT-3110 Control Unit has a built-in webserver, which can be accessed from the Ethernet (RJ45) interface from the back side of the control unit. A PC must be connected to the control unit, either directly by connecting an Ethernet cable between a PC and the LT-3110 Control Unit, or by connecting the LT-3110 Control Unit to a Local Area Network (LAN), to where the PC is connected.

NOTE The IP address allocated to the LT-3110 Control Unit, is shown in the UI (Menu -> System -> Network: IP Address).

The web server has three web pages:

- Dashboard
- Software update
- Diagnostic report

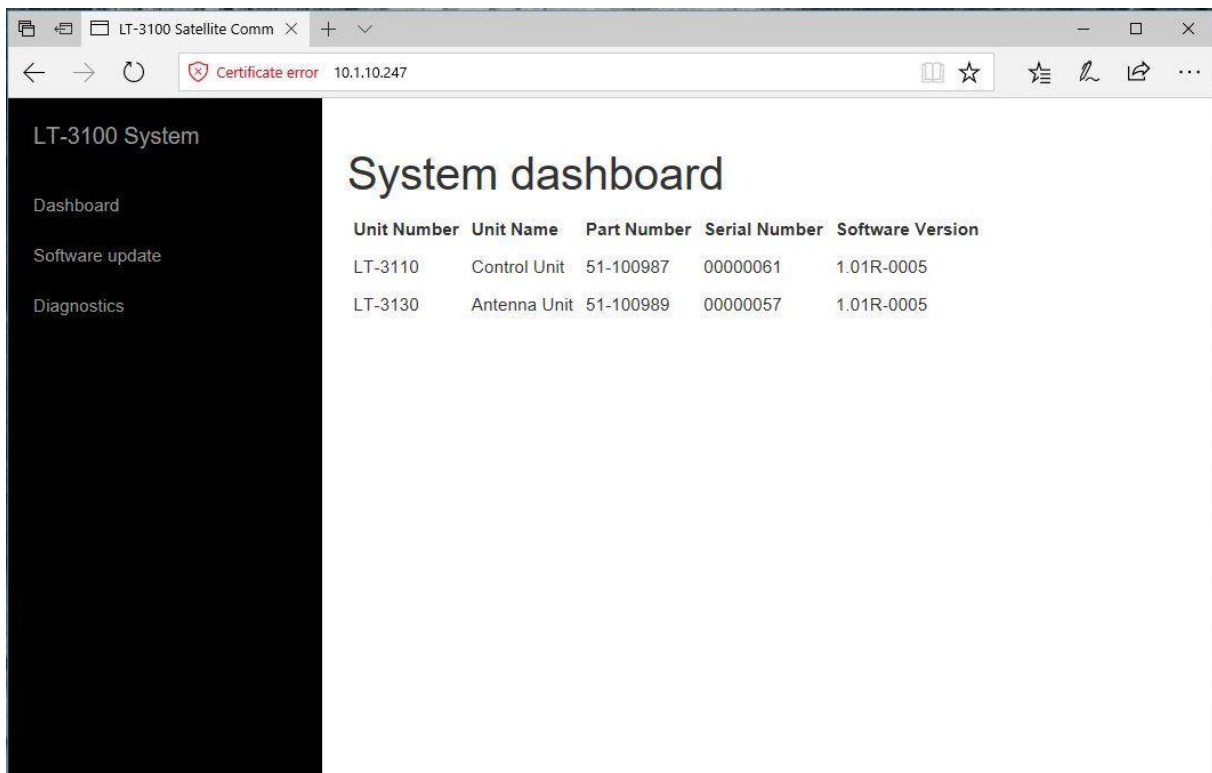


Figure 26: LT-3110 Control Unit - built-in web server (dashboard)

8.1 Dashboard

The dashboard is showing details about the two main units, which forms the Satcom system: the LT-3110 Control Unit and the LT-3130 Antenna Unit. If the antenna unit is connected properly to the control unit, then the antenna unit will be visible on the web server dashboard, as illustrated in Figure 26 on page 40. Otherwise only the control unit will be visible. For each unit, the following information will be available: unit number, unit name, unit part number, unit serial number, and software version. The antenna unit will automatically be updated with the software version, which is available in the control unit.

8.2 Software update

Carefully read the software release note, provided by Lars Thrane A/S, before software updating the Alpatron LT-3100 Iridium.

CAUTION Do not remove power from the control unit while the software update is on-going. Also, do not disconnect the antenna cable between the control unit and the antenna unit, while the software update is on-going.

Navigate to the web server of the Alpatron LT-3100 Iridium, by following the instructions in section 'Accessing the built-in web server' on page 42. Select the 'Software update' webpage and click the 'Browse...' button to select the file, which must be uploaded to the system. The Alpatron LT-3100 Iridium software image has the following filename (example): LT-3100-v1.01R-005.lti – the software image and release documentation will be available on the official company website: www.thrane.eu, under the specific product. Finally click the 'Upload' button to start the upload of the new software image. The upload and installation of the software image will take a few minutes. Progress indication bars can be monitored on the software update webpage, while the software update is on-going. The Alpatron LT-3100 Iridium will reboot once the software image is installed in both the control unit and antenna unit.

NOTE The LT-3110 Control Unit and the LT-3130 Antenna Unit must be operated with the same software version. Automatically, software update will happen if the control unit identifies that the software version in the two units are different.

8.3 Diagnostic report

A diagnostic report can be downloaded from the webpage 'Diagnostics'. Navigate to the webpage and press the 'download' button. A file with the following filename (example): LT-3100_00000061_180104-152149.tar.gz will be downloaded to a location selected by the user. The diagnostic report can be sent back to Alpatron Marine in case of required support and assistance. The diagnostic report contains technical data, from the Alpatron LT-3100 Iridium, and will help identify and resolve problems at the installation site.

8.4 Accessing the built-in web server

To access the built-in web server of the LT-3110 Control Unit, please complete the following steps:

1. Connect the LT-3110 Control Unit directly to a PC using an Ethernet cable, or connect the LT-3110 Control Unit to a Local Area Network (LAN), where a PC is connected.
2. Identify the IP address that is assigned to the LT-3110 Control Unit. The IP address can be read out from the UI Display interface (Menu -> System -> Network: IP Address). The IP address is valid if the 'Link Status' is showing 'Up'. The IP address is assigned dynamically by a DHCP server.
3. From the PC, start a browser (e.g. Microsoft Edge, Explorer, or Chrome) and type in the IP address, which was identified in the LT-3110 Control Unit (e.g. 169.254.1.1).
4. The browser might show you a warning about an invalid web server certificate, as illustrated in Figure 27. Make sure, that you have typed in the correct IP address.
5. Press 'Details' and you will be presented for an extended page view (including a link), which will direct you to the Alpatron LT-3100 Iridium dashboard 'Go on to the webpage (Not recommended)'.
[Go on to the webpage \(Not recommended\)](#)
6. You will now see the Alpatron LT-3100 Iridium dashboard.

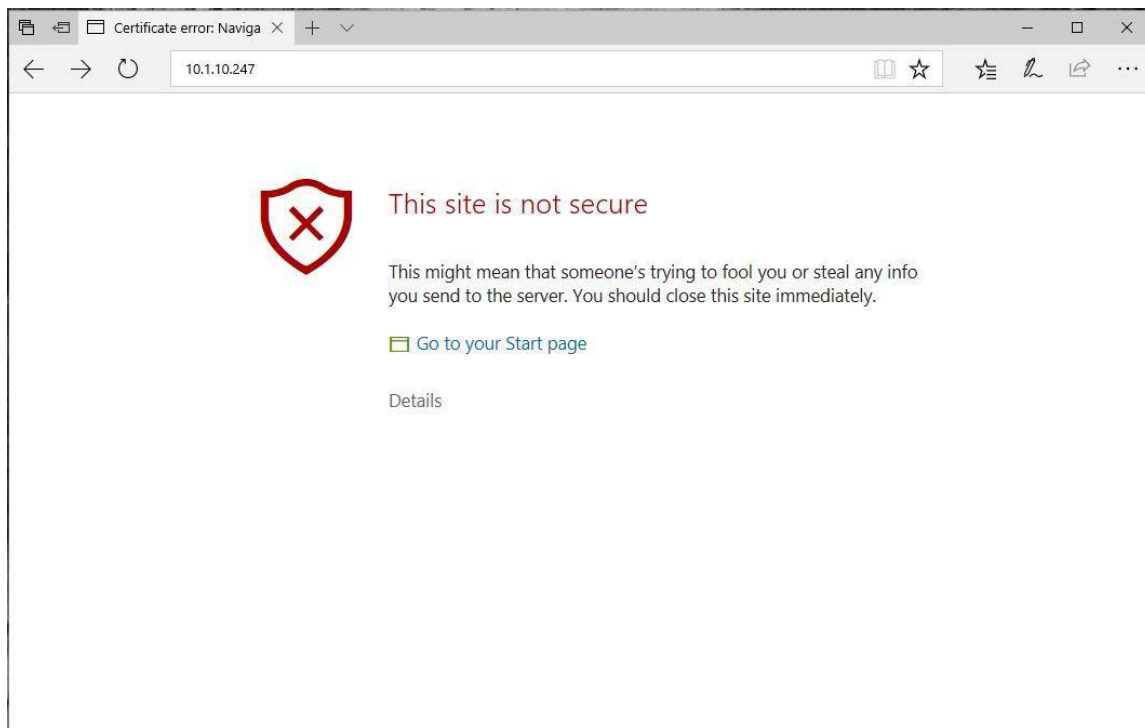


Figure 27: Accessing built-in web server ('This site is not secure')

9 Service & Repair

This chapter describes what the end-user must do in case of required service or repair.

NOTE The Alpatron LT-3100 Iridium does not require any scheduled maintenance or service. Make sure that the product is installed, as described in this manual, before making contact to the distributor or dealer for further assistance.

If the Alpatron LT-3100 Iridium for some reason does not work as described in this manual, contact the distributor or dealer, from where the product was originally bought. The distributor or dealer will have experience and know-how to assist with further technical support and troubleshooting.

Contacting the distributor/dealer:

1. Make sure to have the product name, unit part numbers, and unit serial numbers identified. The unit part numbers and the unit serial numbers are identified on the unit label, which is found on the backside, or at the bottom side of the units. Alternatively, use the built-in web server to read- out the unit part numbers and the unit serial numbers.
2. Write a technical report about the observation or error. If possible, attach a picture of the installed product and include a wiring diagram. If possible, download a diagnostic report as described in section 'Diagnostic report' on page 41.
3. Send all information to the local distributor or dealer.

NOTICE Unless otherwise agreed, the end-user shall always coordinate service and repair issues directly with the distributor or dealer. This practice also applies for returning of products for service and repair.

All information that will get back to Alpatron Marine and Lars Thrane A/S, either directly or indirectly, will be handled with confidentiality. End-user sensitive data will not be shared with any third party without prior written acceptance from the involved parties.



Appendices



Appendix A: Specifications

Alphatron LT-3100 Iridium

Certification & standards	Maritime CE, RED, ISED, FCC, RCM, RoHS, Iridium®
Vibration, operational	IEC 60945 (sine) & proprietary Maritime Random profile
Vibration, survival	Proprietary Maritime Random profile
Vibration, shock	Proprietary Maritime profile (20 g, 11 ms)
Power consumption: operating mode, max	37 W
Power consumption: standby mode, max	21 W
Power consumption: sleep mode, max	0.08 W
Compass Safe Distance, std.	0.85 m (2.8 ft)
Compass Safe Distance, steer.	0.65 m (2.1 ft)

LT-3110 Control Unit

Weight	658 g (1.45 lbs)
Dimensions	224.0 x 120.0 x 70.0 mm (8.82 x 4.72 x 2.76 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust, and water	IP 32
Interfaces	Ethernet, auxiliary, DC input, chassis ground Antenna Unit (N conn.), handset, Bluetooth, SIM card
Input voltage	10 - 32 Vdc
BT transmitter, Max RF output power	10mW
BT transmitter, Frequency bands	TX: 2402-2480MHz, RX:2402-2480MHz

LT-3120 Handset

Weight	290 g (0.64 lbs)
Dimensions	208.8 x 52.8 x 38.2 mm (8.22 x 2.08 x 1.50 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust, and water	IP32

LT-3121 Cradle

Weight	66 g (0.15 lbs)
Dimensions	106.9 x 57.4 x 29.3 mm (4.21 x 2.26 x 1.15 in)

LT-3130 Antenna Unit

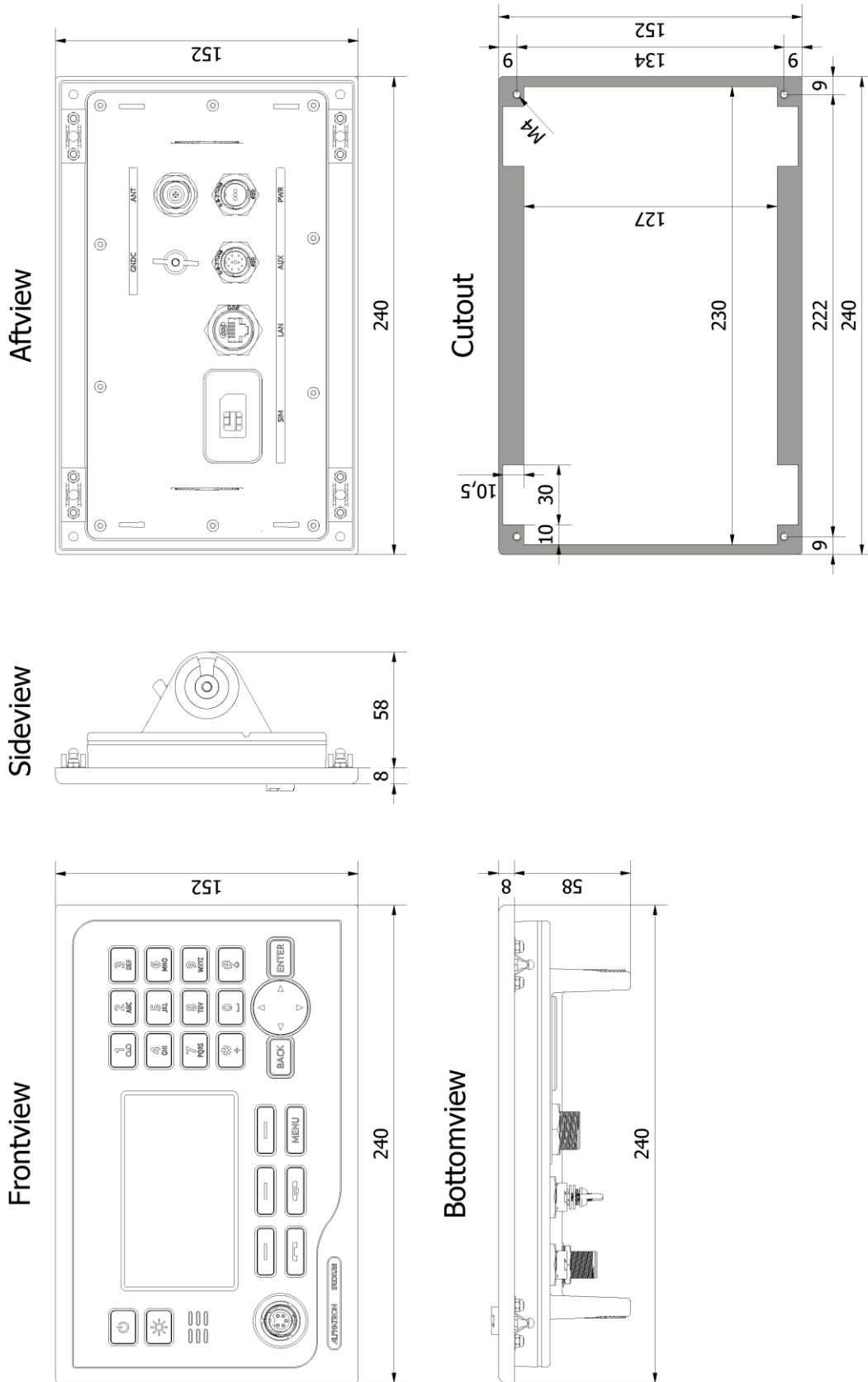
Weight	687 g (1.51 lbs)
Dimensions	151.1 x Ø 149.5 mm (5.95 x Ø 5.89 in)
Temperature, operational	-25°C to +55°C (-13°F to +131°F)
IP rating, dust, and water	IP67
Interfaces	Control Unit (N conn.)
Iridium transmitter, Max RF output power	8W
Iridium transmitter, Frequency bands	TX: 1616-1626,50MHz, RX: 1616-1626,50MHz

Antenna communication cable Coaxial cable, up to 500 m (1500 ft)

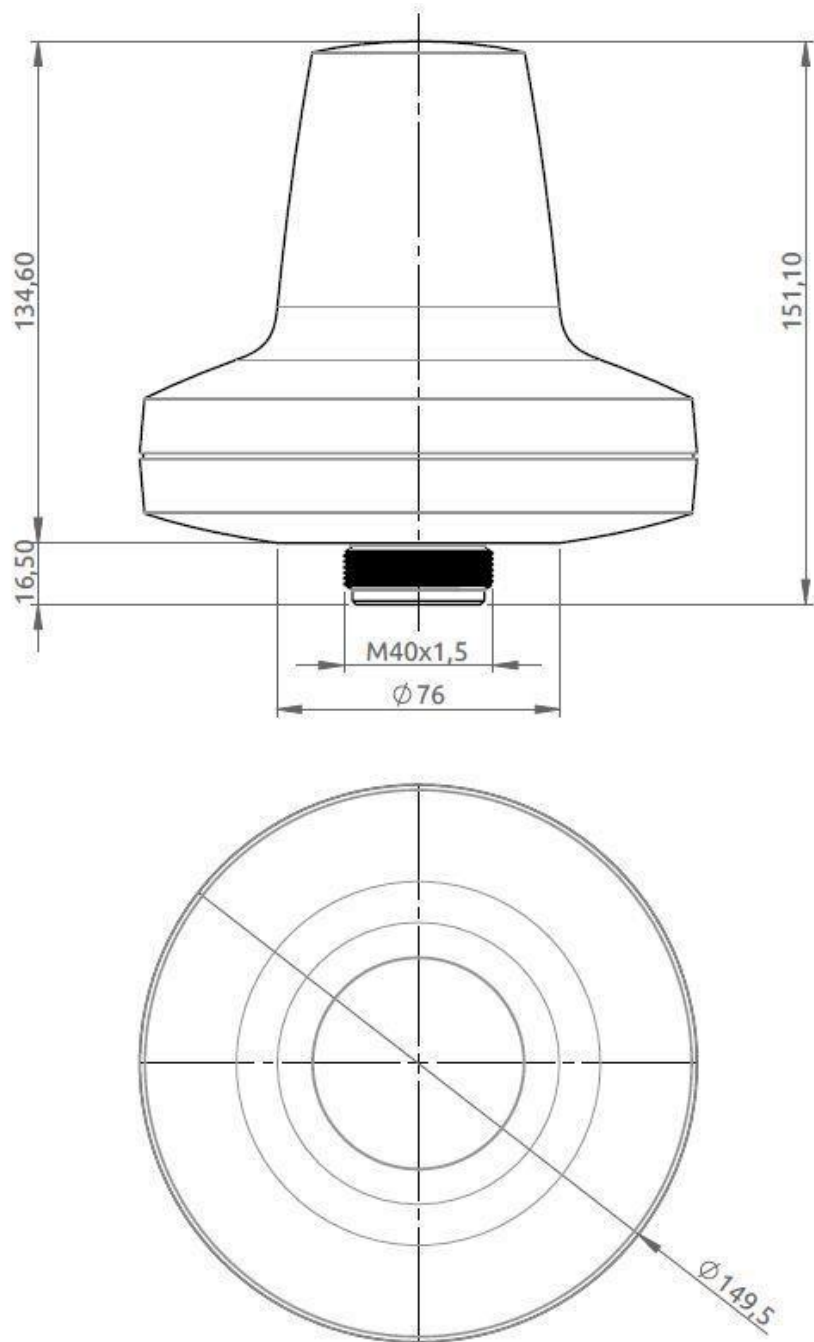
Warranty 2 years

Maintenance None

Appendix B: Outline Drawing: LT-3110 Control Unit

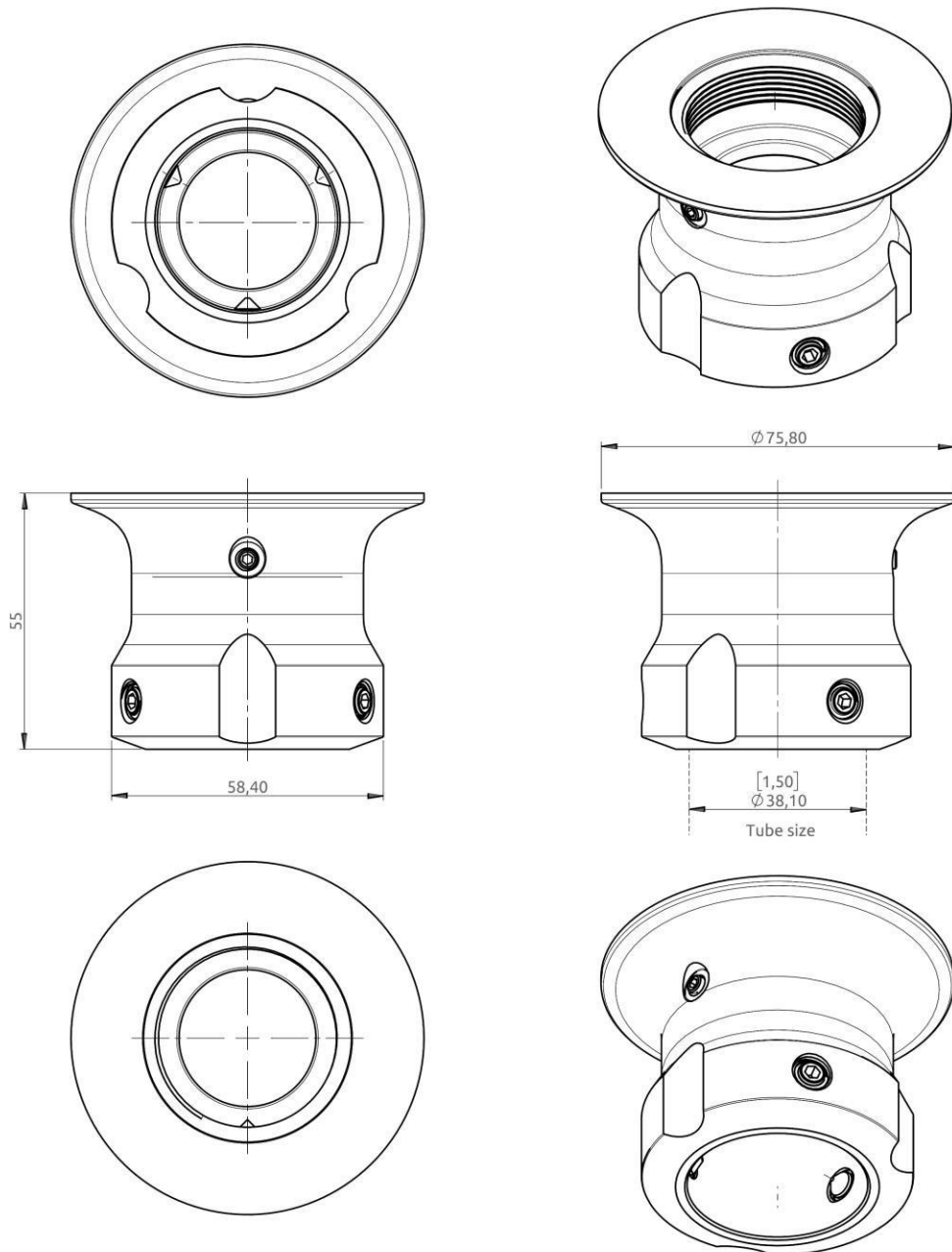


Appendix C: Outline Drawing: LT-3130 Antenna Unit



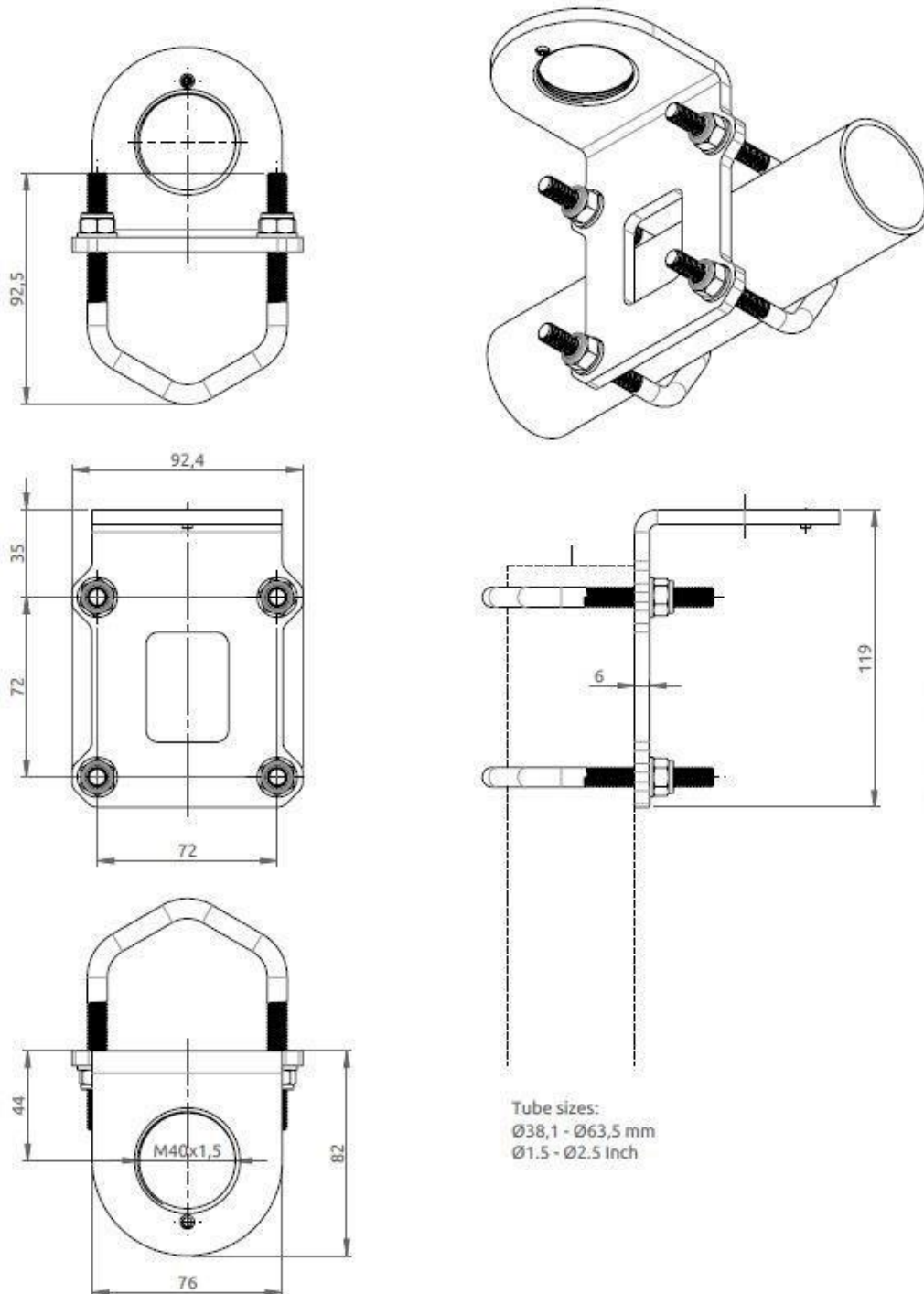
Appendix D: Outline Drawing: Pole Mount, Antenna Unit

NOTE: The Pole Mount (1.5" tube), Antenna Unit interfaces to a tube of maximum 1.5" (38.1 mm), measured outer diameter. The total weight of the Pole Mount is 190 g (0.42 lbs).

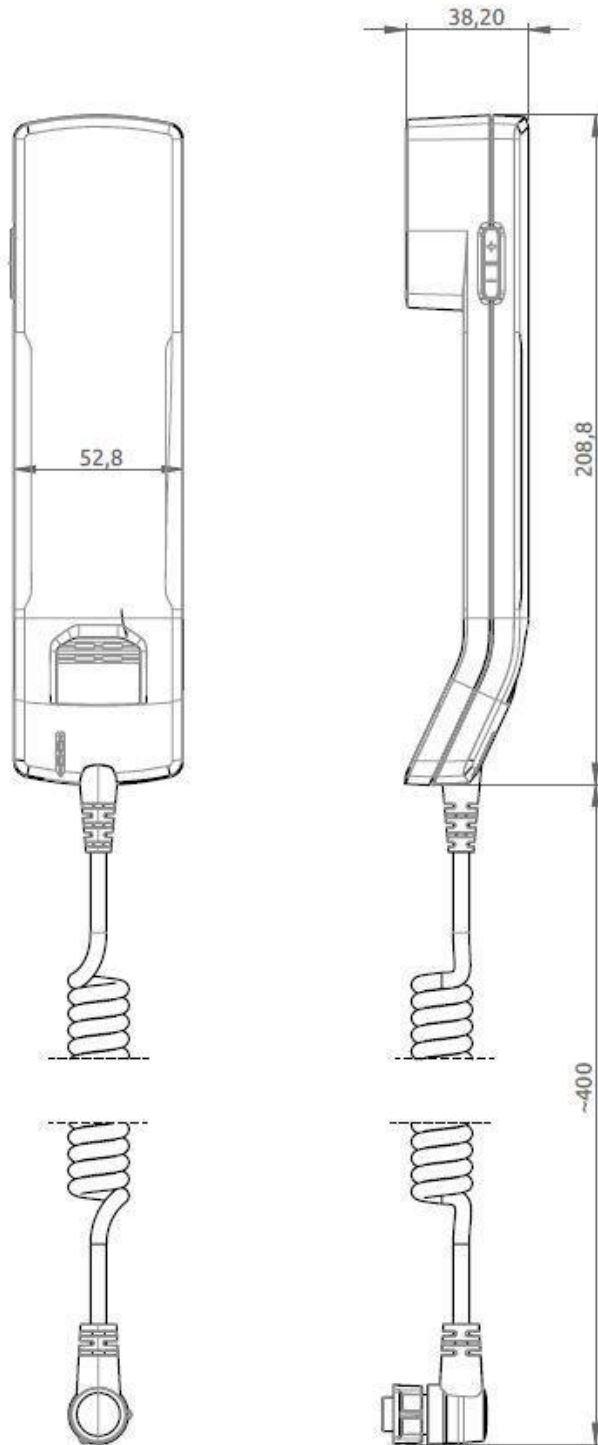


Appendix E: Outline Drawing: Bracket Mount, Antenna Unit

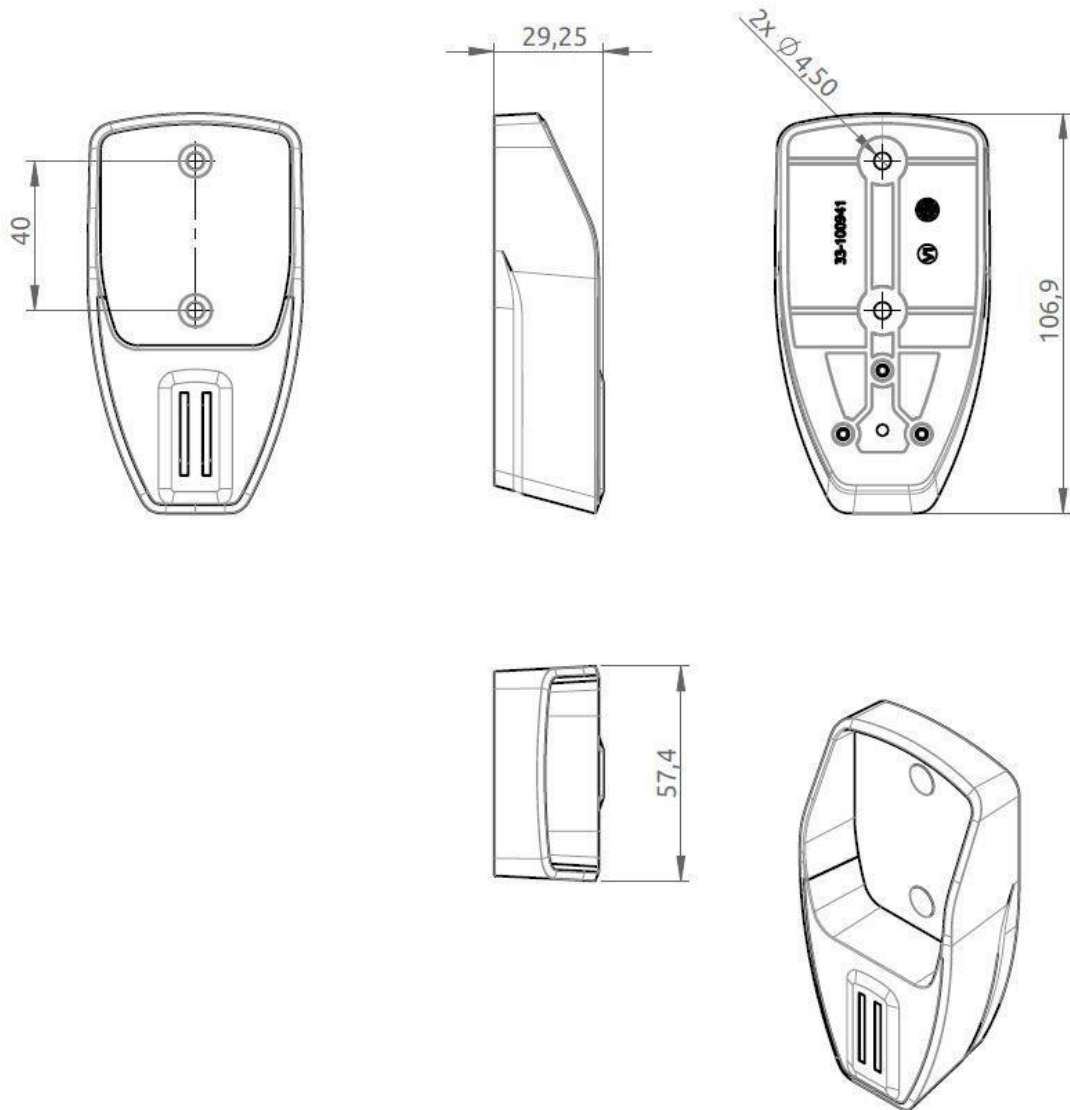
NOTE: The Bracket Mount (1.5" to 2.5" tube), Antenna Unit interfaces to a tube of maximum 2.5" (63.5 mm), measured outer diameter. The total weight of the Bracket Mount is 714 g (1.57 lbs).



Appendix F: Outline Drawing: LT-3120 Handset



Appendix G: Outline Drawing: LT-3121 Cradle



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