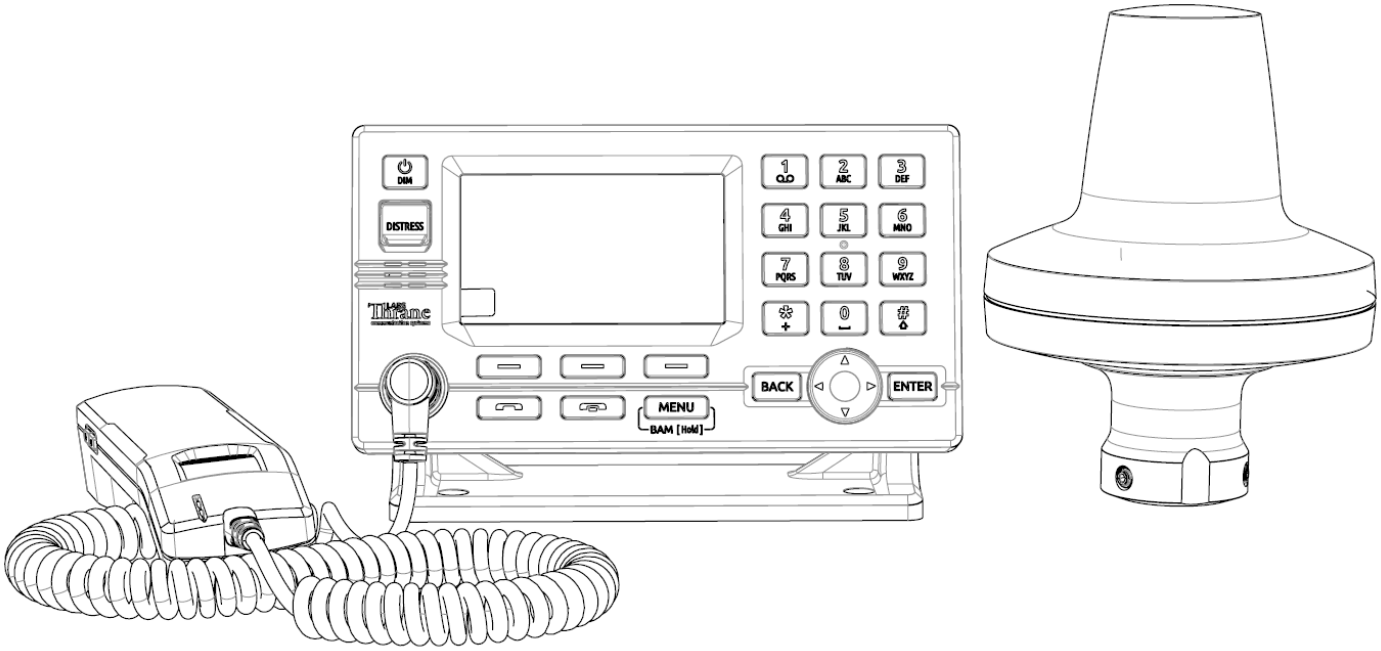
User & Installation Manual

LT-3100S GMDSS Satellite Communications System



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Disclaimer

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Disposal

Old electrical and electronic equipment marked with this symbol can contain substances hazardous to human beings and the environment. Never dispose these items together with unsorted municipal waste (household waste). In order to protect the environment and ensure the correct recycling of old equipment as well as the re-utilization of individual components, use either public collection or private collection by the local distributor of old electrical and electronic equipment marked with this symbol. Contact the local distributor or dealer for information about what type of return system to use.

IMO and SOLAS

The equipment described in this manual is intended for use on commercial marine and leisure vessels. The equipment is covered by the International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) regulations.

Safety Instructions for the Installer

The following safety instructions must be observed during all phases of operation, installation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment.

Lars Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Instructions for the Installer

WARNING - Product installation

To ensure correct performance of this equipment, it is strongly recommended that professionals with expertise, properly trained, and likewise authorized within the industry is completing the installation.

WARNING – Turn off power switch

Turn off the main power switch before installing the equipment described in this manual. Do not connect or disconnect equipment when the main power switch is on.

WARNING – Input Power

The input voltage range is: 12-24 VDC.

WARNING – Power supply protection

Make sure that the power supply is adequately protected by a fuse or an automatic circuit breaker when installing the equipment:
LT-3110S Control Unit (max. 15.0 A)
LT-3140S Interface Unit (max. 5.0 A)

WARNING – DC circuit breaker

DC circuit breaker must be used as ON/OFF switch on the Control Unit and Interface Unit.

WARNING – Overcurrent protective

Overcurrent protective devices used as safeguard (specific to IEC 62368-1) - Lars Thrane A/S has the responsibility of use of non-IEC approved fuses in the equipment.

WARNING - Explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite hazard.

WARNING - Compass safe distance

The compass safe distance for standard and steering compasses is 0.85 m (2.8 ft) and 0.65 m (2.1 ft) respectively. Observe these distances to prevent interference to a magnetic compass.

If the safety precautions and warnings on this site are not followed, warranty will be void.

Safety Instructions for the Operator

The following safety instructions must be observed during all phases of operation, installation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment.

Lars Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Instructions for the Operator

WARNING – Do not disassemble

Do not disassemble or modify this equipment. Fire, electrical shock, or serious injury can result.

WARNING – Keep away from live circuits

Operational personnel must not remove product enclosure. Do not service the equipment with the communication cable connected. Always disconnect and discharge unit, cable and circuits before touching them.

WARNING - Permanent watch

In case of smoke or water leaks into the equipment, immediately turn off the power. Continued use of the equipment can cause fire or electrical shock. Keep access and permanent watch of the equipment in order to prevent any unwanted escalation.

WARNING – DC mains connector

The DC mains connector is to be used as the disconnection device to isolate the equipment from the mains supply.

IMPORTANT - Safety distance

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

Always keep this safety distance to the LT-3130 Antenna Unit to avoid any serious injury.

If the safety precautions and warnings on this site are not followed, warranty will be void.

IMPORTANT – FCC Compliance 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. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This product does not contain any user-serviceable parts.

Repairs should only be made by an authorized Lars Thrane A/S service center. Unauthorized repairs or modifications could result in permanent damage to the equipment and void your warranty and your authority to operate this device under Part 15 regulations.

IMPORTANT – FCC Compliance Note:

This device complies with the GMDSS provisions of part 80 of the FCC rules.

IMPORTANT – Innovation, Science and Economic Development Canada Compliance Note:

This device complies with Innovation, Science and Economic Development Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Required information for the reader

Throughout this document, essential information will be presented to the reader. The following text (emphasized) has the following meaning and/or implication:

WARNING: A 'Warning' is an Operation or Service procedure that, if not avoided, may cause a hazard situation, which could result in personnel death or serious injury.

IMPORTANT: Text marked 'Important' provides essential information to the reader, and is key information to the user in order for the equipment to work properly. Damage to the equipment can occur if instructions are not followed.

NOTE: A 'Note' provides essential information to the reader.

About this manual

Intended readers

This is a User & Installation Manual for LT-3100S GMDSS Satellite Communications System, or LT-3100S GMDSS System. 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.

Software versions

This manual is applicable to the following software:

Software Versions	
Description	**Version**
LT-3100S GMDSS System	1.01

Table 1: Software Versions

Record of Revisions

Rev.	Description	Release Date	Initials
1.00	Original document.	November 4, 2019	PT
1.01	GMDSS user functions	November 19, 2019	KK, PT
1.02	Added FCC compliance notes, Part 80 (page iv)	January 8, 2020	PT

Table of Contents

Introduction

Congratulations on your purchase of the LT-3100S GMDSS Satellite Communications system!

The LT-3100S GMDSS Satellite Communications System is a maritime satellite communication product from Lars Thrane A/S. The LT-3100S GMDSS system is designed for the professional market (deep sea, fishing, and workboats), but can be used for the leisure market as well. The LT-3100S GMDSS system meets all standards and certification requirements needed for worldwide maritime satellite communication equipment.

The LT-3100S GMDSS system has voice and data capabilities with 100% global coverage provided by the Iridium® Communications Network. The LT-3100S GMDSS system offers the following Iridium® GMDSS services:

- Distress Alert
- Safety Voice
- Maritime Safety Information (MSI)

The LT-3100S GMDSS system - basic consists of a control unit, antenna unit, handset and cradle. The additional GMDSS system units available are: LT-3140S Interface Unit, LT-3150S Alarm Panel, and LT-3160S Printer Adapter.

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 LT-3100S GMDSS system 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.

Unpacking (in-the-box)

Unpack the LT-3100S GMDSS Satellite Communications System – Basic (P/N: 90-102071) and check that the following items are present in the box:

- 51-101812 LT-3110S Control Unit
- 51-100988 LT-3120 Handset
- 51-101181 LT-3121 Cradle
- 51-100989 LT-3130 Antenna Unit
- 91-100771 Bracket Mount, Control Unit
- 91-102118 Power Cable, 3m
- 4 x Stainless steel A4 screws (for Bracket Mount, Control Unit)
- 2 x Stainless steel A4 screws (for Cradle)
- 4 x Unit Test Sheets
- 95-101817 LT-3100S GMDSS User & Installation Manual

NOTE: Antenna unit mounts (bracket and pole mount) are not included in the LT-3100S GMDSS Satellite Communications System – Basic (P/N: 90-102071) and must be ordered separately. The antenna unit must only be mounted, using the bracket or pole mounted, delivered by Lars Thrane A/S. The antenna unit mounts are listed with part numbers (P/N) in *Accessories* on page 3.

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 LT-3100S GMDSS system components if there is any sign of shipping damage to any part of a unit or the outer cover. Read the Safety Instructions at the front of this manual before installing or operating the unit.

Accessories

GMDSS parts

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

- 51-101814 LT-3140S Interface Unit
- 51-101815 LT-3150S Alarm Panel (incl. 25m cable)
- 51-101816 LT-3160S Printer Adapter (incl. 25m cable)

SSAS parts

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

- 91-102073 SSAS Alert Button (incl. 50m cable)
- 91-102074 SSAS Test Button (incl. 50m cable)

Mounts

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

- 91-100772 Flush Mount, Control Unit
- 91-100773 Bracket Mount (1.5” to 2.5” tube), Antenna Unit
- 91-100774 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:

- 91-100768 Aux Cable, 3m
- 91-101183 Coaxial cable Ø4.9mm, 10m
- 91-101184 Coaxial cable Ø4.9mm, 25m
- 91-101137 Coaxial Cable Ø10.3mm 10m
- 91-101138 Coaxial Cable Ø10.3mm 25m
- 91-101139 Coaxial Cable Ø10.3mm 50m
- 91-101140 N Conn. (male) for Coaxial Cable Ø4.9mm
- 91-101186 N Conn. (male) for Coaxial Cable Ø10.3mm
- 91-101187 Crimping Tool for Coaxial cable Ø4.9mm
- 91-101188 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 Lars Thrane A/S. A coaxial cable up to a length of 500 meters can be used for connecting the LT-3110S Control Unit and the LT-3130 Antenna Unit. Details about the coaxial cable, specification and cable lengths, are described in *LT-3130 Antenna Unit* on page 26.

System Overview

The LT-3100S GMDSS Satellite Communications System is a standalone communication product, which is using the Iridium® satellite constellation. The LT-3100S GMDSS system is working on the new Iridium® NEXT satellites. An overview of the LT-3100S GMDSS system is illustrated in Figure 1.

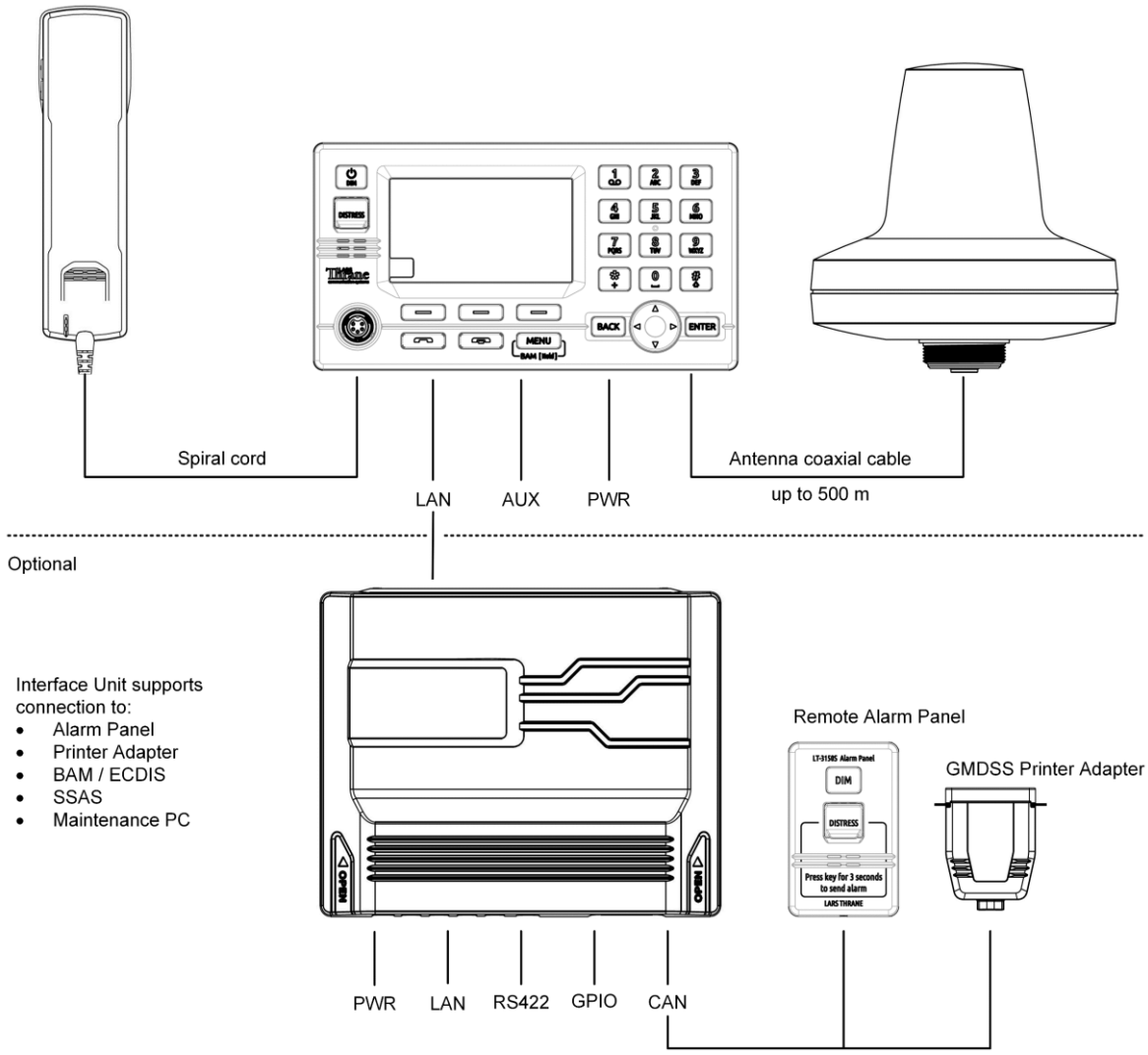


Figure 1: LT-3100S GMDSS system - components and interfaces.

The LT-3100S GMDSS system consists of the following units, provided by Lars Thrane A/S:

- LT-3110S Control Unit
- LT-3120 Handset
- LT-3121 Cradle
- LT-3130 Antenna Unit
- LT-3140S Interface Unit
- LT-3150S Alarm Panel
- LT-3160S Printer Adapter

NOTE: The LT-3100S GMDSS system will be released to customers with the initial software version 1.01. Software version 1.01 includes support for all GMDSS services. Additional none GMDSS services might be added in later software releases. Please contact Lars Thrane A/S for details about future software releases and features: support@thrane.eu

Installation and Mounting

LT-3110S Control Unit

The LT-3110S Control Unit is the master unit in the system, supporting all external interfaces and the operational user interface. The LT-3110S Control Unit is designed for indoor mounting. See the specifications in *App. B - Specifications* on page 58.

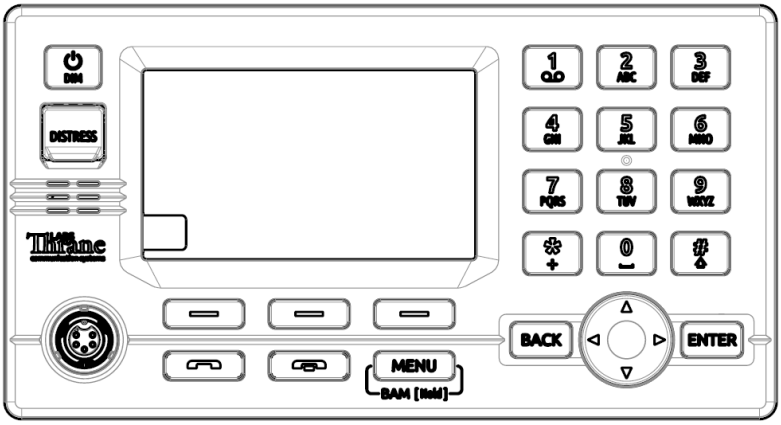


Figure 2: LT-3110S Control Unit (front view).

The LT-3110S Control Unit has the following interfaces:

- 4-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-3110S Control Unit interfaces are described in *Interfaces on page 23*. The LT-3110S Control Unit, front and backside view, are illustrated in Figure 2 and Figure 3.

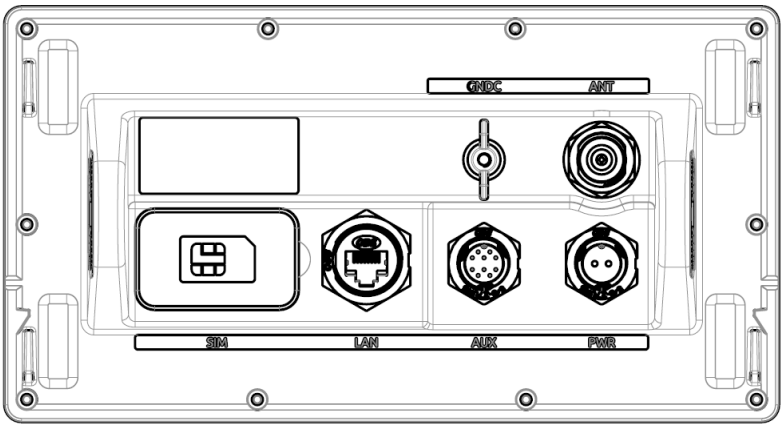


Figure 3: LT-3110S Control Unit (backside view).

The LT-3110S Control Unit user interface, display and buttons, are described in *User Interface (UI)* on page 30.

NOTE: The LT-3110S Control Unit must be mounted with either the Bracket Mount, Control Unit (P/N: 91-100771) or Flush Mount, Control Unit (P/N: 91-100772) - illustrated in Figure 4 and Figure 5. The Flush Mount, Control Unit is not included in the LT-3100S GMDSS Satellite Communications System – Basic (P/N: 90-102071) and must be ordered separately.

Mounting and installation considerations:

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

- Mount the unit indoor (not exposed to direct water)
- Mount the unit using either the bracket mount or flush mount
- 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)

The Bracket Mount and Flush Mount for the LT-3110S Control Unit are illustrated in Figure 4 and Figure 5.

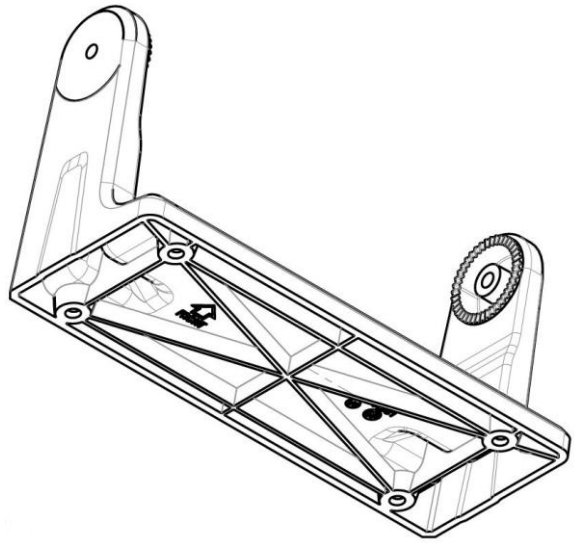


Figure 4: Bracket Mount, Control Unit.

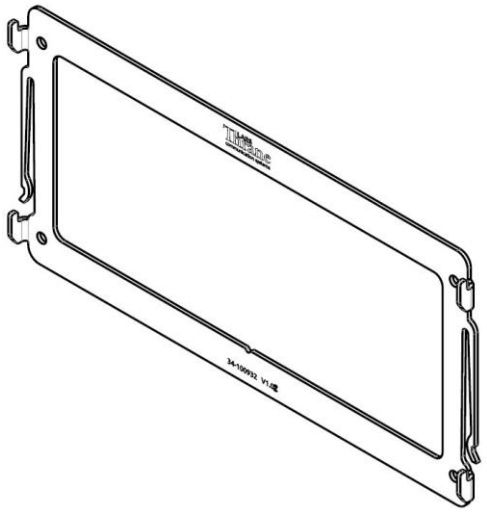


Figure 5: Flush Mount, Control Unit.

LT-3120 Handset

The LT-3120 Handset is the primary voice interface for the LT-3100S GMDSS system. The LT-3120 Handset must be connected on the front of the LT-3110S Control Unit. The connector is illustrated in Figure 2 on page 6.

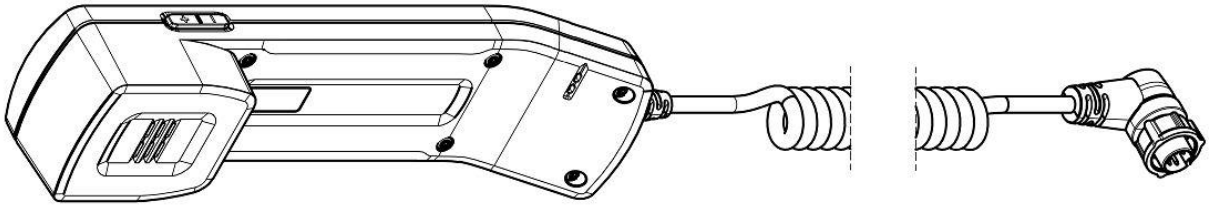


Figure 6: LT-3120 Handset (front view).

The LT-3120 Handset is connected to the LT-3110S 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 *App. B - Specifications* on page 58.

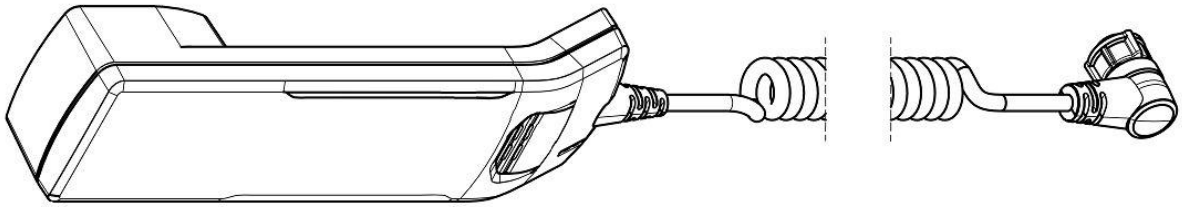


Figure 7: LT-3121 Handset (backside view).

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-3110S Control Unit will inform the user if the LT-3120 handset is not properly connected to the LT-3110S 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 *LT-3121 Cradle* on page 10.

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-3110S Control Unit, supporting the LT-3120 Handset. The LT-3121 Cradle specifications are available in *App. B - Specifications* on page 58.

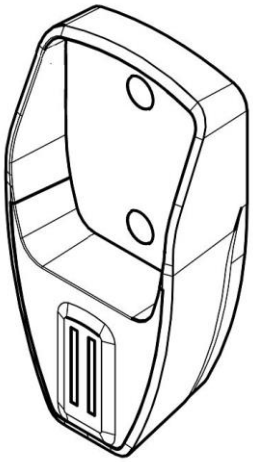


Figure 9: LT-3121 Cradle (front view).

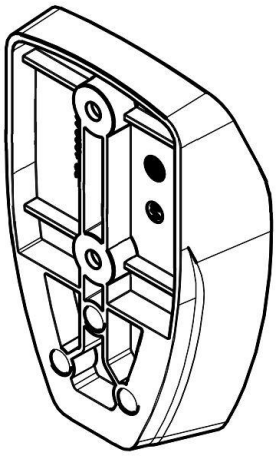


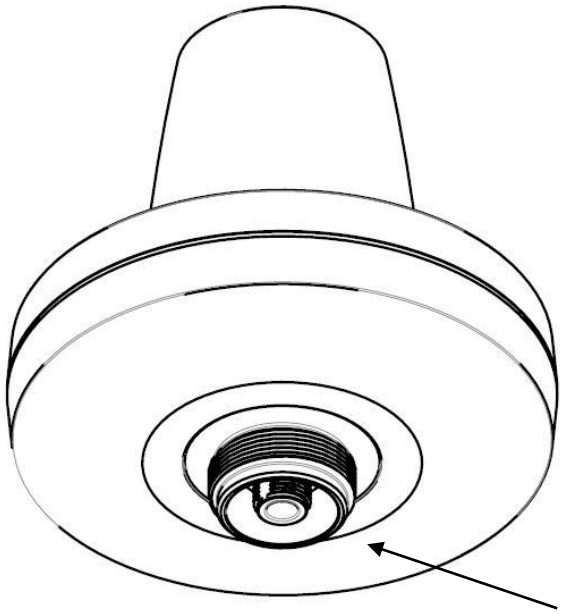
Figure 8: LT-3121 Cradle (backside view)

IMPORTANT: 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 *App. M - Outline Drawing: LT-3121 Cradle* on page 70.

LT-3130 Antenna Unit

The LT-3130 Antenna Unit is designed for outdoor mounting and connected to the LT-3110S Control Unit via a coaxial cable. The LT-3130 Antenna Unit specifications are available in *App. B - Specifications* on page 58. The LT-3130 Antenna Unit has an N connector (female) mounted, centered at the bottom of the antenna.



The LT-3130 Antenna Unit has an N connector (female) at the bottom side of the unit.

Figure 10: 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-3110S Control Unit user interface display, see Figure 35 on page 36)
- 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 Lars Thrane A/S
- Mount the unit outdoor with an ambient temperature between -40°C to +55°C (-40°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

NOTE: It is only the LT-3130 Antenna Unit marked with HVIN 2.00 (Unit Label) or newer that can be used for the LT-3100S GMDSS Satellite Communications System. The LT-3100S GMDSS software will check the HVIN number during start up and the system will not be operational, if connecting a legacy LT-3130 Antenna Unit.

In order to avoid breaking the LT-3130 Antenna Unit N-connector (female), it is important not to use tooling when connecting and fastening the coaxial cable N-connector (male) to the antenna unit. The coaxial cable N-connector thread nut must be fastened only by using handcraft.

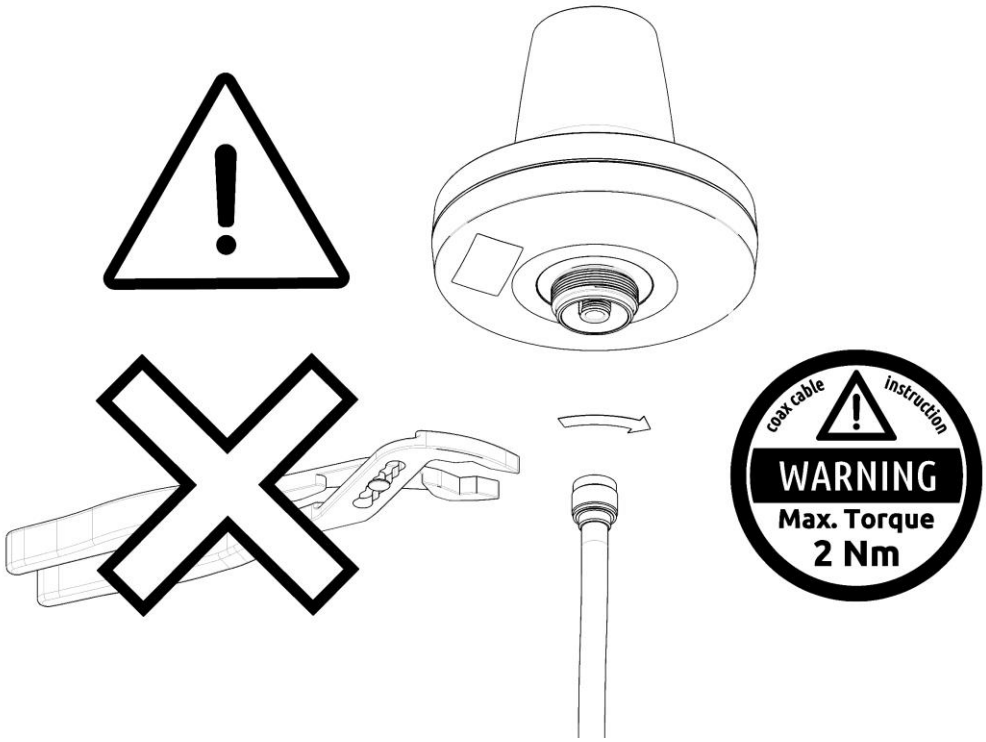


Figure 11: Connecting coaxial cable N-connector to the LT-3130 Antenna Unit.

IMPORTANT: Maximum allowed torque is 2 Nm when connecting the coaxial cable N-connector (male) to the N-connector (female) of the LT-3130 Antenna Unit. No tooling must be used for fastening the coaxial cable thread nut as illustrated on Figure 11 above.

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.

IMPORTANT: Due to the adjacency of the Iridium and Inmarsat frequency bands, the LT-3100 Satellite Communications 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 12 is illustrating how the LT-3130 Antenna Unit should be mounted to avoid interference from radars.

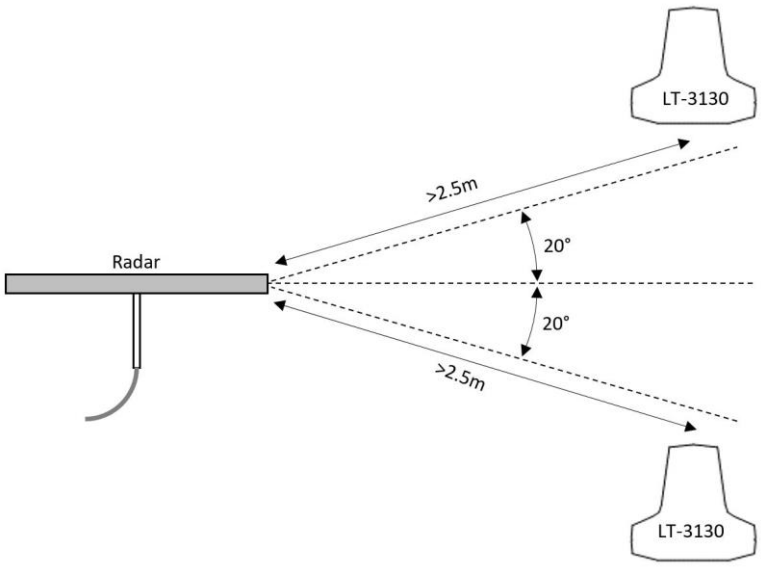


Figure 12: LT-3130 Antenna Unit – Avoid Radar Beam.

IMPORTANT: 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 LT-3100S GMDSS system is installed.

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

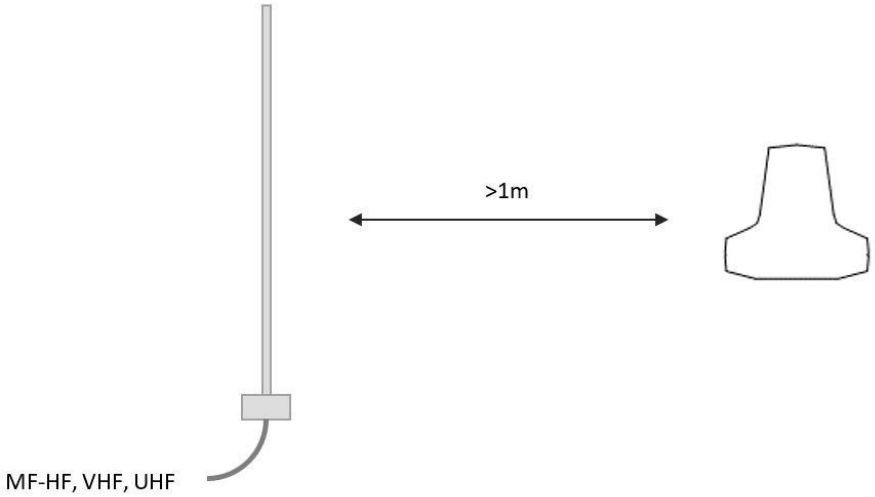


Figure 13: LT-3130 Antenna Unit – Separation to MF-HF, VHF, and UHF antennas.

NOTE: 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.

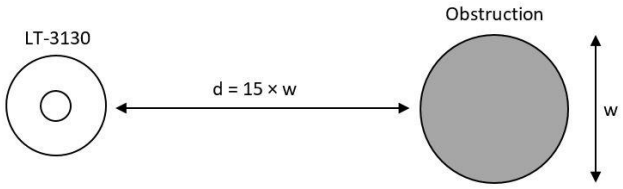


Figure 14: LT-3130 Antenna Unit – Separation distance to minor obstructions.

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

- 91-100773 Bracket Mount (1.5” to 2.5” tube), Antenna Unit
- 91-100774 Pole Mount (1.5” tube), Antenna Unit

LT-3140S Interface Unit

The LT-3140S Interface Unit is designed for indoor mounting and is connected directly to the LT-3110S Control Unit via an Ethernet cable. The LT-3140S Interface Unit specifications are available in *App. B - Specifications* on page 58.

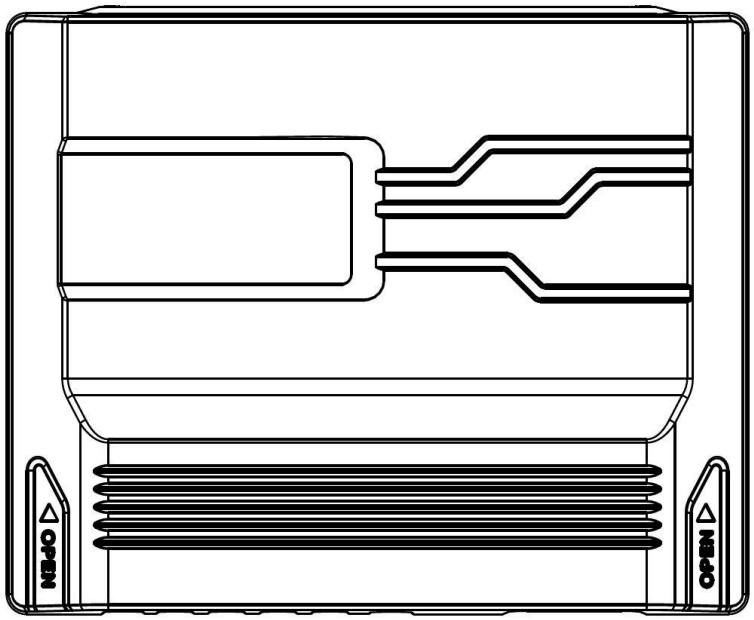


Figure 15: LT-3140S Interface Unit (without front cover).

The LT-3140S Interface Unit without front cover is illustrated in Figure 30 on page 28.

The LT-3140S Interface Unit front cover can be removed by pushing on both sides of the front cover, marked with the text ‘Open’ and press the front cover upwards (hold tight to the backplate, if the unit is not mounted).

Once, the LT-3140S Interface Unit front cover has been removed, the LT-3140S Interface Unit can be flush mounted on a surface. Use all four screw holes (every corner) of the backplate, to fasten the unit sufficiently.

The LT-3140S Interface Unit interfaces are described in *LT-3140S Interface Unit* on page 28.

LT-3150S Alarm Panel

The LT-3150S Alarm Panel is designed for indoor mounting and connected to the LT-3140S Interface Unit via a proprietary 4-wire CAN cable. The LT-3150S Alarm Panel specifications are available in *App. B - Specifications* on page 58.

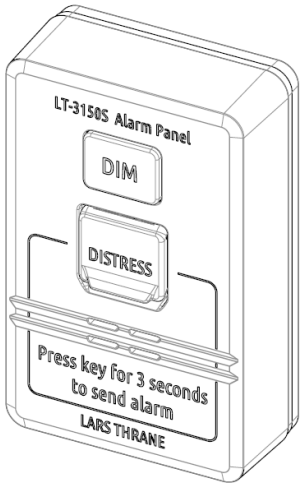


Figure 16: LT-3150S Alarm Panel

The LT-3150S Alarm Panel consist of the following human interface functions: DISTRESS button, DIM button, and speaker. The LT-3150S Alarm Panel is delivered with a 25m cable attached to the unit.

The wire designation of the LT-3150S Alarm Panel is described in Table 2. The LT-3150S Alarm Panel can only be connected to the LT-3140S Interface Unit.

Table 2: LT-3150S Alarm Panel Interconnect details.

LT-3150S AP Interconnect Details	
Wire Color	**Wire Designation**
White	VCC
Yellow	CAN+
Green	CAN-
Brown	GND

See <reference> for operation of the DISTRESS button and activation of Distress Alert.

The LT-3150S Alarm Panel must be flush mounted. A bracket mount is delivered together with the LT-3150S Alarm Panel. The LT-3150S Alarm Panel with the bracket mount is illustrated in Figure 17.

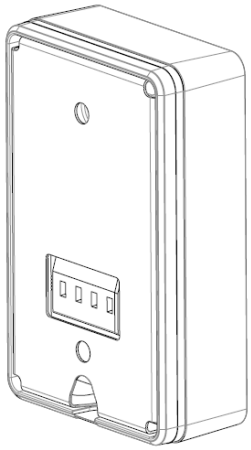


Figure 17: LT-3150S Alarm Panel (backside view).

The LT-3150S Alarm Panel can be released from the bracket mount by using a release tool as illustrated in Figure 19 and Figure 18.

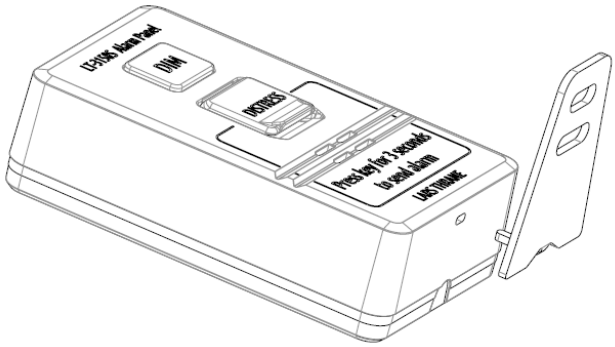


Figure 19: LT-3150S Alarm Panel release tool

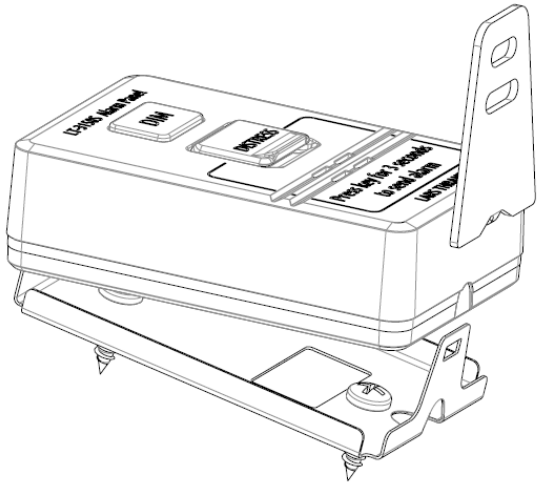


Figure 18: LT-3150S Alarm Panel release tool

LT-3160S Printer Adapter

The LT-3160S Printer Adapter is designed for indoor mounting and connected to the LT-3140S Interface Unit via a proprietary 4-wire CAN cable. The LT-3160S Printer Adapter specifications are available in *App. B - Specifications* on page 58.

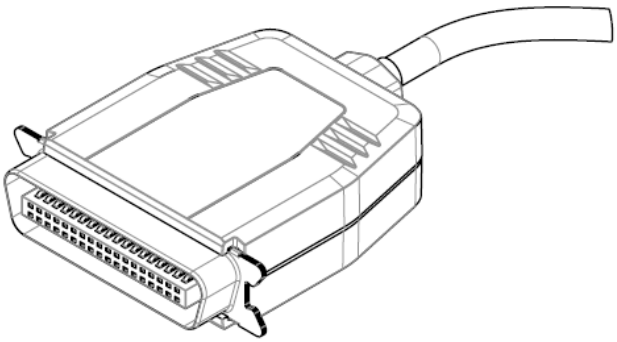


Figure 20: LT-3160S Printer Adapter

The LT-3160S Printer Adapter is interfacing to a GMDSS printer, using the Centronics interface, 36 pins (IEEE Std 1284-2000, 1284-B receptacle connector). The LT-3160S Printer Adapter is delivered with a 25m cable attached to the unit.

The wire designation of the LT-3160S Printer Adapter is described in Table 3. The LT-3160S Printer Adapter can only be connected to the LT-3140S Interface Unit.

Table 3: LT-3160S Printer Adapter Interconnect Details

LT-3160S Printer Adapter Interconnect Details	
Wire Color	**Wire Designation**
White	VCC
Yellow	CAN+
Green	CAN-
Brown	GND

The LT-3160S Printer Adapter can be connected to the following list of GMDSS printers, which is verified by Lars Thrane A/S:

Table 4: LT.3100S GMDSS System Supported GMDSS Printers

Supported GMDSS Printers	
Manufacturer	**Model No.**
Furuno	TBC
JRC	TBC
Cobham SAILOR	TBC

Bracket Mount, Antenna Unit

The Bracket Mount (1.5” to 2.5” tube), Antenna Unit installation options are illustrated in Figure 21 to Figure 24.

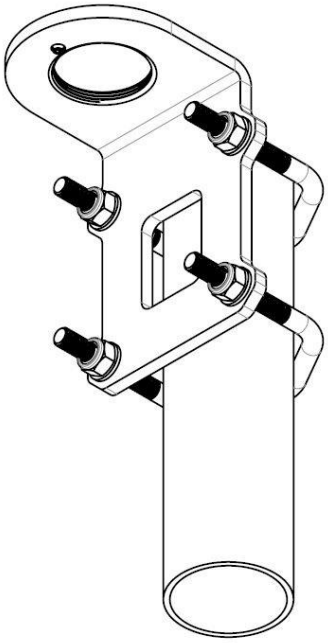


Figure 22: Bracket Mount (1.5” to 2.5” tube), Antenna Unit – vertical tube mount.

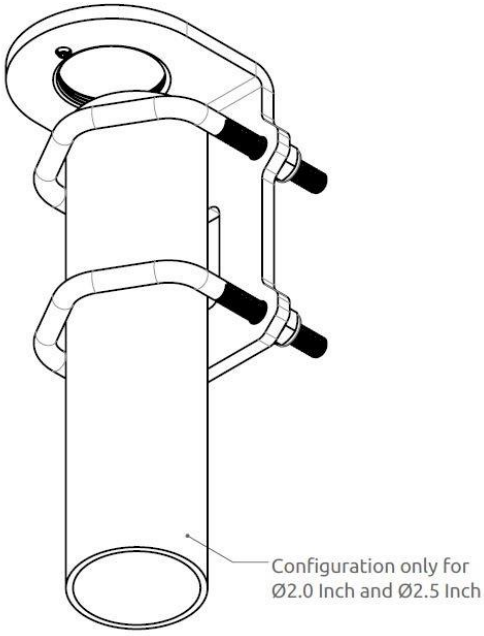


Figure 21: Bracket Mount *(1.5” to 2.5” tube)*, Antenna Unit – vertical tube mount.

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 24 on page 20 (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 24 on page 20.

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.

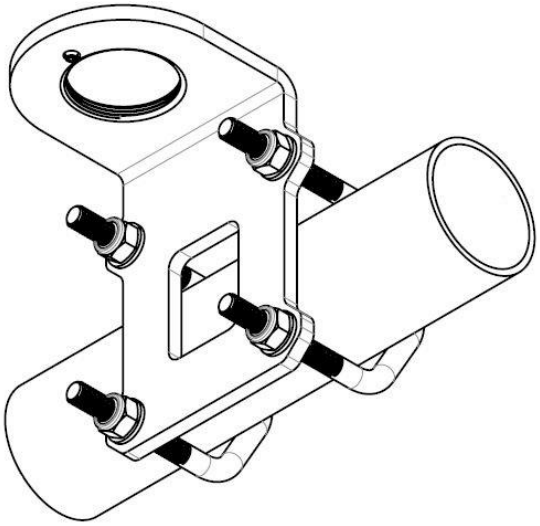


Figure 23: Bracket Mount *(1.5" to 2.5" tube)*,
Antenna Unit – horizontal tube mount.

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 17. The bracket mount, V-bolts, and nuts are all made of A4 stainless steel

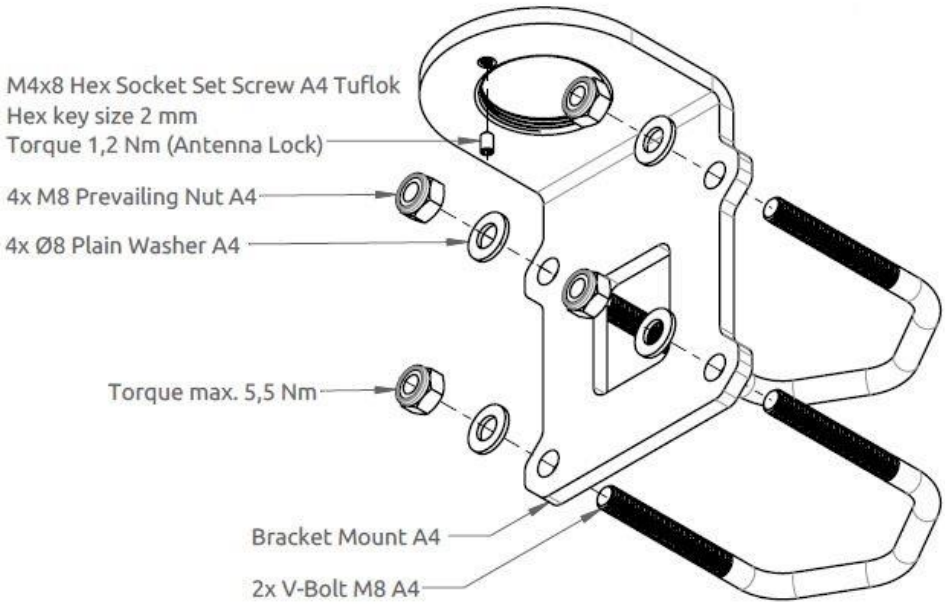


Figure 24: Bracket Mount (1.5" to 2.5" tube), Antenna Unit – horizontal tube mount.

Pole Mount, Antenna Unit

The Pole Mount (1.5” tube), Antenna Unit is illustrated in Figure 25 to Figure 27.

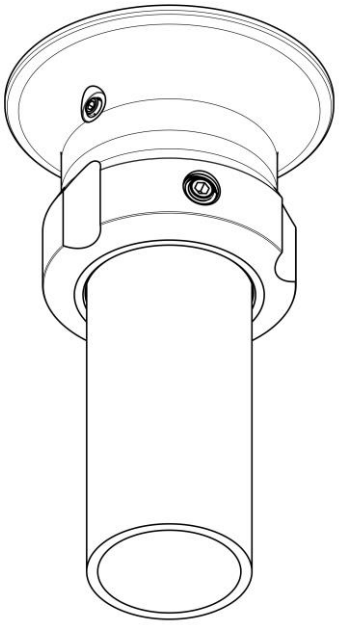


Figure 25: Pole Mount (1.5” tube), Antenna Unit.

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-volcanic 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 27 (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 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.

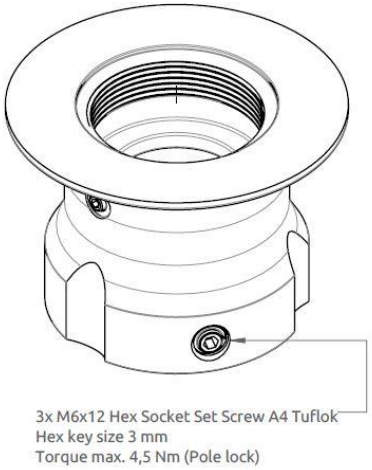


Figure 26: Pole Mount (1.5” tube), Antenna Unit.

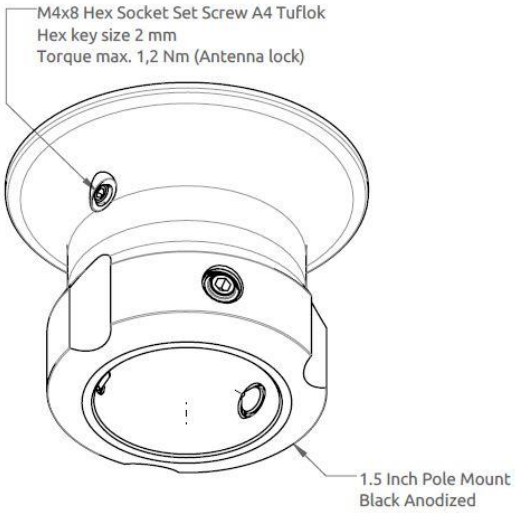


Figure 27: Pole Mount (1.5” tube), Antenna Unit.

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 26 and Figure 27. The pole mount is made of milled aluminum (anodized). The pinot screws are made of A4 stainless steel.

Interfaces

LT-3110S Control Unit

This section will describe all the external interfaces to the LT-3110S Control Unit, including the coaxial cable interface to the LT-3130 Antenna Unit.

DC input

The LT-3100S GMDSS system is designed to be used on 12 VDC and 24 VDC power buses (nominal). External DC power to the LT-3100S GMDSS system is provided by connecting the proprietary 91-102118 power cable, 3m - delivered by Lars Thrane A/S. The power connector is mounted on the back side of the LT-3110S Control Unit and marked 'PWR', see Figure 3 on page 7.

NOTE: The input voltage range is: 12 - 24 VDC. The LT-3110S Control Unit DC input connector and circuit is protected and certified for *Reverse Polarity Protection*. Use only the 91-102118 power cable, 3m delivered by Lars Thrane A/S.

Chassis ground

The chassis ground connector is placed on the back side of the LT-3110S Control Unit and marked with 'GNDC', see Figure 3 on page 7.

SIM card

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

The GMDSS SIM card must be inserted in the LT-3110S Control Unit behind the rubber dust cover. Make sure that the LT-3110S Control Unit is powered off before opening the rubber dust cover. When the GMDSS SIM card is properly inserted in the slot, and the rubber dust cover is secured, the LT-3110S Control Unit can be powered up. The rubber dust cover is illustrated in Figure 3 on page 7 and marked with 'SIM'.

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

1. Turn off the power to the LT-3110S Control Unit
2. Remove the rubber dust cover on the back side of the LT-3110S 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-3110S Control Unit

NOTE: The LT-3110S 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-3110S Control Unit.

Figure 28 is showing an Iridium GMDSS 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.

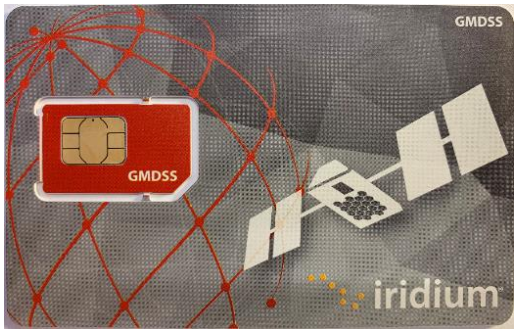


Figure 28: Iridium GMDSS SIM card

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

IMPORTANT: During activation of the GMDSS SIM Card, the Iridium GMDSS Service Provider will request vessel details (e.g. Vessel name, IMO number, Call sign, MMSI number). This essential data must be delivered correctly to the Iridium GMDSS Service Provider and will be validated upon completing the LT-3100S Installation Wizard. If any of this data is not correct, then the Iridium GMDSS Service Provider must be contacted and data must be corrected, before finalizing the GMDSS installation and activation.

The SIM card will be delivered with the SIM lock feature disabled. Thus, the LT-3100S GMDSS system will be operational as soon as the SIM card is inserted and the LT-3100S Installation Wizard has been completed. If the user decides to activate the SIM lock function from the UI display, then the PIN code is required next time the LT-3100S GMDSS system 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.

Ethernet (RJ45)

The LT-3110S Control Unit has an Ethernet LAN (RJ-45) interface, supporting service & maintenance or connection to the LT-3140S Interface Unit. The Ethernet interface can be used to access the built-in web server, which is further described in *Web server* on page 49. The LT-3110S 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-3110S 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).

Auxiliary

The auxiliary connector is a 10-pin connector (male) mounted on the backside of the LT-3110S Control Unit as illustrated in Figure 3 on page 7 and marked with 'AUX'. The auxiliary connector supports the following interfaces:

- RS-422 serial interface
- 2 x Input/output (I/O) – not used

The LT-3110S Control Unit is currently supporting NMEA 0183 GNSS Output on RS-422, which can be configured from the web server, see *Web server* on page 49.

NOTE: Use only the 91-100768 Auxiliary Cable, 3m delivered by Lars Thrane A/S for connecting to the auxiliary connector on the backside of the LT-3110S Control Unit. The Auxiliary Cable, 3m is an accessory part and must be acquired separately.

LT-3130 Antenna Unit

The LT-3110S Control Unit and the LT-3130 Antenna Unit must be connected using a coaxial cable. Both the control unit and the antenna unit has a N connector (female) mounted. This section will specify the requirements to the coaxial cable. The minimum set of requirements are specified in Table 5 and Figure 29.

Cable impedance	50 Ω
Maximum signal loss	47.7 dB/100 m @ 1.5 GHz
Maximum DC resistance	See Figure 29.

Table 5: Minimum requirements for the coaxial cable connecting the LT-3110S 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).

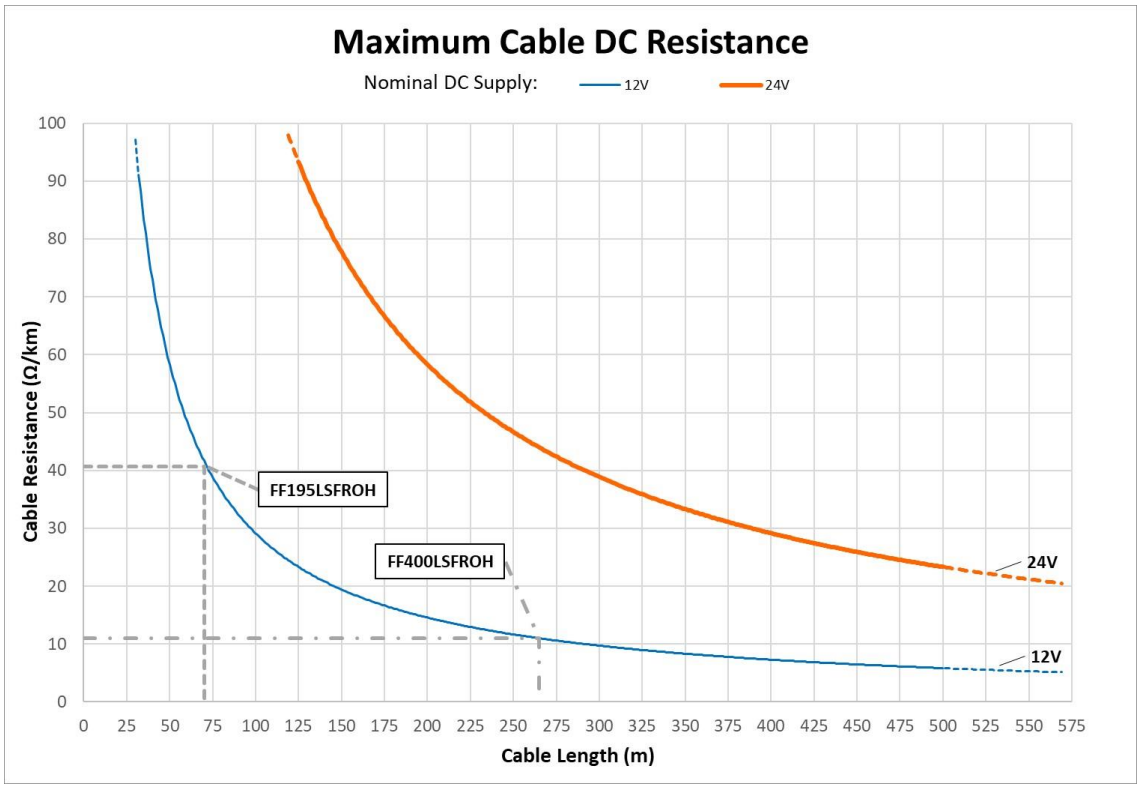


Figure 29: Coaxial Cable Total DC Resistance vs. Cable Length (12 VDC and 24 VDC).

In Figure 29 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 29 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.

Lars Thrane A/S has calculated the maximum allowed cable lengths with two coaxial cables as illustrated in Table 6. The two cables are FF195LSFROH (~RG-58) and FF400LSFROH (~RG-214).

Cable Type	12 VDC Supply Max Cable Length	24 VDC Supply Max Cable Length
FF195LSFROH (4.9mm)	70 m	285 m
FF400LSFROH (10.3mm)	265 m	500 m

Table 6: Maximum coaxial cable length to be used on 12 VDC and 24 VDC (cable examples).

The cable lengths calculated in Table 6 are obtained 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 are:

Cable Type	Inner Conductor DC Resistance [Ω/km]	Outer Conductor DC Resistance [Ω/km]	Total DC Resistance [Ω /km]
FF195LSFROH (4.9mm)	24.9	15.8	40.7
FF400LSFROH (10.3mm)	4.5	6.5	11

Table 7: Total DC resistance (cable examples).

IMPORTANT: If using a coaxial cable that is different to what is specified in this section (FF195LSFROH and FF400LSFROH), then verify that the coaxial cable maximum signal loss (listed in Table 5) is respected and calculate the maximum cable length as a function of the input voltage and the total DC resistance. Contact Lars Thrane A/S to get assistance on selection and acceptance of a specific coaxial cable.

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

LT-3140S Interface Unit

The LT-3140S Interface Unit is designed for indoor mounting and connected to the LT-3110S Control Unit via an Ethernet cable. The LT-3140S Interface Unit specifications are available in *App. B - Specifications* on page 58. Cable strain relief must be used for securing all cables connected to the LT-3140S Interface Unit.

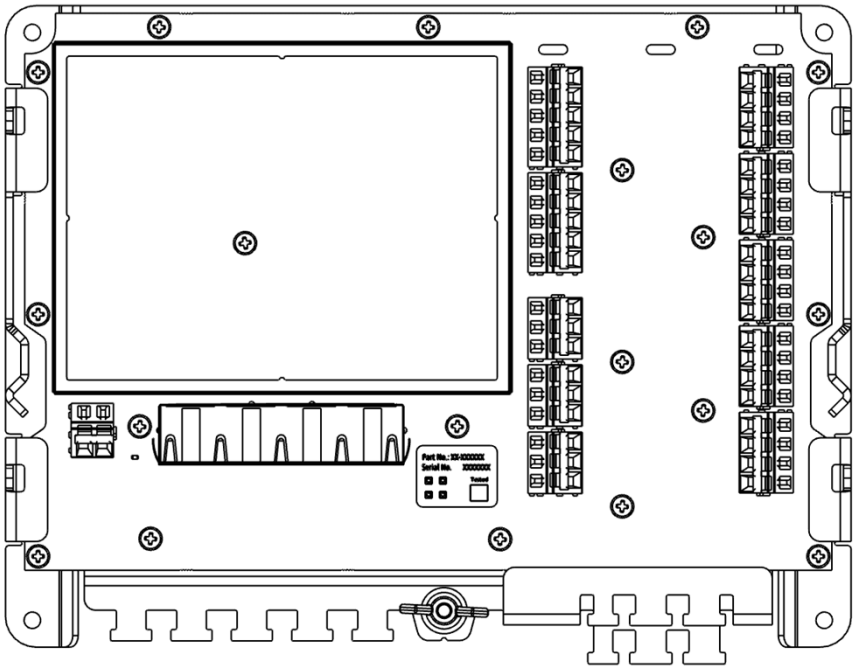


Figure 30: LT-3140S Interface Unit.

The LT-3140S Interface Unit has the following interfaces available:

- 4 x Ethernet
- 2 x RS-422
- 4 x GPIO
- 4 x CAN
- DC input
- Chassis ground

The LT-3140S Interface Unit is required, if connecting to the following external equipment:

- LT-3150S Alarm Panel -> via CAN (up to 3 devices)
- LT-3160S Printer Adapter -> via CAN
- Central Alarm Management (CAM) system -> via RS-422 (BAM)
- Electronic Chart Display and Information System (ECDIS) -> via RS-422 (NAV)
- Ship Security and Alarm System (SSAS) Alarm Button -> via GPIO (up to 3 devices)
- Ship Security and Alarm System (SSAS) Test Button -> via GPIO

NOTE: 3 x spare Ethernet interfaces are available on the LT-3140S Interface Unit to support future information protocols. It is possible to support the LT-3100S GMDSS system by connecting an external PC to one of the free Ethernet ports on the LT-3140S Interface Unit (e.g. for software updating the system or downloading a diagnostic report).

IMPORTANT: In case the LT-3100S GMDSS system is connected to an INS, it is not permitted to also be connected to a CAM system.

DC Input

The LT-3140S Interface Unit is designed to be used on 12 VDC and 24 VDC power buses (nominal). External DC power to the LT-3140S Interface Unit is provided by connecting a DC cable (plus/minus), incl. crimp tubes, to the DC input power connector. The power connector on the LT-3140S Interface Unit is marked with 'PWR'. All connectors on the LT-3140S Interface Unit is hided below a cover and illustrated in Figure 30 on page 28.

NOTE: The input voltage range is: 12 - 24 VDC. The LT-3140S Interface Unit DC input connector and circuit is protected and certified for Reverse Polarity Protection.

Chassis ground

The chassis ground connector is placed underneath the front cover of the LT-3140S Interface Unit and marked with 'GNDC', see Figure 30 on page 28.

WARNING: Only DC input power: 12 to 24 VDC must be applied on the LT-3140S Interface Unit. Crimp tubes on the DC power cable must be used.

User Interface (UI)

The LT-3100S GMDSS system is controlled from the LT-3110S Control Unit, which is the 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 31.

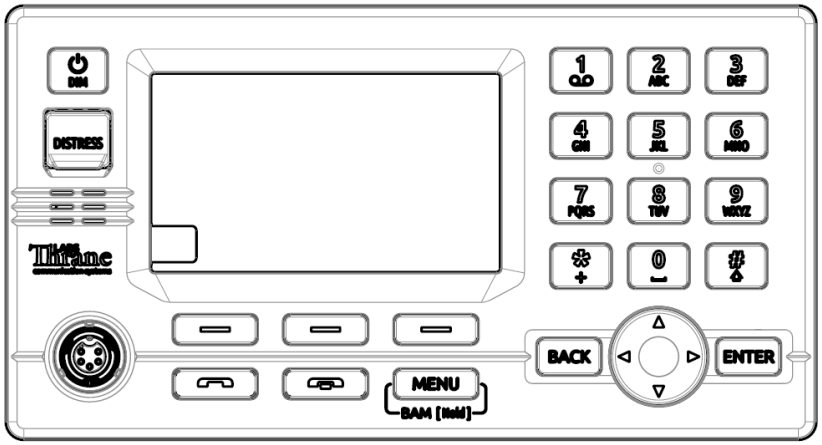


Figure 31: Control Unit (front view) – user interface display and buttons.

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

- **Power & DIM 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. To activate the DIM functionality, press the Power & DIM button shortly. Short press (1 < s); brightness level will change between 7 levels. Long press (≥ 1 s); will change the display mode. The display brightness level and display mode can be changed from the UI menu as well (Menu -> Settings -> Display).
- **DISTRESS button:** Lift the red lid and press the DISTRESS button for minimum 3 seconds to activate a Distress Alert. A Distress Alert window will be visible as soon as a Distress Alert has been activated from the DISTRESS button.
- **Off-hook button:** The button is illustrated with a green colored handset. The function of the off-hook button is to activate a call, if the dialed 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. The microphone is muted as long as the handset remains in the cradle – indicated with an icon in the status bar.
- **On-hook button:** The button is illustrated with a red colored handset. Pressing the on-hook button will terminate an active call.
- **MENU / BAM button:** The MENU button is used to open the main menu, as illustrated in Figure 34. 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). Long-press (> 1 s) the MENU / BAM button and the BAM Alert List will be showed.
- **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, indicating which characters can be cycled - if any. In text mode, the '#' key is used to change between capital and lowercase letters.

Display

The display contains three sections as illustrated in Figure 32: Status bar, view area and soft keys.

Figure 32: LT-3110S Control Unit - UI display sections

The essential system status and system notifications are shown in the status bar, which is always present.

The view area contains the active view. The active view is changed by navigating the UI using the MENU and navigation buttons. The text and function of the soft keys changes dynamically with the active view. The soft keys can also change without changing view depending on the activity in the active view.

The status bar has a dedicated section for presenting time and position and 7 slots for system status icons.

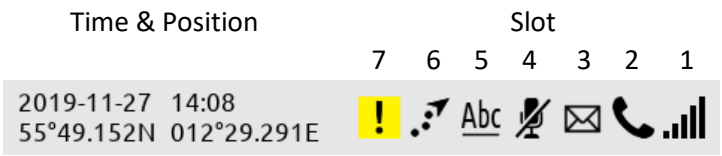


Figure 33: LT-3110S Control Unit - UI status bar

Each slot shows the status of one function or group of functions. If a group of functions in a slot has more than one active icon, the slot will continuously take turn showing one icon at a time for a few seconds before cycling to the icon of the next function.

Network Status – Slot 1	
	The LT-3100 system has no satellite signal and is not registered on the Iridium® Network.
	The LT-3100 system has satellite signal = 0 and is registered on the Iridium® Network.
	The LT-3100 system has satellite signal = 1 and registered on the Iridium® Network.
	The LT-3100 system has satellite signal = 5 and registered on the Iridium® Network.

Table 9: LT-3110S Control Unit - UI network status

Iridium Service – Slot 2	
	Active voice call or off-hook mode.
	An external (SIP) phone is in an active call.
	There is an active RUDIC data call.

Table 8: LT-3110S Control Unit - UI Iridium service

Notifications – Slot 3	
	There are one or more missed calls.
	There are one or more voicemail messages.
	There are one or more unread SMS or E-mail messages.

Table 10: LT-3110S Control Unit - UI notifications

Audio – Slot 4	
	The microphone on the handset is muted.

Table 12: LT-3110S Control Unit - UI audio

Input Mode – Slot 5	
123	The numeric keypad can be used to enter a phone number or numeric number.
Abc	The numeric keypad can be used to enter text. The first letter of a sentence will be in upper case.
abc	The numeric keypad can be used to enter text. All letters will be in lower case.
ABC	The numeric keypad can be used to enter text. All letters will be in upper case.

Table 11: LT-3110S Control Unit - UI input mode

Miscellaneous Functions – Slot 6	
	A Bluetooth device is connected.
	The Tracking service is active.

Table 13: LT-3110S Control Unit - UI miscellaneous functions

BAM Status – Slot 7	
	Active – unacknowledged warning
	Active – silenced warning
	Active – acknowledged warning
	Active – responsibility transferred warning
	Rectified – unacknowledged warning
	Active caution

Table 14: LT-3110S Control Unit - UI BAM status

Menu system

The LT-3100S GMDSS system's main menu is accessed by pressing the MENU button on the keypad. The user will be presented with a layout as illustrated in Figure 34.

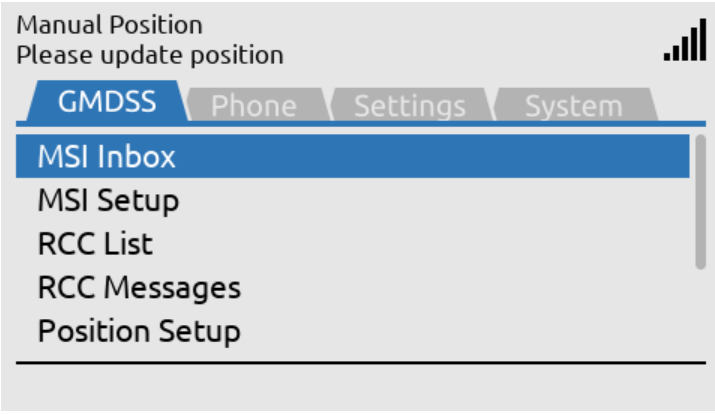


Figure 34: LT-3110S Control Unit - UI display (main menu).

The main menu is represented by four sub-menus: GMDSS, Phone, Settings, and System. The four sub-menus are listed in Table 15 on page 35.

Sub-menus	Entries
GMDSS	MSI Inbox MSI Setup RCC List RCC Messages Position Setup Distress Alert Setup SES Information System Test
Phone	Contacts Messages Call History Data History Phone Usage
Settings	Audio Display Date & Time
System	Phone Setup Network Bluetooth (not for SOLAS) Tracking Security SIP Status GNSS Status Alert List System Information Power Supply Reset Options

Table 15: LT-3110S Control Unit, sub-menu layout.

System status

The LT-3100S GMDSS system installation and mounting is described in the previous sections. After the LT-3100S GMDSS system has been installed and properly connected, the system will automatically start-up and register on the Iridium® Network.

NOTE: It is assumed that the LT-3100S GMDSS System has been commissioned correctly with an Iridium GMDSS Service Provider and that the LT-3100S Installation Wizard has been completed successfully.

The LT-3100S GMDSS system will inform the user, if the system is not properly installed, or the system cannot register onto the Iridium® Network. Figure 35 is illustrating a LT-3100S GMDSS system, which is registered on the Iridium® Network and ready to use. The LT-3100S GMDSS system will provide user information in the status bar and status text (e.g. "Registered" showed below the Iridium® connected logo).

Figure 35: LT-3110S 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 LT-3100S GMDSS system 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 16 gives an overview of the possible combinations, of the signal strength icon, and the status text that the LT-3100S GMDSS system 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 16: LT-3110S 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 17 is listing the system text and describing the status of the LT-3100S GMDSS system.

System Text	Description	System Status
Initializing, please wait…	The LT-3100S GMDSS system is starting up. Please wait until the system text is updated.	Not ready
Searching for Iridium…	The LT-3100S GMDSS system 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 LT-3100S GMDSS system is registering onto the Iridium® Network.	Not ready
Registered	The LT-3100S GMDSS system is registered on the Iridium® Network.	Ready to use
Antenna not connected	The LT-3110S Control Unit and LT-3130 Antenna Unit is not connected via the coaxial cable. Verify coaxial cable connections, specifications, and details in *LT-3130 Antenna* on page 26.	Not ready
Handset not connected	The LT-3120 Handset is not connected to the LT-3110S Control Unit. Phone calls cannot be performed from the LT-3120 Handset.	(Not ready)
SIM card missing	The LT-3110S 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 *SIM card* on page 23.	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-3110S Control Unit, verify correct SIM card re-insert, and re-power the system again.	Not ready

Table 17: LT-3110S Control Unit – System Text

Using the system

Distress Alert

Initiating a Distress Alert

The Distress Alert function can be activated using the DISTRESS button on the LT-3110S Control Unit or from the DISTRESS button on the LT-3150S Alarm Panel. The procedure for activating the Distress Alert function is the same for both buttons:

1. Lift the red lid marked DISTRESS
2. Press and hold the red DISTRESS button for minimum 3 seconds
   (a distress tone will be played immediately when pushing the DISTRESS button)
3. The Distress Alert function will be activated in the LT-3100S GMDSS system after 3 seconds – indicated by distress tone stopping
4. Hereafter you can release the red DISTRESS button
   (the light in the red button is now on maximum intensity)

IMPORTANT: After activating a Distress Alert from an external LT-3150S Alarm Panel it is recommended to check the status of the Distress Alert by verifying the display information of the LT-3110S Control Unit, where more information will be available.

The Distress Alert function will preempt any other ongoing service (voice or data) of priority lower than distress.

Placing a voice call of distress priority

After the Distress Alert message has been acknowledged by the Iridium network, the system will automatically place a voice call of priority distress to the configured preferred RCC if the “auto-dial” setting is enabled.

A voice call of priority distress can be placed to the preferred RCC any time after the Distress Alert message has been acknowledged by the Iridium network. If the “auto-dial” setting is enabled, a voice call of priority distress is automatically placed after acknowledgement has been received. To manually place a voice call, press the Call RCC soft key, press the off-hook key or off-hook the handset.

Selecting Nature of Distress

The Nature of Distress can be assigned at any time before (MENU -> GMDSS -> Distress Alert Setup -> Nature of Distress) or after (soft key Select Nature / Update Nature) activation of Distress Alert.

Canceling a Distress Alert

To cancel a Distress Alert, press the Cancel Distress soft key. The system will then notify the preferred RCC the Distress Alert has been canceled.

Maritime Safety Information (MSI)

Receiving MSI

The system automatically receives MSI messages and, depending on the priority of the message, will notify the user with an audible signal.

To read received MSI messages go to MENU -> GMDSS -> MSI Inbox, select an MSI message and press ENTER to see its message body.

Configuring MSI

Go to MENU -> GMDSS -> MSI Setup to configure additional areas or subject indicators for which MSI should be received.

Priority voice call

Placing a priority voice call to an RCC is done from MENU -> GMDSS -> RCC List:

1. Select the RCC to which you wish to place a priority call
2. Press the soft key Priority Call, press the green off-hook button, or off-hook the handset to open the priority dialog
3. Select a priority
4. Place the call with the chosen priority by pressing the soft key Call RCC, press the green off-hook button or off-hook the handset

During a priority voice call, the priority of the call is presented in the call window.

When receiving priority voice calls from an RCC, the priority of the incoming call is shown in the call window together with the name of the RCC.

Priority messaging

Sending a priority message to an RCC is done from MENU -> GMDSS -> RCC Messages:

1. Press the New soft key to open the New RCC Message window
2. Press the Select RCC soft key to open the RCC List window
3. Select an RCC and press ENTER or the Select soft key
4. In the priority dialog, select the priority of the message and press ENTER or the Select soft key
5. Enter the text of the message boxy
6. Press the Send soft key to send the message

The system automatically receives priority messages from an RCC and, depending on the priority of the message, will notify the user with an audible signal.

To read received priority messages go to MENU -> GMDSS -> RCC Messages, select a message and press ENTER to see its message body.

Non-priority voice call

The LT-3100S GMDSS system must be properly installed, connected, and configured before trying to establish a phone call. The LT-3100S GMDSS system 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-3100S GMDSS system is ready for making a voice call. Check that the system status (system text and icons), as described in *System* on page 36, shows the correct system information.

Dialing 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)

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.

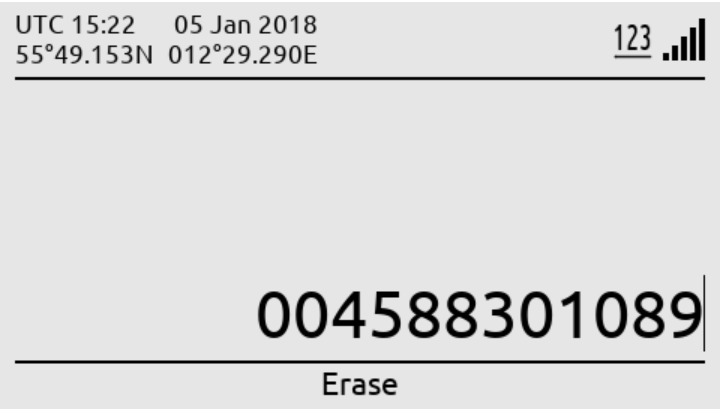


Figure 36: LT-3110S Control Unit – voice call (on-hook mode).

On-hook mode (step-by-step):

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 LT-3100S GMDSS system will now establish a connection to the dialed number

Off-hook mode:

In off-hook mode, the user starts to place the LT-3100S GMDSS system 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 dialed, using the numeric keypad. It is not possible to regret, if one or more wrong digits are typed in, for the dialed number. In this case, the user must on-hook the phone, and dial the correct number again.

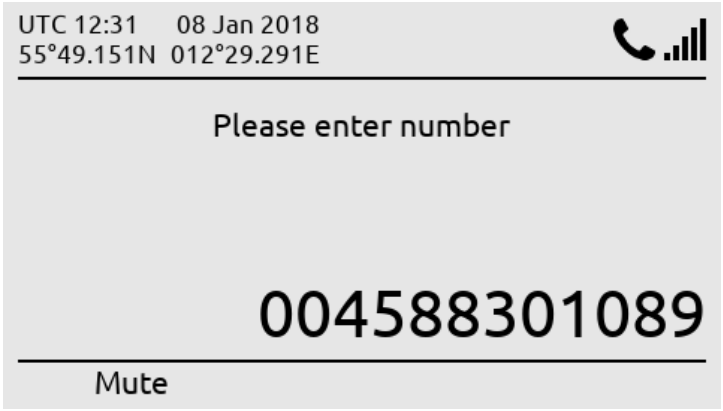


Figure 37: LT-3110S Control Unit – voice call (off-hook mode).

Off-hook mode (step-by-step):

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 LT-3100S GMDSS system will now establish a connection to the called number

NOTE: The LT-3100S GMDSS system 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 38 and Figure 39.

Figure 38: LT-3110S Control Unit – voice call connecting…

Figure 39: LT-3110S Control Unit – voice call successfully connected.

Non-priority messaging

Non-priority messages are sent from MENU -> Phone -> Messages.

The system automatically receives non-priority messages.

NOTE: Non-priority messages cannot be sent to an RCC.

Position of vessel

The system is configured to default use the built-in GNSS receiver (automatic mode) for determining the current position of the vessel. The system has two primary uses for the current position:

- It is automatically included in Distress Alert messages sent to the preferred RCC upon activation of Distress Alert
- It is required for receiving MSI messages relevant for the vessel

In case the built-in GNSS receiver malfunctions or if the user for some other reason (e.g. GNSS spoofing) is required to manually enter the current position of the vessel, this can be done from MENU -> GMDSS -> Position Setup:

1. Select Source of Position and press ENTER
2. Select Manual Input and press ENTER
3. Fill in the Latitude and Longitude fields
4. Fill in the Time of Position field with the time in UTC at which the vessel was at the position entered in the Latitude and Longitude fields.
   NOTE: This may **not** be the current time.
5. The Course over Ground (COG) and Sped over Ground (SOG) are optional and can be set to zero if unknown.
6. When all fields have been assigned a value, press Apply soft key to apply the manual position

NOTE: The manual position should be updated minimum every 4 hours.

Bridge Alert Management

Bridge Alert Management (BAM) is the IMO defined overall concept for the harmonized management, distribution, handling and presentation of alerts on the bridge, to enable the bridge team to devote full attention to the safe operation of the ship and to immediately identify any alert situation requiring action to maintain the safe operation of the ship. The LT-3110S GMDSS system implements the BAM concept in compliance with the relevant standards (see <reference>).

BAM status

The LT-3100S GMDSS system continuously monitor for fault conditions (e.g. no satellite signal) and other events (e.g. received distress communication) that requires the attention of the bridge team and raises relevant alerts. The user can, at any time, check for the presence of alerts without performing any action: if there are one or more active alerts, a BAM icon representing the alert with the highest priority is shown in the status bar (see Figure 40). The exact icon shown depends on the priority and state of the alert with the

Figure 40: LT-3110S Control Unit - UI BAM status

highest priority (see Table 18 on page 46). It is not possible to hide or suppress the BAM icon in the status bar.

Alert list

Once the user has become aware an alert has been raised, the user can navigate to the alert list (MENU -> System -> Alert List) to find further information about the alert conditions.

NOTE: For quick access to the alert list, long press (≥ 1 s) the MENU button at any time.

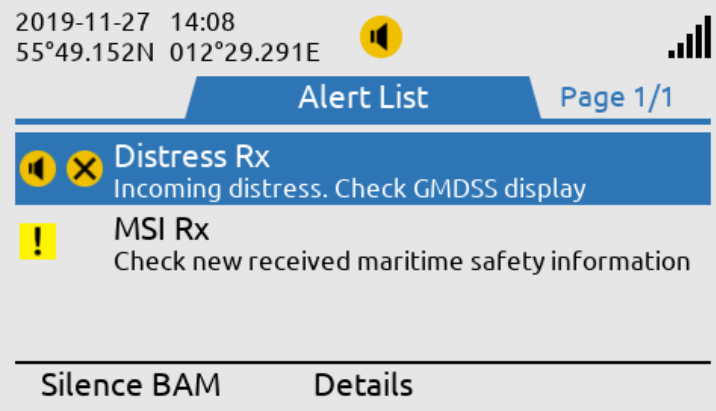


Figure 41: LT-3110S Control Unit - UI alert list

See <reference> for the full list of alerts that can be raised by the LT-3100S GMDSS system.

Alert priority and state

The *priority* of an alert indicates its severity. The BAM concept defines 4 priorities: Emergency Alarm, Alarm, Warning and Caution. The LT-3100S GMSDS system can raise alerts of the following priorities:

- **Warning**: Condition requiring immediate attention, but no immediate action by the bridge team. Warnings are presented for precautionary reasons to make the bridge team aware of changed conditions which are not immediately hazardous but may become so if no action is taken.
- **Caution**: Lowest priority of an alert. Awareness of a condition which does not warrant an alarm or warning condition, but still requires attention out of the ordinary consideration of the situation or of given information.

The shape and color of the BAM icon indicates the priority of the alert and the symbol inside indicates its state as shown in Table 18 below.

Priority	Icon	State	Condition	Audible signal
Warning		Active – unacknowledged	Alert condition present. Alert not acknowledged.	Yes
		Active – silenced	Alert condition present. Alert not acknowledged, but audible signal has been silenced by the operator.	No
		Active – acknowledged	Alert condition present. Alert acknowledged by the operator.	No
		Active – responsibility transferred	Alert condition present. A function of the BAM compliant equipment with additional system knowledge has taken over.	No
		Rectified – unacknowledged	Alert condition rectified. Alert still unacknowledged.	No
	None	Normal	No alert condition present.	No
Caution		Active	Alert condition present.	No
	None	Normal	No alert condition present.	No

Table 18: BAM alert icons, priority and state

Temporary silence

Active unacknowledged alerts cause a short but periodically repeated audible signal. To temporarily silence all alerts (and thus the audible signal), press the “Silence BAM” soft key. The temporary silence period expires after 30 s, after which active silenced alerts become active unacknowledged alerts again, causing the audible signal to resume.

Alert acknowledgement

Alerts of priority warning must be acknowledged by the user. When an alert is both acknowledged and rectified it disappears from the alert list. Cautions cannot be acknowledged and thus disappear as soon as they are rectified.

Icon	Description
	Acknowledge not allowed

Table 19: BAM acknowledge not allowed

When an alert cannot be acknowledged by the user, it is indicated with the "acknowledge not allowed" icon (see Table 19). This applies to alerts that require additional information than the default alert text and alert description that comes with all alerts. This is e.g. the case for the "Distress Rx" alert (see <reference>), where the user must read the received Distress Alert Relay message(s) to implicit both acknowledge and rectify the alert.

NOTE: The LT-3100S GMDSS system currently does not define any alerts that can be explicit acknowledged by the user.

Aggregation

The BAM concept defines aggregation as a means for an alert source to combine multiple individual alerts of the same kind into a single aggregated header alert in order to help reduce the risk that the number of individual alerts obscures the display of equally important additional alerts, for example due to the active alert list length exceeding the maximum display capability of the alert source UI.

NOTE: The LT-3100S GMDSS system currently does not define any alerts that can be aggregated.

Responsibility transfer

The BAM concept defines the Central Alert Management (CAM) system as equipment used for centralizing management, handling and presentation of alerts on the bridge. A CAM system may be standalone or combined with other equipment, for example in the case of an Integrated Navigation System (INS).

A CAM system connects to multiple alert sources (such as the LT-3100S GMDSS system) in order to manage and present their alerts on the CAM UI. An alert will thus be presented in the alert list of both the alert source and the CAM system.

In order to avoid the bridge team having to acknowledge alerts at the individual alert source, the CAM system may perform a *responsibility transfer* of an alert from the alert source to the CAM system. When an alert has had its responsibility transferred to the CAM system, it can be acknowledged at the CAM system and its corresponding audible signal will only be heard at the CAM system.

NOTE: Alerts of priority caution cannot be acknowledged and therefore cannot have their responsibility transferred.

The alert text and alert description of an alert is presented on the CAM system. For some alerts, additional information must be presented in order to allow user acknowledgement of the alert. Responsibility transfer is not allowed for such alerts as they can only be acknowledged at the alert source, where the additional information is present.

NOTE: The LT-3100S GMDSS system currently does not define any alerts that allow responsibility transfer.

Revaluation

To reduce the number of high-priority audible alerts for one situation that requires attention, if the CAM system has additional knowledge regarding an alert situation, which caused the LT-3100S GMDSS system to raise an alert, the CAM system may apply responsibility transfer and apply revaluation by raising a new alert with, if practicable, a lower priority.

NOTE: The LT-3100S GMDSS system currently does not define any alerts that allow responsibility transfer and revaluation.

Time synchronization

The LT-3100S GMDSS system can supply the UTC time of alert state changes to the CAM system due to the built-in GNSS receiver.

NOTE: If the alert state change occurs before the built-in GNSS receiver has obtained the UTC time or in case of GNSS receiver malfunctioning, the LT-3100S GMDSS system will not supply the UTC time.

Printing

If the LT-3160S Printer Adapter has been installed, the LT-3100S GMDSS system can be configured to automatically print MSI and/or priority messages on the printer.

The LT-3100S GMDSS system can print the International Reference Alphabet (IRA) character set (also known as IA5 or T.50).

Web server

The LT-3110S 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-3110S Control Unit, or by connecting the LT-3110S Control Unit to a Local Area Network (LAN), to where the PC is connected.

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

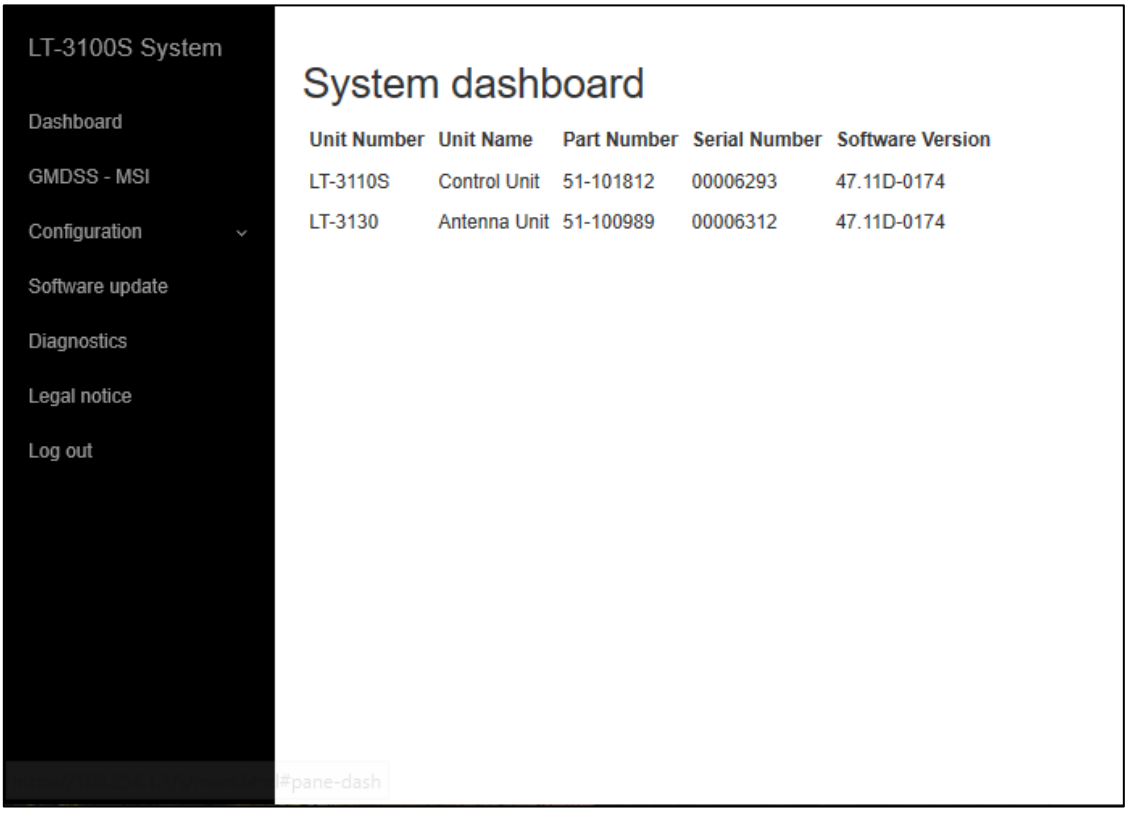


Figure 42: LT-3110S Control Unit - built-in web server (dashboard).

The web server has the following web pages available:

- Dashboard
- GMDSS – MSI
- Configuration
- Software update
- Diagnostic report
- Legal notice
- Log out

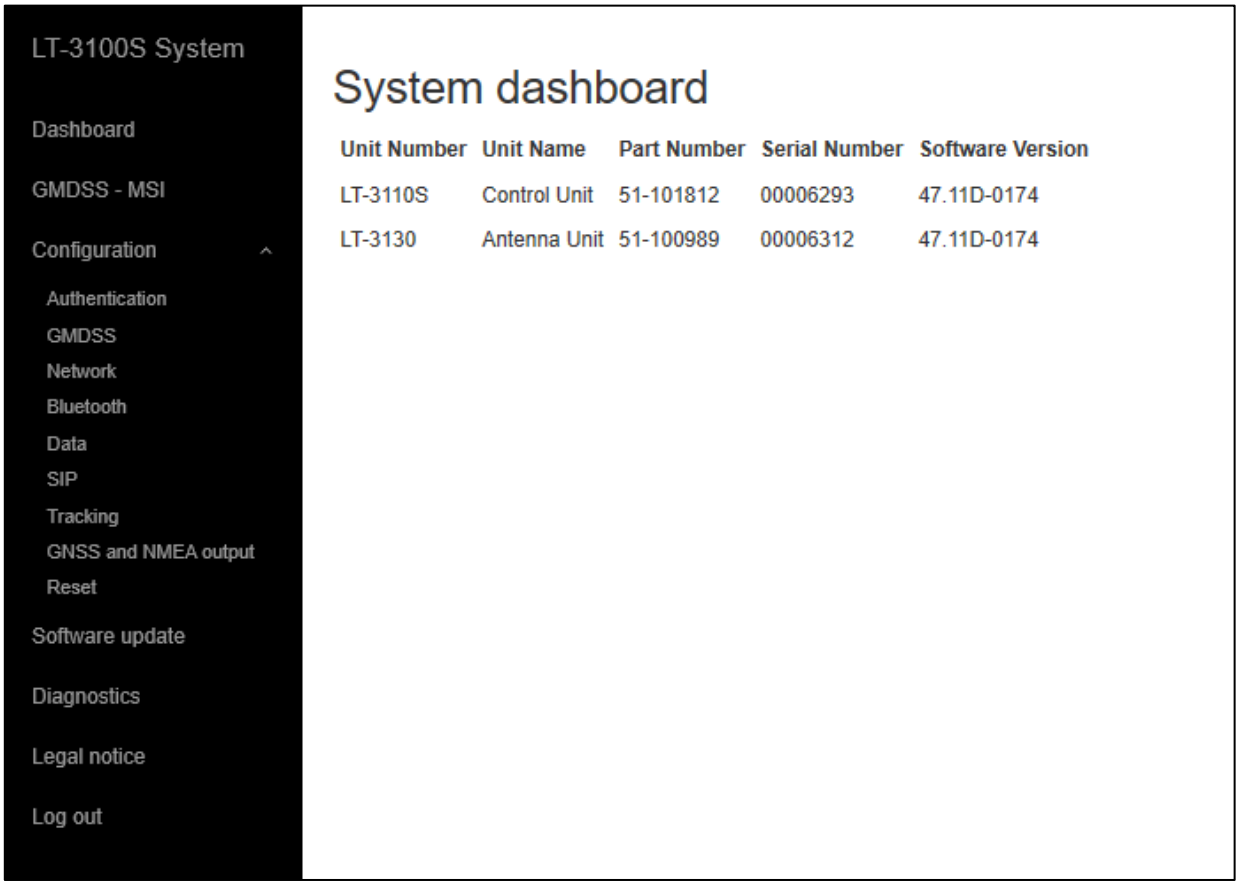


Figure 43: LT-3110S Control Unit – built-in web server (Configuration).

Under Configuration, the following web pages are available:

- Authentication
- GMDSS
- Network
- Bluetooth (only available if none SOLAS vessel)
- Data
- SIP
- Tracking
- GNSS and NMEA output
- Reset

The functionality of the Dashboard, Software update, and Diagnostic report web pages are described in further details in this version of the User & Installation Manual.

NOTE: All web site functionality will be described in detail for the LT-3100S GMDSS system prior to customer release of this system.

Dashboard

The dashboard is showing details about the main units, which forms the Satcom system: the LT-3110S Control Unit, the LT-3130 Antenna Unit, the LT-3140S Interface Unit, the LT-3150S Alarm Panel, and the LT-3160S Printer Adapter. 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 42. 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.

Software update

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

Navigate to the web server of the LT-3100S GMDSS system, by following the instructions in *Accessing the built-in web server on page* 52. Select the 'Software update' web page and click the 'Browse…' button to select the LT-3100S GMDSS system file, which must be uploaded to the system. The LT-3100S GMDSS software image has the following filename (example): LT-3100S-v1.01R-0005.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 web page, while the software update is on-going. The LT-3100S GMDSS system will reboot, once the software image is installed safely in all units.

NOTE: The LT-3110S 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.

IMPORTANT: 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.

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-3100S_00000061_191115-152149.tar.gz will be downloaded to a location selected by the user. The diagnostic report can be sent back to Lars Thrane A/S in case of required support and assistance. The diagnostic report contains technical data, from the LT-3100S GMDSS system, and will help identify and resolve problems at the installation site. This is to avoid sending back the LT-3100S GMDSS system for unnecessary debug and repair, at the Lars Thrane A/S facility.

Accessing the built-in web server

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

1. Connect the LT-3110S Control Unit directly to a PC using an Ethernet cable, or connect the LT-3110S Control Unit to a Local Area Network (LAN), where a PC is connected.
2. Identify the IP address that is assigned to the LT-3110S 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 (in default configuration).
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-3110S 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 44. 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 LT-3100S GMDSS System dashboard 'Go on to the webpage (Not recommended)'.
6. You will now see the LT-3100S GMDSS system dashboard.

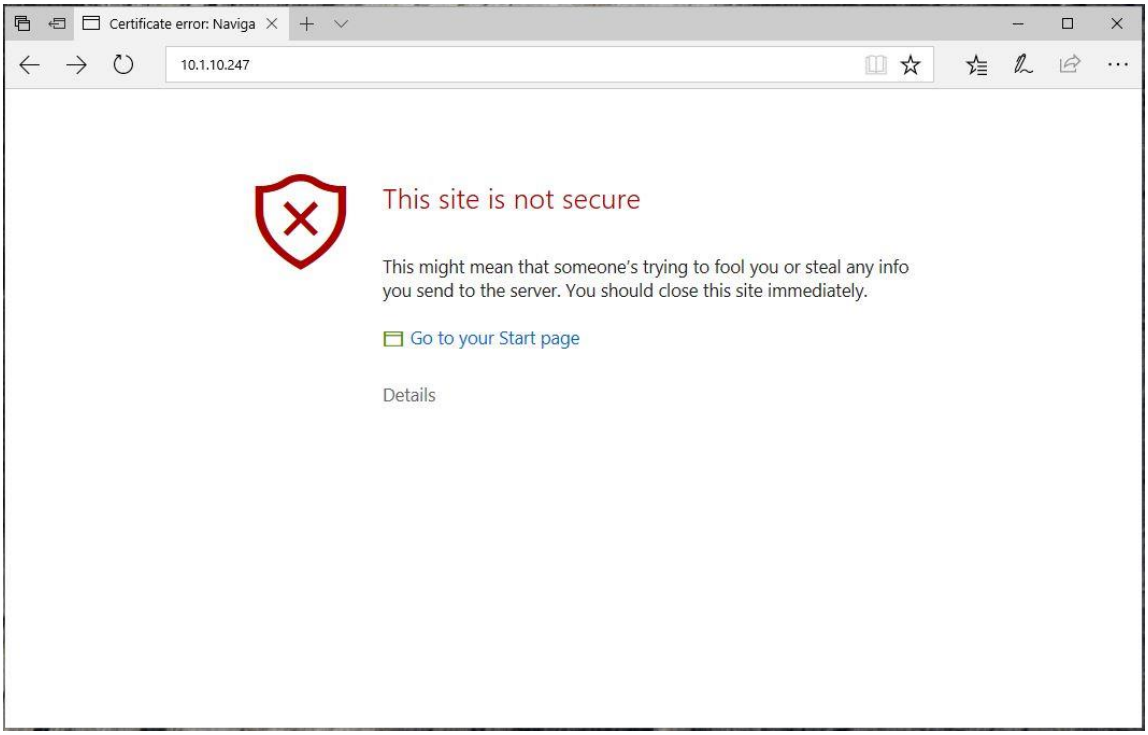


Figure 44: Accessing built-in web server ("This site is not secure").

Service & Repair

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

NOTE: The LT-3100S GMDSS system 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 LT-3100S GMDSS system for some reason does not work as described in this manual, make contact with 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 *Diagnostic report* on page 51.
3) Send all information to the local distributor or dealer.

IMPORTANT: 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 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.

Appendixes

App. A - Bridge Alert Management (BAM)

Alert generating functions

The LT-3100S GMDSS system contains the following functions capable of raising alerts.

Name	Can be deactivated	Description
GMDSS	No	Responsible for all GMDSS services (Distress Alert, Distress Alert Relay, MSI, priority voice, priority messaging). It is not possible to deactivate this function.
Positioning	Yes	Responsible for monitoring automatic (GNSS) and manual position. The system can only be in one of the two modes at any given time. Alerts of the disabled mode will be cleared.
Printing	Yes	Responsible for printing GMDSS messages. If user disables printing, any raised printing related alerts will be cleared.
SIM	No	Responsible for managing the Subscriber Identity Module (SIM) card. It is not possible to deactivate this function.

Table 20: Alert generating functions

Alert categories

The BAM concept groups alerts into categories as a mean to indicate where an alert may be acknowledged (and thus also whether it can have its responsibility transferred):

Category	Description
A	Alert for which additional information at the alert source is necessary, as decision support for the evaluation of the alert related condition. Alert can only be acknowledged at the alert source.
B	Alert where no additional information for decision support is necessary besides the information which can be presented at the CAM UI. Alert may be acknowledged at the alert source and/or the CAM system.
C	Alert that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alert.

Table 21: BAM alert categories

List of alerts

ID:	3013	**Priority:** Caution	**Category:** B
Title:	Doubtful pos		
Description:	GMDSS update manual position		
What to do:	Update the manual position as described in *Position of vessel* on page 44.		
Conditions:	Raised in manual position mode if manually set position is older than 4 hours. Rectified upon update of manual position. Cleared to normal if position mode is set to automatic.		

ID:	3016	**Priority:** Caution	**Category:** B
Title:	Lost position		
Description:	Check GMDSS terminal for lost position		
What to do:	Change to manual position mode as described in *Position of vessel* on page 44.		
Conditions:	Raised in automatic (GNSS) position mode if position is lost and stay lost for a minimum of 10 minutes. Rectified if GNSS receiver obtains a valid position. Cleared to normal if position mode is set to manual.		

ID:	3079	**Priority:** Caution	**Category:** B
Title:	Paper low		
Description:	Check GMDSS printer paper		
What to do:	Replace / refill printer paper.		
Conditions:	Raised when printer is out of paper. Rectified when printer has been filled with new paper. Cleared to normal if printing to printer is disabled as described in *Printing* on page 48.		

ID:	3116	**Priority:** Caution	**Category:** B
Title:	Lost connection		
Description:	Check GMDSS satellite terminal		
What to do:	Verify the LT-3130 Antenna Unit has free line of sight to the sky. Remove any object blocking the line of sight if possible.		
Conditions:	Raised when the terminal has been unable to detect or otherwise contact the satellites of the Iridium® satellite system for a period of one minute or more. Rectified when the terminal detects the Iridium® satellite system.		

ID:	3122	**Priority:** Warning	**Category:** A	**Resp. transfer:**	No
Title:	Distress Rx		**Normal w/o acknowledge:**		Yes
Description:	Incoming distress. Check GMDSS display				
What to do:	Read the received Distress Alert Relay (see *Maritime Safety Information (MSI)* on page 39).				
Conditions:	Raised when a Distress Alert Relay message is received. Rectified when all Distress Alert Relay messages have been read.				
Escalation:	Repeated as a warning after 30 s.				
Other:	In case of reception of multiple Distress Alert Relay messages, only one alert is raised.				

ID:	3122	**Priority:** Warning	**Category:** A	**Resp. transfer:**	No
Title:	Urgency Rx		**Normal w/o acknowledge:**		Yes
Description:	Incoming urgency warning. Check GMDSS display				
What to do:	Read the received urgency MSI message or urgency priority message (see *Maritime Safety Information (MSI)* on page 39 and *Priority messaging* on page 39).				
Conditions:	Raised when an urgency MSI message or urgency priority message is received. Rectified when all MSI messages and priority message of severity urgency have been read.				
Escalation:	Repeated as a warning after 30 s.				
Other:	In case of reception of multiple urgency messages, only one alert is raised.				

ID:	3123	**Priority:** Caution	**Category:** B
Title:	MSI Rx		
Description:	Check new received maritime safety information		
What to do:	Read the received MSI message (see *Maritime Safety Information (MSI)* on page 39).		
Conditions:	Raised when a safety MSI message is received. Rectified when all MSI messages of severity safety have been read.		

ID:	3123	**Priority:** Caution	**Category:** B
Title:	Safety Rx		
Description:	Check new received safety message		
What to do:	Read the received priority message (see *Priority messaging* on page 39).		
Conditions:	Raised when a safety priority message is received. Rectified when all priority messages of severity safety have been read.		

ID:	10003	**Priority:** Caution	**Category:** B
Title:	Lost service		
Description:	Missing SIM card. Check GMDSS terminal SIM card		
What to do:	Verify the SIM card is properly inserted (see *Interfaces* on page 23).		
Conditions:	Raised when the SIM card is removed or cannot be detected. Rectified when the SIM card is detected.		

ID:	10003	**Priority:** Caution	**Category:** B
Title:	Lost service		
Description:	Unknown SIM card. Check GMDSS terminal SIM card		
What to do:	Verify the correct SIM card is inserted in the terminal. If the SIM card has been replaced, power-cycle the system and follow the instructions in the UI.		
Conditions:	Raised when an unknown SIM card is detected. Rectified when the unknown SIM card is removed.		

App. B - Specifications

LT-3100S GMDSS Satellite Communications System

Certification & standards	Maritime CE, FCC, ISED, RCM, MED (Wheelmark), RoHS 2, 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)
Compass Safe Distance, std.	0.85 m (2.8 ft) TBC
Compass Safe Distance, steer.	0.65 m (2.1 ft) TBC
BAM EUT function types	P

LT-3110S Control Unit

Power consumption: operating mode, max	25.9 W
Power consumption: sleep mode, max	0.08 W
Weight	0.67 kg (1.48 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 30
Interfaces	Ethernet, auxiliary, DC input, chassis ground Antenna Unit (N conn.), handset, Bluetooth, SIM card
Input voltage	10 - 24 VDC
BT transmitter, Max RF output power	10mW
BT transmitter, Frequency bands	TX: 2402-2480MHz, RX:2402-2480MHz

LT-3120 Handset

Weight	0.30 kg (0.66 lbs)
Dimensions	52.8 x 208.8 x 38.2 mm (2.08 x 8.22 x 1.50 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust and water	IP30

LT-3121 Cradle

Weight	0.07 kg (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 (without mount)	0.72 kg (1.59 lbs)
Dimensions	151.1 x Ø 149.5 mm (5.95 x Ø 5.89 in)
Temperature, operational	-40°C to +55°C (-40°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)

App. B - Specifications (continued)

LT-3140S Interface Unit

Power consumption: operating mode, max	7.90 W
Power consumption: sleep mode, max	0.08 W
Weight	0.71 kg (1.57 lbs)
Dimensions	227.0 x 186.0 x 40.0 mm (8.94 x 7.32 x 1.57 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust and water	IP 20
Interfaces	4 x Ethernet, 2 x RS-422, 4 x GPIO, 4 x CAN
	DC input, chassis ground
Input voltage	10 - 24 VDC

LT-3150S Alarm Panel

Weight / Weight (incl. 25m cable)	0.07 kg (0.15 lbs) / 1.29 (2.84 lbs)
Dimensions	52.0 x 82.0 x 26.0 mm (2.05 x 3.23 x 1.02 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust and water	IP30
Interfaces	1 x CAN

LT-3160S Printer Adapter

Weight / Weight (incl. 25m cable)	0.03 kg (0.07 lbs) / 1.25 kg (2.76 lbs)
Dimensions	62.1 x 68.1 x 19.4 mm (2.44 x 2.68 x 0.76 in)
Temperature, operational	-15°C to +55°C (+5°F to +131°F)
IP rating, dust and water	IP40
Interfaces	1 x CAN

Warranty	2 year
Maintenance	None

App. C - Outline Drawing: LT-3110S Control Unit

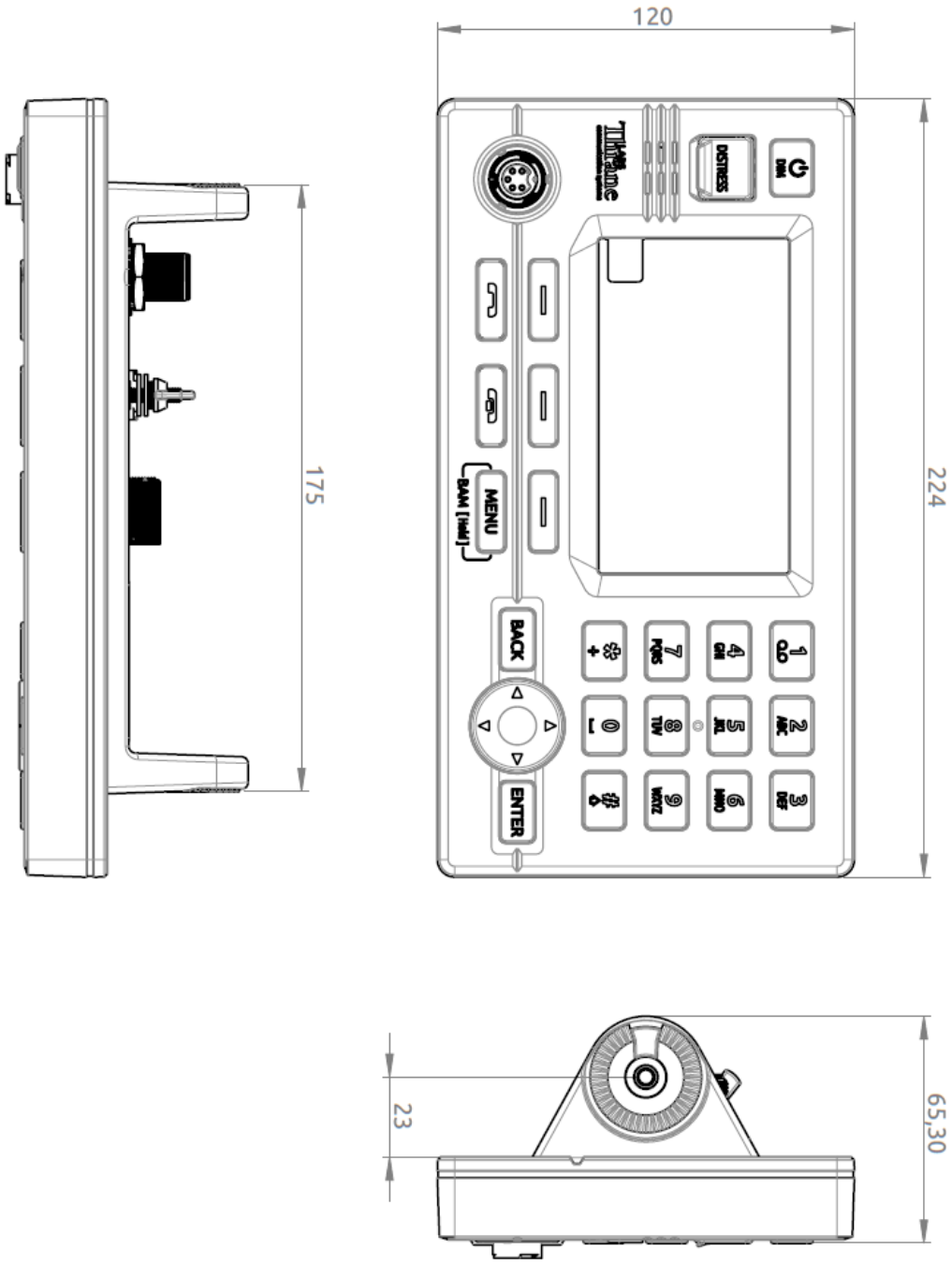


Figure 45: Outline Drawing: LT-3110S Control Unit

App. D - Outline Drawing: Bracket Mount, Control Unit

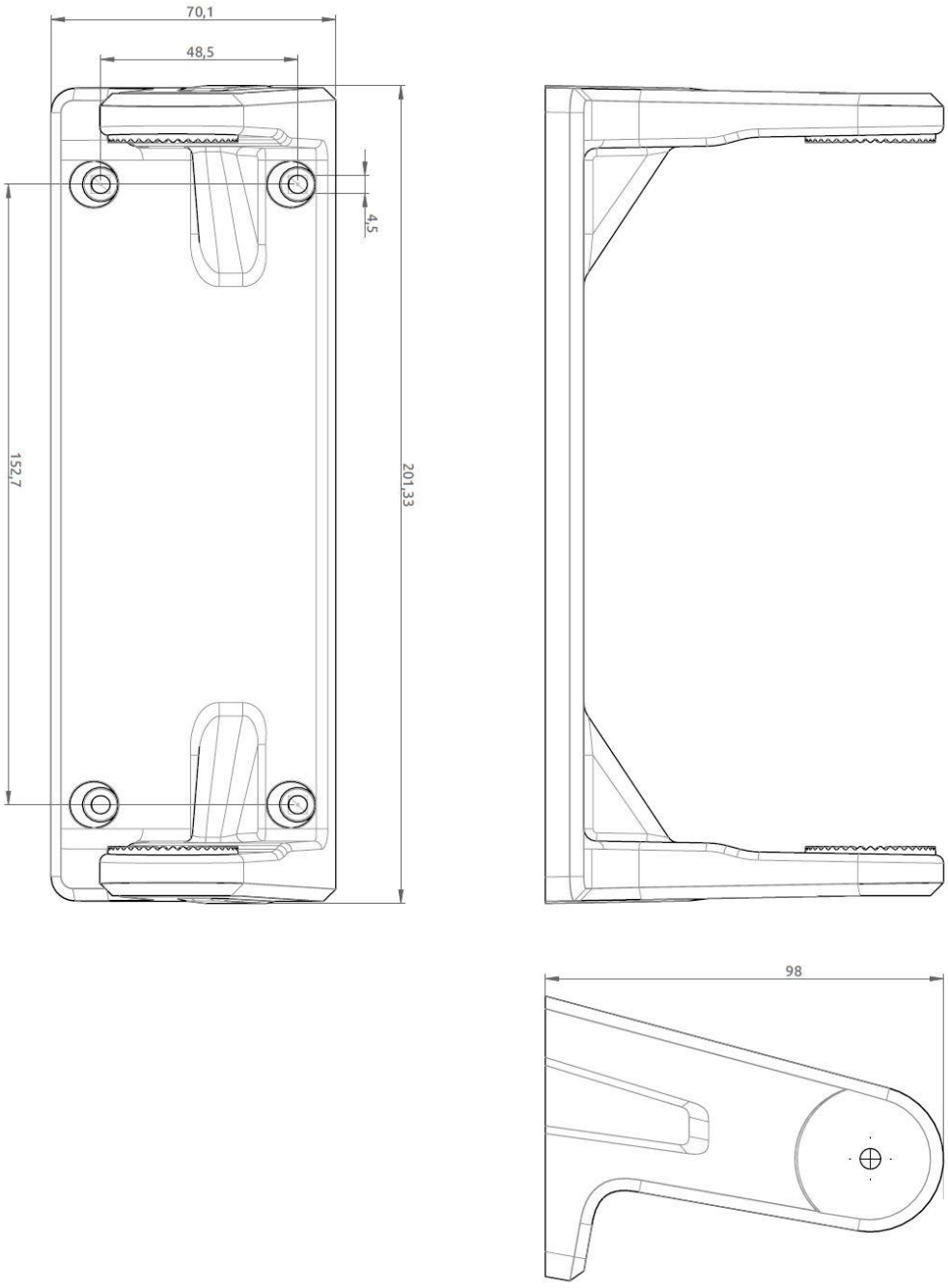


Figure 46: Outline Drawing: Bracket Mount, Control Unit

App. E - Outline Drawing: Flush Mount, Control Unit

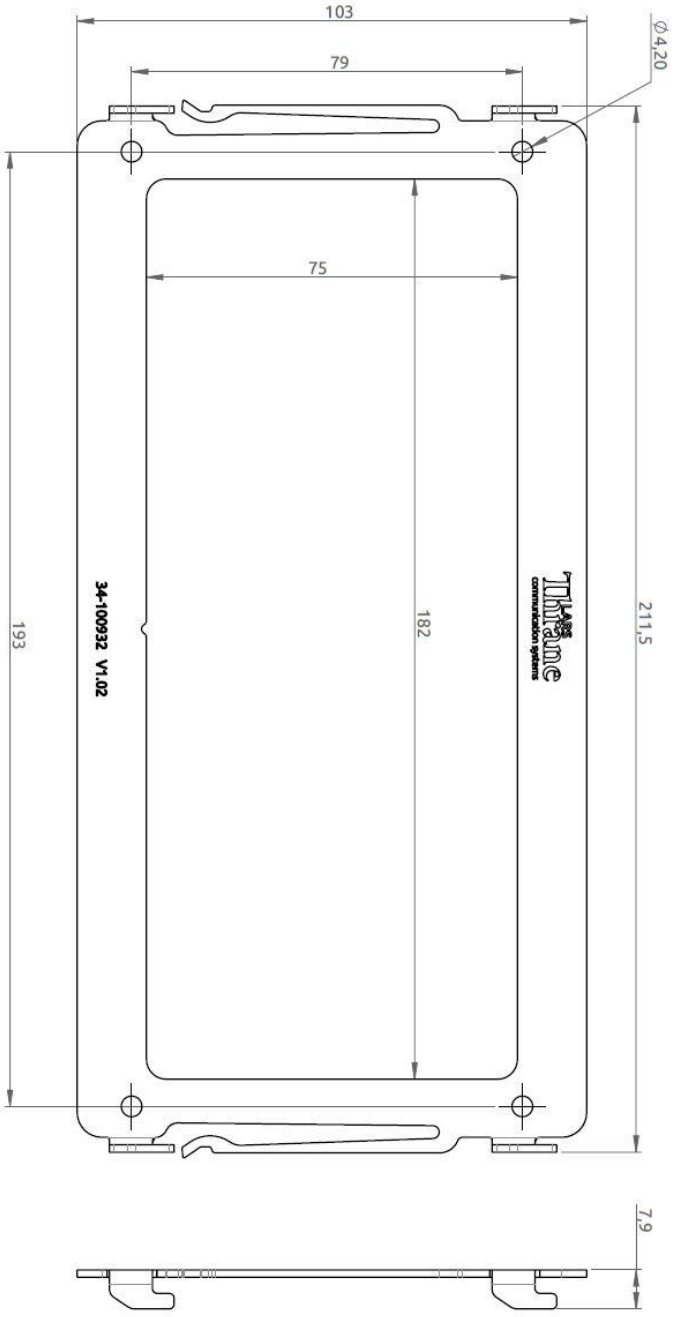


Figure 47: Outline Drawing: Flush Mount, Control Unit

App. F - Outline Drawing: LT-3130 Antenna Unit

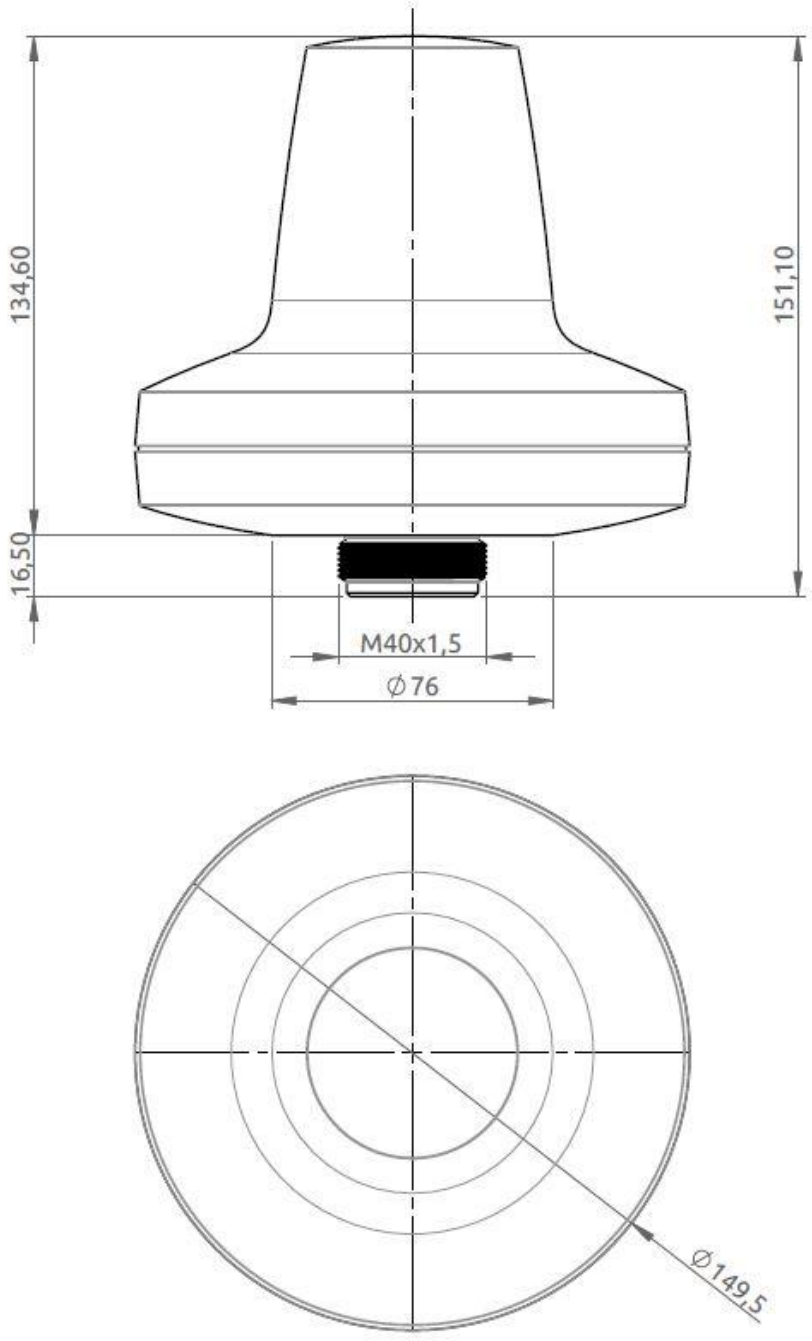


Figure 48: Outline Drawing: LT-3130 Antenna Unit

App. G - Outline Drawing: LT-3140S Interface Unit

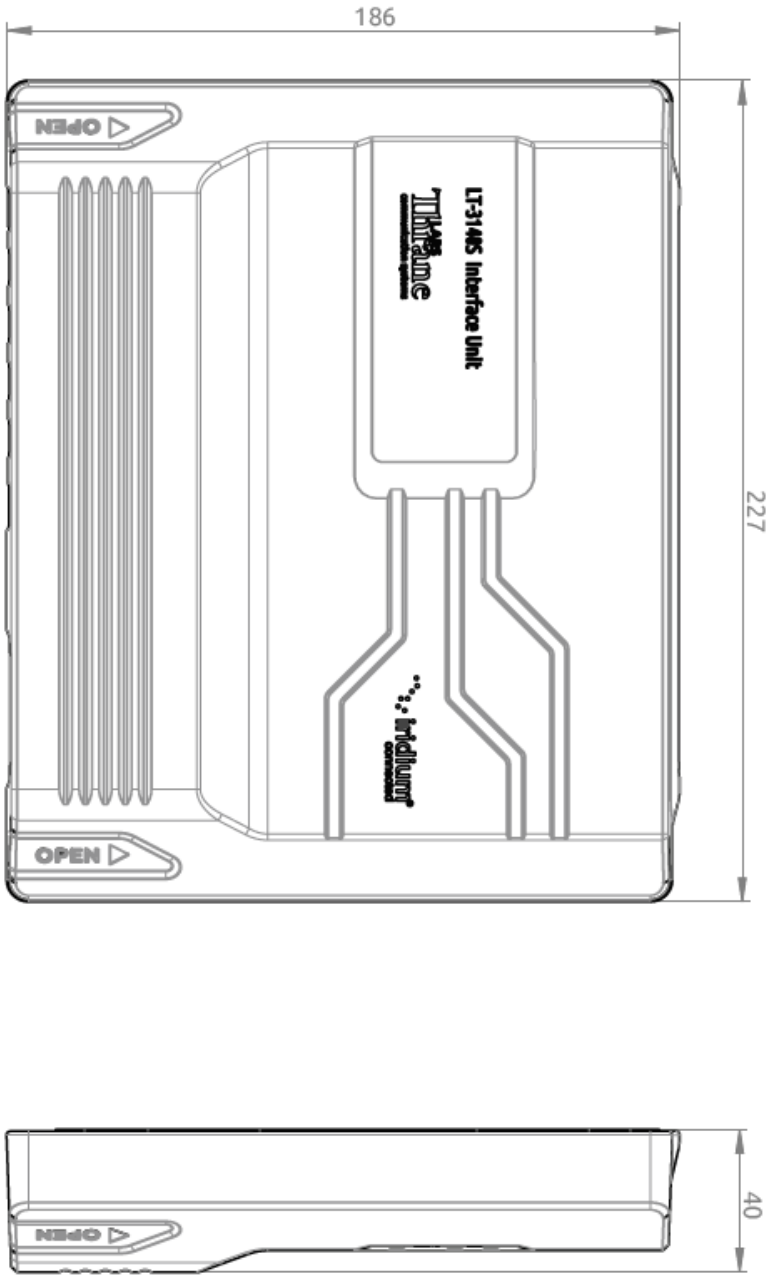


Figure 49: Outline Drawing: LT-3140S Interface Unit

App. H - Outline Drawing: LT-3150S Alarm Panel

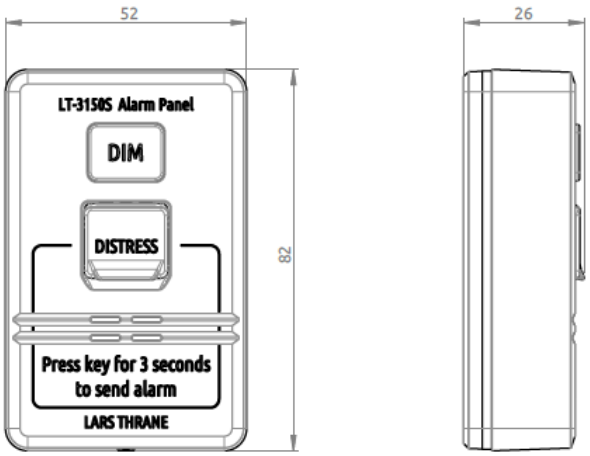


Figure 50: Outline Drawing: LT-3150S Alarm Panel

App. I - Outline Drawing: LT-3160S Printer Adapter

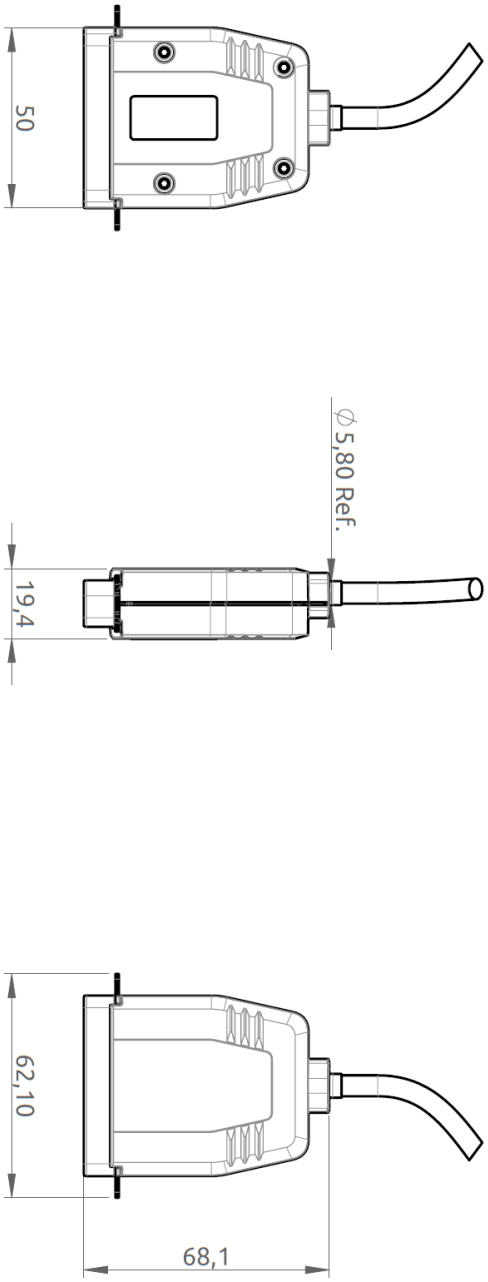


Figure 51: Outline Drawing: LT-3160S Printer Adapter

App. J - 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 0.18 kg (0.40 lbs).

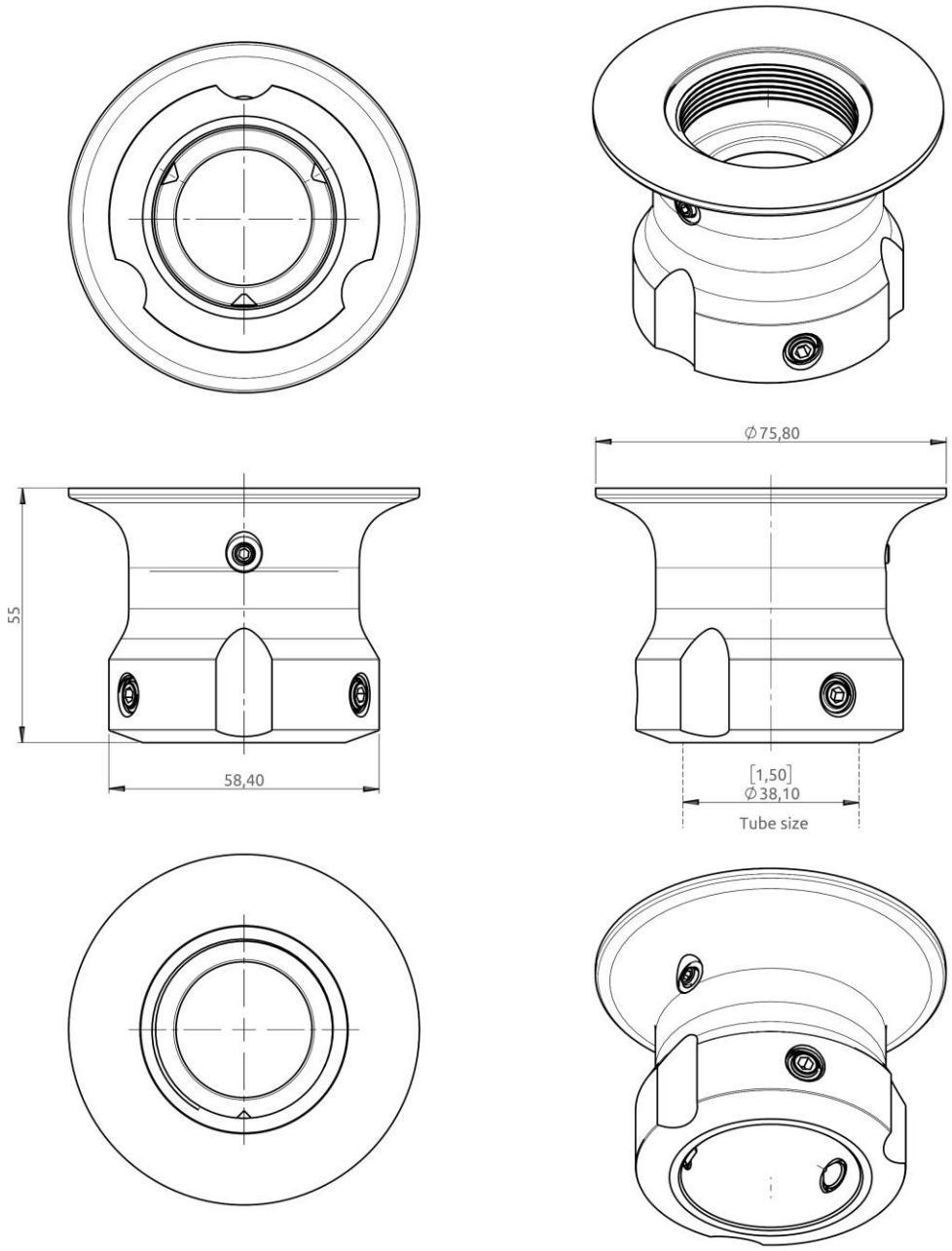


Figure 52: Outline Drawing: Pole Mount (1.5” tube), Antenna Unit

App. K - 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 0.68 kg (1.50 lbs).

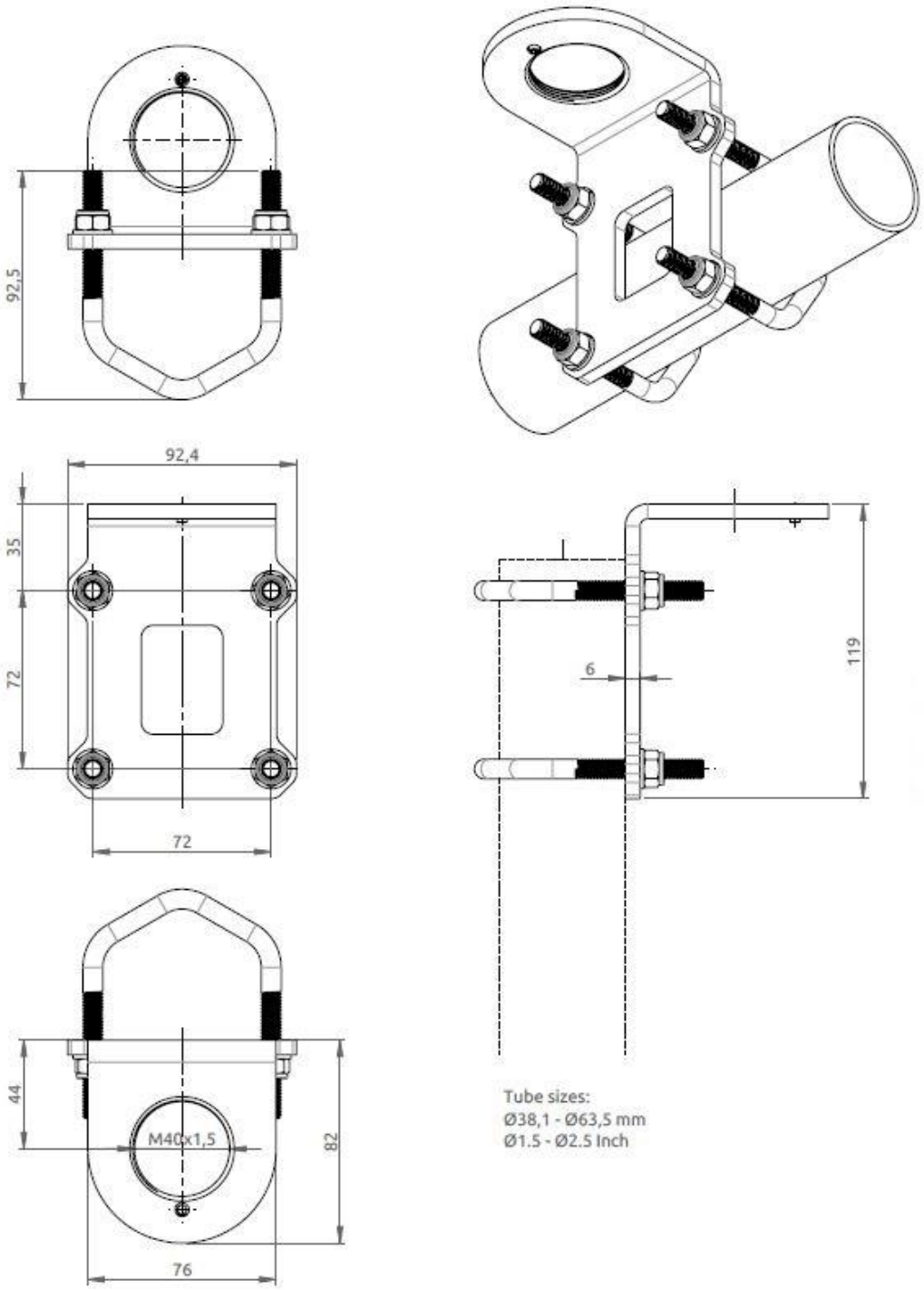


Figure 53: Outline Drawing: Bracket Mount (1.5” to 2.5” tube), Antenna Unit

App. L - Outline Drawing: LT-3120 Handset

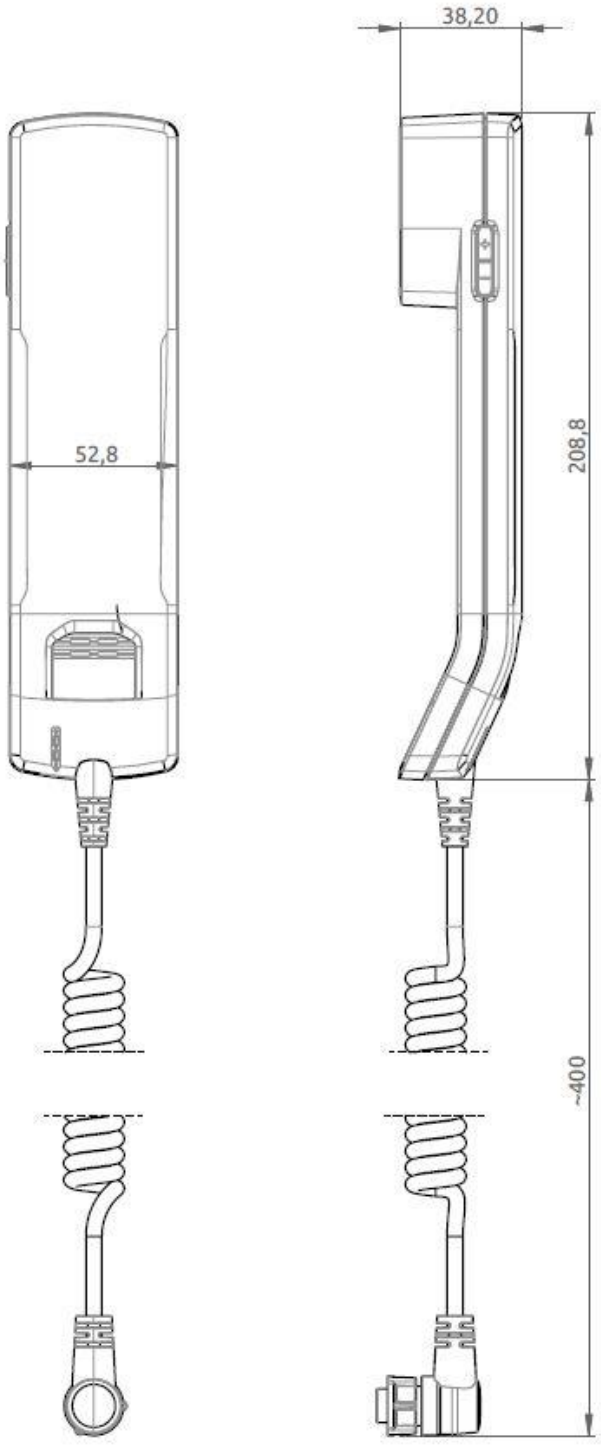


Figure 54: Outline Drawing: LT-3120 Handset

App. M - Outline Drawing: LT-3121 Cradle

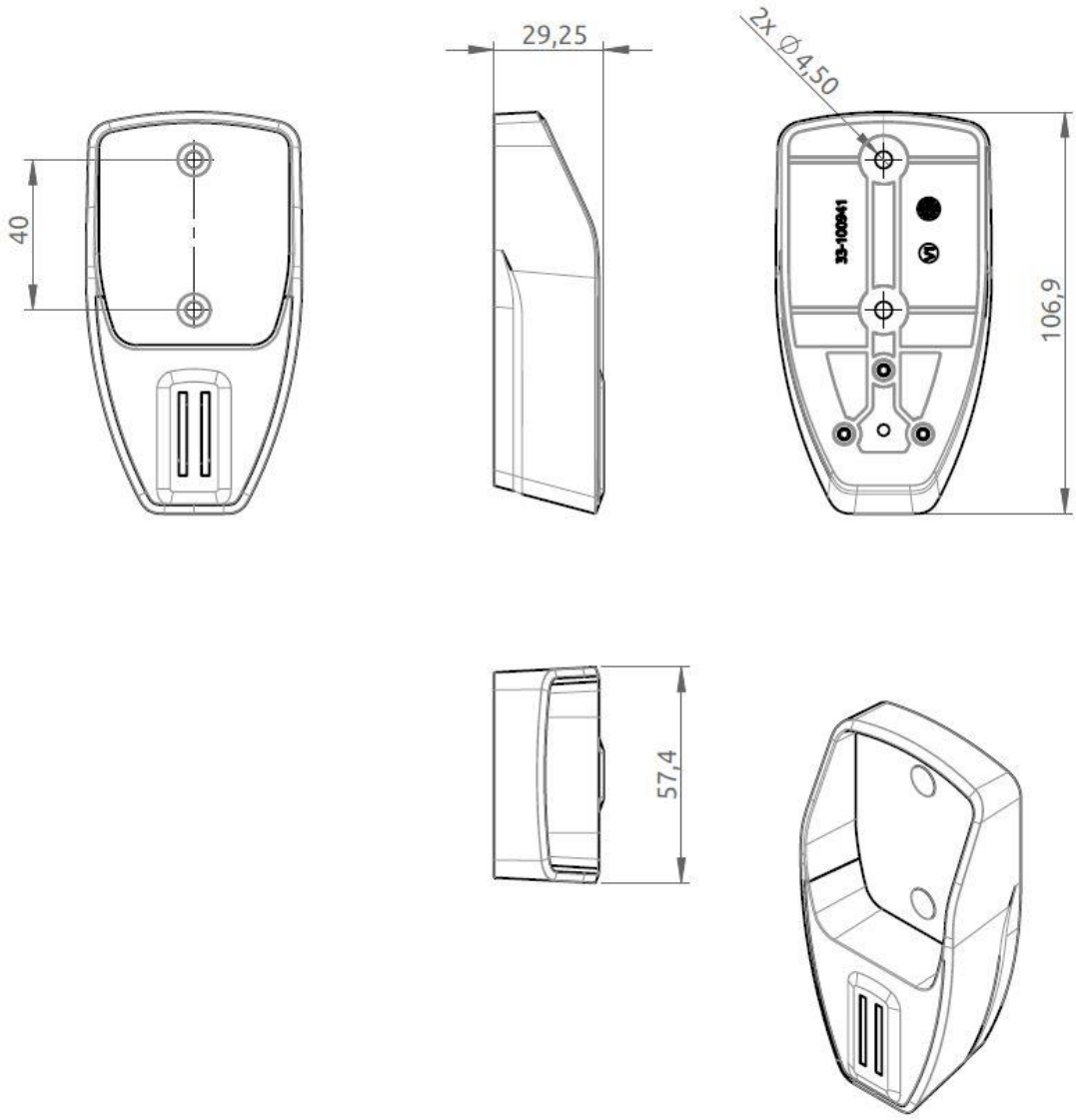


Figure 55: Outline Drawing: LT-3121 Cradle

App. N - EU Declaration of Conformity

Not available yet

(pending BABT approval)

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