

LD3

Installation Manual

VERIPOS





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1 Introduction

1.1 General

This document provides the information required to install an LD3.

When consulting this document it will help the installer to have available the following items to assist in assessing and planning the work:

- the VERIPOS LD3 and associated equipment shipped to site
- the system software on CD ROM
- the 'Equipment Packing list' (included with the equipment packing sent to site)
- the LD3 Operations manual
- the VERIPOS document "Antenna and Coaxial Cable Installation"
- interactive training modules and VERIPOS product literature on CD ROM.

1.2 VERIPOS

VERIPOS was formed in 1989 to supply GPS augmentation services, in the form of differential GPS corrections, to vessels in the offshore oil and gas industry. Owned by Subsea 7, the VERIPOS product line operates worldwide, providing data broadcast and support services for precise positioning applications.

The mission at VERIPOS is to be a market leader in the supply of precise navigation and positioning services and solutions, through innovative application of technology, continuous product development and operational excellence, whilst creating maximum value for both our customers and our parent company.

The mainstay of VERIPOS is the provision of data broadcast services for the purpose of enhancing accuracy, reliability and integrity of precise navigation and positioning. VERIPOS offers a range of such services to meet different client requirements, providing accuracy of up to 10 cms.

The greatest products will not, by themselves, ensure the best solution for the client. Many factors contribute to optimum operational and commercial effectiveness, from the provision of fit-for-purpose products maintained at a high level of operability to rapid, reliable delivery and a high standard of user support.

VERIPOS aims to meet all of these requirements without compromise. At the centre of our business philosophy is an unwavering commitment to provide superior quality while giving appropriate consideration to health, safety and the protection of the environment. From project planning to preventative maintenance, every aspect of our service is designed towards delivering products to our clients in the most professional manner possible.



1.3 LD3 Integrated mobile

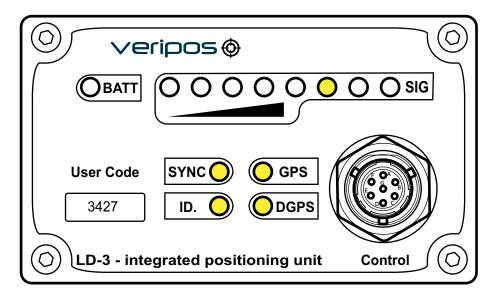


Figure 1. The LD3 Front Panel

The VERIPOS LD3 is a small, light weight and economical unit which may be configured either as a standalone L-band satellite demodulator or as an integrated positioning mobile, complete with an internal L1 GPS receiver.

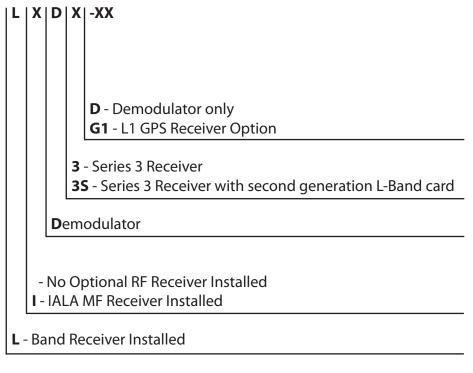
It can receive VERIPOS L-band transmissions from both high and low power satellites and output RTCM correction data which may be used by external GNSS equipment. When used with an external dual-frequency GPS receiver and Verify QC software, the full range of VERIPOS GNSS augmentation services is available.

When fitted with the optional single frequency GPS receiver, the unit can compute DGPS position solutions using single or multiple reference stations. The positions are computed within the GPS receiver and are output in NMEA format for use by the user's equipment.

An option is available to include a dual channel MF receiver which can accept correction data from two IALA MF beacons. These corrections will be used by the internal GPS receiver if it loses L-band corrections (the corrections are not output for use by external equipment).



The LD3 is available in various models, according to the user's requirements. The options installed are indicated by the model number as shown below:





NOTE

Recent LD3 units use a second generation L-band card. They are identified with an "S" suffix in the model number (e.g. LD3S-G1 instead of LD3-G1).

The change results in differences in the menus when configuring and operating the unit. The installation procedure is not affected.

Model descriptions apply to units with or without the "S" suffix.

1.4 What this document covers

The purpose of this manual is to provide the necessary information to perform the installation of the VERIPOS LD3 Integrated mobile unit. The manual contains the information required to install the VERIPOS LD3 unit.

It covers installation of:

- antennas
- coaxial cables
- LD3 receiver.

It is aimed at engineers who will be installing the hardware and peripheral equipment supplied with the LD3.



1.4.1 Contents

Chapter	Contents
1. Introduction	This chapter specifies the purpose and target group for the manual. It also contains a list of used abbreviations and a specification of the document conventions.
2. Safety	This chapter specifies safety instructions to follow when operating and maintaining the system.
3. Description of LD3	This chapter describes the LD3 unit in detail such as signal status LED's, connectors and cable harnesses.
4. Installation	This chapter describes the procedure for installing the the LD3 unit and associated equipment.
5. Reference information	This chapter comprise additional information such as technical specifications, cable harness wiring diagram, station ID listings and a description on how to install the VERIPOS OEM software.
6. Contact information	This chapter contains contact information details about the VERIPOS Helpdesk and VERIPOS offices world wide.



1.5 Terms and abbreviations

A Ampere

ADE Above Deck Equipment
BDE Below Deck Equipment

BER Bit Error Rate
bps Bits Per Second
CoG Course Over Ground
CR Carriage Return
DGPS Differential GPS
DOP Dilution of Precision
DP Dynamic Positioning

EGNOS European Geostationary Navigation Overlay Service

GDOP Geometric Dilution of Precision

GLONASS Global Navigation Satellite System – Russian equivalent to

GPS

GPS Global Positioning System

GNSS Global Navigation Satellite System
HDOP Horizontal Dilution of Precision

HF High Frequency Radio used to transmit correction data

Hz Hertz

KPH Kilometers per Hour
LAN Local Area Network
LED Light Emitting Diode

LF Line Feed

LNA Low Noise Amplifier

L-band Methods of transmitting correction data to mobile users

LCD Liquid Crystal Display

LD2 Unit containing GPS card, demodulator and PC processor

LD3 / LD3S Unit containing GPS card and demodulator

MF Medium Frequency Radio used to transmit correction data

MHz Mega-Hertz
MPH Miles per Hour
m/s Metres per second

MSAS Multi-functional Satellite Augmentation System

NMEA National Marine Electronics Association

N/A Not applicable

PDOP Positional Dilution of Precision
PPP Precise Point Positioning

PPS Pulse per Second
PRN Pseudo Random Noise
RMS Root Mean Square

RoHS Restrictions of Hazardous Substances



RTCM Radio Technical Commission for Maritime Services

SAL Service Access License

SBAS Satellite Based Augmentation System

SD Standard Deviation

SNF Service Notification Form
SNR Signal to Noise Ratio
Spotbeam High Power L-Band Signal

Standard / Std Veripos Single Frequency DGPS System
Standard+ / Std+ Veripos Dual Frequency DGPS System

SV Space Vehicle

TTL Transistor-Transistor Logic

Ultra Veripos High Accuracy Positioning Systems

USB Universal Serial Bus

UTC Coordinated Universal Time

V Volt

VDOP Vertical Dilution of Precision
VERIPOS Global DGPS service provider

VGA Video Graphic Array

VOSS VERIPOS Online Support System

W Watt

WAAS Wide Area Augmentation System

WEEE Waste Electrical and Electronic Equipment

1.6 Target group

The target group for this manual are the installators of the VERIPOS system.



1.7 Document conventions

1.7.1 Typographical conventions

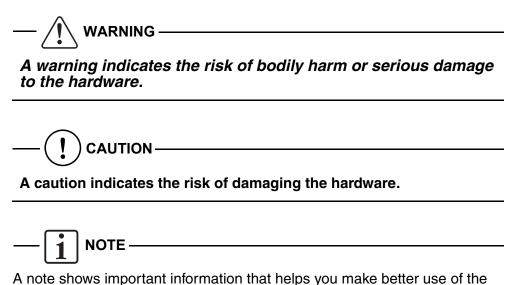
Italic or **bold** text is used to emphasize certain parts of the information. *Italic* is also used in cross-references to other parts of the document.

Bold text is also used for indicators and touch screen "push-buttons" commands.

"Text within quotes" is used when display screens are mentioned in text.

Monospace text is used for input/output strings to/from the device.

1.7.2 Special notices



1.8 VERIPOS Helpdesk

system.

VERIPOS encourage all users to promptly report problems or operating queries to the Helpdesk so that they may receive assistance.

The VERIPOS Helpdesk is the first point of contact for technical enquiries and fault reports. It is manned 24 hours per day, 365 days per year.

Helpdesk contact details are in the *Contact information* chapter.

We recommend initial contact is made by email to the Helpdesk.

Users can also create a fault ticket on the web site. This will ensure contact details and the description of the fault are correctly recorded.

The duty operator is trained to provide direct assistance with most queries and problems and can request technical staff to provide support for more complex issues.



1.9 VERIPOS online support (VOSS)

VERIPOS have an online customer support system called VOSS (VERIPOS online support system).

VERIPOS recommend users to frequently view the announcements made on this system.

VOSS includes a facility for raising fault tickets which are then automatically submitted to the VERIPOS Helpdesk.

The VOSS url is: http://help.veripos.com

VOSS has comprehensive help and assistance that provides:

- updates on VERIPOS service availability and notifications
- knowledge base
- troubleshooter
- downloads
- online fault reporting.

1.10 Enabling the equipment for use

VERIPOS correction signals are provided as a chargeable service.

In order for the equipment to decode corrections and output positions it must be enabled.

This is achieved by the user entering an access code supplied by the VERIPOS Helpdesk.

When not in use some contracts may allow for disabling the service.



NOTE

To use VERIPOS correction signals a contract between the user's company and the VERIPOS Operations department must be in place. VERIPOS call this a service access license (SAL).

To avoid delays users should record the SAL number associated with the VERIPOS equipment.

The Helpdesk is not authorised to issue a code unless an active SAL exists and its reference number can be determined.



1.11 Disclaimer

VERIPOS accepts no responsibility for any damage or injury to the system, ship or personnel caused by drawings, instructions or procedures not prepared by VERIPOS.

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All rights reserved. No part of this manual may be reproduced without prior written permission from VERIPOS.

Contents of this manual are subject to change without notice.

Every effort has been made to ensure accuracy of the information contained within this manual. Please advise VERIPOS of errors you may encounter. Thank you.

VERIPOS assume no responsibility for errors or omissions contained within this manual.





2 Safety

2.1 General

Safety is the responsibility of the individual carrying out the work and all persons involved in the operation.

- On arrival at the worksite contact the wheel house for a site specific safety induction.
- Follow all VERIPOS/Subsea 7 safety rules and any safety rules applying at the work site.
- Obtain all permits relevant to the job prior to any work commencing.
- Were necessary the safety check-list contained in chapter *Reference information* should be completed, if applicable.

2.2 Working aloft on bridge tops or masts

The following guidelines are for information only and are not meant to be used as a basis for all work at height. Always follow your company's own procedures and guidelines for working at height first.

Make sure you are properly trained for working at height, that you are familiar with the safety equipment and how to use it effectively.



NOTE

If you feel that you are inadequately trained for the job in hand, contact your supervisor immediately. Never attempt working at height if you are not comfortable or are not properly trained.

2.3 Loading/unloading equipment

The following guidelines are aimed at reducing the risks associated with the lifting and loading of the equipment associated with this manual.

- 1. Before carrying equipment across to the vessel it's a good idea to check the route for obstacles and trip hazards first. This can be combined with a trip to the wheelhouse to liaise with the person on watch to inform them of your arrival.
- 2. Always follow manual lifting techniques and never carry too much in one go. Bend with your knees and keep your back straight. Do not twist your back when carrying a heavy load.
- 3. It may be necessary to keep one hand free whilst crossing the gangway so unpacking the equipment and carrying it as smaller items may be more sensible. Alternatively, get some help from ship's personnel and use a crane if at all possible.



4. Always pay attention to your surroundings when carrying equipment. Scan the floor for trip hazards as you walk and be careful on stairways. Always try to keep one hand free for ascending/descending stairs, although in some cases this isn't always possible.

2.4 Housekeeping on the job

Any offshore vessel is capable of moving whilst tied to the dock. Therefore, in order to maintain a safe working environment it is necessary to keep the work area clean and clutter free.

This is a preventative measure aimed at reducing the risk of tripping and falling whilst performing the installation work associated with this manual.

- 1. Before commencing the installation, organise the equipment and store in an area where it won't interfere with other people and their work. Store boxes and transit cases in a separate location out of the way.
- 2. Avoid leaving tools and small parts on the floor where they can be stepped on, slipped on or tripped over.
- 3. If lifting floor tiles, be sure to replace them as soon as possible or mark the area off to prevent falls.
- 4. Take a periodic break to tidy up and reorganise parts and tools if the work area becomes cluttered.



3 System description

This section gives an outline description of the VERIPOS LD3 receiver and the components used in LD3 installation variants which may be supplied.

The section contains details summarizing:

- equipment technical data
- mechanical dimensions
- electrical specification
- GNSS receiver
- L-band receiver
- the data interfaces including serial ports
- antennas.

3.1 Description of LD3

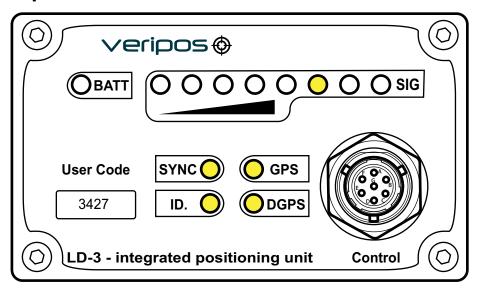


Figure 2. LD3 Front Panel

The VERIPOS LD3 is a small, light weight and economical unit which may be configured either as a standalone L-band satellite demodulator or as an integrated positioning mobile, complete with internal L1 GPS receiver.

Power input to the unit is 11–36 VDC. An external PSU is required. VERIPOS normally supply a suitable AC power supply.

The unit incorporates front panel LED indicators for status monitoring but it has no integral keyboard or alphanumeric display.

All configuration is performed using an external PC running OEM software supplied by VERIPOS.

A technical specification for the LD3 is in the *Reference information* chapter.



3.2 LD3 options

(Refer also to the model number description on the *Introduction* chapter.)

The unit is supplied in **three** main configurations:

LD3-D	L-band card is installed and only one coaxial connector is fitted.
Standalone L-band Satellite Demodulator	The unit outputs DGPS corrections for use by external GNNS equipment.
LD3-G1 Integrated Positioning Mobile	L-band card is installed together with a single channel GPS receiver. One coaxial connector is fitted as standard, a second may be fitted if requested.
	A DGPS position is computed internally and output in NMEA format. DGPS corrections are output for use by external GNNS equipment.
	Raw GPS data may be output for use by external processing equipment.
	Requires two coaxial connectors in order to receive L-band signals using the vessel's Inmarsat system.
	L-band card and single channel GPS receiver.
LID3-G1 Integrated Positioning Mobile	The GPS receiver incorporates an integrated two- channel IALA beacon receiver.
with IALA Beacon Receiver	Two coaxial connectors are fitted.
	The unit has all the features of the LD3-G1. In addition it can receive DGPS correction data from two IALA beacons. These corrections are used by the internal GPS receiver if it loses L-band corrections.

Notes:

The LD3 cannot receive VERIPOS HF reference stations.

The LD3 position solution is computed within the GPS receiver.

IALA Beacon corrections cannot be output to external equipment.

Optionally, where users require more precise position solutions the LD3 can be used in conjunction with an external dual channel GPS receiver and a PC running Verify QC software. The full range of VERIPOS services is then available for use.

The LD3 can be fitted with one or two coaxial input connectors.



3.2.1 Single coax connector

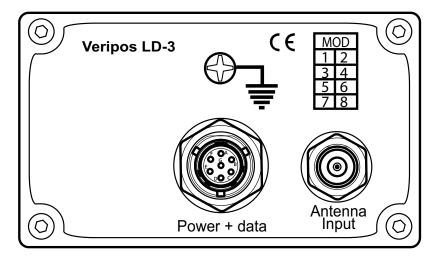


Figure 3. LD3 Rear Panel with Single Coax Connector

- For LD3-D units correction signals may be received from either a high or low power satellites. High power signals can be received using a small omni-directional (SPOT) antenna. Low power signals require the use of a narrow-beam steer able dish antenna. (Ship's Inmarsat is normally used.)
- For LD3-G1 units correction signals may only be received from high power satellites. A dual (or tri)-band omni-directional antenna must be used which receives signals from both the geo-stationary communications satellite and the GPS satellites.

3.2.2 Dual coax connector

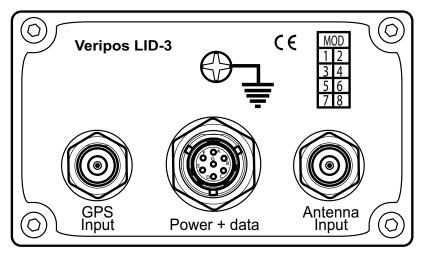


Figure 4. LD3 Rear Panel with Dual Coax Connector

One connector is used for the L-band receiver and one for the GPS receiver. Depending on antenna choice the L-band input may receive corrections from high or low power transmissions.

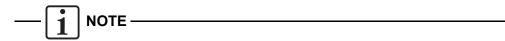
• For LD3-G1 units the GPS input may be used with a standard GPS antenna to receive GPS signals.



• For LID3-G1 units the GPS input may be used with a dual or tri-band antenna to receive both GPS signals and correction signals from IALA MF Beacons.

When used with a combined GPS and DGPS antenna (such as the CDA3) an antenna splitter is required.

3.3 Interface cable harnesses



VERIPOS DPx systems use a different cable harness.

3.3.1 Configuration cable

7-way Amphenol

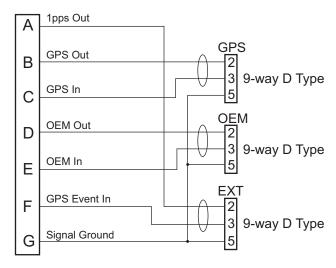


Figure 5. Config cable

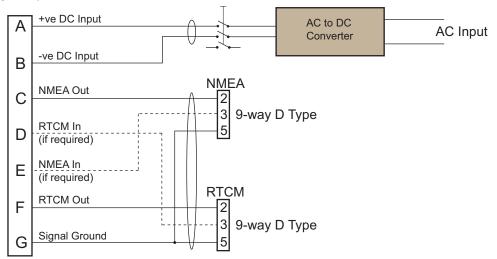
The configuration cable is split between the demodulator (OEM) and GNSS receiver (GPS), both connect to a standard serial port on a laptop or PC.

See the *Reference information* chapter for port pin-outs.



3.3.2 Power supply and data cable

7-way Amphenol



The power supply and data cable can be modified such that the LD3 outputs both NMEA position messages and RTCM.

See the *Reference information* chapter for port pin-outs.

3.4 Scope of supply

The equipment details for the specific installation are contained in the 'Equipment Packing list' which accompanies the shipment.

For a single receiver, the shipment would typically include:

- LD3 (or LD3S) receiver
- AC power supply with power cable
- cable harness for the front panel "Control" connector
- cable harness for the rear "Power + data" panel connector
- $2 \times \text{coaxial cable pigtails (LMR-240)}$
- main antenna coaxial cable (LMR-400)
- CDA3 combined antenna with right-angled mounting bracket
- manuals
- CDs containing VERIPOS OEM software etc.





4 Installation

Details of what is to be installed specific to your installation are in the 'Equipment Packing List' or 'Scope of Supply'.

The 'Equipment Packing List' is shipped with the equipment. This is used to confirm the equipment shipped is present and for reference when planning the installation in conjunction with this installation manual.

Installation depends upon;

- Type and number of antenna(s) to be installed.
- Number of coaxial cables to be installed.
- If used for QC analysis, attachment of data connection to a PC.
- The connection made for output of position data from the LD3 receiver.

If any questions arise during installation or more guidance is needed, please contact your supplier or VERIPOS.

Any pre-installation check list should include safety considerations.

If required see the safety checklist provided in *Reference information* chapter.

Topic	Notes
Confirm location of LD3 and associated equipment.	Ensure adequate access and cooling, correct mountings.
Confirm antenna location.	Follow siting guidance for antennas, any mounting frames required, offset measurements to CRP and other point on the vessel.
Confirm coaxial cable type and route.	Pre-terminated cables preferred, access routes, correct fixtures and grounding points.
Ancillary equipment.	Coaxial pig tails, serial cables, power leads.
Power.	Availability, suitability, cabling.

For guidance on LD3 configuration and use, see the LD3 Operations manual:

http://help.veripos.com

The sections follow a typical order of work for installation of the LD3:

- siting the LD3 receiver
- antenna installation
- cabling and connections between antenna and the below-decks equipment
- cable connections at LD3
- interfacing to DP and other external equipment.



4.1 Choosing a location for the LD3/LD3S

The location and mounting arrangements for all LD3 equipment must be discussed and agreed with the vessel owners/charterers prior to any installation work commencing.

The LD3 is a very small, light-weight unit so it can be mounted in any convenient location. It has no fan or ventilation slots so it may be mounted in any attitude. If rack mounting is required, a suitable shelf unit must be provided. This can be supplied by VERIPOS, if required.

The unit has a power consumption of only 4 W so it will have little impact on the environment of adjacent equipment. It requires a DC input of 11–36 V so a small external PSU is required. This is normally supplied by VERIPOS and should be located close to the LD3. The PSU requires a source of clean AC power. If possible, it should be connected to the vessel's UPS system.

The unit incorporates front panel LED indicators for status monitoring but it has no integral keyboard or display. All unit configuration is performed using an external PC running OEM software supplied by VERIPOS.

It is not necessary for the PC to be permanently connected to the LD3 but it will be required for periodic reconfiguration and for any fault finding. The installer must consider the requirement to install and operate this PC at a location adjacent to the LD3. It is recommended that interface cables are permanently installed to the intended location.

The main considerations when selecting the mounting site:

- Ease of access for coaxial cable(s) so that the cable bend radius is within limits.
- Ease of routing of interface cables.
- A nearby location for installing the PC/Laptop which will be used to configure the unit.
- A nearby source of clean AC power.
- A nearby grounding point for the chassis.
- The front panel should be easily visible to the operator (for viewing status LED's).
- The location must not be subject to dust, high temperatures or excessive vibration.
- The unit should be shielded from direct sunlight.



4.2 Antenna installation

This section provides general guidance on installation of antennas and cabling when installing the LD3 receiver.

It is very important to the ongoing performance of your system that a high quality installation is performed. This will ensure optimum performance and reliability.

Before commencing hardware installation, the following preliminary steps must be completed:

- Antenna mounting locations must be discussed and agreed.
- Coaxial cable routes should be checked for obstructions, through-bulkhead access and suitable attachment points.
- Permit(s) to work should be raised as necessary at the worksite for all work at height, including the wheelhouse/bridge roof. This should be obtained from the person on watch in the wheelhouse/bridge.
- All radar systems should be switched off and isolated/tagged out during the installation period.
- If the installing engineer needs to operate in an area near the vessel's Inmarsat dome, he must either maintain the separation distance specified by the manufacturer or else the system must be switched off and isolated/tagged out during the installation period.
- A risk assessment must be performed to evaluate and minimise the risks involved with the installation of the antennas and associated hardware. Immediately prior to work commencing a briefing session must be held to ensure that all personnel involved in the installation are fully aware of the work to be undertaken and the risks involved.

Two antennas are in common use with the LD3:

- When configured as an "Integrated positioning mobile", the LD3 is normally shipped with a CDA-3 tri-band antenna. This can receive all the signals which are used by the LD3:
 - single frequency GPS signals
 - L-band correction signals from geo-stationary satellites
 - IALA MF correction signals.

Only the single antenna and a single 50 ohm coaxial cable are required.

• When configured as a "Standalone L-band satellite demodulator", the unit can only receive L-band correction signals from geo-stationary satellites. Only a simple L-band antenna is required. The 90984 antenna is normally used.

(Other antennas may be used if the user has special requirements. This should be discussed with the VERIPOS Operations during initial system specification.)



- 1 NOTE

When using the CDA-3 antenna with an LD3 which has separate L-band and GPS antenna inputs, an external RF splitter is required.



Figure 6. CDA-3 GNSS Combined Antenna



Figure 7. 90984 Omni-directional (SPOT) Antenna



The CA-3 antenna has a threaded base which is designed to accept a standard 5/8" x 11 UNC tripod mount. VERIPOS supply a right angled mounting bracket which is attached to the mast using "U" bolts. The antenna is secured to the top plate using a 5/8" bolt.

The user may also choose to fabricate a custom bracket or mount the antenna directly to a threaded pole. Caution is required, the antenna may be damaged if the securing screw is too long.

For guidance on the choice of antenna location and details of other antennas, please refer to VERIPOS document "Antenna & Coaxial Cable Installation" (GD-GL-VER-EQP-801), provided as part of the installation documentation.



WARNING

The above document includes details of the procedure for interfacing to the vessel's Inmarsat system. This may be beneficial in some special circumstances, as detailed in the document.

For all LD3 units, a DC block must be fitted between the unit and the Inmarsat connection. Damage can occur if this is omitted.



Figure 8. DC Block

The illustration shows a typical DC block. This should be included in the installation kit if an Inmarsat connection is planned (if it cannot be located, contact VERIPOS). It has N-type connectors so it is fitted between the LD3/LD3S L-band pigtail and the main coax.

Note that the Inmarsat cannot be interfaced to an LD3-G1 unless it is ordered with the optional dual antenna inputs (separate coax connector for L-band input).



4.3 Coaxial cable installation

The main run should be a single cable, joins must be avoided. As noted earlier in the manual, VERIPOS recommend the use of LMR 400 cable for the main cable runs. Where possible, it is recommended that the user should measure the cable runs and order pre-terminated cables. These have proved more reliable in service.

Coaxial pigtails of smaller diameter cable will be required at both ends of the cable run. LMR 240 cable is recommended for this purpose. The pigtails are more flexible than the main cable so they facilitate routing and reduce the strain on the connectors. They are also used to convert from the "N"-type connectors used on the LMR 400 to the TNC connectors fitted to the LD3 and (most) antennas.

Please refer to VERIPOS document "Antenna & Coaxial Cable Installation" (GD-GL-VER-EQP-801), provided as part of the installation documentation. This document provides general guidance on cable routing, maximum acceptable cable lengths and (if required) cable termination.

4.4 LD3 installation

This section describes the mechanical installation of the LD3 and the cable connections. The installation site should have been chosen according the to guidelines described in section 4.1 Choosing a location for the LD3/LD3S.

General guidelines for cable installation:

- Avoid running coaxial or data cables parallel to power cables.
- Secure all cables neatly with tie wraps. **Do not apply excess pressure** avoid damaging the cables.

4.4.1 Mechanical installation

The LD3 case is formed from a box-section aluminium extrusion, fitted with end plates. The bottom of the case has two slots which can accept M4 half-height nuts. These nuts can be used for securing the unit.

The unit can be supplied ready-mounted on a base plate which allows it to be easily secured on any flat surface. See the *Reference information* chapter.

The external power supply unit should be mounted nearby.

4.4.2 Grounding the chassis

Use 12 to 14 AWG earth cable and ring connectors to ground the LD3 chassis to the ship's superstructure.



Figure 9. Ground Connection on Rear Panel of LD3/LD3S



4.4.3 Antenna inputs (coaxial cables, TNC connectors)

The exact model of LD3 receiver is described in the 'Scope of Supply' as agreed between VERIPOS and the customer.

The installer must be aware of LD3 variant and antenna types which he is installing since this affects how the coaxial cables are connected.

In all cases, a coax pigtail is required between the LD3 and the main antenna coax (see section 4.3 Coaxial cable installation above).

When configured as an "Integrated positioning mobile", the LD3 is usually shipped with a CDA3 tri-band antenna.



NOTE

If used with an LD3 having separate L-band and GPS antenna inputs, an external RF splitter is required (see diagrams below).

Below are two examples of installation drawings for LD3 units. The first shows a unit with a single antenna input; the second shows one with dual antenna inputs.



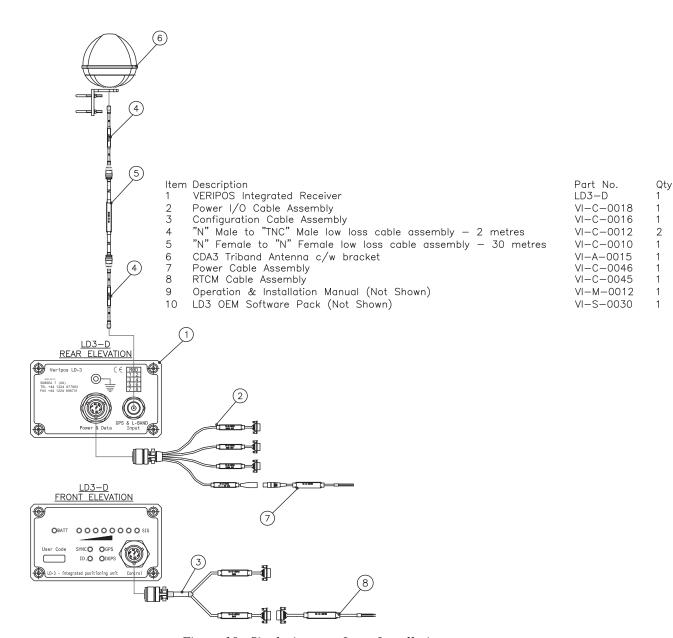


Figure 10. Single Antenna Input Installation



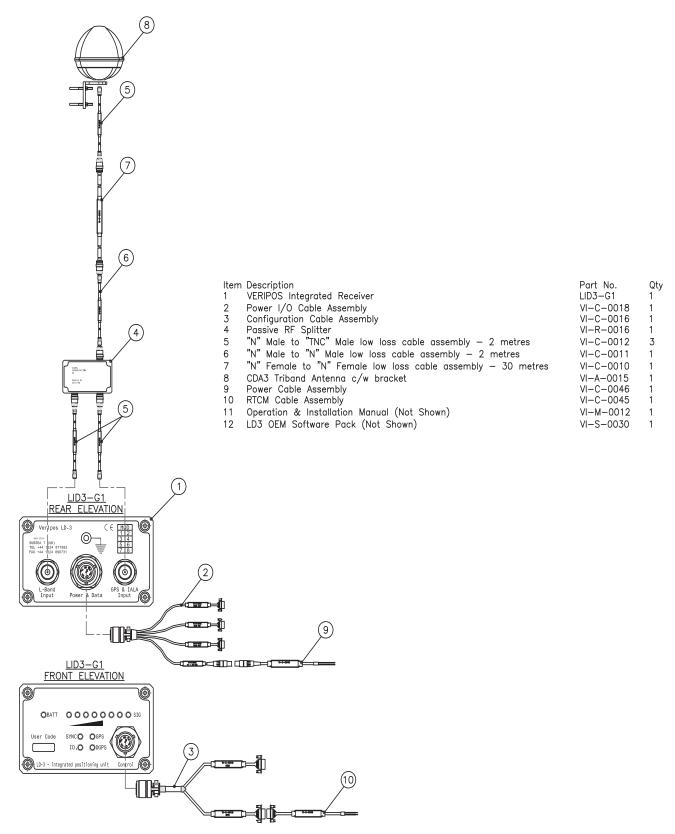


Figure 11. Dual Antenna Input Installation



The following table lists various antennas and indicates how their cables should be connected to the LD3 units. Where your supplied equipment is not shown please contact VERIPOS.

Antenna type	LD3 Single antenna	LD3 Dual antenna		
	Antenna input	GPS input	L-band input	
CDA-3	Х	X (note 1)	X (note 1)	
90984	X (note 2)		Х	
Feed from Inmarsat	X (note 2)		Х	
AD251		X (note 3)		
A30	Х	X (note 1)	X (note 1)	
AD410		X (note 3, 4)		

- Note 1: An external passive RF splitter is required details in "Antenna & Coaxial Cable Installation" (GD-GL-VER-EQP-801).
- Note 2: For LD3-D only.
- Note 2: Not recommended for LID3-G1 (does not support IALA beacon receiver).
- Note 3: The AD410 is a dual frequency antenna.

The above table includes details for connecting to the vessel's Inmarsat system. For model LD3-G1, this is only possible if the unit is ordered with the dual antenna option (separate coax connector for L-band input).



For all LD3 units a DC block must be fitted between the unit and the Inmarsat connection. Damage can occur if this is omitted.

4.4.4 Power and data cables

All the power and I/O functions of the LD3 are combined in two 7-pin Amphenol circular connectors which are mounted on the front and rear panels.

For ease of interfacing, special cable harnesses are used to divide the multiple functions of these connectors into single-function cables, terminated with industry standard DB9 connectors.

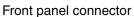
These harnesses may be fabricated by the user or ordered from VERIPOS. Only incorporate those connections which are required for the specific installation.

Examples are shown below:



These are shown below.







Rear panel connector

Figure 12. Fron Panel connector Control and Rear Panel Connector Power + Data

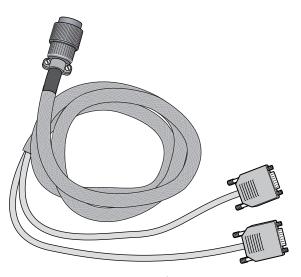


Figure 13. Typical Control Cable

Separate D9 connectors for demodulator and GPS configuration.

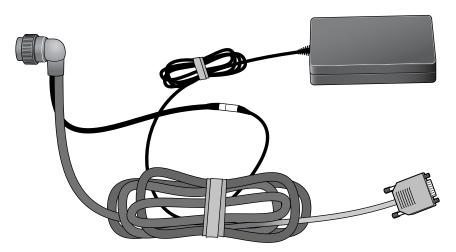


Figure 14. Typical **Power + Data** Cable

This example provides only a NMEA output and DC input. The NMEA output is on a D9 connector.

See the *Reference information* chapter for details of connector pin-out and wiring diagram.



4.5 Interface cables

4.5.1 Serial interfaces

The LD3 has four RS-232 ports (two bi-directional and two output ports) which are distributed between the "Control" and "Power + data" connectors.

Each installation has different requirements for interfacing external equipment. VERIPOS can supply cable harnesses or connector breakout boxes to meet user requirements. These provide a separate D9 connector for each required interface.

An interfacing plan will normally be prepared by the client with assistance from VERIPOS Operations department. If this is not available contact VERIPOS for assistance.

When connecting to other RS-232 devices, the cable type must be selected in accordance with the RS-232 specification. This requires the use of low capacitance cable for longer runs. If the length exceeds that recommended for RS-232, then it may be necessary to convert to RS-422 for the main cable run

Some interfaced equipment, such as DP consoles, may use the RS-422 protocol. Fit an RS-232 to RS-422 converter between the LD3 and the interfaced equipment.

The converter should normally be placed adjacent to the LD3 since transmissions that use RS-422 protocol have better noise immunity and support longer cable runs.

The cable should be selected in accordance with the RS-422 specification.

4.5.2 1PPS output option

The LD3 can output a 1pps signal for use by external equipment. This provides accurate time synchronisation for third party navigation systems or multi-beam sonar.



NOTE

LD3 installations rarely use this function.

The 1pps signal is derived directly from the internal GPS receiver and is output from the LD3 on pin "A" of the front panel "Control" connector (signal ground on pin "G").

It will be necessary to construct a breakout harness to separate the 1pps signal from the other outputs present on the "Control" connector. The 1pps signal is a narrow, low amplitude pulse so cabling precautions are required to avoid signal degradation. See the *Reference information* chapter for details of connector pin-out and wiring diagram.

Consult the VERIPOS Operations department for advice on specific installations.



5 Reference information

5.1 Safety check list

Protective equipment	Ref*	Υ	N
Hard hats.	10		
Safety footwear.			
Eye protection.	10		
Hearing protection.	_		
PPE in accordance with PTW.	1		
Safety equipment fit for purpose.	8		
Respiratory protection.	_		
Additional warm clothing.	5		

Housekeeping	Ref*	Υ	N
Walkways - clear.	_		
Work area – no debris.	_		
Escape routes – clear.	_		
Emergency access – work area.	_		
Fire fighting equipment – available.	_		
Life saving equipment – available.	_		

Safety awareness	Ref*	Υ	N
Management safety objectives?	_		
Is safety monitored regularly?	_		
When was last safety exercise?	_		
Are safety procedures in place?	_		
Is first aid equipment in place?	_		
Is work permit system in use?	_		

Befor working at height	Ref*	Υ	N
Obtain permit to work at height.	1		
Switch-off ALL transmitting devices.	2		
Obtain ships radio for communications.	1		
Work area exhaust fume free?	3		
Carry out risk assessment.	4		
Harness with double lanyard.	6		
Auto snap hooks – double release.	7		
Test snap hooks for "roll out".	7		
Safety equipment – visually fit for use.	8		



Befor working at height	Ref*	Υ	N
Safety equipment – all certified.	9		
Hard hat – chin strap fitted and used.	10		
Use "fall arrest" equipment or	11		
use in-place "latchways" system.	11		
Carry out tool box talk (TBT).	4		

When working at height	Ref*	Υ	N
Anchor point above head height.	12		
Do not connect snap hook back to lanyard.	13		
Do not climb carrying equipment.	14		
Secure tools from falling.	15		
Carry tools in a closed tool bag.	15		
Never climb alone.	16		
Spotter positioned on main deck.	16		
Keep deck below work area clear.	17		

Safety check list reference details

Item	Task
1.	Before commencing any work at height obtain a permit to work from the watchkeeper in the wheelhouse. Obtain a portable radio tuned to the vessel frequency to maintain communications with the vessel watchkeeper.
2.	Confirm that all transmitting devices are switched off and tagged out.
3.	Check work area is free from exhaust stack smoke. If exhaust fumes become an issue discuss alternatives with watchkeeper.
4.	Conduct and record a risk assessment involving all personnel involved in the system installation.
5.	Check conditions at work area. If required put on additional clothing appropriate to the prevailing weather conditions. Do not wear bulky clothing which can snag on vessel structure, sundry steelwork, ladders or rigging.
6.	Use an approved safety harness with a double lanyard providing 100% tie-off.
7.	Check snap hooks are auto type with double release mechanism (minimum). Test snap hooks for "roll out" prior to commencing work at height. If possible use auto locking carabiners instead of snap hooks.
8.	Inspect safety equipment prior to use for tears, cuts, frays, damaged stitching, burns, dry rot, salt water damage, solar radiation damage, paint damage, cracked or bluing D-rings, rust, corrosion and deformation. If in doubt, don't take the risk.
9.	Test safety equipment for compatibility prior to commencing work at height. Never rely on sub-standard or incompatible equipment to keep you safe. If in doubt, don't take the risk.

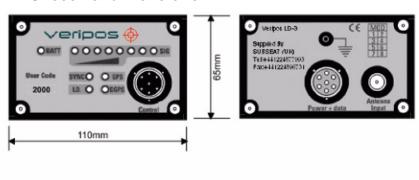


Item	Task		
10.	0. Hard hat and safety glasses should be worn strapped securely at all time		
11.	Use fall arrest equipment when climbing. If a vertical system is in place on the ladders, use it. That's why it's there.		
12.	Always tie off above your head when working and ensure the anchor point will support a minimum force of 2268 Kg or 5000 lbs. Perform a clearance calculation before tying off to an anchor point. Take into account the length of the lanyard (fully deployed) + your own height + safety margin.		
13.	Never connect a snap hook directly back to the lanyard itself. This can lead to forced disengagement of the snap hook. If possible use auto locking carabineers that are approved for connection back to the lanyard. If in doubt, verify correct usage of safety equipment, including connectors before use.		
14.	Do not climb masts or ladders carrying equipment. Use a pouch and hauling line or separate lanyard to keep hands free for climbing.		
15.	Be careful not to drop tools whilst working. A falling tool poses a health and safety risk to people working below and in certain circumstances could even kill someone. Use a tool strap/lanyard to secure them to your wrist, belt or the mast platform you are working on. Always carry tools in a closed tool bag or backpack to avoid injury when climbing and prevent dropping the tools accidentally.		
16.	Never climb alone. Always have a spotter at main deck level to keep an eye on you.		
17.	Do not stand underneath someone working aloft. Make an effort to keep the area below clear from traffic (barrier off) and be aware of activity overhead.		



5.2 Mechanical details

5.2.1 LD3 receiver dimensions



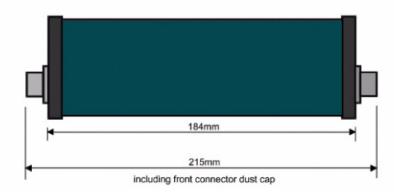


Figure 15. Dimensions, LD3 Receiver

All dimensions are metric. US Standard dimensions are as follows:

110 mm = 4.33"

65 mm = 2.56"

184 mm = 7.24"

215 mm = 8.46"



5.2.2 Mounting plate dimensions

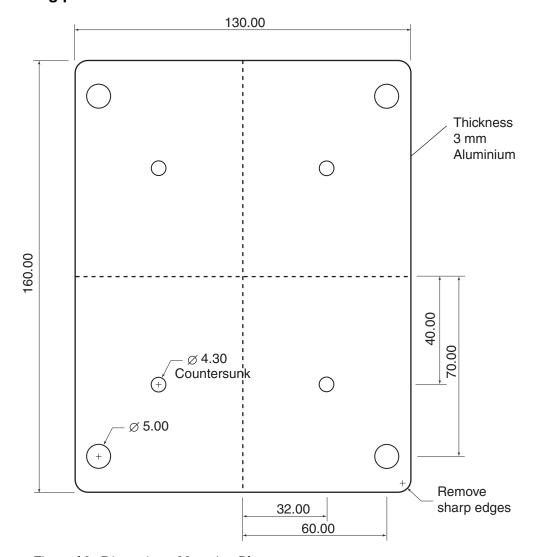


Figure 16. Dimensions, Mounting Plate

All dimensions are metric. US Standard dimensions are as follows:

130 mm = 5.12"

160 mm = 6.3"

70 mm = 2.76"

40 mm = 1.57"

32 mm = 1.26"

60 mm = 2.36"

4.3 mm = 0.17"

5 mm = 0.2"

3 mm = 0.12"



5.3 Cable harness wiring diagrams

5.3.1 Front panel "Control" connector

Amphenol connector	Function
Pin A	1pps Out (LVTTL timing pulse)
Pin B	GPS config. Out (RS-232)
Pin C	GPS config. In (RS-232)
Pin D	L-band config. Out (RS-232)
Pin E	L-band config. In (RS-232)
Pin F	GPS Event In (LVTTL level transition)
Pin G	0 V (RS-232 common)



NOTE -

1pps Out

This provides accurate time synchronisation for third party navigation systems or multi-beam sonar.

GPS Event In

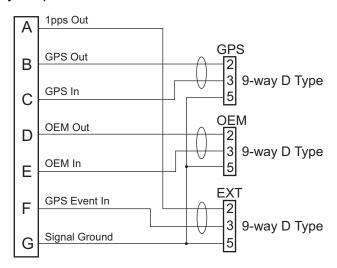
This input can be used to time tag external events. Upon detection of a transition, the receiver can output the time and/or the position at the instant of the event.

Users should contact the VERIPOS Helpdesk for further information before attempting to use either of these two signals.

[&]quot;1pps Out" and "GPS Event In" are rarely used.



A diagram for typical wiring harness is shown below: 7-way Amphenol



5.3.2 Rear panel "Power + data" connector

Amphenol	Function	
connector		
Pin A	+ve DC Input (11 – 36 VDC)	
Pin B	+ve DC Input	
Pin C	NMEA Out	
	(RS-232 from GPS Rx)	
Pin D	RTCM In	
	(RS-232 from external source)	
Pin E NMEA In		
	(RS-232 from external source)	
Pin F RTCM Out		
	(RS-232 from L-band Rx	
Pin G	0 V	
	(RS-232 common)	



NOTE-

RTCM In and NMEA In are rarely used.

RTCM In

RTCM corrections from an external source may to be input to the GPS receiver.

NMEA In

A 'GGA' position message from an external GPS receiver may to be input to an LD3 which does not have an internal receiver.

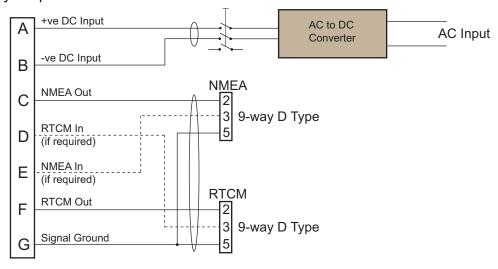


This enables the operation of the GPS and DGPS indicators on the LD3 front panel.

Users should contact the VERIPOS Helpdesk for further information before attempting to use either of these two signals.

A diagram for typical wiring harness is shown below:

7-way Amphenol





5.4 Parts list

5.4.1 Nomenclature

V | **I** | **X** - | **XXXX**

Sequential Number (0010 - 9999)

- A Antenna Assembly
- **C** Cable Component
- D **Data Component**
- **E Enclosure Component**
- **M** Manuals (all Literature & Documentation)
- R RF Component
- **S Software Component**
- **V** Control and Display Component

Component Item

VERIPOS

5.4.1.1 Antennas

Part No.	Description	DWG (dimensional)
VI-A-0010	AD251 – L1 GPS	AB-V-ED-01204
VI-A-0011	AD410 – L1 / L2 GPS & GLONASS	AB-V-ED-01205
VI-A-0013	90984 – L-band	AB-V-ED-01203
VI-A-0014	DHM5000 – MF & HF	AB-V-ED-01202
VI-A-0015	CDA3 – Tri-band, L-band, MF and L1 GPS	AB-V-ED-01206
VI-A-0016	PGA1 – L1 / L2 GPS & GLONASS	AB-V-ED-01231
VI-A-0017	A30 – Tri-band, L-band, MF and L1 GPS	AB-V-ED-01235



5.4.1.2 Cables

Part No.	Description	DWG (GA)
VI-C-0010	30 metre LMR 400 DB assembly NF-NF	AB-V-ED-01000
VI-C-0011	2 metre LMR 240 DB assembly NM-NM	AB-V-ED-01001
VI-C-0012	2 metre LMR 240 DB assembly NM-TNCM	AB-V-ED-01002
VI-C-0015	Earth braid assembly	AB-V-ED-01005
VI-C-0016	LD3 configuration cable	AB-V-ED-01006
VI-C-0017	LD3 Power I/O	AB-V-ED-01007
VI-C-0018	LD3 Power I/O	AB-V-ED-01008
VI-C-0019	LD3 power C/W encapsulated PSU	AB-V-ED-01009
VI-C-0021	RS-232	AB-V-ED-01011
VI-C-0022	RS-232 null modem	AB-V-ED-01012
VI-C-0023	RS-232 null modem "Y"	AB-V-ED-01013
VI-C-0024	LD3 modified power I/O	AB-V-ED-01014
VI-C-0029	30 metre LMR 400 DB assembly NF-NM	AB-V-ED-01019
VI-C-0030	40 metre LMR 400 DB assembly NF-NF	AB-V-ED-01020
VI-C-0031	50 metre LMR 400 DB assembly NF-NF	AB-V-ED-01021
VI-C-0032	100 metre LMR 400 DB assembly NF-NF	AB-V-ED-01022
VI-C-0033	80 metre LMR 400 DB assembly NF-NF	AB-V-ED-01023
VI-C-0040	20 metre LMR 400 DB assembly NF-TNCM	AB-V-ED-01030
VI-C-0041	900 mm LMR 240 DB NM-NM	AB-V-ED-01031
VI-C-0042	2 metre LMR 240 DB assembly NF-NM	AB-V-ED-01032
VI-C-0043	2 metre LMR 240 DB assembly NF-TNCM	AB-V-ED-01033
VI-C-0044	10 metre LMR 400 DB assembly NM-NM	AB-V-ED-01034
VI-C-0045	LD3 RTCM	AB-V-ED-01035
VI-C-0046	LD3 Power	AB-V-ED-01036
VI-C-0047	200 metre LMR 400 DB assembly NF-NF	AB-V-ED-01037
VI-C-0048	300 metre Sucor IS Comp NF-NF	AB-V-ED-01038
VI-C-0049	EDLII 30 metre truck	AB-V-ED-01039
VI-C-0050	EDLII 2 metre truck	AB-V-ED-01040
VI-C-0058	65 metre LMR 400 DB assembly NF-NM	AB-V-ED-01048
VI-C-0059	60 metre LMR 400 DB assembly NF-NM	AB-V-ED-01049
VI-C-0060	60 metre LMR400 DB assembly NF-NF	AB-V-ED-01050
VI-C-0066	100 mm LMR240 assembly NM-TNCM RA	AB-V-ED-01056



5.4.1.3 Data components

Part No. Description DWG (dimensional)

VI-D-0010 Port powered RS-232-422 converter

VI-D-0012 Port powered inline RS-232 opto isolator

VI-D-0016 Repeater

VI-D-0017 Repeater

5.4.1.4 Enclosure components

Part No.	Description	DWG (dimensional)
VI-E-0032	GPS antenna mounting bracket	AB-V-ED-01229
VI-E-0033	LD3 receiver mounting plate	AB-V-ED-xxxxx
VI-E-0034	L-band antenna mounting plate	AB-V-ED-01230
VI-E-0049	LID3-G! DPx 6U rack mount plate	AB-V-ED-xxxxx
VI-E-0050	2U cantilever shelf (LD3 – Mount)	AB-V-ED-xxxxx
VI-E-0150	2U dual RF switch plate assembly	AB-V-ED-01226

5.4.1.5 Manuals

Part No.	Description	DWG (dimensional)
VI-M-0011	Under review	AB-V-MA-xxxxx
VI-M-0012	LD3 Operation & maintenance manual	AB-V-MA-xxxxx
VI-M-0013	Under review	AB-V-MA-xxxxx
VI-M-0014	Under review	AB-V-MA-xxxxx

5.4.1.6 RF components

Part No.	Description	DWG (GA)
VI-R-0010	-10 dB directional coupler	AB-V-ED-01233
VI-R-0011	-20 dB directional coupler	AB-V-ED-01233
VI-R-0012	-30 dB directional coupler	AB-V-ED-01233
VI-R-0013	Power divider	AB-V-ED-01238
VI-R-0014	L1/L2 GPS inline amplifier	AB-V-ED-01236
VI-R-0015	RF splitter	AB-V-ED-01234
VI-R-0016	SPST coaxial switch assembly NM-2 NM	AB-V-ED-xxxxx
VI-R-0040	Lightening arrestor	AB-V-ED-xxxxx
VI-R-0041	Gas capsules	AB-V-ED-xxxxx
VI-R-0050	UHF data modem	AB-V-ED-01241



5.4.1.7 Software

Part No.	Description	Image
VI-S-0015	E-learning modules	X
VI-S-0016	Verichart	X
VI-S-0017	DGPS reporter	X
VI-S-0030	LD3 OEM software bundle	Х

5.4.2 Standard systems

The following section details what are considered standard systems for use in a DP environment c/w the associated scope of supply.

Description	DWG
Single LD3-D	AB-V-ED-00500
Single LiD3-G1	AB-V-ED-00501
Single LiD3-G1 – c/w with Verify Dpx	AB-V-ED-00502
Dual LD3-D	AB-V-ED-00503
Dual LiD3-G1	AB-V-ED-00504
Single LiD3-G1 – c/w with Verify Dpx	AB-V-ED-00505
Single LD2-D	AB-V-ED-00506
Single LiD2-G1	AB-V-ED-00507
Single LiD2-G1 – c/w with Verify Dpx	AB-V-ED-00508
Single LiD2-GG1	AB-V-ED-00509
Single LiD2-GG1 – c/w Verify DP	AB-V-ED-00510
Single LiD2-G2	AB-V-ED-00511
Single LiD2-G2 – c/w with Verify Dpx	AB-V-ED-00512
Single LiD2-GG2	AB-V-ED-00513
Single LiD2-GG2 – c/w Verify DP	AB-V-ED-00514
Dual LD2-D	AB-V-ED-00515
Dual LiD2-G1	AB-V-ED-00516
Dual LiD2-G1 – c/w Verify DP	AB-V-ED-00517
Dual LiD2-GG1	AB-V-ED-00518
Dual LiD2-GG1 – c/w Verify DP	AB-V-ED-00519
Dual LiD2-G2	AB-V-ED-00520
Dual LiD2-G2 – c/w Verify DP	AB-V-ED-00521
Dual LiD2-GG2	AB-V-ED-00522
Dual LiD2-GG2 – c/w Verify DP	AB-V-ED-00523
LiD2-G1 + LiD2-GG1	AB-V-ED-00524
LiD2-G1 + LiD2-GG1 - c/w Verify DP	AB-V-ED-00525
LiD2-G1 + LiD2-G2	AB-V-ED-00526
LiD2-G1 + LiD2-G2 – c/w Verify DP	AB-V-ED-00527
LiD2-G1 + LiD2-GG2	AB-V-ED-00528
LiD2-G1 + LiD2-GG2 - c/w Verify DP	AB-V-ED-00529



Description	DWG
LiD2-GG1 + LiD2-G2	AB-V-ED-00530
LiD2-GG1 + LiD2-G2 - c/w Verify DP	AB-V-ED-00531
LiD2-GG1 + LiD2-GG2	AB-V-ED-00532
LiD2-GG1 + LiD2-GG2 - c/w Verify DP	AB-V-ED-00533
LiD2-G2 + LiD2-GG2	AB-V-ED-00534
LiD2-G2 + LiD2-GG2 - c/w Verify DP	AB-V-ED-00535
LiD3-G1 + LiD2-G1	AB-V-ED-00536
LiD3-G1 – c/w DPx + LiD2-G1 – c/w Verify DP	AB-V-ED-00537
LiD3-G1 + LiD2-GG1	AB-V-ED-00538
LiD3-G1 – c/w DPx + LiD2-GG1 – c/w Verify DP	AB-V-ED-00539
LiD3-G1 + LiD2-G2	AB-V-ED-00540
LiD3-G1 – c/w DPx + LiD2-G2 – c/w Verify DP	AB-V-ED-00541
LiD3-G1 + LiD2-GG2	AB-V-ED-00542
LiD3-G1 – c/w DPx + LiD2-GG2 – c/w Verify DP	AB-V-ED-00543

5.4.3 Supplier detail & costs

5.4.3.1 Antennas

Part No.	Supplier	Part No.
VI-A-0010		AD251
VI-A-0011		AD410
VI-A-0013		90984/3/1
VI-A-0014		DHM5000
VI-A-0015		CDA-3
VI-A-0016		T1730026
VI-A-0017		A30

5.4.3.2 Cables

Part No.	Supplier	Part No.
VI-C-0010		VI-C-0010
VI-C-0011		VI-C-0011
VI-C-0012		VI-C-0012
VI-C-0015		399-7187
VI-C-0016		AB-V-ED-01006
VI-C-0017		AB-V-ED-01006
VI-C-0018		VI-C-0018
VI-C-0019		SPECO46393
VI-C-0020		44878
VI-C-0021		31525
VI-C-0022		SPEC044172



Part No.	Supplier	Part No.
VI-C-0023		SPEC044188
VI-C-0024		VI-C-0024
VI-C-0029		VI-C-0029
VI-C-0030		VI-C-0030
VI-C-0031		VI-C-0031
VI-C-0032		VI-C-0032
VI-C-0033		VI-C-0033
VI-C-0040		VI-C-0040
VI-C-0041		VI-C-0041
VI-C-0042		VI-C-0042
VI-C-0043		VI-C-0043
VI-C-0044		VI-C-0044
VI-C-0045		VI-C-0045
VI-C-0046		VI-C-0046
VI-C-0047		VI-C-0047
VI-C-0048		TBC
VI-C-0049		C012159/20
VI-C-0050		C02044
VI-C-0058		VI-C-0058
VI-C-0059		VI-C-0059
VI-C-0060		VI-C-0060
VI-C-0061		44880
VI-C-0062		44945
VI-C-0063		44943
VI-C-0065		AB-V-ED-01055

5.4.3.3 Data Components

Part No.	Supplier	Part No.
VI-D-0010		IC1474A-F
VI-D-0011		Nport 54501
VI-D-0012		OP232/D1
VI-D-0014		RF15A83S
VI-D-0015		HT205P4
VI-D-0016		UPC2000
VI-D-0017		UPC3002



5.4.3.4 Enclosure components

Part No.	Supplier	Part No.
VI-E-0010		6URAL6004
VI-E-0011		6URAL7021
VI-E-0012		DW-00722
VI-E-0020		TBC
VI-E-0032		SSS-0061-D-0023- 01 Rev. C
VI-E-0033		VPS-0001-D-0001- 01 Rev. C1
VI-E-0034		SSS-0061-D-0014- 01 Rev. C1
VI-E-0049		DW-00952
VI-E-0050		457-1499
VI-E-0150	VERIPOS	TBC

5.4.3.5 RF components

Part No.	Supplier	Part No.
VI-R-0010		AMA-1255-10-1W
VI-R-0011		AMA-1255-20-1W
VI-R-0012		AMA-1255-30-1W
VI-R-0013		AMA-2255-2N
VI-R-0014		LA21-L1L2-N
VI-R-0015		SPLIT2N-PRO
VI-R-0016		477-4632
VI-R-0040		111-642
VI-R-0041		494-919
VI-R-0150		EDLII



5.4.3.6 User interface

Part No.	Supplier	Part No.
VI-V-0012		JH 15T15 MMD
VI-V-0014		JH 17TO2 MMD
VI-V-0016		40765
VI-C-0017		33751
VI-C-0018		Unavailable
VI-C-0019		33754
VI-C-0020		33756
VI-C-0021		Unavailable
VI-C-0022		37361
VI-C-0023		37363
VI-C-0024		37364
VI-C-0025		37366
VI-C-0026		37367
VI-C-0027		Unavailable
VI-C-0028		33462
VI-C-0029		33463
VI-C-0030		33465
VI-C-0031		TBC
VI-C-0032		493-118

5.4.4 Integrated receivers and options

5.4.4.1 LD3 integrated receiver

Item	Supplier	Part No.
LD3 chassis	VERIPOS	TBC
L-band		TBC
DG14 GNSS		TBC
DG16 GNSS upgrade		TBC



6 Contact information

6.1 VERIPOS UK



Prospect Road Arnhall Business Park Westhill Aberdeenshire, AB32 6FE United Kingdom

6.1.1 Helpdesk

 Helpdesk telephone
 +44 (0)1224 527104

 Helpdesk facsimile
 +44 (0)1224 748204

 VERIPOS UK Operations
 +44 (0)1224 526000

 project management
 +44 (0)1224 526000

Helpdesk e-mail veripos.helpdesk@subsea7.com

VERIPOS Online support http://help.veripos.com



NOTE -

If shipping equipment back to VERIPOS, please contact the Helpdesk who will provide the current shipping address, according to the user's area of operations.

6.2 Additional VERIPOS offices:



15990 North Barker's Landing Suite 200 Houston, Texas 77079 USA



2E Capital Building No 39 Tampines Street 92, #02-01 Singapore 528883



Subsea 7 (do Brasil) Avenida prefeito Aristeu Ferreira da Silva, 1256 27930-070 Novo Cavaleiro – RJ Brazil



Calle 64 No. 26, Fracc. Justo Sierra Entre Av. Justo Sierra Y 31-B Cuidad Del Carmen, Campeche Mexico

