

## EXPLORER® 325



# EXPLORER® 325

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## Safety summary

The following general safety precautions must be observed during all phases of operation, 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. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

### Observe marked areas

Under extreme heat conditions do not touch areas of the terminal or antenna that are marked with this symbol, as it may result in injury.



### Microwave radiation hazards

During transmission the antenna in this system radiates Microwave Power. This radiation may be hazardous to humans close to the antenna. When the system is powered, make sure that nobody gets closer than the recommended minimum safety distance.



The minimum safety distance is 0.6 m to the side and above the antenna when the EXPLORER 325 is powered. The safety distance of 0.6 m does not apply directly below the antenna, as the radiation forms a hemisphere above the antenna.

### Service

User access to the interior of the system units is prohibited. Only a technician authorized by Thrane & Thrane A/S may perform service - failure to comply with this rule will void the warranty.

### Do not service or adjust alone

Do not attempt internal service or adjustments unless another person, capable of rendering first aid resuscitation, is present.

### Power supply

The voltage range is 10.5 - 32 V DC; 11.5 A - 4 A. Be aware of high start-up peak current: 20 A@24 V, 5 ms.

### Do not operate in an 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 safety hazard.

### Keep away from live circuits

Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

### Install and use the antenna with care

Thrane & Thrane assumes no liability for any damage caused by the antenna falling off the vehicle or stressing the mounting base. It is the responsibility of the customer to ensure a safe and correct installation of the antenna. The instructions in the Installation manual are only guidelines.

Note the following safety guidelines for mounting the antenna with magnetic mounts:



**CAUTION!** Do not place your fingers underneath the antenna when placing the antenna on the vehicle!  
The magnetic force is very powerful and your fingers may be hurt if they are caught between the antenna and the mounting surface.

Under normal driving circumstances the magnetic force of the magnetic mount kit for the antenna should be sufficient to hold the antenna. However, the magnets may not be able to hold the antenna in place, if:

- the vehicle is involved in an accident,
- the magnets are not mounted properly,
- the roof is not plain or made of a material that will not stick properly to the magnets,
- the speed of the vehicle is too high and/or
- the road is very bumpy.

We recommend mounting the antenna directly on the roof instead of using the magnetic mount kit. Make sure that all mounting bolts and nuts are secured properly, and that the material of the mounting surface is strong enough to hold the antenna during the intended use.

**Failure to comply with the rules above will void the warranty!**

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## About the manual

### Intended readers

This is an installation manual for the EXPLORER 325 system, intended for installers of the system and service personnel. Personnel installing or servicing the system must be properly trained and authorized by Thrane & Thrane. It is important that you observe all safety requirements listed in the beginning of this manual, and install the system according to the guidelines in this manual.

### Manual overview

Note that this manual does not cover general use of the system nor does it cover how to use the IP handset that comes with the system. For this information, refer to the user manual for this system and the user manual for the IP handset, both listed in the next section.

This manual has the following chapters:

- **System units** contains a short description of each main unit in the system.
- **Installing the system** describes where to place the system units, how to mount them, distance to other equipment etc.
- **Connecting power** explains how to connect the terminal to power and gives recommendations for cables.
- **Hardware interfaces** describes each interface on the terminal and shows pin-out for the connectors.
- **Starting up the system** explains how to insert the SIM card, power up the system and enter the PIN. It also gives a short overview of how to use the system.
- **Troubleshooting** describes the function of the Reset button and the light indicator on the terminal. It also describes event messages that may appear in the web interface.

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## Related documents

The below list shows the documents related to this manual and to the system.

Title and description	Document number
<b>EXPLORER 325 User Manual</b> Explains how to set up and use the EXPLORER 325 system.	98-131305
<b>EXPLORER 325 Quick Guide</b> A short guide to the most important functions of the EXPLORER 325 system.	98-131307
<b>Thrane IP Handset, User Manual</b> Explains the features and functions of the Thrane IP Handset. The IP handset works as a standard IP handset, but also serves as a user interface for the EXPLORER 325 system.	98-126059

## Typography

In this manual, typography is used as indicated below:

**Bold** is used for the following purposes:

- To emphasize words.  
Example: “Do **not** touch the antenna”.
- To indicate what the user should select in the user interface.  
Example: “Select **SETTINGS > LAN**”.

**Italic** is used to emphasize the paragraph title in cross-references.

Example: “For further information, see *Connecting Cables* on page...”.

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## System units

### Introduction

The basic system consists of three units: The terminal, the antenna and the IP handset with cradle.

### EXPLORER 325 terminal

The terminal is the central unit in the system. It contains all user interfaces and handles all communication between the BGAN antenna and the local communication units (phones, computers etc.).



The terminal supplies 23.0 - 30.0 V DC to the antenna through a single coaxial cable.

The DC input for the terminal is designed for both 24 V DC and 12 V DC power supply.

### EXPLORER 325 antenna

The EXPLORER 325 antenna is a mechanical tracking antenna, consisting of a 2-axis stabilized antenna with RF-unit, antenna control unit and GPS antenna. The antenna is dedicated to the Inmarsat BGAN (Broadband Global Area Network) system and is designed for roof mounting on a vehicle. All communication between the antenna and terminal passes through a single coaxial cable.



## ***Thrane IP Handset & Cradle***



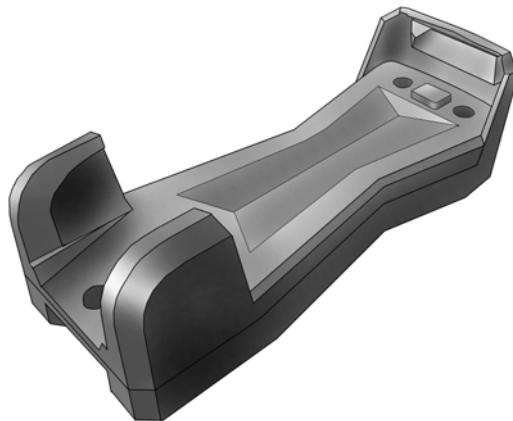
### **Thrane IP Handset**

Besides the normal functions of an IP handset, the Thrane IP handset also provides a user interface for the EXPLORER 325 system. The IP handset connects to the LAN interface of the terminal, and is power supplied with Power over Ethernet (PoE) through the LAN interface.

For further information on the IP handset, refer to the user manual for the Thrane IP Handset.

### **Thrane IP Cradle**

The IP cradle serves as a holder for the IP handset. It is power supplied from the terminal using Power over Ethernet (PoE). The cradle connects to the handset with a coil cord and to the terminal with a standard LAN cable.



## *Installing the system*

### *Unpacking*

Unpack your EXPLORER 325 system and check that the following items are present:

- TT-3733A EXPLORER 325 terminal
- TT-3058A EXPLORER 325 antenna
- TT-3670A Thrane IP Handset & Cradle, wired
- Power cable
- Antenna cable
- LAN cable
- Getting Started kit including:
  - Quick Guide
  - EXPLORER 325 CD  
including electronic versions of User manual, Installation manual and Quick Guide.

Inspect all units and parts for possible transport damage.

**Note**

For information on how to install the IP handset and cradle, refer to the user manual for the handset.

## Placing the antenna

### Obstructions

Obstructions can cause signal degradation.

The amount of degradation depends on the size of the obstruction and the distance from the antenna. As a rule of thumb any obstruction that covers an angle of less than  $3^\circ$  at the antenna has limited effect. The table below gives a guideline for obstruction sizes that will cause limited degradation.

Distance of Obstruction	Size of Obstruction
3 m	16 cm
5 m	26 cm
10 m	52 cm
20 m	104 cm

### Radiation hazard

The EXPLORER 325 antenna radiates 15.1 dBW EIRP. This translates to a minimum safety distance of 0.6 m from the antenna while it is transmitting, based on a radiation level of  $10 \text{ mW/cm}^2$ . Note that the safety distance applies to a hemisphere above the antenna. The antenna does not radiate power directly below the antenna.

### Interference

Do not place the antenna close to interfering signal sources or receivers. We recommend that no other antennas are located within three meters of the antenna. If other equipment is installed near the EXPLORER 325 we recommend testing the total system by operating all equipment simultaneously and verifying that there is no interference.

## Installing the antenna



**CAUTION!** It is the responsibility of the customer to ensure a safe installation! See guidelines in the *Safety summary* on page iii.

### Antenna cables

#### Guidelines

A coaxial cable for connection between the antenna and terminal is delivered with the system. If you need a different cable, make sure that the cable meets the requirements. Preferably choose one of the cable types in *Recommended antenna cables* below.

The maximum allowed RF-loss in the antenna cable is 20 dB at 1660 MHz. This is to ensure the performance of the system.

#### Recommended antenna cables

The table below shows recommended cable types and maximum cable lengths for EXPLORER 325.

Cable Type	Absolute maximum length
RG-223_U-01	14 m
RG-214_U-01	50 m
S-10162-B-11	92 m

Check in the data sheet from the cable supplier that both the RF-attenuation and the DC-resistance are kept within the maximum specified values:

- Antenna cable RF-attenuation at 1660 MHz: max. 20 dB incl. connector.
- Antenna cable modem-attenuation at 54 MHz: max. 4 dB.  
Antenna cable modem-attenuation at 36 MHz: max. 3 dB.
- Antenna cable loop DC-resistance max: 0.6  $\Omega$ .

Also ensure that the specified minimum bending radius is respected. If this is not the case, the loss in the cable will increase. Check the instructions from the cable supplier. The bending radius for the coax cable delivered with the system is min. 110 mm.

## Important mounting notes

### Line of sight

Place the antenna with free line of sight in all directions to ensure proper reception of the satellite signal. Do not place the antenna close to large objects that may block the signal.

After installing and starting up the EXPLORER 325, we recommend checking the signal strength while driving the vehicle in a 360° circle to ensure a clear line of sight in all directions.

### Condensation

In some cases there will be condensation inside the antenna. Ventilation holes in the bottom of the EXPLORER 325 antenna are designed to lead any water away from the antenna.

Make sure these ventilation hole are not blocked.

**Important** Make sure there is always a distance of min. 10 mm between any part of the antenna bottom and the mounting surface. If the magnets are not used, use 10 mm spacers (or higher if necessary) at each bolt.

See *Mounting the antenna fixed on the vehicle roof* on page 8.

## Mounting the antenna

The antenna can now be installed on the roof of the vehicle. You may choose between these methods:

- Attach the antenna using the magnets underneath the antenna. The magnetic force will keep the antenna fixed to the vehicle roof. Note that this method requires a vehicle roof made of magnetizable material.
- Mount the antenna directly on the roof of the vehicle. This method requires that you drill holes in the roof of the car. Remember to leave min. 10 mm space between the antenna and the roof.

Refer to the *Safety summary* on page iii.

## Magnetic mount

### Overview

The antenna comes mounted with 3 individual high intensity magnets with rubber coating. You can place the EXPLORER 325 antenna directly on the roof of the vehicle using these magnets.

### Installing antenna with the magnetic mount kit

**Note**

Make sure the roof of the vehicle is made of a magnetizable material. Wipe the surface clean before placing the antenna on the roof, in order to make a better connection between the magnets and the roof and to avoid scratches in the surface.

To use the magnetic mounts, do as follows:

1. Place the antenna with magnets on the roof of the car. Remember that the magnets only work on a roof made of magnetizable material!



**CAUTION!** Do not place your fingers underneath the antenna when placing the antenna on the vehicle!

The magnetic force is very powerful and your fingers may be hurt if they are caught between the antenna and the mounting surface.

2. Connect the antenna cable between the terminal and the antenna.  
Refer to *Antenna cables* on page 5.

### Detaching the antenna

Grab the antenna near one of the magnets and lift it. When one magnet is loose, the other two are easier to “break off”.

## Mounting the antenna fixed on the vehicle roof

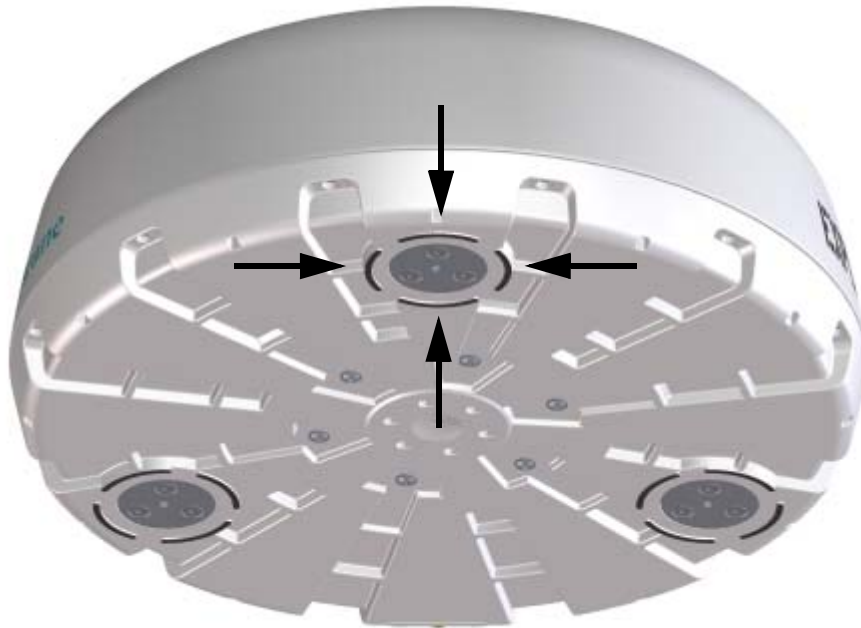
The antenna may be fixed on the roof of your car, using three M5 bolts and mounting plates. This solution requires that you drill three holes in the roof of the car and remove the magnets from the antenna.

To mount the antenna, do as follows:

1. Unscrew the 3 magnets from underneath the antenna and remove them.
2. Use mounting plates that, as a minimum, cover the 4 raised areas around each of the 3 mounting bushings. See the drawing below,

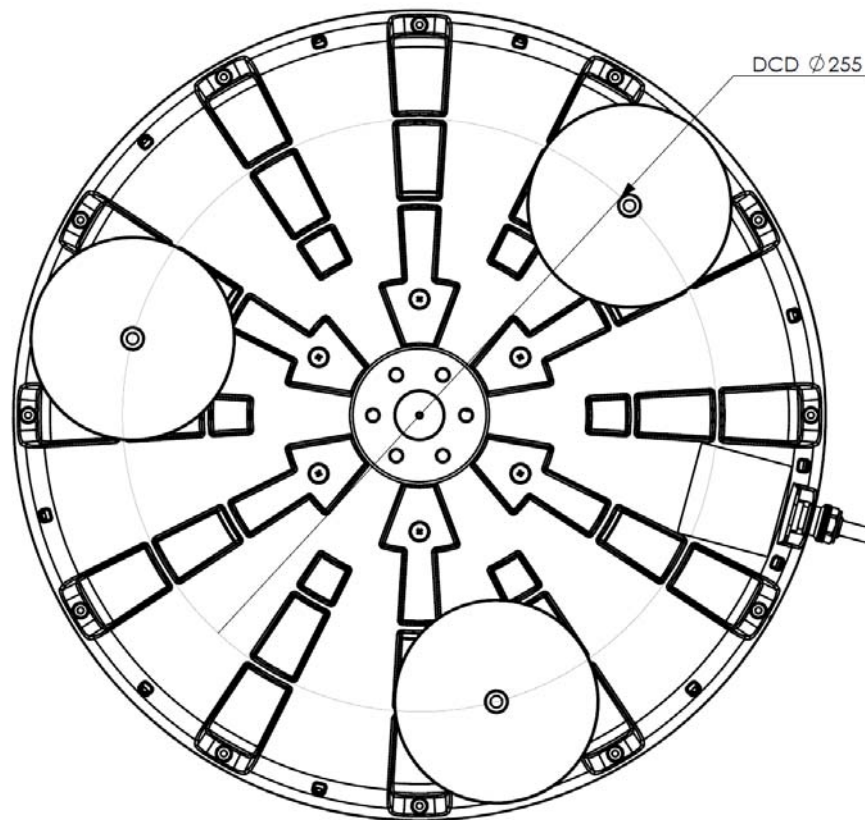
**Example:** You can use 3 mounting plates with a shape and size similar to the magnets provided with the antenna, i.e. approximately  $\varnothing 90 \text{ mm} \times 10 \text{ mm}$ .

**Important** | Do not mount the antenna without mounting plates!





- Based on the dimensions of the mounting plates, calculate and mark up the position of the holes to be drilled in the roof of the car. The drawing below shows the Drill Circle Diameter for the bushings in the antenna. The bushings are 120° apart.



- Drill the 3 holes in the roof according to the previous step.
- Mount the antenna with the mounting plates using 3 M5 screws and washers. If the mounting plates are less than 10 mm thick, use spacers to obtain a minimum distance of 10 mm between the roof and the antenna bottom. This is to ensure that the ventilation holes in the bottom of the antenna are not blocked.

**Important**

The screws must never penetrate more than 10 mm into the bushings in the antenna!

## ***Placing the terminal***

### **Where to place the terminal**

#### **General**

The terminal is designed for installation inside a vehicle. It is not suited for outdoor installation.

#### **Temperature conditions**

The terminal must be placed in a ventilated area with free space around all sides of the unit, except the bottom side.

Ambient temperature range is  $-25^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .

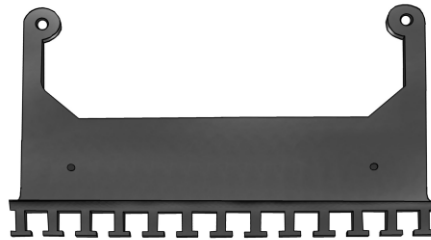
If the terminal is installed in a location where the ambient temperature may exceed  $45^{\circ}\text{C}$ , we recommend placing the terminal where unintentional contact is avoided. If the maximum ambient temperature does not exceed  $45^{\circ}\text{C}$ , the terminal can be placed in a public area.

## Installing the EXPLORER 325 terminal

### Mounting the Basic cable support

The Basic cable support is available from Thrane & Thrane's eShop as "Accessories kit F/ Terminal".

When mounted on the terminal the Basic cable support offers a number of holders to which you can secure the cables from the terminal, using cable strips.



To mount the Basic cable support, do as follows:

1. Remove the two rubber washers from the bottom of the terminal at the connector panel end. The threaded bushings underneath the rubber washers are used for mounting the cable support.



2. Fasten the Basic cable support to the terminal using two M4 x 6 mm countersunk screws.



3. Install the terminal as described in the next section.

## Installing the terminal

Do as follows to mount the terminal:

1. Insert four screws through the mounting holes and into the mounting surface.



2. Connect all cables.  
If you use the cable support, secure the cables to the cable support using cable strips.

## Connecting power

### Power source

The 12 or 24 V DC supply of the vehicle provides power for the terminal.

**Note** Do not use the cigarette lighter socket in the vehicle to supply power for the EXPLORER 325. Connect directly to the 12 or 24 V supply instead.

Note that the maximum allowed source impedance is much lower for a 12 V DC supply than for a 24 V DC supply. Also, the total output power available for Power over Ethernet is limited when the power supply is 12 V DC.

Be aware of high start-up peak current: 20 A at 24 V, 5 ms.

The terminal is equipped with an internal 20 A Fuse, so no external fuse is necessary in order to protect the terminal. However, in order to avoid short circuit in the power cable/connector, the DC outlet of the vehicle should be protected by a 30 A fuse or circuit breaker.

### Power cable selection

#### Source impedance

The length of the power cable depends on the type of cable used and the source impedance of the DC power installation in the vehicle.

The maximum allowed source impedance depends on the usage of the power range of the terminal DC input (10.5 - 32 V DC; 11.5 A - 4 A).

Select a power outlet from the DC system and measure the source impedance of the installation as described in the next section.

**Note** If the total impedance is higher than the limits stated in this section, the terminal may become unstable and start to on/off oscillate.  
The total impedance is made up of the source impedance of the vehicle power supply plus the impedance of connected cables including connectors and joints where cables are extended.

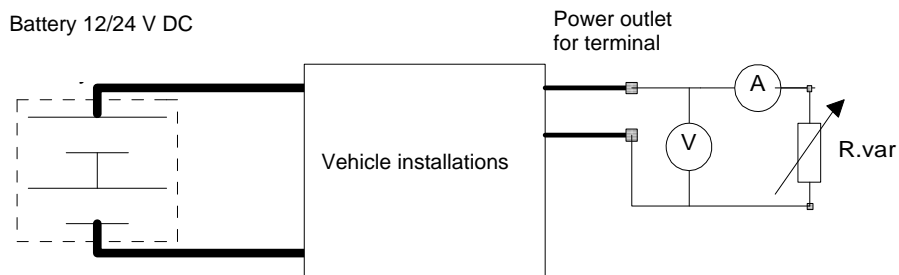
For further recommendations on power cable selection, see *Power cable recommendations* on page 15.

## Measuring the source impedance

Select a power outlet from the 24 V DC or 12 V DC system, and measure the source impedance of the installation as described below.

1. Measure the voltage without load (R.var disconnected).
2. Set the current to e.g. 1 A by adjusting R.var.
3. Measure the corresponding voltage change.

**Example:** 1 A and 50 mV. Source impedance:  $50 \text{ mV}/1 \text{ Amp} = 50 \text{ m}\Omega$ .



## Power cable recommendations

### Overview

The terminal is delivered with a power cable, which can be extended according to the recommendations in this section.

- When extending the power cable, positive and negative supply wires must be installed closely together side by side to keep cable inductance low.
- Ensure that cable inductance for the selected cable at the desired length is below the 50  $\mu$ H requirement.

The power cable that comes with the EXPLORER 325 is 3 meters long and contains the following wires:

Color of wire in power cable	Pin number in connector	Function
Red	A1	Vin+
Black	A2	Vin-

If you want to use the Remote on/off function, you can acquire a power cable that includes the remote on/off wires. The following cables are available from Thrane & Thrane's eShop:

- BGAN-X BDU Power Cable, length: 0.5 m
- BGAN-X BDU LV Cable, length: 6 m

The power cables with remote on/off wires contain the following wires:

Color of wire in power cable	Pin number in connector	Function
Red	A1	Vin+
Black	A2	Vin-
Black	1	not connected
Green	2	Remote on/off
Brown	3	not connected
Red	4	not connected
Orange	5	Remote on/off

## Calculating the maximum power cable extension

**For 24 V DC operation**, the total impedance must be max. 500 mΩ, including the source impedance in the vehicle installation.

**For 12 V DC operation**, the total impedance must be max. 85 mΩ, including the source impedance in the vehicle installation.

The total impedance is made up of the following:

- the source impedance in the vehicle installation
- the cable impedance of the supplied power cable, including the impedance in the joint of the two cables. In the following example, the impedance of the cable and joint is set to 50 mΩ (6 m power cable). Note that if the cable length or type is changed, the impedance will change accordingly.
- the extension cable impedance.

To calculate the maximum cable extension, do as follows:

1. First measure the source impedance in the vehicle installation as shown in *Measuring the source impedance* on page 14.
2. Then find the resistance per meter for the cable type you are going to use.  
For 4 mm<sup>2</sup>/AWG 11, the value is 4 mΩ/m at 20°C  
For 1.5 mm<sup>2</sup>/AWG 15, the value is 10 mΩ/m at 20°C  
For other cable types, refer to the data sheet for the cable.
3. Calculate the maximum allowed impedance in the extension cable as follows:  
Max. allowed impedance in extension cable = max. total impedance - (measured source impedance + impedance of the supplied cable).
4. Then calculate the max. extension cable length as follows:  
Max. length = 0.5 x  $\frac{\text{Max. impedance in extension cable (from step 3.)}}{\text{impedance/meter (from step 2.)}}$

The length is multiplied by 0.5 above because there are two conductors in the cable.



**Example:****Note**

The following example may not be applicable to your installation! For example, the source impedance of the vehicle power supply varies depending on the type of battery and the temperature.

Vehicle supply voltage: 12 V DC

Vehicle source impedance (measured): 15 mΩ

Extension cable type: 4 mm<sup>2</sup> (AWG 11)

$$\text{Max. cable extension} = 0,5 \times \frac{85\text{m}\Omega - (15\Omega + 50\text{m}\Omega)}{4\text{m}\Omega/\text{m}} = 2,5\text{m}$$

In this case, the power cable can be extended with up to 2.5 m.

If you need a longer cable, you can double the maximum allowed length by connecting two cables instead of one, or you can use a cable with a larger diameter.

## Connecting power

### Connecting the power cable

#### To connect the power cable

Do as follows to connect the power cable:

1. Connect the red (+) and black (-) wires of the power cable to the DC supply according to the recommendations in the previous sections.
2. Connect the D-sub connector on the power cable to the DC input connector on the terminal.



If you need a **remote on/off** function, you may use one of the following options:

- Connect the Remote on/off wires in the power cable to a remote switch. For further information, see *Connecting a Remote on/off switch* on page 19
- Connect the ignition pins in the I/O connector to the ignition of your vehicle. For further information, see *Connecting to the ignition* on page 18.

For information on pin-out, see *DC power input* on page 22.

For specifications of the DC input on the terminal, see *EXPLORER 325 terminal* on page 44.

### Connecting to the ignition

The terminal has an ignition function. When this function is used, the terminal switches on/off when you start/stop the engine of your vehicle (provided the power switch on the terminal is on).

#### Note

You must set up the ignition function in the terminal. For details, see the user manual for your EXPLORER 325 system.

To implement the ignition function, connect the appropriate pin in the I/O connector to the ignition key switch:

- Active high (default): Connect pin 5 to Ground. Connect pin 8 to “high” (10.5-32 V DC) when the ignition is on.

- Active low: Connect pin 8 to positive DC voltage (10.5-32 V DC). Connect pin 5 to Ground (< 1.2 V DC) when the ignition is on.

For pin-out and default functions, see *Discrete I/O interface* on page 26.

For information on the standby current when the ignition power is off, see *Standby current* on page 45 in the general specifications.

## Connecting a Remote on/off switch

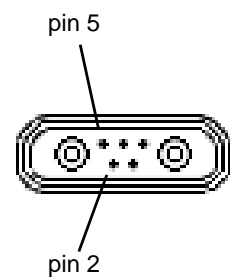
The terminal has a remote on/off function. When the terminal power switch is in the “on” position you can remote-control the power function.

By installing a switch that can short-circuit the “Remote on/off” pins (2 and 5) in the power connector you can power the terminal on or off with this remote switch.

When pins 2 and 5 are not short-circuited and valid input power is present, the terminal is powered on, provided the Power switch is in the “on” position.

For pin-out for the power connector and a description of the wire colors in the power cable, see *Pin-out* on page 22.

For information on the standby current when the remote on/off switch is off, refer to *Standby current* on page 45 in the *General specifications*.



## Hardware interfaces

### The connector panel

The connector panel is placed at one end of the terminal and has the following connectors:



- 1 Antenna connector (TNC)
- 1 Phone connector
- 2 LAN connectors with Power over Ethernet (PoE)
- 1 DC power input connector for connection to 10.5-32 V DC, with optional remote on/off
- 1 Input/Output connector with 5 inputs/outputs for external control or signaling
- 1 ground stud with wing nut

For information on how to connect to a specific interface, see the next sections.

## Antenna interface on terminal

### Overview

The antenna interface on the terminal connects to the TT-3058A antenna.

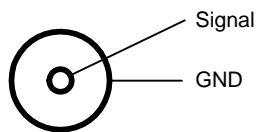
The antenna connector on the terminal is a TNC female connector placed in the connector panel.



For information on cables and how to install and connect the antenna, see *Installing the antenna* on page 5.

### Pin-out

The below drawing shows the TNC female connector in the terminal.



## DC power input

### Overview

The DC power input for the terminal is a 10.5 - 32 V DC; 11.5 A - 4 A input with a remote on/off function. The input is protected against reverse polarity.

The power connector is a D-sub connector placed in the connector panel.



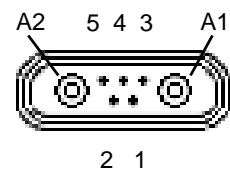
For information on power recommendations and how to connect, see *Connecting power* on page 13.

### Pin-out

The power connector is a Mixed D-Sub connector 7W2, control pin male/ power pin male. The below table shows the pin-out for the connector and the colors of the corresponding wires.

Pin number	Pin function	Color of wire in power cable
A1	Vin+	Red
A2	Vin-	Black
1	not connected	Black
2	Remote on/off	Green
3	not connected	Brown
4	not connected	Red
5	Remote on/off	Orange

Mixed D-Sub connector, 7W2, male



## Analog Phone interface

### Overview

The terminal has one RJ-11 port, which can be used for connection of an analog phone or fax machine.

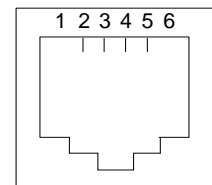


### Pin-out

The Phone connector is an RJ-11, 6/4 female connector. The table and figure below show the connector outline and pin assignments.

Pin number	Pin function
1	-
2	not connected
3	Tip
4	Ring
5	not connected
6	-

RJ-11 female connector



## LAN interface

### Overview

The terminal has two Ethernet LAN ports with Power over Ethernet (PoE). The standard for the Ethernet ports is IEEE 802.3af, and the connectors are RJ-45 connectors.



### Power over Ethernet (PoE)

- One power supply powers both interfaces with a floating 48 V DC supply (44 - 57 V DC). Therefore, the interfaces are not galvanically separated from each other. Both Tx signals are DC connected to the Positive PoE Voltage and both Rx signals to the Negative PoE Voltage. The total output power from the interfaces is 32 W.

Both interfaces can support devices of power class 1, 2 and 3 (4, 7 and 15.4 Watt), as long as the total power consumption does not exceed the above limits. If the limits are exceeded, the LAN ports are prioritized so that LAN port 1 has the highest priority.

In case of power hold-up (failure on input power), PoE will be turned off.

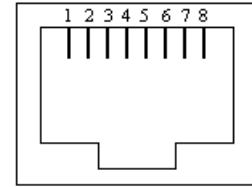


## Pin-out

The figure and table below show the connector outline and pin assignments.

Pin number	Pin function
1	TxD+ input (positive PoE)
2	TxD-input (positive PoE)
3	RxD+ output (negative PoE)
4	not connected
5	not connected
6	RxD- output (negative PoE)
7	not connected
8	not connected

RJ-45 female connector



## Connecting the Thrane IP handset

To connect the Thrane IP Handset to the terminal, do as follows:

Connect the cable from the IP cradle to one of the LAN connectors on the terminal, preferably port 1. In case of insufficient power to the LAN PoE the LAN ports are prioritized, so that port 1 is the last to be shut down.

Note that the handset and terminal must be set up to be able to communicate with each other. For further information, refer to the user manual for the handset.

The maximum length of the cable between IP cradle and terminal is 80 m.

**Note** If you insert a switch or similar between the cradle and the terminal, make sure that it conforms to the industry standard **IEEE 802.3 af (using data pairs)**.

## Discrete I/O interface

### Overview

The terminal has an I/O connector with 5 configurable inputs/outputs.

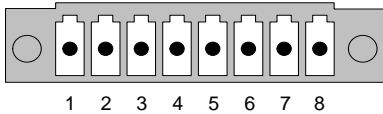


The connector is a WieCon Type 8513S connector. A mating I/O connector is included in the delivery.

### Pin-out

The figure and table below show the connector outline and pin assignments.

WieCon Type 8513S connector



Pin number	Connection	Default configuration <sup>a</sup>
1	GPIO 1	Ringer output
2	GPIO 2	Warning/Error output
3	GPIO 3	Mute output
4	GPIO 4	Radio silence input
5	GPIO 5	Ignition input
6	Chassis GND	Chassis GND
7	DC out	9-15 V DC, 50 mA
8	DC in	(ignition input)

a. The default functions of the I/O pins are described in the next section.

## Default configuration of I/O pins

The built-in web interface of the terminal offers a page for configuring the I/O pins.

The functions of the I/O pins are as follows:

### Pin 1: Ringer output.

Pin 1 acts as a built-in switch in the terminal. You can configure Pin 1 to be Normally closed or Normally open.

**Note**

Do not use the Ringer output if you have enabled Local exchange. For information on Local exchange, refer to the User manual.

- **Normally closed (default):**  
The internal switch at pin 1 is normally closed (pin 1 is connected to ground). When the terminal is notified of an incoming call from the satellite interface, the switch opens (no connection to ground). When the call is answered, or the caller gives up and releases the call, the switch is closed again.
- **Normally Open:**  
The internal switch at pin 1 is normally open (no connection to ground). When the terminal is notified of an incoming call from the satellite interface, the switch is closed (pin 1 is connected to ground). When the call is answered, or the caller gives up and releases the call, the switch is opened again.

### Pin 2: Warning/Error output.

Pin 2 acts as a built-in switch in the terminal. Pin 2 can be used to provide an external signal that indicates active warning/error condition(s). You can configure pin 2 to be Normally closed or Normally open.

- **Normally Closed (default):**  
The internal switch at pin 2 is normally closed (pin 2 is connected to ground). When an alarm occurs, the switch opens (no connection to ground). The switch is closed again when all warnings/errors are cleared.
- **Normally Open:**  
The internal switch at pin 2 is normally open (no connection to ground). When an alarm occurs, the switch is closed (connected to ground). The switch is opened again when all warnings/errors are cleared.

### Pin 3: Mute output.

Pin 3 acts as a built-in switch in the terminal. Pin 3 can be used to provide an external signal that is active during a phone call. The signal can be used to mute external equipment. You can configure pin 3 to Normally closed or Normally open.

- **Normally Closed (default):**  
The internal switch at pin 3 is normally closed (pin 3 is connected to ground). During phone calls, the switch opens (no connection to ground). When the call is ended, the switch is closed again (connected to ground).
- **Normally Open:**  
The internal switch at pin 3 is normally open (no connection to ground). The switch is closed (connected to ground) during phone calls. When the call is ended, the switch opens again (no connection to ground).

**Pin 4: Radio silence input.**

Activation of this pin causes the system to assume radio silence, i.e. to stop all transmission from the system. The terminal gracefully closes all open connections, and deregisters from the BGAN network. No transmission is allowed until the pin is deactivated. You can configure pin 4 to Active low or Active high.

- Active low (default): Connect pin 4 to ground (< 1.2 V DC) when it should be activated.
- Active high: Connect pin 4 to ground (< 1.2 V DC). When it should be activated, disconnect it from ground.

**Pin 5/8: Ignition input.**

The ignition function can be used to turn on/off the terminal by means of an external signal. The external signal that triggers the ignition function can be either positive DC voltage or ground. The ignition function uses pin 5 together with pin 8 (DC in). Connect the appropriate pin to the ignition switch as follows:

- Active high (default): Connect pin 5 permanently to Ground. Connect pin 8 to positive DC voltage (10.5-32 V DC) when the ignition is on. To switch off, disconnect pin 8 from the positive DC voltage.
- Active low: Connect pin 8 permanently to positive DC voltage (10.5-32 V DC). Connect pin 5 to Ground (< 1.2 V DC) when the ignition is on. To switch off, disconnect pin 5 from ground.

**Pin 6: Ground.**

(Non-configurable) Pin 6 can be used as an external connection to ground. Pin 6 is connected to Ground inside the terminal.

**Pin 7: DC output.**

(Non-configurable) Pin 7 can be used as a DC output. The voltage on pin 7 is 9-15 V and the output can supply up to 50 mA. Pin 7 can be used as power supply to a relay, ringer or similar.

For information on how to configure the I/O pins, see the user manual for the EXPLORER 325 system.

## Starting up the system

### Using the SIM card

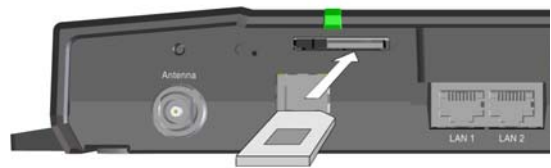
#### Inserting the SIM card

The SIM card is provided by your Airtime Provider. Insert the SIM card as follows:

1. Open the SIM cover in the left side of the connector panel.

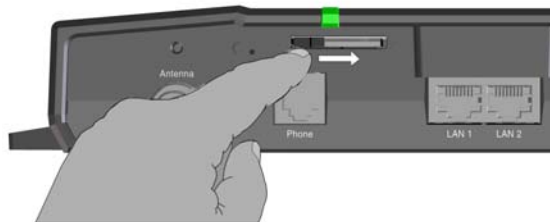


2. Insert the SIM card into the SIM slot. Place the card with the chip side facing up as shown.



3. Press gently until it clicks.

4. Slide the lock in front of the SIM card.



5. Close the cover for the SIM slot.

## Removing the SIM card

**Note**

When the SIM card is removed, you cannot use the BGAN menu of the IP handset nor make calls or start data sessions.

Only emergency calls are allowed, and only if permitted by the network.

However, if you have an administrator user name and password, you can upload software using the web interface without having a SIM card. For further information, see the user manual for the EXPLORER 325 system.

Remove the SIM card as follows:

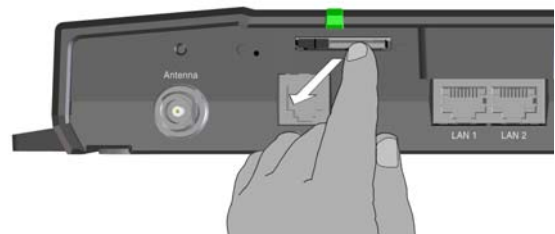
1. Open the SIM cover in the left side of the connector panel.



2. Slide the lock aside.



3. Gently push the SIM card and let it pop out.



4. Remove the SIM card and close the cover for the SIM slot.

## Powering the system

### Switching the terminal on

#### Using the power switch

**To switch on** the terminal, use the On/Off switch in the connector panel. It normally takes one or two seconds for the terminal to switch on.



#### Using the ignition system

If you have connected the ignition system of your vehicle to the I/O connector, you may leave the power switch in the “on” position and the terminal will switch on/off when you start/stop the engine of your vehicle.

When the engine is stopped the terminal is in standby mode, meaning that only the primary parts of the system are kept alive. The standby current is max. 15 mA when the ignition is off. For information on how to connect to the ignition, refer to *Connecting to the ignition* on page 18.

You must set up the ignition function in the web interface. For further information, see the user manual for the EXPLORER 325 system.

**Note** In some cases, the system may reboot after power-on because of the high start-up current.

#### Using a remote on/off switch

If an external switch is connected to the remote on/off pins in the DC connector, you may leave the power switch in the connector panel in the “on” position and use the remote switch to turn the terminal on and off. When the remote switch is off, the terminal is off. However, if you leave the power switch on the terminal in the “on” position, you can always switch the terminal back on with the remote switch. The standby current when the remote switch is off is max. 2 mA. For further information on how to connect a remote on/off switch, see *Connecting a Remote on/off switch* on page 19.

## Switching the terminal off

To **switch off** the terminal, change the position of the power switch again.

**Note** | Wait at least 5 seconds after power off, before trying to power on the system again.

To **switch off using the Ignition function**, leave the On/Off switch in the connector panel in the On position and turn off the ignition.

## Entering the SIM PIN for the terminal

### Overview

If your SIM card requires a PIN, you have to enter a PIN to use the system. You can enter the PIN using a standard phone, the IP handset or the web interface.

For information on how to connect the handset or computer you are going to use, refer to the user manual.

### Entering the PIN using a phone or IP handset

#### To enter the PIN

If you have a phone connected to the terminal, you can use it to enter the PIN at start up.

Do as follows:

- **For an analog phone:**  
Pick up the phone. When the terminal is waiting for a PIN, you will hear 2 beeps - pause - 2 beeps - etc.  
Dial <PIN> followed by #.  
When you hear a “busy” tone or a dialing tone, the PIN has been accepted and you can hang up or dial a number.
- **For an IP handset:**  
Select the **BGAN** menu, select **ENTER PIN** and enter the user name and password for the terminal. Then enter the PIN for the terminal.

**Note** | The ENTER PIN menu item is only available if your SIM card requires a PIN, and the PIN has not yet been entered and accepted in the terminal.

#### Wrong PIN

##### Analog phone:

If, instead of the busy tone or dialing tone, you continue to hear 2 beeps - pause - 2 beeps - etc., it means the PIN was not accepted. Check that you have the correct PIN and try again.



If a wrong PIN has been entered three times, you will hear 3 beeps - pause - 3 beeps - etc. This means you have to enter the PUK (PIN Unblocking Key) provided with your SIM card. After entering the PUK, you must enter a new PIN of your own choice (4 to 8 digits long).

Dial the following:

**<PUK> \* <New PIN> \* <New PIN>** followed by # or off-hook key.

**Example:** If the PUK is 87654321 and the new PIN is 1234, dial  
**87654321 \* 1234 \* 1234** followed by # or off-hook key.

If you enter 10 wrong PUKs, the SIM card will no longer be functional. Contact your Airtime Provider for a new SIM card.

**IP handset:**

After having entered the user name and password for the terminal you have 3 attempts to enter the terminal PIN, before you are asked to enter the PUK (Pin Unblocking Key). The PUK is supplied with your terminal SIM card.

Enter the PUK followed by a new PIN of your own choice. The PIN must be from 4 to 8 digits long.

If you enter a wrong PUK 10 times, the SIM card will no longer be functional, and you have to contact your BGAN Airtime Provider for a new SIM card.

## Entering the PIN using the web interface

If your SIM card requires a PIN and the PIN has not yet been entered when you start up the web interface, the start-up page will be the PIN page. Enter the PIN and click **OK**.

For further information on the web interface, see the user manual for your EXPLORER.

## Operating the system

### General use

The user manual for the EXPLORER 325 system describes general use of the system and all the functions of the web interface. It also contains a brief description of how to use the Thrane IP Handset with the terminal.

### User interfaces

#### Overview

The main user interfaces for operation of the system are

- the built-in web interface using a computer with an Internet browser
- the Thrane IP Handset

#### Built-in web interface

The built-in web interface is used for easy configuration and daily use. You access the web interface from a computer connected to the terminal, using an Internet browser. No installation of software is needed.

An Administrator password is required to access advanced configuration of the system. From factory, the Administrator User name is **admin** and the Administrator password is **1234**.

For further information on the web interface, refer to the user manual for the EXPLORER 325 system.

#### IP handset

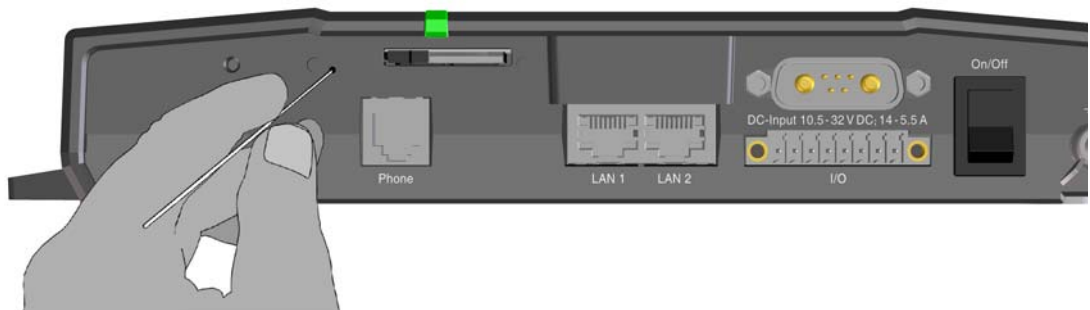
Apart from the standard functions of an IP handset, the Thrane IP Handset contains a display menu for the EXPLORER 325 system. For further information on the Thrane IP Handset, refer to the user manual for the IP handset.

## Troubleshooting

### Reset button

#### How to access the Reset button

The terminal has a Reset button placed next to the SIM slot behind the SIM cover. The functions of this button is described in the next section.



To press the Reset button, use a pointed device.

#### Functions of the Reset button

The Reset button on the terminal has the following functions:

Action	Function
With the terminal running, press the Reset button normally.	The terminal IP address and IP netmask are temporarily set to the default value (default IP address: 192.168.0.1). With this function, even if the IP address has been changed and you do not remember the new IP address, you can still access the web interface and see your current configuration. The default value is not saved in the configuration, but is only valid until next reboot.
With the terminal running, press and hold the Reset button for 30 seconds, until the Power indicator on the terminal is flashing orange.	The terminal restores factory settings and reboots the system.

Action	Function
<p>While the terminal is booting, press and hold the Reset button.</p>	<p><b>For service use only!</b></p> <p>The bootloader initiates software upload. This firmware upload procedure is only to be used if the other procedures fail due to missing or corrupted firmware.</p> <p>This setup uploads software to the terminal from a TFTP server via the LAN connection. The procedure is as follows:</p> <ol style="list-style-type: none"><li>1. Activate or install a TFTP server on a PC.</li><li>2. Locate the correct software image (xxx.dl) for the terminal and place it in the TFTP server directory.</li><li>3. Rename the image to <b>ttexp.dl</b>.</li><li>4. Reconfigure the PC LAN interface to use the static address <b>192.168.0.2/255.255.255.0</b>.</li><li>5. Power off the terminal.</li><li>6. Connect the PC LAN Interface to the terminal.</li><li>7. Press and hold down the Reset button.</li><li>8. Keep the Reset button pressed while powering on the terminal, and through the next step.</li><li>9. Monitor the TFTP server window. When the upload starts you can release the Reset button.</li></ol> <p>When the TFTP upload finishes the terminal boots up using the new image.</p>

## Status signaling

### Overview

The EXPLORER 325 system uses event messages and light indicator to display the status of the system.

### Power indicator

The Power indicator is placed above the SIM slot in the connector panel.



The Power indicator has the following functions:

Behavior	Meaning
Steady green	Power OK.
Flashing green	The terminal is powering up.
Flashing orange	The terminal is shutting down.
Off	No power.

## Event messages

### Display of event messages

The terminal can detect events during

- **POST** (Power On Self Test)
  - a self test performed at every power-up,
- **PAST** (Person Activated Self Test)
  - a self test performed when you click the **Self test** button under **Help desk** in the web interface, or
- **CM** (Continuous Monitoring)
  - continuous monitoring while the system is in operation.

When the terminal detects an event that requires your action, it issues an event message.

You can see the active event messages in the web interface by clicking the warning symbol in the icon bar at the top in the web interface.

All events are logged in the event log. For information on the event log, see *Event log* on page 38.

## Logging of events

### Diagnostic report

The diagnostic report contains information relevant for the service personnel during troubleshooting. When contacting Thrane & Thrane A/S for support, please include a diagnostic report.

To generate the diagnostic report, access the web interface and select **Help Desk**. Then click **Generate report**.

### Event log

The event log holds information of all registered events in the terminal or antenna.

The log includes the time of the occurrence, a short description, location of the error etc. This information can help troubleshooting errors in the system. You can see the event log in the web interface. For further information on the web interface, see the user manual for the EXPLORER 325 system.

## Part numbers

### System units

#### EXPLORER 325 system

Item	Part number
EXPLORER 325 antenna	403058A
EXPLORER 325 terminal	403733A

#### TT-3670A Thrane IP Handset & Cradle, wired

Item	Part number
Thrane IP Handset, wired	403672A
Thrane IP Cradle, wired	403674A

### Spare parts

For information on available spare parts, do as follows:

1. Log on to the Thrane & Thrane Extranet
2. Select eShop from the menu.

-or click this link <http://shop.thrane.com>. You may be asked to enter your user name and password for the Extranet.

# Technical specifications

## Overview

This chapter contains specifications for the EXPLORER 325 system including the terminal and antenna.

**Note** For specifications and outline drawings for the Thrane IP Handset, refer to the manual for the IP handset.



## EXPLORER 325 antenna

### General specifications

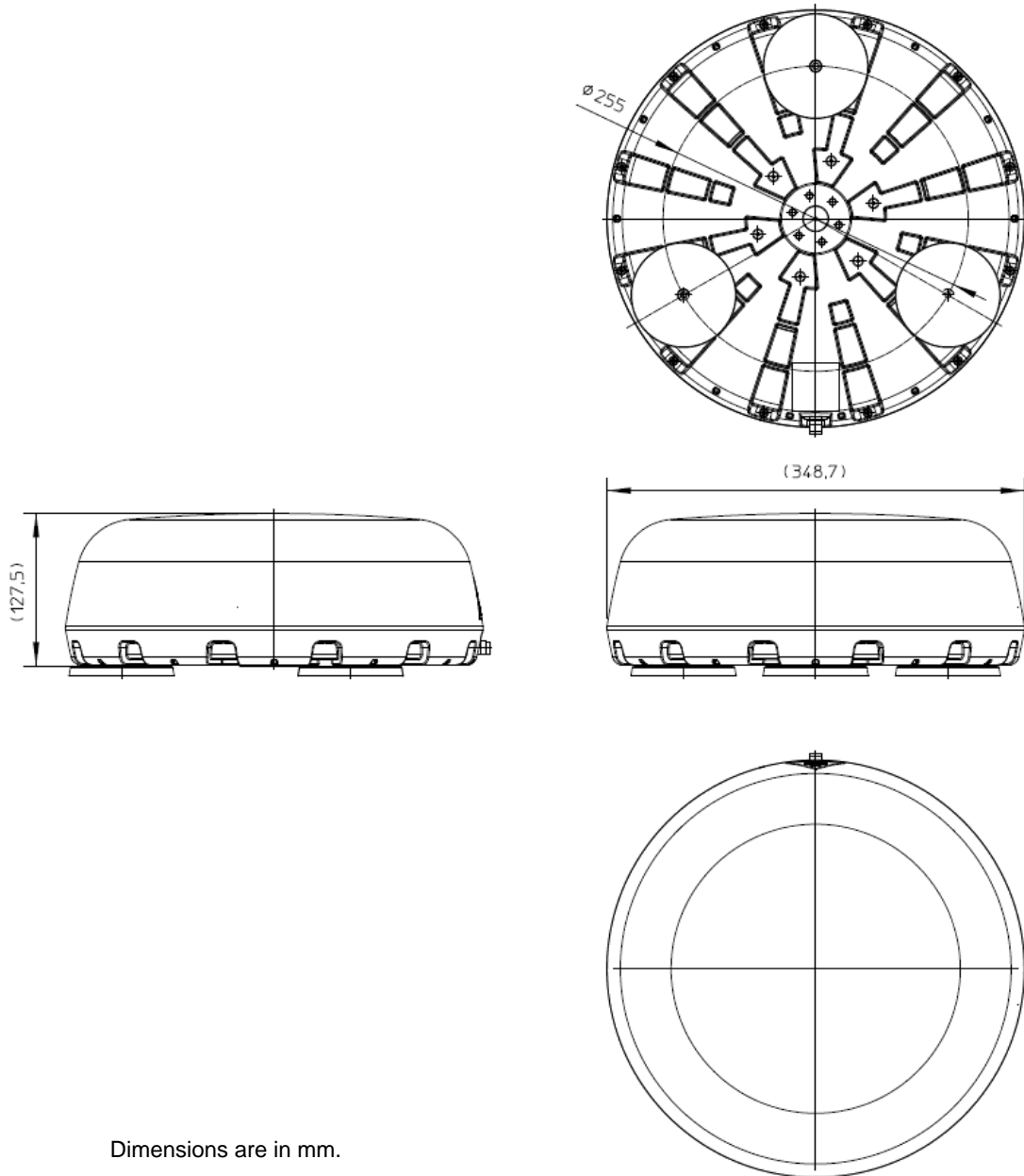
Item	Specification
Type	BGAN Class 11, land-vehicular mechanical tracking antenna
Polarization	RHCP
Rx Freq. Band Tx Freq. Band GPS	1525.0 - 1559.0 MHz 1626.5 - 1660.5 MHz 1575.42 MHz
Channel Spacing	1.25 kHz
Antenna element	Gain (RX-band, min.): 9.4 dBi Gain (TX-band, min.): 10.0 dBi
G/T	G/T $\geq$ -15.5 dBK
EIRP	15.1 dBW +1 dB -2 dB
Return loss	Better than -10 dB/50 $\Omega$
Cable losses	RF attenuation: at 1660 MHz: max. 20 dB at 54 MHz: max. 4 dB at 36 MHz: max. 3 dB DC resistance (loop): max. 0.6 $\Omega$ Max. cable length, terminal to antenna: <ul style="list-style-type: none"> <li>• RG-223_U-01: 14 meter</li> <li>• RG-214_U-01: 50 meter</li> <li>• S-07262-BD: 70 meter</li> <li>• S-10162-B-11: 92 meter</li> </ul>
Antenna power supply	23.0 - 30.0 V DC, 47 W max. continuous
Total antenna weight	3.6 kg (7.9 lbs) without magnets 4.4 kg (9.7 lbs) including magnets

## Environmental specifications

Item	Specification
Water and dust	IP-56 dust and water jet proof.
Ambient Temperature	Operational: -25° to +55°C Storage: -40° to +80°C
Vibration, operational	Random spectrum 1.05 g rms x 3 axes: 5 to 20 Hz: 0.02 g <sup>2</sup> /Hz 20 to 150 Hz: -3 dB/octave
Vibration, non-operational	Random spectrum 1.7 g rms 2 h x 3 axes 6 h total): 5 to 20 Hz: 0.05 g <sup>2</sup> /Hz 20 to 150 Hz: -3 dB/octave
Vehicle motion <sup>a</sup>	Turning rate: 60°/s Turning acceleration: 50°/s <sup>2</sup> Induced acceleration: 0.5 g Velocity: Max. 200 km/h <b>see note below!</b>

- a. Note that these specifications only apply for the antenna alone. The values will differ depending on the mounting method. Especially when the antenna is mounted with magnetic mount the max. velocity can be lower.

## Antenna outline dimensions



## EXPLORER 325 terminal

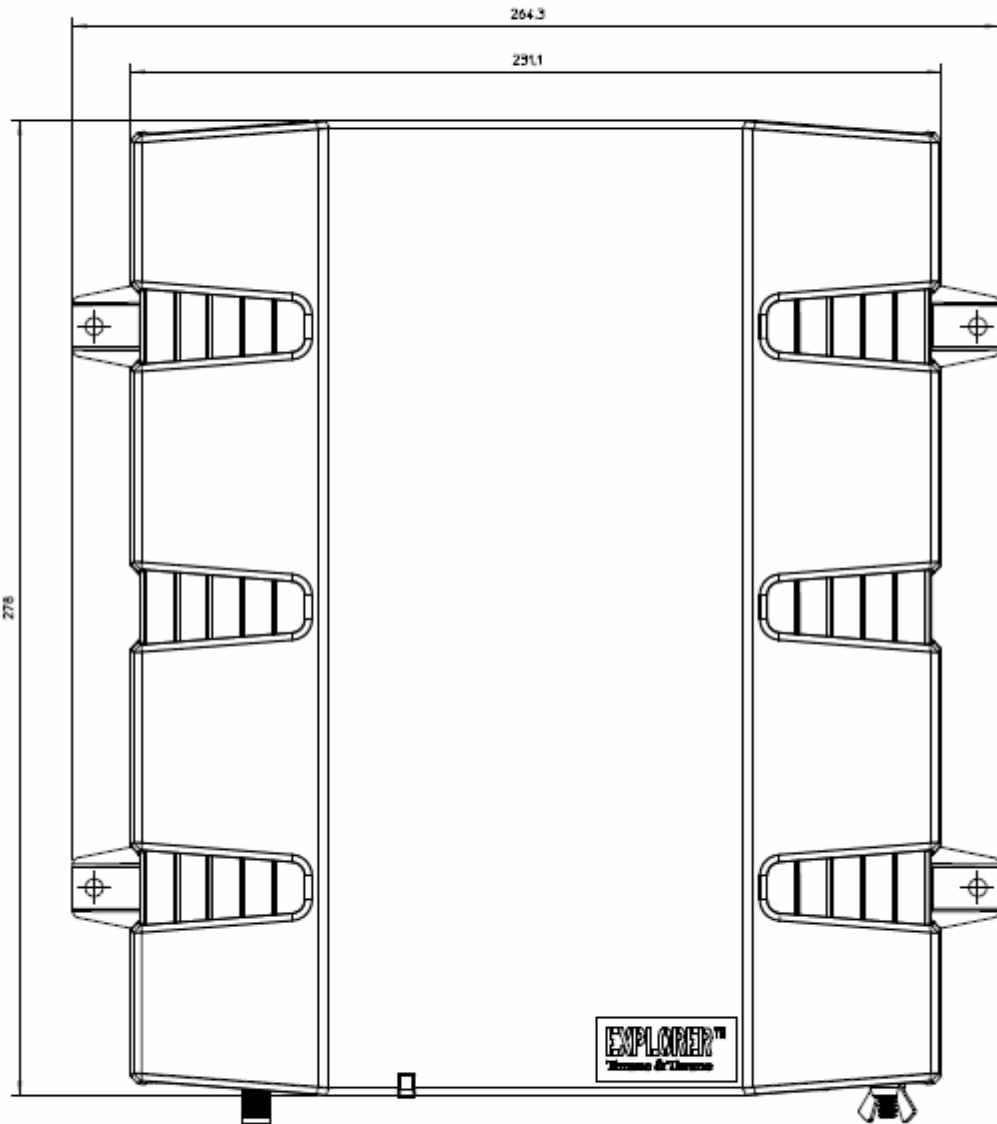
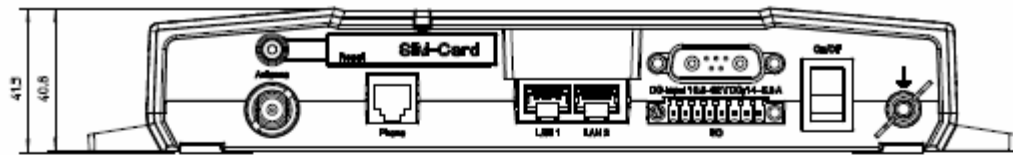
### General specifications

Item	Specification
Weight	2.2 kg (4.9 lbs)
Dimensions	231 mm x 278 mm x 41 m (9.1" x 10.9" x 1.6")
Global services	
Voice	4 kbps AMBE+2 or 3.1 KHz Audio
Data	
Standard IP	432/432 kbps
Streaming IP	32, 64, 128 kbps
SMS	Up to 160 characters
Antenna interface	One connector, TNC-female 1525 to 1559 MHz: -94 dBm to -64 dBm 1626.5 to 1660.5 MHz: -9 dBm to +11 dBm Power supply: 23.0 - 30.0 V DC
2-wire telephone interface	One connector: RJ-11 female. 600 $\Omega$ ITU-T Rec. G.473, standard DTMF telephone. Supported cable length: up to 100 meters.
LAN interface	Two connectors: RJ-45 female. Conforms with IEEE 802.3 af, 10/100 Mbps. Supported cable length: up to 100 m PoE (max. 15.4 W) on each port, Total PoE power: 32 W.

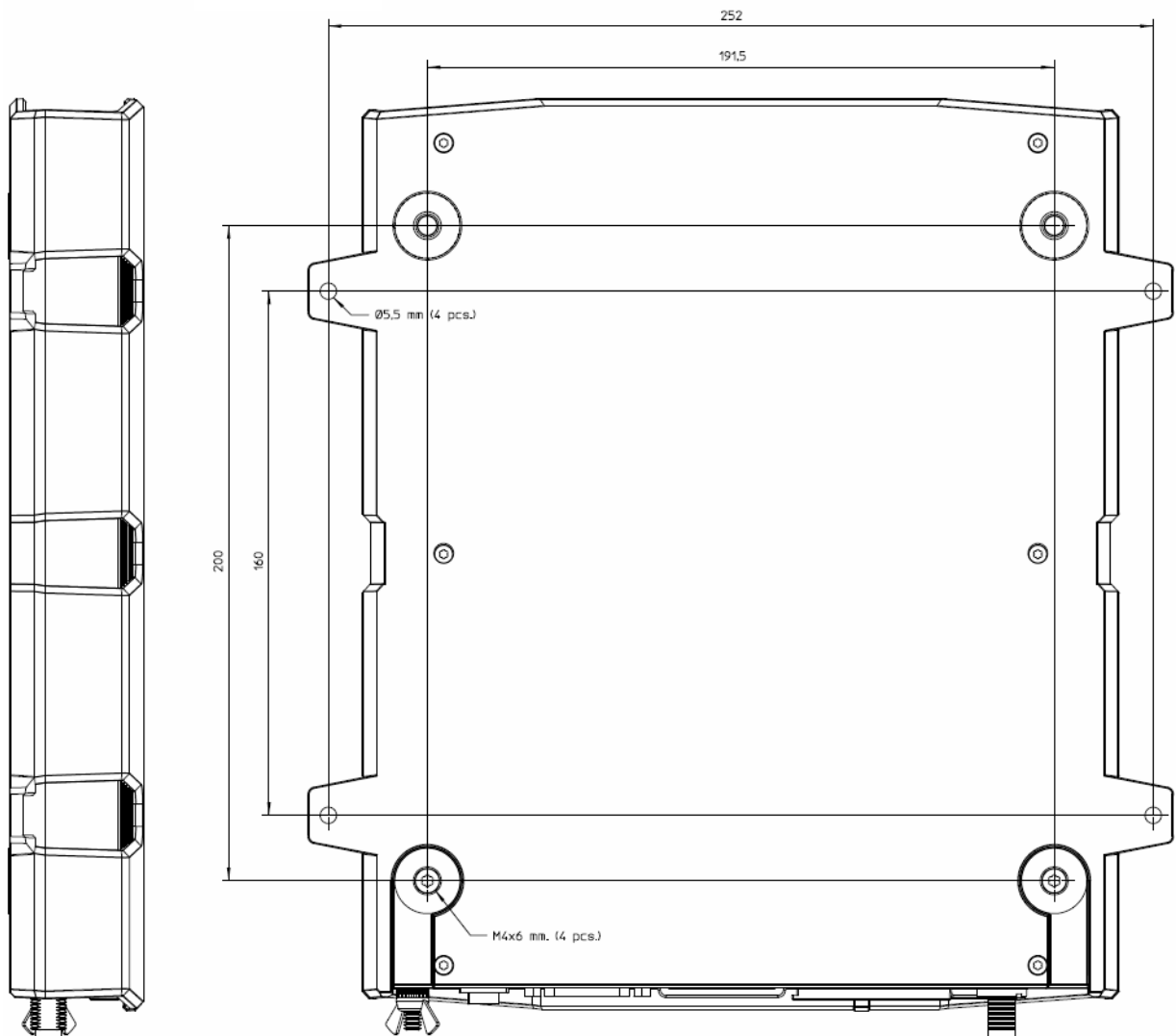
Item	Specification
<p>I/O interface</p> <p><b>Output:</b></p> <p>Open switch hold-off voltage</p> <p>Open circuit resistance</p> <p>Closed switch voltage</p> <p><b>Input:</b></p> <p>Input resistance</p> <p>Voltage</p> <p>Voltage High</p> <p>Voltage Low</p>	<p>One connector with 5 configurable inputs/outputs.</p> <p>Open collector, Short circuit protected at 1.5 A and reverse polarization protected.</p> <p>max. 32 V</p> <p>min. 130 K<math>\Omega</math></p> <p>max. 1 V DC at 50 mA</p> <p>min. 130 K<math>\Omega</math></p> <p>Max. 32 V</p> <p>Min. 2.2 V</p> <p>Max. 1.2 V</p>
<p>Power Input</p>	<p>Connector: Mixed D-Sub 7W2</p> <p>Nominal 12/24 VDC (10.5 - 32 V DC; 11.5 A - 4 A)</p> <p>Max. source impedance: 85 m<math>\Omega</math> at 12 V, 500 m<math>\Omega</math> at 24 V</p> <p>Maximum 20 A at 24 V, 5 ms (start up)</p>
<p>Standby current</p>	<p>Ignition function, off: max. 15 mA</p> <p>Remote on/off in DC connector, off: max. 2 mA</p>
<p>Ambient temperature</p>	<p>Operational: -25° to +55°C</p> <p>Storage: -40° to +80°C</p>
<p>Relative Humidity</p>	<p>95% non-condensing at +40°C</p>

## Outline dimensions, EXPLORER 325 terminal

Connector panel, top view and end view.



Side view and bottom view.



Weight: 2.2 kg.

Dimensions are in mm.

## A

**AWG** American Wire Gauge. A means of specifying wire diameters.

## B

**BGAN** Broadband Global Area Network. A mobile satellite service that offers high-speed data up to 492 kbps and voice telephony. BGAN enables users to access e-mail, corporate networks and the Internet, transfer files and make telephone calls.

## C

**CD** Compact Disc

**CM** Continuous Monitoring

## D

**DC** Direct Current (or Continuous current). In direct current, the electric charges flow in the same direction, distinguishing it from alternating current (AC).

**DTMF** Dual Tone Multi Frequency. The keypad signaling technology that generates two distinct tones when each key is pressed. This system allows navigation of voice menus and other advanced calling services. All wireless phones use DTMF dialing.

## G

**G/T** A figure of merit of an antenna and low noise amplifier combination expressed in dB. "G" is the net gain of the system and "T" is the noise temperature of the system. The higher the number, the better the system.

**GPIO** General Purpose Input/Output

**GPS** Global Positioning System. A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver.



**I**

I/O Input/Output

IMSO International Maritime Satellite Organisation. An intergovernmental body established to ensure that Inmarsat continues to meet its public service obligations, including obligations relating to the GMDSS.

IP Internet Protocol. The method or protocol by which data is sent from one computer to another on the Internet.

**L**

LAN Local Area Network

**P**

PAST Person Activated Self Test. A test similar to the POST test, but activated by the user. The PAST causes the system to reset.

PC Personal Computer

PIN Personal Identification Number. A secret numeric password shared between a user and a system, used to authenticate the user to the system.

PoE Power over Ethernet. A standard for combining power supply with transmission of data over the Ethernet. The source unit "injects" power into the Ethernet cable and the power is "picked up" at the connected device.

POST Power On Self Test. A test sequence that runs every time the system is powered up or reset.

PUK Pin Unlocking Key

**R**

RF Radio Frequency. Electromagnetic wave frequencies between about 3 kilohertz and about 300 gigahertz including the frequencies used for communications signals (radio, television, cell-phone and satellite transmissions) or radar signals.

RHCP Right-Hand Circular Polarization.

**S**

**SIM** Subscriber Identity Module. The SIM provides secure storing of the key identifying a mobile phone service subscriber but also subscription information, preferences and storage of text messages.

**T**

**TFTP** Trivial File Transfer Protocol. A very simple file transfer protocol, with the functionality of a very basic form of FTP. Since it is so simple, it is easy to implement in a very small amount of memory.

**A**

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