

Stream-C (AR600V24H10)

Massive array GPR data acquisition system

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1 INTRODUCTION

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1 INTRODUCTION

This document describes the Stream-C radar system, and it refers to the concepts the user should learn before initiating the utilization of this device. Therefore it is recommended to carefully reading the entire document before starting the system.

This manual contains a complete description of the Stream-C radar system, detailing the assembly procedure, and the general operating procedures of the system.

1.1 PURPOSE

Reading this document will provide all the necessary knowledge to install and maintain the Stream-C. It illustrates a step by step procedure to install the system, information for a safe utilization of the system and instructions for its general maintenance.

1.2 APPLICATION FIELD

This system is dedicated to underground utilities localization and mapping and it is used for applications in the civil engineering field.

1.3 INTENDED READERSHIP

The intended reader of this manual should be the technician in charge of using the system that has undergone the IDS training for Stream-C.

2 HOW TO READ THE MANUAL

2.1 MANUAL LAYOUT

This manual is composed of several parts. After an Introduction, the first part describes the device and its components, with the explanation of the main features.

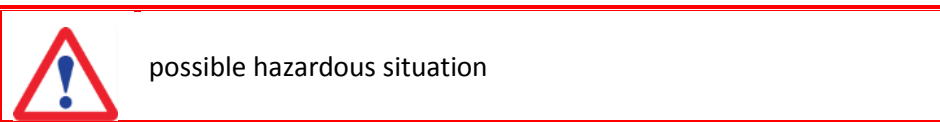
The second part shows the procedure to install the device and how to configure it correctly (Assembly Procedure).

Then, a description of the main feature of the GNSS to be used in conjunction with the system, are described.

Eventually, the maintenance plan, and additional information are illustrated.

2.2 SYMBOLS

This manual contains the following symbols with related meanings:



2.3 GLOSSARY & ACRONYMS

- DAD:** Digital Antenna Device
- RADAR:** RAdio Detection And Ranging
- USB:** Universal Serial Bus
- GPR:** Ground Penetrating Radar
- HDOP:** Horizontal Dilution Of Precision
- RTK:** Real Time Kinematic
- LAN:** Local Area Network
- GPS:** Global Positioning System
- GNSS:** Global Navigation Satellite System
- AC:** Alternate Current
- NMEA:** National Marine Electronics Association
- CORS:** Continuously Operating Reference Station
- UHF:** Ultra High Frequency
- GSM:** Global System for Mobile communications
- WMS:** Web Map Service
- DXF:** Digital eXchange Format
- KML:** Keyhole Markup Language
- GIS:** Geographic Information System



To keep on mind

2.4 DEFINITIONS

Raw data: unprocessed data obtained during a field survey.

Maps: graphics showing the change in received radar signal with respect to the scanning direction.

Survey: the name given to a collection of acquisitions, which together cover all the areas of a large investigation: typically an entire town or a large urban area.

Scan: a single movement of the antenna trolley from the beginning to the end of a pre-established path.

Setup: initialization of a piece of equipment or a software process.

Encoder: a distance measurement device which constantly signals the distance travelled from the start of the scan back to the Control Unit .

Transmitter: part of the antenna dedicated to emitting the radar signals.

Receiver: part of the antenna dedicated to detecting the radar signals.

Utilities: the objects the Stream-C searches for, i.e. pipes supplying gas and water, electricity cables, etc.

3 STREAM-C HARDWARE DESCRIPTION

3.1 General

The Stream-C system is composed by the following parts:

- Stream-C main body
- Laptop (with One Vision data acquisition software)
- Battery(s)
- Battery charger
- Accessories
 - GPS support
 - Hauling kit
 - Electric motor kit

This chapter contains the description of the above listed parts.

The whole system is shown in Fig. 3.1 (actual picture), and Fig. 3.2 (Sketch).

Stream-C is available in two versions: one motor-assisted, and one manually-operated. The first needs two extra-batteries (12V-24Ah) to be operated with the motor (total weight of the system is 72 Kg), the latter does not need any extra battery, except the one to power the Stream-C (total weight of the system is 65 Kg).



Fig. 3.1 – The Stream-C

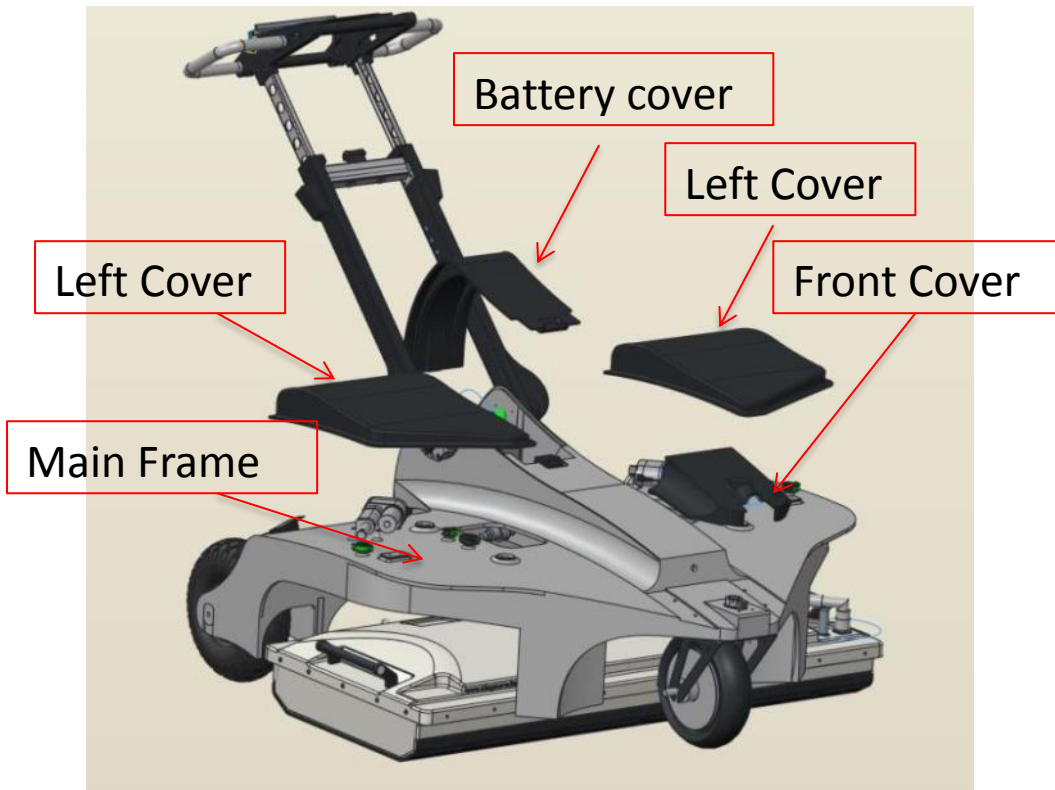


Fig. 3.2 – Sketch of the Stream-C and its main components

3.1.1 Stream-C main body

The main body of the system consists of a trolley with foldable handle, for an easier storage and transportation; it includes the following parts:

- Antenna
- Control unit
- Encoder
- Handle
- Wheels

- Laptop support
- Wheel Blockage system

3.1.2 Antenna

The Stream-C System deploys an antenna with 34 channels (Fig. 3.3).

The antenna box is 120cm wide, 20cm high, and 57cm deep. Its weight is 20Kg, and its power consumption equals 60W.

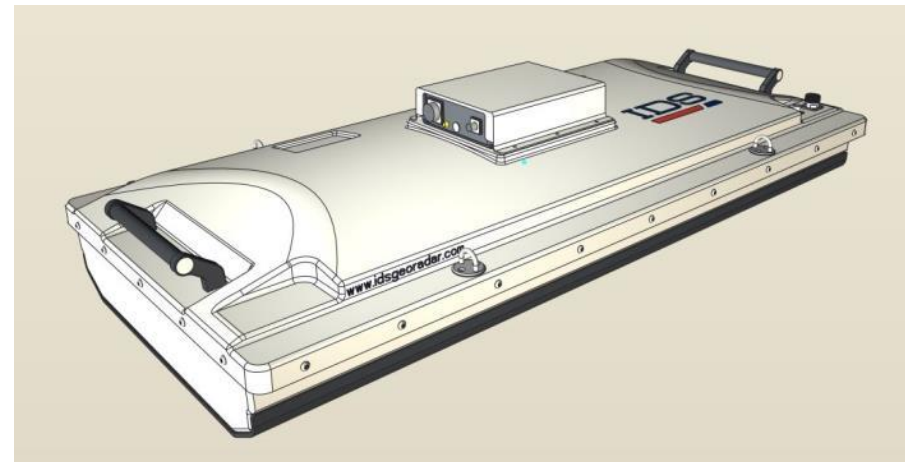


Fig. 3.3 – Sketch of the Stream-C antenna

The antenna height can be adjusted (of about 5 cm) through an electric command located at the left hand side of the rudder (Fig. 3.4).



Fig. 3.4 – The command to adjust the antenna height

3.1.3 Control unit

The Control Unit, or DAD, is the central part of the system because it communicates with the antenna, the laptop and the encoder, making all the systems work together.

The DAD is lodged on top of the antenna box and has a power button on top of it to turn it on/off (Fig. 3.5).

The characteristics of the Control Unit are:

Voltage: 12 V +/- 10%

Environment feature: IP 65

Absorbed power: 8 W

Operating temperature: -10/+40 °C



Fig. 3.5 – DAD unit

3.1.4 Encoder

The Stream-C employs one encoder for collecting distance data, and this is positioned inside the rear left wheel (Fig. 3.6).



Fig. 3.6 – The encoder (red arrow)

3.1.5 Handle

The Stream-C handle is an ergonomic and adjustable bar (Fig. 3.7), whose orientation can be adjusted both in height and inclination.



Fig. 3.7 – The Stream-C Handle

The Laptop support is mounted on top of the handle bar (see par. 3.1.7). The Handle bar also contains the Ethernet cable that goes to the laptop (Fig. 3.8).

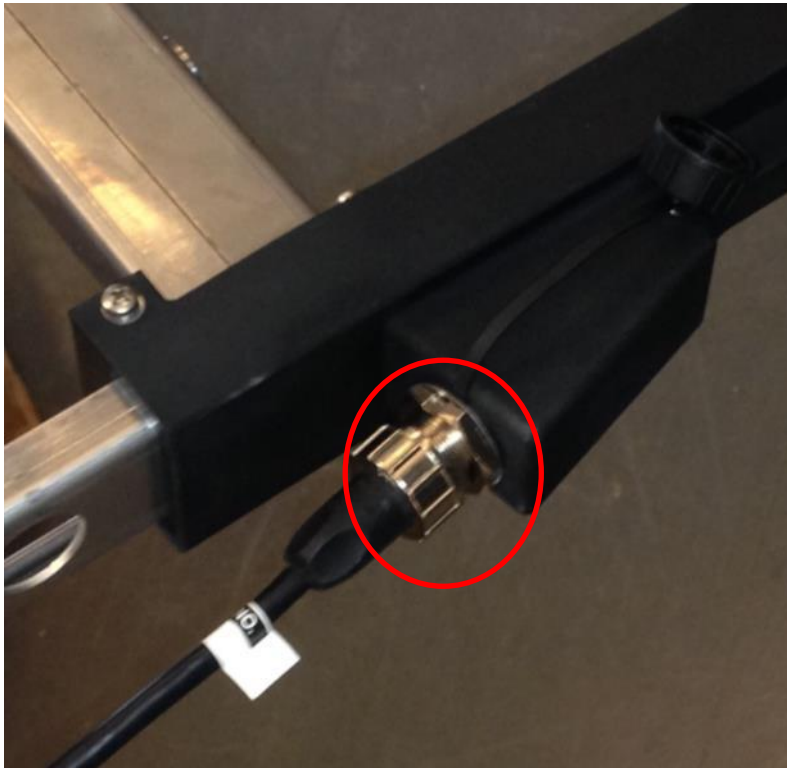


Fig. 3.8 – Ethernet cable plug on the handle (red circle)

3.1.6 Wheels

The Stream-C is a three wheeled system and comes into two versions: one is only manually operated and one is electric motor-assisted (optional), powered by two batteries lodged in the rear part of the Stream –C main body (Fig. 3.9).

The manually operated version, can be upgraded into a motorized one.

The front wheel is pivoting, to facilitate the manoeuvre, and can be blocked in straight position, by a pull system located in the front part of the Stream-C frame (Fig. 3.10).



Fig. 3.9 – The position of the batteries powering the electric motor to operate the system (red arrows)



Fig. 3.10 – Pivoting wheel blocking gear (red circle)

3.1.7 Laptop support

The inclination of the Laptop support can be adjusted to achieve the best viewing angle for the user (Fig. 3.11).

The support is designed to hold a laptop Panasonic CF-H2, but also a different type of computer may be laid on top of it.



Fig. 3.11 – Laptop support

3.1.8 Wheel Blockage system

A system to lock/unlock the system is mounted on the rear right wheel of the system to secure the stop position when the system is in non-operative mode (Fig. 3.12).



Fig. 3.12 – Wheel Blockage system

3.2 Laptop

The system can be provided with a laptop (see Fig. 3.13), with the software already installed; however the user can operate Stream-C with any laptop respecting the following minimum requirements:

- Processor: i3 1.7 GHz
- RAM: 1 GB
- Graphic adapter compatible with Open GL 2 or newer
- Operative system: Windows 7
- Ethernet port

APPENDIX A. Disclaimer

However, for an optimal performance we recommend the following requirements:

- Processor: i5 1.7 GHz
- RAM: 2GB
- Graphic adapter compatible with Open GL 2 or newer
- Screen resolution: 1024 X 786
- Operative System: Windows 7
- Hard disk: 40 GB shock proof
- Serial port RE 232 (only used with the GPS)
- USB port
- Ethernet port



Fig. 3.13 – Laptop for Stream-C

Prior to the software installation the user should be sure that the drivers of the graphic adapter are updated to the latest version.

For example for Intel graphic adapter those steps can be followed:

1. Connect the laptop to internet (the user should set the IP address to dynamic for this operation);
2. Open an internet browser and go to http://www.intel.com/p/en_US/support/detect;
3. Install the updated drivers;
4. Change again the IP address to the original one.

3.3 Battery

The battery used by an Stream-C system provides power to the Control Unit and, from there, to the Antenna, the Encoder, the antenna up/down system, and the hauling system remote control (optional), if present; the battery does not provide power to the laptop or the GPS, if present.

The Stream-C battery is a 12 V / 12 Ah rechargeable lead battery lodged in the rear part of the system, between the arms of the handle at the attachment with the main body (see Fig. 3.14).



Fig. 3.14 – Stream-C battery position

3.4 Battery charger

The battery charger is composed of two parts: a small cable to connect the battery to the charger and the battery charger itself, to be connected to the electricity mains at AC 110/220 (see Fig. 3.15).



Fig. 3.15 – Battery charger

The battery can be charged whilst connected to the system or after having been removed. Note that, in either case, the radar cannot be turned on during the battery charging.

3.5 Accessories

3.5.1 GPS Support

The GPS support can be easily mounted on the radar main body (rear left part) and holds the GPS pole (see Fig. 3.16).



Fig. 3.16 – GPS Support in the storage bag

3.5.2 Hauling Kit

The Stream-C system can also be provided with an optional kit to pull the system by a vehicle (Fig. 3.17).



Fig. 3.17 – The Hauling kit

In this case, the handle is maintained in the folded position, and a remote control (Fig. 3.18) is connected to the handle (Fig. 3.19) to move the antenna up and down.



Fig. 3.18 – The Antenna height remote control



Fig. 3.19 – The remote control connector to the handle (red arrow)

3.5.3 Electric motor kit

Stream-C offers the possibility (as an optional) to be operated by an electric motor. The system, is embedded into the front pivoting wheel and can be manoeuvred by a command, located on top the left side of the handle (Fig. 3.20).



Fig. 3.20 – Electric Engine command

4 Assembly procedure

The procedure to assemble the Stream-C is very simple and can be performed by one person.

To assemble the system follow these steps:

1. Unfolding the radar main body (Par. 4.1);
2. Connecting the antenna (Par. 4.2)
3. Connecting the battery (Par. 4.3)
4. Connecting the laptop (Par 4.4);
5. Connecting the Electric Engine battery (Optional, Par. 4.5);
6. Mounting the Hauling kit support (optional, Par. 4.6);
7. Mounting the GPS support (optional, Par. 4.7.

4.1 Unfold the radar main body

To unfold the Stream-C main body place it to on the ground, press the central handle button and raise the rudder to the desired angle (Fig. 4.1).



Fig. 4.1 – Unfolding the Stream-C through the button into the red square

The user can also adjust the height of the handle bar and laptop support, by using the two vertical buttons (red square) in the upper part of the rudder (Fig. 4.2).

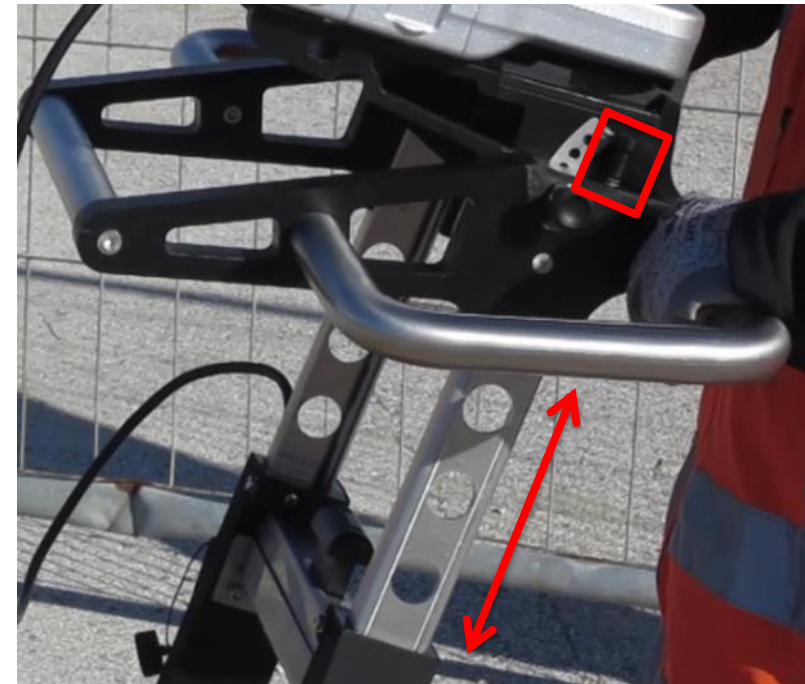


Fig. 4.2 – Handle bar and laptop support height regulation buttons

The inclination of the laptop support can be changed opening the two horizontal locks (red squares) on its sides (Fig. 4.3).



Fig. 4.3 – Laptop support inclination regulation

4.2 Connect the antenna

To connect the antenna with the main body of the system, pull up the front of the frame (Fig. 4.4), and lay it gently on top of the antenna, paying attention not to damage any part of the connectors. Then, connect the cables to the connectors on top of the antenna and the DAD, and lock the hooks to the up/down system of the frame, as specified below.



In performing this operating pay attention not to pinch fingers between the main body of Stream-C, and the antenna body.



Fig. 4.4 – Raising the frame to connect the antenna

In particular, follow these steps:

1. Connect the battery cable between the frame and the DAD (),
2. Connect the LAN cable (),
3. Connect the antenna cable between the DAD and the antenna (),
4. Connect the wheel cable (),
5. Connect the second power cable between the frame and the antenna,
6. Connect the quick release to the four u-shaped hooks on top of the antenna ().



Fig. 4.5 – Connecting the battery cable



Fig. 4.7 – Connecting antenna cable



Fig. 4.6 – Connecting the LAN cable



Fig. 4.8 – Connecting the wheel cable to the DAD



Fig. 4.9 – Connecting the second power cable to the antenna



Fig. 4.10 – Locking the antenna to the four quick release

4.3 Connect the battery

To connect the main battery, open from the rear toward the front of the system, the battery housing cover between the two arms of the handle, and then connect the male/female connectors between the battery and the battery housing (Fig. 4.11).



Fig. 4.11 – Connecting the main battery (male/female connectors are in the red circle)

4.4 Connect the laptop

After laying the laptop on top of the laptop support, connect the laptop and the system through the LAN cable starting from the right hand side of the handle (Fig. 4.12).



Fig. 4.12 – connecting the laptop through the LAN cable (red circle)



Fig. 4.13 – c

4.5 Connect the electric engine battery (optional)

The batteries powering the electric engine moving the system, are housed at the rear part of Stream-C (Fig. 4.13), and connected to it through two connectors (Fig. 4.14).

To connect the batteries, just slide the metal part of the support bag of the batteries from top to bottom of the frame.

connecting the electric engine batteries (optional, red arrows)



Fig. 4.14 – connectors of the electric engine batteries

4.6 Mounting the hauling kit (optional)

An optional hauling system is also available with Stream-C. The system is operated by hooking one end of the hauling system (part “A” of Fig. 4.15) to the vehicle, and joining the opposite end to the frame of the pivoting wheel of the frame (“B” in Fig. 4.15). In this case, the handle must be in folded position, as shown in Fig. 4.15, and the height of the system is adjusted through a remote control connected to the end side on the handle (the same connector used for operating the electric engine) (“C” in Fig. 4.15).

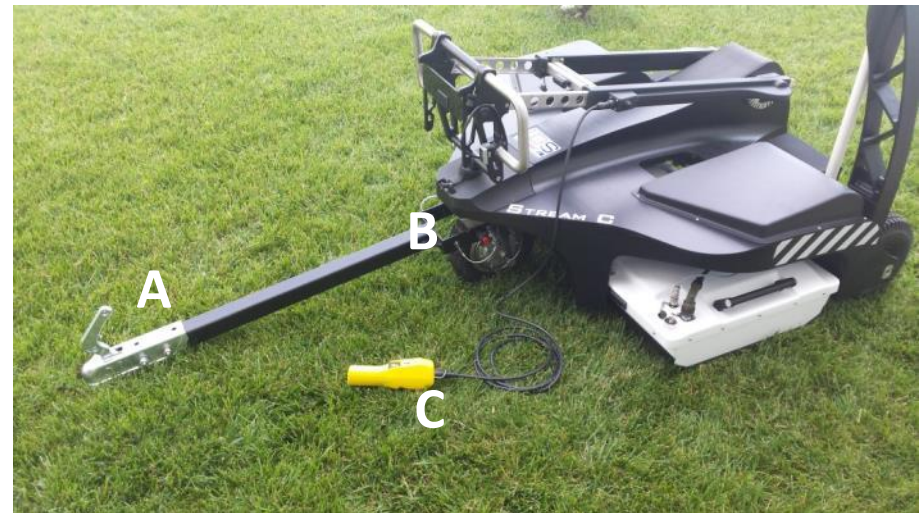


Fig. 4.15 – mounting the hauling system

4.7 Mounting the GPS pole support (optional)

An optional GPS pole support can easily be mounted at the left rear side of the main frame (Fig. 4.16). To do this, just slide the metal part of the support from left to right of the frame.



Fig. 4.16 –Mounting the GPS pole support

5 GPS requirements

As the Stream-C system can be operated with a GNSS to position the scans in real time without the need of creating a grid, the operator should consider the following requirements relating to the positioning device:

1. Dual frequency (L1+L2);
2. Positioning update greater than 5 Hz;
3. RTK: connection to a base station via radio link (UHF or GSM) or connection to a Continuously Operating Reference Station (CORS) via internet;
4. NMEA output;
5. Serial cable (RS232) is required, alternatively the GPS can be connected to the laptop via Bluetooth.

6 Maintenance plan

6.1 Cleaning Information

Before cleaning any external parts of the apparatus, make sure that all cables have been disconnected, including the power supply cable. If a damp cloth is used, make sure it is not too wet, to avoid any damage to the electrical components of the equipment. Wait until the equipment is totally dry before reconnecting the cables.

The Stream-C should be cleaned periodically using a damp cloth.

Do not use solvents or abrasive detergents.

Do not apply liquid directly to the electrical contacts of the various connectors. If a specific spray is used to clean the PC TFT monitor, make sure it is not flammable; in any case, do not spray it directly on the screen, instead, spray it onto the cleaning cloth.

6.2 Battery Removal Information

Laptop Batteries:

For the battery removal instruction, please do refer to the PC user' manual.

Radar batteries:

Manufacturer: FIAMM FG21202 / SAFT MP176065

Type: Rechargeable lead acid / rechargeable lithium-ion

Characteristics: 12V & 12Ah / 15V & 6.8Ah

Removal instructions:

- Disconnect the battery from the instrument:
 - .1 pull the connector wings;
 - .2 separate the connectors;
- Remove the battery from the cover (optional) opening the strap.

6.3 Periodical Check

The Operator should periodically check the status of the antenna wearing sledge, the LAN cable, and the tires.

- The Sledge should be periodically checked out to verify when it needs to be removed and replaced.
- The LAN cable should be verified at each use of the system, in order to check out whether connection to the PC and to the Georadar, are integer and no damages occurred. In case of any damage, remove and replace it.
- The tires, should be verified at each use of the system in order to check out whether their internal pressure and the consumption, are compatible with a safe use of the system. In case of any

deviation from the above either, inflate the tires and/or replace it, as deemed.

7 IDS On-line assistance

7.1 Download area

The Georadar section of the IDS website has a download area accessible from the customer to get the latest update of software, manuals, guides and other useful tools.

To do this the first step is to fill the registration form, accessible from <https://www.idscorporation.com/georadar/more-information/georadar-customer-area-logged/request-an-account> (Fig. 7.1).

Customer Area

If you already have an account please [Login here](#)

Welcome to the IDS Customer Support Area. Join our Customer Support Area to download the latest software updates and manuals. To become a member, please fill in the following fields.

Name / Surname

Company

E-mail

Product Category

SS Code

SN Code of the Sensor Head

I have read and am aware of the below information

PRIVACY POLICY

In order to provide you the information and services that IDS - Ingegneria Dei Sistemi S.p.A (in the following "IDS" or the "Company") makes available on the WEB site, you shall enter personal details and information as required. Before entering these data please read carefully the following Notice containing the provisions put in place by IDS, for the protection of your personal data, in accordance with the Italian law - Legislative Decree No. 196/2003 (Code for the Protection of Personal Data). By acknowledging the above note you give IDS the consent for the Treatment of the entered data in accordance with such law and the Notice.

Fig. 7.1 – Registration form

The request will be handled by the Customer Care of IDS, then the user will receive an email with its credentials to access the download area, that he has to enter in <https://www.idscorporation.com/georadar/more-information/georadar-customer-area-logged/customer-area-login>.

7.2 Remote assistance using Webex Support Center

The Webex Support Center is a service that allows the activation of a two host session, making an application or the desktop available to the other user or letting the user capture another remote desktop.

It can be used to perform web conferences and presentations.

It is easy to use thanks to a simple and intuitive interface.

Since there are no firewalls or other types of network configurations, it is a fast and secure means of reaching any client host in any part of the world. In fact, the client only has to accept to download a small plug used to permit the service authentication and function.

7.2.1 How to use the Webex service

The user will receive an email from IDS Customer Care containing a link to the support session (see Fig. 7.2).

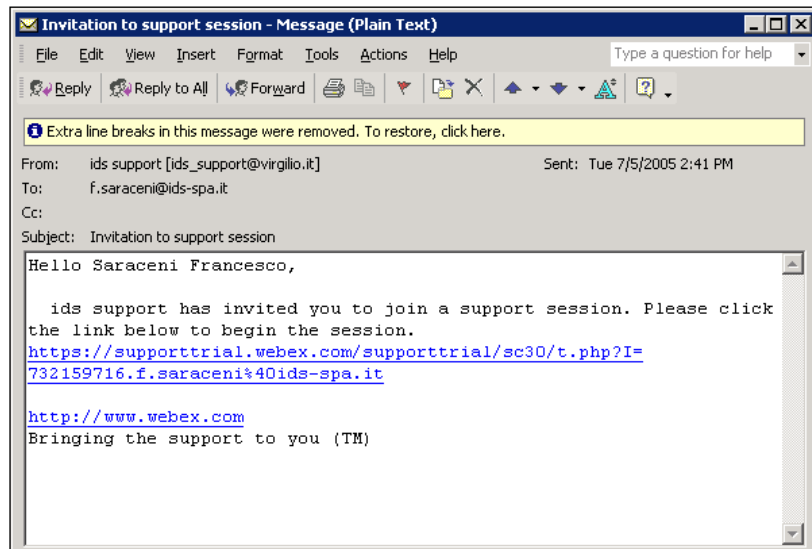


Fig. 7.2 – IDS e-mail sent to the client

Clicking on the link in the email, the following window appears. Insert the user data into the form (see Fig. 7.3).

Pre-Session Form

In order to provide a higher quality of service, we ask that you fill in the following information:

Support session number:	732 159 716	
First name:	<input type="text" value="Saraceni"/>	(Required)
Last name:	<input type="text" value="Francesco"/>	
Email:	<input type="text" value="f.saraceni@ids-spa.it"/>	
Company:	<input type="text" value="IDS"/>	

Fig. 7.3 – Client data insertion form

Clicking **Submit**, the following page appears showing a downloading bar. The session starts as soon as the download is complete. (see Fig. 7.4).

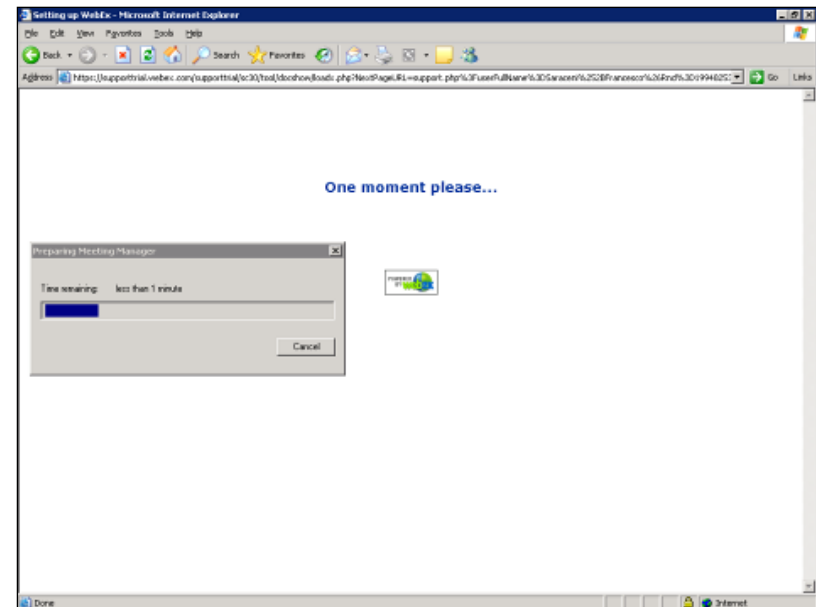


Fig. 7.4 – Webex Set up window

As shown in the following screen (see Fig. 7.5) the user is given a console, containing the **Chat**, **Video** and **Leave Session** commands.

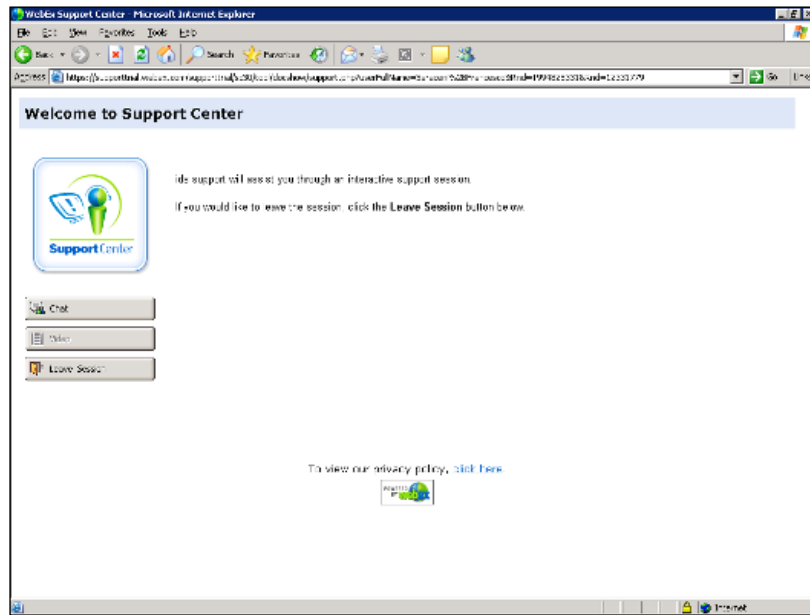


Fig. 7.5 - Welcome to Webex Support Center window

At this point, IDS Customer Care can perform a range of operations on the user desktop:

- Request control of the desktop using the Request Control command;
- Give the user control of the IDS desktop using the Share Control command;
- Request to display the remote desktop using Request View;
- Share the visualization of the IDS desktop using Share View.

Before each command is activated, the user is asked for confirmation through the window shown in Fig. 7.6.

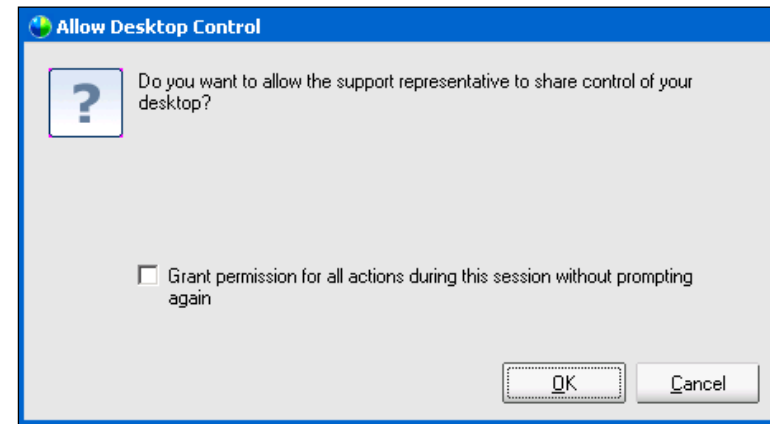


Fig. 7.6 – Command acceptance window

APPENDIX A DISCLAIMER

1. **Generals.**

- i. The present Disclaimer applies to all products (the “Products”) designed, produced and distributed by Ingegneria Dei Sistemi SpA - Georadar Division (“IDS”), its Subsidiaries, Affiliated and authorized Distributors. IDS reserves full ownership and intellectual property rights of any “Information” contained in this Disclaimer including Trade Marks and Graphics. No part of this Disclaimer may be used or reproduced in any forms without the prior written agreement of IDS.
- ii. In the event that any provision of this Disclaimer may be invalid, unlawful or incapable of being enforced by a rule of law, all other provisions shall, nonetheless, remain in full force and effect. Failure to either enforce or exercise any right, privilege, or legal remedy at any time, any provision contained in this Disclaimer, shall not be deemed a waiver of such provisions or right, remedy, or privilege.
- iii. This Disclaimer shall be interpreted, governed, construed and enforced in accordance with the laws of Italy. Buyer hereby consents to the exclusive jurisdiction of Pisa

1. **Initial Precautions for Setting-up and Use of the Products.**

- i. The Buyer, for setting-up and using the purchased Products, shall consult the official documentation provided by IDS for the Products (“Reference Documentation”) and carefully ascertain the compliance with national laws and requirements, which may limit or even forbid their use.
- ii. For Products which shall operate by circulation in Public Areas/Roads, with or without moving traffic, Buyer/User shall verify the approval of local authority and/or site’s owner according to their specific procedures. IDS shall not be liable for any direct, indirect, special, incidental or consequential damages or injuries, including without limitation, lost revenues or lost profits, resulting by unauthorized use of the Products in Public Areas/Roads.
- iii. For IBIS Products Family, Buyer/User warrants:
 - that these Products are not being used, in the design, development, production or use of chemical, biological, nuclear ballistic weapons. Buyer/ User will defend, indemnify and hold IDS harmless against any liability

(including attorney’s fees) for non-compliance with the terms of this article.

- that no operation or use of the IBIS products shall be started before its designated Operator/s has got the IBIS User Certificate, as defined by IDS specific procedure which the Buyer confirms to know and accept.

- iv. For Products which include specific “Operational” software with automatic data processing and analysis “Tools”, i.e. the IBIS Products, User shall be aware that the results provided by these “Tools” may be not error free. User that completely relies on the outcomes provided by these Tools only, does it at his own risk.
- v. In no event IDS shall be liable for special, direct, indirect, incidental, exemplary, punitive or consequential damages including, but not limited to, loss of profits or revenue, caused by the use of the Products, either separately or in combination with other products or relied upon the results provided by the above “Tools”.

2. **Disclaimer for the “Use” of the Products.**

- i. The User shall follow the instructions provided by IDS in its official “Reference Documentation” for the Product, in particular the User’s Technical Manual which contains all the specific steps and recommendations for a correct setting-up and use of the Product.
- ii. In no event IDS shall be liable for special, direct, indirect, incidental, exemplary, punitive or consequential damages including, but not limited to, loss of profits or revenue, caused by the missed or incomplete observance of the instructions and prescriptions for the use of the Products, either separately or in combination with other products, in particular for the following main aspects:
 - a. Use of IDS Products outside its limitation of use, without proper and adequate scientific/technical knowledge or without specific training.
 - b. Use of results/outcomes of the measurements performed by the Product aimed to safety aspects without using adequate control procedures and assessment by skilled personnel.
 - c. Opening of the Equipment (for HW Products) without express written authorization of IDS.
 - d. Unauthorized changes and additions to the Products.
 - e. Use of the Products connected to suspected non-working equipment or with equipment (mainly PC) having

- characteristics non in compliance with the required specifications of IDS on not expressly authorized by IDS.
- f. Poor or faulty operation of the electrical and telecommunication networks not directly managed by IDS or its delegates.
 - g. Poor or faulty operation Software/Hardware of the third parties connected with IDS Equipment.
 - h. Poor or faulty operation of the Products due to Software Virus which infected the Products after their delivery.
 - i. Use of the Products which have encountered suspected manumissions, accidents, electrostatic shocks, flashes, fire, earthquake, flooding or other natural disasters or unexpected events.
 - j. Use or storage of the Products outside the limits of the "Operational Temperature Range" specified by IDS.

APPENDIX B WARRANTY

A. Standard Warranty Conditions

1. IDS Ingegneria dei Sistemi S.p.A, (hereinafter referred to as IDS or Seller), warrants that its products shall be free from defects in material and workmanship, for a period of 12 months from the delivery date duly registered and certified (“Effective Date”) in the “Warranty Registration Form” enclosed hereto. IDS shall repair or replace Products or parts thereof found faulty (the “Faulty Parts”) which are returned to IDS, and which, at IDS’s judgment, were defective or became defective during its normal use. Seller’s obligations shall not apply to Faulty Parts that:
 - (a) Buyer do not properly store, install, use, or maintain;
 - (b) Buyer modify, or perform tests which are not approved in writing by the Seller;
 - (c) Buyer have subjected to any kind of misuse, detrimental exposure beyond its intended purpose or damaged in an accident or by natural disaster or calamities.
 - (d) Are repaired by other than IDS personnel; in which have been installed HW/SW accessories not supplied by IDS; are integrated or connected to equipment different from the ones supplied by IDS (except the PC data Logger conform to IDS specifications);
 - (e) Whose operational software was not installed as per IDS instruction (see IDS User’s Guide for the Data Acquisition Software);
2. Seller’s Products may include specific “Operational” software with automatic data processing and analysis tools (SW) supplied under a License agreement (EULA). While every effort is made to ensure the accuracy of the information/results provided by these tools, they must not be intended as a substitute for people analysis; rather, they have to be intended as an advisor and the user must not completely rely on the results provided by them. Under no circumstances does IDS warrant that the SW will operate uninterrupted or error free The SW is provided “as is” without warranty of any kind. IDS warrants for a period of sixty (60) days from the Effective date that, under normal use, the SW support media will be free of defects in material and workmanship; in such case the provisions of above point a) apply

3. Any different warranty, granted by the Buyer to its retailers and clients, even as final consumers, pursuant to the European Union law in force regarding the rights of the consumers, does not engage IDS in anyway.
4. The above mentioned warranty excludes any other remedies and it has to be considered the only and exclusive remedy foreseen for the Buyer and its retailers and clients, with reference to IDS Products purchase, being, expressly understood that any kind of limitation and/or discharge of responsibility provided by the present warranty is referred to both (I) the responsibility as against any third parties, pursuant to the legislation regarding the producer responsibility and (II) the warranty provided by the law in force.

B. Warranty Procedure

1. To proceed in the application of warranty terms, Buyer shall have to contact IDS Customer Care Office to get the clearance to return the Faulty Parts.
2. The Faulty Parts once received by IDS will be inspected to verify they are eligible for repair or replacement..
3. Buyer is responsible for ensuring that the Faulty Parts be returned to IDS with a suitable packing (it is recommended that the original packing be saved for a better understand of the failure cause); IDS will not be obliged to repair or replace Faulty Parts damaged from abuse, misuse, negligence, accident loss or damage in transit.
4. The Shipping costs for Products returned during the warranty period, are as follows:
 - (f) From Buyer Site to Seller site → shipping costs, as per Incoterms CIP, are borne by Buyer
 - (g) From Seller Site to Buyer site → shipping cost, as per Incoterms CIP, are borne by Seller
5. The warranty period on the repaired or replaced Faulty Parts is 6 (six) months or the unexpired portion of warranty on such Faulty Parts whichever date comes later.

C. Special Warranty Conditions for IBIS Products

Without prejudice to the Warranty terms defined in the above Clauses A and B, the following special conditions apply to the IBIS products.

1. IDS offers to the Buyer, optionally, special Support and Maintenance Plans to be performed along the life of the equipment. These plans set forth special Warranty conditions which are detailed in the relevant options purchased.

APPENDIX B. Warranty

2. IBIS Product Family is subject to export/import regulations as per EU export control regime Council Regulation (EC) No. 428/2009 and successive amendments. The category of exportation for IBIS F product family is 6A008.d. Buyer warrants that the IBIS Products to be purchased: a) shall not be re-exported, directly or indirectly, outside Buyer's country in violation of any law or regulation or to embargoed or otherwise restricted countries, b) shall not be used, in the design, development, production or use of chemical, biological, nuclear ballistic weapons. It is Buyer's responsibility to know the law pertaining to export/import procedures in the country of destination of the Products. Buyer will defend, indemnify and hold Seller harmless against any liability (including attorney's fees) arising out of Buyer's failure to comply with the terms of this article. Should the Authorities issue an export restriction which leads to the cancellation of a purchase order already accepted by IDS, IDS only liability shall be to return to Buyer any account paid without interests. Buyer shall comply with the laws and procedures in force in the country of destination of the Products.
3. IBIS can be used in Critical Monitoring for safety purposes applications, like real time monitoring of unstable slopes including Opencast Mining. Buyer shall be aware and agree that the assessment of the stability conditions of the observed target must be tasked to skilled and certified operator/s able to understand data supplied by either IBIS or others. The performance of IBIS can be, in fact, influenced either by the parameters introduced by the operator/s or by particular environmental conditions which may distort its outcomes, thus giving rise to false or missing alarms.
4. IDS assumes no liability for any direct, indirect special, incidental or consequential damages or injuries caused by such reliance or for the use of IBIS Products by operator who have not achieved a training course certified by IDS. Any person or entity that completely relies on information obtained from the automated data processing/analysis tools only or by operators who have not achieved a training course certified by IDS, does so at his own risk

D. Limited Liability

Without prejudice to the exclusion of liability stated at the above Clause C.

1. Seller's sole obligation and liability under this Agreement shall be limited to the repair or replacement of the Product, or the refund of the purchase price at the Seller's sole option. This Article sets forth the sole and exclusive remedies for claims based upon defects or nonconformity of the Products,

whether the claim is on contract, warranty, tort (including negligence), strict liability, or otherwise.

The cumulative liability of Seller, including its subcontractors or suppliers, for any and all claims, including but not limited to claims based on Seller's negligence of any degree, strict liability, breach of contract, warranty, reliance on the accuracy, reliability, or timeliness of the information provided by the SW, patents or otherwise, shall not exceed the sums cashed by IDS for the purchased Products, which give rise to the claim, and any such liability shall terminate upon the expiration of the warranty period.

APPENDIX C TECHNICAL SPECIFICATION

AR600V24H10 antenna SPECS	
Lenght	1200 mm
Width	570 mm
Height	200 mm
Weight	20 kg
Enclosure Class	IP 65
Temperature Range	-10 °C ÷ + 40 °C
Input voltage range	100 ÷ 240 V AC
Power Consumption	60 W
External Fuse	20 A ATO
LAN	RJ 45 10 ÷ 100 Mbit

APPENDIX D RECYCLING



RECYCLING

The crossed out wheeled bin symbol shown on the equipment indicates that the product must be recycled separately from other waste at the end of its useful life.

Separate waste disposal of this product at the end of its useful life will be organised and managed by IDS. When you decide to dispose of the equipment, contact IDS and follow the system that IDS has set up to permit the separate collection of the apparatus at its life end.

Adequate separate collection for its subsequent recycling, treatment and environmental friendly disposal contribute towards avoiding any unnecessary effects on the environment and to health and favour the reuse or recycling of the materials that make up the equipment. Unauthorised disposal of this product as unsorted waste by its possessor will lead to an administrative penalty foreseen by national regulations.

APPENDIX E CONFORMITY TO EUROPEAN REGULATION

CONFORMITY TO EUROPEAN REGULATIONS

The equipment conforms to the following requirements set by EC regulations, including subsequent modifications, and to the legislation set by the member states that implement these regulations:

1999/05/EEC Radio Directive

Warning: this equipment is destined for use in industrial environments (Class A apparatus). In residential, commercial and light industry environments, this apparatus may generate radio interference: in this case, the user may be required to operate while taking appropriate countermeasures.

The apparatus is sensitive to the presence of external electromagnetic fields, which may reduce its performance.



APPENDIX F IMPORTANT NOTICE FOR THE US CUSTOMER

FCC ID: UFW-AR600V24H10

This device complies with part 15 of the FCC Rules:

Operation is subject to the following conditions:

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

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Operation of this device is restricted to law enforcement, fire and rescue officials, scientific research institutes, commercial mining companies, and construction companies. Operation by any other party is a violation of 47 U.S.C. § 301 and could subject the operator to serious legal penalties.

Coordination Requirements.

(a) UWB imaging systems require coordination through the FCC before the equipment may be used. The operator shall comply with any constraints on equipment usage resulting from this coordination.

(b) The users of UWB imaging devices shall supply detailed operational areas to the FCC Office of Engineering and Technology who shall coordinate this information with the Federal Government through the National Telecommunications and Information Administration. The information provided by the UWB operator shall include the name, address and other pertinent contact information of the user, the desired geographical area of operation, and the FCC ID number and other

nomenclature of the UWB device. This material shall be submitted to the following address:

Frequency Coordination Branch., OET

Federal Communications Commission

445 12th Street, SW

Washington, D.C. 20554

ATTN: UWB Coordination

(d) Users of authorized, coordinated UWB systems may transfer them to other qualified users and to different locations upon coordination of change of ownership or location to the FCC and coordination with existing authorized operations.

(e) The NTIA/FCC coordination report shall include any needed constraints that apply to day-to-day operations. Such constraints could specify prohibited areas of operations or areas located near authorized radio stations for which additional coordination is required before operation of the UWB equipment. If additional local coordination is required, a local coordination contact will be provided.

(f) The coordination of routine UWB operations shall not take longer than 15 business days from the receipt of the coordination request by NTIA. Special temporary operations may be handled with an expedited turn-around time when circumstances warrant. The operation of UWB systems in emergency situations involving the safety of life or property may occur without coordination provided a notification procedure, similar to that contained in CFR47 Section 2.405(a)-(e), is followed by the UWB equipment user.

Notice: Use of this device as a wall imaging system is prohibited by FCC regulations.

APPENDIX G IMPORTANT NOTE FOR CANADIAN CUSTOMERS

IMPORTANT NOTE FOR THE CANADIAN CUSTOMERS

IC Certification Number: 8991A – AR600V24H10

This device complies with the requirements of IC Standard RSS-220

This Ground Penetrating Radar Device shall be operated only when in contact with or within 1 m of the ground.

This Ground Penetrating Radar Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

NOTE IMPORTANTE POUR LES UTILISATEURS CANADIENS

Numéro de certification 8991A – AR600V24H10

Cet appareil est conforme aux exigences de la norme RSS IC-220

Cet équipement géoradar doit être utilisé que lorsqu'il est en contact ou à moins de 1 mètre du sol.

Cet équipement géoradar doit être utilisé que par des organismes d'application de la loi, des instituts de recherche scientifique, des sociétés minières commerciales, des entreprises de construction et de secours d'urgence ou les organisations de lutte contre les incendies.

RADIO-FREQUENCY EXPOSURE COMPLIANCE

This product operated is usually operated at least 1 m from the operator.

Typical power density levels at a distance of 1 m or greater is below 1 $\mu\text{W}/\text{cm}^2$ (0.01 W/m^2) which are far below the levels specified by the current regulations.

Thus, this product pose no health and safety risk when operated in the normal manner of intended use.

CONFORMITÉ D'EXPOSITION AUX FRÉQUENCES RADIO

Le produit doit être à au moins un mètre de l'utilisateur lorsqu'en opération.

Le niveau de densité de puissance à une distance de 1 mètre et plus est de 1 $\mu\text{W}/\text{cm}^2$ (0.01 W/m^2), ce qui est nettement inférieur aux niveaux spécifiés par la réglementation en vigueur.

Ainsi, ce produit ne représente aucun risque pour la santé et la sécurité lorsqu'il est exploité dans les conditions d'utilisation prescrites.

APPENDIX H CONTACTS

IDS GeoRadar s.r.l.

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