

Chaser XR

Version 001



ORIGINAL INSTRUCTION IN ENGLISH LANGUAGE



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1 INTRODUCTION

This document describes the Chaser XR system, that is a dual frequency GPR system by IDS GeoRadar.

This document refers to the concepts the user must learn before initiating the utilization of this device. Therefore, it is mandatory to carefully reading the entire document before starting and operating the system.

1.1 Purpose

The purpose of this document is to drive the reader to a list of actions to install and use the Chaser XR system, in a thorough and safe way.

The structure of the manual is organized in a collection of "how-to" as well as descriptive chapters. Each chapter contains the illustration and basic description, of the main operations to be carried out for system installation and use on field.

1.2 Application field

The main application of Chaser XR is the collection of GPR data over areas of variable extension, and for applications including, but not limited to, glaciology, environmental, archaeology, geology, geotechnic. Also, any type of buried objects or structures may be the aim of the system if these are buried within its depth of reach.

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 GeoRadar training for Chaser XR.

1.4 Authorization of use

The use of Chaser XR system may be subject to a license and/or an authorization by the Competent Ministry of the country where the system will be used. An individual license and restrictions are in place to date in the following European countries:

France: <https://www.anfr.fr/en/broadcasting-authorisation/reseaux-professionnels/les-frequences-utilisees-a-titre-temporaire/les-systemes-dimagerie-radar-de-type-gpr-wpr/>

Germany:

https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Technik/Inverkehrbringen/Produkten/Schnittstellenbeschreibungen/OrtungsfunkOR/SSBOR_N022.pdf?__blob=publicationFile&v=4

Portugal: <https://www.anacom.pt/render.jsp?categoryId=389647>

Romania: https://www.ancom.ro/radio-spectrum_2749

Spain: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2011-19146

Sweden:

<https://www.pts.se/sv/bransch/radio/radiotillstand/ansokningshandlingar/>

Liechtenstein and Switzerland:

<https://www.bakom.admin.ch/bakom/en/homepage/frequencies-and-antennas/frequency-use-with-or-without-licences/radiocommunication-licences-in-general.html>

For more details with reference to the restriction, please refer to the following website: [ECO Frequency Information System \(cept.org\)](http://ECO-Frequency-Information-System.cept.org)

	CH	DE
	ES	FR
	LI	PT
	RO	SE

1.4.1 CE Marking



This equipment complies with the essential requirements and other relevant provisions of Directive 2014/53/UE. The full Declaration of its Conformity can be found either on the CD or a separate document included with this product.

This is a Class A product. In a domestic environment it may cause radio interference. If so, the user may need to take adequate measures.

1.4.2 UKCA Marking



This equipment complies with the essential requirements of the Radio Equipment Regulations 2017 (S.I. 2017/1206). The full Declaration of its Conformity can be found either on the CD or a separate document included with this product.

Licensing requirements in UK can be found here:
<https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/licensed-short-range>

2 HOW TO READ THE MANUAL

2.1 Manual Layout

As mentioned, this User Manual is structured in a “How to” manner. In each of the relevant chapter, the User shall find the basics to carry out the Chaser XR installation and use.

It is strongly recommended to go through this manual thoroughly, and to read it carefully. However, as the document is divided into a first part that is descriptive of the whole system, but also into procedures that are self-consistent, and that can be read sparsely, it is not mandatory to read this document chapter after chapter, in case of need.

2.2 Symbols

Warning messages are an essential part of the Safety Concept of the instrument. They appear wherever hazards or hazardous situations can occur.

Warning messages:

- make the user alert about direct and indirect hazards concerning the use of the product.
- contain general rules of behaviour.

For the user's safety, all safety instructions and safety messages shall be strictly observed and followed. Therefore, the manual must always be available to all persons performing any tasks described herein.

DANGER, WARNING, CAUTION and **NOTICE** has got standardized signal words for identifying levels of hazards and risks related to personal injury and property damage.

For safety purposes, it is important to read and fully understand the table below with the different signal words and their definitions. Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.

Information symbols may be placed within a warning message as well as supplementary text.



- NOTICE: Note text/to keep in mind



- Tip text

2.3 Glossary & Acronyms

The following acronyms are used in this manual:

- **Chaser XR:** IDS GeoRadar GPR System
- **Controller:** PC / Tablet used by the user for data acquisition. The data acquisition SW (client) is performed on the controller.
- **EsT:** Equalized Scrambled Technology
- **FCU:** Fast Control Unit
- **GNSS:** Global Navigation Satellite System
- **GPR:** Ground Penetrating Radar or Georadar or Ground Probing Radar
- **HMI:** Human Machine Interface
- **HW:** Hardware
- **NMEA format:** National Marine Electronics Association format
- **RTK:** Real Time Kinematic

- **SNR:** Signal to Noise Ratio
- **SW:** Software
- **UBLOX:** GNSS device within the GPR system
- **uMap:** IDS GeoRadar software for GPR data acquisition

3 SAFETY DIRECTIONS

3.1 Description

The following directions enable the person responsible for the product, and the person who uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

3.2 Intended Use

The intended use of Chaser XR is the detection of underground features in diverse environmental conditions, and within the depth of reach of the system itself, including but not limited to:

- Geology
- Geotechnical
- Environmental
- Glaciers
- Rivers
- Archaeology
- Forensic
- Buried structures, in general.

3.3 Reasonably Foreseeable Misuse

- Infringing traffic regulation.
- Use of the product without instruction.
- Use outside of the intended use and limits.

- Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obvious damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of IDS GeoRadar s.r.l.
- Inadequate safeguards at the working site.

3.4 Limits of Use

Environment: Suitable for use in an atmosphere appropriate for permanent human habitation. Not suitable for use in explosive environments.

WARNING: POTENTIALLY HAZARDOUS AREAS



working in hazardous areas, such as potentially explosive areas, or close to electrical installations, or similar situations, could result in death or serious injury.

PRECAUTION: Local safety authorities and safety experts must be contacted, by the person in charge of the product on site, prior commencing any survey in potentially hazardous areas, for the due risk assessment.

- To understand the safety instructions on the product and the instructions in the user manual.
- To ensure that it is used in accordance with the instructions.
- To be familiar with traffic laws and local regulations relating to safety and accident prevention.
- To inform IDS GeoRadar s.r.l. immediately if the product and the application becomes unsafe.
- To ensure that the traffic laws, the national laws, regulations, and conditions for the operation of electromagnetics transmitters are respected.

NOTICE: Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods.



Precautions:

Periodically carry out test measurements, particularly after the product has been subjected to abnormal use and before and after of important measurements.

3.5 Responsibilities

Manufacturer of the product - IDS GeoRadar s.r.l. is responsible for supplying the product, including the user manual and original accessories, in a safe condition.

Person responsible for the product - The person responsible for the product (the user) has the following duties:

3.6 Hazard of use

	WARNING: CRUSHING HANDS AND FINGERS While installing the system, the risk of fingers pinch-out, may occur. PRECAUTION: To mount the system, the user must always wear protective gloves and safety boots.
	WARNING: RISK OF ACCIDENTS During surveys there is a danger of accidents occurring if the user does not pay attention to the surrounding site conditions, such as obstacles, excavations, or traffic. PRECAUTIONS: During operations, the user of the product must be fully aware of the existing site conditions, and potential dangers.
	WARNING: ELECTROCUTION Because of the risk of electrocution, it is dangerous to use poles and extensions near electrical installations such as power cables or electrical railways.  PRECAUTIONS: Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their safety instructions.

	NOTICE: If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged. Precautions: When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position. Avoid subjecting the product to mechanical stress.
	WARNING: LIGHTING STRICKING If the product is used with accessories (for example GNSS pole support), the user may increase the risk of being struck by lightning. PRECAUTIONS: Do not use the product during thunderstorm.
	WARNING: SECURING OF THE WORKING SITE Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations. PRECAUTIONS: Always ensure that the working site is adequately secured. Adhere to the regulations governing safety, accident prevention, and road traffic.

NOTICE: If the product is improperly disposed, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.



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 GeoRadar. When you decide to dispose of the equipment, contact IDS GeoRadar and follow the system that IDS GeoRadar has set up to permit the separate collection of the apparatus at its life end.

Adequate separate collection for its subsequent recycling, treatment and environmentally 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.

WARNING: EXPOSURE OF BATTERIES TO HIGH MECHANICAL STRESS, HIGH AMBIENT TEMPERATURES OR IMMERSION INTO FLUIDS



High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

PRECAUTIONS: Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

WARNING: MECHANICAL INFLUENCES TO BATTERIES

During the transport, shipping or disposal of batteries it is possible, for inappropriate mechanical influences, to constitute a fire hazard.



PRECAUTIONS: Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat. When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, please contact your local passenger or freight transport company.

NOTICE: Only IDS GeoRadar authorized technical service are entitled to repair this product.

**WARNING: Short circuit of battery terminals**

Risk of fire, electric shock, and damage.

PRECAUTIONS: Do not open the battery housing.

Keep away any metallic or wet objects from the battery terminals.

**WARNING: Short circuit of battery terminals**

If battery terminals are short-circuited e.g., by coming in contact with jewellery, keys, metallised paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets.

PRECAUTIONS: Make sure that the battery terminals do not come into contact with metallic objects.

**WARNING: Battery may get hot after prolonged use.**

Risk of burning injuries.

PRECAUTIONS: Avoid touching the hot battery. Allow the battery to cool down before removing it.

4 GENERAL DESCRIPTION

The Chaser XR GPR system is designed to detect and locate underground features for a wide range of possible applications including, but not limited to Geology, Geotechnical, Environmental, Glaciers, Rivers, Archaeology, Forensic, buried structures in general. It provides georeferenced underground maps if a supported positioning system is used.

4.1 Delivery Contents

The Georadar system Chaser XR includes 3 possible configurations: 1 is the basic configuration and 2 includes optional components to be purchased separately, namely:

1. **Chaser XR Lite Pack** (989791)
2. **Chaser XR Drag kit** (989754, optional),
3. **Chaser XR Positioning Kit** (986689, optional,).

4.1.1 Chaser XR Lite Pack (989791)

The basic package includes:

- a. Hardcase (989397)



- b. HPRC bag 2400 (989847)



- c. Antenna Chaser XR with sledge and handles (987402)



- d. Wheel Encoder WHE50 (854803)



- e. 2.5 meters LAN cable (987232, left image), and 0.50 meters Wheel Encoder cable (987233, right image).



- f. Chaser XR Pulling pole kit (987672).



- g. 2 Batteries GEB 364 (954519) and battery charger GKL311 single charger prof 3000 (799185).



4.1.2 Chaser XR Drag Kit (989754, optional)

This optional package includes:

- a. Chaser XR rugged Sledge for the antenna (987605)



- b. Wheel encoder mechanical coupling kit



- c. Wheel encoder WHE100 (854898)



- d. Wheel encoder cable



4.1.3 Chaser XR Positioning Kit (986689, Optional)

The optional positioning kit, includes:

- a. Chaser XR GNSS Positioning support and bayonet adapter.



Both the optional kits (the Drag kit and the Positioning kit) can be used only with the Chaser XR Lite Pack.

4.2 Basic System Composition

The **Chaser XR Lite Pack** is the basic configuration in which the system may be purchased. Fig. 1 illustrates Chaser XR Lite after assembling and the following components are illustrated:

- a) The telescopic drag pole with safety lace
- b) The LAN cable connecting the antenna and the PC (note: Chaser XR, may be deployed also WiFi, without any LAN cable)
- c) The Antenna with sledge and handles
- d) The WHE 50 encoder with encoder cable

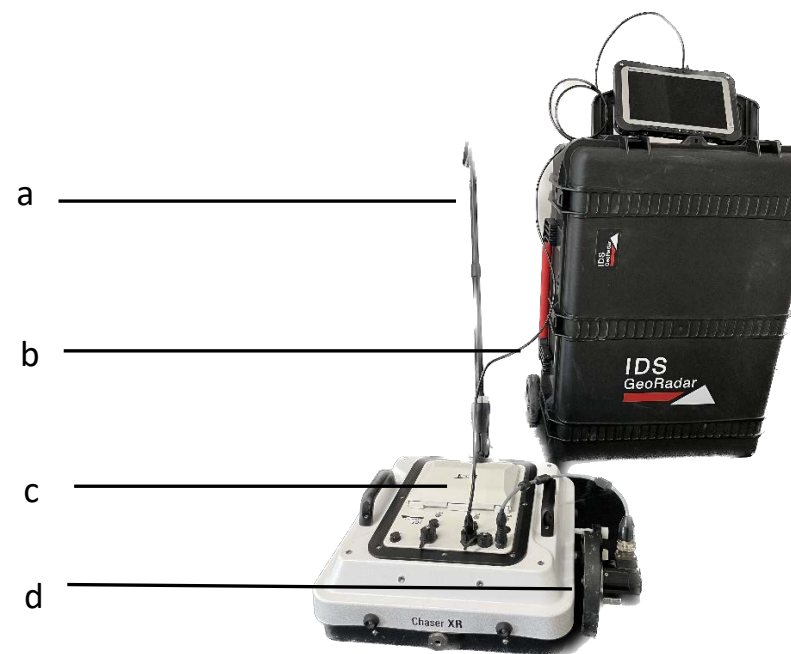


Fig. 1 Chaser XR Lite

4.3 Accessories

4.3.1 Chaser XR Drag Kit (optional)

The Chaser XR can be upgraded by the drag kit allowing for the use of the system over more rough surface. This optional kit includes all the items described at 4.1 and the system, after its installation, is shown below (Fig. 2).



Fig. 2 Chaser XR with Drag kit

Fig. 2 illustrates Chaser XR after installation of the drag kit for rough terrain. The set up of these components makes the system differs with respect to the Chaser XR Lite version because of the following items:

- a) The WHE 100 encoder type
- b) The mechanical coupling kit
- c) The sledge for rough terrain

4.3.2 Chaser XR Positioning Kit (optional)

A GNSS or a TPS can be paired to Chaser XR after installation of the positioning kit allowing for a GNSS antenna receiver or a 360° prism to be coupled to the top of the antenna case, after fixing it at its four corners by the 4 screws, provided with the optional kit.



Fig. 3 Chaser XR including drag kit and positioning kit

Fig. 3 illustrates the Chaser XR in its full configuration also including the positioning kit. The difference with respect the Lite and the Drag Kit version relates to:

- a) GNSS antenna receiver (not included)
- b) Positioning kit

4.4 Battery Handling

4.4.1 Charging

The temperature range for charging is between 0 °C to +40 °C/ +32 °F to +104 °F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10 °C to +20 °C/+50 °F to +68 °F if possible.

4.4.2 Operation/Discharging

The batteries can be operated from –20 °C to +50 °C/–4 °F to +122 °F. Lower operating temperatures reduce the capacity that can be drawn; higher operating temperatures reduce the service life of the battery.

4.4.3 Storage

The following recommendations should be kept in mind with respect to storage of batteries:

- Remove batteries from the product and the charger before storing.
- After storage recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.
- The batteries can be stored from –20 °C to +50 °C/–4 °F to +122 °F.

4.5 GNSS requirements

Chaser XR can be used (paired) with a GNSS antenna or a TPS to position the GPR data in an absolute coordinates system and to receive real-time positional corrections while the system is moving and collecting georadar data.

4.5.1 How to connect Chaser XR to a GNSS

Chaser XR can be linked to a GNSS which complies with the following characteristics:

1. Dual frequency (L1+L2);
2. Positioning update minimum 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 in GGA format ONLY, and choose only one group of satellites (GLONASS, Galileo)
5. Serial cable (RS232) is required, alternatively the GPS can be connected to the laptop via Bluetooth.

Once configured, the GNSS does not need an application to be able to receive and transmit data. It can directly transmit the received data to a device (PC).

In this case, the antenna is connected to the data logger via serial cable or Bluetooth.

For the pairing procedure (and requirements) of the GNSS with uMap Controller PC, please refer to the user's manual of the GNSS used.

4.5.2 How to connect Chaser XR to a TPS

Chaser XR can be linked to a TPS which complies with the following characteristics:

1. Robotic Total Station
2. Motorized
3. Automatic Target Recognition (ATR)
4. Positioning update greater than 5 Hz
5. Range >1000 m (with prism)
6. Angular accuracy: <3"

7. Measure synchronization: angles measure and distance measure must be synchronized; maximum permitted latency must be less than 2 ms.

8. Wi-Fi/Bluetooth controller is required.

9. Serial port (RS-232) on the controller is required

10. Formatted output strings, pseudo NMEA output (Northing and Easting coordinates expressed in meters) is required.

In this case, the remote controller must be connected to the Laptop through Bluetooth or a serial cable, to keep the Remote controller inside the vehicle during the acquisition phase.

For the pairing procedure (and requirements) of the TPS with uMap Controller PC, please refer to the user's manual of the TPS used.

5 HOW TO SET UP CHASER XR

This section of the User's Manual provides the description on how to assemble Chaser XR in all its configurations.

5.1 How to...set up Chaser XR Lite

The assembly of the basic configuration of Chaser includes the following steps:

1. Open the Hard case and take off the Antenna.



2. Install the WHE 50 encoder in one of the female screws located at each of the 4 side of the antenna case indicated as the HH or the VV polarization. The position of the encoder is going to be 90° with respect to the acquisition mode (i.e.: encoder next to the HH label->acquisition mode VV, vice-versa, encoder next to the VV label->acquisition mode HH).



3. Plug the WHE50 encoder cable on top of the WHE 50 encoder, on one side, and on one of the (2) "Wheel" port beside the battery housing on top of the antenna case, on the opposite side of the cable.



4. Install the anchor plate for the drag pole (its position varies depending if the system is used in HH or VV mode, and this is indicated onto the antenna case).



5. Install the drag pole through the ball clamp. The VV or the HH label closer to it, shall indicate the acquisition mode.



6. Plug the LAN cable on one side on the "LAN" port beside the battery housing on top of the antenna case, and to the LAN port of the PC on the opposite side of the cable (NOTE: this operation, is not necessary if the antenna is connected to the Controller via WiFi).
7. Release the screw on top of the battery compartment cover, open it, and insert the (2) batteries provided with the system. Then, close the cover.



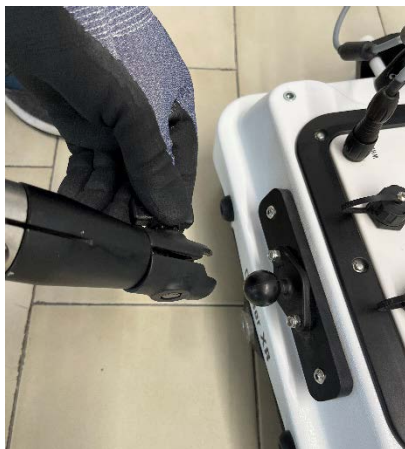
8. Chaser XR, is now ready to be turned on using the O/I button.



5.2 How to...set up Chaser XR Drag Kit (Optional)

Starting from the configuration set up as per 5.1 above, the installation of the drag kit includes the following steps:

1. Remove the drag pole from its original position.



2. Unplug the wheel encoder cable from the Wheel port on top of the antenna.



3. Remove (unscrew) the WHE50 encoder from the side of the antenna case.



4. Place the sledge for rough terrain under the antenna and fix it through the screw to the antenna.



5. Remove the anchor plate for the drag pole on top of the antenna.



6. Install the anchor plate drag pole on the sledge frame.



7. Install the anchor plat for the WHE100 encoder.



8. Install the WHE 100 encoder in one of the 4 side of the antenna case indicated as the HH or the VV polarization. The position of the encoder is going to be opposite (180°) with respect to the drag pole.



9. Plug the WHE100 encoder cable on top of the WHE 100 encoder, on one side, and on one of the (2) "Wheel" port beside the battery housing on top of the antenna case, on the opposite side of the cable.



5.3 How to...set up Chaser XR Positioning Kit (Optional)

The Positioning Kit can be used with both the Lite version as well as the version including the drag kit. Hence, the steps to set it up are:

1. Lay the positioning kit on the top of the antenna making sure that the holes at its four edges overlap with the female screw inserts at each of the four corners of the antenna and fix the (4) screws to secure the kit.



2. Couple the GNSS receiver antenna or the 360° prism either screwing directly or using the bayonet adapter provided with the kit.



6 HOW TO WORK ON SITE WITH CHASER XR

Chaser XR is a Georadar system that can be deployed on site in a wide variety of hardware and software configurations. Also, several positioning systems (Encoder, Virtual Grid, GNSS, Robotic Total Station) can be associated to the Chaser XR HW and SW. The aim is to cover the largest possible applications and field conditions.

6.1 How to set up Chaser XR in HH or VV Polarization

Besides the HW product configurations illustrated in 4.2 and 4.3 and their specific set up illustrated in 5.1, 5.2, and 5.3, Chaser XR can be deployed in 2 different orientation of the antenna, namely in HH (**Horizontal**, internal dipoles perpendicular with respect to the drag direction) or VV Polarization (**Vertical**, internal dipoles parallel with respect to the drag direction).

The HW set up in HH or VV polarization depends upon the relative installation of the Drag pole and the encoder wheel:

1. **VV Polarization acquisition mode:**

- a. Drag pole attached next to the VV label on the antenna case.
- b. Wheel encoder fixed next to the HH label on the antenna case.

2. **HH Polarization acquisition mode:**

- a. Drag pole attached next to the HH label on the antenna case.
- b. Wheel encoder fixed next to the VV label on the antenna case.

6.2 How to connect the field PC and the Chaser XR antenna

The connection between the field PC (where the uMap data acquisition SW is installed) and the Chaser XR antenna can be fulfilled 1) via WiFi or 2) via LAN Cable.

Regardless the specific field configuration to be used to collect field data, the common steps to start up the system before commencing any data acquisition on site are:

1. **Connecting Chaser XR antenna and field PC in Wi Fi Mode:**

- a. Open the battery compartment on top of the antenna case and insert the (2) batteries. Then close the same battery compartment.



- b. Press the O/I button beside the battery compartment to start up the antenna.



- c. 3 leds are present on top of the antenna case: 2 indicating the “battery” status, 1 the “System” status. As the system is turned on and the batteries are fully charged, the battery led shall be solid green and the “system” led shall have long-paused blinking green-to-blue for three times, indicating that the internal WiFi module is starting up to generate its own local network.



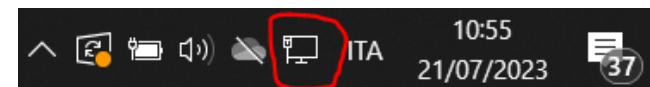
- d. As the “System” led is solid green, the WiFi is ready.



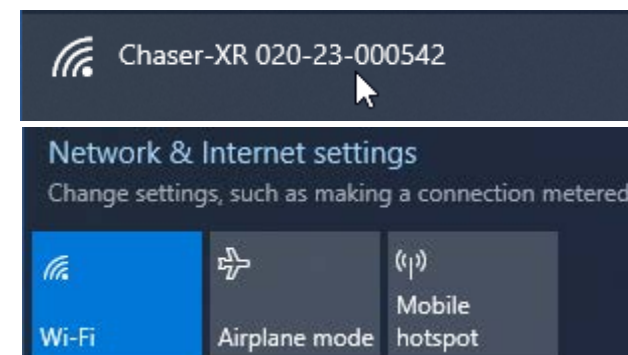
- e. Turn on the field PC where the uMap software is installed (note: please refer to the specific uMap user’s manual for details on installation. Also, firewall and antivirus must be OFF). The IP address of the WiFi port of the PC must be set to DHCP (Dynamic mode and NOT Static IP address).

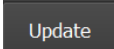


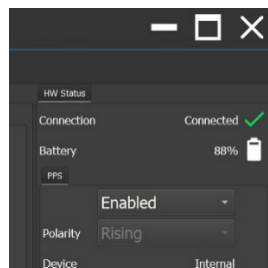
- f. Click on the network icon on the lower right corner.



- g. Select the WiFi network generated by the Chaser antenna including the serial number of that specific antenna (e.g.: **Chaser XR 020-23-000542**). Wait for connection.



- h. Turn on uMap software, then press on the Radar diagnostic icon , press update  if needed, and the connection between the antenna and the PC is established.



2. Connecting Chaser XR antenna and field PC using LAN Cable:

- a. Open the battery compartment on top of the antenna case and insert the (2) batteries. Then close the same battery compartment.

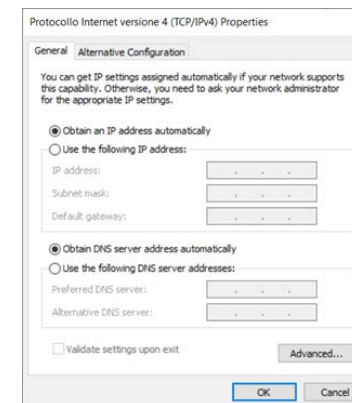


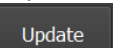
- b. Connect the field PC and the Chaser XR antenna via the LAN cable provided with the system: on one side to the antenna LAN connector, on the opposite side to the LAN port of the PC.
- c. Press the O/I button beside the battery compartment to start up the antenna. In this case, the green-to-blue blinking (described in the previous paragraph) will be not present due

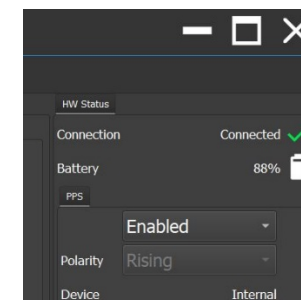
to the connection via LAN cable, but the WiFi module will be start up and usable in any case.



- d. Turn on the field PC where the uMap software is installed (note: please refer to the specific uMap user's manual for details on installation. Also, firewall and antivirus must be OFF). The IP address of the Ethernet port of the PC must be set to DHCP (Dynamic mode and NOT Static IP address).



- e. Turn on uMap, press on the Radar diagnostic icon , press update , and the connection between the antenna and the PC is established.



Chaser XR, is now ready to be used on site for data acquisition.

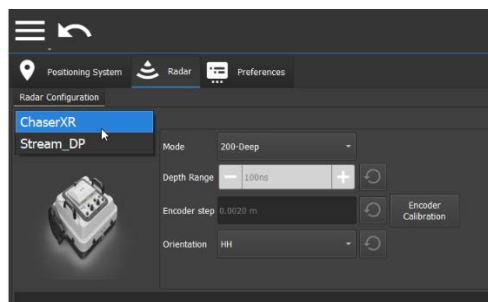
6.3 How to collect Chaser XR data in Encoder mode

Starting from a set up as per Fig. 1 (Chaser XR Lite) or Fig. 2 (Chaser XR Drag Kit), the minimum steps to be conducted to start gathering data are:

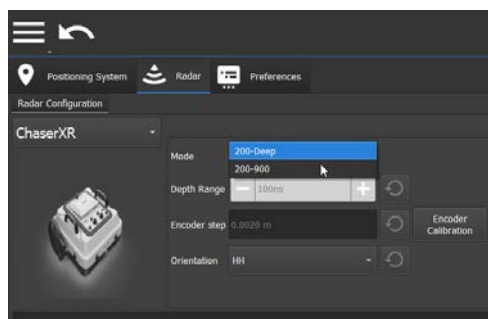
1. Start up the PC and launch the uMap acquisition software as per 6.2

and click on the Radar Status icon .

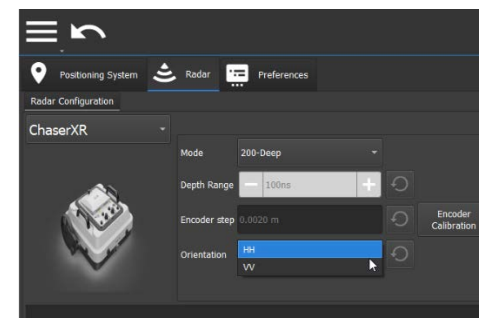
2. Select the Antenna type Chaser XR from the drop-down menu in uMap.



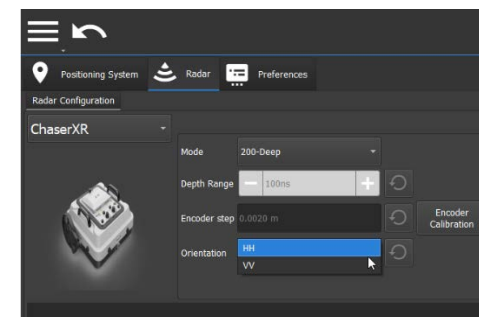
3. Select the antenna frequency



4. Select the Antenna orientation (HH or VV).



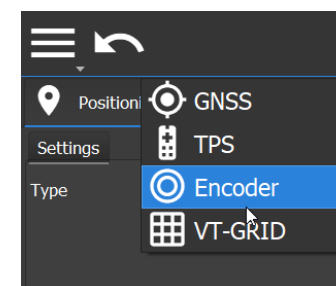
5. Select the encoder type mounted on Chaser XR (WHE50 or WHE100).



6. Click on the positioning icon to switch to the Positioning view tab.



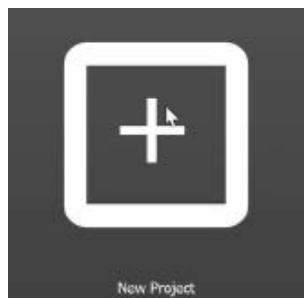
7. From the drop-down menu of the Positioning tab select the Encoder Mode.



8. Go back to the previous page by pressing the icon.



9. Press on the New Project icon to start a new project window.



10. In the Project Window, press the Play button to start the acquisition.



11. Press the Stop Acquisition button to close the swath acquisition.



12. Press the close current button to close the project.



13. Refer to uMap Software User's Manual for specific software tools.

6.4 How to collect Chaser XR data in GRID mode

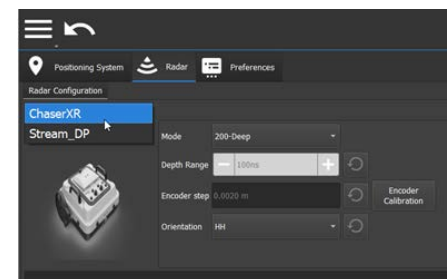
Starting from a set up as per Fig. 1 (Chaser XR Lite) or Fig. 2 (Chaser XR Drag Kit), the minimum steps to be conducted to start gathering data are:

1. Start up the PC and launch uMap the acquisition software as per 6.2

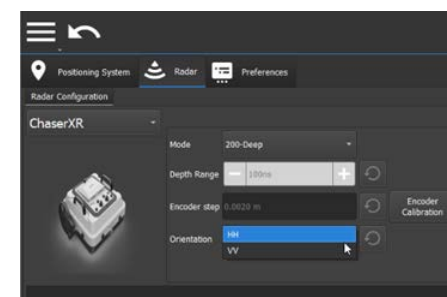
and click on the Radar Status icon



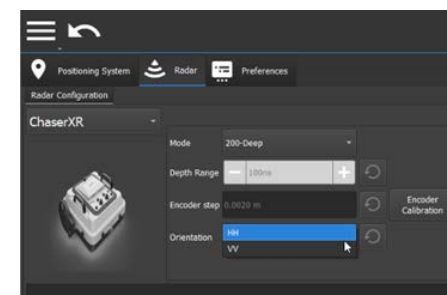
2. Select the Antenna type Chaser XR from the drop-down menu.



3. Select the Antenna orientation (HH or VV).



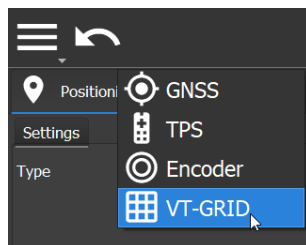
4. Select the encoder type mounted on Chaser XR (WHE50 or WHE100).



5. Click on the positioning icon to switch to the Positioning view tab.



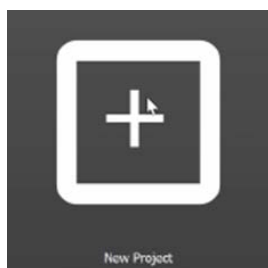
6. From the drop-down menu of the Positioning tab select the VGRID Mode.



7. Go back to the previous page by pressing the icon.



8. Press on the New Project icon to start a new project window.



9. In the Project Window, press the Play button to start the acquisition.



10. Press the Stop Acquisition button to close the swath acquisition.



11. Press the close current button to close the project.

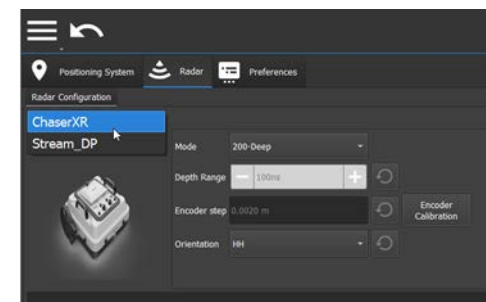


12. Refer to uMap Software User's Manual for specific software tools.

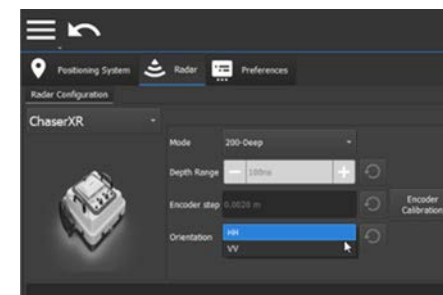
6.5 How to collect Chaser XR data in GNSS mode

Starting from a set up as per Fig. 1 (Chaser XR Lite) or Fig. 2 (Chaser XR Drag Kit), the minimum steps to be conducted to start gathering data are:

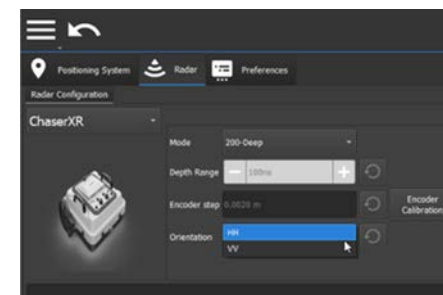
1. Start up the PC and launch uMap the acquisition software as per 6.2 and click on the Radar Status icon .
2. Select the Antenna type Chaser XR configuration from the drop-down menu.



3. Select the Antenna orientation (HH or VV).



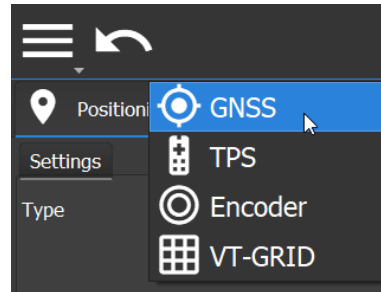
4. Select the encoder type mounted on Chaser XR (WHE50 or WHE100).



5. Click on the positioning icon to switch to the Positioning view tab.



6. From the drop-down menu of the Positioning tab select the GNSS Mode.



7. Go back to the previous page by pressing the icon.



8. Press on the New Project icon to start a new project window.



9. In the Project Window, press the Play button to start the acquisition.



10. Press the Stop Acquisition button to close the swath acquisition.



11. Press the close current button to close the project.



12. Refer to uMap Software User's Manual for specific software tools.

6.6 How to collect Chaser XR data in TPS mode

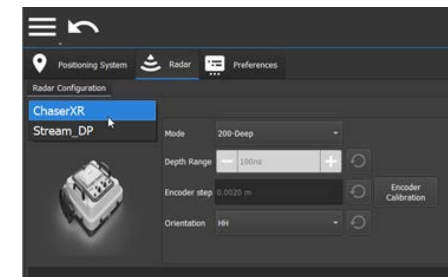
Starting from a set up as per Fig. 1 (Chaser XR Lite) or Fig. 2 (Chaser XR Drag Kit), the minimum steps to be conducted to start gathering data are:

1. Start up the PC and launch uMap the acquisition software as per 6.2

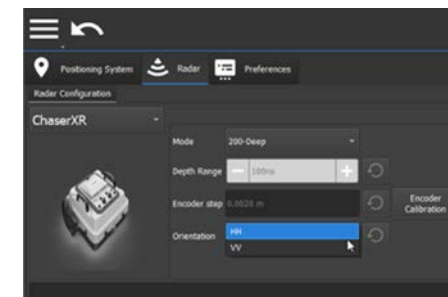
and click on the Radar Status icon



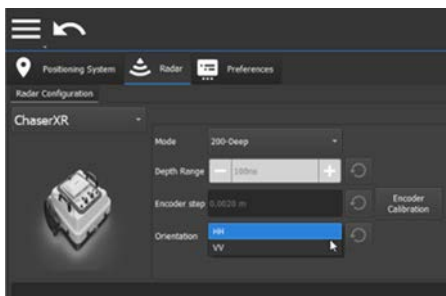
2. Select the Antenna type Chaser XR configuration from the drop-down menu.



3. Select the Antenna orientation (HH or VV).



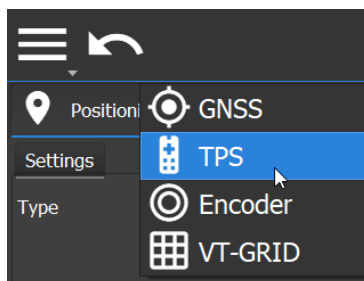
4. Select the encoder type mounted on Chaser XR (WHE50 or WHE100).



5. Click on the positioning icon to switch to the Positioning view tab.



6. From the drop-down menu of the Positioning tab select the TPS Mode.



7. Go back to the previous page by pressing the icon.



8. Press on the New Project icon to start a new project window.



9. In the Project Window, press the Play button to start the acquisition.



10. Press the Stop Acquisition button to close the swath acquisition.



11. Press the close current button to close the project.



12. Refer to uMap Software User's Manual for specific software tools.

7 CARE AND TRANSPORT

7.1 Cleaning Information

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



CAUTION: DAMAGE TO ELECTRICAL COMPONENTS

If a damp cloth is used while cleaning the system or part of it, make sure that this is not wet, to avoid any damage to the electrical components of the equipment

PRECAUTION: Before cleaning any of the external parts of the apparatus, make sure that all cables and wires have been unplugged, including the power supply cable.

The Chaser XR should be cleaned periodically using a damp cloth.



NOTICE: If the system is dirty, connectors and encoders may not work properly.

Precautions:

After a field work, check the conditions of the system and clean it if necessary.

Do not use solvents or abrasive detergents.



CAUTION: DAMAGE TO ELECTRICAL COMPONENTS

Consider only cleaning products appropriate for electronic components.

PRECAUTION: Verify if the cleaning products are compliant with electronic devices.

Do not apply liquid directly to the electrical contacts of the various connectors.

If a specific spray is used to clean the PC 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.



CAUTION: DAMAGE TO ELECTRICAL COMPONENTS

Flammable spray could damage the electronic devices, as controller laptop.

PRECAUTION: Verify if the cleaning products are compliant with electronic devices.

7.2 Battery Removal Information

Remove batteries from the product and the charger before storing.

- After storage recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.
- A storage temperature range of $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ / $-4\text{ }^{\circ}\text{F}$ to $+122\text{ }^{\circ}\text{F}$ in a dry

environment is recommended to minimize self-discharging of the battery.

- At the recommended storage temperature range, batteries containing a 40% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.

As for the Laptop Batteries please, do refer to the PC manufacturer user's manual.

7.3 Periodical Check

The Operator should periodically check the status of the antenna sledge, shells, all cables, any rotating part, and any (potentially) consumable part. The system must not be used in case of any malfunctioning or broken part, as this may cause other parts to be damaged and/or malfunction consequently.



NOTICE: The Sledges should be periodically checked out to verify their status, and should be removed and replaced, when needed. Prior starting any survey, the status of the sledge should be verified for integrity.

Precautions:

If the antenna shell is exposed, even partially, because of the sledge being consumed, the sledge must be replaced immediately.



NOTICE: All the cables and connectors should be verified at each use of the system

Precautions:

In case of any damage, remove and replace it.



NOTICE: All the connectors on the antenna and the accessories, must be plugged at any time either by the corresponding cable plug, or by the connector cap, when not in use. This is to prevent dust or water ingress, that may damage the connector itself and its functionality.

Precautions:

Verify the connectors status before running a survey.

7.4 Proper system use and Transport/shipping

Always use the system as indicated in this manual, by following instructions.

When not in use, the system should always be transported and/or shipped by using the flight case with which the system is delivered. Transporting and/or shipping the system outside this packaging or by using other shipping boxes may cause the system, or part of it, to be damaged.



CAUTION: MECHANICAL DAMAGE OF THE SYSTEM

Transporting and/or shipping the system outside its original packaging or by using other shipping boxes may cause the system, or part of it, to be damaged.

PRECAUTION: The system should always be transported and/or shipped by using the flight case with which the system is delivered.

8 IDS GEORADAR SUPPORT

8.1 myWorld

myWorld platform of Leica Geosystems offers a wide range of services, information, and training material. With direct access to *myWorld*, the user can access all relevant services. The availability of services depends on the instrument model.

SERVICE	DESCRIPTION
myProducts	Add all IDS GeoRadar products that you and your company own and explore your world of Leica Geosystems: View detailed information on your products and update your products with the latest software and keep up to date with the latest documentation.
myService	View the current service status and full-service history of your products in IDS GeoRadar service centres including detailed information on the services performed on your system.
mySupport	Create new support requests for your products that will be answered by your local Support Team. View the complete history of your support requests and view detailed information on each request in case you want to refer to previous support requests.
myLearning	Welcome to the home of Leica Geosystems online learning! There are numerous online courses – available to all customers with products that have valid CCPs (Customer Care Packages).
myTrustedServices	Add your subscriptions and manage users for Leica Geosystems Trusted Services, the secure software services, that assist you to optimise your workflow and increase your efficiency.
mySmartNet	HxGN SmartNet is the GNSS correction service built on the world's largest reference station network, enabling GNSS-capable devices to quickly determine precise positions in the range of one to two centimetre accuracy. The service is provided 24/7 by a highly-available infrastructure and professional support team with more than 10 years of experience reliably delivering the service.
myDownloads	Downloads of software, manuals, tools, training material and news for IDS GeoRadar products.

8.2 How to manage return for Service

On occasions, your GPR may need to be returned to factory for repairs. These events, depending on circumstances, may be handled under maintenance or warranty conditions.

IDS GeoRadar, implements an internal ticket system to handle the repair of its Products worldwide. In this respect, for the global IDS Customer Support to be able to troubleshoot in case of need, it is necessary identifying the GPR system first hence, it is mandatory providing information including Serial number and Product Number of the system or part of it that need repair. This information may be found on a label placed on top of the system (e.g.: inside the battery housing, on top of the antenna, on the side of the rudder, on top of the SCU, etc....). An example of this label is illustrated in Fig. 4.



Fig. 4 Example of an IDS GPR system label

In any event, the workflow to follow up on a support request is:

1. Contact, by using the local Support mailing list, your local representative of IDS Customer Support, or enter a support case into the *mySupport* page of *myWorld*, indicating the following:
 - a. Type of System or part of it (defined by Product Number or Article number, that is PN 859224 in Fig. 4)
 - b. Serial Number (SN 020-21-000333, in Fig. 4)
 - c. Type of issue

2. The local Representative of IDS Customer Support or the Central IDS Customer Support shall follow up on the case by a first level, remote troubleshooting to assess the system and the possible issue.
3. If a further, direct assessment of the system is necessary, the system shall be returned for analysis. Based on this, a repair under warranty or maintenance conditions, may be carried out. Depending on cases and the type of possible repair, return may be towards the local Representative of IDS or to the main factory.
4. Prior return of the goods, wait for the IDS logistic office to provide a reference number for the return case and shipping instructions.
5. As the system reaches IDS repair premises, this is analyzed to find the root cause of the issue, and repaired ONLY after signed approval of the quotation, in case where the warranty does not apply. The status of the repair may be checked onto the *mySupport* page of *myWorld*.
6. At the end of the repair, the system is shipped back to the shipping address indicated at the beginning of the procedure, and this is conducted based on contractual agreements.



NOTICE: The above, is meant solely as a broad indication of the workflow for the return of a system for repair.

Precautions:

Please, refer to the Contractual Terms and Conditions for more detailed information.

APPENDIX A DISCLAIMER

1. General

- i. The present Disclaimer applies to all products designed, produced and distributed by IDS GeoRadar S.r.l., its Subsidiaries, Affiliated and authorized Distributors (the “Products”). IDS GeoRadar S.r.l. 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 GeoRadar S.r.l.
- 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. User/Buyer hereby consents to the exclusive jurisdiction of Pisa.

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

- i. The User/Buyer, for setting-up and using the Products, shall consult the official documentation provided by IDS GeoRadar S.r.l. 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 GeoRadar S.r.l. 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 un-authorized use of the Products in Public Areas/Roads.

iii. Buyer/User further 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 GeoRadar S.r.l. harmless against any liability (including attorney’s fees) for non-compliance with the terms of this article.
- That, if IDS GeoRadar S.r.l. requires that Buyer/User shall carry out a training with reference to some Product categories, no operation or use of the Products shall be started before its designated Operator/s has got the User Certificate, as defined by IDS GeoRadar S.r.l. 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”, e.g. the IBIS Products and Hydra 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 GeoRadar S.r.l. 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”.

3. Disclaimer for the “Use” of the Products.

- i. The User shall follow the instructions provided by IDS GeoRadar S.r.l. 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 GeoRadar S.r.l. 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, including but not limited to the following main aspects:
 - a. Use of IDS GeoRadar S.r.l. 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 GeoRadar S.r.l.;
 - 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 not in compliance with the required specifications of IDS GeoRadar S.r.l. not expressly authorized by IDS GeoRadar S.r.l.;
 - f. Poor or faulty operation of the electrical and telecommunication networks not directly managed by IDS GeoRadar S.r.l. or its delegates.
 - g. Poor or faulty operation Software/Hardware of the third parties connected with IDS GeoRadar S.r.l. 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 GeoRadar S.r.l.

APPENDIX B TECHNICAL SPECIFICATIONS

PARAMETER	CONFIGURATION	
	Chaser XR 200 Deep	Chaser XR 200-900
Number of channels	1	2
Maximum time-range	512ns	128ns
Max number of samples	2048	
Maximum radar speed	ca 50 km/h (31 mph)	
Polarization	HH and VV (depending on acquisition mode)	
Power consumption	Stand-by: 12 W; Acquisition: 16W	
Max Operating Time	8h (acquisition), with two batteries. Extended, by hot swap capability	
Antenna Size	430 x 430 x 184 mm	
System Size (with Drag Kit + Positioning kit)	690 x 496 x 324 mm	
Antenna Weight (without batteries)	5.5Kg	
Environmental	IP65	
Certification	EC, FCC, IC, UKCA	
Recommended Laptop	Panasonic FZ-G2	
Positioning	Internal PPS; Encoder; External GPS and TPS	

SOFTWARE SPECIFICATIONS

uMap Acquisition Software	Automatic calibration for an easy and quick start-up Visualization and storage of radar data Real-time visualization of radar tomography (time-slices). Connection with NMEA positioning. Device multi-language. Supports both Metric and Imperial units
IQMaps Processing Software	Advanced 3D processing software with a direct export link to AutoCAD

Tab. 1 – Radar Sensor Technical Specifications

**Exposure to Radio Frequency (RF) Signals:**

For this the minimum distance between the user and any radiating elements is about 200 mm.

SAR evaluation is not required because the output power value is less than exemption limit at such separation distance.

APPENDIX C CONFORMITY TO EUROPEAN and UK REGULATIONS

We,

IDS Georadar s.r.l.
via A. Righi, 6, 6 A, 8, 56121 PISA, ITALY

declare under our sole responsibility that the product:

Ground Penetrating Radar (GPR)
Model No(s): CHASERXR

To which this declaration relates, is in conformity with the essential requirements of

2014/53/EU Directive (RED)

The product(s) has been tested according to the following standards or technical specifications:

Essential requirements	Standard
Essential requirements for the protection of the health and safety of people, pets and goods, Article 3.1a)	- Assessment for conformity to Art. 3.1a (Safety) - Assessment for conformity to Art. 3.1a (Health)
Essential requirements on electromagnetic compatibility levels, Article 3.1b)	ETSI EN 301 489-33 V2.2.1 (2019-04) ETSI EN 301 489-1 V2.2.3 (2019-11)
Essential requirements for the effective use of radio spectrum, Article 3.2	ETSI EN 302 066 V2.2.1 (2020-06) ETSI TS 103 361 V1.1.1(2016-03)

We,

IDS Georadar s.r.l.
via A. Righi, 6, 6 A, 8, 56121 PISA, ITALY

declare under our sole responsibility that the product:

Ground Penetrating Radar (GPR)
Model No(s): CHASERXR

To which this declaration relates is in conformity with the relevant legislation of United Kingdom:

UK SI 2017 No. 1206 The Radio Equipment Regulation 2017

The following BSI standards and technical specifications have been applied: standard(s) or other normative document(s):

Essential requirements	Standard
Radio Testing (UK Part 2 Chapter 1(6)(2))	ETSI EN 302 066 V2.2.1 (2020-06) ETSI TS 103 361 V1.1.1(2016-03)
EMC testing (UK Part 2 Chapter 1(6)(1)(b))	ETSI EN 301 489-33 V2.2.1 (2019-04) ETSI EN 301 489-1 V2.2.3 (2019-11)
Safety testing (UK Part 2 Chapter 1(6)(1)(a))	- Assessment for conformity to UK Part 2 Chapter 1(6)(1)(a) (Safety) - Assessment for conformity to UK Part 2 Chapter 1(6)(1)(a) (Health)

APPENDIX D IMPORTANT NOTE FOR US CUSTOMERS

FCC ID: UFW-CHASERXR

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.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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

(c) The manufacturers, or their authorized sales agents, must inform purchasers and users of their systems of the requirement to undertake detailed coordination of operational areas with the FCC prior to the equipment being operated.

(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

This device devices may not be employed for the operation of toys. Operation onboard an aircraft, a ship or a satellite is prohibited.

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.

Cet appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux RSS(s) exempts de licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est soumise aux deux conditions suivantes :

1. Cet appareil ne peut pas causer d'interférence.
2. Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

APPENDIX E IMPORTANT NOTES FOR CANADIAN CUSTOMERS

IMPORTANT NOTE FOR THE CANADIAN CUSTOMERS

IC Certification Number: **8991A-CHASERXR**

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.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

NOTE IMPORTANTE POUR LES UTILISATEURS CANADIENS

Numéro de certification : **8991A-CHASERXR**

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.

APPENDIX F TROUBLESHOOTING

LED	Status	Error	Troubleshooting
SYSTEM	Blue	No connection between Chaser XR system and Controller	- Verify connection of the LAN cable between Chaser XR and Controller - Verify that the Network Adapter is in DHCP mode (IP address not static)
	Red	Internal hardware error	- Stop the acquisition - Try to update configuration in uMap Software - If error is still present, reset the Chaser XR system by power off and on the GPR antenna - If the LED is still in error mode, contact Customer Support
BATTERY	Red	Low battery percentage	- Replace the battery

APPENDIX G CONTACTS

The IDS GeoRadar Support team is available to answer any question about:

- general enquiries
- request of advertising material
- technical issues
- As well as listening to your suggestions too.

Please, feel free to contact us at:



IDS GeoRadar S.r.l.

via Augusto Righi, 6/6A/8
Ospedaletto - 56121
Pisa, Italy



(39) 050 8934 122



(*GEO BU* Customer Technical Support)
support.geo@idsgeoradar.com