

IDA-3106

Interference and Direction Analyzer

Operating Manual



IDA
IDA 2

narda 
Safety Test Solutions

Narda Safety Test Solutions GmbH
Sandwiesenstraße 7
72793 Pfullingen, Germany

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Order no.: 3106/98.21

Issue: 06/01.2022, A ...

Previous issues: 05/06.2016, A ...

Subject to change.

Our normal terms of warranty and delivery
apply.

Printed in Germany

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1

Introduction

This chapter contains basic information on measuring electromagnetic fields, on using the IDA-3106, and on how this manual is laid out.

- 1.1 About this device (page 2)**
- 1.2 The antenna handle (page 3)**
- 1.3 Narda directional antennas (page 4)**
- 1.4 PC connection (page 5)**
- 1.5 Overview of options (page 5)**
- 1.6 About this operating manual (page 6)**

1.1 About this device

The Interference and Direction Analyzer IDA-3106 is a compact, portable system for measuring electromagnetic signals in the frequency range 9 kHz to 6 GHz. As well as the spectrum display with its extremely fast measuring speed, other optional operating modes such as Multi-Channel Power, Level Meter and Time Domain (Scope) allow sophisticated analysis of the signals.

Together with the handle and Narda directional antennas, the IDA-3106 is particularly used for identifying and localizing signal sources. The bearings determined manually using the Manual Bearing function or automatically with the Horizontal Scan function can be directly superimposed on an electronic map in Direction Finding mode. Triangulation can then be used to determine the location of the transmitter.

The IDA-3106 can be used outdoors even under difficult environmental conditions thanks to its robust casing, controls that can also be operated when wearing gloves, and rechargeable batteries that can be hot swapped.



Figure 1: IDA-3106 in field use

1.2 The antenna handle

The antenna handle is designed for attaching to the Narda directional antennas, providing an ergonomic grip for the antenna. An electronic 3-axis compass, a 20 dB preamplifier, and a button for starting measurements are all built in to the handle. The snap fixing allows you to quickly and easily adjust the antennas by 90° to match the polarization plane. The antenna module used and the polarization plane are automatically detected by the basic unit. The power supply is provided from the basic unit via the separate data cable.



Figure 2: Antenna handle

An arm support, which simply clips on to the handle and allows effortless long term use, is included with the handle.



Figure 3: Antenna handle with arm support

1.3 Narda directional antennas

Three Narda directional antennas that are specially matched to the IDA-3106 and which fit the antenna handle are available. They cover the frequency range from 20 MHz to 6 GHz. A highly sensitive loop antenna is also available as an accessory for covering the lower frequency range from 9 kHz to 30 MHz.

You can of course also use directional or omnidirectional antennas from other manufacturers with the IDA-3106. Even Direction Finding mode is possible when using the antenna with the antenna handle and adapter.

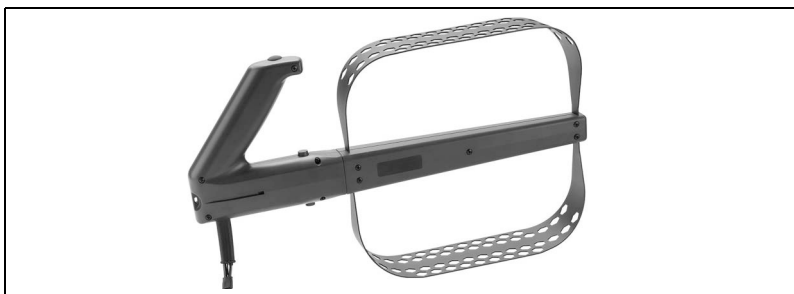


Figure 4: Directional antenna 1, frequency range 20 MHz to 250 MHz

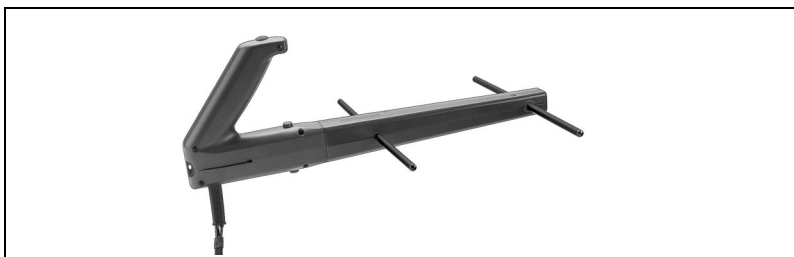


Figure 5: Directional antenna 2, frequency range 200 MHz to 500 MHz



Figure 6: Directional antenna 3, frequency range 400 MHz to 6 GHz



Figure 7: Loop antenna, frequency range 9 kHz to 30 MHz

1.4 PC connection

The device IDA-3106 can be connected to a PC via the optical interface or the USB port (Mini B type). This allows access to the device functions and measurement results. You can find detailed information about this in the following chapters:

- *PC Software* on page 235
- *Remote Control* on page 239

1.5 Overview of options

The table below shows all the options available for the IDA-3106. Your particular device may not be equipped with all the options listed here and described in this operating manual. Contact your local sales representative to order an option, and refer to the chapters *Updating the device software* on page 233 and *Activating options* on page 233.

Table 1: Available options

Name	Function	Order No.
Mapping	Mapping activation status (Activated / Deactivated)	3100/95.01
Time Domain (Scope)	Time Domain (Scope) activation status (Activated / Deactivated)	3100/95.04
I/Q Analyzer	I/Q Analyzer activation status (Activated / Deactivated)	3100/95.05

Table 1: Available options

Name	Function	Order No.
Level Meter	Level Meter activation status (Activated / Deactivated)	3100/95.06
Demodulation	Demodulation activation status (Activated / Deactivated)	3100/95.07
Multi-Channel Power	Multi-Channel Power activation status (Activated / Deactivated)	310/ 95.08
Direction Finding	Direction Finding activation status (Activated / Deactivated)	3100/95.09
I/Q Streaming	I/Q Streaming activation status (Activated / Deactivated)	3100/95.10
Audio Streaming	Audio Streaming activation status (Activated / Deactivated)	3100/95.11

1.6 About this operating manual

1.6.1 User interface language

This operating manual uses English terminology to describe the user interface. The user interface of the IDA-3106 can however be displayed in other languages.


If you select another language for the user interface, the displayed terms will differ from the ones described in this manual.

1.6.2 Symbols and characters used

Various elements are used in this operating manual to draw attention to special meanings or important points in the text.


Symbols and terms used in warnings

The following warnings, symbols and terms are used in this document in compliance with the American National Standard ANSI Z535.6-2011:

	This general danger symbol in conjunction with the terms CAUTION , WARNING , or DANGER warns of the risk of severe injury. Follow all subsequent instructions to avoid injury or death.
NOTICE	Indicates a danger that could lead to damage or destruction of the device.
CAUTION	Indicates a danger that represents a low or medium risk of injury.
WARNING	Indicates a danger that could lead to death or severe injury.
DANGER	Indicates a danger that will result in death or severe injury.

Warning format

All warnings have the following format:

 WARNING TERM
Type and source of danger Consequences of ignoring the warning ⇒ Action needed to avoid danger

Symbols and characters

!	Important action instruction Indicates an instruction for action that must be followed in order to avoid danger.
✓	Requirement Indicates a requirement that must be fulfilled before the subsequent action can be taken. Example: ✓ The measurement screen is displayed.
⇒	Action Indicates a single action. Example: ⇒ Switch the device on.
1. 2. 3.	Sequence of actions Indicates a sequence of actions that must be performed in the order given.
↵	Result Indicates the result of an action. Example: ↵ The device starts a self test.
Bold text	Control element or menu name Indicates device control elements and menu names. Example: ⇒ Press the OK key.
Gray text	Orientation To keep things simple, only the softkeys that you need to press are indicated in this manual, not the menus and sub-menus that contain the softkey commands. To help you find your way around, there is a line of text in gray at the start of each section indicating the order of selection for the menus and sub-menus. This line is omitted if the function is on the topmost level. Example: Multi-Channel Power • Select Menu
Note:	Important additional information or details of special features or situations.

2

Important Safety Instructions

This chapter explains important terms that are used in this operating manual.

- 2.1 Using this operating manual (page 10)**
- 2.2 Before connecting up (page 10)**
- 2.3 Proper use (page 10)**
- 2.4 Improper use (page 11)**
- 2.5 General hazards (page 11)**
- 2.6 Dangers due to electromagnetic fields (page 12)**
- 2.7 AC adapter / charger (page 14)**
- 2.8 Rechargeable batteries (page 15)**
- 2.9 Faults and unusual stresses (page 18)**
- 2.10 Proper disposal (page 18)**

2.1 Using this operating manual

- ⇒ Please read this manual carefully and completely before using the device.
- ⇒ Keep this manual so that it is readily available to all users of the device.
- ⇒ Always make sure that this manual accompanies the device if it is given to a third party.

2.2 Before connecting up

The device left the factory in perfect condition. We recommend that the following instructions be followed to ensure that this condition is maintained and that operation of the device is without danger.

2.3 Proper use

The device may only be used under the conditions and for the purpose for which it was constructed.

The IDA-3106 is designed for measuring and evaluating electromagnetic fields.

- ⇒ Only use the device under the conditions and for the purpose for which it was constructed.

Proper use also includes the following:

- ⇒ Following the national accident prevention rules that apply at the place of use.
- ⇒ Only allowing appropriately qualified and trained persons to use the device.

2.4 Improper use

The IDA-3106 is not a warning device that gives indication of the presence of dangerous fields by means of visible or audible signals.

- ⇒ Always consider the device as a measuring device, never as a warning device.
- ⇒ Always carefully observe the actual measurement value display when approaching unknown fields.
- ⇒ In case of doubt, use an additional warning device such as **RadMan** or **Nardalert** from Narda Safety Test Solutions.

2.5 General hazards

CAUTION

Hot connector sockets

The connecting sockets can get very warm if the instrument is used for long periods. This is normal.

- ⇒ Please be careful when touching the connectors after using the instrument for a long period of time.

2.6 Dangers due to electromagnetic fields

WARNING

Strong fields

Very strong fields can occur in the vicinity of some radiation sources

- ⇒ Be aware of and observe any safety barriers and markings.
- ⇒ In particular, persons fitted with electronic implants (e.g. pacemakers) must keep away from dangerous areas.

WARNING

Unsuitable frequency range

Dangerous fields may not be detected if an unsuitable frequency range is selected

- ⇒ Always select the largest available or the most suitable frequency range.
- ⇒ Always carefully observe the actual measurement value display when approaching unknown fields.
- ⇒ In case of doubt, use an additional wideband warning device such as RadMan or Nardalert from Narda Safety Test Solutions.

WARNING

Electric shock

High voltages may occur within the device.

- ⇒ Do not bring the measuring device or the antenna into contact with any electrically conductive items.
- ⇒ Do not open the device. (Opening the device will void any claim under warranty.)
- ⇒ Do not handle or use a device that is opened or that is visibly damaged.
- ⇒ Only use the accessories supplied with and designed for the IDA-3106.

NOTICE

Malfunction

Improper use, damage, and unauthorized repairs can impair the accuracy and function of the device

- ⇒ Only use the device under the conditions and for the purpose for which it was constructed.
- ⇒ Regularly check the device for signs of damage.
- ⇒ Only allow qualified persons to make repairs.

Metallic stickers on the antenna can lead to measurement errors, specifically to an underestimation of the electromagnetic field strength.

- ⇒ Do not apply metallic stickers to the antenna handle or the antennas.

Metallic stickers in the area above the display can cause malfunction of the GPS receiver.

- ⇒ Only apply stickers of any kind to the back or sides of the device.

2.7 AC adapter / charger

WARNING

Electric shock

Parts carrying dangerous voltages may be exposed and cause injury through electric shock if the AC adapter / charger is damaged.

⇒ Do not use an AC adapter / charger that is damaged.

NOTICE

Destruction of the AC adapter / charger

The AC adapter / charger can be destroyed by an incorrect AC line voltage, condensation, temperatures that are too high or too low, and insufficient ventilation.

- ⇒ Make sure that the AC line voltage is the same as the operating voltage of the AC adapter / charger **before** you connect it up.
- ⇒ Do not use the AC adapter charger if condensation has formed on it. If condensation is unavoidable, e.g. when the AC adapter charger is cold and is brought into a warm room, it must be allowed to dry out before you connect it up.
- ⇒ Only use the AC adapter / charger indoors and at temperatures between 0 °C and +40 °C.

2.8 Rechargeable batteries

The IDA-3106 is fitted with a replaceable rechargeable Lithium-ion battery so that you can use it independently of AC line power. The device also has an internal NiMH buffer battery which will power the device for 10 seconds so you can replace the rechargeable battery during operation (hot swap). You cannot access this buffer battery.

2.8.1 Storage

CAUTION

Unsuitable environmental conditions

Excessive temperatures and humidity can lead to a short circuit which can result in a fire, which may cause injury or destroy the battery pack.

- ⇒ Make sure that the storage conditions are within the following limits:
 - Temperature: -10 °C to +50 °C
 - Air humidity: 0 % to 80 %
- ⇒ Check regularly to ensure that the storage temperature and humidity are within the prescribed limits.
- ⇒ Do not leave discharged batteries in the instrument for an extended period of time.
- ⇒ Do not store the batteries for more than 6 months without recharging them in the meantime.
- ⇒ Do not store the batteries together with any other metallic objects.
- ⇒ Long-term storage can reduce the battery capacity and shorten battery life. The casing can also be damaged internally by leaking electrolyte.

2.8.2 Handling

- ⇒ Observe the following instructions for correct and safe handling of the battery pack.

CAUTION

Mechanical stresses

Incorrect handling and unsuitable mechanical stresses can lead to explosion, fire, or chemical leakages, which may cause injury or destroy the battery pack.

- ⇒ Do not open, crush, or dismantle the battery pack.
- ⇒ Do not drop the battery pack from a great height.
- ⇒ Do not attempt to solder anything on to the battery pack.

2.8.3 Fire hazards

CAUTION

Ignition of battery pack

The battery pack may catch fire if it is not used correctly. This may result in injury and will damage the battery pack.

- ⇒ Do not expose the batteries to high temperatures for an extended period of time.
- ⇒ If the anode or cathode of the battery comes into contact with another metal, heat may be generated and the electrolyte may leak. The electrolyte is flammable. The battery must be removed immediately from proximity to fire if electrolyte leakage occurs.
- ⇒ If a fire occurs, only use a Type D (dry powder) extinguisher to extinguish the fire. Make sure that you are upwind of the fire before attempting to extinguish it to prevent inhaling poisonous vapors.
- ⇒ Irritation of the eyes, skin, and respiratory tract can occur due to smoke or vapors from a burning battery (see next section).

2.8.4 Chemical hazards

CAUTION

Leakage of dangerous substances

Dangerous substances cannot leak from the battery pack during normal use, so there is no danger of contact with toxic materials. Leakage can only occur due to mechanical damage to the casing. If there is a chemical leak, please note the following information:

- ⇒ Gases released by a fire or by mechanical damage can cause breathing difficulties. Ventilate the area immediately or go outside into the fresh air. In case of emergency, seek medical attention.
- ⇒ The chemicals may cause irritation if they come into contact with your skin. If this happens, wash the affected area thoroughly with soap and water.
- ⇒ Your eyes may also be irritated. If this happens, wash your eyes thoroughly with water and seek medical attention.
- ⇒ Wipe up any spilled electrolyte with an absorbent cloth, making sure that you protect your skin, eyes and respiratory tract from contact with the electrolyte.

2.8.5 Charging and discharging

CAUTION

Incorrect charging and discharging

Incorrectly charging or discharging the batteries can cause explosion, fire, or leakage of chemical materials. This may result in injury or in destruction of the battery pack.

- ⇒ Only charge the batteries in accordance with the instructions in this manual using the specified charger unit.
- ⇒ The charging temperature must be between 0 °C and +40 °C.
- ⇒ Only discharge the battery between -20 °C and +60 °C.

2.8.6 Disposal

Under normal circumstances the battery will not cause any environmental damage. However, because they contain dangerous chemicals, they must be disposed of separately when they reach the end of their useful life.

The batteries are classed as dangerous waste.

It is therefore considered hazardous waste, and must be disposed of via a recognized recycling / return system. They must never be thrown away in the normal trash. See *Proper disposal* on page 18

2.9 Faults and unusual stresses

Take the device out of service and secure it against unauthorized use if it can no longer be used safely, for example as in the following situations:

- The device is visibly damaged.
- The device does not work any more.
- The permitted limits have been exceeded due to excessive stresses in any form.


Contact your local Sales Partner for assistance in such cases.

2.10 Proper disposal

2.10.1 Disposal of used equipment



The crossed-out wheeled garbage can symbol indicates that this product is subject to the European WEEE Directive 2012/19/EU on the disposal of waste electrical and electronic equipment and must be disposed of separately from household waste in accordance with your national regulations.

 In the European Union, all electronic measuring systems purchased from Narda after August 13, 2005 can be returned at the end of their useful life.

⇒ For more information, please contact your Narda distributor.

2.10.2 Disposal of removable batteries

- ⇒ Batteries must not be disposed of in household waste, but must be disposed of separately from the product in accordance with the applicable regulations. They can be returned free of charge to the appropriate collection points, your dealer or directly via Narda.
- ⇒ Please discharge the batteries before disposal.

2.10.3 Disposal of permanently installed batteries

Your instrument has permanently installed NiMH batteries, which cannot be removed non-destructively by the user. Non-destructive removal is only possible by Narda itself or by qualified personnel.

- ⇒ Instructions for non-destructive removal of the batteries can be found on the Narda website www.narda-sts.com under the corresponding product page.

2.10.4 Deleting private data

- ⇒ Make sure that you delete any stored private data before passing on or disposing of the device.

3

Connecting Up and Starting to Use the Device

This chapter describes field and laboratory use of the IDA-3106, as well as the general concept of the device.

- 3.1 Unpacking the device (page 22)**
- 3.2 Device overview (page 23)**
- 3.3 Power supply (page 27)**
- 3.4 Fitting the Narda directional antennas (page 30)**
- 3.5 Attaching other Narda antennas (page 31)**
- 3.6 Using cables and antennas from other manufacturers (page 34)**
- 3.7 Using the carrying strap (page 37)**

3.1 Unpacking the device

3.1.1 Packaging

The packaging is designed to be re-used as long as it has not been damaged during previous shipping. Please keep the original packaging and use it again whenever the device is shipped.

3.1.2 Package contents

The package contents are listed on the delivery note. Please check that you have received all the items listed. Contact your supplier if anything is missing.

3.1.3 Checking the device for shipping damage

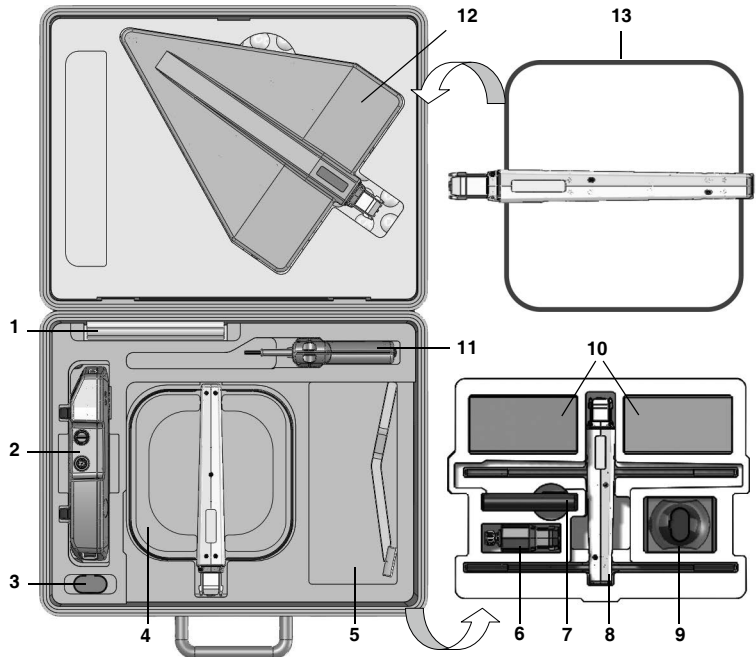
After unpacking, check the device and all accessories for any damage that may have occurred during shipping. Damage may have occurred if the packaging itself has been clearly damaged. Do not attempt to use a device that has been damaged.

3.1.4 Recovery after shipping and storage

Condensation can form on a device that has been stored or shipped at a low temperature when it is brought into a warmer environment. To prevent damage, wait until all condensation on the surface of the device has evaporated. The device is not ready for use until it has reached a temperature that is within the guaranteed operating range of -10 to +50 °C.

3.2 Device overview

3.2.1 Case contents



No.	Element	No.	Element
1	Operating manual, software CD	8	Antenna 2
2	IDA Basic Unit	9	Charger dock (accessory)
3	Spare battery (accessory)	10	AC adapter charger(s)
4	Antenna 1	11	Antenna handle
5	Arm support, headphones, carrying strap, USB cable	12	Antenna 3
6	Antenna adapter (accessory, 3100/15)	13	Loop antenna (accessory, 3100/14)
7	Spare battery (accessory)		

In the unit:

- microSD memory card

Not shown:

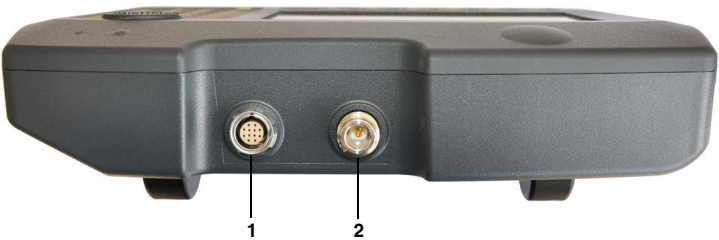
- Memory-Card Reader, microSD / USB

3.2.2 Display and control panels



No.	Element	Function / Explanation
1	LCD panel	Screened, high-resolution liquid crystal display.
2	GPS receiver	GPS receiver antenna area. Do not attach any metallic stickers to this area.
3	Vertical softkeys	Context-dependent, operating mode and function selection, changing settings.
4	Microphone	For recording voice comments.
5	Loudspeaker	For output of demodulated signal content and the audible signal search tone.
6	Keypad and rotary control knob	Navigation, changing settings, entering values, confirming or cancelling entries.
7	Status display	<ul style="list-style-type: none">• LED green: device is ready for use.• LED flashes green every 3 s: Device is in stealth mode• LED red: device is initializing or device error.
8	Charge indicator	<ul style="list-style-type: none">• LED red: Battery is charging.• LED green: Charging cycle finished or AC adapter / charger still connected to device charging socket.
9	On/Off key	Switches device on or off (hold down key).
10	Horizontal softkeys	Context-dependent, function selection, changing settings.

3.2.3 Device side panel with antenna / cable connectors



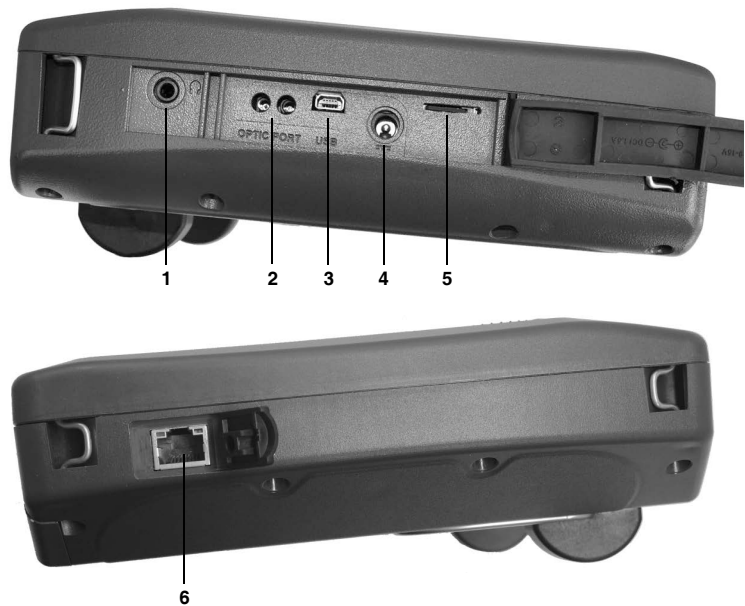
No.	Element	Function / Explanation
1	Multi-pin connector	12-pole socket for connecting the control cable (for automatic recognition of antenna and cable when using a Narda antenna or Narda cable).
2	N connector	Antenna connecting socket

3.2.4 Device side panel with battery compartment



No.	Element	Function / Explanation
1	Battery compartment with lid and fixing screw	Holds the rechargeable batteries.

3.2.5 Device side panel with external connectors



No.	Element	Function / Explanation
1	Earphone socket	For connecting an earphone for listening to saved voice comments.
2	Optical connector	For connecting optical cables for on-site device communications
3	USB, Mini-B type	For connection to a computer (PC).
4	Charging socket	For connecting the AC adapter / charger supplied
5	Card slot	Slot for microSD memory card
6	Ethernet	For connecting to a local area network (IDA 2, 3106/02 and later). Data transfer is not indicated visually.

3.3 Power supply

The power supply is normally taken from the rechargeable battery pack provided. It is also possible to use the AC adapter / charger supplied with the device as a power source.



3.3.1 Operation from battery pack

A fully charged battery pack is sufficient for about 3 hours of operation (with GPS and display backlight). This operating time can be increased significantly by using the energy saving options (Power Save) such as automatic backlight switch off (Backlight switches off after). The battery pack is supplied in a pre-charged state and must be fully charged before being used for the first time.

NOTE: Only use type 3001/90.15 battery packs or the earlier type 3001/90.01. If you are using the different types of battery pack, the device setting in the main menu under Settings (see *Changing the language, battery type, date, and time* on page 67) must be adjusted so that the device shows the remaining capacity correctly. The part number (P/N) of the battery type in use is printed at the lower end of the battery label. If the capacity of these battery packs is insufficient for your needs, additional battery packs can be obtained as accessories.

Charge indicator

The charge state of the battery pack is shown in the upper status line.

Display	Meaning
	The battery is fully charged.
	The battery is almost discharged.
Batt. flashes	The battery charge state is critical. You should now switch the device off or connect it to the AC adapter / charger. If you continue to operate the device from the batteries, it will switch off automatically after a short time. The device configuration will however be saved before it switches off.

Charging the battery pack

A complete recharge takes about 5.5 hours.

You must use the AC adapter / charger provided or the optionally available charging dock to recharge the battery pack.

Starting the charge cycle

- ✓ The AC line voltage must be the same as the operating voltage of the AC adapter / charger.
- 1. Connect the AC adapter / charger to the charge socket of the IDA-3106.
- 2. Connect the AC adapter / charger to the AC line.
 - ⇒ The charge cycle starts.
 - ⇒ The **Charge LED glows red during the charge cycle.**
 - ⇒ The AC adapter / charger switches to trickle charge mode automatically and the **Charge LED** glows green when the charge cycle is completed.

3.3.2 Changing the battery pack

CAUTION

Incorrect handling of the battery pack

Incorrect handling of the battery pack can result in damage to the battery pack or in injury.

- ⇒ Do not open, crush, or dismantle the battery pack.
- ⇒ Do not drop the battery pack from a great height.
- ⇒ Only recharge the battery packs in the way described in this operating manual.
- ⇒ Do not expose the battery packs to very high temperatures for an extended period of time either separately or inside the device.
- ⇒ Do not leave a discharged battery pack in the device for an extended period of time.
- ⇒ Do not store the battery pack for longer than six months without recharging it in the meantime.
- ⇒ Please also observe the safety instructions for handling batteries starting on page 15

Changing the battery pack

NOTE: The device also has an internal NiMH buffer battery which will power the device for 10 seconds so you can replace the rechargeable battery during operation (hot swap). You cannot access this buffer battery. As a part of normal maintenance, have a Narda Service Center replace the buffer battery every four years.



1. Undo screw (1) in the battery compartment cover.
2. Pull out the battery pack using the tab (2).
3. Hold the tab on the new battery pack and slide the battery pack into the compartment.
4. Replace the battery compartment cover and do up the screw (finger tight).

NOTE: Under normal circumstances the battery will not cause any environmental damage. However, because they contain dangerous chemicals, they must be disposed of separately when they reach the end of their useful life. The batteries are classed as dangerous waste. It is therefore considered hazardous waste, and must be disposed of via a recognized recycling / return system. It must not be thrown away with normal trash (also see *Proper disposal* on page 18).

3.3.3 Operation from AC adapter / charger

The IDA-3106 can also be operated and powered from the AC adapter / charger.

However, this is not recommended for general use, as the measurement characteristics can be significantly affected by the presence of the power supply cable in the electromagnetic field when the IDA-3106 is operated with the AC adapter / charger connected to it.

3.4 Fitting the Narda directional antennas

This section describes how to fit Narda directional antennas and the handle on to the IDA-3106. Full use of all the functions of the IDA-3106 is only possible when you use the Narda antenna handle.

3.4.1 Connecting the handle to the Basic Unit

The antenna handle has a built in cable with two connectors:

- N connector: for transmitting the RF signal.
- Multipin connector: for power supply and for transmitting the compass data and control signals

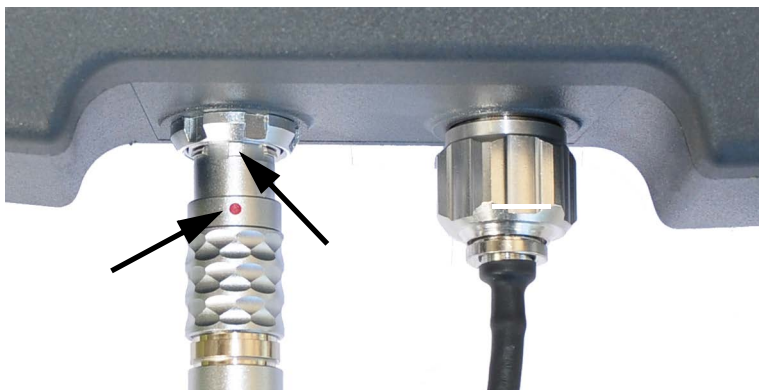
To connect the handle:

1. Place the Basic Unit in a vertical position.
2. Plug the N connector on the handle in to the N connector of the Basic Unit and carefully do up the coupling nut, making sure that it is not cross-threaded.

NOTICE: Make sure that the cable does not twist when you are tightening the coupling nut. The electrical properties of the high quality coaxial cable could otherwise be affected by torsion forces.

NOTE: If the nut seems difficult to do up, undo it and start again. About 4 turns are needed to make a secure connection.

3. Plug the control cable plug of the handle in to the multipin connector on the Basic Unit, making sure that the red mark on the control cable plug is aligned with the notch on the multipin connector.



4. Press the control cable plug into the connector using the locking sleeve until the plug lock clicks into place.

To unplug the connectors:

1. Undo the coupling nut on the N connector.
2. Pull the control cable plug back using the ridged top of the plug until the lock clicks open.

3.4.2 Connecting a Narda directional antenna to the handle

Narda directional antennas can be attached to the handle in positions that are at angles of 90 degrees to each other. This makes it quick and easy for you to change the polarization plane of the antenna.

- ⇒ Push the antenna on to the handle until you hear the connector click into place.
- ⇒ To remove the antenna, press in the two unlocking buttons and pull off the antenna.

NOTE: The device automatically recognizes the antenna type that is connected. This is displayed on the screen in the section showing the general instrument configuration. If the antenna is not recognized, the associated antenna configuration is probably missing. The antenna configuration data are uploaded to the instrument using the IDA Tools PC software.

3.5 Attaching other Narda antennas

You can use other antennas from Narda instead of the directional antennas, for example if you want to make omnidirectional measurements. These antennas can either be attached directly to the instrument or connected to it using a Narda cable.

NOTE: Isotropic measurements with 3-axis antennas are not supported. You can select one of the 3 axis (X, Y or Z) for the measurement.

3.5.1 Attaching the Narda antenna directly to the Basic Unit

1. Place the Basic Unit in a vertical position.
2. Plug the N connector on the antenna on to the N connector of the Basic Unit.
3. Carefully do up the coupling nut on the antenna N connector, making sure that it is not cross-threaded.

NOTE: If the nut seems difficult to do up, undo it and start again.
About 4 turns are needed to make a secure connection.

4. Plug the control cable plug of the antenna cable in to the multipin connector on the Basic Unit, making sure that the red mark on the control cable plug is aligned with the notch on the multipin connector.
5. Press the control cable plug into the connector using the locking sleeve until the plug lock clicks into place.
🔓 The Narda antenna is now connected.

The device automatically recognizes the antenna type that is connected. This is displayed on the screen in the section showing the general instrument configuration.

3.5.2 Connecting a Narda antenna to the Basic Unit using a Narda cable

Connecting a Narda cable to the IDA-3106

1. Place the Basic Unit in a vertical position.
2. Plug the N connector on the cable on to the N connector of the Basic Unit.
3. Carefully do up the coupling nut on the cable N connector, making sure that it is not cross-threaded.

NOTE: If the nut seems difficult to do up, undo it and start again.
About 4 turns are needed to make a secure connection.

4. Plug the control cable plug of the cable in to the multipin connector on the Basic Unit, making sure that the red mark on the control cable plug is aligned with the notch on the multipin connector.
5. Press the control cable plug into the connector using the locking sleeve until the plug lock clicks into place.
 - ↳ The Narda cable is now connected.
The device automatically recognizes the cable type that is connected. This is displayed on the screen in the section showing the general instrument configuration.

Connecting a Narda cable to a Narda antenna

1. Plug the N connector on the cable on to the N connector of the antenna.
2. Carefully do up the coupling nut on the cable N connector, making sure that it is not cross-threaded.

NOTE: If the nut seems difficult to do up, undo it and start again.
About 4 turns are needed to make a secure connection.

3. Plug the control cable plug of the antenna into the control cable socket on the cable making sure that the red dots on both connectors are aligned.
4. Press the antenna control cable plug into the connector using the locking sleeve until the plug lock clicks into place.
 - ↳ The Narda antenna is now connected.
The device automatically recognizes the antenna type that is connected. This is displayed on the screen in the section showing the general instrument configuration.

3.6 Using cables and antennas from other manufacturers

In contrast with the use of Narda components, automatic detection of the cable or antenna type connected does not work if you use third party products (commercially available cables or antennas).

For this reason, the cable loss is not taken into account automatically when other cables are used, and the results are not shown automatically in units of field strength if other antennas are used.

NOTE: When you use other components, you will need to enter the data for the cable and antenna in to the IDA-3106 manually using the PC software (see description below).

Manually entering data for third party components

You first have to enter the data in the PC software IDA Tools and then transfer them to the IDA-3106.

To enter the data:

1. Enter the data from the calibration certificate for the third party component into the PC software (refer to the on-line help for the PC software for information on how to do this).
2. Save the configuration you created on the PC.
3. Upload the configuration data to the IDA-3106.
4. Select the cable or antenna on the IDA-3106.

Connecting cables and antennas directly to the device

- ✓ The configuration data for the components have been uploaded and selected.
- ⇒ Connect the component(s) to the RF input of the IDA-3106.

Connecting third party antennas to the handle

Antennas fitted with a coaxial N connector can also be used as directional antennas with the Narda handle by means of the Antenna Adapter 3100/15.



Connecting the antenna:

- ✓ The configuration data for the antenna have been uploaded.
- 1. Connect the handle to the IDA-3106.
- 2. Connect the N connector of the third party antenna to the antenna adapter. When you do this, make sure that the antenna is screwed on to correspond with the polarization direction shown on the adapter (i.e. antenna dipole position is in the direction of the arrow).
- 3. Connect the antenna adapter to the antenna handle.
 - ↪ The device will indicate the correct polarization H or V in Direction Finding mode.
- 4. Select the antenna type you are using (see *Displaying and selecting Antennas* on page 77).

NOTE:

The device remembers the last third party antenna that was used with the antenna adapter and selects this automatically when it is plugged in. Check that the correct antenna type is displayed before making measurements.

NOTICE

Unsuitable directional antennas

The antenna adapter may detach from the antenna handle if the directional antenna weighs more than 1.5 kg.

⇒ Only use directional antennas weighing less than 1.5 kg.

NOTICE

Rapid rotation

The antenna adapter may detach from the antenna handle when it is rotated rapidly if the directional antenna weighs more than 1 kg or is longer than 60 cm.

⇒ Pan the directional antenna slowly.

⇒ Use a tripod if necessary.

3.7 Using the carrying strap

The strap allows you to effortlessly carry the IDA-3106 hands free, so you can use one hand to align the antenna and the other to operate the measuring instrument. You can also clip the antenna handle to the strap if you need to carry the equipment over a long distance or you want to use both hands to operate the instrument.



To use, attach and adjust the strap:

1. Put on the carrying strap. Tighten the two shoulder straps and the chest strap to adjust it so it fits comfortably.



2. Attach the strap holders to the loops on the sides of the Basic Unit (4 loops, one on each corner).



3. Clip the side strap together.

⇒ You can unclip this strap to make it easier to take off the carrying strap with the Basic Unit still attached.



4. Adjust the strap so that the Basic Unit is at the right height and angle for you. It should be comfortable and the display should be easy to read.

⇒ You can also clip the antenna handle to the strap.

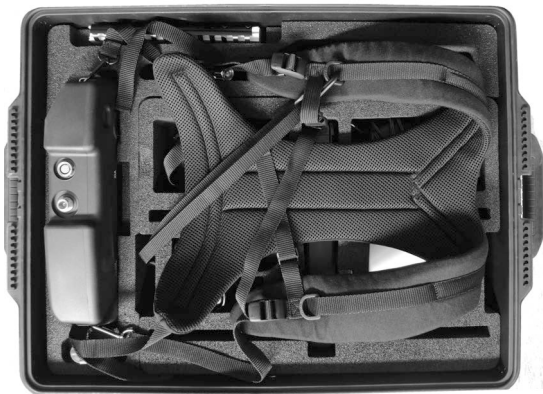


3 Connecting Up and Starting to Use the Device

5. You can pull the Basic Unit up close to your chest to make it easier to carry over longer distances by pulling on the two straps attached to the top corners of the Basic Unit.



6. You can leave the Basic Unit attached to the carrying strap, even when it is stored in the hard case.



4

Operation and Basic Settings

This chapter describes the controls and connectors on the device.











- 4.1 Controls (page 42)**
- 4.2 Switching the device on and off (page 45)**
- 4.3 Switching stealth mode on and off (page 45)**
- 4.4 LCD screen elements (page 46)**
- 4.5 Fundamental operating steps (page 50)**

4.1 Controls











The following controls are provided for operating the IDA-3106:

- **Rotary control knob**
- **Hardware keys** (referred to as **keys** in this manual)
- **Software keys** (referred to as **softkeys** in this manual)
- **Button on the antenna handle**

4.1.1 Rotary control knob and keys

	Element	Function / Explanation
		Quickly sets the frequency (Fcent), selects functions and values, navigates and zooms on maps, moves limits and markers, etc.
		Moves left or right in entry boxes, selects items from lists, (left = down, right = up), selects bearings, sets the demodulation volume
		Confirms changed settings, selects functions, etc.
		Cancels the current operating step (changes in values are rejected), moves back to a higher menu level
		1. From the top menu level in an operating mode: Switches to the Main menu 2. From a sub-menu: Switches to the top menu level of the operating mode
		Freezes the display; the measurement continues. Press again to update the display to show the actual values again.
		Saves data to the data logger
		For entering numbers and the decimal point
		Hold down to switch the device on / off Press briefly to switch stealth mode on / off

4.1.2 Hotkeys

Key	Function
	Reduce sound volume (see <i>Altering the volume (Volume)</i> on page 121).
	Increase sound volume (see <i>Altering the volume (Volume)</i> on page 121).
	Hold down for 3 seconds to reset all device settings (see <i>Resetting all device settings</i> on page 90).
	Manual Dwell Time switching between audio demodulation at the marker frequency and the spectrum measurement (see <i>Starting demodulation (Spectrum only)</i> on page 120).
	Magnify screen contents (see <i>Navigating and zooming</i> on page 149).
	Reduce size of screen contents (see <i>Navigating and zooming</i> on page 149).
	Move screen contents up (see <i>Navigating and zooming</i> on page 149).
	Move screen contents left (see <i>Navigating and zooming</i> on page 149).
	Move screen contents down (see <i>Navigating and zooming</i> on page 149).
	Move screen contents right (see <i>Navigating and zooming</i> on page 149).

4.1.3 Softkeys

The softkey functions depend on the selected menu level, operating mode, or function. The softkeys are therefore described in the menu and operating mode descriptions.

4.1.4 Button on antenna handle

The button on the top of the antenna handle only functions in **Direction Finding** mode. It has the following functions:

Manual Bearing

- ⇒ Press the button briefly.
 - ↳ Hold on > Hold off (toggle function).
- ⇒ Press and hold down the button.
 - ↳ Resets the maximum value.

Horizontal Scan

Scan Type Continuous

- ⇒ Press the button briefly.
 - ↳ Start Continuous > Stop (toggle function)
- ⇒ Press and hold down the button.
 - ↳ Resets the measurement results.

Scan Type Discrete

- ⇒ Press the button briefly.
 - ↳ Start & Add Value > Add Value > Add Value > ...
- ⇒ Press and hold down the button.
 - ↳ Stop > Resets the measurement results.

Scan Type Discrete with Max Hold

- ⇒ Press the button briefly.
 - ↳ Start & Reset Max > Add Value > Reset Max > Add Value > ...
- ⇒ Press and hold down the button.
 - ↳ Stop > Resets the measurement results.

4.2 Switching the device on and off

Switching on

⇒ Press and hold down the  key for a few seconds.

↳ The device switches on.

You can terminate the switch on process by pressing the **Quit** softkey.

The device performs a self test during the boot up process. The results are displayed on the screen.

The screen displayed after switch on depends on the setting of the **Power on** function. For more information about this, see *Changing the switch on behavior* on page 87.

Switching off

⇒ Press and hold down the  key for a few seconds.


↳ The device switches off.

4.3 Switching stealth mode on and off

Stealth mode allows you to quickly deactivate / reactivate the display and audio playback. The device will switch off completely after 10 minutes in stealth mode to conserve battery power.


NOTE: In stealth mode power is not saved significantly, even when the display is deactivated. Thus, stealth mode will not prevent the batteries from running empty.

To switch to stealth mode:

⇒ Press the  key.

↳ The screen display and audio playback switch off. The status display LED flashes briefly every 3 seconds.

To switch off stealth mode and revert to measurement operation:

⇒ Press the  key.

4.4 LCD screen elements

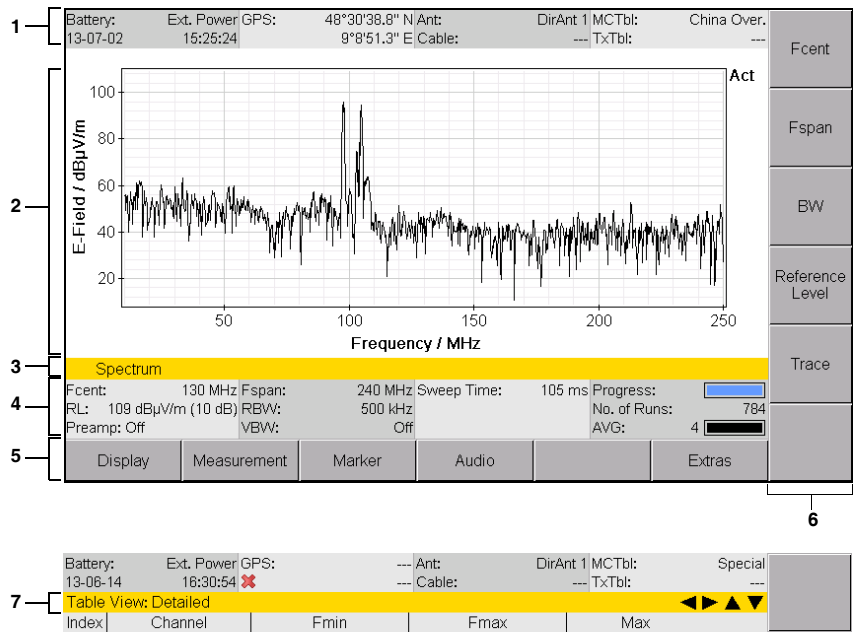


Figure 8: LCD screen

Table 2: LCD screen elements

No	Element	Description
1	Upper status bar	Indicates general parameter settings.
2	Display area	Graphical or numerical display of measurement values.
3	Info bar	<ul style="list-style-type: none">Shows menu path to the current function.Indication of corrected parameters.Parameter display for volume adjustmentEvent display for Auto Save
4	Lower status bar	Indicates settings and process analysis; displays error messages.
5	Horizontal softkeys	Displayed functions are context-sensitive.
6	Vertical softkeys	Displayed functions are context-sensitive.
7	Navigator bar	Selected display mode and arrow symbols for navigation

4.4.1 The upper status bar

The upper status bar gives information about the device, the components used, and the general settings.







Battery: 14.07.09	Ext. Power 08:40:53	GPS 	48°27'30.0" N 9°13'50.9" E	Ant: Cable:	Modul 1 ---	MCTbl: TxTbl:	Full Band EU ---
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Figure 9: Upper status bar

Table 3: Upper status bar elements

Element	Description
Battery	<p>Power supply indicator:</p> <p>Ext. Power External supply from AC adapter.</p> <p> Battery fully charged.</p> <p> Battery almost discharged.</p> <p>Batt. (flashes) Battery discharged, device powers down immediately and switches off.</p>
Date, time	Indicates the date and time.
GPS	<p>GPS receiver status and coordinates:</p> <p> DGPS reception.</p> <p>Coordinates GPS reception, coordinates are displayed</p> <p> When the signal is lost, the last GPS coordinates are used until a signal is received again or the device is switched off.</p> <p> No GPS reception.</p>
Ant.	Antenna used (displayed only if the type is automatically recognized or has been entered manually).
Cable	Cable used (displayed only if the type is automatically recognized or has been entered manually).
MCTbl	Selected multi-channel table.
TxTbl	Selected transmitter table.

4.4.2 The lower status bar

The lower status bar gives information about the current measurement. The contents of the display may vary, depending on the operating mode.

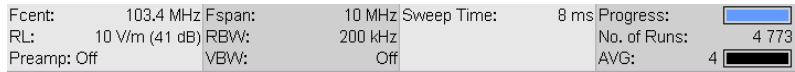


Figure 10: Lower status bar

Table 4: Lower status bar elements (example)

Element	Description
Fcent	Center frequency
RL	Reference level (the input attenuator setting (0 – 50 dB) is shown in brackets)
Preamp: On/Off	Preamplifier in handle on / off
Fspan	Displayed frequency span
RBW	Resolution bandwidth
VBW	Video bandwidth
Sweep Time/ Time Span	Time for each measurement cycle
Progress	Progress of measurement (as a check until the first screen display during measurements requiring a lot of processing)
No. of Runs	Number of measurements made since last measurement start
AVG	Number of measurements to form average or time to form average

4.4.3 The navigator bar

When tables are displayed, the navigator bar shows various elements that make navigation easier and which give you information about the current position in the menu and the selected function.

Table View



Figure 11: Navigator bar

- The currently selected display is shown at the left hand edge.
- Arrow symbols at the right hand edge of the bar indicate further information which can be displayed by pressing the arrow keys or by turning the rotary control knob:

Symbol	Meaning
	Pressing the key displays further information (e.g. in a column of the table).
	Pressing the key displays further information (e.g. in a column of the table).
	Pressing the key as well as the key displays further information.
	Paging up by turning the rotary control knob displays further information (e.g. lines in the table).
	Paging down by turning the rotary control knob displays further information (e.g. lines in the table).
	Paging up or down by turning the rotary control knob displays further information (e.g. lines in the table).

4.4.4 Activating / deactivating status and info bars

The **upper status bar**, **help bar** and **lower status bar** can be individually activated or deactivated. If you do not need the information that is displayed in these bars, you can deactivate all of them to maximize the area of the screen that is available to display the measurement values.

You can hide the upper and lower status bars separately from the general screen arrangement when the Magnifier function is active in **Spectrum**, **Time Domain (Scope)** and **IQ Analyzer** modes. The extra item **Hide at Magnifier** is provided for this purpose. For more information about this, see *Automatically hiding the status bars* on page 117.

To change the screen arrangement:

- ✓ You have selected an operating mode.
- 1. Press the **Display** softkey.
- 2. Press the **Screen Arrangement** softkey.
- 3. Use the **rotary control knob** and **softkeys** to select the settings you want and then press the **OK** key to implement the changes.

4.5 Fundamental operating steps

The operating steps described in this section are repeated in every menu and function. They are therefore described only once here and knowledge of these basic steps is assumed in all subsequent descriptions of the operating modes.

4.5.1 Navigating in the menus

The operating modes and functions of the IDA-3106 are arranged in hierarchical menu levels. The diagram below (see Figure 12 on page 50) shows this arrangement using the main menu and some of the functions in mode as examples.

To navigate in the menus:

- To move down one level: Press the appropriate **Softkey**.
- To move up one level: Press the **ESC** key.
- To return to the measurement or the main menu: Press the **MENU** key.

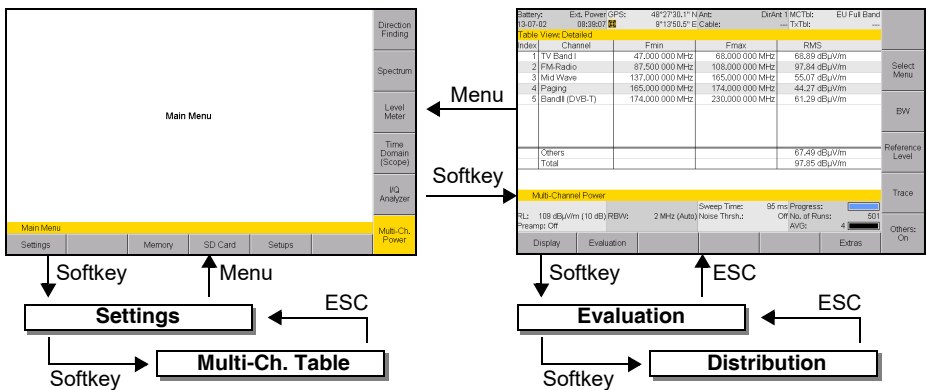


Figure 12: Examples showing how the menus and functions are arranged.

4.5.2 Forwards / Backwards

When you are changing setting parameters, two softkeys labeled **Forwards** and **Backwards** are provided to allow you to move forwards or backwards through the setting parameter history within the active operating mode.

Changes in the following setting parameters will be taken into account depending on the selected operating mode:

Mode	Parameters
Direction Finding	Fcent, CBW
Spectrum	Fcent, Fspan, RBW
Level Meter	Fcent, CBW
Time Domain (Scope)	Fcent, CBW, Time Span, Time Resolution
IQ Analyzer	Fcent, CBW, Time Span
Multi-Channel Power	Function not available

To move backwards or forwards:

⇒ Press the **Extras** softkey, then press the **Backwards** or **Forwards** softkey.

The **Forwards** softkey is not shown until you have pressed the **Backwards** softkey at least once.

4.5.3 Selecting entries from a list

Settings are often made by selecting entries or items from a list.

Simple list

You can only select a single item from a simple list. This is demonstrated by the selection of a reference level in the example below.

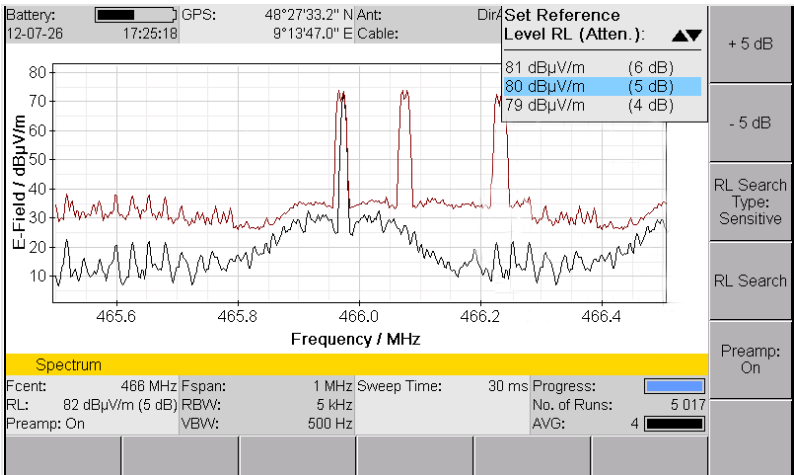


Figure 13: Example of a simple list: Set Reference Level

NOTE: Only three lines of the list are displayed so that the measurement screen is not hidden. You can use the rotary control knob to page through the list.

To select an item:

- 1. Use the rotary control knob or arrow keys to highlight the desired item.
- 2. Press the **OK** key to confirm your selection.
 - ↳ The new value will be set.

Extended list

You can select more than one entry or item from an extended list. You can select one item at a time or use the softkeys to select all the items. This is demonstrated by the selection of channels in the example below.

Battery: 13-07-02		Ext. PowerGPS: 15:54:06		48°27'30.0" N Ant: 9°13'50.9" E Cable:		DirAnt 1 MCTbl: --- TxTbl: ---		EU Full Band		Select	
Select Channels: Detailed											
Index	Channel	Fmin	Fmax	RMS						Select All	
<input type="checkbox"/>	1 TV Band I	47.000 000 MHz	68.000 000 MHz	62.48 dBµV/m							
<input checked="" type="checkbox"/>	2 FM-Radio	87.500 000 MHz	108.000 000 MHz	97.08 dBµV/m						Invert Selection	
<input type="checkbox"/>	3 Mid Wave	137.000 000 MHz	165.000 000 MHz	56.47 dBµV/m							
<input checked="" type="checkbox"/>	4 Paging	165.000 000 MHz	174.000 000 MHz	48.02 dBµV/m						Select First	
<input type="checkbox"/>	5 BandIII (DVB-T)	174.000 000 MHz	230.000 000 MHz	63.39 dBµV/m							
	Others			61.72 dBµV/m							
	Total			97.08 dBµV/m							
Multi-Channel Power • Select Menu											Select Last
RL: 109 dBµV/m (10 dB)		RBW: 2 MHz (Auto)		Sweep Time: 98 ms		Progress: <div></div>		Off No. of Runs: 2 616			
Preamp: Off				Noise Thrsh.:		AVG: 4					

Figure 14: Example of an extended list: Select menu

☒ A selection box indicates if the option has been selected or not in an extended list.

To select or deselect items individually using the rotary control knob:

- 1. Use the rotary control knob to highlight the desired item.
- 2. Press the **Select** key to select or deselect the item.
 ↳ The selection box shows the actual status.
- 3. Press the **OK** key to return to the measurement display.

To select or deselect several items at the same time:

Use the following softkeys to select or deselect all the items or a group of items in a list.

NOTE: The softkeys that are actually available depend on the Select menu that is opened.

⇒ When you have selected the items you want, press the **OK key to revert to the measurement display** again.

Select All

- If all the items were selected, they will all be deselected.
- If all the items were deselected, they will all be selected.
- If some items were selected and others deselected, they will all be selected or deselected.

Invert Selection

Changes the status of every item in the list.

Select First / Select Last

You can use these softkeys to select a group of items from the list.



1. First deselect all items using the **Select All** softkey.
2. Use the rotary control knob to highlight the first item in the group that you want to select and then press the **Select First** softkey.
3. Use the rotary control knob to highlight the last item in the group that you want to select and then press the **Select Last** softkey.
4. The highlighted section is now selected.

4.5.4 Changing numerical values


You can change numerical values using the rotary control knob or by using the keys.

NOTE: If you use the rotary control knob to change a numerical value, you cannot then use the keys to change the value in the same setting step, or vice versa. You must first exit the Select menu and then reopen it.

To change a value using the rotary control knob:

1. Open the Select menu.
2. Use the arrow keys   to select the digit you want to change and then use the **rotary control knob** to set the desired value.
3. Press the **OK** key to set the new value.

To change a value using the keys:

1. Open the Select menu.
2. Use the **number keys** and **decimal point key** to enter the desired value and enter the desired units using the appropriate **softkey**. (You can delete digits using the **Backspace**  softkey.)
 - ↳ The new value is set and the Select menu closes as soon as you have entered the units.

4.5.5 Entering text

A simple text editor opens so that you can enter alphanumeric characters (e.g. when saving setups):

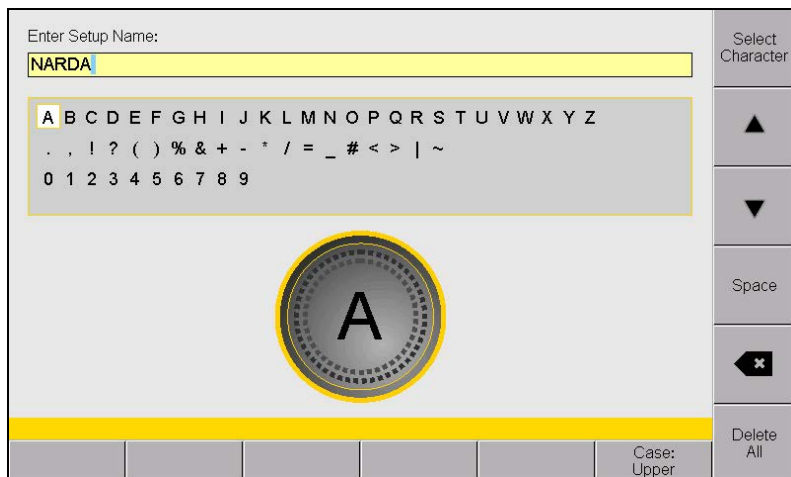



Figure 15: Text editor for entering alphanumeric characters

To enter text:

1. Use the rotary control knob to select a character from the character field.
(You can select a line directly using the ▲ and ▼ softkeys.)
☞ The selected character is marked by a circle.
2. Press the **Select Character** to enter the character.
3. Press the **OK** key when you have finished entering the characters you want.

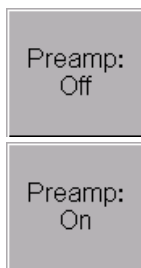
There are some further functions that you can use to enter text:

Softkey	Function
Space	Enters a space.
	Deletes the last item entered (backspace).
Delete All	Deletes all characters entered.
Case	Switches between upper and lower case characters: <ul style="list-style-type: none">• Lower: lower case characters• Upper: upper case characters

NOTE: You can also enter the digits 0 through 9 directly using the numerical keys.

4.5.6 Softkeys with toggle function

Softkeys for changing settings

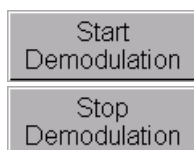


Softkeys for changing settings indicate the function and the current setting separated by a colon.

In this example:

- **Preamp: Off** – The preamplifier is deactivated. Pressing the softkey activates the preamplifier and the softkey will indicate **Preamp: On**.
- **Preamp: On** – The preamplifier is activated. Pressing the softkey deactivates the preamplifier and the softkey will indicate **Preamp: Off**.

Softkeys for performing actions



Action softkeys indicate the function that is performed when the softkey is pressed.

In this example:

- **Start Demodulation:** Demodulation starts when you press the softkey. The softkey then indicates Stop Demodulation.
- **Stop Demodulation:** Demodulation stops when you press the softkey. The softkey then indicates Start Demodulation.

4.5.7 Creating a screenshot

You can download the saved screenshots in PNG format from the device using the PC software application IDA Tools.

To create a screenshot:

1. Press the **Display** softkey.
2. Press the **Save Screenshot** softkey.

5

The Main Menu

This chapter describes all the Main Menu with all the settings that apply to the device itself and to the components connected to it. Furthermore you will find here how to use the memory, to run measurement routines and to use setups.

- 5.1 Menu overview (page 58)**
- 5.2 Displaying and editing system settings (page 66)**
- 5.3 Displaying and editing configuration data (page 77)**
- 5.4 Saving and loading setups (page 85)**
- 5.5 The memory menu (page 87)**
- 5.6 The SD Card menu (page 88)**

5.1 Menu overview

This section describes the two menu levels of the Main menu and the operating modes. The conditions necessary for the indicated softkey to be displayed are shown in brackets.

5.1.1 Main menu

Level 1	Level 2	Level 1	Level 2
Settings	Device Info	Direction Finding	See <i>Direction Finding</i> on page 59.
	GPS Info	Spectrum	See <i>Spectrum</i> on page 60.
	Network	Level Meter	See <i>Level Meter</i> on page 62.
	Reset Settings	Time Domain (Scope)	See <i>Time Domain (Scope)</i> on page 63.
	Service Menu	I/Q Analyzer	See <i>I/Q Analyzer</i> on page 64.
	Sync Time with GPS	Multi-Channel Power	See <i>Multi-Channel Power</i> on page 65.
	Antenna		
	External Device		
	Cable		
	Multi-Channel Table		
Memory	Transmitter Table		
	Data Viewer		
	Screenshot Viewer		
	Demod. Record Viewer		
	Time Controlled Storing		
SD Card Setups	Comment		
	Format SD Card		
	«Mark» Power on Setup ¹⁾		
	Power on Settings		
	Save Setup as		
	Recall Setup		
	Overwrite Setup ¹⁾		
	Delete Setup ¹⁾		
	Delete All Setups		
	Sort		

1) Visible when Factory is not selected.

5.1.2 Direction Finding

Level 1	Level 2
Fcent	Rotary Knob: Immediate/Preselct/TxTbl (Fcent selected, TxTbl only if Transmitter Table selected)
	Step Size: Auto/Fix
	Set Fstep (StepSize: Fix selected)
External Bearing	Display
	Localization: On/Off
	Map
	Save External Bearing
	VBW
BW (Horizontal Scan: Off selected)	
Start Continuous (Horizontal Scan: On selected)	Stop
Reference Level (Horizontal Scan: Off selected)	Set Noise Threshold (Noise Thrs.: On selected)
	Noise Threshold: On/Off
	+ 5 dB
	- 5 dB
	RL Search Type: Sensitive/Safe
	RL Search
	Preamp: On/Off
	External Device: On/Off (If an external device is defined)
Reset (Horizontal Scan: On selected)	(Start Continuous and Stop selected)
Detector	RMS Average Time
	Reset All
	Reset Max
Scan Type	
Horizontal Scan On/Off	

Level 1	Level 2
Display	Save Screenshot, Screen Arrangement, Save Setup as Y-Scale Range, Y-Scale Ref, Y-Scale Auto
	Unit
Localization On/Off	
Map	Display
	Average Position
	Marker
	Select Map (Loc. Mode: Outdoor selected)
	Loc. Mode: Outdoor/Indoor
	Edit Sketch (Loc. Mode: Indoor selected)
	Select Transmitter
	Move to Point of View (Loc. Mode: Outdoor selected)
	Auto Fit (Active)
	Move horizontally
	Move vertically
	Zoom
Audio	Demodulation Recorder (Demodulation = On)
	Volume
	Demodulation
	Tone Search
Change Settings (Horizontal Scan: On selected)	
Extras (Horizontal Scan: Off selected)	Select Multi-Channel Table
	Select Channel
	Backwards (setting parameters were changed)
	Forwards (Backwards selected once)
	Select Transmitter Table
	Add Transmitter
	Go to: ...

5.1.3 Spectrum

Level 1	Level 2	Level 1	Level 2
Display	Save Screenshot, Screen Arrangement, Save Setup as	Spectrogram Marker (Spectrogram or Spectrogram & Spectrum selected)	Display
	Y-Scale Range, Y-Scale Ref, Y-Scale Auto		Marker Settings
	Unit		Delta Marker
Measurement	Spectrum	Audio (Demodulation On, Spectrogram or Delta Spectrum selected)	Navigation: Frequency/Time
	Delta Spectrum		Active Marker: A/B
	Spectrogram		Extras
	Spectrogram & Spectrum		Highest Peak, Next Peak, Peak Left, Peak Right
	Peak Table		Peak Up, Peak Down
	(with Spectrum only)		(Navigation: Time selected)
	Single-Channel Power		Detector
	(with Spectrum only)		Marker to Center
	Set Trace as Ref.		Demodulation Recorder
	(with Spectrum and Delta Spectrum only)		Start/Stop Demodulation
Marker/ Spectrogram Marker	Time Resolution	Extras	Extras
	(Spectrogram and Spectrogram & Spectrum only)		Volume
	Display		Demodulation
	Marker Settings		BFO (Demodulation LSB or USB selected)
	Marker: Single/Delta B-A		Squelch
	Keep Marker: On/Off		(Demodulation selected - except FM)
	Active Marker: A/B		Demod. Bandwidth
	Extras		Dwell Time
	Highest Peak, Next Peak, Peak Left, Peak Right		Select Multi-Channel Table
	Active Trace		Select Channel
	Marker to Center		Backwards (setting parameters were changed)
			Forwards (Backwards selected once)
		Extras	Select Transmitter Table
			Go to: ...

Level 1	Level 2
Extras	Select Multi-Channel Table
	Select Channel
	Backwards (setting parameters were changed)
	Forwards (Backwards selected once)
	Select Transmitter Table
	Go to: ...
Fcent/Fstart	Set Fstart & Fstop/Set Fcent & Fspan
	Rotary Knob: Immediate/Preselect/TxTbl (Fcent selected, TxTbl only if Transmitter Table selected)
	Step Size: Auto/Fix (Fcent selected)
Fspan/Fstop	Full Span
	Set Fstart & Fstop/Set Fcent & Fspan
BW	VBW
	Set T-RMS
Reference Level	+ 5 dB
	- 5 dB
	RL Search Type: Sensitive/Safe
	RL Search
	Preamp: On/Off
Trace	Set as Reference
	Average Type: No. of Avg/Average Time
	No. of Avg (Average Type: No. of Avg selected)
	Average Time (Average Type: Average Time selected)
	Select, Select All, Invert Selection, Reset All, Reset Min & Max

5.1.4 Level Meter

Level 1	Level 2	Level 1	Level 2
Display	Save Screenshot, Screen Arrangement, Save Setup as Y-Scale Range, Y-Scale Ref, Y-Scale Auto	Fcent	Rotary Knob: Immediate/Preselect/TxTbl (Fcent selected, TxTbl only if Transmitter Table selected)
	Unit		Step Size: Auto/Fix
	Volume		Step Size: Auto/Fix (Fcent selected)
	Demodulation		VBW
Audio	Select Multi-Channel Table	BW	Set Noise Threshold (Noise Thrsh.: On selected)
	Select Channel		Noise Threshold: On/Off
	Backwards (setting parameters were changed)		+ 5 dB
	Forwards (Backwards selected once)		- 5 dB
	Select Transmitter Table		RL Search Type: Sensitive/Safe
	Add Transmitter		RL Search
	Go to: ...		Preamp: On/Off
			External Device: On/Off (if an external device is defined)
			RMS Average Time
			Reset All
Extras		Reference Level	Reset Max
		Detector	

5.1.5 Time Domain (Scope)

Level 1	Level 2	Level 1	Level 2
Display	Save Screenshot, Screen Arrangement, Save Setup as Y-Scale Range, Y-Scale Ref, Y-Scale Auto	Fcent	Rotary Knob: Immediate/Preselct/TxTbl (Fcent selected, TxTbl only if Transmitter Table selected)
	Unit		Step Size: Auto/Fix
	High Resolution Scope		Set F-step (Step Size: Fix selected)
Measurement	Long-Time Scope	Time Span	Mode: s/ht:mm:ss
	Duty Cycle		Time Resolution (for Long-Time Scope)
	Display		VBW
Marker	Marker Settings	BW	+ 5 dB
	Marker: Single/Delta B-A		- 5 dB
	Keep Marker: On/Off		RL Search Type: Sensitive/Safe
Extras	Active Marker: A/B	Reference Level	RL Search
	Highest Peak, Next Peak, Peak Left, Peak Right		Preamp: On/Off
	Active Detector (Long-Time Scope selected)		External Device: On/Off (if an external device is defined)
	Select Multi-Channel Table		Select
	Select Channel		Select All
	Backwards (setting parameters were changed)		Invert Selection
	Forwards (Backwards selected once)		Display
	Select Transmitter Table		Measurement
	Go to: ...		Marker
			Trigger Mode
		Detector (Long-Time Scope selected)	Select
			Select All
			Invert Selection
		Trigger Menu	Display
			Measurement
			Marker
			Trigger Mode

5.1.6 I/Q Analyzer

Level 1	Level 2	Level 1	Level 2
Display	Save Screenshot	Fcent	Rotary Knob: Immediate/Preselct/TxTbI (Fcent selected, TxTbI only if Transmitter Table selected)
	FFT Points, FFT Overlap, Goto Trigger Time		Step Size: Auto/Fix
	Screen Arrangement, Save Setup as		Set Fstep (Step Size: Fk selected)
	Y-Scale Range, Y-Scale Ref, Y-Scale Auto		Mode: s/ht:mm:ss
	Unit		VBW
Marker	Display	Time Span	
	Marker Settings		BW/BW (Fspan)
	Delta Marker	Reference Level	+ 5 dB
	Navigation: Time/Frequency		- 5 dB
	Active Marker: A/B		RL Search Type: Sensitive/Safe
View	Highest Peak, Next Peak, Peak Left, Peak Right	Trigger Menu	RL Search
	Active Detector (Long-Time Scope selected)		Preamp: On/Off
	View: I/Q/Magnitude/Sgram Full/Sgram Zoom/Persistence		External Device: On/Off (if an external device is defined)
	Select Multi-Channel Table		Display
	Select Channel		Marker
Extras	Backwards (setting parameters were changed)		View: I/Q/Magnitude/Sgram Full/Sgram Zoom/Persistence
	Forwards (Backwards selected once)		Trigger Mode
	Select Transmitter Table		
	Add Transmitter		
	Go to: ...		

5.1.7 Multi-Channel Power

Level 1	Level 2	Level 1	Level 2
Display	Save Screenshot	Select Menu	Select
	Screen Arrangement		Select All
	Views		Invert Selection
	Save Setup as		Select First
	Table: Detailed/Condensed		Select Last
	Y-Scale Range, Y-Scale Ref, Y-Scale Auto (Bar Graph selected)		
Evaluation (Table selected)	Unit	Reference Level	Set Noise Threshold (Noise Thresh.: On selected)
	Sort		Noise Threshold: On/Off
	Distribution		+ 5 dB
			- 5 dB
	Marker: Single/Delta B-A		RL Search Type: Sensitive/Safe
	Keep Marker: On/Off		RL Search
Marker (Bar Graph selected)	Active Marker: A/B		Preamp: On/Off
	Extras		External Device: On/Off (if an external device is defined)
	Highest Value, Next Value, Value Left, Value Right		Average Type: No. of Avg/Average Time
	Active Trace		No. of Avg (Average Type: No. of Avg selected)
	Select Multi-Channel Table		Average Time (Average Type: Average Time selected)
	Select Transmitter Table		Select, Select All, Invert Selection, Reset All, Reset Min & Max
Extras	Go to: ...	Others: On/Off	

5.2 Displaying and editing system settings

Main Menu • Settings

Important general device settings are made in the **Settings** menu

Settings ▼						Antenna
Language:		English				
Battery Type:		3001_90_01				
Date Format:		yy-mm-dd				External Device
Date:		14-01-20				
Time Format:		24 h				
Time:		15:58:26				Cable
Time Zone:		UTC+1				
Daylight Saving Time:		On				
GPS Format:		DMS deg°mm'ss" N(S,E,W)				Multi-Ch. Table
Unit of Length:		Meter				
Magnetic Declination:		1.9 °				
Remote Interface:		USB				Transmitter Table
Volume:		6.3 %				
Color Scheme:		Default				
Brightness:		100 %				
Power Save (Backlight switches off after):		10 min				
RL Search on Setup Recall:		Off				
Main Menu • Settings						
Device Info	GPS Info	Network	Reset Settings	Service Menu	Sync Time with GPS	

Figure 16: **Settings** menu

All device specific settings can be edited immediately by selecting an entry from the list using the rotary control knob. All other settings (e.g. antennas, cables, etc.) can be reached by means of the softkeys on the right side. This menu allows you to perform the following actions:

- **Changing the language, battery type, date, and time** (page 67)
- **Editing device-specific settings** (page 68)
- **Displaying device information** (page 70)
- **Displaying GPS information** (page 73)
- **Changing network settings** (page 73)
- **Resetting all device settings** (page 74)
- **Performing device diagnosis** (page 75)
- **Calibrating the internal compass** (page 76)
- **Displaying and selecting Antennas** (page 77)
- **Using external devices** (page 78)
- **Displaying and selecting cables** (page 79)
- **Displaying and creating Multi-Channel Tables** (page 79)
- **Creating and editing Transmitter Tables** (page 82)



5.2.1 Changing the language, battery type, date, and time

Main Menu • Settings

Table 5: Descriptions of language, battery type, date and time

Item	Description and available options
Language	User interface language
Battery Type	Battery type used: <ul style="list-style-type: none"> • 3001/90.01 (3001_90_01) • 3001/90.15 (3001_90_15) Note: The remaining battery capacity is only shown correctly if the right battery type is selected.
Date Format	Date format: <ul style="list-style-type: none"> • yy.mm.dd (year.month.day) • yy-mm-dd (year-month-day) • mm/dd/yy (month/day/year) • dd.mm.yy (day.month.year)
Date	Date
Time Format	Time format: <ul style="list-style-type: none"> • 12 h (12-hour clock) • 24 h (24-hour clock)
Time	Time (hour:minute:second)
Time Zone	Time zone
Daylight Saving Time	Summer / winter time change: <ul style="list-style-type: none"> • Off (Standard / winter time) • On (Summer time)

To change the settings:

1. Use the rotary control knob to highlight the item and select it by pressing **OK**.
2. Use the rotary control knob to change the setting and press **OK** to confirm the change or press **ESC** to cancel the changes.
Use the arrow keys   to move the cursor by one digit.
3. Press **ESC** to return to the Main menu.

To synchronize the clock to the GPS clock:

- ⇒ Press the **Sync Time with GPS** softkey.
- 👉 The time is synchronized to the GPS clock.

5.2.2 Editing device-specific settings

Main Menu • Settings

Table 6: Description of device-specific settings



Item	Description and available options
GPS Format	GPS data display format: <ul style="list-style-type: none">• DegDec (-)ddd.ddddd• MinDec (-)ddd°mm.mmm• DMS deg°mm'ss" N(S,E,W)
Unit of Length	Length units: meters, feet
Magnetic Declination	Entry of magnetic declination at the measurement location for correcting the compass display. You can find the declination values for any location at (e.g.): http://www.magnetic-declination.com
Remote Interface	Interface used for remote control: <ul style="list-style-type: none">• Optical• USB Also see <i>Connecting the device to a PC</i> on page 236
Volume	Audio volume from the built-in loudspeaker or headphones (stepwise setting). You can also alter the volume using the arrow keys   when Demodulation is activated.
Color Scheme	Display color scheme <ul style="list-style-type: none">• Default (display with light background)• Night• High-Contrast
Brightness	LCD screen brightness In 5 % steps from 1 % to 100 %
Power Save (Backlight switches off after):	Power save mode, backlight switches off automatically: <ul style="list-style-type: none">• In steps from 1 min. to 30 min• Never (on permanently)

Table 6: Description of device-specific settings(cont.)

Item	Description and available options
RL Search on Setup Recall	Search for reference level when a setup is recalled: <ul style="list-style-type: none"> • On • Off
RL Search Type	Reference level search type: <ul style="list-style-type: none"> • Sensitive: The reference level is selected so that no saturation occurs in a normal environment. • Safe: The reference level is selected so that no saturation occurs even in an environment with extremely variable signal strengths (multi-frequency environment).
Beep on new Maximum	Beep when new maximum is detected in the operation modes Multi-Channel Power and Level Meter: <ul style="list-style-type: none"> • Yes • No

To change the settings:

1. Use the rotary control knob to highlight the item and select it by pressing **OK**.
2. Use the rotary control knob to change the setting and press **OK** to confirm the change or press **ESC** to cancel the changes.
3. Press **ESC** to return to the Main menu.

5.2.3 Displaying device information

Main Menu • Settings • Device Info

- ⇒ Press the **Device Info** softkey.
- ↪ A list of the device information is displayed.

Table 7: Description of **Device Info** list

Information	Description
Device Model	Device model name
Production ID	Production number
Serial Number	Device serial number
ID number	Unique device identification number
Firmware version	Device software version
Firmware Date	Device software date
Bootloader Version	Bootloader software version
Calibration Date	Date of last calibration
Next Recommended Calibration	Date recommended for next calibration
Options	
Option name	Option status (Activated / Deactivated)

Displaying connected antenna information

Main Menu • Settings • Device Info

NOTE: Information about the connected antenna is only displayed when you use a Narda antenna. The information for the manually selected antenna type is displayed when other antennas are used.

⇒ Press the **Antenna Info** softkey.

↳ The antenna information is displayed as a list. The information displayed depends on the antenna being used.

Table 8: Description of *Antenna Info* list for Narda directional antennas

Information	Description
Long Name	Antenna description
Release Date	Antenna version release date

Table 9: Description of *Antenna Info* list

Information	Description
Long Name	Antenna description
Serial Number	Antenna serial number
Calibration Date	Date of last calibration

Displaying antenna handle information

Main Menu • Settings • Device Info

⇒ Press the **Antenna Handle Info** softkey.

↳ The antenna handle information is displayed as a list.

Table 10: Description of *Antenna Handle Info* list

Information	Description
Long Name	Antenna handle description
Serial Number	Antenna handle serial number
Calibration Date	Date of last calibration

Displaying connected external device information

Main Menu • Settings • Device Info

You can find information about the External Device function under *Using external devices* on page 78.

⇒ Press the **External Device Info** softkey.

↳ The information is displayed as a list.

Table 11: Description of *External Device Info* list

Information	Description
Long Name	External device description
Serial Number	External device serial number
Calibration Date	Date of last calibration

Displaying connected cable information

Main Menu • Settings • Device Info

NOTE: Information about the connected cable is only displayed when you use a Narda cable.

⇒ Press the **Cable Info** softkey.

↳ The cable information is displayed as a list.

Table 12: Description of *Cable Info* list

Information	Description
Long Name	Cable description
Serial Number	Cable serial number
Calibration Date	Date of last calibration

5.2.4 Displaying GPS information

Main Menu • Settings

⇒ Press the **GPS Info** softkey.

↳ A list of the GPS information is displayed.

Table 13: Description of **GPS Info** list

Information	Description
Detected GPS Chipset	Indicates the chipset used
Satellites in Use	Number of satellites received
GPS Quality Indicator	<ul style="list-style-type: none"> • NO = no GPS reception • GPS = standard GPS • DGPS = differential GPS with better accuracy than GPS
Latitude	Latitude of actual position
Longitude	Longitude of actual position
Altitude	Altitude of actual position
UTC Time	Universal Time Coordinate

5.2.5 Changing network settings

Main Menu • Settings

⇒ Press the **Network** softkey.

↳ The network settings are displayed.

Table 14: Description of **Network** list

Information	Description
DHCP	Automatic setting of IP addresses and parameters
IP Address	Device Internet protocol address
Subnet Mask	Network mask in static Ethernet mode
Default Gateway	Default gateway in static Ethernet mode
TCP Port	Transmission control protocol in static Ethernet mode
Host Name	Unique device identification for the network (cannot be edited)
Mac Address	Unique network interface designation (cannot be edited)

To save the network settings:

Main Menu • Settings

- ✓ Network settings have been changed.
- ⇒ Press the **Save Settings** softkey.

5.2.6 Resetting all device settings

Main Menu • Settings

Main Menu • Settings • Service Menu

Main Menu • Settings • Network

Main Menu • Setups

All menus

It can be useful to reset the device settings when you have used it for a long time or it has been used by other persons. The reset can be performed in different ways and affects the device settings differently. The following contents are not altered:

- Stored data logger content (measurement results)
- Configuration files (antennas, cables, tables, etc.)
- microSD card contents

Resetting the system settings

All the system settings (i.e. those shown in the Settings menu) are reset to their factory defaults. The following are not reset, however: Language, Battery Type, Time Zone, Daylight Saving Time, Magnetic Declination and Color Scheme.

To reset the system settings:

- ✓ The **Main Menu • Settings** menu is open.
- ⇒ Press the **Reset Settings** softkey.

Resetting the measurement settings

All the measurement settings (i.e. the parameters used in the operating modes) are reset to their factory defaults. The system settings are not reset.

To reset the measurement settings:

- ✓ The **Main Menu • Setups** menu is open.
- 1. Select **Factory Setup** using the rotary control knob.
- 2. Press the **OK** key.

Resetting all device settings

You can reset the system settings (except those mentioned under *Resetting the system settings*) and the measurement settings with this function. This function is available in all menus.

To reset all device settings:

- ✓ Any menu is open.
- 1. Press and hold down the **ESC** key for 3 seconds.
- 2. Press the **OK** key.
- or –
- ✓ The **Main Menu • Settings • Service Menu** is open.
- 1. Press the **Factory Settings** softkey.
- 2. Press the **OK** key.

5.2.7 Performing device diagnosis

Main Menu • Settings • Service Menu

This menu allows you to test the function of the LCD monitor, display certain instrument data and reset the instrument to the factory settings.

- ⇒ Press the **Service Menu** softkey.
- ↳ The Service Menu is displayed.

To check the display:

- ⇒ Press the **Display Test** softkey.
- ↳ The basic colors red, blue and green are displayed in turn.
The test stops after three cycles.
- ⇒ Press the **ESC** key to end the test immediately.

To display the device diagnostics:

- ⇒ Press the **Device Diag** softkey.
- ↳ A list of some basic data is displayed.

NOTE: The displayed data is intended primarily for servicing purposes.

Table 15: Description of **Device Diagnostics** list

Information	Description
Mainboard Temperature	Temperature of main circuit board
RF-Board Temperature	Temperature of RF circuit board
RF-Board Hardware Version	RF board hardware version

Table 15: Description of **Device Diagnostics** list

Information	Description
Battery Voltage	Actual battery voltage
Battery Capacity	Remaining battery capacity
Buffer Battery Voltage	Internal system battery voltage
Free Memory	Free memory space in megabytes, absolute
Free Memory in Percent	Free memory space in percent, relative
Device Calibration OK	Indicates if a valid device calibration has been made
Operating Hours Counter	Number of hours of operation so far
GPS module detected	Indicates that the internal GPS module is working properly.
Detected GPS Chipset	Indicates the GPS chipset used

5.2.8 Calibrating the internal compass

Main Menu • Settings • Service Menu

This function is used to calibrate the compass built in to the IDA Basic Unit. This compass is only used for orientation and aligning the maps displayed on the instrument. The calibration routine reduces any distortion of the earth's magnetic field due to ferrous metals inside the instrument. Calibration is only needed if there is a significant difference between the indicated and actual North pole. Calibration must be performed outdoors and away from any metallic objects.

NOTE: Newer versions of IDA only have a compass built in to the antenna handle, not in the Basic Unit itself, so these Basic Units do not require calibration. All the compass functions are available but the orientation and alignment of the map displayed on the Basic Unit.

To calibrate the compass:

1. Press the **Calibrate Int. Compass** softkey.
 ↳ Instructions for calibration are displayed on the screen.
2. Follow the instructions for calibration.

5.3 Displaying and editing configuration data

Main Menu • Settings

The Settings menu includes the following functions in addition to the system settings:

- Displaying and selecting **Antennas**
- Displaying and selecting **External Devices** (page 78)
- Displaying and selecting **cables** (page 79)
- Displaying, selecting and creating **Multi-Channel Tables** (page 79)
- Displaying, selecting and creating **Transmitter Tables** (page 82)

5.3.1 Displaying and selecting Antennas

Main Menu • Settings

1. Press the **Antenna** softkey.
 ↳ The available antennas are listed with their characteristic data.
 The detected antenna type will be displayed when you use a Narda antenna.
2. Use the rotary control knob or arrow keys to highlight the desired item.
3. Press the **OK** key to confirm your selection.

Table 16: Description of **Antennas list**

Item	Description
Short Name	Short name (in the display)
Fmin	Lower limit frequency
Fmax	Upper limit frequency
Property	Field type (E-field, H-field)
Rel. Date (for Narda directional antennas)	Antenna version release date
Calibration Date (for other antennas)	Calibration date

NOTE: If the antenna is not recognized, the associated antenna configuration is probably missing. The antenna configuration data are uploaded to the instrument using the IDA Tools PC software.

5.3.2 Using external devices

Main Menu • Settings

You can use the **External Device** function to select and control devices connected in series to the RF input such as attenuators or filters. Both switchable and non-switchable external components can be used.

Selecting a device:

- 1. Press the **External Device** softkey.
 ↳ A list of the available devices is displayed.

Table 17: Description of *External Device* list

Information	Description
Short Name	Short name for the external device
Fmin On, Fmax On ¹⁾	Lower / upper limit frequency in the on state.
Fmin Off, Fmax Off ¹⁾	Lower / upper limit frequency in the off state. These parameters are only shown for switchable devices.
Cal. Date	External device calibration date

1) The Fmin, Fmax parameters are entered using the IDA Tools PC software.

- 2. Select the desired device and press the **OK** key.
 ↳ Selecting the device activates it. **ExtDev: On** is shown in the lower status bar.

Switchable devices can be switched on or off via the measuring instrument.

To switch external devices on or off:

- ✓ You are using a switchable device.
- 1. Press the **Reference Level** softkey in the desired operating mode.
- 2. Press the **External Device** softkey (vertical bar at the bottom).
 ↳ The softkey shows **On** or **Off**. **ExtDev: On** or **Off** is shown in the lower status bar.

5.3.3 Displaying and selecting cables

Main Menu • Settings

⇒ Press the **Cable** softkey.

- ↳ The available cables are listed with their characteristic data.
The automatically detected cable type will be displayed when you use a Narda cable.

Table 18: Description of **Cables** list

Item	Description
Short Name	Short name (in the display)
Fmin	Lower limit frequency
Fmax	Upper limit frequency
Cal. Date	Date of last calibration

To select a cable:

⇒ Use the rotary control knob to select an item and press **OK** to confirm.

5.3.4 Displaying and creating Multi-Channel Tables

Main Menu • Settings

Multi-channel tables are used to define a specific number of channels and to recall these defined channels when needed using the table name.

NOTE: Multi-channel tables can be opened, displayed, and created using the **Extras** softkey in any operating mode.

To display the available multi-channel tables:

⇒ Press the **Multi-Ch. Table** softkey.

- ↳ A list of the available multi-channel tables is displayed.

Table 19: Description of **Multi-Channel Tables** list

Item	Description
Short Name	Short name of the multi-channel table (shown on the screen)
Long Name	Full name of the multi-channel table (shown in the Select menu)

To select a multi-channel table:

⇒ Select an item in the list using the rotary control knob and press **OK** to confirm.

Displaying channels of a multi-channel table

Main Menu • Settings • Multi-Channel Table

- ⇒ Press the **View Multi-Ch. Table** softkey.
- ↳ The channels included in the table are listed.

Table 20: Description of **Multi-Channel Table... list**

Information	Description
Channel	Channel name
Fmin	Lower limit frequency
Fmax	Upper limit frequency
RBW	Resolution bandwidth

Creating a new multi-channel table

Main Menu • Settings • Multi-Channel Table

You can create a new multi-channel table using this menu.

NOTE: The facilities for creating multi-channel tables in the IDA-3106 are limited. You cannot manually enter individual channels or change the channel names. Tables are much easier to create using the IDA-Tools PC software. Tables created using it can be uploaded to the IDA-3106 afterwards.

To create a new multi-channel table:

1. Press the **Create Multi-Ch. Table** softkey and enter the desired values.
2. Press the **Save Table softkey when you have entered all the values.**
3. Enter a name for the multi-channel table and save it.

Tip: Enter the name **"Default"** to automatically load this table each time you reset the device settings.

The example below shows the parameters for the GSM-900 service. The corresponding entries in the multi-channel table are found in column 3 of Table 21 (the example values are shown in bold type).

Example: GSM-900

Downlink: **935.2** – 960 MHz

Channel number: **1** – **124**

Channel width: **200 kHz**

→ without gap

→ all channels have the same width

Table 21: Description of **Create Multi-Channel Table** list

Item	Description	Entries for the example GSM-900P
First Channel Center Frequency	Center frequency of first channel	935.3 (center frequency of 935.2 – 935.4 MHz)
First Channel Number	First channel number	1
Channel Step Width	Channel spacing referred to the center frequency	200 kHz
Channel Bandwidth	Channel bandwidth	200 kHz
Number of channels	Number of channels	124
Preferred RBW	Preferred resolution bandwidth	50 kHz (200 kHz/4)

Editing channels of a multi-channel table

Channels in an existing multi-channel table can only be edited using the PC software.

5.3.5 Creating and editing Transmitter Tables

Main Menu • Settings

Transmitter tables are mainly used in **Direction Finding** mode to simplify the search for several interference transmitters. You only need to select the transmitter from the list to eliminate the need to make manual settings for the frequency and RBW.

When you have selected a Transmitter Table, all the transmitters defined in it will be highlighted in color in the spectrum to make them easy to see. If you set the Marker to this section, the transmitter name will be shown automatically in the Marker bar (HitRadio Antenne 1 in the example).

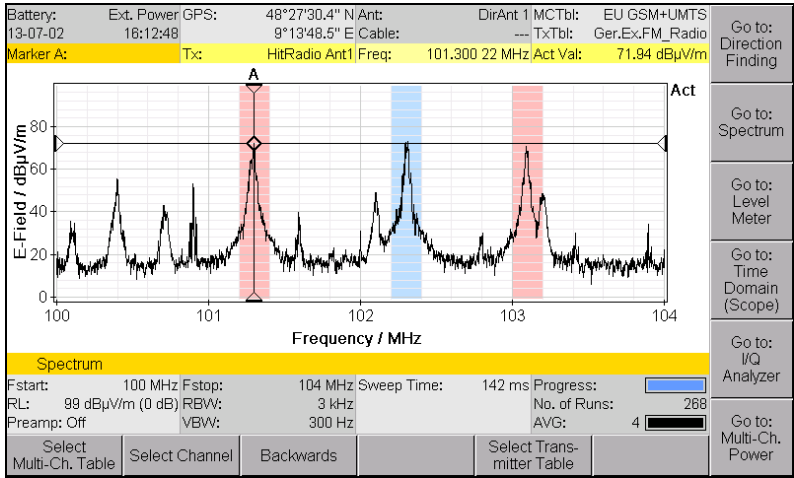


Figure 17: Example showing the use of a Transmitter Table.

Displaying and selecting Transmitter Tables

1. Press the **Transmitter Table** softkey.
→ A list of the available transmitter tables is displayed.

Table 22: Description of **Transmitter Tables** list

Item	Description
Short Name	Short name (in the display)
Long Name	Name (in the selection menu)

2. Use the rotary control knob to select an item and press **OK** to confirm the selection.

Creating a new transmitter table

Main Menu • Settings • Transmitter Table

You must first create an empty table and then fill it up in order to create a new transmitter table. Each transmitter in a transmitter table must be defined separately by its center frequency and channel bandwidth, in contrast with multi-channel tables. However, the separate frequency bands in a Transmitter Table can also overlap.

Tip: The transmitter frequencies can be entered much more easily using the marker in **Spectrum** mode. You can find information about this under *Adding individual frequencies to a Transmitter Table* on page 84.

To create a new transmitter table:

1. Press the **Create Transmitter Table** softkey.
2. Enter a name and press **OK** to save it.
3. Select the new table using the rotary control knob and press the **Edit Transmitter Table** softkey.
4. Press the **Add Transmitter** softkey to add a new transmitter, and make the necessary settings using the available softkeys:
 - **Transmitter Name:** Edit the transmitter name
 - **Fcent:** Enter the **center frequency**
 - **CBW:** Enter the **channel bandwidth**
 - **Antenna Polarization:** Select the polarization (optional information)
 - **Directional Antenna:** Select the antenna (optional information)
 - **Add Transmitter:** Add a further transmitter
 - **Delete Transmitter:** Delete the selected transmitter
 - **Sort:** Sort the transmitters according to their names or center frequencies
5. Press the **ESC** key to exit from the table.

Displaying and editing items in a transmitter table

Main Menu • Settings • Transmitter Table

1. Select a table using the rotary control knob and press the **Edit Transmitter Table** softkey.
 - ↳ The existing transmitters are shown as a list.
2. Press the **ESC** key to exit the menu without making any changes.
3. To edit the transmitters: Use the softkeys as described under *Creating a new transmitter table* on page 83.
4. Press the **ESC** key to exit from the table.

Deleting transmitter tables

Main Menu • Settings • Transmitter Table

You can delete transmitter tables separately or all together.

To delete all the transmitter tables:

⇒ Press the **Delete All Transmitter Tables** softkey and press **OK** to confirm.

To delete individual transmitter tables:

1. Select a table using the rotary control knob.
2. Press the **Delete Transmitter Table** softkey and press **OK** to confirm.

Adding individual frequencies to a Transmitter Table

Spectrum

You can easily add individual transmitter frequencies to a Transmitter Table in **Spectrum** mode.

To add individual transmitter frequencies to a Transmitter Table

✓ **Spectrum** mode is open.

1. Press the **Marker** softkey, then use the rotary control knob to select the desired frequency.
2. Press the **Extras** softkey.
If you have not already done so, you can select the desired Transmitter Table now.
3. Press the **Add Transmitter** softkey.
4. Where necessary, adjust the center frequency and channel bandwidth using the **Fcent** and **CBW** softkeys.
5. Press the **Save** softkey to add the frequency to the Transmitter Table.

Selecting frequencies from a Transmitter Table

If you have selected and activated a Transmitter Table, you can use it in any operating mode except Multi-Channel Power to quickly and easily switch the center frequency F_{cent} and the CBW or F_{span} . You can find more information about setting the center frequency under *Setting the center frequency (F_{cent})* on page 91.

5.4 Saving and loading setups

Main Menu • Setups

You can use this menu to save all the settings as a setup or recall and load setups that you have saved previously.

NOTE: Setups can only be created on the device itself. They cannot be created on a PC. When you save a setup, the actual measurement settings for all operating modes are always saved as well.

5.4.1 Saving settings as a setup

Main Menu • Setups

1. Make the desired settings on the device.
2. Switch to the **Main Menu • Setups** menu and press the **Save Setup** softkey.
 - ↳ The entry box opens.

NOTE: You can also save a setup directly from an operating mode. This function is found in the **Display** menu of the operating mode.

3. Enter a suitable name and press **OK** to confirm your entry.
 - ↳ The settings are saved as a new setup and displayed in the overview bar.

5.4.2 Loading settings from a setup

Main Menu • Setups

- ⇒ Use the rotary control knob to highlight the desired setup and press the **Recall Setup** softkey or the **OK** key.
- ↳ The settings saved in the selected setup will be loaded and the display switches to the measurement screen.

5.4.3 Editing the setup list

Main Menu • Setups

You can edit the setup list as well as save and recall setups.

Sorting the setup list

1. Press the **Sort** softkey.
2. Select sort by **Name** or **Mode** (operating mode) and press **OK**.
 - ↳ The list will be resorted according to the selected criterion.

Overwriting a setup

1. Use the rotary control knob to highlight the setup to be overwritten and press the **Overwrite Setup** softkey.
2. Confirm the action by pressing **OK**. (You can cancel the action by pressing **ESC**.)
 - ↳ The settings in the existing setup will be overwritten with the actual device settings.

5.4.4 Deleting setups

Main Menu • Setups

Setups can be deleted from the PC software as well as from the Main menu.

Deleting a setup

1. Use the rotary control knob to highlight the setup to be deleted and press the **Delete Setup** softkey.
2. Confirm the action by pressing **OK**.
You can cancel the action by pressing **ESC**.
 - ↳ The selected setup is deleted.

Deleting all setups

1. Press the **Delete All Setups** softkey.
2. Confirm the action by pressing **OK**.
You can cancel the action by pressing **ESC**.
 - ↳ All setups except the **Factory Setup** are deleted.

5.4.5 Changing the switch on behavior

Main Menu • Setups

You can specify the measurement settings to be used by the device when it starts up after being switched on:

- **Factory Setup:** The default factory setup (state as supplied) is used.
- **Last Settings:** The settings in use at the time the device was last switched off will be used (default after reset).
- **Power On Setup:** The setup marked in the **Setups** menu as the **Power on Setup** will be used.

To select the settings:

1. Press the **Power on Settings** softkey.
 ↳ The selection window opens.
2. Mark the desired function using the rotary control knob and press **OK** to confirm.

To select a setup as the Power on Setup:

- ⇒ Mark the desired setup in the list using the rotary control knob and then press the **Mark Power on Setup** softkey.
- ↳ The selected setup is marked in the list («...») and will be loaded the next time you switch on the instrument.

5.5 The memory menu

Main Menu • Memory

The following functions are contained in the Memory menu:

- Display data sets (Data Viewer)
 - Display saved screenshots (Screenshot Viewer)
 - Output of recorded demodulated signal content (Demod. Record Viewer)
 - Set comment function
 - Save data to microSD memory card in csv format
 - Configure automatic storage (Time Controlled)
- ⇒ You can find detailed information about all these functions in chapter 13 *Measurement Data Memory* on page 219.

5.6 The SD Card menu

5.6.1 Formatting the memory card

The card provided with the instrument is already correctly formatted and includes pre-installed coarse resolution OSM maps.

NOTICE: Please note that this data and any other data stored on the card will be lost if you format the card by mistake.

Use the formatting function to prepare newly purchased microSD memory cards for use with the IDA-3106. The card is formatted using FAT32 with a block size of 4k.

To format a memory card:

1. Push the memory card into the card slot on the left side of the instrument and press the **SD Card** softkey.
2. Press the **Format SD Card** softkey.
 - ↳ A warning message is displayed, indicating that all data on the memory card will be erased.
3. Press the **OK** button to start formatting.

This takes only a few seconds (quick format).

- TS8GUSDC6 Transcend 8 GB, cl 6, µSDHC
- SDSDQ-8192 SanDisk 8 GB, cl 4, µSDHC

6

Common Functions

This chapter describes the functions that are common to more than one operating mode. These functions are then indicated in the descriptions of the individual operating modes by a cross reference to the relevant section of this chapter.

- 6.1 Notes on this chapter (page 90)**
- 6.2 Resetting all device settings (page 90)**
- 6.3 Setting the center frequency (Fcent) (page 91)**
- 6.4 Setting the bandwidth (RBW / CBW) (page 94)**
- 6.5 Setting the video bandwidth (VBW) (page 96)**
- 6.6 Setting the reference level (Reference Level) (page 97)**
- 6.7 Selecting the trace type (Trace) (page 101)**
- 6.8 Changing the displayed units (Unit) (page 103)**
- 6.9 Adjusting the Y axis (Y-Scale) (page 105)**
- 6.10 The Marker function (page 106)**
- 6.11 Using the Magnifier function (page 114)**
- 6.12 Using Multi-Channel Tables (page 117)**
- 6.13 Demodulating signals (Audio) (page 118)**
- 6.14 Setting the noise threshold (Noise Thresh.) (page 123)**
- 6.15 Measuring with multiple axis antennas (Axis) (page 124)**
- 6.16 Changing the operating mode (page 125)**

6.1 Notes on this chapter

The menu paths shown in gray immediately below the section heading indicate the operating modes and sub-menus where the function described can be found.

Screenshots, where used, only serve to illustrate the function. As a rule, the settings described apply in the same way in the other operating modes although the display on the screen may not be the same as the screenshot used in this manual.

6.2 Resetting all device settings

It can be useful to reset the device settings when you have used it for a long time or it has been used by other persons.

To reset all device settings:

✓ Any menu is open.

1. Press and hold down the **ESC** key for 3 seconds.
2. Press the **OK** key.

This resets both the system settings and the measurement settings. The following are not reset:

- Stored data logger content (measurement results)
- Configuration files (antennas, cables, tables, etc.)
- microSD card contents
- The system settings for: Language, Battery Type, Time Zone, Daylight Saving Time, Magnetic Declination.

You can reset the system settings (**Settings**) and measurement settings (**Factory Setup**) separately. You can find information about this under *Resetting all device settings* on page 74.

6.3 Setting the center frequency (Fcent)

Direction Finding

Spectrum

Level Meter

Time Domain (Scope)

I/Q Analyzer

You can set the center frequency (Fcent) using the number keys or the rotary control knob, or by selecting it from a table (Transmitter Table or Multi-Channel Table).

6.3.1 Setting the center frequency using the number keys

To change the center frequency using the number keys:

✓ The **Fcent** softkey is displayed.

1. Enter the frequency using the **number keys**. You do not need to press the Fcent softkey first.
 - ↳ The **Fcent** window opens and the center frequency you entered is displayed.
2. Press the **kHz**, **MHz**, or **GHz** softkey to select the units and complete the setting.
 - ↳ The window closes and the change is applied immediately.

6.3.2 Setting the center frequency using the rotary control knob

To change the center frequency using the rotary control knob:

- ✓ The **Fcent** softkey is displayed and the **Marker** function is disabled.
 - ✓ The default setting for the rotary control knob, **Rotary Knob: Immediate** is selected.
- ⇒ Turn the rotary control knob to the right / left to increase / decrease the center frequency.
- ↳ The change is applied immediately.
 - ↳ The **Fcent** window closes 3 seconds after you stop turning the rotary control knob.



You can change the step size for changing Fcent using the **Step Size** setting. The acceleration function also increases the step size when the rotary control knob is turned rapidly.

Table 23: Description of **Step Size** softkey

Softkey	Description
Step Size: Auto (default)	A suitable value for the step size is selected automatically depending on the actual settings of Fspan or CBW.
Step Size: Fix	You can set the step size using the Set Fstep parameter

To set the step size:

- ✓ The **Fcent** softkey is displayed.
- 1. Press the **Fcent** softkey.
 - ↳ The **Step Size** softkey is displayed.
- 2. Press the **Step Size** softkey until **Fix** appears.
 - ↳ The **Set Fstep** softkey is displayed.
- 3. Press the **Set Fstep** softkey and select the step size using the rotary control knob or enter it using the number keys.
- 4. Press **OK** to apply the value.

NOTE: You can change individual digits in the center frequency value when the entry window is open by using the arrow keys   to select the digit you want to change and then using the **rotary control knob** to set the desired value. Press the **OK** key to set the new value.

Changing the rotary control knob function

You can set the following functions for the rotary control knob:

Table 24: Description of **Rotary Knob** softkey

Softkey	Description
Rotary Knob: Immediate (default)	The center frequency is set directly by turning the rotary control knob.
Rotary Knob: Preselect	The Fcent softkey must be pressed first before you can change the center frequency using the rotary control knob and set it by pressing the OK key. This setting is recommended to prevent changing the center frequency by mistake.
Rotary Knob: TxTbl	This setting is only displayed if a Transmitter Table has been selected (see <i>Creating and editing Transmitter Tables</i> on page 82). After you press the Fcent softkey, use the rotary control knob to highlight a transmitter in the table and press OK to select it.

To change the rotary control knob function:

- ✓ The **Fcent** softkey is displayed.
- 1. Press the **Fcent** softkey.
- 2. Press the **Rotary Knob** softkey and select the desired function.

6.3.3 Setting Fspan and Fstart / Fstop (Spectrum only)

Spectrum

NOTE: A frequency range must always be set for **Spectrum** operating mode. This is set by default by the center frequency and the frequency span. You can also set the frequency range by defining the start and stop frequencies.

To change the frequency range setting:



1. Press the **Set Fstart & Fstop** or **Set Fcent & Fspan** softkey until the desired setting method is displayed.
 - ✎ The labels on the **Fstart / Fstop** and **Fcent / Fspan** softkeys also change to match the selected setting method.

2. Press the **Fstart**, **Fstop**, **Fspan** or **Fcent** softkeys and enter the desired values.

↳ You can enter the frequency values using the rotary control knob or using the keypad. The frequency values are set in the same way as the center frequency. Information on how to enter numerical values is also found under *Changing numerical values* on page 54.

3. Press **OK** to apply the value.

When you select the **Fspan**, **Fstart**, or **Fstop** softkeys the **Full Span** softkey is displayed. Press this softkey to set the frequency range to the maximum width.


NOTE: You can adjust the step size setting for Fstart / Fstop when the entry window is open by using the arrow keys   to select the digit you want to change and then using the **rotary control knob** to set the desired value. Press the **OK** key to set the new value.

6.4 Setting the bandwidth (RBW / CBW)

Direction Finding
Spectrum
Level Meter
Time Domain (Scope)
IQ Analyzer
Multi-Channel Power

The resolution bandwidth (RBW) or channel bandwidth (CBW) allow you to select a narrow frequency range with the desired bandwidth from a wideband spectrum and to suppress the remaining signal components.

To set the resolution bandwidth or channel bandwidth:

1. Press the **BW** softkey.
2. Use the rotary control knob to select the desired value and press the **OK** key.
 The selected value is applied.

Background information:

Gaussian filters are used to display differing signal spectrums. The desired frequency range is set using Fcent / Fspan or Fstart / Fstop and then swept at a relatively small RBW (e.g. Fspan/500) in order to capture the actual spectral form of the signal selectively. Gaussian filters are particularly suitable for such rapid and dynamic actions. Bandwidths from 10 Hz up to 20 MHz are available. The Gaussian filters are used in Multi Channel Power mode to generate steep cutoff filters of any width. This is done by overlapping the appropriate number of Gaussian filters.

Channel filters are used to measure the overall power of a signal. The analyzer is tuned with Fcent to the fixed center frequency of the signal. After this, CBW is adjusted as closely as possible to the signal bandwidth. Bandwidths from 100 Hz up to 32 MHz are available.

Mode	BW	Filter type
Spectrum	RBW	Gaussian
Multi-Channel Power	RBW	Gaussian
Direction Finding	CBW	Steep channel filter
Level Meter	CBW	Steep channel filter
Time Domain (Scope)	CBW	Steep channel filter
I/Q Analyzer	CBW	Steep channel filter

6.5 Setting the video bandwidth (VBW)

Direction Finding
Spectrum
Level Meter
Time Domain (Scope)
IQ Analyzer

The video filter can smooth signals and reduce fluctuations. It results in RMS averaging with an integration time that is affected by the VBW. The selection of the video filter bandwidth (VBW) is relative to the RBW / CBW setting:

- Spectrum mode: VBW = RBW/10 ... RBW/1000 or **Off**
- Other operating modes: VBW = CBW/1 ... CBW/10000 or **Off**

To set the video bandwidth:

1. Press the **BW** softkey, followed by the **VBW** softkey.
↳ The **Select Video Bandwidth (VBW)** entry box opens.
2. Use the rotary control knob to select the desired setting and press the **OK** key.
↳ The selected value is applied. The selected **VBW** is shown in the lower status bar.

NOTE: The smaller the VBW, the longer the measurement time (Sweep Time) in Spectrum mode. The measurement time in other operating modes is unaffected.

The effective integration time for forming the RMS value can be defined as follows:

$$T = 1 / (\pi \times \text{VBW}) \quad \text{or} \quad T \approx 0.32 / \text{VBW}$$

Setting the integration time T-RMS directly

You can set the desired integration time directly on the device in Spectrum mode. The integration time T-RMS is selected and set instead of the VBW. The trace label on the measurement screen changes from Actual (Act) to RMS when you do this.

To set the integration time T-RMS directly:

1. Press the **BW** softkey, followed by the **Set T-RMS** softkey.
↳ The VBW softkey label changes to T-RMS.
2. Press the **T-RMS** softkey.
↳ The **Select RMS Integration Time (T-RMS)** entry box opens.

3. Use the rotary control knob to select the desired setting and press the **OK** key.
 - ⇒ The selected value is applied. The selected T-RMS is shown in the lower status bar.

6.6 Setting the reference level (Reference Level)

All operating modes

Background information:

The sensitivity of the system depends on the input attenuator setting. This setting is determined by the **Reference Level (RL)** parameter. High measurement sensitivity avoids falsification of the results due to noise generated internally by the device. On the other hand, it is important that the device is not overloaded (saturated). Saturation can also be caused by signals outside the frequency band, e.g. high power radio transmitters when measuring mobile telephone signals.

The reference level setting covers up to 50 dB depending on the attached components (handle, type of antenna, etc.) and is coupled to the setting of the input attenuator (Attenuator, Atten). The input attenuator can be matched ideally to the measurement signal by means of its fine adjustment in steps of 1 dB. At the highest reference level setting, Atten = 50 dB; at the most sensitive reference level, Atten = 0 dB. The actual value of the input attenuator setting is shown in brackets after the reference level.

It is possible to decouple the reference level and the input attenuator indirectly using the **Y-Scale Ref** parameter in the **Display** menu.

To set the reference level:

⇒ Press the **Reference Level** softkey.

You can now select the reference level as follows:

- **Manual reference level selection**
- **Automatic reference level search (RL Search)**

6.6.1 Manual reference level selection

Manual adjustment is recommended if the field situation is known or if pulsed signals are being measured.

- 1. Press the **Reference Level** softkey.
 - ↳ The **Set Reference Level** selection box opens displaying a list of possible input sensitivities.

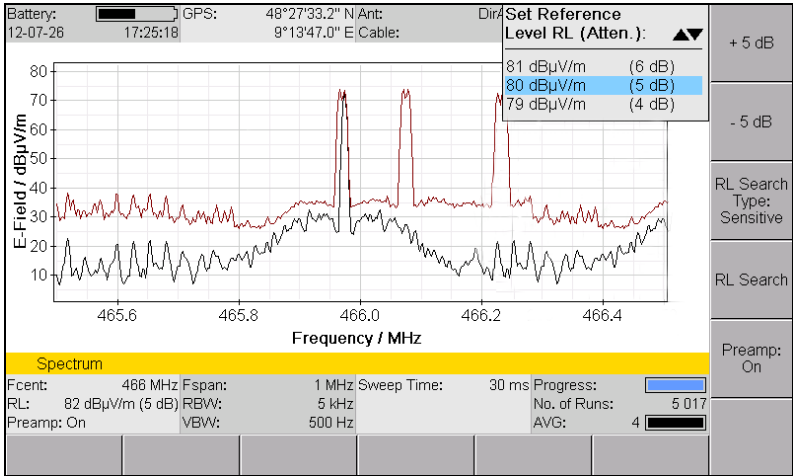


Figure 18: **Set Reference Level** selection box

- 2. Use the rotary control knob to select the desired input sensitivity.
- 3. Press the **OK** key.
 - ↳ The input sensitivity is set.

You can use the two upper softkeys to check for over modulation and to rapidly change the values in 5 dB steps. The softkeys are only activated if the change is possible in the selected direction. The Y scale is fixed as soon as you make a change using the ± 5 dB softkeys so that changes in level are easier to see.

As well as controlling overload, the ± 5 dB offset can also be used to distinguish an actual measurement signal from an intrinsic spurious signal (Spurious). Regardless of the Reference Level setting, the measurement signal will display the same level value until compression occurs from overloading. In contrast, the displayed value of an intrinsic spurious signal will change each time the Reference Level is changed (RL +5 dB \rightarrow displayed value increases by +5 dB as well).

NOTE: The selected reference level applies to all operating modes and does not have to be set again if you change operating mode.

6.6.2 Automatic reference level search (RL Search)

This softkey initiates a search for a suitable reference level. This is recommended if the field situation is unknown.

⇒ Press the **RL Search** softkey.

↳ The message: **Searching for best reference level. Please wait.** is displayed. A measurement over the entire frequency range covered by the antenna you are using is made in the background. This takes several seconds. When it is completed, the device sets the reference level to the optimum value automatically and reverts to normal measurement mode.

NOTE: Press the **ESC** key if you want to cancel the process.

RL Search Type

The IDA-3106 provides two types of reference level search which can be selected using the **RL Search Type** softkey (toggle function):

- **Sensitive:** This type is suitable for all largely static signals.
- **Safe:** This type allows for a higher overload reserve. It is better to set the reference level manually if pulsed signals are being measured.

To select the search type:

⇒ Press the **RL Search Type** softkey.

↳ The switch toggles between the two types each time the softkey is pressed.

6.6.3 Measurements with preamplifier

You can activate a 20 dB preamplifier in the antenna handle when measuring very small signals. The reference level correction is automatically taken into account.

To activate / deactivate the preamplifier:

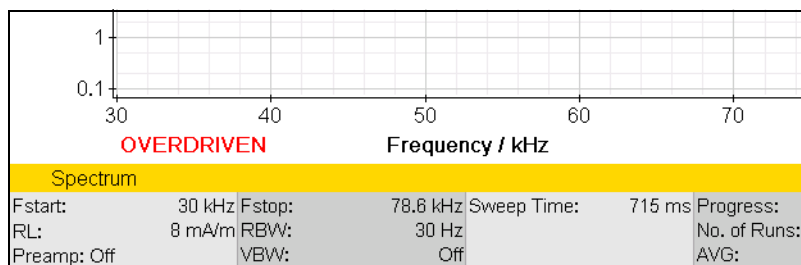
✓ A Narda antenna handle is connected.

1. Press the **Reference Level** softkey, then press the **Preamp:** softkey.
↳ The softkey indicates the status of the preamplifier.
2. Press **ESC** to return to the measurement menu.

6.6.4 Measurement input overload

If the signal level is higher than the range that can be measured, the warning message **OVERDRIVEN** is shown in the display (in the part above the lower status line, next to the axis setting).

⇒ In this case, you should increase the Reference Level (RL) and disable the preamplifier if necessary.



6.7 Selecting the trace type (Trace)

Spectrum • Trace

Multi-Channel Power • Trace

The trace type determines how the recorded values are displayed by the trace arithmetic. The following trace types can be selected / deselected (you can select more than one at the same time):

Table 25: Types listed in the **Trace** box

Type	Abbrev.	Function / Explanation
Actual/RMS	Act/ RMS	Clears the previous trace and writes the current trace after each new sweep (also called CLEAR / WRITE). RMS is always displayed if the integration time T-RMS is activated (see VBW) and in Multi-Channel Power mode.
Maximum Hold	Max	The trace displays the maximum value from the current measurement and all previous traces (also called MAX HOLD).
Average	Avg	The trace displays the rolling average RMS value. Averaging is done over the last 4 to 256 traces or over a time period between 1 and 30 minutes (settable).
Minimum Hold	Min	The trace displays the minimum value from the current measurement and all previous traces (also called MIN HOLD).
Reference	Ref	Trace memory for determining a difference spectrum (Spectrum and Delta Spectrum only).

For all the above trace types: If a frequency range is compressed into the width of a single pixel the display will be in the form of a vertical line between the minimum and maximum levels in the range.

To select or deselect a trace type:

1. Press the **Trace** softkey.
2. Use the rotary control knob and the softkeys to make the desired selection.

You can find information on how to select items from a list under *Selecting entries from a list* on page 52

3. When you have made your selection, press the **OK** key.

Tip:

It is recommended to just select the trace type **Act** if fast fluctuating signals shall be displayed. In this case the display is refreshed with a particular high rate.

6.7.1 Average formation (Trace type: Average)

An average can be formed over a specific number of measurements or over a period of time.

Taking the average of a number of measurements:

- ✓ Trace type **Average** is selected (the actions described below can nevertheless be carried out even if this trace type is not selected).
- 1. Press the **Trace** softkey.
- 2. Press the **Average Type** softkey until **No. of Avg** is shown.
- 3. Press the **No. of Avg** softkey, then use the rotary control knob to select the desired number of measurements, and then press the **OK** key.
 - ↳ The measurements start. The **AVG** line shows the selected number of measurement values and a bar graph next to this shows the progress towards the formation of the first average value.

Taking the average over a period of time:

- ✓ Trace type **Average** is selected (the actions described below can nevertheless be carried out even if this trace type is not selected).
- 1. Press the **Trace** softkey.
- 2. Press the **Average Type** softkey until **Average Time** is shown.
- 3. Press the **Average Time** softkey, then use the rotary control knob to select the desired time period, and then press the **OK** key.
 - ↳ The measurements start. The **AVG** line shows the selected time period numerically and a bar graph next to this shows the progress towards the formation of the first average value.

6.7.2 Reset measurement values

You can reset the values for Max, Avg, and Min:

- Reset All: Resets all the above-mentioned measurement values.
- Reset Min & Max: Resets the **Minimum Hold (Min)** and **Maximum Hold (Max)** measurement values only.

6.8 Changing the displayed units (Unit)

The frequency range that can be set is determined by the selected units when IDA antennas are used. Measurements are only possible within the specified frequency range of the antenna if **units of field strength** or **power density** are selected (see Table 27). This is because no antenna factors are available outside this range for calculating the field strength or power density.

You can set the frequency range to any range you like if **units of power level** or **voltage level** are selected (see Table 26). However, the functionality of the antennas is no longer guaranteed or is severely limited outside the specified frequency range.

Available units

The following power and voltage units are always available:

Table 26: Selectable units

Units	Description
dBm	Power level, referred to 1 mW
dBV	Voltage level, referred to 1 V
dBmV	Voltage level, referred to 1 mV
dBμV	Voltage level, referred to 1 μ V

The following power or field strength units are additionally available when an antenna is connected or selected:

Table 27: Units that can be selected additionally (with antenna)

Units	Measured quantity	Description
dBV/m	Electric field strength	Expressed as a log. value referred to 1 V/m.
dBmV/m	Electric field strength	Expressed as a log. value referred to 1 mV/m.
dBμV/m	Electric field strength	Expressed as a log. value referred to 1 μ V/m.
dBA/m	Magnetic field strength	Expressed as a log. value referred to 1 A/m.

Table 27: Units that can be selected additionally (with antenna)

Units	Measured quantity	Description
V/m	Electric field strength	Converted using the characteristic impedance of a vacuum $Z_0 = 377 \, \Omega$ unless measured directly.
A/m	Magnetic field strength	
W/m ²	Power density	Calculated using the characteristic impedance of a vacuum $Z_0 = 377 \, \Omega$
mW/cm ²	Power density	

NOTE: It is best to use units of field strength (e.g. dBμV/m) so that the level values can be compared even if different antennas are used. Avoid changing the measurement units unnecessarily. Since conversion between Table 26 and Table 27 is not possible, you must use the same units selected for a localization from start to finish.

To change the units:

- ✓ The top menu level of the operating mode is displayed.
- 1. Press the **Display** softkey, then press the **Unit** softkey.
- 2. Use the rotary control knob to highlight the desired unit and press the **OK** key.
 - ↵ The selected unit is saved.

6.9 Adjusting the Y axis (Y-Scale)

All operating modes • Display

There are two ways of adjusting the Y axis:

- **Manual adjustment of Y axis scaling and reference point**
- **Automatic adjustment of Y axis**

Adjusting the Y axis manually

You can change the scaling as well as the reference point of the Y axis (Y-Scale Ref). Changes you make are applied immediately. Y-Scale Ref is always set relatively to the reference level (RL). By shifting the reference point, the reference level and input attenuator are effectively uncoupled from each other. Usually (recommended) the reference point should not be shifted (RL +0 dB).

To change the Y axis scaling:

1. Press the Y-Scale Range softkey.
2. Use the rotary control knob to highlight the desired value.
↳ The change is applied to the display immediately.
3. Press the **OK** key or the **ESC** key.

To change the Y axis reference point:

1. Press the **Y-Scale Ref** softkey.
2. Use the rotary control knob to highlight the desired value.
↳ The change is applied to the display immediately.
3. Press the **OK** key or the **ESC** key.

To fix the Y axis:

The Y axis changes automatically if you switch the preamplifier in the antenna handle (0 dB / 20 dB). You can fix the Y axis to prevent this from happening, so you can more easily compare the signal shape with and without pre amplification.

1. Press the **Y-Scale Ref** softkey.
2. Press the **Y-Scale Ref fix** softkey until **On** is shown.
↳ The Y axis is fixed.
3. Press **OK** or **ESC** to exit from the menu.

Adjusting the Y axis automatically

⇒ Press the Y-Scale Auto softkey.

↳ The Y axis is adjusted automatically.

In this case, the scaling (Y-Scale Range) is set to 100 dB and the reference point (Y-Scale Ref) is the same as the reference level (RL +0 dB). Fixing of the Y axis is reset when you do this.

6.10 The Marker function

Spectrum • Marker

Time Domain (Scope) • Marker

I/Q Analyzer • Marker

Multi-Channel Power • Marker

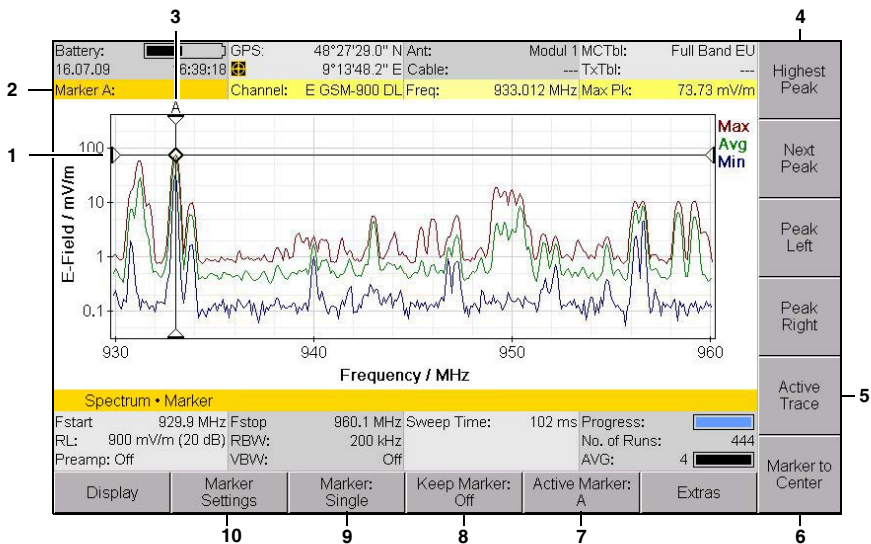
The Marker function is very useful for marking and comparing specific individual frequencies in the display. The following types of marker function can be selected:

- Two independent markers
- Individual display of each marker or display of the difference between the markers
- Automatic location of peak values
- Automatic peak tracking (can be disabled)
- Rotary control knob with acceleration function

NOTE: The marker is not restricted by the pixel resolution of the screen, so it always provides the full measurement data resolution of approximately RBW/2.

6.10.1 The Marker menu

⇒ Press the **Marker** softkey.



No.	Function / Explanation
1	Graphical display of the measurement value at the marker position.
2	Marker bar with marker information: <ul style="list-style-type: none">• Marker A: Marker A is active• Channel: Selected channel. (If a transmitter table is selected, the transmitter names will be shown here.)• Freq: Frequency at the marker position• Max. Pk: Selected trace type/detector and measured value
3	Graphical display of the marker position (for trace type Max in the example).
4	Marker functions for peak value selection (see Table 28 on page 109).
5	Specifies on which trace the marker is to be used
6	Sets Fcent to the position of the active marker. Parameter that depend on Fcent like Fspan and RBW are automatically adapted.
7	Active marker (Marker A is active in the example).
8	Selects whether the marker is shown even after you exit the Marker menu.
9	Display type: Single marker or difference marker
10	You can set the marker evaluation properties under Marker Settings.

Marker Settings

⇒ Press the **Marker Settings** softkey.

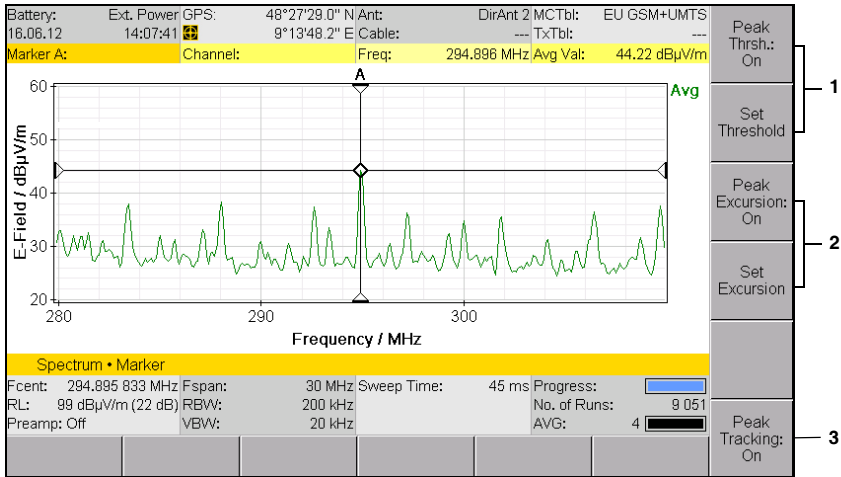


Figure 20: Marker Settings (display with one marker)

No.	Function / Explanation
1	Peak Threshold: Specifies a threshold for evaluating the peaks
2	Peak Excursion: Specifies a minimum peak excursion for evaluating the peaks
3	Peak Tracking: Activates / deactivates peak tracking or highest level tracked

Changing the marker evaluation settings

⇒ You can find information about setting a threshold or a minimum peak excursion or peak tracking value under *Changing the marker evaluation settings (Marker Settings)* on page 113.

6.10.2 Using the markers separately

You can set and display the two markers A and B independently using the **Marker: Single** marker function.

To use the markers separately:

- ✓ You have selected the necessary trace types (see *Selecting the trace type (Trace)* on page 101).
- ✓ The **Marker** sub-menu is active.
- 1. Press the **Marker** softkey until **Marker: Single** is shown.
- 2. Press the **Active Marker** softkey to select marker **A** or **B**.
- 3. Select a trace type / detector: Press the **Active Trace** softkey, select an entry with the rotary control knob and then press the **OK** key.

You can now use the available functions separately for markers A and B:

Table 28: Marker functions for selecting peak values

Selection	Function
Rotary control knob	Moves the marker to the desired position manually.
Highest Peak softkey	Places the marker on the highest peak value.
Softkey Next Peak	Places the marker on the next higher peak value.
Peak Left softkey	Places the marker on the next peak value to the left of the previous position.
Peak Right softkey	Places the marker on the next peak value to the right of the previous position.

NOTE: An algorithm that covers all the existing measurement values contained in the spectrum is used for peak markers. Peak values are indicated by "Pk" after the trace type / detector (e.g.: Max Pk: 105.8 mV/m). If the marker is not on a peak value, "Val" is shown after the trace type / detector (e.g.: Max Val: 105.8 mV/m). Another special feature of the peak marker is that the frequency is tracked and follows the peak value (Peak Tracking: On).

6.10.3 Using both markers to determine a difference

The difference between the markers can be determined using **Delta B-A**.

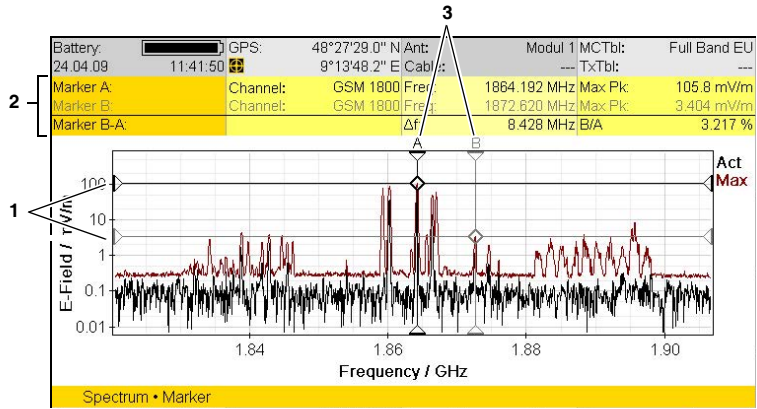


Figure 21: Display with both markers

No.	Function / Explanation
1	Graphical display of the measurement values at the marker positions.
2	<div>Marker information:</div> <ul style="list-style-type: none">• Marker...: Marker A is active (black lettering), Display of difference B-A• Channel: Selected channels. (If a transmitter table is selected, the transmitter names will be shown here.)• Freq: Frequencies at the marker positions, frequency difference $f_B - f_A$• Max. Pk: Selected trace types / detectors and measured values• B/A: ratio of measured values<ul style="list-style-type: none">– The ratio B/A is given in % for Unit = V/m, A/m, W/m², mW/cm²– The difference B-A is given in dB for log. units such as dBμV or dBV/m
3	Graphical display of the marker positions.

To use the Delta function:

✓ The **Marker** sub-menu is active.

1. Press the **Marker** softkey until **Marker: Delta B-A** is shown.
2. Press the **Active Marker** softkey to select marker **A**.
3. Press the **Active Trace** softkey to select a trace type / detector for Marker **A**.
4. Move Marker **A** to the desired position (either manually or using the Peak functions).
5. Press the **Active Marker** softkey to select marker **B**.
6. Select a trace type / detector for Marker **B**.

The difference determined depends on the trace type / detector selected for Marker **A** and Marker **B**:

- **Same trace type / detector for Marker A and Marker B:**

The difference between the measured values of one trace type/detector at two different frequencies is determined.

- **Different trace types / detectors for Marker A and Marker B:**

The difference in the measured values between the two trace types / detectors at one frequency is determined.

7. Move Marker **B** to the desired position (either manually or using the Peak functions).

↪ The selected frequencies and the corresponding measured values along with the difference are displayed in the upper status bar.

6.10.4 Displaying the marker data on the measurement screen

If you activate the Marker function, the frequency and measured value corresponding to the active marker are displayed in the upper status bar instead of the GPS data.

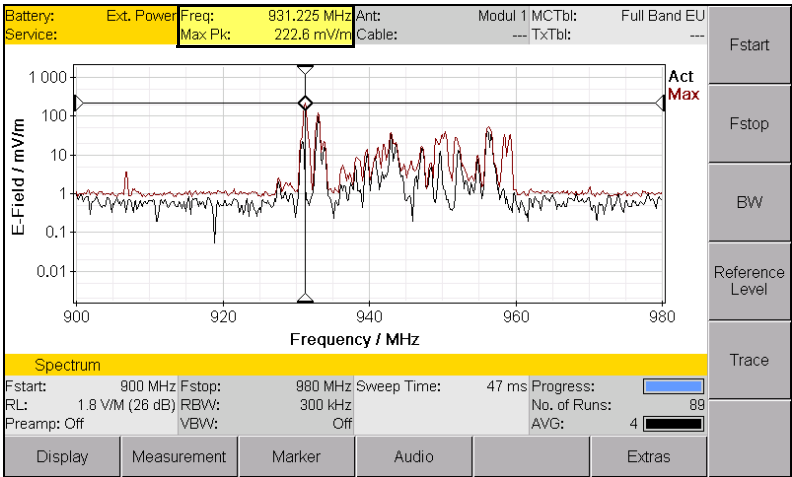


Figure 22: Display of marker data in the upper status bar.

To activate the display function:

- ✓ The **Marker** sub-menu is active.
1. Press the **Keep Marker** softkey until **Keep Marker: On** is shown.
 2. Press the **ESC** to return to the measurement screen.

6.10.5 Changing the marker evaluation settings (Marker Settings)

Marker • Marker Settings

The peak marker evaluation functions can be set using the **Marker Settings** softkey.

Setting a threshold (Peak Threshold)

Peak Threshold allows you to set a threshold within the range RL+20 dB to RL-120 dB. This ensures that only values above the noise floor are recorded for the evaluation. Values below the threshold are ignored. You can evaluate up to 50 peaks.

To select a threshold value:

1. Press the **Peak Thrsh.** softkey until **On** appears.
↳ The function is activated.
2. Press the **Set Threshold** softkey.
↳ A table showing the threshold value appears; this value is also shown at the same time as a horizontal line on the measurement screen.
3. Select a value with the rotary control knob, and press **OK** to make the setting.

Setting a minimum signal peak excursion (Peak Excursion)

Whereas Peak Threshold sets a threshold that the peak values for an evaluation must exceed, **Peak Excursion** defines how far the peak excursion has to be for the signal to be included as a peak in the list (setting range 0 – 20 dB)

To select a Peak Excursion value:

1. Press the **Peak Excursion** softkey until **On** appears.
↳ The function is activated.
2. Press the **Set Excursion** softkey, select a value with the rotary control knob, and press **OK** to make the setting.

Tracking the peak values (Peak Tracking)

The Peak Tracking function allows you to track a traveling peak value that you previously determined using a Peak softkey (e.g. Highest Peak). The marker cannot track frequency jumps or rapidly changing peak values. In contrast, the marker is always set to the highest peak when you select the **Highest** setting, so it can track any jump. This function is only available in **Spectrum**, **Time Domain (Scope)** and **I/Q Analyzer** modes and is activated (**On**) by default.

To activate and deactivate Peak Tracking:

- ⇒ Press the **Peak Tracking** softkey in the **Marker** menu.
- ↳ The softkey shows **On**, **Highest**, or **Off**.

6.11 Using the Magnifier function

Spectrum • Marker • Display

Time Domain (Scope) • Marker • Display

I/Q Analyzer • View: Magnitude • Marker • Display

I/Q Analyzer • View: I/Q • Marker • Display

The Magnifier function allows you to display a magnified view of the area around the current marker position in a separate window (split screen). This two stage selectable enlargement acts like a graphical magnifier, so that no new measurement is started and no parameters are changed. The active marker is shown in the center of the X axis of the enlarged area.

One of the great advantages of the IDA is its very high frequency and time resolution. Using the Magnifier function, you can display and analyze both the entire spectrum and a section of it at full resolution. This allows you to display a magnified view of the area around the current marker position in a separate window (split screen). This two stage selectable enlargement acts like a graphical magnifier, so that no new measurement is started and no parameters are changed. The active marker is shown in the center of the X axis of the enlarged area. You can set a maximum magnification of 50 times in the frequency domain or 500 times in the time domain.

6.11.1 Activating the Magnifier function

- 1. Press the **Marker** softkey.
 - ↳ The last marker function used (Marker A, Marker B, Delta B-A) is displayed.
- 2. Set the active marker to the desired frequency and press the **Display** softkey.
- 3. Press the **Magnifier** softkey until **Magnifier: On** appears.
 - ↳ The enlarged range and the measurement range are shown in separate windows one above the other on the screen.
- 4. Press the **Magnification: Low/High** softkey to set the desired magnification.

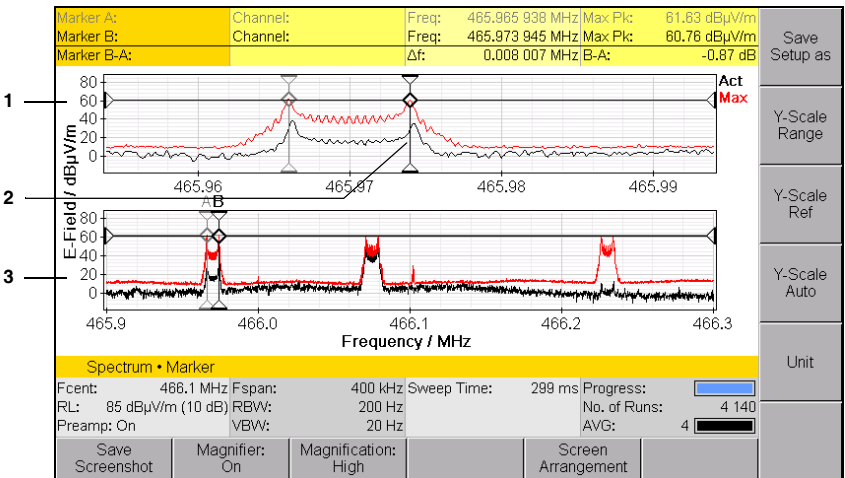


Figure 23: Split screen display for Magnifier function

No.	Function / Explanation
1	Magnifier window
2	Marker shown in Magnifier window at center of X axis
3	Overview window (Spectrum, Time Domain (Scope), IQ Analyzer)

Changing the Magnifier scale

The scale of magnification can be set in two steps with the **Magnification** softkey.

The following table shows the relationship between the operating mode, measurement function and magnification factor.

Table 29: Relationship between operating mode, measurement function and magnification factor.

Mode	Measurement function	Magnification:	
		Low	High
Spectrum	Spectrum	10 times (Fspan/10)	50 times (Fspan/50)
	Delta Spectrum		
Time Domain (Scope)	Long-Time Scope	10 times (Time Span/10)	50 times (Time Span/50)
	High Resolution Scope	25 times (Time Span/25)	500 times (Time Span/500)
I/Q Analyzer	I/Q	25 times (Time Span/25)	500 times (Time Span/500)
	Magnitude		

Notes on using the Magnifier function:

- All the marker functions are retained in the Magnifier function.
- When you change the marker position (in the lower window), the X axis in the Magnifier window is redrawn to correspond.
- When you use the Peak marker in Spectrum mode, the X axis is not adjusted until the active Peak marker goes above or below a threshold of $\pm 1/4$ of the current Magnifier span. This avoids continuous jumping of the display.
- The **Keep Marker** function also keeps the Magnifier settings in the main view when you exit the Marker menu.

6.11.2 Automatically hiding the status bars

You can hide the upper and lower status bars to allow more space for the split screen display. You can link the hide function to activation of the Magnifier function so that you do not have to hide the status bars manually every time you switch to the split screen display.

To hide the status bars automatically:

- ✓ The **Marker • Display** menu is active.
The Magnifier function is activated (**Magnifier: On**)
- 1. Press the **Screen Arrangement** softkey.
 - ↳ The **Set Screen Arrangement** fold-out window opens.
- 2. Use the rotary control knob and softkeys to highlight the item **Hide at Magnifier** under **Upper status bar** or under **Lower status Bar** and press the **OK** key.
 - ↳ The selected display is adjusted accordingly.

6.12 Using Multi-Channel Tables

All operating modes • Extras

1. Press the **Select Multi-Ch. Table** softkey.
 - ↳ A list of the available multi-channel tables is displayed.
2. Use the rotary control knob to select an item and press **OK** to confirm the selection.

NOTE: Information about creating a multi-channel table is found under *Displaying and creating Multi-Channel Tables* on page 79.

Selecting a channel

NOTE: You can find information about selecting channels in Multi-Channel Power mode under *Showing and hiding channels* on page 213.

1. If necessary, change the multi-channel table using the **Select Multi-Ch. Table** softkey.
2. Press the **Select Channel** softkey.
 - ↳ A list of the available channels is displayed.
3. Use the rotary control knob to select an item and press **OK** to confirm the selection.

6.13 Demodulating signals (Audio)

Direction Finding • Audio

Spectrum • Audio

Level Meter • Audio

The optional Audio function is used to stream demodulated signals over Ethernet or to demodulate analog modulated signals in the device so that you can listen to them using the built in loudspeaker or headphones. You can also record and save the demodulated signal with the Demodulation Recorder.

6.13.1 Demodulation types (Demodulation)

Direction Finding • Audio

Spectrum • Audio

Level Meter • Audio

The following demodulation types are available:

- FM: frequency modulation
- AM: amplitude modulation
- CW: Continuous wave
- LSB: lower side band
- USB: upper side band

The types displayed in the selection window depend on the selected resolution bandwidth RBW / CBW:

- FM, AM, CW: up to 200 kHz max.
- LSB, USB: up to 16 kHz max.

CW demodulation is used to demodulate clocked carrier signals (Morse signals) and generates a 1 kHz sinewave when the carrier signal is active.

Demodulating the LSB / USB (BFO)

The additional BFO function (beat frequency oscillator) is available when demodulating single sideband modulated signals (LSB/USB). The BFO can be used to offset the center frequency (F_{cent}) by ± 20 Hz to correct frequency shifts for demodulating carrierless signal bands.

To activate BFO:

- ✓ You must have selected either LSB or USB.
- 1. Press the **Audio** softkey, then press the **BFO** softkey.
- 2. Set the desired value using the rotary control knob.
 - ↳ Changes are applied immediately, so you can optimize the setting by monitoring the audio output.
 - ↳ **Level Meter** and **Direction Finding**:
The **Fcent** display changes from black to red to indicate that the center frequency has been offset by the BFO frequency.
- 3. Press **OK** or **ESC** to close the setting window.

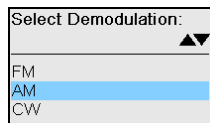
6.13.2 Starting demodulation (Direction Finding and Level Meter only)

Direction Finding • Audio

Level Meter • Audio

To start demodulation in Direction Finding and Level Meter modes:

1. Select a suitable channel bandwidth.
2. Press the **Audio** softkey, then press the **Demodulation** softkey.
 - ↳ The possible demodulation types are shown in the selection window depending on the selected channel bandwidth.



3. Use the rotary control knob to select the desired type and press **OK** to confirm.
 - ↳ The demodulated signal content is output from the loudspeaker or from headphones, if connected.
4. To deactivate demodulation, press the **Demodulation** softkey, select **Off** with the rotary control knob and press **OK** to confirm.

6.13.3 Starting demodulation (Spectrum only)

Spectrum • Audio

You can start demodulation of the signal at the actual marker position in **Spectrum** mode. The sweep is paused while demodulation is taking place. You can switch between demodulation and sweep manually or automatically. The duration of demodulation can be selected using the **Dwell Time** softkey. The demodulation frequency can be tuned at any time by adjusting the marker position. The demodulation bandwidth can be set independently from the resolution bandwidth of the measured spectrum.

To start demodulation:

1. Press the **Audio** softkey.
 - ↳ The selection window for choosing the demodulation type opens.

⇒ If a demodulation type is already selected, go to step 3.
2. Use the rotary control knob to select the desired demodulation type and press **OK** to confirm.
 - ↳ If a marker is not displayed, it will be activated automatically. The measurement traces are frozen and the signal at the marker position is demodulated (adjust the volume if necessary).
Demodulating is displayed at the lower right of the measurement screen.
3. Press the **Demod. Bandwidth** softkey to adjust the bandwidth.
 - ↳ The selection window opens and displays Coupled to RBW (... Hz). The demodulation bandwidth used is shown in brackets.
4. Press the **Start/Stop Demodulation** softkey to switch between measurement and demodulation.
 - or –
 - Press the **decimal point** key of the number keys.
5. To stop demodulation:
Press the **Demodulation** softkey, select **Off** with the rotary control knob and press **OK** to confirm.

NOTE: **Dwell Time** is set to **manual** by default. You can also set a value here between 1 s and 30 s to enable automatic switching between demodulation and sweep.

Demod. Bandwidth is set to **Coupled to RBW** by default and limits the demodulation bandwidth to permissible values automatically. You can also set a fixed value.

Demodulation can also be used after exiting from the Audio menu. If you want to do this, use the **decimal point** key of the number keys to interrupt demodulation.

6.13.4 Altering the volume (Volume)

1. Press the **Volume** softkey.
↳ The selection window opens.
2. Use the rotary control knob to select the desired volume.
↳ The volume changes immediately.
3. Press **OK** or **ESC** to close the window.

NOTE: The volume can also be set using the arrow keys:

◀ = softer, ▶ = louder

6.13.5 Activating the squelch function (Squelch)

You can use the **Squelch** softkey to set suitable noise suppression. The response threshold is set relative to the Reference Level. The **Squelch** softkey is displayed for all signal types except **FM**.

To activate squelch:

- ✓ The Audio menu is active and you have selected the signal type AM, CW, LSB or USB.
1. Press the **Squelch** softkey.
↳ The selection window opens.
 2. Use the rotary control knob to select the desired value and press **OK** to confirm.
 3. To deactivate noise suppression press the **Squelch** softkey, select **Off** with the rotary control knob (last item in the list), and press **OK** to confirm.

6.13.6 Recording demodulated signals (Demodulation Recorder)

With demodulation activated, you can record the demodulated signal with the Demodulation Recorder.

1. Activate demodulation.
 - ↳ The **Demodulation Recorder** softkey is displayed.
2. Press the **Demodulation Recorder** softkey, then press the **REC** softkey.
 - ↳ Recording starts.
3. To stop recording, press the **STOP** softkey.
4. To replay the demodulated signal you just recorded, press the **Play** softkey.
5. To make a new recording, press the **Repeat REC** softkey.
6. To save the recording, press the **Save REC** softkey.
 - ↳ The save process is shown on the screen along with the index number where the recording is stored.
7. To exit from the recording menu, press the **Cancel REC** softkey or the **ESC** key.

6.13.7 Digital audio streaming

The audio streaming option lets you stream the demodulated signals over Ethernet. See *Demodulation types (Demodulation)* on page 118 for details of demodulation types and bandwidth.

Tip: For smooth operation of digital audio streaming at 200 kHz RBW and 32 kHz sample rate disconnect the antenna control plug of the antenna handle.

6.14 Setting the noise threshold (Noise Thresh.)

Direction Finding

Level Meter

Multi-Channel Power

Every electronic instrument generates a certain level of intrinsic noise. This noise is present in all frequency ranges, including those not occupied by signals. It is easy to see when a signal is swamped by the intrinsic noise when performing spectrum analysis with a graphical display of the spectrum. To enable this distinction to be made in other operating modes, it is possible to set a threshold. For results below this threshold, the device does not display the measured value but instead shows the threshold value preceded by "<".

You can select threshold values of 0, 3, 6, 10, 15 and 20 dB.

- 0 dB: intrinsic noise level, does not give any information about the signal
- 3 dB: usual value selected for signals with normal noise levels
- > 3 dB: for signals with higher noise levels

The threshold values are relative and always refer to the level of the intrinsic noise floor.

To activate / deactivate the noise threshold:

1. Press the **Reference Level** softkey.
2. Press the **Noise Thrsh.** softkey until **On** appears.
 - ↳ The noise threshold is activated.

To select the threshold value:

- ✓ The noise threshold must be activated before you can select a value.
1. Press the **Reference Level** softkey and then the **Noise Thresh.** softkey.
 2. Use the rotary control knob to set the desired input sensitivity and then press the **OK** key.
 - ↳ The threshold value is set.

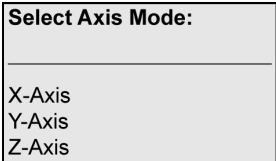
6.15 Measuring with multiple axis antennas (Axis)

Spectrum • Axis
Level Meter • Axis
Time Domain (Scope) • Axis
I/Q Analyzer • Axis
Multi-Channel Power • Axis

You can only make measurements in a single axis with the IDA-3106 even if a multiple axis antenna is connected. The Axis Mode selection window allows you to select the axis for measurement. In this way you can measure all three axes one after the other and save the results separately without having to reposition the antenna.

To select the axis:

- 1. Press the **Axis** softkey.
 ↳ The selection window opens.



- 2. Select an axis, press **OK** to confirm, and make the measurement you want.
- 3. Select and measure the other axes in the same way.

It is a good idea to use a tripod if you are using a multiple axis antenna and you want to measure all the axes.

6.16 Changing the operating mode

There are two ways to change the operating mode:

- Using the same parameters by means of the **Extras** softkey
- Without using the same parameters by means of the Main menu

6.16.1 Changing the operating mode and keeping the same parameters

You can switch directly from one operating mode to another without opening the main menu. Certain measurement parameters are kept the same when you do this, depending on the target operating mode (see table below).

Table 30: Parameters retained when changing operating mode

Parameter	Operating modes
Fcent	All operating modes
Marker frequency	Instead of Fcent when marker is activated in Spectrum , and for the frequency views in IQ Analyzer
CBW	In Direction Finding , Time Domain (Scope) , Level Meter and IQ Analyzer
Demodulation bandwidth set as CBW	From Spectrum to Direction Finding , Level Meter , Time Domain (Scope) and IQ Analyzer

To change the operating mode keeping the same parameters:

1. Press the **Extras** softkey.
2. Press the **Go to: ...** softkey for the desired operating mode.

NOTE: The RBW values set in the multi-channel tables have no function when parameters are retained. These RBW values are only used in Multi-Channel Power mode. If a channel is marked in Multi-Channel Power mode, the parameters are kept for this channel bandwidth when the operating mode is changed, and the most suitable CBW is set.

6.16.2 Changing the operating mode from the Main menu

1. Press the **MENU** key until the Main menu is displayed.
2. Press the softkey for the desired operating mode.

7

Direction Finding Mode

Direction Finding mode combines several functions in order to determine the bearing and location of a signal source. This chapter describes these functions and explains how to localize signal sources.

- 7.1 About Direction Finding mode (page 128)**
- 7.2 Operating mode specific functions (page 129)**
- 7.3 Manual Bearing (page 131)**
- 7.4 Horizontal Scan (page 134)**
- 7.5 Localizing a signal source (Outdoor) (page 139)**
- 7.6 Exchanging bearings between instruments (page 142)**
- 7.7 The Map menu (page 143)**
- 7.8 Finding the location of a signal source (Indoor) (page 154)**

7.1 About Direction Finding mode

Direction Finding mode is used to determine the direction (bearing) and location of a signal source. As this mode requires compass information, you must use the Narda antenna handle for measurements. This supplies the measuring instrument with information about the actual position of the antenna in addition to the measurement signal.

The individual functions are:

- | | |
|------------------------|---|
| Manual Bearing | Manual determination of the signal source bearing by measuring the largest signal level. |
| Horizontal Scan | Automatic determination of the bearing of a signal source by means of a 360° scan and display on a polar diagram. |
| Localization | <p>Collecting one or more bearings and automatically determining the location of the signal source(s) by triangulation. Localization can be performed for outdoor or indoor locations. Reception of a GPS signal is required for outdoor localization, but defined reference points within the room are used for indoor localization.</p> <p>Switching between outdoor and indoor localization is done using the Loc. Mode softkey.</p> <ul style="list-style-type: none">• Loc. Mode: Indoor = Indoor localization• Loc. Mode: Outdoor = Outdoor localization <p>The information bar in the measurement menu shows the localization mode that you have selected:
Direction Finding (Outdoor) or Direction Finding (Indoor)</p> |
| Map | Allows you to display the graphical position of bearing results (indoor and outdoor). Switching between indoor and outdoor measurement is also done in the Map menu. Outdoor bearing results can be superimposed on an electronic map if the Mapping option is activated. |

These menus are described in the sections below. You can find information about the basic settings such as center frequency, resolution bandwidth or reference level under *Common Functions* on page 89.

7.2 Operating mode specific functions

This section describes how to select a detector.

You can find information about the general settings and functions that are present in several operating modes (such as Fcent, RBW / CBW, Reference Level) in Chapter 6 *Common Functions* on page 89.

NOTE: You will find basic settings in the **Horizontal Scan** menu (**Horizontal Scan: On**) when you press the **Change Settings** softkey.

Tip: You can greatly simplify the repetitive procedure for localization from several points by selecting a transmitter from a transmitter table.

7.2.1 Selecting the detector

In contrast with the other operating modes, the **Detector** menu in Direction Finding mode allows you to select Peak and RMS detector types. The following can be displayed:

- **Peak** (for fast pulsed signals)
- **RMS** (recommended setting for constant or fluctuating signals)

NOTE: The **Discrete with Max Hold** setting (see page 137) is recommended for slow pulsed signals (e.g. coming from a rotating antenna).

To select a detector:

1. Press the **Detector** softkey.
2. Use the rotary control knob to make the selection and press **OK** to confirm.

To select the RMS averaging time:

1. Press the **Detector** softkey.
2. Press the **RMS Average Time** softkey.
3. Use the rotary control knob to make the selection and press **OK** to confirm.

NOTE: When you press the **Detector** softkey, other softkeys appear that allow you to reset the maximum value (Reset Max) or all values (Reset All). **Reset All** resets the maximum values and the average values.

Table 31: Values displayed in **Direction Finding** mode

Type	Function / Explanation
Peak	<p>Displays the instantaneous measured value.</p> <p>The peak value display (Peak) is held for 480 ms. The value displayed therefore corresponds to the highest level measured within the last 480 ms. This means that the numerical display is more stable and the graphical display is smoothed.</p>
RMS	<p>Displays the RMS value averaged over a defined period of time. This setting should be used for constant or fluctuating signals.</p> <p>The bar next to AVG in the lower status bar indicates the progress of the measurement until the averaging time is reached. When this time is reached (complete bar), the instrument refreshes the resulting value using the new measurement results and discards the oldest results (<i>progressive</i> averaging over time). Please note that correct direction finding is only possible using a longer averaging time if the direction of the antenna is also changed correspondingly slowly.</p>
Max	<p>The maximum value (RMS or Peak) that occurred since the start of the measurement is also shown. The maximum value is shown as a red line in the bar graph. This display is only possible for <i>Manual Bearing</i> (see section 7.3 on page 131).</p>

7.3 Manual Bearing

Direction Finding (Horizontal Scan: Off)

The **Manual Bearing** function allows you to determine the bearing of a signal source manually with the aid of visual or audible field strength indicators. The function is basically the same as Level Meter mode, but it additionally indicates the azimuth (angle from magnetic North) and elevation (angle above the horizon) of the signal source as well as the signal polarization.

To select the Manual Bearing function:

⇒ Press the **Horizontal Scan** softkey until **Off** appears.

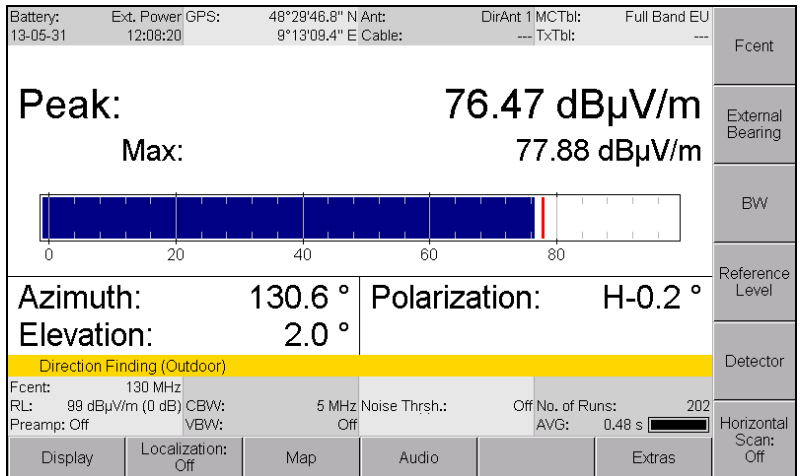


Figure 24: **Direction Finding** mode, **Manual Bearing** measurement screen.

To determine the bearing of a signal source:

1. Set the measurement parameters as desired.
2. Check the polarization (horizontal / vertical):
 - Tip the antenna by 90°: The maximum signal strength is displayed when the polarization is correct.
 - If necessary, change the position of the antenna module in the holder.
3. Slowly pan the antenna horizontally until the bargraph indicates the maximum level (for information on how to pan the antenna, see *Holding and panning the directional antenna properly* on page 266). The maximum value display on the bargraph helps you to find the bearing with the highest signal level.
4. To hold the measurement value, press the button on the antenna handle or press the **Hold** key on the Basic Unit.
 - ↳ **Hold** flashes on the screen.
5. Press the **SAVE** key on the Basic Unit to save the measurement results.
 - ↳ A window indicates the save process and the index number under which the current measurement values are saved.

NOTE: You can also save measurement values without using the Hold function.

6. Press the button on the antenna handle or the **Hold** key on the Basic Unit again to unfreeze the measurement value.
7. Make further measurements and save the results as required. Each time you save results, they are stored as a separate data set or data subset (for localization) with consecutive index numbers.

7.3.1 Using the audio function

Direction Finding • Audio

The **Tone Search** function provides assistance for manual direction finding by means of audible signals. Two modes are provided for this: **Bargraph** and **Leveling**.

Tone Search can also be used at the same time as demodulation of audio signals.

NOTE: You can perform a tone search without a bargraph with the function **Horizontal Scan: On** (see *Horizontal Scan* on page 134).

Bargraph

In Bargraph mode, the measured signal level is also output as an audible signal. The pitch corresponds to the signal strength.

- The stronger the signal, the higher the tone.
- The weaker the signal, the lower the tone.

The pitch of the tone will still change even if the upper (2,000 Hz) or lower (500 Hz) limit of the bar graph has already been reached. This gives you a means of qualitatively assessing a change in signal strength outside the visual display range.

The difference in pitch corresponds to two octaves for the values stated above. You can scale the Y-axis (see *Adjusting the Y axis (Y-Scale)* on page 105) to alter the frequency ratio per dB between the high and low tone. The frequency ratio per dB can be set in the range from 20 to 120 dB. The Y-axis scaling must be set to 40 dB to achieve a value of 20 dB/octave.

Leveling

This mode converts the polarization and elevation angles at which the antenna is held into an audible signal.

- $< \pm 7.5^\circ$: no signal
- $\pm 7.5^\circ$ to $\pm 15^\circ$: intermittent sound
- $> \pm 15^\circ$: continuous sound

This gives you an audible check that the antenna is aligned horizontally. A further audible signal indicates when the rotation (panning) speed is too high.

⇒ You can find further information about this in the Annex under *Proper holding* on page 266.

To activate / deactivate audible signals:

1. Press the **Audio** softkey, then press the **Tone Search** softkey.
2. Use the rotary control knob to select the desired setting and press **OK** to confirm.
3. To deactivate the audible signals, select **Off** using the rotary control knob and press **OK** to confirm.

7.4 Horizontal Scan

Horizontal Scan plots the signal strength versus the angle of incidence on a polar diagram. The measured signals are normalized to the maximum value linearly during the measurement (1 = 100 % signal strength). The display allows you to more easily see the difference between the received signal and the reflections that occur. The IDA-3106 automatically calculates the bearing of the signal source based on the horizontally measured values.

The calculation of the main angle of incidence is performed where possible using a quadratic regression of the measured values obtained. Otherwise, the azimuth angle of the maximum level is assumed to be the direction of transmission and a message to this effect is displayed.

To select the Horizontal Scan function:

⇒ Press the **Horizontal Scan** softkey until **On** appears.

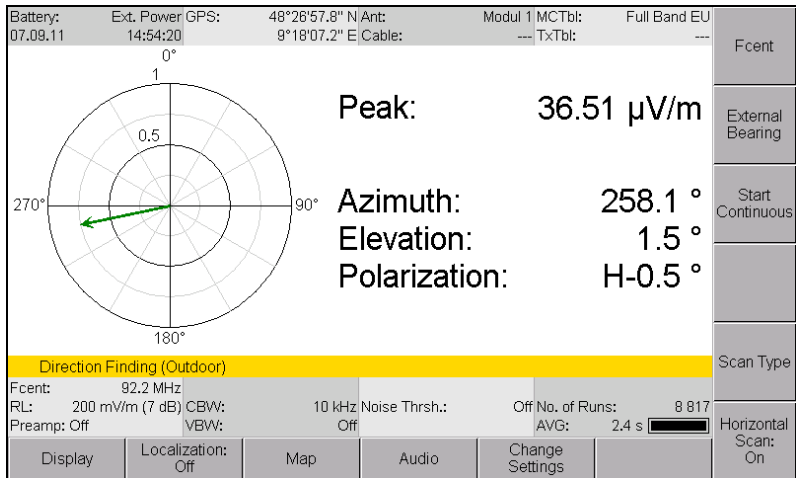


Figure 25: **Direction Finding mode, Horizontal Scan function.**

The following measurement procedures are available:

- **Continuous Horizontal Scan (Continuous)** (see page 135)
- **Discrete Horizontal Scan (Discrete)** (see page 136)
- **Discrete Horizontal Scan with Max Hold (Discrete with Max Hold)** (see page 137)

You can also determine the bearing manually if the bearing calculated on the basis of the measured values does not appear to be sensible; see *Horizontal Scan and manual determination* on page 138.

7.4.1 Continuous Horizontal Scan (Continuous)

Direction Finding (Horizontal Scan: On)

The IDA-3106 continuously measures the signal level and saves the values as the antenna is panned horizontally. The measurement is stopped manually after a sufficient number of measured values has been obtained. The actual alignment of the antenna, the field strengths measured during the scan, and the calculated transmitter bearing are shown in the polar diagram. Warning messages indicate if the antenna is not held correctly or if no meaningful results could be obtained.

NOTE: Further information on using polar diagrams and interpreting the results is found under *Horizontal Scan in practice* on page 269.

To make a Continuous Horizontal Scan:

1. Set the measurement parameters as desired. Above all, select a short averaging time (max. 0.48 s), since longer averaging times require the antenna to be panned more slowly.
2. Check the polarization (horizontal / vertical):
 - Tip the antenna by 90°: The maximum signal strength is displayed when the polarization is correct.
 - If necessary, change the position of the antenna module in the holder.
3. Press the **Scan Type** softkey and select **Continuous**.
4. To start the measurement, press the button on the antenna handle or press the **Start Continuous** softkey.
5. Pan the antenna horizontally through 360°, taking about 20 seconds to do this (pan more slowly if you are using an averaging time > 0.48 s). Keep the antenna as horizontal as possible while you do this.
6. When you have finished the scan, press the button on the antenna handle or press the **Stop** softkey.
 - ↪ If the scan is successful, the red arrow in the polar diagram indicates the direction of the signal source that was determined. The result is also shown numerically.
7. Press the **SAVE** key on the Basic Unit to save the measurement results.
 - ↪ A window shows the save process.
8. To start a new measurement, repeat the steps from step 4 onwards. (Starting a new measurement automatically resets the instrument.)

NOTE: If you pan the antenna too quickly or tilt it by more than 15° horizontally or vertically (elevation: $\pm 15^\circ$, polarization: $\pm 15^\circ$) **Azimuth uncertain** will be displayed in red to indicate that deviations can occur in the bearing that is determined.

7.4.2 Discrete Horizontal Scan (Discrete)

Direction Finding (Horizontal Scan: On)

This method is particularly suitable for variable signals, which need a longer RMS averaging time for detection. After you start the measurement, a new measurement value is added each time you press the button. Once you have enough measured values (at least three), you can stop the measurement.

NOTE: Further information on using polar diagrams and interpreting the results is found under *Horizontal Scan in practice* on page 269.

To make a Discrete Horizontal Scan:

1. Set the measurement parameters as desired.
2. Press the **Scan Type** softkey and select **Discrete**.
3. To start the measurement, press the button on the antenna handle or press the **Start & Add Value** softkey.
4. Point the antenna in the desired direction and press the button on the antenna handle or press the **Add Value** softkey on the Basic Unit.
 - ↳ The first measurement value is saved and shown in the polar diagram.
5. Save further measurement results in the same way.
6. Press the **Delete Last Value** softkey to delete the last value you added.
7. Press the **Stop** softkey to end the measurement.
 - ↳ The results are shown in the polar diagram and displayed numerically.
8. Press the **SAVE** key on the Basic Unit to save the measurement results.
 - ↳ A window shows the save process.
9. To start a new measurement, repeat the steps from step 3 onwards.
(Starting a new measurement automatically resets the instrument.)

NOTE: If you pan the antenna too quickly or tilt it by more than 15° horizontally or vertically (elevation: $\pm 15^\circ$, polarization: $\pm 15^\circ$) **Azimuth uncertain** will be displayed in red to indicate that deviations can occur in the bearing that is determined.

7.4.3 Discrete Horizontal Scan with Max Hold (Discrete with Max Hold)

It is possible that impulse radiation from signal sources such as radar will not be captured when the **Discrete** function is used. Using the **Discrete with Max Hold** function allows you to determine and save the maximum value at a given position in such cases.

NOTE: Further information on using polar diagrams and interpreting the results is found under *Horizontal Scan in practice* on page 269.

To make a Discrete Horizontal Scan with Max Hold:

1. Set the measurement parameters as desired.
2. Press the **Scan Type** softkey and select **Discrete with Max Hold**.
3. Hold the antenna in the desired direction.
4. To start the measurement, press the button on the antenna handle or press the **Start & Reset Max** softkey and wait for the maximum value to be reached.
5. Press the button on the antenna handle or press the **Add Value** softkey on the Basic Unit.
 - ↳ The first measurement value is saved and shown in the polar diagram.
6. Pan the antenna to the new position and then press the button on the antenna handle or press the **Reset Max** softkey to reset the maximum value and save further measurement values in the same way. (The antenna handle button function toggles between **Add Value** and **Reset Max**.)
7. Press the **Delete Last Value** softkey to delete the last value you added.
8. Press the **Stop** softkey to end the measurement.
 - ↳ The results are shown in the polar diagram and displayed numerically.
9. Press the **SAVE** key on the Basic Unit to save the measurement results.
 - ↳ A window shows the save process.
10. To start a new measurement, repeat the steps from step 3 onwards. (Starting a new measurement automatically resets the instrument.)

NOTE: If you pan the antenna too quickly or tilt it by more than 15° horizontally or vertically (elevation: $\pm 15^\circ$, polarization: $\pm 15^\circ$) **Azimuth uncertain** will be displayed in red to indicate that deviations can occur in the bearing that is determined.

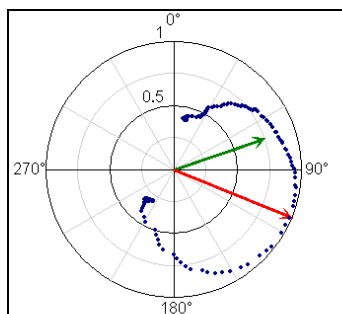
7.4.4 Horizontal Scan and manual determination

Direction Finding (Horizontal Scan: On)

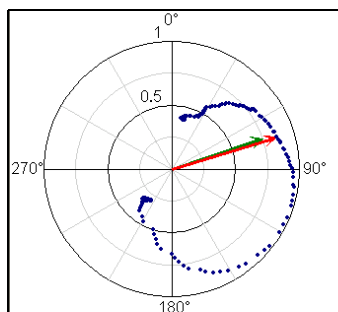
Once the bearing is displayed on the polar diagram, you can also specify the bearing manually. This may be necessary if the calculated result does not appear to be sensible due to interference.

To set the bearing manually:

- ✓ You have made a Horizontal Scan.
 - ✎ The red (lower) arrow indicates the calculated bearing. The green (upper) arrow indicates the direction in which the antenna is pointing.



1. Point the antenna in the desired direction and press the **Manual Correct. of Direction** softkey.
 - ✎ The red arrow moves to the manually specified direction (green arrow) when you press the softkey.



2. Press the **SAVE** key on the Basic Unit to save the measurement results.
 - ✎ A window shows the save process.

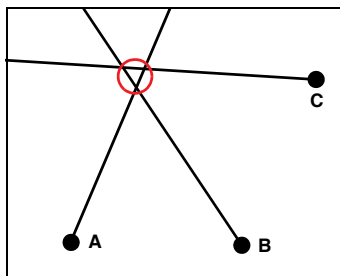
7.5 Localizing a signal source (Outdoor)

This section describes the typical procedure for localizing a signal source outdoors. You can find detailed information about individual functions such as Average Position and Distance under *The Map menu* on page 143. You can find a description of how to localize a signal source indoors under *Finding the location of a signal source (Indoor)* on page 154.

You can determine the location of a signal source in two ways:

By triangulation

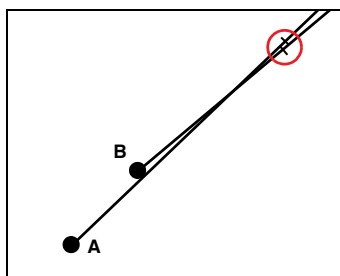
If you take bearings on a signal source from several different locations, the bearing lines will intersect within a small area. The signal source is in this area. It does not matter whether you have determined the bearings from Manual Bearing or Horizontal Scan. You can determine the location on the basis of the bearings using the **Average Position** function in the Map menu.



NOTE: Triangulation is invalid if the bearings do not intercept or the angle between the bearings is too acute. Choosing a different location may help you to get a valid result.

From the distance

It can be time-consuming and require travel over long distances to take bearings on a signal source from different locations. As an alternative, the power level of the signal source can be measured in the direction of the source from two points far enough apart so that the location can be determined from the direction and the difference in signal levels. The **Distance** function in the Map menu is provided for this purpose. This method does require that the source signal level is constant and that reflections are small (this is critical in street canyons, for example).



7 Direction Finding Mode

NOTE: Localization is determined from the results of triangulation and the distance (level difference) when the Distance function is activated. You can quickly see whether the additional level difference data provides a more accurate determination of the position by switching the Distance function on and off.

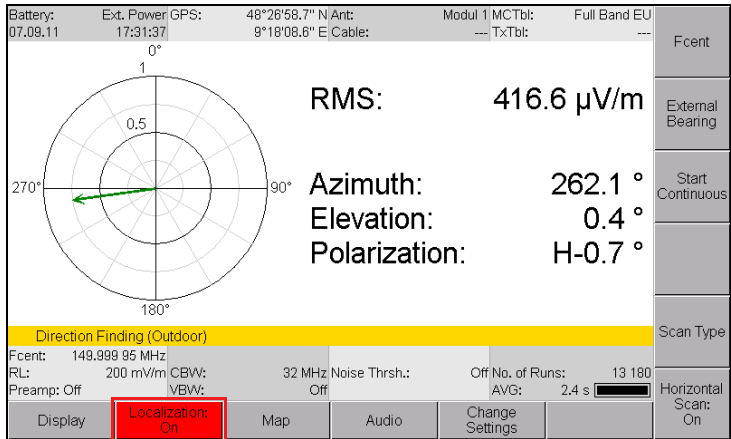
Localization takes place in three steps:

1. Start localization.
2. Take bearings on the signal source from different locations and save the measurements.
3. Display the bearings in the Map menu and calculate the transmitter location.

Step 1: Start localization

⇒ Press the **Localization** softkey.

✎ The softkey shows **On** and glows red. All the measurement results saved until you press the softkey again are saved in the same data set and used for subsequent localization.



Step 2: Saving bearings in a localization

1. Tune the receive frequency F_{cent} and channel bandwidth CBW to the bearing signal.

NOTE: You can take bearings on several frequencies one after the other and save them in a localization. Multiple frequency bearings are much easier to do if you use a transmitter table.

2. Determine the direction of the signal source by direction finding and save the result by pressing the **SAVE** key.
3. Determine the direction from different locations, saving the results each time with the **SAVE** key.

Step 3: Display the localization and calculate the transmitter location

1. Press the **Map** softkey to switch to the Map menu.
↳ The bearings are displayed.
2. Press the **Average Position** softkey to calculate the transmitter location and display it.
↳ The location is determined automatically from the existing bearings and indicated on the map. The location coordinates are shown in the header line. Repeat the direction determination as given in *Step 2* if necessary until the position of the transmitter is shown accurately enough.
3. To complete the localization, press the **Localization** softkey followed by the **OK** key.

A warning message is shown if you press **OK** before you complete the localization.

NOTE: You can find the description of the Map menu under *The Map menu* on page 143.

Transferring results from other instruments

Measurements can be made simultaneously from different locations with several instruments and the results transferred instead of using only one instrument and changing your location. The bearing results from the other instruments can then be entered into one instrument. You can find information about this under *Exchanging bearings between instruments* on page 142.

7.6 Exchanging bearings between instruments

Direction Finding • External Bearing

You will normally only use one IDA-3106 and will therefore have to move to a different location to take bearings from different points. If more than one instrument is available, you can have measurements made at several locations simultaneously and exchange the results or transfer them to one IDA-3106 for evaluation.

The bearing results from the other instruments can be read over a radio or mobile phone link and entered manually, for example.

To use bearing results from other instruments:

- ✓ A localization must be open, otherwise transfer can only be made as a single data set.
- 1. Press the **External Bearing** softkey.
 - ↳ The menu for entering the measured values opens and initially shows the current bearing results for the instrument itself.
- 2. Select the items using the rotary control knob, press **OK** to open them, enter the values as measured, and press **OK** to confirm:
 - **Fcent**: center frequency
 - **Transmitter**: Transmitter name
(optionally, you can make the selection from a transmitter in the loaded transmitter table. Fcent is then entered automatically)
 - **Value**: Data is exchanged in dB μ V/m for field strength, otherwise in dB μ V
 - **Latitude**: Measurement location latitude (in DegDec)
 - **Longitude**: Measurement location longitude (in DegDec)
 - **Azimuth**: measured azimuth value, 0° (North) to 359.9°
- 3. After you have entered all the values, press the **Save External Bearing** softkey to save the bearing in the open localization.
 - ↳ This bearing is now part of the localization just like the bearings taken using your own instrument.

NOTE: Items 1 and 2 are used as well for transferring to other instruments. This ensures that the transfer is made in suitable units.

7.7 The Map menu

Direction Finding • Map

You can view localizations, recall saved bearings with the marker, superimpose maps, calculate the transmitter location or display your own location using the Map menu.

7.7.1 Switching between outdoor and indoor localization

Before you start a localization, you must specify in the Map menu whether you want to make an outdoor or an indoor localization.

To select the localization type:

- ⇒ Press the **Loc. Mode:** softkey in the Map menu:
- **Loc. Mode: Indoor** = Indoor localization
 - **Loc. Mode: Outdoor** = Outdoor localization

The information bar in the measurement menu indicates the selected type:

- **Direction Finding (Outdoor)** = Outdoor localization
- **Direction Finding (Indoor)** = Indoor localization

7.7.2 Displaying bearings while a localization is open

You can switch to the Map menu while a localization is in progress (Localization softkey glows red) and check the bearings that have been saved so far. You can also calculate the transmitter location on the basis of the bearings taken so far.

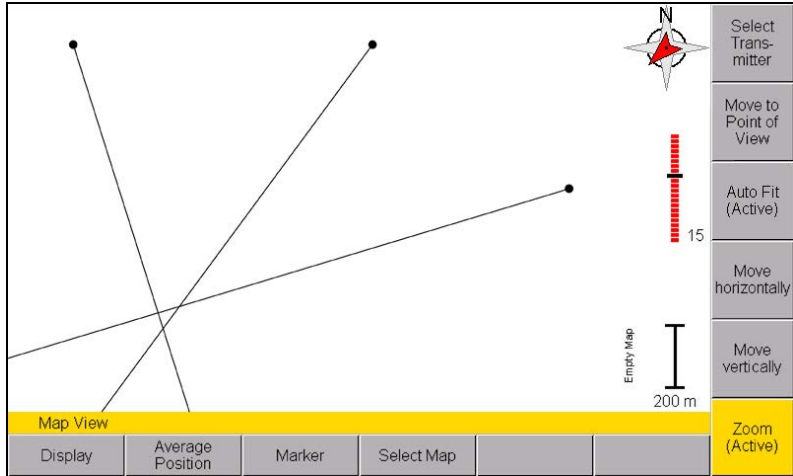


Figure 26: Display of bearings in the Map menu during a localization

To display bearings during a localization in progress:

- ⇒ Take bearings as described in sections 7.3 on page 131 and 7.4 on page 134, and press the **Map** softkey without closing the localization.
- ⇒ Press **ESC** to return to the measurement menu.

7.7.3 Loading saved localizations and adding bearings

Localizations that have already been completed can be recalled from the memory and displayed. After you have opened a saved localization, you can add further bearings to it. You can also add a localization to a bearing that you have already made.

Loading a localization from the memory

1. Press the **MENU** key to open the main menu.
2. Press the **Memory** softkey, then press the **Data Viewer** softkey.
3. Select the desired data set using the rotary control knob and open it by pressing the **Recall Data Set** softkey.
 - Localization data sets are indicated by **LOC**.
 - The screen switches to **Direction Finding** mode.

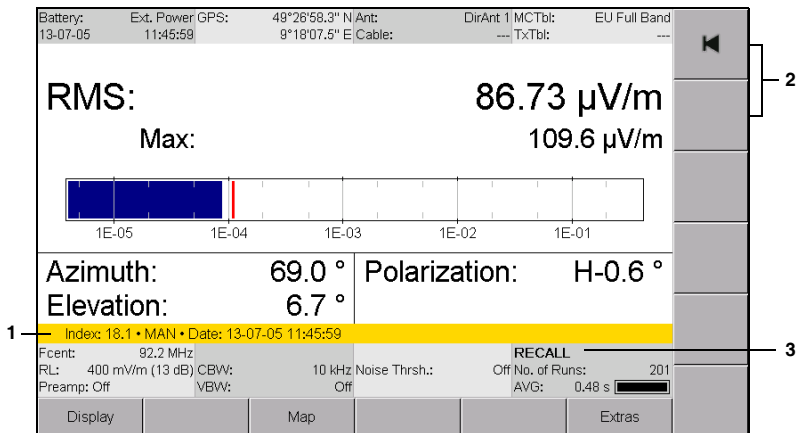


Figure 27: Screen display after recalling a data set.

No.	Function / Explanation
1	<ul style="list-style-type: none"> Index 11.1: consecutive index number LOC: data type: Localization Date: Date and time when measurement was made
2	Page forwards or backwards in the data memory without switching to the Memory menu
3	Display is in recall mode

4. Press the **Map** softkey to switch to the Map menu.
↳ The bearings are displayed.

Adding new bearings to a saved localization

You can also add new bearings to a saved localization.

1. Open the localization you want (see *Loading a localization from the memory* on page 145).
2. Press the **Add Bearings** softkey to open the localization.
↳ The **Localization** softkey is shown in red.
3. Take further bearings (see *Localizing a signal source (Outdoor)* on page 139).

Adding saved bearings to an existing localization

Bearings that were taken and saved without reference to a localization can also be added to a saved localization.

NOTE: This function is only available for outdoor localizations. The bearing to be added must include GPS and compass data and use the same units as the localization.

To add saved bearings to a localization:

1. Open the localization you want (see *Loading a localization from the memory* on page 145).
2. Press the **Add Bearings** softkey to open the localization.
↳ The **Localization** softkey is shown in red.
3. Open the saved bearing: Menu > Memory > Data Viewer > Select data set > Recall Data Set.
4. Press the **Add to Localization** softkey.
↳ The bearing is added to the opened localization.
5. If desired, add further bearings. Then press the **Localization** softkey to close the localization and save it.

7.7.4 Displaying maps

Direction Finding • Map

NOTE: The Direction Finding option must be activated for the Map option to work.

If the Map option is activated on your instrument, you can display an electronic map on which you can immediately see the geographical positions of the bearings in the Map menu.

You can only select maps that have been stored on the microSD card. Suitable maps can be downloaded free from the Internet using the Narda MapTools PC software, and then configured on the memory card (see *Loading maps using Narda MapTools* on page 148). If a map for the displayed area at the selected zoom level is not available, a plain color background will be displayed.

To display a map:

1. Press the **Select Map** softkey.
2. Select a map using the rotary control knob and press **OK** to confirm.
 ↪ The map is displayed.

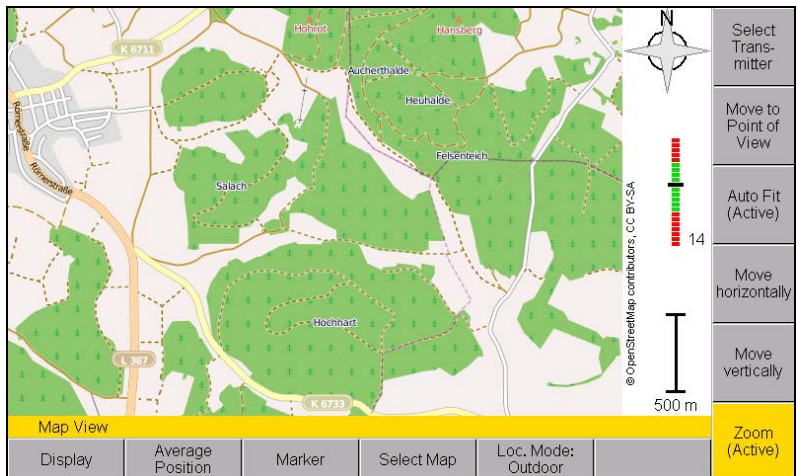


Figure 28: Display of an electronic map in the Map menu.

You can find information on how to navigate and zoom in the next section.

7.7.5 Loading maps using Narda MapTools

The Narda MapTools PC program is used to access suitable online map servers, select a map section, set the required degree of detail (zoom level) and download the selected map.

The selected map area is saved as an offline map on the PC. The next step is to connect the microSD card of the IDA to the PC using the USB adapter supplied, select a section of the offline map and copy it to the memory card. You can then use the Select Map function to select maps transferred in this way when the microSD card is inserted into the IDA.

A world map with zoom stages 2 to 8 is stored on the memory card as supplied from the factory. The large quantity of data contained in more detailed maps means that you will need to select the map areas of interest to you and download them from the Internet yourself.

The installation program for Narda MapTools is on the IDA Tools CD.

7.7.6 Creating your own maps

It is often useful to use your own maps, aerial photographs, orthoimages or satellite images showing the particular infrastructure that you want.

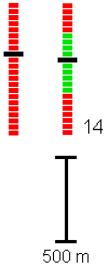

The map material used in the IDA-2 measuring system uses image segments called tiles, which are based on the Slippy Map Tile System from OpenStreetMap, so you can create your own maps using any commercial GIS application. You can select the regions you require and the zoom levels, and even add objects to your maps in this way.

Narda has published a Technical Note, TN105, which explains how to create your own maps based on the Global Mapper™ GIS application.

You can download the Technical Note from the Narda website at www.narda-sts.com.

7.7.7 Navigating and zooming

The following functions are provided for suitably displaying the bearings and maps:

Move to Point of View	Centers the map on your own current location (only possible if GPS signal received). ⇒ Press the softkey to center the map.
Auto Fit	Adjusts the section displayed on screen to match the existing bearings. If no bearings are present, the smallest zoom level is applied to the map. ⇒ Press the softkey to adjust the map. ✦ The softkey is labeled (Active) when it has been pressed, until you change the section displayed by using another function.
Move horizontally	Moves the screen contents horizontally. ⇒ Press the softkey and use the rotary control knob to move the contents or use the speed buttons: – Move left = press 7 – Move right = press 9
Move vertically	Moves the screen contents vertically. ⇒ Press the softkey and use the rotary control knob to move the contents or use the speed buttons: – Move up = press 5 – Move down = press 8
Zoom 	Changes the display size. The zoom bar on the right hand edge of the screen indicates the current zoom level (graphically and numerically) and the possible zoom range (green) for maps. If you go outside the green range when using a map, the map can no longer be displayed. The selected scale is shown below the zoom bar. ⇒ Press the softkey and use the rotary control knob to set the zoom level or use the speed buttons: – Increase = press 1 – Decrease = press 4
	Bearings and maps are always positioned such that North is at the top of the screen. Depending on the version of your instrument a compass rose is located in the upper right corner of the screen as an aid to orientation. The actual direction is indicated by a red arrowhead related to magnetic north.

7.7.8 Determining the transmitter location (Average Position)

Direction Finding • Map

The **Average Position** function is used to find the location of a transmitter by triangulation based on the bearings taken. You can find more information about this method under *Localizing a signal source (Outdoor)* on page 139.

To find the location:

- ✓ Bearings are available in an open localization or a saved localization has been recalled.
- 1. Press the **Map** softkey.
 - ↳ The bearings are displayed.
- 2. Press the **Average Position** softkey.
 - ↳ A red cross marks the calculated position. A red circle around the cross indicates the possible location area taking the measurement uncertainties into account (see *Measurement uncertainty (Bearing Uncertainty)* on page 153).

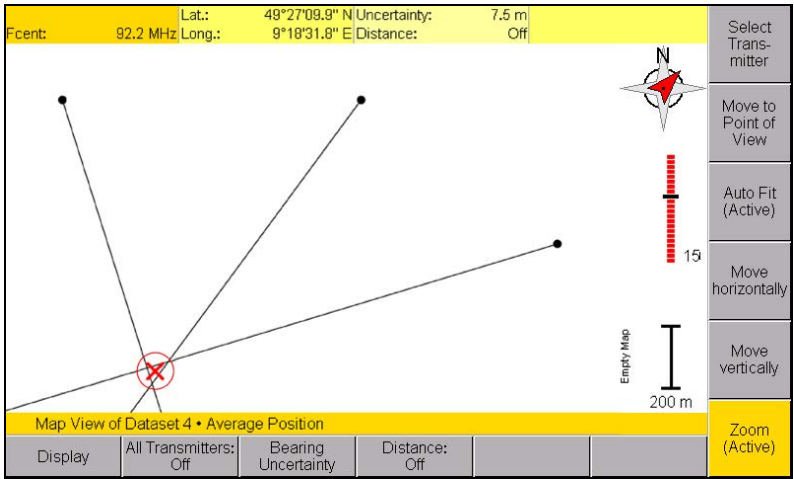


Figure 29: Bearings from three locations showing the calculated position.

NOTE: You can use the **All Transmitters** softkey to display all transmitter locations for all frequencies simultaneously as different colored circles. Measurement locations and bearings are not then displayed. Details (e.g. geo-coordinates) are displayed in each case for the transmitter that you highlight.

Determining the transmitter location by distance calculation (Distance)

Direction Finding • Map • Average Position

The **Distance** function is used to determine the location of a signal source based on differences in signal level.

You can find more information about this method under *Localizing a signal source (Outdoor)* on page 139.

To use the Direction function:



- ✓ Bearings are available in an open localization or a saved localization has been recalled.
- 1. Press the **Map** softkey then press the **Average Position** softkey.
 - ↳ The location cross and circle are displayed.
- 2. Press the **Distance** softkey until **On** appears.
 - ↳ The distance function is activated. Black lines across the bearing lines indicate the distance determined from the position from which the particular bearing was taken.

7.7.9 Excluding bearings from the calculation (Disable Bearing)

Direction Finding • Map • Marker

You can use the marker function to select individual bearings in a localization and exclude them from the calculation of the location.

To use the marker function:

1. Open the desired localization.
 - ↳ **Average Position** must not be selected.
2. Press the **Marker** softkey.
 - ↳ The first bearing is selected and marked in red.
3. Select a bearing using the arrow keys  .
4. To exclude a bearing from the calculation of the location, press the **Disable Bearing** softkey.
 - ↳ An excluded bearing is shown in gray.
5. To reactivate all excluded bearings, press the **Enable all Bearings** softkey.
6. To delete a bearing, press the **Delete Bearing** softkey.
 - ↳ The selected bearing is deleted from the localization.

7.7.10 Excluding bearings from the calculation automatically (Auto Disable Bearings)

Direction Finding • Map • Marker

Auto Disable Bearings allows you to automatically exclude bearings from the calculation that do not make any useful contribution to the result. This exclusion can be used to reduce the size of the location circle around the signal location to improve the measurement result. The Bearing Uncertainty setting (see page 153) has an effect on which of the bearing results are excluded. A more stringent selection is made when higher accuracy is set.

To exclude bearings automatically:

⇒ Press the **Auto Disable Bearings** softkey.

7.7.11 Displaying your own location

Direction Finding • Map • Display

Your own location can be shown on the map (only possible with GPS reception). This speeds up orientation.

To show your own location:

1. Press the **Display** softkey.
2. Press the **Point of View** softkey until **On** appears.
↳ Your own location is shown as a black circle with a black center dot: ●
3. To hide your own location again, press the **Point of View** softkey again until **Off** is displayed.

NOTE: An arrow in the black dot indicates the direction in which you are holding the handle (and antenna) when the antenna handle is plugged in.



7.7.12 Measurement uncertainty (Bearing Uncertainty)

Direction Finding • Map • Average Position

Measurement inaccuracies occur when taking bearings, mainly due to reflections and multipath propagation. Minor inaccuracies are also caused by GPS and compass deviations. These uncertainties can be taken into account using the Bearing Uncertainty function and included in the calculation of the signal location.

The uncertainty is defined by an angle that widens the bearing line by the selected value. Values between 1° and 15° can be selected. The default value is an angle of 5° . When triangulation is performed, the intersection of these open triangular areas encompasses an area within which the signal location lies (indicated by the red circle). If a greater uncertainty is selected, the diameter of the circle around the calculated location increases accordingly.

The default value of 5° should be sufficient in most cases. The value can be increased appropriately if large compass deviations occur due to magnetic fields or metallic objects.

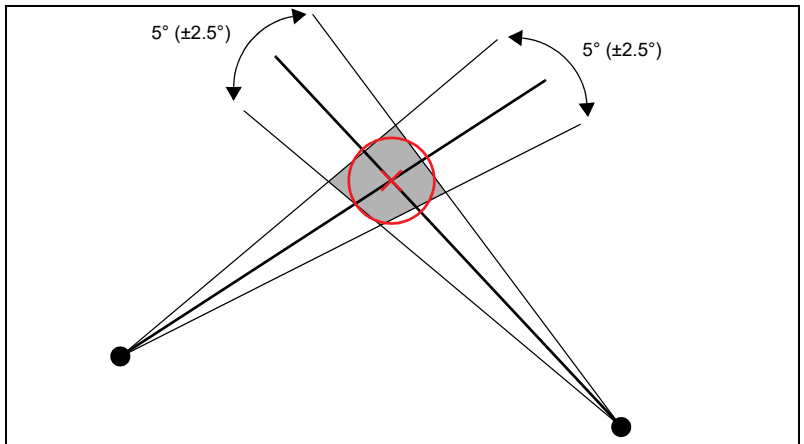


Figure 30: Effect of measurement uncertainty (Bearing Uncertainty) on the calculation of the signal location. An uncertainty of 5° is selected in this example.

To change the bearing uncertainty:

1. Press the Bearing Uncertainty softkey in the **Average Position** display.
2. Select a value using the rotary control knob and press **OK** to confirm.

7.8 Finding the location of a signal source (Indoor)

Direction Finding • Map • Loc. Mode

GPS reception is generally not possible within closed rooms. It is therefore possible to use the compass to determine direction but the location cannot be determined.

To localize signal sources in rooms despite this fact, the IDA-3106 allows you to define the ground area of the room by means of four corners (A – D) and to specify its orientation by its azimuth. Bearings are taken on the signal source from the defined corners and are displayed relative to these reference points. Points A through D can also be seen as measurement positions in rooms with completely different geometries (e.g. a circular room), so the actual shape of the room is unimportant.

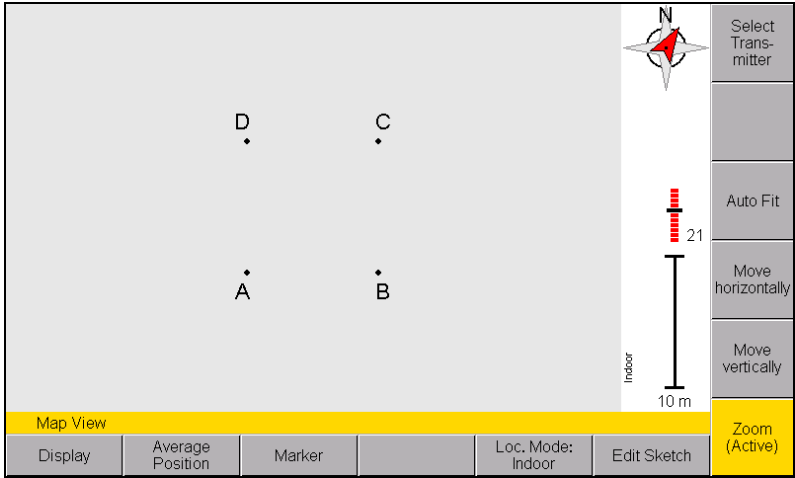


Figure 31: Direction Finding Indoor: Ground plan of the room with reference points

No.	Function / Explanation
A, B, C, D	Room corners
Distance B - A	Room width
Distance D - A	Room length
Direction A → D	Room azimuth

An indoor localization takes place in two steps:

1. **Referencing:** Four points are defined as references in the room, and the dimensions and azimuth are entered.
2. **Localization:** Start localization, take bearings on the signal source from the four reference points, save the results, and determine the position.

NOTE:

Remember that considerable reflections can occur, particularly in small rooms. A minimum distance from the walls is also often recommended in order to reduce field distortions. Indoor DF may not work as intended if the rooms are small, with short distances between walls and objects. In such cases, it is better to switch to Tone Search mode for locating the signal source (see *Using the audio function* on page 132).

Referencing the room

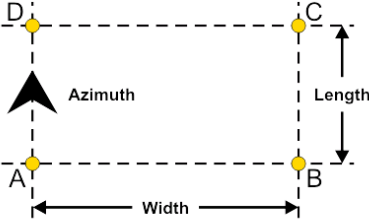
Edit Sketch		Save Setup as
Length (D - A):	10 m	
Width (B - A):	10 m	
Azimuth (point from A to D):	0.0 °	
		
Direction Finding (Indoor) • Edit Sketch		

Figure 32: Edit Sketch: Referencing

1. Specify the floor area of the room to be measured using four corners A through D. The room sides must be at right angles to each other. (The reference points normally correspond to the room corners.)
2. Press the **Map** softkey in **Direction Finding** mode, then press the **Loc. Mode** softkey until **Indoor** is shown.

3. Press the **Edit Sketch** softkey, select the desired parameter using the rotary control knob, and open the parameter by pressing **OK**:
 - Measure the room width (distance B - A) and room length (distance D - A) and enter these values.
 - Select **Azimuth** to enter the room orientation, press **OK** to open the parameter, align the antenna in the direction A → D, and press **OK** again (or press the button on the antenna handle).
4. When you have entered all the values, press **ESC** to exit from the menu.
 - ↳ A message asks you if you want to save the entries as a setup.

This completes the referencing of the room.

Localizing the signal source

- ✓ The room has been referenced.
 - ✓ Indoor mode is activated (**Loc. Mode** softkey displays **Indoor**).
 - ✓ The measurement parameters have been selected appropriately.
1. If you still have the Map menu open, press **Esc** to exit from the Map menu.
 2. Press the **Localization** softkey until **On** appears.
 - ↳ Localization starts and the softkey is shown in red.
 3. Take the bearing from the first reference point and press **SAVE**. If you press the button on the antenna handle, you can freeze the bearing direction first and then save it.
 - ↳ A window opens for you to select a reference point.
 4. Use the rotary control knob to select the reference point that you used and press **OK** to save the measurement.
 - ↳ You can work through the reference points in any order.
 5. Take the bearings from the other reference points in the same way and save the results. You can also save more than one bearing taken from the same reference point in the localization.

The bearings taken so far in an open localization can be displayed during the measurement:

- Press the **Map** softkey: The bearings taken so far are displayed
 - The **Average Position** softkey shows the signal location calculated on the basis of the bearings taken so far
6. When you have taken bearings from all the reference points, press the **Localization** softkey to close the localization.
 7. A closed localization is not shown in the Map menu any more and must be recalled from the memory when required (see *Loading saved localizations and adding bearings* on page 145).

8. Press the **Average Position** softkey to display the calculated signal location.
- ↪ **X** indicates the horizontal distance and **Y** the vertical distance from point **A**.

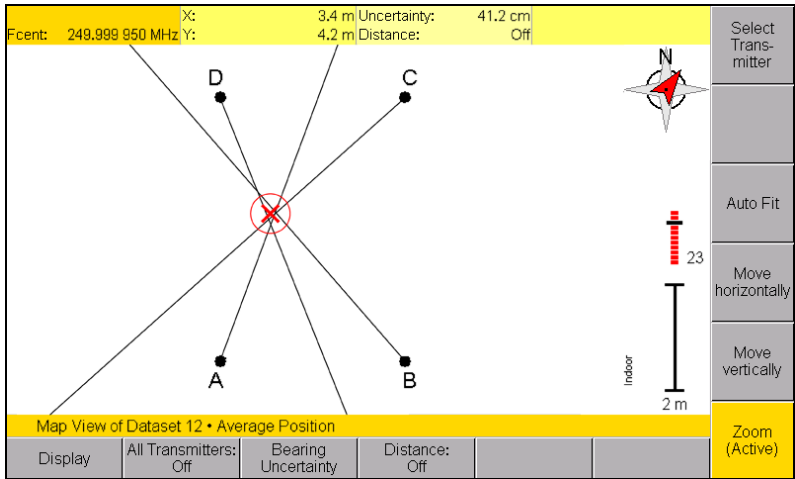


Figure 33: Direction Finding Indoor: Bearings and calculated transmitter location.
header line X, Y: distance of signal location from point A.

8

Spectrum Analysis Mode

This chapter describes the **Spectrum Analysis** operating mode. Following a short introduction on the use of this operating mode, this chapter contains an overview of the basic settings and information about evaluating the results.

- 8.1 About Spectrum Analysis mode (page 160)
- 8.2 The Spectrum measure menu (page 161)
- 8.3 Comparing spectra (Delta Spectrum) (page 166)
- 8.4 Displaying the time characteristic (Spectrogram) (page 168)
- 8.5 The Spectrogram Marker (page 171)

8.1 About Spectrum Analysis mode

All the field components in the selected range can be recorded to give an overview of the detected spectrum or to determine the maximum values in **Spectrum Analysis** mode. The extended functions of the device enable you to perform optimum evaluation of the measured values directly on site. Marker functions and a peak table are provided for rapid assessment of the results of spectrum analysis. You can also display the wideband value of the integrated level for a freely-definable frequency band.

You can use the **Delta Spectrum** function to define a displayed spectrum as reference and handle it like a further trace type. Even the smallest changes can be quickly and accurately determined by taking the difference between the spectra and the reference.

Spectrogram allows you to display the time characteristic of the signal strength of a spectrum. The diagram can be displayed alongside the current spectrum or on its own. RMS, +Peak and -Peak detectors are available. Results are always recorded and saved for all three detector types.

Spectrum and Spectrogram can be displayed individually or in two windows one above the other.

To select a function:

⇒ Press the **Measurement** softkey.



Figure 34: The **Measurement** menu: The selected function is highlighted in color.

8.2 The Spectrum measure menu

Spectrum • Measurement • Spectrum

The Spectrum measure screen displays the signal distribution versus frequency. Information on how to change the settings is given in the chapter 6 *Common Functions* on page 89.

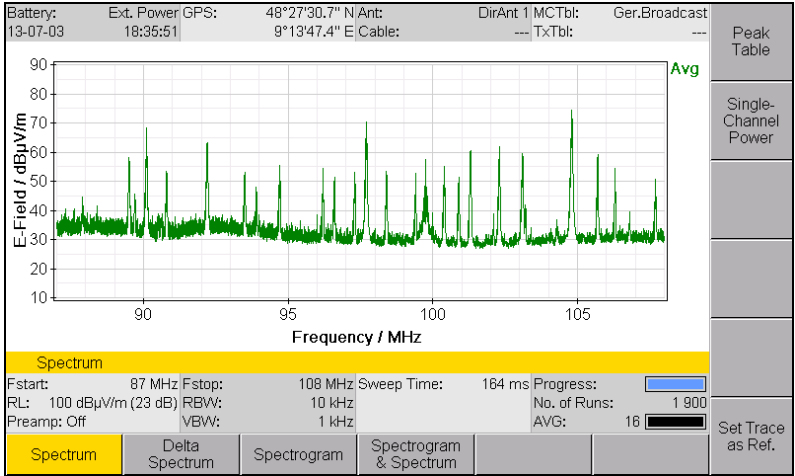


Figure 35: Spectrum display

The Spectrum Measurement menu also includes further evaluation functions as follows:

- **Peak Table:** Lists the highest peaks
- **Single Channel Power:** Determines wideband values

These functions are described below.

8.2.1 Displaying the peak values (Peak Table)

The highest peaks (up to 50) in the frequency spectrum under consideration are listed in the Peak Table. These are true peak values.

To open the Peak Table function:

⇒ Press the **Peak Table** softkey.

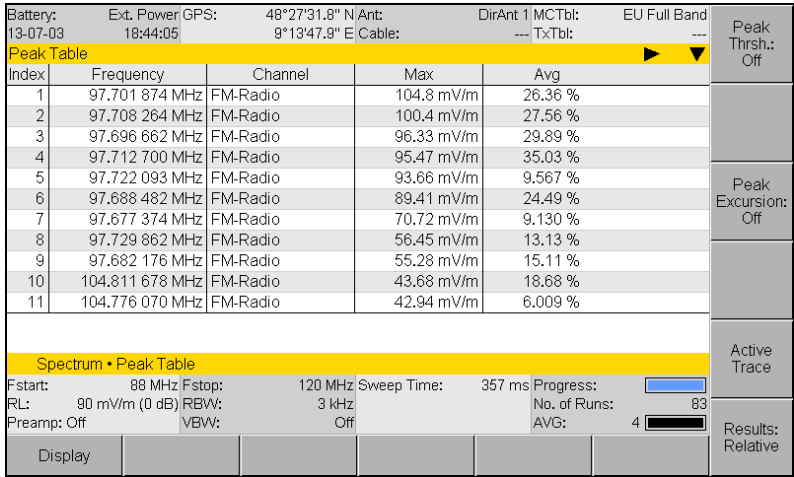


Figure 36: Peak Table in **Spectrum Analysis** mode

Column	Description
Index	Sequence number of the peak (up to 50)
Frequency	Frequency value of the peak
Channel/ Transmitter	Channel to which the peak (frequency value) belongs. If a transmitter table is selected, the transmitter names will be shown here.
Avg	Trace types
Max	The columns displayed depend on the trace types that have been selected (see next section).

Selecting trace types as reference values

The reference trace type is selected using the **Active Trace** softkey, which is shown in the first column after the **Channel** or **Transmitter** column. You can only select the trace types that have been marked under **Spectrum • Trace**. The relative display will then show all trace types relative to the reference value.

1. Press the **Active Trace** softkey.
2. Use the rotary control knob to select an entry and press the **OK** key.

Setting a threshold (Peak Threshold)

⇒ See *Changing the marker evaluation settings (Marker Settings)* on page 113.

Setting a minimum signal peak excursion (Peak Excursion)

⇒ See *Changing the marker evaluation settings (Marker Settings)* on page 113.

Selecting absolute or relative display mode

The measured values are shown relative to the selected reference trace in relative display mode.

- ⇒ Press the **Results** softkey:
- For **absolute values**: The softkey label must show **Absolute**.
 - For **relative values**: The softkey label must show **Relative**.

8.2.2 Measuring channel power
(Single Channel Power)

SpectrumSpectrum • Measurement • Single-Channel Power

You can determine a wideband value for the measurement values in a defined frequency range using **Single Channel Power** mode. You can therefore make channel power measurements.

To open the integration function:

⇒ Press the **Measurement** softkey, then press the **Single Channel Power** softkey.

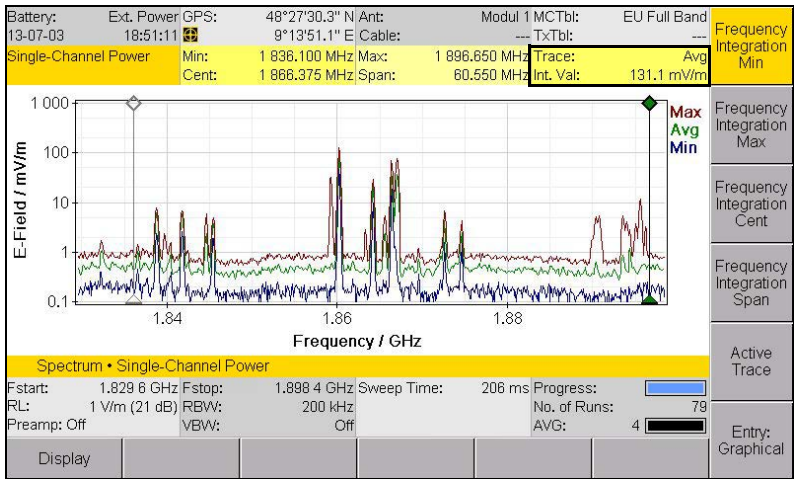


Figure 37: **Int. Val**: Shows the result of the integration.

NOTE: The integration function takes all the spectral lines within the integration range into account, including those which lie within the noise floor. The result of this evaluation function is therefore very dependent on the intrinsic noise level and therefore from the selected reference level if the signal levels present are close to the intrinsic noise level.

Possible entry methods

The type of entry method is selected using the **Entry** softkey:

- **Numerical:** Numerical entry using the number keys and decimal point key in the keypad.
- **Graphical:** The rotary control knob is used to enter the frequency limits.

Selecting the trace type

The **Active Trace** softkey is used to select the trace type to be used for integration. You can only select from the trace types that were highlighted under **Spectrum • Trace**.

1. Press the **Active Trace** softkey.
2. Use the rotary control knob to select an entry and press the **OK** key.

Setting the integration range using frequency limits

1. Press the **Frequency Integration Min** softkey to set the lower frequency limit.
 - ↳ The diamond of the left marker will be filled out (in the colour of the trace type) if graphical entry is selected.
2. Use the rotary control knob or the number keys to specify the lower frequency limit and then press the **OK** key to save the setting.
3. Softkey **Frequency Integration Max** softkey to set the upper frequency limit.
 - ↳ The diamond of the right marker will be filled out (in the colour of the trace type) if graphical entry is selected.
4. Use the rotary control knob or the number keys to specify the lower frequency limit and then press the **OK** key to save the setting.

Setting the integration range using a center frequency and a frequency band

1. Press the **Frequency Integration Cent** softkey to set the center frequency.
 - ↳ The diamond of the center marker will be filled out in black if graphical entry is selected.
2. Use the rotary control knob or the number keys to specify the center frequency and then press the **OK** key to save the setting.
3. Press the **Frequency Integration Span** softkey to set the frequency band.
 - ↳ The diamonds of both markers will be filled out in black if graphical entry is selected.
4. Use the rotary control knob or the number keys to specify the frequency band and then press the **OK** key to save the setting.

8.3 Comparing spectra (Delta Spectrum)

Spectrum • Measurement • Delta Spectrum

The **Delta Spectrum** measure menu allows you to display and save differences compared to a reference trace. Small deviations can be seen clearly thanks to the display in dB.

To use the Delta Spectrum function:

⇒ Press the **Measurement** softkey in the Spectrum main menu. Then select Delta Spectrum.

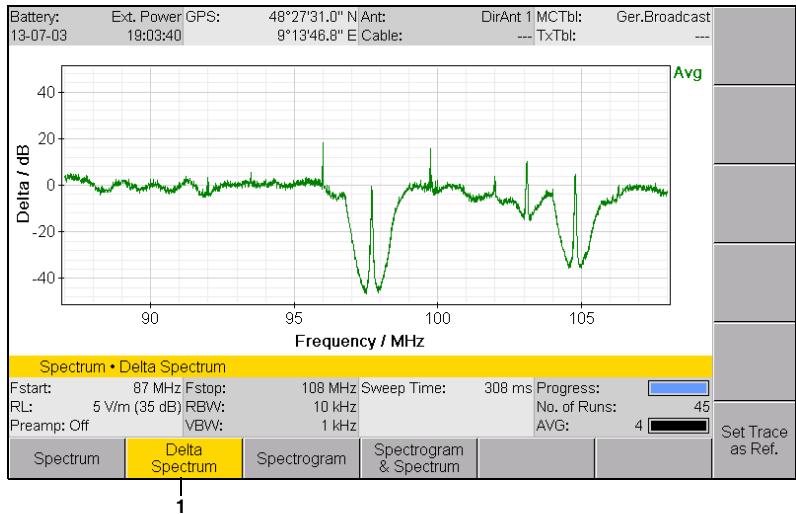


Figure 38: The **Measurement** menu: Delta Spectrum is activated.

No.	Function / Explanation
1	Delta Spectrum Activates / deactivates the Delta Spectrum function. All the displayed spectra are shown relative to the reference spectrum when the function is activated (softkey highlighted in color). If a reference trace is not present a window opens, allowing one of the current traces to be set as reference.

8.3.1 Using a spectrum as reference

1. Set the spectrum display as required. The trace type that you want to select as reference must be displayed.
2. In the Spectrum main menu, press the **Trace** softkey.
 - ↳ The **Trace** window opens and the **Set as Reference** softkey is shown in the lower bar.
3. Press the **Set as Reference** softkey.
 - ↳ The previous window, Trace, now shows the trace types that can be selected as reference:

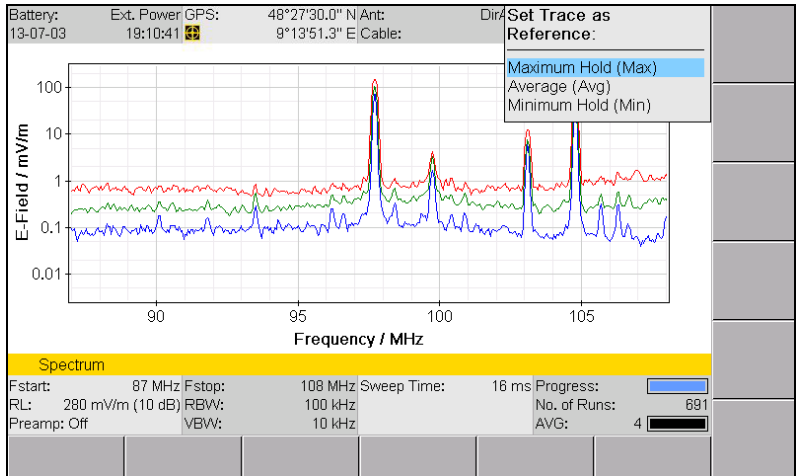


Figure 39: Selection of a trace type for saving the reference spectrum.

4. Select a trace type using the rotary control knob and press **OK** to set it.
 - ↳ The reference spectrum is shown as another trace and listed under the list of trace types on the right of the screen. It can be shown or hidden just like the trace types using the **Trace** softkey in the main menu.

To use the reference spectrum:

- ⇒ Press the Delta Spectrum softkey in the **Measurement** menu (the softkey is highlighted in color when the function is activated).
- ↳ All the displayed spectra are shown relative to the reference spectrum.

8.3.2 Saving the delta spectra and reference

The displayed delta spectra as well as the reference spectrum can be saved. The traces that will be saved depend on their settings. The table below shows the relationships:

Delta Spectrum = on	Delta Spectrum = off
The reference spectrum and all the displayed delta spectra are saved. The delta spectra are displayed again when you recall the saved data (Recall).	Only the reference spectrum can be saved. You must select it as trace type for this to work (Trace softkey). You can generate a new reference spectrum from a saved spectrum for subsequent measurements.

✓ A spectrum has been set as reference (**Set as Reference** softkey).

1. Make your selection according to the table above.
2. Press the **SAVE** button.

8.4 Displaying the time characteristic (Spectrogram)

Spectrum • Measurement • Spectrogram

Spectrogram mode allows you to display the variation in the signal strength of a spectrum versus time.

To display the spectrogram:

- ⇒ Press the **Measurement** softkey. Two display modes are available:
- **Spectrogram:** Only the spectrogram is displayed.
 - **Spectrogram & Spectrum:** The spectrogram and the spectrum are displayed.

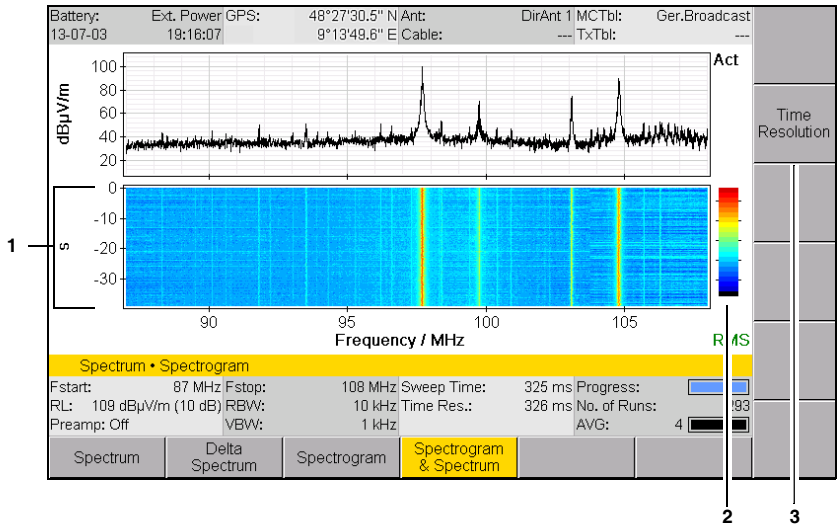


Figure 40: Spectrogram in **Spectrogram & Spectrum** display mode.

No.	Function / Explanation
1	Spectrogram 0 is the current value; the values along the Y axis show the elapsed time in seconds. There are 400 lines available. The total range that can be displayed depends on the Sweep Time and the selected time resolution (see <i>Changing the time resolution (Time Resolution)</i> on page 170). If the entire time range cannot be shown in one diagram, the spectrogram marker function allows you to scroll back to older values (see <i>The Spectrogram Marker</i> on page 171).
2	Colored display of the signal level in the spectrogram. The dashes next to the color scale correspond to the subdivisions of the Y axis in the Spectrum window, i.e. 10 to 90 dB μ V/m in the example shown. You can adjust the colored display using the Y-Scale Range and Y-Scale Ref parameters in the Display menu (see <i>Adjusting the Y axis (Y-Scale)</i> on page 105).
3	Softkey for selecting the Time Resolution .

8.4.1 Changing the time resolution (Time Resolution)

In total, 400 lines are available in the spectrogram for the display. The time resolution corresponds to the representation of one line and therefore determines the maximum time that can be displayed: $t = 400 \times \text{Time Res.}$ If the measurement time needed for a spectrum is longer than the time resolution setting, the average sweep time will be shown in the display as **Time Res.** When the maximum display time is reached, the oldest result is overwritten in each case (rolling memory).

To change the Time Resolution:

⇒ Press the **Spectrogram / Time Resolution** softkey and select a value.

NOTE: A new spectrogram line is generated with every new spectrum if you set **As fast as possible**.

8.4.2 Selecting the detector

Since the data in the time axis as well as the frequency axis is compressed to display each individual pixel in the spectrogram, you must select a detector. The choice of a detector determines which values from the spectrum are shown in the spectrogram. The following types can be selected:

- **RMS:** The spectrogram shows the time characteristic of the RMS value
- **+Peak:** The spectrogram shows the time characteristic of the largest value
- **–Peak:** The spectrogram shows the time characteristic of the smallest value

NOTE: The measurement is always performed for all three detectors at the same time. You can therefore switch between the detector types at any time and the results shown immediately, without the need for a new measurement.

To select a detector:

⇒ Press the **Detector** softkey, select a type using the rotary control knob and press **OK** to set it.

8.5 The Spectrogram Marker

The Spectrogram Marker allows you to analyze the recorded spectra by means of time or frequency based navigation in the spectrogram.

⇒ You can find detailed information on how to use the Marker functions under *The Marker function* on page 106.

The Spectrogram Marker has some additional functions:

- **Navigation:** Moves the marker along the frequency or time axis.
- **Delta Marker:** Displays the differences between markers at the same time, at the same frequency, or freely settable markers.

To activate the Marker function in the spectrogram:

- ⇒ Press the **Spectrogram Marker** softkey in the Spectrum main menu.
- ⇒ The Spectrogram Marker main menu opens.

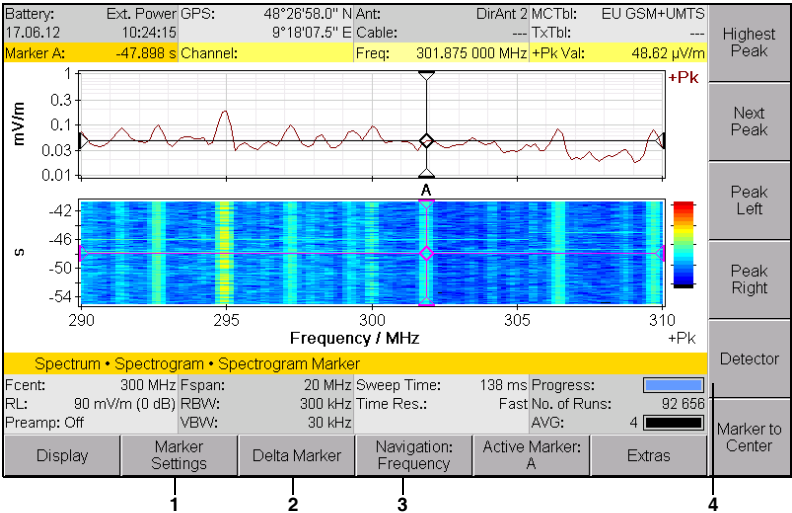


Figure 41: The **Spectrogram Marker** main menu

No.	Function / Explanation
1	Marker Settings: Opens the sub menu for further marker settings.
2	Delta Marker: Selects the marker function: <ul style="list-style-type: none">• Single Marker: Displays Marker A or Marker B only.• Delta Time & Frequency: Displays Marker A and Marker B. Both markers can be moved on the time and frequency axes independently of each other.• Delta Time: Displays Marker A and Marker B. Both markers can only be moved together on the frequency axis.• Delta Frequency: Displays Marker A and Marker B. Both markers can only be moved together on the time axis.
3	Navigation: Selects the marker movement type <ul style="list-style-type: none">• Time: The markers can be moved on the time axis.• Frequency: The markers can be moved on the frequency axis. ⇒ The marker is moved using the rotary control knob.
4	Detector: Selects a detector: RMS, +Peak, -Peak

To open the Spectrogram Marker sub menu:

- ⇒ Press the **Marker Settings** softkey.

8.5.1 Example Delta Marker applications

Finding a single event that is earlier than the time range shown in the Spectrogram window:

- ✓ Delta Marker = **Single Marker**,
Navigation = **Frequency**

1. Press the **Hold** key to freeze the display.
2. Select Active Marker = **A** or **B**.
3. Set the desired frequency with the selected marker.
4. Select Navigation= **Time**.
5. Scroll back down the time axis of the spectrogram with the marker and select the desired time point.
 - ↳ The associated values are displayed in the Marker bar.

Comparing two events at different times in the spectrogram:

- ✓ Delta Marker = **Delta Time**,
Navigation = **Frequency**

1. Press the **Hold** key to freeze the display.
2. Select Active Marker = **A**.
3. Set the desired frequency with the selected marker.
4. Select Navigation= **Time**.
5. Set Marker **A** to the first time point.
6. Select Active Marker = **B**.
7. Set Marker **B** to the second time point.
 - ↳ The associated values are displayed in the Marker bar.

Tip: If you select Navigation = **Frequency**, you can move both markers together through the frequency band.

Comparing two events at identical times in the spectrogram:

- ✓ Delta Marker = **Delta Frequency**,
Navigation = **Frequency**

1. Press the **Hold** key to freeze the display.
2. Select Active Marker = **A**.
3. Set Marker **A** to the first frequency.
4. Select Active Marker = **B**.
5. Set Marker **B** to the second frequency.
 - ↳ The associated values are displayed in the Marker bar.

Tip: If you select Navigation = **Time**, you can move both markers together along the time axis.

Determining two different times and frequencies:

- ✓ Delta Marker = **Delta Time & Frequency**,
Active Marker = **A**,
Navigation = **Frequency**
- 1. Press the **Hold** key to freeze the display.
- 2. Set Marker **A** to the first frequency.
- 3. Select Navigation= **Time**.
- 4. Set Marker **A** to the desired time.
- 5. Select Active Marker = **B** and Navigation = **Frequency**.
- 6. Set Marker **B** to the second frequency.
- 7. Select Navigation= **Time**.
- 8. Set Marker **B** to the desired time.
 - ↳ The associated values are displayed in the Marker bar.

8.5.2 Setting a threshold (Peak Threshold)

⇒ See *Changing the marker evaluation settings (Marker Settings)* on page 113.

8.5.3 Setting a minimum signal peak excursion (Peak Excursion)

⇒ See *Changing the marker evaluation settings (Marker Settings)* on page 113.

9

Level Meter Mode

This chapter describes **Level Meter** mode. Following a short introduction to the operating mode, an overview of the measurement screen is given along with information about the settings.

- 9.1 About Level Meter mode (page 176)
- 9.2 Display overview (page 177)
- 9.3 Operating mode specific functions (page 178)

9.1 About Level Meter mode

Level Meter mode allows you to make selective measurements at a defined frequency (F_{cent}) e.g. for monitoring the field strength of a communications channel. The channel bandwidth (CBW) for this can be set in the range 100 Hz to 32 MHz (zero span mode). Steep filters enable precise separation of adjacent channels. The Peak detector values (for brief pulsed signals) and RMS detector values (for variable signals) are displayed simultaneously.

One advantage of **Level Meter** mode is that the measurement is in real time and there are **no time gaps**.

9.2 Display overview

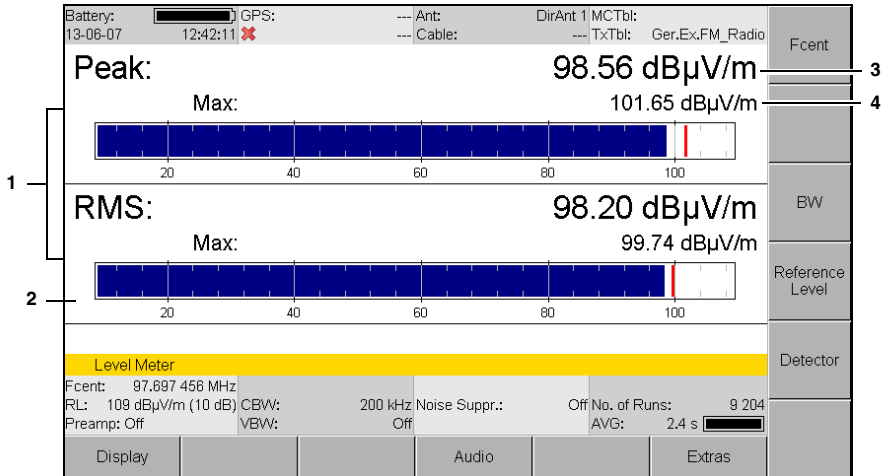


Figure 42: Level Meter mode with display of Peak and RMS.

No.	Function / Explanation
1	Display area with selectable detector types Peak and RMS
2	Bar graph displaying the current level: <ul style="list-style-type: none"> Red line: indicates the maximum measured level Bar: indicates the level at the moment <p>Note: The maximum extent of the bar corresponds to the selected reference level (Reference Level softkey).</p>
3	Numerical display of current measured value
4	Numerical display of maximum measured value

9.2.1 Signaling the maximum level audibly

Main Menu • Settings • Beep on new Maximum

A new maximum level can also be indicated by a beeper. To do this, you must activate the **Beep on new Maximum** function at Main Menu/Settings.

To activate the beeper:

⇒ See *Editing device-specific settings* on page 68.

9.3 Operating mode specific functions

This section describes how to select a detector.

You can find information about the general settings and functions that are present in several operating modes (such as Fcent, RBW / CBW, Reference Level) in chapter 6 *Common Functions* on page 89.

9.3.1 Selecting the detector

In contrast with other operating modes, the **Detector** menu in Level Meter mode allows selection of the detector types Peak and RMS. The following can be displayed:

- Peak only
- RMS only
- Peak and RMS

To select a detector:

1. Press the **Detector** softkey.
2. Use the rotary control knob to select the desired averaging time and then press the **OK** key to make the setting.

To select the averaging time:

1. Press the **Detector** softkey.
2. Press the **RMS Average Time** softkey.
3. Use the rotary control knob to select the desired averaging time and then press the **OK** key to make the setting.

The maximum values are also shown in addition to the actual or mean values:

Table 32: Values displayed in **Level Meter** mode

Type	Function / Explanation
Peak	Displays the instantaneous measured value. Note: The peak value display (Peak) is held for 480 ms. The value displayed therefore corresponds to the highest level measured within the last 480 ms. This means that the numerical display is more stable and the graphical display is smoothed.
Max	Displays the maximum value that has occurred since the measurement started.
RMS	Displays the RMS value averaged over a defined period of time. The bar next to AVG in the lower status bar indicates the progress of the measurement until the averaging time is reached. When this time is reached (complete bar), the instrument refreshes the resulting value using the new measurement results and discards the oldest results (<i>progressive</i> averaging over time).
RMS Max	Displays the maximum value of the averaged values that has occurred since the measurement started.

10

Time Domain (Scope) Mode

In **Time Domain (Scope)** mode, the IDA-3106 measures continuously and selectively at a fixed frequency setting. This enables it to also detect brief peaks, e.g. from pulsed radar equipment. The operating mode is also suitable for timer-controlled measurements.

- 10.1 About Time Domain (Scope) mode (page 182)**
- 10.2 Display overview (page 183)**
- 10.3 Selecting measurement parameters (page 184)**
- 10.4 Measurement parameter examples (page 187)**
- 10.5 Using the trigger function (page 192)**
- 10.6 Saving measured values automatically (page 195)**
- 10.7 Measuring the Duty Cycle and Time Domain Power (page 196)**

10.1 About Time Domain (Scope) mode

In **Time Domain (Scope)** mode, the IDA-3106 measures selectively at a pre-selected frequency and displays the result as a graph continuously versus time (Zero Span operation). The trace shape corresponds here to the magnitude of the signal level, which is recorded without any gaps within the displayed time range. This would display the RMS value of a constant sine wave signal (CW) as a horizontal measurement line.

A trigger function with selectable threshold allows you to trigger and save a measurement when a particular trigger event occurs. It is also possible to make long-term measurements over periods of up to 24 hours.

There are two sub modes:

Sub mode	Function	Application
High Resolution Scope	The measurement is displayed at maximum resolution and can comprise up to 250,000 individual measured values.	This sub mode is therefore suitable for displaying short term signals that require a time resolution of down to 32 ns. Time Span can be selected and Time Res is fixed ($= 1/\text{CBW}$).
Long-Time Scope	The measurement results are displayed on a compressed time scale. Up to 62,500 measured values can be recorded per detector.	Use this sub mode when the maximum Time Span of High Resolution Scope mode is insufficient. The maximum Time Span is 24 hours. Time Span and Time Res can be selected.

To select a sub mode:

⇒ Press the **Measurement** softkey and select a sub mode.

10.2 Display overview

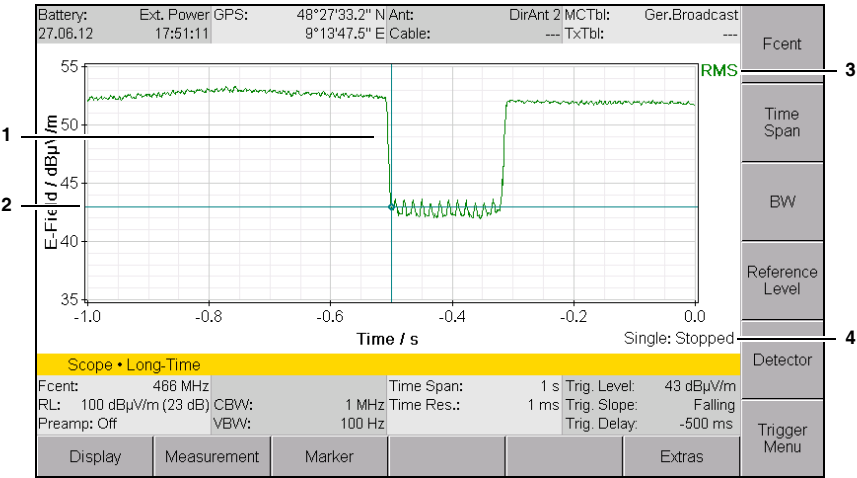


Figure 43: Time Domain (Scope) mode with activated trigger function

No.	Function / Explanation
1	Display of the measured signal versus time
2	Trigger: <ul style="list-style-type: none">• horizontal line = Trigger Level• vertical line = Trigger Delay
3	Trace / Detector (depends on the selected measurement function/ sub menu) <ul style="list-style-type: none">• Act = real-time measurement• +Pk/RMS/-Pk = compressed values over longer measurement periods
4	Measurement “frozen” by trigger function (see Table 36 on page 194)

10.3 Selecting measurement parameters

The parameters described in must be set to match the channel being measured to obtain meaningful results. Fcent and CBW must be set first of all.

Table 33: Measurement parameters and their functions

Parameter	Function / Setting
Fcent	Center frequency of channel under observation
Time Span	Measurement duration for capturing the signal characteristic
Time Resolution	Time resolution for the displayed measurement values
CBW	Channel bandwidth of the signal to be displayed
Trace / Detector	The trace types / detectors that can be selected depend on the measurement function: Act / +Peak, RMS, -Peak

The time span, time resolution, and number of measured values (n) are linked and can be represented by the following equation:

Time span = Number of measured values (n) x Time resolution




At least 16 measured values must be displayed over the time span. This relationship is clear from the following table.

Table 34: Relationship between Time Span and Time Res parameters

Sub mode	Time Span	Time Res	No. of values (n)	Trace / Detector
High Resolution Scope	settable, ≤ n / CBW	fixed, 1 / CBW	max. 250,000	Act
Long-Time Scope	settable, ≤ 24 h	settable, ≥ Time Span / n	max. 62,500	+Peak, RMS, -Peak

Some examples of channels and the appropriate settings of these parameters are also given in the section *Measurement parameter examples* on page 187.

10.3.1 Selecting Time Span, Time Resolution

1. Press the **Time Span** softkey.
 - ↳ Entry is in seconds by default.
2. Enter the desired time. This can be done in the following ways:
 - **Keys:** Type in a value using the numerical keys and select the units using the softkeys.
 - **Rotary control knob:** Change the value stepwise using the rotary control.
 - **Rotary control knob + arrow keys:** Use the arrow keys to select the digit that you want to change. Additional digits can be displayed using the  key. Change the value of the digit using the rotary control knob. The value is changed with carry-over.
 - **Entry in hh:mm:ss format:** Press the **Mode** softkey. Select a section using the   keys and change the value using the rotary control knob.
3. Press the **Time Resolution** softkey and enter the time in the same way.
 - ↳ You can only enter the Time Resolution for the **Long-Time Scope**. In all other cases, the time resolution is determined by the CBW (time resolution = $1/\text{CBW}$)
4. Press **OK** to complete entry.

10.3.2 Setting the channel bandwidth (CBW)

You must choose a channel bandwidth that allows the entire signal to be captured. The maximum possible time resolution ($1/\text{CBW}$) results from the bandwidth setting.

⇒ See *Setting the bandwidth (RBW / CBW)* on page 94.

10.3.3 Selecting the trace type / detector

The **Measurement** softkey is used firstly to set the sub mode. Depending on this setting, only the associated trace types/detectors will be available under **Trace / Detector**.

Table 35: Sub mode and available trace types / detectors

Sub mode	Trace type/ detector	Function / Explanation
High Resolution Scope	Act	Value measured at the moment (The Trace softkey is hidden)
Long-Time Scope	+Peak, RMS, -Peak	Detector: Maximum, average, and minimum value within a compressed time interval

To select a trace type/detector:

1. Press the **Measurement** softkey and select a sub mode.
2. Press **OK** or **ESC** to exit from the menu.
3. Press the **Trace / Detector** softkey, select an item using the rotary control knob, and press **OK** to set the selection.
 - ↳ If you selected **High Resolution Scope** sub mode, the **Trace/ Detector** softkey is not shown. Only the detector **Act** is possible.

10.4 Measurement parameter examples

Some examples of measurement parameter settings for typical applications are given below.

10.4.1 Example 1: GSM

GSM is characterized by the following properties:

- BCCH and several traffic channels
- Channel bandwidth 200 kHz
- Cycle time: 8 timeslots of 577 μ s each = 4.6 ms

This results in the following settings:

Parameter	Function / Setting
Fcent	Center frequency of GSM channel to be observed, e.g. 931.1879 MHz
CBW	200 kHz
Measurement	High Resolution Scope
Time Span	> 4.6 ms, selected: 5 ms
Time Resolution	Automatically set from $1/\text{CBW} = 5 \mu\text{s}$

10.4.2 Example 2: DECT telephone

DECT is characterized by the following properties:

- Frequency range: 1880 MHz – 1900 MHz
- Base station is permanently active
- Number of channels: 10
- Channel bandwidth: 1728 kHz
- Cycle time: 24 timeslots of 417 μ s each = 10 ms

This results in the following settings:

Parameter	Function / Setting
Fcent	e. g. Channel 0: 1897.344 MHz
CBW	1728 kHz → selected: 2 MHz
Measurement	High Resolution Scope
Time Span	24 timeslots x 417 μ s = 10 ms
Time Resolution	Automatically set from $1/\text{CBW} =$ 500 ns

10.4.3 Example 3: WLAN

WLAN is characterized by the following properties:

- Frequency ranges:
 - 2.40 GHz – 2.497 GHz
 - 5.15 GHz – 5.35 GHz
 - 5.725 GHz – 5.825 GHz
- Number of channels:
 - 2.4 GHz: 14 (overlapping), 3 (non-overlapping)
 - 5 GHz: 12 (non-overlapping)
- Channel bandwidth:
 - 10 MHz, 20 MHz, 40 MHz
 - 20 MHz are most often used
- Cycle time: 0.25 ms – 2 ms

This results in the following settings:

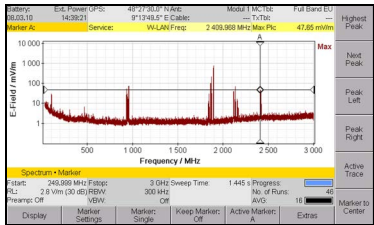
Parameter	Function / Setting
Fcent	e. g. Channel 10: 2.457 GHz
CBW	20 MHz
Measurement	Long-Time Scope
Detector	+Peak/RMS/-Peak
Time Span	1 ms
Time Resolution	400 ns

Because of the large spread of possible setting values, it is not possible to specify fixed values. However, two representative examples are given below.

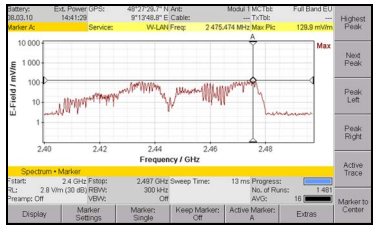
Procedure for example 3:

- 1. Switch to **Spectrum** mode, select a suitable frequency using the marker function, and then switch to **Time Domain (Scope)** mode (parameters are retained)
- ↳ Frequency hopping can make this selection more difficult.

Spectrum Analysis mode

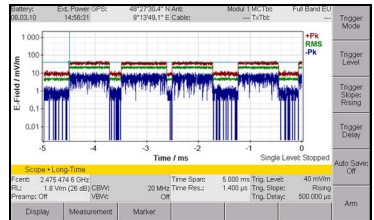
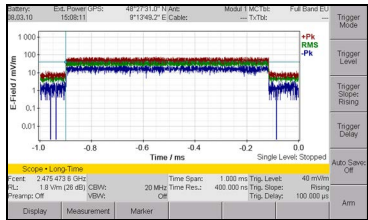


Frequency Hopping



- 2. Examples of different settings, CBW = 20 MHz and Measurement = Long-Time Scope:

 - Time Span = 1 ms
 - Time Resolution = 400 ns
 - Time Span = 5 ms
 - Time Resolution = 1400 ns

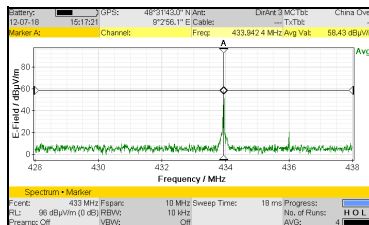


10.4.4 Example 4: Remote automobile key (ISM band)

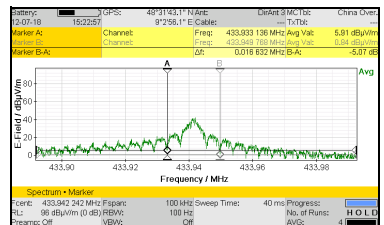
Only the frequency range 433.05 MHz – 434.79 MHz can be specified for remote automobile keys using the ISM band. The following describes how the other parameters can be determined:

- Switch to **Spectrum** mode and activate the marker function:
 - Find Fcent: Set the marker to the maximum (here: 433.942 MHz).
 - Find RBW: Set markers A and B: Bandwidth is the difference between the two frequency points (here: > 16 kHz).

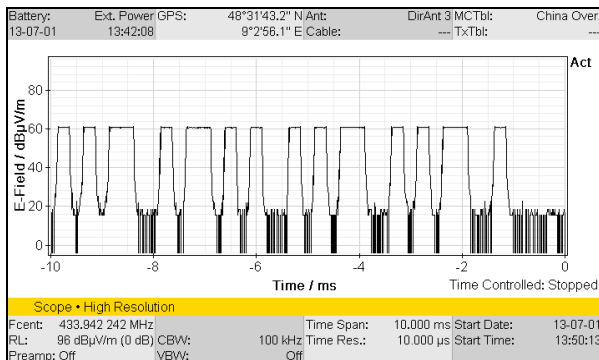
Find Fcent



Find RBW



- Switch to **Time Domain (Scope)** mode.
- Settings in the example:
 - Fcent = 433.942 MHz
 - CBW = 100 kHz
 - Measurement = High Resolution Scope
 - Time Span = 10 ms
 - Time Resolution = $1/\text{CBW} = 10 \mu\text{s}$



10.5 Using the trigger function

Time Domain (Scope) • Trigger Menu

I/Q Analyzer • Trigger Menu

The trigger function allows you to trigger a measurement when the observed input signal meets the specified conditions. After the measurement is triggered and the set time span has elapsed, the display is "frozen" so you can see the signal characteristic. The Actual Trace is always used as the signal source for trigger events, even in Long-Time Scope mode.

You can select the following trigger types:

- **Free Run: No trigger function**
- **Single:** The trigger is triggered once when the trigger event occurs.
- **Multiple:** The trigger is triggered each time the trigger event occurs.
- **Time Controlled:** The measurement starts either immediately or at the date and time set, and stops when the Time Span has elapsed.

10.5.1 Free Run

The display updates continuously. **Free Run** is displayed at the lower right of the screen.

10.5.2 Single und Multiple

Time Domain (Scope) • Trigger Menu

I/Q Analyzer • Trigger Menu

These trigger types freeze the display after the first valid event (Single) or after every new valid event (Multiple). If you select one of these trigger types, you must then set the following functions:

- **Trigger Level:** Level activating the trigger
- **Trigger Slope:** Signal edge activating the trigger:
 - Rising
 - Falling
- **Trigger Delay:** Delay in activating the trigger
 - Negative delay values cause the signal characteristic prior to the trigger event to be displayed (pre-trigger).
 - Positive delay values cause the signal characteristic after the delay following the trigger event to be displayed. The trigger event is outside the display area.

To use the Single or Multiple trigger types:

1. Press the **Trigger Mode** softkey and select the appropriate function.
2. Press the **Trigger Level** softkey and use the rotary control knob to set a threshold value.
 - ↳ The threshold is indicated by a horizontal blue line on the screen.
3. Press the **Trigger Slope** softkey to select the edge:
 - Softkey **Trigger Slope: Rising**: Rising edge is selected.
 - Softkey **Trigger Slope: Falling**: Falling edge is selected.
4. Press the **Trigger Delay** softkey and select a value:
 - Negative value: earlier time
 - Positive value: later time
 - ↳ When you select a negative value, the trigger delay will be shown as a vertical blue line on the screen.

When you have selected Single or Multiple, the readiness of the trigger function is indicated at the lower right of the measurement screen:

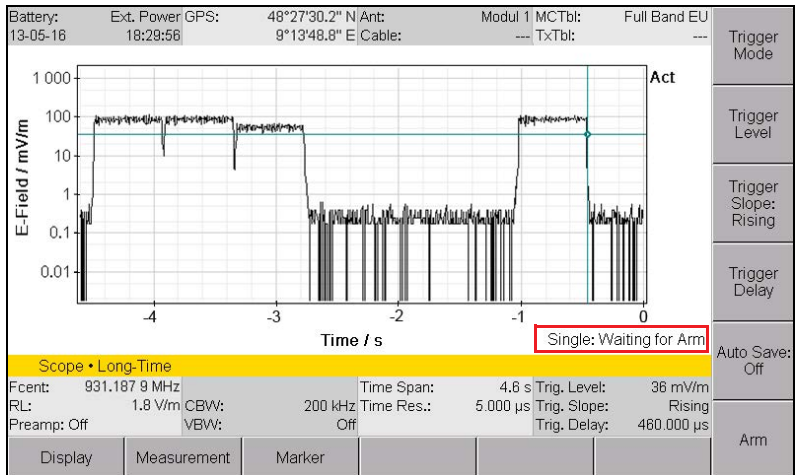


Figure 44: **Time Domain (Scope)** operating mode, trigger function **Single** selected but not yet started

The following status messages are possible:

Table 36: Trigger messages

Message	Function / Explanation
Waiting for Arm	Trigger mode has been activated (Single or Multiple) but the trigger function has not yet been started (Arm softkey)
Waiting	This message appears in Multiple trigger mode when the trigger condition has already been met once and the trigger is waiting for the next event.
Armed	The trigger function has been activated (Arm softkey has been pressed) but no valid event has occurred yet
Triggered	This message appears only briefly when the trigger condition is met.
Stopped	An event has met the trigger condition. The display stops and the signal trace is "frozen".

To start the recording:

⇒ Press the **Arm** softkey.

- ✎ The message **Armed** appears on the screen and the **Arm** softkey is now labeled **Break**.

To break off recording:

⇒ Press the **Break** softkey.

10.5.3 Time Controlled

Time Domain (Scope) • Trigger Menu

I/Q Analyzer • Trigger Menu

This trigger type allows you to start the recording at a specified time. Recording stops as soon as the Time Span has elapsed.

To start the recording immediately:

1. Press the **Trigger Mode** softkey and select **Time Controlled**.
 - ✎ The message **Waiting for Arm** appears on the screen.
2. Press the **Start Now** softkey.

To start the recording at a specified time:

1. Press the **Trigger Mode** softkey and select **Time Controlled**.
 - ✎ The message **Waiting for Arm** appears on the screen.
2. Press the **Start Date** softkey and enter the desired date. You can enter the current date automatically by pressing the **Current Date** softkey.

3. Press the **Start Time** softkey and enter the desired time. You can enter the current time automatically by pressing the **Current Time** softkey.
 - ↳ The start date and time are displayed in the lower status line.
4. Press the **Prog Start** softkey to activate the trigger function.
 - ↳ The message **Armed** is displayed on the screen. (If the start time precedes the actual time, the trigger function starts immediately.)

The recording starts when the specified time has been reached and stops when the Time Span has elapsed.

To deactivate the trigger function or break off recording:

⇒ Press the **Break** softkey.

10.6 Saving measured values automatically

Time Domain (Scope) • Trigger Menu

I/Q Analyzer • Trigger Menu

The Auto Save function allows you to save measured values automatically when a trigger event occurs.

To save measured values automatically:

1. Open the Trigger menu and select the desired trigger type.
2. Press the **Auto Save** softkey.
 - ↳ The auto save function is active, the softkey label shows **On**.
3. Press the **Arm** softkey.
 - ↳ The trigger function is active; the **Suspend Auto Save** softkey is displayed.
 - ↳ The measurement is saved when the trigger event occurs and the time specified by Time Span has elapsed.

To suspend auto saving:

⇒ Press the **Suspend Auto Save** softkey.

To set the time span between save events for Multiple trigger type:

Auto Save Holdoff specifies the dead time between consecutive save events. This dead time begins when the measurement time (Time Span) has elapsed completely following the last trigger event.

✓ Multiple trigger type is selected.

⇒ Press the **Auto Save Holdoff** softkey, select an item using the rotary control knob, and press **OK** to set the selection.

To set the maximum number of events to be saved when Multiple trigger type is set:

The maximum number of events to be saved is set by **Auto Save Events**.

✓ Multiple trigger type is selected.

⇒ Press the **Auto Save Events** softkey, select an item using the rotary control knob, and press **OK** to set the selection.

10.7 Measuring the Duty Cycle and Time Domain Power

The **Duty Cycle** evaluation function is available for High Resolution Scope and Long-Time Scope modes. This function automatically displays the ratio of the average to the maximum power level (P_{avg}/P_{peak}), calculated for the displayed time period. The Duty Cycle function corresponds to the signal duty cycle if the signal shape is rectangular. The values of P_{avg} and P_{peak} are also displayed in the Marker bar. The measured value for P_{avg} is often referred to as the Time Domain Power.

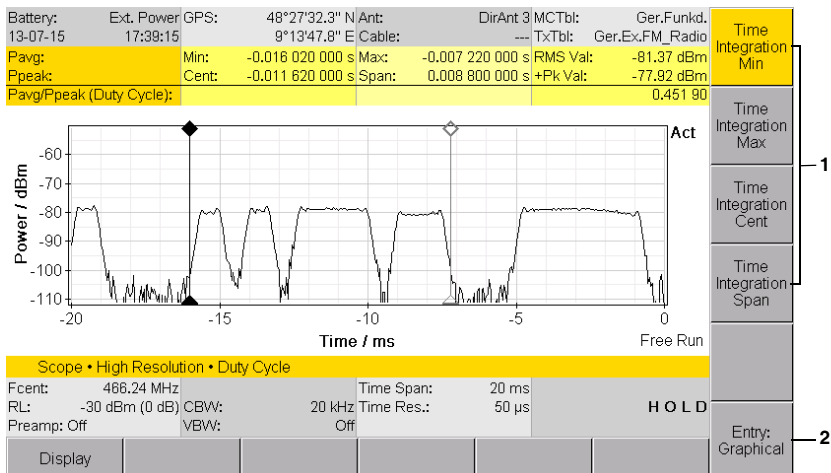


Figure 45: The **Duty Cycle** evaluation function

To activate the **Duty Cycle** function:

1. Press the **Evaluation** softkey, then press the **Duty Cycle** softkey.
2. Use the **Entry** softkey to select the method of entering the integration range:
 - Graphical = Entry by moving the markers
 - Numerical = Numerical entry of values
3. Specify the integration range using the four **Time Integration ... (1)** softkeys
 - Graphical: Press one of the softkeys and then use the rotary control knob to move the marker to the desired position.
 - Numerical: Press one of the softkeys and set the value.

↳ The selected values as well as the ratio Pavg/Ppeak are shown in the upper part of the screen.

11

I/Q Analyzer Mode

I/Q demodulation is performed at a fixed set frequency in the optional **I/Q Analyzer** mode. The recorded I/Q data can be displayed in various different views in order to analyze signals with high resolution in the time or frequency domain.

- 11.1 About I/Q Analyzer mode (page 200)**
- 11.2 Display overview (page 202)**
- 11.3 Selecting measurement parameters (page 205)**
- 11.4 Using the trigger function (page 209)**
- 11.5 Saving measured values automatically (page 209)**

11.1 About I/Q Analyzer mode

Measurement method:

In **I/Q Analyzer** mode, the IDA-3106 measures a pre-selected frequency selectively using the selected channel bandwidth (CBW) (Zero Span operation). Only the I/Q data resulting from the complex output signal of a base-band demodulation are obtained; this is referred to as I/Q demodulation. The I (in phase demodulated signal) and Q (quadrature demodulated signal) components can describe a complex input signal completely.

Recording and saving measurement data:

I/Q data are measured either in **Free Run** mode or triggered by an event. All the signal information is captured without gaps during I/Q demodulation. Even extremely short duration signals in the nanosecond range can be detected and captured with high resolution of up to 250,000 data pairs for I and Q. This representation of a signal sequence is retained completely without data compression even after the measurement data is saved. Only the raw I/Q data is saved in every case.

Analyzing and displaying measurement data:

Various types of view are provided for effective evaluation and signal analysis, all of which are produced by computation from the measured raw I/Q data. Once captured, the I/Q data provide users with comprehensive analysis facilities. You can switch between the time and frequency domains at will, and the FFT analysis parameters can be subsequently optimized. The measurement is interrupted to perform frequency domain transformation (FFT). In extreme cases, this can take several seconds in order to compute the up to 7805 spectrums and display them as a spectrogram or digital persistence spectrum. The gapless spectrogram with its fine time resolution of down to 1 μ s is a particularly powerful tool for interference searching.

Using I/Q Streaming:

On-line signal monitoring can be done over as long a period as you like with gapless I/Q streaming. I/Q streaming with a channel bandwidth of up to 400 kHz is supported by the Ethernet interface in remote controlled operation. You can find more information about this in the Command Reference Guide (see IDA Tools CD).

There are five different views available.

View	Description
I/Q	Displays the time characteristic of the captured raw data as I (in phase demodulated signal) and Q (quadrature demodulated signal) components. Experts can draw conclusions about modulation types and interference just from the shape of the signal.
Magnitude	Displays the time characteristic of the signal power level. The magnitude is used as a trigger source for the IQ Analyzer . A video bandwidth VBW can be set for smoothing the signal, which may be necessary for triggering. The VBW does not affect other Views.
HiRes Spectrogram Full	The measured signal is displayed as a gapless, time-compressed spectrogram so that the entire characteristic can be seen on the screen. The spectrums can be selected and viewed with their full time resolution using the marker. <i>(For information about spectrograms, see Displaying the time characteristic (Spectrogram) on page 168 and The Spectrogram Marker on page 171.)</i>
HiRes Spectrogram Zoom	Comparable to the "HiRes Spectrogram Full" view but without any time compression. Each spectrum captured is shown as a separate spectrogram line. You can scroll through the spectrogram in Hold mode.
Persistence Spectrum	All the computed spectrums are displayed as level versus frequency. The color indicates the number of times that the level occurred. This corresponds to a "digital afterglow effect", which makes it possible to recognize signals with superimposed frequencies or which occur sporadically.

To select a view:

⇒ Press the **View** softkey and select a view.

NOTE: Magnitude corresponds to the results of Time Domain (Scope) mode / High Resolution Scope sub mode (see *About Time Domain (Scope) mode* on page 182 for information).

11.2 Display overview

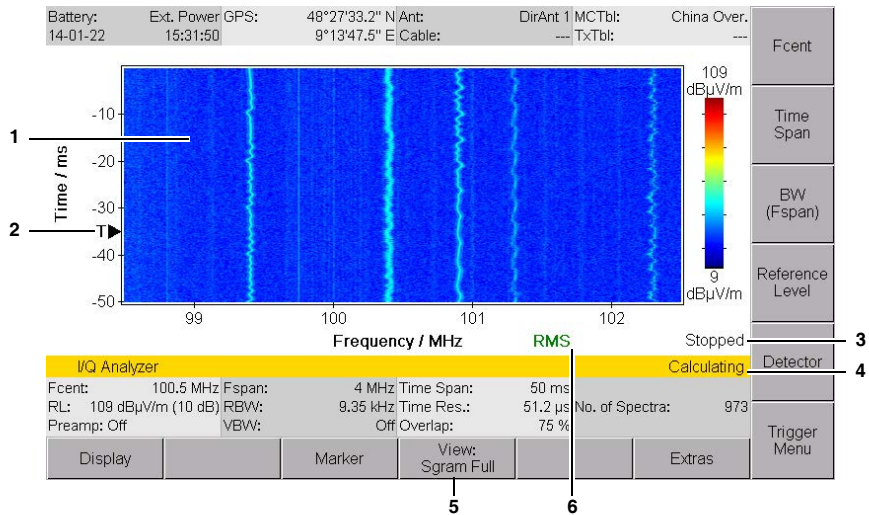


Figure 46: I/Q Analyzer mode with activated trigger function

No.	Function / Explanation
1	Measurement display.
2	Trigger time point indication (not needed for Free Run)
3	Trigger message (see Table 36 on page 194).
4	Display during a calculation
5	View (view selection) <ul style="list-style-type: none"> I/Q Magnitude HiRes Spectrogram Full HiRes Spectrogram Zoom Persistence Spectrum
6	Selected detector (for spectrogram views only).

11.2.1 View examples

A triggered mobile telephone signal is shown in different view below.

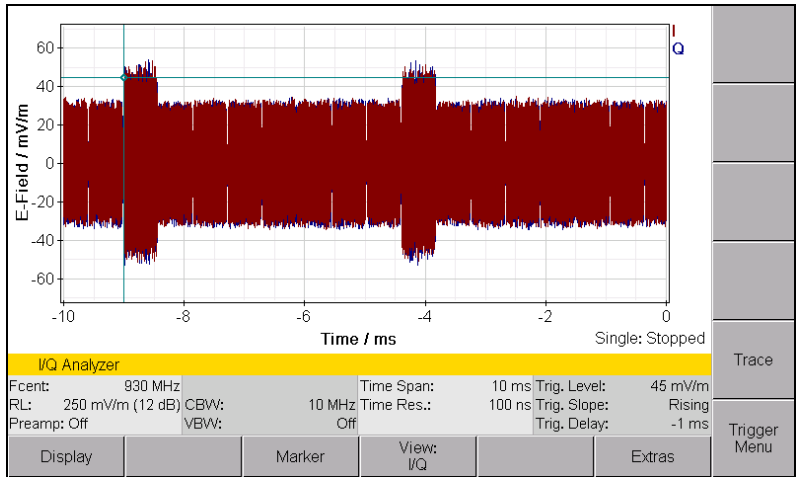


Figure 47: **View: I/Q** (time domain) with display of trigger time point.

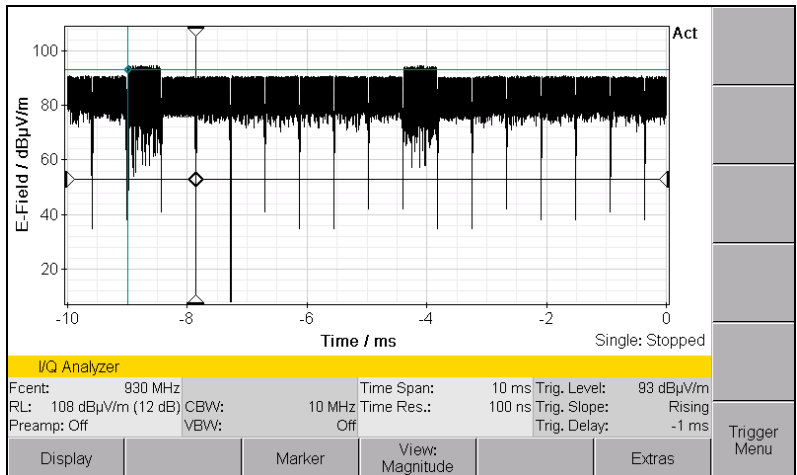


Figure 48: **View: Magnitude** (time domain) with trigger time point and marker.

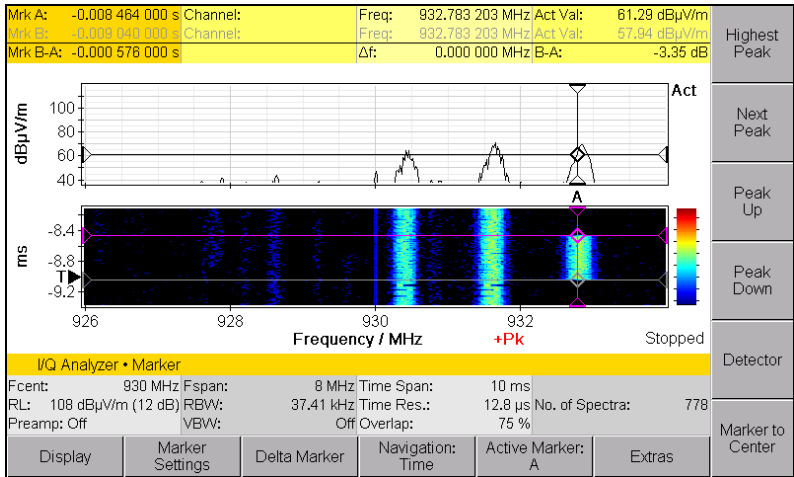


Figure 49: **View: HiRes Spectrogram Zoom** (frequency domain) in Marker menu

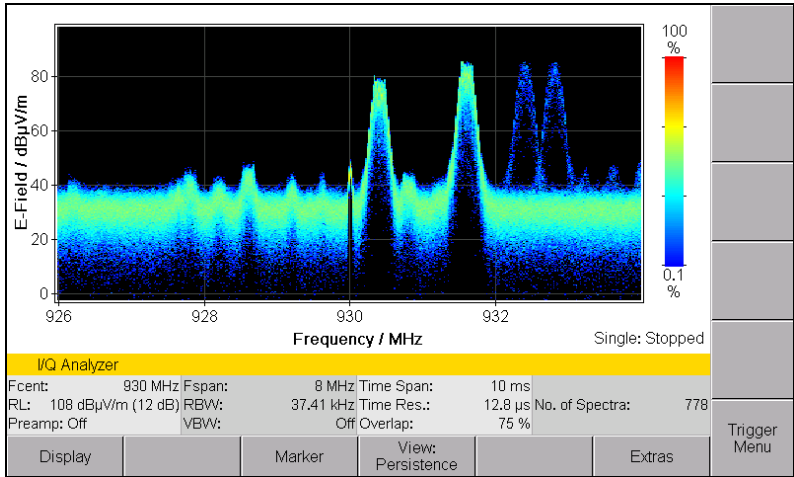


Figure 50: **View: Persistence Spectrum** (digital persistence in the frequency domain)

11.3 Selecting measurement parameters

Measurement parameters are basically set in the same way as for Time Domain (Scope) High Resolution Scope mode (see *Selecting measurement parameters* on page 184). The following settings are crucial here:

1. Press the **Fcent** softkey to set the center frequency (see *Setting the center frequency (Fcent)* on page 91).
2. Press the **BW** softkey to set the channel bandwidth (see *Setting the bandwidth (RBW / CBW)* on page 94).
3. **Time Span** is always automatically set to the maximum possible value when the bandwidth is changed. Reduce the value if necessary (see *Selecting Time Span* on page 205).
4. Press the **Reference Level** softkey to set the reference level for correct modulation (see *Setting the reference level (Reference Level)* on page 97).
5. Make settings in the Trigger menu in order to start event controlled capture. Otherwise the measurement will be in Free Run mode (see *Using the trigger function* on page 192).

11.3.1 Setting the channel bandwidth (CBW)

You must choose a channel bandwidth that allows the entire signal to be captured. The maximum possible time resolution ($1/\text{CBW}$) results from the bandwidth setting.




The fast Fourier transformation (FFT) requires the selection of a higher channel bandwidth for computing the spectrum.


Fspan = $0.8 \times \text{CBW}$ (maximum value approx. 22 MHz)

⇒ See *Setting the bandwidth (RBW / CBW)* on page 94.

11.3.2 Selecting Time Span

1. Press the **Time Span** softkey.
 - ↳ Entry is in seconds by default.

2. Enter the desired time. This can be done in the following ways:
 - **Keys:** Type in a value using the numerical keys and select the units using the softkeys.
 - **Rotary control knob:** Change the value stepwise using the rotary control.
 - **Rotary control knob + arrow keys:** Use the arrow keys to select the digit that you want to change. Additional digits can be displayed using the  key. Change the value of the digit using the rotary control knob. The value is changed with carry-over.
 - **Entry in hh:mm:ss format:** Press the **Mode** softkey. Select a section using the   keys and change the value using the rotary control knob.

 You cannot enter a Time Resolution value. The time resolution is determined by the CBW (time resolution = 1/CBW)
3. Press **OK** to complete entry.

11.3.3 Changing the frequency and time resolution of a spectrogram

I/Q Analyzer • View: Sgram Full

I/Q Analyzer • View: Sgram Zoom

I/Q Analyzer • View: Persistence

To change the frequency resolution of the spectrogram:

A fast Fourier transformation (FFT) converts a signal from the time domain to the frequency domain. The number of samples determines whether a high time resolution (e.g. 256 samples) or a high frequency resolution (e.g. 2,048 samples) is achieved.

✓ A spectrogram view is selected.

1. Press the **Display** softkey.
2. Press the **FFT Points** softkey, select an item using the rotary control knob, and press **OK** to set the selection.

To change the overlapping of the spectrogram:

A higher degree of overlapping in the FFT windowing results in better amplitude accuracy and higher time resolution. It also results in an increased computation time for the spectrogram. The overlap can be set in steps of 50 %, 75 % and 87.5 %.

- ✓ A spectrogram view is selected.
- 1. Press the **Display** softkey.
- 2. Press the **FFT Overlap** softkey, select an item using the rotary control knob, and press **OK** to set the selection.

11.3.4 Display time domain (trigger time point)

I/Q Analyzer • View: Sgram Zoom

- ✓ **HiRes Spectrogram Zoom** view is selected.
- 1. Press the **Display** softkey.
- 2. Press the **Goto Trigger Time** softkey to display the time domain with the trigger time point.

NOTE: At the same time, the marker is set to the trigger time point in the Marker menu. It is always set to the lowest spectrogram line in **Free Run** trigger mode.

11.3.5 Selecting the trace type / detector (Trace/ Detector)

The **View** softkey is used firstly to set the view mode. Depending on this setting, only the associated trace types/detectors will be available under **Trace / Detector**.

Table 37: Views and available detectors

View	Trace type/ detector	Function / Explanation
I/Q	I, Q	The RF signal is represented by the components I and Q, resulting from the complex output signal of a base-band demodulation (I/Q demodulation). <ul style="list-style-type: none">• I data: Real part (In-phase)• Q data: Imaginary part (Quadrature-phase)
Magnitude	(Act)	Value measured at the moment (The Trace softkey is hidden)
HiRes Spectrogram Full	+Peak, RMS, -Peak	Detector: <ul style="list-style-type: none">• Maximum, average, and minimum value within a compressed time and frequency interval
HiRes Spectrogram Zoom	+Peak, RMS, -Peak	Detector: <ul style="list-style-type: none">• Maximum, average, and minimum value within a compressed frequency interval. The display in the time axis is always uncompressed and at maximum resolution.
Persistence Spectrum	—	Value measured at the moment (The Trace softkey is hidden)

To select a trace type/detector:

1. Press the **View** softkey and select a view.
2. Press **OK** or **ESC** to exit from the menu.
3. Press the **Trace / Detector** softkey, select an item using the rotary control knob, and press **OK** to set the selection.

11.3.6 Setting the Persistence Range

IQ Analyzer • View: Persistence

Different colors are used in the **Persistence Spectrum** view to represent how often different amplitude values occur at a given frequency. You can set the number of decades displayed from 2 to 4 decades by selecting one of the six different ranges using the **Persistence Range** softkey in the Display menu. The example in Figure 50 has a range set from 0.1 % to 100 % showing 3 decades. A suitable value is set automatically if you select **Auto** decade.

✓ **Persistence Spectrum** view is selected.

1. Press the **Display** softkey.
2. Press the **Persistence Range** softkey, select a range using the rotary control knob, and press **OK** to set the selection.

11.4 Using the trigger function

IQ Analyzer • Trigger Menu

The trigger function allows you to trigger a measurement when the observed input signal meets the specified conditions. After the measurement is triggered and the set time span has elapsed, the display is "frozen" so you can see the signal characteristic. The Magnitude is always used as the trigger source to which all other trigger parameters refer. A video bandwidth can be selected to smooth signal peaks.

⇒ See *Using the trigger function* on page 192.

11.5 Saving measured values automatically

The Auto Save function allows you to save measured values automatically when a trigger event occurs.

⇒ See *Saving measured values automatically* on page 195.

12

Multi-Channel Power Mode

This chapter describes the **Multi-Channel Power** operating mode. Following a short introduction on the use of this operating mode, this chapter contains an overview of the different display modes and information about the basic setting functions.

- 12.1 About Multi-Channel Power mode (page 212)**
- 12.2 Operating mode specific functions (page 212)**
- 12.3 Using the Table view (page 215)**
- 12.4 Using the Bar Graph view (page 218)**

12.1 About Multi-Channel Power mode

Multi-Channel Power mode is especially suitable for obtaining a quick overview of defined frequency bands and channels. You can freely define up to 500 channels per multi-channel table, each with its own RBW and editable name. Simultaneous display of minimum, maximum and average values allows you to immediately distinguish between continuous and burst signals.

12.2 Operating mode specific functions

This section describes functions that are specific to this operating mode. You can find information about the general settings and functions that are present in several operating modes (such as Fcent, RBW / CBW, Reference Level) in chapter 6 *Common Functions* on page 89.

12.2.1 Selecting the display mode

Two display modes are available:

- **Table** (see page 215)
- **Bar Graph** (see page 218)

To switch the display mode:

1. Press the **Display** softkey.
2. Press the **Views** softkey.
 - ↳ The **Select View** window opens.
3. Use the rotary control knob to highlight a view and press the **OK** key:
 - Table
 - Bar Graph
 - ↳ The selected view will be displayed.

NOTE: Pressing the **ESC** key returns you to the top menu level in the measurement screen. (Press the **MENU** key to return to the Main menu.)

12.2.2 Signaling the maximum level audibly

Main Menu • Settings • Beep on new Maximum

A new maximum level can also be indicated by a beeper. To do this, you must activate the **Beep on new Maximum** function in the main menu under **Settings** and activate the **Maximum Hold (Max)** trace type.

To activate the beeper:

⇒ See *Editing device-specific settings* on page 68.

12.2.3 Showing and hiding channels

You can specify the channels that are to be measured in the **Select Menu**.

To show or hide specific channels:

1. Press the **Select Menu** softkey.
 ↳ The Select menu opens.
2. Select the channels required using the rotary control knob and the softkeys.
 You can find information on how to select items from a list under *Selecting entries from a list* on page 52.
3. After you have selected the channels, press the **OK** key.
 ↳ The selected channels will be displayed.

12.2.4 Setting the resolution bandwidth (RBW)

Setting RBW automatically

The IDA-3106 sets the RBW automatically using the basic setting **Automatic**:

$$RBW \leq \frac{\text{Fspan (narrowest channel)}}{4}$$

This ensures that the narrowest channel to be measured is resolved finely enough.

Setting the RBW manually for the entire table

To set the resolution bandwidth manually:

1. Press the **BW** softkey.
2. Use the rotary control knob to highlight the desired value.
(The largest value displayed is the only largest possible value of all channels shown.)
3. Press the **OK** key.

NOTE: Finer resolution normally means slower measurement speed. Regardless of the selected value, the narrowest resolution bandwidth is limited by the narrowest channel:

$$RBW \leq \frac{Fspan \text{ (narrowest channel)}}{4}$$

Setting the RBW separately for each channel

NOTE: Separate RBWs cannot be selected unless **Others = OFF**.

The value selected manually on the device applies to the entire table. You can also enter the resolution bandwidth for each channel separately using the PC software. Refer to the online Help function of the PC software for information on how to do this.

Tip: More information about the RBW is found in the *Glossary* page 271.

12.2.5 Measuring in the gaps between defined channels (Others)

The field strengths of the channels not selected in the multi-channel table can be measured and their overall value shown by activating the **Others** function.

NOTE: Only those other channels between the first and last channels to be measured are taken into account.


To activate and deactivate the function:

- ⇒ Press the **Others** key until the desired status (**On**, **Off**) is displayed.
 ↳ The table view shows **Others**; the graphical view shows **O**.

Tip: The measurement can be speeded up by deactivating the **Others** function.

12.3 Using the Table view

The channels and measured values are displayed as a table in the Table view. The values displayed depend on the table type (see *Changing the table type* on page 216) and from the selected trace types (see *Selecting the trace type (Trace)* on page 101).

Battery: 13-07-02		Ext. Power GPS: 08:39:07 		48°27'30.1" N Ant: 9°13'50.5" E Cable:		DirAnt 1 MCTbl: --- TxTbl: ---		EU Full Band		
Table View: Detailed										
Index	Channel	Fmin	Fmax	RMS	<div>Select Menu</div>					
1	TV Band I	47.000 000 MHz	68.000 000 MHz	68.89 dBµV/m						
2	FM-Radio	87.500 000 MHz	108.000 000 MHz	97.84 dBµV/m						
3	Mid Wave	137.000 000 MHz	165.000 000 MHz	55.07 dBµV/m						
4	Paging	165.000 000 MHz	174.000 000 MHz	44.27 dBµV/m						
5	BandIII (DVB-T)	174.000 000 MHz	230.000 000 MHz	61.29 dBµV/m	<div>BW</div>					
	Others			67.49 dBµV/m	<div>Reference Level</div>					
	Total			97.85 dBµV/m						
Multi-Channel Power										<div>Trace</div>
RL: 109 dBµV/m (10 dB)		REBW: 2 MHz (Auto)		Sweep Time: 95 ms		Progress: <div><div></div></div>		501		
Preamp: Off				Noise Thrsh.:		Off No. of Runs: 4		AVG: <div><div></div></div>		
Display	Evaluation						Extras	Others: On		

Changing the table type

The table below shows the measured values that are displayed depending on the table type and the selected trace types.

NOTE: All the measurements for channels with the same name (e.g. Vodafone or T-Mobile) are combined together in the **Condensed** table type.

Table 38: Table type **Condensed**





Index	Channel	Trace types, e.g. Max
These columns are displayed continuously.		A maximum of three trace types can be displayed. If more than three trace types have been selected, you can use the   keys to scroll through all of the trace types. Arrow symbols in the navigation bar indicate that further trace types are available and the possible scrolling direction.

Table 39: Table type **Detailed**

Index	Channel	Fmin, Fmax	RBW	Trace types, e.g. Max
These columns are displayed continuously.			RBW is only displayed if the resolution bandwidth is selected individually using the PC software (Others = Off). If this is not done, the RBW is shown only in the lower status bar.	Only one trace type can be displayed. If more than one trace type has been selected, you can use the   keys to scroll through all of the trace types. Arrow symbols in the navigation bar indicate that further trace types are available and the possible scrolling direction.

To change the table type:

1. Press the **Display** softkey.
2. Press the **Table** softkey until the desired table type is shown.
3. Press the **ESC** key to return to the measurement menu.

Changing the displayed units

1. Press the **Display** softkey.
2. Press the **Unit** softkey.
3. Use the rotary control knob to select the desired sort order and press the **OK** key.
4. Press the **ESC** key to return to the measurement menu.

Changing the sort order

1. Press the **Display** softkey.
2. Press the **Sort** softkey.
3. Use the rotary control knob to select the desired sort order and press the **OK** key.
↳ The list is re-sorted.
4. Press the **ESC** key to return to the measurement menu.

12.3.2 Displaying the channel power as a percentage

You can use the **Distribution** function to display the percentage contribution of each channel to the overall field strength. The values are shown for the trace type selected using the **Active Trace** softkey. The sum of the individual channel powers is always 100 % (=Total) for trace type **RMS**. In principle, the total can deviate from 100 % for the other trace types.

To display the percentage distribution:

✓ The top menu level of the operating mode is displayed.

1. Press the **Evaluation** softkey.
2. Press the **Distribution** softkey.

The display now depends on the table type selected. The absolute measured values for the selected trace are also always displayed as well as the percentage values (**Distribution**).

Display for table type: **Condensed**:

Index	Channel	Max	Distribution
1	Srv_0001	-68.35 dBV	4.031 %
2	Srv_0002	-68.22 dBV	4.152 %
3	Srv_0003	-68.71 dBV	3.709 %

Trace type selected using the
Active Trace softkey

Percentage value

Display for table type: **Detailed**:

Index	Channel	Fmin	Fmax	RBW	Max
1	Srv_0001	935.100 MHz	935.300 MHz	50 kHz	-68.35 dBV
2	Srv_0002	935.300 MHz	935.500 MHz	50 kHz	-68.22 dBV
3	Srv_0003	935.500 MHz	935.700 MHz	50 kHz	-68.71 dBV

The arrow keys are used to switch between the absolute measured value and the percentage value.

12.4 Using the Bar Graph view

The measured values are shown as bars in the Bar Graph view. The selected trace types are shown as abbreviations on the right side of the diagram and shown in the corresponding colors in the diagram. The Marker menu is available here for evaluating the display, unlike the Table view.

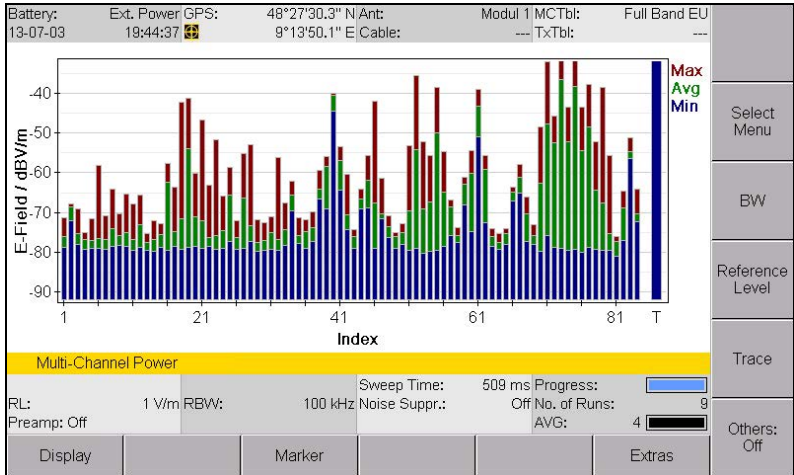


Figure 52: Bar Graph view in Multi-Channel Power mode

NOTE: Information about the status bars is found under *The upper status bar* on page 47 and *The lower status bar* on page 48.

13

Measurement Data Memory

This chapter describes how to display measurement data and screenshots, how to save data by condition and timer controls, and how to use the comment function.

- 13.1 About the Memory menu (page 220)**
- 13.2 Viewing and recalling data sets (page 221)**
- 13.3 Exporting data (Export to SD Card) (page 223)**
- 13.4 Viewing screenshots (page 224)**
- 13.5 Replaying demodulation recordings (page 225)**
- 13.6 Saving measured values manually (page 225)**
- 13.7 Saving measured values automatically (page 226)**
- 13.8 Changing the comment modes (page 229)**

13.1 About the Memory menu

Main Menu • Memory Menu

The Memory sub menu of the Main menu contains the following functions:

- Recall or delete stored data
- Display screenshots
- Activate comment mode
- Configure automatic storage (Time Controlled)

To open the menu:

- ⇒ Switch to the Main menu and press the **Memory** softkey.
 ↪ The Memory menu is displayed with the stored data.

Memory Menu						Data Viewer
Total Memory:		127.5 MB				
Free Memory:		121.3 MB				
Number of Antenna Data Sets:		8				Screenshot Viewer
Number of Directional Antenna Data Sets:		4				
Number of External Device Data Sets:		1				
Number of Cable Data Sets:		4				Demod. Record Viewer
Number of Multi-Channel Tables:		27				
Number of Transmitter Tables:		1				
Number of Setups:		1				Time Controlled Storing
Number of Measurement Data Sets:		44				
Number of Screenshots:		6				
Number of Demodulation Records:		0				Comment
Main Menu • Memory Menu						Comment

Figure 53: **Memory** menu

13.2 Viewing and recalling data sets

Main Menu • Memory Menu

⇒ Press the **Data Viewer** softkey.

↪ The list of saved data sets is displayed.

Table 40: Column descriptions

Column	Function / Explanation
Index	Consecutive index number
Num.	Number of data subsets (every saved value in a localization or a timer or condition controlled measurement is a data subset)
Mode	Operating mode saved from: <ul style="list-style-type: none"> • DIR_FIND: Direction Finding • SPECTRUM: Spectrum Analyzer • SGRAM: Spectrum Analyzer / Spectrogram • LEVEL: Level Meter • SCOPE: Time Domain (Scope) • IQ_ANLZ: I/Q Analyzer • MCP: Multi-Channel Power
Storing	Save type <ul style="list-style-type: none"> • MAN: Manual (all operating modes) • LOC: Localization (Direction Finding mode only) Additionally for SPECTRUM, LEVEL and MCP modes: <ul style="list-style-type: none"> • TIME: timer controlled storage • AUTO: Event-controlled storage using the AUTO SAVE function
Date	Date of storage
Time	Time of storage
Comment	Comment (if activated)

To view a data set:

⇒ Select a data subset using the rotary control knob and press the **Recall Data Set** softkey or the **OK** key.

↪ The data set is displayed in the form that it was saved. **RECALL** on the screen indicates that the data set is a saved data set.

Tip:

- You can use the ▲▼ softkeys to page through the list.
- You can use the ◀▶ softkeys to jump to the previous or next data set in the data viewer as well as in the operating modes.

To display and recall data subsets:

1. Select a data set with data subsets (column number > 1) using the rotary control knob and then press the **View Sub-Data Sets** softkey.
↳ The data subsets are displayed.
2. Select a data subset using the rotary control knob and press the **Recall Data Set** softkey or the **OK** key.
↳ The data subset is displayed in the form that it was saved. **RECALL** on the screen indicates that the data set is a saved data set.
↳ The complete localization is displayed when you switch to the Map menu.

Tip:

- You can use the ◀▶ softkeys to jump to the previous or next data subset without having to go back to the Memory menu.
- You can use the ◀||▶ softkeys to jump to the previous or next data subset if several results are saved in one data set.

To delete a data set:

- ⇒ Use the rotary control knob to select a data set to be deleted and press the **Delete Data Set** softkey. You cannot delete individual data subsets.

To delete all data sets:

1. Press the **Delete Menu** softkey.
2. Press the **Select All** softkey.
3. Press the **Delete Selection** softkey.

To delete a range of data sets:

1. Press the **Delete Menu** softkey.
2. Select the range you want to delete using the appropriate softkey (there are several ways to select a range using the **Invert Selection**, **Select**, **Select First** and **Select Last** softkeys).
3. Press the **Delete Selection** softkey.

13.3 Exporting data (Export to SD Card)

Main Menu • Memory Menu

You can save data on the microSD memory card and transfer it from there to a computer for further processing.

To save data to the microSD memory card:

1. Press the **Data Viewer** softkey, then the **Export to SD Card** softkey.
↳ The list of saved data sets is displayed.
2. Use the rotary control knob and softkeys to select the data sets you want to export.
3. Press the **Start Export** softkey.
↳ The data are transferred to the microSD memory card and saved in a folder named **Export**.

NOTE: You can export screenshots (png) and recordings of demodulated signals (wav) in the same way.

To process the data on a computer:

1. Remove the memory card.
2. Connect the Memory Card Reader to the USB port on a computer and insert the microSD memory card into the card reader.
↳ The contents will be displayed and can be further processed as required.

13.3.1 Changing the CSV format

CSV data can be exported in the following formats:

- Decimal separator: dot, comma
- Column separator: semicolon, tab, comma

To change the format:

1. Press the CSV Export Settings softkey in the **CSV Export** menu.
2. Use the rotary control knob and the **OK** button to select and change a parameter.

13.3.2 Deleting the export folder

The exported data are written into an export folder on the microSD memory card. You can delete this folder if you want.

To delete the folder:

- ⇒ Press the **Delete Export Directory** softkey in the **CSV Export** menu.
 - ↳ The folder is deleted and will be created again when you next export data.

13.4 Viewing screenshots

Main Menu • Memory Menu

- ⇒ Press the **Screenshot Viewer** softkey.
 - ↳ The list of the stored screenshots is displayed.

To view a screenshot:

- ⇒ Use the rotary control knob to select a screenshot and press the **Recall Screenshot** softkey to display it.
(Press the ▲▼ softkeys to show the first or last entries of the list.)
 - ↳ The selected screenshot is displayed.

NOTE: Screenshots are saved without showing the softkeys.

- ⇒ Press the ◀ or ▶ softkey to page through the list.
- ⇒ Press **ESC** to return to the Screenshot Viewer menu.

To delete a screenshot:

- ⇒ Use the rotary control knob to select a data set and press the **Delete Screenshot** softkey.

To delete all screenshot:

- ⇒ Press the **Delete All Scr.shot** softkey.

13.5 Replaying demodulation recordings

Main Menu • Memory Menu

⇒ Press the **Demod. Record Viewer** softkey.

↳ A list of recorded contents is displayed.

To replay a recording:

⇒ Select an item using the rotary control knob and press the **Play** softkey.

↳ The recording is replayed.

– or –

Select an item using the rotary control knob and press the

Recall Demod. Record softkey.

↳ The recording is replayed and the data for the measurement is also displayed.

⇒ Press the **Stop** softkey to stop replaying the recording.

Tip:

- You can use the ▲▼ softkeys to jump to the first or last item in the list.
- You can use the ◀▶ softkeys to jump to the previous or next data set.

To delete a recording:

⇒ Select an item using the rotary control knob and press the

Delete Demod. Record softkey.

To delete all recordings:

⇒ Press the **Delete All Demod. Records** softkey.

13.6 Saving measured values manually

To save measured values to the data logger:

⇒ Press the **SAVE** button.

13.7 Saving measured values automatically

You can also save results automatically in the data memory instead of pressing the **SAVE** key each time you want to save a result. There are two memory functions for this purpose:

- **Event triggered saving**

Saving of results starts as soon as the trigger condition is met and a measurement is triggered. Automatic storing controlled by trigger events is only possible in **Time Domain (Scope)** and **IQ Analyzer** modes.

- **Timer controlled saving**

Storing of data is controlled by a start time and a duration. Timer-controlled storing is only possible in **Spectrum**, **Level Meter** and **Multi-Channel Power** modes.

NOTE: The internal memory of the IDA-3106 has the capacity to store large quantities of data. However, reading out a large number of data sets from the instrument to a PC can take a long time. Try not to fill the data memory too much, and carry out regular data maintenance.

13.7.1 Event triggered storing of measured values (Scope)

NOTE: Automatic storing of measured values controlled by trigger events is only possible in **Time Domain (Scope)** and **IQ Analyzer** mode. You can find information about this under *Saving measured values automatically* on page 195.

13.7.2 Time controlled storing of measured values (Time Controlled Storing)

Main Menu • Memory Menu • Time Controlled Storing

NOTE: Timer-controlled storing is only possible in **Spectrum**, **Level Meter** and **Multi-Channel Power** modes.

NOTE: Time controlled storing in Scope mode is started from the operating mode itself and not from the Main menu. You can find information about this under *Using the trigger function* on page 192.

For time controlled storing you specify the start time, duration, and interval between store events in the **Time Controlled Storing** menu.

Time Controlled Storing						Start Now
Start Date:		13-07-03				
Start Time:		19:52:59				
Duration [hh:mm:ss]:		00:06:00				
Time Interval:		As often as possible				Prog Start
Main Menu • Memory Menu • Time Controlled Storing						Current Date & Time

Figure 54: Time Controlled Storing

To save measured values by time control:

1. Select the desired operating mode and then press the **MENU** key to open the Main menu.
2. Press the **Memory** softkey, then press the **Time Controlled Storing** softkey and set the parameters:

Table 41: Time Controlled Storing parameters

Condition	Function / Explanation	Possible settings
Start Date	Start date	You can use the date and time settings from the IDA-3106 by pressing the Current Date & Time softkey.
Start Time	Start time	
Duration	Duration of recording	Maximum 99 hours 59 minutes 59 seconds
Time Interval	Time interval between saves	<ul style="list-style-type: none"> • As often as possible • Maximum 60 minutes

To start storing values immediately:

3. Press the **Start Now** softkey.
 - ↳ Automatic storage is activated.
The screen displays the view of the operating mode previously selected. The info line shows *Time Controlled Storing* and the remaining recording time.

To start storing at the specified time:

4. Press the **Prog Start** softkey.
 - ↳ The screen displays the view of the operating mode previously selected. The info line shows *Time Controlled Storing* and the remaining time until the start of recording. Storing starts when the countdown reaches 0.

To stop storing:

- ⇒ Storing stops automatically when the specified duration has elapsed. To stop storing values before this, press the **Stop** softkey.
 - ↳ The operating mode is again displayed normally. You can view the stored measurement values from the **Memory** menu (see *Viewing and recalling data sets* on page 221).

13.8 Changing the comment modes

Main Menu • Memory • Comment

⇒ Press the **Comment** softkey.

↳ The **Comment** dialog is displayed.

Comments can be added to data sets or screenshots. In both cases the comment mode and the default comment text can be set individually.

Following table shows the available comment modes:

Table 42: Comment modes

Mode	When saving a dataset or a screenshot ...
No Comment	... no comment can be added.
Standard Text	... the text saved in Standard ... Text is added as a comment.
Individual Text	... the text saved in Standard ... Text is displayed in the text editor and can be edited.
Voice Comment	... a voice comment can be added (a voice comment can only be made when saving data sets).

To change the comment mode:

1. Use the rotary control knob to select **Data Set Comment Mode** or **Screenshot Comment Mode** or **Demod. Rec. Comment Text** and press **OK**.
2. Use the rotary control knob to change the mode and press **OK**.

To change the default comment text:

1. Use the rotary control knob to select **Standard Data Set Comment Text** or **Standard Scr.shot Comment Text** or **Standard Demod. Comment Text** and press **OK**.
↳ The text editor opens.
2. Enter the default text and press **OK**.
↳ This text will be used when **Standard Text** is set as Comment Mode. When **Individual Text** is set, the entered text is suggested in the editor and can be complemented or overwritten.

14

Maintenance, Repairs, Updates

This chapter describes the maintenance and repairs that can be undertaken by the user. It also contains information about updating the software and activating options.

14.1 Cleaning (page 232)

14.2 AC adapter / charger (page 232)

14.3 Updating the device software (page 233)

14.4 Activating options (page 233)

14.1 Cleaning

- Do not use solvents to clean the Basic Unit, the antennas, or the AC adapter / charger. We recommend the use of lukewarm water to which a drop of liquid detergent has been added as cleaning fluid.
- Only use a lightly moistened cloth for cleaning. Water must not get into the device under any circumstances.
- To avoid spots and drying marks, wipe off the device while it is still damp with a dry cloth.

14.2 AC adapter / charger

Opening the device



WARNING

Electric shock

Parts carrying dangerous voltages that can cause injury through electric shock may be exposed if the AC adapter / charger is opened.

- ⇒ The AC adapter / charger is not designed to be repaired. If it is defective or malfunctioning, the entire device should be replaced.
- ⇒ Do not open the AC adapter / charger.

Damage to the device

NOTICE

Damage to the device

Improper repairs may change the characteristics of the AC adapter / charger to the extent that it could be destroyed by short circuits e.g. across creepage and air paths.

- ⇒ Repairs must only be performed by qualified persons.

Spare parts

NOTICE

Damage to the device

If constructional changes are made to the AC adapter / charger, the safety of the device can no longer be guaranteed.

⇒ Only use original spare parts for repairs to the AC adapter / charger.

14.3 Updating the device software

The device software is updated using the PC software. You will find information about the PC software and about connecting the device to a PC in chapter 15 starting on page 235.

Detailed information on how to use the PC software is provided in the online Help function in each version of the PC software.

14.4 Activating options

Options are activated using the PC software. You will find information about the PC software and about connecting the device to a PC in chapter 15 starting on page 235.

Detailed information on how to use the PC software is provided in the online Help function in each version of the PC software.

15

PC Software

The PC software is an application for PC that allows convenient handling and management of the IDA-3106.

15.1 PC software versions and functions (page 236)

15.2 Connecting the device to a PC (page 236)

15.3 Working with the PC software (page 237)

15.1 PC software versions and functions

The PC software IDA Tools is free and is included with the IDA-3106.

It contains the following functions:

- Download measurement data to the PC
- Download screenshots and demodulation recordings to the PC
- Create antenna, cable, and external device configurations as well as multi-channel tables and measurement routines
- Transfer instrument configurations
- Activate options and update the device software (firmware)

NOTE: The IDA Tools CD additionally includes the latest information (ReadMe), pdf documents (operating manuals, command references) and further auxiliary applications.

15.2 Connecting the device to a PC

The device is configured for communication using the USB interface by default. A suitable cable is included with the device. The IDA Tools PC software does not support an Ethernet connection.

The IDA operates as a USB slave and can be controlled from a USB host (PC) by means of the PC software.

✓ You have installed the IDA Tools PC software on your PC.

1. Connect the IDA-3106 and the PC together using the USB cable supplied.
 2. Start the IDA Tools PC software.
 - ↳ The device is detected automatically.
 3. If the interface configuration has been changed, set the appropriate interface on the IDA-3106:
 - Open the **Settings** menu (Main Menu • Settings), select the **Remote Interface** command and press **OK to confirm**.
 - Use the rotary control knob to select **USB** and press the **OK** key to confirm the setting.
 - or –
 - Reset the settings using **Main Menu • Settings • Reset Settings**.
- ⇒ Further information on connecting the IDA-3106 to the PC is found under *Connecting to the PC* on page 240.

15.3 Working with the PC software

Detailed information on how to use the PC software is provided in the online Help function in each version of the PC software.

16

Remote Control

This chapter gives some basic information about remote control of the IDA-3106 from a PC or via a network.

- 16.1 About remote control (page 240)**
- 16.2 Connecting to the PC (page 240)**
- 16.3 Connecting to the network (page 242)**
- 16.4 Activating / deactivating remote control (page 242)**
- 16.5 Syntax rules for remote control commands (page 244)**

16.1 About remote control

The IDA Tools PC software is mainly intended for configuring the IDA and for transferring saved measurement data via the USB or optical interface (see *PC Software* on page 235).

Remote controlled measurements should preferably be made via the Ethernet interface. Documentation for the remote control commands is found on the IDA Tools CD along with some example applications.

16.2 Connecting to the PC

The connectors for the optical interface (RS 232) and the USB port (Mini B type) are located on the left hand side panel of the device.

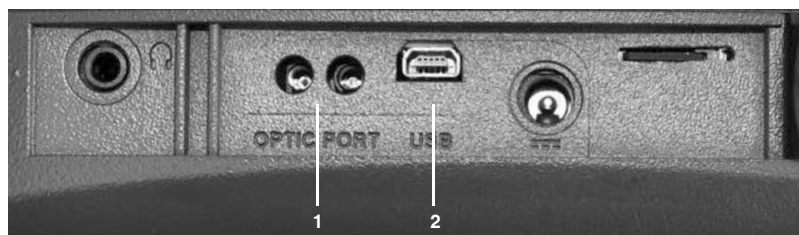


Figure 55: Optical interface (1) and USB port (2)

The Ethernet connector is located on the right hand side panel of the device.



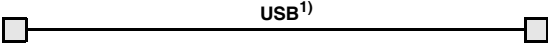
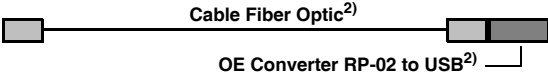
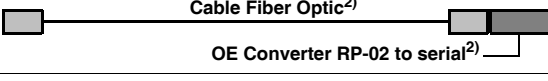

Figure 56: Ethernet interface (3)

The following types of connection between the IDA-3106 and the PC are possible (cables and adapters are shown in the table below):

- **USB – USB:** The fastest and most used type of connection. The electrical signals transmitted can affect the field being measured.
- **Optical – USB:** Slower transmission speed than USB – USB. However, the field being measured is unaffected by the optical signals transmitted.

- **Optical – Serial:** The only connection possible for systems not equipped with USB ports or if COM1 of the PC must be used.
- **Crossover network cable:** Direct connection using an Ethernet network cable. The device Ethernet interface is always activated. Use this connection for remote controlled measurements. Static IP addresses must be assigned to the client and server (**DHCP: Off**). The IDA Tools program cannot be used via this connection.

The following cables and adapters are needed for these connection types:

IDA-3106 connector	Link	PC connector
USB	 USB ¹⁾	USB
Optical	 Cable Fiber Optic ²⁾ OE Converter RP-02 to USB ²⁾	USB
Optical	 Cable Fiber Optic ²⁾ OE Converter RP-02 to serial ²⁾	serial
Ethernet	 Crossover Cable ³⁾	Ethernet

1) Included with the device

2) Available as an option

3) Commercially available

To make the network cable connection:

1. Connect the IDA-3106 and PC together using a network cable.
2. Adjust the network settings for communication with the PC (see *Changing network settings* on page 73).

To make the USB or optical interface connection:

1. Connect the IDA-3106 and PC together using one of the connection types shown above.
2. Set the appropriate interface on the IDA-3106:
 - Open the **Settings** menu (Main Menu • Settings), select the **Remote Interface** command and press **OK to confirm**.
 - Use the rotary control knob to select the interface being used on the IDA-3106: Optical if you are using the optical cable, USB if you are using a USB cable.
 - Press **OK to confirm** the setting.

3. Start the application for controlling and managing the PC interface and set the following interface parameters:

Parameter	Setting
COM Port	Optical or USB, as selected by connection made (item 1 above)
Baud rate	115200 Baud
Start bits	1
Data bits	8
Stop bits	1
Parity	None
Handshake	None (the IDA-3106 does not support any software handshake)

16.3 Connecting to the network

There is an Ethernet connector (100BaseT) located on the right hand side panel of the device for connecting it to a network.

To make the connection to the network:

1. Connect the IDA to the network using a commercially available network cable.
2. Adjust the network settings to match the network properties (see *Changing network settings* on page 73).
 - ↳ The device can be remotely controlled via the network.

16.4 Activating / deactivating remote control

To activate remote control:

- ⇒ Transmit the command **REMOTE ON**;
 - ↳ The IDA-3106 switches to remote controlled operation.
 - ↳ The screen display switches off.
 - ↳ The keypad is disabled.

To deactivate remote control:

- ⇒ Transmit the command **REMOTE OFF**;
 - ↳ Remote control is deactivated.
 - ↳ The screen display switches on.
 - ↳ The keypad is enabled once more.

16.4.1 Solving problems

If the IDA-3106 does not switch to remote controlled operation, check the following items:

- Is the IDA-3106 set to the correct interface: Optical, USB
(**Main Menu • Settings: Remote Interface**)?
- Have you used the correct remote control cable (see *Connecting the device to a PC* on page 236) and is the cable OK?
- Do the interface parameters on the PC and the IDA-3106 match (see *Connecting to the PC* on page 240)?
- Was the command **REMOTE ON**; transmitted correctly (Response = **0**)?

16.5 Syntax rules for remote control commands

16.5.1 Commands to the IDA-3106

The following types of command can be transmitted to the IDA-3106:

- **GET**: gets information about the actual settings of the IDA-3106
- **SET**: changes a setting on the IDA-3106

Remote control syntax is based on ASCII strings. The command interpreter does not distinguish between upper and lower case characters

(**Command [Parameter_1]; = COMMAND [Parameter_1];**).

For clarity, some commands contain underline characters (e.g. **F_MIN**, **BI_VALUE**).

Rules for GET commands

- Each GET command comprises a command string and a question mark: **Command?**;
- No distinction is made between upper and lower case characters: **Command?**; = **COMMAND?**;
- Each GET command must end with a **semicolon (;)**.

Rules for SET commands

- Each SET command comprises a command string and a specific number of parameters: **Command [Parameter_1],...,[Parameter_n];**
- The command must be separated from the parameters by one or more **spaces**.
- Parameters must be separated from each other by a **comma**.
- **/LF** can be used optionally as a separator between parameters.
- The command string must **not** contain a **question mark (?)**. Also, the command string must not contain the characters **/DC1** and **/DC3** for sequence control.
- The command must end with a **semicolon (;)**.

16.5.2 IDA-3106 responses

- The IDA-3106 initially responds to a GET command with **/CR** followed by the value of the requested parameter and an error code:
 - 0 = transmission correct
 - xxx (error code) = transmission errorThe value and code are separated by a comma, and the response ends with a semicolon (;): **[Value],0;**
- The IDA-3106 inserts **/CR** after a certain number of commas in long responses in order to force a new line.
- The IDA-3106 also responds to a SET command with **/CR** and an error code (normally "0"). The response ends with a semicolon (;). In this way you can also check if the communication is working properly with SET commands.

16.5.3 Example of a command sequence

Command (PC)	Response (IDA-3106)	Function / Explanation
Remote ON;	0;	Activate remote control No error
Remote?;	ON,0;	Query: is remote control activated? Remote control is activated, no error
Mode SPECTRUM;	0;	Set operating mode to SPECTRUM No error
Mode?;	SPECTRUM,0;	Operating mode is SPECTRUM, no error

17

Specifications

The specifications of the IDA-3106 Basic Unit and the available antennas are listed in this chapter.

All specifications are subject to change without prior notice.

The technical specifications may change due to product developments. The latest technical specifications can be found in the datasheet of the product. The datasheet can be downloaded from the Narda website www.narda-sts.com under the corresponding product page.

- 17.1 Definitions and conditions (page 248)**
- 17.2 IDA-3106 Basic Unit (page 249)**
- 17.3 Operating modes (page 252)**
- 17.4 Antenna handle and antennas (page 258)**
- 17.5 Declaration of Conformity (page 263)**

17.1 Definitions and conditions

Conditions

Unless otherwise noted, specifications apply after 30 minutes warm-up time within the specified environmental conditions.

Specifications with limits

These describe product performance for the given parameter covered by warranty. Specifications with limits (marked as $<$, \leq , $>$, \geq , \pm , max., min.) apply under the given conditions for the product and are tested during production taking measurement uncertainty into account.

Specifications without limits

These describe product performance for the given parameter covered by warranty. Specifications without limits represent values with negligible deviations which are ensured by design (e.g. dimensions or resolution of a setting parameter).

Typical values (typ.)

These characterize product performance for the given parameter that is not covered by warranty. Typical values stated as a range or as a limit (marked as $<$, \leq , $>$, \geq , \pm , max., min.) represent the performance met by approximately 80 % of the instruments. Otherwise, the mean value is given. The measurement uncertainty is not taken into account.

Nominal values (nom.)

These characterize expected product performance for the given parameter that is not covered by warranty. Nominal values are verified during product development but are not tested during production.

Uncertainties

These characterize an interval for a given measurand estimated to have a level of confidence of approximately 95 percent. Uncertainty is stated as the standard uncertainty multiplied by the coverage factor $k = 2$ based on the normal distribution. The evaluation has been carried out in accordance with the rules of the "Guide of the Expression of Uncertainty in Measurement" (GUM).

17.2 IDA-3106 Basic Unit

RF data apply in the temperature range of 20 °C to 26 °C and a relative humidity between 25 % and 75 %.

17.2.1 Frequency

Frequency range	9 kHz to 6 GHz		
Phase noise (SSB)	f_c	df = 10 kHz	df = 100 kHz
	57.5 MHz	≤ -121 dBc/Hz	≤ -126 dBc/Hz
	2.1405 GHz	≤ -92 dBc/Hz	≤ -100 dBc/Hz
	4.5005 GHz	≤ -97 dBc/Hz	≤ -100 dBc/Hz
Reference frequency	<ul style="list-style-type: none"> Initial deviation: < 1 ppm Aging: < 1 ppm/year, < 5 ppm over 15 years Thermal drift: < 1.5 ppm (-10 °C to +50 °C) 		

17.2.2 Amplitude

Display range	From Displayed Average Noise Level (DANL) to +20 dBm
Reference level (RL)	-30 dBm to +20 dBm in steps of 1 dB
RF Input attenuation	0 to 50 dB in steps of 1 dB (coupled with reference level)
Reference level setting	Set individually from a list or using the RL Search function for determining the optimum reference level at a given time
Level uncertainty	≤ 1.2 dB (15 °C to 30 °C) valid for Spectrum Analysis and Multi-channel Power modes
Displayed Average Noise Level (DANL) Basic unit only ¹⁾	<ul style="list-style-type: none"> $f \leq 50$ MHz: < -160 dBm/Hz (noise figure < 14 dB) $f \leq 2$ GHz: < -156 dBm/Hz (noise figure < 18 dB) $f \leq 4$ GHz: < -155 dBm/Hz (noise figure < 19 dB) $f \leq 6$ GHz: < -150 dBm/Hz (noise figure < 24 dB)
Displayed Average Noise Level (DANL) in conjunction with Active Antenna Handle, preamp on, (typ.) ¹⁾	<ul style="list-style-type: none"> $f \leq 3$ GHz: < -167 dBm/Hz (noise figure < 7 dB) $f \leq 4$ GHz: < -166 dBm/Hz (noise figure < 8 dB) $f \leq 6$ GHz: < -164 dBm/Hz (noise figure < 10 dB)

3rd order intermodulation	<ul style="list-style-type: none">• $f \leq 50$ MHz: < -76 dBc for two single tones with a level of 6 dB below RL, spaced by 1 MHz or more, $IP3 \geq +22$ dBm (@ RL = -10 dBm)• $f > 50$ MHz: < -60 dBc for two single tones with a level of 6 dB below RL, spaced by 1 MHz or more, $IP3 \geq +14$ dBm (@ RL = -10 dBm)
Spurious responses (input related)	< -60 dBc or RL -60 dB (whichever is worse) and a carrier offset of 100 kHz or more
Spurious responses (residual) ¹⁾	< -90 dBm

1) RL = -30 dBm (input attenuation = 0 dB)

17.2.3 RF input

Type	N-Connector, 50 Ω , female
Maximum RF power level	+27 dBm (destruction limit)
Maximum DC voltage	± 50 V
Return loss ¹⁾	<ul style="list-style-type: none">• > 12 dB (typ.), $f \leq 4.5$ GHz• > 10 dB (typ.), $f > 4.5$ GHz

1) RL \geq -28 dBm (input attenuation \geq 2 dB)

17.2.4 General specifications

Display	<ul style="list-style-type: none">• Type: TFT color display with backlight• Size, resolution: 7 inch (152 mm x 91 mm), 800 x 480 pixels
Interface	<ul style="list-style-type: none">• Ethernet (100BaseT)• USB mini B (USB 2.0)• Optical RS232 (Baud rate 115 200)• Earphone 3.5 mm TRS, ≥ 16 ohms (mono), switches off the integrated speaker when connected• microSD card interface for maps and export of measurement data, screenshots and WAV
Antenna detection	<p>Narda Directional Antennas are automatically detected (type, polarization, consideration of typical antenna factors, preamp gain and frequency response).</p> <p>For other antennas parameters can be defined and selected manually.</p>
Cables and external devices	<p>Narda RF cables are automatically detected (type, frequency response and more)</p> <p>Other cables and external devices (e.g. filters) can be defined and selected manually.</p>

Units	<ul style="list-style-type: none"> Anytime: dBm, dBV, dBmV, dBμV With Antenna, additionally: V/m, A/m, W/m², mW/cm², dBV/m, dBmV/m, dBA/m, dBμV/m
Display functions	<ul style="list-style-type: none"> Y-scale reference: -130 dBm to 40 dBm Y-scale range: 20 dB, 40 dB, 60 dB, 80 dB, 100 dB, 120 dB Y-scale auto: automatic scaling
Marker functions	<p>For graphical analysis of Spectrum, Spectrogram, Time Domain (Scope), I/Q Analyzer, MCP Bar Graph</p> <ul style="list-style-type: none"> Single marker or Delta marker Peak Marker: Highest, next, left, right. Adjustable peak threshold and excursion. Peak tracking (selectable)
Demodulation	<ul style="list-style-type: none"> Modulation Types: AM, FM, LSB, USB, CW (Spectrum, Level Meter and Direction Finding modes) Demodulation bandwidth 100 Hz to 200 kHz (max. 16 kHz for LSB, USB) Representation: Instrument speaker or external earphone Squelch: -120 dB to -40 dB nominal, Off Audio recording: 16 kHz / 16 bit wave file recording (WAV)
Setups	Up to 200 complete device configurations can be saved in the basic unit; can be uploaded and downloaded using IDA-3106 Tools software.
Storing	
Format	Result can be stored as a screenshot (in png format) or as ASCII data sets for further evaluation and import into e.g. MS-Excel
Event Controlled Storing	Auto Save function for up to 500 triggered events in Time Domain (Scope) and IQ Analyzer mode
Time Controlled Storing	<ul style="list-style-type: none"> Timer controlled storage of results for long term monitoring (only Spectrum, Level Meter and Multi-Channel Power) start date, start time and duration: resolution one second. Duration maximum 99 hours Storage rate settable to every 6 s, 12 s, 18 s, 30 s, 1 min, 2 min, 3 min, 5 min, 6 min, 10 min, 15 min, 20 min, 30 min, 60 min
Memory capacity	128 MB internal memory to store up to 8000 spectra, 4000 screen shots
Operating temperature range	<ul style="list-style-type: none"> -10 °C to +55 °C with battery 0 °C to +40 °C with external power supply
Compliance	
Climatic	<ul style="list-style-type: none"> Storage: 1K3 (IEC 60721-3) extended to -10 °C to +50 °C Transport: 2K4 (IEC 60721-3) restricted -30°C to + 70°C due to display Operating: 7K2 (IEC 60721-3) extended to -10 °C to +50 °C
Mechanical	<ul style="list-style-type: none"> Storage: 1M3 (IEC 60721-3) Transport: 2M3 (IEC 60721-3) Operating: 7M3 (IEC 60721-3)

17 Specifications

EMC	<ul style="list-style-type: none">• Complies with EMC Directive 2014/30/EU (previously 2004/108/EC) and EN 61326-1: 2013• Immunity: IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 Immunity at least 200 V/m (RF input power limited to permissible values)• Emissions: IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
Ingress protection	<ul style="list-style-type: none">• IP 52 (with antenna attached and interface protector closed)• IP 67 (stored in the hardcase)
Safety	Complies with European Low Voltage Directive 2014/35/EU (previously 2006/95/EC) and EN 61010-1: 2010
Air humidity (operating range) RF	< 29 g/m ³ (< 93 % RH at +30 °C)
Weight	2.8 kg / 6.2 lbs (basic unit including rechargeable battery)
Dimensions (H x W x D)	213 mm x 297 mm x 77 mm (8.4" x 11.7" x 3.0")
Power supply	Rechargeable battery <ul style="list-style-type: none">• Lithium-Ion rechargeable battery pack, "hot-swappable" during operation• operating time: 3 hours (nominal)• charging time: 5.5 hours (nominal) External power supply <ul style="list-style-type: none">• Input: 9 to 15 VDC• Adapter: 100 – 240 VAC / 12 V DC, 2.5 A
Recommended calibration interval	24 months
Country of origin	Germany

17.3 Operating modes

17.3.1 Overview

Measurements vs. frequency	<ul style="list-style-type: none">• Spectrum Analysis (including Spectrogram)• Multi-Channel Power
Measurements vs. time	<ul style="list-style-type: none">• Level Meter• Time Domain (Scope)• IQ Analyzer
Measurement vs. orientation/position	<ul style="list-style-type: none">• Direction Finding including Horizontal Scan and Localization

17.3.2 Direction Finding

Measurement principle	Selective level measurement at a selectable frequency from 9 kHz to 6 GHz. Possible parameters and settings as specified under Level Meter.
Antenna direction indication	Numerical display of Azimuth, Elevation and Polarization determined by the embedded electronic compass of the antenna handle.
Position indication	
Outdoor	Instrument position displayed as latitude and longitude (GPS WGS84) determined by the embedded GPS receiver of the basic unit. Optional: Graphical indication of the current position drawn on a map.
Indoor	Instrument position set manually on an editable rectangular room layout.
Detector	Peak or RMS detection RMS averaging time: selectable, 0.12 s to 30 min Peak hold time: 480 ms
Display modes	
Manual Bearing	Bar graph and numerical display of the signal level and indication of the direction.
Horizontal Scan	Polar diagram of the signal level vs. antenna orientation, normalized to the maximum signal. Automatic direction finding and indication.
Map	Graphical indication of the triangulation results for all measurement positions. Accepts measurements being performed by Manual Bearing or Horizontal Scan. Display of the estimated emitter coordinates, optional drawn on a map (Mapping option).
Horizontal Scan	
Continuous	Every 120 ms the polar diagram is updated with the current signal level and compass data. Start and Stop is initiated by key press on the antenna handle. The duration of a scan is limited to a maximum of 4 min. The target azimuth is calculated automatically.
Discrete	For every key press on the antenna handle the polar diagram is updated with the current signal level and compass data. At least 3 samples are required for calculating the target azimuth (up to 2000 samples are possible). Useful for longer averaging times.
Discrete with Max Hold	Same as for Discrete but using the highest measured values for direction finding, ideal for intermittent signals.

Map - Average Position	<p>Shows the vector of target azimuth related to the measurement position.</p> <p>Triangulation results based on several vectors will be calculated and the geo coordinates of the potential transmitter position will be displayed. Coordinates are referenced to the WGS84 geodetic datum. Signal fading vs. distance can be taken into account for target position calculation. Remotely determined vector data can be added by manual entry.</p>
Transmitter Table	<p>Used to simplify frequency settings and speed up finding multiple sources transmitting at different frequencies. Tables can be created on-site and include Fcent, CBW, Polarization and Antenna model.</p>
Map View with Mapping option	<p>Display of high-resolution street maps in various zoom levels. OpenStreetMap bitmap files can be downloaded from the internet free of charge using the Narda Map Download Tool. Map data are stored on microSD card and then plugged into the IDA card slot for portable use.</p>

17.3.3 Spectrum Analysis

Measurement principle	Spectrum analysis
Resolution bandwidth RBW, (-3 dB nominal)	10 Hz to 20 MHz (1-2-3-5 steps)
Video bandwidth VBW and RMS detection	<ul style="list-style-type: none"> • 0.2 Hz to 2 MHz (1-2-3-5 steps) or off • Coupled with selected RBW (VBW = RBW/10 ... RBW/1000) • RMS detection: The effective integration time for forming the RMS value can be defined as $T \approx 0.32/\text{VBW}$.
Filter	<ul style="list-style-type: none"> • Type: Gaussian • Shape factor (-60 dB/-3 dB): 3.8 typical
Trace	<ul style="list-style-type: none"> • Act: Displays instantaneous (actual) spectrum • Max: Maximum hold function • Avg: Average over a selectable number of spectra (4 to 256) or a selectable time period of 1 to 30 min. • Min: Minimum hold function • Ref: Reference Trace stored by the user for comparing spectrums or for Delta Spectrum view
Measurement functions	<ul style="list-style-type: none"> • Spectrum: graph, peak table, channel power • Delta Spectrum: displays the selected Traces relative to the Reference Trace (Ref) • Spectrogram • Spectrogram & Spectrum
Spectrogram time axis	<ul style="list-style-type: none"> • Up to 400 traces (spectrogram lines) can be captured • Frequency resolution of Fspan/860 • Observation length: app. 4 s up to 40 hours • Time resolution: as fast as possible, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 50 s, 1 min, 2 min, 5 min or 6 min
Spectrogram detection	RMS, +Peak, -Peak
Magnifier (Graphical Zoom)	<ul style="list-style-type: none"> • Simultaneous display of the selected spectrum and an enlarged view of the section of interest • Magnification level of 10 x and 50 x

17.3.4 Level Meter

Measurement principle	Selective level measurement at a selectable frequency from 9 kHz to 6 GHz
Detector	<ul style="list-style-type: none"> • Peak (holding time 480 ms) • Root mean square value (RMS), average time selectable from 120 ms up to 30 min
Channel bandwidth CBW, (-6 dB)	100 Hz to 32 MHz In steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz, ..., 10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz

Filter	<ul style="list-style-type: none">• Type: Steep cut-off channel filter (app. raised cosine)• Roll-off factor: 0.16
Video bandwidth (VBW)	0.01 Hz to 32 MHz or off, Coupled with selected CBW (VBW = CBW/1 ... CBW/10000)
Max Hold	Available for Peak and RMS detectors
Noise threshold	Selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor. Measurement values below the threshold are shown as "< absolute threshold value".

17.3.5 Time Domain (Scope)

Measurement principle	Selective level measurement at a selectable frequency from 9 kHz to 6 GHz
Channel bandwidth CBW, (-6 dB nominal)	100 Hz to 32 MHz In steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz,... 10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz
Filter	<ul style="list-style-type: none">• Type: Steep cut-off channel filter (app. raised cosine)• Roll-off factor: 0.16
Video bandwidth (VBW)	0.01 Hz to 32 MHz or off Coupled with selected CBW (VBW = CBW/1 ... CBW/10000)
Measurement	
High Resolution Scope	<ul style="list-style-type: none">• Measures the actual magnitude, max. 250000 samples• Time resolution coupled to 1/CBW (31.25 ns to 10 ms)
Long-Time Scope	<ul style="list-style-type: none">• Uses selectable detectors to measure the magnitude• Time Span 4 μs to 24 h (resolution 250 ns)
Detector	+Peak, RMS, -Peak can be selected individually for Long-Time Scope
Evaluation functions	Duty cycle (ratio of average power to maximum power) including Time Domain Power
Triggering	<ul style="list-style-type: none">• Free run, single, multiple, time controlled• Programmable trigger level, trigger slope and trigger delay
Magnifier (Graphical Zoom)	<ul style="list-style-type: none">• Simultaneous display of the selected trace and an enlarged view of the section of interest• Magnification level of 25 x and 500 x for High Resolution Scope and 10 x and 50 x for Long-Time Scope

17.3.6 I/Q Analyzer

Measurement principle	Selective level measurement at a selectable frequency from 9 kHz to 6 GHz with I/Q demodulation and subsequent FFT
Fast Fourier Transformation (FFT)	<ul style="list-style-type: none"> • FFT points selectable: 256, 512, 1024, 2048 • FFT window overlap selectable: 50 %, 75 %, 87.5 % • FFT window type: Nuttall filter
Channel bandwidth CBW, (-6 dB nominal)	100 Hz to 32 MHz In steps of 100, 125, 160, 200, 250, 320, 400, 500, 640, 800, 1000 Hz,... 10 MHz, 13.33 MHz, 16 MHz, 20 MHz, 26.67 MHz, 32 MHz
Filter	<ul style="list-style-type: none"> • Type: Steep cut-off channel filter (app. raised cosine) • Roll-off factor: 0.16
Video bandwidth (VBW)	<ul style="list-style-type: none"> • 0.01 Hz to 32 MHz or off Coupled with selected CBW ($VBW = CBW/1 \dots CBW/10000$) • Only affects the magnitude measurement and is useful for triggering
Measurement Views	
I/Q (Time Domain)	<ul style="list-style-type: none"> • Measures the real and/or imaginary part of the signal I, Q (max. 250000 samples each) • Time resolution coupled to $1/CBW$ (31.25 ns to 10 ms)
Magnitude (Time Domain)	<ul style="list-style-type: none"> • Measures the actual magnitude, max. 250000 samples • Time resolution coupled to $1/CBW$ (31.25 ns to 10 ms)
High Resolution Spectrogram (Frequency Domain)	<ul style="list-style-type: none"> • Gapless spectrogram with a time resolution up to 1 μs • Up to 7805 spectrums can be displayed • Fspan = $CBW \times 0.8$ (< 22 MHz)
Persistence Spectrum (Frequency Domain)	<ul style="list-style-type: none"> • Indicates by colors how often an amplitude value is present for a specific frequency • Persistence range selectable: 6 different ranges from 0.01 %–100 % to 1 %–10 % • Auto: 0.01 %–100 % (corresponds to 4 decades)
Triggering	<ul style="list-style-type: none"> • Free run, single, multiple, time controlled • Programmable trigger level, trigger slope and trigger delay
Magnifier (Graphical Zoom)	<ul style="list-style-type: none"> • Simultaneous display of the selected trace and an enlarged view of the section of interest for I/Q and Magnitude • Magnification level of 25 x and 500 x
I/Q Streaming (only IDA 2, 3106/02)	<ul style="list-style-type: none"> • Remote controlled data streaming is provided via Ethernet • Gapless data streaming for CBW settings from 100 Hz to 400 kHz • Blockwise data transfer for all CBW settings

17.3.7 Multi-Channel Power

Measurement principle	Spectrum analysis, followed by Channel Power evaluation
Number of channels	1 to 500, to be defined on instrument or by IDA Tools PC software
Channel band width CBW, (-3 dB nominal)	Individually selectable for each channel, from 40 Hz to 6 GHz
Roll-off factor	$< 4 \times \text{RBW} / \text{CBW}$
Applied RBW	<ul style="list-style-type: none"> • Automatic: Frequency range of channel divided by 4 but not more than 20 MHz. • Manually: Can be set in the range of available RBWs of spectrum analysis, but not more than CBW of channel divided by 4. • Individual: separately defined for each individual service minimum service bandwidth divided by 4 (Other needs to be off)
Name of channel	<ul style="list-style-type: none"> • User definable, maximum 15 characters • Automatic creation of communication channel lists by PC software. Channel name is assigned automatically.
Detection	Root mean square value (RMS), integration time = $1 / \text{RBW}$
Trace, RBW	See spectrum analysis mode
Display: Table view	<ul style="list-style-type: none"> • Channel name, corresponding frequency band, measurement result, RBW if set individually for each channel. • Sort function according to columns.
Display: Bar graph view	Bar graph for measurement result of each channel.
Noise threshold	<ul style="list-style-type: none"> • Selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor. • Measurement values below the threshold are shown as “< absolute threshold value”.

17.4 Antenna handle and antennas

17.4.1 Antenna handle

Frequency range	<ul style="list-style-type: none"> • 9 kHz to 6 GHz • Frequency response correction is applied automatically when used in conjunction with the IDA basic unit.
Preamplifier	<ul style="list-style-type: none"> • Built in, can be switched off • Amplification 20 dB, noise figure < 6 dB
Compass	<ul style="list-style-type: none"> • Embedded electronic compass, Azimuth uncertainty < 1.5° RMS (typ.) for tilt < 15° • Pitch- and roll uncertainty < 3° RMS (typ.) in the range of $\pm 30^\circ$ (RMS means the standard deviation of the specified error)
Connection cable to IDA basic unit	RF cable and control cable combined in a flexible tube, length of 1 meter

RF connector to basic unit	N-connector, male, 50 Ω
RF connector to Narda directional antennas	BMA 50 Ω , (female on handle side)
Antenna connectivity	Narda antennas can be plugged in with horizontal and vertical polarization. Type of antenna and polarization detected automatically and transferred to basic unit.
Power supply	From basic unit
Mounting	Connecting thread on the underside of the handle for tripod mounting.

17.4.2 Directional Antenna 1 (3100/11)

Frequency range	20 MHz to 250 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Loop antenna
Antenna factor	21 dB (1/m) typical @ 200 MHz

17.4.3 Directional Antenna 2 (3100/12)

Frequency range	200 MHz to 500 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Dipole antenna
Antenna factor	21 dB (1/m) typical @ 350 MHz

17.4.4 Directional Antenna 3 (3100/13)

Frequency range	400 MHz to 6 GHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Log-periodic antenna
Antenna factor	18.5 dB (1/m) typical @ 500 MHz

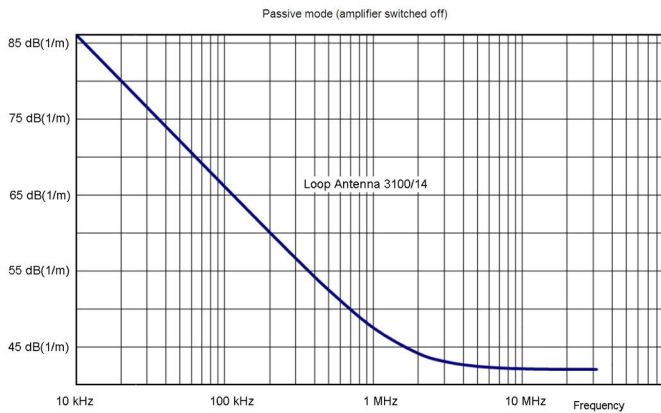
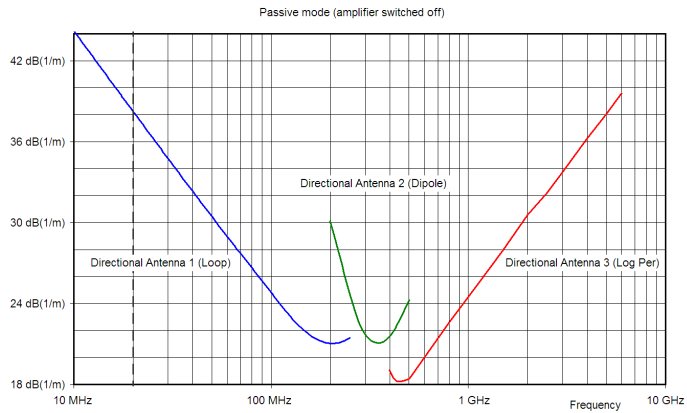
17.4.5 Loop Antenna, H field (3100/14)

Frequency range	9 kHz to 30 MHz Typical antenna factor correction is applied automatically when used in conjunction with the IDA basic unit and Narda Active Antenna Handle
Antenna type	Shielded loop antenna
Antenna factor	66.0 dB (1/m) typical @ 100 kHz 47.5 dB (1/m) typical @ 1 MHz 42.0 dB (1/m) typical @ $f > 10$ MHz

17.4.6 General specifications

Operating temperature range	-10 °C to +50 °C
Compliance	
Climatic	<ul style="list-style-type: none"> Storage: 1K3 (IEC 60721-3) extended to -10 °C to +50 °C Transport: 2K4 (IEC 60721-3) Operating: 7K2 (IEC 60721-3) extended to -10 °C to +50 °C
Mechanical	<ul style="list-style-type: none"> Storage: 1M3 (IEC 60721-3) Transport: 2M3 (IEC 60721-3) Operating: 7M3 (IEC 60721-3)
EMC	<ul style="list-style-type: none"> Complies with EMC Directive 2014/30/EU (previously 2004/108/EC) and EN 61326-1: 2013 Immunity: IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 Immunity at least 100 V/m for the handle with antenna (limited by the max. permissible field for the antennas, Preamp: Off) Emissions: IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
Safety	Complies with European Low Voltage Directive 2014/35/EU (previously 2006/95/EC) and EN 61010-1: 2010
Air humidity	$< 29 \text{ g/m}^3$ ($< 93 \% \text{ RH}$ at +30 °C)
Dimensions, weight	
Active Antenna Handle (dimensions without cable)	Length: 165 mm, width: 165 mm, height: 43 mm Weight: 470 g / 1.04 lbs
Directional Antenna 1	Length: 325 mm, width: 255 mm, height: 80 mm Weight: 400 g / 0.88 lbs
Directional Antenna 2	Length: 285 mm, width: 410 mm, height: 43 mm Weight: 300 g / 0.66 lbs
Directional Antenna 3	Length: 478 mm, width: 332 mm, height: 50 mm Weight: 350 g / 0.77 lbs
Loop Antenna 3100/14	Length: 430 mm, width: 370 mm, height: 42 mm Weight: 380 g / 0.84 lbs
Country of origin	Germany

17.4.7 Antenna factors (typical)



17.4.8 Antenna characteristics (typical)

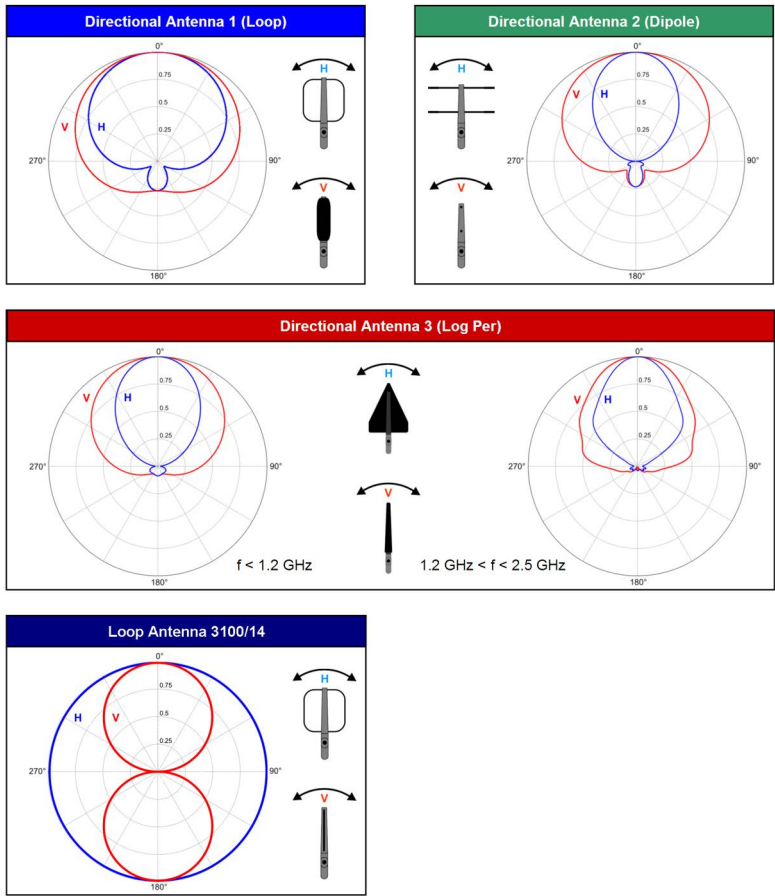


Figure 57: The directional characteristics shown apply for a Horizontal Scan and vertical (V) or horizontal (H) polarization.

17.5 Declaration of Conformity

Hereby, Narda STS declares that this equipment is in compliance with the directives 2014/30/EU, EN 61326-1:2013, 2014/35/EU, EN 61010-1:2010, and 2011/65/EU.

⇒ The full text of the EU declaration of conformity is available at www.narda-sts.com.

18

Annex

This chapter describes how to use a directional antenna properly.

- 18.1 Holding and panning the directional antenna properly (page 266)**
- 18.2 Determining the polarization plane (page 269)**
- 18.3 Horizontal Scan in practice (page 269)**

18.1 Holding and panning the directional antenna properly

Proper use of the antenna is a major factor in obtaining reliable measurement results. Correctly holding the antenna and panning it (turning it about the directional axis or azimuth) prevents inaccuracies in the measurement and achieves reproducible results.

18.1.1 Proper holding

There is a position sensor built in to the antenna handle as well as the electronic compass. The sensor measures the elevation angle and the polarization angle of the antenna. While the elevation and polarization can provide important information for determining the direction of the signal source when taking bearings manually (Manual Bearing), the elevation and polarization angles need to be kept constant during panning when performing a Horizontal Scan. The polarization and elevation angles should be as close to 0° as possible.

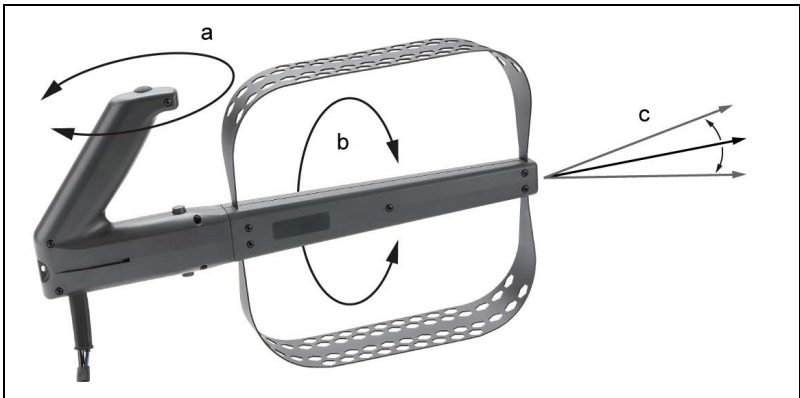


Figure 58: Correct alignment of the antenna for Horizontal Scan:

- a = azimuth
- b = polarization
- c = elevation

Visual check (Azimuth uncertain)

The elevation and polarization are monitored continuously during a Horizontal Scan. If an angle of 15° is exceeded, the display indicates **Azimuth uncertain** to warn you that the bearing result may be impaired.

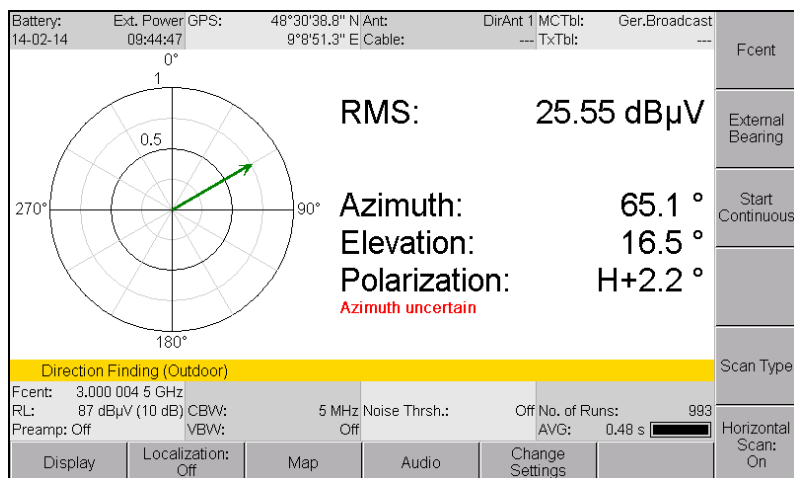


Figure 59: **Azimuth uncertain** indicates that the antenna is not being held properly. In this example, the elevation angle is much too high at 18.5° .

Audible check (Tone Search)

In addition to the **Azimuth uncertain** indicator, you can activate an audible check (**Tone Search**) similar to the park distance control system in an automobile. Deviations from the ideal central position are signaled by an intermittent tone that changes to a continuous tone as the angle increases.

- $\pm 7.5^\circ$ to $\pm 15^\circ$: intermittent sound
- $\geq 15^\circ$ and $\leq -15^\circ$: continuous sound

To activate tone search:

- ✓ The **Direction Finding** menu is selected.
- 1. Press the **Audio** softkey, then press the **Tone Search** softkey.
- 2. Select **Leveling** using the rotary control knob and press **OK** to confirm.
 - ↳ Tone Search is activated.

18.1.2 Panning speed

To ensure that reliable results are obtained for a Horizontal Scan, the antenna must be slowly and steadily panned as well as being kept horizontal. As a general rule, **panning through 360° should take at least 20 seconds** (AVG of 0.48 s). If you pan the antenna too quickly, the bearing will be falsified by the averaging time and deviations between the signal level and the corresponding compass data. Ideally, panning should be in a smooth line without interruptions. In the same way as when the elevation and polarization angles are exceeded, **Azimuth uncertain** is displayed to indicate that the result is too inaccurate if you pan the antenna too quickly.

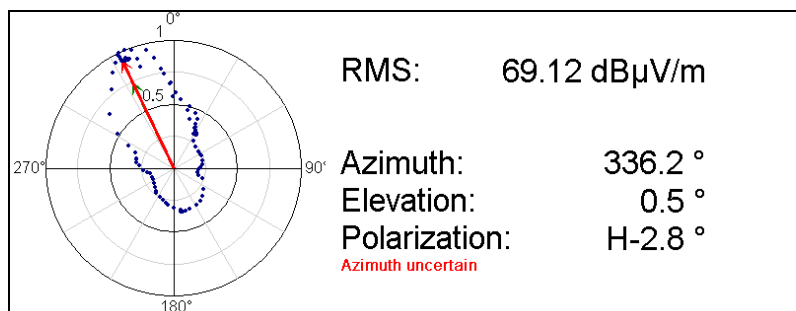


Figure 60: Panning was too fast. There are large gaps between the blue measurement points, so the display shows Azimuth uncertain.

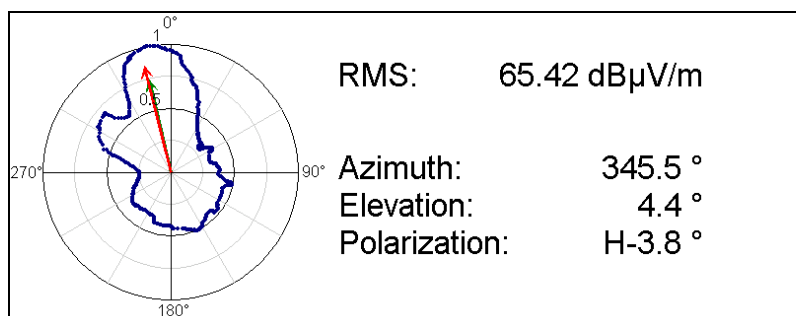


Figure 61: Panning was slow and steady. The blue measurement points are close together over the entire measurement curve.

NOTE: A new measured value is recorded and displayed on the polar diagram every 120 ms in Horizontal Scan Continuous mode. This represents 167 values spaced less than 0.5° apart in a full rotation (360°) taking 20 seconds.

18.2 Determining the polarization plane

You should determine the correct polarization plane before you take bearings on transmitters and record measurement values. This will give you more exact values and more reliable results. The measuring system cannot warn you that the polarization plane is incorrect because this only results in a reduction of the signal level.

To determine the correct polarization plane:

1. Pan the antenna until the signal maximum is displayed.
2. Tip the antenna by 90° : The maximum signal strength is displayed when the polarization is correct.
3. If necessary, change the position of the antenna module in the holder.

18.3 Horizontal Scan in practice

A Horizontal Scan results in a polar diagram that displays the measured signal strength over a 360° angle. In the ideal situation, i.e. a transmitter of constant output power level without any reflections, the polar diagram would show the directional characteristics of the antenna. In such cases, the bearing can be determined very easily from the signal maximum.

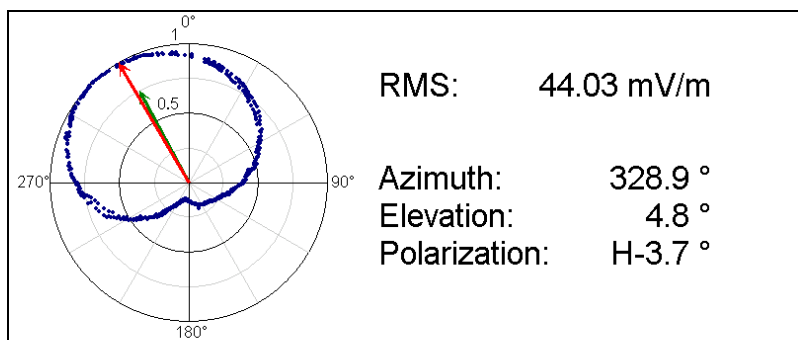


Figure 62: Ideal Horizontal Scan situation: The polar diagram shows the directional characteristic of the antenna. Interpretation is easy; the bearing of the signal source can be determined without problems.

In reality, a large number of reflections are superimposed on the actual signal, making the polar diagram difficult to interpret. Such reflections occur due to natural changes in ground level, large metal objects such as vehicles, and street canyons. In most cases, though, automatic evaluation of the polar diagram to determine the bearing will lead to the correct result.

In particularly complex situations it is possible that the automatic evaluation will not give any plausible results. You can intervene at any time and correct the bearing manually, however (see *Horizontal Scan and manual determination* on page 138).

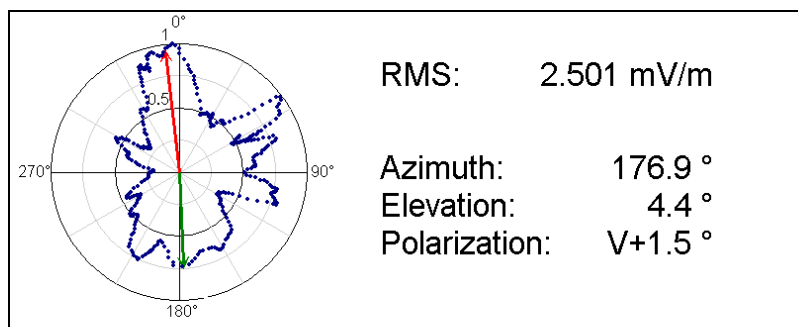


Figure 63: Multiple reflections make interpretation of the polar diagram difficult: The calculated bearing (arrow pointing upwards) seems plausible in view of the shape and level.

19

Glossary

The meanings of terms and abbreviations are explained in this chapter.

Term or Abbreviation	Meaning	Function / Explanation
AM	A mplitude m odulation	Modulation method (used for radio broadcasting, for example).
Atten	Attenuator <i>Attenuator</i>	Attenuators are used to adjust signal levels. A high measurement dynamic range can be achieved in a signal analyzer by correctly choosing the input attenuation. The finely spaced setting for the IDA-3106 is coupled with the reference level RL setting.
BFO	B eat F requency O scillator <i>Beat Frequency Oscillator</i>	The beat frequency oscillator is used to correct the frequency offset of a demodulated signal. This is particularly useful for carrierless single sideband modulated signals (LSB, USB) where there is no exact frequency reference.
BW	B andwidth	The bandwidth is the width of the frequency spectrum used to transmit data.
CBW	C hannel b andwidth <i>Channel bandwidth</i>	Steep edged channel filters that give a high degree of channel separation are used to select individual channels.
CW	C ontinuous w ave <i>Continuous wave</i>	Constant signal characterized by constant amplitude and frequency. Can be selected as the demodulation type for clocked carrier signals (Morse signals).
Detector	Detector	A detector captures the measured values, e.g. as peak values (+Peak , -Peak) or average values (RMS). Detectors are mostly used to compress the data, i.e. the number of data points is reduced.
DGPS	Differential GPS	Method of increasing the accuracy of GPS navigation by transmitting correction data (path and time system).
DVB-T	D igital V ideo B roadcasting T errestrial	Terrestrial digital transmission of television signals.
Fcent	Center frequency	Center frequency in a frequency range. Also called the tuning frequency of a receiver or for receiving the signals from individual channels.
FM	F requency m odulation	Modulation method.
Fmax/Fstop	Upper limit frequency	Highest frequency in a frequency range.
Fmin/Fstart	Lower limit frequency	Lowest frequency in a frequency range.
Fspan	Frequency span (range)	Frequency band centered about the center frequency Fcent .

Term or Abbreviation	Meaning	Function / Explanation
Full Span	Full bandwidth	All frequency values set using Fcent/Fspan or Fstart/Fstop are reset to the maximum possible frequency range that is defined by the antenna connected, by the cable used, or by the IDA-3106 itself.
GPS	Global Positioning System <i>Global positioning system</i>	The global positioning system is a satellite navigation system developed by the US Ministry of Defense that is used to determine positions and to measure time throughout the world.
GPRS	General Packet Radio Service	Packet-switched service used for data communications in GSM networks.
GSM	Global System for Mobile Communications	Standard for fully digital mobile telecommunications networks; mainly used for telephony but also used for circuit- and packet-switched data communications.
I/Q data	–	Recording an I/Q demodulated signal enables the reconstruction and analysis of signal characteristics of any complexity. The RF signal is represented by the components I and Q, resulting from the complex output signal of a base-band demodulation (I/Q demodulation). <ul style="list-style-type: none"> • I data: Real part (In-phase) • Q data: Imaginary part (Quadrature-phase)
LSB	Lower Side Band <i>Lower side band</i>	The lower of the two sidebands that occur through amplitude modulation.
Magnetic Declination	Magnetic declination	Describes the angle between the geographic (true) and the magnetic North and is used to correct the compass reading at a given location. You can find the declination values for any location at (e.g.): http://www.magnetic-declination.com
Pavg	Power Average <i>Average power</i>	Average value of the power. Pavg corresponds to the Time Domain Power measurement.
Ppeak	Power Peak <i>Peak power</i>	Peak value of power

Term or Abbreviation	Meaning	Function / Explanation
RBW	Resolution bandwidth <i>Resolution bandwidth</i>	Signal selectivity. Only signals having a frequency spacing that is greater than the defined resolution bandwidth can be distinguished from one another. The RBW selected for measuring signals having very close frequency spacing must be correspondingly small. A larger resolution bandwidth can be used for measuring wideband signals. <ul style="list-style-type: none">• The indicated level will be too low if the RBW is too small.• Individual signals cannot be separated from one another if the RBW is too big.
RL	Reference Level <i>Reference Level</i>	Parameter that determines the drive range and sensitivity of the instrument. This parameter sets the input attenuator among other things. Signals below the reference level can be measured without clipping. Smaller reference levels reduce intrinsic noise and yields increased sensitivity.
RMS	Root Mean Square <i>Root Mean Square</i>	The root mean square is an average value formed by taking the square root of the average of the sum of the squares of the individual values, e.g. when measuring high frequency electromagnetic fields. It corresponds to taking the linear average of power densities.
Spectrogram	Spectrogram	A spectrogram is used to display the variation in the signal strength of a spectrum versus time. The recorded spectrums are shown as lines. Different signal levels are represented by different colors. This enables changes in the spectral distribution to be seen rapidly.
Squelch	Noise suppression	Squelch is frequently used in walkie-talkies to suppress the noise during pauses in speech and transmission. The squelch threshold value is settable.
Trace	Measurement curve	The trace display can be altered using arithmetical functions. Depending on the selected trace type, minimum or maximum values can be held, or curves averaged. The number of data points is not changed by this.
USB	Upper Side Band <i>Upper side band</i>	The higher of the two sidebands that occur through amplitude modulation.

Term or Abbreviation	Meaning	Function / Explanation
UTC	Universal Time Coordinated <i>Coordinated universal time</i>	The primary standard used to express time throughout the world. The zero meridian is used as the reference (Greenwich Mean time UTC ± 0). Time zones are expressed as differences from UTC (UTC -12 to UTC +14). The precise UTC time can be received e.g. by navigation satellites.
VBW	Video bandwidth <i>Video bandwidth</i>	The VBW is used to smooth the signals, particularly to reduce the noise. The selected VBW influences the sweep time. The smaller the VBW selected, the more the noise will be smoothed but the longer the sweep time will be.
WAV	Wave file format	The WAV file format is a container format for saving audio data, which can contain compressed audio data in addition to the uncompressed PCM raw data. It is the de facto standard for storing audio data on MS Windows based PC systems.
WGS84	World Geodetic System 1984	WGS84 is a geodesy (ground survey) system introduced by the USA with satellite navigation in 1984. WGS84 covers both the reference point as well as the ellipsoid and is the geodetic basis for GPS.
WiMax	Worldwide Interoperability for Microwave Access	Radio system conforming to IEEE Standard 802.16 for fixed systems (e.g. radio links) as well as for use with portable devices.
WLAN	Wireless Local Area Network	Wireless local area network conforming to the IEEE-802.11 standard.

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Narda Safety Test Solutions GmbH

Sandwiesenstrasse 7
72793 Pfullingen, Germany
Phone +49 7121 97 32 0
info@narda-sts.com

Narda Safety Test Solutions

North America Representative Office
435 Moreland Road
Hauppauge, NY11788, USA
Phone +1 631 231 1700
info@narda-sts.com

Narda Safety Test Solutions GmbH

Beijing Representative Office
Xiyuan Hotel, No. 1 Sanlihe Road, Haidian
100044 Beijing, China
Phone +86 10 6830 5870
support@narda-sts.cn

www.narda-sts.com