PROWATCH *Neo* +
PROWATCH *Neo* 2

TV AND SATELLITE ANALYZER

PROMAX

SAFETY NOTES

Read the user's manual before using the equipment, mainly "**SAFETY RULES**" paragraph.

The symbol ⚠ on the equipment means "**SEE USER'S MANUAL**". In this manual may also appear as a Caution or Warning symbol.

WARNING AND CAUTION statements may appear in this manual to avoid injury hazard or damage to this product or other property.

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ELECTRONIC MANUAL VERSION

You can access instantly to any chapter by clicking on the title of the chapter in the table of contents.

Click on the arrow ⬅ at the top right page to return to the table of contents.

At Index, click on page number to access the subject.

Click on the **link** or scan the **QR code** inside de video boxes ▶ in order to play a tutorial video.

USER'S MANUAL VERSION

Manual Version	Web Published Date	Firmware Version
F6.0	March 2025	31.10

■Please update your equipment to the latest software version available (for more details refer to <u>"NetUpdate Connection" on page 245</u>). Ask PROMAX for the update file if the server is not available.

■This user's manual describes operation for models **PROWATCH *Neo* +** and **PROWATCH *Neo* 2**. Differences between them are specified by an asterisk (*) and in certain sections explicitly.

■Screen captures of current manual are from the **PROWATCH *Neo* 2**.

WHAT'S NEW on manual F6

- Update: New specifications for the RF Aux option ("► Fibre Optics" on page 269).
- New: The "Advanced FM + basic DAB" option now is also available for PROWATCH Neo + ("ADVANCED FM OPTION+ BASIC DAB" on page 301).
- New: Tool **FM MPX over time** for Advanced FM ("MPX FM measurements over time" on page 305).
- Improvement: The frequency input via virtual numeric keypad allows more than two decimal places ("In case of tuning by frequency:" on page 58).
- Improvement: Channel editing in WebControl allows more than two decimal places ("► Channel Plan Creator Operation" on page 223).
- Others: Other minor updates and improvements.

> **NOTE:** For changes details in previous versions of the user's manual please refer to the annex "PREVIOUS VERSIONS OF USER'S MANUAL" on page 329

SAFETY RULES

* The safety could not be assured if the instructions for use are not closely followed.

* Use this equipment connected only to systems with their negative of measurement connected to ground potential.

* The AL-103 external DC charger is a Class I equipment, for safety reasons plug it to a supply line with the corresponding ground terminal.

* This equipment can be used in Overvoltage Category I installations and Pollution Degree 2 environments.

* External DC charger can be used in Overvoltage Category II, installation and Pollution Degree 1 environments.

* When using some of the following accessories use only the specified ones to ensure safety:

   ■ Power cord

* Observe all specified ratings both of supply and measurement.

* Remember that voltages higher than 70 V DC or 33 V AC rms are dangerous.

* Use this instrument under the specified environmental conditions.

* When using the power adaptor, the negative of measurement is at ground potential.

* Do not obstruct the ventilation system of the instrument.

* Use for the signal inputs/outputs, specially when working with high levels, appropriate low radiation cables.

* Follow the cleaning instructions described in the Maintenance paragraph.

SAFETY SYMBOLS

----	DIRECT CURRENT		|	ON (Supply)
	ALTERNATING CURRENT		○	OFF (Supply)
	DIRECT AND ALTERNATING		▣	DOUBLE INSULATION (Class II protection)
	GROUND TERMINAL		⚡	CAUTION (Risk of electric shock)
	PROTECTIVE CONDUCTOR		⚠	CAUTION REFER TO MANUAL
	FRAME TERMINAL			FUSE
	EQUIPOTENTIALITY		♲	EQUIPMENT OR COMPONENT TO BE RECYCLED

DESCRIPTIVE EXAMPLES OF OVER-VOLTAGE CATEGORIES

* **Cat I**: Low voltage installations isolated from the mains.

* **Cat II**: Portable domestic installations.

* **Cat III**: Fixed domestic installations.

* **Cat IV**: Industrial installations.

TABLE OF CONTENTS

MONITORING SYSTEM
PROWATCH *Neo* +
PROWATCH *Neo* 2

1 INTRODUCTION

1.1 Description

The new **PROWATCH** *Neo* is a monitoring system oriented to supervise radio and TV signals that covers the most popular broadcasting standards for satellite, cable and terrestrial (DVB, ISDB-T...). It also monitors IPTV, TS (over ASI) or WiFi signals. It also supports formats such as MPEG-2, MPEG-4, HEVC... and Dolby audio

The equipment can be controlled in local mode with a keyboard and screen connected to the USB and HDMI ports. It also allows remote connection through the Ethernet port using the webControl software developed by PROMAX.

The webControl system allows remote access from any personal computer, tablet or mobile phone through a standard internet browser and with no need to install any additional software. This system emulates the portable meter using the Console tool, which allows the user to interact with the equipment as if it was in his hands. It also has other exclusive functions such as setting and monitor alarms.

This equipment is also SNMP compatible, letting it be part of any SNMP manager system already in use by the network operator. Building a monitoring network with the **PROWATCH** *Neo* is easy, just adding as many remote stations as required.

The **PROWATCH** *Neo* belongs to the **RANGER** *Neo* platform, on which the latest generation of PROMAX field strength meters are based. **RANGER** *Neo* equipment integrates the latest technological innovations and is constantly evolving by developing applications and improvements according to new demands and needs on the market.

Figure 1.

Besides the basic functions of TV meter and spectrum analyzer for terrestrial and satellite band, it provides additional tools, such as the detection of LTE signal interferences (some of its working frequencies are close to the TV bands), the diagrams constellations or the echoes detection.

The PROWATCH Neo has an application to manage data generated at each installation. This feature helps the user to manage information generated so he can access it at any time or download it to a PC for further analysis.

The PROWATCH Neo 2 has some extra features than differ from the PROWATCH Neo +. It has a TS-ASI input and output to work with Transport Streams. It also has an IPTV port to measure and decode multicast signal. Finally, it has a 1TB built-in memory for internal storage.

The PROWATCH Neo has been designed and developed entirely in the European Union. A multidisciplinary team of highly qualified professionals has dedicated effort and commitment to the development of a powerful, efficient and reliable tool. During the manufacturing process, all used materials have been subjected to a strict quality control.

In an effort to facilitate its work to professionals, our long experience ensures an after sales quality service, which includes software updates.

Introducing the RANGER NEO family

SCAN

2 SETTING UP

2.1   Package Content

Check that your package contains the following elements:

- **PROWATCH Neo** Monitoring System.
- Mains cord.
- Aero SMA - BNC adapter (female/male).
- Dongle WiFi - USB dual band.
- WiFi 4G/5G dual antenna.
- Jack RCA (4V) cable.
- Quick Reference Guide.

> **NOTE:** Keep the original packaging, since it is specially designed to protect the equipment. You may need it in the future to send the analyzer to be calibrated.

2.2 Equipment Details

2.2.1 PROWATCH Neo +

Figure 2. Front View.

1 Status LED:

- Colour GREEN: In Operation.
- Colour GREEN (blinking): Monitoring Enabled.
- Colour ORANGE: Service Mode.
- Colour ORANGE (blinking): Updating.
- Colour RED: Error.

Figure 3. Rear View.

from left to right:

1 Power Plug.

2 Fuse.

3 On / Off Switch.

4 Ethernet connector for IPTV (according to model).

5 ASI Output (according to model).

6 ASI Input (according to model).

7 Ethernet connector for NetUpdate / Streaming VA / webControl.

8 USB Connector.

9 HDMI™ Output.

10 Video / Audio Input.

11 Access to Service Mode Button.

12 RF Input Connector.

2.2.2   PROWATCH Neo 2

Figura 4. Front View.

from left to right:

1 Status LED:

- Colour GREEN: In Operation.
- Colour GREEN (blinking): Monitoring Enabled.
- Colour ORANGE: Service Mode.
- Colour ORANGE (blinking): Updating.
- Colour RED: Error.

2 Input connector for CAM module.

Figure 5. Rear View.

from left to right:

1 Power Plug.

2 Fuse.

3 On / Off Switch.

4 Ethernet connector for IPTV.

5 ASI Output.

6 ASI Input.

7 1 PPS/10 MHz connector.

8 RF connector for 1-8 inputs (according to model).

9 Ethernet connector for NetUpdate / Streaming VA / webControl.

10 USB connector.

11 HDMI™ Output.

12 Video / Audio input.

13 Access to Service Mode Button.

14 FC/APC optical fibre input connector.

15 RF auxiliary input connector.

2.3 Local / Remote Mode

The equipment can be used in local mode (directly connecting peripherals to the equipment) or in remote mode (through a data network).

► **Operation in Local Mode**

1 Use a HDMI™ standard cable to connect the HDMI™ output to a monitor HDMI™ input (see figure). The image will appear immediately on the monitor screen.

2 Connect a USB hub (**2.0 or lower**) to the USB port (see figure).

3 Connect a keyboard to the USB HUB (do not connect the keyboard directly to the USB port because it will not be recognized).

4 Use the keyboard to move around the user's interface (for more details refer to).
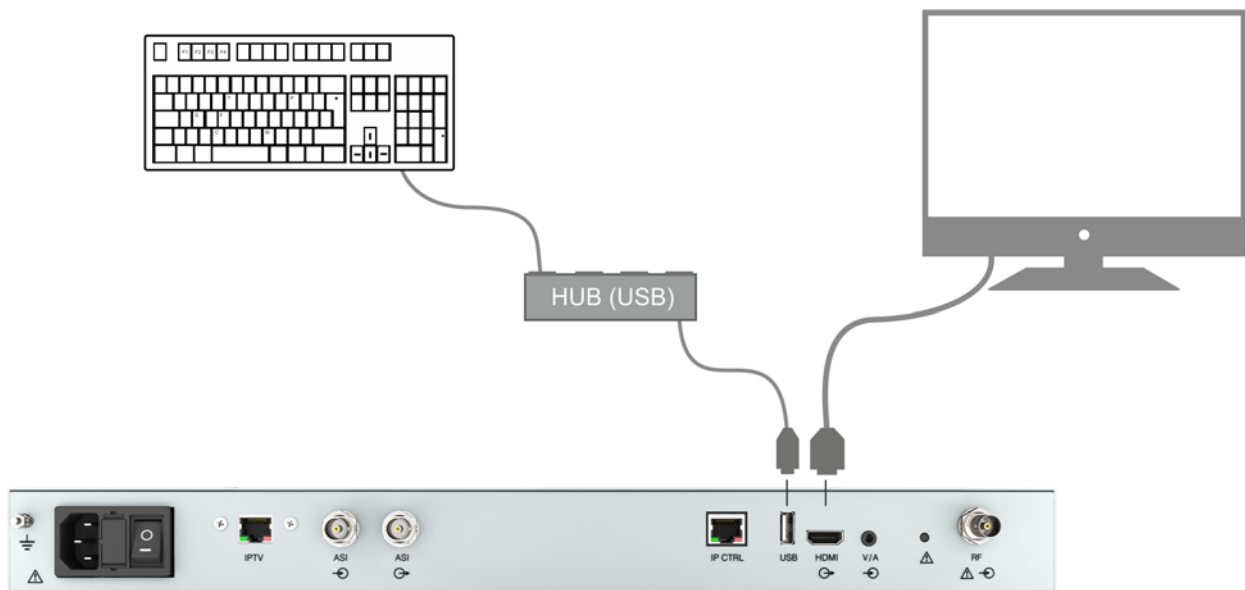
Figure 6. Local Mode Connection

► **Operation in Remote Mode from a Local Network using webControl**

1 Use a ethernet cable to connect the IPCTRL output to your data network.

2 The IP by default is 10.8.8.188*. To change this IP follow instructions on this manual (for more details refer to "Setting / Updating" on page 9).

3 From a remote access device (PC, mobile device) connected to your LAN network run a standard web browser (Chrome recommended).

4 On the address bar write the address to remotely access the equipment.

5 If the connection is successful, it should appear on screen the webControl welcome screen (see figure). This screen shows the equipment model and serial number.

*. IP by default is 10.0.6.198 for firmware versions prior to 26.8
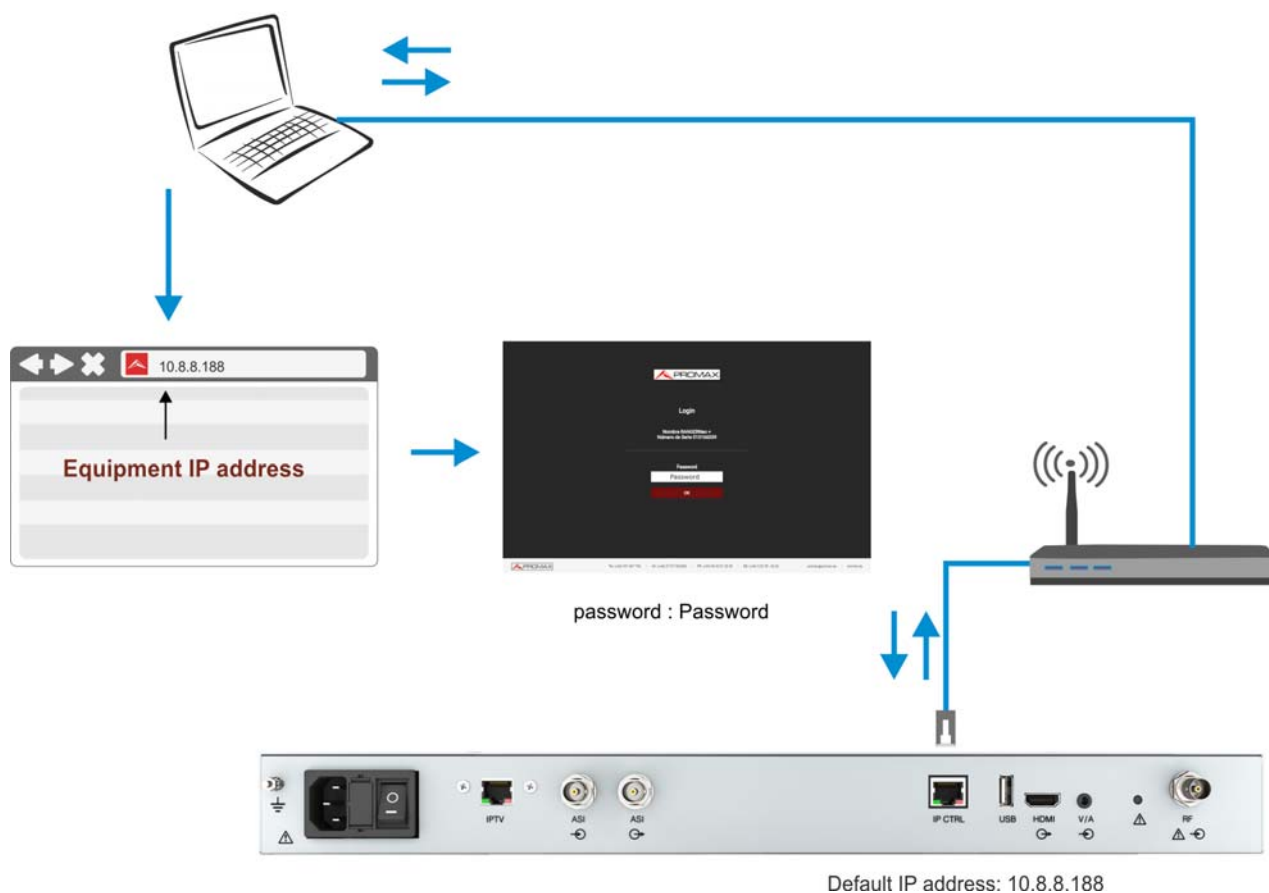
Figure 7. Remote Mode Connection

6 Enter the password and press OK (password by default is **Password**).

7 Refer to the webControl chapter ([_"WEBCONTROL" on page 204_](#)) to know more about this remote control application.

NOTE: There are many ways to connect to the meter from an external network. If you have follow these instructions and you fail to connect the webControl, please contact PROMAX technical assistance and we will help you (promax@promax.es).

2.4   Setting / Updating

2.4.1   Change of Network Settings via PENDRIVE

If you want to change the network settings, follow these steps:

1 Confirm that your equipment is on firmware version 29.9 or higher. If not, update your equipment (for more details refer to <u>"Firmware Updating" on page 11</u>)

2 Create a file text (TXT) with the networks parameters. This file must have these features:

- Name and extension: **PROMAX_IP.txt**

- File content (example):
  > **dhcp:off**
  > **10.0.6.60**
  > **255.255.255.0**
  > **10.0.6.1**

- Explanation of the content:
  > dhcp:off: dhcp:off/on protocol according to status
  > 10.0.6.60: equipment IP
  > 255.255.255.0: Subnetwork mask
  > 10.0.6.1: Gateway

3 Once the TXT with the network parameters is ready, you should copy that file in the root directory of a USB pendrive.

4 Next, put your equipment in SERVICE mode. To do this follow the steps below.

5 Press and hold the service mode button (see number 13 on <u>"Rear View." on page 4</u>). You can use the tip of a paperclip to press this button.

6 Press the power switch and wait a few seconds for the equipment to turn on.

7 Release the service mode button.

8 To verify that you are in service mode, check the led colour is orange.

9 Insert the pendrive with the **PROMAX_IP.txt** file in the USB port of the equipment.

10 Then press the SERVICE mode button again for a time longer than 3 seconds but no longer than 7 seconds.

11 The equipment loads the new network settings and restarts.

12 When the equipment turns on, if the led is green then indicates that it has been successfully configured. If it shows the red colour it indicates that there

has been an error. In this case, repeat the process again and if the problem persists, contact PROMAX.

2.4.2   **Change of Network Settings via WEBCONTROL**

To change the network settings remotely using the webControl application you should follow these steps (for more details refer to):

1 Use an ethernet cable to connect the IPCTRL output from your equipment to a data network. Switch on the equipment.

2 Open a web browser (Chrome advisable) and enter your IP to access the equipment (IP by default is **10.8.8.188**).

3 If it connects, on screen you should see the webControl application.

4 Enter the password (by default is **Password**).

5 Press the icon REMOTE CONSOLE.

6 Press the button START EMULATION.

7 Press 2 seconds on the FOLDER icon to access the PREFERENCES menu.

8 Press the NETWORK tab. From here you can change network settings (IP, subnet mask, gateway, DHCP).

9 Press SAVE and EXIT.

10 Remember when the equipment reboots you must connect with the new IP.

NOTE: The equipment can also be set through the user interface from the equipment in local mode. To access this interface connect a monitor to the HDMI™ port and a keyboard (using a switch USB 2.0 or lower). It shows up the interface on screen. From there, access the **Preferences** option by pressing on the keyboard the key **F** for more than 1 second.

2.4.3   Recommended Settings for Monitoring

Now there is a list with the recommended settings for monitoring. To access these settings press on key PREFERENCES 🗁 for 2 seconds o press the key F on the keyboard for 2 seconds:

- Date & Time: It is important to set date and time in the equipment in order to save monitorings at the proper time and later be able to locate them.
- NTP: It is the time server where the equipment takes date and time reference. It is complementary to Date & Time settings.
- Tools -> Watchdog: Enabled.
- Tools -> Moni. ddbb loc.: Hard drive.
- SMTP -> Set the mail server to receive alarms.
- Equipment -> Company / User: Company and user where alarms are sent.

For more info about settings and preferences refer to the chapter <u>"SETTINGS AND PREFERENCES" on page 41</u>.

2.4.4   Firmware Updating

Time to time firmware updates are published. These updates add some new functions and improve performance. We recommended you to keep your equipment updated.

To update your equipment follow these steps:

1 Switch off the equipment.

2 Press and hold the service mode button (see number 13 on <u>"Rear View." on page 4</u>). You can use the tip of a paperclip to press this button.

3 Press the power switch and wait a few seconds for the equipment to turn on.

4 Release the service mode button.

5 To verify that you are in service mode, check the led colour is orange.

6 Insert a USB flash drive with the update[*] file inside.

7 Then press the service mode button again for a time longer than 10 seconds and release it.

---

*. Request the update file to PROMAX

8 The status led should blink. That indicates it is updating.

9 After updating it restarts.

10 When the equipment turns on, if the LED is green then indicates that it has been successfully updated. If it shows the red color it indicates that there has been an error. In this case, repeat the process again and if the problem persists, contact PROMAX.

> **NOTE:** The equipment can also be updated using the NetUpdate software, which is available for free on the PROMAX website. For more information refer to "NetUpdate Connection" on page 245 or download the NetUpdate manual from the PROMAX website.

2.5 ▌ Navigation

In local mode, the equipment can be operated from a keyboard. With a keyboard you can perform the same actions that using the keys of a conventional portable meter. In local mode mouse is not available.

In remote mode the equipment can be operated using the webControl software that runs from a standard web browser. To use this software you need a keyboard and a mouse or a touch screen.

The arrow cursor on the keyboard (up, down, left, right) and Enter equals the movements that can be made with the joystick of a portable meter (for more details refer to "Arrow Keys" on page 23).

Some keys in the keyboard have the same functions as the 4 softkeys and the 6 shorcut keys in the portable meter (for more details refer to "Shortcut Keys" on page 25).

The mouse cursor can only be used in remote mode from the webControl software. When the mouse clicks on a certain area of the screen it is equivalent to the touch of your finger on the touch screen of a portable meter. In this way with the cursor you can open menus, select frequencies, etc. (for more information refer to "Mouse" on page 14).

The menu navigation includes hints that appear when the cursor is placed on an disabled (grayed) option for a while. These hints help the user to understand why an option is disabled and what to do to enable it.

The following figure and table and the following sections describe the different actions that can be performed with the keyboard and its equivalence with a portable meter.

Figure 8. Equivalent keys on portable meter

Keyboard	Action	Equivalent key on portable meter
Cursor keys	4 directions.	
Enter	It validates selected option.	
Key F (short press)	Access to Installations folder.	
Key F (long press)	Access to Preferences.	
Key C (short press)	Access to General Settings.	
Key C (long press)	Access to Video / Audio Settings.	
Key M	Access to Measurement Mode. Pressing repeatedly provides access to a different view within the same mode.	

Keyboard	Action	Equivalent key on portable meter
Key S	Access to Spectrum Analyzer Mode. Pressing repeatedly provides access to a different view within the same mode.	
Key T	Access to TV Mode. Pressing repeatedly provides access to a different view within the same mode.	
Key P	Screenshot.	
Key F1	Access to F1 softkey menu.	
Key F2	Access to F2 softkey menu.	
Key F3	Access to F3 softkey menu.	
Key F4	Access to F4 softkey menu.	

2.5.1 Mouse

The mouse can only be used in remote mode from the webControl software.

When the cursor clicks on a certain area of the screen it is equivalent to the touch of your finger on the touch screen of a portable meter. In this way, with the cursor you can open menus, select frequencies, etc.

These actions can be done through the touch panel:

- Menu Selection.
- Frequency or Channel Selection.
- Frequency or Channel Scroll.
- Virtual Keyboard Writing.
- Toolbar Access.
- Screen Mode Switch.
- Installation Manager Access.
- One-touch zoom-in.

► **Menu Selection**

User can operate on the menus on screen: drop-down a menu, select an option, accept or exit a message, and so on, just touching on the option.
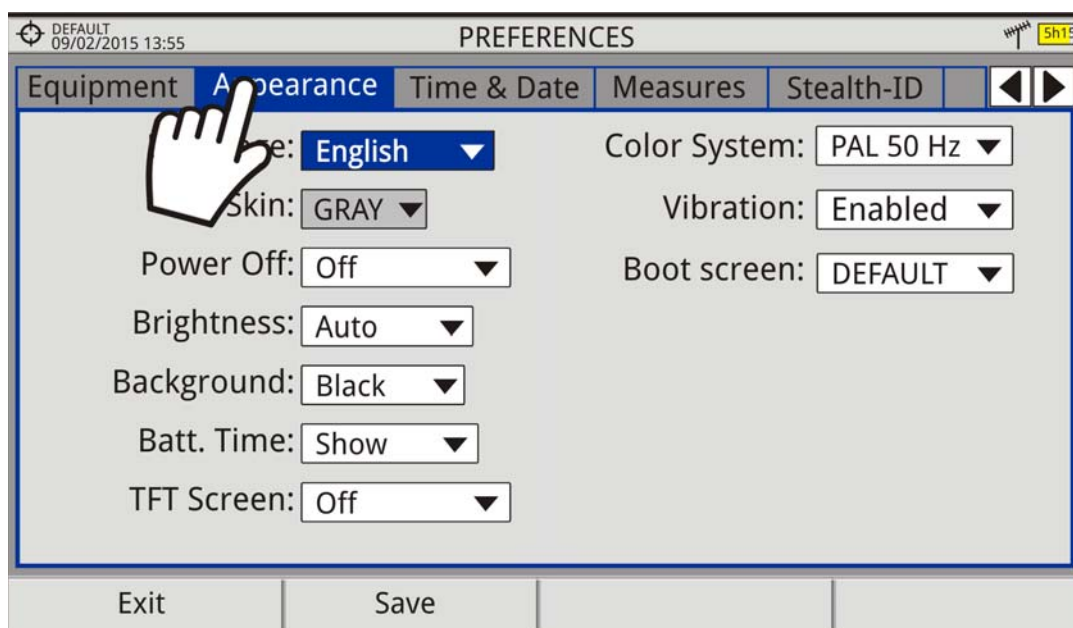
Figure 9.
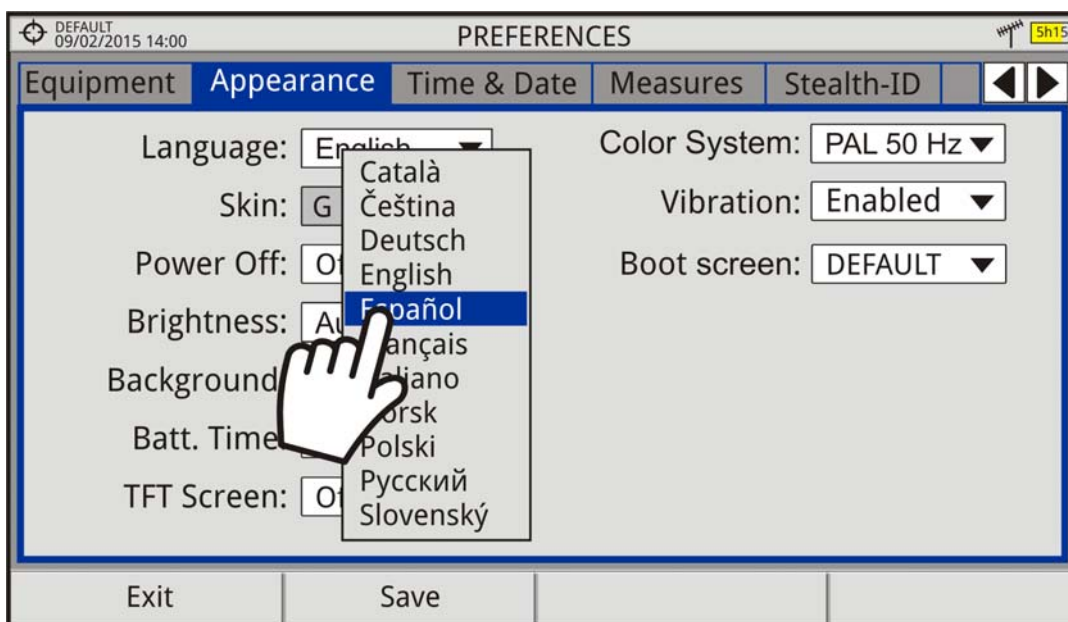
Figure 10.
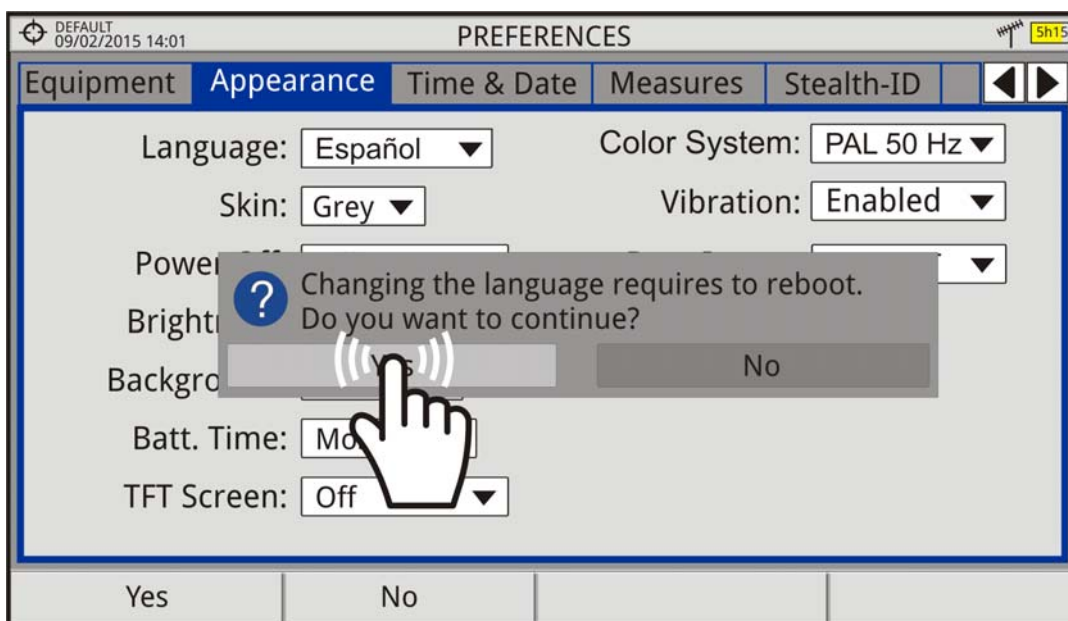
Figure 11.

►**Frequency or Channel Selection**

At the Spectrum Analyzer mode, user can select a channel or frequency by tapping on the frequency or channel.
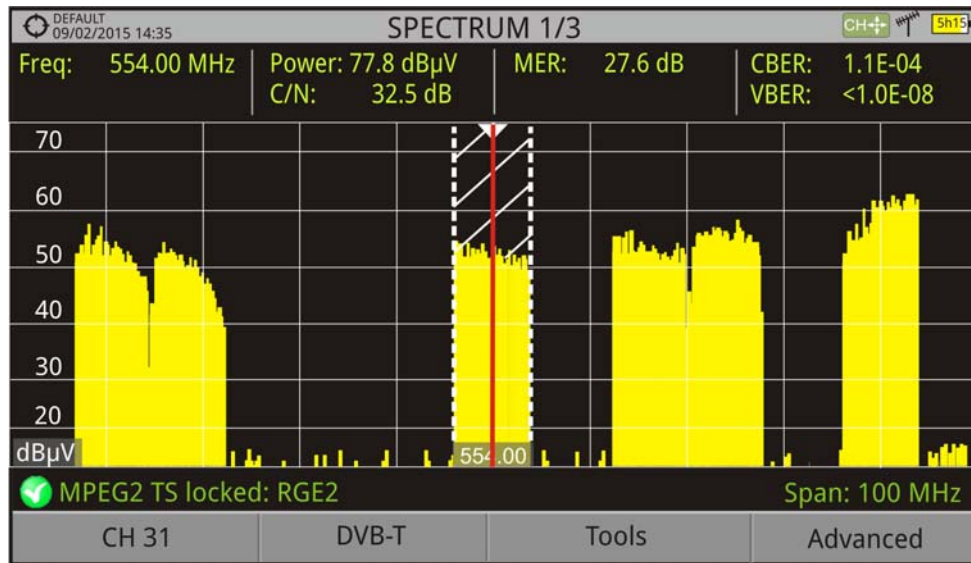
Figure 12. First screen (channel locked).
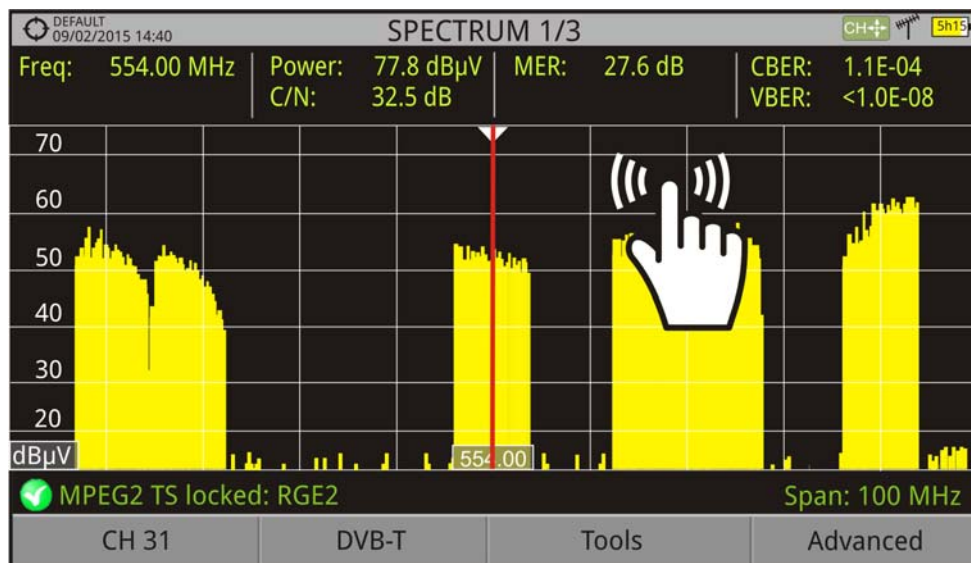
Figure 13. Tap on the new frequency.
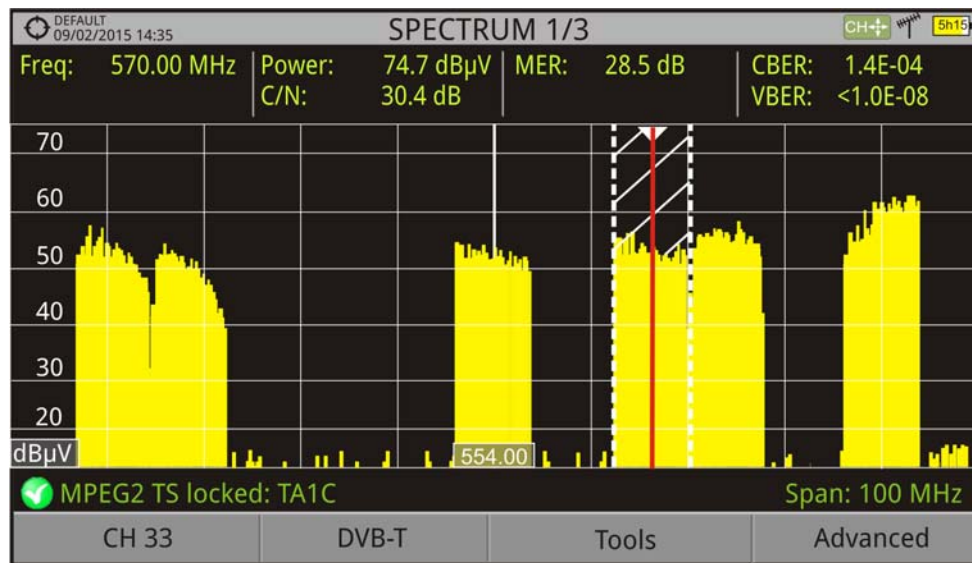
Figure 14. The cursor moves to the frequency.

►**Frequency or Channel Scroll**

At the Spectrum Analyzer mode, user can scroll through frequency or channels by dragging and dropping his finger on the screen.
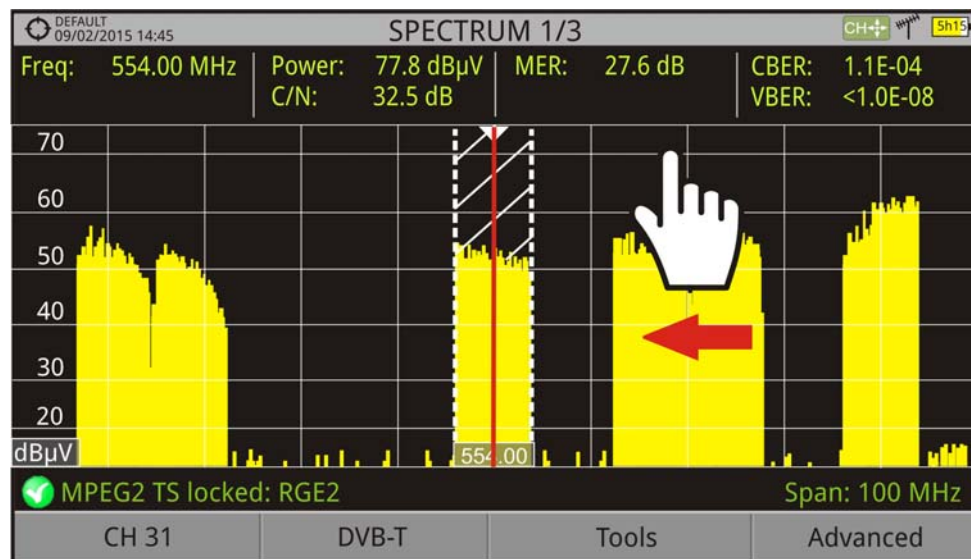
Figure 15. Drag and drop to move along
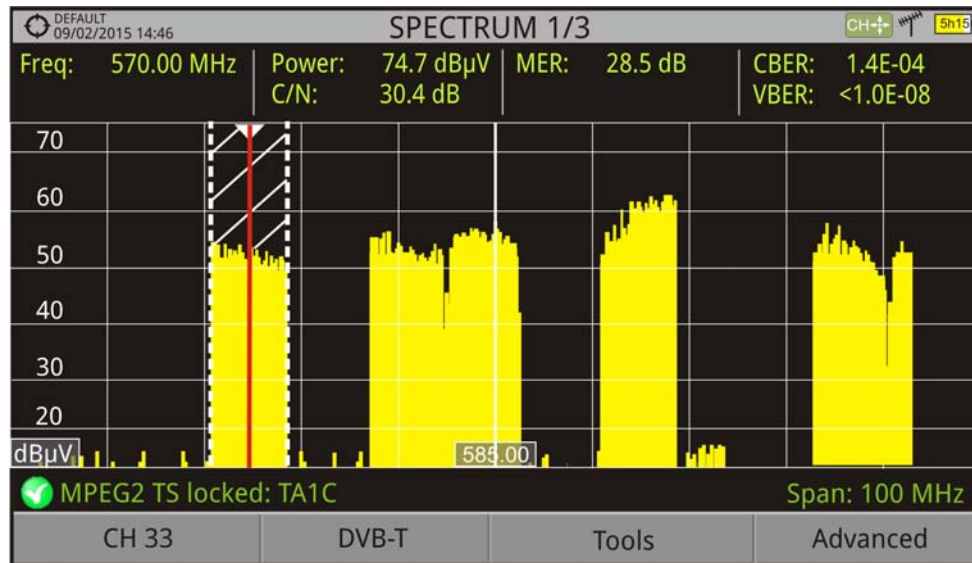
Figure 16.

►**Virtual keyboard/keypad writing**

User can type directly on the on-screen keyboard or keypad.
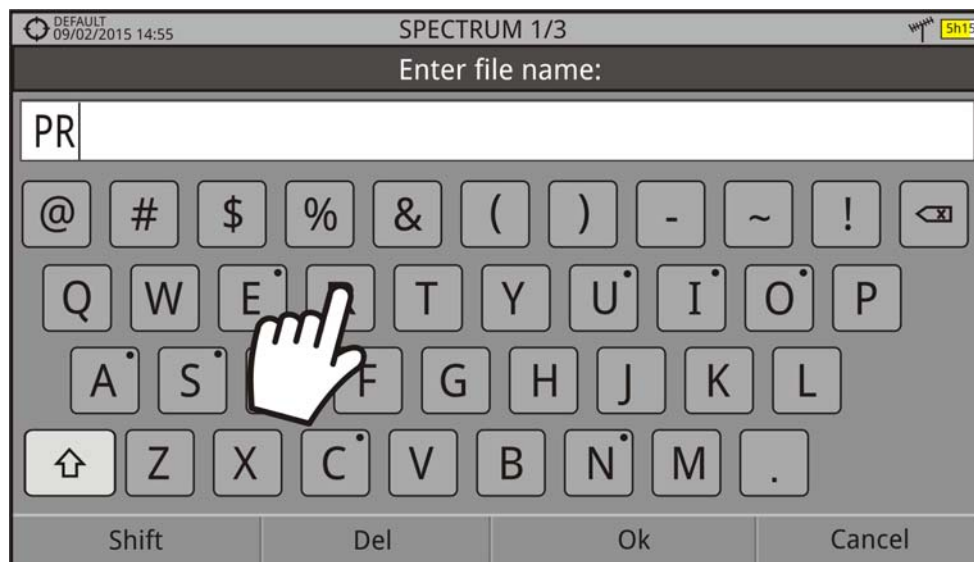
Figure 17.
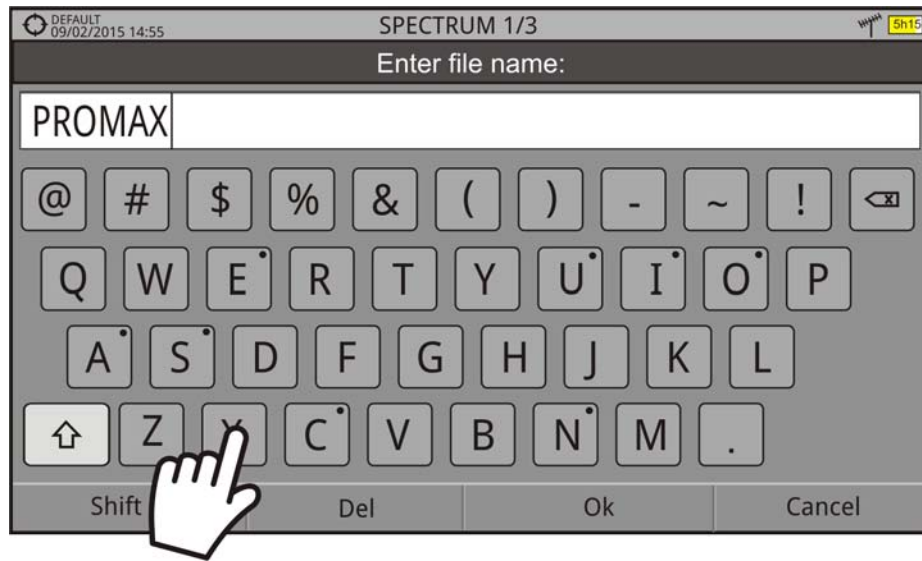
Figure 18.

►**Toolbar Access**

User can access the most important functions through the toolbar by pressing on the right top corner of the screen. It displays a box with several icons to access several functions.
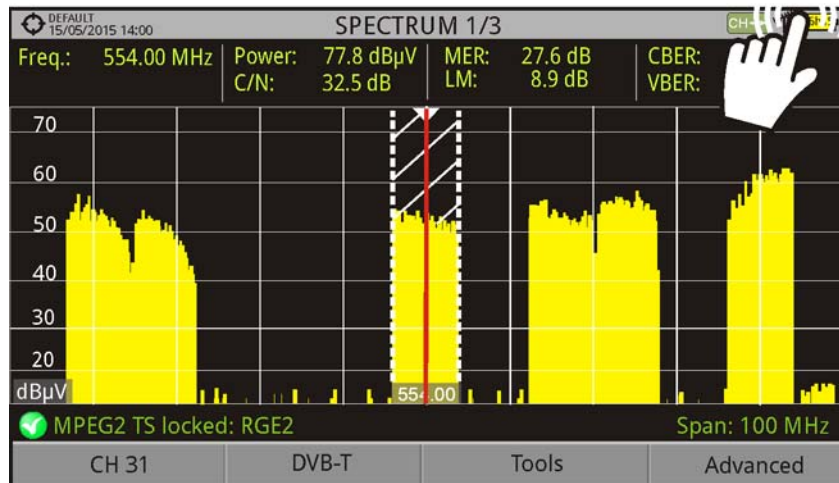
Figure 19.
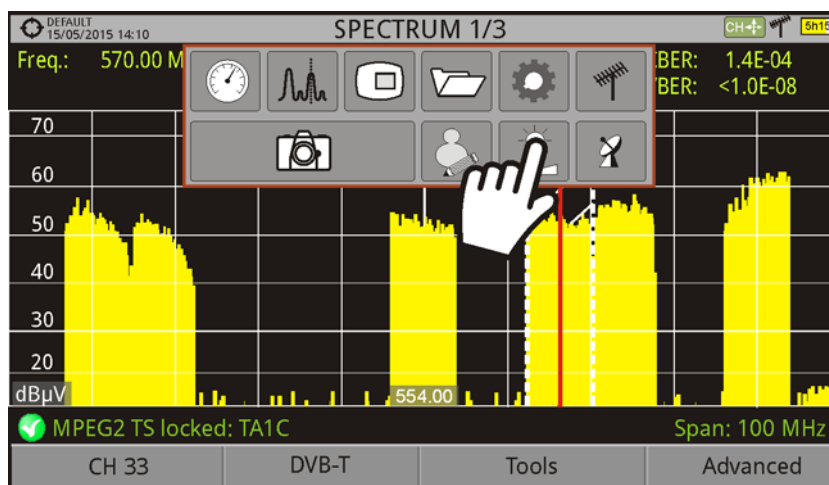
Figure 20.

• Toolbar Icons Description

Measurement Mode   Settings   Video & Audio Settings
Spectrum Analyser Mode   Terrestrial Band   Preferences
TV Mode   Satellite Band   Screen Capture
Installations Management

► **Mode Screens**

User can switch the view of the current mode by pressing on the top center of the screen.
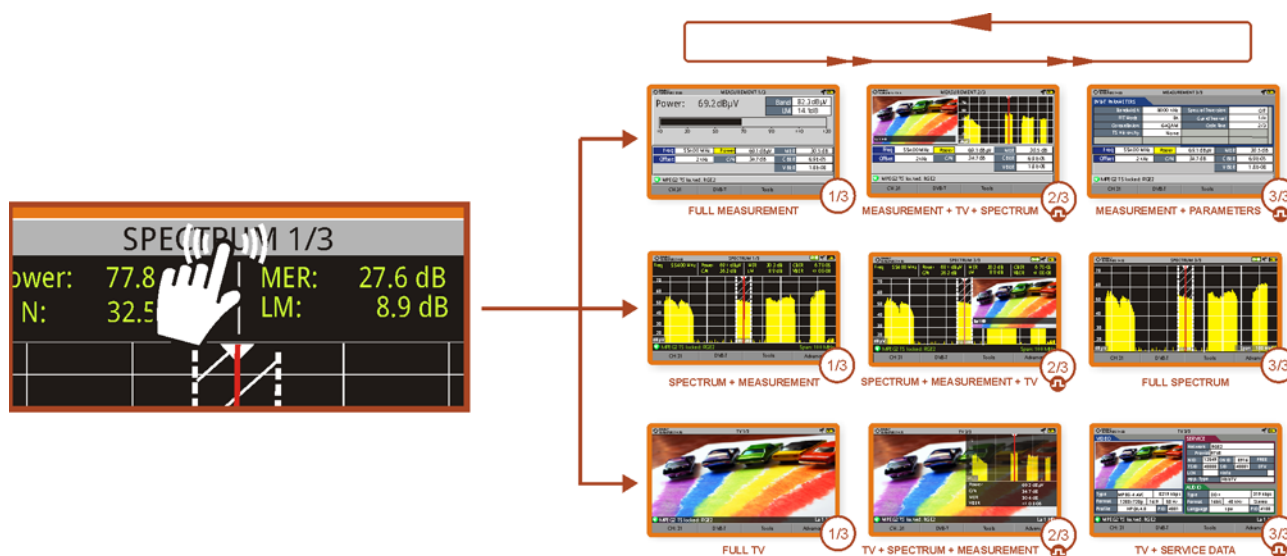
Figure 21.

►Installations Management

User can access data from the current installation by pressing on the left top corner.
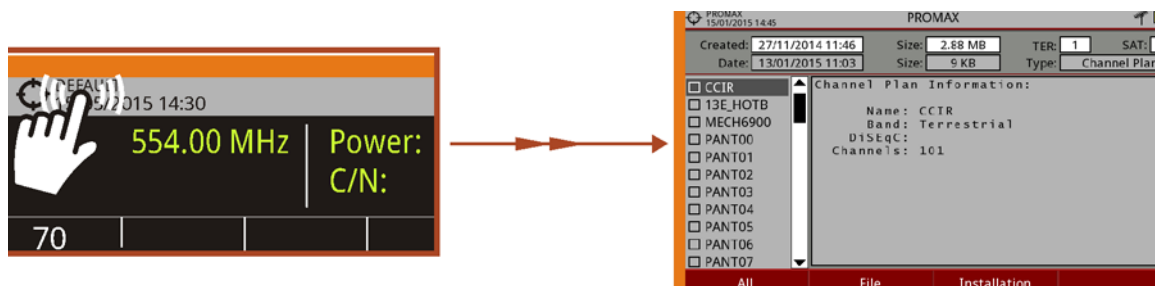
Figure 22.

►One Touch Zoom-in

In a view with different windows (Measurement, Spectrum and / or TV), if the user clicks on one of the windows, he will directly access the corresponding enlarged view.

SPECTRUM+ MEASUREMENT

FULL MEASUREMENT

FULL TV
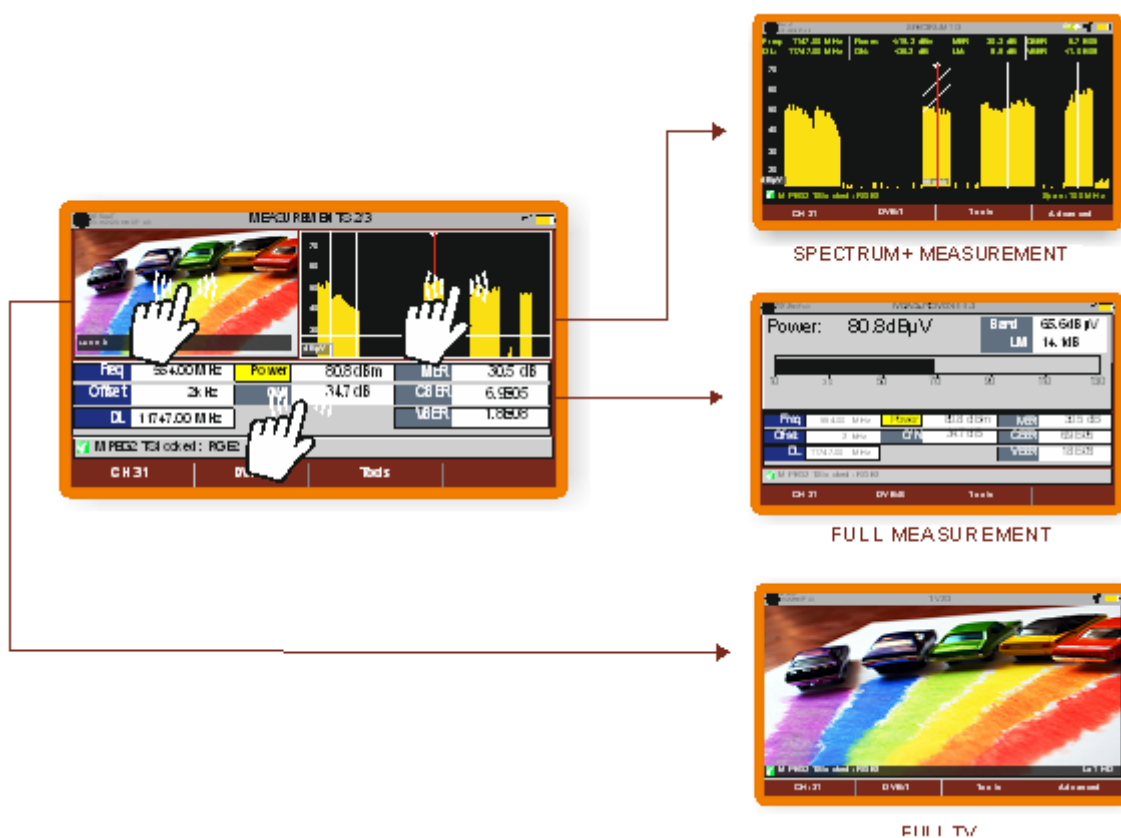
Figure 23.

2.5.2   Arrow Keys

The arrow cursor on the keyboard (up, down, left, right) and Enter equals the movements that can be made with the joystick of a portable meter:

UP   DOWN   LEFT   RIGHT   VALIDATE
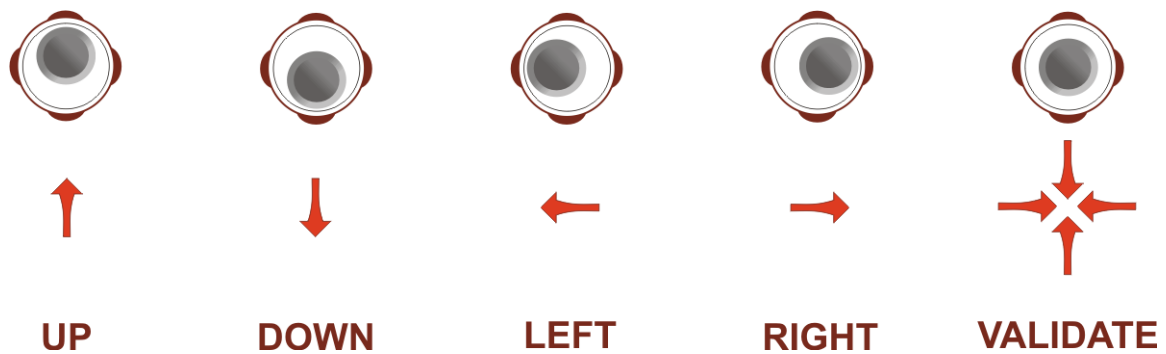
Figure 24. Joystick movements

In some modes or tools, the joystick is multifunctional, that is, each time you press on it (validate), its function changes:

FR / CH
Frequency tuning / Channel tuning

SP
SPAN Change

MK
Marker moving (Marker ON)
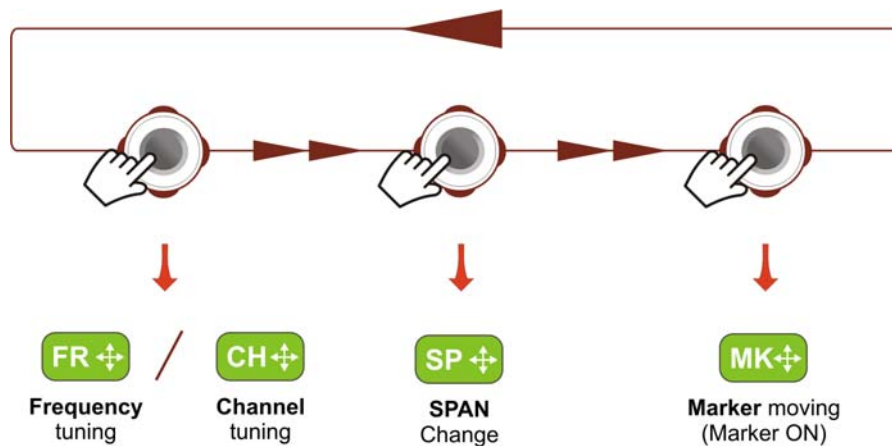
Figure 25. Functions of Joystick in SPECTRUM ANALYZER mode.

The user can see the active function according to the icon that is displayed at the upper right corner of the equipment (see next figure).

Figure 26. Channel Tuning selected

Also, depending on the screen, the cursor has some specific functions. They are:

► In **MEASUREMENT** mode, the cursor has these functions:

■ Left - Right
•Channel change or frequency change (according to tune selected: tune by channel or tune by frequency).

■ Up - Down
•Change of main measure on screen (screen MEASUREMENT 1/3).

► In **TV** mode, the cursor has these functions:

■ Left - Right
•Channel change or frequency change (according to tune selected: tune by channel or tune by frequency).

■ Up - Down
•Change of TV service.

► In **SPECTRUM ANALYZER** mode, the cursor has these functions:

■ Left - Right
•CH or FR: Channel change (CH) or frequency (FR) change (according to tune selected: tune by channel or tune by frequency).
•SP: Span change.
•MK: Marker move (if marker is enabled).

■ Up - Down
•Reference level change.

In Spectrum Analyzer mode, pressing the Enter for 1 second, a box appears explaining the selection modes available. From here user can also select the joystick mode.
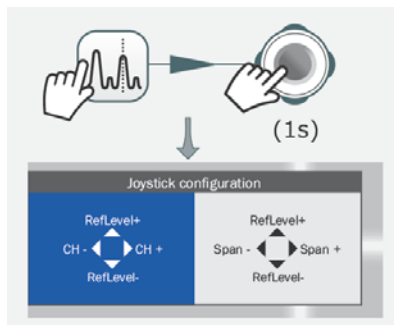
Figure 27.

► In **WIFI** mode, the cursor has these functions:

- Left - Right
  - AP or CH: Change of Access Point (AP) or Channel (CH) (according to tune selected: tune by Access Point or tune by Channel).
  - SP: Change of Span.

- Up - Down
  - Reference level change.

► In **ECHOES** tool, the cursor has these functions:

- Left - Right
  - CH or FR: Channel (CH) change or frequency (FR) change (according to the tune selected: tune by channel or tune by frequency).
  - EC: Echo change.

- Up - Down
  - Distance span.

2.5.3   Shortcut Keys

The are six keys on the keyboard that correspond to the 6 shortcut keys of a portable meter. They are described below:

► **Management Keys**

There are two Management keys. Depending on how long you press these keys, it has two different functions:

■ Installations / Preferences key 🗁 (Key F)

- •Short Press (<1s): It shows the list of installations and the menus to manage them.
- •Long Press (>1s): It shows the Preferences menu.

■ Tune Settings / Video - Audio Settings ⚙ (Key C)

- •Short Press (<1s): It shows the Settings menu (menu changes according to signal source selected).
- •Long Press (>1s): It shows the Video & audio settings.

►**Screenshot / Reference key** 📷 (Key P)

Depending on how long you press this key, it has two different functions:

- •Short Press (<1s): Pressing this key for less than one second on the Spectrum Analyzer mode, it holds on screen the current waveform as a trace or reference. It is equivalent to go to the option "Reference - Set" from the "Advanced" menu. Pressing short again, it deletes the waveform reference. It is equivalent to go to the option "Reference - Clear" in the "Advanced" menu.
- •Long Press (>1s): Pressing this key for one second it makes a capture of what it is shown on screen at the time. The capture may be from the screen image, from the measurement data or from both. The type of capture, either screen, data, or both can be set in the "**Export button**" option which is on the label "**Measures**" in the "**Preferences**" menu (for more details refer to).

►**Mode keys**

On the left side there are three keys to access the most important modes of the meter.

■ ⭕ Measurement key (key M).

■ 〰 Spectrum Analyzer key (key S).

■ ▢ TV Mode key (key T).

Pressing on one of these keys repeatedly provides access to a different view within the same function. For analogue signals only the first view of each

function is available. Each view name is shown at the top centre of the screen. When reaching the third view it returns to the first view.

2.5.4 Function keys or Softkeys

There are four programmable keys, also called softkeys, numbered from F1 to F4 for the portable meter that are equal to keys F1, F2, F3 and F4 from the keyboard.

Each key provides access to one menu. This menu changes according to the mode or tool selected.

The menu is displayed over each softkey at the bottom of the screen.
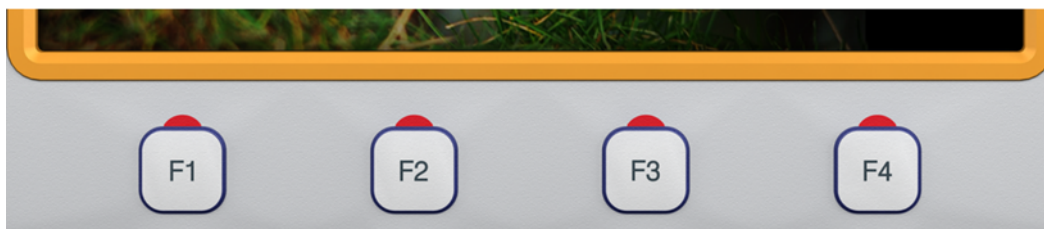
Figure 28.

2.5.5 Select and Edit Parameters

To edit or select any parameters follow these instructions:

1 Place over the option and press the Enter.

2 The data field gets into the edit mode (yellow background).

3 A menu is deployed with some options or if it is numeric, a number gets a black background.

4 Move the up/down to select one option. To move between figures press right/left and to change it press up/down.

5 After finish press Enter to confirm or any function key to exit.

2.5.6 Text Edition

When a user needs to enter or edit a text (from an image, Channel Plan, etc.), a screen with a virtual keyboard appears (see figure).

Figure 29.

To edit a name use your keyboard or mouse.

To edit a word with a mouse follow these steps:

1 Place the cursor over the text box where the name appears.

2 Move the cursor to place it next to the letter that user wants to edit.

3 Press on the virtual keyboard to edit.

4 Once edition is finished, press OK F3 to accept or F4 to Cancel.

To delete a letter, move the cursor to the right side of the letter and then press the joystick on the Delete key ⌫ or press Delete F2 .

To enter an upper case letter press first F1 or press the joystick on the key ⇧ . To block upper case press F1 or press the joystick on the key ⇧ twice. To return to lower case press F1 or the key ⇧ again.

Keys with a point at top right corner give access to special characters, by keeping pressed the joystick for one second on the key.

2.6 Power

The PROWATCH Neo is powered by a power cord connected to the mains. Be sure the mains voltage is compatible with the power supply voltage of the equipment.

►**Switching On:**

1 Press the switch on the back.

2 If the equipment is connected via HDMI™ to a monitor, you could see the boot screen and also a progress bar that indicates the system is loading. At the top left corner it shows the equipment model and firmware version.

3 After the system loads, it shows the last status used (mode and screen).

►**Switching Off:**

1 Press the switch on the back.

2.7 Screen Icons and Dialog Boxes

On the screen are some icons that provide useful information to the user about the current status of the instrument.

SCREEN ICONS REFERENCE

STATUS BAR

- Battery charging
- Satellite band
- Current voltage, 22 kHz signal and **LNB** power level
- Terrestrial band
- USB flash drive inserted
- WIFI signal source
- Current installation
- Compressed installation
- SatCR (SCD/EN50494) commands enabled
- JESS (SCD2/EN50607) commands enabled
- Joystick multi-function enabled. Two-letter code indicates the exact function:
  - FR Frequency tuning
  - CH Channel tuning
  - SP SPAN change
  - MK Marker moving
  - EC Echo change/zoom
  - AP Access Point change

- Task scheduled
- 5 GHz RF Auxiliary Input*
- IPTV signal source
- OTT streaming

SERVICE LIST SELECTOR
- DIGITAL TV service
- High Definition TV service
- Digital radio
- Data
- Scrambled service

DIALOG BOXES
- Error message
- OK message
- Question message
- Warning message

* **Optical Option**. Refer annex on the User's Manual

Figure 30.

2.8 Menu Tree

▶ **RF Menu**
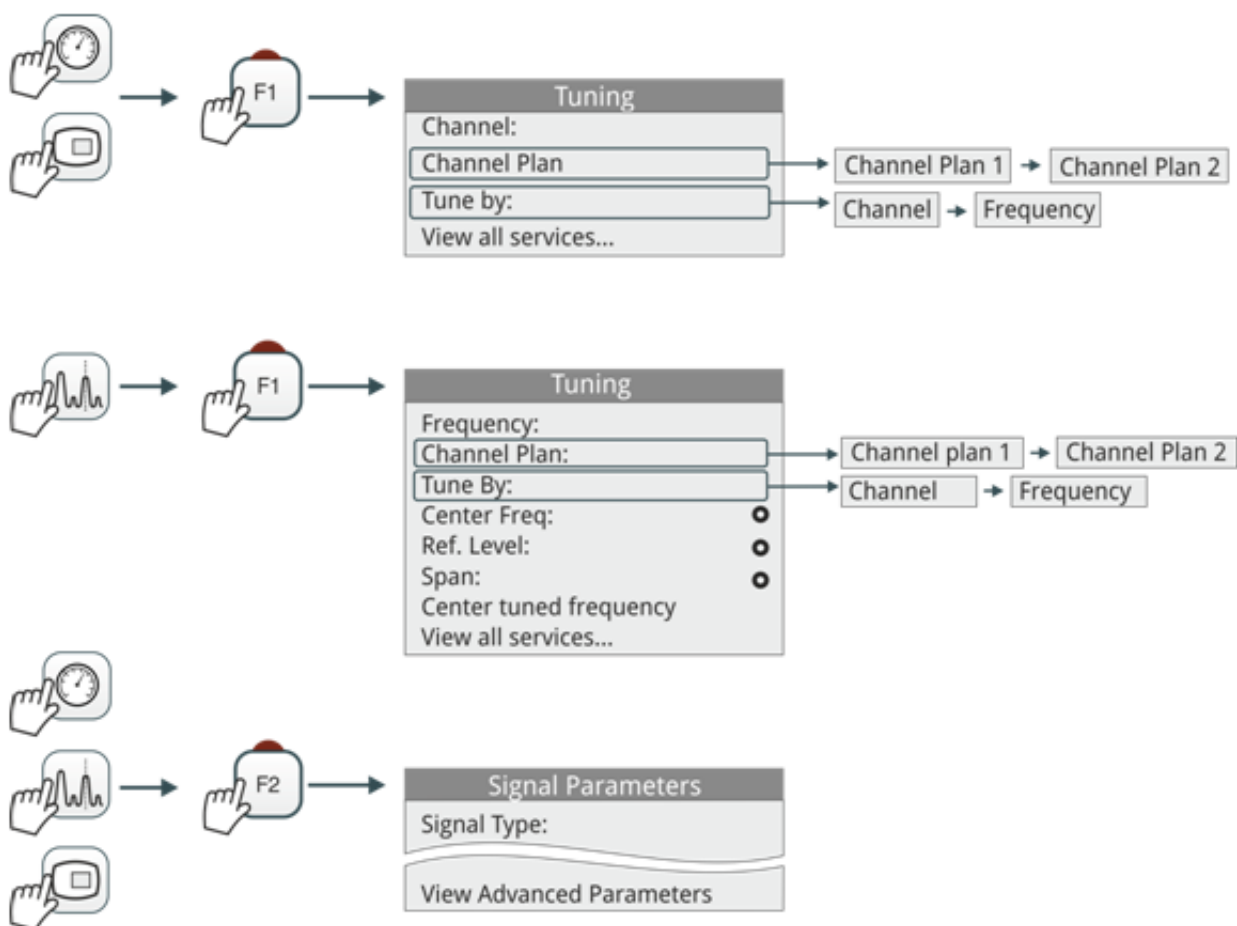
Figure 31.
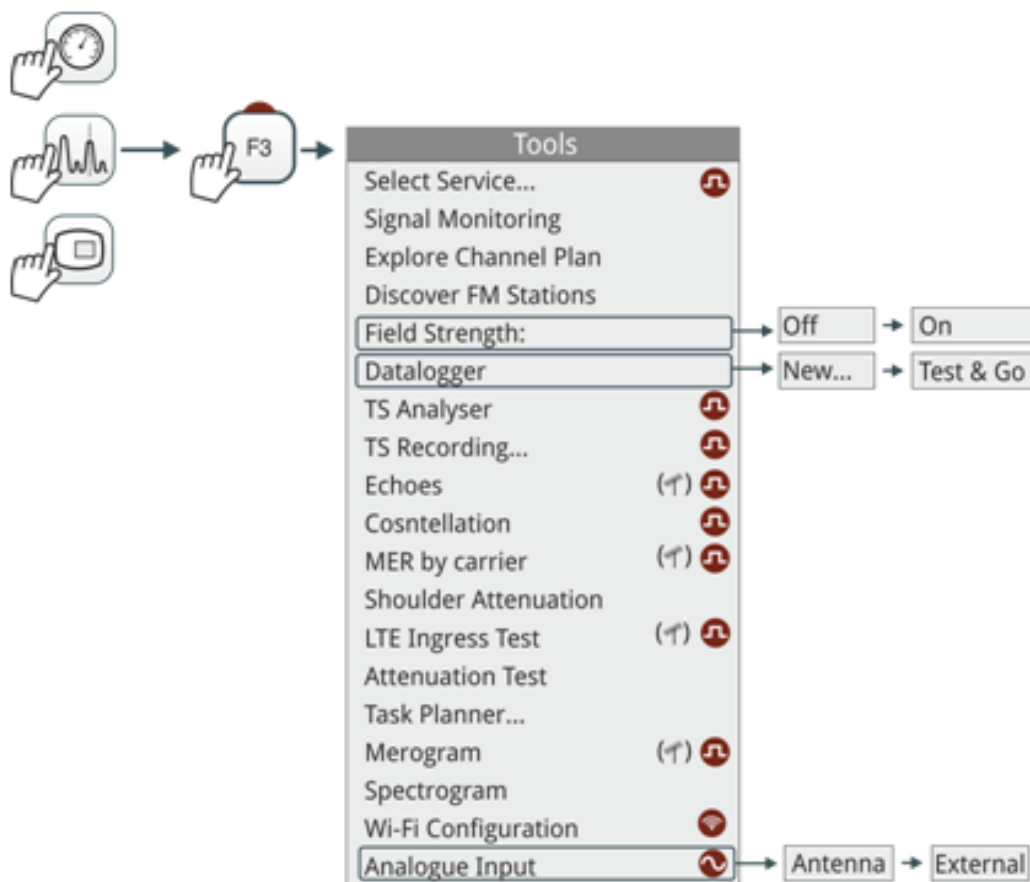
Figure 32. Tools Menu*

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*. TS Analyser and TS Recording are not available for **PROWATCH Neo +**.
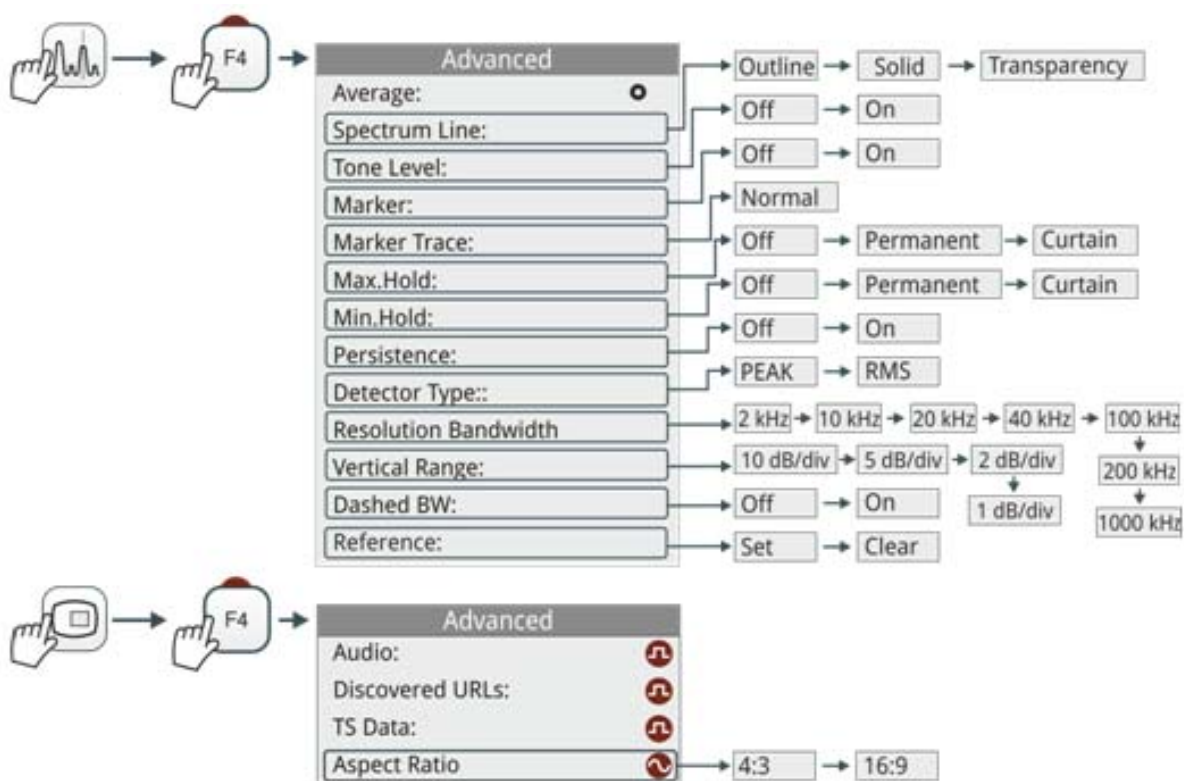
Figure 33. Advanced Menu[*]

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[*]. Resolution bandwidth values 2 kHz, 10 kHz, 20 kHz and 40 kHz are not available for PROWATCH Neo+.

► **WiFi Menu**
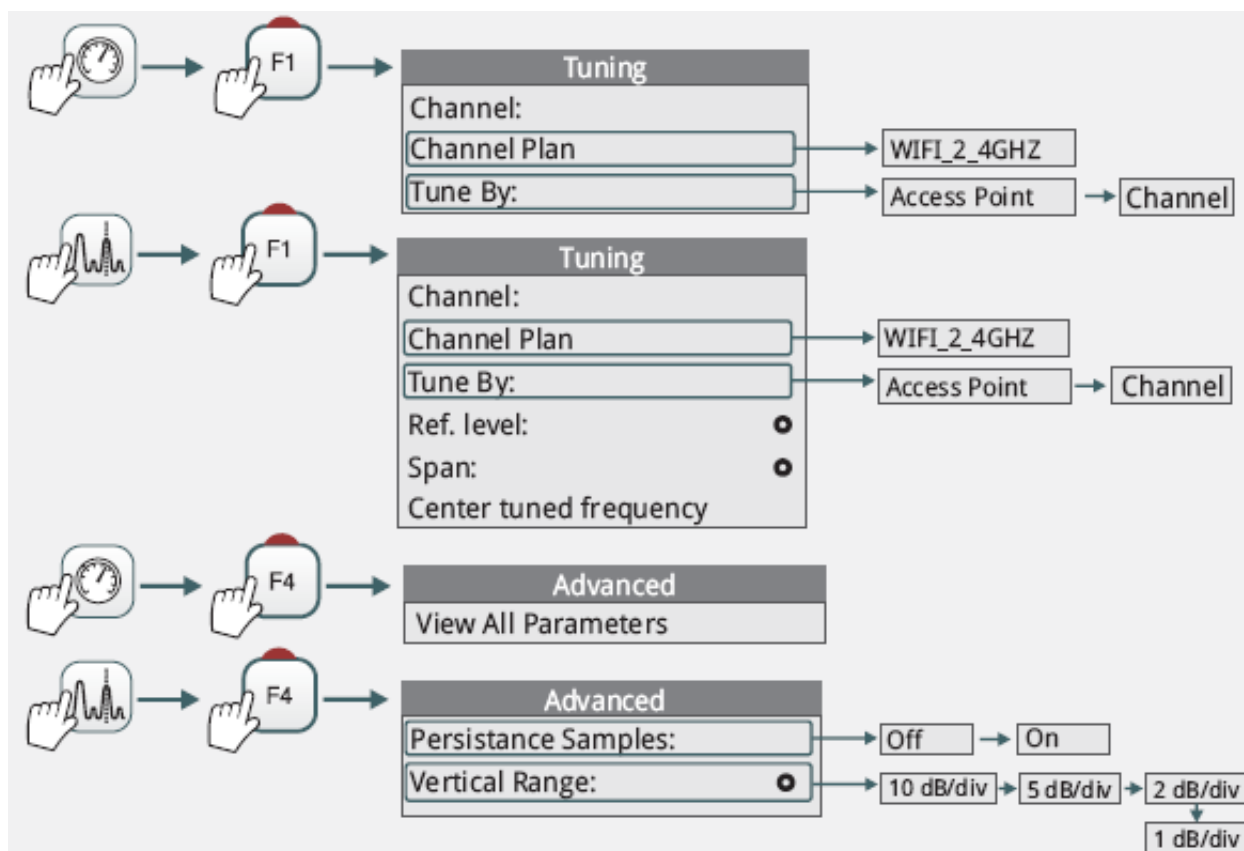
Figure 34.

► **IPTV Menu**[*]
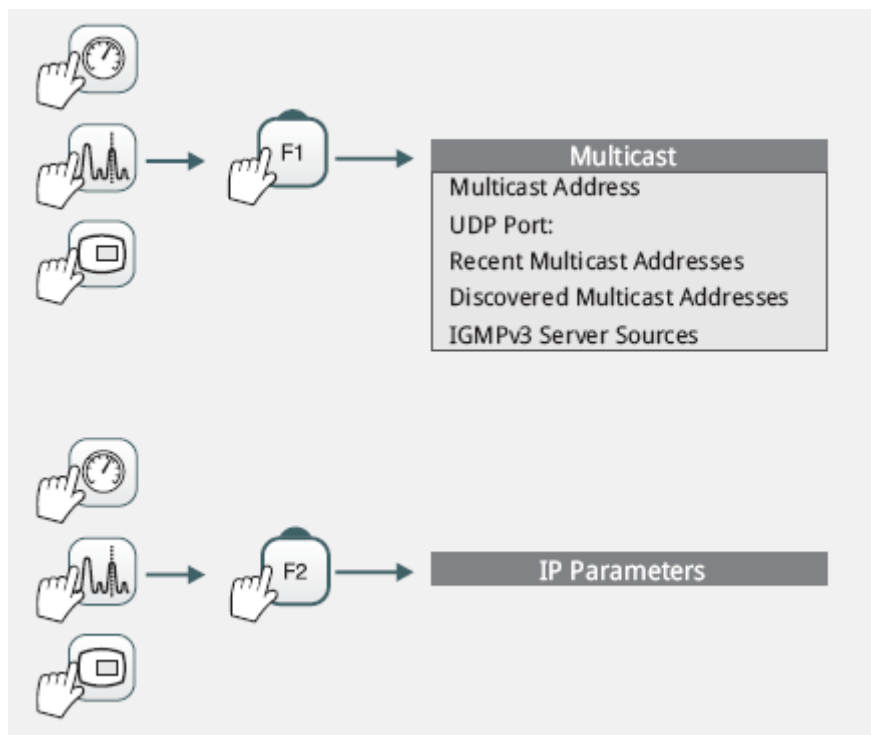
Figure 35.
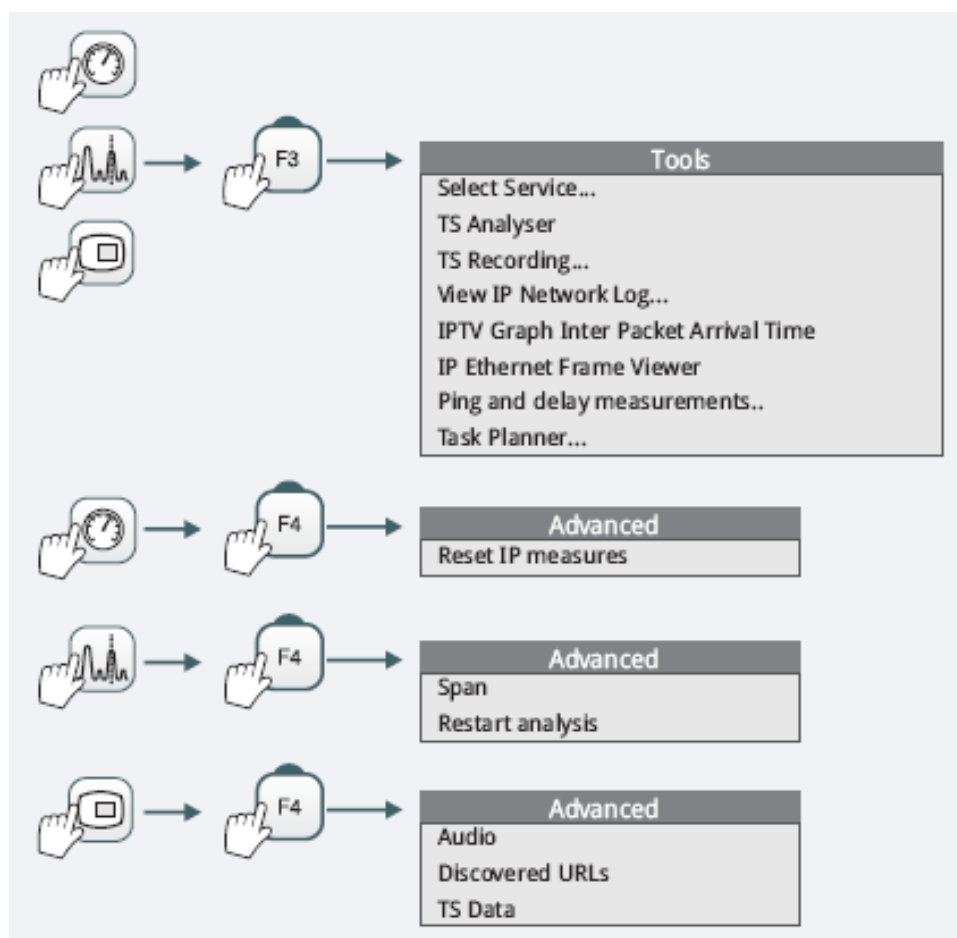
Figure 36.

►**Installation Management Menu**
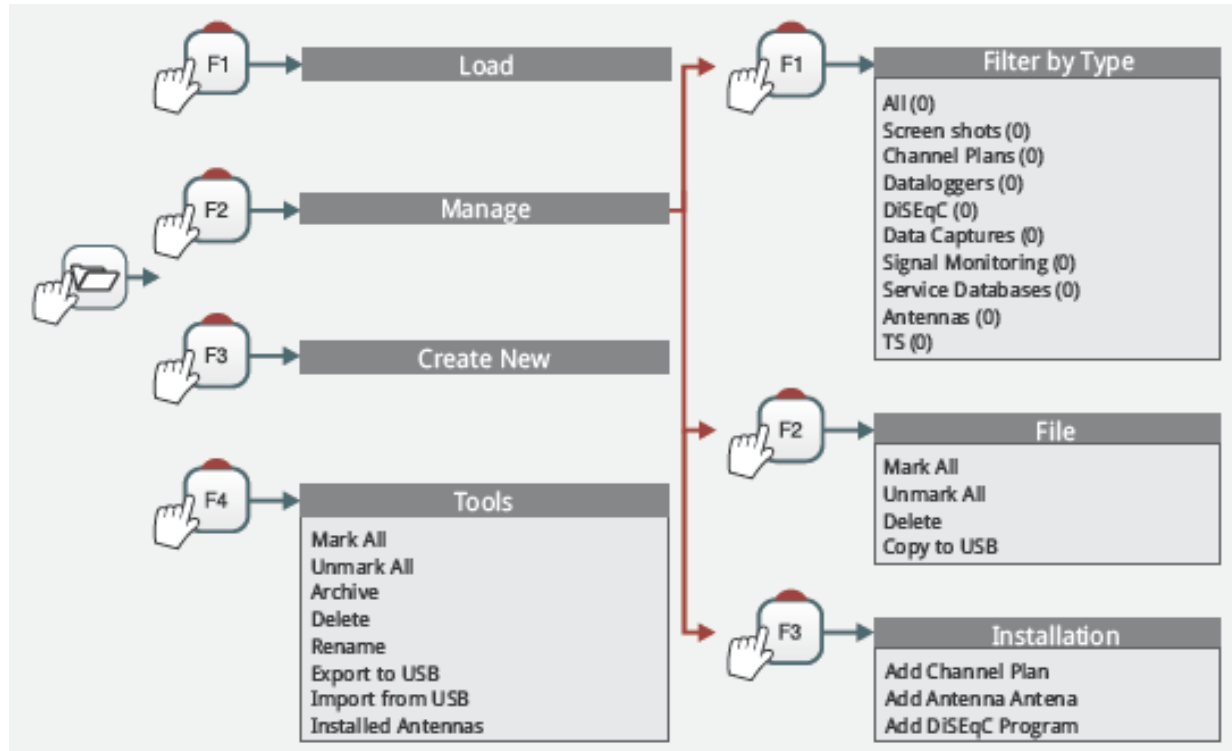
Figure 37.

► **Preferences Menu**[*]
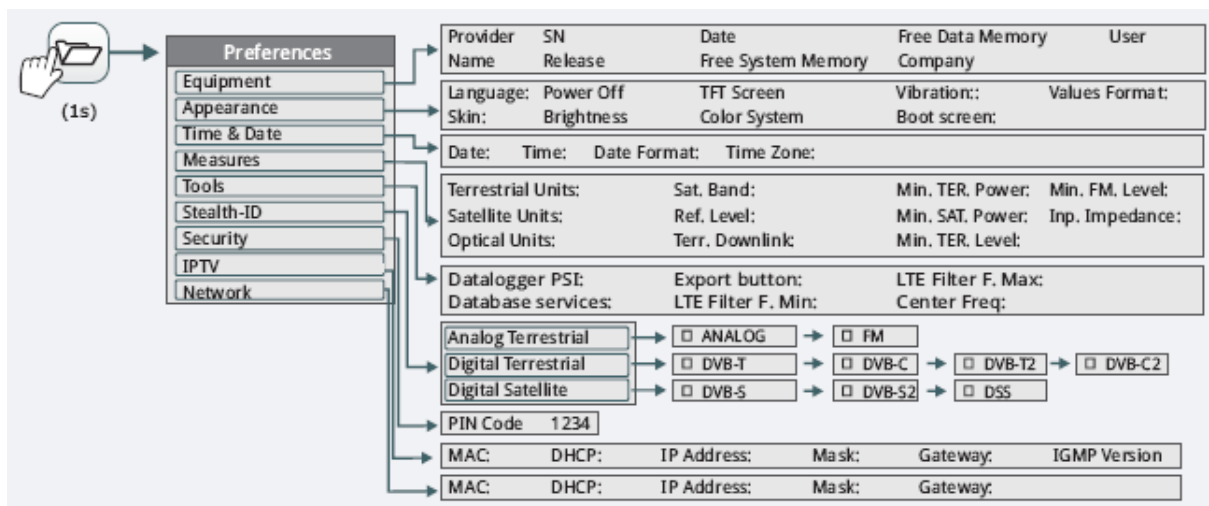
Figure 38.

►**Settings Menu**^{**}
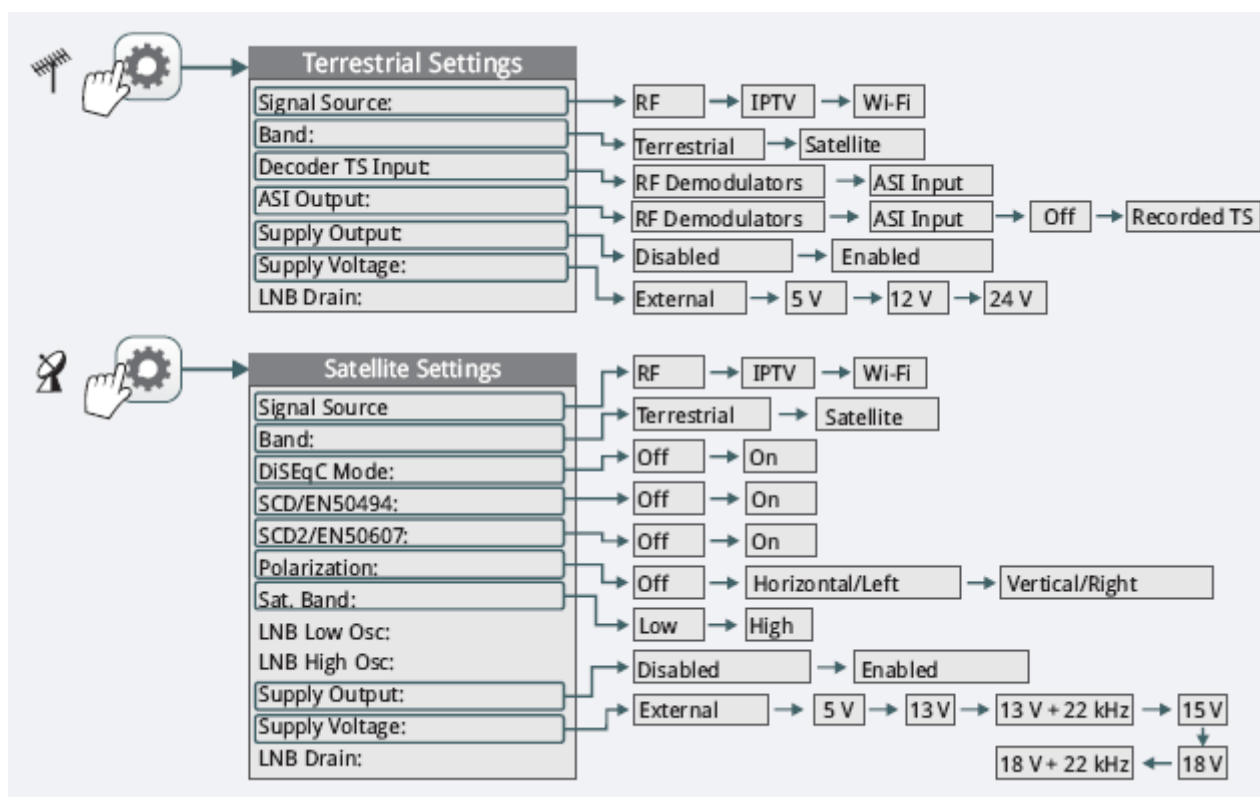
Figure 39.

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*. IPTV preference is not available for PROWATCH *Neo* +.

**. IPTV signal, TS Input and ASI output are not available for PROWATCH *Neo* +.
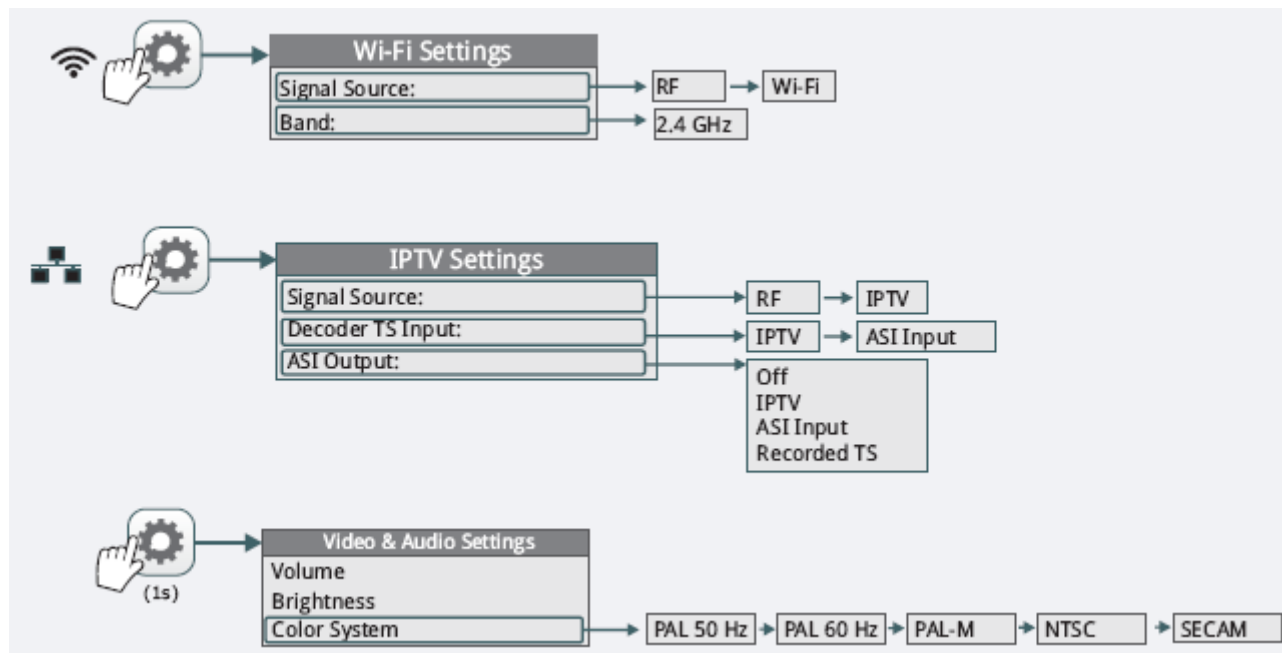
Figure 40.

2.9 Practical examples

The next section is a general explanation of how to tune a terrestrial or satellite RF signal, step by step. For more details about operation and setting parameters refer to).

2.9.1 RF Terrestrial signal tuning

1 Connect the RF input signal cable to the RF input connector of your equipment.

2 Press the Preferences ⌂ key for 1 second.

3 Access the tab "Stealth ID" to use the automatic identification feature.

4 Select the type of signals you want to identify when the meter is searching a signal. Press "Save" and "Exit".

5 Press the Settings ⚙ key. At "Source of signal" select **RF**. At "Band" select **Terrestrial**.

6 Press the Spectrum ⌁ key. The signal spectrum appears on screen. Press again this key to switch among views. Select the SPECTRUM 1/3 view.

7 Press the Enter to change to **SP** mode. In this mode, when moving left or right it changes the **Span**. The recommended value for a terrestrial signal is 50 MHz. The span value is shown at lower right corner. Once is selected, press again Enter to return to Tune mode.

8 Press the joystick up or down to adjust the reference level.

9 Press the F1 key and in the "**Tune by**" option select if you want to tune by **frequency** or by **channel**.

10 If you want to tune by channel, then select a proper channel plan according to your area in option "Channel plan".

11 In case you do not find a proper channel plan, you can add or create a new channel plan using one of this tools:

- Press 🗁 -> F2: Manage -> F3: Installation -> Add Channel Plan.
- F3: Tools -> Explore Channel Plan.
- WebControl -> Installations management -> Create a Channel Plan.

12 Press F2 and confirm StealthID is enabled (On).

13 Search your frequency or channel by moving the cursor left or right. You can also enter a frequency or select a channel on menu F1.

14 If the signal is locked, then some info about the signal shows up on the lower left corner. A triple cursor shows the bandwidth for the signal detected in case it is a digital carrier.

15 The meter detects automatically all the parameters for the signal and shows on screen the main measurements.

2.9.2 **RF Satellite signal tuning**

1 Connect the RF input signal cable to the RF input connector of your equipment.

2 Press the Preferences 🗁 key for 1 second.

3 Access the tab "Stealth ID" to use the automatic identification feature.

4 Select the type of signals you want to identify when the meter is searching a signal. Press "Save" and "Exit".

5 Press the Settings ⚙ key. At "Source of signal" select **RF**. At "Band" select **Satellite**.

6 If you want to use a rotor to move the satellite dish, press the Settings ⚙ key and enable the option "Supply output". Then select the communication protocol you are going to use to send commands to the rotor (DiSEqC, SCD, SCD2).

7 Press the Spectrum 〽 key. The signal spectrum appears on screen. Press again this key to switch among views. Select the SPECTRUM 1/3 view.

8 Press Enter to change to **SP** mode. In this mode, when moving left or right it changes the **Span**. The recommended value for a satellite signal is 100 MHz. The span value is shown at lower right corner. Once is selected, press again the Enter to return to Tune mode.

9 Press the up or down to adjust the reference level.

10 Press the (F1) key and in the "**Tune by**" option select if you want to tune by **frequency** or by **channel**.

11 If you select the option **tune by frequency**, press the Settings ⚙ key and select the settings parameters: Supply voltage, polarization and satellite band.

12 If you select the **tune by channel** option, then select in "Channel plan" a proper channel plan according to your area. Channels from channel plan have pre-set parameters (supply voltage, polarization and satellite band), so they cannot be changed from the Settings menu.

13 In case you do not find a proper channel plan, you can add or create a new channel plan using one of this tools:

• Press 🗀 -> (F2): Manage -> F3: Installation -> Add Channel Plan.
• F3: Tools -> Explore Channel Plan.
• WebControl -> Installations management -> Create a Channel Plan.

14 Press (F2) and confirm StealthID is enabled (On).

15 Search your frequency or channel by moving the cursor left or right. You can also enter a frequency or select a channel on menu (F1).

16 If the signal is locked, then some info about the signal shows up on the lower left corner. A triple cursor shows the bandwidth for the signal detected in case it is a digital carrier.

17 The meter detects automatically all the parameters for the signal and shows on screen the main measurements.

▶ **Standard operation**   **S C A N**

▶ **How to point a rotor driven antenna**   **S C A N**

3 SETTINGS AND PREFERENCES

3.1　Settings Menu

Press the **Settings** key ⚙ (key C) to access the settings menu. Depending on the signal source, the menu may be different.
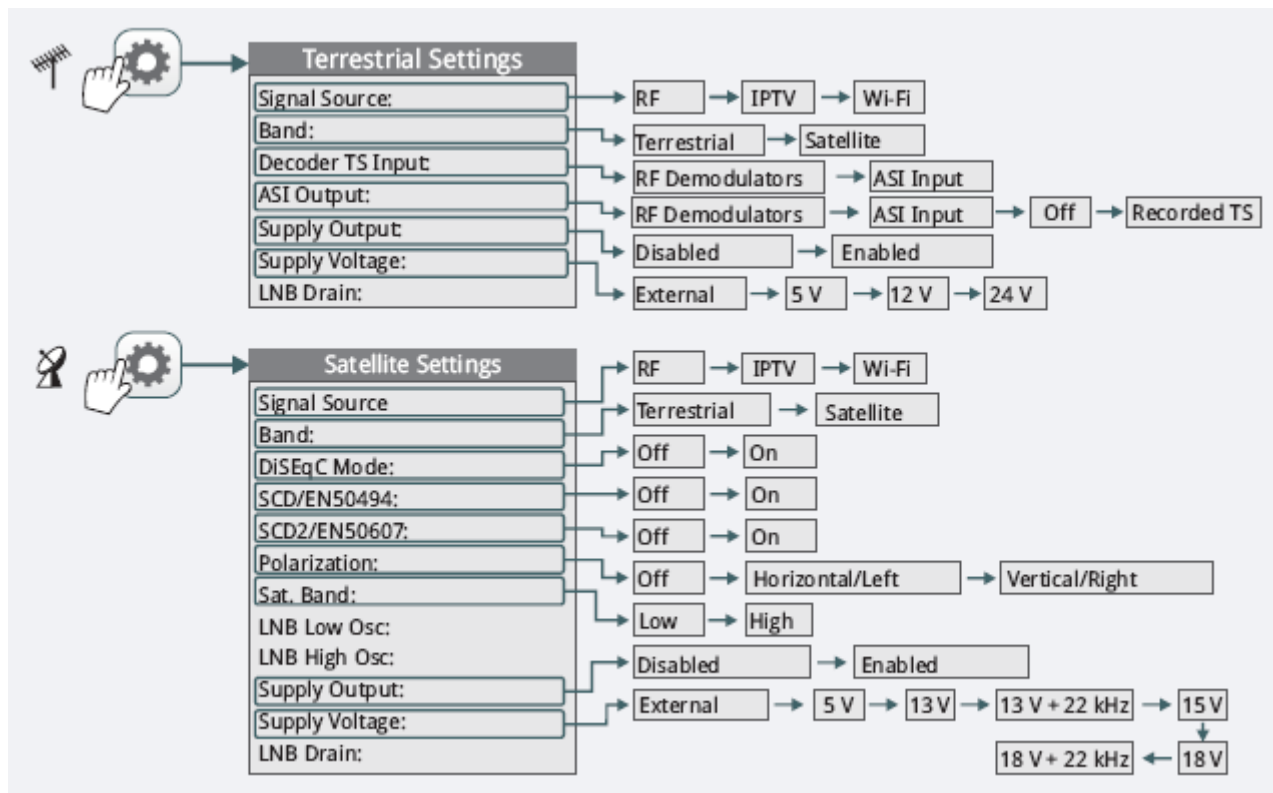
Figure 41. Settings for RF (Terrestrial and Satellite band)
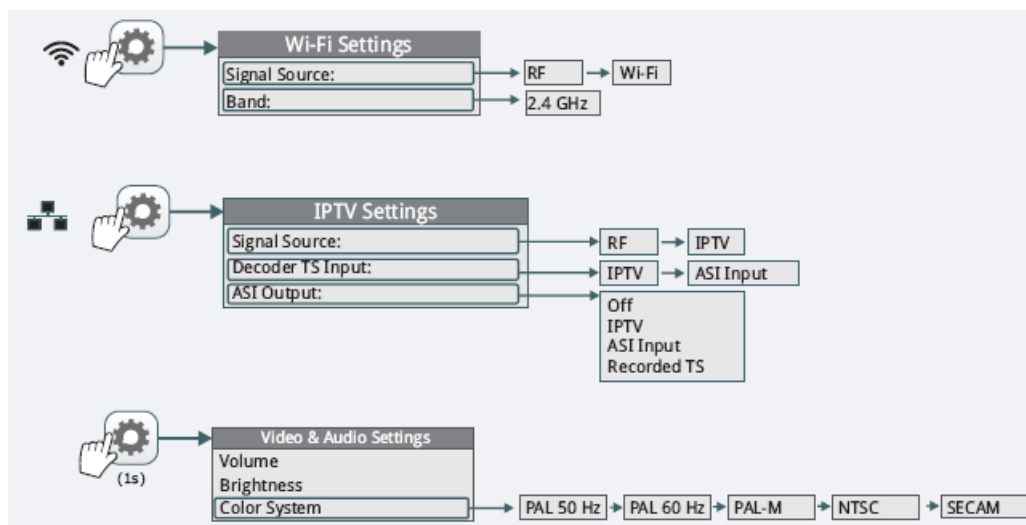
Figure 42. Settings for WiFi and IPTV* / Video & Audio.

Next there is an explanation about each option available in this menu.

Settings Menu

►**Signal Source**

It allows the user to select the signal coming into the equipment: RF (for radio-frequency signals), IPTV** (for TV over any type of IP packet based distribution network), WiFi (for WiFi operation bands), OTT (for Over the Top services) or CCTV*** (to show video from video-surveillance devices).

►**Band**

It allows the user to select between terrestrial or satellite frequency band for RF, or the WiFi operation band for WiFi****.

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*. Only available for **PROWATCH** *Neo* 2.
. Only available for **PROWATCH *Neo* 2.
***. It works with the CV-150 adapter. Contact PROMAX for more info.
****. WiFi 5 GHz band available as an option.

►**Decoder TS Input**[*]

It allows the user to select the transport stream coming into the equipment:

- RF Demodulators: (This option is available only if RF is selected as a Signal Source). The TS extracted from the RF signal by means of the internal RF demodulator. The RF signal can come from digital terrestrial, satellite or cable.

- IPTV: (This option is available only if IPTV is selected as a Signal Source). The TS extracted from the IPTV signal.

- ASI Input: The TS coming directly through the ASI-TS input connector.

- Recorded TS: (This option is available only if there is a TS previously recorded). The TS comes from the one being played and previously recorded with the TS Recording tool (warning: this option is automatically selected each time a recorded TS is played. Disable it once the TS playing has finished).

►**ASI Output**[**]

It allows the user to select the signal source for the TS-ASI packets going out through the equipment ASI Output:

- Off: ASI Output disabled.

- RF Demodulators: (This option is available only if RF is selected as a Signal Source). The signal through ASI Output is the TS extracted from the RF signal by means of the internal RF demodulator. The RF signal can come from digital terrestrial, satellite or cable.

- IPTV: (This option is available only if IPTV is selected as a Signal Source). The signal through ASI Output is the TS extracted from the IPTV signal.

- ASI Input: TS-ASI packets coming from ASI input connector go out through the ASI output connector.

- Recorded TS: The TS comes from the one being played and previously recorded with the TS Recording tool (warning: this option is automatically selected each time a recorded TS is played. Disable it once the TS playing has finished).

►**External power supply** (available for terrestrial and satellite band**)**

It enables or disables the power supplied to external units such as preamplifiers for antennas in terrestrial television or LNBs and FI simulators in the case of satellite TV.

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[*]. Only available for **PROWATCH Neo 2**.
[**]. Only available for **PROWATCH Neo 2**.

When this option is enabled the equipment applies at the output the voltage selected by the user in the Supply Voltage option (see below). When this option is disabled the equipment does not apply the voltage to the output but it will behave as if it did.

►**Supply voltages** (available for terrestrial and satellite band)

It selects the voltage to be applied to an external unit. Available voltage options change depending on the selected band. In tuning by channel mode this option can not be changed because is defined by the channel.

- Voltage available for terrestrial band: External, 5 V, 12 V and 24 V.

- Voltage available for satellite band: External, 5 V (for devices working with 5 V such as GPS active antennas), 13 V, 13 V + 22 kHz, 15V, 18 V, 18 V + 22 kHz.

In the External supply voltage option the power supplier to the external units is the power supplier of the antenna preamplifiers (terrestrial television) or the satellite TV receiver (collective or domestic).

►**LNB Drain** (available for terrestrial and satellite band)

The LNB drain option shows the voltage and current flowing to the external unit.

If there is any problems (e.g. short circuit), an error message appears on the screen ('SHORTCIRCUIT'), a warning beep sounds. The equipment allows you to disable the output tension that feeds the LNB when the short-circuit warning is displayed.

The equipment does not return to its normal operating state until the problem is solved. During this time the equipment checks every three seconds if there still the problem, warning with an audible signal.

► **DiSEqC Mode** (only available for satellite band)

It enables or disables DiSEqC mode. DiSEqC (Digital Satellite Equipment Control) is a communication protocol between the satellite receiver and accessories of the satellite system (for more details refer to "DiSEqC Commands" on page 249).

►**SCD/EN50494** (only available for satellite band)

It enables or disables the SCD/EN50494 function to control devices of a satellite TV installation that supports this technology (for more details refer to "SCD / EN50494 (SatCR) Commands" on page 250).

►**SCD2/EN50607** (only available for satellite band)

It enables or disables SCD2/EN50607 mode to control devices in a satellite TV installation which must be compatible with this technology (for more details refer to "SCD2 / EN50607 (JESS) Commands" on page 252).

►**Polarization** (only available for satellite band)

It allows the user to select the signal polarization between Vertical/Right (vertical and circular clockwise) and Horizontal/Left (horizontal and circular anti-clockwise), or disable it (OFF). In tuning by channel mode this option can not be changed because is defined by the channel.

►**Sat Band** (only available for satellite band)

It allows the user to select the High or Low band frequency for satellite channel tuning. In channel tuning mode the Band Sat can not be changed. In tuning by channel mode this option can not be changed because is defined by the channel.

►**LNB Low Osc.** (only available for satellite band)

It defines the local oscillator frequency for the LNB low band. When a channel plan is selected but LNB oscillator values are not properly selected, a warning is issued.

►**LNB High Osc.** (only available for satellite band)

It defines the local oscillator frequency for the LNB high band (up to 25 GHz). When a channel plan is selected but LNB oscillator values are not properly selected, a warning is issued.

3.2 Video & Audio Settings

Press the Settings key ⚙ (key C) for one second to access the Video & Audio settings menu.
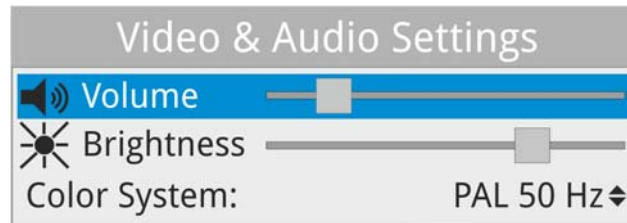
Figure 43.

A brief explanation of each option available on the menu:

►**Volume**

It increases or decreases the volume of the speaker audio output by moving the joystick to the right (+ volume) or left (- volume).

►**Brightness**

It increases or decreases the screen brightness by moving the joystick to the right (+ brightness) or left (- brightness).

►**Colour System**

The coding system used in analogue transmissions. Available options are: PAL 50 Hz, PAL 60 Hz, PAL-M, NTSC, SECAM.

3.3   Preferences Menu

Preferences menu is available by pressing the **Installations Management** key ☐ (Key F) for one second. The options are grouped in tabs as follows:

- **Equipment**: Equipment information.

- **Appearance**: Equipment customizing options.

- **Time & Date**: It allows the user to change date, time, date format and time zone (selecting continent and country/city).

- **Measurements**: It allows the user to choose between several units of measure among other parameters.

- **Tools**: It allows to edit some parameters for different tools.

- **StealthID**: It allows the user to select the set of signal types being used while auto identifying any modulation type.

- **Security**: It allows to edit the PIN code.

- **IPTV**[*]: IPTV network parameters settings.

- **Network:** Network parameters settings.

- **Streaming V/A**: Streaming configuration.

- **SNMP**: SNMP configuration.

- **SMTP**: e-Mail server configuration.

- **NTP**: (Network Time Protocol) It allows your meter to connect to a server in order to set date and time.

▶   **Preferences Menu**   S C A N

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[*]. only available for **PROWATCH** *Neo* 2.
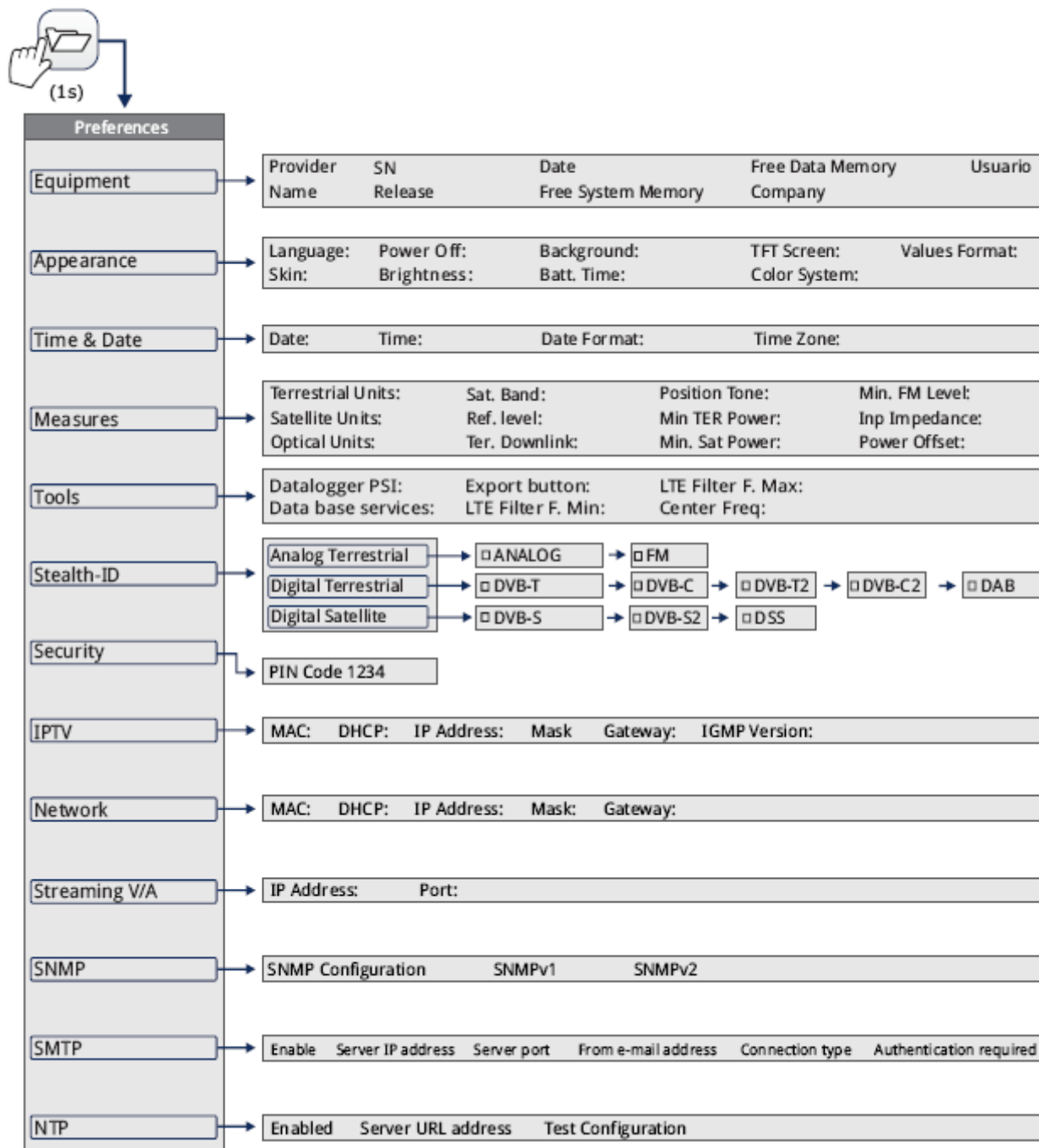
Figure 44.

To navigate between tabs move the cursor left or right. To navigate between options inside the tab move the cursor up or down.

Press F1 Exit (key F1) to exit Preferences.

Press F2 Save to save changes (key F2).

A brief explanation of the options available in each tab:

►**Equipment Information**

- Provider: Provider's name.

- Name: Equipment's name.

- Serial number: Unique identification number for this equipment.

- Release: Version of software installed on the equipment.

- Date: Date of software installed on the equipment.

- Free system memory: Free size of the flash memory installed on the equipment / Size of the flash memory installed on the equipment for system (equipment software).

- Free data memory: Free size of the flash memory installed on the equipment / Size of the flash memory installed for data (dataloggers, screenshots, service recording and so on...).

- Company: Name of the company which owns the equipment (set by user; protected by PIN code). This field appears on the boot screen.

- User: Name of the equipment's user (set by user; protected by PIN code). This field appears on the boot screen.

►**Appearance Options**

- Language: Language used on menus, messages and screens. Available languages are: English, Spanish, Catalan, Czech, German, French, Italian, Norwegian, Polish, Portuguese, Greek, Russian, Slovak and Swedish. Once the new language is selected, the equipment shows a warning message and re-starts in order to load the new language.

- Skin: It is the theme and colours used on screen.

- Power Off[*]: It allows the user to select the time to power off, which is the time after which the equipment shuts down automatically unless user press any key.

- Brightness[**]: User can select between two options:
  •Manual: The display brightness is adjusted manually using the brightness setting (see section **Video and audio settings**).
  •Automatic: The display brightness is automatically adjusted according to the light received by the sensor.

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[*]. This function is not enabled for PROWATCH *Neo*.
[**]. This function is not enabled for PROWATCH *Neo*.

- Background: It allows the user to select the background colour on the display screen. Options available are: white, green, red, black and blue.

- Battery Time[*]: It hides or shows the remaining battery time. Remaining battery time is displayed on the inside of the battery level icon.

- TFT Screen: User can select a time after which the TFT screen turns off, but the equipment is still running normally. The screen turns on by pressing any key. Time options are: off, 1, 5, 10 or 30 minutes.

- Color System: The coding system used in analogue transmissions. Available options are: PAL 50 Hz, PAL 60 Hz, PAL-M, NTSC and SECAM.

- Values Format: It allows the user to select the format to show on fields PID, NID, ONID, TSID and SID in TV mode screen 3/3 and on field SID in "Select Service" tool. Available formats are decimal or hexadecimal.

- Touchscreen Calibration[**]: Press on F4 to run a test to calibrate the touchscreen. Just follow the instructions and press on each circle at corner and centre to calibrate.

► **Time & Date Options**

- Date: It allows the user to edit the date. Press the joystick for edit mode.

- Time: It allows the user to edit the time. Press the joystick for edit mode.

- Date Format: It allows the user to change the date format, which is the order in which is shown day (DD), month (MM) and year (YYYY or YY).

- Time Zone: It allows the user to select continent and country/city where the meter is in order to determine if it is necessary to apply DST (Daylight Saving Time).

► **Measurement Options**

- Terrestrial Units: It allows the user to select the terrestrial measurement units for the signal level. Available options are: dBm dBmV and dBµV.

- Satellite Units: It allows the user to select the satellite measurement units for the signal level. Available options are: dBm, dBmV and dBµV.

- Optical Units: It allows the user to select the optical measurement units for the signal level. Available options are: dBm.

- Satellite Band: It allows the user to select the type of satellite band used between Ku/Ka band and C band.

- Reference Level: It allows the user to select the type of reference level adjustment between manual (modified by the user) or automatic (selected by the equipment).

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*. This function is not enabled for **PROWATCH** *Neo*.
. This function is not enabled for **PROWATCH *Neo*.

■ TER. Downlink: If this option is enabled it allows you to set a local oscillator in terrestrial band from Settings ⚙ and it displays intermediate and downlink (DL) frequencies calculated from local oscillator. For example, it allows you to work with terrestrial radio-links or frequency converters.

■ Position Tone: The user can select where at the voltage to insert a 22 kHz tone: Up, Center or Down. The tone will be inserted on the top, in the center or below the LNB tension respectively.

■ Min. TER. Power: It sets the minimum power for a terrestrial digital signal to be identified when channel exploring or datalogger.

■ Min. SAT. Power: It sets the minimum power for a satellite digital signal to be identified when channel exploring or datalogger.

■ Min. TER. Level: It sets the minimum level for a terrestrial analogue signal to be identified when channel exploring or datalogger.

■ Min. FM Level: It sets the minimum power for a FM signal to be identified when channel exploring or datalogger.

■ Input Impedance: It allows the user to select the impedance at the RF input between 50 Ω and 75 Ω.

■ Power Offset: It adds this value to the power/level measurement. When this value is different to 0 dB, next to power/level measurement an asterisk (*) is shown as a warning that offset is been applied.

►**Tools Options**

■ Datalogger PSI: If you select the option "**Capture**", when datalogger is working it captures the service list of each channel. This process slows the datalogger, but provides additional information that can be downloaded in XML files. To disable this option select "**Don't capture**".

■ Database Services: When it is enabled, it saves all the services been detected in the current installation. There is a database for services in terrestrial band and another for services in satellite band. Services are included automatically when the signal is locked. If enabled, these services will be displayed on the "**View all services**" option in the **Tuning** F1 menu.

■ Export Button: It allows the user to select the data to be exported when pressing the export key among the following options: screen only, data only or both. More info in the "Export key" chapter.

■ LTE Filter F. Min: Select the minimum frequency for the external LTE filter.

■ LTE Filter F. Max: Select the maximum frequency for the external LTE filter.

■ Center Frequency: User can set the center of frequency to **Manual or Auto mode**. In Manual mode the user sets the center of frequency and the equipment does not change it never, so the main cursor can be moved

out of screen. In Auto mode the equipment changes the center of frequency to display always the main cursor on screen.

- Moni. ddbb loc.: It allows you to select where the database for the webControl "Monitoring" tool will be stored (for more details refer to <u>"Signal Quality Monitoring" on page 214</u>). The available options are "Internal" to save to an internal memory of the equipment or "Hard Drive" to save to a disk drive. If your equipment has hard drive then it is selected by default. In case of replacing this hard drive, it must be USB 2.0 formatted with the "ext4" file system and labeled with the name "PR0MAX_HD" where 0 is a zero.

- Watchdog: It allows you to enable or disable a surveillance system that resets the equipment if it crashes.

- Zoom: It enables the "Zoom" option to be available on the "Advanced" menu in the Spectrum mode (for more details refer to <u>"►Advanced Menu in Spectrum Analyzer mode" on page 65</u>).

►Stealth-ID Options

It allows the user to select the set of signal types being used while auto identifying any modulation type (for more details refer to <u>"►Stealth-ID Options" on page 52</u>).

►Security Options

It allows the user to change the PIN code that gives access to protected data fields. The default PIN code is "1234". To change the PIN, first enter the current PIN code, then enter the new PIN.

In case the user forgets the PIN, after the third attempt, a 12-digit code will appear on screen. Sending this 12 digit code to the PROMAX customer service, the user will recover the PIN.

► IPTV* Options

Network parameters that user has to fill out in order to register the equipment into a data network. This is necessary to receive IPTV signal. Network parameters are:

- MAC: Physical address of the equipment. It is unique and cannot be edited.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network. That feature contributes to make things

*. only available for **PROWATCH Neo 2**.

easier to installers when debugging network access. Enable the DHCP protocol for proper IP configuration.

- IP Address: IP Address of the equipment into the local network.

- Mask: Subnet mask of the equipment (by default 255.255.255.0).

- Gateway: IP Address of the router into the local network (by default 10.0.1.1).

- IGMP Version: Protocol for multicast transmissions used by the router. Available versions are 1, 2 and 3. To disable select Off.
  - IMGPv1: IGMP version 1. Each time user selects a multicast address, meter asks for the new multicast stream.
  - IMGPv2: IGMP version 2. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one.
  - IMGPv3: IGMP version 3. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one, from the servers approved by the user.
  - Off: Meter does not send any IGMP messages and discards the received ones.

►Network Options

Network parameters that user has to fill out in order to identify the equipment into a data network. This is necessary to connect to a PC via ethernet. Network parameters are:

- MAC: Physical address of the equipment. It is unique and cannot be edited.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network. That feature contributes to make things easier to installers when debugging network access.

- IP Address: IP Address of the equipment into the local network.

- Mask: Subnet mask of the equipment (by default 255.255.255.0).

- Gateway: IP Address of the router into the local network (by default 10.0.1.1).

►Streaming V/A Options

Streaming parameters that user has to fill out in order to broadcast video/audio from the meter to a PC. Streaming parameters are:

- IP Address: IP address belonging to the PC to broadcast in streaming from the meter.

- Port: Broadcasting port linked to the PC IP.

For more information refer "Streaming V/A" on page 169.

►SNMP Options

SNMP is a communication protocol to monitor devices in a network. User has to fill out these parameters to communicate with the equipment and to supervise it. SNMP parameters are:

- SNMP Configuration:
  •Get Community (by default "public"): Community identification name for request messages.
  •Set Community (by default "private"): Community identification name for setting messages.

- SNMP version 1 / SNMP version 2
  •Traps: It allows enabling or disabling alert messages.
  •Manager IP: IP address for SNMP Manager.
  •Community: Community identification name.

►SMTP Options

SMTP stands for simple mail transfer protocol. User has to fill in all these parameters in order to receive by e-mail all the notifications triggered during monitoring (for more details refer to "Signal Quality Monitoring" on page 214). SMTP parameters are:

- Enabled: When checking this box e-mails sending is enabled.

- Server IP Address

- Server port.

- From e-mail address.

- Connection type (secure, unsecure).

- Authentication required: Check this box if authentication is required and in that case enter user and password.

►NTP Options

NTP (Network Time Protocol) is a network protocol that synchronizes time from a server on a device. It periodically connects this server and updates date and time. This function requires an Internet connection to work. It is especially necessary in tools where accuracy at the time of execution is important, such as in monitoring, task management, etc.

NTP parameters are:

- Enabled: Mark this checkbox to enable NTP.

- Server URL Address: NTP server address (example: 0.pool.ntp.org).

- Test Configuration: NTP connection server test (to perform this test, first unmark the Enabled checkbox).

4 RF SIGNAL TUNING

4.1 ■ Introduction

On the panel left side, the equipment has three functions keys, which give direct access to three ways to display RF signal.

- ■ MEASUREMENT 🕐 (key M): This mode shows main measures of RF signal and allows you to identify if any measure is above or below usual values.

- ■ SPECTRUM ANALYZER 📈 (key S): This mode shows spectrum and allows you to visually identify any anomalies over the RF signal.

- ■ TV 📺 (key T): This mode shows RF signal demodulated and allows you to check broadcasting quality for video and audio.

Pressing a key repeatedly provides access to a different view within the same mode displaying different windows. Each view combines several RF modes (demodulated, spectrum, measures) which is very convenient to identify problems.

The StealthID function is an auto-identification system which identifies type and characteristic parameters of the signal and then tries to tune and demodulate it with no need to enter any parameter by hand.

4.2 ■ Operation

1 Connect the RF input signal to the equipment.

2 Press the "Settings" key ⚙ (key C) to access Settings menu and in "Source Signal" select "RF".

3 From Settings menu access the "Band" option and select "Terrestrial" to work on terrestrial band or "Satellite" to work on satellite band.

4 Select the display mode by pressing the MEASUREMENT (key M), SPECTRUM ANALYZER (key S) or TV mode (key T). Pressing a key repeatedly provides access to different views.

5 Enter frequency or channel using the "Tuning" (F1) menu or using the cursor to go left or right along the frequency / channel band.

6 Once you are placed on the channel or frequency, the StealthID function tries to identify and lock the signal and its characteristic parameters and will show results on screen.

4.3   General Menu Options

At the bottom of the screen four menus are accessible via the softkeys or function keys.

- F1 It displays the channel where is pointing the cursor and gives access to the tuning menu.

- F2 It displays the selected transmission standard and gives access to the signal parameters menu.

- F3 It displays the Tools menu.

- F4 It displays the Advanced menu.

In general, these options are the same for all modes (Measure, Spectrum Analyzer and TV).

The specific options for a mode are placed in the menu "Advanced" pressing the key F4.

In next sections each one of these menus is described.

4.3.1   F1: Tuning - Selecting Channel / Frequeny

Press F1 to access. It contains tuning options.

Tuning options are:

►**Channel/Frequency**

It displays the channel/frequency pointed by the cursor. Tuning type (channel/frequency) is selected by means of the Tune by option

►**Channel Plan**

This option allows the user to select a channel plan from the ones available for the current installation.

►**Tune by**

It allows the user to select between tuning by channel (selecting a channel or channel by channel with the cursor) and tuning by frequency (selecting a frequency or step by step with the cursor).

In case of tuning by channel:

1 Place over the **Channel** option and press Enter.

2 A box appears with all channels of the active channel plan and its frequency.

3 Move along the box to select a channel.

4 After finished press Enter to save the selected value or any function key to exit without saving.

5 The cursor will place on the selected channel and it will appear on the [F1] option.

   •Channels can be changed directly with the cursor in CH mode.

NOTE: When using tune by channel on satellite, the polarity parameters (horizontal/vertical and left/right) and satellite band (high/low) are selected automatically by the equipment, according to the channel plan enabled and cannot be changed by the user. To change these parameters, the user may switch to frequency tuning. But the user can change the voltage output while in a channel plan, as long as none has been defined in that same channel plan. For instance, if a standard channel plan is being used like the CCIR, there is no need for switching to frequency tuning mode.

In case of tuning by frequency:

1 Place over the **Frequency** option and press the cursor.

2 The option is highlighted in yellow to indicate it is in edit mode.

3 Move left/right to move between the figures and up/down to change the figure.

4 After finished press Enter to save the selected value or any function key to exit without saving.

- The frequency can be changed directly with the cursor in FR mode in 50 kHz steps.

▶ **Manual input of frequencies**

►**Center Frequency**

This option is available only for the Spectrum Analyzer mode. It allows to edit the center frequency. The center frequency is the frequency at which the screen is centered.

►**Reference Level**

This option is available only for the Spectrum Analyzer mode. It allows you to edit the reference level. The reference level is the power range represented on the vertical axis.

The Reference Level can be changed directly pushing the cursor up or down.

►**Span**

This option is available only for the Spectrum Analyzer mode. It allows to edit the span, which is the frequency range displayed on screen on the horizontal axis. The current span value appears on screen at bottom right.

Span available values change according to Resolution Bandwidth selected (for more details refer to "Spectrum Analyzer Mode" on page 265).

To switch among span default values move the cursor (left, right) in span (SP) mode. For example, for RBW = 100 kHz default span values are Full (full band), 500 MHz, 200 MHz, 100 MHz, 50 MHz, 20 MHz and 10 MHz. To change to any other span value in this frequency range use the "span" option in the Tuning menu (F1 key).

►**Center Tuned Frequency**

This option is only available for the Spectrum Analyzer mode. When selecting this option, the frequency tuning (where the main cursor is pointing) is placed

at the center of the screen. This option does not work with FULL span or if main cursor is very close to terrestrial or satellite band boundaries.

►Downlink

This option shows up if "Terrestrial Downlink" option in Preferences is enabled and if it is selected tune by frequency. It displays downlink (DL) frequency calculated from local oscillator value. To set a local oscillator value press Settings ⚙ from terrestrial band.

►View all services

This option only appears if the Database services option is enabled in the Preferences menu.

This option displays a window with a list of services that have been detected in the current installation.

The list shows service name, provider, SID (stream identifier) and an icon that shows its type (radio, TV) and if it is scrambled. When hovering on the service for one second it displays a hint window with more information.

If user presses Enter on a service, it will access that service. When disabling the Database services option, all services in the installation will be deleted from the list.

At the bottom of this option are shown the softkeys with these functions:

- **F1** Cancel: It exits the option.

- **F2** Filter List: It shows several options to filter the list of services:
  - By access (Free Only, Scrambled Only, All).
  - By type (All, TV, Radio).
  - Search by name (filtered by the name).
  - Reset list (it restarts the list as at first) Service filtering is persistent until reseting.

- **F3** Page Up: It jumps one page up.

- **F4** Page Down: It jumps one page down.

4.3.2   **F2: Signal Parameters**

Access by the [F2], function key. It allows selecting the standard transmission and displays the parameters for signal transmission.

▶**Signal Type**

It displays the selected standard. It allows selecting another standard in the same band (terrestrial or satellite):

Operation:

1 Place over the **Signal Type** option and press Enter.

2 It displays a menu with transmission standards.

3 Move the cursor up / down to select a standard.

4 Press Enter to select the standard or any function key to exit without selecting.

▶**View Advanced Parameters**

It shows the TPS parameters (Transmission Parameters Signalling) for the locked signal according to the modulation standard. This option is available only when these parameters are detected. The remaining transmission parameters are detected demodulating the locked signal.

- In case of a DVB-S/S2 signal, the symbol-rate parameter can be set manually.
- In case of a Generic signal, the bandwidth of the channel can be set manually.

In case of a DVB-S2 signal, there will be some special settings for this type of signal. They are:

■ Physical Layer Scrambling or PLS is used in DVB-S2 as a way to improve data integrity. A number called the "scrambling sequence index" is used by the modulator as a master key to generate the uplink signal. This same number must be known by the receiver so that demodulation is possible.

■ Most satellite transponders use PLS 0 as a default value but there are some transponders that use other values.

■ If it is a multistream signal (MIS), it will appear an option that enables filtering by the input stream identifier (ISI) and to select the stream to

demodulate (by default it will randomly select one stream from the signal).

►**Stealth-ID**

The **StealthID** function is a RF signal identification function performed automatically by the equipment without any user intervention.

The equipment tries to identify the channel or frequency of the input signal it receives, and according to the band selected by the user (terrestrial or satellite), it applies identifying criteria according to the standards available on that band. When the equipment recognizes in the input signal the identification parameters of a specific standard, it decodes and identifies data of that signal.

Settings:

1 Press the **Preferences** key 🗁 (key F) for 1 second.

2 In the **StealthID** tab, select the signal types to auto-identify. By default all them are selected. Press the F2 key to save the changes made and the F1 key to exit the **Preferences** screen.

Operation:

1 Press the F2 key and check the StealthID option is ON.

2 Press the **Settings** ⚙ key (key C).

3 Select the band (terrestrial or satellite).

4 Select a channel or frequency to identify.

5 The bottom of the screen shows the message "**Searching for signal**" and the standard transmission checking. The identification system tries to lock the first signal using the modulation defined in the channel plan for that signal. If after five seconds it fails to lock with that modulation, it starts the wheel for automatic detection. If then it locks in a modulation other than indicated, it generates an internal temporary channel plan to accelerate tuning the same channel later on.

6 Wait a few seconds for the equipment to identify the signal. User can force the auto-identification of a signal by pressing the F2 key and selecting the type of signal from the menu.

7 When the equipment identifies the signal it displays on screen its standard and type.

8 Press F2 **Signal Parameters** to see all signal parameters.

9 Once the signal has been identified, to disable auto-identification press F2 and on StealthID option select OFF.

▶**Signals automatically detected**

- Digital Terrestrial Television First Generation (DVB-T).
- Digital Terrestrial Television Second Generation (DVB-T2: T2-Base and T2-Lite profiles).
- Digital Satellite Television First Generation (DVB-S).
- Digital Satellite Television Second Generation (DVB-S2).
- Digital Satellite Television, exclusive for DirecTV (DSS).
- Digital Cable Television First Generation (DVB-C).
- Digital Cable Television Second Generation (DVB-C2).
- Integrated Services Digital Broadcasting - Terrestrial (ISDB-T).
- Digital multi-programme systems for television, sound and data services for cable distribution (J83 Annex B).
- Analogue TV.
- Analogue FM.

4.3.3 F3: Tools

Access by the F3 key. It shows the Tools menu. If a specific tool is not available for the signal locked then the option is disabled. Tools are:

- Select Service: It displays the list of services available in the multiplex tuned, with the service name, icons that identify the service type, SID (stream identifier) and LCN (logic channel number). Icons that appear next to the service name identify the features of the service. The meaning is given in the following table:

📺	**Digital TV** service	HD	**High Definition** TV service
📻	**Digital radio**	1010	**Data**
🔒	**Scrambled** service		

- Signal Monitoring: This tool allows the user to monitor a signal by measuring its power, MER and C/N. All this data, can be downloaded to a

PC and exported to a file for later analysis. In this file are saved all characteristics measurements for each type of signal.

■ Signal Coverage[*]: This option allows the user to check signal coverage by measuring its power, MER and C/N. The position where all these measurements are taken is determined by a GPS receiver. All this data, measurements and GPS position can be downloaded to a PC and exported to a file for later analysis.

■ Explore Channel Plan: It explores the selected channel plan. Tune by channel must be selected.

■ Datalogger: It creates a file in which are stored measurements. This file belongs to the selected current installation.

■ Constellation: It displays the constellation of the locked signal.

■ LTE Ingress Test: It enables the detection of signal interferences coming from mobile phones.

■ Attenuation Test: This feature allows the user to easily check the response of the telecommunications installations before antennas and headers are working.

■ Echoes: It detects the echoes that may appear due to the simultaneous reception of the same signal from several transmitters.

■ MER by carrier: This function analyses continuosly the measure of the MER value for each one of the carriers forming the selected channel and they are displayed in a graphic on screen.

■ MEROGRAM: This functions shows a graphical representation of the MER level for each carrier of the locked signal, which is superimposed over time.

■ Spectrogram: This function shows a graphical representation of the spectrum superimposed over time of a channel or frequency selected by the user.

■ Discover FM Stations: This function scans the FM band and creates a FM channel plan from scratch. Scanned frequency range is from 87 to 108 MHz.

■ Field Strength: This function allows the equipment to measure as a field strength meter.

■ Task Planner: This function allows the user to schedule specific tasks.

■ TS Analyzer[**]: This function allows the user to make a comprehensive analysis of the Transport Stream (TS) contained in a tuned signal.

■ TS Recording[***]: This function can capture in real time the received transport stream (TS) contained in the received signal.

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*. GPS receiver not included. Contact PROMAX to obtain a valid GPS receiver.
. only available for **PROWATCH *Neo* 2.
***. only available for **PROWATCH** *Neo* 2.

- Shoulder Attenuation: This function measures the shoulder-shaped interferences in the adjacent channels.

- Service Recording: This function records in real-time the digital service shown on display from the tuned transport stream.

- Tilt: This function shows level difference among four carriers, in graphic and numerical mode.

- Scan: This function shows signal level in bar graph mode for all channels in a channel plan.

- Streaming V/A: This function allows the user to broadcast video/audio from the meter to a PC through a data network.

For more information about these features, see .

4.4	**Advanced Options**

Press key ⟨F4⟩, to access advanced options for the mode selected.

►Advanced Menu in Spectrum Analyzer mode

- Average: The user can select the amount of signal values to be used to set the average signal value to be displayed on screen. The larger the average value, the more stable the displayed signal appears.

- Spectrum Line: It defines the spectrum display. The Outline option displays the spectrum outline. The Solid option displays the contour of the spectrum with solid background. The Transparence option shows the outline in yellow and the background in a softer yellow.

- Tone Level: This option produces a tone that changes according to the input level of the signal so the tone is sharper if the level increases and deeper if the level decreases.

- Marker: It allows enabling/disabling the marker. This marker is displayed on screen with the shape of an arrowhead, showing on screen some information about the frequency and power level where it points. You can move left/right by the cursor in MK mode (press the cursor until the icon MK appears). When the Marker is ON at the top right corner a window pops up with the following data:
- •Freq: Frequency where is placed the marker.
- •Level: Power level at the frequency where is placed the marker.
- •ΔF: Difference of frequency between the marker and the main cursor.
- •ΔL: Difference of power level between the marker and the main cursor.

■ Marker Trace: It allows the user to select the trace to place the marker on:

•Normal: It places the marker on the spectrum trace in real time.

•Reference: It places the marker on the spectrum reference trace. To make a spectrum reference use the Reference function.

•Max. Hold: It places the marker on the max. hold trace. To make a maximum hold trace use the Max. Hold function.

•Min. Hold: It places the marker on the min. hold trace. To make a minimum hold trace use the Min. Hold function.

■ Max. Hold:(Off/Permanent/Curtain). It allows the user to display the current signal with the maximum values measured for each frequency. The OFF option disables this function. The Curtain option displays the maximum values in blue for a moment with the current signal. The Permanent option maintains maximum signal on the screen. This option is especially useful for detecting sporadic noises.

■ Min. Hold: (Off/Permanent/Curtain). It allows the user to display the current signal with the minimum values measured for each frequency. The OFF option disables this function. The Curtain option displays the minimum values in green for a moment with the current signal. The Permanent option maintains minimum signal on the screen. This option is useful for detecting interferences in TV cable or identify deterministic interference in analogue and digital channels.

■ Persistence: When active, the signal is displayed on a coloured background. The signal prior to current signal persists for a while before disappearing so the user can see how the signal changes easily.

■ Detector Type: (PEAK/RMS). It allows the user to select between maximum PEAK detector or RMS detector. The maximum peak detector is mainly used for analogue modulated signals, while the RMS option is the right choice for digital modulated signals. The maximum peak detector causes the noise floor to rise, according to the RMS to peak ratio. That same effect causes digital signals to apparently grow in level when maximum peak detector is used.

■ Resolution Bandwidth (RBW)[*]: Resolution filters available are: 2 kHz (only terrestrial band), 10 kHz, 20 kHz, 30 kHz, 40 kHz, 100 kHz, 200 kHz and 1000 kHz. According to filter selected maximum and minimum span changes (for more details refer to "Spectrum Analyzer Mode" on page 265).

■ Vertical Range: It allows setting the vertical scale on screen. Available values are 1, 2, 5 and 10 dB per division.

■ Dashed BW: When it is ON the channel bandwidth area is hatched by lines.

■ Reference: (Set / Clear). It memorizes the current trace on screen, which can be used as a reference for further comparison. It may be also very helpful for visually measure the gain or attenuation in a TV distribution network. To delete the reference, select the "clear" option. The trace can

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*. Resolution Bandwidth 2, 10, 20 and 40 kHz are available only for **PROWATCH Neo2**.

be also captured by a short press on the export key (📷) in the Spectrum Analyzer mode. Pressing short again on the export key it clears the reference.

- Start Zoom (this function must be previously enabled on Preferences -> Tools): It automatically sets parameters from the Spectrum mode in order to analize small signals. Settings are:
  - Span: 200 kHz.
  - Resolution filter: 12.5 kHz.
  - Reference level: minimum.
  - Measurement units: dBm.

NOTE: Some parameters such as average, spectrum line, tone level and marker are recovered after switching on.

►Advanced Menu in TV mode

- Analogue Signal: This option is available only if the detected or selected signal is ANALOGUE. Pressing the [F3] key it allows you to select the source for the analogue signal between antenna (via RF connector) and external (via V/A input connector). To get an external analogue signal use the A/V input.

- Aspect Ratio: This option is available only if the detected or selected signal is ANALOGUE. It allows the user to select the image aspect ratio (4:3; 16:9). It remembers this selection even after switch off.

- Advanced: This option is available only if the detected or selected signal is DIGITAL. There are these options:
  - Audio: It allows the user to select among the audio tracks available.
  - TS Data: It shows the IRG data descriptor. If the signal contains this carrier identifier, this option will be enabled. If the signal does not contain this identifier, the option will be disabled (for more information refer to section "IRG descriptor").
  - Discovered URLs: If shows the URL related to the interactive service.

4.5   Screen Description

The information that appears on screens for each mode (Measurement mode, Spectrum mode and TV mode) is described below. To change the mode, press the corresponding mode key. To change the screen in the same mode, press the same mode key consecutively..

Spectrum Analyzer 1/3

Spectrum Analyzer 2/3

Spectrum Analyzer 3/3

Measurement mode

TV mode

4.5.1　Measurement Mode Screens

▶ **FULL MEASUREMENT (MEASUREMENT 1/3)**
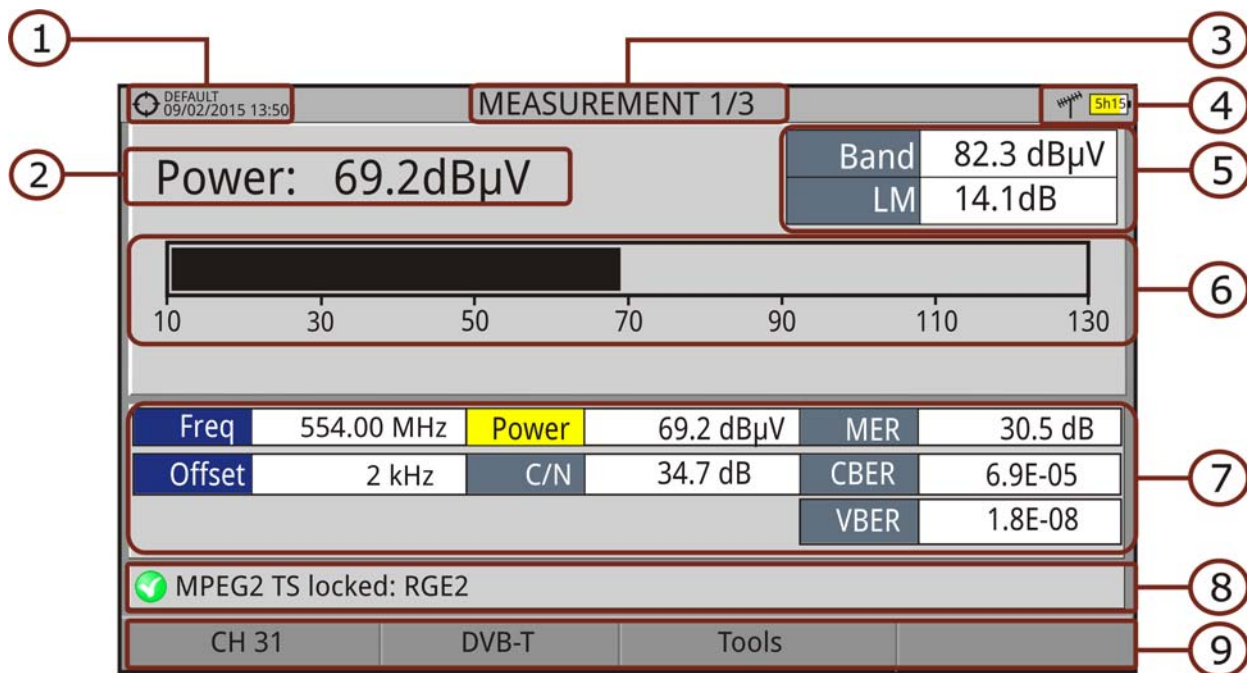
Figure 45.

1 Selected installation, date and time.

2 Main measurement and its numeric value. To select another main measurement move cursor up / down.

3 Number of view/total views.

4 Selected band, battery level.

5 Total power detected over the whole selected band (terrestrial or satellite). The total power can be used to know when it is close to saturation. It also shows the link margin measurement. The link margin is the margin of safety remaining for a good reception.

6 Graphical measurement of the main measurement.

7 Measurement values for the type of locked signal.

8 Signal status (searching/locked/multiplex name).

9 Softkeys menus.

■ Cursor functions:
•Up/down: Change of main measurement on screen.
•Left/right: Change of channel/frequency.

▶ MEASUREMENT + TV + SPECTRUM (MEASUREMENT 2/3)
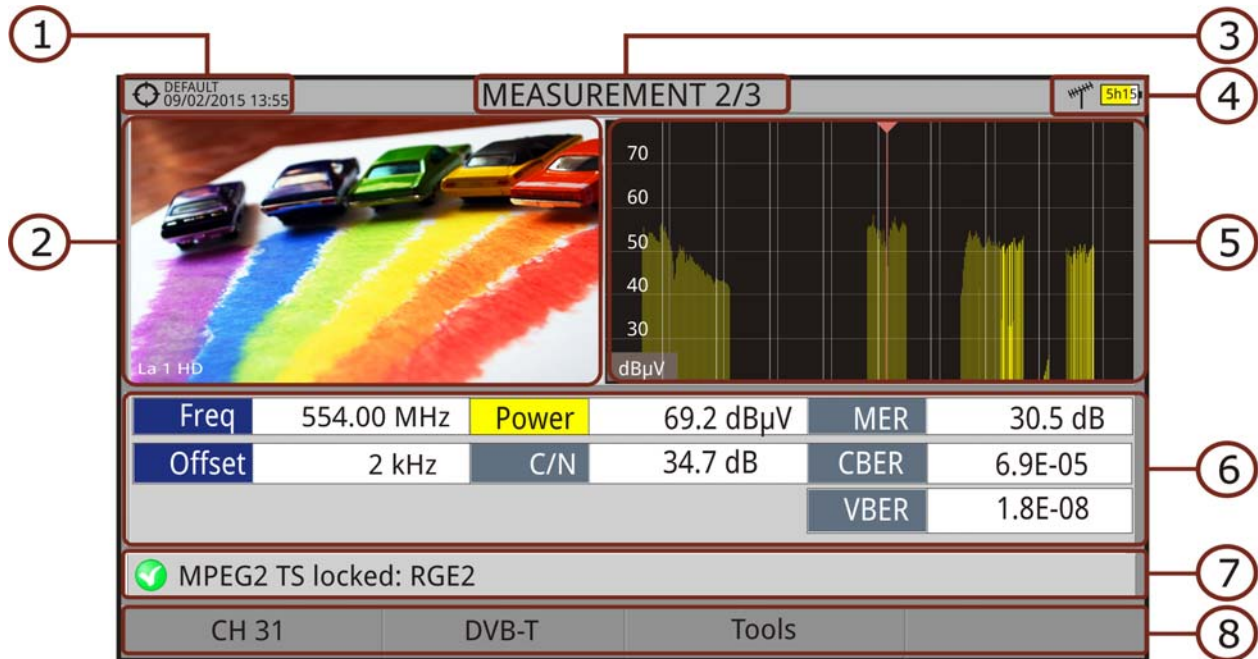
Figure 46.

1 Selected installation, date and time.

2 Image of locked signal.

3 Number of view/total views.

4 Selected band, battery level.

5 Spectrum of locked signal.

6 Measurement values for the type of locked signal.

7 Signal status (searching/locked/multiplex name).

8 Softkeys menus.

■ Cursor functions:
• Left/right: It changes channel/frequency.

▶ **MEASUREMENT + PARAMETERS (MEASUREMENT 3/3)**

DEFAULT 09/02/2015 13:56	MEASUREMENTS 3/3	5h15

DVB-T PARAMETERS

Bandwidth:	8000 kHz	Spectral Inversion:	Off
FFT Mode:	8k	Guard Interval:	1/4
Constellation:	64QAM	Code Rate:	2/3
TS Hierarchy:	NONE		

Freq	554.00 MHz	Power	69.2 dBµV	MER	30.5 dB
Offset	2 kHz	C/N	34.5 dB	CBER	6.8E-05
				VBER	<1.0E-08

✅ MPEG2 TS locked: RGE2

CH 31	DVB-T	Tools	
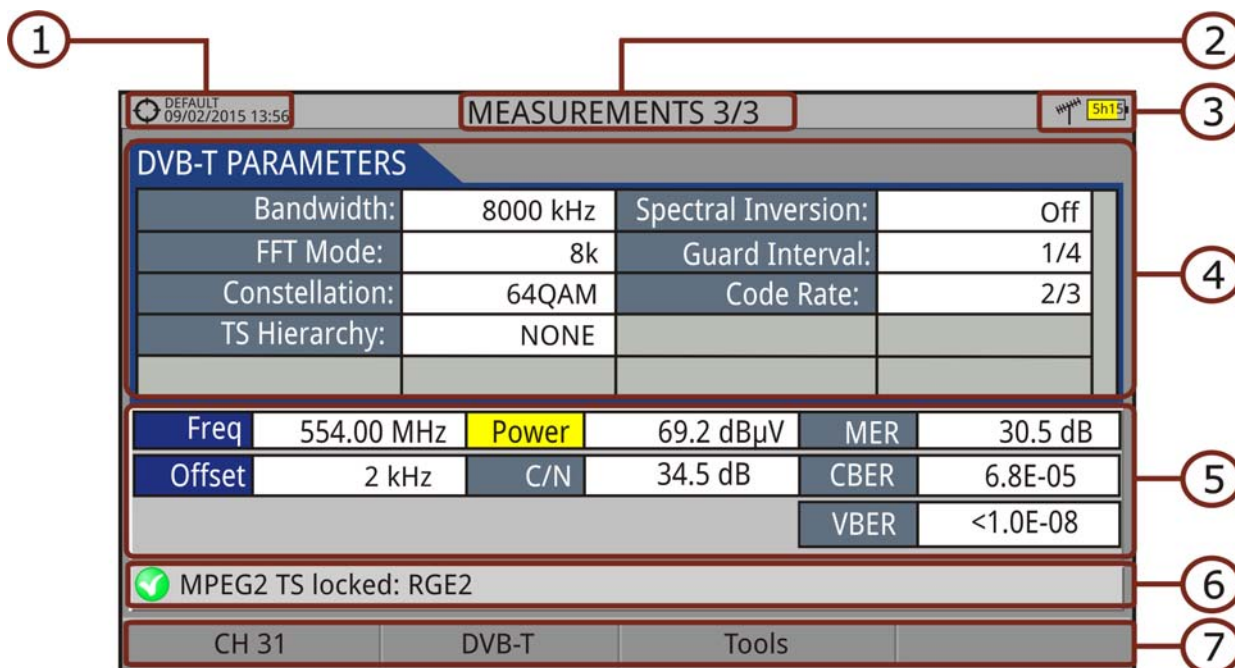
Figure 47.

1 Selected installation, date and time.

2 Number of view/total views.

3 Selected band, battery level.

4 Demodulation parameters for the locked signal.

5 Measurement values for the type of locked signal.

6 Signal status (searching/locked/multiplex name).

7 Softkeys menus.

■ Cursor functions:
•Left/right: It changes channel/frequency.

4.5.2 Spectrum Analyzer Mode Screens

▶ SPECTRUM + MEASUREMENT (SPECTRUM 1/3)
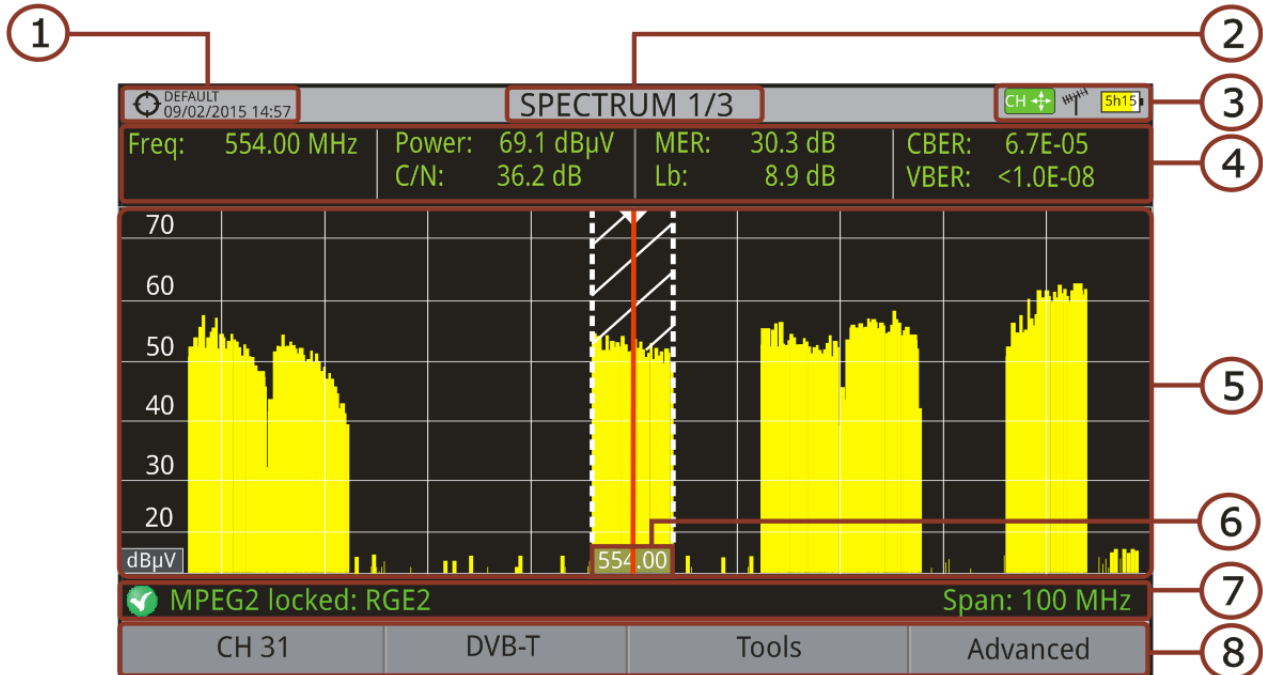
Figure 48.

1 Selected installation, date and time.

2 Number of view/total views.

3 Cursor active mode, selected band, battery level.

4 Measured values of the signal at the frequency/channel where is pointing the cursor.

5 Spectrum in the band with the selected span.

6 Centre frequency and cursor. It also shows the bandwidth of a digital locked signal.

7 Signal status (searching/locked/multiplex name/selected span).

8 Softkeys menus.

- ■ Cursor functions:
- •Up/down: It changes reference level.
- •Left/right (depending on the selection mode):
  - -SP: Span change.
  - -FR or CH: Frequency change or Channel change.
  - -MK: Marker change (if marker is enabled).

► **SPECTRUM + MEASUREMENT + TV (SPECTRUM 2/3)**
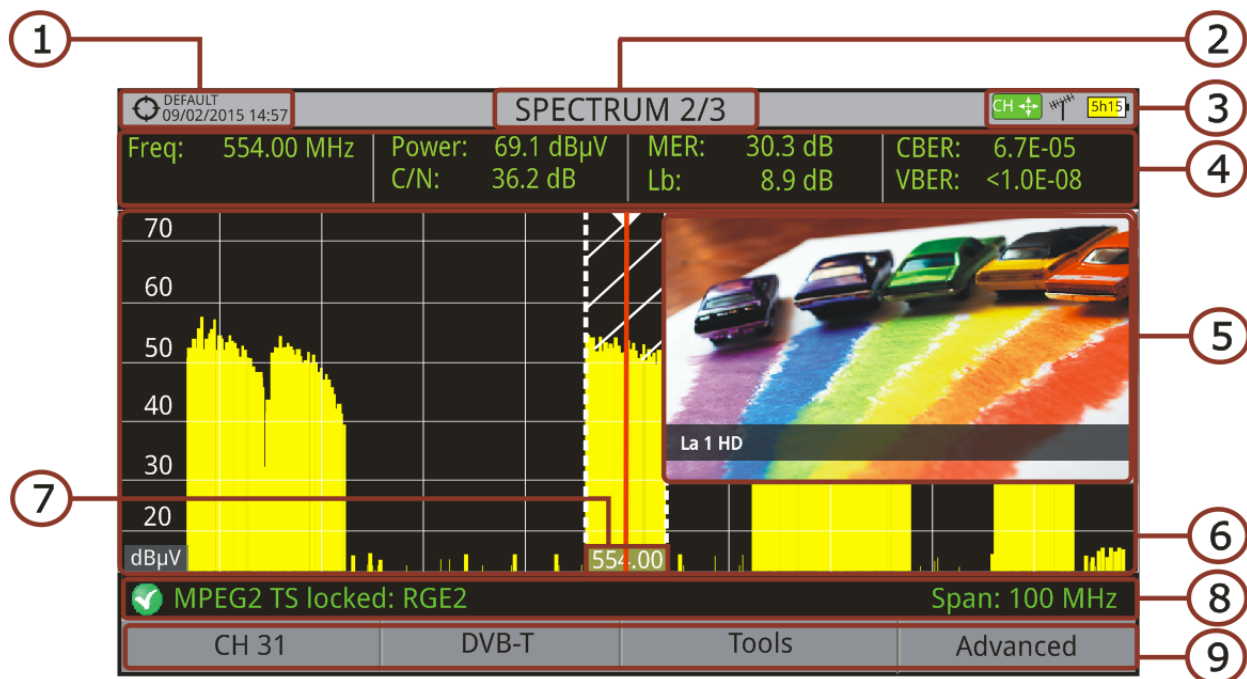
Figure 49.

1 Selected installation; date and time.

2 Number of view/total views.

3 Cursor active mode; selected band; battery level.

4 Measured values of the signal at the frequency/channel where is pointing the cursor.

5 Image of the tuned signal.

6 Spectrum in the band with the selected span.

7 Centre frequency and cursor. It also shows the bandwidth of the digital signal locked.

8 Signal status (searching/locked/multiplex name/selected span).

9 Softkeys menus.

   ■ Cursor functions:
   •Up/down: It changes reference level.
   •Left/right (depending on the cursor active mode):
    -SP: Span change.
    -FR or CH: Frequency change or Channel change.
    -MK: Marker change (if marker is enabled).

► **FULL SPECTRUM (SPECTRUM 3/3)**
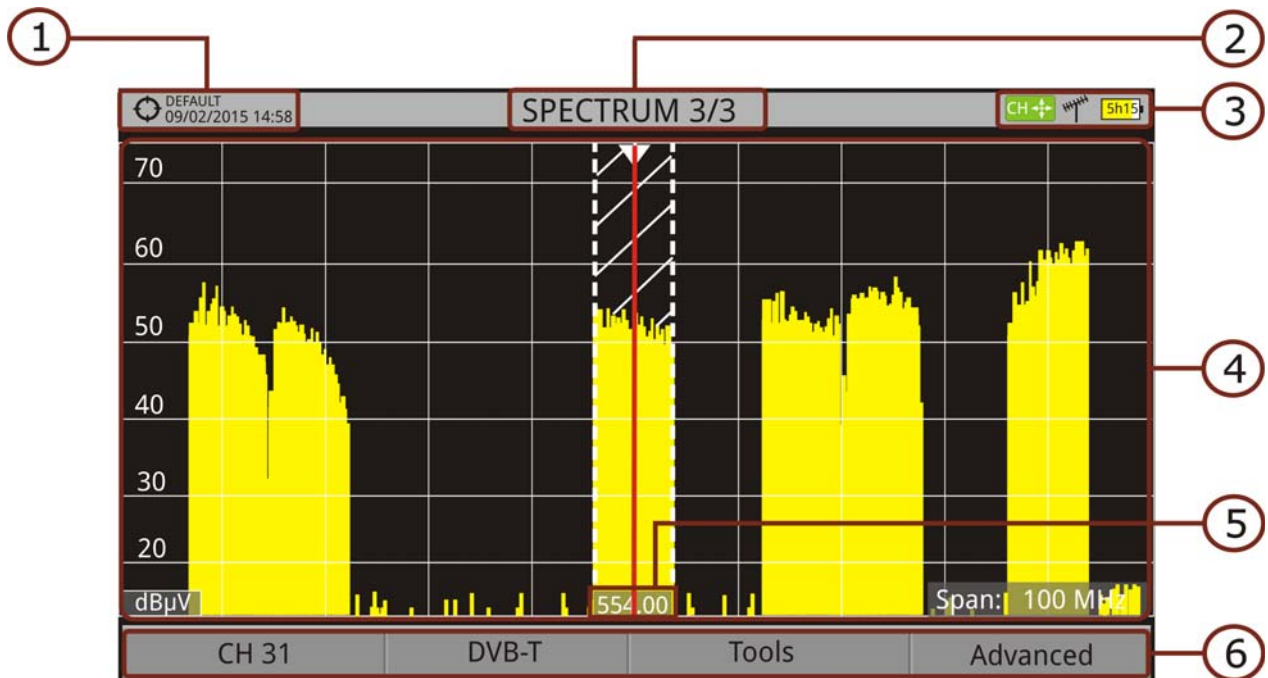
Figure 50.

1 Selected installation, date and time.

2 Number of view/total views.

3 Cursor active mode; selected band; battery level.

4 Spectrum in the band with the selected span.

5 Centre frequency and cursor. It also shows the bandwidth of a digital signal locked.

6 Softkeys menus.

■ Cursor functions:
•Cursor up/down: It changes reference level.
•Cursor left/right (depending on the cursor active mode):
 -SP: Span change.
 -FR or CH: Frequency change or Channel change.
 -MK: Marker change (if marker is enabled).

► **FULL SPECTRUM (SPECTRUM 3/3) WITH MARKER**
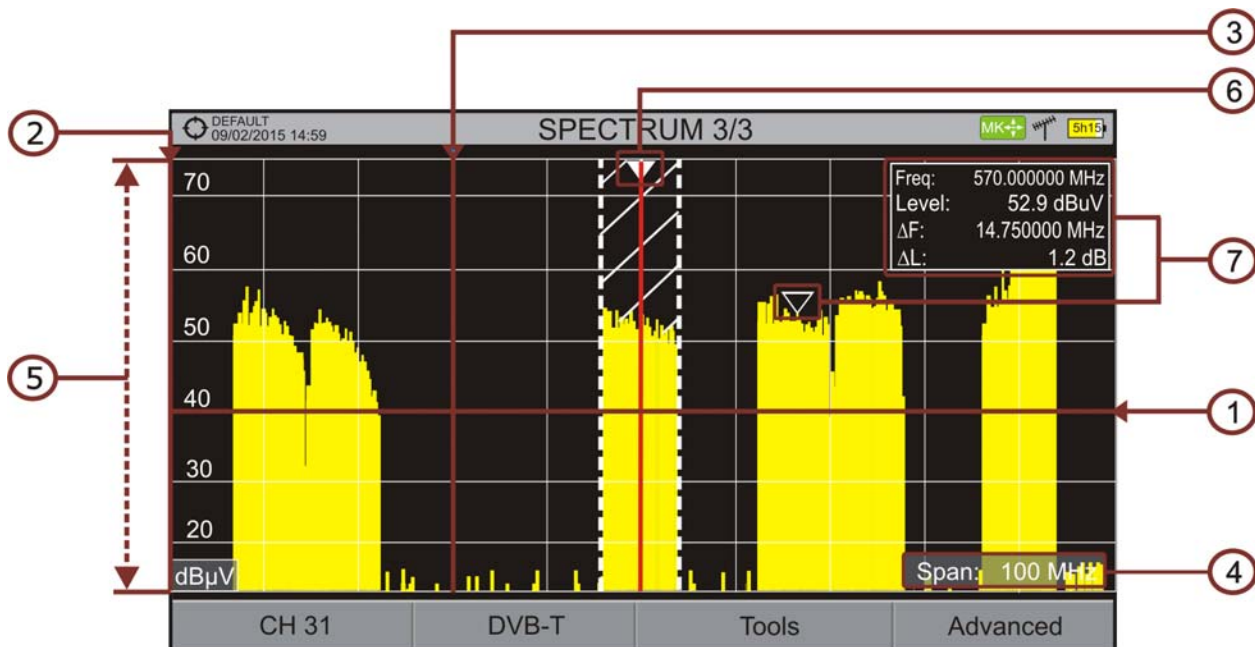
Figure 51.

1 Horizontal reference line: It shows level of signal.

2 Vertical axis: It indicates the signal level.

3 Vertical reference line: It indicates the frequency.

4 SPAN: It is the frequency range displayed on the horizontal axis. Span values available changes according to Resolution Bandwidth selected. The current span value appears at the bottom right of the screen. To switch among span default values use the cursor (left, right) in span mode (SP). For example, for RBW = 100 kHz default span values are Full (full band), 500 MHz, 200 MHz, 100 MHz, 50 MHz, 20 MHz and 10 MHz. To change to any other span value in that frequency range use the "span" option in the Tuning menu (F1 key).

5 Reference Level: It is the power range represented on the vertical axis. To change use the cursor (up, down; 5 dB steps). This equipment has an option to activate the automatic adjustment of the reference level, so it detects the optimal reference level for each situation. In automatic mode, it sets the optimum reference level each time it enters the spectrum mode. This option can be enabled or disabled through the **PREFERENCES** menu and **Measurements** tab.

6 Cursor: Red vertical line that indicates position during the channel or frequency tuning. When a digital signal is detected, there is a triple cursor that shows the frequency for the signal locked and two vertical lines that shows the bandwidth of the digital carrier. In the case of a GENERIC signal, the bandwidth shown is the one selected by the user on the "Signal Parameters" menu when pressing the F2 key. To change frequency/channel

use the cursor (left, right) in FR mode (tuning by frequency) or CH mode (tuning by channel).

7 Marker: It is a special cursor that can be placed on a given frequency to check the power in this point. This option can be enabled using the "Marker" option from the Advanced menu (F4 key). To change use the cursor (left, right) in MARKER (MK) mode.The window Marker shows the following data::

- •Freq: Frequency where is placed the marker (MHz units; accurate to Hz).
- •Level: Power level at the frequency where is placed the marker (in case of working with FSM tool, it shows FSM level).
- •ΔF: Difference of frequency between the marker and the main cursor (MHz units; accurate to Hz).
- •ΔL: Difference of power level between the marker and the main cursor.

8 Centre Frequency: Frequency at which the screen is centered. This frequency can be set through the **Tuning** key F1 . It also changes when moving the cursor out of screen.

4.5.3   TV / Radio Mode Screens

▶ **FULL TV (TV 1/3)**
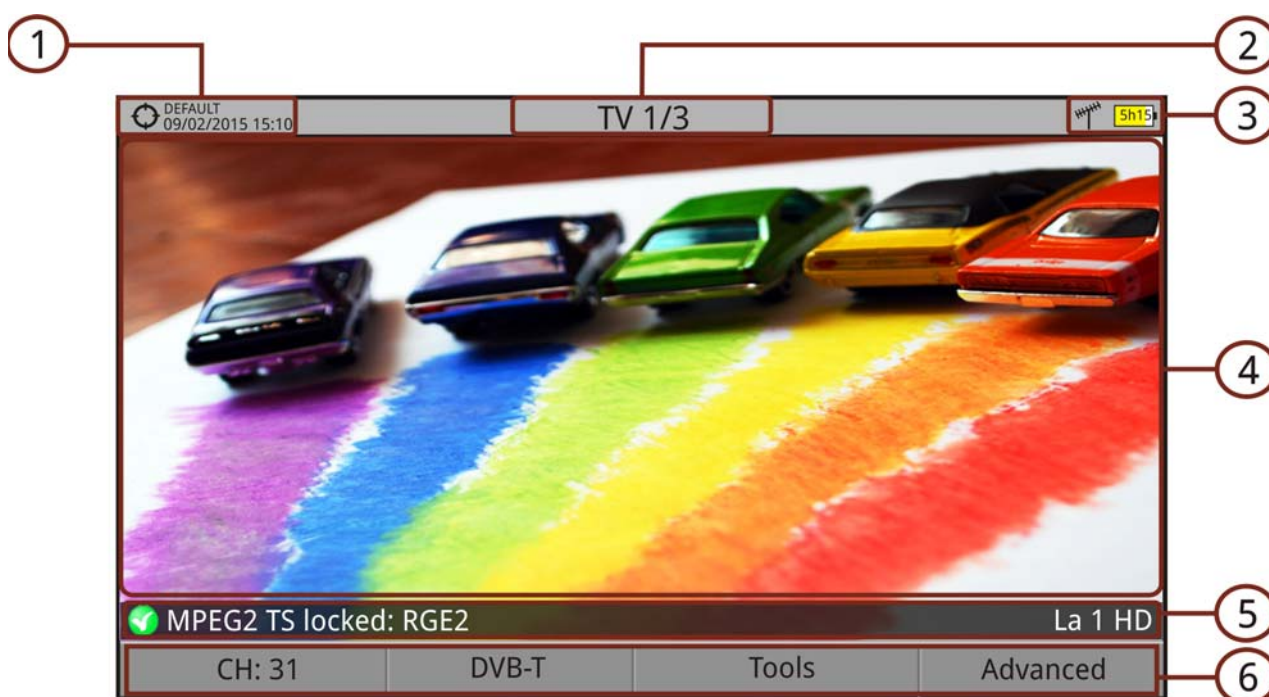
Figure 52.

1 Selected installation; date and time.

2 Number of view/total views.

3 Selected band, battery level.

4 Tuned service image.

5 Signal status (searching/locked/multiplex name) and name of the selected service.

6 Softkeys menus.

■ Cursor functions:
•Up/down: It changes service.
•Left/right: It changes channel/frequency (depending on the tuning mode).

► **TV + SPECTRUM + MEASUREMENT (TV 2/3)**
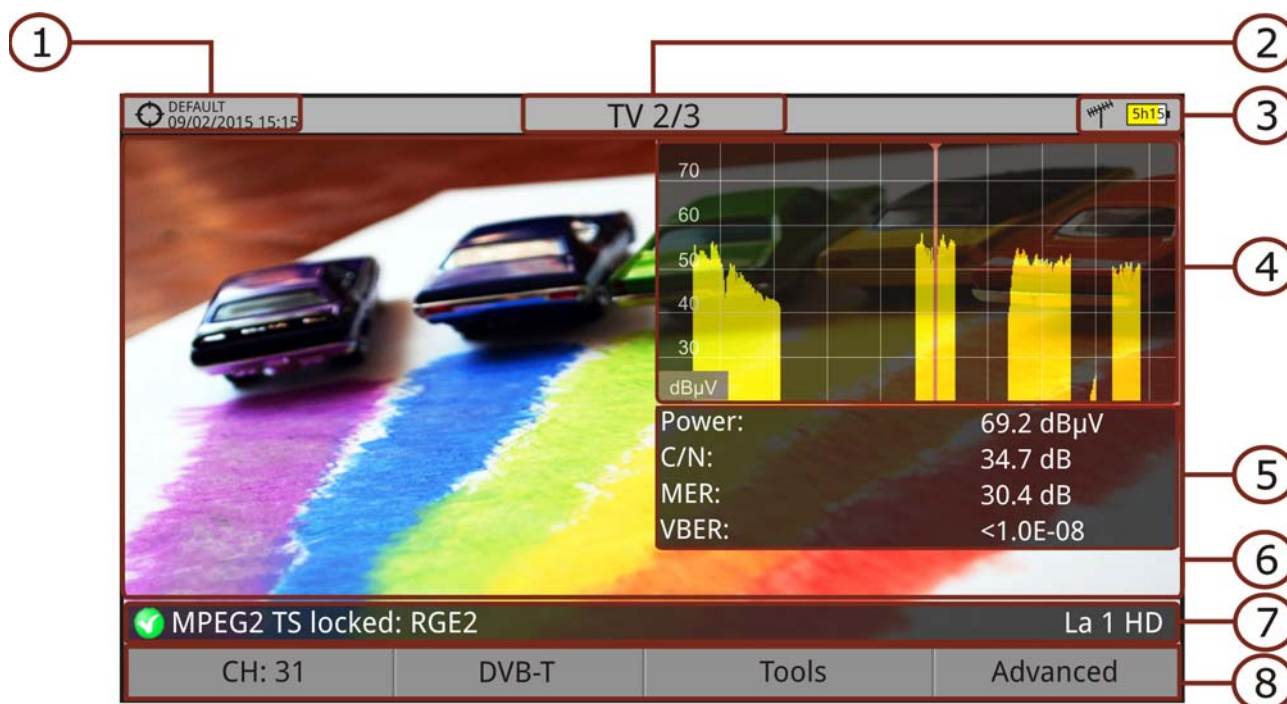
Figure 53.

1 Selected installation; date and time.

2 Number of view/total views.

3 Selected band, battery level.

4 Tuned service image.

5 Spectrum.

6 Measured values of the signal in the frequency/channel the cursor is pointing.

7 Signal status (searching/locked/multiplex name) and name of the selected service.

8 Softkeys menus.

■ Cursor functions:
•Up/down: It changes service.
•Left/right: It changes channel/frequency (depending on the tuning mode).

▶ **TV + SERVICE DATA (TV 3/3)**
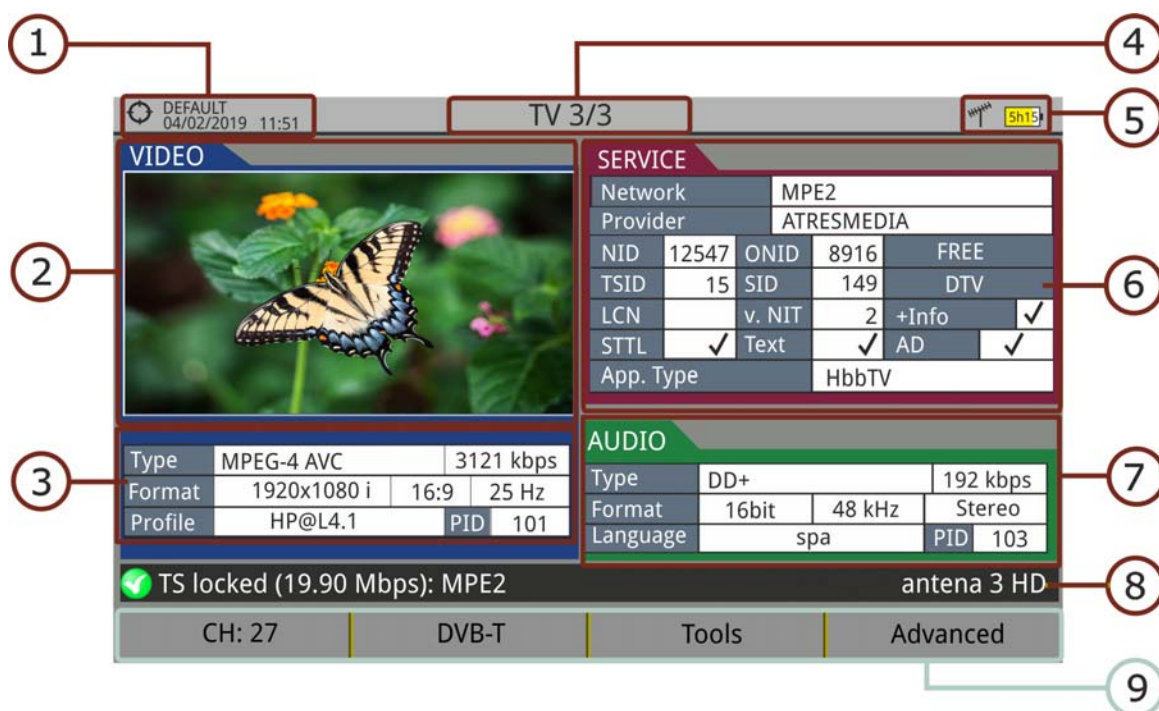
Figure 54.

1 Selected installation; date and time.

2 Tuned service image.

3 Tuned service information.

- TYPE: Encoding type and video transmission rate.
- FORMAT: Resolution (horizontal x vertical), aspect ratio and frequency.
- PROFILE: Profile level.
- PID: Video program identifier.

4 Number of view/total views.

5 Selected band; battery level.

6 Tuned service information.

- NETWORK: Television distribution network (Terrestrial). Orbital position (Satellite).
- PROVIDER: Program provider name.
- NID: Network identifier where the signal is distributed.
- ONID: Identifier of the original network where the signal originates.
- TSID: Transport stream identifier.
- SID: Service Identifier.

- App. Type: Type of detected interactive service such as HbbTV, MHP and MHEG-5. It also shows the URL related to the interactive service in F4: Advanced - Discovered URLs.
- LCN: Logic Channel Number. It is the first logic number assigned to the first channel in the receiver.
- +Info: Additional service information.
- v. NIT: Network Information Table (NIT) version.
- FREE/SCRAMBLED: Free/scrambled transmission.
- DTV/DS: Standard type of transmission.
- STTL: Subtitles available.
- Text: Teletext available.
- AD: Audio description available (for visually impaired).

7 Tuned Audio Information.

- TYPE: Type of audio encoding and transmission speed.
- FORMAT: Service audio format. Bit depth; sampling frequency; sound reproduction.
- LANGUAGE: Broadcasting language.
- PID: ID of the audio program.

8 Signal status (searching/locked/multiplex name) and name of the selected service.

9 Softkeys menu.

- Cursor functions:
 •Up/down: It changes service.
 •Left/right: It changes channel/frequency (depending on the tuning mode).

NOTE: The equipment can identify the HEVC format (H.265) and display broadcasting data such as type, profile, format, aspect ratio, bit rate and images. In the 4K UHD services it shows all data from transmission and images*.

---

*. For PROWATCH Neo images are show in a sequence of image frames through the "4K Frame Grabber" tool.

NOTE: PID, NID, ONID, TSID and SID fields can be shown in decimal or hexadecimal format. To select this parameter go to "Values Format" in "Preferences" - "Appearance".

► **AUDIO RADIO (RADIO 1/3)**

Figure 55.

► **AUDIO RADIO + SPECTRUM + MEASUREMENT (RADIO 2/3)**
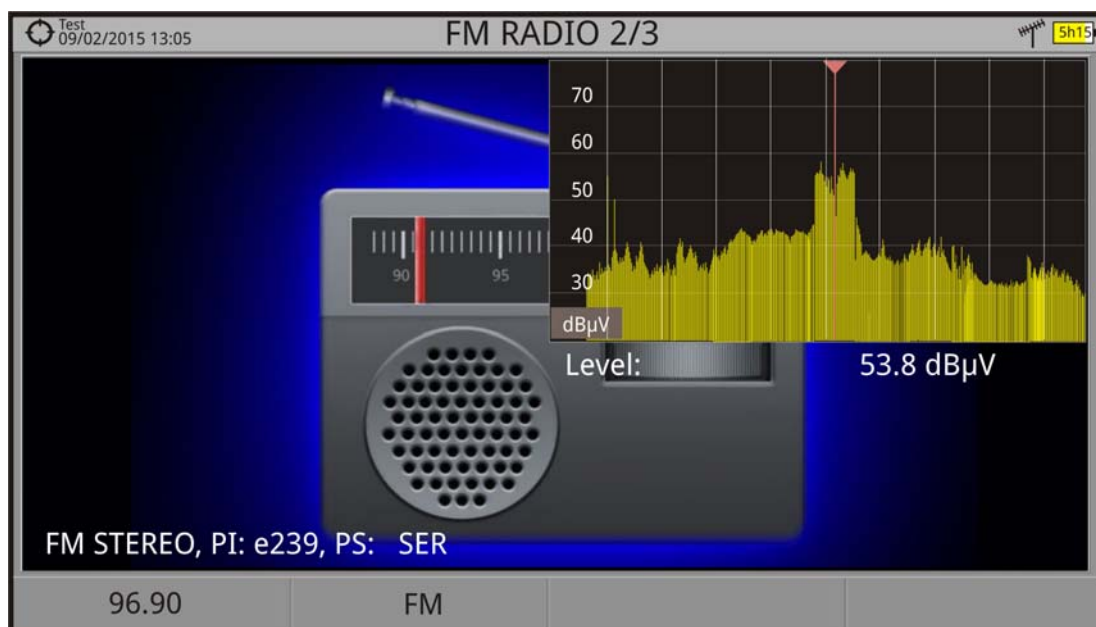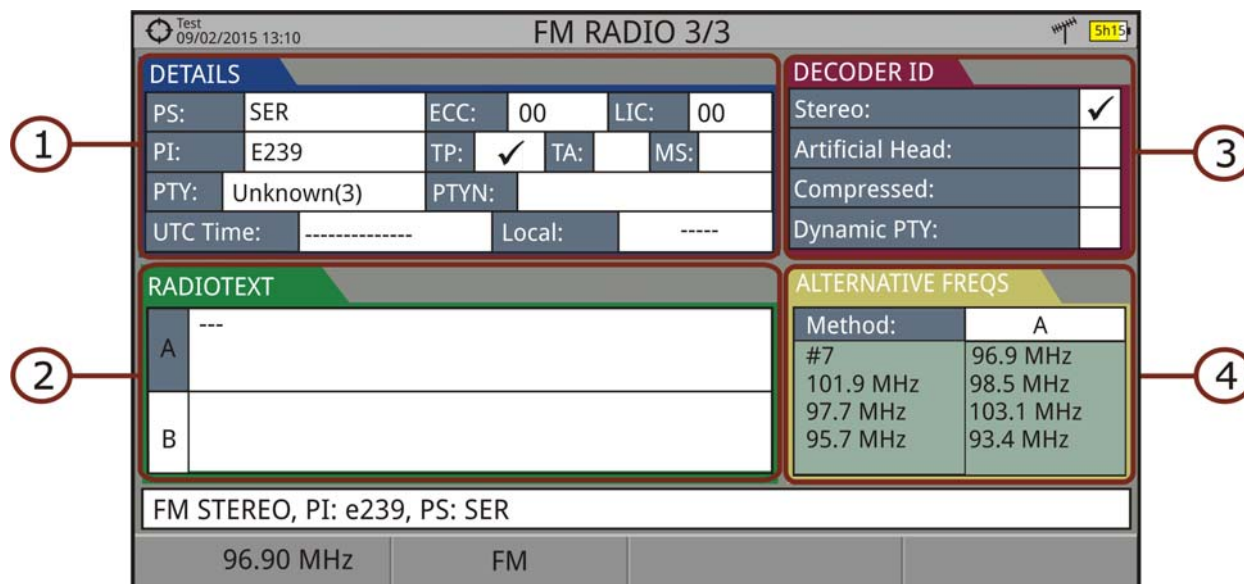
Figure 56.

► **AUDIO RADIO + RDS DATA (RADIO 3/3)**

Figure 57.

1 RDS Data:

- PS: Programme service.
- PI: Programme Identification.
- PTY: Program type.
- UTC Time: Universal time.
- Local: Local time.
- ECC: Extended country code.
- LIC: Language Identification Code.
- TP: Traffic program.
- TA: Traffic announcement.
- MS: Music switcher.

2 Radiotext: Extra text information.

3 Decoder ID: It identifies different operation modes of the decoder.

4 Alternative Freqs: : It shows alternative frequencies and its total number.

4.6   Additional Functions

In this chapter there is explained some additional functions for the meter. There are:

- Generic Signal
- Satellite Identification
- IRG Descriptor
- 4K Decoding
- LTE Signals

4.6.1   Generic Signal

This is a special digital signal that the equipment does not demodulate. It can be used for special signals as DAB/DAB + or COFDM modulation with narrow BW.

To select this type of signal press [F2] and in "Signal Type" select GENERIC.

In this type of signal the user can select the signal bandwidth by accessing the "Signal Parameters" menu on the [F2] key.

The power measure and C/N ratio is calculated according to the bandwidth selected by the user. The triple cursor shows on screen the BW selected by the user.

4.6.2   Satellite Identification

The spectrum analyzer makes easier the fieldwork for engineers when working with SNG mobile units and VSAT communications, since it allows adjusting transmission-reception systems. It also has several functions to identify satellites that avoid any possibility of error. When the signal is locked it identifies the satellite and shows on screen its name.

Often satellite operators request to look for the Beacon signal, as a method of satellite identification. This signal is easily identified by the meter, because it has high resolution, high sensitivity and short sweep times.

How to locate satellite beacon carriers

S
C
A
N

Below are two Beacon screen-shots signals, with a span of 10 MHz and a bandwidth of 100 kHz resolution, all with a sweep time of 90 ms.
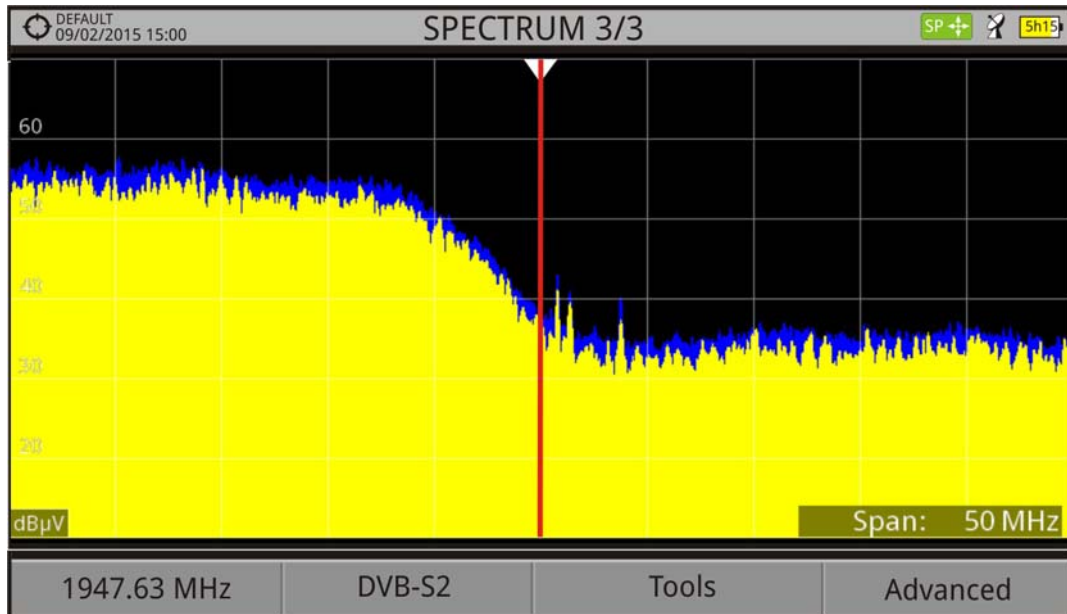
Figure 58.
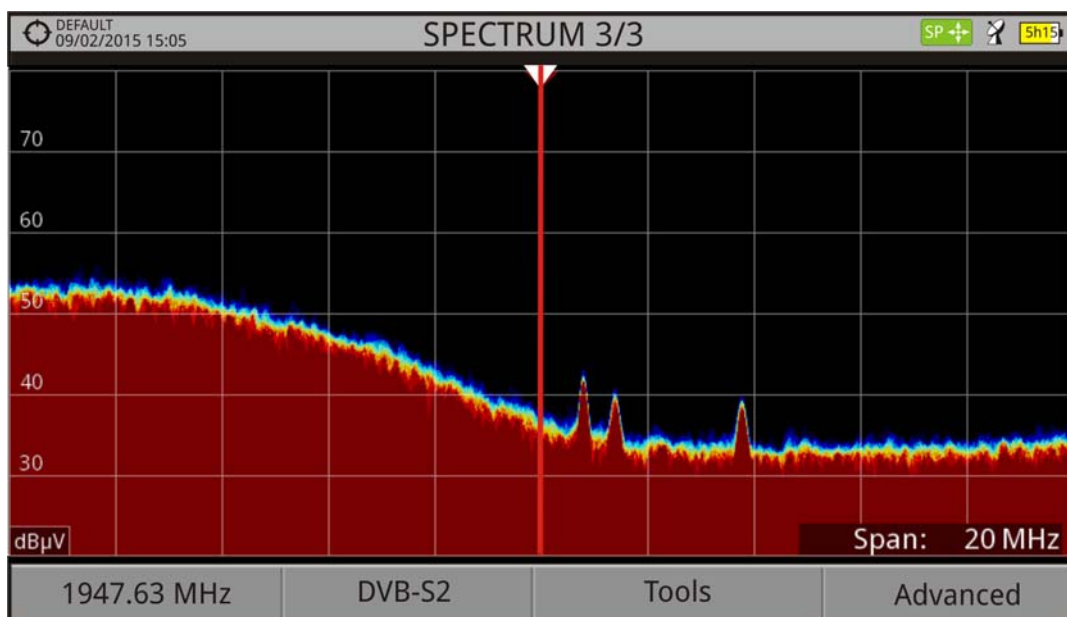
Figure 59.

More info about satellite signals in the application note "How to point a dish antenna" available on the PROMAX website.

4.6.3 **IRG Descriptor**

The analyzer is compatible with IRG recommendations and it can extract the Carrier ID information and display it conveniently showing all the details.

This information is useful to identify the interference, thanks to the carrier ID. This identifier provides enough information to detect the interference source (customer name, contact data, geo coordinates, etc.) and allows the operators to communicate directly with the RFI source to resolve the incident.

IRG descriptor function is available only for signals containing the carrier identifier. To access this feature:

1 Connect the **RF** input signal to the equipment.

2 Tune the channel that produces interferences and access TV Mode (key T).

3 Access the **TV** mode and press the **Advanced** menu F4.

4 Select the **TS Data** option. If the signal has a carrier identifier, this option is enabled. If the signal does not contain this identifier, this option is disabled.

5 The **IRG descriptor** window is displayed with the data about the provider (see figure below).
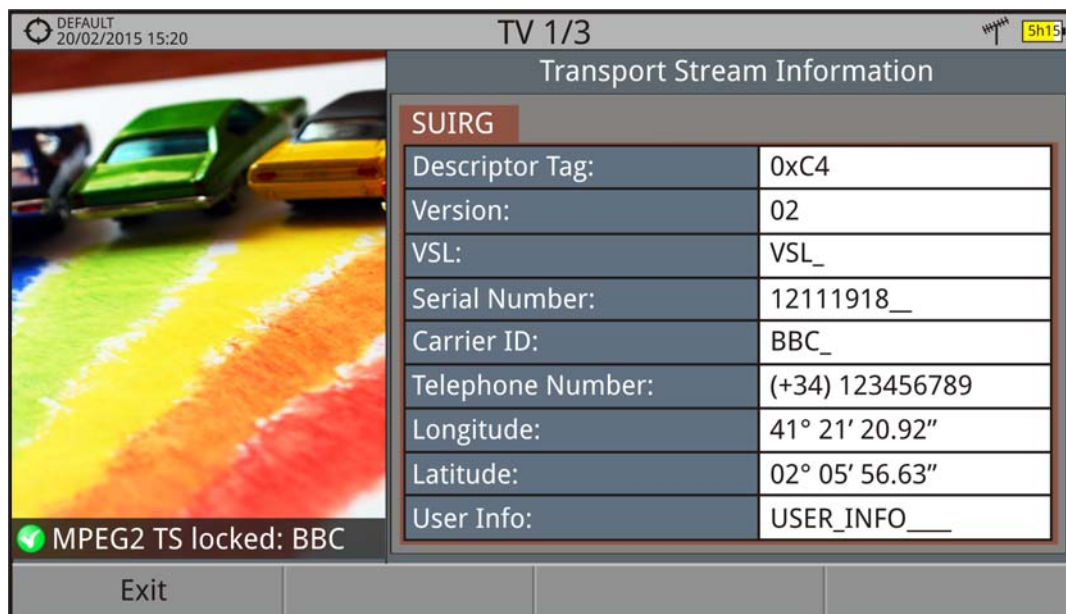
Figure 60.

4.6.4   **4K Decoding***

   *. Available for **PROWATCH Neo 2**

The equipment has the "4K Frame Grabber" function. This function decodes UHD video frames and displays them on screen as a slideshow.

The equipment can identify the HEVC (H.265) signalling and display its transmission data such as the video type, profile format, aspect ratio, bit rate and image.

Decoding a real 4K signal in DVB-T2

SCAN

4.6.5   **LTE Signals**

The equipment can measure LTE signals at 900 MHz (band 8) or at 2600 GHz (band 7)*.

1 Connect the RF input signal to the equipment. In "Settings" ⚙ select the RF source signal and the terrestrial band.

2 Select the Spectrum Analyzer mode ⩓. Press [F2] and select the GENERIC signal.

3 In this kind of signal the user can select its bandwidth from "Signal Parameters" on key [F2]. Usually the bandwidth for this signal is 10 MHz.

4 Now press F1 and select tuning by channel or frequency. If you have a channel plan with the operators channels** then use the tuning by channel. If not then use tuning by frequency.

5 If using tuning by frequency, enter the frequency for the operator's link you want to measure. If using tuning by channel just select a channel.

---

   *. Band 7 is an expansion option. Refer to annex.
   **.Contact PROMAX for specific LTE channel plans.
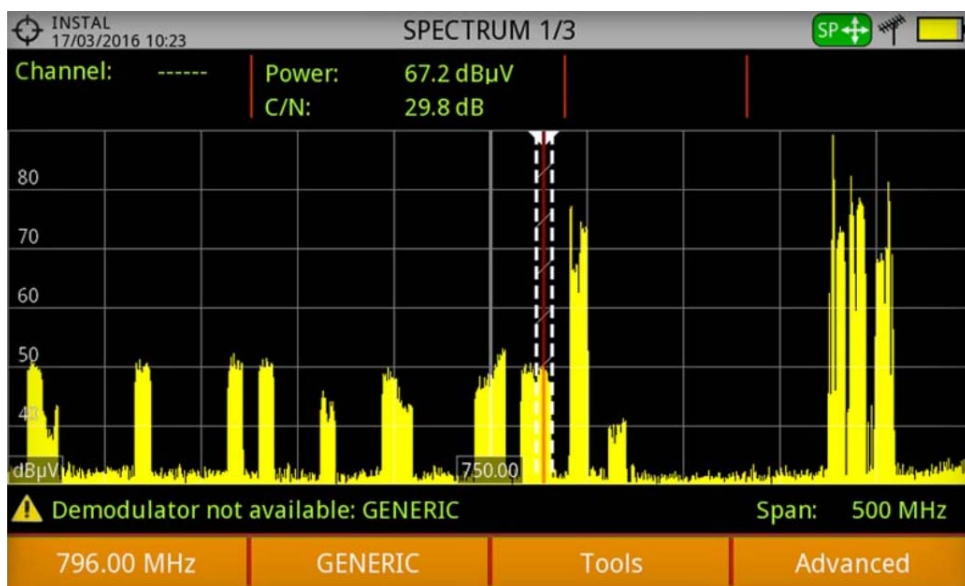
Figura 61.

[6] Set the SPAN to better signal view. Measure on downlink and uplink frequencies.

LTE signal measurement (mobile telephony)

SCAN

5 TOOLS

5.1   Introduction

Tools are specific functions that complement the standard functions of the meter. These tools can help solve specific situations where the usual measurement is not enough. In this chapter, each of these tools is described in detail. It is advisable to know them to make the most of the meter potential.

Tools are accessible by pressing the key [F3]. Some tools may be disabled or unavailable when they are incompatible with the type of signal tuned.

The following lists shows all available tools and the type of signal they are compatible with:

Name	Type of Signal	Additional Data*
Constellation	All digital signals	
LTE Ingress Test	All terrestrial digital signals	
Echoes	DVB-T, DVB-T2, DVB-C2, ISDB-T	
MER by Carrier	DVB-T, DVB-T2, DVB-C2	
MEROGRAM	DVB-T, DVB-T2, DVB-C2	
Spectrogram	All signals	
Attenuation Test	All signals	
Signal Monitoring	All signals	
Signal Coverage	All signals	GPS connected to USB port is mandatory
Datalogger	All signals	
Screen and Data Capture (Export key)	DVB-T, DVB-T2, DVB-S, DVB-S2, DSS, DVB-C, DVB-C2, analogue, FM, generic, ISDB-T	Also for other source signals: IPTV, WiFi and OTT
Explore Channel Plan	All signals	
Discover FM Stations	FM	
Field Strength	All signals	
Task Planner	All signals	Also for IPTV source signal
Transport Stream Analyzer[**]	All digital signals	Also for other source signals: IPTV and TS-ASI input
Transport Stream Recording[***]	All digital signals	Also for other source signals: IPTV and TS-ASI input
Shoulders Attenuation	DVB-T, DVB-T2, DVB-C, DVB-C2, ISDB-T	
Service Recording	DVB-T, DVB-T2, DVB-S, DVB-S2, DSS, DVB-C, DVB-C2, ISDB-T	Also for other source signals: IPTV
Tilt	All terrestrial signals	
Scan	All terrestrial signals	
Streaming V/A	All digital signals	Also for other source signals: IPTV and TS-ASI input

*. IPTV and Transport Stream source signals only available for **PROWATCH Neo 2**

. only available for **PROWATCH Neo 2

***. only available for **PROWATCH Neo 2**

5.2 Constellation

5.2.1 Description

The constellation diagram is a graphic representation of the digital symbols received over a period of time. There are different types of constellation diagrams according to the modulation type.

In the case of an ideal transmission channel without noise or interference, all symbols are recognized by the demodulator without errors. In this case, they are represented in the constellation diagram as well defined points hitting in the same area forming a very concentrated dot.

Noise and interferences cause the demodulator to not always read the symbols correctly. In this case hits are dispersed and create different forms which can visually determine the type of problem in the signal.

Each type of modulation is represented differently. A 16-QAM signal is shown on screen by a diagram of a total of 16 different zones and a 64-QAM signal is represented by a diagram of 64 different zones and so on.

The constellation diagram shows in different colours the density of hits and includes features to zoom, move and delete the display on screen.

Constellation

S
C
A
N

5.2.2 Operation

The constellation is available to all **digital** signals, both **terrestrial** and **satellite**.

To access the **Constellation** tool:

1 Connect the **RF** input signal to the equipment.

2 Tune to a digital signal from satellite or terrestrial band.

3 Press (F3) (Tools).

4 Select **Constellation**.

5 The **Constellation** of the tuned signal appears.

▶ **Screen Description**
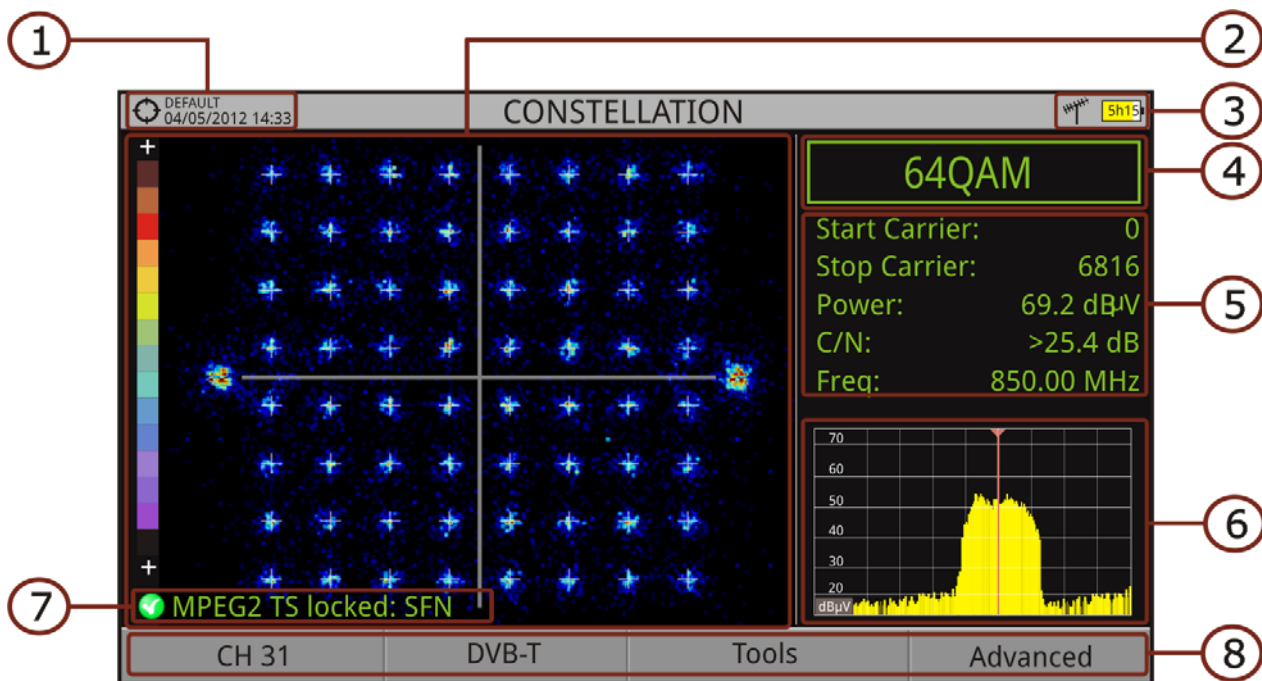
Figure 62.

1 Selected installation; date and time.

2 Constellation window. The colour scale placed at the left side indicates the signal quality in a qualitative way by a gradation of colours proportional to the density of symbols concentrated in a given area. The colour scale ranges from black (no symbols) to red (highest density). Greater dispersion of the symbols indicates higher noise level or worse signal quality signal. If there is symbols concentration with respect to the full grid (see advanced menu for types of grid) this is indicative of good ratio signal/noise or absence of problems.

3 Selected band; battery level.

4 Constellation modulation.

5 Data Window. Data shown are: Start Carrier, Stop Carrier, Power, C/N and frequency/channel.

6 Spectrum of the tuned signal. Spectrum is displayed with the span selected at the **Spectrum** mode.

7 Signal status (searching/locked/multiplex name).

8 Softkeys menus.

■Cursor functions:
   •Left/right: Frequency/Channel change (depending on the tuning mode).

5.2.3 Menu Options

On the bottom of the screen there are four menus accessible via the function keys.

- **F1** It displays the channel / frequency where is pointing the cursor, accesses the tuning menu and allows selecting the channel plan.

- **F2** It displays the selected transmission standard menu and accesses the signal parameters.

- **F3** It displays the Tools menu.

- **F4** It displays the Advanced menu.

In the **Advanced** menu there are some options to set the constellation tool. They are:

- Grid type:
  - Full Grid: The grid where the constellation is displayed is a complete grid.
  - Cross Grid: The grid where the constellation is displayed is made of crosses.

- Persistence: It allows the user to set the level of persistence, which is the lapse of time the signal stays on the screen before disappearing. Available options according to the persistence level are: low, medium, high or permanent.

- Zoom: It allows the user to select a quarter (I, II, III or IV) where apply the zoom in. To come back to normal view select All.

- Start Carrier/Stop Carrier: This option allows selecting the range of carriers to be displayed between the first and last.

- Clear: This option clears all symbols in the whole constellation window.

5.3	**LTE Ingress Test**

5.3.1	**Description**

Long Term Evolution is a new standard for mobile networks. This mobile communication standard uses a frequency band close to the bands used by television. For this reason it can cause interferences.

The equipment allows you to use an LTE external filter to put on the RF input connector. This filter can be enabled to check if the quality of the TV signal reception improves, when much of the LTE band has been attenuated by the filter. With this tool you can measure the MER of a DTT channel, presumably affected by an LTE signal, and evaluate the effects of enabling an LTE filter.

To be clarified that these filters cannot completely remove the LTE band signals. Especially for the TV channels close to 790 MHz, where is the end for the current UHF. If we are close to a LTE station with low downlink channels, a filter cannot be a sufficient solution.

Other options to better mitigate the LTE signals can be considered, such as a change in the location of the TV antenna or a passive shield in the way between the two antennas (TV and LTE).

For more information, refer to application note "LTE Digital Dividend" available on the PROMAX website.

▶	**LTE ingress test**	SCAN

5.3.2	**Operation**

The **LTE Ingress Test** is available to all **Digital Terrestrial** signals.

► Settings

1 Press the "**Installation manager**" (key F) for one second to access "**Preferences**" settings.

2 Go to "**Tools**" tab and edit the LTE filter settings:

■ LTE Filter F. Min.: Select the minimum frequency for the external LTE filter.

■ LTE Filter F. Max.: Select the maximum frequency for the external LTE filter.

3 Once selected, press F2 to save changes and F3 to exit "Preferences".

▶ **Operation**

1 Connect the external **LTE** filter between the signal and the **RF** input.

2 Tune the channel that is possibly affected by a LTE interference.

3 Press the key F3: Tools.

4 Select the **LTE Ingress Test** mode.

5 Screen shows a confirmation message. Press on F1 "Yes" if filter is connected or F2 "No" if filter is not connected.

6 It starts to measure.

7 To change filter status (ON / OFF), press again the F4 key and will appear a confirmation message. Connect / disconnect the LTE filter at the RF input and then press F1 key: Ok to start measuring.

8 The user can enable / disable the LTE measure by pressing the F4 : **ON/ OFF**. Remember to connect / disconnect the LTE filter to the RF input. Each time a LTE measure starts, the time counter will reset.

9 Check how to connect and disconnect the LTE filter affects the installation, by comparing the MER measure and the LTE band power.

► **Screen Description**
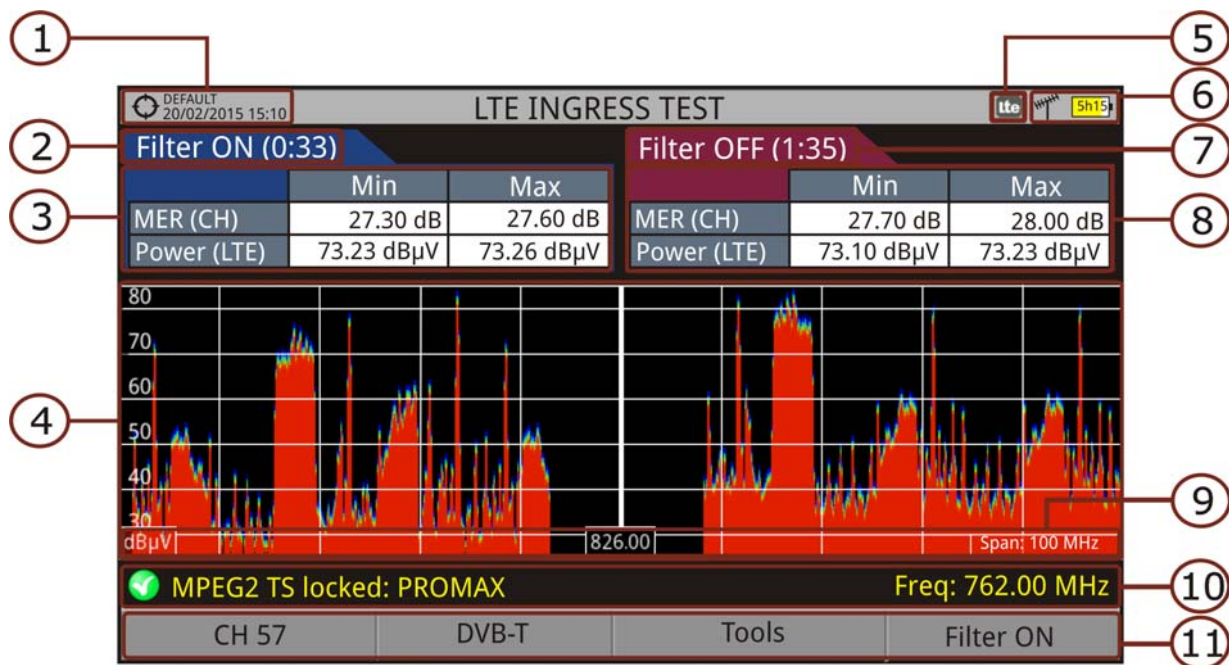
Figure 63.

1 Selected installation; date and time.

2 Elapsed time with filter enabled (ON).

3 Measurement with LTE filter enabled:

- MER: Maximum and minimum MER for the TV channel tuned (the one probably affected by the LTE interference signal).

- LTE Power:Maximum and minimum power for the complete band, between minimum and maximum filter frequencies.

4 Spectrum band, frequencies between minimum and maximum filter frequencies.

5 Identifier icon of the **LTE** filter ON (only when using internal LTE filter).

6 Selected band; battery level.

7 Time elapsed with filter disabled (OFF).

8 Measurement with LTE filter disabled:

- MER: Maximum and minimum MER for the TV channel tuned (the one probably affected by the LTE interference signal).

- LTE Power: Maximum and minimum power for the complete band, frequencies between minimum and maximum filter frequencies.

9 Measurement units/centre frequency/span (span: 10 MHz/division).

10 Signal status (searching/locked/multiplex name).

11 Softkeys menus.

5.3.3 Menu Options

On the bottom of the screen there are four menus accessible via the function keys.

- **F1** It displays channel/frequency and access the tuning menu. It allows selecting the channel plan and the channel where apply the LTE ingress test.

- **F2** It displays the selected transmission standard menu and accesses the signal parameters.

- **F3** It displays the Tools menu.

- **F4** It enables (ON) / disables (OFF) the LTE filter.

5.4 Echoes

5.4.1 Description

The **Echoes** function shows the response in time of a digital terrestrial channel and therefore it can detect echoes that can occur due to the simultaneous reception of the same signal from several transmitters with different delays and amplitudes.

Another cause that may cause echoes is reflection of the signal on large objects, as buildings or mountains. This may be the explanation that having a good C/N and a good signal, the BER does not reach the minimum value.

With the **Echoes** function is possible to know the distance from where the equipment is to the transmitter or the object that caused the echo. Thus, the installer can minimise the effect that the echo may cause on the installation, reorienting the antenna and reducing the effect of received echoes.

This function is only available for **DVB-T**, **DVB-T2, DVB-C2** and **ISDB-T**. Therefore, previously have to configure the equipment for the reception of such signals.

<table>
<tr><td>▶</td><td>**Echoes analyzer**</td><td>SCAN</td></tr>
</table>

5.4.2   Operation

Echoes function is available for **DVB-T**, **DVB-T2**, **DVB-C2** and **ISDB-T** signals.

1 Connect the **RF** input signal to the equipment.

2 Tune a **DVB-T**, **DVB-T2, DVB-C2** or **ISDB-T** digital signal at the terrestrial band.

3 Press the Tools `F3` key.

4 Select the Echoes option.

5 The **Echoes** function of the tuned signal appears on screen.

▶ **Screen Description**
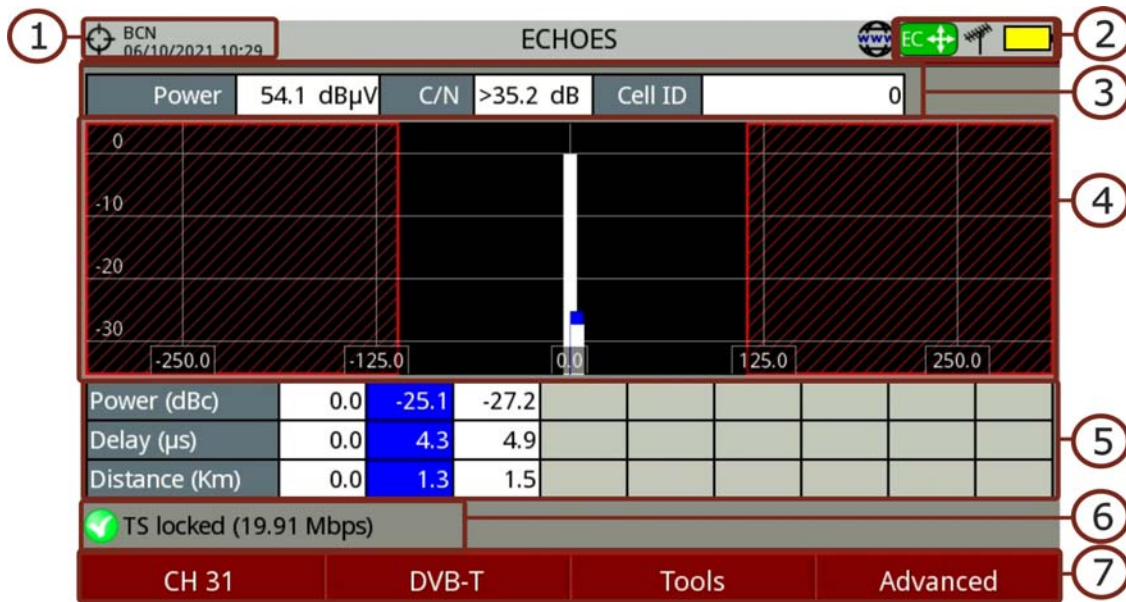
Figure 64.

1 Selected installation; date and time.

2 Selected band, battery level.

3 Main signal data: Power, C/N and Cell ID (it shows the main signal transmitter, if available).

4 **Echoes** Diagram. The display shows a graphical representation of the echoes. The horizontal axis of the graph corresponds to the delay in receiving

the echo on the main path (the stronger signal).The vertical axis represents the attenuation of the echo in dB on the main path.

5 Data box with main data regarding echoes. EIn the list of echoes it shows the power, the delay in microseconds and the distance in kilometres to the echoes.

6 Signal status (searching/locked/multiplex name).

7 Softkeys menus.

■ Cursor functions:
•Cursor left/right (**Channel/Frequency** mode): It changes the channel/ frequency (according to the tuning type selected).
•Cursor left/right (Echoes mode): It changes echo.
•Cursor up/down (Echoes mode): It changes zoom.

Remember to press the Enter to switch between the **Echoes** (EC) mode and the **Channel/Frequency** (CH/FR) mode.

5.4.3 Menu Options

At the bottom of the screen there are four menus available via the function keys.

■ **F1** It displays the channel/frequency where is pointing the cursor, it allows the user to select a channel or frequency, a channel plan and access the tuning menu.

■ **F2** It displays the selected transmission standard menu and accesses the signal parameters.

■ **F3** It displays the Tools menu.

■ **F4** It displays the Advanced menu. The ZOOM option changes the zoom on the echoes windows. Zooms are 1x, 2x, 4x and 8x.

5.5 MER by Carrier

5.5.1 Description

The MER by Carrier function analyses continuously the measure of the MER value for each one of the carriers forming the selected channel and they are displayed in a graphic on screen. This tool is especially useful for the analysis of systems

in which signals of different type and origin interfere with each other, as may occur during the transition from analogue to digital TV.

<table>
<tr><td>▶</td><td>**MER by carrier**</td><td>[QR code] S C A N</td></tr>
</table>

5.5.2 ■ Operation

The **MER by carrier** tool is available for signals with carriers: **DVB-T**, **DVB-T2** and **DVB-C2**.

1 Connect the **RF** input signal to the equipment.

2 Select terrestrial band and tune a **DVB-T**, **DVB-T2** or **DVB-C2** digital signal.

3 Press the **Tools** key [F3].

4 Select **MER by carrier** option.

5 The MER function appears on screen.

6 To exit press any key of mode (TV mode, Spectrum mode or Measurement mode).

▶ **Screen Description**
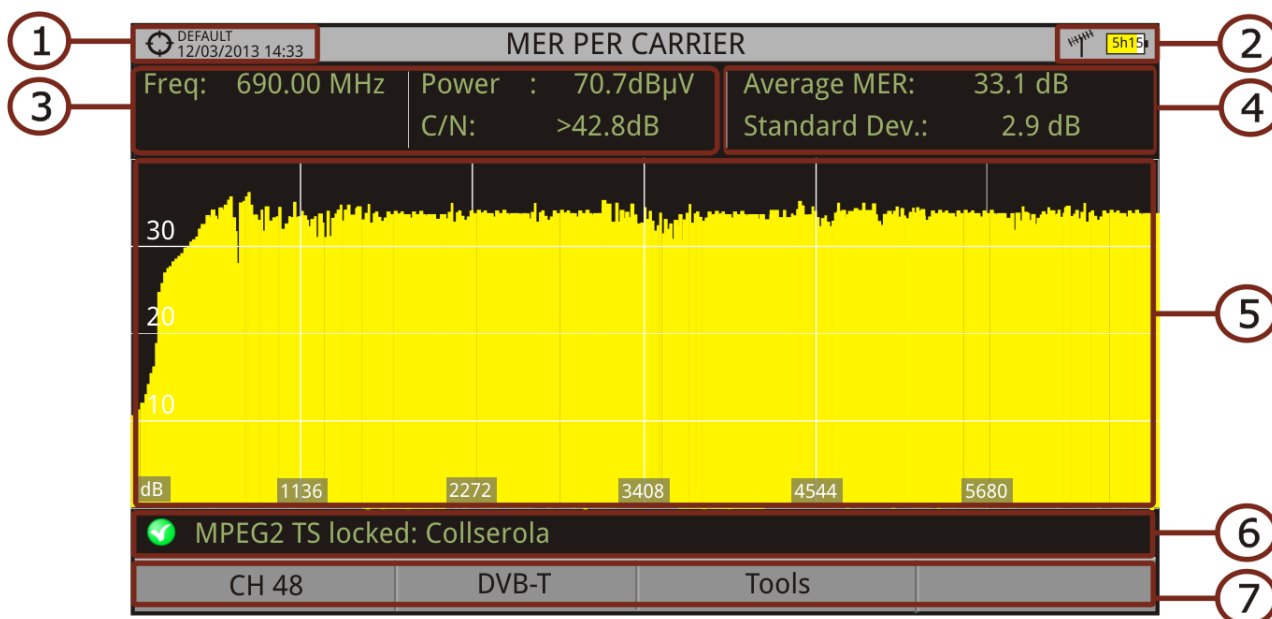
1 Selected installation; date and time.

2 Cursor active mode; Selected band, battery level.

3 Measurement values for the signal tuned at the frequency/channel selected.

4 Average measurement value and standard deviation value of MER.

5 **MER by carrier** graphic.

6 Signal status (searching/locked/multiplex name).

7 Softkeys menus.

■Cursor functions:
- Cursor left/right: Channel/frequency change (according to the tuning mode).

■Axis description:
- Axis X: Number of Carriers.
- Axis Y: MER.

5.5.3   Menu Options

At the bottom of the screen there are three menus available via the function keys.

■ **F1** It displays the channel/frequency where is pointing the cursor, it allows selecting channel plan and channel and access the tuning menu.

■ **F2** It displays the selected transmission standard menu and accesses the signal parameters.

■ **F3** It displays the Tools menu.

5.6   MEROGRAM

5.6.1   Description

The MEROGRAMA function shows a graphical representation of the MER level for each carrier of the locked signal, which is superimposed over time. During the MEROGRAM function, maximum and minimum of some parameters and the time when they are reached are stored. This tool is especially useful for detecting sporadic problems over time.

MEROGRAM

5.6.2 Operation

The **MEROGRAM** function is available for signals with carriers: **DVB-T**, **DVB-T2** and **DVB-C2**.

1 Connect the **RF** input signal to the equipment.

2 Select the terrestrial band and tune a **DVB-T**, **DVB-T2** or **DVB-C2** channel or frequency.

3 Press the **Tools** F3 key.

4 Select the **MEROGRAM** function.

5 It shows the **MEROGRAM** function of the signal.

6 To exit press any key of mode (TV mode, Spectrum mode or Measurement mode). All data registered is cleaned after leaving.

▶ **Screen Description**
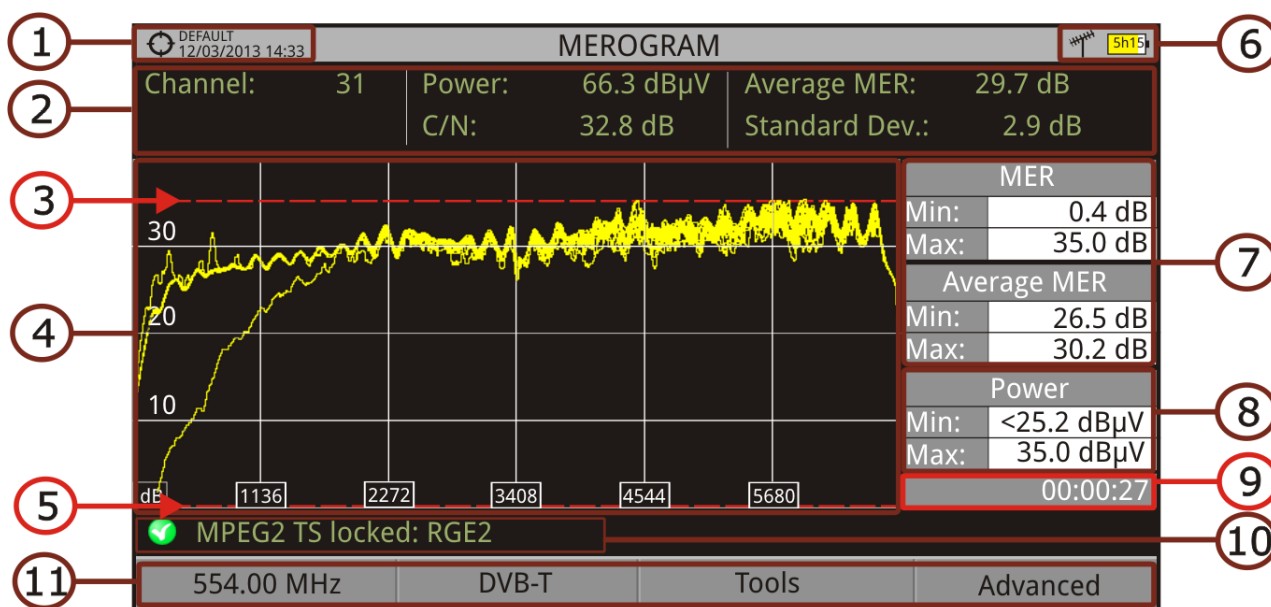
Figure 65.

1 Selected installation; date and time.

2 Measurement values for the signal tuned at the frequency/channel selected.

3 Maximum level of MER.

4 **MEROGRAM** graphic.

5 Minimum level of MER.

6 Selected band, battery level.

7 Maximum and minimum MER value and MER average over time.

8 Maximum and minimum value of the measure selected by the user in the option "User measure" (see next section).

9 Elapsed time after starting the **MEROGRAM** function.

10 Signal status (searching/locked/multiplex name).

11 Softkeys menus.

■ Cursor functions:
• No function in this tool.

■ Axis Description:
• Axis X: Number of Carriers.
• Axis Y: Power.

<table><tr><td>**5.6.3**</td><td>**Menu Options**</td></tr></table>

At the bottom of the screen there are four menus available via the function keys.

■ **F1** It displays the channel/frequency where is pointing the cursor, it allows selecting channel plan and channel and access the tuning menu.

■ **F2** It displays the selected transmission standard menu and accesses the signal parameters.

■ **F3** It displays the Tools menu.

■ **F4** It displays the Advanced menu.

In the Advanced menu there are some options for the **MEROGRAM** function configuration. They are:

■ User measure: It allows the user to select the measure to view on screen among the several available for each type of signal..

■ Details: It allows the user to view on screen the date and time when maximum and minimum measures were reached. To quit this view press the key F1.

■ Clear measures: It clears the **MEROGRAM** function, measurement and restarts the timer.

5.7 Spectrogram

5.7.1 Description

The Spectrogram function shows a graphical representation of the spectrum superimposed over time of a channel or frequency selected by the user. During the Spectrogram, maximum and minimum of several measures and time are registered. This tool is especially useful to analyse the behaviour of a spectrum over time, because sporadic and indeterminate anomalies can be detected.

▶ **Spectrogram**   SCAN

5.7.2 Operation

The Spectrogram tool is available for all signals.

1 Connect the **RF** input signal to the equipment.

2 Select a channel or frequency.

3 Select the **SPAN** within the spectrogram will be displayed.

4 Press the **Tools** key F3 .

5 Select the **Spectrogram** option.

6 It shows the **Spectrogram** of the signal.

7 To exit press any key of mode (**key S, M or T**). All data registered is cleaned after leaving.

While using the Spectrogram function, if the signal unlocks, timer and measurement reset and they will start to register again when signal locks.

▶ **Screen Description**
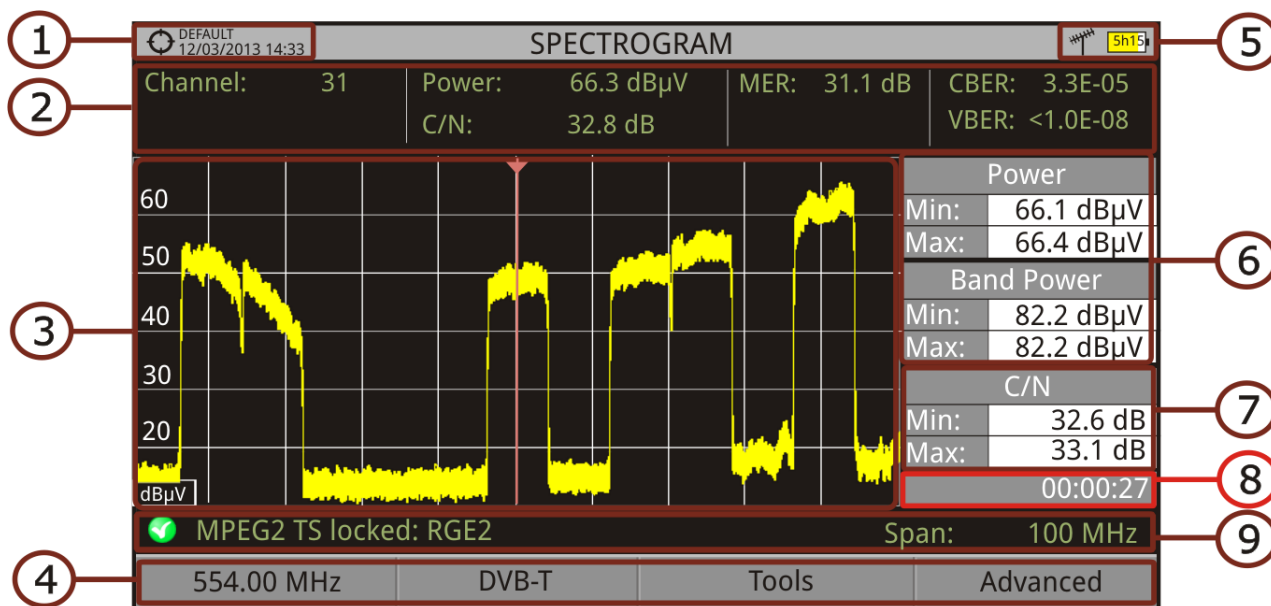
Figure 66.

1 Selected installation; date and time.

2 Measurement values for the signal tuned at the frequency/channel selected.

3 Spectrum over time at the selected span.

4 Softkeys menus.

5 Selected band, battery level.

6 Maximum and minimum values of signal power and band power over time.

7 Maximum and minimum value of the measure selected by the user in the option "User measure" (see next section).

8 Elapsed time.

9 Signal status (searching / locked / multiplex name / selected span).

■ Cursor functions:
   • No function for this tool.

■ Axis description:
   • Axis X: Span (MHz).
   • Axis Y: Power.

5.7.3   Menu Options

At the bottom of the screen there are four menus available via the function keys.

- **F1** It displays the channel/frequency where is pointing the cursor and access the tuning menu.

- **F2** It displays the selected transmission standard menu and accesses the signal parameters.

- **F3** It displays the Tools menu.

- **F4** It displays the Advanced menu.

In the Advanced menu there are some options for the spectrogram configuration:

- User measure: It allows the user to select a measure to view on screen among the several available for each type of signal.
- Details: It allows the user to view on screen the date and time when maximum and minimum measures were reached. To quit this view press the key F1 .
- Clear measures: It clears the spectrogram, measurement and restarts the timer.

5.8 Attenuation Test

5.8.1 Description

The Attenuation Test function allows the user to easily check the response of the telecommunications installations before antennas and headers are working. It allows the user to evaluate the response along the complete range of frequencies by measuring the losses (attenuation) in the distribution of TV signals, comparing reference levels at headend output and at each house antenna plugs.

▶ **Attenuation test**   S C A N

5.8.2 | Operation

Attenuation test function is available for all signals.

1 In **Settings** ⚙ (key C) select the terrestrial or satellite band.

2 Press the **Tools** key [F3].

3 Select the **Attenuation Test** option.

4 The **Attenuation Test** function for the signal appears on screen.

5 First, set the parameters before the test, pressing the **Advanced** [F4] key. Parameters to set are: Frequencies of pilot signals (pilot 0, pilot 1 and pilot 2), maximum attenuation and threshold attenuation (see more details in next section).

6 Then it is necessary to **Set References**. This requires a signal generator. We recommend to use of one of the PROMAX signal generators: **RP-050**, **RP-080**, **RP-110** or **RP-250** (depending on the frequency band).

7 Connect the generator and the meter where the origin of the signal distribution is in the installation (antenna, headend, etc.) or connect the generator directly to the RF input of the meter. If necessary, the meter can feed the generator using the **Supply Output** option from the **Settings** menu ⚙ (key C).

8 Active the signal generator and in the equipment, press the **Set Reference** key [F2].

9 Once are set the references for the pilot signals, let the signal generator connected to the source point of the distribution system and take measurements in each user access point with the equipment.

10 In each measurement a message over each pilot signal indicates whether the measure "Pass" or "Fail" according to the parameters set.

11 The measurement data from the **Attenuation Test** can be saved through the **Datalogger** tool. To do this, when creating a new datalogger, in the option **Include Attenuation Tests**, select Terrestrial and/or Satellite. Then, the user must perform a datalogger from the test point where he is performing the attenuation test. Another quick option it is to select the "Test & Go" function in the "Datalogger" menu. This option creates automatically one channel plan (TER ICT or SAT ICT according to the current band) and starts to save measurements. The data will be saved and can be checked and transferred to a PC. For more information, see "Datalogger" section under the "Tools" chapter. Also measurement data or screen image can be exported by pressing the **Export** 📷 key (see more details in section "Export

key") and after that display the images or download the data files (in XML format).

NOTE: In both satellite and terrestrial band, the system saves the LNB state every time the user sets a reference and uses this value always that the equipment is working in this mode.

► **Screen Description**
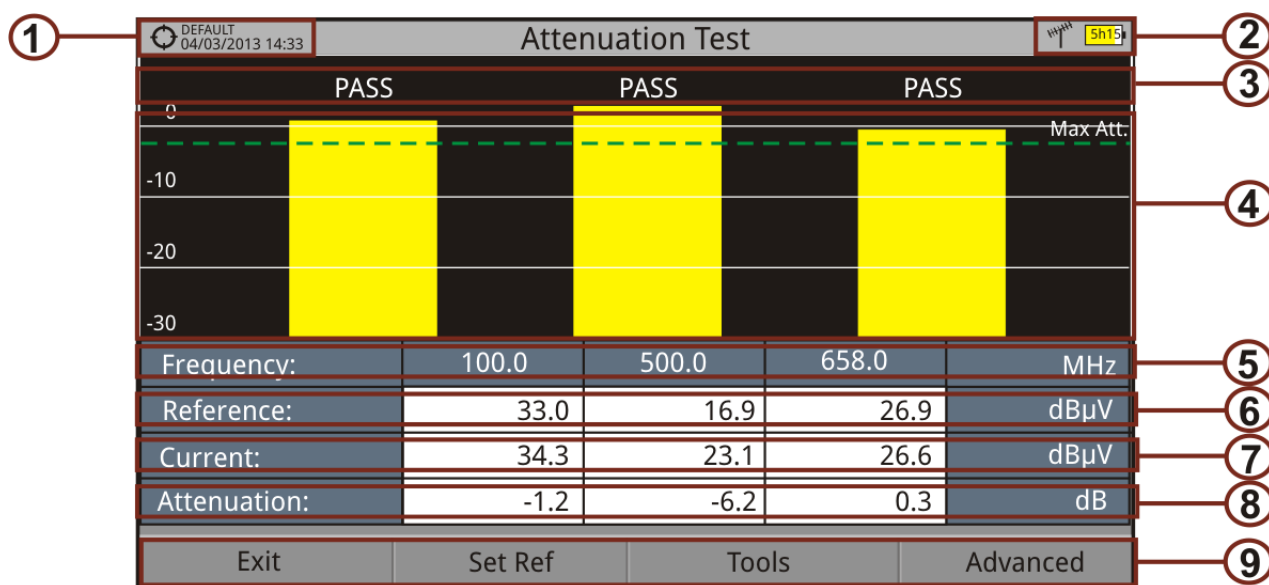
Figure 67.

1 Installation selected, date and time.

2 Selected band; battery level.

3 Status message depending on the attenuation level.

4 Power level of the signal.

5 Signal Frequency (MHz).

6 Power level of the reference signal obtained when setting the reference and used to calculate the attenuation level (dBµV).

7 Power level of the test signal at the user access point (dBµV).

8 Attenuation level (dB); Attenuation = Reference - Current.

9 Softkeys.

■ Cursor functions:
•No function for this tool.

■ Axis description:
•Axis X: Pilot signals.
•Axis Y: Power.

5.8.3   Menu Options

In the bottom of the screen are four menu accessible via the softkeys.

- **F1** Exits the tool.

- **F2** Pressing this option the current power values are captured and they are assigned as reference values.

- **F3** Access the Tools main menu.

- **F4** Access the Advanced menu.

In the **Advanced** menu there are five parameters to set the attenuation test. They are:

- Threshold Attenuation: It defines the maximum difference that may exist between the pilot signal of higher level and the pilot signal of lower level. All pilot signals out of this range will be removed and not used as a pilot signal during the measurement process.

- Maximum Attenuation: It sets the attenuation level used by the equipment to show on screen if the signal passes or fails. When the attenuation level is below this value the message on screen is "**PASS**" and when it is above this value is "**FAIL**".

- Pilot 0: It defines the frequency of the pilot signal 0 (MHz).

- Pilot 1: It defines the frequency of the pilot signal 1 (MHz).

- Pilot 2: It defines the frequency of the pilot signal 2 (MHz).

5.9	Signal Monitoring

5.9.1	Description

The Signal Monitoring tool allows monitoring one locked signal or a channel plan (several channels) by measuring its power and other parameters over time. All this data can be visualized in the equipment or downloaded to a PC and exported to a file for later analysis.

Signal monitoring

SCAN

5.9.2	Operation

The Signal Monitoring tool is available for all RF signals.

1 In Settings ⚙ (key C) select the source of signal RF and terrestrial or satellite band.

2 Access the Spectrum mode. Select the channel plan (key F1) and tune the signal for monitoring.

- In case of tuning a **DVB-T2** signal, in the **Signal Parameters** menu [F2] select the Profile (Base or Lite) and in the [F4] key select the PLP identifier. User has to choose one profile and one PLP identifier per each monitoring.

3 Press the **Tools** key [F3].

4 Select the **Signal Monitoring** option.

5 Select between monitoring a **single channel** or a **channel plan**.

6 The **Signal Monitoring** function appears on screen.

7 Before starting the monitoring, access the **Configuration** option in the **Advanced** menu [F4] for settings (more details in next section).

8 After settings, access the **Advanced** menu [F4] and press on **Start** to start the signal monitoring analysis. Before starting, it shows some warnings to confirm signal parameters (signal locked or unlocked, bandwidth and reference level) and if the file name already exists.

9 In **Continuous** mode, the equipment takes samples automatically according to sample time (see next section). In **Manual** mode each time the user presses Enter the equipment takes a sample. In **Schedule** mode it starts to take samples automatically at the end of the countdown to the starting time.

10 Access the **Advanced** menu [F4] and press on **Stop** to finish the signal monitoring. Data obtained is automatically stored.

11 After stopped, it gives the option to access the Signal Monitoring Viewer that allows the user to watch the final results (for more details refer to <u>"Data Viewer" on page 112</u>).

12 You can also access data by pressing the **Installation Management** key to check that the monitoring data file has been saved. This file is a "Signal Monitoring" type. To manage the data, see below the section "Data File Processing".

▶ **Screen Description**
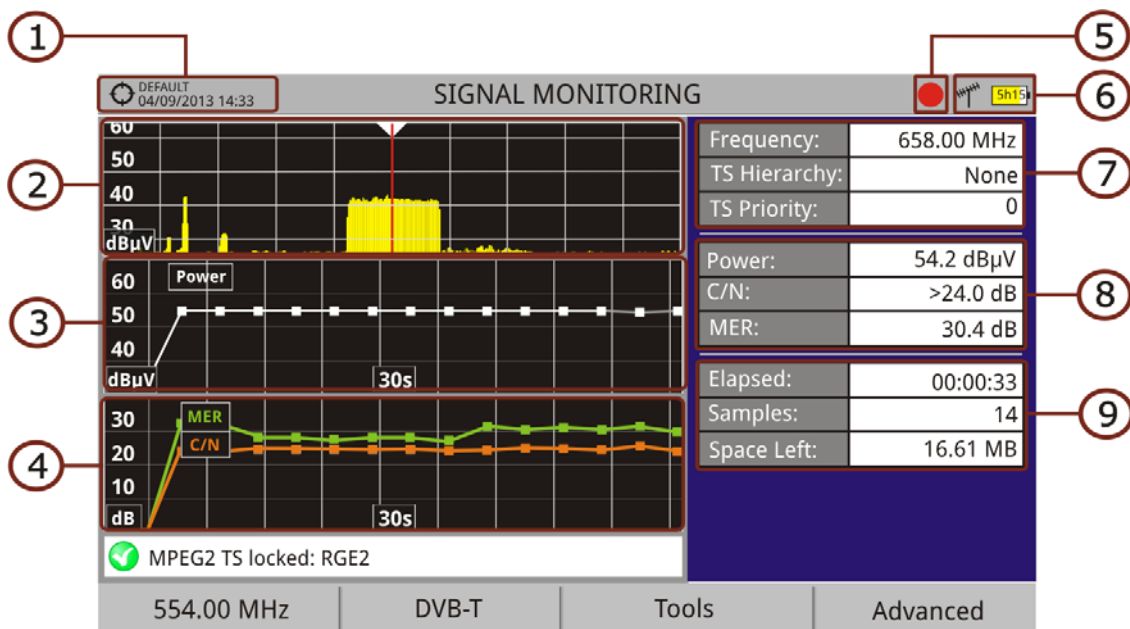
Figure 68. Single Channel Monitoring
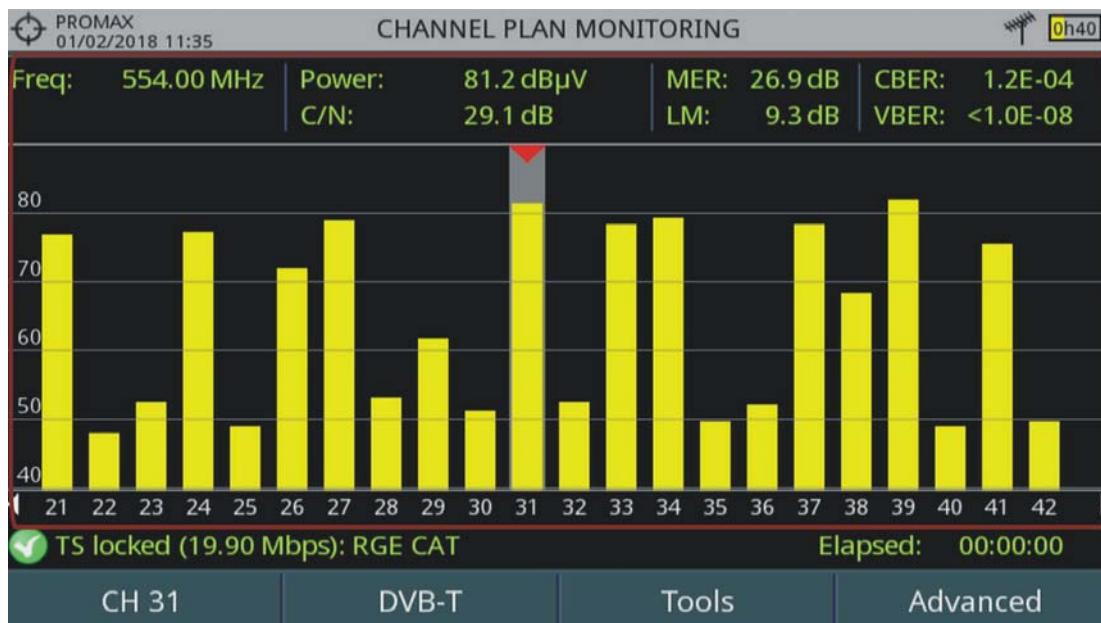
Figure 69. Channel Plan Monitoring

1 Selected installation; date and time.

2 Spectrum.

3 Power measurement over time (window size is span time set in configuration).

4 MER and C/N measurement over time (window size is span time set in configuration). In case of monitoring a FM signal, it shows nothing as there is no measure to draw.

5 Indicator of signal monitoring started.

6 LNB, Selected band; battery level.

7 Signal information window 1:

- **Frecuency**: frequency at which signal is locked; **Profile** (only for DVB-T2 signals): Base or Lite; **PLP identifier** (only for DVB-T2 signals): identifier of the layer being measured, **TS Hierarchy** (table hierarchy at the transport stream) **TS Priority** (packet priority at the transport stream).

8 Signal information window 2:

- Measurements of the signal over time.

9 Signal information window 3:

- File name: Name of the current monitoring.

- **Elapsed**: Time elapsed since the beginning of the monitoring.

- **Samples**: Samples taken since the beginning of the monitoring.

- **Space left**: Space left in the memory to save data.

10 Channels from the channel plan being monitored. Measurement data are from the selected channel (pointed by a red arrowhead).

■Cursor functions:
　•No function for this tool.

■Axis Description (Single channel monitoring screen):
　•Axis X: Window 1: Frequency; Window 2 and 3: Time.
　•Axis Y: Window 1 and 2: Power; Window 3: MER and C/N.

5.9.3　Menu Options

At the bottom of the screen there are four menus available via the function keys.

■ F1 It displays the channel/frequency where is pointing the cursor and access the tuning menu.

■ F2 It displays the selected transmission standard menu and accesses the signal parameters.

■ F3 It displays the Tools menu.

■ F4 It displays the Advanced menu.

In the **Advanced** menu there are some options for the **Signal Monitoring**. They are:

■ **Start**: It starts the signal monitoring.

■ **Stop**: It stops the signal monitoring.

■ **Pause**: It stops the signal monitoring for a while until resuming.

■ **Configuration**: It shows the settings window with some parameters (see the "Configuration" section for more details).

■ **Audio**: It allows enable or disable audio. When this option is enabled, the user can listen to any service in the monitored signal, knowing about signal reception while driving or doing other tasks.

5.9.4   **Settings**

User can adjust some parameters on the Signal Monitoring:
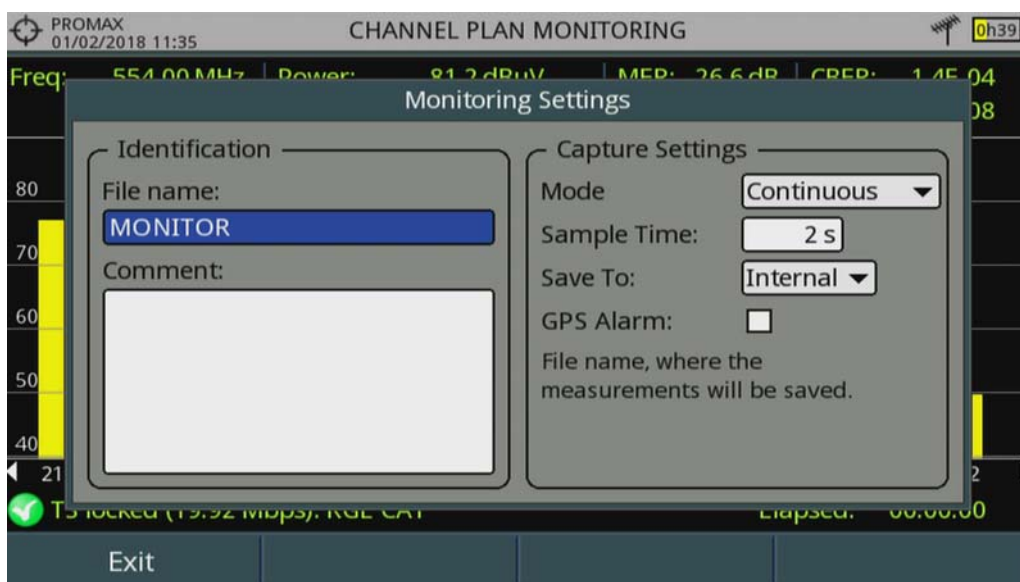
Figure 70. Settings for Single Channel Monitoring

- **File Name**: User can give a name to the file where data is saved. All measurement will be stored on the data file. Be sure to change the file name when starting a new signal monitoring. If not, after a warning message, the new data file will be saved on the last one.

- **Comment**: User can write some comments about the monitoring.

- **Mode**: There are **three operation modes**:
  - Continuous: A sample is taken automatically every sample time.
  - Manual: A sample is taken every time that user presses Enter.
  - Schedule: User defines starting time for monitoring. Then he must press on "Start" in Advanced menu (F4) to start the countdown to the starting time.

- **Sample Time**: Time between samples. Only when working in continuous or schedule mode. Minimum time is 1 second.

- **Span Time (only for single channel monitoring)**: It is the width, in time, shown on screen for the X axis.

- **Save to**: There are **two** options: **Internal** or **USB**. For Internal option it saves the file with all data in the internal memory of the equipment. For USB option it saves the file with all data in a USB flash-drive connected to the port of the equipment.

- **GPS Alarm**: If this box is checked then it sounds a beep when the GPS is unlocked.

5.9.5 Data Viewer

The data viewer allows the user to watch the monitoring final results. It accesses directly when signal monitoring ends or also by opening the data file in the installation management screen.

According to the monitoring signal, saved parameters can change. For example, in case of a FM signal, it also saves some RDS data like the PI and PS.

► **Screen Description**
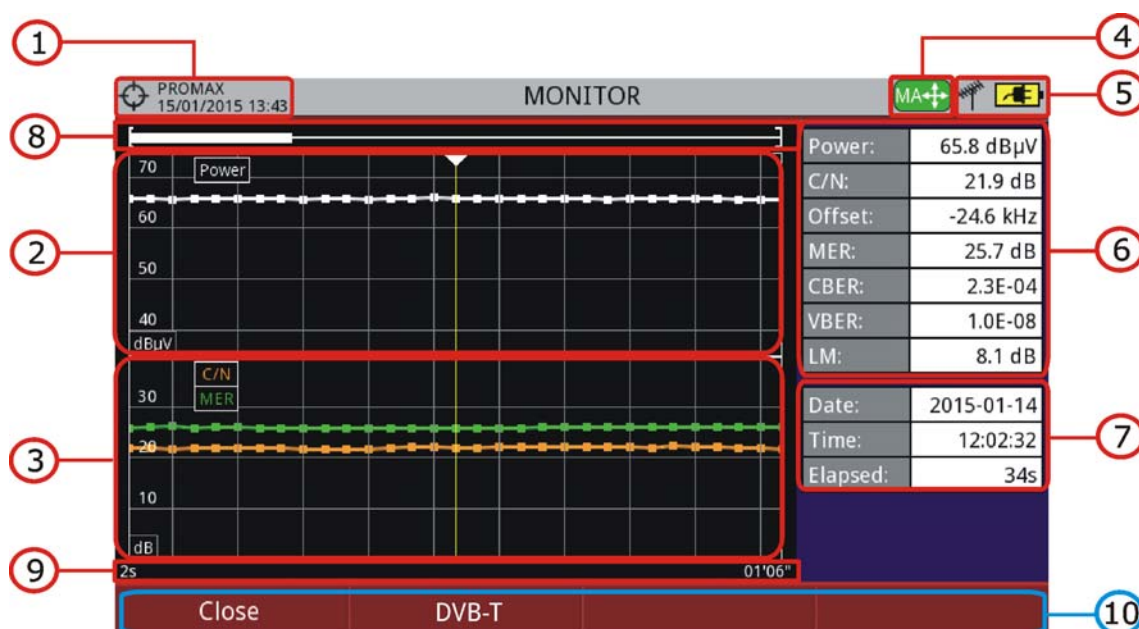
Figure 71.

1 Selected installation; date and time.

2 Power measurement over time.

3 MER and C/N measurement over time. In case of a FM signal, it shows nothing as there is no measure to draw.

4 Cursor mode selected: PA mode (panoramic) or MA mode (cursor movement).

5 LNB, selected band; battery level.

6 Signal information window 1: Measurement where the cursor is.

7 Signal information window 2: Date, time and elapsed time.

8 Scroll-bar: it shows position and size of the data displayed related to total data.

9 Time span of displayed data.

10 Menu Options:

- •F1: Exits the data viewer.
- •F2: It shows transmission parameters of the monitored signal.
- •F3: It shows the monitored channel or for channel plan it allows selecting the channel to view data.

■Cursor functions:

- •Cursor up/down: It increases / decreases zoom.
- •Cursor left/right: In PA mode it moves time span along the total time. In MA mode it moves the cursor along the samples of the time span.
- •Enter: It switches between panoramic (PA) and movement (MA) mode.

5.9.6	Data File Processing

►Description

This document is an explanation about the process that is needed to be done in order to obtain a more comfortable view of the XML data obtained with the meter, when performing a Signal Monitoring.

Once you got the monitoring data, copy the XML data file from the equipment to a USB memory using the Installation Manager (for more details refer to).

►Obtaining an excel file

For this section, you must have at least Excel 2003 or newer version. Excel 2007 (or later) is highly recommended to avoid macro problems.

1 First of all we need to locate the XML data file in the folder from which we want to work. There are no requirements needed to be satisfied. A file named COVERAGE.XSL must be placed in the same data file folder. That second file allows proper data formatting when processed by Excel.

2 Select the XML data file and then right click with the mouse button on the file name.

3 Choose the option "**Open with**" and then select Excel 2007 (or the available version).

Figure 72.

4 When Excel tries to open the file it will ask you the import method to open the XML data file by this way:
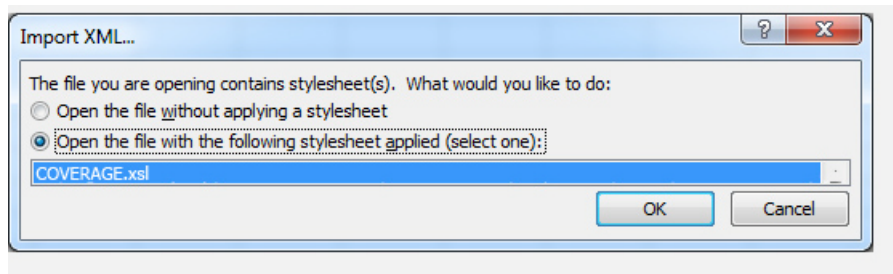
Figure 73.

5 You must choose the option in which a stylesheet is asked. It will appear as an option the "COVERAGE.xsl" file (you can download the "COVERAGE.xsl" file from the PROMAX website).

6 Now Excel is opening the XML data file using the format that the XSL file is providing. This step could take few seconds depending on the size of the XML data file.

7 At this point, you should have an excel file with three different sheets. Each sheet corresponds to a different view of the same data:

- The first one will show you the generic signal information and the different coverage measures for each point acquired.

- In the second one, you will find the same data but presented in a table format, more user friendly for working with graphs based on each measured parameter.

8 Now save the data as a true excel file. No specific name or path is required, but you must remember the path.

5.10　Signal Coverage

5.10.1　Description

The Signal Coverage function allows the user to check signal for a tuned signal or a channel plan (several channels) by measuring power and other parameters over time.

The position where all these measurements are taken is determined by a GPS receiver. When the equipment locks a GPS signal, it automatically sets date and time using the GPS signal. As long as the GPS is locked, date and time is updated every hour.

All this data, measurements and GPS position can be downloaded to a PC and exported to a file for later analysis.

| ▶ | **Signal coverage 1/2 (GPS)** | SCAN |

5.10.2　Operation

The Signal Coverage tool is available for all RF signals.

1 Connect the GPS* receiver to the meter.

2 In **Settings** menu ⚙ (key C) select the source of signal RF and terrestrial or satellite band.

3 Access the **Spectrum** mode and tune the signal for coverage study.

- In case of tuning a **DVB-T2** signal, in the **Signal Parameters** menu [F2] select the Profile (Base or Lite) and the PLP identifier. User has to choose one profile and one PLP identifier per each signal coverage analysis.

4 Press the Tools key [F3].

---

*. GPS is not included for **PROWATCH** *Neo*. Contact PROMAX to get a valid GPS.

5 Select the **Signal Coverage** option.

6 Select between monitoring one single channel or one channel plan.

7 The **Signal Coverage** function appears on screen.

8 Before starting the signal coverage analysis, access the **Configuration** option in the **Advanced** menu [F4] for settings (for more details refer to next section).

9 After settings, access the **Advanced** menu [F4] and press on **Start** to start the signal coverage analysis. Before starting, it shows some warnings to confirm signal parameters (signal locked or unlocked, bandwidth and reference level) and if the file name already exists.

10 In **Continuous** mode, the equipment takes samples automatically according to sample time (see next section). In **Manual** mode each time the user presses Enter the equipment takes a sample. In **Schedule** mode it starts to take samples automatically at the end of the countdown to the starting time. Measurement are linked to the GPS reference.

11 Access the **Advanced** menu [F4] and press on **Stop** to finish the signal coverage analysis. Data obtained is automatically stored.

12 After stopped, it gives the option to access the Signal Monitoring Viewer that allows the user to watch the final results (for more details refer to "Data Viewer" on page 112).

13 You can also access data by pressing the **Installation List** key to check that the monitoring data file has been saved. This file is a "Data Capture" type. To manage the data, see below the section "Data File Processing".

►**Screen Description**
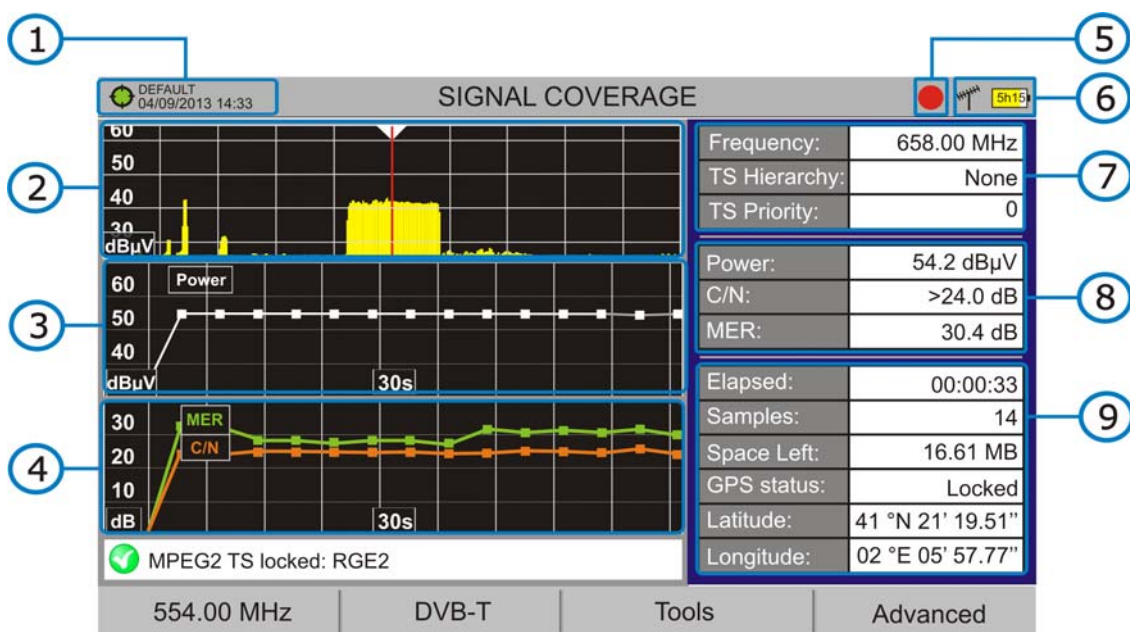
Figure 74. Signal Coverage for Single Channel
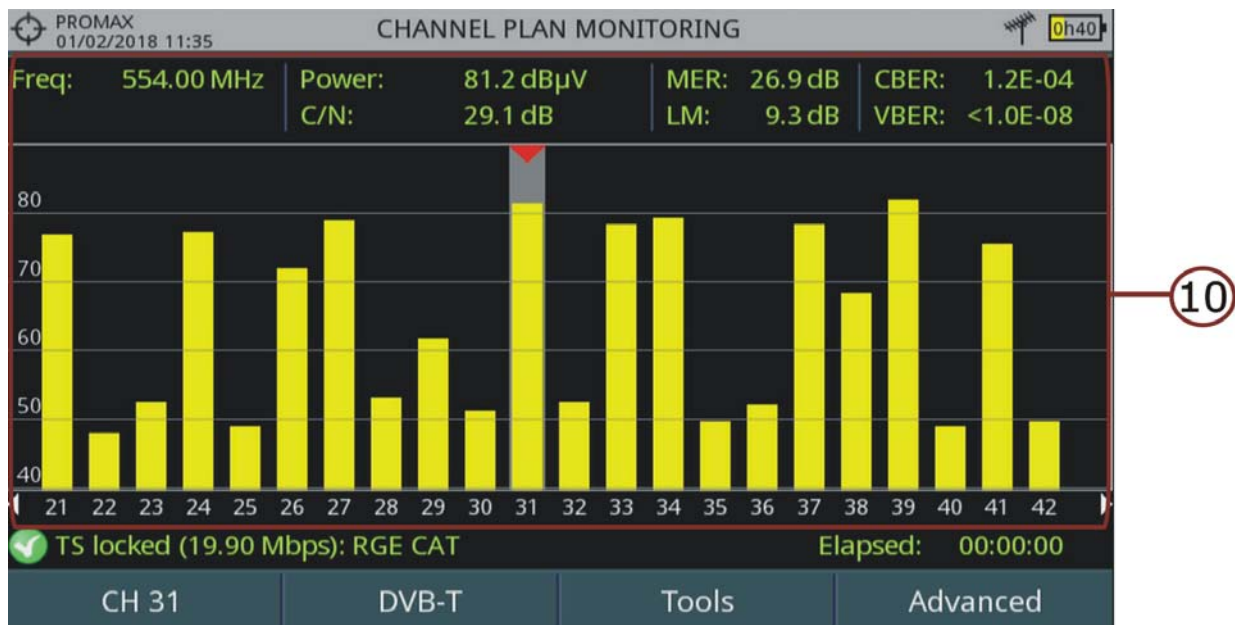
Figure 75. Signal Coverage for Channel Plan

1 Selected installation; date and time. The "Current installation" ● in green indicates the system has locked the GPS signal. The "Current installation" ● in red indicates that the system has not locked the GPS signal.

2 Spectrum.

3 Power measurement over time (span time is set in configuration).

4 MER and C/N measurement over time (span time is set in configuration). In case of monitoring a FM signal, it shows nothing as there is no measure to draw.

5 Indicator of Signal coverage started.

6 LNB, Selected band; battery level.

7 Signal information window 1:

•Frequency: frequency at which signal is locked; **Profile** (only for DVB-T2 signals): Base or Lite; **PLP identifier** (only for DVB-T2 signals): identifier of the layer being measured, **TS Hierarchy** (table hierarchy at the transport stream) **TS Priority** (packet priority at the transport stream).

8 Signal information window 2:

•Measurement over time.

9 Signal information window 3:

- File name: Name of current coverage file.

- **Elapsed**: Time elapsed since the beginning of the coverage study.

- **Samples**: Samples taken since the beginning of the coverage study.

- **Space left**: Space left in the memory to save data.

- **GPS status**: It shows if the GPS receiver is locked or unlocked.

- **Latitude**, **Longitude**: It shows the latitude and longitude at the current position, if GPS is locked.

10 Channels from the channel plan being monitored. Measurement data are from the selected channel (pointed by a red arrowhead).

■Cursor functions:
•No function for this tool.

■Axis Description (Single Channel Monitoring screen):
•Axis X: Window 1: Frequency; Window 2 and 3: Time.
•Axis Y: Window 1 and 2: Power; Window 3: MER and C/N.

5.10.3 **Menu Options**

At the bottom of the screen there are four menus available via the function keys.

- **F1** It displays the channel/frequency where is pointing the cursor and access the tuning menu.

- **F2** It displays the selected transmission standard menu and accesses the signal parameters.

■ **F3** It displays the Tools menu.

■ **F4** It displays the Advanced menu.

In the **Advanced** menu there are some options for the **Signal Coverage**. They are:

- ■ **Start**: : It starts the signal coverage study.

- ■ **Stop**: It stops the signal coverage study.

- ■ **Pause**: It stops the signal monitoring for a while until resuming.

- ■ **Configuration**: It shows the settings window with some parameters (see "Settings" chapter for more details).

- ■ **Audio**: It allows enable or disable audio. When this option is enabled, the user can listen to any service in the monitored signal, knowing about signal reception while driving or doing other tasks.

- ■ **GPS Status**: It shows a list and a graph with satellites detected to locate the GPS signal. It is also provided additional data such as longitude, latitude, date and universal time, visible satellites and GPS status (locked or not).
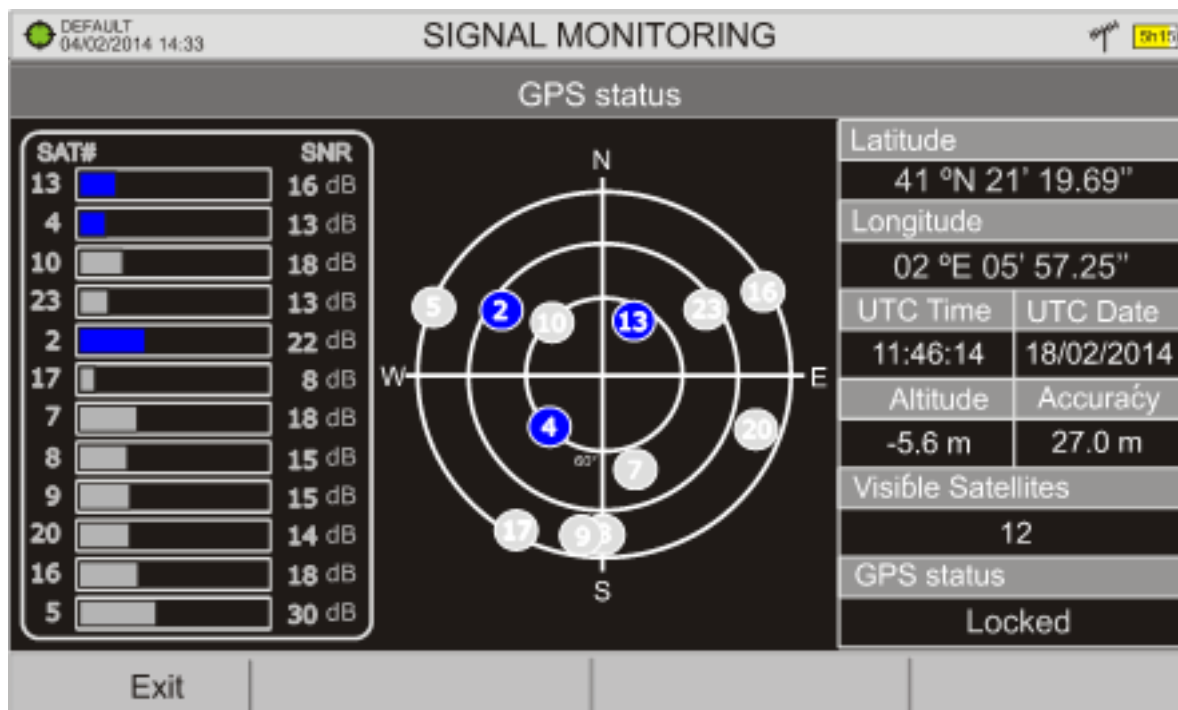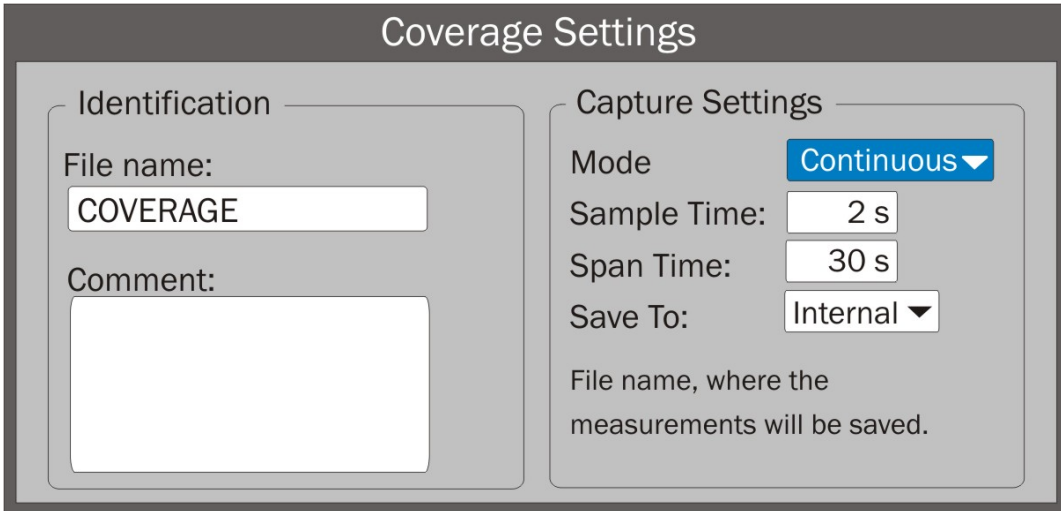
Figure 76.

User can adjust some parameters on the Signal Coverage analysis:

Coverage Settings

Identification

File name:

COVERAGE

Comment:

Capture Settings

Mode — Continuous ▼

Sample Time: — 2 s

Span Time: — 30 s

Save To: — Internal ▼

File name, where the
measurements will be saved.

Figure 77.

■ **File name**: User can give a name to the file where data is saved. All measurement will be stored on the data file. Be sure to change the file name when starting a new Signal coverage analysis. If not, a warning message appears before new data file will be saved on the last one.

■ **Comment**: User can write some comments about the study.

■ **Mode**: There are **three operation modes**:
•Continuous: A sample is taken automatically every sample time.
•Manual: A sample is taken every time that user presses Enter.
•Schedule: User defines starting time for monitoring. Then he must press on "Start" in Advanced menu (F4) to start the countdown to the starting time.

■ **Sample Time**: Time between samples. Only when working in continuous or schedule mode. Minimum time is 1 second.

■ **Span time (only for signal channel coverage)**: It is the width, in time, shown on screen for the X axis.

■ **Save to**: There are **two** options: **Internal** or **USB**. For Internal option it saves the file with all data in the internal memory of the equipment. For USB option it saves the file with all data in a USB flashdrive connected to the USB port of the equipment.

■ **GPS Alarm**: If this box is checked then it sounds a bip when the GPS is unlocked.

5.10.5 Data Viewer

The data viewer allows the user to browse along the final results. It opens directly after saving the data or by opening the associated data file (that is located in the installation manager).

► **Screen Description**
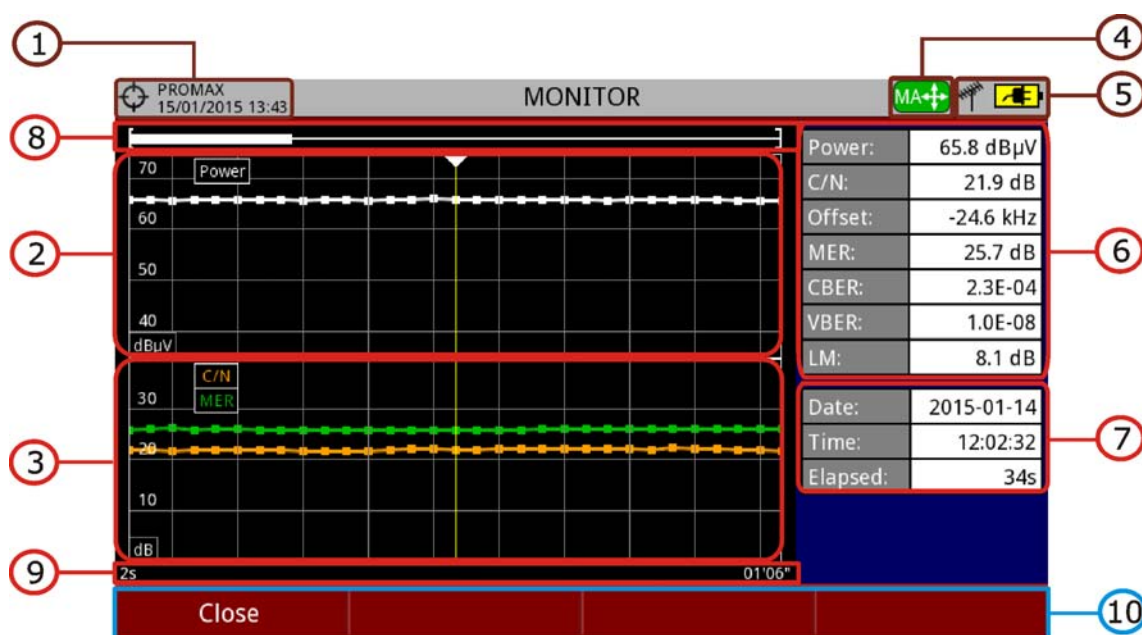
Figure 78.

1 Selected installation; date and time.

2 Power measurement over time.

3 MER and C/N measurement over time. In case of a FM signal, it shows nothing as there is no measure to draw.

4 Cursor mode selected: PA mode (panoramic) or MA mode (cursor movement).

5 LNB, selected band; battery level.

6 Signal information window 1: Measurement where the cursor is.

7 Signal information window 2: Date, time and elapsed time.

8 BScrollbar: it shows position and size of the data displayed related to total data.

9 Time span of displayed data.

10 Menu Options:

- • F1: Exits the data viewer.
- • F2: It shows transmission parameters of the monitored signal.
- • F3: It shows the monitored channel or for channel plan it allows selecting the channel to view data.

■ Cursor functions:
- • Cursor up/down: It increases / decreases zoom.
- • Cursor left/right: In PA mode it moves time span along the total time. In MA mode it moves the cursor along the samples of the time span.
- • Enter: It switches between panoramic (PA) and movement (MA) mode.

5.10.6		**Data File Processing**

► **Description**

This document is an explanation about the process that is needed to be done in order to obtain a more comfortable view of the XML data obtained with the meter, with GPS option, when doing a Signal Coverage analysis.

Once you got the coverage data, copy the XML data file from the equipment to a USB memory using the Installation Manager (for more details refer to <u>"? Menu Options" on page 199</u>).

► **Obtaining an Excel File**

For this section, you must have at least Excel 2003 or newer version. Excel 2007 (or later) is highly recommended to avoid macro problems.

1 First of all we need to locate the XML data file in the folder from which we want to work. There are no requirements needed to be satisfied. A file named COVERAGE.XSL must be placed in the same data file folder. That second file allows proper data formatting when processed by Excel.

2 Select the XML data file and then right click with the mouse button on the file name.

3 Choose the option "**Open with**" and then select Excel 2007 (or the available version).

Open
Edit
Open with
Print
Run as administrator
Share with   >
Restore previous versions
Send to   >
Cut
Copy
Create shortcut
Delete
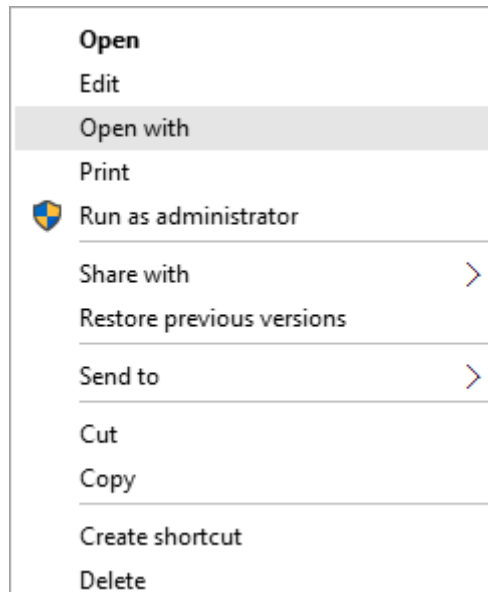
Figure 79.

4 When Excel tries to open the file it will ask you the import method to open the XML data file by this way:

Import XML...

The file you are opening contains stylesheet(s). What would you like to do:
○ Open the file without applying a stylesheet
◉ Open the file with the following stylesheet applied (select one):
COVERAGE.xsl

OK   Cancel
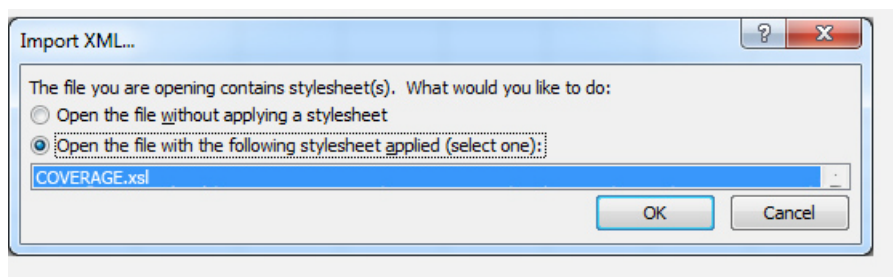
Figure 80.

5 You must choose the option in which a stylesheet is asked. It will appear as an option the "COVERAGE.xsl" file (you can download the "COVERAGE.xsl" file from the PROMAX website).

6 Now Excel is opening the XML data file using the format that the XSL file is providing. This step could take few seconds depending on the size of the XML data file.

7 At this point, you should have an excel file with three different sheets. Each sheet corresponds to a different view of the same data:

- The first one will show you the generic signal information and the different coverage measures for each point acquired
- In the second one, you will find the same data but presented in a table format, more user friendly for working with graphs based on each measured parameter.
- The third one provides data in a format adapted for geolocation. Information is shown in terms of parameters required for presenting the measured data as a map layer (latitude, longitude, id, description and an icon identifier number) as required for GIS and Google Earth technologies. This third sheet is formatted mainly to be compatible with main Google Earth format converters available in Internet

8 Now save the data as a true excel file. No specific name or path is required, but you must remember the path.

5.10.7 **Displaying Measurement in Google Earth**

Measurement taken with the **Signal Coverage** tool can be exported and displayed on Google Earth 3D maps.

> **Signal coverage 2/2 (KML generator)**
>
> SCAN

1 Install Google Earth Pro on your PC.

2 Once measurements have been made and coverage data obtained, copy the generated data file (COVERAGE.XML) to a USB stick or to a PC (for more details refer to "CONNECTING TO EXTERNAL DEVICES" on page 240).

3 Access the KML Generator application by PROMAX (http://www.promax.es/tools/kml-generator/).

4 Click on the **KML Generator** screen and then a file explorer opens. Select your data file (COVERAGE.XML) exported from the meter.

5 If the file is correct it opens a window with a series of options that allow you to customize the visualization:

- **Assign colors to the test points using a quality-based color scale:** It assigns a color (selected by the user) for the worst quality value and another color for the best quality value. For the intermediate values performs a gradation between both colors.

- **Use a PASS/FAIL threshold:** It uses only two colors (selected by the user). A color for measures that are below a certain threshold value and another color for measures that are above that value.

- **Quality parameter to use as reference:** Select the type of measurement (POWER, MER…) to show on the map.

- **Bad quality test points color:** Select one color for bad quality points.

- **Good quality test points color:** Select one color for good quality points.

- **Value:** Define a value for bad quality and another for good quality points. These values are related to color above.

- **Automatic:** If you check this option it uses the highest and / or lowest value detected in your exported data file.

- **Threshold value:** It allows you to select the limit value to paint the measurements of one color or another.

- **Generate and overlay a legend:** It shows a legend that provides information to understand the map.

- **Include test points with UNLOCKED signal (only for digital signals):** It shows all test points even if signal is not tuned.

- **Add extra information to test points (all measurements, date and time):** It displays all measures for each test point also date and time when they were taken.

- **Skip test points at the same physical location:** It only uses the first measure if are more than one with the same coordinates.

- **Choose a marker style for test points geolocation:** Select the type of marker.

6 Once the configuration of the file is finished, click on the option "Download your KML file for Google Earth".

7 Click on the downloaded file in KML format (COVERAGE.KML). It Should open the Google Earth program showing the measurement data over a 3D map.

5.11   Datalogger

5.11.1   Description

The Datalogger function stores automatically measurements in a file set by the user (name, channel plan). User can store for each datalogger measurements taken at different test points of the selected installation. Measurements are made for all channels in the active channel plan, both analogue and digital. Each installation has its own datalogger files.

As an example, you can picture the Installation folder as a folder that includes all the measurements of a building. Within the installation folder the datalogger sub-folders would group the measurements for each apartment inside that

building. Finally the test points would be the files with the measurements that would be taken in each one of the TV sockets inside the apartment.

▶	**Datalogger**	S C A N

5.11.2		**Operation**

► Creating a new datalogger

1 First select one installation of the list of installations 🗁 (key F) and load it pressing the "Load" key [F1]. An installation contains the channel plans and DiSEqC commands selected by the user and it stores dataloggers and screenshots when it is selected (more information in chapter "Installations management").

2 Check the installation is selected. The name of the installation should appear on the upper left corner of the screen.

3 Press the [F3]: Tools key.

4 Press on the "Datalogger" option.

5 It displays a menu with the "New ...", "Test & Go" option and a list of all dataloggers at the selected installation.

6 Select "New ..." to create a new datalogger, select "Test & Go" to create a quick datalogger (see next) or select the file name of an existing datalogger (if the user want to save data on a specific datalogger already existing).

7 If "New ..." is selected, a installation wizard shows how to create a new datalogger. Follow its instructions:

- [F4] Next: to move to the next screen.
- [F3] Previous: to move to the previous screen.
- [F1] Cancel: to cancel.

8 When creating a new datalogger through the wizard, the user can give a name to the datalogger.
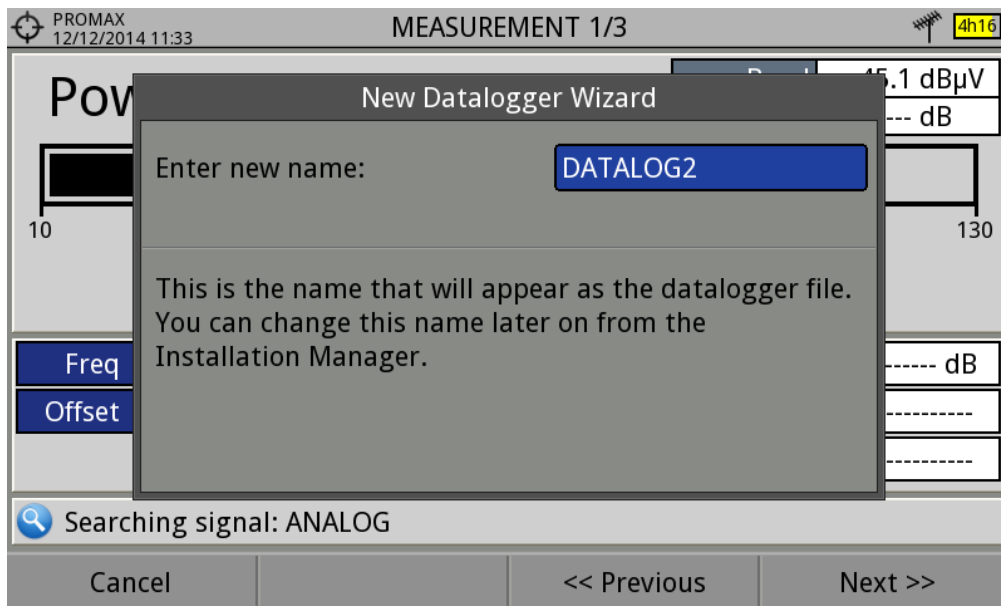
Figure 81.

9 Next, the user can select the terrestrial and/or satellite channel plan to use in the datalogger. The channel plans that are shown depends on the channel plans available for the current installation.
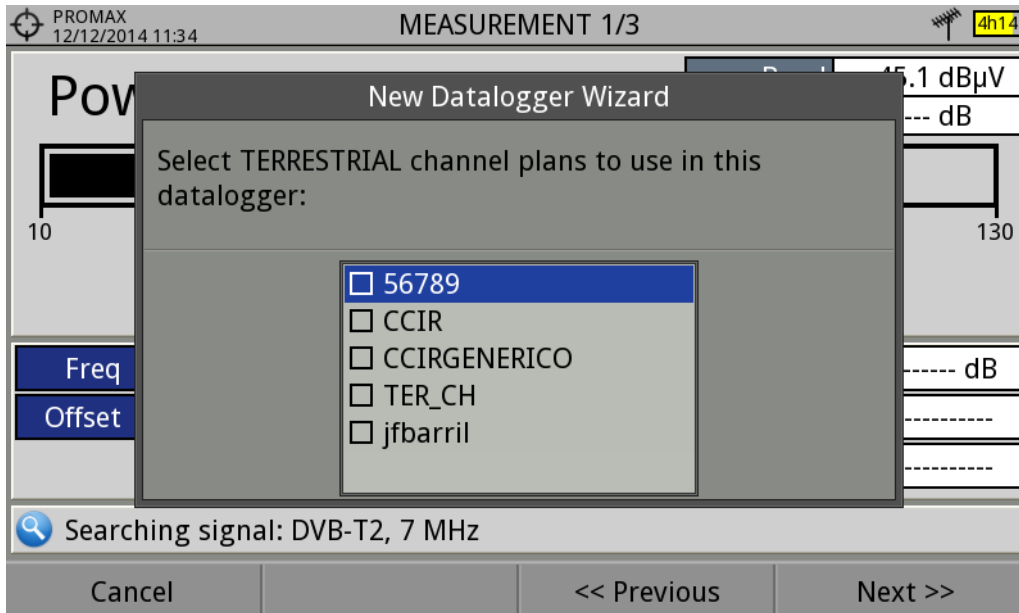
Figure 82.
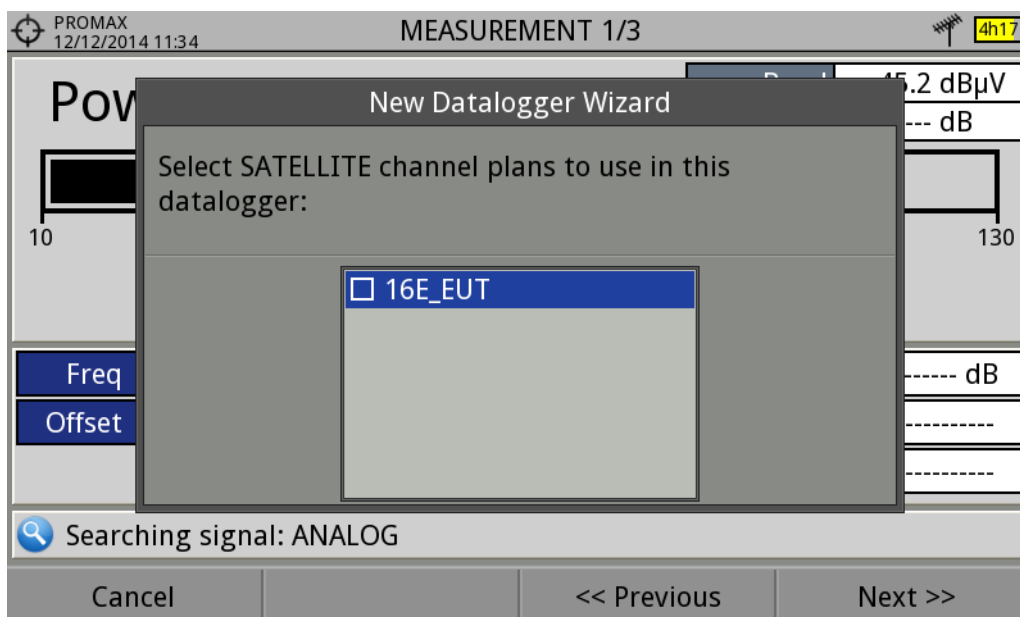
Figure 83.
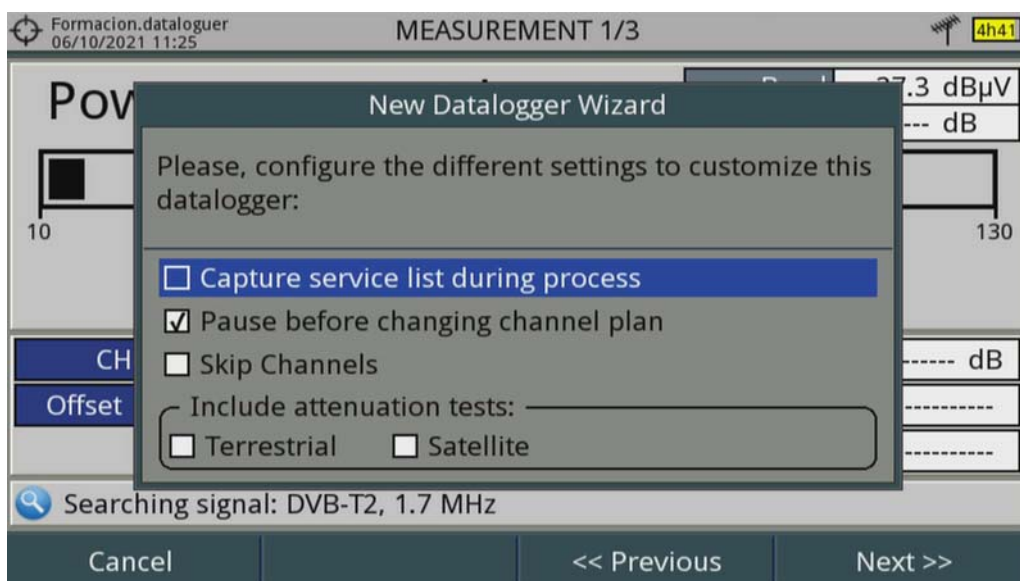
Figure 84.

10 In the next window, the user can select among some options:

- Capture service list during process: This option slows down the process but provides more information about the services detected in the channel.

- Pause before changing channel plan: This option allows the user to enable a pause between channel plans (the process stops until the user wants to carry on).

- Skip Channels: This option skip channels that are below the values defined in Preferences -> Measurement (for more details refer to "?Measurement Options" on page 50).

■ Include attenuation tests: This option allows the user to perform a datalogger on the attenuation test, terrestrial or satellite (for more details refer to <u>"Attenuation Test" on page 103</u>).

11 At the last step, user can select to open the just created new datalogger (by default, this option is selected).

12 Once a new datalogger is created or selected an already existing one, it shows the datalogger viewer screen and measurements of test points can start.

13 If it is a new datalogger, in first place before starting the datalogger, the system will create a new test point (see next section). Test points represent a specific point such a TV antenna socket.

► Starting a datalogger

1 After creating a new datalogger file or selecting an existing one, the user can start the datalogging process.

2 From the datalogger viewer screen, press the "Test point" key [F4] and from the menu select an existing test point using the "Jump to..." option or "Create new..." to create a new test point. If a new test point is created, user has to give it a name.
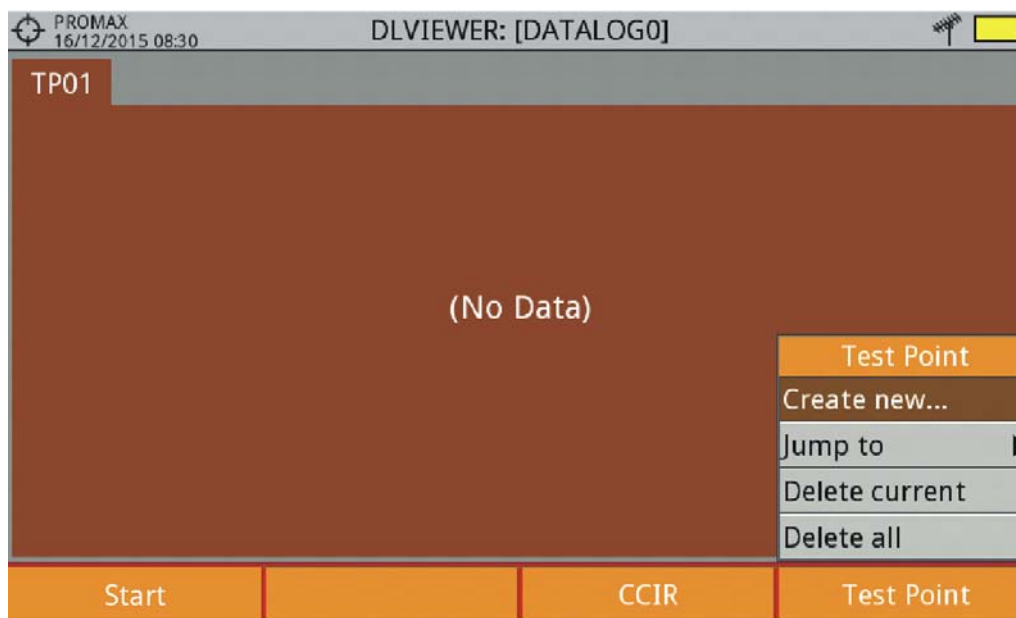
Figure 85.

3 Now datalogger is ready to start. Press the key [F1] and "Start". The datalogger process starts, during which all the measurements of all channels that are part of the datalogger and also the attenuation test are saved.

4 During datalogger, it catches the list of available services of all channels in the channel plan that are part of the datalogger (if this option was selected when creating the datalogger or if the "Datalogger PSI" option is enabled in the Preferences menu). If there is a change of channel plan during datalogger there will be a pause (if this option was selected when creating the datalogger). User can pause and resume the datalogger process at any time by pressing on the key "Pause" [F3]. If the "Attenuation Test" option was included when creating the datalogger, these measures will also saved.

5 At the end it saves the data and allows watching the results on screen by channel plan/attenuation test. To change the view of channel plan or attenuation test data press on the [F3] key. Data about terrestrial and satellite attenuation will appear as the option TER ICT and SAT ICT respectively.

6 It is also possible to download Datalogger files to a PC by the NetUpdate software (free download on the PROMAX website). Once downloaded, the program can generate reports with these files. This is not possible with the datalogger files exported directly to a USB (without using NetUpdate). Information of Service lists is in the XML files downloaded to the PC.

> **NOTE:** To make a datalogger with the Field Strength tool, in first place user has to enable the field strength tool, and then to create a new datalogger file. The field strength data will be stored in this datalogger.

▶ **Screen Description (Datalogger)**
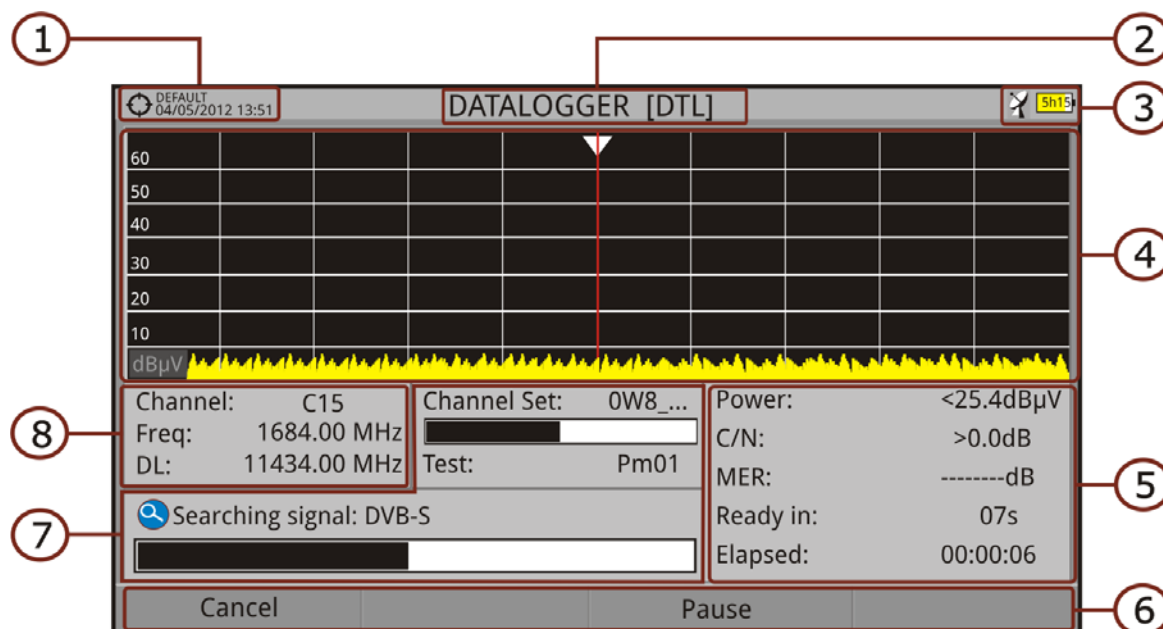
Figure 86.

1 Selected installation; date and time.

2 Current datalogger name.

3 Selected band; battery level.

4 Exploring the spectrum in real time.

5 Level/Power, C/N ratio, MER, time remaining to identify a channel, elapsed time since the start of the channel identification.

6 Softkey menus.

7 Current channel plan, progress bar in the current channel plan, selected test point.

8 Channel, frequency and Downlink.

▶**Screen Description (Data Viewer)**
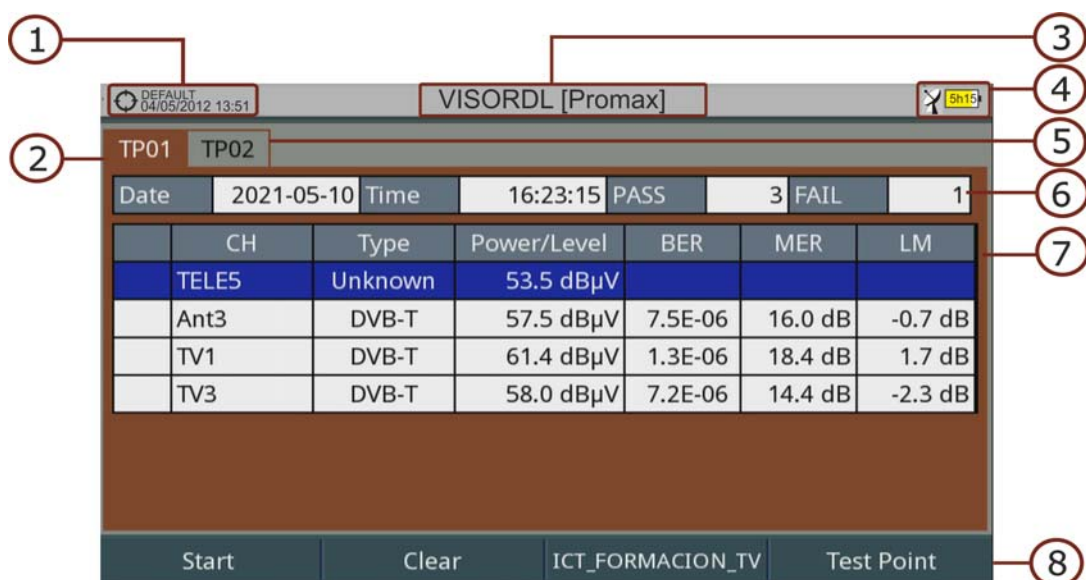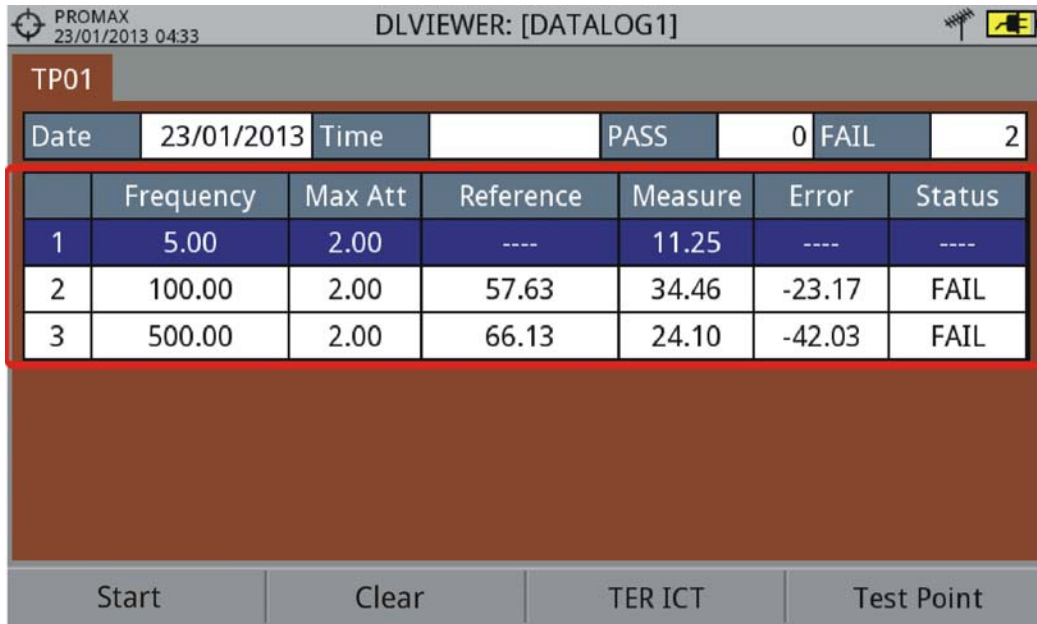
Figure 87. Channel Plan Data Viewer.

Figure 88. Attenuation Test Data Viewer.

1 Selected installation; date and time.

2 Tab identifying the displayed test point.

3 Current datalogger name.

4 Selected band; battery level.

5 Tab identifying each test point.

6 Date and time when the datalogger was created. Number of channels locked (PASS) or not locked (FAIL).

7 Data table with measurement data for each channel. In order from left to right: Colour identifying if the channel has been locked (WHITE) or not locked (RED) channel; signal type; power/level; BER; MER; Link Margin. Move the cursor up or down to navigate along the measurement data. Press Enter on a channel to display the signal parameters.

NOTE: When performing a datalogger for a DVB-T2 signal, the channel field will show channel name, profile and layer (PLP). This is show by letter "B" which stands for Base profile or "L" for Lite profile. The number indicates the amount of PLP.

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8 Softkey menus.

9 Table with the measurement data for each pilot signal in the attenuation test. In order from left to right: number of pilot signal, pilot signal frequency, maximum attenuation allowed, reference level value, level value at the test point, error and signal status.

5.11.3 ■ Menu Options

► **Data Viewer Menu**

■ F1 It starts the datalogger in the selected test point.

■ F2 It clears all the acquired data.

■ F3 It displays a menu with the available channel plans to select the channel plan whose data want to be displayed. Channel plans available are those that have been selected during the creation of the datalogger.

■ F4 It contains four options:
- Jump to: It allows selecting a test point.
- Create New...: It creates a new test point.
- Delete Current: It deletes the current test point.
- Delete All: It deletes all test points of the datalogger.

► **Datalogger Menu Options**

■ F1 It cancels the datalogger.

■ F3 It pauses datalogger until the user resumes by pressing again.

5.11.4 ■ Test & Go

"Test & Go" function inside the "Datalogger" tool allows the user to create a quick datalogger by creating automatically a new datalogger, a new test point and then starting it.

Datalogger parameters are set automatically based on:

■ File name: DL [current band - terrestrial or satellite][consecutive number].

■ Channel plan: Current channel plan selected in the equipment.

■ Test point: PM01.

■ No capture of services list.

If "Test & Go" is performed when using the "Attenuation test" tool, then the datalogger created will be specific to save attenuation test data.

5.12	**Screen and Data Capture (Export key)**

5.12.1	**Description**

The Screen and Data Capture function captures what is displaying on screen at the moment. The capture can be an image, measurement data or both. This is set through the **Preferences** menu ("Export button" option).

Data capture is saved in a XML file with all data, measurements and text, that is on screen at this time. The image is saved in a PNG file.

Captures can be displayed on the equipment or also can be downloaded and displayed through an external software.

Spectrum footprint

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5.12.2	**Operation**

► Settings

1 Press the "Management Installation" 🗁 key (key F) for one second to enter "Preferences" menu.

2 Go to the label " **Tools**" and select your option in "**Export button**". There are three options available: Screen Only, Data Only or Screen+Data. "Screen Only" saves the screen image in PNG format. "Data Only" saves measurement data on screen in a XML file format. "Screen + Data" saves both screen and data.

3 Once selected, press F2 to save changes and F1 to exit "Preferences".

► Capture

1 Press the **Export** key 📷 (key P) for one second when on screen appears the screen to be captured. The LED next to key lights.

2 A progress bar shows the progress of the capture process. When finished, the screen is captured and the LED is OFF.

3 Then the virtual keyboard appears with the default name assigned to the file. The filename for the screen capture is automatically generated with the following code: capture mode (SP for Spectrum mode, TV for TV mode, ME for Measurement mode), capture channel (CHXX) and a consecutive number.

4 Edit the name if necessary (see section "Virtual keyboard"). Then press [F3]: OK to end the capture or [F4]: Cancel for cancellation.

► **Display**

1 To display the screen captured press on the **Installations Management** key ▭ (key F).

2 Select the installation where the capture was done and press [F2] **Manage**.

3 Press [F1] **Filter by type**. Select "Screen Shots" or "Data Captures" option. This shortens the list to the selected option.

4 It appears a list of all the captures.

5 Move up or down to find the file to be displayed.

6 Leave the cursor on the file to be displayed. It appears a progress bar that lasts a few seconds, depending on the size. Then the capture appears.

7 To see the capture in full screen just press the F4: **Options** key and then on the menu press "View in Full Screen". To exit the full screen view press any **softkey**.

8 To delete or copy the capture to a USB stick, select the capture by pressing Enter, and then select the appropriate option from the menu [F2]: **File**.

9 Captures can also be displayed on a PC, by downloading the whole installation file using the NetUpdate software (see the NetUpdate manual for more information).

5.13   Explore Channel Plan

5.13.1   Description

The Explore Channel Plan function performs a scan of the selected channel plan. It detects where active signals are in a channel plan and in which channels of

the current channel plan signal is received. With this information it explores these channels with signal, looking for any broadcast and identifying them.

▶ **Explore channel plan**

5.13.2   **Operation**

The Explore Channel plan function is available for all signals.

1 Connect the **RF** input signal to the equipment.

2 Access Preferences by pressing the Installations key 📁 (key F) for one second.

3 At the 'Measures' tab check the minimum values for the signal to be identified during the scan (for more information refer to section: Preferences -> Measures options).

4 Press the **Tools** key 🔘 (F3).

5 Select the **Explore Channel Plan** option.

6 The first screen of **Explore Channel Plan** appears.
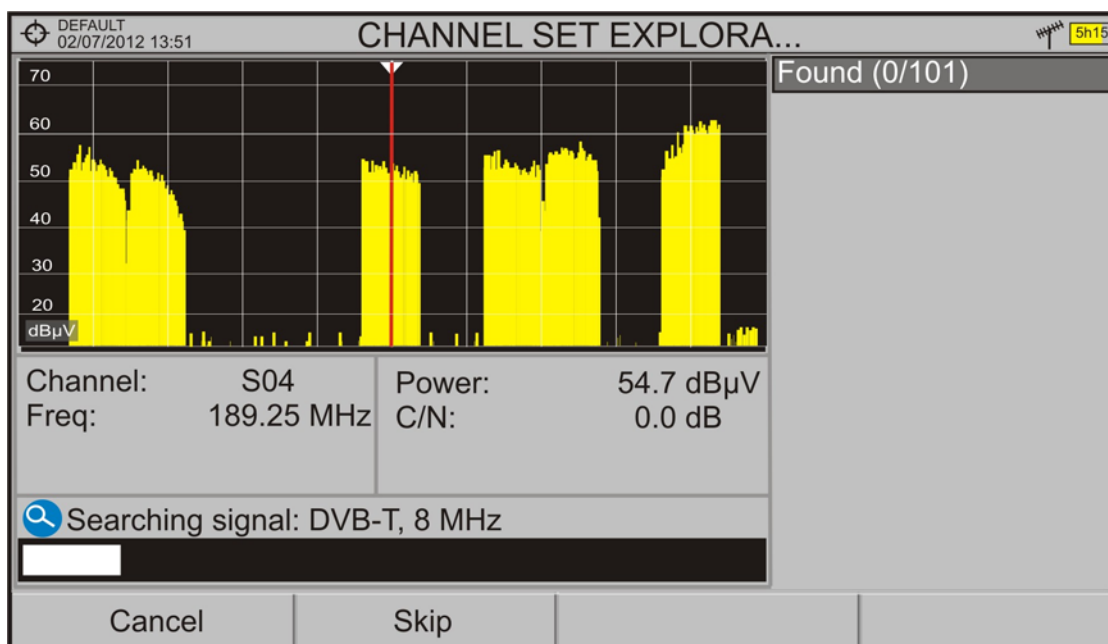
Figure 89.

7 After the exploration the following screen appears:

► **Screen Description**
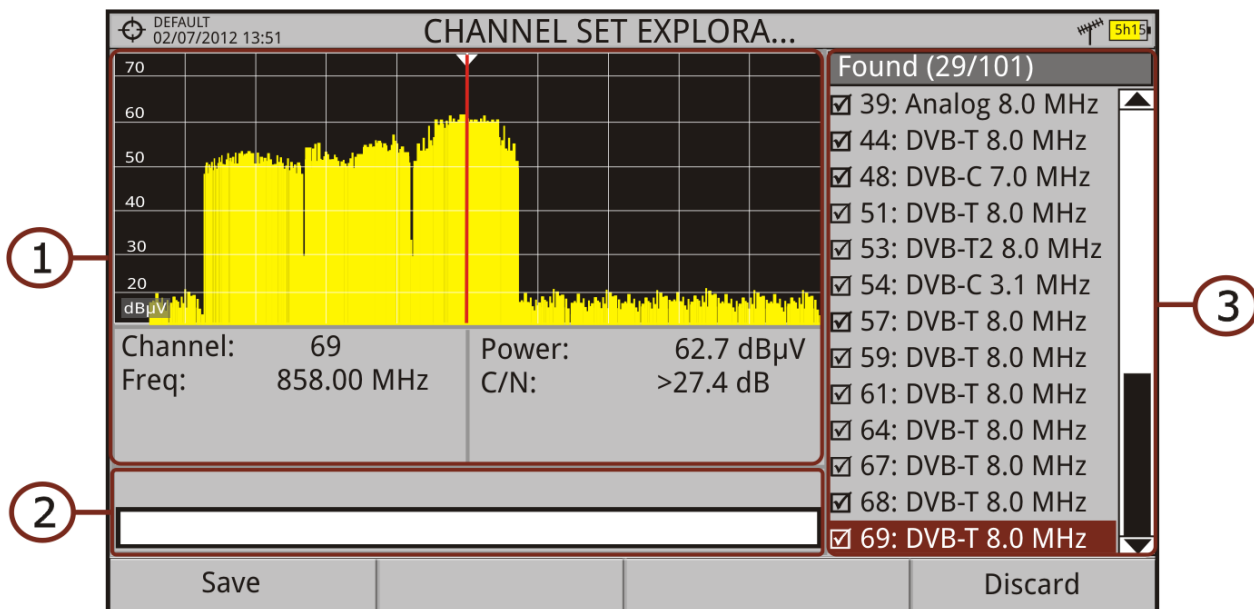
Figure 90.

1 **Spectrum and Measurement**: It shows the cursor scrolling through each of the channels of the channel plan. On the bottom of the screen the channel and frequency appears next to the Power/Level and the C/N ratio.

2 **Progress Bar**: It shows the signal type detected and the scan progress in real time. At the end a box shows a message informing the exploration process has finished.

3 **Channel plan**: At the end of the process it shows the channels that have been detected during the channel plan exploration. In parentheses shows the number of detected channels to total channels of the channel plan. When moving the cursor through the channels, the spectrum and measurement windows are dynamically updated for the selected channel. It allows you to select/unselect channels to save them as a new channel plan.

5.13.3 **Menu Options**

At the bottom are the function keys. They are detailed below.

- **F1** **Cancel** (during the process): EThis option appears only while performing the exploration process. It cancels the exploration before finish. When pressing, a confirmation message appears before cancelling.

- **F1** **Save** (at the end of the process): This option appears at the end of the exploration process. It saves the results obtained during the

exploration as a new channel plan. The name of the original channel plan is assigned to the new one by default and the user can modify the name using the virtual keyboard that appears prior to saving. The new channel plan is now available in the list of channel plans in the installation and can be used as any other channel plan. After saving it becomes the selected channel plan to work with.

- **F2** **Skip** (during the process): This option allows skipping the current channel and explore the next one in the channel plan.

- **F4** **Discard** (at the end of the process): This option appears at the end of the exploration process. It discards the results obtained from the exploration.

5.14 Discover FM Stations

5.14.1 Description

The **Discover FM Stations** tool scans the FM band and creates a FM channel plan from scratch. Scanned frequency range is from 87 to 108 MHz.

[Discover FM stations](#)

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5.14.2 Operation

To scan the FM band:

1 Connect the **RF** input signal to the equipment.

2 Press the **Tools** key `F3`.

3 Select the **Discover FM Stations** option.

4 The first screen of **Channel Plan Exploration** appears and the exploration starts.
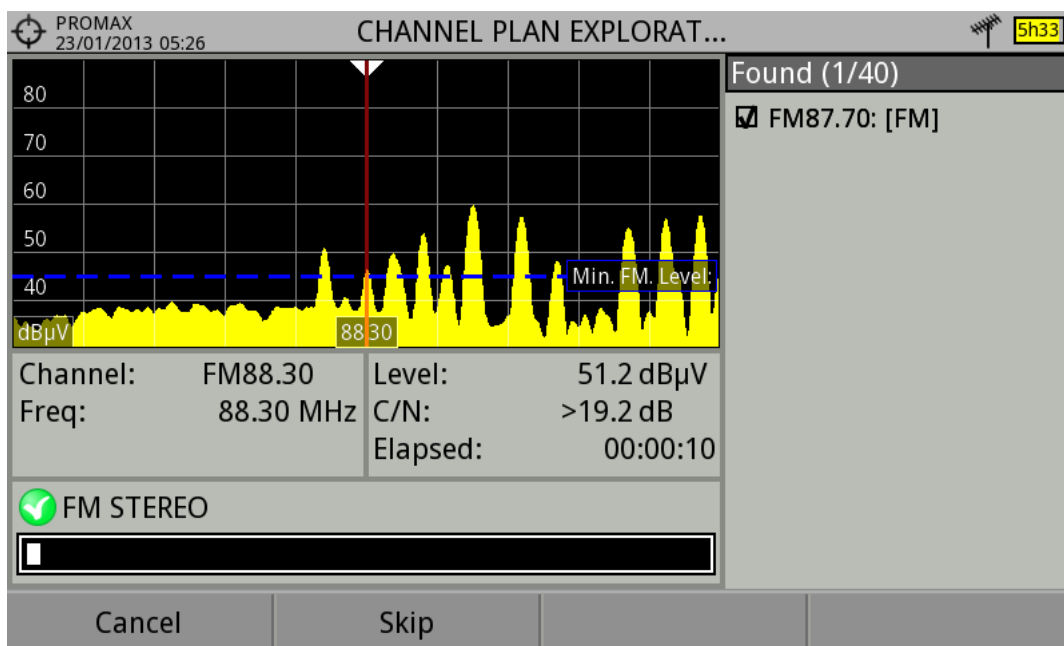
Figure 91.

5 After the exploration the following screen appears:

► **Screen Description**
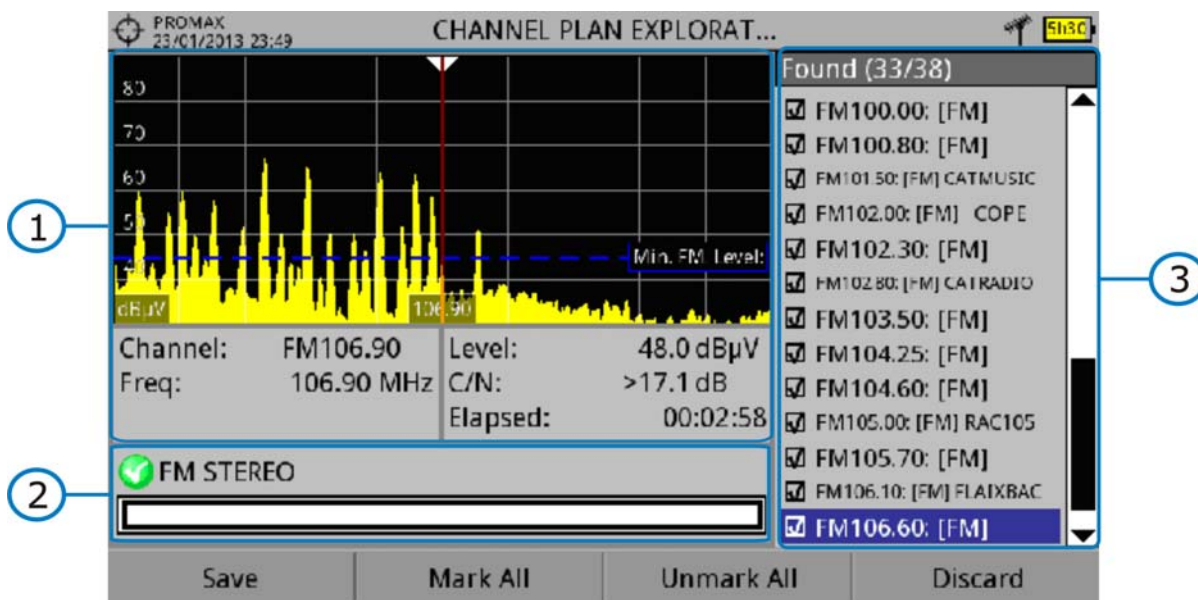
Figure 92.

1 Spectrum and Measurement: It shows the cursor scrolling through each of the channels of the **FM** band. On the bottom of the screen the channel and frequency appears next to the Power/Level and the C/N ratio. In the spectrum area there is the **Minimum FM Level**. This line is the minimum signal level required to identify the FM signal. The channels below that signal

level will not be identified. It can be configured in the "Measures" tab in "Preferences" 🗁 (key F for 1 second).

2 Progress Bar: It shows the signal type detected and the scan progress in real time. At the end a box shows a message informing the exploration process has finished.

3 Channel Plan: It shows a list with the channels being detected during the exploration of the FM band. At the top and between parentheses there is the number of detected channels to total channels. When moving the cursor through the channels, the spectrum and measurement windows are dynamically updated for the selected channel. User can mark / unmark the FM channels to save in the channel plan.

5.14.3   Menu Options

Function keys are detailed below:

- **F1** Cancel (during the process): This option appears only while performing the exploration process. It cancels the exploration before finish. When pressing, a confirmation message appears before cancelling.

- **F1** Save (at the end of the process): It appears at the end of the exploration process. It saves the results obtained during the exploration. It is assigned a name by default to the channel plan but the user can modify the name using the virtual keyboard that appears prior to saving. Each channel takes its name from the service name extracted from RDS data (if available). The new channel plan is now available in the list of channel plans in the installation and can be used as any other channel plan. After saving it becomes the selected channel plan to work with.

- **F2** Skip (during the process): This option allows skipping the current channel and explore the next one.

- **F2** Mark All (at the end of the process): This option marks all the channels that appear on the channel list.

- **F3** Unmark All (at the end of the process): This option unmarks all the channels that appear on the channel list.

■ F4 Discard (at the end of the process): This option appears at the end of the exploration process. It discards the results obtained from the exploration.

5.15   Field Strength

5.15.1   Description

The Field Strength function allows the equipment to work as a field strength meter, measuring dBµV per meter. To perform this type of measurement is needed to enter the calibration parameters of the antenna being used to receive the signal.

▶ **Field strength**

5.15.2   Operation

The Field Strength tool is available for all signals received by the RF input.

1 Connect the antenna to the **RF** input of the equipment.

2 Select a channel or frequency.

3 Press the **Tools** key F3.

4 Select the **Field Strength** option and in the drop down menu select **On**.

5 Select again the **Field Strength** option, now select the new option that appears, called **Configuration**.

6 In the configuration window enter the antenna calibration parameters, by hand or selecting one of the available antenna types (data of different antenna types should be imported by the user. Refer to the following section).

7 Now access the **Spectrum Analyzer** or **Measurement** mode to check the field strength measure shown as FSM (dBµV/m). This measure replaces the power.
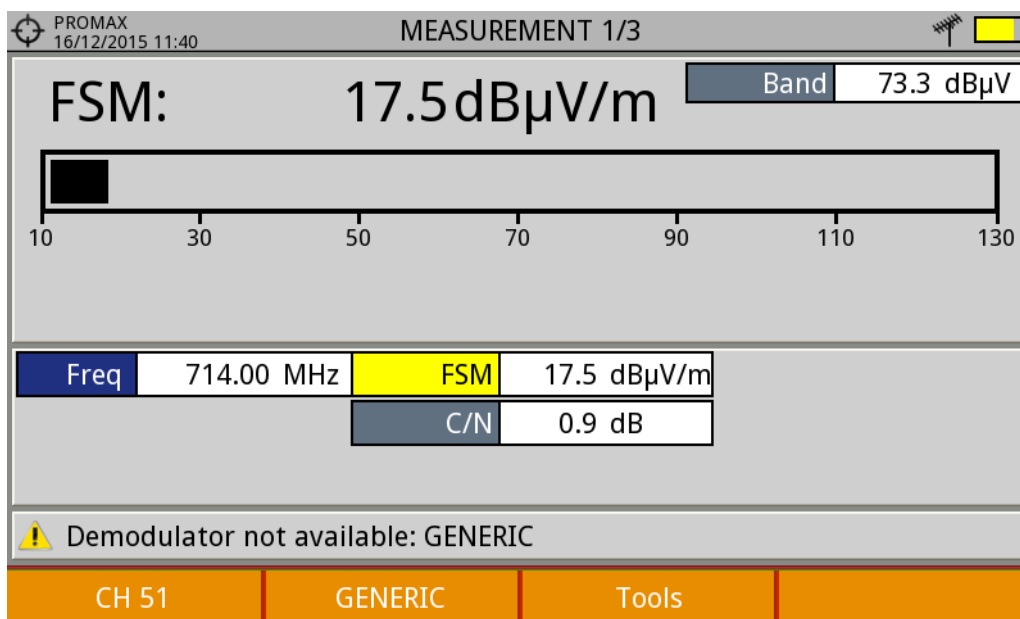
Figure 93.

8 To save FSM data, go to "Tools", select "Datalogger" and then "New" to create a new datalogger. Keep in mind that the "FSM" tool does not demodulate any signal, it only detects the transmitted energy, so it is identied as a GENERIC signal. For this reason only FSM data is saved for each channel (for more details refer to "Datalogger" on page 125).

9 Once finished, return to the **Tools** menu and in the **Field Strength** option select **Off**.

NOTE: Some tools (Constellation, Echoes, MER by carrier, Merogram...) are disabled when the **Field Strength** option is enabled. Remember to turn off "FSM" option if you want to use these other tools.

5.15.3 **Settings**

The **Field Strength** configuration option allows the user to enter the correction factors for the antenna and cable used when measuring the field strength.

Field Strength Configuration

Figure 94.

Data fields to be filled are:

▶ **Antenna:**

- Type: In this box the user must select the type of antenna between manual and any other type of antenna available. If you select the manual antenna, you must enter the correction factor by hand. If you select an antenna type then the correction factors associated with each frequency are applied. These data are defined in the antenna file imported by the user (refer to next section to know how import antenna data).

- Factor: This is the correction factor (K) for the antenna at the measurement frequency.

- Detector Type: (PEAK/RMS). It allows the user to select between maximum PEAK detector or RMS detector. The maximum peak detector is mainly used for analogue modulated signals, while the RMS option is the right choice for digital modulated signals.

▶ **Cable**

- Type: In this box the user must select the type of antenna between manual and any other type of cable available. If you select the manual cable, you must enter cable loss by hand.

- Loss (dB): In this box the user must enter the estimated loss for the cable used to connect to the antenna.

At the bottom of the configuration window you can see the field strength in real time according to the current frequency and correction factors.

5.15.4   Creating and Importing Calibration Tables

The user can import the antenna calibration data obtained from the manufacturer. There is a template (available on the download area at PROMAX

website) that can be filled and imported into the equipment (this template has been created in an Excel file; the procedure explained below only works for the Excel 2007 version and above).

Figure 95.

Next are the steps to fill in the template data and import them to the equipment:

▶ **Antenna Generator**

1 Download the "Antenna XML Generator" template from the PROMAX website.

2 In the "Model" box enter the name by which the antenna will be identified (maximum 8 characters).

3 In the "Description" box, type a description to identify the antenna.

4 In the "Impedance" box select the impedance of the antenna between 50 and 75 ohms.

5 In the "Height" box enter the antenna height in meters.

6 Now fill the calibration table of the antenna with the K factor according to frequency.

7 Do not change units when filling the table.

8 Extend or contract the calibration table to the number of filled lines.

9 After filling the calibration table, go to option "Save As -> Other Formats.

10 In the window that appears, edit the file name in "File name".

11 In the drop down menu "Save as type" select the "XML Data" option. Then click "Save".

12 If a warning message shows up, click "Continue".

13 Now the file is already generated with the selected name and the extension "xml".

14 Now just import it to your equipment and load the calibration table of the antenna in the installation.

► **Import**

1 Copy the generated file on a flash drive and connect it to the meter's USB port.

2 Press the **Installation Manager** key 🗁 (key F).

3 Press the Tools key (F4).

4 Select "Import from USB" option.

5 The Import Files window appears. Select the generated file and press the (F4) "Import" key.

6 Press the **Installation Manager** key 🗁, select the installation to which you want to add the antenna calibration table and press the (F2) "Manage" key.

7 Press (F3) key: "Installation" and select the "Add Antenna" option.

8 Select the antenna to be added and OK.

9 The antenna calibration table is now added to the installation.

10 Now this antenna will be available in the type of antenna field in the configuration menu of the "Field Strength" tool.

► **Remove**

1 Press the Installation manager (key F) 🗁.

2 Press (F4) "Tools" key.

3 Select "Installed Antennas" option.

4 Check the antenna to remove.

5 Press (F2): "Remove" key.

5.16 Task Planner

5.16.1 Description

The **Task Planner** function allows the user to set-up a task list, selecting when to start, a repetition rate and other parameters. The equipment can be switched off after setting all parameters and it will wake-up, at the required time, to perform the scheduled tasks.

Task planner

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5.16.2 Operation

The Task Planner tool is available to run screenshots and dataloggers.

1 Press the **Tools** key.

2 Select the **Task Planner** option to access the Task Planner window that shows a list of scheduled tasks. In the right column and next to each task there is its status: if the date of the next execution appears then the task is pending; if "finished" appears then the task has been executed; if nothing appears then the task has not been scheduled.

PROMAX 18/02/2015 08:41		SPECTRUM 1/3			
Freq: 634.00 MHz	Power: <24.4 dBµV		MER: ----- dB	CBER: ------------	
	C/N: <0.0 dB			VBER: ------------	

Task Planner

Name	Next execution
☐ Capture SPECTRUM 1/3	----------
☐ Capture SPECTRUM 1/3	Finished
☐ Datalogger	Finished

502.50

🔍 Searching signal: DVB-T2, 5 MHz   Span: FULL

Exit	Tasks	Parameters	Timing
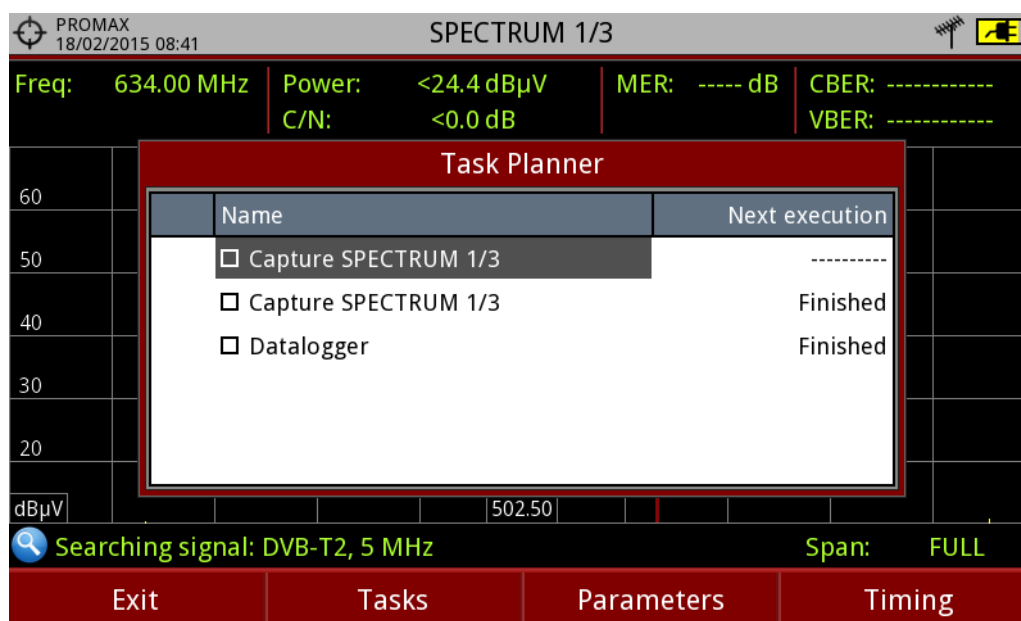
Figure 96.

3 To add a new task press [F2]: **Tasks** and select the "**Add**" option. It deploys a menu with these options: Capture, Datalogger and Monitoring.
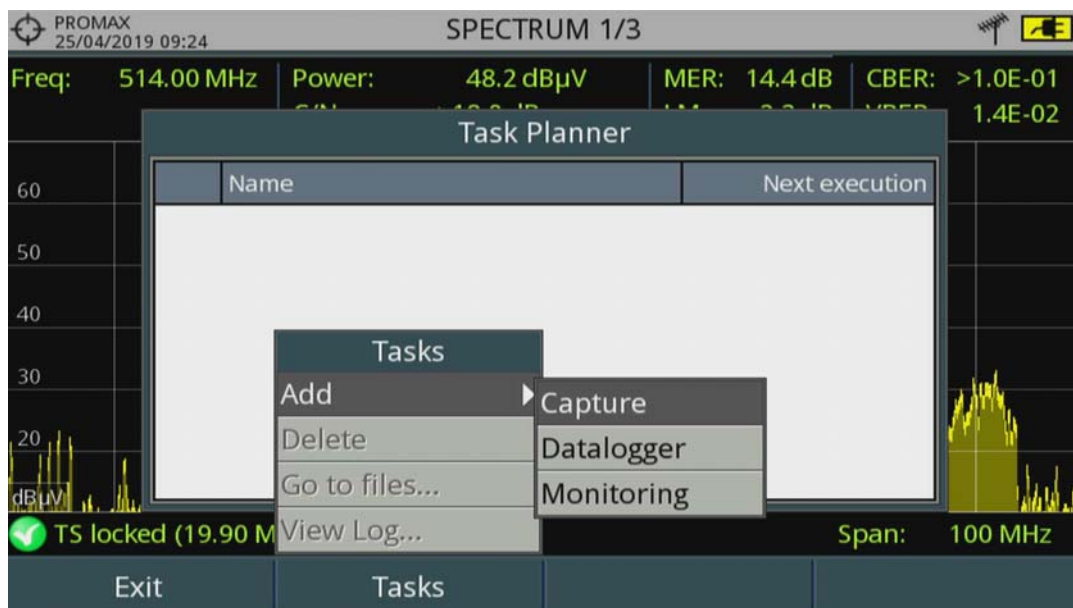
Figure 97.

4 The "**Capture**" option performs the capture task. The user can select the screen and type of capture. The screen options include any view in the three modes: Measurement, Spectrum or TV. The options for type of capture are: screen only, data only or screen+data (for more details refer to "Screen and Data Capture (Export key)" on page 134).
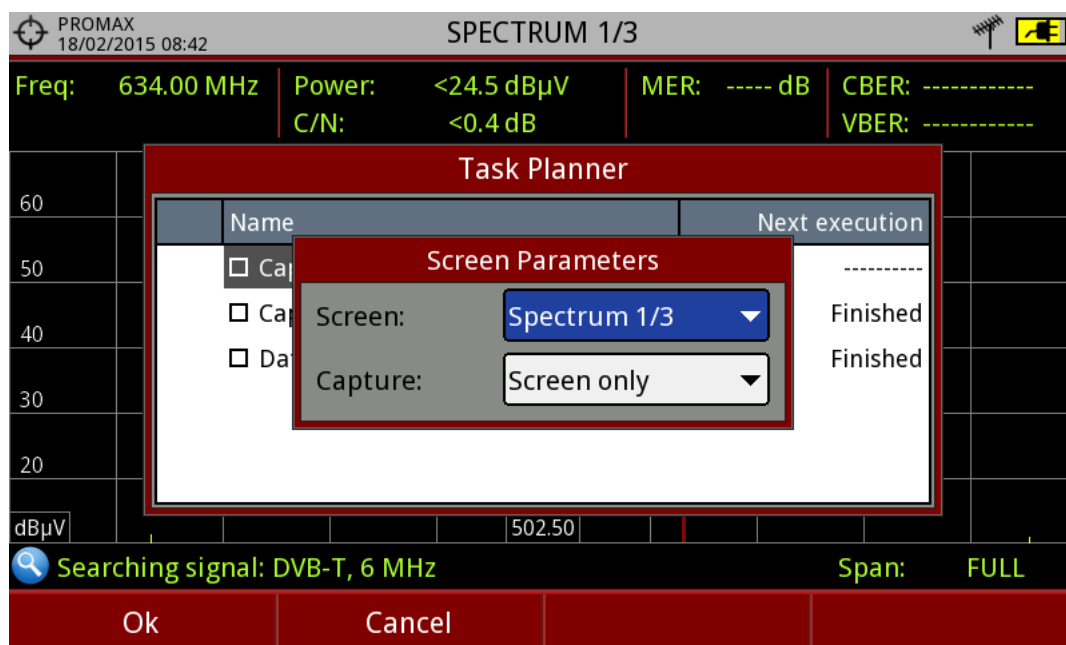
Figure 98.

5 The "**Datalogger**" option performs the datalogger task. The user must first select the datalogger from those available for the current installation. If there not any datalooger task available the user must create one (for more details refer to "Datalogger" on page 125).

6 The "**Monitoring**" option performs a monitoring task. The user must first select the monitoring from those available for the current installation and its duration (days, hours and minutes). If there is not any monitoring task available the user must create one using the webControl program (for more details refer to "Signal Quality Monitoring" on page 214).

7 After selecting the type of task, check the box next to it and press [F4]:**Timer** to schedule the time to execute the task (see next section for details about the timer).

8 When saving the timer for the task, the upper right corner shows an icon of a clock 🕐 indicating that the equipment has tasks pending to execute.
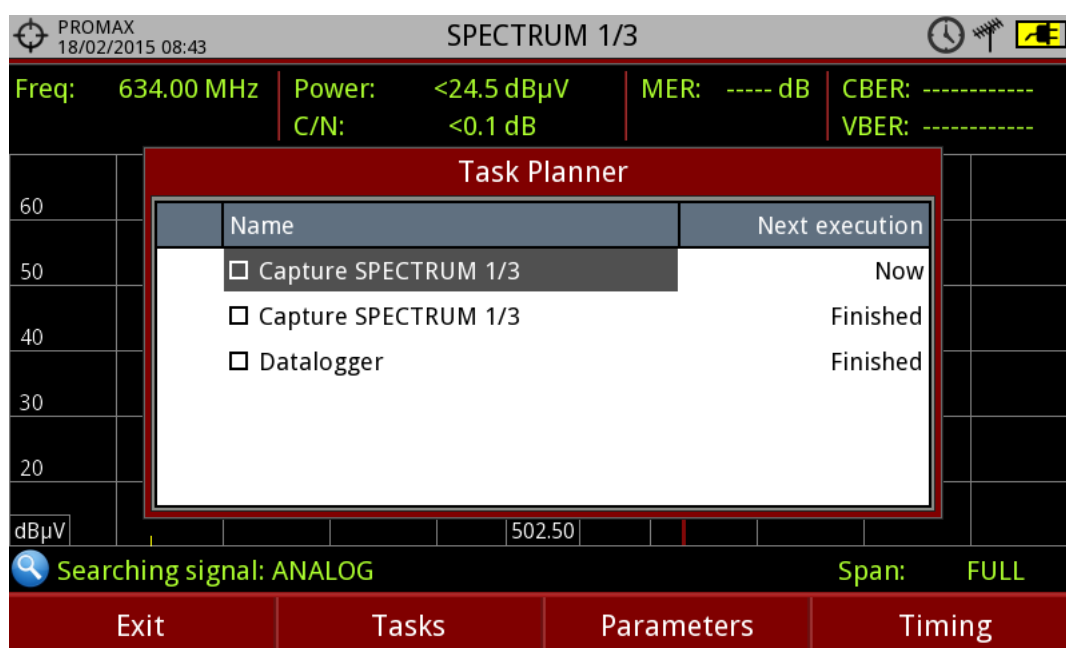
Figure 99.

9 To change any parameter of the task, check the box next to the task and press [F3]: Parameters.

10 To delete a task, check the box next to it and in [F2]:**Tasks**, press "**Delete**".

11 After setting up the tasks press [F1]: Exit. Since this moment the timer for task execution starts.

12 When the task is finished, the user can access the data through "**Go to file** ..." option in [F2]: Tasks. It will take you directly to the management installation window where the data for each installation are stored.

13 Once the task is completed, user can access a short log for each programmed task, just to know if each task has been successfully completed

or to indicate if something prevented its execution. To access this function, from **Task Manager**, press [F2]: **Task** and then "**View Log**...".

NOTE: The equipment can be turned off after task planning as it will automatically turn on when the time to task execution comes[*].

Two tasks cannot be executed simultaneously.

It is recommended that the datalogger selected have not enabled the option to pause between channel plans, since in that case the process would stop during the execution of the task.

The filename for the screen capture is automatically generated with the following code: capture mode (SP for Spectrum mode, TV for TV mode, ME for Measurement mode), capture channel (CHXX) and a consecutive number.

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*. not available for **PROWATCH Neo**

5.16.3   Timer

The timer window contains several options for task scheduling.
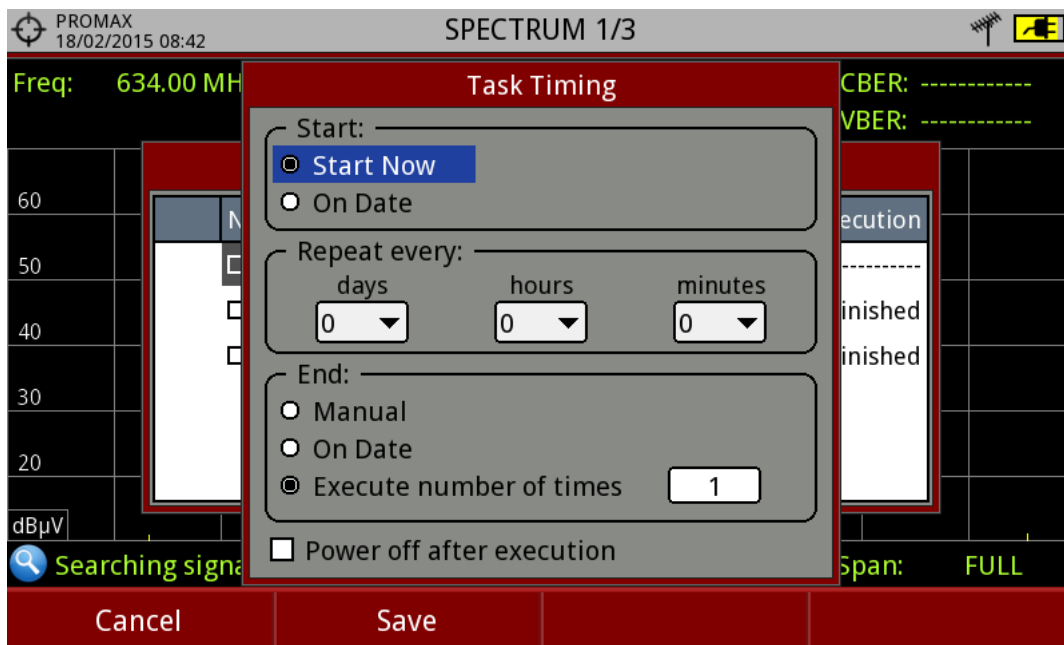
Figure 100.

■ Start
  •Start Now: The task begins immediately after leaving the task planner.
  •On Date: The user selects the start date for the task (day / month / year) and time (hour: minute).

■ Repeat every: The task repeats each cycle of time (days, hours and minutes).

■ Stop
  • Manual: The user finishes the task.
  • On date: The user selects the stop date for the task (day / month / year) and (hour: minute).
  • Repeat a number of times: The task execution ends after the number of times set.

■ Turn off after execution[*]: By checking this option, the equipment turns off after the execution of the task.

5.17 Transport Stream Analyzer[*]

  *. only available for **PROWATCH Neo 2**

5.17.1 Description

The Transport Stream Analyzer function allows the user to make a comprehensive analysis of the Transport Stream (TS) contained in a tuned signal. The signal can be received through any of the equipment inputs: TS -IN, RF, IP, CAM module and terrestrial and satellite demodulators. This feature gives a great flexibility to process the signal in multiple ways, so the equipment becomes a portable laboratory for the analysis of digital signal.

Transport Stream analyzer

S C A N

This tool can be of great interest to research centres, broadcasting operators, universities or training centres as well as to installers that want to expand their technical knowledge or training in analysing the smallest unit of a digital signal transmission.

This tool has these main functions:

■ Tables: It shows all the metadata carried in the corresponding PSI/SI tables in a tree diagram so user can deploy its content to the detail.

■ Bitrates: It shows the bitrate information for each program in real time, in a graphical way and also shows the percentage contribution of each one to the total TS.

■ Alarms: It shows a list of alarms that warn about any possible failure in the TS layer according to the three priority levels described in the TR 101 290 measurement guidelines by the DVB group.

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  *. not available for **PROWATCH Neo**

■ PID List: It shows an ordered PID list with a short explanation of its contents. PID bitrate is refreshed continuously to help in understand bandwidth usage.

5.17.2	**Operation**

The Transport Streams (TS) Analyzer tool is available for all DIGITAL signals.

1 Connect the digital signal to any input of the equipment.

2 Select the channel or frequency and tune the signal.

3 Press the **Tools** key [F3].

4 Select the **TS Analyzer** option.

5 A drop down menu appears with these options: **Tables**, **Bitrates, Alarms**, **PID list and T2MI**. Select your option.

6 While starting, the TS Analyzer takes few seconds to detect and identify the TS signal (it shows the table capture process on screen), and then the results appear.

7 An error message pops up if the signal does not contain any TS or if the TS cannot be found. In this case, check the signal. If the user cancels the table capture process, no data about the TS will appear. Then select "Restart analysis" on F4 to try capture the TS again.

The following describes in detail each one of these functions.

5.17.3	**Table Analyzer**

► Description

This function displays the TS tables. When system starts it shows the table capture process. When it finishes tables are shown in a tree diagram for easy browsing with the keyboard. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated. This tool requires detailed knowledge about the contents of these tables.

▶ **Screen Description**
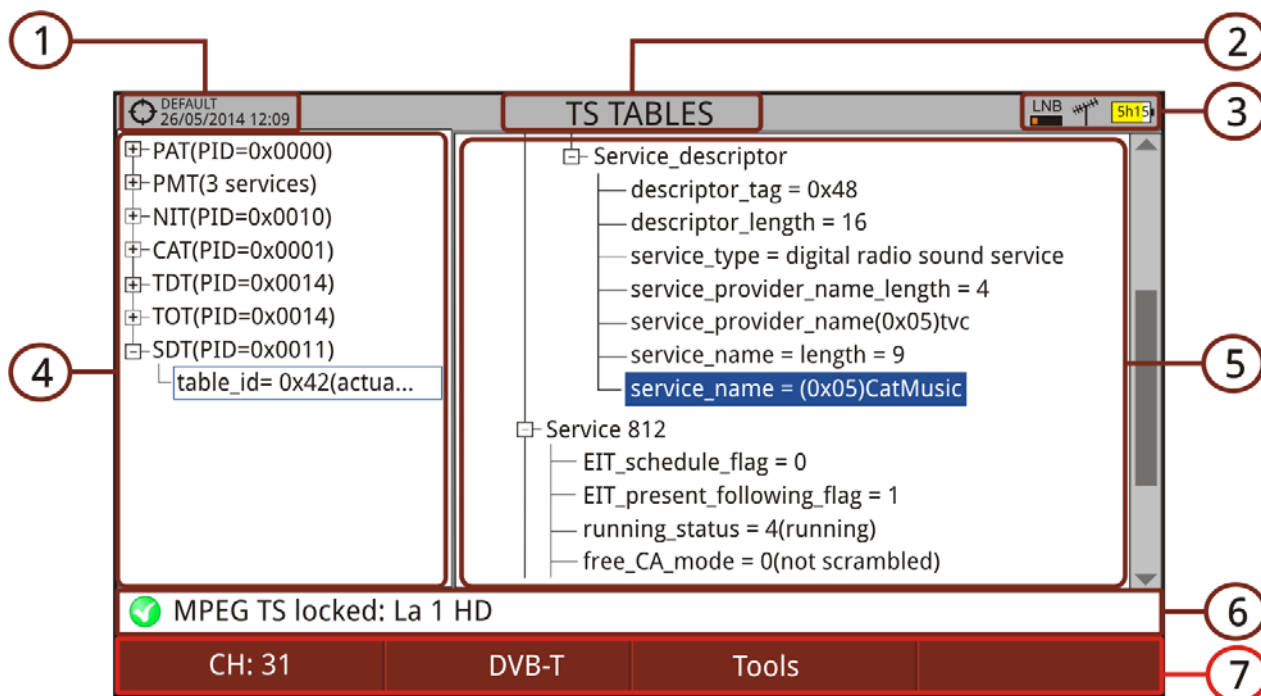
Figure 101.

1 Selected installation; date and time.

2 Selected function.

3 Selected band; battery level.

4 Main Table Tree.

5 Detail Table Tree.

6 Signal status (searching/locked/multiplex name).

7 Softkey menus.

- Advanced [F4]: It shows the "**Restart Analysis**" option which makes a new detection and updating of the TS tables.

■Cursor functions:
- Cursor left/right: It changes between Main menu tree and Detail menu tree.
- Cursor up/down: It moves along the tables in the tree.
- Enter: Pressing on a node with the symbol ⊞ it deploys the tree. Pressing on a node with the symbol ⊟ it closes the tree.

► Tables Description

Below is a brief explanation of the main tables that can appear in the detection of a TS. For more details we recommend to consult guidelines ETSI TR 101 211.

There are two generic groups of tables:

- PSI (Program Specific Information) Tables: These tables are specified by the MPEG-2 standard worldwide. They are used by all the digital transmission standards. The TS analyzer detects all the PSI tables.

- SI (Service Information) Tables: These tables are specified by the standard used in the area or country (in this case DVB). These tables are more detailed and imply a higher level of information relating to the PSI tables. The TS analyzer detects the most important SI tables. The PID (Packet Identification) code next to the name of the table is a 13-bit code that identifies each packet type and therefore to what kind of table corresponds.

► PSI Tables

PSI tables are:

- PAT (Program Association Table): It is a master table that lists all services found in the TS being transmitted. It also points the table where are specified each one of the services.

- PMT (Program Map Table): It is a table that identifies all the components within a service (video, audio and/or data).

- NIT (Network Information Table): Optional table with information about TS and multiplex of a given network. The content in detail is described in the tables used by the digital standard (DVB in this case).

- CAT (Conditional Access Table): Table that controls the scrambling of a service.

► SI Tables

Most important SI tables are:

- NIT (Network Information Table): It is a master table used by the broadcasting network to manage the services. It provides logic network info by grouping several TS together and adding tuning information for all network services. In the case of a satellite provides information about its channels. It also contains the LCN descriptor that provides information to order the services.

- BAT (Bouquet Association Table): It is a table containing information required to group a set of services or content, which is related for

commercial reasons (packs of a particular distribution platform, packs of a particular film genre or sport, etc.).

- ■ SDT (Service Description Table): It is a table with a description of each service, providing a service name and other related information such as head-end and service details, if it is scrambled or not, if it is radio or tv, the provider, etc.

- ■ EIT (Event Information Table): Table that provides information on events (program or programs being broadcasted) in a given service. It is the basis for building an EPG (Electronic Program Name), the program guide shown on TV.

- ■ TDT (Time and Date Table): Table that provides UTC (Universal Time Coordinated) coded as MJD (Modified Julian Date) that means, time and date at the current moment and universal.

- ■ TOT (Time Offset Table): Table that provides the time offset related to UTC in order to calculate the local time. It also provides information on daylight saving time changes.

5.17.4 Bitrate Analyzer

► Description

This function shows the TS bitrate in a graphical way, and also by numbers and percentage. A pie graph, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the tuned multiplex. It also allows selecting any of the services to check its composition, which is also shown in bar graph.

This function allows the user to compare between television services and to check the bitrate used by each one. User can observe dynamically the variation that when changing the transmission content. Another use may be to identify the amount of null packets and therefore to know the amount of available payload by the multiplex.

▶ **Screen Description**
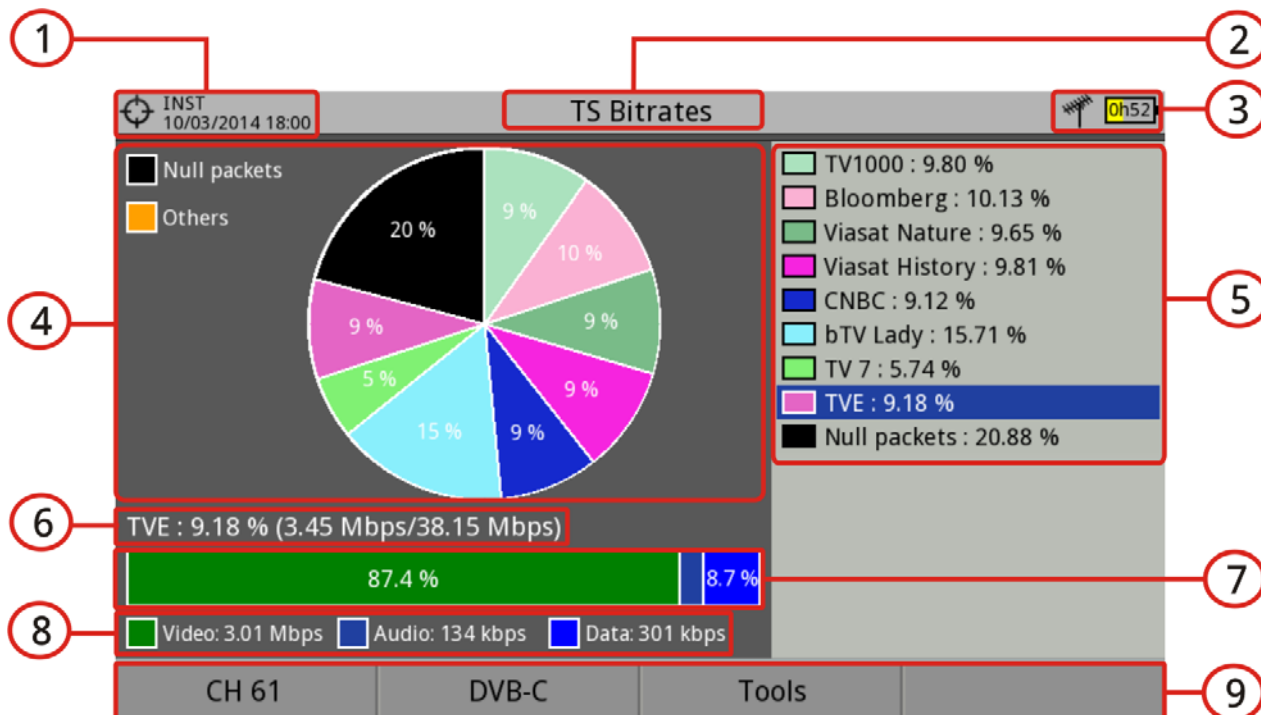
Figure 102.

1 Selected installation; date and time.

2 Selected function.

3 Selected band; Battery level.

4 Pie Chart. The graph represents and shows the percentage of each service on the total bitrate for the tuned channel. The colours of the graph correspond to the services detected. They are shown on the right side of the screen. Services with a very low percentage are grouped with the legend "Others".

5 Detected services. It shows all the services identified in the tuned multiplex and the percentage of each service relating to the total bitrate.

6 Detail of the Selected Service: Service name and percentage related to the total bitrate (bitrate/total bitrate).

7 Bar graph representing the bitrate percentage for each component (video, audio, data).

8 Video bitrate, audio and data.

9 Softkey menus.

•Advanced (F4): It shows the "**Restart Analysis**" option which makes a new detection and updating of the TS tables.

Cursor functions:
- Cursor up/down: It moves among detected services.
- Enter: Pressing on a service it will show details of the selected service.

5.17.5 Alarms

▶ Description

This tool monitors the TS. It is a dynamic tool as it displays in real time the evolution of the TS and the alarms that may occur. The priority levels of alarms are set according to the recommendations by technical standards TR 101 290.

Each alarm has a log where events are stored. These data can be exported.

▶ Main Screen Description
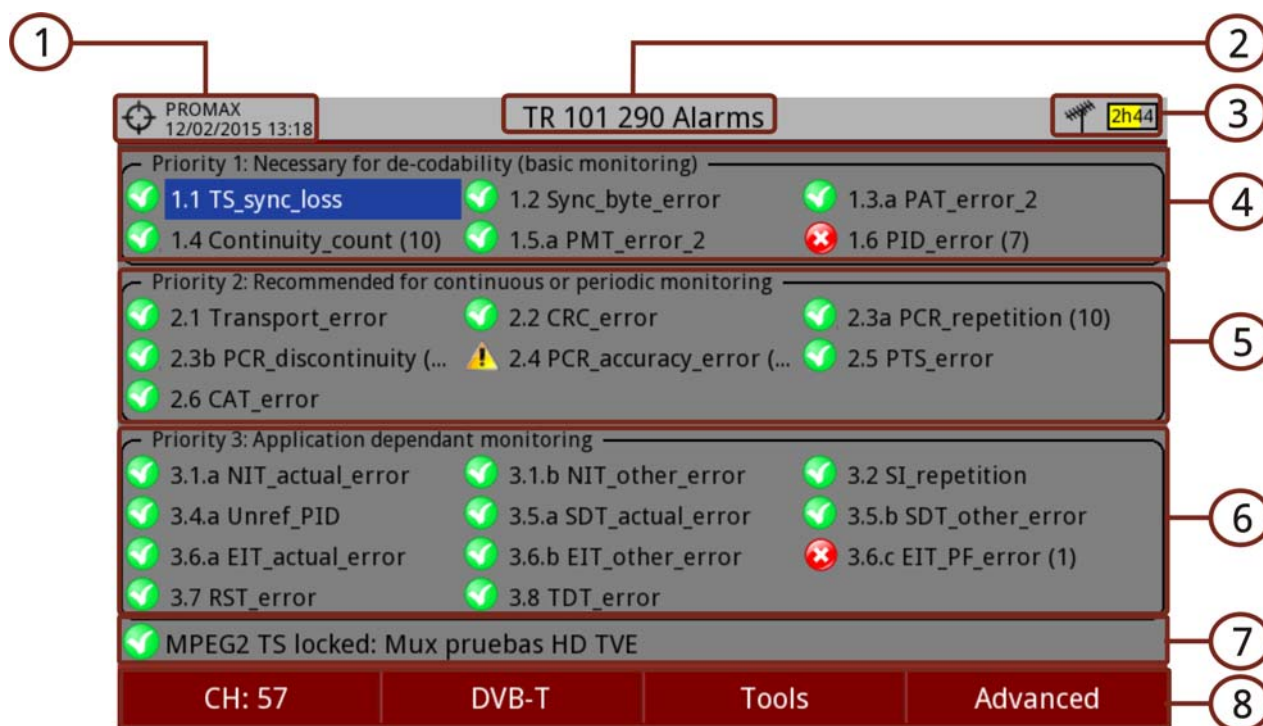
Figure 103.

1 Selected installation; date and time.

2 Selected function.

3 Selected band; Battery level.

4 Priority 1: High level security parameters. These are alarms that make the TS vulnerable and avoid them to be received. The parameters at this level

must be correct for the TS to be decoded. If any of these parameters fails the information cannot be recovered and therefore the signal cannot be decoded.

5 Priority 2: Medium level security parameters. These are alarms recommended by DVB for continuous or periodic monitoring of TS and ensure quality of transmission parameters. The alarm in any of these parameters does not prevent the receiving but it is indicative of a possible problem.

6 Priority 3: Low level security parameters. These are parameters that are not harmful but are required for getting the most from the receiver capabilities. They ensure that the receiver can extract in the best conditions the TS information especially when there are additional features such as the program guide or the services list.

7 Signal status (searching/locked/multiplex name).

8 Softkey menus.

- •Advanced ⌈F4⌉:It shows the "Restart Analysis" option which makes a new detection and updating of the TS tables.

■Cursor functions:
- •Cursor up/down: It moves among alarms and highlights one on blue background.
- •Enter: When you press on an alarm, it gives access to the alarm log.

Icons that appear according to the alarm type are:

- ■ ✅ OK.

- ■ ⚠️ Warning.

- ■ ❌ Error.

▶ **Alarm Log Screen Description**

To access the alarm log screen, press on the alarm to access its log screen.
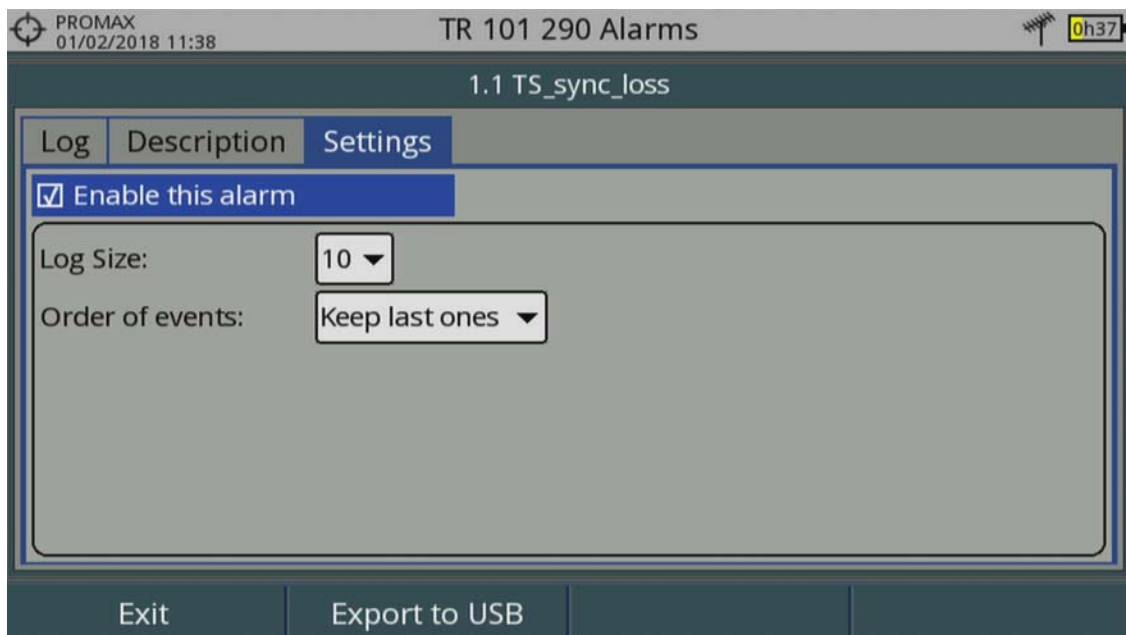
Figure 104.

The "**Log**" tab shows the alarm log data.

The "**Description**" tab shows a description of the alarm.

The "**Settings**" tab shows the following settings options:

- **Enable this alarm**: When this box is checked the alarm is enabled.
- **Notify on error**: It enables or disables the alarm warnings. If it is enabled it will notify the alarm status on screen.
- **Log Size**: It allows the user to select the number of events stored (10, 25 or 50).
- **Order of events**: Select the order for keeping the events between keeping the first or the last ones.

To export the alarm log connect an USB memory to the equipment and press [F2]: Export. Data is exported into a plain text file.

5.17.6 ▌ PID List

▶ **Description**

This tool shows an ordered PID list with a short explanation of each PID and its bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

▶ **Screen Description**
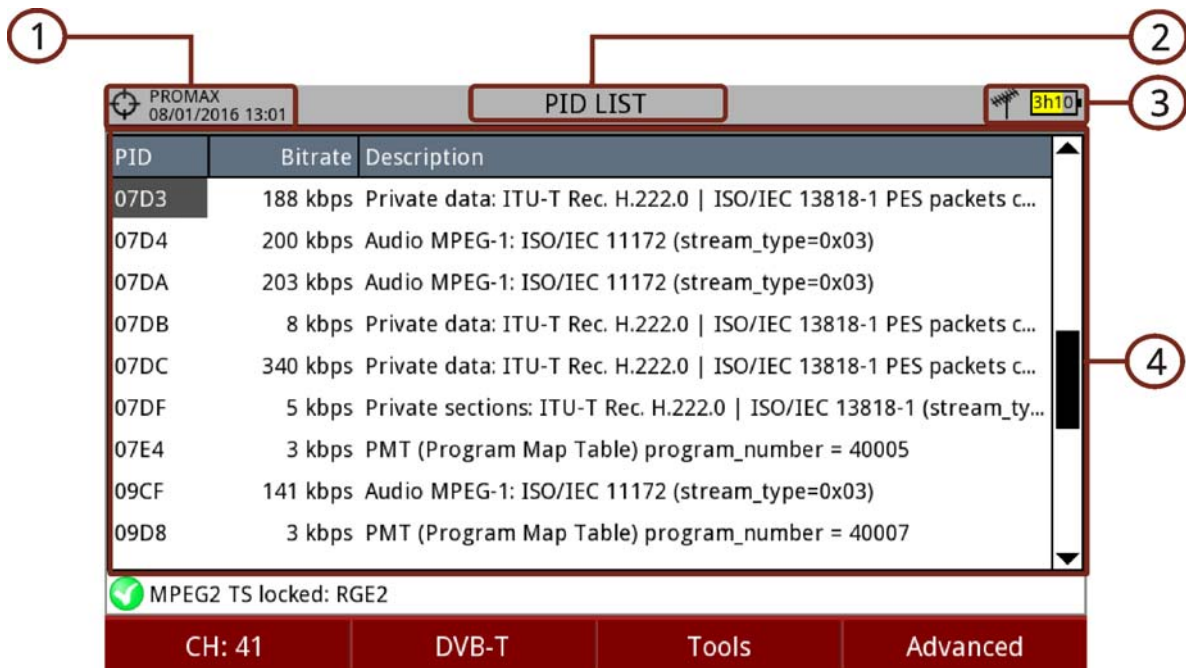
Figure 105.

1 Selected installation; date and time.

2 Selected function.

3 Selected band; Battery level.

4 PID, real-time bitrate and description.

5.18   Transport Stream Recording*

*. only available for PROWATCH Neo 2

5.18.1   Description

The Transport Stream Recording function captures in real-time transport streams received by any input (RF, ASI or IP) such as a DTT channel.

The TS recording can be stored in the 1 TB internal memory or on an external USB drive. The recording time depends on the bit rate of the transport stream.

Only the last recording stored in the internal memory can be played and analyzed on the equipment itself as if it was a live received signal. The other recordings can be exported or removed from the installation manager.

The recording time depends on the bitrate of the transport stream, but by reference to a DVB-T signal of 19.9 Mbps, six minutes of transmission can be stored.

Transport Stream recording

5.18.2 Operation

Transport Stream recording is available for all **digital** signals.

To access the **Transport Stream recording** tool:

1 Connect the signal to any of the equipment inputs.

2 Access the **Settings** menu (key C) and in the **Source Signal** option select between RF or IPTV.

3 Access the **Settings** menu (key C) and in the **Decoder TS Input** select from where comes the transport stream: RF/IPTV Demodulators or ASI Input.

4 Press F3: Tools and select the option **TS Recording**.

5 It shows the screen for TS recording / playback. Select where to save the TS between internal memory or USB by Advanced menu F4.

6 Start recording by pressing the **RECORD** key. It shows an icon on the top right corner that means it is recording. Even if you quit the TS Recording screen it keeps recording.

7 If there is any problem during recording (too high bitrate; full memory) it shows a message on screen.

8 End recording by pressing the **STOP** key.

9 To play the recorded transport stream press the **PLAY** key. The TS keeps playing even if you quit the TS Recording screen. To finish playing press on the **STOP** key.

10 During the playback of the transport stream it can be analysed by the **TS Analyzer** tool as if it was received live. All services encapsulated in the transport stream are also available in the TV mode.

11 When playback ends verify that the **Decoder TS Input** option in the **Settings** menu (key C) is properly set in order to receive the corresponding type of signal.

> **NOTE:** The equipment only can play and analyze the last transport stream recorded. Also the transport stream bitrate must be equal or less than 44 Mbits/s and its size below 1 GB.
>
> When not meeting these conditions, the transport stream is stored on the internal memory but cannot be played or analyzed. To manage these files use the Installations Manager ("Installation Management" on page 198) where they can be exported to a USB or deleted.
>
> When playing a recorded TS, the "Decoder TS Input" option is automatically selected as a "Recorded TS". After playing it returns to its previous state.

▶ **Screen Description**

Figure 106.

1 Selected installation; date and time.

2 Selected band; Battery level.

3 Recording / playback image.

4 Recording / Playback time elapsed.

5 Control Keys:

- ▪ [🔴] : Recording.

- ▪ [◀◀] : Rewind.

- ⏹ : Stop.

- ⏩ : Forward.

- ▶ : Play.

6 File information window that reports about file duration, the recording date and maximum bit rate.

7 This window reports about the recording source.

8 This window reports about available space and total space.

9 Softkey menus.

■ Cursor functions:
- Cursor left/right: Navigation through the control keys.

5.18.3   Menu Options

In the bottom of the screen are these options accessible via the softkeys.

- **F1** Exit: It exits the tool.

- **F2** Erase File: : It erases the internal memory dedicated to record transport stream, prior a confirmation message.

- **F3** Export to USB:

  - Start Copy: It starts to copy the TS to an USB if there is an USB is connected.

- **F4** Advanced: There are two options:

  - Play Loop: It allows you to enable the "Play Loop" option for playing the recorded stream in an endless loop.
  - Record onto: It allows to select where to save the TS between internal memory or external USB memory.

NOTE: Please note that due to the huge size of such files and the slow transfer speed, the total time for a copy of TS can take several hours. For this reason it is recommended to use this option only when the internal TS capabilities are not enough. In that case, a 15 seconds TS capture is enough to detect tables issues.

5.19	Shoulders Attenuation

5.19.1	Description

The Shoulders Attenuation function measures interferences in adjacent channels that look like shoulders.

Broadcast signals such as DVB-T, DVB-T2, ISDB-T or ATSC are constructed to follow strict RF requirements mostly aimed to ensure they occupy the bandwidth they have been assigned and they do not interfere with any other adjacent channels. In particular the shape of the signal spectrum must be within the limits of certain given masks specified in the different corresponding standards, i.e. ETR290 recommendations for DVB-T. The specific masks depend on the type of signal and standard.

Due mainly to nonlinearities in the power amplifiers the output RF signal contains unwanted band limit and out of band components, the shape of which has given rise to the term "shoulder", that tend to compromise the compliance with the mask limits.

Shoulders attenuation

S C A N

5.19.2	Operation

Shoulders attenuation tool is available for digital terrestrial signals.

1 Shoulder attenuation should be measured at the output of the power amplifier right before sending the signal to the antenna through the net of passive devices. Because of the power level typically available at that point it is mandatory to use external power attenuators so that the level can be adapted to the máximum accepted by the analyzer.

2 Connect the signal to be measured to the RF input.

3 Tune a digital channel in terrestrial band.

4 Press the F3 Tools key.

5 Select the **Shoulders Attenuation** option.

6 The **Shoulders Attenuation** screen shows up.

► **Screen Description**
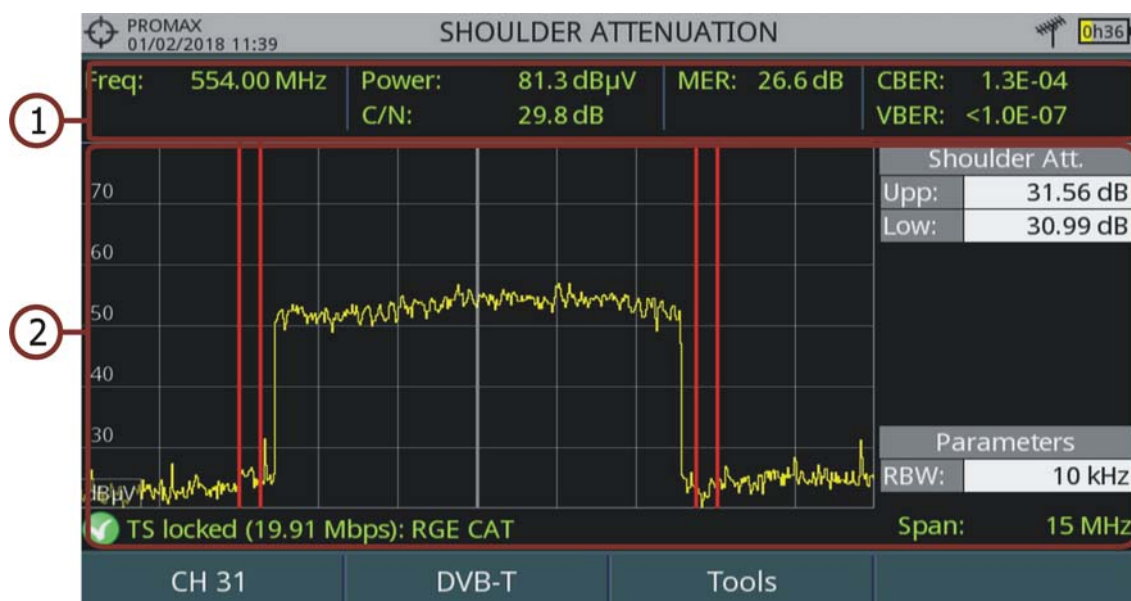
Figure 107.

1 Frequency / tuned channel; Power; C/N; MER; CBER; VBER of pilot signal.

2 Channel spectrum showing shoulder attenuation delimited by two vertical red markers. These markers delimit the area of calculation for Upper shoulder attenuation and Lower shoulder attenuation. The Parameters window shows the Resolution of the bandwidth.

5.20   Service Recording

5.20.1   Description

The Service Recording equipment records in real-time one digital service from the transport-steam received that is shown on screen. This service is saved directly on the USB flash drive memory connected to the equipment. Afterwards that record can be played on a PC with a video player.

> **Service recording**

5.20.2   Operation

The **Service Recording** tool is available for all **digital** signals.

1 Connect the signal to the equipment input.

2 Tune the channel and select the service to record.

3 Connect the adapter cable to the mini-USB port on the equipment and then connect a USB memory.

4 Press the key $\boxed{F3}$: **Tools** and select the PVR option.

5 The screen to record the service appears.

6 Start the recording by pressing the **RECORD** key ⬤.

7 End the recording by pressing the **STOP** key ⬤.

8 The recording file is saved in the PVR folder created by the equipment in the USB memory.

9 The file name is PVR plus a consecutive number and the file extension is TS.

10 The file can be played in a computer with a media player like VLC. This file cannot be played from the meter itself.

▶ **Screen Description**

Figure 108.

1 Installation selected; date and time.

2 Icons from left to right: recording; USB connected; selected band; battery level.

3 Recording Service.

4 Memory device where service is recorded: internal memory or USB

5 Window with some information about recorded files such as name, size and created date. It only shows files inside the memory device selected (internal memory or USB).

6 Size of recording file and time duration.

7 Window with information about the service being recorded: recording length, maximum bit rate, channel service recorded and free available memory.

8 Control keys:

- ■ 🔴 : Recording

- ■ ⏹ : Stop

9 Softkeys.

■ Cursor functions:
   • Cursor left/right: Navigation between the control keys.

5.20.3 **Menu Options**

At the bottom there are the function keys. They are.

- ■ [F1] Exit: Exits this function. If exits when it is recording it does not stop the recording. To stop press stop key.

- ■ [F2] Delete file: It deletes files selected on the recording files window (after a warning message).

- ■ [F3] Export to USB: It copies files selected to the USB.

- ■ [F4] Advanced: It allows user to select between record on internal memory or on USB.

5.21 **Tilt**

5.21.1 **Description**

The Tilt function displays on-screen, graphically and numerically, the difference in level between any four carriers. This function works for upstream and downstream band. **Tilt** is the difference in amplitudes between the minimum and maximum frequency that the system can compensate.

Typically, CATV networks transmit two pilot signals at the beginning and at the end of the band. These signals are the ones that can be tuned simultaneously on the screen. By this way you can evaluate the losses slope and therefore readjust equalizers of the amplifiers in order to compensate these losses and ensure a flat response along the band.

5.21.2 Operation

Tilt function is available for DVB-C and DVB-C2 signals.

1 Connect signal to input and check in Settings the source signal is RF and band is terrestrial.

2 Press F3: **Tools** and select Tilt & Scan option. Then select Tilt option.

3 Tilt function opens.

4 Enter two pilot frequencies at the start of the band (freq 1 and freq 2) and two pilot frequencies at the end of the band (freq 3 and freq 4).

5 Tilt appears on screen graphically and numerically.

6 Press Exit to quit this function.

▶ **Screen Description**
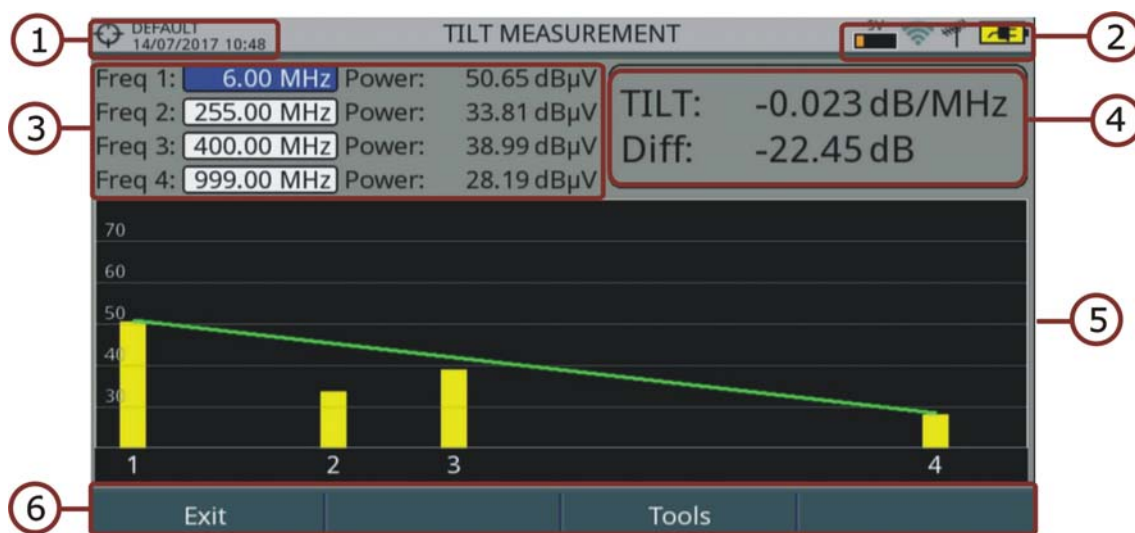
Figure 109.

1 Selected installation; date and time.

2 Icon area.

3 Pilot frequencies 1 to 4 and power level of each one. These frequencies can be selected by the user.

4 TILT value in dB/MHz and difference between pilot frequency 1 and pilot frequency 4 in dB.

5 Graphic bar for each frequency pilot power and resulting TILT.

6 Softkeys.

- F1: Exits function.
- F3: Access other tools.

■ Cursor functions:
- Cursor up/down: Change of pilot frequency.

5.22 Scan

5.22.1 Description

The Scan function shows on screen the signal level in a graph bar for each one of the channels in the channel plan.

5.22.2 Operation

The **Scan** function is available for all DVB-C and DVB-C2 signals.

1 Connect signal to input and check in Settings the source signal is RF and band is terrestrial.

2 Press [F3]: **Tools** and select Tilt & Scan option. Then select Scan option.

3 Scan function opens.

► **Screen Description**
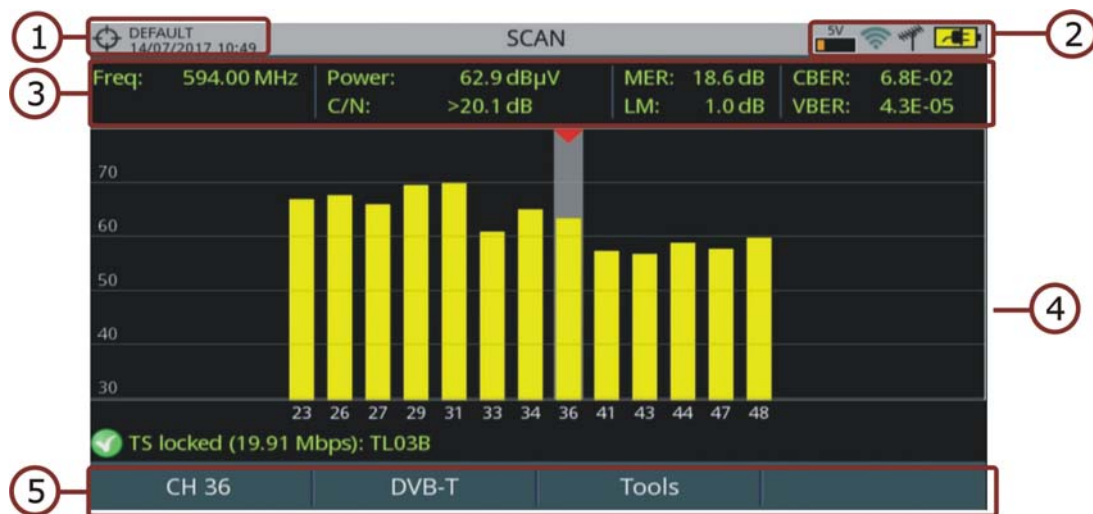
Figure 110.

1 Selected installation; date and time.

2 Icon area.

3 Frequency and measurement for the selected channel.

4 Graphic bar of power for each channel in the selected channel plan. The shadow area with a red arrowhead shows the selected channel. The system tries to show all channels with no one reaching the reference level.

5 Softkeys.

- •F1: Change of channel, channel plan or tune.
- •F2: Parameters for the tuned signal.
- •F3: Access tools.

■ Cursor functions:
- •Cursor left/right: Change channel.

5.23   Streaming V/A

5.23.1   Description

The Streaming V/A function broadcasts video/audio from the meter to a PC using a data network.

5.23.2   Operation

The Streaming V/A function is available for all digital signals.

▶ Settings

1 Press "Installation management" key (F key) for one second to access the "Preferences" settings.

2 Go to "Streaming V/A" tab and set streaming parameters:

- IP Address: It is the IP address of the computer where we are going to broadcast in streaming from the meter.
- Port: Computer broadcasting IP port.

3 Once done, press F2 to save changes and F3 to quit "Preferences".

▶ Operation

1 Tune channel and service to broadcast in streaming.

2 Connect the Ethernet cable to meter using the IP CTRL port.

3 Press key F3: Tools.

4 Select Streaming V/A option. There are these options:

- •Start TS: It starts streaming the complete Transport Stream (all services).
- •Start Current Service: It starts streaming the selected service.
- •Stop: It stops streaming.

5 The icon ((O)) at the top right corner means streaming is working.

6 To watch streaming service from a computer you need a software that can play this type of service, such as VLC multimedia player (free software).

7 In VLC, open "Media" from tool bar and select "Open Network Stream".

8 In the box "Enter a network URL" enter this text **udp://@:1234** and press on "Play". "1234" is the port in the computer (see settings section). If everything is right, it will play the service on the computer screen.

9 If you are streaming the whole TS, open "Playback" from toolbar and select "Program". It will show all available TS services. Select the service to watch on screen.

10 To exit streaming, press F3: Tools, select "Streaming V/A" and then "Stop".

6 WIFI MONITORING

6.1 | Introduction

WiFi allows connectivity and communication among devices in the 2.4 GHz and 5 GHz frequency band. These bands are used by several technologies simultaneously, such as Bluetooth, Wireless USB, Zigbee (used in Domotics), cordless phones, security cameras, microwave ovens, etc. which may interfere on WiFi devices. For this reason it is necessary to have a tool that can analyze all these signals to detect problems and ensure good level in WiFi communication.

> ▶ **WiFi measurement**   S C A N

On the panel side the equipment has two functions keys which give direct access to two functions to display WiFi signal.

- MEASUREMENT 🕐 (key M): Access the "Site Survey" screen which shows all access points (AP) and its characteristic parameters.

- SPECTRUM 〽 (key S): Access the "WiFi Spectrum" screen which shows the spectrum signal over WiFi channels and detected Access Points.

6.2 | Operation

1 Connect the USB WiFi adapter (supplied) to one of the two USB ports on the device. The "Wi-Fi Configuration" window pops up and it performs a Wi-Fi scan showing all networks detected. The WiFi icon will appear at the top of the screen. Press [F1] to exit because it is not necessary to log in a WiFi network to use this tool.

2 Connect the RF omni-directional antenna (supplied) to the RF input. This antenna detects WiFi band spectrum.

3 Press "Settings" key to access Settings menu. In "Signal Source" select "WiFi".

4 Press "Settings" key again, access "Band" option and select a band from available WiFi[*] bands.

5 The first screen is the "WiFi Spectrum" screen. This screen shows spectrum and access points over channels in the selected band. This spectrum is traced

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*. 5 GHz WiFi band available as an option.

through signal coming from the RF input. So it shows any signal using this band, not only WiFi signals (for more details see next section).

6 To display Access Points information, press Measurement key ⊘ (key M). Press "Advanced" key (F4) for more details about access points (for more details see next section).

7 To display the WiFi spectrum screen again press Spectrum key 🎝 (key S).

8 To start monitoring, select tuning mode wether to tune by access point (AP) or channel (CH) using the F1 "Tuning" menu (enabled tuning mode is shown on joytstick icon). Then enter an access point or channel or navigate left / right through the access points / channels. Define the workspace using the span to focus on the desired APs.

9 To return to RF signal source press "Settings" (key C) to access the Settings menu and in "Signal Source" option select "RF".

6.3   WiFi Access Point Connect

To connect to a WiFi access point you need to log in that network. Configuration window is available when the USB WiFi adapter is connected to the device. It shows up right after is connected. It is also available as an option in "Tools" menu (key (F3)).

WiFi settings are:

- Band*: Select the WiFi frequency band where to scan networks.
- DHCP: Enable this option to get automatically the proper IP address when the unit is first connected to your network. This option works if your router has enabled the DHCP protocol. Enable the DHCP protocol for proper IP configuration. If DHCP is OFF you should enter data in next fields.
- IP Address: IP address of the meter into the local network.
- Mask: Subnet mask of the equipment (usually 255.255.255.0).
- Gateway: It allows the meter to get out from the local network (if the network does not have gateway, use 0.0.0.0).

---

*. 5 GHz WiFi Band available as an option

6.4 WiFi Spectrum

6.4.1 Description

This function shows spectrum on the WiFi band over access points and also data and measurements such as power, identification and channel bandwidth. Set the screen to clearly see each channel occupation.

With this function you can determine the occupation of each channel, how many APs share the same spectrum and activity at any point on the spectrum.

All this information help user to determine the best place to place the AP or to analyze interferences on the spectrum.

To display the WiFi spectrum screen from the WiFi tuning mode, press the Spectrum key 〰 (key S).

6.4.2 Screen Description
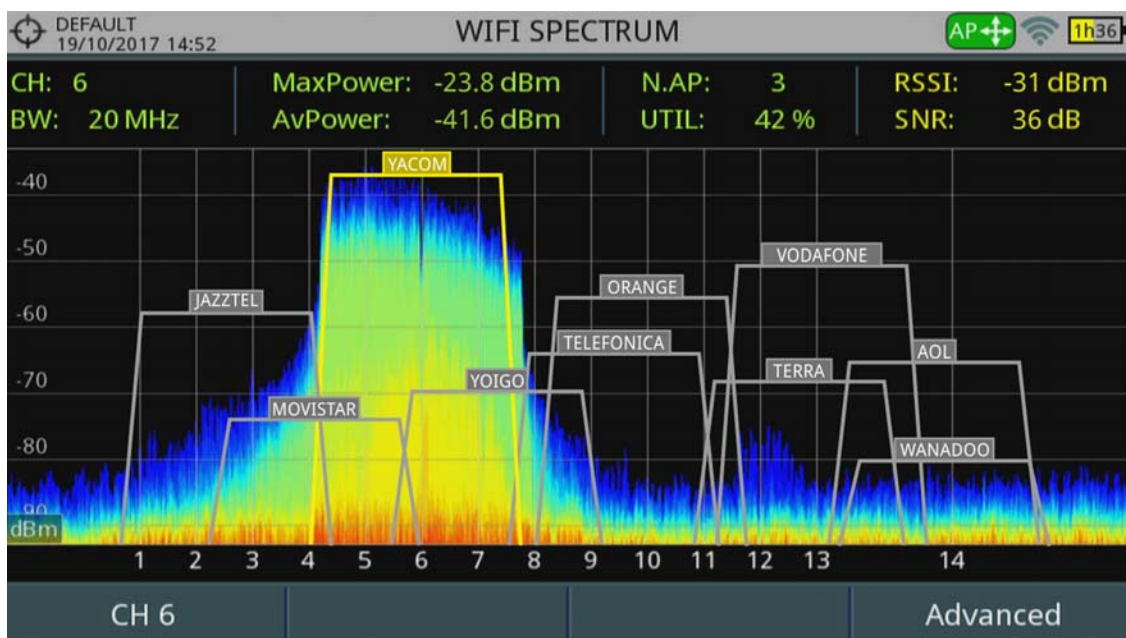
Figure 111.

1 Measurement

■ CH:

-When **tuning by Access Point** it shows the central channel for the Access Point selected. The Access Point selected is highlighted for easy identification.

-When **tuning by Channel** it shows current channel. If selected channel is the central channel of an Access Point then the AP is highlighted and shows data for that Access Point.

■ BW: It shows Access Point (AP) bandwidth. Bandwidth changes depending on the AP. Each AP can work in different bandwidths depending on standard and configuration.

■ AvPower: RMS value of power detected (dBm) in the bandwidth occupied by the AP or channel selected.

■ MaxPower: Maximum power detected (dBm) within the bandwidth occupied by the AP or channel selected.

■ N.AP: Number of access points using the same channel. This number determines if the channel is very saturated. If it is used by more than one AP there may be times with a high percentage of use.

■ UTIL (%): Percentage of channel used. It is a measurement based on how much time the channel is used. This measurement can help to decide if this channel can accept another AP.

■ RSSI (Received Signal Strength Indicator): Power measured by the dongle (USB WiFi adapter) for the selected Access Point. The dongle measures the power of a single AP and the meter measures the power of an area of the spectrum where there may be several APs. For this reason and also for using different type of antennas on each device, the power measured by the dongle and by the spectrum may not match.

■ SNR (Signal to Noise Ratio): SNR measured by the dongle (USB WiFi adapter) for the selected Access Point.

2 WiFi Spectrum

It shows WiFi channels within the WiFi band, Access Points detected and name, bandwidth and spectrum. Spectrum is drawn from the signal received by the omni-directional antenna connected to the RF input.

This screen allows you to know how busy each channel is, how many APs share spectrum, activity in each point of spectrum, etc. Spectrum not only shows WiFi signals but any signals that use this band, such as those coming from security video cameras, etc. which allows you to easily identify interferences in a network.

- Cursor functions:
  - •Enter: It changes mode.
    - -In tuning by Access Point: (-> AP -> SP ->).
    - -In tuning by Channel: (-> CH -> SP ->).
  - •Cursor left/right:
    - -In AP mode: It changes Access Point.
    - -In CH mode: It changes WiFi channel.
    - -In SP mode: It changes span.
  - •Cursor up/down: It changes reference level.

6.4.3   Menu Options

► **Tuning Menu** F1

Press F1 to access this menu. It has some options to tune a channel or an access point. Tuning menu has these options:

- Channel / Access Point: It allows you to select the channel / access point to tune (tuning selection on "tuny by" option). After pressing it shows available channels / access point to select.

- Channel Plan: This option allows the user to select a channel plan from the ones available for the current installation. It is necessary a Channel Plan to work on WiFi band. Load a WiFi channel plan if your installation does not have any (WIFI_2_4GHZ is available by default).

- Tune by: It allows the user to select between tuning by channel or tuning by access point.
  -Tuning by channel: It allows you to select a channel or jump from channel to channel by pressing left / right. When the channel corresponds to an Access Point central channel, the AP highlights and shows some information on screen (RSSI and SNR).
  -Tuning by AP: It allows you to select a AP or jump from AP to AP by pressing left / right. The selected AP highlights and shows some information on screen (RSSI and SNR).

- Reference Level: It allows you to edit the reference level. The reference level is the power range represented on the vertical axis. Reference level can also be change using cursor up/down.

- Span: It allows you to edit the span, which is the frequency range displayed on screen. Span can also be change using cursor left/right in SP mode.

- Center Tuned Frequency: When selecting this option, the channel / Access Point tuned (where the main cursor is pointing) is placed at center of the screen. This option does not work with FULL span.

► Advanced Menu F4

Press F4 to access this menu. It has some options to display the spectrum.

- **Persistence samples:** It allows you to set retentive depth of spectrum. This option helps to identify level of channel usage by non-wireless signals such as those generated by microwave ovens or some wireless video cameras. The more presence of this type of signals in the channel, the brighter the spectrum will appear on screen.

- **Resolution Bandwidth:** Resolution filters available are: 10 kHz, 20 kHz, 30 kHz, 40 kHz, 100 kHz, 200 kHz and 1000 kHz. According to the filter being selected, that maximum and minimum span allowed is modified.

- **Vertical Range:** It allows you to adjust vertical range on screen. Available values are 1, 2, 5 and 10 dB per division.

6.5 Site Survey

6.5.1 Description

This function shows a chart listing all Access Points detected and its main parameters.

To display the Site Survey screen from the WiFi tuning mode, press the Measurement key ⊙ (key M).

To display a detailed report about a selected Access Point, select one and press F4: Advanced \ View all parameters.

6.5.2   Screen Description

► **Access Points at Site Survey**

Figure 112.

- ■ SSID (Service Set ID): Access Point Name.

- ■ BSS (Basic Service Set ID): MAC of Access Point.

- ■ CH: Central Channel of Access Point.

- ■ RSSI: Power (in dBm) of AP received. This power is measured by the USB WiFi adapter.

- ■ Security: Type of security to access the Access Point.

- ■ Device: Name of device's manufacturer that provides infrastructure. Not always available.

- ■ Cursor functions:
  - •Up / down: It changes Access Point.

► Access Point Report

Figure 113.

■ Cursor functions:
  •Up / down: It scrolls along the report.

6.5.3 Menu Options

► From Site Survey screen:

■ Advanced Menu [F4].
  •View all parameters: It shows a detailed report about the access point selected.

► From Access Point Report screen:

■ Exit [F1]: Returns to the previous screen.

■ Options [F2].
  •Copy to USB: If you insert a USB memory into a USB port you can copy the Access point report.

■ Page Up / Page Down ([F3] / [F4]): It scrolls through the report.

7 IPTV*

7.1 Introduction

IPTV stands for TV over IP networks. It actually means TV over any type of IP packet based distribution network. They can be referred to as LAN (Local Area Network), ethernet, computer networks, etc. With the growth of LAN based TV distribution systems, having an IPTV input in your field strength meter becomes a handy feature.

The equipment allows you to receive television programmes coming from IPTV networks. The multicast IPTV stream should carry MPTS or SPTS in order to be analyzed and decoded. It is also able to work with networks where there are redundant SPTS multicast streams with the same IP but different source. The meter is also compatible with M3U files, which allows to load a service list from an external file.

Those programmes can be displayed on the screen together with other important service information.Although some concepts are similar, signal quality assessment metrics is not the same in IPTV as it is in digital TV over RF. The equipment offers you the measurements you need to understand, identify and correct the new problems that can be found in this new type of television distribution networks.

▶ **IPTV analyzer**   S C A N

7.2 Operation

1 Connect the IPTV input/output signal to the equipment through the Ethernet IPTV connector.

2 In "Preferences" ▱ (key F) (press for one second), tab "IPTV" set parameters to log your meter into the network (for more details see "Settings" section next).

3 In "Settings" ⚙ menu (key C), option "Signal source" select IPTV. The IPTV icon ⌁ will appear at the screen corner.

4 Press the F1 Multicast. Set the Multicast address and port. The equipment automatically detects if it is UDP or RTP protocol (for more details see next).

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*. only available for PROWATCH Neo 2.

5 Now image should appear on screen.

6 Access Measurement, Spectrum or TV mode by pressing the corresponding key (S, T or M) to view different measurement data and image (see next section for more details). Press again to display the next view.

7.3 Screen Description

7.3.1 Measurement Mode
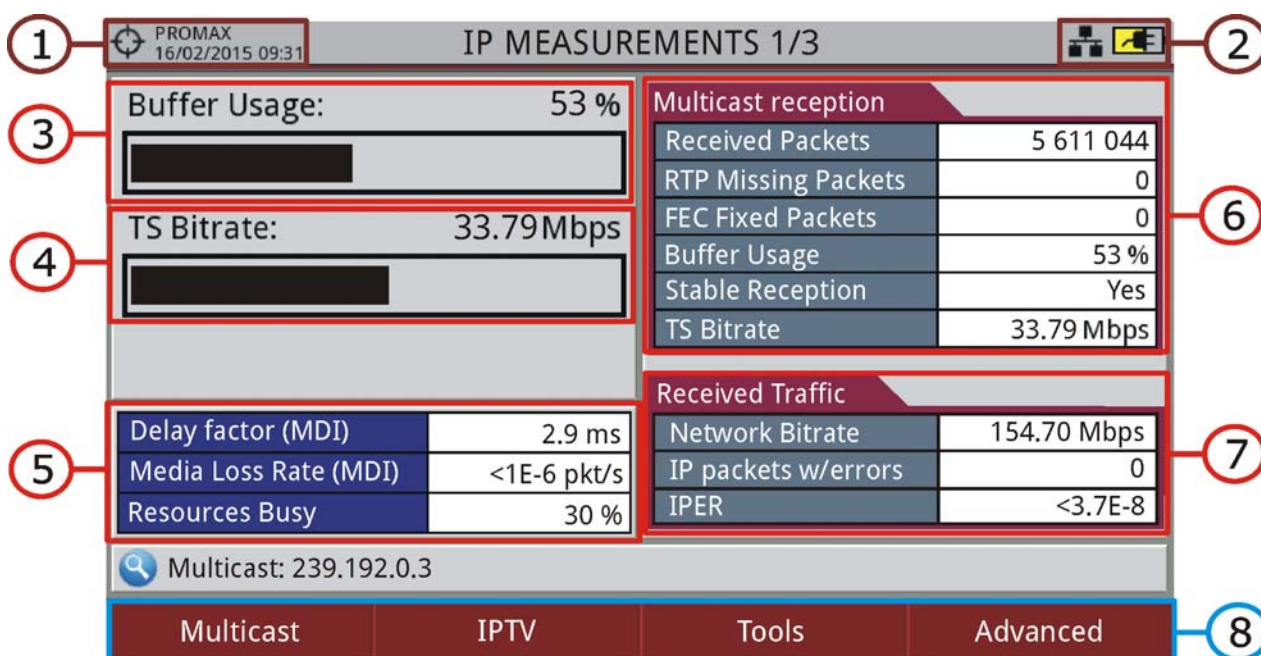
Figure 114.

1 Selected installation; date and time.

2 IPTV mode enabled; battery level.

3 Graphic bar "Buffer Usage" showing the internal multicast stream buffer usage.

4 Graphic bar "TS Bitrate" showing the recovered TS bitrate.

5 Measurements on data network:

- Delay Factor (MDI - Media Delivered Index): Maximum time that one multicast packet stream is within the receiving buffer of the equipment (measurement done over the last second of data received) (recommended value < 100 ms).

- Media Loss Rate (MDI): Ratio of lost packets to received packets in one multicast stream (only for RTP protocol after FEC) (recommended value < 0.005 pkt/s).

- Resources Busy: Resources busy shows the "%" of equipment resources used for handling current IP traffic. Arriving at 100%, means the receiver can't handle all packets related to data and IP protocols other than Multicast stream. In that situation, data loss may happen.

6 Measurement on the multicast reception: received packets, RTP missing packets, FEC fixed packets, buffer usage, stable reception and TS bitrate (if TS input has many variations in packet reception a stable packet rate cannot be established).

7 Measurements over all traffic data in the network: network bitrate, IP packets with errors and IPER (IP Packet Error Ratio; ratio of Ethernet packets with errors to Ethernet packets received).

8 Softkey menus (see "Settings" section for more details).

PROMAX 16/02/2015 09:31	IP MEASUREMENTS 2/3	
La 1 HD	**Multicast reception**	
	Received Packets	5 611 044
	RTP Missing Packets	0
	FEC Fixed Packets	0
	Buffer Usage	53 %
	Stable Reception	Yes
	TS Bitrate	33.79 Mbps
Delay factor (MDI)	2.9 ms	**Received Traffic**
Media Loss Rate (MDI)	<1E-6 pkt/s	Network Bitrate	154.70 Mbps
Resources Busy	30 %	IP packets w/errors	0
	IPER	<3.7E-8

Multicast	IPTV	Tools	Advanced
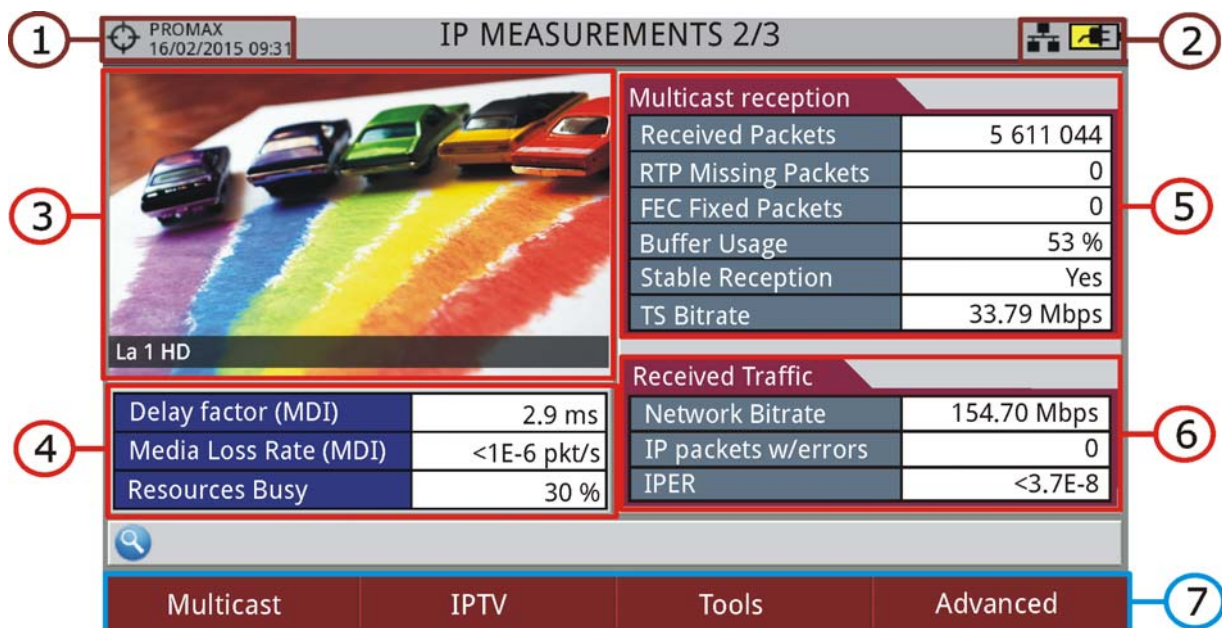
Figure 115.

1 Selected installation; date and time.

2 IPTV mode enabled; battery level.

3 Image of the tuned signal.

4 Measurements on the data network: Delay Factor, Media Loss Rate and Resources busy (see previous section for more details).

5 Measurement on the multicast reception: received packets, RTP missing packets, FEC fixed packets, buffer usage, stable reception and TS bitrate (if TS input has many variations in packet reception a stable packet rate cannot be established).

6 Measurements over all traffic data in the network: network bitrate, IP packets with errors and IPER (IP Packet Error Ratio; ratio of Ethernet packets with errors to Ethernet packets received).

7 Softkey menus (see "Settings" section for more details).

DEFAULT 14/01/2013 17:25	IP MEASUREMENTS 3/3	CH 2h57

IP Parameters

Ethernet Speed:	------
IGMP Version:	------
Multicast Address:	------
Protocol:	------
FEC Status:	------
FEC Rows(D):	------
FEC Columns(L):	------
TS Packets/IP Frame:	------

Multicast Reception

Received Packets	0
RTP Missing Packets	0
FEC Fixed Packets	0
Buffer Usage	0 %
Stable Reception	No
TS Bitrate	0.00 Mbps

Received Traffic

Network Bitrate	0.00 Mbps
IP packets w/errors	0
IPER	<1.0E-6

Multicast: 239.192.0.1 (0 bps)

Multicast	IPTV	Tools	Advanced

Figure 116.

1 Selected installation; date and time.

2 IPTV mode enabled; battery level.

3 Internet parameters: Ethernet speed, IGMP protocol version, multicast server address, detected communication protocol (UDP/RTP), forward error correction (FEC) status, FEC rows, FEC columns and TS packets / IP frame.

4 Measurement on the multicast reception: received packets, RTP missing packets, FEC fixed packets, buffer usage, TS locked/unlocked and TS bitrate.

5 Measurements over all traffic data in the network: network bitrate, IP packets with errors and IPER (IP Packet Error Ratio; ratio of Ethernet packets with errors to Ethernet packets received).

6 Softkey menus (see "Settings" section for more details).

7.3.2   **Interarrival Packet Time / Packet Rate Over Time**

IPTV view in Spectrum Analyzer mode shows the "Interarrival packet time" or "Packet Rate Over Time" screen. To switch between these two options press F3: Tools and select on IPTV Graph submenu.
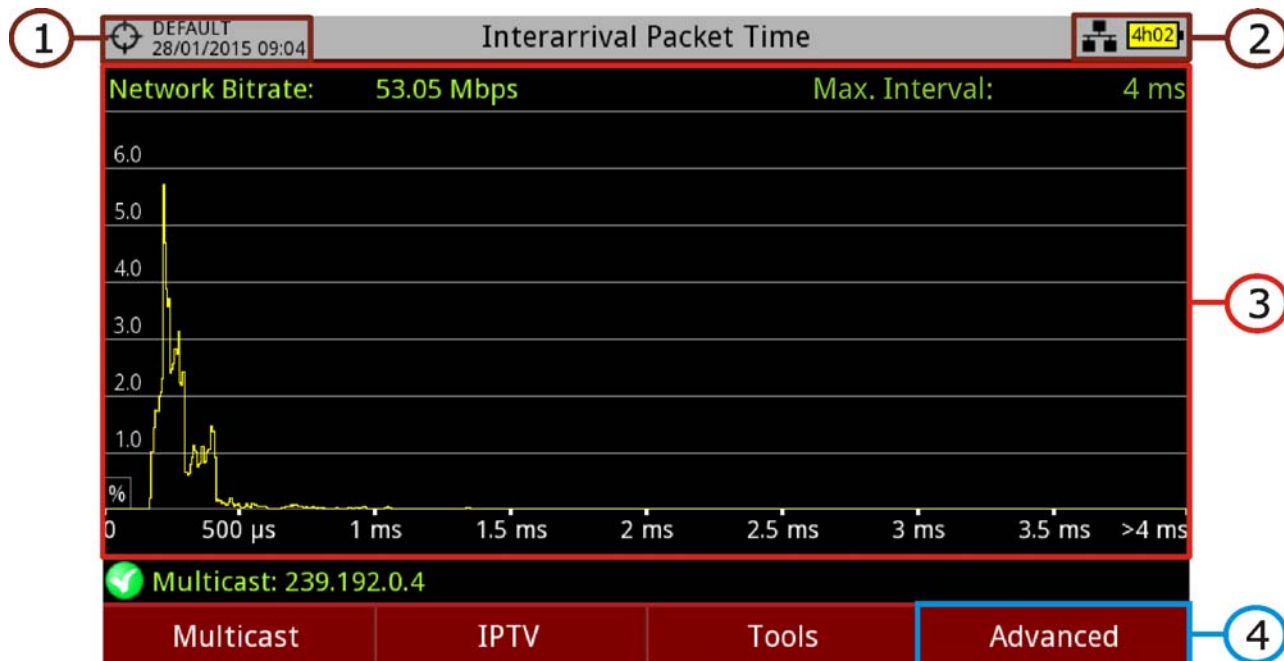
Figure 117. Interarrival Packet Time

Figure 118. Packet Rate Over Time

1 Selected installation; date and time.

2 IPTV mode enabled; battery level.

3

- **Interarrival packet time**: It shows the IP packet percentage as a function of time between packets. Its purpose is check for reception packet continuity, for the selected stream. Usually, the graph should concentrate around small time values. Spreading through the time axis may point to a network problem. Maximum interval measure shows the maximum time detected between consecutive IP packets.

- **Packet Rate Over Time**: This graph shows the number of IP packets being received from the current streaming over time.

4 Advanced.

- For **Interarrival Packet Time** allows to change span (4, 8, 40, 200, 400 and 1920 ms) or restart analysis.

- For **Packet Rate Over Time** allows change resolution (1, 5, 10, 50, 200 and 1000 ms) or restart analysis.

7.3.3 TV Mode
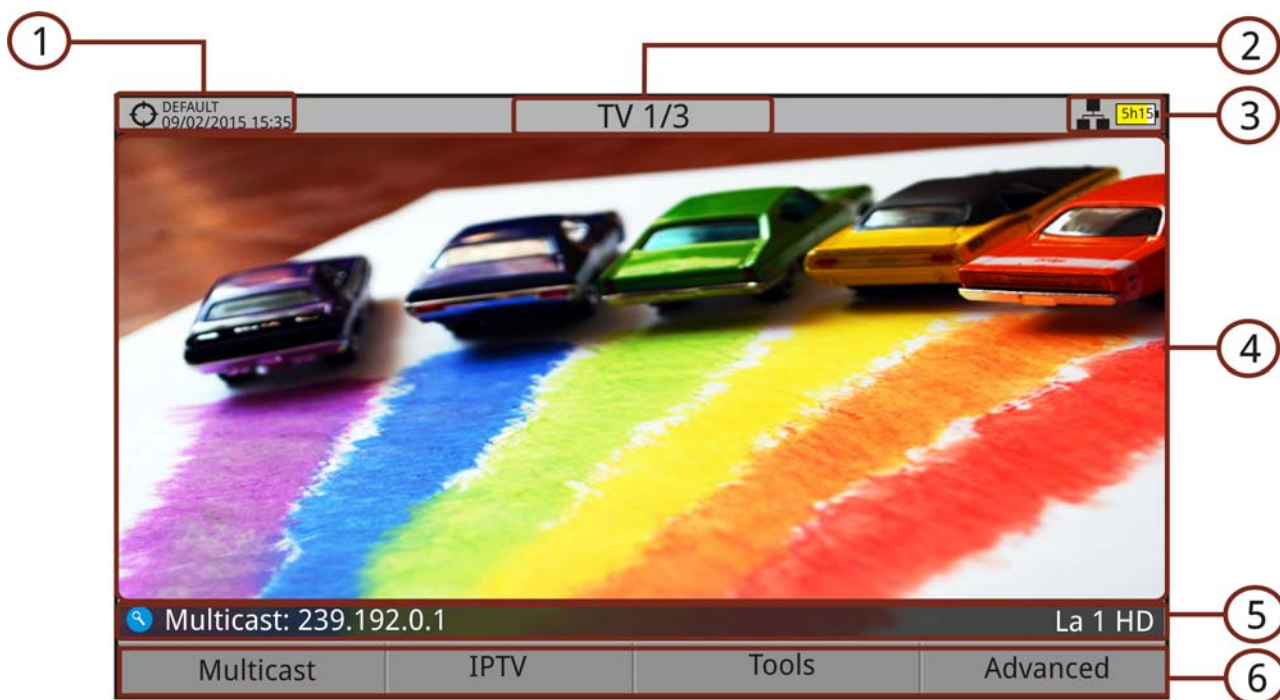
Figure 119. IP TV 1/3

1 Selected installation; date and time.

2 Number of view/total views.

3 IPTV mode enabled, battery level.

4 Tuned service image.

5 Multicast IP address and name of the selected service.

6 Softkeys menus (see "Settings" section for more details).
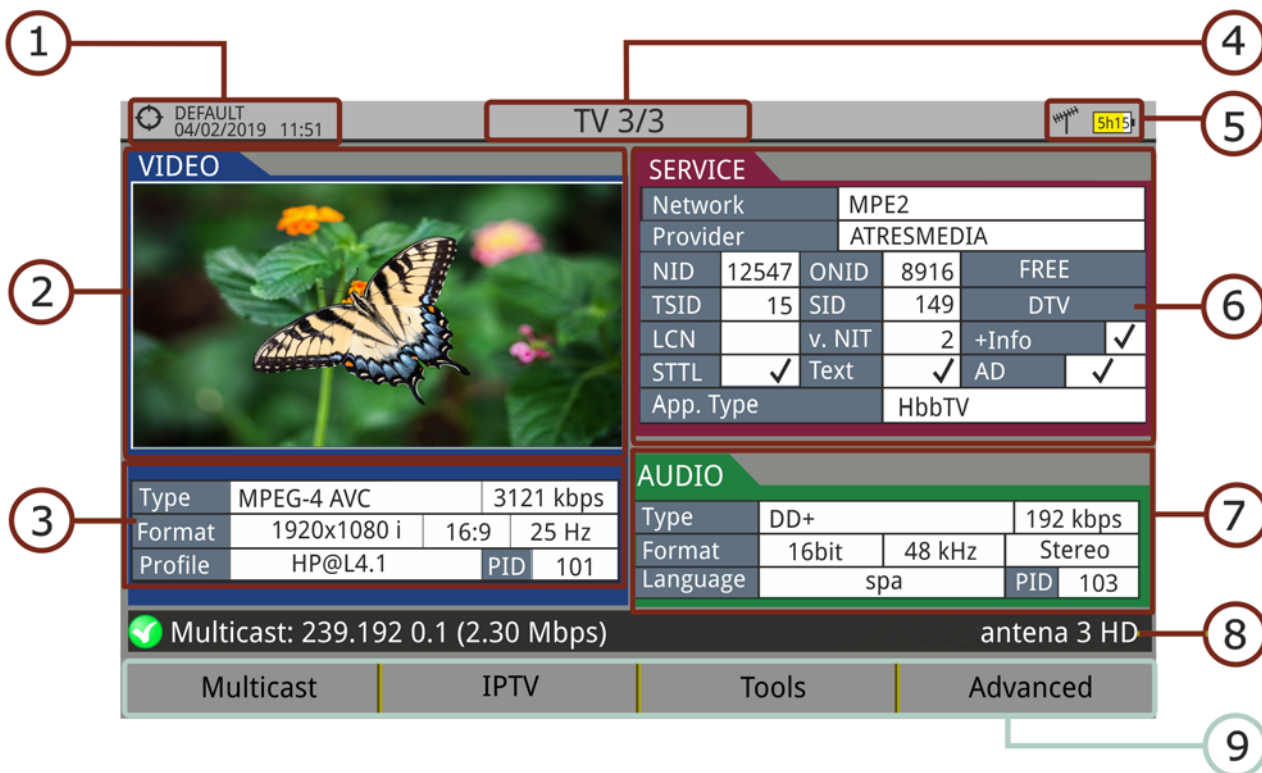
Figure 120.

1 Selected installation; date and time.

2 Tuned service image.

3 Tuned service information.

  ■ TYPE: Encoding type and video transmission rate.

  ■ FORMAT: Resolution (horizontal x vertical), aspect ratio and frequency.

  ■ PROFILE: Profile level.

  ■ PID: Video program identifier.

4 Number of view/total views.

5 IPTV mode enabled; battery level.

6 Tuned service information.

  ■ NETWORK: Television distribution network.

  ■ PROVIDER: Program provider name.

  ■ NID: Network identifier where the signal is distributed.

  ■ ONID: Identifier of the original network where the signal originates.

  ■ TSID: Transport stream identifier.

  ■ SID: Service Identifier.

- App. Type: Type of detected interactive service such as HbbTV, MHP and MHEG-5. It also shows the URL related to the interactive service.

- LCN: Logic Channel Number. It is the first logic number assigned to the first channel in the receiver.

- +Info: Additional service information.

- v. NIT: Network Information Table (NIT) version.

- FREE/SCRAMBLED: Free/scrambled transmission.

- DTV/DS: Standard type of transmission.

- STTL: Subtitles available.

- Text: Teletext available.

- AD: Audio description available (for visually impaired).

7 Tuned audio information.

- TYPE: Type of audio encoding and transmission speed.

- FORMAT: Service audio format. Bit depth; sampling frequency; sound reproduction.

- LANGUAGE: Broadcasting language.

- PID: ID of the audio program.

8 Multicast IP address and name of the selected service.

9 Softkeys menu (for more details refer to "Settings" on page 189).

7.4 Tools

Press F3 : Tools to access tools for IPTV mode.

The **IP Ethernet Frame Viewer**, **Ping and delay measurements** and **View IP Network log** are specific tools for IPTV. The other tools (TS Analyzer, TS Recording, Service Recording, Streaming V/A, Network Delay and Task Planner) are generic and its explanation and operation can be found in "TOOLS" on page 87.

7.4.1   PING/TRACE

The PING tool is a diagnostic tool about the network. To use it follow these steps:

1 Set parameters for the PING/TRACE test. Press on [F4]: Advanced. Options are:

■ Mode: Select between
 •PING: It confirms if a given unit can get any response from another machine in the same network.
 •TRACE: It shows all IP servers between the meter and the IP address measuring transit delays of packets across the network.
 •Avg Packet Delay / IPDV: It shows delay between two points in the network and changes in this delay.

■ Pings for each IP (only for PING tool): Number of times to repeat the ping test. If "Forever" is selected, it can be stopped with "Cancel" or "Exit".

■ Ping range (only for PING tool): Range of addresses to apply the ping test. It adds the number selected to the original IP address.

2 Click on IP Address and enter the IP address of the remote machine you want to check its communication. It works for both local network or external network.

3 Press [F2]: Start. The equipment starts sending data packets to the IP address of the remote machine.

PROMAX 07/01/2016 11:26	TV 1/3		2h48

PING/TRACE TOOL

IP Address: 8.8.8.8

Gateway: 10.0.1.1; Mask: 255.255.255.0
Pinging 8.8.8.8 with 16 bytes of data:
Reply from 8.8.8.8 (Bytes=16): < 387 ms TTL=46
Reply from 8.8.8.8 (Bytes=16): < 584 ms TTL=46
Reply from 8.8.8.8 (Bytes=16): < 491 ms TTL=46
Reply from 8.8.8.8 (Bytes=16): < 491 ms TTL=46
All pings done

🔍 Multicast: 239.192.0.1   ----------

Exit	Start		Advanced
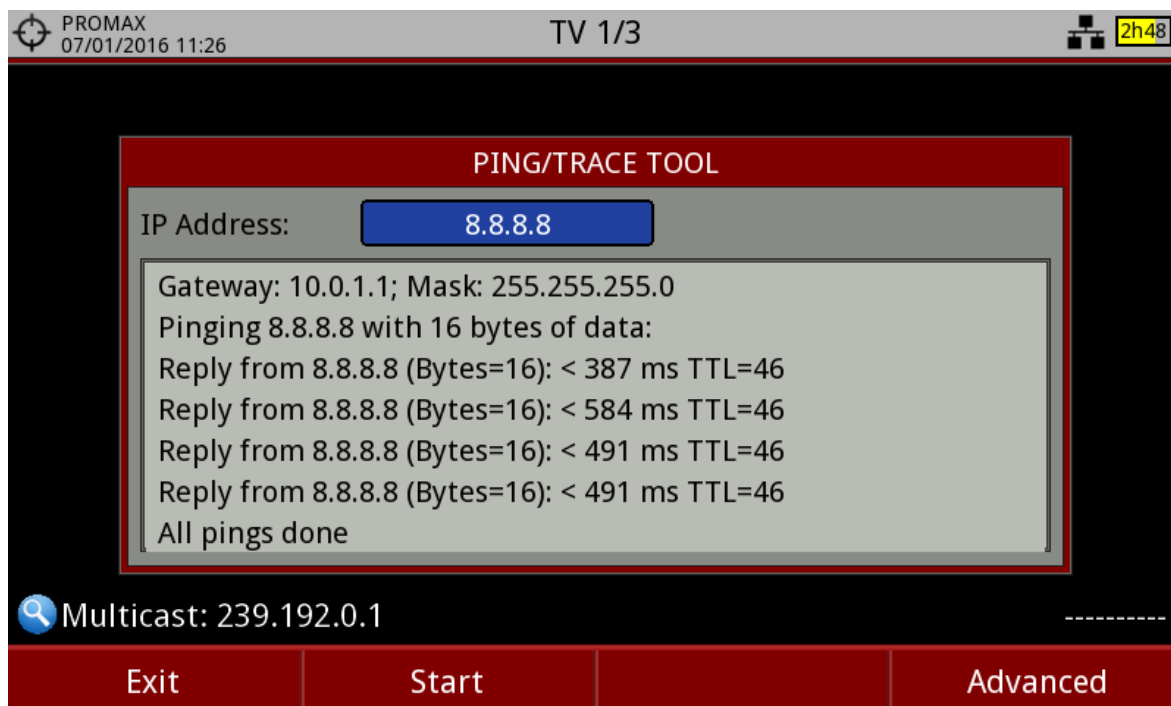
Figure 121.

4 If it gets response, on screen appears the message "Reply from" with the response IP address, number of bytes received, time of response, TTL (time-to-live) or average IPTD (average IP Packet Transfer Delay) and IPDV (IP Packet Delay Variation).

5 To exit press [F1]: **Exit**.

7.4.2 View IP Network Log

This function shows a log with network events about protocols IGMP, PING, ARP, DHCP and also Ethernet link detection. Data shown is date, hour and event description.

PROMAX 07/01/2016 11:30	IP MEASUREMENTS 1/3	2h45

	IP Network Log (Event1/67)	
Date	**Event description**	
07/01/2016 10:21:02	Assigned new host IP: 10.0.1.93	
07/01/2016 10:21:02	Network Mask: 255.255.255.0	
07/01/2016 10:21:02	IGMP has been disabled	
07/01/2016 10:21:47	Ethernet link down.	
07/01/2016 11:25:28	Ethernet link up.	
07/01/2016 11:25:33	ARP request sent to 10.0.1.1	
07/01/2016 11:2	Options	from 10.0.1.1
07/01/2016 11:2	Export to USB	to 8.8.8.8 with TTL=64
07/01/2016 11:2	Clear IP Network Log	from 8.8.8.8

Exit	Options	Page Up	Page Down

Figure 122.

■ [F2] Options: The log can be exported to an USB flash memory or be cleared.

7.4.3 IP Ethernet Frame Viewer

This function only works for **Multicast streaming**.
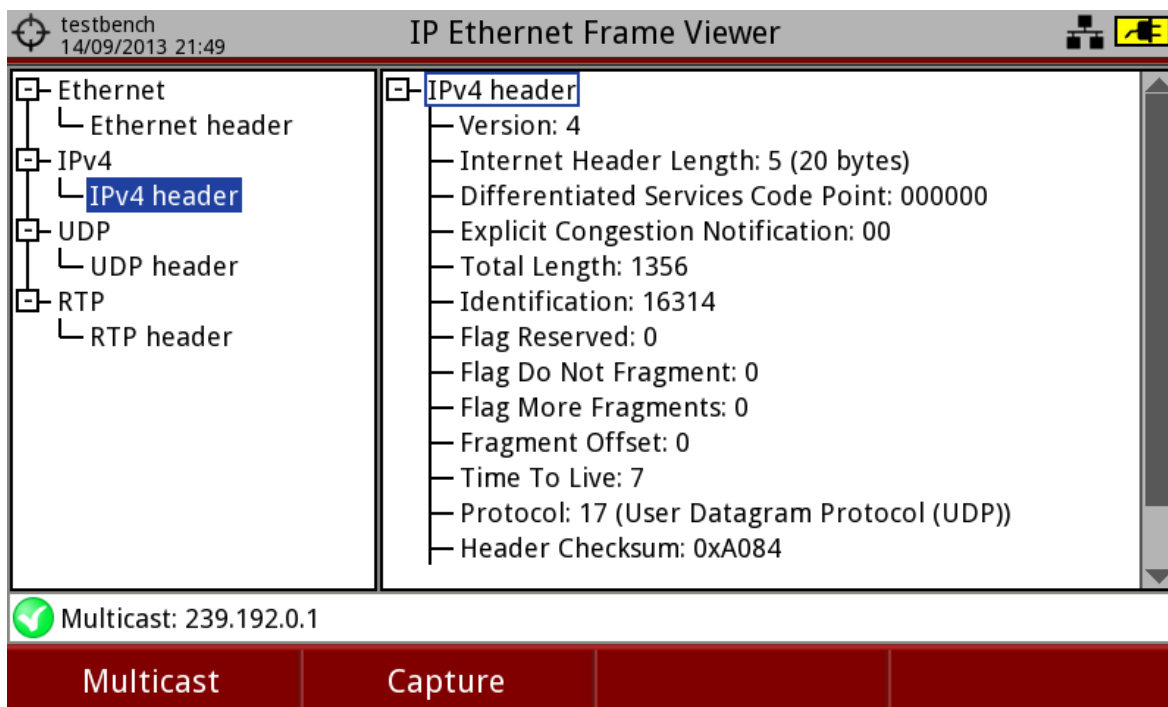
Figure 123.

- ▪ ⌴F1⌴ Multicast: It allows user to change multicast address.

- ▪ ⌴F2⌴ Capture: The system captures an Ethernet packet that belongs to the multicast stream been received. Information of this packet is shown as a tree that can be deployed to show header data of each protocol available (Ethernet, IPv4, UDP and RTP).

7.5   Settings

7.5.1   Sofkey Menus

▶ ⌴F1⌴: Multicast

The IPTV tuning options are on ⌴F1⌴: Multicast. These options are available to receive a multicast signal. Multicast is an open broadcasting over IP in which the device only takes data packets with a specific address.

For multicast distribution, options are:

- ▪ Multicast Address: Multicast address at which the equipment is subscribed to receive a multicast transmission.

- **Port:** It allows the user to select the port (protocol is automatically detected by the meter).

- **Recent Multicast Addresses:** It shows a list of multicast addresses recently used.

- **Discovered Multicast Addresses:** It discovers and shows all multicast streams into the network. It shows a complete list including IP addresses and bitrates for each stream.

- **IGMPv3 Server Sources:** Multicast IP servers validated by the user to receive multicast streams (only for IGMPv3 protocol; select IGMP version protocol in "Preferences").

▶ [F2] IPTV

It displays a list of IP Parameters: ethernet speed, IGMP version, multicast address, protocol, FEC status and TS packets/IP frame.

▶ [F3] Tools

It access tools for IPTV mode. The **IP Ethernet Frame Viewer**, **Ping and delay measurements** and **View IP Network log** are specific tools for IPTV. The other tools (TS Analyzer, TS Recording, Service Recording, Streaming V/A, Network Delay and Task Planner) are generic and its explanation and operation can be found in "TOOLS" on page 87.

▶ [F4] Advanced

There is an option to reset IP measurements on IP Measurements Mode or options to select audio track, URLs and TS Data on TV mode.

7.5.2 General Settings and Preferences

▶ **Preferences**

To access Preferences press the 🗁 key for 1 second. Go to the IPTV tab to fill out options to log in a data network. This is necessary to receive IPTV signal.

Network parameters are:

- **MAC:** Physical address of the equipment. It is unique and cannot be edited.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network. That feature contributes to make things easier to installers when debugging network access. Enable the DHCP protocol for proper IP configuration.

- IP Address: IP Address of the equipment into the local network.

- Mask: Subnet mask of the equipment (by default 255.255.255.0).

- Gateway: It allows the meter to get out from the local network when using PING or TRACE (if the network does not have gateway, use 0.0.0.0).

- IGMP Version: Protocol for multicast transmissions used by the router. Available versions are 1, 2 and 3 (by default it is disabled - Off).
  - IGMPv1: IGMP version 1. Each time user selects a multicast address, meter asks for the new multicast stream.
  - IGMPv2: IGMP version 2. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one.
  - IGMPv3: IGMP version 3. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one, from the servers approved by the user.
  - Off: Meter does not send any IGMP messages and discards the received ones.

► **General Settings**

When pressing the settings ⚙ (key C) it shows IPTV settings:

- Signal Source: It allows the user to select the signal coming into the equipment. Select IPTV.

- Decoder TS Input: It allows the user to select the transport stream coming into the equipment among RF demodulator, IPTV input and ASI input. If you want to save the transport stream received by the IPTV, select the IPTV input.

- ASI Output: It allows the user to select the way out for TS-ASI packets. User can select among Off, IPTV and ASI Input. This transport stream received by the equipment can feed the signal to other devices as well. If you want to send to the output the transport stream from the IPTV signal, select IPTV. In the case of IPTV option the TS-ASI packets go out through the IPTV connector.

7.5.3 M3U file import

M3U are files that contain a list of services available on streaming. To load one of these files on your meter follow these steps:

1 Copy your M3U file on a pendrive.

2 Access or create a new installation and press the F4 key: "Import from USB". Select your M3U file.

3 Once loaded, press F1 and it will appear an option to load the M3U file. Select it and it will show a list with all available services, alike services on TV mode.

8 OTT

8.1   Introduction

OTT or Over The Top refers to video, audio and other media services delivered directly to the user over the Internet, for Video on Demand or Live broadcasting. There are different standards being used to deliver OTT services. MPEG-DASH and HLS are the most popular. All OTT protocols address the fundamental problem of poor viewer tolerance to disruption or buffering during video play out caused by the naturally changing network conditions of the Internet

To solve these problems, the OTT servers provide the same audio / video fragments in different resolutions and bitrates so the user can select one or the other depending on the network conditions. This helps to decrease the annoying effect of buffering.

To know server's availability is important, so the client media player can select the right quality at a certain time. This information is contained in the HLS MANIFEST file or in the MPEG-DASH MPD file (Media Presentation Description). The meter can retrieve and display the information of these files and download the selected content by segments and also it shows the download bitrate in a graph.

OTT operation and analysis   SCAN

8.2   Operation

1 Connect the OTT signal to the meter through the IP CTRL port.

2 Press "Settings" ⚙ (key C), and select OTT on "Signal Source".

3 First screen OTT 1/2 shows the log with some system messages. Press again on ⊙ (key M) to switch to screen OTT 2/2. This screen shows segments loading in sequence.

4 Press URL F1 . It shows a list of available URL. Select one URL. It also allows the user to import a URL file from a USB pendrive by pressing F2 "Import from USB" (see next section).

5 The equipment downloads the file (MANIFEST or MPD) from the URL. This file should contain a description of all content available on the server.

6 The equipment validates the description file and shows basic information about the description file (type and profile). If there is any problem while downloading it will show a message on screen.

7 Then the equipment selects one available stream and shows it on "Representation". OTT 1/2 screen shows detailed information about the selected stream. OTT 2/2 shows the sequence of segment requests and result (OK, failed). To view the OTT segment download bitrate in a graph press 𝅘.

8.3   Screen Description

8.3.1   OTT Mode
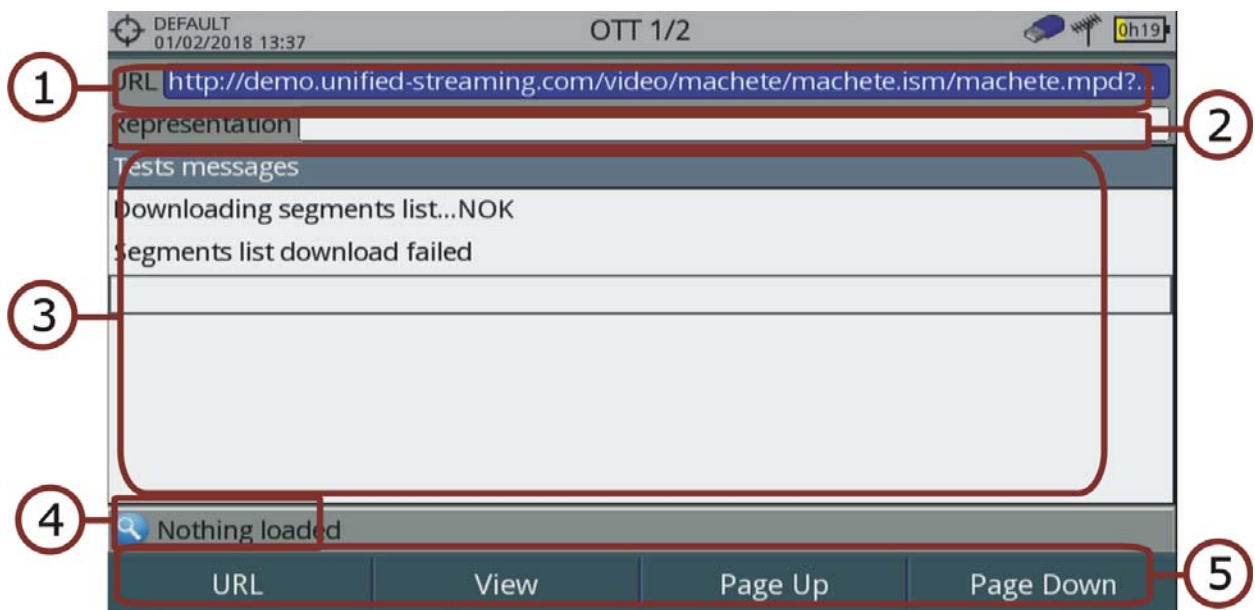
Figure 124.

1 URL selected.

2 Representation selected (resolution and profile).

3 System messages log.

4 Standard status.

5 Softkeys menus (see next section for more details).

■ Cursor functions:
   • Up/down: It scrolls screen up and down.
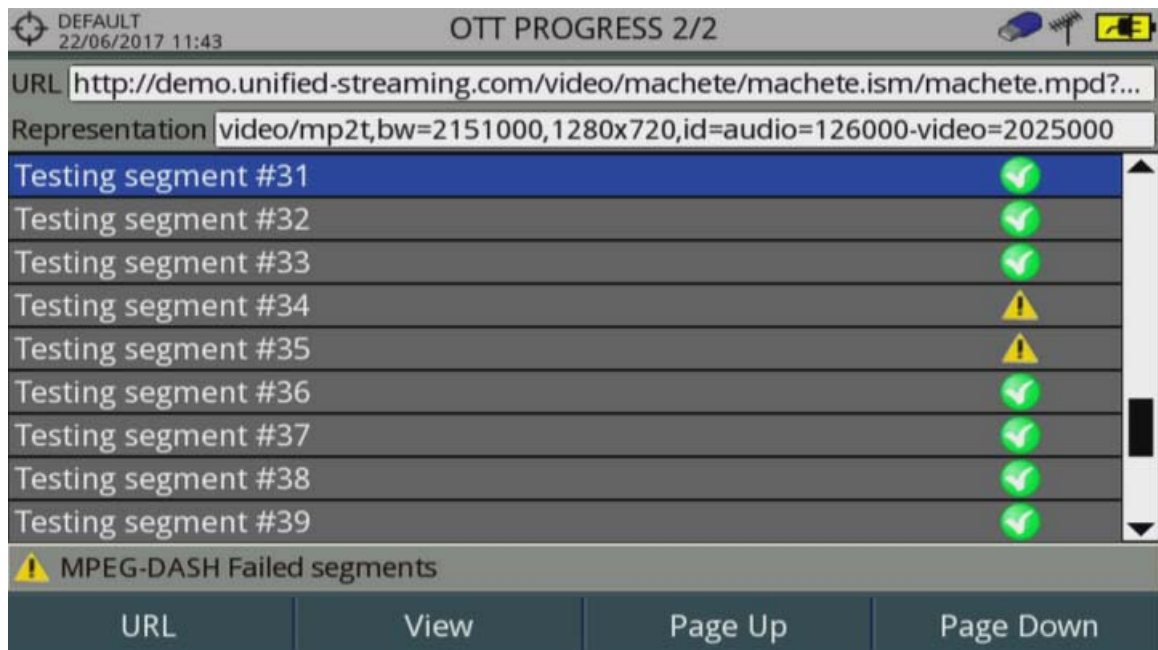
Figure 125. Log for Segment request and status

8.3.2   OTT Segment Bitrate
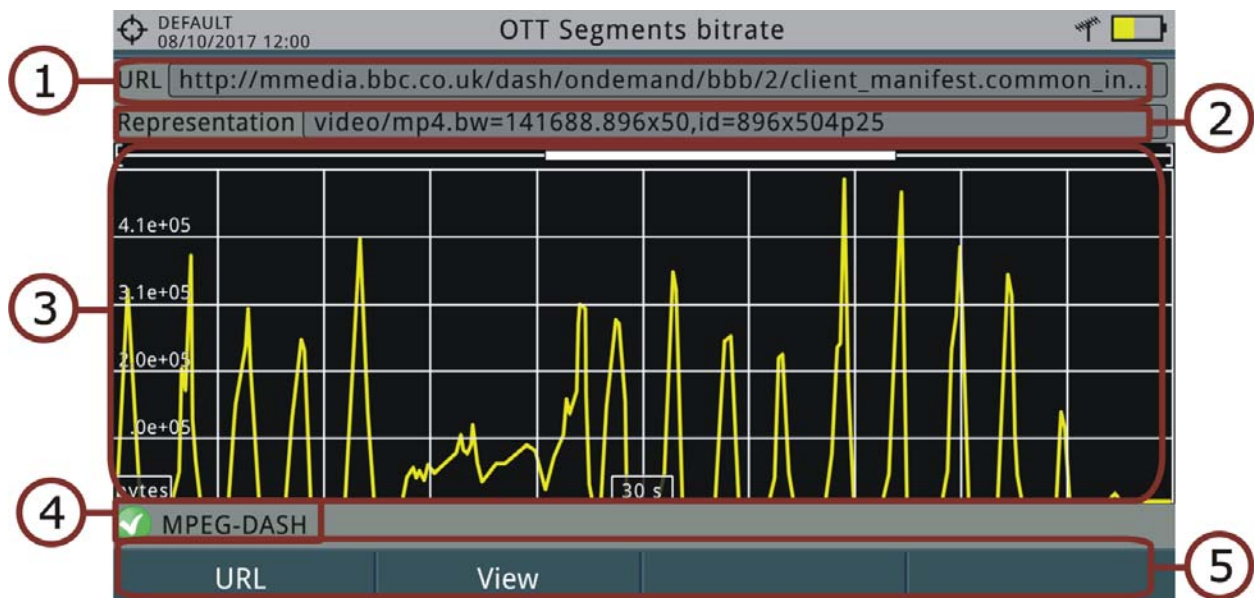
Figure 126.

1 URL selected.

2 Representation selected (resolution and profile).

3 Bitrate of segments download. Graph scrolls to right while segments downloading.

4 Standard status.

5 Softkeys menus (see next section for more details).

■Cursor functions:
- •Cursor up/down: Decreases/Increases time span.

■Axis description:
- •Axis X: Time Span (s).
- •Axis Y: Download size (bytes). This axis re-scales according to biggest value.

8.3.3 | **Menu Options**

At the bottom of the screen there are some menus available via the function keys.

■ **F1** URL: It shows a screen with a list of available URL from which download segments. It also allows you to import URLs from a file on a pendrive.
- •Import from USB: The USB flashdrive must have a text file named OTT.URL on the root in order to be imported. It must contain the URL with this format:
  -#*URL1 description*
  -*https://URL1 address*
  -#*URL2 description*
  -*https://URL2 address*
  -...
  -Example:
  -#web PROMAX
  -https://www.promax.es

■ **F2** View: There are two options:
- •Presentation Description: It shows a MPD file in text format.
- •Presentation Parameters: It shows most common MPD parameters.

9 INSTALLATIONS MANAGEMENT

9.1 ☐ Introduction

The Installations Management is a program embedded in the equipment that allows the user to easily create a file (installation) to individually store and manage data for each installation. Measurements, channel plans, screenshots and any other data associated with the installation will be stored in the folder corresponding to that installation. These measures can then be displayed and downloaded to a PC.

If the user does not create any file installation, the equipment stores measurements in the installation file by default (named "DEFAULT").

Installations management   S C A N

9.2 ☐ Operation

1 To access the Installations menu press the key ☐ (key F).

2 It shows up a window with a list of all available installations. On the softkeys appears the options to manage these installations.

3 To exit the list of installations press the key ☐ (key F).
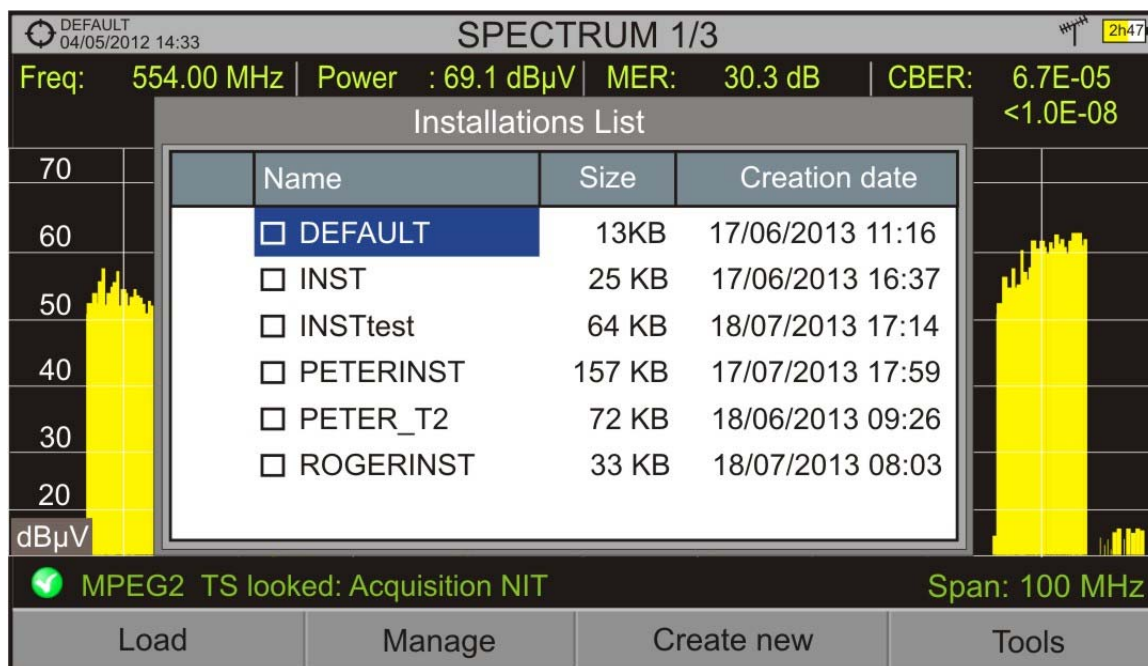
Figure 127.

There are the following options:

- Load (F1): It loads the selected installation. To select a installation from the list, place the cursor on the installation and press Enter, then press "Load" (F1) to load it. Once loaded, the name of the installation appears on the upper left corner of the screen, accompanied by the symbol ⊕, that means that is the current installation. All measurements, screenshots, channel plans and other data since this moment will be stored in the current installation.

- Manage (F2): It opens a window that displays all data of the current installation and from where they can be edited, changed or view (more details in "Installation Management" section).

- Create New (F3): It creates a new installation with the data introduced by the user (more details in "New installation" section).

- Tools (F4): It shows up a menu with some tools to use with the installations (see "Tools" section).

9.3   Installation Management

The DEFAULT installation is the installation preinstalled on the equipment. It is like any other installation and it can load channel plans, DiSEqC programs, etc. The DEFAULT installation can not be deleted or renamed.

In the list of installations, press on the option Manage [F2] to access to the Installation manager screen:
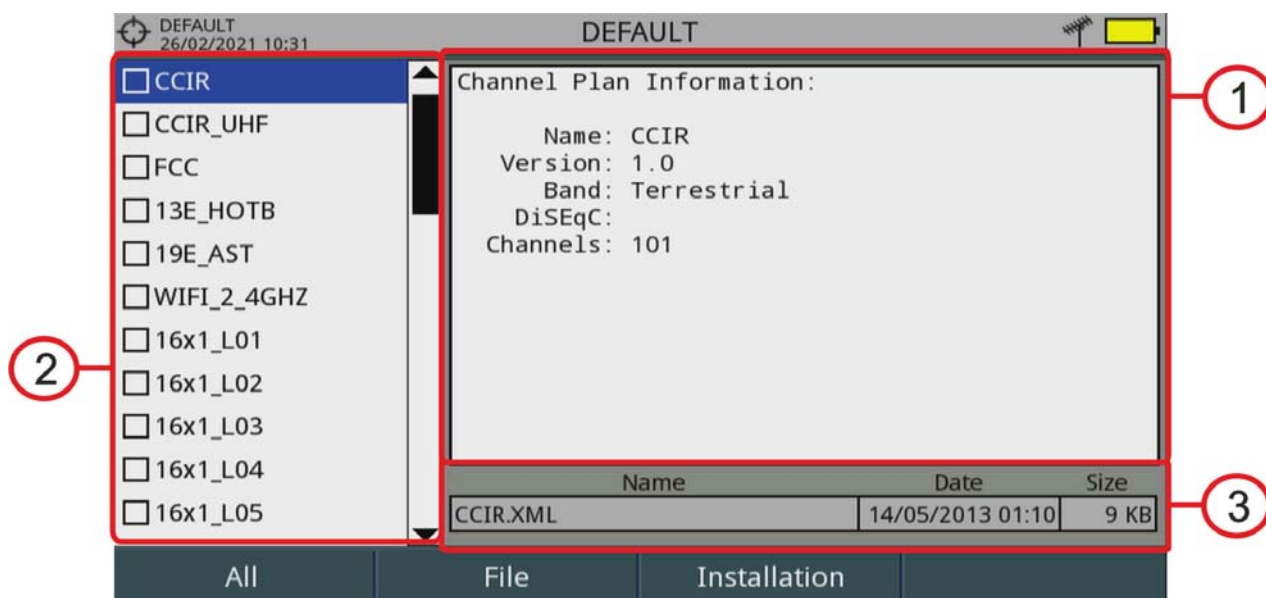
Figure 128.

The window is divided into three areas:

1 Display Area: It is the area where data file description is displayed. The file data is displayed only if the cursor is placed for a moment on the file name. For a screenshot, it displays a thumbnail of the full screen, as captured. In the remaining cases, it only shows some data description of the file type. If there is any extra option associated with the file, it will appear on the [F4] key.

2 List of Files: It shows all types of data files in the selected installation. These can be: screenshots, channel plans, dataloggers, DiSeqC commands, data captures, signal monitoring, service databases and antennas. To move along this file list move the cursor up or down. Any of these files can be selected or deselected by pressing the cursor.

3 File Description Area: It shows file name, extension, creation date and time and size.

► **Menu Options**

The installation manager menu has four options linked with the softkeys. They are described below:

■ [F1] Filter by Type: It shows all available file types in the current installation and the amount of them between brackets. User can filter by

file type. The selected file type will be the only one available in the list of files. Available file types are: screenshots, channel plans, dataloggers, DiSeqC commands, data captures, signal monitoring, service databases and antennas (or all).

- ■ **F2** File
  - •Mark All: It marks all files on the list of files area.
  - •Unmark All: It deselects all files on the list of files area.
  - •Delete: It deletes all selected files on the list of files area.
  - •Copy to USB: It saves selected files on the list of files area to an USB stick connected to the equipment. If the name of the file to be copied is greater than 8 characters the system cuts it. If the file name is cut and matches with another one, then it is added a number to the name to make them different. For instance, 2 files with similar names, like FILENAME01 and FILENAME02 both files will be correctly copied with names FILENA~1 and FILENA~2. To keep the file names with more than 8 characters it is recommended to export the complete installation using the "Export to USB" option (see "Tools" section). The Datalogger files copied to the USB cannot be used to generate reports by the NetUpdate program. To do this the datalogger files must be exported directly through the NetUpdate program (for more details refer to NetUpdate manual on PROMAX website).
  - •Send via mail: It allows you to send files, selected from the file list, via e-mail. Mail server parameters must be defined on the SMTP tab at Preferences (for more details refer to "?SMTP Options" on page 54).

▶	**Sending files by e-mail via WiFi**	⬛ **S C A N**

- • **F3** Installation
  - •Add Channel Plan: It opens a window to add a channel plan, terrestrial or satellite and band (for optical option), to the current installation.
  - •Add Antenna: It allows the user to add an specific antenna among the ones available. To import an antenna refer to "Field Strength" section in chapter "Tools".
  - •Add DiSEqC program: It allows the user to select and add to the current installation any DiSEqC program available in the equipment.

- ■ **F4** Options: This option appears if there is any extra option associated with the file type.
  - •See Full Screen: This option only appears if user selects an image in the list of files. It displays the selected image full screen.
  - •DiSEqC Program: This option only appears if a satellite channel plan is selected in the list of files area. It allows the user to add a Diseqc program

to the selected satellite channel plan from the list of diseqc programs available for the current installation.

•Open File: This options appears if the file type selected is datalogger, data capture or signal monitoring. In case of datalogger it opens the data viewer. In case of data capture (if the capture was done in the Spectrum Analyzer mode) shows the spectrum reference. In case of signal monitoring it opens the signal monitoring viewer.

To get out from the Installation manager press any key to access MEASUREMENT, SPECTRUM or TV mode.

9.4   New Installation

In the list of installations, when selecting the option Create New (F3) it runs the installation wizard that helps to create a new installation.

1 During the process, the user has the option to edit the default name assigned or import data from another installation.

2 The user can select the channel plans (terrestrial and satellite) that will be used in that installation. At least one for each band has to be selected.

3 For satellite channel plans the user can select the Diseqc commands associated to the installation and also the satellite band (Ku-Ka or C band) and the frequencies of the LNB Oscillator.

4 During the creation process the softkeys functions are: Next (it goes to the next step), Previous (it goes to the previous step) or Cancel (it cancels the process).

5 When finish, the new installation created will be the current installation.

9.5   Tools

In the list of installations, when pressing the Tools (F4) option it shows a menu with some options to edit the installation files:

■ Mark All: It selects all installations in the list of installations.

■ Unmark All: It deselects all installations in the list of installations.

■ Archive: It compresses (using the ZIP algorithm) the selected installations

to save more space. A zipped installation shows a box icon at the left side in the list of installations. A zipped installation can be loaded as anyone else, but the load time can be slightly higher because previously it is unzipped automatically. Once the installation is unzipped the user must

re-zip it if necessary. To transfer an installation file from the equipment to a PC, it must have been previously zipped.

- Delete: It deletes the selected installations and all the files associated to them. The DEFAULT installation cannot be deleted.

- Rename: It edits the name of the installation selected in the list of installations. The installation by default DEFAULT cannot be renamed.

- Export to USB: It saves the installations files selected in the list of installations to an USB stick connected to the instrument. The installation file is exported in zip format.

- Import from USB: It imports installation files from a USB stick connected to the equipment. It has to use the same folder structure that is generated when exporting to USB (for more details see next section).

- Installed Antennas: It allows user to remove antennas files on the meter.

9.6   Importing Data from USB

The data import tool allows the user to import data files in a simple way from an USB flash drive to the equipment.

Data available to be imported are:

- Installations.
- Channel Plans.
- Antennas.
- Dataloggers.

► **Operation**

1 Copy the file to be imported on a flash drive and plug it into USB port. The file must be in the proper format so the system can recognize it.

2 Press the Installation Management key 🗁.

3 Press the key ⌨F4 "Tools".

4 Select the "Import from USB" option.

5 The Import Files window appears. Select the file and press the ⌨F4 key: "Import".
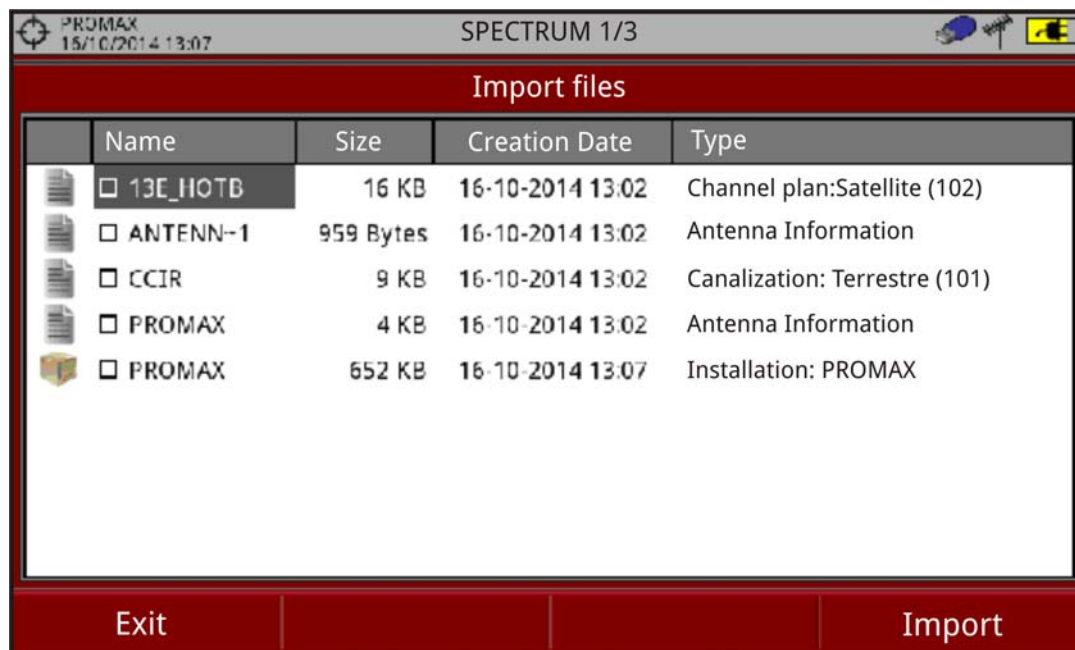
Figure 129. Import Files window

6 If the file import is successful then a window shows a confirmation message.

10 WEBCONTROL

10.1 ▌ Introduction

The webControl function allows you to connect remotely to the equipment in order to visualize measurements and operate on it. The equipment must be connected to a data network. To connect to equipment from a remote access device you need just a standard web browser.

WebControl modes are:

- Measurement and Spectrum: It shows spectrum and measurement from the tuned channel.
- TV Parameters: It shows data, video and audio from the tuned channel.
- Console: It emulates a portable equipment and allows you to interact with it in first person.
- Quality Signal Monitoring: It monitors a signal according to some parameters selected by the user.
- Historical Monitoring: It shows data from monitoring and they can also be exported.
- Installations Management: It manages installation files and creates channel plans.
- Task Management: It allows the user to schedule some tasks.

There is also an option on demand:

- Mask Monitoring[*]: It monitors RF spectrum by comparing against a reference spectrum.

Next section explains how to configure the equipment to be able to connect remotely. Following sections explain each mode.

webControl introduction

SCAN

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*. Contact PROMAX if you want to buy this option.

10.2   Settings and Remote Access

► General Configuration

1 There are two ways to configure the equipment:

- •Connecting a pendrive with the STATE.xml file to the USB port. The STATE.xml should contain configuration data (for more details refer to "Change of Network Settings via PENDRIVE" on page 9).
- •By the user's interface. To access user's interface you need to connect in local mode (for more details refer to "? Operation in Local Mode" on page 6). In the next section it is explained how to connect to a network following this way.

► Connection Settings (Ethernet / WiFi) in Local Mode

Next following steps describe how to configure the equipment in **local mode** (with a keyboard and a monitor) using the user's interface in order to connect to a local data network.

1 The equipment can be connected to a data network via an Ethernet cable or via WiFi. To access the configuration parameters:

- •Ethernet network: Access the preferences options by pressing the "Installations" ⌸ key (key F) for 1 second. Go to the "Network" tab where you can find the configuration parameters to register in the network.
- •WiFi network: Connect the USB WiFi adapter and the WiFi configuration window will appear or you can also access through the "WiFi configuration" menu from the "Tools" button (F3).

2 Select DHCP ON, if you connect the equipment to a network with a router or server with DHCP protocol enabled. Then the network will set automatically the parameters in the equipment. If not, follow the next steps to set the equipment.

3 On "IP Address" box enter the equipment's IP. Use an IP in the same range used by your PC in the local network (if you do not know these data see "find out local network data" section). For instance, if the IP for your PC is 10.0.1.18, the equipment must have a free IP in the same range, like 10.0.1.50.

NOTE: Another option is to keep default settings and change your PC IP to the same range. As the IP by default is 10.8.8.188[*] the PC should have a free IP on the same range, like 10.8.8.50.

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*.   IP by default is 10.0.6.198 for firmware versions prior to 26.8

4 In the "Mask" box, enter the mask value, which should be the same as the one used by the local network (usually 255.255.255.0; if you do not know these data see "find out local network data" section).

5 To connect the equipment from an external network, fill in the "Gateway" with the info obtained from the local network.

6 Press on "Save" and then "Exit" to save changes and exit.

7 Connect the equipment to a data network with Internet access. You can use an Ethernet cable connected to the IPCTRL port or in case of WiFi network, connect the USB WiFi adapter, select the network and enter the password.

► Find out Local Network Data (LAN)

1 To obtain data from the Ethernet network where your equipment is connected, you should use a PC connected to this same network.

2 From the PC click on Start menu in Windows. On the Search box write CMD and press Enter.

3 In opens a command line in a window. Write IPCONFIG and press enter.

4 It displays a window with some lines with info. On line "Local Network Ethernet Adapter" see line "IPv4 Address". This is the local IP for your PC. Write down this IP. Also write down "Subnet Mask" and "Default Gateway". This data is needed to configure the equipment by hand.

► Remote Access

1 From a remote access device (PC, mobile device) run a standard web browser (Chrome recommended).

2 On the address bar write the IP address to remotely access the equipment.

3 If the connection is successful, it should appear on screen the webControl welcome screen (see figure). This screen shows the equipment model and serial number.
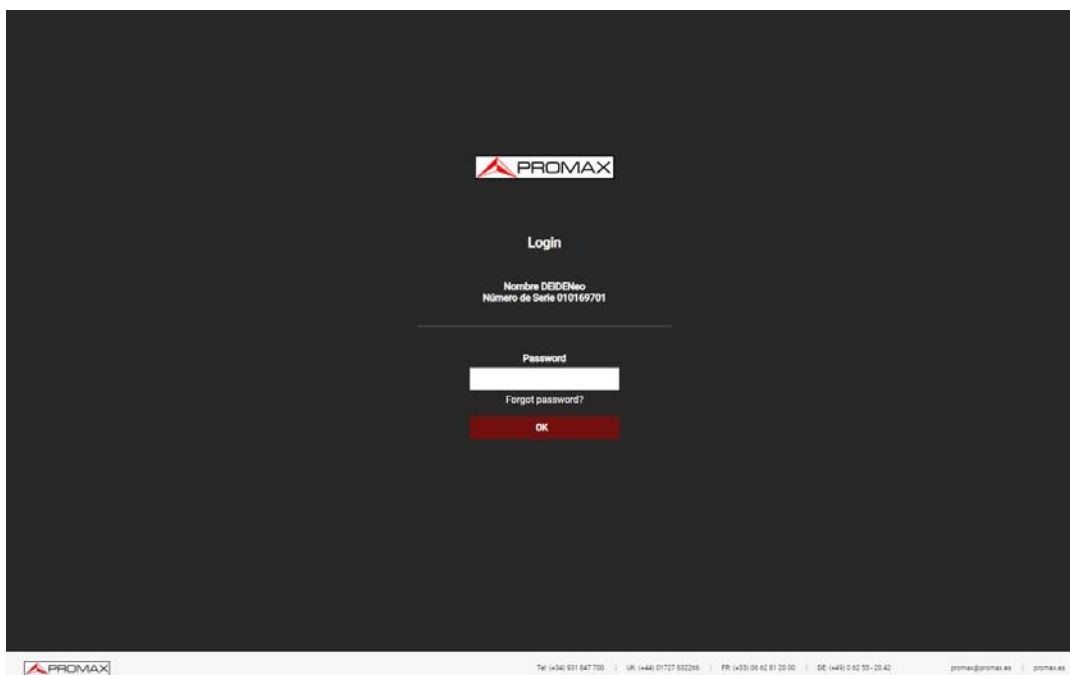
Figure 130.

4 Enter the password and press OK (password by default is **Password**).

NOTE: There are many ways to connect to the equipment from an external network. If you have follow these instructions and you fail to connect the webControl, please contact PROMAX technical assistance and we will help you (promax@promax.es).

► **Password Recovery**

If after changing the webControl password you forget it, click on "forgot password?". It opens a window with some instructions to reset the password. Follow these steps:

1 Send an e-mail to the PROMAX technical assistance service (promax@promax.es) with the following information:

■ Contact details: Full name, company name and address, phone number and e-mail.

■ Internal number shown on the window.

■ Recovery code shown on the window.

2 Once this information is sent, it is checked and if everything is right, a temporary password is sent back. Write this password on the box "temporary password". This password is for one time use.

3 If you have access to the main screen go to "Config" on the upper right corner and click on "Change Password".

4 A window will appear to change the password. Enter the temporary password in the "Old password" box. Enter your new password in the "New password" box and again in the "Repeat new password" box. Press OK.

10.3 Icon Table

At the top of the screen there is a bar notification where some icons show up:

Icon	Description	Icon	Description
	Installation		Monitoring
	Terrestrial Band		WiFi Connection
	Satellite Band		USB connected
	Battery level		Notification
	Battery charging		Warning full memory
	Emulating		Hard drive detected / in use
	Pending tasks		GPS enabled
	Cleaning database		Warning
	Audio recording		Transport Stream recording

Icon	Description	Icon	Description
🔊•))	Audio streaming	TS•))	Transport Stream streaming
✖	Error	!	Warning full memory

10.4   Measurements and Spectrum

► Description

Measurements and Spectrum screen shows real time spectrum and all measurements of the RF channel if it is tuned. It also allows modifying the reference level, span, type of tuning and channel plan among others. To communicate you need at least 200 kB/s of bandwidth.

To access this screen click on Measurement icon ⊘ .

► Screen Description
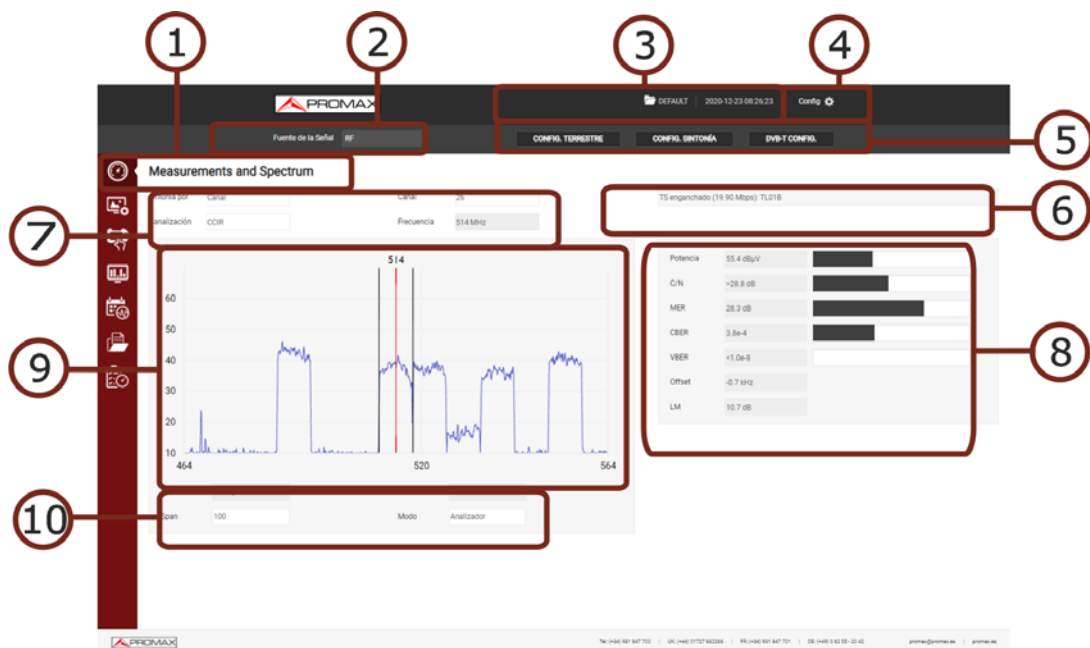
Figure 131.

1 Selected function (Measurements and Spectrum).

2 Source of Signal.

3 Icon bar, selected installation and current date and hour[*].

4 Access to settings:

- Change Password: It allows you to change your password.
- Reboot Equipment: It allows you to reset your equipment after confirmation.
- About Equipment: It gives information about your equipment: model name, serial number, release version / webControl version.
- Logout: It exits your current session.

5 Signal settings. When clicking on a button it shows settings for the current signal and also they can be changed.

- Terrestrial / Satellite settings (band; external power supply; power voltage; LNB drain).
- Tuning type settings (tuning by channel/frequency; channel; channel plan; frequency).
- Tuned signal parameters.

6 If shows if signal is locked/unlocked. If locked it shows its multiplex.

7 Selection parameters: Tuning type, channel/frequency selection and channel plan.

8 Signal data: Power, C/N, MER, CBER, VBER, Offset, LM[**].

9 Spectrum graph.

10 Spectrum settings parameters: reference level, center frequency, span and analyzer (automatic reference level) / spectrum (reference level set by user) mode.

10.5 TV Parameters

► **Description**

TV Parameters screen shows important metadata that identifies the network (NID), (ONID), TS, Service, LCN, etc. and also a slide show of one service that belongs to the selected multiplex. To communicate you need at least 200 kB/s of bandwidth.

To access this screen click on TV icon .

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[*]. In case you have the GPS option installed, it should appear your current geographic coordinates.
[**]. In case you have DAB Advanced or FM Advanced installed, it shows advanced measurements related to these options.

► **Screen Description**
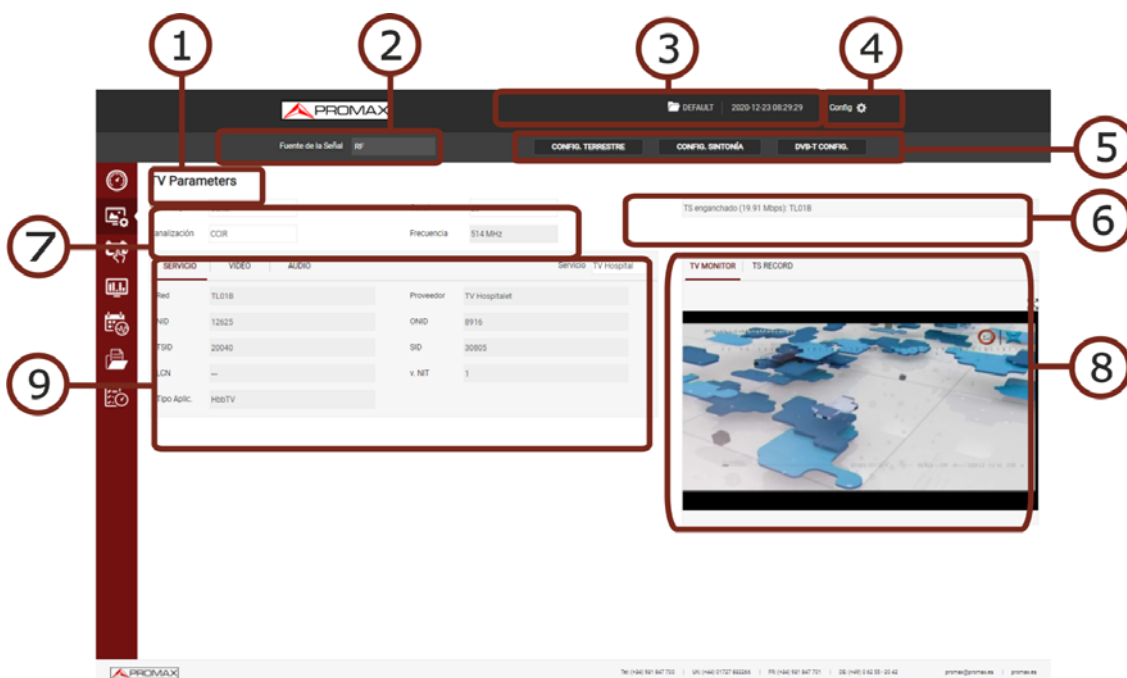
Figure 132.

1 Selected function (TV Parameters).

2 Source of Signal.

3 Icon bar, selected installation and current date and hour[*].

4 Access to settings:

- Change Password: It allows you to change your password.
- Reboot Equipment: It allows you to reset your equipment after confirmation.
- About Equipment: It gives information about your equipment: model name, serial number, release version / webControl version.
- Logout: It exits your current session.

5 Signal settings. When clicking on a button it shows settings for the current signal and also they can be changed.

- Terrestrial / Satellite settings (band; external power supply; power voltage; LNB drain).
- Tuning type settings (tuning by channel/frequency; channel; channel plan; frequency).
- Tuned signal parameters.

6 If shows if signal is locked/unlocked. If locked it shows its multiplex.

7 Selection parameters: Tuning type, channel/frequency selection and channel plan.

8 This area allows you to select between two tabs:

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[*]. In case you have the GPS option installed, it should appear your current geographic coordinates.

- TV Monitor: It shows a slideshow of the selected service from the channel locked. The symbol ⛶ shows the service full screen. If it is a DAB or FM signal, the audio is demodulated and can be listened to. If the DAB signal contains images they are also shown.

- TS Record: It records the current service (service recording) or the complete transport stream* (TS recording). The file is recorded on the equipment itself or on a USB (check option "use USB"). To start recording, fill in the "description" field and click on the red button. It shows available time and space. To stop recording, press the red button again. Only one TS can be played and analysed from the equipment itself. If more than one TS is recorded, a message will appear indicating that only the last one can be played and analysed. The rest of TS should be downloaded to the PC to be played or analysed.

- Audio Record: It allows you to save audio (in wav format) from the service being played. The service could be FM, DAB or digital TV. Select a name and press "Start Audio Record". It will start to record and will show some data about the service being recorded like total time, space available and location. When finish press "Stop Audio Record".

- TS Streaming: It allows you to stream the selected service. Enter the IP address and port to stream and press "Start Streaming" (for more details about Streaming refer to). When finish press "Stop Streaming".

9 Service option shows the selected service and a list of available services in the channel. Each tab (service, video, audio) shows general details for the selected service and video and audio details.

10.6 Remote Console

► **Description**

Console screen allows you to interact remotely with the equipment like you were in front of it. To communicate you need at least 3 MB/s of bandwidth. When the emulation is running no other webControl services are available.

To interact with the equipment you can use the mouse pointer as a touch on screen and also equipment controllers (cursor, function keys and shortcut keys) to access menus and options.

There are some limitations that we will try to solve in future versions. Currently, audio is not available.

To access this screen click on Console icon [icon].

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*. Transport Stream Record only for PROWATCH Neo 2

► **Screen Description**

Figure 133.

1 Selected function (Console).

2 Selected installation and current date and hour*.

3 Access to settings:

- Change Password: It allows you to change your password.
- Reboot Equipment: It allows you to reset your equipment after confirmation.
- About Equipment: It gives information about your equipment: model name, serial number, release version / webControl version.
- Logout: It exits your current session.

4 Start / Stop console emulation button.

5 Joystick. Click left, right, up or down to simulate joystick movement. Click on centre to simulate enter. You can use the joystick to move along the menus and to select options. Also you can use your mouse pointer like a finger touch on screen.

6 Direct Access keys to access Installation management and Settings. Press for more than one second to access Preferences and Video / Audio settings.

7 Direct Access keys to access Measurement, Spectrum and TV mode.

8 Direct Access key to Screenshot (screenshot is saved on your remote device and data on the equipment).

9 Softkeys or Function keys.

---

*. In case you have the GPS option installed, then it also appears current geographic coordinates.

10.7   Signal Quality Monitoring

► Description

The Signal Quality Monitoring function allows users to select and monitor channels from a channel plan by setting alarms on specific parameters.

The equipment monitors certain signal quality parameters according to value ranges established by the user. If values are outside these margins, the system will notify the user.

When the monitoring has started, historical monitoring can be consulted, but the rest of webControl services are disabled.

Data is stored for 30 days. After that they are overwritten. After that the system removes the older data in order to have more room for new data. When the system is deleting data it appears an indicative icon, even that, the monitoring system is not affected and works as usual, but the user cannot access data from records.

To access this screen, click on the Monitoring icon 🔲 .

► Settings

1   In "Preferences", check date, time and time zone where the equipment is located (for more details refer to <u>"?Time & Date Options" on page 50</u>) or synchronise time with a NTP server (for more details refer to <u>"?NTP Options" on page 54</u>).

2   In "Preferences", label "Utilities", option "Moni. ddbb loc." select where the monitoring data will be stored: internal memory or hard disk (for more details refer to <u>"?Tools Options" on page 45</u>).

3   You need a channel plan with special information for monitoring. To do that, create a new channel plan from an existing one using the "Explore channel plan" tool in the equipment (<u>"Explore Channel Plan" on page 135</u>). If existing channel plans are not enough you can create a new one from scratch from the "Create channel plan" function in the Installations Management (see next) or from a PC using the NetUpdate software (for more details refer to <u>"NetUpdate Connection" on page 245</u>).

4   Check measurement units (for more details refer to <u>"?Measurement Options" on page 50</u>).

► Operation

1 In "Monitoring type" box select "Signal Quality Monitoring".

2 In "Monitoring" dropdown menu, select an existing monitoring or create a new one by clicking "New". You can also import a monitoring (in zip format) by pressing "Import" (this monitoring previously must be created and exported using the "Export" option).

3 If you create a new monitoring, a box will appear that allows you to select the channel plan that you want to monitor. In case the system detects a monitoring that was not finished, then it allows you to load it in order to finish it.

4 Next, the "Name" box appears. Write a name to identify the monitoring. In the "Description" box add additional information.

5 A list will appear with all channels in the channel plan. Alarms on each channel are available to be set.

6 To set an alarm from a channel, click on the cross icon next to channel. It drops down a list with all parameters available.

7 Each channel can be configured with this parameters:

- Auto: The system automatically tunes the channel and takes measurements and reports an alarm when the user-defined condition is met.

- Manual: The system tunes the channel and waits during a time defined by user (in seconds). Then it takes measurements and reports an alarm when the user-defined condition is met.

- Cycles: The system reports an alarm when the user-defined condition is met during a number of consecutive cycles defined by user. If this box is empty is equal to 1 cycle.

8 When the channel is deployed, the alarm configuration will appear:

- Status unlocked: This condition is always enabled and reports alarm when the channel is unlocked.

- Parameter: Parameter to monitor.

- OVER / UNDER: It indicates the condition to met in relation to the user-defined value.

- Pre-alarm: Press on the switch and enter the value so when the condition is met it reports a pre-alarm. Value must be in decimal notation.

- Alarm: Press on the switch and enter the value so when the condition is met it reports a pre-alarm. Value must be in decimal notation.

9 Configure each channel to be monitored.

10 When configuration is finished, press on Save.

11 Select one monitoring in the box "Monitoring".

12 To start monitoring press on "Start Monitoring". Monitoring will start. To delete a monitoring press on "Delete" or to export press on "Export".

13 The active monitoring screen shows the measurements obtained and alarms and pre-alarms for the last cycle if there are any. Also it displays a bar graph with the measurements of the selected parameter. Under the bar graph it shows the monitoring channel, total monitoring time and cycle time. To select the parameter in the graph, select "Select Parameter". If you click on a channel, related information will appear.

14 Alarms are notified by sending e-mails to addresses from the e-mailing list. In order for the equipment to send e-mails, the mail service must be configured in Preferences, SMTP tag (for more details refer to "?SMTP Options" on page 54).

15 To stop press on "Stop Monitoring" or cancel remote control on the equipment.

16 Data obtained can be requested on "Historical Monitoring" screen.

► **Screen Description**
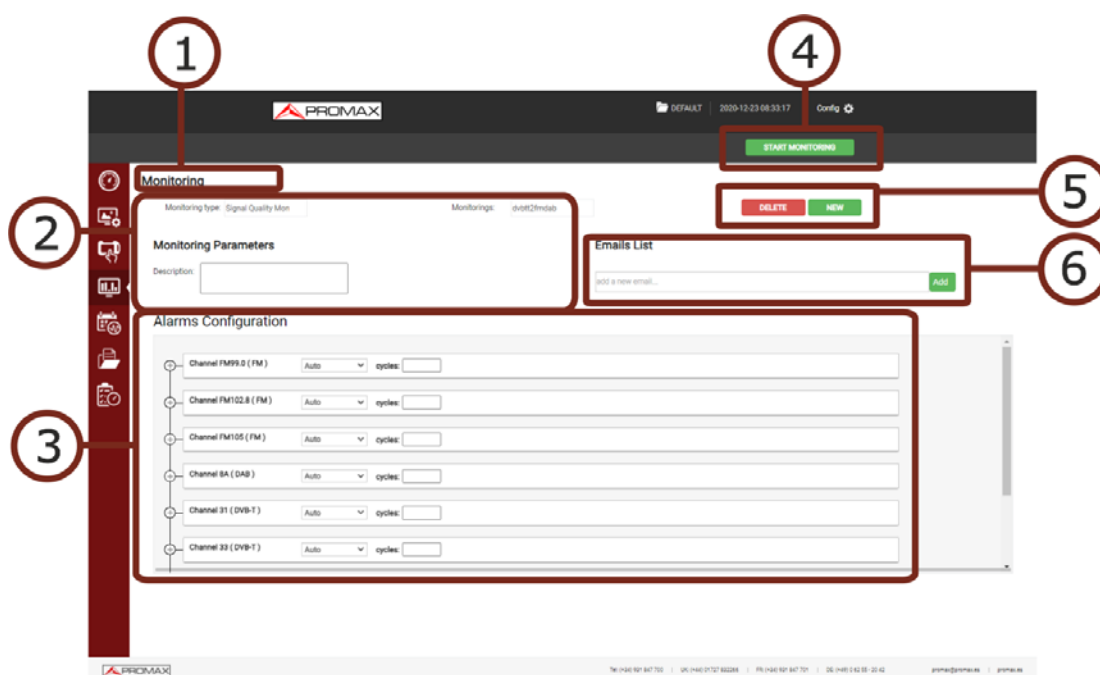
Figure 134.

1 Selected function (Monitoring).

2 Monitoring selection. On Monitoring type select "Signal Quality Monitoring". On "Monitorings" select one existing monitoring (previously, user must create a monitoring in order to show here). Below there is a text box to add a description to the monitoring.

3 Alarms configuration. It allows to select the Auto or Manual mode and cycles. If you click on the cross next to the channel, the available parameters[*] of the channel will be displayed to set alarms. At the bottom there is the "Save" button to save all changes made.

4 When pressing on "Start Monitoring" it will start monitoring.

5 The "Delete" button deletes the selected monitoring and the button "New" creates a new monitoring.

6 It shows a list of e-mails. When an alarm is triggered, a notification is send to these e-mails. It allows you to add e-mails in the box "add a new email". To remove it press on the cross next to the e-mail. Parameters to set the e-mail server are in the equipment's "Preferences" menu.

► **Screen Description**
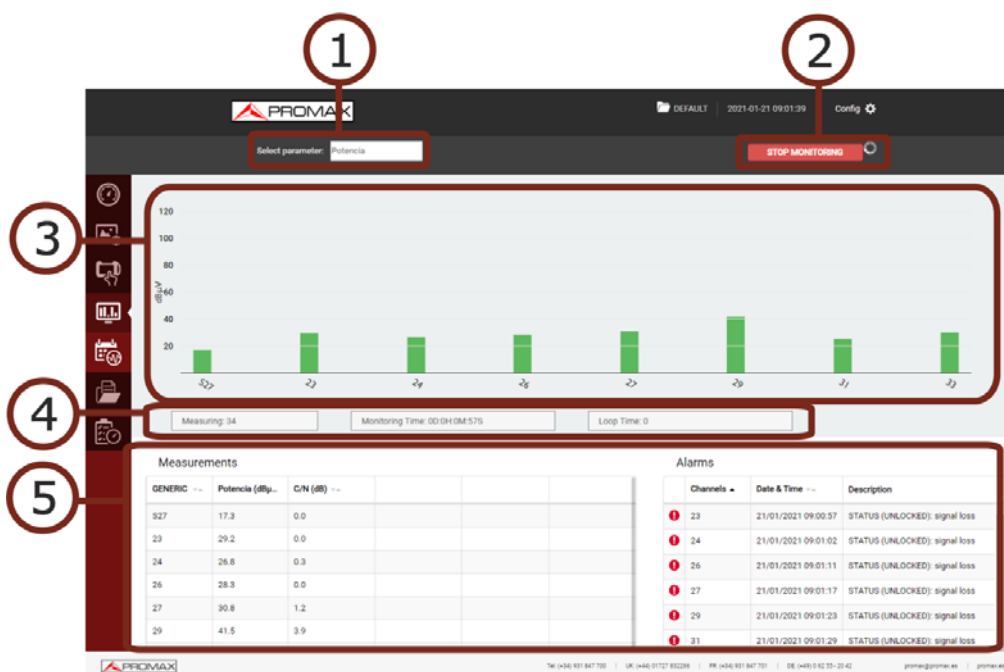
Figure 135. Monitoring started

1 Parameter selected shown on graphic bar.

2 Start / Stop monitoring.

3 Graphic bar of selected parameter. At the bottom the channel being measured. When pressing on a graphic bar channel it pops up a window with

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*. In case you have DAB Advanced or FM Advanced installed, it shows advanced measurements related to these options.

measurements. If there are too many channels to show on screen drag and drop to see the rest of them.

4 Current monitoring data: Monitoring channel, monitoring total time and cycle time.

5 Measurements and alarms window. Only shows alarms and measurements from the last cycle. On screen only appears the main measurements. When clicking on a channel it will show all measurements on that channel. Alarms table shows date and time of alarm and description. The icon 🔴 indicates alarm. The icon 🟠 indicates pre-alarm. Data is organized by type of signal and can be organised from lowest to highest or viceversa by pressing on the parameter at table heading.

10.8   Historical Monitoring

► **Description**

Historical Monitoring screen shows data obtained during monitoring. It stores all data about alarms, pre-alarms and system messages like memory problems, short-circuits, etc.

Historical monitoring can be consulted even if monitoring is working.

To access this screen, click on the Historical Monitoring icon 📅.

► **Operation**

1 In "Monitoring type" box select "Signal Quality Monitoring".

2 In the "Monitoring" box select the monitoring from which you want to obtain data.

3 In the "Channels" box, select the channel from which you want to obtain data. For all channels select "All".

4 In the "Measurement" box select the parameter from which you want to obtain data. For all parameters select "All".

5 Select the start and end date and time for the monitoring data query. It must be the local date and time for equipment.

6 Check the box "Measurements" or "Alarms" if you want to see the measurements, alarms or both.

7 Press "Done" and wait a few seconds to visualize data. Data for measurements is shown in the left column and for alarms in the right column.

8 To visualize data in graphic form press on label "Graph". This graph is displayed only if one single channel and one type of measurement is selected.

9 To export data to a CSV file, click on "Export to CSV".

► **Screen Description**
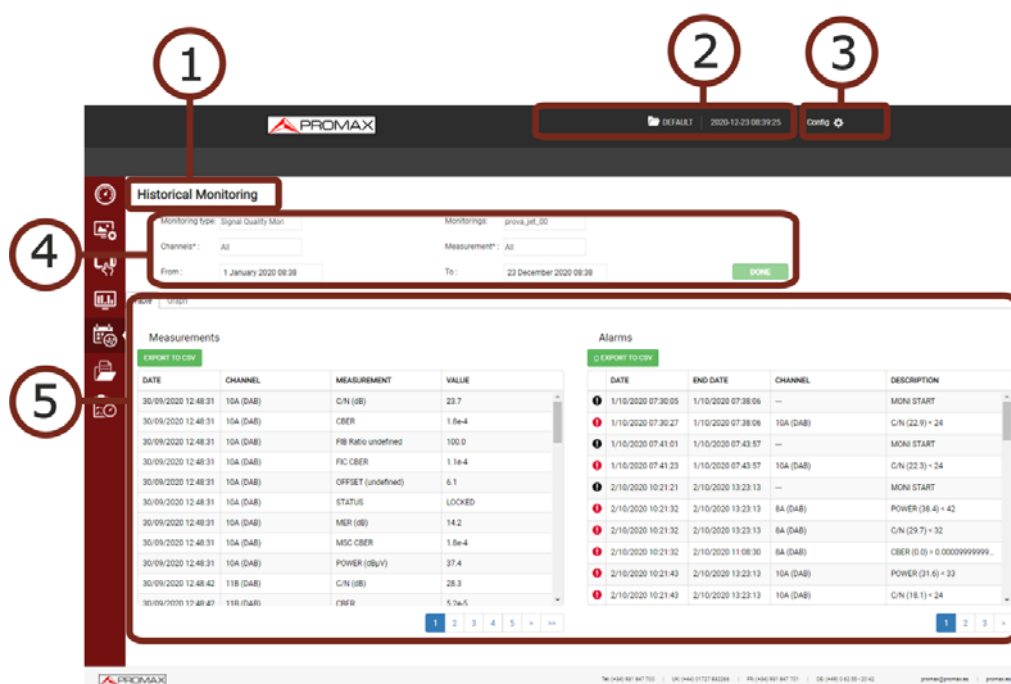
Figure 136.

1 Selected function (Historical Monitoring).

2 Selected installation and current date and hour[*].

3 Access to settings:

- Change Password: It allows you to change your password.
- Reboot Equipment: It allows you to reset your equipment after confirmation.
- About Equipment: It gives information about your equipment: model name, serial number, release version / webControl version.
- Logout: It exits your current session.

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[*]. In case you have the GPS option installed, then it also appears current geographic coordinates.

4 Boxes to select parameters for historical data query:

- •Monitoring Type: Select "Signal Quality Monitoring".
- •Monitoring: Select monitoring to obtain data.
- •Channel or all channels.
- •Measurement type or all measurements.
- •Date and time (from / to). The query can be up to 7 days. You must put date and hour at the location where the meter is monitoring (not the date and time from where you are making the query, unless both were in the same time zone).

5 Data table / graph (graphic bar is only displayed when one single channel and one measurement type is selected). Click on the corresponding label to switch between Table and Graph. Alarms table shows when the alarm or pre-alarm was reported and when disappeared. If signal is unlocked some measurements related to demodulation (MER, CBER...) will be empty. Measurement data keep units used when monitoring.

10.9   Installations Management

► Description

Installations Management allows you to access the File Manager and the Create Channel Plan tool.

To access this screen, click on the Installations Management icon 📂 .

10.9.1   File Manager

This function allows you to manage files inside an installation (channel plans, screenshots, dataloggers, etc.).

> ▶️ **File manager**   S C A N [QR code]

► File Manager Operation

1 Press on tab "File Manager" to access the file manager. Wait for few seconds to system to read all files from the equipment.

2 All installations are shown on the left side of the window. Each folder is for an installation. When clicking on a folder it deploys its content in a tree structure. The area on the right side shows the content inside the selected folder.

3 The padlock icon on an item means that it cannot be removed. If the padlock is on a folder it also means that its content cannot be change (nor deleted or added).

4 To make any action on an item use the tools bar or deploy the options menu by pressing the right button of the mouse. Next are described the most common options.

▶ **Tools Bar:**

■ ⬅ Back: Back to the previous screen.

■ ➡ Forward: Back to the posterior screen.

■ 📄 Upload: It transfers a document from your PC to the equipment. It shows a window where you can drag files, paste URLs or images or select files or folders from your PC.

■ 📂 Open: It opens a folder or downloads the selected file.

■ 💾 Download: It downloads a folder or file to your PC. When it is a folder or multiple files, it downloads a zipped file in TGZ format.

■ 🚫 Delete: It deletes the folder or file selected.

▶ **Options Menu (mouse right button):**

■ 📂 Open: It opens a folder or downloads the selected file.

■ 💾 Download: It downloads a folder or file to your PC. When it is a folder or multiple files, it downloads a zipped file in TGZ format.

■ 👁 Preview: It shows file info.

■ 📄 Upload files: It transfers a document from your PC to the equipment. It shows a window where you can drag files, paste URLs or images or select files or folders from your PC.

■ 🚫 Delete: It deletes the folder or file selected.

■ 📄 Edit Channel Plan: It allows editing a channel of the equipment. It only works if a channel plan file (XML extension) is selected. The channel plan files are located in the CH folder (for more details see the next section).

- ■ 📄 Create Report: It generates a report in PDF format from the folder where the datalogger files are stored. To create a report, you must select the datalogger folder. These folders are inside the DATALOG folder.

Report generator

- ■ 🖥 Empty the folders: It removes all the content inside a forlder.

- ■ 📇 Create archive: It creates a zip file from the files selected in TAR or GZIP format.

- ■ 📇 Extract files from archive: It unzips a zipped file in a new folder or in the current folder.

- ■ ⊞ Select All: It selects all the files.

- ■ 🔳 Invert selection: It reverts the current selection.

- ■ ℹ Get info: It shows some info about the selected file.

► **File and Installations Management Screen**
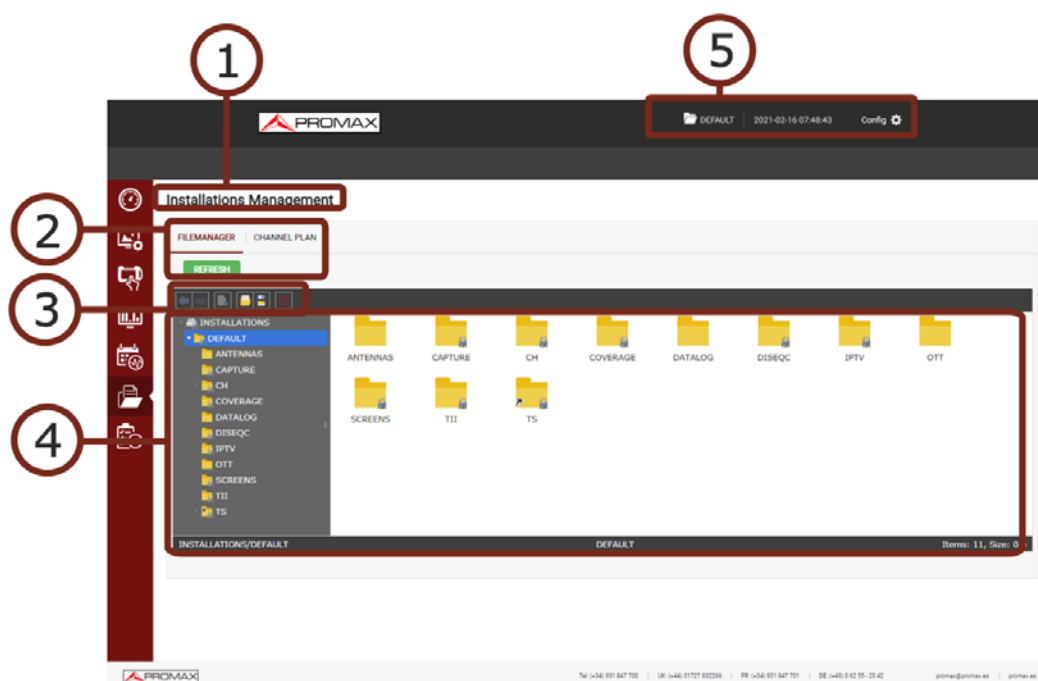
Figure 137. File Manager

1 Selected function (Installations Management).

2 Tabs to select the File Manager or the Channel Plan Creator.

3 Toolbar.

4 File navigation area.

5 Selected installation, current date and hour* and access to settings:

- Change Password: It allows you to change your password.
- Reboot Equipment: It allows you to reset your equipment after confirmation.
- About Equipment: It gives information about your equipment: model name, serial number, release version / webControl version.
- Logout: It exits your current session.

10.9.2   Channel Plan Creator

This functions allows you to create a channel plan from scratch.

▶	**Channel plan creator and editor**	S C A N

► Channel Plan Creator Operation

1 Press on the "Channel Plan" tab to access the channel plan creator. Press on "Create Channel Plan" button.

2 In the box "*Name*" enter the channel plan name. In the box "*Band*" enter the band (terrestrial or satellite). Next fill in the box "LNB" and "TV system". Parameters "Average Filter", "Video Filter", "Start Band Frequency" and "Stop Band Frequency" are specially indicated to use it for LTE signals.

3 Press the "Add Channel" button and enter one by one each channel that made the channel plan. Enter channel name, frequency and signal type for each channel.

4 Edit each parameter by clicking on it. Remove a channel clicking on the red cross.

5 Once finished press on "*Download Channel Plan*" to download it on your PC. By default the channel plan file is downloaded inside the folder "Downloads" in your PC. The file has XML format.

6 To use the new channel plan, upload it by means of the File Manager (see previous section). Get into the CH folder in your installation and select the folder TER, SAT or AUX according to terrestrial or satellite channel plan. The channel plan will be available for you.

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*. In case you have the GPS option installed, then it also appears current geographic coordinates.
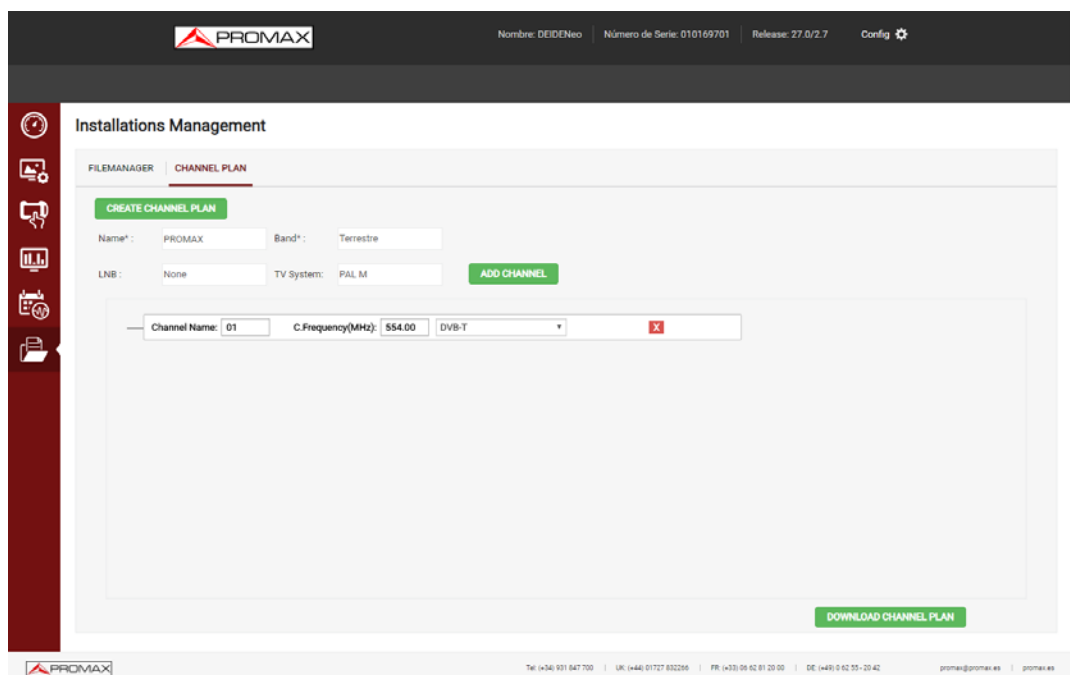
Figure 138. Channel Creation

| 10.9.3 | **Channel Plan Editor** |

This function allows you to edit channel plans.

▶ **Channel Plan Editor Operation**

1 Files with channel plans are inside the "CH" folder. "SAT" sub-folder contains satellite channel plans, "TERR" sub-folder contains terrestrial channel plans and "AUX" contains other channel plans. Select the file that contains the channel plan to edit and press the right button on the mouse to select the "Edit channel plan" option.

2 The channel plan definition parameters and all the channels that form it will appear. From here you can edit any value by clicking on the box.

3 Channels can be modified by clicking on each parameter or deleted by pressing the red cross.

4 Once the channel plan is finished, click on "Download Channel Plan" to download it to the PC. By default the file with the channel plan is downloaded in the PC "Download" folder. The file is in XML format.

5 To use the channel plan on the equipment use the File Manager to upload the XML file. It must be uploaded to the installation's CH folder and within the sub-folder TER, SAT or AUX depending on whether it is terrestrial, satellite

or auxiliary channel plan. The channel plan should now be available for use on the equipment.

| 10.10 | Task Management |

▶ **Description**

The Task Management function allows you to configure a list of tasks and schedule when the task starts, the number of repetitions and other parameters. The equipment can be turned off after configuring the tasks as it will automatically turn on to run the scheduled task.

From the equipment itself, tasks can also be scheduled using the "Task Planner" tool, but the Task Management function from the webControl is more advanced and has more options.

When using the Task Management function from the webControl, the equipment's Task Planner will be disabled. To use this tool again from the equipment itself, all pending tasks must be deleted in Task Planner from the webControl.

To access this screen, click on the Task Management icon .

▶ **Operation**

1 Press on "*New Task*".

2 When creating a new task, fill in these fields:

- Task Type: Type of scheduled task. Options are:
  - Signal Quality Monitoring.
  - Mask Monitoring*.
  - Datalogger (more details in "Datalogger" on page 125).
  - TS Record (more details in "Transport Stream Recording" on page 159).
  - Audio Record: It records the audio from the selected service.
  - ETI Record**: It records the ETI service from a DAB channel (for more details refer to "DAB ETI Recordings" on page 292).
  - Capture (more details in "Screen and Data Capture (Export key)" on page 134).
- Type Configuration: It shows setting parameters according to selected task.

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*.This function is available only for meters with the "Mask Monitoring" option installed. Contact PROMAX for more information.

**. This function is available only for equipment with the "DAB Advanced" option installed. Contact PROMAX for more information.

-Signal Quality Monitoring: Selection of Quality Monitoring.
-Mask Monitoring: Selection of Mask Monitoring.
-Datalogger: Selection of Datalogger.
-TS Record: Selection of channel and the complete transport stream or only one service.
-ETI Record: Selection of channel and service.
-Audio Record: Selection of channel and service.
-Capture: Selection of data capture, screenshot or both.

•Time Configuration: Date, time start and time end. If there is no finish date then check "Without expire date".

•During: It allows you to select for how long run your task.

•Execute every: It allows you to select when to repeat your task.

•Repetition Type: It allows you to select time scale for repetition: hourly (minutes / hours repetition); weekly (week / day repetition); monthly (month / day repetition).
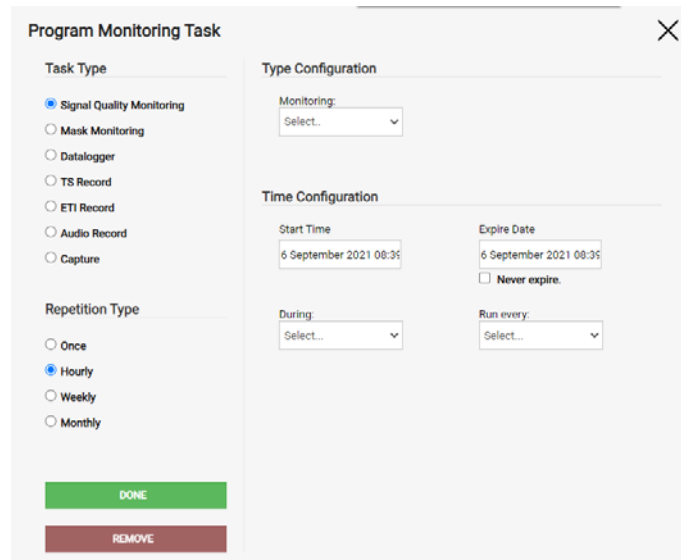
Figure 139. Task Settings Screen

3 Once the task has been set, press on "Done" to save it or "Remove" to remove it.

4 If one task tries to start when another task is running, the task will be cancelled on that repetition and will retry to run again on the next repetition if there is one.

5 To edit or view your task, click on the task list. To delete it, click on the trash can icon.

6 When the task reaches the end date, it is automatically remove from the task list.

▶ **Task Management Screen Description**
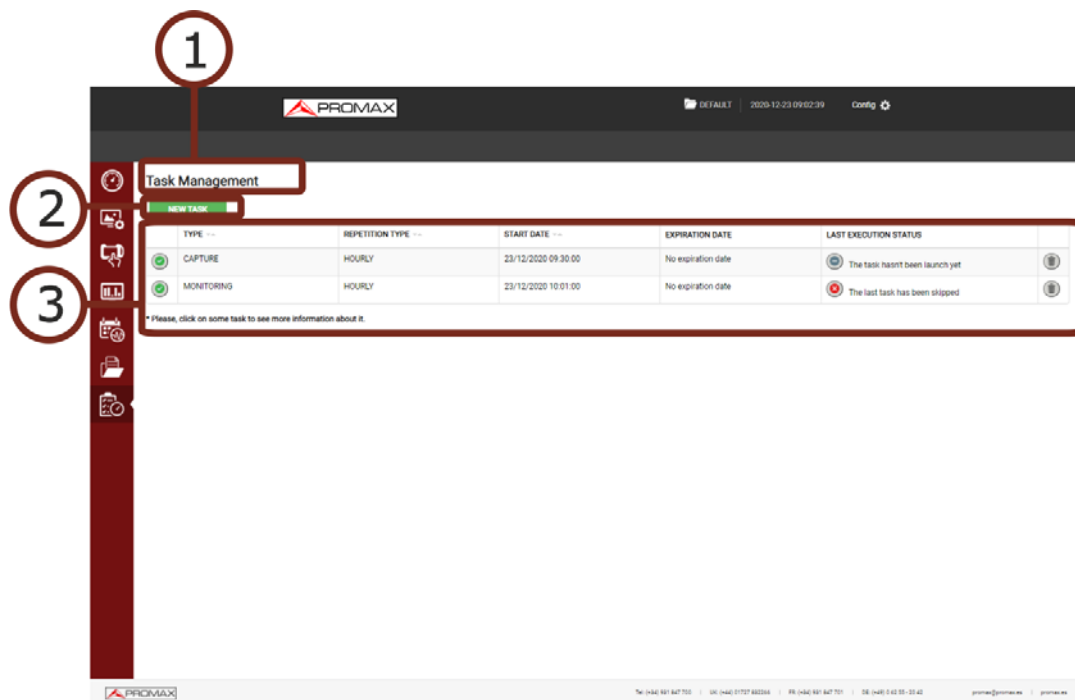
Figure 140. Task Management

1 Selected function (Task Management).

2 Button to set a new task.

3 Scheduled list task with info from each one: task type, repetition type, start date, expiration date and last execution status.

10.11   **Mask Monitoring***

*. This option is available for equipment with the "Mask Monitoring" option installed. Contact PROMAX for more information.

► **Description**

The Mask Monitoring function allows you to save a spectrum in a specific frequency band and time. This spectrum will work as a reference or mask when comparing to another spectrum.

According to the signal to be monitored, there are three types of detection:

■ FM

■ Minimum / Maximum

■ Mask Deviation

The equipment uses a spectrum captured by the user as a reference. A comparison is made between the reference spectrum and the current one, and if it exceeds the established margins, the system will notify the user.

The maximum number of records to store in the equipment's internal database is 500.000. How long it takes to reach this number of records depends on different factors, especially the Time Period. Once this amount is exceeded, oldest records are overwritten. Data can be exported from the monitoring history to a CSV file.

To access this screen, click on the Monitoring icon 🔲 .

Spectrum monitoring (radio FM)   S C A N

Spectrum monitoring (max/min)   S C A N

Spectrum monitoring (mask deviation)   S C A N

Spectrum monitoring (cross-polarization)   S C A N

▶	**Spectrum monitoring (4G/5G interference)**	S C A N

► Settings

1 In "Preferences", check date, time and time zone where the equipment is located (for more details refer to <u>"?Time & Date Options" on page 50</u>) or synchronise time with a NTP server (for more details refer to <u>"?NTP Options" on page 54</u>).

2 In "Preferences", label "Utilities", option "Moni. ddbb loc." select where the monitoring data will be stored: internal memory or hard drive (for more details refer to <u>"?Tools Options" on page 45</u>).

3 Check measurement units (for more details refer to <u>"?Measurement Options" on page 50</u>).

► Operation

1 In "Monitoring type" box select "Mask Monitoring".

2 In "SP Monitorings" dropdown menu, select an existing monitoring or create a new one by clicking "New". You can also import a monitoring (in zip format) by pressing "Import" (this monitoring must be previously created and exported using the "Export" option).

3 When creating a new mask monitoring, fill in these fields. If the system detects a monitoring process that was not properly completed, it will allow it to be reloaded for completion:

- Name: Name to identify your monitoring.
- Description: Monitoring description.
- Units: Measurement units (dBuV, ...).
- Sample Period (ms): It saves a spectrum each time period defined in this field.
- Band: Select between satellite or terrestrial.
- Num. Inputs: The input number to be monitored[*].
- Input: For each input fill in these fields:
  - Name: Name to identify this input.
  - Detection Type: Type of algorithm applied to detect differences between spectrums. According to selected detection type, settings will be different. Available detection types are:
    - **FM**: For FM Carriers.
    - **Max/Min**: To detect differences between maximum and minimum values.

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[*]. By default it is a single input but if the expansion option is installed, then you can select from 8 to 16 inputs (see option "8-16 Inputs" at annex).

-**Deviation**: Deviation over spectrum outline.

4 Settings for **FM detection type**:

- •Alarm Thresholds
  -Min Threshold: Signals that does not exceed this value will indicate that a station that had been previously detected has disappeared.
  -Max Threshold: Signals exceeding this value will be considered as an operating station.
  -Reiteration: Number of consecutive times that the threshold condition must be met to trigger the alarm.
- •Spectrum
  -Start Freq: Start frequency to monitor.
  -End Freq: End frequency to monitor.
  -Reference Level: It must be set to a proper level (according to the antenna) to avoid saturation or not viewing the signal.
  -Average Count: It allows the user to select the number of signal values to be used as average to establish the signal value that is displayed on the screen.
  -Resolution Filter: Bandwidth resolution filter.
  -Video Filter: It is the average of digital acquisitions of the signal. The lower this value, the faster the signal will be displayed but less clearly and vice versa.

5 Settings for **Max/Min detection type**:

- •Alarm Thresholds
  -Min Threshold: Minimum threshold below that it triggers the alarm. To disable check the checkbox next to it.
  -Max Threshold: Maximum threshold above that it triggers the alarm. To disable check the checkbox next to it.
  -Reiteration: Number of consecutive times that the threshold condition must be met to trigger the alarm.
- •Spectrum
  -Start Freq: Start frequency to monitor.
  -End Freq: End frequency to monitor.
  -Reference Level: It must be set to a proper level (according to the antenna) to avoid saturation or not viewing the signal.
  -Average Count: It allows the user to select the number of signal values to be used as average to establish the signal value that is displayed on the screen.
  -Freq. Analysis: It is the central frequency of the bandwidth being monitored. The system calculates it automatically from the BW Analysis parameter. The user can change this value.
  -BW Analysis: Bandwidth where the analysis is performed. The system calculates it automatically from the start and end frequencies. The user can change this value. If the bandwidth defined by the user is less than that calculated by the system, two black vertical lines will appear on the graph to delimit it.
  -Resolution Filter: Bandwidth resolution filter.

-Video Filter: It is the average of digital acquisitions of the signal. The lower this value, the faster the signal will be displayed but less clearly and vice versa.

6 Settings for **Deviation detection type**:

• Alarm Thresholds
-Min Threshold: It indicates how many dB below the reference mask before trigger the alarm.
-Max Threshold: It indicates how many dB above the reference mask before trigger the alarm.
-The other parameters are the same that **Max/Min detection**.

7 After setting the parameters, press "*Acquire references*" to acquire a reference spectrum according to the settings.

8 After a few seconds the reference spectrum will appear. If the spectrum is not right, you can modify any parameter and press "Acquire references" again until you obtain a valid reference spectrum.

9 Once a proper reference spectrum has been obtained, save by pressing "Save".

10 Saved reference spectrum will appear on the box "Mask Monitorings".

11 To start a mask monitoring, select a reference spectrum in "Mask Monitorings", select an input and press "Start Monitoring" to start.

12 Monitoring screen shows measurements and alarms from the last cycle. When clicking on a channel it will show some additional info.

13 Alarms are notified by sending e-mails to addresses from the e-mailing list. In order for the equipment to send e-mails, the mail service must be configured in Preferences, SMTP label (for more details refer to "?SMTP Options" on page 54).

14 To stop press on "*Stop Monitoring*" or cancel remote control.

15 All saved data it is available on the "Historical Monitoring" screen.

► Screen Description (FM Detection type) (1/2)
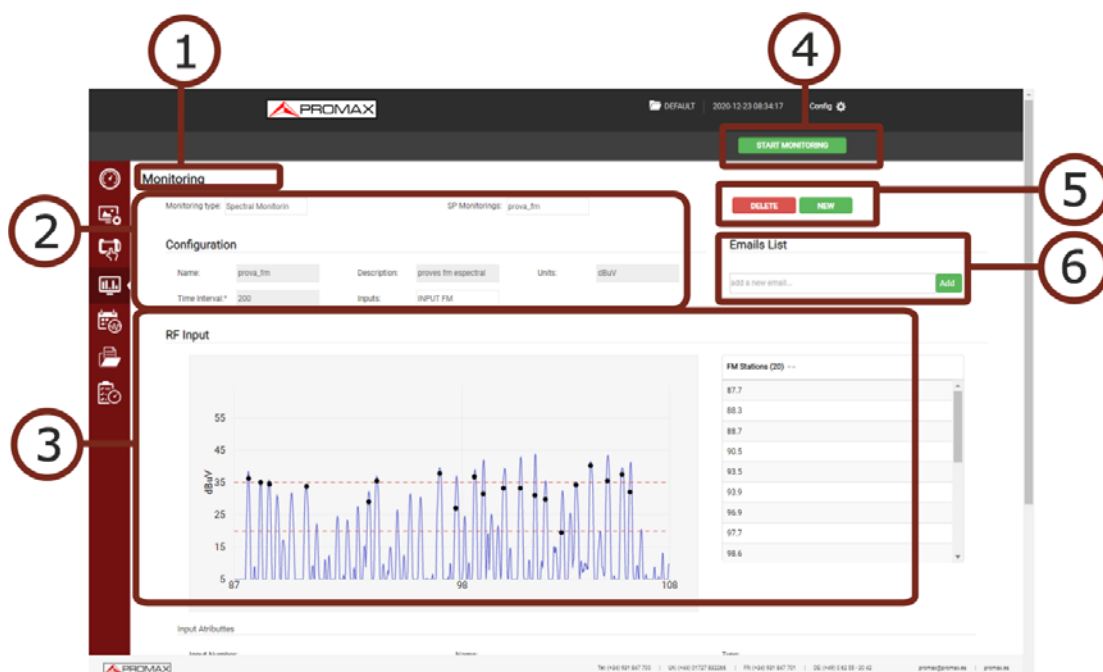
Figure 141. Monitoring Creation / Edition

1 Selected function (Monitoring).

2 Monitoring selection. In "Monitoring Type" select Mask Monitoring. In "Monitorings" box select monitoring to start (it must be a monitoring previously created in order to show here). Below there is a box with the monitoring description.

3 Reference spectrum, thresholds (red horizontal lines) and detected stations (black dots).

4 Start / Stop monitoring.

5 The "Delete" button deletes the selected monitoring and the button "New" creates a new monitoring.

6 It shows a list of e-mails. When an alarm is triggered, a notification is send to each one of these e-mails. It allows you to add e-mails in the box "add a new email". To remove it press on the cross next to the e-mail. Parameters to set the e-mail server are in the equipment's "Preferences" menu, "SMTP" option.

► Screen Description (FM detection type) (2/2)
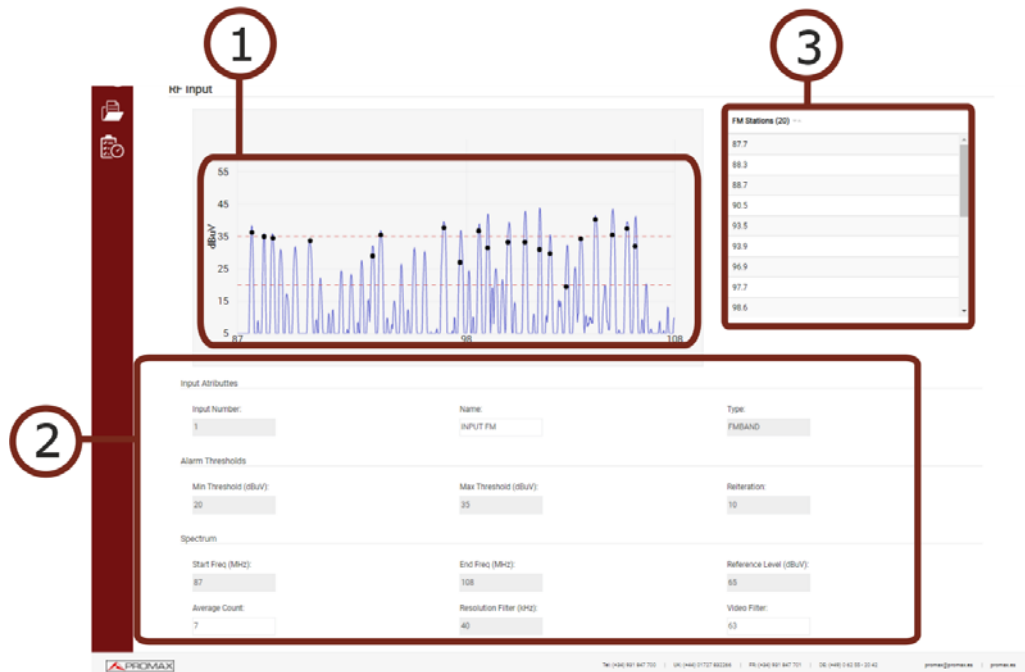
Figure 142. Mask Monitoring Creation / Edition

1 Reference spectrum, thresholds (red horizontal lines) and detected stations (black dots).

2 Settings parameters for reference spectrum.

3 Detected stations (for FM detection). For other type of detection it shows: Thresholds (for Max/Min detection); Deviation (for Deviation detection).

► Screen Description
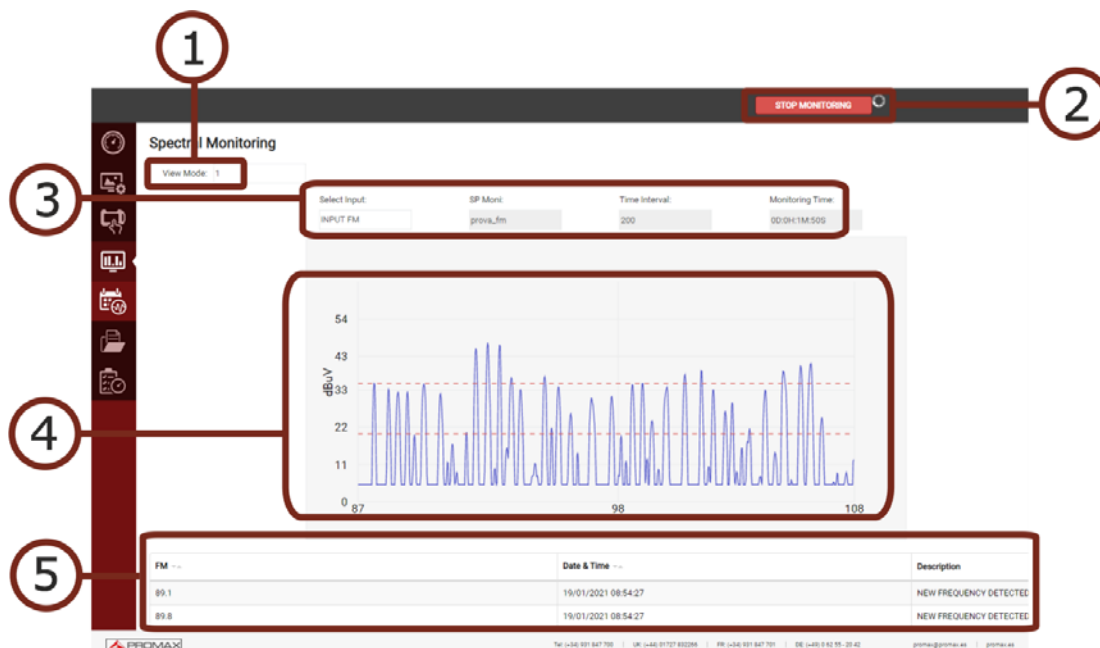
Figure 143. Mask Monitoring in Operation (FM Detection)

1 View Mode selection[*].

2 Start / Stop monitoring.

3 Monitoring parameters: Selected input, monitoring name, time period (ms) and time elapsed since monitoring start.

4 Spectrum at monitoring frequency band for the detection type selected (in this case for FM detection). Horizontal red lines are the upper and lower threshold.

5 Alarm window. It shows alarm data from the last cycle with a description and date and hour when it was detected. Only it shows active alarms. When the condition that trigger the alarm no longer met, then this alarm disappears in the next cycle, although it is stored in the database and can be consulted through the historical monitoring function.

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[*]. By default it is a single input but if the expansion option is installed, then you can view up to 9 inputs at the same time on screen (see option "8-16 Inputs" at annex).

10.12	**Mask Historical Monitoring**[*]

[*]. This function is available only for equipment with "Mask Monitoring" option installed. Contact PROMAX for more information.

► Description

Historical Monitoring screen shows data obtained during monitoring. It stores all data about alarms and system messages like memory problems, short-circuits, etc.

Historical monitoring can be consulted even if monitoring is working.

To access this screen, click on the historical Monitoring icon .
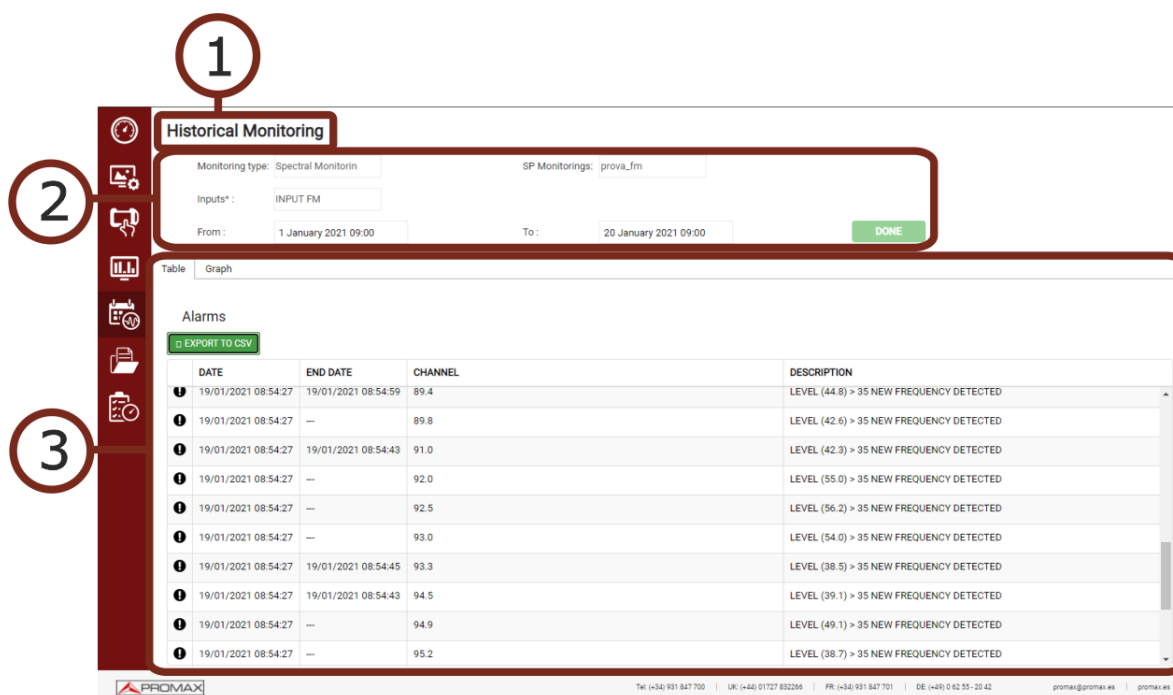
► Operation

1 In "Monitoring type" box select "Mask Monitoring".

2 In the "Mask Monitoring" box select the monitoring from which you want to obtain data.

3 In the "Inputs"[*] box select the input from which you want to obtain data.

4 Select the start and end date and time for the monitoring data query. It must be the local date and time for equipment.

5 Press "Done" and wait a few seconds to visualize data. All alarms triggered are shown on screen, with start and end date, channel and a description.

6 When clicking on start / end date on an alarm, it shows the spectrum graph when the alarm was triggered. When pressing on previous or next arrows you can see up to 50 graph spectrum previous and after to the alarm moment.

7 To export alarm data to a CSV file, press on "Export to CSV".

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[*]. By default it is a single input but if the expansion option is installed, then you can select from 8 to 16 inputs (see option "8-16 Inputs" at annex).

▶ **Screen Description: Historical Mask Monitoring**

Figure 144. Data table from Historical Mask Monitoring

1 Selected function (Historical Monitoring).

2 Boxes to select query parameters from the historical data:

- •Monitoring Type: Select "Mask Monitoring".
- •Monitoring: Select monitoring.
- •Input: Select input.
- •From / to: Select date range.
- •Done: Press to run query.

3 Data table / Data graph. Data table shows date start and data end for each alarm. When clicking on any data and hour it shows the spectrum graph in that time moment (see next figure). Measurement units are the same than the units selected when creating a monitoring.

► **Historical Mask Monitoring by Detection Type**
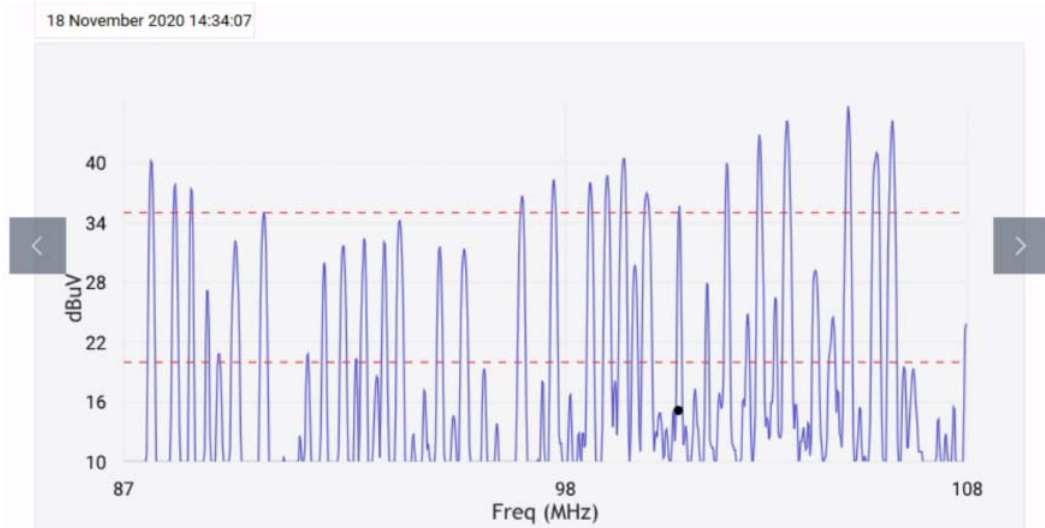
Figure 145. Spectrum Graph Monitoring (FM detection)
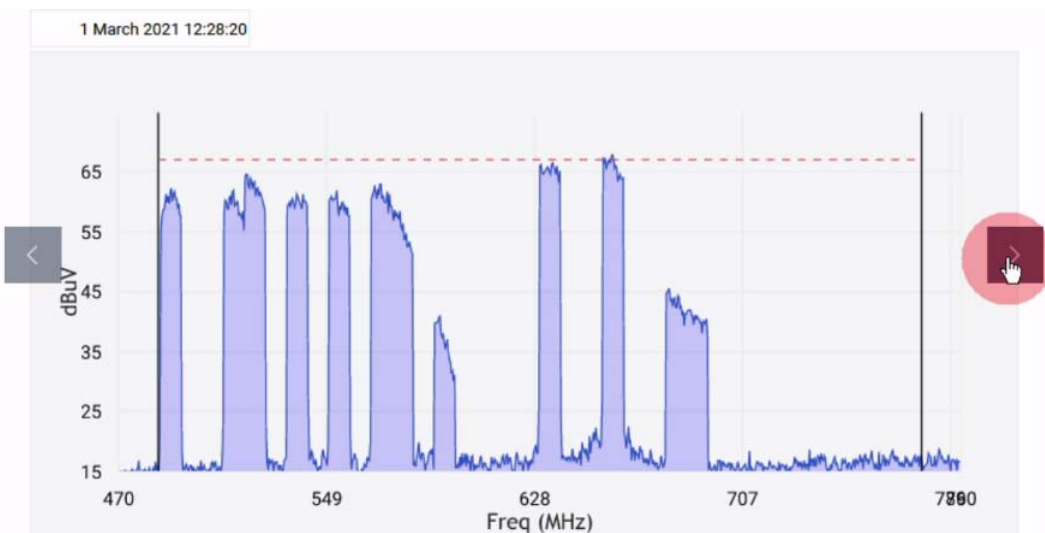
Figure 146. Spectrum Graph Monitoring (Max/Min detection)
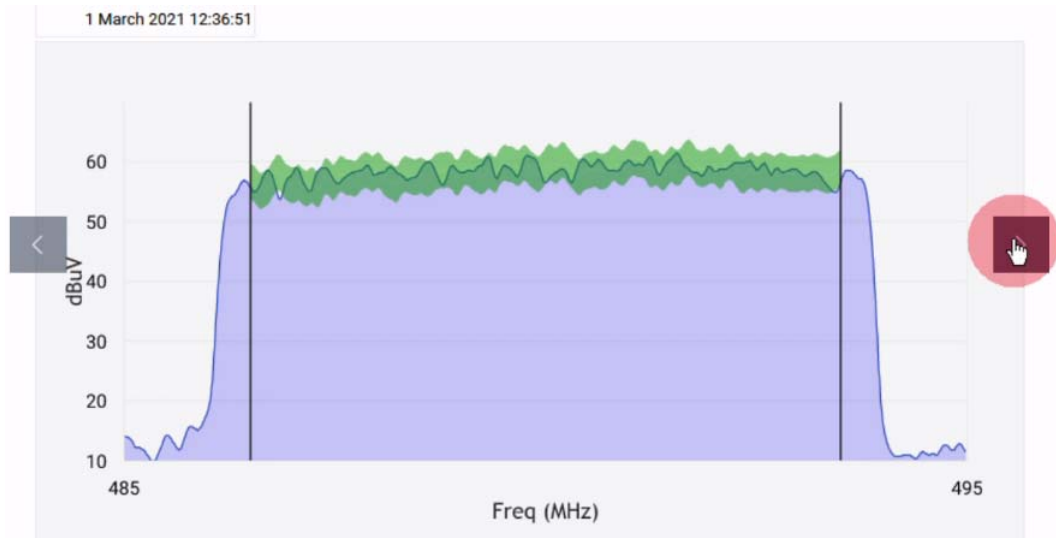
Figure 147. Spectrum Graph Monitoring (Deviation Detection)

11 CONNECTING TO EXTERNAL DEVICES

11.1　Introduction

The equipment can interact with external devices, sharing information through its interfaces. Connection types are:

- Input/output data via Ethernet port (IP CTRL).
- Input/output data via USB port.
- Video/Audio digital output via **HDMI™** port.
- Video/Audio analogue input via **V/A** port.
- DiSEqC, SCD/EN50494 standard (also known as SatCR) and SCD2/EN50607 standard (also known as JESS) interface via **RF** connector.
- CAM modules input via Common Interface slot[*].
- TS-ASI Input/Output via BNC connector[**].

Next is described each of these interfaces and their interaction with external devices.

11.2　USB Port

Devices that can connect the meter via USB port are:

- USB flash drive.
- USB WiFi adapter[***] ("dongle").
- GPS signal receiver.
- Keyboard (you need to connect a USB hub between the keyboard and the equipment).

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[*].　only available for **PROWATCH Neo 2**
[**].　only available for **PROWATCH Neo 2**
[***].　only the ones approved by PROMAX

11.2.1   USB Flash Drive

This connection allows the user to copy files (screenshots, channel plans, dataloggers, DiSEqC commands and others) and export/import installations from the equipment to the USB and vice versa.

▶ **To copy some specific data from an installation**

1 Connect the USB stick to the USB equipment port.

2 USB icon should appear on the top right corner of the equipment. This icon indicates that an USB stick has been detected at the port.

3 Press the Installations key ▭ (key F) and check the installation to download some of its data.

4 Press the key (F2): Manage to access the data of the selected installation.

5 Press the key (F1): Filter by type to select the type of list to view (list of all the files, only screenshots, only channel plans, only dataloggers or only DiSEqC commands).

6 Select the files from the list to be copied on the USB memory stick, by pressing enter or by pressing (F2): File and selecting "Mark All" (it selects all files on the list displayed).

7 Once files are selected press (F2): File and select the "Copy to USB" option. This option is enabled only if it detects that there is an USB connected to the equipment and if any file has been selected.

8 It shows a progress bar and a message informing that files are being copied to the USB.

9 When finish you can remove the cable with the USB stick memory directly from the equipment and connect it to a computer to view the files copied.

10 Default files are copied to the root directory of the USB memory. Screenshots appear with PNG extension and data with XML extension.

▶ **To export one or more complete installations**

1 Connect the USB stick to the USB equipment port.

2 USB icon should appear on the top right corner of the equipment. This icon indicates that an USB stick has been detected at the port.

3 Press the Installations key ▭ (key F) and check the installations to export.

4 Press the key `F4`: Tools and select Export to USB.

5 A progress bar and a message indicates that the files are being copied to the USB. The files are copied to the root directory of the USB in ZIP format.

6 When finished, the cable can be extracted directly with the USB stick and connect it to a computer to display the copied files.

7 Unzip the installation file to access the data.

▶ **To import one installation**

1 Connect the USB stick to the USB equipment port.

2 USB icon should appear on the top right corner of the equipment. This icon indicates that an USB stick has been detected at the port.

3 Press the Installations key ▱ (key F).

4 Press de key `F4`: Tools and select Import from USB.

5 A drop-down menu shows the installations identified in the USB memory. An installation can be imported if it has the same folder structure than when exporting. Select the installation to import from those available.

6 The import process starts. If the name of the installation matches with an existing one, it gives a warning before import.

11.2.2 USB WiFi adapter ("dongle")

This connection is necessary for the use of the equipment as a WiFi meter (for more details refer to "WIFI MONITORING" on page 171) or to connect to a WiFi access point and use the meter remotely with the webControl tool (for more details refer to "WEBCONTROL" on page 204).

11.2.3 GPS Signal Receiver

The GPS Signal Receiver is needed for the "Signal Coverage" tool. This tool takes measurements linked to a geographic position determined by the GPS receiver. Later on, all this data, measurements and GPS position can be downloaded to a PC and exported to a file for later analysis (for more details refer to "Signal Coverage" on page 115).

11.2.4   Keyboard and Mouse

A keyboard is necessary to navigate along the user's interface in local mode (keyboard must be connected to the USB port of the equipment through a USB hub).

The keyboard and the mouse cursor are necessary to use in remote mode from the webControl software. When the mouse clicks on a certain area of the screen it is equivalent to the touch of your finger on the touch screen of a portable meter. In this way with the cursor you can open menus, select frequencies, etc. (for more details refer to <u>"Mouse" on page 14</u>).

The following figure and table and the following sections describe the different actions that can be performed with the keyboard.

Keyboard	Action	Equivalent key on portable meter
Cursor keys	4 directions.	
Enter	It validates selected option.	
Key F (short press)	Access to Installations folder.	
Key F (long press)	Access to Preferences.	(1s)
Key C (short press)	Access to General Settings.	
Key C (long press)	Access to Video / Audio Settings.	(1s)
Key M	Access to Measurement Mode. Pressing repeatedly provides access to a different view within the same mode.	
Key S	Access to Spectrum Analyzer Mode. Pressing repeatedly provides access to a different view within the same mode.	
Key T	Access to TV Mode. Pressing repeatedly provides access to a different view within the same mode.	

Keyboard	Action	Equivalent key on portable meter
Key P	Screenshot.	
Key F1	Access to F1 softkey menu.	
Key F2	Access to F2 softkey menu.	
Key F3	Access to F3 softkey menu.	
Key F4	Access to F4 softkey menu.	

11.3 Ethernet Port

▶ Description

This connection allows communication between the equipment and a device via an Ethernet cable using the IP CTRL port.

You can communicate the equipment in different ways:

- Through the NetUpdate software by PROMAX.
- Through a web browser using the webControl tool by PROMAX.
- Through a software that allows to send remote control commands (such as hyperterminal or PuTTY).
- Through SFTP protocol (using software such as Filezilla).

▶ Settings for Ethernet connection

1 Use the equipment in local mode to access settings menu.

2 From the equipment access Preferences by pressing "Installations" key 🗁 (key F) for 1 second.

3 Go to "Network" where the parameters to login into a network are.

4 Select DHCP ON, if you connect the equipment to a network with a router or server with DHCP protocol enabled. Then the network will set automatically the parameters in the equipment. If not, follow the next steps to set the equipment.

5 On "IP Address" box enter the equipment IP. Use an IP in the same range used by the local network (if you do not know these data see "local network data"). For instance, if the IP for your PC is 10.0.1.18, the equipment should have a free IP in the same range, like 10.0.1.50.

6 In the "Mask" box, enter the mask value, which should be the same as the one used by the local network (usually 255.255.255.0).

7 To connect to the equipment from an external network, fill in the "Gateway" with the info obtained from the local network.

8 Press on "Save" and then "Exit" to save changes and exit.

► **Find out Local Network Data**

1 To obtain data from the Ethernet network where your equipment is connected, you should use a PC connected to this same network.

2 From the PC click on Start menu in Windows. On the Search box write CMD and press Enter.

3 In opens a command line in a window. Write IPCONFIG and press enter.

4 It displays a window with some lines with info. On line "Local Network Ethernet Adapter" see line "IPv4 Address". This is the local IP for your PC. Write down this IP. Also write down "Subnet Mask" and "Default Gateway". This data is needed to configure the equipment.

11.3.1	**NetUpdate Connection**

► **Description**

The NetUpdate software is available for free on the download page at the [PROMAX website](#).

NetUpdate has the following functions:

- Update the firmware of the meter.
- Open/Receive/Save/Print data files captured with the Datalogger function.
- Transmit/Receive/Edit/Save channel plans.
- Create/Edit channel plans.

For more information about the NetUpdate program, see the user's manual, which is available on the PROMAX website.

| ▶ | **How to create channel plans using NetUpdate4** | S C A N |
| ▶ | **How to generate a measurement report with NetUpdate4** | S C A N |

▶ Operation

1 Install the NetUpdate program on the PC. All permissions requested during the installation must be approved for a correct operation of the program.

2 Switch off the equipment. Use an Ethernet cable to connect the equipment's IPCTRL port to a switch or to the PC's ethernet port. Switch on the equipment.

3 Open the NetUpdate program. In the "Select Port" box select "Ethernet" option and press "Detect".

4 A window will appear where you must enter the same IP that you have set in the equipment (in our example it would be 10.0.1.50) and then press OK.

5 If connection is successful, a confirmation window will appear and you will be able to see the meter data in the main NetUpdate window (for details about NetUpdate program, download the manual from the PROMAX website).

11.3.2 webControl Connection

The webControl function allows you to connect remotely to the equipment in order to visualize measurements and operate on it. The equipment must be connected to an Ethernet network. To connect to equipment from a remote access device use just a standard web browser.

WebControl tools are:

- Measurement and Spectrum: It shows spectrum and measurement from the tuned channel.
- TV Parameters: It shows data, video and audio from the tuned channel.
- Console: It emulates a portable equipment and allows you to interact with it in first person.

■ Quality Signal Monitoring: It monitors a signal according to some parameters selected by the user.

■ Historical Monitoring: It shows data from monitoring and they can also be exported.

■ Installations Management: It manages installation files and creates channel plans.

■ Task Management: It allows the user to schedule some tasks.

For more information about webControl refer to .

11.3.3   Remote Control Command Connection

► **Description**

The design of this meter is based on a microprocessor which allows data to be exchanged between the meter and a remote controller (usually a personal computer). By this way, data can be obtained from the equipment and also control it remotely.

This protocol is controlled by software using a virtual serial port over an Ethernet port. Data and information are exchanged using messages consisting of ASCII alphanumerical characters. This method ensures easy carrying between different types of personal computers.

► **Operation**

1 Install a remote communication program to send commands, such as PuTTY or Hyperterminal.

2 Use an Ethernet cable to connect the meter's IPCTRL port to the PC's ethernet port.

3 Run the communication remote program. It should appear a window to enter the meter's IP (in our example it would be 10.0.1.8).

4 The meter's communication port is 2222. Enter this number in the box "port" at the remote communication program.

5 Select connection type: Telnet and press OK.

6 It should appear a window with a command line where you can write and send remote control commands (download <u>"Remote Control Commands"</u> <u>from PROMAX website</u> for more details).

11.3.4   **SFTP Protocol Connection**

► **Description**

SFTP (SSH File Transfer Protocol) is a protocol to transfer and edit files which uses SSH to provide security into the data stream.

► **Operation**

1 Install a program to connect via SFTP (like FileZilla) in your device.

2 Through an Ethernet cable connect the IPCTRL port from the equipment to a ethernet port.

3 Open the program for remote communication. Enter these connection settings:

- User: Promax
- Password: Monitoring2019
- IP: Meter's IP (IP by default is 10.8.8.188)
- Port: 22

4 The command console may show first connection attempts and finally connection succeed.

5 Once is connected you can access several folders and download its files.

11.4   **HDMI™ Interface**

HDMI™ (High-Definition Multimedia Interface) is a technology for transmitting uncompressed digital data. HDMI™ technology supports, on a single cable, any TV or PC video format, including standard, enhanced, and high-definition video; up to 8 channels of digital audio.

This connection allows the equipment to interface with other High Definition equipment. It can also be very useful to check proper operation of the client's TV while on a service call. Everything that can be seen on the meter's screen is available through the HDMI™ technology.

This connection allows you to switch between the image from the meter to an auxiliary monitor by following these steps:

1 Connect the HDMI™ cable to the HDMI™ output connector, ensuring that the plug is fully inserted.

2 Connect the opposite end to the auxiliary monitor where video and audio of the equipment will be played.

11.5   Input Jack Connector

The V/A input connector allows connecting a video/audio analogue input signal. This connection allows the user to view an image on the meter screen coming from an external source by following these steps:

1 Connect the supplied jack 4V cable to the video/audio input connector, ensuring that the plug is fully inserted.

2 Connect the opposite end (RCA connector) to the source of video/audio.

3 Switch on the meter and select terrestrial band and analogue signal.

4 Select TV mode 🔲 and press key [F3]: Input.

5 From the menu, select "External". A message shows that the external input has been selected.

6 After a few seconds, the input image will be displayed on screen.

7 With the option [F4]: Aspect, you can select the aspect ratio of the image, between 4:3 and 16:9.

NOTE: If the equipment is displaying an external analogue video, it will not switch to internal video mode anymore when that external video is disconnected or lost.

11.6   RF Connector

11.6.1   DiSEqC Commands

The RF connector allows controlling an antenna using DiSEqC commands. DiSEqC (Digital Satellite Equipment Control) is a communication protocol between the satellite receiver and the installation accessories of satellite (switches, LNBs, etc.) proposed by Eutelsat, in order to standardize the diversity

of switching protocols (13 to 18 V, 22 kHz) and meet the needs of the installations for the reception of digital TV.

1 Connect the RF cable to the RF connector for the input signal of the equipment.

2 Press the **Spectrum** key (key S) to access the spectrum analyzer mode.

3 Press the **Settings** key (key C) and select the satellite band.

4 From the **Settings** menu, select the polarization (horizontal/vertical) and the satellite band (high/low).

5 If necessary, enable the **Supply output** and select the supply voltage for the LNB.

> **NOTE:** When tuning by channel is selected, polarization, satellite band and supply output cannot be changed, because these parameters are determined by the channel plan.

6 Select the option **DiSEqC mode**.

7 Two new functions appear on the softkeys: Command [F3] and Software [F4]. DiSEqC programs appear classified in categories or folders.

8 Select the command or program and press Enter to send it to the antenna. These commands or programs allow the user to control an antenna (for more information about DiSEqC commands and programs download document from PROMAX website).

> ▶ **How to align a dish via DiSEqC**   S C A N

11.6.2 SCD / EN50494 (SatCR) Commands

By means of function SCD/EN50494 (international standard, also known as SatCR) it is possible to control the devices of a TV satellite installation that are compatible with this standard, which allows to concentrate downlink frequencies (slots) by an only cable. By this way each user using a slot can tune and decode any signal present in the satellite.

1 Connect the RF cable to the RF connector for the input signal of the equipment.

2 Press the **Spectrum** key (key S) to access the Spectrum analyzer mode.

3 Press the **Settings** key (key C) and select the satellite band.

4 Select the polarization (horizontal/vertical) and the satellite band (high/low).

5 If necessary, enable the **Supply output** and select the supply voltage for the LNB.

NOTE: When tuning by channel is selected, polarization, satellite band and supply output cannot be changed, because these parameters are determined by the channel plan.

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6 In the option SCD/EN50494, select ON to enable it. It appears the 🟧 icon at the top right corner.

7 Also in the SCD/EN50494 option, select **Configuration** to access SCD/EN50494 parameters.
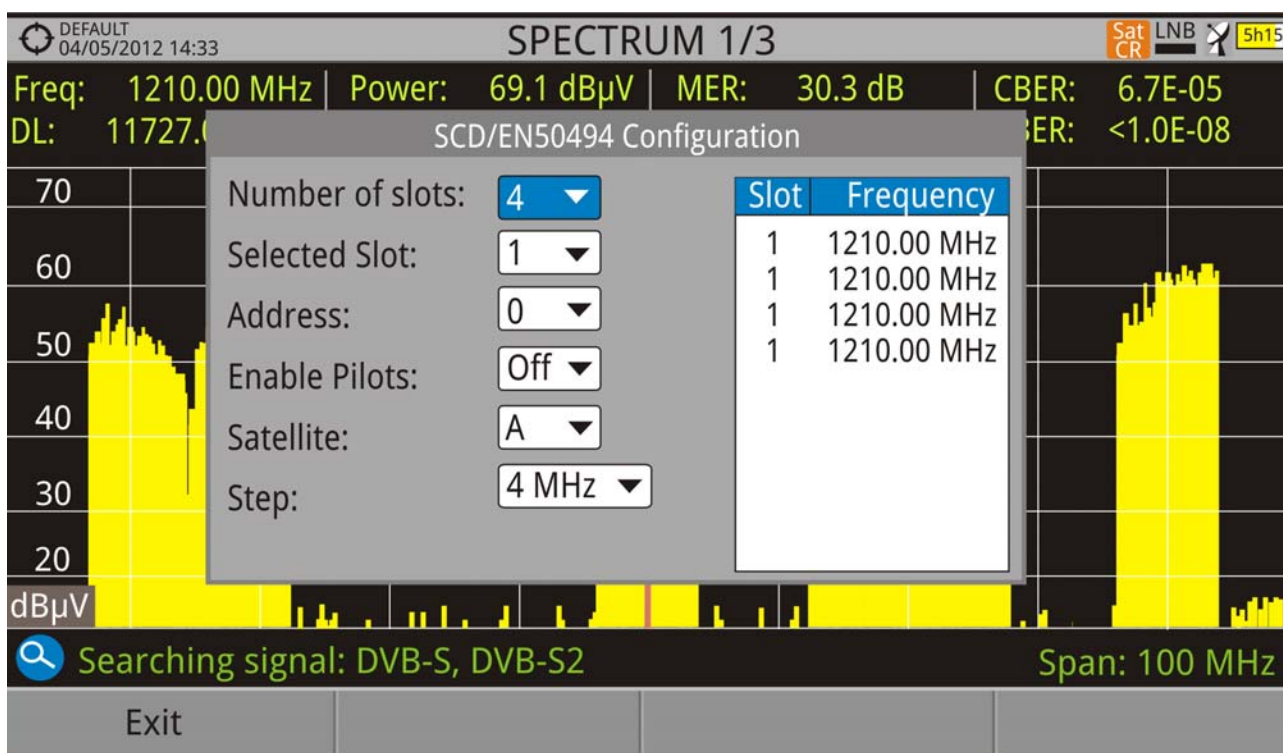
Figura 148.

The configuration window shows the options that user can modify: number of slots, slot selected, device address, pilot signal activation (when activating the SatCR device located in the headend, it emits a pilot signal with constant level for each downlink frequency to identificate available channels), selected satellite and frequency step. For each type of slot number unit there is a list of independent frequencies to select. The user may have separate frequencies for 2, 4 or 8 slots units and these values are not lost when switching from one type to another.

8 Once SCD/EN50494 is configured, the user can select the slot by the "Tuning" key.

11.6.3 SCD2 / EN50607 (JESS) Commands

Through the SCD2/EN50607 (internation standard, also known as JESS) function is possible to control the devices of a TV satellite installation that are compatible with this standard. This technology has two main functionalities: one for configuring headends, and another for configuring sockets. This technology requires bidirectional DiSEqC capabilities.

Thanks to its bidirectional DiSEqC capabilities, the meter can automatically read the configuration from any SCD2/EN50607 compatible unit connected to it. In case that no compatible device is detected, the meter allows the user to make a blind configuration of the unit without any confirmation other than spectrum reference.

For information about JESS technology, developed by JULTEC, refer to its website (http://jultec.de/).

1 Connect the RF cable to the RF connector for the input signal of the equipment.

2 Press the Spectrum key 〽 (key S) to access the spectrum analyzer mode.

3 Press the Settings key ⚙ (key C) and select the satellite band. From the Settings menu, select the polarization (horizontal/vertical) and the satellite band (high/low).

4 If necessary, enable the Supply output and select the supply voltage for the LNB.

> **NOTE:** When tuning by channel is selected, polarization, satellite band and supply output cannot be changed, because these parameters are determined by the channel plan.

5 In the option SCD2/EN50607, select ON to enable it. It appears the JESS icon at the top right corner of the screen.

6 Now the SCD2/EN50607 option shows a new menu. Select Configuration to access the configuration parameters. The user can select the power, central frequency, tone beacon and satellite for each band. The user can also select the number of user bands and the available satellites through the option "Configuration" on key [F2].

Figura 149.

7 Also from option SCD2/EN50607, select Socket to access the configuration of socket. The user can select the user bands that should be enabled for the socket and to send them to configure the socket.

Figura 150.

8 Once it is configured, the user, through the [F1] key "Tuning" can select the user band.

9 User frequency tuned is stored for each User band (UB) and it is restored each time the multiswitch is being configured.

NOTE: When not detecting any SCD2 receiver, the function enters in a more basic mode, allowing sending configuration commands even with nothing connected. In that mode, the user can debug cable issues or even SCD2 units problems.

NOTE: For special devices that use non-standard commands, it has been added a channel bandwidth for every user band.

11.7 Common Interface Slot*

*. only available for **PROWATCH Neo 2**

This connection enables the conditional access (decryption) for encoded digital TV signals.

This technology supports all those decryption systems for which a valid CAM module exists, according to DVB-CI, with the corresponding subscriber card.

The equipment by means of Common Interface method offers the possibility of supporting various conditional access systems, so that video and/or audio broadcast by encrypted services (scrambled TV for subscribers) may be decoded following the SimulCrypt model. It provides a standard connector to insert CAM modules (Conditional Access Module), which allows a specific management for each codification system.

SimulCrypt is a process that supports various parallel conditional access systems, together with the encryption algorithms specified by DVB-CSA (Common Scrambling Algorithm) to control access to pay-TV services. The SimulCrypt broadcasts Transport Stream contains keys for various conditional accesses, thereby allowing reception by more than one type of decoder.

NOTE: The insertion of a CAM module or a SMART-CARD in a wrong position might produce the instrument malfunction and could generate damages to the equipment.

▶ **Operation**

1 Insert the subscriber Smart-Card* in the CAM** module.

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*. Smart-Card not included.
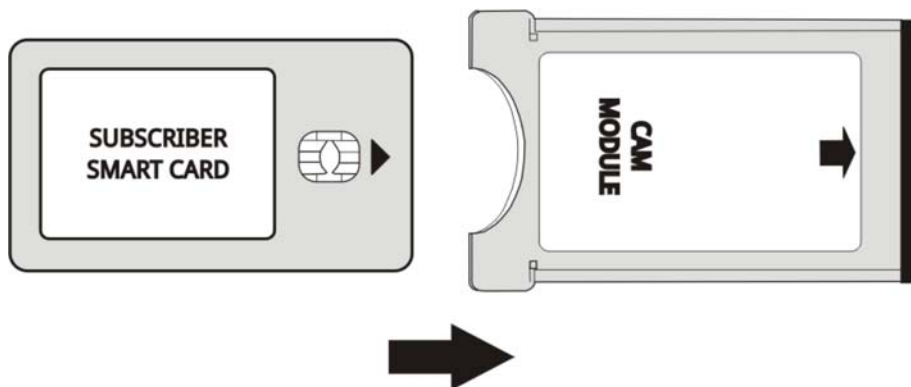
Figura 151.

2 Insert the CAM module in the Common Interface slot of the equipment. The CAM module connector is located on the equipment rear panel. Place the instrument on a stable surface and insert the module so the printed arrow appears on the visible upper face, pressing until the extractor mechanism button becomes visible.

3 If the equipment detects the CAM module it shows a confirmation message.

4 Press the Settings key ⚙ (key C).

5 Seleccione la opción de interfaz común.

6 By means of this option the user can navigate through the CAM module menu. Each time an option is selected, the waiting icon appears, until the module allows accessing the next menu or option.

7 To extract an inserted CAM module, press the button from extractor mechanism and remove the module. If the equipment detects the CAM module extraction it shows a confirmation message.

11.8 TS-ASI Port*

*. only available for **PROWATCH Neo 2**.

It is an asynchronous serial interface. It is the serial standard used for MPEG-2 TS, in multimedia equipment interconnection:

- Synchronous 270 Mbps data flow (up to 218 Mbps payload).
- Differential signal over coax interface.
- It allows intermediate node test in broadcast and distribution infrastructures.

**. CAM module not included.

11.8.1 TS-ASI Input

The TS-ASI option is a key feature. You can monitor and analyze streams coming from satellite receivers, transport stream players, multiplexers, etc... It automatically detects whether the stream is composed of 188 or 204 bytes.

▶ **Operation**

1 Press the **Settings** key ⚙ (key C) to access the settings.

2 Select the **Decoder TS Input** option. It shows up a menu to select the transport stream coming into the equipment between the RF Demodulators, IPTV and the ASI Input.

3 The **RF Demodulators** option (this option is available only if RF is selected as a Signal Source) extracts the TS from the RF signal by means of the internal RF demodulator. The RF signal can come from digital terrestrial, satellite or cable.

4 The **IPTV** option (this option is available only if IPTV is selected as a Signal Source) extracts the TS from the IPTV signal.

5 The **ASI Input** option gets the TS directly through the ASI-TS input connector.

11.8.2 TS-ASI Output

It can transmit in packet mode or burst mode. User can use the transport stream received by the equipment to feed the signal to other devices as well through the TS-ASI output.

▶ **Operation**

1 Press the **Settings** key ⚙ (key C) to access settings.

2 Select the **ASI Output** option. It allows the user to select the signal source for the TS-ASI packets going out through the ASI Output. User can select among Off, IPTV, RF demodulators and ASI Input. By this way, the transport stream can feed another device.

3 The **Off** disables the ASI Output. If the **RF Demodulators** option (this option is available only if RF is selected as a Signal Source) is selected, the signal through ASI Output is the TS extracted from the RF signal by means of the internal RF demodulator. The RF signal can come from digital terrestrial, satellite or cable. If the **IPTV** option is selected (This option is available only if IPTV is selected as a Signal Source), the signal through **ASI**

Output is the TS extracted from the IPTV signal. The ASI Input option enables the TS-ASI packets coming from ASI input connector go out through the ASI output connector.

12 SPECIFICATIONS PROWATCH Neo +/2 *

12.1 General

▶ **Inputs and Outputs**

Parameter	Value	Additional Data
RF Input		
Input Connector	F male	75 Ω
Maximum Signal	130 dBµV	
Maximum Input Voltage	50 V rms	DC a 100 Hz
	140 dBµV	Protected up to 30 seconds
Analogue Video Input		
Input Connector	Multipole Jack	Zin=75 Ω
Sensibility	1 Vpp	75 Ω; positive video
Analogue Audio Input		
Input Connector	Multipole Jack	Zin=10k; same V/A input multipole jack
Digital Video / Audio Output		
Output Connector	HDMI™	1080p Resolution
Interfaz TS-ASI I/O (PROWATCH Neo 2)		
Connector	BNC Female	75 Ω
USB Interface 2.0		
Connector	USB type A	
Features	Mass Storage Host	Can read and write on a pendrive USB CDC
	USB CDC	CDC: Communication device class
IP Interface (IPTV) (PROWATCH Neo 2)		
Connector	RJ45	Labeled IPTV
Protocol	UDP / RTP	
IP Interface (control IP)		
Connector	RJ45	Labeled IP CTRL
Type	Ethernet 10 / 100 Mbps	Ethernet connection is designed to work through a switch. We do not guarantee direct connection through a cable.

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*. This specifications are for models **PROWATCH Neo +** and **PROWATCH Neo 2**. When a specification is for one specific model then its name appears intro brackets.

Parameter	Value	Additional Data
Communication Software	webControl	Functions: Measurement and spectrum, TV parameters, remote console, monitoring, historical monitoring, installation management and task management.
	Netupdate	Functions: Installation management and firmware update.
IP by default	10.8.8.188	10.0.6.198 for firmware versions prior to 26.8
WiFi Interface		
Type	Wireless standard 802.11 abgn	Dongle-Wifi connected to USB port
		Dongle must be validated by PROMAX
External Unit Power (through the RF input connector)		
Terrestrial Supply	External	
	5 V	Up to 500 mA
	12 V	Up to 500 mA
	24 V	Up to 250 mA
Satellite Supply	External	Up to 500 mA
	5 V	Up to 500 mA
	13 V	Up to 500 mA
	15 V	Up to 500 mA
	18 V	Up to 500 mA
22 kHz Signal Voltage	0.65 V ± 0.25 V	Selectable in Satellite band
22 kHz Signal Frequency	22 kHz ± 4 kHz	Selectable in Satellite band
DiSEqC Generator	DiSEqC 2.2 (DiSEqC 1.2 commands implemented)	DiSEqC is a trademark of EUTELSAT
SATCR / SCD (EN50494)	Available	DiSEqC 1.2
dCSS / SCD2 (EN50607)	Available	Compatible with LNB SKY UK According DiSEqC 2.x

►Internal Storage

Parameter	Value	Additional Data
(PROWATCH Neo +)	6 GB	Memory for measurement protocols, screenshots, monitoring and service recording
(PROWATCH Neo 2)	1 TB	Hard drive For measurement protocols, screenshots, transport stream recordings, monitoring and service recording

►Mechanical Features

Parameter	Value	Additional Data
Dimensions	482 x 44,4 x 381 mm	(W) x (H) x (D)
Rack Units	1U	
Weight (PROWATCH Neo +)	2.9 kg	Without installed options
Weight (PROWATCH Neo 2)	3.5 kg	Without installed options

►**Power Supply**

Parameter	Value	Additional Data
External Voltage	110 - 230 V AC	
Consumption	40 W	

►**Operating Environmental Conditions**

Parameter	Value	Additional Data
Altitude	Up to 2000 m	
Temperature Range	From 5 °C to 45 °C	Automatic disconnection by excess of temperature
Max. Relative Humidity	80%	Up to 31°C; decreasing lineally up to 50% at 40 °C.

> **NOTE:** Equipment specifications are set in these environmental operating conditions. Operation outside these specifications is also possible. Please check with us if you have specific requirements.

►**Included Accessories**

Parameter	Value	Additional Data
1x CA-005	Mains cord	
1x 0 CO6861	Aero SMA/f-BNC/m adapter (f/m)	
1x AW010	Dongle WiFi-USB dual band	
1x AM071	WiFi 4G/5G dual antenna	
1x CC-046	Jack RCA (4V) cable	
1x DG0387	Quick Reference Guide	

> **NOTE:** It is recommended to keep all the packing material in order to return the equipment, if necessary, to the Technical Service.

12.2   Measurement Mode

► **DVB-T**

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of power Measurement	35 dBµV - 115 dBµV	786 MHz, 8k, GI=1/4 64 QAM, CR=2/3 Sensitivity (QEF): 29 dBµV
Measurement	Power, CBER, VBER, MER, C/N and Link Margin	VBER measurement can go down to <1E-10; CBER measurement can go down to <1E-7
Displayed Data	Numeric and level bar	
Carriers	2k, 8k	

Parameter	Value	Additional Data
Guard Interval	1/4, 1/8, 1/16, 1/32	
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	
Constellation	QPSK, 16-QAM, 64-QAM	
Bandwidth	6, 7 and 8 MHz	
Spectral inversion	ON, OFF	Auto
Hierarchy	Indicates hierarchy mode	
Cell ID	Detected from transmitter station	
TPS signalling	Time slicing, symbol interleaver and MPE-FEC	
Tuning Range	45 - 1000 MHz	

► **DVB-T2**

Parameter	Value	Additional Data
Profiles	T2-Base, T2-Lite	
Modulation	COFDM	
Margin of Power Measurement	35 dBμV - 115 dBμV	786 MHz, 32k, GI=1/32 256 QAM Rotated, CR=3/5 Sensitivity (QEF): 30 dBμV
Measurement	Power, CBER, C/N, LBER, MER, Link Margin, BCH ESR, LDP Iterations and wrong packets	LBER measurement under 1E-10
Displayed Data	Numeric and level bar	
Carriers	1k, 2k, 4k, 8k, 8k+ EXT, 16k, 16k+ EXT, 32k, 32k+ EXT	
Guard Interval	1/4, 19/256, 1/8, 19/128, 1/16, 1/32, 1/128	
Bandwidth	5, 6, 7 and 8 MHz	
Spectral Inversion	ON, OFF	Auto
Pilot Pattern	PP1 - PP8	
PLP Code Rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6	
PLP Constellation	QPSK, 16QAM, 64QAM, 256QAM	
PLP Constellation Rotation	ON, OFF	Auto
PLP ID	0 - 256	
Cell ID	Detected from transmitter station	
Network ID	Detected from transmitter station	
T2 System ID	Detected from transmitter station	
Tuning Range	45 – 1000 MHz	

► **ISDB-T**

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of power Measurement	35 dBμV - 115 dBμV	
Measurement	Power, CBER, VBER, MER, C/N and Link Margin	
Displayed Data	Numeric and level bar	
Mode	1 (2k), 2 (4k), 3 (8k)	
Guard Interval	1/4, 1/8, 1/16, 1/32	
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	
Constellation	QPSK, 16-QAM, 64-QAM	

Parameter	Value	Additional Data
Bandwidth	6, 7 and 8 MHz	
Spectral inversion	ON, OFF	Auto
Layer	A, B, C	
Segments	1...13	

► DVB-C

Parameter	Value	Additional Data
Modulation	QAM	
Margin of Power Measurement	45 - 115 dBµV	786 MHz 16 QAM Sensitivity (QEF): 30 dBµV 32 QAM Sensitivity (QEF): 33 dBµV 64 QAM Sensitivity (QEF): 36 dBµV 128 QAM Sensitivity (QEF): 39 dBµV 256 QAM Sensitivity (QEF): 42 dBµV
Measurements	Power, BER, MER, C/N and Link Margin	
Displayed Data	Numeric and level bar	
Demodulation	16/32/64/128/256 QAM	
Symbol Rate	1000 - 7100 kbauds	
Roll-off (α) factor of Nyquist filter	0.15	
Spectral Inversion	ON, OFF	Auto
Tuning Range	45 – 1000 MHz	

► DVB-C2

Parameter	Value	Additional Data
Modulation	QAM	
Margin of Power Measurement	45 - 115 dBµV	786 MHz, 32k, GI=1/128 1024 QAM Rotated, CR=9/10 Sensitivity (QEF): 48 dBµV
Measurements	Power, CBER, MER, C/N, LBER, BCH ESR, LDP Iterations and wrong packets	
Displayed Data	Numeric and level bar	
Carriers	4k	
Guard Interval	1/64, 1/128	
Bandwidth	6, 8 MHz	
Spectral Inversion	ON, OFF	Auto
Pilot Pattern	PP1 - PP8	
Code Rate PLP	2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
PLP Constellation	64 QAM, 256 QAM, 1k QAM, 4K QAM	
Dslice PLP	0 - 256	Auto
PLP ID	0 - 256	
Cell ID	Detected from transmitter station	
Network ID	Detected from transmitter station	
C2 System ID	Detected from transmitter station	
Tuning Range	45 – 1000 MHz	

► J83 Annex B

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of Power Measurement	35 dBµV - 115 dBµV	
Measurement	Power, BER, MER, C/N and Link Margin	
Displayed Data	Numeric and level bar	
Bandwidth	5, 6, 7 and 8 MHz	
Spectral Inversion	ON, OFF	Auto
Demodulation	64/256 QAM	
Symbol Rate	5057/5361 kbauds	
Roll-off factor (α) for Nyquist filter	0.18 / 0.12	

► Analogue TV

Parameter	Value	Additional Data
Colour System	PAL, SECAM and NTSC	
Standard Supported	M, N, B, G, I, D, K and L	
Sensibility	40 dBµV for a correct synchronism	

► FM/RDS

Parameter	Value	Additional Data
Tuning step size	10 kHz	
Sensitivity	5 dBµV	150 MHz (S+N/N = 40 dB)
Selectivity (mono)	± 200 kHz 25 dB	
Tuning range	45 - 1000 MHz	

► DVB-S

Parameter	Value	Additional Data
Modulation	QPSK	
Margin of Power Measurement	35 dBµV - 115 dBµV	2150 MHz, 27500 kSps, CR=2/3 Sensitivity (QEF): 29 dBµV 18 dBµV a 2.15 GHz / 2 MSs; 30 dBµV a 2.15 GHz / 27 MSs; 33 dBµV a 2.15 GHz / 45 MSs
Measurements	Power, CBER, MER, C/N and Link Margin	
Displayed Data	Numeric and level bar	
Symbol Rate	1 - 45 Mbauds	
Roll-off (α) factor of Nyquist filter	0.35	Auto
Code rate	1/2, 2/3, 3/4, 5/6, 7/8	
Spectral Inversion	ON, OFF	
Tuning Range	250 – 2350 MHz	From 2150 to 2350 MHz does not meet sensitivity specifications

► **DVB-S2**

Parameter	Value	Additional Data
Modulation	QPSK, 8PSK, 16APSK, 32APSK	Compatible with CCM, ACM and VCM modes
Margin of Power Measurement	35 dBµV - 115 dBµV	2150 MHz, 27500 kSps, CR=2/3 Roll-off: 0,20 QPSK Sensitivity (QEF): 26 dBµV 8PSK Sensitivity (QEF): 30 dBµV 8PSK: 24 dBµV a 2.15 GHz / 2 MSs; 34 dBµV a 2.15 GHz / 27 MSs
Measurements	Power, CBER, LBER, MER, C/N, BCH ESR, Wrong Packets and Link Margin	
Displayed Data	Numeric and level bar	
Symbol Rate	2 - 45 MSps	QPSK, 8PSK, 16APSK, 32APSK
Roll-off (α) factor of Nyquist filter	0.20, 0.25 and 0.35	
Code rate (8PSK)	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Code rate (QPSK)	3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Code rate (16APSK)	2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Code rate (32APSK)	3/4, 4/5, 5/6, 8/9, 9/10	
Spectral Inversion	ON, OFF	Auto
Pilots	Indicator	
TS clock	Available	Warning message when the TS clock is too high
Tuning Range	250 – 2350 MHz	From 2150 to 2350 MHz does not meet sensitivity specifications

► **DSS**

Parameter	Value	Additional Data
Modulation	QPSK	
Margin of Power Measurement	35 dBµV - 115 dBµV	
Measurements	Power, CBER, VBER, MER, C/N and Noise Margin	
Displayed Data	Numeric and level bar	
Symbol Rate	20 Mbauds or variable	Auto detected
Roll-off (α) factor of Nyquist filter	0.2	
Code rate	1/2, 2/3, 6/7 and AUTO	
Spectral Inversion	ON, OFF	Auto
Tuning Range	250 - 2350 MHz	From 2150 to 2350 MHz does not meet sensitivity specifications

12.3   Spectrum Analyzer Mode

► **Digital Signal**

Parameter	Value	Additional Data
General Parameters		
Markers	1	It displays frequency, level indication, level difference, frequency difference
Reference Level	60 dBμV - 135 dBμV	Adjustable in steps of 5 dB
Spectrum Range		Span, dynamic range and reference level are variable by means of arrow cursors
Terrestrial		
Tuning range	5 - 1000 MHz	Continuous tuning from 5 to 1000 MHz
Tuning mode	Channel or frequency	Channel plan configurable; tune step 50 kHz
Tuning Accuracy	± 1163 Hz	
Tuning Resolution	10 kHz	
Resolution Bandwidth (PROWATCH Neo +)	100, 200, 1000 kHz	
Resolution Bandwidth (PROWATCH Neo 2)	2, 10, 20, 30, 40, 100, 200, 1000 kHz	
Measurement Range	20 dBμV - 130 dBμV	3.16 μV a 3.16 V
Span (PROWATCH Neo 2)	200 kHz - 40 MHz (min-max)	for RBW = 2 kHz
Span (PROWATCH Neo 2)	1 MHz - 250 MHz (min-max)	for RBW = 10 kHz
Span (PROWATCH Neo 2)	2 MHz - 450 MHz (min-max)	for RBW = 20 / 30 / 40 kHz
Span	10 MHz - 995 MHz (min-max)	for RBW = 100 / 200 / 1000 kHz
Digital channels measures	Channel power, C/N, MER, BER, LM	According to modulation type
Satellite		
Tuning range	250 - 2500 MHz	
Tuning mode	Intermediate frequency or downlink	Channel plan configurable; tune step 50 kHz
Tuning accuracy	± 2.6 kHz	
Tuning Resolution	10 kHz	
Resolution Bandwidth (PROWATCH Neo +)	100, 200, 1000 kHz	
Resolution Bandwidth (PROWATCH Neo 2)	10, 20, 30, 40, 100, 200, 1000 kHz	
Measurement range	31 dBμV - 130 dBμV	35.5 μV - 3.16 V
Span (PROWATCH Neo 2)	1 MHz - 250 MHz (min-max)	for RBW = 10 kHz
Span (PROWATCH Neo 2)	2 MHz - 450 MHz (min-max)	for RBW = 20 / 30 / 40 kHz
Span	10 MHz - 2250 MHz (min-max)	for RBW = 100 / 200 / 1000 kHz
Digital Channel Measurements	Channel Power, C/N, MER, BER, LM	According to modulation type

► **Analogue Signal**

Parameter	Value	Additional Data

Parameter	Value	Additional Data
General Parameter		
Attenuation scale	Auto-range	
Numerical indication	Absolute value according to selected units	
Graphical indication	Analogue bar on screen	
Audible indicator	Pitch sound	Tone with pitch proportional to signal strength
Terrestrial		
Tuning Range	5 - 1000 MHz	
Tuning Mode	Manual	
Tuning Resolution	10 kHz	
Measurement Range	15 dBµV - 130 dBµV	3.16 µV - 3.16 V
Analogue channels measures	Level, C/N, V/A	
Accuracy	±1,5 dB	20 dBµV - 130 dBµV @ 990 MHz 10 µV - 3.16 V 23 °C ± 5 °C
Out of range indication	<, >	
Satellite		
Tuning Range	250 - 2500 MHz	
Tuning Mode	Intermediate frequency or downlink	Channel plan configurable
Tuning Resolution	10 kHz	
Measurement Range	15 dBµV (250 – 1800 MHz) 20 dBµV (1800 – 2300 MHz) 24 dBµV (2300 – 2500 MHz)	31.6 µV - 3.16 V
Analogue channels measurements	Level, C/N	
Accuracy	±1,5 dB	20 dBµV - 130 dBµV @ 2490 MHz 10 µV - 3.16 V 23 °C ± 5 °C
Out of range indication	<, >	

12.4   TV Mode

► **Video**

Parameter	Value	Additional Data
Codecs	MPEG-1	
	MPEG-2	MP@HL (Main profile high level)
	MPEG-4 AVC H.264	High Profile Level 4.1; ; maximum bitrate 40 Mbps
	H.265 L4.1	Maximum bitrate according to specifications b HEVC High Profile 4.1
Maximum Image Size	1920x1080x60p; 1280x720x60p/50p	
Minimum Image Size	352x240x30p; 352x288x25p	
Bitrate	40 Mbps	
Aspect Ratio	16/9; 4/3	
SI/PSI Data	Service list and main PIDs	
HD Video Resolution	1080, 720 and 576	Progressive or interlaced
HDMI™ Output Resolution	1080p	

► **Audio**

Parameter	Value	Additional Data
Codecs	MPEG-1	
	MPEG-2	
	HE-AAC	
	Dolby Digital and Dolby Digital +	
Demodulation	According to the TV standard	
De-emphasis	50 µs	75 µs (NTSC)
Sound subcarrier	Digital frequency synthesis according to the TV standard	

► **Transport Stream (PROWATCH Neo 2)**

Parameter	Value	Additional Data
Communication Protocol	MPEG-2	
Packets	188 or 204 bytes	Automatic detection
Video Info	Type, bitrate, format, aspect ratio, frequency, profile, PID	
Service Info	Network, provider, NID, ONID, scrambled/free, TSID, SID, LCN	
Audio Info	Type, bitrate, format, frequency, mono/stereo, language, PID	
Max. Recording Bitrate	Up to 66 Mbit/s	Between 44 and 66 Mbit/s the TS recorded cannot be played or analyzed
Memory for Recording	1 GB	

12.5 WiFi Analyzer Mode 2.4 GHz

Parameter	Value	Additional Data
Band	2.40 GHz	
Resolution Filter	100 kHz	
Reference Level	Available	
RSSI	Available (dBm)	Depending on WiFi dongle
SNR	Available (dB)	
Maximum Power	+15 dBm	Measured over spectrum
Average Power	+15 dBm	Measured over spectrum
Bandwidth	Access Point Bandwidth	
Access Point Number	Access Point number in the same BW	

12.6 IPTV Mode (PROWATCH Neo 2)

Parameter	Value	Additional Data
IP	224.0.0.0 - 239.255.255.255	
Ports	1024 - 65535	
Maximum Bitrate	80 Mbit/s	

Parameter	Value	Additional Data
IPER (ITU Y.1540)	Available	Population of interest: all Ethernet frames received on the interface; recommended value according to quality of service: class 0 - 4: < 1.0E-4 class 5: sin unspecified class 6 - 7: <1.0E-6
MDI (RFC445)	Available	Population of interest: specified multicast stream; recommended value < 0.005 pkt/s
Mean IPTD, IPDV (ITU Y.1540)	Available	Population of interest: PING packets with 16 bytes of data. Packet Transfer Delays are based in the halved round-trip time of PING packets
Autodetection of crossover cables	Available	
M3U files support	Available	

12.7　Tools

► Constellation

Parameter	Value	Additional Data
Type of Signal	DVB-T, DVB-T2, DVB-C, DVB-C2, DSS, DVB-S, DVB-S2, ISDB-T	
Displayed Data	I-Q Graph	

► Echoes

Parameter	Value	Additional Data
Type of Signal	DVB-T, DVB-T2, DVB-C2, ISDB-T	
Measurement range	Depends on the standard, carrier and guard interval	
Delay	0.1 - 224 us	Typical configuration (DVB-T 8K, GI = 1/4)
Distance	0.3 - 67,2 km	Typical configuration (DVB-T 8K, GI = 1/4)
Power Range	0 dBc - -30 dBc	Typical configuration (DVB-T 8K, GI = 1/4)
Time scale	1/3 Symbol Period	

►LTE Ingress Test

Parameter	Value	Additional Data
Type of signal	DVB-T, DVB-T2, DVB-C, DVB-C2, ISDB-T	
Displayed Data	LTE band plus quality parameters for a selected TV channel	

► **Attenuation Test**

Parameter	Value	Additional Data
Test Frequencies	3 selectable pilots	

► **Datalogger**

Parameter	Value	Additional Data
Stored Data	Signal type, modulation parameters, all measures available for the detected signal type, and time stamp, PSI info for each measured channel	If GPS is connected to USB port, the equipment stamps GPS coordinates in each measurement made. For DVB-T2 signals it saves information from all PLPs. In case of Satellite signal it also saves polarization. LBER equal o less than 1E-7.
Timestamp	Date and time at each measured channel	

► **Transport Stream Analyzer (PROWATCH Neo 2)**

Parameter	Value	Additional Data
PSI Tables	PAT	Program Association Table
	PMT	Program Map Table
	NIT	Network Information Table
	CAT	Conditional Access Table
SI Tables	NIT	Network Information Table
	BAT	Bouquet Association Table
	SDT	Service Description Table
	EIT	Event Information Table
	TDT	Time and Date Table
	TOT	Time and Date Table
Bitrate	Maximum 80 Mbit/s	
Alarms	According to ETSI standard TR101 290 v1.2.1	Sections 3.3, 3.9 and 3.10 (no measurements done)

12.8   Options

► **Fibre Optics**

Parameter	Value	Additional Data
Descriptive Code (for PROWATCH Neo +)	OP-001-PS	It includes WiFi 5G, 2.6 GHz LTE and RF 6 GHz
Descriptive Code (for PROWATCH Neo 2)	OP-002-PS	It includes WiFi 5G, 2.6 GHz LTE and RF 6 GHz
Selective Optical Power Meter		
Optical Measure bands	1310 nm ± 50 nm; 1490 nm ± 10 nm; 1550 nm ± 15 nm	
Connector	FC/APC	
Measurement Dynamic Range	- 49.9 dBm - +10 dBm	Accuracy ± 0,5 dB
Isolation between bands	> 45 dB	

Parameter	Value	Additional Data
Optical to RF Converter		
Dynamic range of conversion	-5 dBm - +10 dBm	
RF Attenuation	ON = 15 dB; OFF = 0 dB	
RF band converted (Optical Cable and DTT links)	65 MHz - 1000 MHz	
RF band converted (Optical IF-Satellite Installations)	950 MHz - 5450 MHz	for universal optical LNB
RF Output	65 MHz - 2150 MHz	
6 GHz RF Auxiliary Input		
Connector	SMA	
Frequency Bands	Sub-Band 1: 2150 MHz - 3000 MHz	
	Sub-Band 2: 3400 MHz - 4400 MHz	
	Sub-Band 3: 4400 MHz - 6000 MHz	
Dynamic Range	45 -105 dBµV	ATT OFF
	60 - 120 dBµV	ATT ON
Span (min-max)	1 MHz - 250 MHz	for RBW = 10 kHz
	2 MHz - 450 MHz	for RBW = 20 / 30 / 40 kHz
	10 MHz - 1600 MHz	for RBW = 100 / 200 / 1000 kHz (the maximum span might be smaller depending on the sub-band selected by the user. This value corresponds to the sub-band 3)
Conversion Gain	7 dB	
	-8 dB	
Flatness	±5 dB	
Spurious	< 45 dBµV	(-65 dBm); typical value
Inter-modulation Products	<15 dB	typical value
Maximum Input Signal	RF: 120 dBµV; DC: 50 V	

▶ WiFi 5G Analyzer + LTE 2.6 GHz

Parameter	Value	Additional Data
Descriptive Code (for PROWATCH Neo+)	OP-001-WL	It includes an RF 6 GHz aux. input
Descriptive Code (for PROWATCH Neo2)	OP-002-WL	It includes an RF 6 GHz aux. input
TBD	TBD	TBD

▶ DAB / DAB+ Advanced (PROWATCH Neo 2)

Parameter	Value	Additional Data
Descriptive Code (for PROWATCH Neo2)	OP-002-DAB2	
Modulation	COFDM	
Combined Antenna Input	for Band III	
DAB Sensitivity	up to 22 dBµV	Typical Value
Decoding Audio Service	up to 384 kbit/s	
Transmission Mode	I	

Parameter	Value	Additional Data
Margin of Power Measurement	35 dBμV - 115 dBμV	At 239,2 MHz with EEP-3A protection ratio. Sensitivity (just before synchronization is lost): 14 dBμV
Measurement	Power, C/N, MER, CBER, MSC CBER, FIC CBER, FIB Ratio	All CBER measurement can go down to <1E-8. MER measurement exceeds 40 dB.
Spectral Inversion	ON/OFF	Auto
TII	Detect up to 8 different TII signatures	TII signatures can be detected if SNR is higher than 0 dB
Constellation	Available	
MER by carrier	Available	
Echoes	Available	Up to 9 echoes; it is able to detect echoes up to 35 dB if the channel has a good SNR
Save IQ raw samples into file	Available	
Save ETI into file	Available	

► FM Advanced + Basic DAB

Parameter	Value	Additional Data
Descriptive Code (for PROWATCH Neo +)	OP-001-FM	
Descriptive Code (for PROWATCH Neo 2)	OP-002-FM	
Frequency Deviation	240 kHz	Max peak theoretical value
Frequency Deviation	100 kHz	Signal modulated with a 1 kHz tone
Modulation Power	from -20 to -14.4 dBr	
Stereo Pilot Detection	Yes	Detected if its frequency deviation is higher than 500 Hz
Sensibility of a FM mono signal	25 dBuV	Min power to detect the signal
Available Measurements		
Frequency deviation of whole band pass filtered MPX	Available	
Frequency deviation caused by L+R (or mono) component of MPX	Available	
Frequency deviation caused by L-R (or stereo) component of MPX	Available	
Frequency deviation caused only by L channel	Available	Once decoded
Frequency deviation caused only by R channel	Available	Once decoded
Frequency deviation caused only by stereo pilot component of MPX	Available	19 kHz tone
Frequency deviation caused only by RDS	Available	
Histogram 50 ms (according to recommendation ITU-R SM.1268-2)	Available. It measures the maximal value of frequency deviation in 50 ms and then accumulate them into the histogram	Histograms classify frequency deviation from 0 Hz to 150 kHz in binds of 200 Hz
Histogram All Values (according to recommendation ITU-R SM.1268-4)	Available. It accumulates all values of frequency deviation into the histogram	Histograms classify frequency deviation from 0 Hz to 150 kHz in binds of 200 Hz

► **High Frequency (**PROWATCH Neo 2**)**

Parameter	Value	Additional Data
Descriptive Code (for PROWATCH Neo 2**)**	OP-002-AF	
Terrestrial Band		
Marker Accuracy	±1 kHz	Temperature: 5 - 45ºC
Marker Accuracy (using a 10 external reference)	±250 Hz	External reference must have an accuracy equal or less than ±125 Hz

13 MAINTENANCE

13.1   Instructions for Returning by Mail

Instruments returned for repair or calibration, either within or out of the warranty period, should be sent with the following information: Name of the Company, name of the contact person, address, telephone number, receipt (in the case of coverage under warranty) and a description of the problem or the service required.

13.2   Cleaning Recommendations

►Cleaning the Case

The equipment has to be disconnected before cleaning the case.

The case must be cleaned with a solution of neutral soap and water, using a soft cloth dampened with this solution.

Before use, the equipment has to be completely dry.

Never clean with abrasive soaps, chlorinated solvents or aromatic hydrocarbons. These products may degrade the case.

i OPTICAL OPTION

i.1   Description

This annex contains operating instructions for the next option:

- OP-00x-PS.

This option expands the meter with these functions:

- Selective Optical Power Meter
- Selective Optical to RF Converter
- RF 6 GHz Input
- WiFi 5 GHz
- LTE 2,6 GHz

The evolution of the telecommunications market, more and more demanding in quality standards, speed, services and so on and also economical and competitiveness factors has changed the trend in telecommunications installations, and increasingly, fibre-optics is being imposed on traditional ADSL twisted-pair copper lines.

For this reason and in anticipation of an increase of fibre-optics installations, this option has been developed. It is applicable to the field strength meter and allows adapting it in order to work with fibre-optics networks.

The selective meter option allows measurements on optical fibre networks, which are necessary to certify an installation according to the parameters set by local policies.

The optical to RF selective converter has a photosensor for each wavelength, which obtains the RF signal carried by each one. With this module, user can measure terrestrial or cable (up to 1 GHz) networks or optical LNB for satellite antennas (up to 5.45 GHz), so that the installer does not need any additional equipment to measure this type of installations.

The 6 GHz auxiliary RF input option can be used among other applications to directly connect optical LNBs with 5.4 GHz output.

The 5 GHz WiFi option extends the WiFi Analyzer to the second frequency range used for WiFi.

The 2.6 GHz LTE option expands the spectrum analyzer to the band 7 of LTE. Band 7 is defined by an uplink band between 2.5 and 2.57 GHz and a downlink band between 2.62 and 2.69 GHz. Band 7 of LTE is one of the most used globally since it allows to transmit with greater speed but at a shorter distance and is more exposed to suffer interference.

This expansion module is available for any unit (both for new equipment or to upgrade equipment owned).

[Optical fiber](#)

S C A N

i.2　Selective Optical Power Meter

i.2.1　Description

The selective meter consists, in first place, of a selective triple filter for 1310, 1490 and 1550 nm signals. The filter separates each wavelength and each one leads to an independent circuit with a photosensor, which obtains the RF signal that it carries. Next, a circuit measures the optical signal power received by the photosensor. The RF signal obtained for each wavelength goes to a band switch.

The band switch receives a signal and converts it to a frequency within the RF band (65 — 2150 MHz). In the case of a terrestrial/cable signal the signal is not converted since that signal is within the RF range.

After the conversion, the RF signal output is connected to the analyzer input connector and the measurement is performed in the usual way to an RF signal. In the conversion, bear in mind that for every unit of optical attenuation (one dB), occurs two dBs of power loss in RF. As an example, every 3 dB of optical attenuation for each splitter are equivalent to 6 dB of power loss for RF.

i.2.2　Optical Fibre Test

► **Description**

The optical function of this module allows the user to certify a telecommunication installation by calibrating the signals at the installation and then measuring them in each of the user access points.

The optical module can measure simultaneously and in a selective way the three wavelengths used in optical fibre (1310, 1490 and 1550 nm). It has a selective receiver with a filter for each band that makes a real and very stable

measurement of each wavelength. With this feature, user will be able to certify any installation according to the telecommunications infrastructure policies.

▶ **Operation**

To access the Fibre Optical Test tool:

1 Connect the **optical input** signal to the optical input of the equipment.

2 Press the **Tools** key [F3].

3 Select the **Fibre Optic Test** option.

4 It appears the screen to perform the **Fibre Optic Test** on the signal.
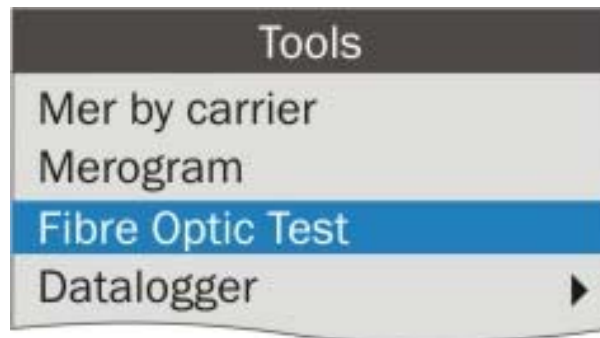
Figure 152.

► **Screen Description**

			DEFAULT 04/03/2013 14:33	Fibre Optic Test	CH	5h15
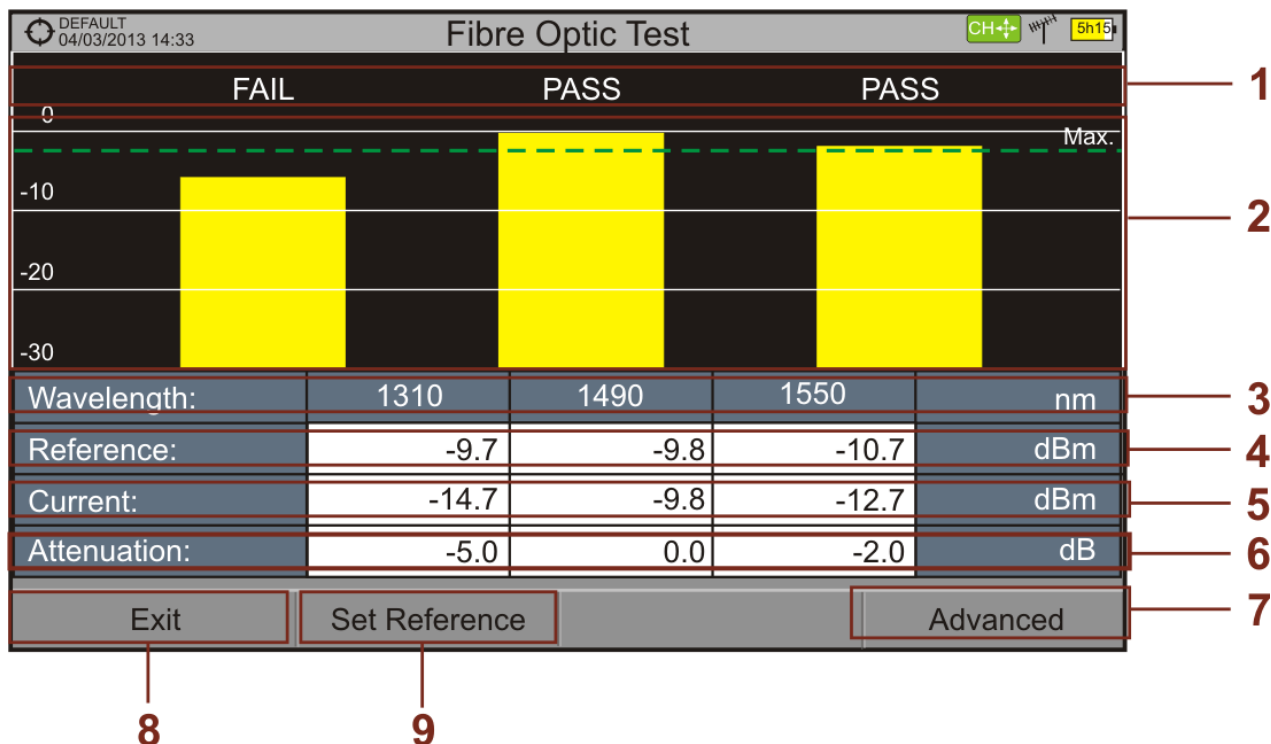
Figure 153.

1 Status message depending on the level of attenuation.

2 Power level of signal.

3 Wavelength of signal (nm).

4 Power level of reference signal, which is used to calibrate and calculate the attenuation level (dBm).

5 Power level of test signal at the user's access point (dBm).

6 Attenuation level (dB); Attenuation = Current - Reference.

7 "**Advanced**" key to access these options: Threshold attenuation and Max. attenuation (see Max. dashed line).

8 "**Exit**" button to exit the screen.

9 "**Set Reference**" key to calibrate the reference signal.

► **Menu Options**

On the bottom of the screen there are three menus accessible via function keys.

- F1 It exits the tool.

- F2 When pressing this key it uses the current values of power as a reference values.

- F4 It accesses the Advanced menu.

In the **Advanced** menu there are two parameters to configure the fibre optical test. They are:

- Threshold Attenuation: It defines the maximum difference that can exist between the reference signal with the highest power level and the reference signal with the lowest power level. Any signal out of this range will be deleted and not used as a reference signal during the measurement process.

- Max. Attenuation: It defines the attenuation level used by the field meter to display the status message on screen. If the attenuation level is below this value the status message will be "**PASS**" and if it is above this value the status message will be "**FAIL**".

i.3 Selective Optical to RF Converter

► **Description**

The selective optical to RF converter has a filter that separates each wavelength and directs it to an independent circuit with a photosensor, which obtains the RF signal that carries. The RF signal obtained for each wavelength passes to a band switch.

The band switch receives a signal and converts it to a frequency within the RF band (65 — 2150 MHz). In the case of a terrestrial / cable signal the signal is not converted since that signal is within the RF range. After the conversion, the RF signal output is connected to the analyzer input connector and the measurement is performed in the usual way to an RF signal. In the conversion, bear in mind that for every unit of optical attenuation (one dB), occurs two dBs of power loss in RF. As an example, every 3 dB of optical attenuation for each splitter are equivalent to 6 dB of power loss for RF.

► **Connection**

1 Pigtail adapter (supplied with the module) releasing input optical signal to FC-APC input port.

► **Settings**

After the connection is made, the user can use the equipment for measurement of optical signals as if they were **RF** signals. Steps to measure a signal are as follows:

1 Press the Settings ⚙ key (key C) and in "Signal source" select "Fiber optic".

2 From Settings, select the corresponding band, whether terrestrial (for optical link) or satellite (for optical LNB). In the case of a satellite optical signal and frequency tuning, user has to select the signal type, characterized by the band (low/high) and the type of polarization (vertical/horizontal). In the case of a satellite optical signal and channel tuning, the parameters are defined by the channel (refer to the Settings menu section for more details).

3 Select the **Optical module** option and press Enter.

4 It appears a window to enable the optical module and to configure additional parameters.

5 Select **Enable**.

6 At the top right area of the screen appears the **OPT** icon meaning there is external power.

7 It appears a window with some setting parameters.

Optical Module		
Module:	Enabled ▼	1310 nm -5.0 dBm
Wavelength:	1310 nm ▼	1490 nm -0.0 dBm
Attenuator:	On ▼	1550 nm -2.0 dBm
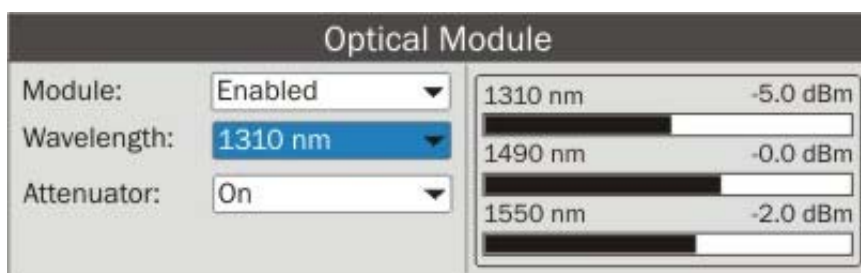
Figure 154.

In this window appears the level power for each wavelength and also the user can set two parameters:

- Wavelength: Wavelength selection at the **RF** output by the user among the three wavelength available: 1310, 1490 and 1550 nm.

- Attenuator: It can be enabled (ON) or disabled (OFF). When the attenuator is ON is 15 dB RF attenuation. When the attenuator is OFF is 0 dB RF attenuation. The attenuator must be adapted to the installation according to the RF power (modulation index).

i.4   6 GHz Auxiliary RF Input

► **Description**

The 6 GHz auxiliary RF input option can be used among other applications to directly connect optical LNBs with 5.4 GHz output. The RF input works for three bands:

- Band I From 2150 MHz to 3000 MHz
- Band II From 3400 MHz to 4400 MHz
- Band III From 4400 MHz to 6000 MHz

► **Settings**

Follow these steps to set:
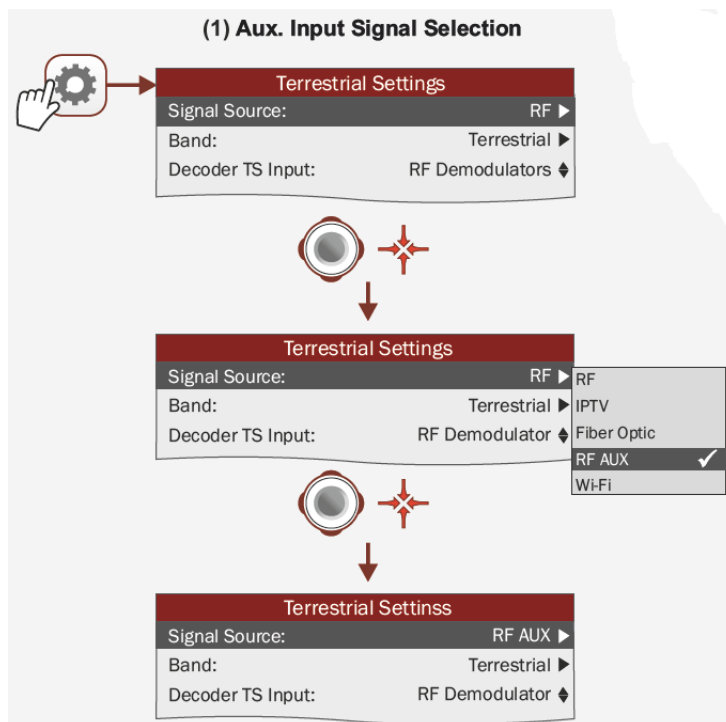
Figure 155. Auxiliary Input Signal Selection
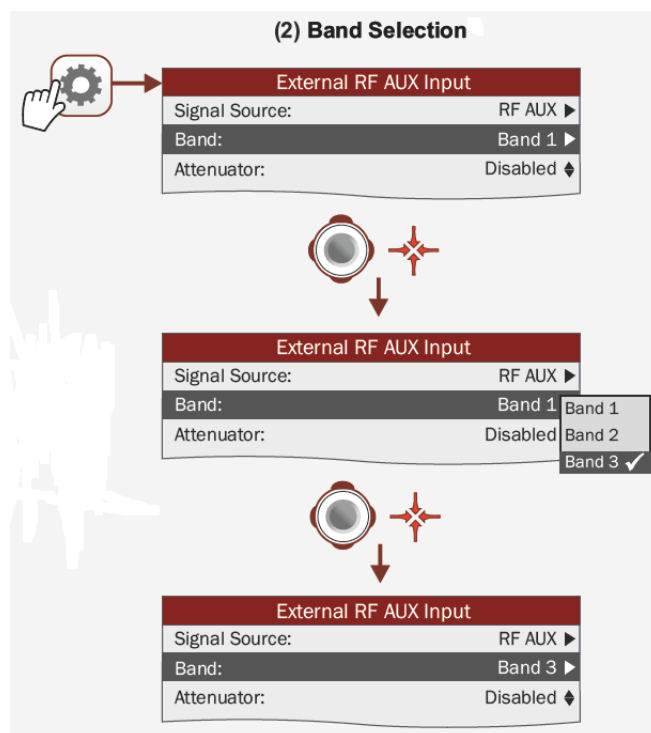
Figure 156. Band Selection

► **Configuration**
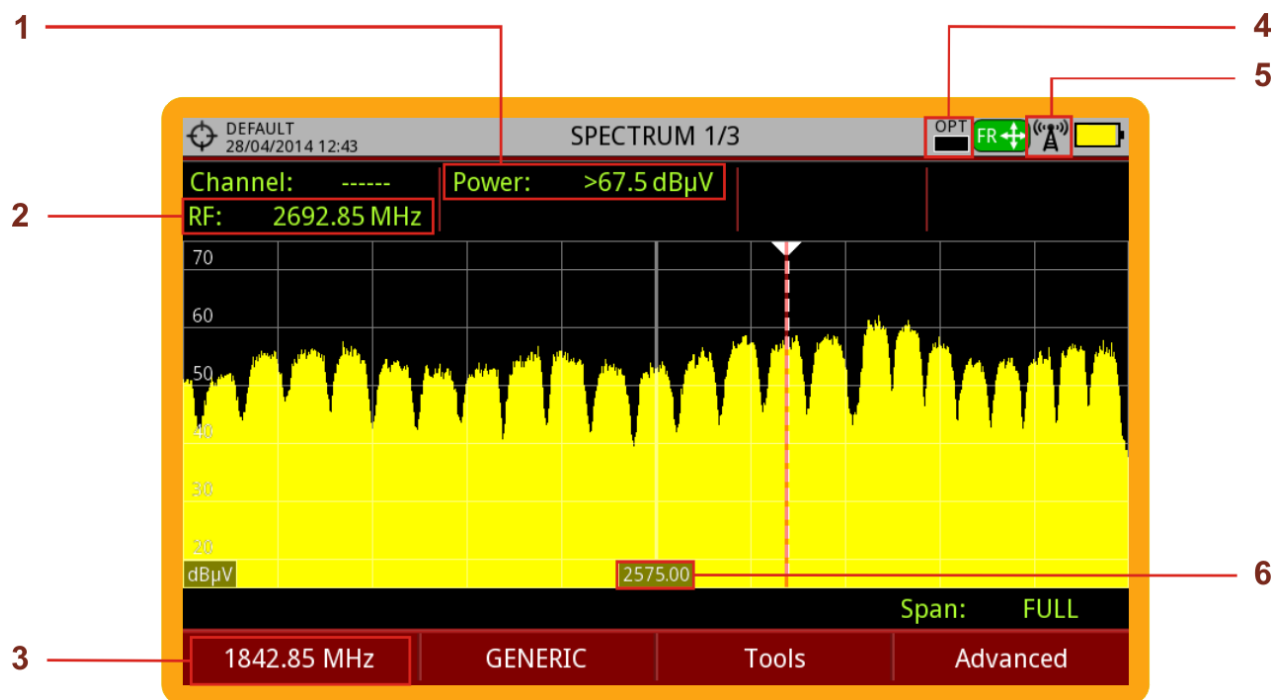
Figure 157.

1 Signal Power for RF Auxiliary Input
2 Signal Frequency for RF Auxiliary Input
3 Signal Frequency Input
4 Optical LNB Power Level
5 Auxiliary RF Input Enabled
6 Central Frequency

i.5 WiFi 5 GHz

► **Description**

The 5 GHz WiFi option extends the WiFi Analyzer to the second frequency range used for WiFi.

► **Operation**

1 Connect the USB WiFi adapter (supplied) to one of the two USB ports on the device. The "Wi-Fi Configuration" window pops up and it performs a Wi-Fi scan showing all networks detected. The WiFi icon will appear at the top of

the screen. Press F1 to exit because it is not necessary to log in a WiFi network to use this tool.

2 Connect the RF omni-directional antenna (supplied) to the RF input. This antenna detects WiFi band spectrum.

3 Press "Settings" key to access Settings menu. In "Signal Source" select "WiFi".

4 Press "Settings" key again, access "Band" option and select a band from available WiFi bands.

5 Press the F1 "Tuning" key and on "Channel Plan" select the WIFI 5 GHz. In case it is not avaiable, go to "Installations management" 🗁, press F2: Manage and press F3: Installation. Press "Add Channel Plan" and select the WiFi 5GHz channel plan.

6 To start monitoring, first select tuning mode wether to tune by access point (AP) or channel (CH) using the F1 "Tuning" menu (enabled tuning mode is shown on joytstick icon)

7 For more details about WiFi Monitoring refer to <u>"WIFI MONITORING" on page 171</u>.

i.6	**LTE 2.6 GHz**

▶ **Description**

The 2.6 GHz LTE option expands the spectrum analyzer to the band 7 of LTE. Band 7 is defined by an uplink band between 2.5 and 2.57 GHz and a downlink band between 2.62 and 2.69 GHz.

Band 7 of LTE is one of the most used globally since it allows to transmit with greater speed but at a shorter distance and is more exposed to suffer interference.

▶ **Description**

Follow the steps explained in the section <u>"LTE Signals" on page 85</u>.

ii DAB/DAB+ OPTION*

ii.1 Description

This annex contains operating instructions for the next option:

- OP-00x-DAB2: Measurement of DAB and DAB+ digital radio with advanced features.

This option allows the user to detect, measure, analyze and visualise digital radio DAB and DAB+.

The DAB (Digital Audio Broadcasting) is a digital radio standard, designed for both home and portable receivers to broadcast terrestrial and satellite audio and also data. It works with Band III and L-Band frequencies.

The DAB+ is an evolution of DAB using the AAC + audio codec. It also includes Reed-Solomon error correction, which makes it more robust. DAB receivers are not compatible with DAB+ receivers.

ETI (Ensemble Transport Interface) is the output stream for a DAB/DAB+ multiplexer. The ETI is divided in several layers with information about the radio signal. It is similar to the transport stream obtained when multiplexing a TV signal.

The DAB+ ADVANCED option has some exclusive tools such as the ETI record and the IQ signal from RF record. It is also able to decode and show images (slideshow) that some broadcasters sent to complement audio services.

Also some standard tools such as Echoes, Constellation and MER by carrier are also available on DAB/DAB+.

Icons ![DAB] or ![DAB+] identify when a service is DAB or DAB+.

Icon ![slideshow icon] identifies when a DAB/DAB+ service contains slideshow.

| ![YouTube] | **DAB / DAB + measurements** | S C A N ![QR code] |

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*. Only available for PROWATCH Neo 2

Advanced DAB

ii.2 Operation

1 Connect the RF input signal to the equipment.

2 Select RF source signal and terrestrial band in Settings ⚙ (key S).

3 Lock the DAB/DAB+ signal.

4 To enable auto-detection for DAB/DAB+, access "Preferences" pressing the key 🗁 (key F) for one second and in the StealthID tab select the DAB option.

5 For more details refer to "RF SIGNAL TUNING" on page 56.

ii.3 Operation Modes

The information that appears on screens for each mode (Measurement mode, Spectrum mode and TV mode) is described below. To change the mode, press the corresponding mode key. To change the screen in the same mode, press the same mode key consecutively.

ii.3.1 Measurement Mode

▶ **Specific Measurements for DAB/DAB+**

- **MSC CBER**: CBER for MSC (*Main System Channel*). It is part of ETI containing audio and images.
- **FIC CBER**: CBER for FIC (*Fast Information Channel*). It is part of ETI containing information about the configuration of the ETI itself, such as number and type of services.
- **CBER**: Bit error ratio for DAB/DAB+ channel (it includes all the ETI content).
- **FIB Ratio**: FIC quality ratio. It is calculated from wrong packets detected by CRC. 100% is the top quality level.

■ Cursor Functions:
- Up/down: Change of main measurement on screen (only for Measurement 1/3).
- Right/left: Change of channel/frequency.

- ■ Function Keys:
  - •F1 Tuning: Tuning options.
  - •F2 DAB: DAB detected parameters.
  - •F3 Tools: Tools enabled for DAB.

- ■ Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).
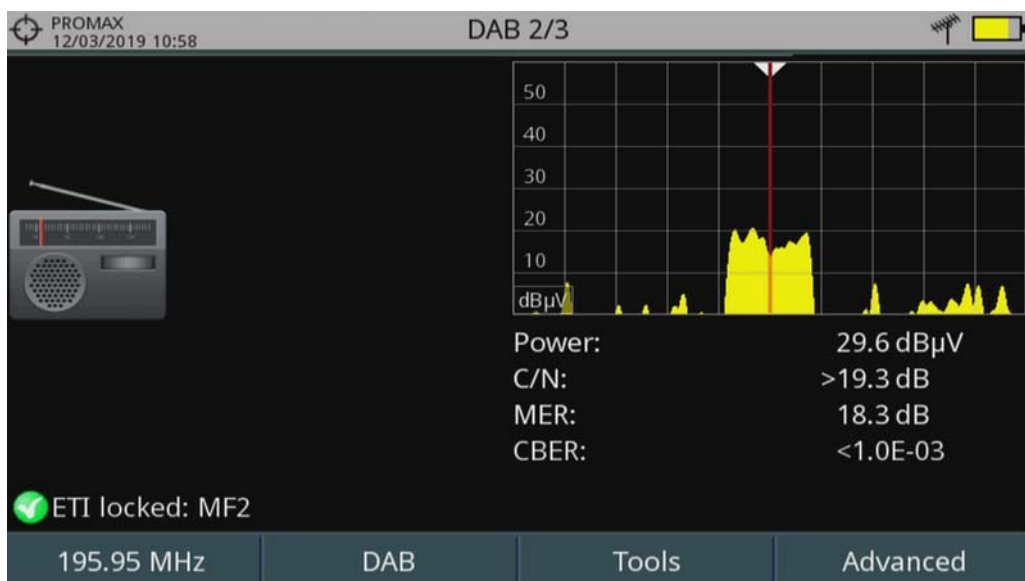
► **Measurement Mode Screens**
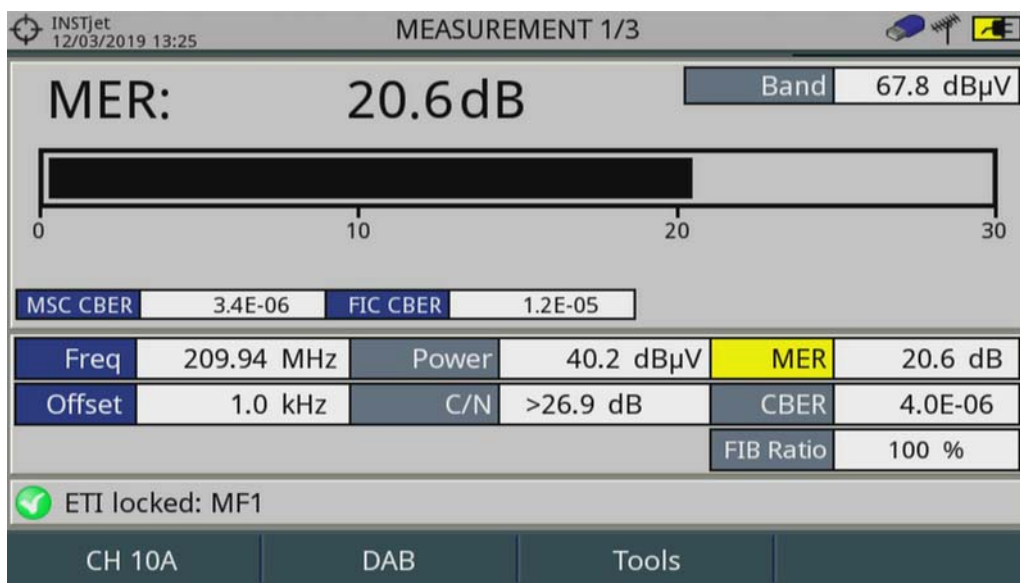
Figure 158. Measurement 1/3
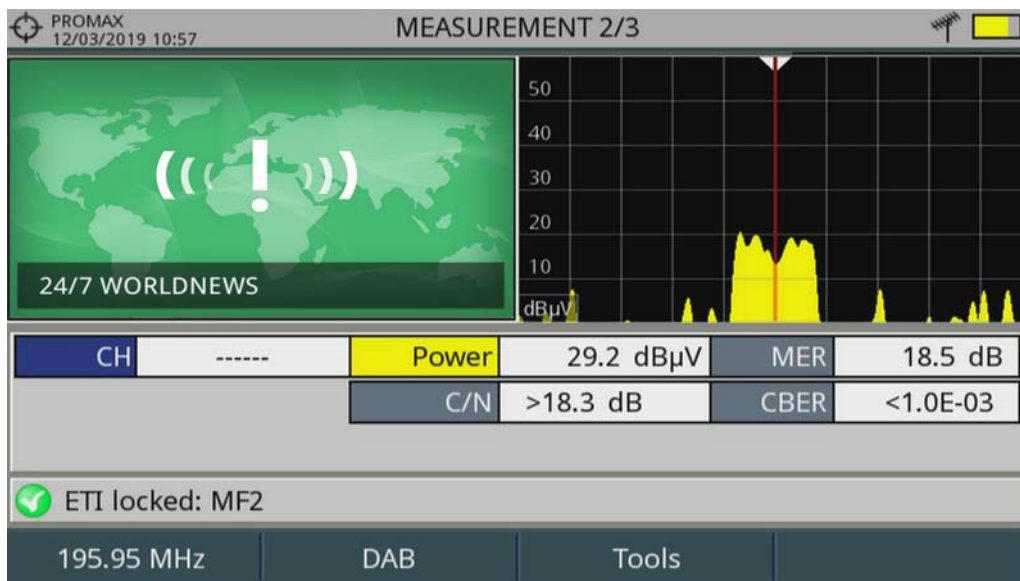
Figure 159. Measurement 2/3
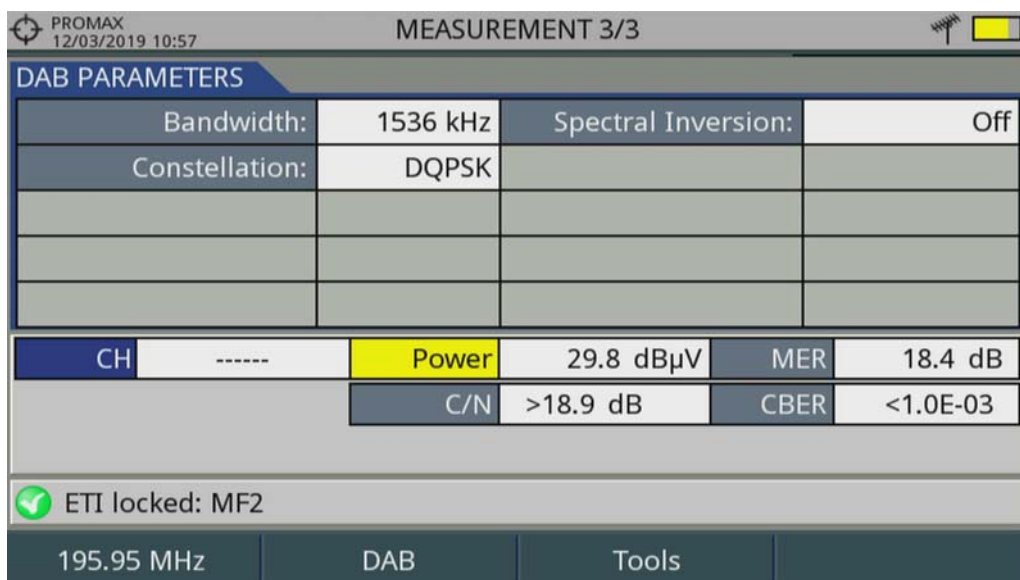
Figure 160. Measurement 3/3.

ii.3.2 Spectrum Analyzer Mode

■ Cursor Functions:
  •Up/down: Change of reference level.
  •Right/left (according to joystick mode):
   -SP: Change of SPAN.
   -FR or CH: Change of channel/frequency.

- ■ Function Keys:
  - •F1 Tuning: Tuning options.
  - •F2 DAB: DAB detected parameters.
  - •F3 Tools: Tools enabled for DAB.
  - •F4 Advanced: Spectrum Analyzer advanced options.

- ■ Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).

► **Spectrum Analyzer Mode Screen**
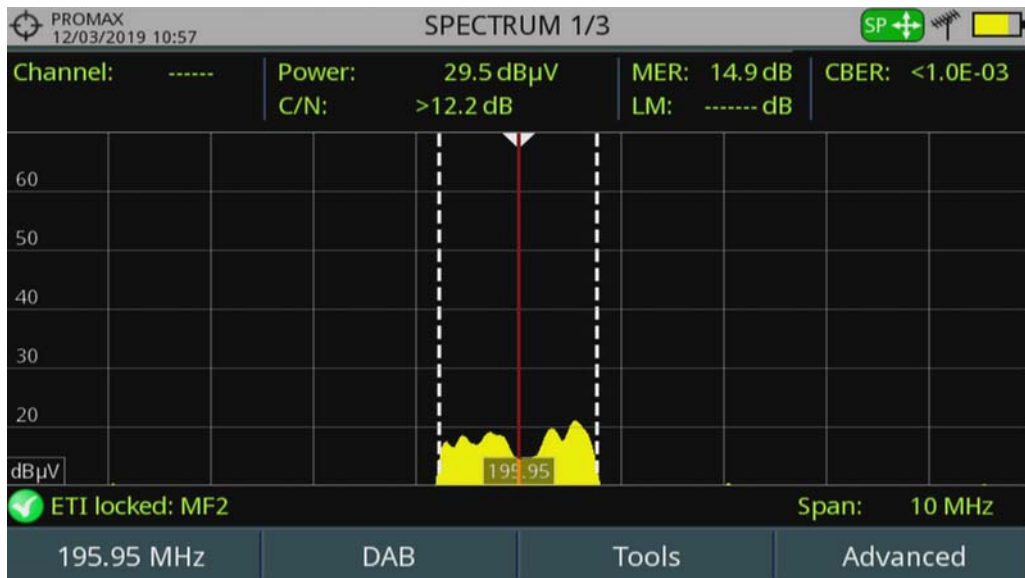
Figure 161. Spectrum 1/3

Figure 162. Spectrum 2/3
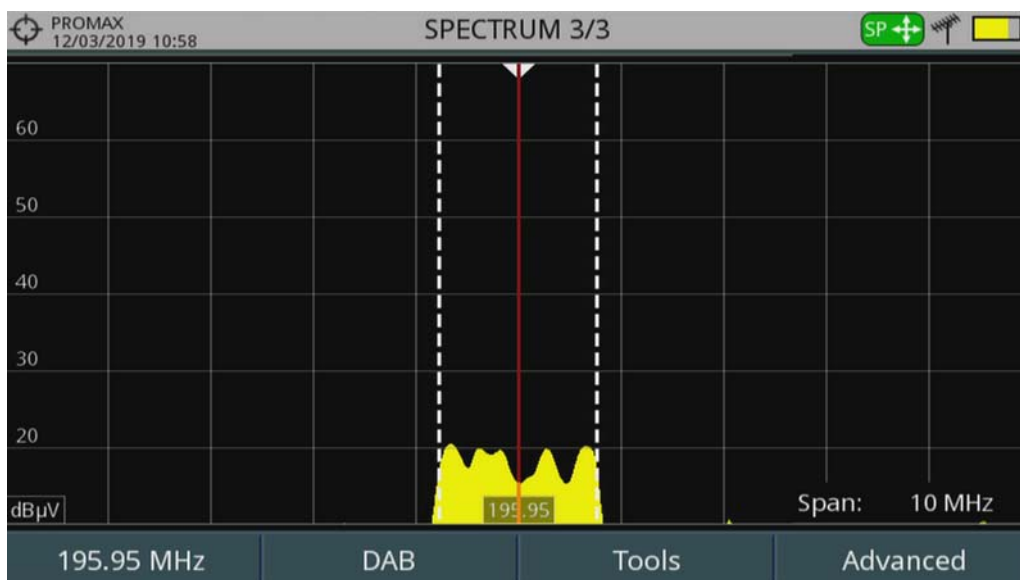
Figure 163. Spectrum 3/3

ii.3.3 ▌ DAB Mode

► Info extracted from DAB (DAB 3/3)

    -Ensemble
    -Country ID
    -Service
    -Extended Country Code (ECC)
    -Content
    -Programme Type (PTY)
    -Component
    -Category
    -SubChannel ID
    -Format
    -Protection Level
    -Bitrate
    -Audio
    -Language
    -Radiotext

■ Cursor Functions:
   •Up/down: Change of service.
   •Right/left: Change of channel/frequency.

■ Function Keys:
   •F1 Tuning: Tuning options.
   •F2 DAB: DAB detected parameters.
   •F3 Tools: Tools enabled for DAB.
   •F4 Advanced: Spectrum Analyzer advanced options.

■ Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).

► **DAB Mode Screens**

Figure 164. DAB 1/3

Figure 165. DAB 2/3

Figure 166. DAB 1/3

ii.4   Tools

Pressing on the (F3) key you access the Tools menu. Tools that are not compatible with DAB/DAB+ are disabled.

DAB ADVANCED option has some exclusive tools for these signals:

- ■ DAB ETI Recordings.
- ■ DAB IQ Recordings.
- ■ DAB TII.

Also Echoes, MER by Carrier and Constellation tools are also available for DAB/DAB+.

All the other tools are explained in "Tools" chapter (<u>"TOOLS" on page 87</u>).

ii.4.1   DAB ETI Recordings

The tool DAB ETI Recordings records an ETI (*ensemble transport interface*). The ETI contains all services inside the channel. Record can be played afterwards.

► **Scren Description**

Figure 167.

1 Selected installation; date and time.

2 Images send by the service (*slideshow*). The DAB/DAB+ service can transmit still images to complement audio service.

3 Control keys:

- ■ 🔴 : Record.

- ■ ⏪ : Rewind.

- ■ ⏹ : Stop.

- ■ ⏩ : Forward.

- ■ ▶ : Play.

4 Function keys.

5 From left to right: USB (when connected); selected band; battery level.

6 Location where the service is being recorded: internal memory or USB.

7 Information window about recorded files. It shows name, size and creation date. It only shows files in the selected location (internal memory or USB).

8 Information window about the recording file. It shows file duration, maximum bitrate, source and available space.

- ■ Cursor Functions:
  - •Up/down/Enter: File selection.
  - •Right/left/Enter: Control keys.

- **Function Keys:**
  - •F1 Exit: It quits the tool.
  - •F2 Erase File: It removes the selected file.
  - •F3 Export to USB: It exports the selected file to a USB pendrive.
  - •F4 Advanced: It allows to select a channel service.

ii.4.2 DAB IQ Recordings

The DAB IQ Recordings tool saves the DAB/DAB+ RF signal in I/Q coordinates. This record can be downloaded on a pendrive and played using a signal analyser software. To record the DAB IQ is not necessary to lock a signal.

► **Screen Description**

Figure 168.

1 Selected installation; date and time.

2 (Not in use.

3 Control keys:

- ■ : Record.

- ■ : Stop.

4 Softkeys.

5 From left to right: USB (when connected); selected band; battery level.

6 Location where the service is being recorded: internal memory or USB.

7 Information window about recorded files. It shows name, size and creation date. It only shows files in the selected location (internal memory or USB).

8 Information window about the recording file. It shows file duration, maximum bitrate, source and available space.

- Cursor Functions:
  - •Up/down/Enter: File selection.
  - •Right/left/Enter: Control keys.

- Function keys:
  - •F1 Exit: It quits the tool.
  - •F4 Advanced: It exports the file to a USB.

ii.4.3   DAB TII

The DAB TII tool shows information that identifies transmitters (TII) from the ETI locked. The graph on screen shows PRS and null symbols.

▶ Screen Description
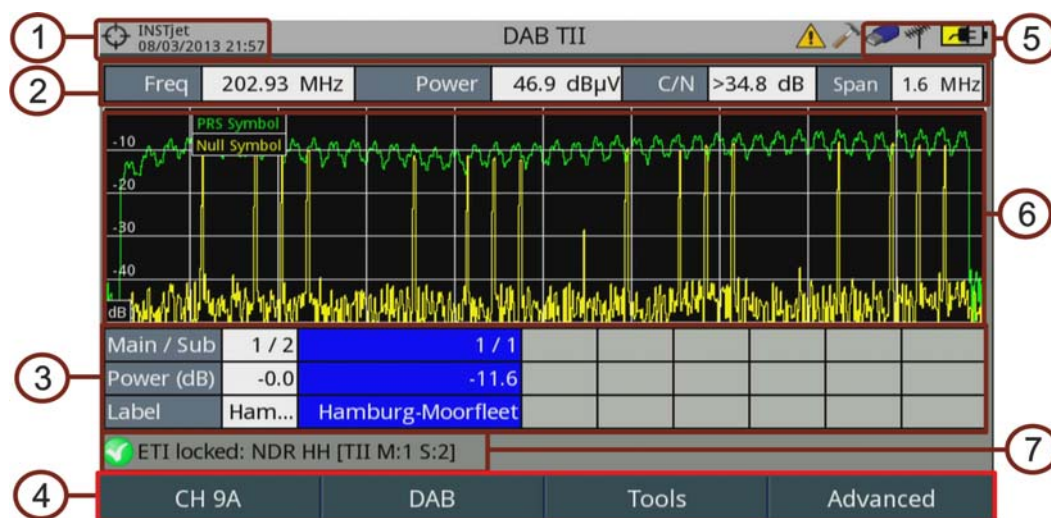
Figure 169.

1 Selected installation; date and time.

2 ETI locked data: frequency, power, C/N and span.

3 Transmitters data. Transmitters are ordered from highest to lowest power. It also allows you to select one of the transmitters by clicking on it. Data shown are as follows:

- Main identifier (Main) and sub-identifier (Sub) of the transmitter.

- Power of transmitter in relation to most powerful transmitter.

- Transmitter Identification label (see next).

4 Softkeys.

5 From left to right: USB (when connected); selected band; battery level.

6 PRS symbol spectrum (green) and null (yellow). Using the Advanced menu you can display each one separately. It also allows you to select the display of the null symbol with or without transmitter information.

7 It shows if the TSI is locked or unlocked. If it is locked, it shows the transmitter identification information (TII) that is being received with more power. It also shows the main identifier (M) and the sub-identifier (S) of the transmitter.

■ Cursor Functions:
  •Right/left/Enter: Navigation among transmitters.
  •Enter: Transmitter selection.

■ Advanced Menu (F4):
  •Tii Labels:
  -Import from USB: It allows you to import data from a USB flash drive. Data imported must be a file in XML format with the description labels of transmitters.
  -Export to USB: It allows you to export data to a USB flash drive. Data exported is a XML file with all the description labels of transmitters.
  •Show:
  -All: It shows the PRS and null symbols.
  -PRS symbol: It shows only the PRS symbol.
  -Null symbol: It shows only the null symbol.
  •Null symbol:
  -With TII: With transmitters info.
  -Without TII: Without transmitters info.

ii.4.4 Constellation

The constellation diagram is a graphic representation of the digital symbols received over a period of time. It shows in different colours the density of hits and includes features to zoom, move and delete the display on screen.

► **Constellation Screen**
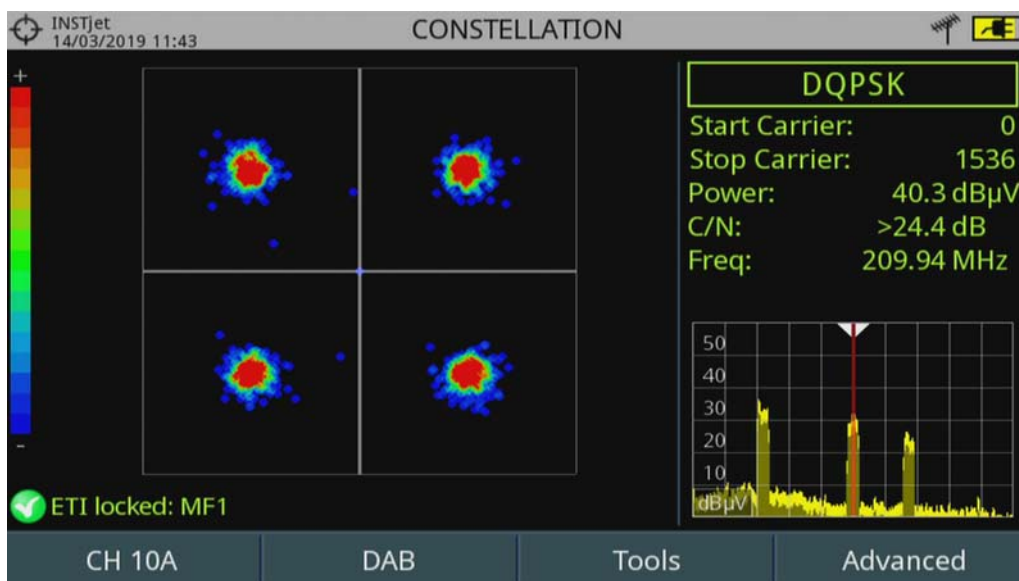
Figure 170.

- Cursor Functions:
  - Left/right: Frequency/Channel change (depending on the tuning mode).

- Advanced Menu:
  - Grid type:
    - Full Grid: The grid where the constellation is displayed is a complete grid.
    - Cross Grid: The grid where the constellation is displayed is made of crosses.
  - Persistence: It allows the user to set the level of persistence, which is the lapse of time the signal stays on the screen before disappearing. Available options according to the persistence level are: low, medium, high or permanent.
  - Zoom: It allows the user to select a quarter (I, II, III or IV) where apply the zoom in. To come back to normal view select All.
  - Start Carrier/Stop Carrier: This option allows selecting the range of carriers to be displayed between the first and last.
  - Clear: This option clears all symbols in the whole constellation window

For more details refer to "Constellation" on page 88.

ii.4.5 Echoes

The **Echoes** function shows the response in time of a DAB channel and therefore it can detect echoes that can occur due to the simultaneous reception of the same signal from several transmitters with different delays and amplitudes.

► **Echoes Screen**
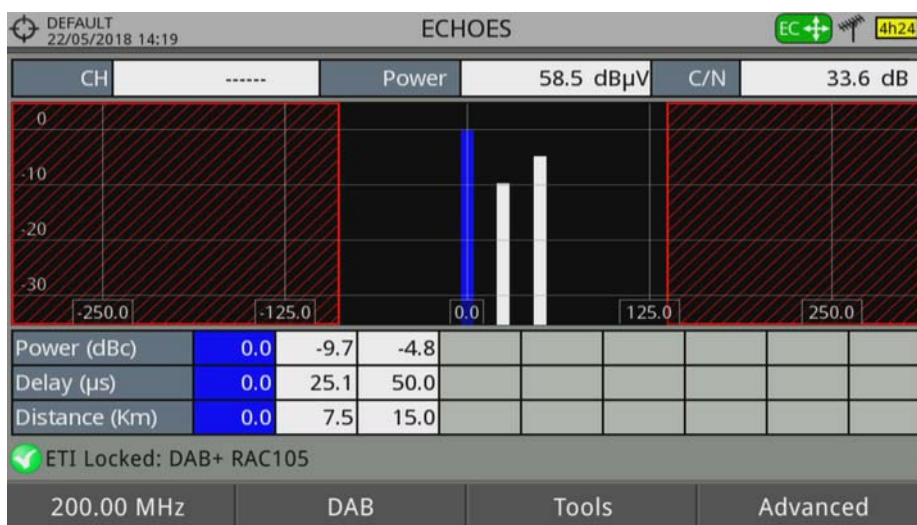
Figure 171.

- Cursor Functions:
  - •Left/right (**Channel/Frequency** mode): It changes the channel/ frequency (according to the tuning type selected).
  - •Left/right (Echoes active mode): It changes Echo.
  - •Up/down (Echoes active mode): It changes zoom.

Remember to press Enter to switch between the **Echoes** (EC) mode and the **Channel/Frequency** (CH/FR) mode.

- Advanced Menu:
  - •Zoom: The ZOOM option changes the zoom on the echoes windows. Zooms are 1x, 2x, 4x and 8x.

For more details refer to <u>"Echoes" on page 94</u>.

ii.4.6 MER by Carrier

The MER by Carrier function analyses continuously the measure of the MER value for each one of the carriers forming the selected channel and they are displayed in a graphic on screen.

► **MER by Carrier Screen**
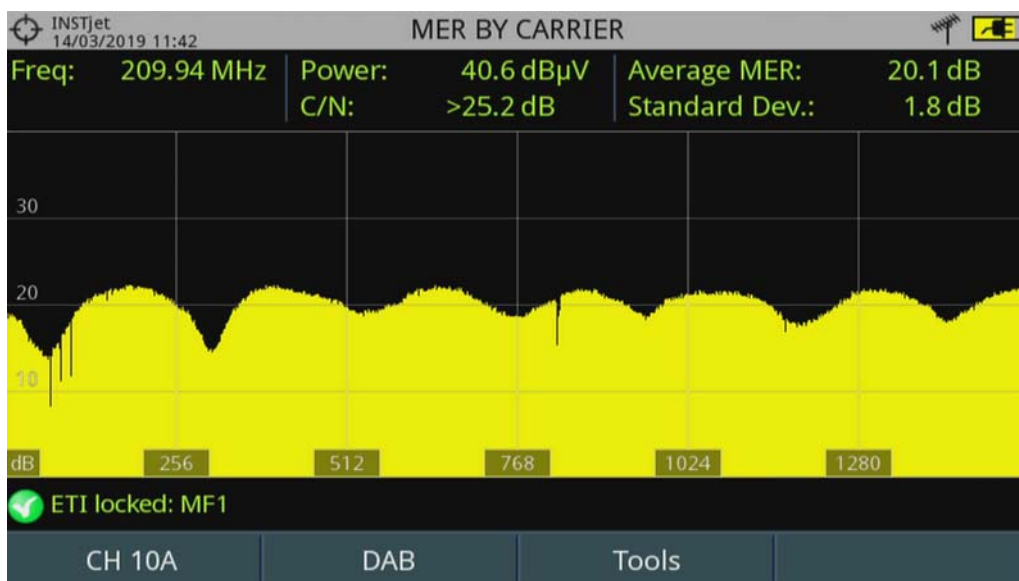
Figure 172.

■ Cursor functions:
  •Left/Right: Frequency/Channel change (depending on the tuning mode).

For more details refer to "MER by Carrier" on page 96.

ii.4.7   Datalogger

The Datalogger function stores automatically measurements in a file set by the user (name, channel plan). User can store for each datalogger measurements taken at different test points of the selected installation. Measurements are made for all channels in the active channel plan, both analogue and digital. Each installation has its own datalogger files.

Specific mesurements for DAB/DAB+ (MSC CBER; FIC CBER; CBER; FIB Ratio) are also saved.

For more details refer to "Datalogger" on page 125.

ii.4.8   Signal Monitoring

The Signal Monitoring tool allows monitoring one locked signal or a channel plan (several channels) by measuring its power and other parameters over time. All this data can be visualized in the meter or downloaded to a PC and exported to a file for later analysis

Specific mesurements for DAB/DAB+ (MSC CBER; FIC CBER; CBER; FIB Ratio) are also saved.

For more details refer to <u>"Signal Monitoring" on page 107</u>.

ii.4.9 | **Signal Coverage**

The Signal Coverage function allows the user to check signal for a tuned signal or a channel plan (several channels) by measuring power and other parameters over time.

The position where all these measurements are taken is determined by a GPS receiver. When the equipment locks a GPS signal, it automatically sets date and time using the GPS signal. As long as the GPS is locked, date and time is updated every hour.

All this data, measurements and GPS position can be visualized on the meter or downloaded to a PC and exported to a file for later analysis.

Specific mesurements for DAB/DAB+ (MSC CBER; FIC CBER; CBER; FIB Ratio) are also saved.

For more details refer to <u>"Signal Coverage" on page 115.</u>

iii ADVANCED FM OPTION+ BASIC DAB

This annex contains operating instructions for the next option:

- OP-00x-FM: Measurement of FM with advanced features + Basic DAB.

This option adds advanced features and tools to the FM measurement and demodulation.

Some of this new measurements are signal level for demodulated multiplex and deviations for several sub-carriers that form the multiplex. The new tools shows the FM multiplex spectrum and the FM deviation histogram.

This option also includes the DAB Basic function that allows the user to detect, measure, analyze and visualise digital radio DAB and DAB+.

The DAB (Digital Audio Broadcasting) is a digital radio standard, designed for both home and portable receivers to broadcast terrestrial and satellite audio and also data. It works with Band III and L-Band frequencies. The DAB+ is an evolution of DAB using the AAC + audio codec. It also includes Reed-Solomon error correction, which makes it more robust. DAB receivers are not compatible with DAB+ receivers.s.

▶	**Advanced FM**	[QR] SCAN

▶	**DAB / DAB + measurements**	[QR] SCAN

iii.1 █ Advanced FM operation

1 Connect the RF input signal to the equipment.

2 Select RF source signal and terrestrial band in Settings ⚙ (key S).

3 Select the tuning mode (by frequency or by channel). To tune by channel select previously a channel plan that contains FM channels.

4 To detect automatically the signal to demodulate press F2 and enable the StealthID function otherwise select the FM signal type.

5 Select a FM channel or frequency and wait to lock the signal to measure.

6 Press the measurement key ⊘ (key M) to access the Measurement Mode.

NOTE: To enable auto-detection for FM, access "Preferences" pressing the key 🗁 for one second and in the StealthID tab check the FM option.

To create a FM channel plan from scratch use the "Discover FM Stations" tool (for more details refer to).

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iii.2   Measurement Mode

► **Measurement Mode Screen**
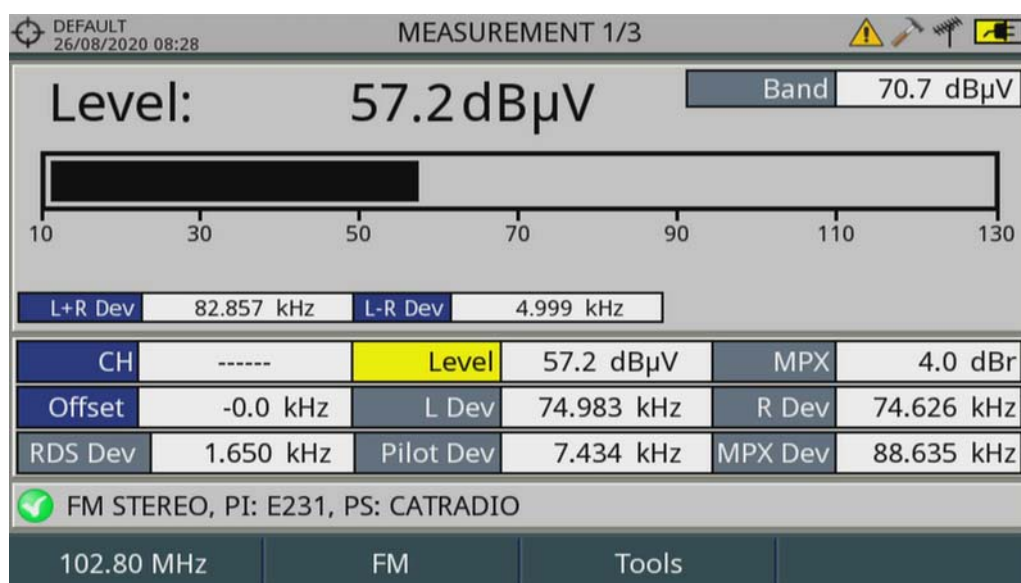
Figure 173. Measurement 1/3

► **Advanced Measurements for FM**

- **L+R Dev**: Frequency deviation caused only by L+R (or mono) component of MPX.
- **L-R Dev**: Frequency deviation caused only by L-R (or stereo) component of MPX.
- **MPX**: FM Multiplex level (dBr = dB relative to reference level).
- **Offset**: Frequency offset between the transmitter and the received tuned frequency.
- **L Dev**: Frequency deviation caused only by L channel (once decoded).

•**R Dev**: Frequency deviation caused only by R channel (once decoded).
•**RDS Dev**: Frequency deviation caused only by RDS subcarrier.
•**Pilot Dev**: Frequency deviation caused only by stereo pilot (19 kHz tone) component of MPX.
•**MPX Dev**: Deviation of whole band pass filtered MPX.

■ Cursor functions:
•Up/down: Change of main measurement on screen.
•Left/right: Change of channel/frequency.

■ Function Keys:
•F1 Tuning: Tuning options.
•F2 FM: FM demodulation parameters.
•F3 Tools: Tools available for FM.

■ Status Bar: It shows if the FM is locked or unlocked. If it is locked then it shows the PI (Programme Identification) and the PS (Programme Service).

► **Measurement Mode Screen 4/4**
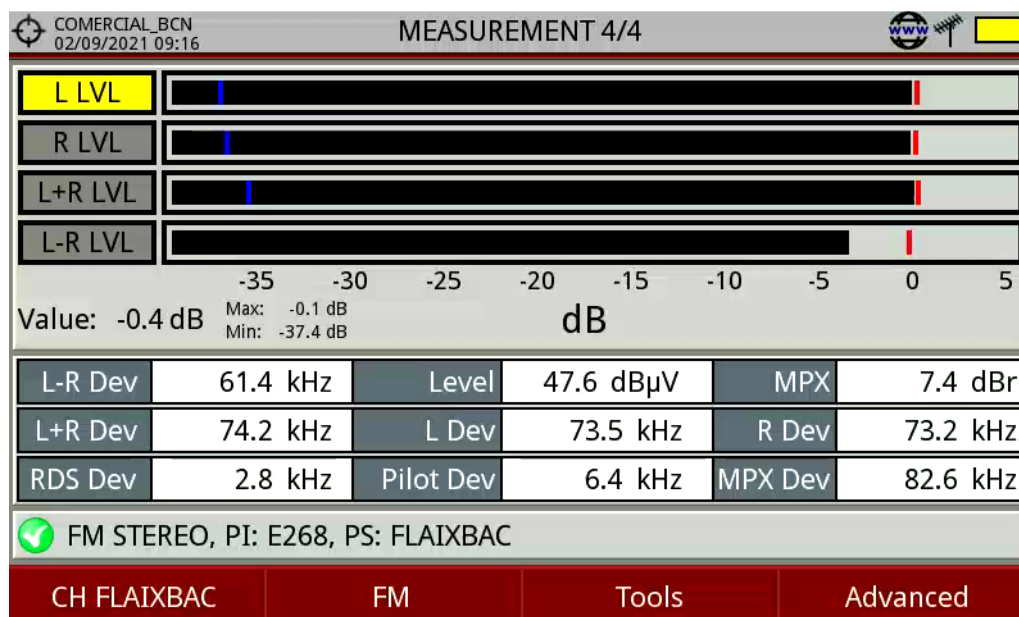
Figura 174. Measurement 4/4

► **Advanced measurement for FM**

Graph bars show dynamically levels for each component of the FM signal:

•**L LVL**: Left channel level.
•**R LVL**: Right channel level.
•**L+R LVL**: L+R component level (left + right), also known as mono, for MPX.
•**L-R LVL**: L-R component level (left + right), also known as stereo, for MPX.

The maximum level reached appears as a vertical red line and the minimum level as a vertical blue line. The selected parameter appears with a yellow background. Numerical values for level, maximum and minimum are below the bars.

The other measurements have been already explained on screen Measurement 1/4.

- ■ Cursor functions:
  - •Up/down: Change of selected parameter.

- ■ Function keys:
  - •F1 Tune: Tune options.
  - •F2 FM: FM signal parameters.
  - •F3 Tools: Tools enabled for FM.
  - •F4 Advanced (Reset Bars): It resets bar graph measurements.

- ■ Status bar: It shows if the FM signal is locked or unlocked. If it is locked it will show the PI (Program Identification) and the PS (Service Program).

iii.3   Tools

Press the [F3] key to access the Tools menu. Tools not compatible with FM signals are disabled.

The Advanced FM option has some exclusive tools for FM:

- ■ FM MPX Spectrum.

- ■ MPX FM measurements over time.

- ■ FM Histogram.

All the other tools are explained in "Tools" chapter ("TOOLS" on page 87).

iii.3.1   FM MPX Spectrum

The FM MPX Spectrum tool shows the FM multiplex spectrum in a frequency span of 100 kHz. It shows all the subcarriers that form the FM multiplex. It gives a general view of the FM multiplex and can help to detect problems.

► Screen Description
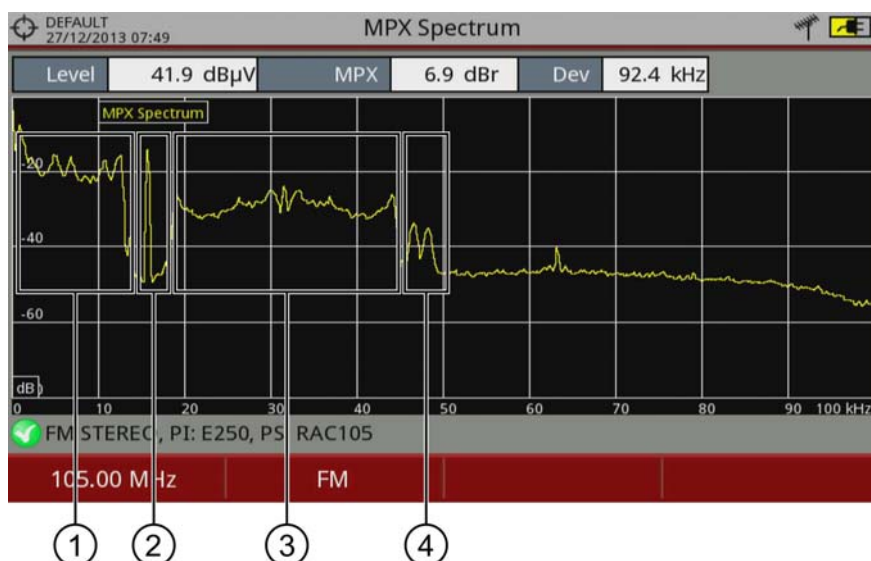
Figure 175.

1 L+R subcarrier.

2 Stereo Pilot.

3 L-R subcarrier.

4 RDS subcarrier.

► Measurements

- **Level**: FM signal level.
- **MPX**: FM Multiplex level (dBr = dB relative to reference level).
- **Dev**: Deviation for the multiplex (with all the subcarriers).

■ Function Keys:
- F1 Tuning: Tuning options.
- F2 FM: FM demodulation parameters.

iii.3.2   MPX FM measurements over time

The "MPX FM measurements over time" tool displays a graph showing the evolution of FM multiplex power over time and the related measurements.

► Screen description
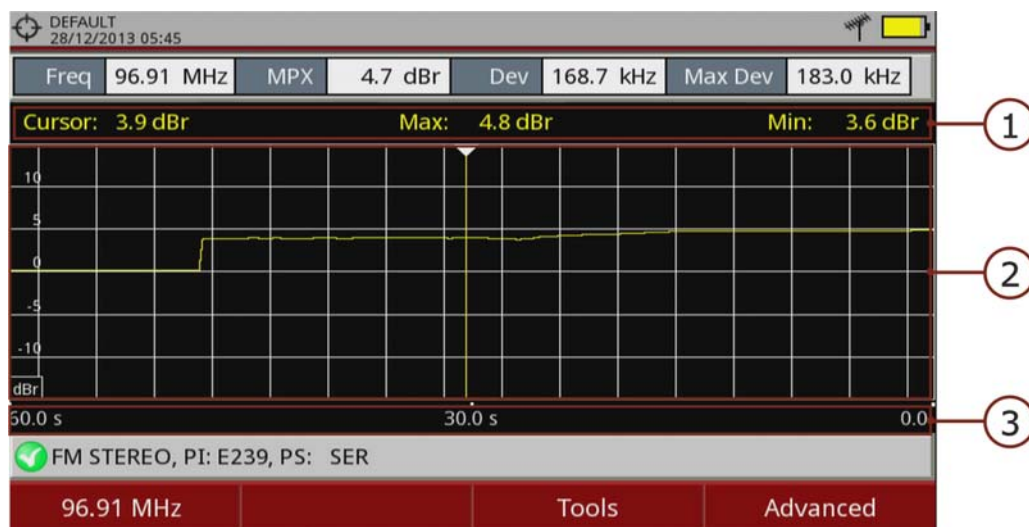
Figure 176.

1 FM multiplex level measurement at the cursor position, along with the maximum and minimum levels detected within the time range displayed on the screen.

2 Graph of the evolution of the FM multiplex level (dBr) over time..

3 Time span selected by the user.

► Measurements

- **Freq**: Tuned frequency.
- **MPX**: FM Multiplex level (dBr = dB relative to reference level).
- **Dev**: Deviation for the multiplex (with all the subcarriers).
- **Max Dev**: Maximum deviation for the multiplex.

■ Cursor Functions:
- Right/left: It moves the cursor along the graph.

■ Function keys:
- F1 Tuning: Tuning options.
- F3 Tools: Tools available for FM.
- F4 Advanced: Advanced Menu.

■ Advanced Menu F4:
- Re-start analysis.
- Span: Time span displayed on the screen (available values: 1 min, 3 min, 10 min, 30 min, 1 h, 3 h).

iii.3.3 | FM Histogram

The FM Histogram shows a graph with the distribution of MPX FM deviation measurements.

► **Screen Description**

Figure 177.

1 MPX Measurements.

- **Level**: FM signal level.
- **MPX**: FM Multiplex level (dBr = dB relative to reference level).
- **Dev**: Frequency deviation of whole band pass filtered MPX.
- **Hold**: Period of time taking samples.

2 Measurements:

- Frequency: It is the selected threshold for MPX FM deviation.
- Samples: Percentage of MPX FM deviation samples that are equal to the selected threshold (yellow graph).
- Accumulated: Percentage of MPX FM deviation samples that are equal o higher than the selected threshold (green graph).

3 Selected threshold for the MPX FM deviation (tipically 75 kHz). Move right-left to change threshold.

4 .Green graph: Percentage of accumulated samples values for MPX FM deviation (measured according to the selected standard).

5 Yellow graph: Percentage of MPX FM deviation values (measured according to the selected standard).

■ Cursor Functions:
- Right/left: Move cursor to select threshold for MPX FM deviation.

■ Function keys:
- •F1 Tuning: Tuning options.
- •F2 FM: FM demodulation parameters.
- •F3 Tools: Tools available for FM.
- •F4 Advanced: Advanced Menu.

■ Advanced Menu (F4):
- •Samples Hold:
  - -All: It takes samples continuously.
  - -Time: It takes samples for a period of time.
- •Time: Select the period of time to take samples.
- •Standard:
  - -All samples: Histogram calculated according to the ITU-R SM 1268-4 standard. It accumulates all values of frequency deviation into the histogram.
  - -Max 50 ms: Histogram calculated according to the ITU-R SM 1268-2 standard. It measures the maxim value of frequency deviation in 50 ms and then accumulate them into the histogram.
- •Reset: It clears and re-starts the histogram.

iii.3.4   Datalogger

The Datalogger function stores automatically measurements in a file set by the user (name, channel plan). User can store for each datalogger measurements taken at different test points of the selected installation. Measurements are made for all channels in the active channel plan, both analogue and digital. Each installation has its own datalogger files.

Specific measurements for FM (FM Level, Multiplex FM Level and deviation) are also stored.

For more details refer to <u>"Datalogger" on page 125</u>.

iii.3.5   Signal Monitoring

The Signal Monitoring tool allows monitoring one locked signal or a channel plan (several channels) by measuring its power and other parameters over time. All this data can be downloaded to a PC and exported to a file for later analysis

Specific measurements for FM (FM Level, Multiplex FM Level and deviation) are also stored.

For more details refer to <u>"Signal Monitoring" on page 107</u>.

iii.3.6   Signal Coverage

The Signal Coverage function allows the user to check signal for a tuned signal or a channel plan (several channels) by measuring power and other parameters over time.

The position where all these measurements are taken is determined by a GPS receiver. When the equipment locks a GPS signal, it automatically sets date and time using the GPS signal. As long as the GPS is locked, date and time is updated every hour.

All this data, measurements and GPS position can be downloaded to a PC and exported to a file for later analysis.

Specific measurements for FM (FM Level, Multiplex FM Level and deviation) are also stored.

For more details refer to <u>"Signal Coverage" on page 115</u>.

iii.4   webControl

The webControl function allows you to connect remotely to the meter in order to visualize measurements and operate on it. The meter must be connected to a data network. To connect to meter from a remote access device use just a standard web browser.

WebControl tools are:

- Measurement and Spectrum: It shows spectrum and measurement from the tuned channel.
- TV Parameters: It shows data, video and audio from the tuned channel.
- Console: It emulates and allows you to interact with the meter in first person.
- Quality Signal Monitoring: It monitors a signal according to some parameters selected by the user.
- Historical Monitoring: It shows data from monitoring and they can also be exported.
- Installations Management: It manages installation files and creates channel plans.
- Task Management: It allows the user to schedule some tasks.

Specific measurement for advanced FM like different types of signal level (L, R, L+R, L-R), level and deviation for multiplex FM and others are shown on the measurement screen.
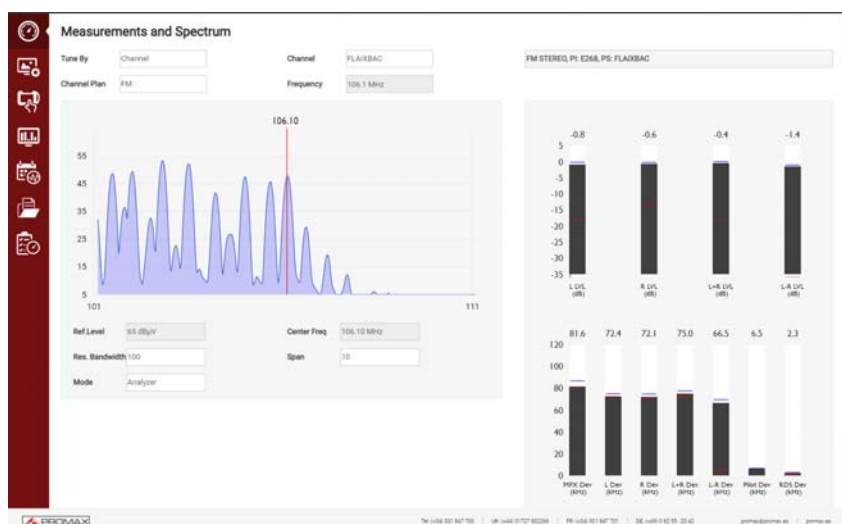
Figure 178. Measurement and Spectrum for Advanced FM

Parameters for Advanced FM like audio level and deviation can also be monitored.

Figure 179. Parameters monitoring for Advanced FM

For more details refer to

iii.5 | Basic DAB operation

1 Connect the RF input signal to the equipment.

2 Select RF source signal and terrestrial band in Settings ⚙ (key S).

3 Select the channel plan and the channel or the frequency where the DAB/DAB+ signal is located. Frequencies with three decimals must be entered using the virtual numeric keypad that will appear when editing the current frequency.

4 To enable auto-detection for DAB/DAB+, access "Preferences" pressing the key 🗁 (key F) for one second and in the StealthID tab select the DAB option. Now press F2 to confirm that the Stealth-ID option is ON.

5 When the DAB signal is locked, the status bar will turn green.

6 For more details refer to .

iii.6 | Operation Modes

The information that appears on screens for each mode (Measurement mode, Spectrum mode and TV mode) is described below. To change the mode, press the corresponding mode key. To change the screen in the same mode, press the same mode key consecutively.

iii.6.1 | Measurement Mode

■ Cursor functions:
  • Up/down: Change of main measurement on screen (only for Measurement 1/3).
  • Right/left: Change of channel/frequency.

■ Function Keys:
  • F1 Tuning: Tuning options.
  • F2 DAB: DAB detected parameters.
  • F3 Tools: Tools enabled for DAB.

■ Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).

► **Measurement Mode Screens**
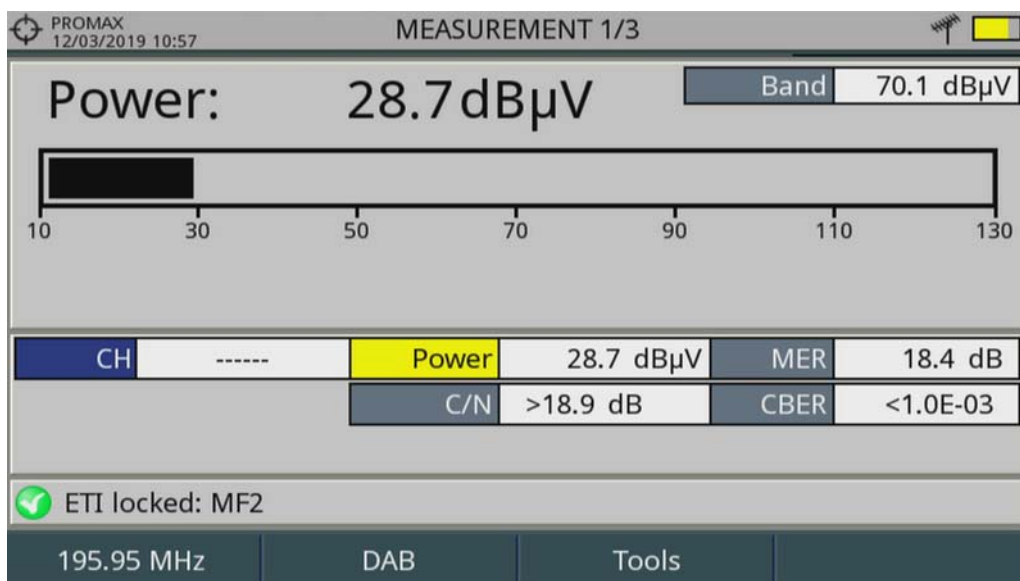
Figure 180. DAB measurement 1/3
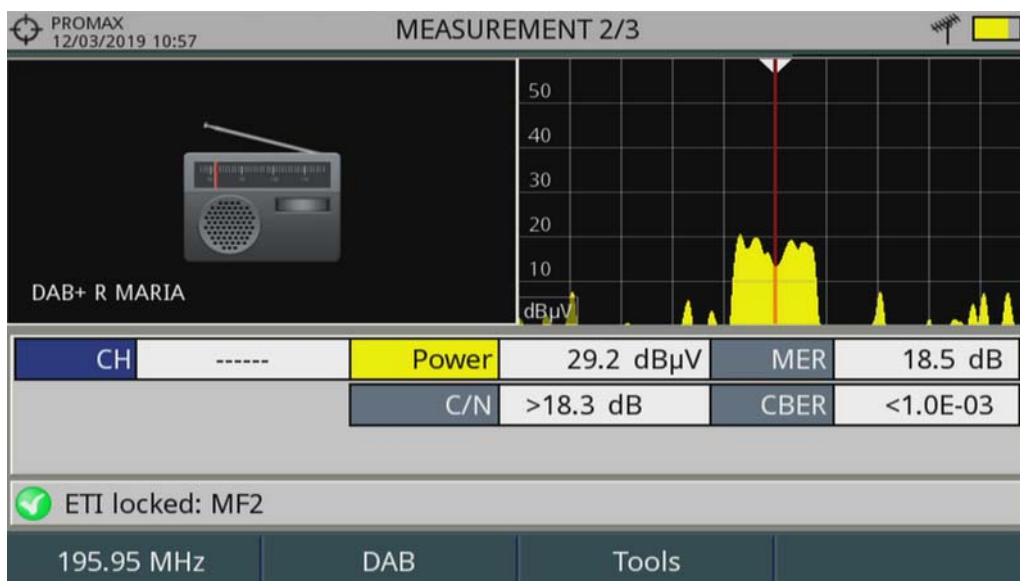
Figure 181. DAB measurement 2/3
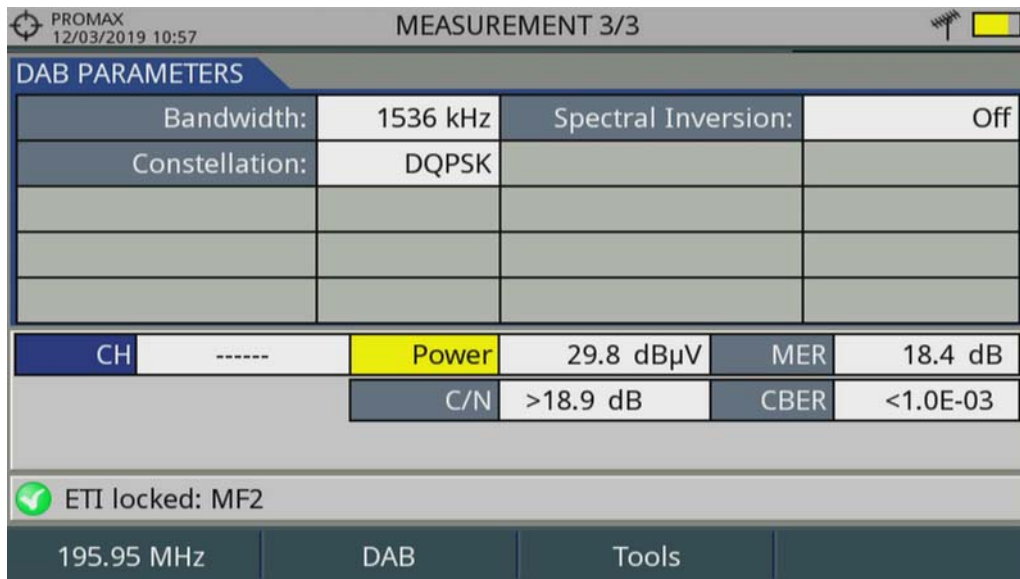
Figure 182. DAB measurement 3/3.

iii.6.2	**Spectrum Analyzer Mode**

- Cursor Functions:
  - •Up/down: Change of reference level.
  - •Right/left (according to active mode):
    - -SP: Change of SPAN.
    - -FR or CH: Change of channel/frequency.

- Function Keys:
  - •F1 Tuning: Tuning options.
  - •F2 DAB: DAB detected parameters.
  - •F3 Tools: Tools enabled for DAB.
  - •F4 Advanced: Spectrum Analyzer advanced options.

- Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).

► **Spectrum Analyzer Mode Screen**
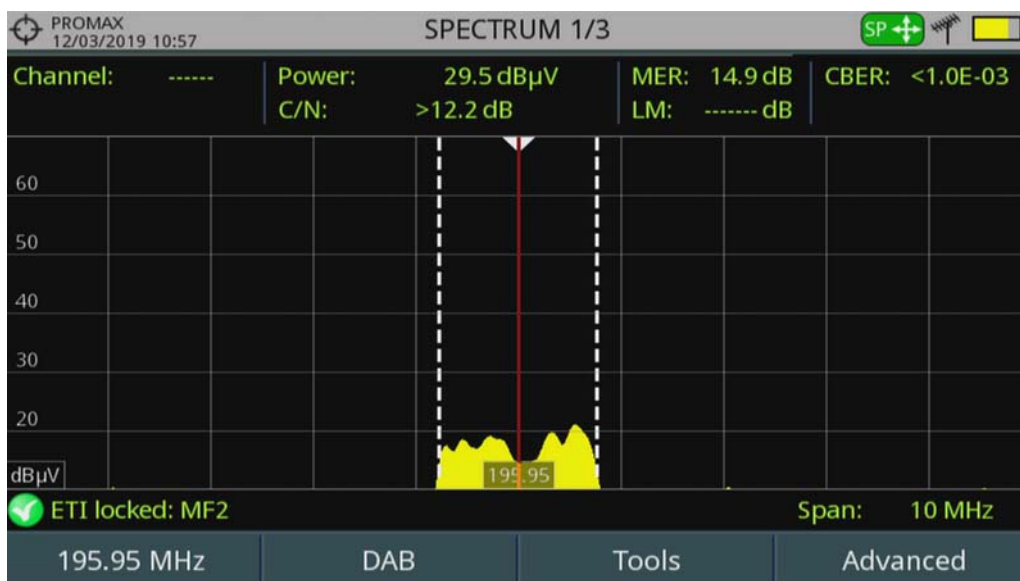
Figure 183. Spectrum 1/3
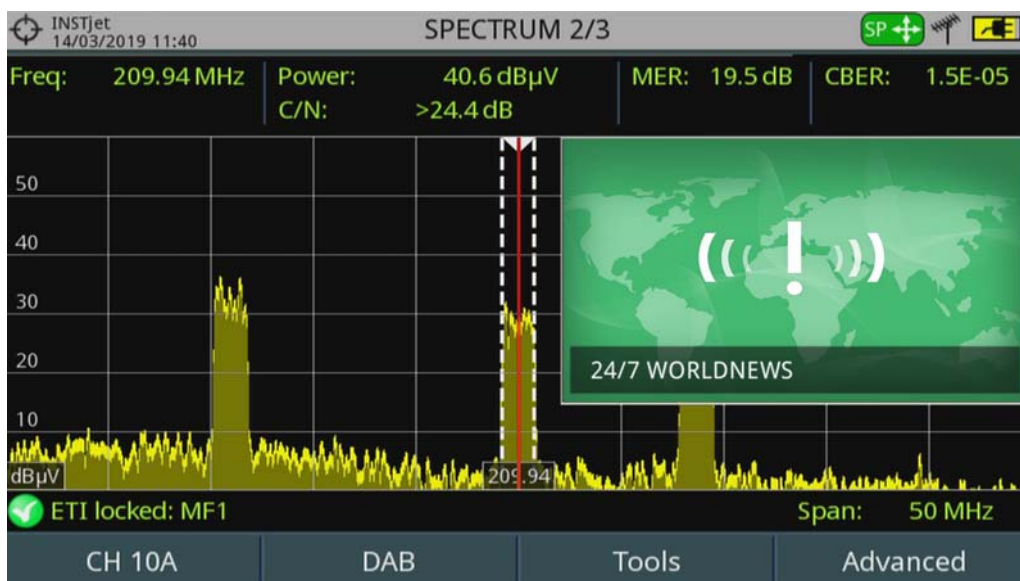
Figure 184. Spectrum 2/3
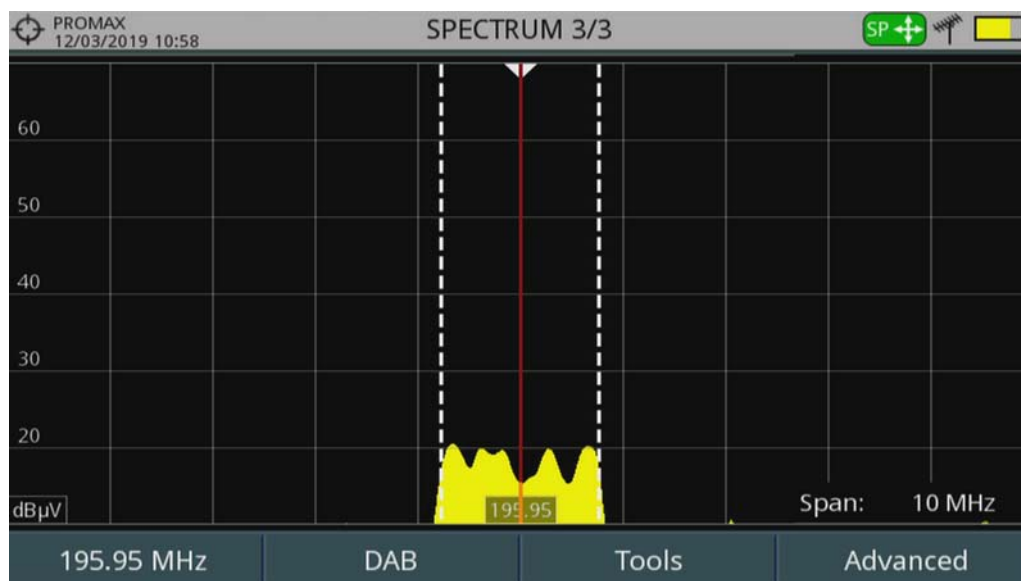
Figure 185. Spectrum 3/3

iii.6.3   DAB Mode

- ■ Cursor Functions:
  - •Up/down: Change of service.
  - •Right/left: Change of channel/frequency.

- ■ Function Keys:
  - •F1 Tuning: Tuning options.
  - •F2 DAB: DAB detected parameters.
  - •F3 Tools: Tools enabled for DAB.
  - •F4 Advanced: Spectrum Analyzer advanced options.

- ■ Status Bar: It shows if the ETI is locked or unlocked. If it is locked then it shows the TII (Transmitter Identification Information) that is received with more power. It also shows the transmitter main identifier (M) and sub-identifier (S).

► **DAB Mode Screens**

Figure 186. DAB 1/3

Figure 187. DAB 2/3

Figure 188. DAB 3/3

iv HIGH FREQUENCY OPTION*

This annex contains operating instructions for the next option:

■ OP-00x-AF: High Frequency measurement.

This option increases accuracy when measuring frequency.

iv.1 ■ Operation

1 Connect the RF input signal to the equipment.

2 Press the Settings ⚙ key to access the Settings Menu and in "Signal Source" select "RF".

3 From Settings menu access the "Band" option and select "Terrestrial" to work on terrestrial band or "Satellite" to work on satellite band.

4 Press the Spectrum key 〰 to get into the SPECTRUM ANALYZER mode. If you press this key repeatedly you could see different views of a signal.

5 Press the [F1] key to enter the "Tuning" mode and in "Tune by" option select "By frequency". Then, on option "Frequency" enter your frequency or move left/right along the frequency band.

6 If you have a reference signal of 10 MHz, you should connect it to the 1PPS[**] input.

7 When connecting the external reference signal it should appear on screen this message "Tuning external reference". If it is successfully tuned, it will appear on screen the "Ext Ref" icon on the top right corner.

8 Press the [F4] key to access the Advanced menu and on "Marker" option select ON.

9 The marker is displayed on screen as an arrowhead, showing on a window some information about the frequency and power level where it points. You can move the marker left/right when the marker is in MK mode (to do so, press Enter until the MK icon appears).

10 The frequency on the marker's window has an accuracy of ±1 kHz (3 decimals). When using an external reference signal of 10 MHz, accuracy reaches ±250 Hz (6 decimals).

---

*. Only available for PROWATCH Neo 2
**. For the PROWATCH Neo 2 it is labeled as EXT REF.

► **Screen Description**
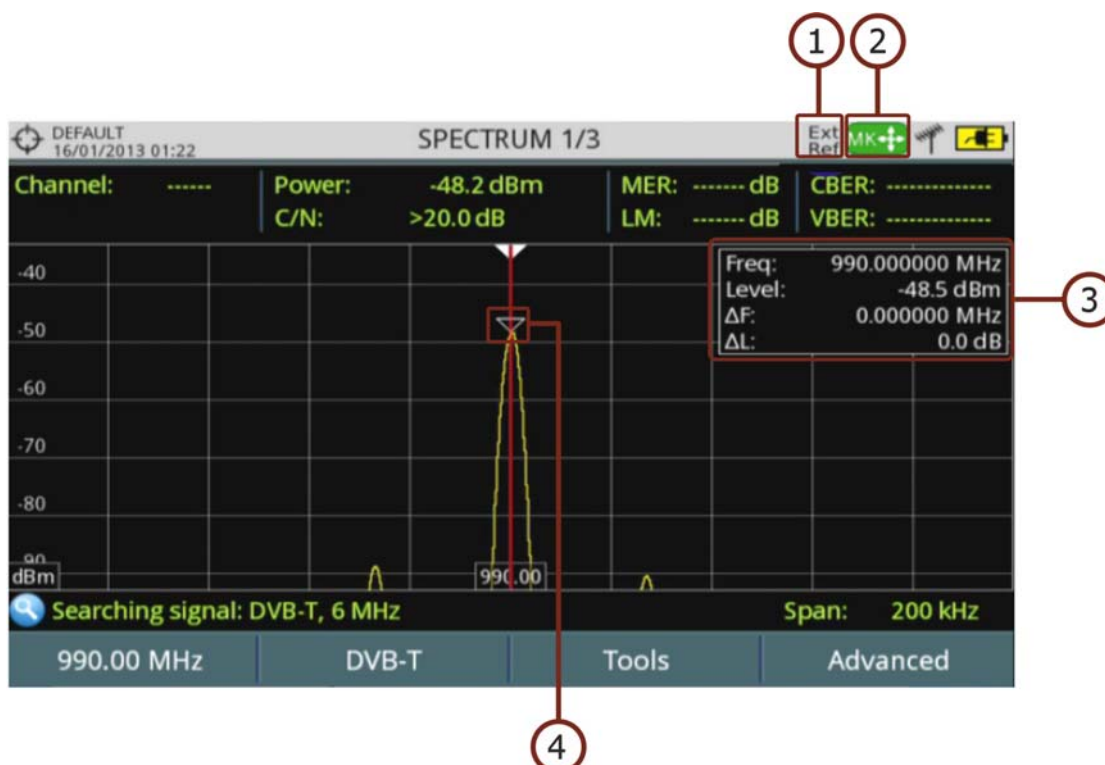
Figure 189.

1️⃣ Icon when external reference is tuned.

2️⃣ Joystick in Marker mode (MK).

3️⃣ Marker window:

- •Freq: Frequency where the marker is pointing (MHz).
- •Level: Power level at the frequency where the marker is pointing.
- •ΔF: Frequency difference between marker and cursor.
- •ΔL: Power level difference between marker and cursor.

4️⃣ Marker.

■ Cursor functions:
- •Joystick up/down: It changes reference level.
- •Joystick left/right (press to change mode):
  - -MK: Move marker.
  - -SP: Change SPAN.
  - -FR or CH: Move cursor to change frequency or channel.

v 8 or 16 INPUTS OPTION

This annex contains operating instructions for the next options:

- OP-00x-PN-8: 8 RF inputs without redundant power source.
- OP-00x-PN-R: 8 RF inputs with redundant power source.
- OP-00x-PN-16: 16 RF inputs (redundant power source included).

The standard **PROWATCH Neo** equipment has only 1 input. With this option you can expand RF inputs to 8 or 16. This option should be asked when requesting the equipment.

v.1 Single Signal Operation

1 Connect each signal to the corresponding RF input.

2 The RF1 input is selected by default.

3 To change the default input open the webControl and go to "Measurements and Spectrum" or "TV Parameters" then go to option "Config" and select other input.

4 The equipment only can work with the signal from the selected input.

v.2 Multiple Signal Operation

1 The "Mask Monitoring" tool allows you to work sequentially (almost simultaneously) with several or all inputs from RF1 to RF8 or RF16. This is an optional tool (for more details refer to <u>"Mask Monitoring" on page 228</u>).

2 Mask Monitoring settings, management and historical record search is done through the webControl software (for more details refer to <u>"WEBCONTROL" on page 204</u>).

3 During monitoring configuration, you can individually select and configure each available input (1-8 or 1-16 according to option) with the condition that all them must be on the same frequency band: terrestrial (from 5 to 1000 MHz) or satellite (from 950 to 2500 MHz). It also allows you to select a different detection type for each input.

4 The equipment performs a sequential monitoring for each input. Each spectrum received from each input can be view on screen at the same time, up to 9 inputs..

▶	**Spectral monitoring for multiple inputs**	S O A N

v.3 **PROWATCH Neo (8 Inputs)**
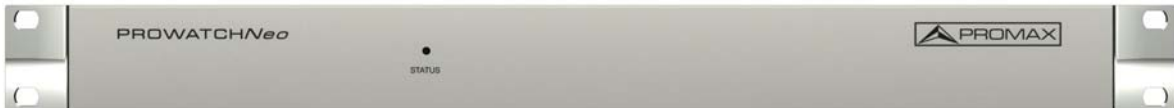
Figure 190. Front View

Figure 191. Rear View

Figure 192. Front View

Figure 193. Rear View

vi ADDITIONAL INFORMATION

vi.1 Additional Documents

On the PROMAX website you can find additional information to go deeper in some aspects related to the field strength meter.

Name	Description	Link
PROMAX Download Area	Documentation related to PROMAX equipment	http://www.promaxelectronics.com/ing/downloads/user-manuals
Signals Description	Brief definition of all signals and parameters detected by the meter	http://www.promaxelectronics.com/ing/downloads/user-manuals/ranger-neo-3/high-class-field-strength-meter-and-spectrum-analyzer
How to Point a Dish Antenna	Explanation about how to use the meter to install and point a satellite dish	http://www.promaxelectronics.com/ing/downloads/user-manuals/ranger-neo-3/high-class-field-strength-meter-and-spectrum-analyzer
DiSEqC Commands	Description of DiSEqC commands for remote control of antennas	http://www.promaxelectronics.com/ing/downloads/user-manuals/ranger-neo-3/high-class-field-strength-meter-and-spectrum-analyzer
Remote Control Commands	Description of remote commands for remote control of the meter	http://www.promaxelectronics.com/ing/downloads/user-manuals/ranger-neo-3/high-class-field-strength-meter-and-spectrum-analyzer
NetUpdate Manual	Instructions manual about the NetUpdate software to update firmware and manage data from the meter	http://www.promaxelectronics.com/ing/downloads/user-manuals/ranger-neo-3/high-class-field-strength-meter-and-spectrum-analyzer
Coverage.xsl	Excel stylesheet to apply to the signal monitoring or signal coverage file	https://www.promax.es/downloads/software/HDRanger/signal-coverage-support.zip

vi.2 Social Networks

Name	Link
Twitter	@PROMAX_news
Linkedin	https://www.linkedin.com/company/1493234/
Facebook	https://www.facebook.com/promaxelectronics/
YouTube	https://www.youtube.com/user/PROMAXElectronics

vii MULTIMEDIA CONTENT

The following table shows all the links to video tutorials included in this manual:

Chapter	Title	Link	QR Code	
1. Introduction	Introducing the RANGER Neo	https://youtu.be/UBGLAf-oDP4	▦	
2. Setting Up	Standard operation	https://youtu.be/bAZuNhJ5aL8		▦
2. Setting Up	How to point a rotor driven antenna	https://youtu.be/bAZuNhJ5aL8?t=826	▦	
3. Settings and Preferences	Settings menu	https://youtu.be/LACzovzAn4E		▦
3. Settings and Preferences	Preferences menu	https://youtu.be/M0aEnmF3sVM	▦	
4. RF Signal Tuning	Manual input of frequencies	https://youtu.be/81l5ezO4cgg		▦
4. RF Signal Tuning	Measuring and decoding DVB-S2 multi-stream	https://youtu.be/xuv9ESed_Ak	▦	
4. RF Signal Tuning	Spectrum analyser 1/3	https://youtu.be/cpGIYJBTOvs		▦
4. RF Signal Tuning	Spectrum analyser 2/3	https://youtu.be/rk4c_pM8PME	▦	
4. RF Signal Tuning	Spectrum analyser 3/3	https://youtu.be/BNep4ID55Zo		▦
4. RF Signal Tuning	Measurement mode	https://youtu.be/aQcHadfcEkQ	▦	
4. RF Signal Tuning	TV mode	https://youtu.be/wqsYEtgXhmM		▦
4. RF Signal Tuning	How to locate satellite beacon carriers	https://youtu.be/POqhXWxfsYw	▦	
4. RF Signal Tuning	TV mode	https://youtu.be/wqsYEtgXhmM		▦
4. RF Signal Tuning	Decoding a real 4K signal in DVB-T2	https://youtu.be/XZnhX0JWvbw	▦	
4. RF Signal Tuning	LTE signal measurement (mobile telephony)	https://youtu.be/ApNOxR9dpTg		▦

Chapter	Title	Link	QR Code	
5. Tools	Constellation	https://youtu.be/jKsILCNc10k	▦	
5. Tools	LTE ingress test	https://youtu.be/DytxQUAIIms		▦
5. Tools	Echoes analyser	https://youtu.be/f2SKJJ3B6KI	▦	
5. Tools	MER by carrier	https://youtu.be/J1lTkI5uNlo		▦
5. Tools	MEROGRAM	https://youtu.be/orGLVeYzDO4	▦	
5. Tools	Spectrogram	https://youtu.be/eQpUUN3OtUM		▦
5. Tools	Attenuation test	https://youtu.be/h7Y5SuZ5nWM	▦	
5. Tools	Signal monitoring	https://youtu.be/yRM4JrblZCI		▦
5. Tools	Signal coverage 1/2 (GPS)	https://youtu.be/-Xh7s7sDujM	▦	
5. Tools	Signal coverage 2/2 (KML generator)	https://youtu.be/-IMMFZcEd8g		▦
5. Tools	Datalogger	https://youtu.be/16ZCBDoClu0	▦	
5. Tools	Explore channel plan	https://youtu.be/mNCLy7zlnOI		▦
5. Tools	Discover FM stations	https://youtu.be/ZgnpXvnj1wY	▦	
5. Tools	Field strength	https://youtu.be/Av16CAiUynw		▦
5. Tools	Task planner	https://youtu.be/u2wVhioZikE	▦	
5. Tools	Transport Stream analyzer	https://youtu.be/9YP5Q8FHOWw		▦
5. Tools	Transport Stream recording	https://youtu.be/l1iiqVhogJU	▦	
5. Tools	Shoulder attenuation	https://youtu.be/GhdA3oaZagE		▦

Chapter	Title	Link	QR Code	
5. Tools	Service recording	https://youtu.be/NYYRn3G-QMo		
6. WiFi Monitoring	WiFi measurement	https://youtu.be/75cJlm880_k		
7. IPTV	IPTV analyzer	https://youtu.be/VP1XgAxHM5c		
8. OTT	OTT operation and analysis	https://youtu.be/O4TdvJswPbI		
9. Installations Management	Installations management	https://youtu.be/TUuHJBX0BQI		
9. Installations Management	Sending files by e-mail	https://youtu.be/aIzvhn1xWe0		
10. webControl	webControl introduction	https://youtu.be/YV1MicKpSN0		
10. webControl	File manager	https://youtu.be/RAhiw04P2h8		
10. webControl	Report generator	https://youtu.be/_EFG1LmwqCQ		
10. webControl	Channel plan creator and editor	https://youtu.be/0Zg1dg7xZXg		
10. webControl	Spectrum monitoring (FM radio)	https://youtu.be/T6bLB7sFatQ		
10. webControl	Spectrum monitoring (max/min)	https://youtu.be/CACecSJNGQU		
10. webControl	Spectrum monitoring (mask deviation)	https://youtu.be/HrcznPZHAXg		
10. webControl	Spectrum monitoring (cross-polarization)	https://youtu.be/t-AeoXFfUrE		
10. webControl	Spectrum monitoring (4G/5G interference)	https://youtu.be/7d3Ar1qDpmQ		
11. Connecting to external devices	How to align a dish via DiSEqC	https://youtu.be/i5O-e5qOsDA		
11. Connecting to external devices	How to create channel plans using NetUpdate4	https://youtu.be/YwbpfRNGJYI		
11. Connecting to external devices	How to generate a measurement report with Update4	https://youtu.be/fQP8n-59pHc		

Chapter	Title	Link	QR Code	
Annex i	Optical fiber	https://youtu.be/7OiEijjRZ64		
Annex ii	DAB / DAB+ measurements	https://youtu.be/pUDkiOHvrVM		
Annex iii	Advanced DAB	https://youtu.be/kBv_3ToWdQs		
Annex iv	Advanced FM	https://youtu.be/23I6dyyYbh8		
Annex vi	Spectral monitoring for multiple inputs	https://youtu.be/Db8c3lQ4qQg		

viii PREVIOUS VERSIONS OF USER'S MANUAL

Manual Version	Web Publication Date	Firmware Version
F5.0	December 2023	31.5
F4.0	June 2022	30.7
F3.0	January 2022	29.9
F2.0	May 2021	29.8

WHAT'S NEW on manual F5

- Update: Different views for PROWATCH *Neo* + and PROWATCH *Neo* 2.
- Update: HDMI™ trademark.
- Update: M3U compatible.
- Update: Specifications update (Digicipher II).
- Update: Older versions of What's new are moved as an annex.

WHAT'S NEW on manual F4.0

- New: Option "Start zoom" ("►Advanced Menu in Spectrum Analyzer mode" on page 65).
- Improvement: Specifications and functions for standard ISDB-T and J83B ("► ISDB-T" on page 261) ("► J83 Annex B" on page 263).
- Improvement: The query for the monitoring database in webControl can take up to 7 days ("Historical Monitoring" on page 218).
- Update: Several changes in managing monitoring DDBB ("Signal Quality Monitoring" on page 214).
- Update: DAB is now only available as an option ("DAB/DAB+ OPTION" on page 284).
- Improvement: SCAN view optimized ("Scan" on page 168).
- Others: Other minor updates and improvements.

WHAT'S NEW on manual F3.0

- Improvement: Video-tutorials inserted along the manual ("MULTIMEDIA CONTENT" on page 325).
- Update: New screen 4/4 in Advanced FM ("► Measurement Mode Screen 4/4" on page 303).
- Update: Measurement and monitoring for FM Advanced in webControl ("webControl" on page 309).

- Improvement: Added a step by step to tune a RF signal terrestrial or satellite ("Practical examples" on page 38).
- Update: Datalogger, echoes and webcontrol figures.
- Improvement: For FM signal, parameters PS and PI from RDS are saved on file XML for Signal Monitoring ("Data Viewer" on page 112).
- Update: New way to set network parameters via pendrive ("Change of Network Settings via PENDRIVE" on page 9).
- Update: New way to set network parameters via webControl ("Change of Network Settings via WEBCONTROL" on page 10).
- Update: Removed "Load factory settings" ("Setting / Updating" on page 9).
- Update: Removed "Load user settings" ("Setting / Updating" on page 9).
- Update: Recommended settings when monitoring ("Recommended Settings for Monitoring" on page 11).
- Improvement: New option when creating a datalogger that allows you to skip channels ("Datalogger" on page 125).
- Update: The data viewer from the datalogger now shows BER instead of C/N ("►Screen Description (Data Viewer)" on page 131).
- New: It allows you to send files from the equipment via e-mail ("► Menu Options" on page 199).
- New: Watchdog option ("►Tools Options" on page 51).
- New: Task Management from webControl can schedule tasks to save audio and ETI ("Task Management" on page 225).
- New: It allows you to stream from TV parameters in webControl ("TV Parameters" on page 210).
- New: It allows you to play and record audio from TV parameters in webControl ("TV Parameters" on page 210).
- New: Notification icons on the top bar of the webControl ("Icon Table" on page 208).
- New: Communication via SFTP ("SFTP Protocol Connection" on page 248).
- New: webControl allows you to export and import monitoring ("Signal Quality Monitoring" on page 214).
- Improvement: webControl allows you to reload an unfinished monitoring ("Signal Quality Monitoring" on page 214).
- Improvement: webControl can store up to 30 days of data in quality monitoring ("Signal Quality Monitoring" on page 214).

WHAT'S NEW on manual F2.0

- New tool: Task Management from webControl ("Task Management" on page 225).
- New tool (optional): Mask Monitoring from webControl ("Mask Monitoring" on page 228).
- Update: Monitoring total time counter and cycle time counter on the quality signal monitoring from webControl ("► Screen Description" on page 217).
- Update: On TV Parameters from webControl if DAB contains images they are also shown ("► Screen Description" on page 211).
- Update: New options on webControl (About Equipment; current installation folder; GPS coordinates) ("► Screen Description" on page 209).

- Update: FM Advanced measurement and DAB advanced measurement are shown on webControl (for meters with this option installed) ("► Screen Description" on page 211
- New tool: Channel plan edition from webControl ("Channel Plan Editor" on page 224).
- New tool: PDF report creation from webControl ("► Options Menu (mouse right button):" on page 221).
- Update: In webControl, the TV Parameters screen allows listening to FM or DAB audio ("TV Parameters" on page 210).
- New option: It allows rebooting the meter from webControl ("Measurements and Spectrum" on page 209).
- New tool: File Manager from webControl ("File Manager" on page 220).
- New tool: Channel Plan Creator from webControl ("Channel Plan Creator" on page 223).
- New tool: Service Recording / TS from webControl ("TV Parameters" on page 210).
- New tool: Password Recovery from webControl ("► Password Recovery" on page 207).
- Update: System messages are saved as alarms on the webControl monitoring tool ("Historical Monitoring" on page 218).
- Update: Polarization for satellite band it is also saved in datalogger ("? Datalogger" on page 269).
- Update: Ethernet communication specs ("► Inputs and Outputs" on page 258).
- Update: DAB specs ("► DAB / DAB+ Advanced (PROWATCH Neo 2)" on page 270).
- Update: Transport Stream Specifications ("► Transport Stream (PROWATCH Neo 2)" on page 267).
- Update: DVB-S2 Specifications ("► DVB-S2" on page 264).
- New preference: Time setting by means of NTP protocol ("►NTP Options" on page 54).
- New preference: SMTP e-mail server settings ("►SMTP Options" on page 54).
- New preference: Using a hard drive for webcontrol monitoring ("►Tools Options" on page 51).
- New setting: 22 kHz Tone Position ("►Measurement Options" on page 50).
- Update: Boot screen option removed (on Preferences/Appearance).
- Update: Available SID identifier in hexadecimal format ("►Appearance Options" on page 49).
- Update: Previous to start a Signal Coverage or Drive Test, it shows the reference level to be used during measurement ("Signal Coverage" on page 115)
- Update: On Discover FM Stations, each channel is named after its service name ("Menu Options" on page 140).
- Update: Date and time are updated when locking a GPS signal ("Signal Coverage" on page 115).
- New option: Schedule for signal monitoring and coverage ("Settings" on page 120).
- Update: Datalogger shows profile and PLP number for DVB-T2 channels ("Datalogger" on page 125).
- Update: The Task Planner can run and stop alarm monitoring ("Task Planner" on page 146).
- Update: GPS height is saved in datalogger ("Signal Coverage" on page 115).
- Update: Transport Stream Recording ("Transport Stream Recording" on page 159).

- Update: TV 3/3 screen and IPTV 3/3 screen show more service features ("▶ TV + SERVICE DATA (TV 3/3)" on page 78).
- Update: Last spectrum settings recovered after switching on ("▶Advanced Menu in Spectrum Analyzer mode" on page 65).
- Update: New section "LTE Signals" ("LTE Signals" on page 85).
- Update: New section "4K Decoding" ("4K Decoding" on page 85).
- Update: On Installation Manager, when selecting a channel plan it shows its version ("Installation Management" on page 198).
- Update: DAB/DAB+ screens ("DAB / DAB+ OPTION" en página 278).
- Update: Improvement of Optical option annex ("OPTICAL OPTION" on page 274).
- New option (opcional): FM Advanced ("ADVANCED FM OPTION+ BASIC DAB" on page 301).
- New option: Advanced DAB ("DAB/DAB+ OPTION" on page 284).
- New option (optional): High Frequency ("HIGH FREQUENCY OPTION" on page 318).
- Others: Other minor updates and improvements.

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