SRM-3000
Selective Radiation Meter

Operating Manual

3001/98.21

narda Safety Test Solutions
an L3 Communications Company

SRM-3000
Selective Radiation Meter

300X/XX, Series C ...

Operating Manual

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Please direct all enquiries to your local sales company.

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1 Introduction

1.1 Application

In today's world, virtually everyone lives and works in an environment full of technical equipment that generates electric and magnetic fields. As research into the possible effects on humans has increased, so has awareness of the problem and the depth of information within this area of interest. Various authorities have long defined limit values to protect users from excessive exposure to emissions.

The SRM-3000 provides practically everyone who is concerned with this problem with a measuring instrument which, with the minimum of fuss, is capable not only of showing whether limit values are being adhered to or not, but also of allowing further analysis of the field components in relation to the overall exposure.

The available operating modes cover the requirements of very different users.

For example, a safety engineer concerned with the frequency spectrum of telecommunications equipment can use the instrument to monitor compliance with limit values at the workplace, and a planner can measure the emissions present in public areas so that these can be taken into account in future plans.

On the other hand, the SRM is also a high-quality evaluation tool for qualified communications engineers who may be concerned with the emission spectra present around telecommunications equipment.

The SRM takes care of all evaluations directly on site. Nevertheless, the results can be transferred to a PC, so that measurement reports can be produced, for example. The SRM can also be remote controlled from a PC.

Fig. 1-1 The SRM-3000 in use

1.2 About this instrument

The SRM-3000 is an instrument for measuring high-frequency fields in the range from 100 kHz to 3 GHz.

The instrument incorporates a very wide, versatile range of functions in an extremely light weight, handy device. This means that it is also ideal for use particularly under conditions that require high mobility and robustness.

The SRM-3000 is a complete measuring system. Along with the basic instrument, the SRM, Narda Safety Test Solutions GmbH also supplies various antennas as solutions to different applications and frequency ranges. These antennas have either three axes or a single axis. All Narda antennas can be mounted directly on the basic instrument or connected to it using a special RF cable.

Antennas with three axes (three axis antennas) make it possible to automatically detect the three spatial components of the field to be measured. Isotropic measurements are simpler and much faster than with single axis antennas.

Other commonly available antennas can also be connected to the SRM using the customary types of connecting cable.

1.3 About this Manual

The following is a standard text which explains the typographic conventions used in Narda documentation.

Typographic conventions

Some of the paragraphs in this Manual are marked with various symbols or headings to make it easier to read and understand.

↳ The bent arrow indicates a **cross-reference** to another chapter or section or to another document.

Note: This heading indicates important additional information or **notes** about special features or situations.

✓ The check mark before a paragraph indicates a **requirement** that must be fulfilled before the next steps can be carried out.

⇒ An arrow before a paragraph indicates a single **action** or task that must be performed.

1. A numbered list indicates a **series of actions** that must be performed one after the other.

2 Safety instructions

2.1 Before connecting up

This instrument was shipped in perfect condition. To ensure that this condition is maintained and that operation is safe, please follow the instructions given below.

2.2 Correct use

The instrument must only be used for the purpose and under the conditions for which it is designed.

Danger

No warning function

The instrument is designed for detection and rapid evaluation of electromagnetic field emissions. It is not a warning instrument; i.e. it does not actively warn you of the presence of dangerous fields by means of visible or audible signals.

⇒ Always consider this instrument to be a measuring instrument, not a warning device.
⇒ Always carefully observe the measured value display when approaching unknown fields.
⇒ If you are in any doubt, use a warning device such as “RadMan” or “Nardalert” from Narda Safety Test Solutions to give warning of potentially hazardous field strengths.

Danger

Unsuitable frequency range

Dangerous fields can be overlooked if an unsuitable frequency range is selected.

⇒ Select the largest available or the appropriate frequency range.
⇒ Always carefully observe the measured value display when approaching unknown fields.
⇒ If you are in any doubt, use a broadband device such as “RadMan” or “Nardalert” from Narda Safety Test Solutions to give warning of potentially hazardous field strengths.

Danger

Misinterpretation of results obtained with single axis antennas

Only the field components which are parallel to the antenna axis will be detected by a single-axis antenna.
Even if the field is strong, there is a danger that only a weak field or no field at all will be measured if the antenna is not correctly positioned in the field.

⇒ Make sure that the measurement setup is suitable when using a single-axis antenna.

Danger

Strong fields

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

⇒ Take care to observe safety barriers and markings.
⇒ In particular, persons fitted with electronic implants (pacemakers) must keep away from danger areas.

Danger

Electric shock

High voltages can occur inside the instrument.

⇒ Do not bring the instrument or the antenna into contact with parts carrying live voltages.
⇒ Do not open the instrument.
⇒ Do not use or handle an instrument which is open or which has been visibly damaged.
⇒ Only use the accessories supplied and intended for use with the SRM-3000.

Caution

Malfunction

Incorrect use, damage and unauthorized repairs can adversely affect the accuracy and function of the instrument.

⇒ Only use the instrument under the conditions and for the purpose for which it is designed.
⇒ Check the instrument regularly for signs of damage.
⇒ Repairs must only be made by qualified service personnel.

Caution

Malfunction

Metallic stickers placed on the (yellow) sensor area of the antenna can lead to measurement errors, particularly to an underestimation of the electromagnetic field strength.

⇒ Stickers or labels of any type should only be affixed to the (black) antenna shaft.

2.3 AC Adapter / Charger

Danger

Electric shock

Parts carrying live voltages may be exposed if the AC Adapter / Charger is damaged. This could result in injury from electric shock.

⇒ Never use a damaged AC Adapter / Charger.

Caution

Destruction

The AC Adapter / Charger can be destroyed or damaged by an incorrect AC line voltage, condensation, too high or too low temperatures, and insufficient ventilation.

⇒ **Before connecting up the AC Adapter / Charger** check that the operating voltage of the AC Adapter / Charger and the voltage of the local AC supply are the same.

⇒ Do not use an AC Adapter / Charger on which condensation has formed. If condensation is unavoidable, e.g. because the AC Adapter / Charger is cold and it is brought into a warm room, make sure that it has dried out before connecting it up.

⇒ Only use the AC Adapter / Charger indoors and at temperatures between +5 °C and +45 °C.

2.4 Faults and excessive stresses

Take the instrument out of service and secure it against unauthorized use if safe operation is no longer possible. This is the case, for example, if:

- the instrument shows visible signs of damage,
- the instrument does not work,
- the instrument has been subjected to any kind of stress that exceeds the permitted limits.

In such cases, contact the service center for your area.

2.5 Disposal in accordance with local regulations

The SRM-3000 is a high-quality instrument that will give you many years of reliable service. Nevertheless, even this product will eventually become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations.

The SRM-3000 conforms to the WEEE Directive of the European Union (2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments).

You can return the instrument to us free of charge for proper environment-friendly disposal. You can obtain further information from your local Narda Sales Partner or by visiting our website at www.narda-sts.com.

3 Preparation for use

3.1 Unpacking

3.1.1 Packaging

The packaging is designed to be reused as long as it has not been damaged during previous use. Keep the original packaging and use it for all future transport of the instrument.

3.1.2 Checking the instrument for transport damage

After unpacking, check the instrument and all accessories for any damage that might have occurred during transport. This should be suspected if the packaging itself has been clearly damaged. Do not attempt to use a damaged instrument.

3.1.3 Recovery after transport and storage

Condensation can form on an instrument that has been stored or transported at a low temperature when it is brought into a warmer environment. To prevent any damage, wait until condensation is no longer visible on the instrument surface. The instrument is not ready for use until it has reached a temperature within the guaranteed operating range of -10 °C to +50 °C.

3.2 Power supply

The battery pack provided is usually used as the power supply. You can also use the AC Adapter / Charger as an alternative power supply.

3.2.1 Battery pack operation

The SRM-3000 is operated from the battery pack supplied with the instrument.

A fully charged battery pack is sufficient for about 4 hours operation. As supplied, the battery pack is only pre-charged and needs to be fully charged before it is used for the first time.

Note: Only use original battery packs as supplied with the instrument. If the capacity of the battery pack supplied is insufficient for your test task requirements, further battery packs can be obtained as accessories.

Charge indicator

The charge state of the battery pack is indicated by a battery symbol in the “General information” section of the LCD panel.

↳ Refer to sec. 6.3, page 6-10 for more details.

Discharge indication

If the battery voltage drops below a critical value, the battery symbol will be replaced by the flashing message “Low Battery”. A warning message will also be displayed at regular intervals in the center of the LCD panel. The instrument will switch off automatically after about 10 minutes of further operation. The instrument configuration is saved before switch off.

Charging the battery pack

A full charge cycle takes about 3.5 hours.

You must use the AC Adapter / Charger supplied with the instrument to charge the battery pack.

Starting the charge cycle

✓ The local AC line voltage and the operating voltage of the AC Adapter / Charger must be the same.

1. Connect the AC Adapter / Charger to the charging socket of the SRM-3000.
2. Connect the AC Adapter / Charger to the AC power supply.
   Charging starts.
   A red LED next to the “Charge” label is on during the entire charge cycle.
   When the battery pack is fully charged, the AC Adapter / Charger automatically switches to trickle charging.
   At this stage, a green LED next to the “Charge” label switches on.

3.2.2 Handling the battery pack

- Do not drop, damage or dismantle the battery pack.
- Only recharge the battery pack as described in this Operating Manual.
- Do not expose the battery pack to very high temperatures for a long time either inside or outside the instrument.
- Do not leave a discharged battery pack in the instrument for a long time.
- Do not store battery packs for more than six months without recharging them occasionally.

3.2.3 Operation from AC Adapter / Charger

The SRM-3000 can always be powered and operated from an AC Adapter / Charger connected to it.

This is not recommended in practice, however, because the measurement characteristics can be affected considerably by the presence of the power supply cable in the field when the SRM-3000 is operated with the AC Adapter / Charger connected to it.

3.3 Switching the instrument on and off

3.3.1 Switching on

✓ You have made sure that the battery pack is sufficiently charged for the planned measurement task.

⇒ Press the **ON/OFF** button for about 1 second.
The SRM-3000 switches on.
A green LED next to the “Status” label switches on.
The function test runs.

Function test

The function test checks the functions of various components and checks internal processes. It takes about 5 seconds.

A test screen is displayed during the function test. This shows the instrument name and serial number along with a list of the elements that are to be tested.

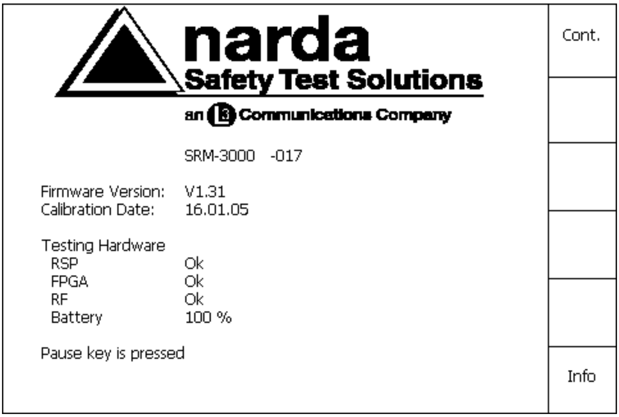


Fig. 3-1 Display during function test

When the function test has been completed successfully, the instrument reverts to the settings used for the last measurement and the measurement screen is displayed.

Measurements can now be started.

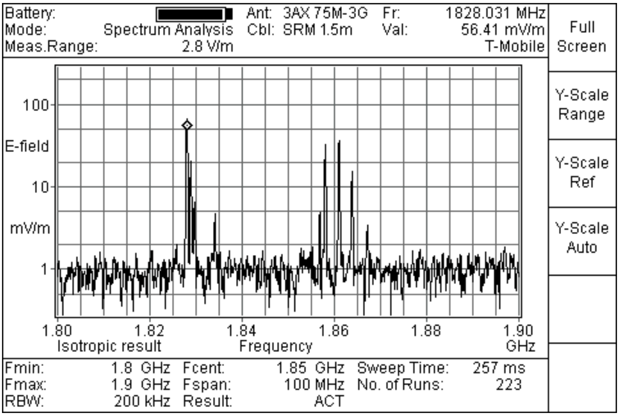


Fig. 3-2 Display after completion of function test (example)

Note: The instrument reverts automatically to the default setting if you change the antenna:

- Maximum input attenuation, i.e. least sensitive measurement range
- Maximum frequency range

Possible faults

If a fault occurs during the function test, the message “Error detected during initialization” will be displayed and the start-up process will be interrupted automatically. The error code for the fault that was detected will be shown on the display.

⇒ Contact the Service Center.

3.3.2 Switching off

⇒ Press the **ON/OFF** button for at least 1 second.
The LCD panel clears. The instrument is switched off.

Notes:

4 Instrument concept

4.1 SRM as a field strength meter

The SRM is an instrument designed to measure electromagnetic fields in the frequency range from 100 kHz to 3 GHz. The main measurement task is the determination of field strength.

Users can select from several operating modes, all of which are designed to give immediate, informative on-site results that require no further processing or evaluation.

In “Safety Evaluation” mode, users can put together a list of frequency ranges within which the field strength is to be measured. The results in each frequency range of the so-called Service Table defined in this way are displayed in units of field strength or as a percentage of a selected safety standard. The displayed value 100% indicates that the limit value defined in the standard has been reached. This makes direct, on-site determination of compliance with defined limit values possible.

In “Spectrum Analysis” mode, all the field components in the selected environment can be detected to give an overview of the spectrum or for determining maximum values. Here too, the extended functions of the instrument allow evaluation of the measured values directly on site.

In “UMTS P-CPICH Demodulation” mode (option) the SRM decodes the Primary Common Pilot Channel of UMTS cells. As in “Safety Evaluation” mode, the field strengths due to individual pilot channels can be determined in units of field strength or as percentages of a selected human safety standard level. The field strength exposure that the cell would cause when fully loaded can be extrapolated from these values.

In “Time Analysis” mode, the SRM makes selective, continuous measurements at a fixed, user-defined frequency. This allows detection of even short duration spikes, e.g. from pulsed radar equipment. The operating mode is ideal for timer-controlled measurements.

4.1.1 Overall concept

In the simplest case, the complete test setup for measuring field strength consists of the basic instrument plus an antenna which plugs into the basic instrument.

Depending on the measurement method selected, it may be advisable or necessary to place the antenna some distance from the basic instrument rather than directly on it. Cables can be used to connect the antenna to the basic instrument. The field strength measuring systems supplied by Narda Safety Test Solutions include a 1.5 m long cable. A 5 m long cable is available for special applications.

The antenna must be placed where it will not be disturbed and positioned exactly for precision measurements. A tripod which is also provided with a suitable positioning device can be added to the test setup for this purpose.

Regardless of the items supplied as described, you can also connect customary antennas and cables to the basic instrument and make measurements as required.

4.1.2 Basic instrument

The SRM is a field strength meter which can be used for outdoor measurements, especially in locations where access is difficult or awkward.

The functions of the instrument have therefore been tailored to provide easy handling under practical conditions of use.

Despite its wide range of functions, the SRM is very handy and light. There are two ergonomically formed grips located to the left and right of the casing, which allow secure handling during measurements and trouble-free access to all controls at the same time.

The main menus are accessed by three menu selection buttons. Sub-menus, functions and entry boxes within these menus is by means of softkeys. Function keys allow direct entry of parameters and access to the evaluation and memory functions.

The large easy-to-read LCD panel is backlit to allow operation even in poorly-lit areas.

The foil keypad makes operation even under bad conditions safe and sure.

↳ All the display and control elements of the basic instrument are described in sec. 6, page 6-1.

4.1.3 Antennas

A three axis antenna is included as standard with your SRM-3000. This antenna covers the frequency range from 75 MHz to 3 GHz. It automatically determines the three spatial components of the field being measured, so isotropic measurements are quick and easy to perform. It is designed for outdoor use and for making measurements in places that are difficult to access.

Narda Safety Test Solutions also supplies other single axis and three axis antennas for electric and magnetic fields that are suitable for other applications and lower frequency ranges.

Every Narda antenna is equipped with a control cable as well as the RF connection. The control cable is connected to the basic instrument by a multi pin connector, and is used to transmit the antenna parameters (type, serial number, calibration date, list of antenna factors) so that these can be recognized by the SRM.

Customary types of antenna can also be connected to the basic instrument. The table below summarizes the types of antenna that are suitable for measuring field strength exposure:

Type	Field type measured	Frequency range (typical values)	Notes
Broadband dipole	Electric field	Between 30 MHz and 3 GHz	-
Log- periodic antenna	Electric field	Between 30 MHz and 20 GHz	Directional characteristic. Not suitable for isotropic measurements.
Loop antenna	Magnetic field	Between 100 kHz and 30 MHz	-

Table 4-1 Antenna types

4.1.4 Cable

Narda Safety Test Solutions offers two cables that can be used for the connection between the antenna and the basic instrument, covering the frequency range between 100 kHz and 3 GHz. These cables are 1.5 m and 5 m long and contain ferrite to reduce the effects of the external field on the measurement results. The cables contain a control cable as well as the RF cable. This is connected to the basic instrument by a multi pin connector. This control cable transmits the cable parameters (type, serial number, calibration date, list of attenuation factors) so that these can be recognized by the SRM. When the three axis antenna is used, the SRM also uses this cable to control successive measurement of all three axes for an isotropic result (see sec. 11.1.1, page 11-2), or to select a single axis in order to obtain directional information (see sec. 11.1.2, page 11-4).

Customary types of cable can also be used for the connection between the antenna and the basic instrument. However, such cables do not provide the controller function for three axis antennas.

4.2 SRM as a spectrum analyzer

Although designed for field use, the basic instrument of the SRM can also be used as a spectrum analyzer under laboratory conditions, for example.

The serial or USB interface can be used to connect the instrument to a PC and provide access to the instrument functions.

5 Measurement setup variants

5.1 Variant overview

The measurement setups for using a three axis and a single axis antenna are shown on the following pages.

↳ Measurement setup with three axis antenna: sec. 5.1.1, page 5-2

↳ Measurement setup with single axis antenna: sec. 5.1.2, page 5-3

Both variants are considered with regard to their suitability for mobile applications (pendulum or sweep method) or for use in a precision measurement (matrix method). The description of possible applications and the limitations in their use is intended to help you select the right antenna and measurement method for the type of measurement you want to make.

The two methods (pendulum or sweep method and matrix method) are described in detail in Appendix A for measurements using a single axis antenna.

↳ Appendix A: Measurement methods using a single axis antenna: see page A-1

The information in this section too can be of assistance when selecting the appropriate measurement method. You should in any case familiarize yourself with the correct procedure for the selected measurement method before starting measurements.

5.1.1 Measurement setup with a three axis antenna

	Mobile measurement	Precision measurement
Measurement method	• Manual movement of antenna within the field	• Measurement at various points within the space • Sequential positioning of antenna at various heights using a tripod
Measurable frequency range	75 MHz to 3 GHz	
Appropriate use	• Rapid determination of maximum field strength within a space • Locating a maximum value within a space where interruptions in operations are unacceptable (e.g. offices) • Locating a maximum value in spaces where high mobility is needed (e.g. platforms, rooftops)	• Exact measurement of a defined space with the aid of a tripod • Spatial averaging of immissions desirable (required by some standards) • Location of local maxima
Usage limitations	• Spatial averaging of immissions not possible	• Rapid determination of maximum values not possible as a large number of measurements have to be made • Locating a maximum value within a space where interruptions in operations are unacceptable (e.g. offices) • Locating a maximum value in spaces where high mobility is needed (e.g. platforms, rooftops) • Locations where a tripod cannot be used (e.g. platforms, rooftops)

Table 5-1 Comparison of possible uses of a three axis antenna

5.1.2 Measurement setup with a single axis antenna

Note: The table below refers to customary antenna types. Two main types are considered:
- broadband dipoles
- loop antennas

	Mobile measurement (pendulum or sweep method)	Precision measurement (matrix method)
Measurement method	• Manual movement of antenna axis within the field	• Measurement at various points within the space • Sequential positioning of antenna on three orthogonal axes and at various heights using a tripod
Measurable frequency range	Depends on the antenna selected	
Appropriate use	• Rapid determination of maximum field strength within a space • Locating a maximum value within a space where interruptions in operations are unacceptable (e.g. offices) • Locating a maximum value in spaces where high mobility is needed (e.g. platforms, rooftops) • Adequate experience required	• Exact measurement of a defined space with the aid of a tripod • Spatial averaging of immissions desirable (required by some standards) • Location of local maxima

Table 5-2 Comparison of possible uses of a single axis antenna

	Mobile measurement (pendulum or sweep method)	Precision measurement (matrix method)
Usage limitations	• Spatial averaging of immissions not possible • Underestimates strongly elliptically polarized immissions • Undefined measurement uncertainty: Measurements with single axis antennas only detect field components that are parallel to the antenna axis. Even if the field is strong, there is a danger that only a weak field or no field at all will be measured if the antenna is not correctly positioned in the field.	• Rapid determination of maximum values not possible as a large number of measurements have to be made • Signal does not remain constant throughout the measurement • Locating a maximum value within a space where interruptions in operations are unacceptable (e.g. offices) • Locating a maximum value in spaces where high mobility is needed (e.g. platforms, rooftops) • Locations where a tripod cannot be used (e.g. platforms, rooftops)

Table 5-2 Comparison of possible uses of a single axis antenna

5.2 Assembling the measurement setup

The connecting socket for the antenna is on the top end of the SRM.

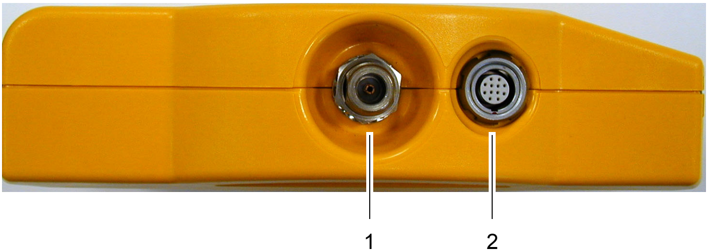


Fig. 5-1 N type connector RF input socket, 50 Ω (1) and multi pin type cable connector (2)

Note: The multi pin connector is only used with Narda antennas and cables.
It has two functions:

- Automatic detection of the connected antenna and / or cable
- Control of three axis antenna for making isotropic measurements

5.3 Fitting the antenna directly on the basic instrument

Connecting a Narda antenna

✓ The SRM is switched off.

1. Stand the basic instrument up vertically.
2. Place the N connector of the antenna over the N connector of the basic instrument.
3. Carefully screw down the coupling ring of the N connector of the antenna on to the N connector of the basic instrument taking care not to cross-thread it.

Note: If there is resistance when you try to screw down the coupling ring, it needs to be re-seated. Only about 4 turns are needed to establish a firm connection.

Fig. 5-2 Connecting up the N connectors

4. Place the control cable plug of the antenna on the multi pin connector of the basic instrument so that the red dot on the control cable plug and the red dot on the multi pin connector are aligned.

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

Fig. 5-3 Connecting the multi pin connectors

The Narda antenna is now connected.
The instrument will automatically detect the type of antenna that is connected.
This information will be shown in the general instrument configuration section of the LCD panel when the instrument is switched on.

Connecting customary antenna types

You will not normally be able to connect customary types of antenna directly to the basic instrument. You will need to use a connecting cable.

↳ Connecting customary antenna types using a cable: see page 5-10

5.4 Using a cable to connect the antenna to the basic instrument

Connecting a Narda cable

A Narda cable is connected in two stages:

- Connect the Narda cable to the SRM
- Connect the Narda cable to the Narda antenna

Fig. 5-4 Connecting the SRM-3000 and antenna with a cable

Connecting the Narda cable to the SRM

✓ The SRM is switched off.

1. Stand the basic instrument up vertically.
2. Place the N connector of the cable over the N connector of the basic instrument.

3. Carefully screw down the coupling ring of the N connector of the cable on to the N connector of the basic instrument taking care not to cross-thread it.

Note: If there is resistance when you try to screw down the coupling ring, it needs to be re-seated. Only about 4 turns are needed to establish a firm connection.

4. Place the control cable plug of the cable on the multi pin connector of the basic instrument so that the red dot on the control cable plug and the red dot on the multi pin connector are aligned.
5. Press the control cable plug into the connector using the locking sleeve until the plug lock clicks into place.
   The Narda cable is now connected.
   The instrument will automatically detect the type of cable that is connected.
   This information will be shown in the general instrument configuration section of the LCD panel when the instrument is switched on.

Connecting the Narda cable to the Narda antenna

✓ The SRM is switched off.

1. Place the N connector at the end of the cable over the N connector of the antenna.
2. Carefully screw down the coupling ring of the N connector at the end of the cable on to the N connector of the antenna taking care not to cross-thread it.

Note: If there is resistance when you try to screw down the coupling ring, it needs to be re-seated. Only about 4 turns are needed to establish a firm connection.

3. Place the control cable plug of the antenna on the multi pin connector of the cable so that the red dot on the control cable plug and the red dot on the multi pin connector are aligned.
4. Press the control cable plug into the connector using the locking sleeve until the plug lock clicks into place.
   The Narda antenna is now connected.
   The instrument will automatically detect the type of antenna that is connected.
   This information will be shown in the general instrument configuration section of the LCD panel when the instrument is switched on.

Connecting customary antenna types using a cable

✓ The SRM is switched off.

1. Stand the basic instrument up vertically.
2. Place the N connector of the cable over the N connector of the basic instrument.
3. Carefully screw down the coupling ring of the N connector of the cable on to the N connector of the basic instrument taking care not to cross-thread it.

Note: If there is resistance when you try to screw down the coupling ring, it needs to be re-seated. Only about 4 turns are needed to establish a firm connection.

4. Place the N connector at the other end of the cable over the N connector of the antenna.
   If the antenna is not equipped with an N connector you will need to use an adapter.
5. Carefully screw down the coupling ring of the N connector of the cable on to the N connector of the antenna taking care not to cross-thread it.

Note: If there is resistance when you try to screw down the coupling ring, it needs to be re-seated.

5.5 Fitting the Narda antenna to a tripod

Special fittings are needed to attach Narda antennas to a tripod. Narda provides two different types of antenna holder.

5.5.1 Antenna holder for three axis antennas

This antenna holder can be used to attach the antenna vertically or horizontally to the tripod. In principle, the orientation has no effect on the results, since the antenna has three axes. It is still a good idea to align the antenna head roughly with the probable location of the field source to avoid any possible side effects.

Assembly

1. Screw the antenna holder horizontally or vertically on to the tripod.
2. Attach the antenna using the Velcro strips.
3. Connect the antenna to the basic instrument using a cable, see sec. 5.4, page 5-8.

Fig. 5-5 Antenna attached to holder for three axis antennas (3501/90.02), mounted horizontally and vertically

5.5.2 Antenna holder for single axis and three axis antennas

This holder is used to precisely align the antenna in defined positions.
This serves a dual purpose:

- Single axis antennas can be aligned in three mutually perpendicular (orthogonal) directions one after the other by simple rotation, allowing you to make isotropic measurements easily (see sec. 11.2.2, page 11-6)
- three axis antennas can be precisely oriented within a field, allowing you to measure a specific axis (see sec. 11.1.2, page 11-4).

Assembly

Fig. 5-6 Single axis E field antenna (top) and single axis H field antenna (bottom) mounted on the antenna holder for single axis and three axis antennas (3501/90.01)

1. Screw the antenna holder plate on to the tripod.
2. Screw the antenna holder on to the antenna holder plate.
3. Open the Velcro strips and place the antenna in the holder so that the N connector and the control cable lie in the groove provided (see fig. 5-7).
4. Close the Velcro strips.
5. Turn the antenna to the desired position (marked on the antenna holder plate) and fix it in position with the screw.
6. Connect the antenna to the basic instrument using a cable, see sec. 5.4, page 5-8

Notice: When removing the antenna from the holder, first slide it a little in the direction of the antenna head and then remove it from the holder. This will prevent the black coating from being damaged by the spacing screws.

Fig. 5-7 Cable and N connector in guide groove

5.6 Registering a non-Narda antenna

Note: Automatic detection of the connected antenna type is not possible if a customary antenna is used instead of a Narda antenna.
You will need to manually register / select the connected antenna on the basic instrument in order to display the results in units of field strength or as a percentage of a selected safety standard. This requires that the corresponding antenna type has been defined by the user with the aid of the “SRM-Tools” or “SRM-TS” PC software supplied and has been saved in the basic instrument. Refer to sec. 16, page 16-1 for more information.

Registering a non-Narda antenna

✓ The instrument is switched on.

1. Press the **CONF** button.
   The CONFIGURATION menu opens.
2. Select the ANTENNA/SENSOR command.
3. Press the **ENT** button.
   The ANTENNA/SENSOR menu opens.
4. Select the connected antenna type.
5. Press the **ENT** button.
   The antenna type is shown in the general instrument configuration section of the LCD panel.

5.7 Registering a non-Narda cable

Note: Automatic detection of the connected cable type is not possible if a customary cable is used instead of a Narda cable.
You will need to manually register / select the connected cable on the basic instrument in order to take the cable losses into account in the results. This requires that the corresponding cable type has been defined by the user with the aid of the “SRM-Tools” or “SRM-TS” PC software supplied and has been saved in the basic instrument.
Refer to sec. 16, page 16-1 for more information.

Registering a non-Narda cable

✓ The instrument is switched on.

1. Press the **CONF** button.
   The CONFIGURATION menu opens.
2. Select the CABLE command.
3. Press the **ENT** button.
   The CABLE menu opens.
4. Select the cable type used and press the **ENT** button to confirm.
   The cable type is shown in the general instrument configuration section of the LCD panel.

Notes:

6 User interface

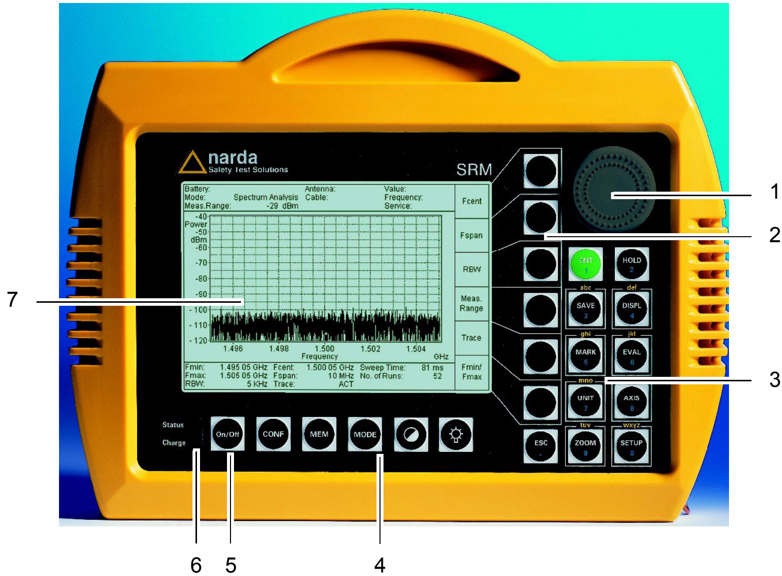


Fig. 6-1 Display and control elements

No.	Element
1	Rotary control
2	Softkeys
3	Function keys
4	Menu selection keys
5	On / Off switch
6	Status LED / Charge LED
7	LCD panel

Table 6-1 Display and control elements

6.1 Control elements

6.1.1 On / Off switch

Key	Function
ON/OFF	On / Off switch. • Starts the instrument with the same settings as were active when it was last switched off. • Switches the instrument off (press key for longer time).

Table 6-2 On / Off switch

6.1.2 Menu selection keys

Key	Function.
CONF	Opens the CONFIGURATION menu. • Enables: – Antenna selection. – Cable selection. – Standard selection. – Service table selection. – Cell name table selection (option). – Device information display. – Date and time settings. – General instrument properties settings. – “Safety Evaluation” mode configuration. – “Spectrum Analysis” mode configuration. – “UMTS P-CPICH Demodulation” mode configuration (Option). – “Time Analysis” mode configuration.
MEM	Opens the MEMORY menu. • Enables: – Display and management of stored results. – Definition and activation of special memory mode. – Comment function settings.
MODE	Opens the MODE menu. • Enables operating mode selection.

Table 6-3 Menu selection keys

6.1.3 Softkeys

The softkey functions vary according to the menu that is displayed.

The softkeys are operated using the row of keys on the right next to the display.

6.1.4 Function keys

Note: Numerical entries can be made using either the function keys or the rotary control. The two functions are mutually exclusive; if you use the rotary control, the function keys are disabled, and vice versa.

Function key functions

Key	Function
ESC / .	Cancels an operating sequence. • Cancels the current operating step; changes in values are also canceled. • Enables return to a higher menu level. Key for entering a decimal point when editing a parameter.
ENT / 1	Confirms entries or activates menus. • Ends the current operating step and confirms changes in values. • Activates sub-menus in the CONFIGURATION menu. Key for entering the number 1 when editing a parameter.
HOLD / 2	Pauses the measurement. • Stops the measurement. (In stopped status you can access display and evaluation functions but you cannot edit parameters.) • Resumes the measurement. Key for entering the number 2 when editing a parameter.

Table 6-4 Function keys

Key	Function
SAVE / 3 (abc)	Saves data sets. • Saves: – individual sets of data (spectra, tables) Key for entering the number 3 when editing a parameter. Key for entering the characters ABC.
DISPL / 4 (def)	Activates the DISPLAY menu. • Enables the following in “Spectrum Analysis” mode: – full screen display – selection of display scale range (20 dB, 40 dB, 60 dB, 80 dB, 100 dB) – selection of the upper limit of the Y axis – automatic Y axis scaling if the other parameters have been selected correctly. • Enables the following display modes in “Safety Evaluation” mode: – full screen – as condensed table (Cond. Table) • Enables the following display mode in “UMTS P-CPICH Demodulation” mode (option) and “Time Analysis” mode: – full screen Key for entering the number 4 when editing a parameter. Key for entering the characters DEF.
MARK / 5 (ghi)	Activates the “Peak Marker” function. • Enables the following in “Spectrum Analysis” mode: – search for highest peak – search for next peak to the right – search for next peak to the left – search for next higher peak – search for next lower peak Key for entering the number 5 when editing a parameter. Key for entering the characters GHI.
EVAL / 6 (jkl)	Activates the EVALUATION FUNCTION menu. • Enables the following in “Spectrum Analysis” mode: – display of a list of the 20 highest peaks – integration of the results over a selected frequency range Key for entering the number 6 when editing a parameter. Key for entering the characters JKL.

Table 6-4 Function keys

Key	Function
UNIT / 7 (nmo)	Selects the display units. • Opens a selection menu listing the available units. Key for entering the number 7 when editing a parameter. Key for entering the characters NMO.
AXIS / 8 (pqrs)	Activates the MEASUREMENT MODE menu. • If a three axis Narda antenna is used, enables: – selection of an isotropic measurement mode – selection of a measurement axis (X, Y or Z axis) • If a single axis antenna is used, enables: – selection of the isotropic measurement method for sequential measurement of the three spatial components of the field being measured Key for entering the number 8 when editing a parameter. Key for entering the characters PQRS.
ZOOM / 9 (tuv)	Activates the “Zoom” function. • Enables: – rapid setting of a new sweep range within the sweep range just selected in “Spectrum Analysis” mode Key for entering the number 9 when editing a parameter. Key for entering the characters TUV.
SETUP / 0 (wxyz)	Activates the SETUP menu. • Enables: – saving of user defined setups – recalling of saved setups – deletion of saved setups Key for entering the number 0 when editing a parameter. Key for entering the characters WXYZ.

Table 6-4 Function keys

Editing parameters

Opening the numerical value entry box

⇒ Press the softkey that enables editing of a parameter (e.g. **Fmin**).
The box for entering the numerical value to be changed opens.

Entering the numerical value and units

➪ For entry using the rotary control, see sec. 6.1.5, page 6-7.

1. Use the function keys to enter the first digit of the desired numerical value.
   The rotary control is disabled as soon as you have entered the first digit.
   The digit you entered will be displayed. The previous value is deleted.
   The softkeys will now be labeled with the possible units and the backspace function.
2. Enter all the remaining digits of the numerical value, using the decimal point if necessary.
3. Press the softkey that is labeled with the desired units.
   The entry box now shows the complete numerical value and units.

Using the BACKSPACE softkey

Incorrect entries can be deleted by pressing the **BACKSPACE** softkey.

⇒ Press the **BACKSPACE** softkey.
The unit or digit furthest to the right will be deleted.

Completing an entry

⇒ Press the **ENT** key.
The entry box closes.
The values defined are displayed in the “Instrument configuration” section.
The function keys are enabled.
The softkey functions change.

6.1.5 Rotary control

Note: Numerical entries can be made using either the function keys or the rotary control. The two functions are mutually exclusive; if you use the rotary control, the function keys are disabled, and vice versa. The first step in setting a parameter determines which method of entry is selected.

Opening the numerical value entry box

⇒ Press the softkey that enables editing of a parameter (e.g. **Fmin**).
The box for entering the numerical value to be changed opens.
One digit of the displayed value is shown highlighted. The position of this digit defines the step width when the rotary control is used to change the value.
Examples: **1**00 = step width 100, 1**0**0 = step width 10, 10**0** = step width 1

Using the rotary control

⇒ Turn the rotary control one step to the right.
The original value will increase by one digit corresponding to the current step width.
The **>** and **<** softkeys for changing the step width are activated.
The function keys are disabled.

– or –

⇒ Turn the rotary control one step to the left.
The original value will decrease by one digit corresponding to the current step width.
The **>** and **<** softkeys for changing the step width are activated.
The function keys are disabled.

Changing the step width

⇒ Press the **>** softkey.
The highlighted digit moves one position to the right.
The step width is reduced by a factor of 10.

– or –

⇒ Press the **<** softkey.
The highlighted digit moves one position to the left.
The step width is increased by a factor of 10.

Completing an entry

⇒ Press the **ENT** key.
The entry box closes.
The values defined are displayed in the “Instrument configuration” section.
The function keys are enabled.
The softkey functions change.

Note: The rotary control can only change the value of parameters within the pre-set range limits.

6.1.6 Keys for optimizing the display

Key	Function
	**CONTRAST** key. • Opens the “Adjust contrast” box for setting the display contrast.
	**BRIGHT** key. • Switches the display backlight on or off.

Table 6-5 keys for optimizing the display

Setting the display contrast

1. Press the **CONTRAST** key.
   The display contrast is shown as a bar graph.
2. Use the rotary control to adjust the contrast.
3. Press the **ENT** key.
   The contrast is adjusted. The bar graph is no longer displayed.

Switching on the backlight

⇒ Press the **BRIGHT** key for longer than 2 seconds.
The backlight switches on permanently.

Switching off the backlight

⇒ When the backlight is switched on permanently, press the **BRIGHT** key.
The backlight switches off.

6.2 Operating status display

Element	State	Function
Status LED	Green	Indicates readiness for use
	Red	Instrument is being initialized Error detected
Charge LED	Red	Battery is being charged
	Green	Charging cycle has ended AC Adapter / Charger is still connected to the instrument

Table 6-6 LED overview

6.3 LCD panel elements

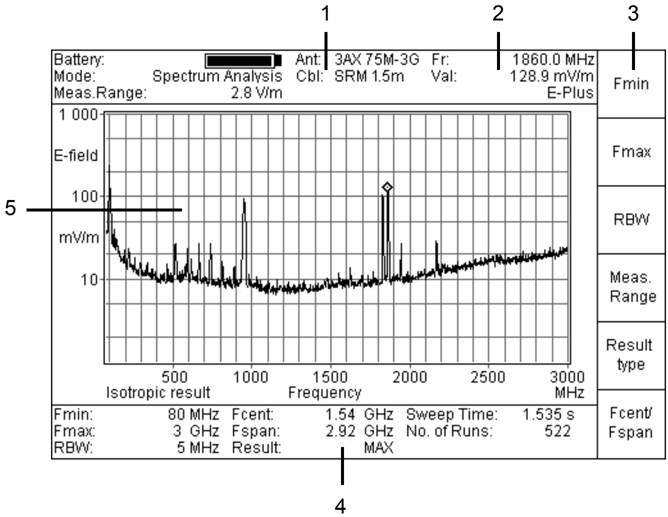


Fig. 6-2 LCD panel in “Spectrum Analysis” mode (example)

No.	Description
1	**General information** The “General information” section gives information about the current instrument status. The following data are displayed here: • type of antenna connected • type of cable connected • selected operating mode • active standard (if a standard has been activated as reference) • battery pack charge status • selected measurement range
2	**Evaluation tools** The “Evaluation tools” section indicates the status of the active evaluation tools, e.g. current position of the marker.
3	**Softkeys** The softkey labels change according to the menu that is being displayed. The softkeys are operated using the row of keys to the right next to the display.
4	**Instrument configuration** The “Instrument configuration” section displays the user settings for the individual operating modes.
5	**Measurement data** The measurement result display depends on the operating mode and evaluation tools that have been selected. Refer to the sections covering the operating modes for more details.

Table 6-7 Key to LCD panel elements

↳ More detailed information about the LCD panel is given in the sections dealing with the different operating modes.

6.4 External connectors

There are two sockets on the top side of the SRM-3000. These are for connecting the antenna and the control cable.

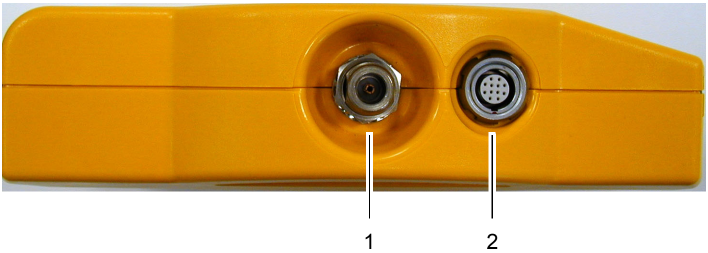


Fig. 6-3 Antenna and control cable connector sockets

No.	Function
1	Antenna connector socket • N connector
2	12 pole socket (multi pin connector) for connecting the control cable • If a Narda antenna or Narda cable is used this socket automatically detects the antenna and cable.

Table 6-8 Antenna and control cable connector sockets

On the base of the instrument you will find the battery holder on the left and three further external connections on the right: USB, serial interface, AC Adapter / Charger.

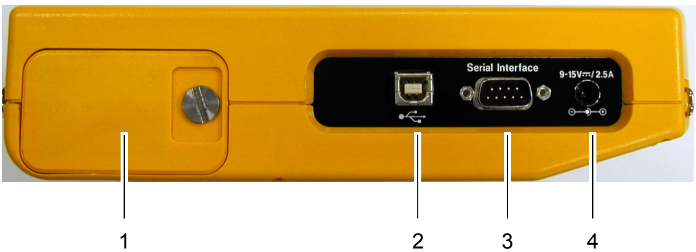


Fig. 6-4 Battery holder and external connectors

No.	Function
1	Battery holder
2	USB interface for connecting to a computer (PC)
3	Serial data interface (RS 232) for connecting to a computer (PC): • 115000 Baud • 8 data bits • 1 stop bit • No parity • Xon / Xoff protocol
4	AC Adapter / Charger connection • Nominal voltage: 9 V

Table 6-9 Battery holder and external connectors

Notes:

7 “Safety Evaluation” mode

7.1 “Safety Evaluation” mode functions

“Safety Evaluation” mode was specially developed for evaluating field strength exposure in a multi frequency environment. It provides an overview of exposure values in units of field strength or as a percentage of a selected safety standard for certain frequency bands or “services”. This makes an immediate assessment of conformance to defined limit values possible right at the point of measurement, as well as indicating the contribution made by frequency bands of interest to the overall exposure level.

The service tables used as the basis for “Safety Evaluation” mode are defined and transferred to the instrument using the “SRM-Tools” or “SRM-TS” PC software.

↳ Refer to sec. 16, page 16-1 for more information about this.

7.2 Selecting the operating mode

1. Press the **MODE** button.
   The OPERATING MODES menu opens.

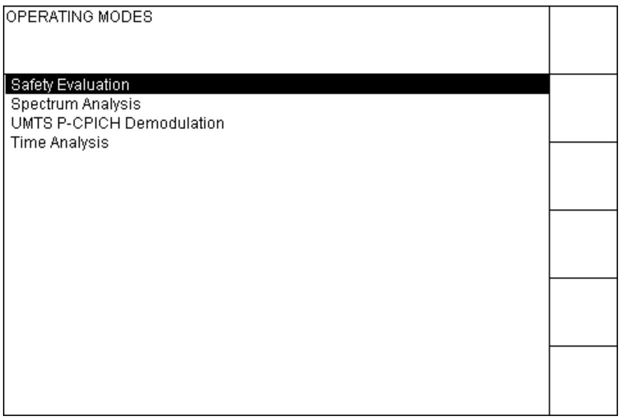


Fig. 7-1 OPERATING MODES menu

2. Use the rotary control to highlight “Safety Evaluation”.

3. Press the **ENT** button.
   The measurement menu for “Safety Evaluation” mode opens.
   The softkey functions change.

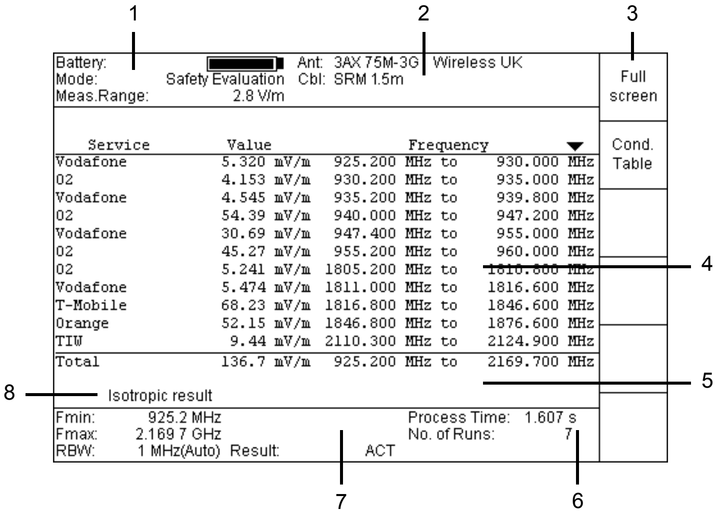


Fig. 7-2 Measurement menu for “Safety Evaluation” mode

No.	Description	Explanation
1	Operational status:	
	Battery	Battery charge state
	Mode	Operating mode
	Meas. Range	Input attenuator setting (input sensitivity)
2	Antenna parameters	
	Ant	Selected / connected antenna
	Cbl	Selected / connected measurement cable
	-	Name of service table used
3	-	Softkey functions

Table 7-1 Key to “Safety Evaluation” mode measurement menu

No.	Description	Explanation
4	Table of results (individual results)	
5	Total	Total result
6	Progress display (rotating bar)	
7	Measurement parameters display	
	Processing Time	Time to perform the measurement
	No. of Runs	Number of times measurement performed
	AVG	Number of averages. Only displayed for “Result Type” = “AVERAGE” and “MAX AVERAGE”.
	Result	Result type (ACT, MAX, AVERAGE, MAX AVERAGE)
	Fmin	Lower frequency limit
	Fmax	Upper frequency limit
	RBW	Resolution bandwidth. Only displayed if “RBW Automatic” set to OFF in the CONFIGURATION menu.
8	Isotropic result	Measurement type: X, Y, Z axis measurement or isotropic measurement

Table 7-1 Key to “Safety Evaluation” mode measurement menu

7.3 Selecting the service to be measured

All the frequency bands (or services) that are of interest when assessing field strength exposure are usually collected together into a so-called service table. “Safety Evaluation” mode is based on the selection and activation of such a table. The desired service table is selected using the CONFIGURATION menu (see sec. 14.6, page 14-7).

Note: If there is no active service table when you select “Safety Evaluation” mode, a warning message will appear to remind you of this. “Safety Evaluation” mode cannot be used if there are no service tables available on the instrument.

If an antenna combined with a cable or an antenna and a separate cable are used together, only those services which are within the frequency range of the antenna and / or the cable will be taken into account in “Safety Evaluation” mode.

“Safety Evaluation” mode provides two methods of further restricting the list of services to be measured:

- Selection of the first service to be measured in the frequency range (restricts the list upwards)
- Selection of the last service to be measured in the frequency range (restricts the list downwards)

7.3.1 Restricting the list of services to be measured using the first service

✓ The “Safety Evaluation” mode measurement menu is displayed.

1. Press the **Sel. first service** softkey.
   The “Select First Service” selection box opens showing the list of first services to be measured.
2. Use the rotary control to highlight the desired first service to be measured.
3. Press the **ENT** button.
   The “Measurement parameters” pane of the measurement menu will display the lower limit frequency of the selected service as the minimum measurement frequency.

Note: If the newly selected service is after the last service just set in the table, the list of services to be measured will be reduced to a single service, i.e. to the service just selected.

7.3.2 Restricting the list of services to be measured using the last service

✓ The “Safety Evaluation” mode measurement menu is displayed.

1. Press the **Sel. last service** softkey.
   The “Select Last Service” selection box opens showing the list of last services to be measured.
2. Use the rotary control to highlight the desired last service to be measured.
3. Press the **ENT** button.
   The “Measurement parameters” pane of the measurement menu will display the upper limit frequency of the selected service as the maximum measurement frequency.

Note: If the newly selected service is before the first service just set in the table, the list of services to be measured will be reduced to a single service, i.e. to the service just selected.

7.3.3 Restoring the original list of services to be measured

✓ The “Safety Evaluation” mode measurement menu is displayed.

⇒ Press the **Sel. all services** softkey.
All the services in the service table are displayed.

7.4 Setting the measurement range

The system sensitivity depends on the input attenuator setting, which is determined by the “Measurement Range” parameter. A high measurement sensitivity avoids any falsification of the results that might occur due to the intrinsic noise of the device. However, the device must not be overloaded. Overloading can also be caused by signals that are outside the frequency range of the services being measured, such as those from a powerful radio transmitter which might be superimposed on the mobile telephone signals that you actually want to measure.

For the above reasons, the SRM allows you to

- select the measurement range manually,
- automatically search for the best measurement range,
- apply noise suppression.

The measurement range you select will apply to all operating modes, so you do not have to set it each time you change from one operating mode to another.

7.4.1 Setting the measurement range manually

This method can be used if you know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens showing a list of possible input sensitivities.
2. Use the rotary control to highlight the desired input sensitivity.
3. Press the **ENT** button.
   The selected input sensitivity is set.

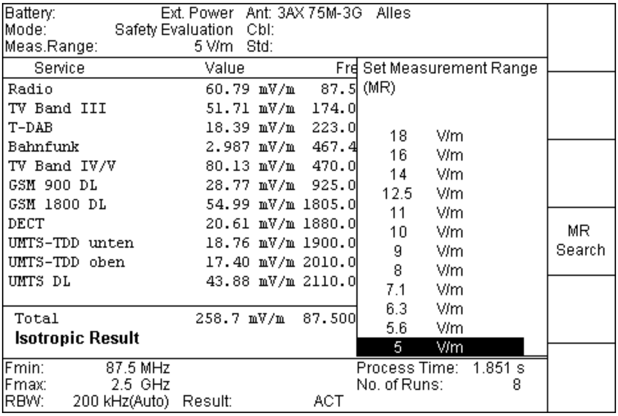


Fig. 7-3 “Set Measurement Range (MR)” selection box

7.4.2 Search for the best measurement range

This method is best if you do not know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens;
   the fourth softkey is labeled **MR Search**.
2. Press the **MR Search** softkey.
   The message “Searching for best measurement range. Please wait.” is displayed. The SRM makes a background measurement over the entire frequency range covered by the antenna you are using. This will take several seconds. When the measurement is finished, the SRM automatically sets the measurement range to the best value and displays the normal measurement menu again.

Note: Press the **ESC** key if you want to stop the automatic setting process.

➭ Selecting the parameters for the measurement range search (Configure General): see page 14-16

7.4.3 Using noise suppression (Noise Threshold)

The intrinsic noise of the device is present in all frequency ranges, including those that are not occupied with payload signals. When you perform a spectrum analysis and display the results graphically, it is easy to see when a spectral line disappears into the noise floor. You can set a threshold so that you can also make this distinction when the results are presented numerically as in “Safety Evaluation” mode. If the result is below this threshold level, the device displays the threshold value preceded by the “<” character (i.e. less than the threshold value) instead of the actual measured value.

You can set threshold levels of 0, 3, 6, 10, 15 and 20 dB. These values are relative to the level of the intrinsic noise floor.

Selecting the threshold value for noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Noise Threshold Factor”.
5. Press the **ENT** key.
6. Use the rotary control to select a value between 0 and 20 dB.

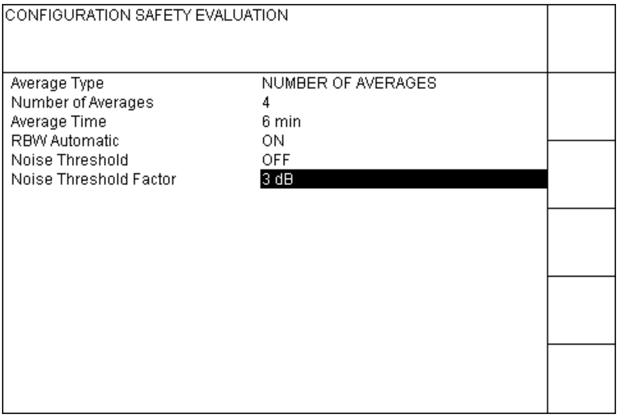


Fig. 7-4 CONFIGURATION SAFETY EVALUATION menu; setting the threshold value for noise suppression (Noise Threshold Factor)

7. Press the **ENT** key.
   The threshold value is set.
8. Press the **ESC** key twice to return to the measurement menu.

Activating and deactivating noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight
   “Noise Threshold”.
5. Press the **ENT** key.
6. Use the rotary control to select “ON” or “OFF”.
   Automatic noise suppression is activated or deactivated.
7. Press the **ESC** key twice to return to the measurement menu.
   When noise suppression is activated, the measurement menu displays the set threshold value preceded by the “<” character for all numerical measurement values that are below the threshold value.

7.5 Selecting the result type

The result type determines how the values recorded are evaluated and displayed. One value is displayed for each service.

ACT	The actual (latest) measured value is displayed.
MAX	The maximum measured value is displayed.
AVERAGE	The average of the measured values is taken ofer a specified number of results or a specified time. The resulting value is displayed. ↳ Selecting the averaging parameters: see page 7-11
MAX AVERAGE	The maximum of all the averaged values is displayed.

Selecting the result type

1. Press the **Result type** softkey.
   A selection box showing a list of possible result types opens.
   If the “Spatial Averaging” option has been activated, the fifth softkey will be labeled **Spatial AVG**.
   Spatial Averaging in “Time Analysis” mode: see page 12-16
2. Use the rotary control to highlight the desired result type.
3. Press the **ENT** button.
   The selected result type is shown in the “Measurement parameters” pane of the measurement menu.

7.6 Selecting the averaging parameters

The SRM provides two ways of averaging the results:

- Averaging over a specified number of individual results (Number of Averages)
- Averaging over a specified time (Average Time)

You can set both parameters in the CONFIGURATION menu. They will be effective only when you select “AVERAGE” or “MAX AVERAGE” evaluation mode.

Selecting averaging over a specified number of results (Number of Averages)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.

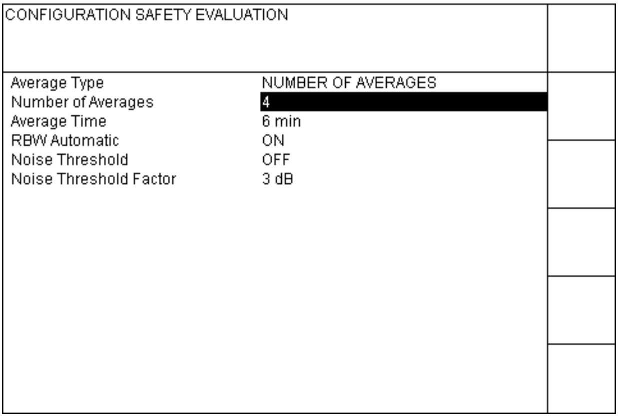


Fig. 7-5 CONFIGURATION SAFETY EVALUATION menu

4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Number of Averages”.
7. Press the **ENT** key.
8. Use the rotary control to highlight “Number of Averages”.
9. Press the **ENT** key.

10. Use the rotary control to set the number of averages (between 4 and 64).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

Selecting averaging over a specified time (Average Time)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Average Time”.
7. Press the **ENT** key.
8. Use the rotary control to highlight “Average Time”.
9. Press the **ENT** key.
10. Use the rotary control to set the averaging time (between 1 and 30 min).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

7.7 Selecting the resolution bandwidth (RBW)

You will not normally need to enter the resolution bandwidth (RBW) manually in "Safety Evaluation" mode. In the default setting of the SRM ("RBW Automatic"), the device selects the resolution bandwidth so that the narrowest band service being measured is resolved finely enough for an accurate measurement. Nevertheless, you can set the resolution bandwidth manually. As a rule, the finer the resolution, the longer the measurement will take.

The actual setting can be seen from the lowermost softkey label:

(no label)	RBW Automatic (default setting)
RBW	You must enter the resolution bandwidth manually.

Deactivating automatic resolution bandwidth selection in the CONFIGURATION menu

1. Press the **CONF** key.
   The CONFIGURATION menu opens.

↳ Also refer to sec. 14, page 14-1.

2. Use the rotary control to highlight "Configure Safety Evaluation Mode".
3. Press the **ENT** key.
   The current settings will be displayed.

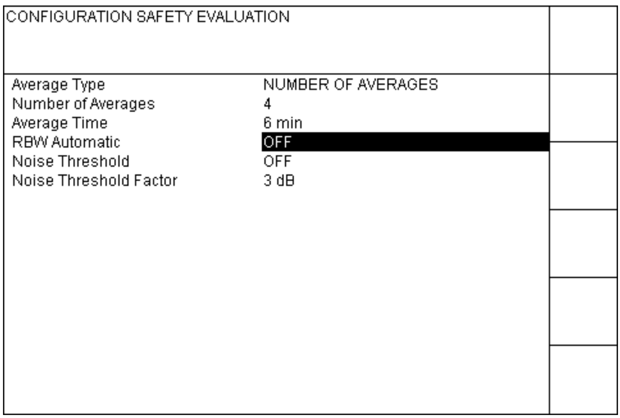


Fig. 7-6 CONFIGURATION SAFETY EVALUATION menu

4. To change the setting, use the rotary control to highlight “RBW Automatic”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “OFF”.
7. Press the **ENT** key.
8. Press the **ESC** key twice to return to the measurement menu.
   The lowermost softkey is now labeled **RBW**. The selected value is shown in the “Measurement parameter” pane of the measurement menu.

Defining the resolution bandwidth in the measurement menu

✓ “RBW Automatic” is set to “OFF” in the CONFIGURATION menu.
✓ The “Safety Evaluation” mode measurement menu is open.

1. Press the **RBW** softkey.
   A selection box showing a list of the possible resolution bandwidths opens.
2. Use the rotary control to highlight the setting you want.
3. Press the **ENT** key.
   The selected value is shown in the “Measurement parameter” pane of the measurement menu.

Note: A narrow resolution bandwidth will result in a long measurement time. You can see that the device is working by looking at the progress display (rotating bar) in the measurement menu (see fig. 7-2).

7.8 Selecting display options

The following display options can be selected:

- Units for the results
- Full screen display of the service table
- Display of results as a detailed table or a condensed table

7.8.1 Selecting the units for the results

✓ “Safety Evaluation” mode is set.

1. Press the **UNIT** button.
   The “Select Display Unit” selection box opens.
2. Use the rotary control to select the desired units.
3. Press the **ENT** button.
   The measurement results will be displayed with the selected units in the “Safety Evaluation” mode measurement menu.

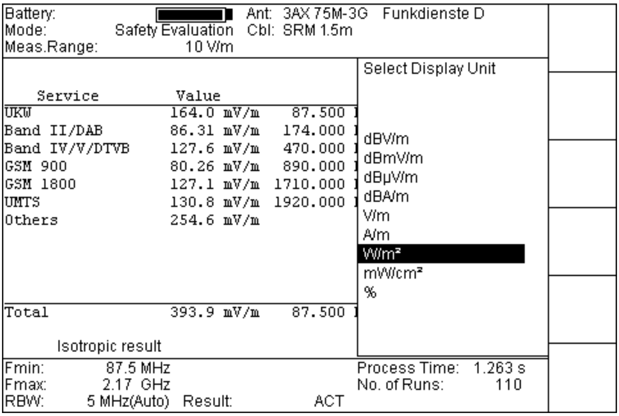


Fig. 7-7 “Select Display Unit” selection box

Refer to sec. 8.8.1, page 8-14 for a detailed description of the units that can be set.

7.8.2 Selecting display options

✓ “Safety Evaluation” mode is set.

⇒ Press the **DISPL** button.
The softkey functions change.

Battery:
Mode: Safety Evaluation
Meas.Range: 2.8 V/m
Ant: 3AX 75M-3G Wireless UK
Cbl: SRM 1.5m

Service	Value	Frequency		
Vodafone	5.320 mV/m	925.200 MHz	to	930.000 MHz
O2	4.153 mV/m	930.200 MHz	to	935.000 MHz
Vodafone	4.545 mV/m	935.200 MHz	to	939.800 MHz
O2	54.39 mV/m	940.000 MHz	to	947.200 MHz
Vodafone	30.69 mV/m	947.400 MHz	to	955.000 MHz
O2	45.27 mV/m	955.200 MHz	to	960.000 MHz
O2	5.241 mV/m	1805.200 MHz	to	1810.800 MHz
Vodafone	5.474 mV/m	1811.000 MHz	to	1816.600 MHz
T-Mobile	68.23 mV/m	1816.800 MHz	to	1846.600 MHz
Orange	52.15 mV/m	1846.800 MHz	to	1876.600 MHz
TIW	9.44 mV/m	2110.300 MHz	to	2124.900 MHz
Total	136.7 mV/m	925.200 MHz	to	2169.700 MHz

Isotropic result

Fmin: 925.2 MHz
Fmax: 2.169 7 GHz
RBW: 1 MHz(Auto) Result: ACT
Process Time: 1.607 s
No. of Runs: 7

Full screen

Cond. Table

Fig. 7-8 Softkeys for selecting the display type

Selecting “Full Screen” display

⇒ Press the **Full Screen** softkey.
The entire display area is used to display the service table.

Vodafone	4.550 mV/m	925.200 MHz	to	930.000 MHz
O2	5.117 mV/m	930.200 MHz	to	935.000 MHz
Vodafone	10.82 mV/m	935.200 MHz	to	939.800 MHz
O2	48.02 mV/m	940.000 MHz	to	947.200 MHz
Vodafone	26.22 mV/m	947.400 MHz	to	955.000 MHz
O2	51.46 mV/m	955.200 MHz	to	960.000 MHz
O2	4.670 mV/m	1805.200 MHz	to	1810.800 MHz
Vodafone	5.245 mV/m	1811.000 MHz	to	1816.600 MHz
T-Mobile	77.62 mV/m	1816.800 MHz	to	1846.600 MHz
Orange	62.22 mV/m	1846.800 MHz	to	1876.600 MHz
TIW	10.28 mV/m	2110.300 MHz	to	2124.900 MHz
O2	8.571 mV/m	2124.900 MHz	to	2134.900 MHz
Vodafone	10.73 mV/m	2134.900 MHz	to	2149.700 MHz
T-Mobile	8.444 mV/m	2149.700 MHz	to	2159.700 MHz
Orange	16.88 mV/m	2159.700 MHz	to	2169.700 MHz
Others	67.59 mV/m			
Total	144.8 mV/m	925.200 MHz	to	2169.700 MHz

Isotropic result

Fig. 7-9 “Full Screen” display

Displaying the normal size service table (Detailed Table)

⇒ Press any button.

The service table will be displayed normal size again.

Displaying the condensed service table (Condensed Table)

⇒ Press the **Cond. Table** softkey.
The display switches to the condensed table display.
The softkey function changes to “Detail Table”.

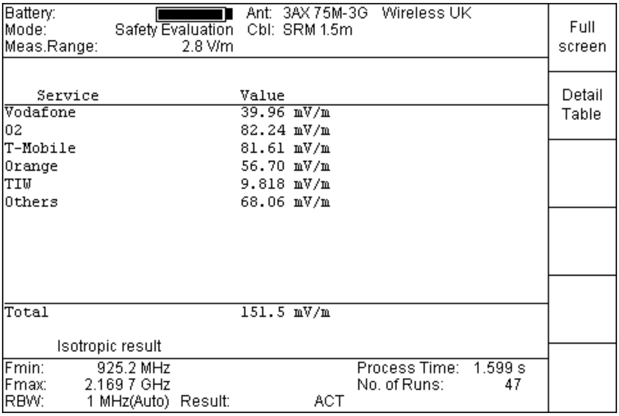


Fig. 7-10 “Cond. Table” display

Displaying the detailed service table (Detailed Table)

⇒ Press the **Detail Table** softkey.
The display switches to the detailed table display.
The softkey function changes to “Cond. Table”.

Notes:

8 “Spectrum Analysis” mode

8.1 Operating mode functions

In “Spectrum Analysis” mode, you can display all the field components in the selected environment for an overview of the detected spectrum or to determine maximum values. Complete evaluation of the results can be performed directly at the measurement site.

8.2 Selecting the operating mode

1. Press the **MODE** button.
   The OPERATING MODES menu opens.

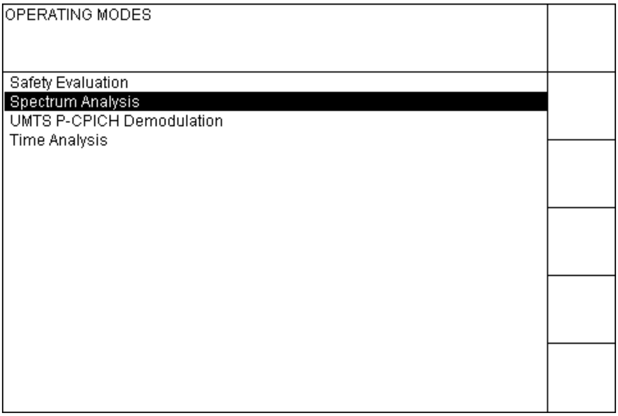


Fig. 8-1 OPERATING MODES menu

2. Use the rotary control to highlight “Spectrum Analysis”.
3. Press the **ENT** button.
   The measurement menu for “Spectrum Analysis” mode opens.
   The softkey functions change.

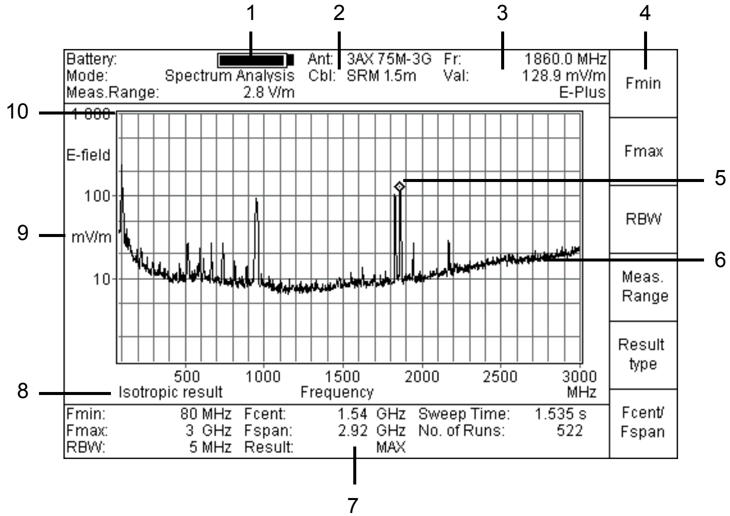


Fig. 8-2 Measurement menu for “Spectrum Analysis” mode

No.	Name	Description
1	Operating states	
	Battery	Battery charge state
	Mode	Operating mode
	Meas. Range	Input attenuator setting (input sensitivity)
2	Antenna parameters	
	Type	Selected / connected antenna
	Cbl	Selected / connected measurement cable
3	Digital result display	
	Fr (Pk ...)	Frequency display, e.g. for the marker position. The display depends on the chosen settings.
	Val	Level value e.g. for the marker position. The display depends on the chosen settings.

Table 8-1 Key to “Spectrum Analysis” mode measurement menu

No.	Name	Description
4	-	Softkey functions
5	-	Marker
6	Graphic result display (spectrum)	
	-	Frequency spectrum (graphic)
7	Measurement parameters display	
	Sweep Time	Sweep time (the total time of the complete process to determine the isotropic result is shown here for three axis antennas)
	No. of Runs	Number of times measurement performed
	AVG	Number of averages. Only displayed for “Trace Type” = “AVERAGE” and “MAX AVERAGE”.
	Fcent	Center frequency
	Fspan	Frequency span
	Result	Result type
	Fmin	Lower frequency limit of spectrum
	Fmax	Upper frequency limit of spectrum
	RBW	Resolution bandwidth
8	Isotropic result	Display of measurement type: X, Y, Z axis measurement or isotropic measurement
9	mV/m (dBV ...)	Y axis scale units
	-	X axis scale
10	-	Reference line, reference point

Table 8-1 Key to “Spectrum Analysis” mode measurement menu

8.3 Selecting the frequency range

There are two ways to set the frequency range in “Spectrum Analysis” mode:

- By entering the upper and lower frequencies
- By entering the center frequency and frequency span

8.3.1 Selecting the frequency range entry method

The lowermost softkey in the “Spectrum Analysis” mode measurement menu toggles between the functions “Fmin/Fmax” and “Fcent/Fspan”.

- If the toggle function shown is “Fcent/Fspan”, the first two softkeys have the functions “Fmin” and “Fmax”. The frequency range is defined by setting the upper and lower frequencies.
- If the toggle function shown is “Fmin/Fmax”, the first two softkeys have the functions “Fcent” and “Fspan”. The frequency range is defined by setting the center frequency and frequency span.

Note: Both pairs of values are always displayed in the “Measurement parameters” pane of the measurement menu. The display automatically adjusts to the last frequency range defined.

8.3.2 Defining the frequency range by upper and lower frequencies

✓ The toggle key function is “Fcent/Fspan”.

1. Press the **Fmin** softkey.
   An entry box opens where you can enter the value of the lower frequency limit.
2. Enter the value using the function keys or the rotary control.
   As soon as the first digit is entered, the softkey functions change to show the possible units.

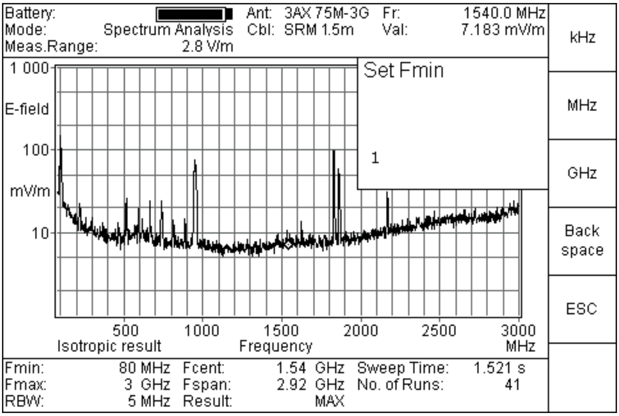


Fig. 8-3 “Set Fmin” entry box

3. Use the appropriate softkey to enter the units.
4. Press the **ENT** button.
   The lower frequency limit you defined will be displayed in the “Measurement parameters” pane of the measurement menu.
5. Press the **Fmax** softkey and enter the upper frequency limit in the same way.
   The display frequency axis automatically adjusts to the selected frequency range.
   The upper frequency limit you defined will be displayed in the “Measurement parameters” pane of the measurement menu. The values of Fcent and Fspan are also adjusted to match your entries and now correspond to the defined frequency range.

8.3.3 Defining the frequency range by center frequency and frequency span

✓ The toggle key function is “Fmin/Fmax”.

1. Press the **Fcent** softkey.
   An entry box opens where you can enter the value of the frequency that is to be at the center of the desired frequency sweep range.
2. Enter the value using the function keys or the rotary control.
   As soon as the first digit is entered, the softkey functions change to show the possible units.

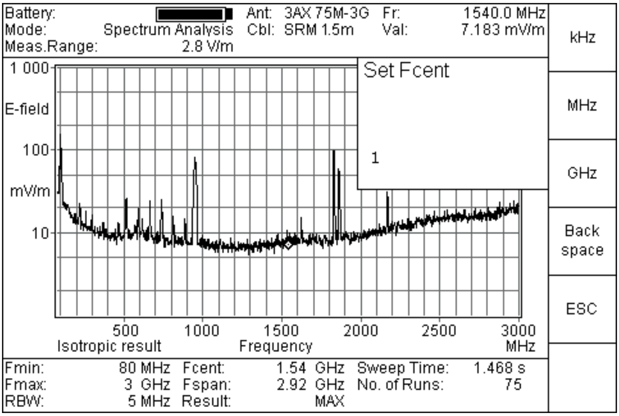


Fig. 8-4 “Set Fcent” entry box

3. Use the appropriate softkey to enter the units.
4. Press the **ENT** button.
   The center frequency you defined will be displayed in the “Measurement parameters” pane of the measurement menu.
5. Press the **Fspan** softkey and enter the value in the same way for the frequency band to be examined by the spectrum analyzer.
   The display frequency axis automatically adjusts to the selected frequency range.
   The frequency span you defined will be displayed in the “Measurement parameters” pane of the measurement menu. The values of “Fmin” and “Fmax” are also adjusted to match your entries and now correspond to the defined frequency range.

8.4 Setting the resolution bandwidth (RBW)

The resolution bandwidth (RBW) characterizes the selectivity of the spectrum analyzer in respect of signals having the same amplitude. Only signals which are separated by a frequency greater than the defined resolution bandwidth can be distinguished from one another.

Tip: An appropriately small value of RBW must be selected for signals that are very closely spaced in frequency. A larger resolution bandwidth can be selected for broadband signals.

Setting methods

The SRM-3000 can automatically define a suitable resolution bandwidth dependent on the selected frequency span. Two options for this are provided in the CONFIGURATION menu:

FAST SWEEP	The RBW is set so that the optimum sweep time can be achieved.
HIGH RESOLUTION	The RBW is set so that the highest resolution can be achieved.

You can alternatively set the resolution bandwidth directly from a range of preset values. This option is available when the setting “OFF” is selected in the CONFIGURATION menu.

➷ The criteria governing the resolution bandwidths available for the currently selected frequency span are explained in Appendix B.

Activating automatic resolution bandwidth selection in the CONFIGURATION menu

1. Press the **CONF** button.
   The CONFIGURATION menu opens.

➷ Also refer to sec. 14, page 14-1.

2. Use the rotary control to highlight “Configure Spectrum Analysis Mode”.
3. Press the **ENT** button.
4. Use the rotary control to highlight “RBW Automatic”.
5. Press the **ENT** button.
   The current setting will be highlighted.

6. Use the rotary control to highlight “FAST SWEEP” or “HIGH RESOLUTION”.

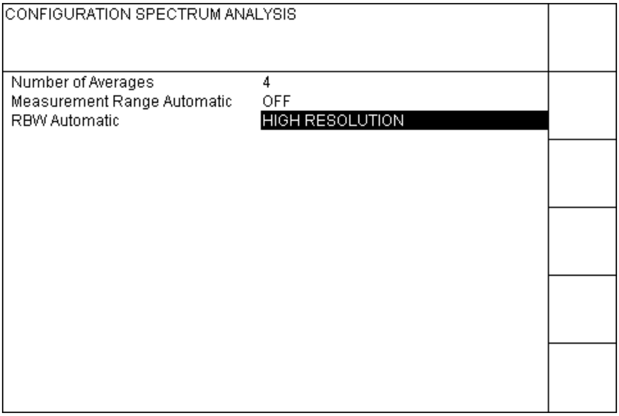


Fig. 8-5 CONFIGURATION SPECTRUM ANALYSIS (RBW Automatic) menu

7. Press the **ENT** button.
8. Return to the measurement menu of “Spectrum Analysis” mode by pressing the **MODE** button and selecting “Spectrum Analysis”.
   Automatic resolution bandwidth selection is activated.
   The **RBW** softkey is no longer displayed.

Defining the resolution bandwidth in the measurement menu

✓ “RBW Automatic” in the CONFIGURATION menu is set to “OFF”.
✓ The “Spectrum Analysis” mode measurement menu is open.

1. Press the **RBW** softkey.
   A selection box opens showing a list of possible resolution bandwidths.
2. Use the rotary control to highlight the desired setting.
3. Press the **ENT** button.
   The selected value will be shown in the “Measurement parameters” pane of the measurement menu.
   The spectrum is re-drawn using the RBW.

8.5 Setting the measurement range

The system sensitivity depends on the input attenuator setting, which is determined by the “Measurement Range” parameter. A high measurement sensitivity avoids any falsification of the results that might occur due to the intrinsic noise of the device. However, the device must not be overloaded. Overloading can also be caused by signals that are outside the set frequency range, such as those from powerful UHF and VHF broadcast transmitters.

For the above reasons, the SRM allows you to

- select the measurement range manually,
- automatically search for the best measurement range.

Note: The measurement range you select will apply to all operating modes, so you do not have to set it each time you change from one operating mode to another.

8.5.1 Setting the measurement range manually

This method can be used if you know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens showing a list of possible input sensitivities.
2. Use the rotary control to highlight the desired input sensitivity.
3. Press the **ENT** button.
   The selected input sensitivity is set.

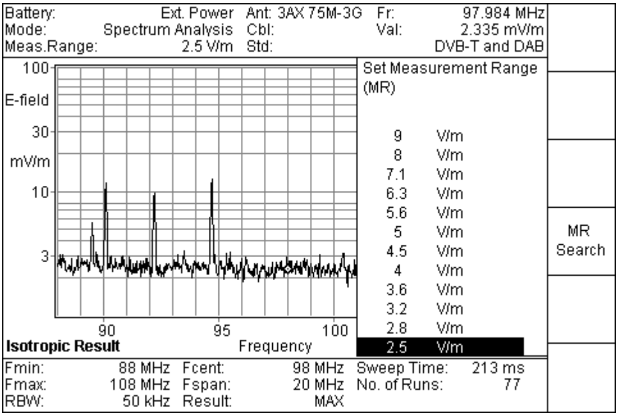


Fig. 8-6 “Set Measurement Range (MR)” selection box

8.5.2 Search for the best measurement range

This method is best if you do not know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens;
   the fourth softkey is labeled **MR Search**.
2. Press the **MR Search** softkey.
   The message “Searching for best measurement range. Please wait.” is displayed. The SRM makes a background measurement over the entire frequency range covered by the antenna you are using. This will take several seconds. When the measurement is finished, the SRM automatically sets the measurement range to the best value and displays the normal measurement menu again.

Note: Press the **ESC** key if you want to stop the automatic setting process.

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

8.6 Selecting the result type

The result type defines how the values recorded are displayed.

ACT	The rms value of the current (actual) spectral line is displayed.
MAX	The maximum value occurring for all spectral lines since activation of MAX trace type is displayed.
AVERAGE	The average of the measured values is taken over a specified number of results or a specified time. The resulting value is displayed. ↳ Selecting the averaging parameters: see page 8-12
MAX AVERAGE	The maximum value of all the averaged spectra is displayed.

Selecting the result type

1. Press the **Result type** softkey.
   The “Select Result Type” selection box opens showing a list of possible result types.
   If the “Spatial Averaging” option has been activated, the fifth softkey will be labeled **Spatial AVG**.
   Spatial Averaging in “Spectrum Analysis” mode: see page 12-14
2. Use the rotary control to highlight the desired result type.
3. Press the **ENT** button.
   The selected result type is shown in the “Measurement parameters” pane of the measurement menu.

8.7 Selecting the averaging parameters

The SRM provides two ways of averaging the results:

- Averaging over a specified number of individual results (Number of Averages)
- Averaging over a specified time (Average Time)

You can set both parameters in the CONFIGURATION menu.
They will be effective only when you select “AVERAGE” or “MAX AVERAGE” evaluation mode.

Selecting averaging over a specified number of results (Number of Averages)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Spectrum Analysis Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Number of Averages”.
7. Press the **ENT** key.
8. Use the rotary control to highlight “Number of Averages”.
9. Press the **ENT** key.
10. Use the rotary control to set the number of averages (between 4 and 64).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

Selecting averaging over a specified time (Average Time)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Spectrum Analysis Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Average Time”.

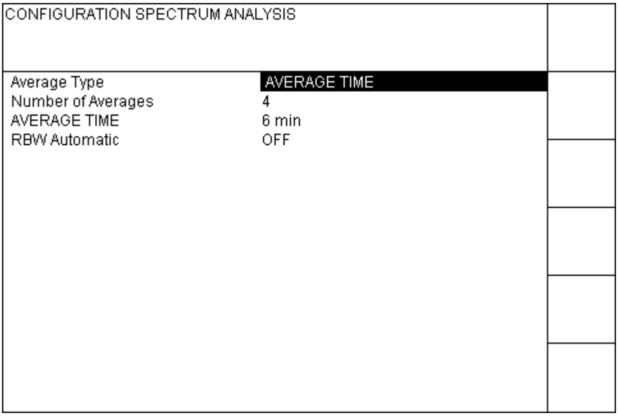


Fig. 8-7 CONFIGURATION SPECTRUM ANALYSIS menu

7. Press the **ENT** key.
8. Use the rotary control to highlight “Average Time”.
9. Press the **ENT** key.
10. Use the rotary control to set the averaging time (between 1 and 30 min).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

8.8 Selecting the display

This section describes how to optimize the display of measurement results in “Spectrum Analysis” mode.

8.8.1 Selecting the units

The Y axis units are selected using the **UNIT** button.

The following power and voltage units are available if an antenna is not connected or selected:

dBm	Power level referred to 1 mW
dBV	Voltage level referred to 1 V
dBmV	Voltage level referred to 1 mV
dBµV	Voltage level referred to 1 µV

The following units are available if an antenna is connected or selected:

V/m	Electric field strength (calculated using the characteristic impedance of a vacuum Zo = 377 Ω if not measured directly)
A/m	Magnetic field strength (calculated using the characteristic impedance of a vacuum Zo = 377 Ω if not measured directly)
dBV/m	Electric field strength (expressed logarithmically, referred to 1 V/m)
dBmV/m	Electric field strength (expressed logarithmically, referred to 1 mV/m)
dBµV/m	Electric field strength (expressed logarithmically, referred to 1 µV/m)
dBA/m	Magnetic field strength (expressed logarithmically, referred to 1 A/m)
W/m^2	Power density (calculated using the characteristic impedance of a vacuum Zo = 377 Ω)
mW/cm^2	Power density (calculated using the characteristic impedance of a vacuum Zo = 377 Ω)
%	% referred to a selected safety standard

✓ “Spectrum Analysis” mode is set.

1. Press the **UNIT** button.
   The “Select Display Unit” selection box opens showing a list of available units.

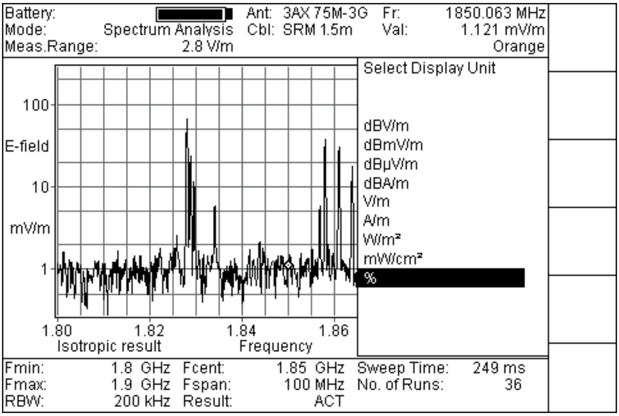


Fig. 8-8 “Select Display Unit” selection box

2. Use the rotary control to highlight the desired units.
3. Press the **ENT** button.
   The measurement results will be displayed with the selected units in the “Spectrum Analysis” mode measurement menu.

8.8.2 Selecting the display mode and scaling

The display mode (full screen), scaling and the Y axis reference value are set using the **DISPL** button.

✓ "Spectrum Analysis" mode is set.

⇒ Press the **DISPL** button.
The softkey functions change.

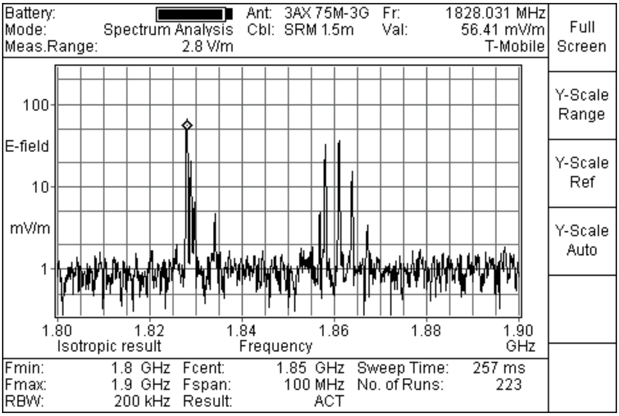


Fig. 8-9 Softkeys for selecting the display mode and scaling

Selecting the display mode

⇒ Press the **Full Screen** softkey.
The entire display area is used to display the spectrum.

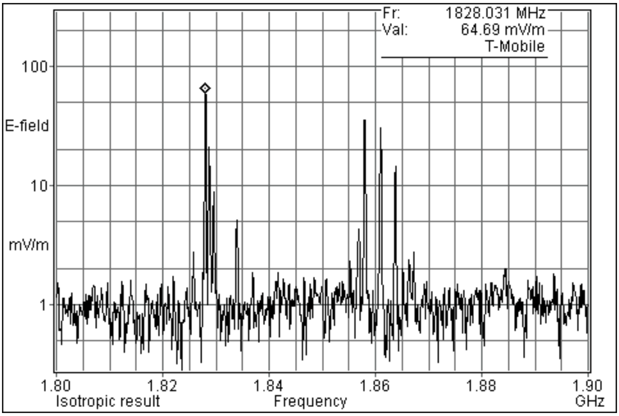


Fig. 8-10 “Full Screen” display mode

Displaying the spectrum in normal size

⇒ Press any button.

The display mode reverts to the normal size spectrum display.

Selecting the Y axis scaling

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Range** softkey.
   The “Select Y-Scale Range” selection box opens.

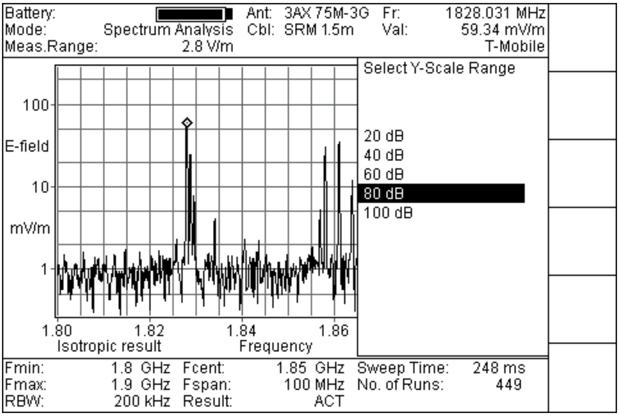


Fig. 8-11 “Select Y-Scale Range” selection box

2. Use the rotary control to highlight the desired value.
3. Press the **ENT** button.
   The Y axis will be displayed with the selected scale range in the “Spectrum Analysis” mode measurement menu.

Selecting the Y axis reference point

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Ref** softkey.
   The “Select Y-Scale Reference” selection box is displayed.
   The **Auto** softkey is displayed.

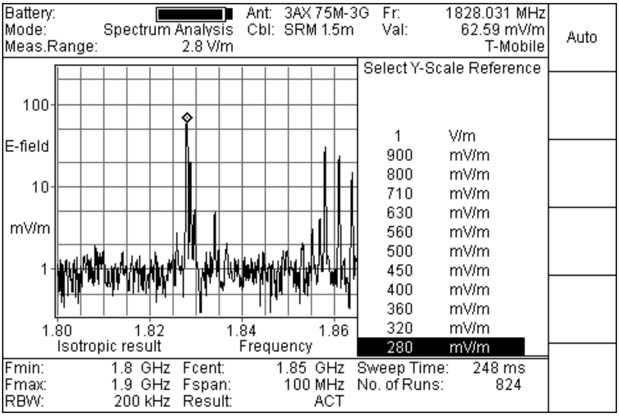


Fig. 8-12 “Select Y-Scale Reference” selection box

2. Use the rotary control to highlight the desired value.
3. Press the **ENT** button.
   The Y axis reference point is set to the selected value in the “Spectrum Analysis” mode measurement menu.

Note: The reference value is shown in the selected units.

Selecting the reference value automatically

✓ The “Select Y-Scale Reference”selection box is displayed.
✓ The **Auto** softkey is displayed.

⇒ Press the **Auto** softkey.
The Y-axis reference value is the same as the measurement range.
The Y-axis reference adjusts automatically when you change the measurement range.
The selection box closes.

8.8.3 Rapidly changing the frequency span (Zoom function)

Zoom functions are provided to allow rapid alteration in the frequency span. An area of interest within the selected frequency span is marked and the upper and lower frequency limits of the marked frequency range are then set as the limits of the new frequency span.

Note: Executing this function starts a new measurement. New measurement parameter values may also be set automatically, e.g. a new resolution bandwidth.

The individual settings are described in the sections below.

✓ “Spectrum Analysis” mode is set.

⇒ Press the **ZOOM** button.
The softkey functions change.
The zoom area is defined by two vertical lines on the display. The frequencies at the line positions are shown as Zmin and Zmax in the measurement menu. Zcent is the frequency at the center of the zoom area.

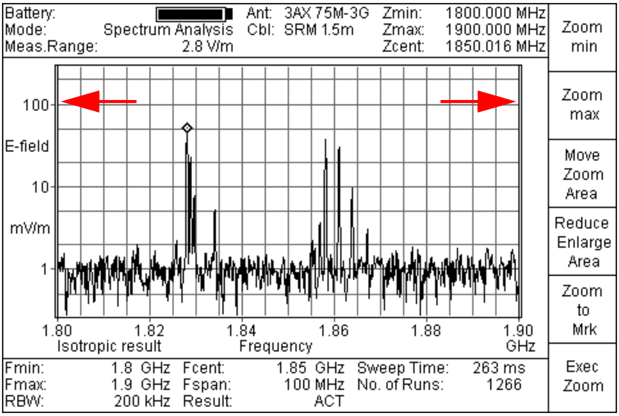


Fig. 8-13 Softkeys for selecting the zoom settings

The softkey functions are as follows:

Zoom min	Sets the lower limit of the zoom area.
Zoom max	Sets the upper limit of the zoom.
Move Zoom Area	Moves the zoom area over the spectrum.
Reduce/Enlarge Area	Reduces or enlarges the zoom area by a specific amount.
Zoom to Mrk	Positions the zoom area symmetrically about the marker.
Exec Zoom	Activates the zoom settings.

Note: The frequency range (Fmin, Fmax) for the spectrum analysis changes immediately the **Exec Zoom** softkey is pressed. The RBW is set automatically.

Setting the lower limit of the zoom area

The lower limit of the zoom area can be set individually.

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).

1. Press the **Zoom min** softkey.
   The lower line demarcating the zoom area is marked with a diamond.

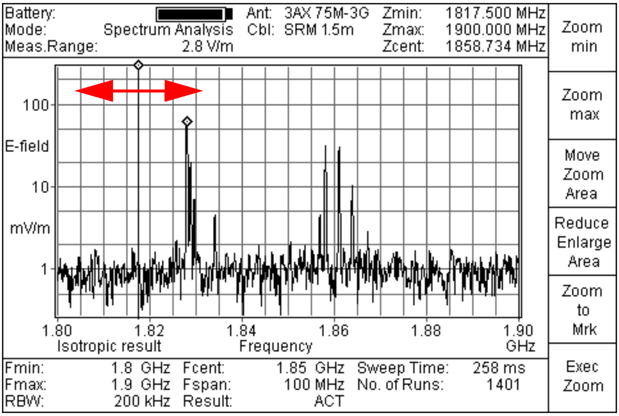


Fig. 8-14 Lower limit of zoom area

2. Move the line to the desired position using the rotary control.

Setting the upper limit of the zoom area

The upper limit of the zoom area can be set individually.

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).

1. Press the **Zoom max** softkey.
   The upper line demarcating the zoom area is marked with a diamond.

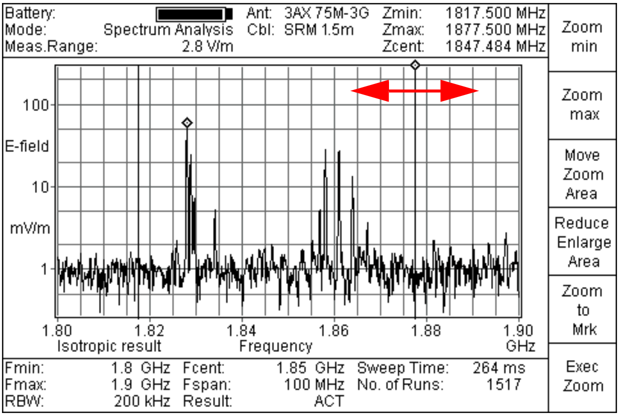


Fig. 8-15 Upper limit of zoom area

2. Move the line to the desired position using the rotary control.

Moving the zoom area

The upper and lower limits of the zoom area can be moved simultaneously.

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).

1. Press the **Move Zoom Area** softkey.
   The lines demarcating the zoom area are marked with diamonds.

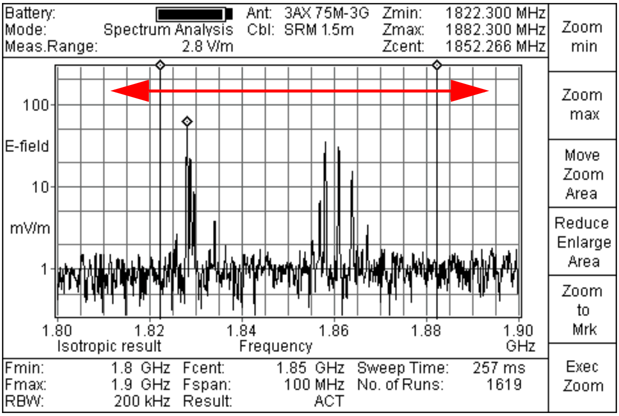


Fig. 8-16 Move zoom area

2. Move the zoom area to the desired position using the rotary control.

Reducing / enlarging the zoom area

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).

1. Press the **Reduce Enlarge Area** softkey.
   The lines demarcating the zoom area are marked with diamonds.

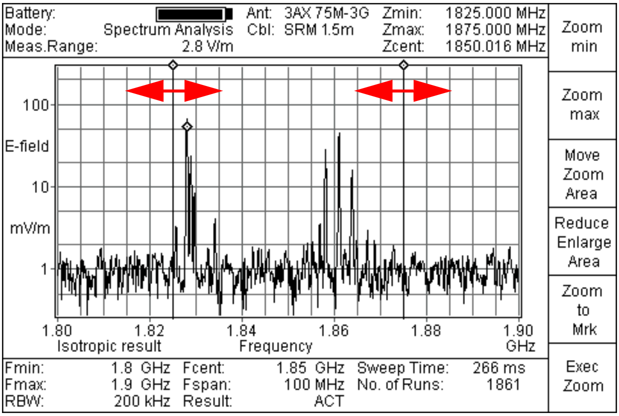


Fig. 8-17 Reduce / enlarge zoom area

2. Reduce or enlarge the zoom area using the rotary control.

Positioning the zoom area symmetrically about the marker

✓ The marker is set to the desired position.

↳ Marker functions: see page 8-28

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).

1. Define the zoom area using the **Zoom min** / **Zoom Max** softkeys or with the **Reduce Enlarge Area** softkey.
2. Press the **Zoom to Mrk** softkey.
   The zoom area will be positioned so that the marker is in the center of the area.

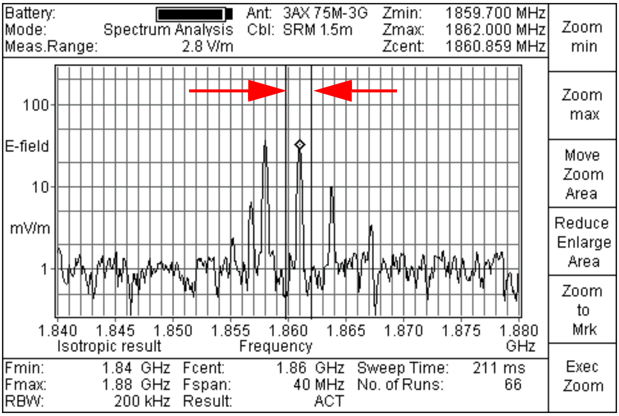


Fig. 8-18 Positioning the marker in the center of the zoom area

Activating the zoom settings

✓ The **ZOOM** button has been pressed.
✓ The softkeys for selecting the zoom settings are displayed (see fig. 8-13).
✓ The zoom area has been defined.

⇒ Press the **Exec Zoom** softkey.
The limits of the zoom area are set as the new values of Fmin and Fmax. The RBW is set automatically.

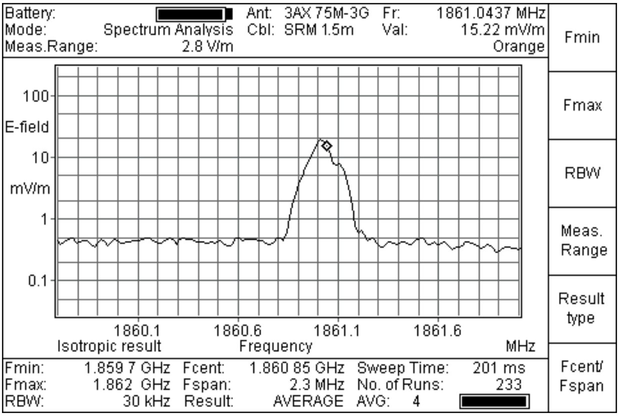


Fig. 8-19 Measurement menu after pressing the **Exec Zoom** softkey

8.9 Evaluating results

Marker functions and a peak value table are provided for rapid evaluation of the spectrum analysis results. You can also display the integrated level of a freely definable frequency band.

8.9.1 Marker functions

Standard marker

The standard marker is always visible and is located in the center of the frequency range when spectrum analysis is started. It is indicated by a small diamond. The marker (diamond) is moved over the frequency range by turning the rotary control. This marker function is always active. The frequency value (Fr) and level value (Val) at the position of the marker are shown in the measurement menu.

Note: This marker gives you access to all measured values e.g. for all the spectral lines (more information can be found in Appendix B).
The spacing between two measured values (between two spectral lines) is approximately half of the currently selected resolution bandwidth.

Tip: Turn the rotary control slowly to move in small frequency steps.
Turn it quickly to move in large steps.
A brief movement in the opposite direction stops the marker movement.

Peak marker

✓ “Spectrum Analysis” mode is set.

⇒ Press the **MARK** button.
The softkey functions change.

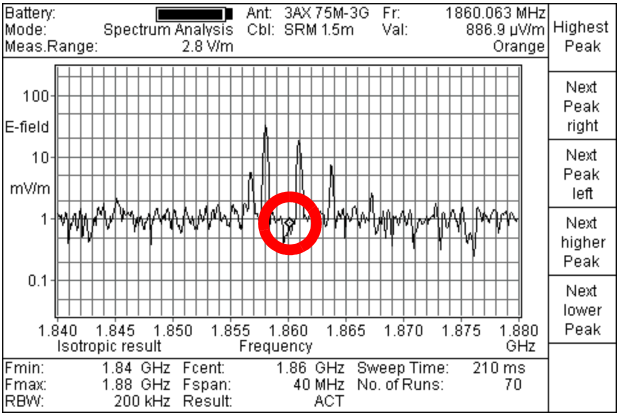


Fig. 8-20 Peak marker in the measurement menu

The softkey functions are as follows:

Highest Peak	Moves the marker to the highest peak
Next Peak right	Moves the marker to the next peak to the right of its current position
Next Peak left	Moves the marker to the next peak to the left of its current position
Next higher Peak	Moves the marker to the next peak that is higher than the current position
Next lower Peak	Moves the marker to the next peak that is lower than the current position

Note: An algorithm is used for the determination of peak markers. The frequency resolution is about 1/50 of the currently selected resolution bandwidth.

Moving the peak marker to the highest peak

✓ The **MARK** button has been pressed.
✓ The softkeys for selecting the marker functions are displayed (see fig. 8-20).

⇒ Press the **Highest Peak** softkey.
The marker is set to the peak with the highest level value.

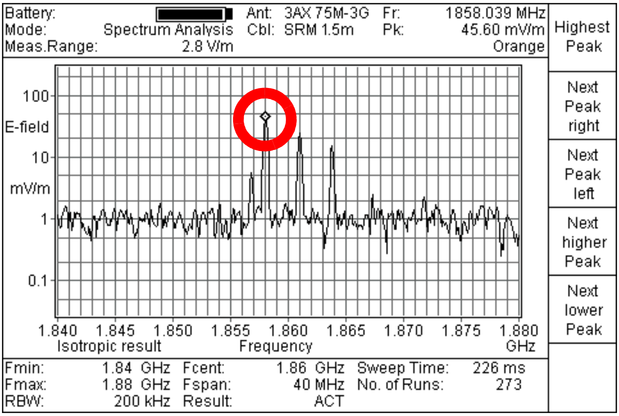


Fig. 8-21 Moving the marker with the **Highest Peak** softkey

Moving the peak marker to the next peak (left or right)

✓ The **MARK** button has been pressed.
✓ The softkeys for selecting the marker functions are displayed (see fig. 8-20).

⇒ Press the **Next Peak right** softkey.
– or –
Press the **Next Peak left** softkey.
The marker is set to the next peak to the left or right of its current position.

Moving the peak marker to the next higher or next lower peak

✓ The **MARK** button has been pressed.
✓ The softkeys for selecting the marker functions are displayed (see fig. 8-20).

⇒ Press the **Next higher Peak** softkey.
– or –
Press the **Next lower Peak** softkey.
The marker is set to the next peak that is higher or lower than its current position.

8.9.2 Peak table

The display can be switched to show a peak table for better result evaluation. The peak table lists the highest peaks (maximum of 20) occurring in the frequency spectrum being considered.

Note: The same algorithm is used for the peak table as is used to determine local maxima using the peak marker (see sec. 8.9.1).

Displaying the peak table

✓ “Spectrum Analysis” mode is set.

1. Press the **EVAL** button.
   The EVALUATION FUNCTION menu opens.

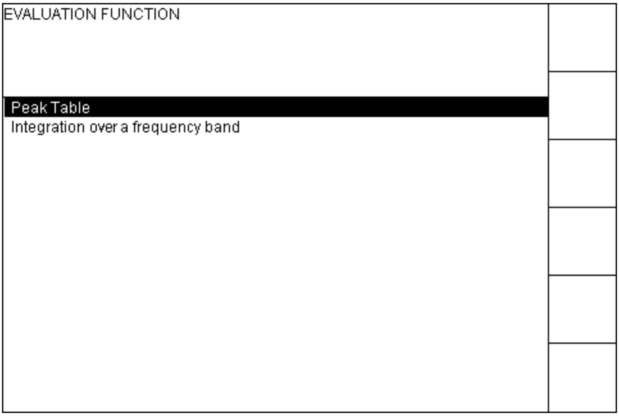


Fig. 8-22 EVALUATION FUNCTION menu

2. Use the rotary control to highlight “Peak Table”.
3. Press the **ENT** button.
   The peak table is displayed.

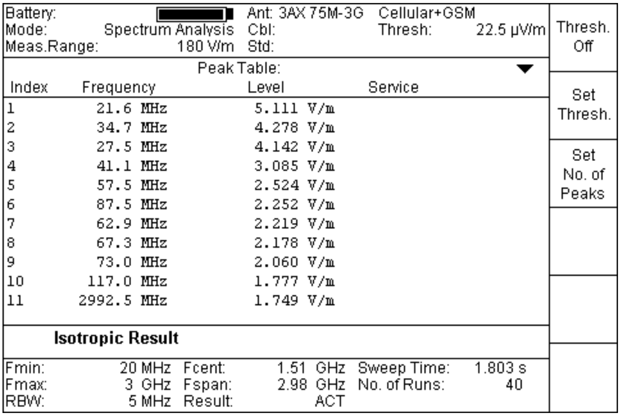


Fig. 8-23 Peak table

Note: Press the **ESC** button to display the frequency spectrum again.

The table below explains the column headers used in the peak table:

Column header	Explanation
Index	Peak sequence number (maximum 50).
Frequency	Peak frequency value.
Level	Peak level value.
Service	Service to which the peak (frequency value) belongs, e.g. “UMTS”. Assignment of a frequency value to a service is only possible if a corresponding service table has been selected in the CONFIGURATION / Service Table menu. The name of the selected service table is shown in the measurement menu, e.g. Orange.
▼ or ▲	The triangle indicates that there are more values in the table. They can be displayed by turning the rotary control.

Table 8-2 Peak table column headers

The following softkey functions are available for this display mode:

Thresh. On
: Activates the threshold if it is deactivated, i.e. the softkey label “Thresh. On” indicates that the threshold is currently switched *off*. The instrument will display all the peaks.

Thresh. Off
: Deactivates the threshold if it is activated, i.e. the softkey label “Thresh. Off” indicates that the threshold is currently switched *on*. The instrument will only display the peaks that are above the specified threshold.

Set Thresh.
: Sets the threshold for the peaks to be displayed.

Set No. of Peaks
: Sets the number of peaks that are to be displayed (maximum 50 peaks).

Displaying only those peaks which exceed a selected threshold

✓ The peak table is displayed.

1. Press the **Set Thresh** softkey.
   The “Set Threshold” selection box opens.

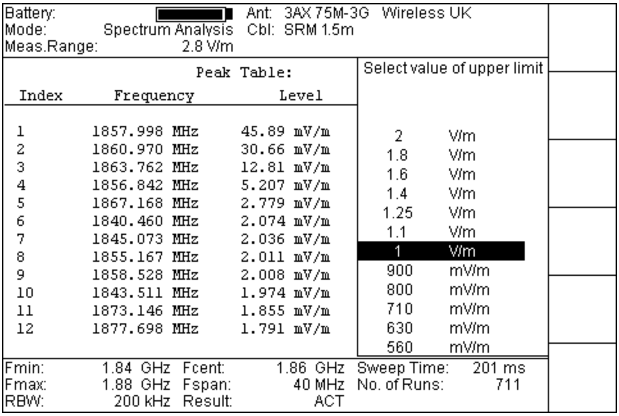


Fig. 8-24 “Select Threshold” selection box

2. Use the rotary control to highlight the desired threshold value.
3. Press the **ENT** button.
4. Press the **Thresh. On** softkey.
   (The softkey label changes to “Thresh. Off”.)
   Only those peaks which exceed the set threshold value will now be displayed. The selected threshold value (Thresh) is shown in the measurement menu.

Limiting the number of peaks displayed

✓ The peak table is displayed.

1. Press the **Set No. of Peaks** softkey.
   The “Select max. number of peaks in peak table” selection box opens.

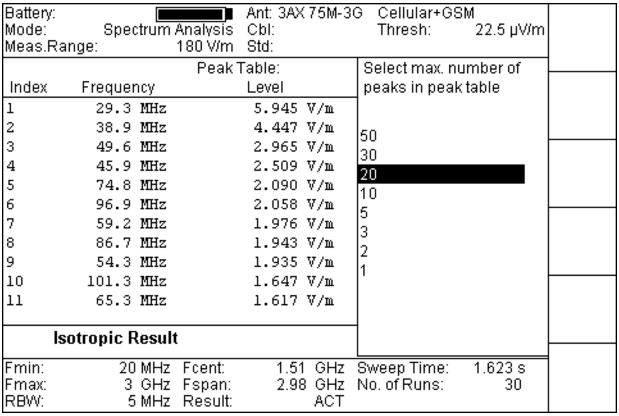


Fig. 8-25 “Select max. number of peaks in peak table” selection box

2. Use the rotary control to highlight the desired number.
3. Press the **ENT** key.
   The peak table is now limited to the number of peaks you have specified.

8.9.3 Integration over a defined frequency band

The results in a defined frequency band within the currently selected frequency range can be integrated using this function. This evaluation function thus provides an indication of the broadband value within the frequency range being considered.

The current result (Value) is shown in the measurement menu.

Note: The integration function takes all the spectral lines within the integration range into account, including those buried in the noise floor. The result of this evaluation function is therefore strongly dependent on the intrinsic noise level and consequently from the selected measurement range if the levels of the available signals are too close to the intrinsic noise level.

✓ “Spectrum Analysis” mode is set.

1. Press the **EVAL** button.
   The EVALUATION FUNCTION menu opens.

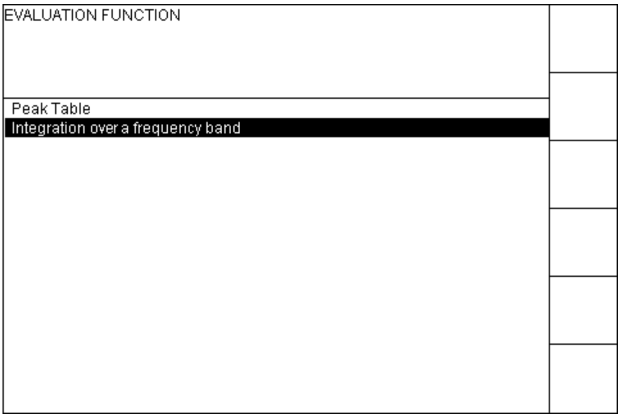


Fig. 8-26 EVALUATION FUNCTION menu

2. Use the rotary control to highlight “Integration over a frequency band”.

3. Press the **ENT** button.
   Two lines (band limits) are displayed in the frequency spectrum.
   The band limit frequencies (FIntmin and FIntmax) and the integrated level value (Value) are displayed in the measurement menu.

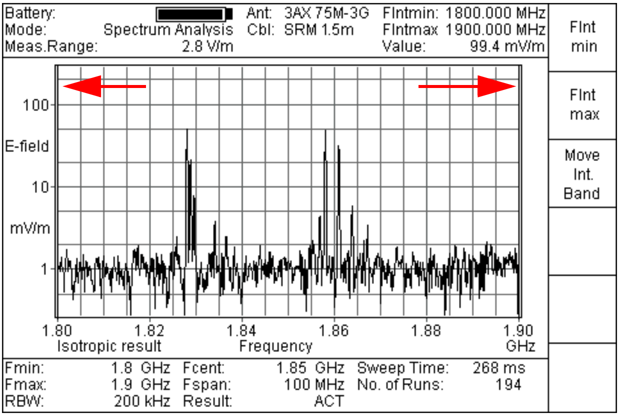


Fig. 8-27 Integrating the level value over a frequency band

The following softkey functions are available in this display mode:

FInt min	Sets the lower limit of the frequency band.
FInt max	Sets the upper limit of the frequency band.
Move Int. Band	Moves the frequency band over the spectrum.

Setting the lower limit of the frequency band

The lower limit of the frequency band can be set individually.

✓ “Integration over a frequency band” display mode is activated.

1. Press the **FInt min** softkey.
   The lower limit of the frequency band is indicated by a diamond.

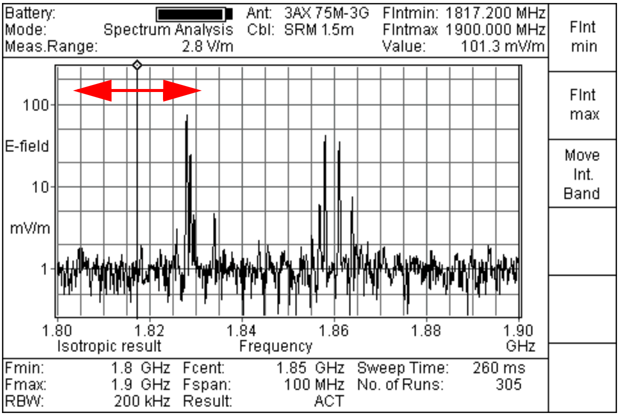


Fig. 8-28 Lower limit of frequency band

2. Use the rotary control to move the line to the desired frequency.

Setting the upper limit of the frequency band

The upper limit of the frequency band can be set individually.

✓ “Integration over a frequency band” display mode is activated.

1. Press the **FInt max** softkey.
   The upper limit of the frequency band is indicated by a diamond.

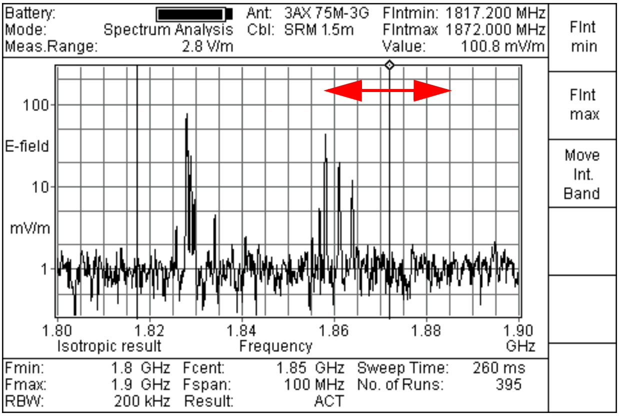


Fig. 8-29 Upper limit of frequency band

2. Use the rotary control to move the line to the desired frequency.

Moving the frequency band

✓ “Integration over a frequency band” display mode is activated.

1. Press the **Move Int. Band** softkey.
   The demarcation lines for the frequency band are indicated by diamonds.

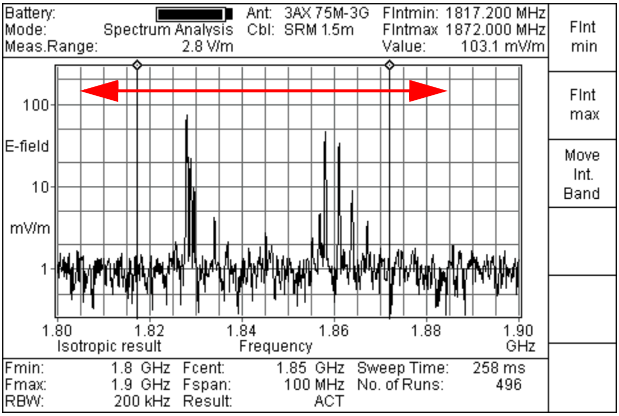


Fig. 8-30 Moving the frequency band

2. Use the rotary control to move the frequency band to the desired position.

Notes:

9 “UMTS P-CPICH Demodulation” mode (option)

9.1 Operating mode functions

Unlike GSM, you cannot simply use a frequency selective measurement with UMTS to detect individual channels and assign them to a radio cell. This is because the information in individual channels is “spread” over an entire frequency channel of 5 MHz and is also scrambled. This method is known as W-CDMA (Wideband Code Division Multiple Access). Within this multiplex signal there is a P-CPICH (Primary Common Pilot Channel) for each radio cell. This channel transmits continuously at a constant power level. Each cell has its own P-CPICH with its own scrambling code.

In “UMTS P-CPICH Demodulation” mode, the SRM decodes all the scrambling codes present in the selected UMTS frequency channel. In this way, it is capable of separately detecting and listing the contributions made by the individual cells to the overall field exposure level. It also calculates the sum of these contributions. You can use an extrapolation factor to estimate the “worst case” situation that would occur if all traffic channels were fully loaded. The SRM also displays the analog measurement value, which corresponds to the actual field exposure level integrated over the complete UMTS frequency channel of 5 MHz.

9.2 Selecting the operating mode

✓ The Option has been enabled (sec. 16.6, page 16-16).

1. Press the **MODE** button.
   The OPERATING MODES menu opens.

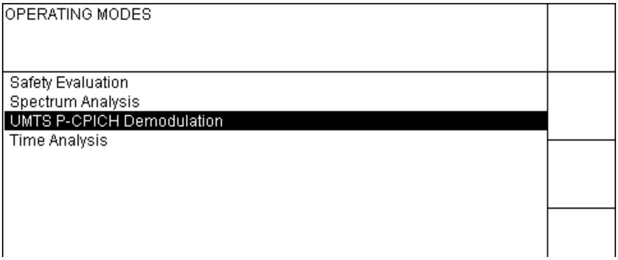


Fig. 9-1 OPERATING MODES menu

2. Use the rotary control to highlight “UMTS P-CPICH Demodulation”.
3. Press the **ENT** button.
   The measurement menu for “UMTS P-CPICH Demodulation” mode opens.
   The softkey functions change.

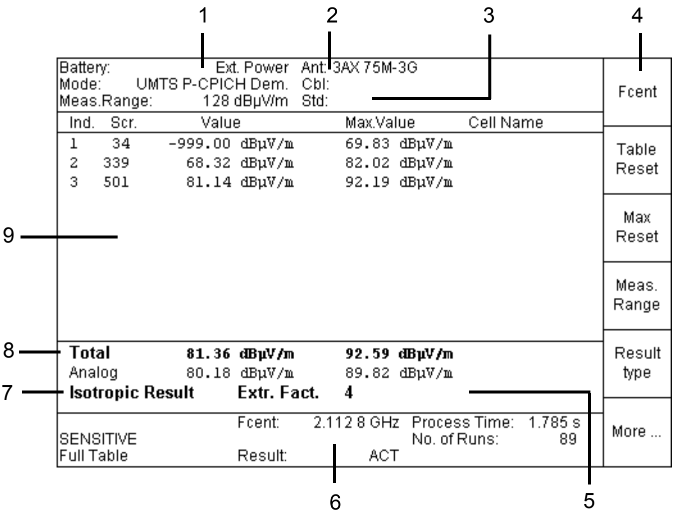


Fig. 9-2 Measurement menu for “UMTS P-CPICH Demodulation” mode

No.	Name	Description
1	Operating states	
	Battery	Battery charge state.
	Mode	Operating mode.
	Meas. Range	Input attenuator setting (input sensitivity).
2	Antenna parameters	
	Type	Selected / connected antenna.
	Cbl	Selected / connected measurement cable.
3	Evaluation	
	Std	Standard or regulation selected if result display is set to a percentage of a limit value.
4	-	Softkey functions.
5	OVERDRIVE display if the result overloads the device (Value). MAX OVERDRIVE display if the maximum value result overloads the device (Max Value).	
6	Measurement parameter display.	
	No Scr. Code found!!	This message appears if the device cannot detect a scrambling code.
	SENSITIVE	Optimization for high sensitivity or high speed (FAST) when detecting UMTS channels
	Full Table	Display of the entire table. The entries in the table can be sorted and selected using various criteria. Sorting table entries: see page 9-7 Selecting table entries: see page 9-8
	Fcent	Center frequency
	-	Provider’s name (based on selected service table, if any; see sec. 14.6, page 14-7).
	Process Time	Time taken to run a measurement sequence.

Table 9-1 Key to “UMTS P-CPICH Demodulation” mode measurement menu

No.	Name	Description
	Measurement parameter display (continued).	
	No. of Runs	Number of measurement runs.
	Result	Evaluation type: Current (actual) value (ACT) or average of several results (AVERAGE).
	AVG	Number of averages. Only displayed for “Result Type” = “AVERAGE”.
7	Isotropic result	Display of measurement type: X, Y, Z axis measurement or isotropic measurement.
	Extr. Fact.	Display of extrapolation factor used for multiplying the individual results and the overall result but not the result of the analog field strength measurement.
8	Overall result display.	
	Total	Overall result calculated from the individual results of instantaneous measurements (Value), as well as the overall result determined from the saved maximum values (Max. Value).
	Analog	Result of analog field strength measurement in the selected 5 MHz UMTS frequency channel.
9	Individual result display.	
	Ind.	Consecutive index corresponding to the detected scrambling codes.
	Scr.	Detected scrambling code number.
	Value	Current measurement value.
	Max. Value	Maximum value since last reset.
	Cell Name	Cell name, if a cell name table has been recorded (see sec. 14.7, page 14-9).

Table 9-1 Key to “UMTS P-CPICH Demodulation” mode measurement menu

9.3 Selecting the display

⇒ Press the **DISPL** key.
The second to last softkey provides the following options:

Table Ratio	Switches to table display mode. The last column shows the ratios of the individual results[1)] to the result of the analog field strength measurement (Value/Analog) in dB.
Bar Graph	Switches to graphic display mode, showing the measured values as a bar graph.
Mixed	Switches to mixed display mode: • Numerical display of the overall result[2)] or the results for selected scrambling codes[2,3)]. • Graphic display versus time of the overall result [2)] or the results for selected scrambling codes[2,3)].
Value	Switches to numerical display of the overall result[2)] or the results for selected scrambling codes[2,3)].
Graph	Switches to graphic display versus time of the overall result [2)] or the results for selected scrambling codes[2,3)].
Table Normal	Switches to the default display mode showing the results [2,3)] as a table (fig. 9-2, page 9-2).

1 The extrapolation factor is not used for this calculation.
2 Multiplied by the extrapolation factor.
3 Selecting table entries: see page 9-8

9.3.1 Table Normal display mode

This is the default display setting for “UMTS P-CPICH Demodulation” mode (fig. 9-2, page 9-2).

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Table Normal** appears.
2. Press the **Table Normal** softkey.
   The results are displayed as a table.
   Cell names are shown in the last column if a cell name table is recorded.

↳ Selecting a cell name table: see page 14-9.

3. Press the **ESC** key to return to the measurement menu.

Selecting the result units

1. Press the **UNIT** key.
   The “Select Display Unit” selection box opens.
2. Use the rotary control to highlight the units you want to select.
3. Press the **ENT** key.
   The measurement results are shown with the desired units in the measurement menu. The extrapolation factor is applied to all individual results and to the overall result (Total) but not to the result of the analog field strength measurement (Analog).

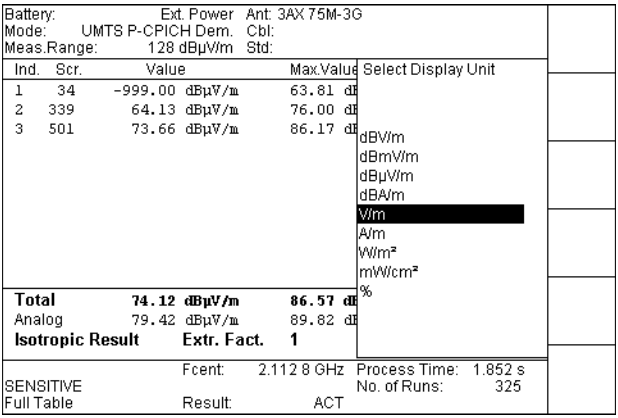


Fig. 9-3 “Select Display Unit” selection box

↳ For a detailed description of the units that you can select, see sec. 8.8.1, page 8-14.

↳ Setting the extrapolation factor (Extr. Fact.): see page 9-31

Selecting “Full Screen” display mode

⇒ Press the **DISPL** key.
The softkey labels change.
⇒ Press the **Full Screen** softkey.
The entire display area is used for the results.

Press the **ESC** key to return to the measurement menu.

Sorting table entries

1. Press the **More** softkey.
   The softkey labels change.
2. Press the **Sort Table** softkey.
   The “Sort Table” selection box opens.
   The following sort options are provided:

CODE	Lists entries in increasing order of scrambling codes.
VALUE	Lists entries in decreasing order of measured values.
MAX VALUE	Lists entries in decreasing order of maximum values.
CELL NAME	Lists entries in alphabetical order of cell names.

3. Use the rotary control to highlight the desired option.
4. Press the **ENT** key.
   The table entries are shown in the desired order in the measurement menu.

Selecting table entries

1. Press the **More** softkey if necessary.
   The softkey labels change.
2. Press the **Select Menu** softkey.
   The SELECT menu opens.
   You can now choose from the following options using the softkeys:

Select First	Selects an entry in the table that is to be selected as the first in a series of entries. The entry is marked with a triangle pointing downwards.
Select Last	Selects an entry in the table that is to be selected as the last in a series of entries. The entry is marked with a triangle pointing upwards.
Select All	Selects all the entries in the table. Entries are marked with a check mark.
Select Deselect	Selects or deselects the highlighted entry. The selected entry is marked with a check mark.
Invert All	Inverts the selection.

3. Use the rotary control to highlight the entry you want to select.
4. Press the appropriate softkey to make the type of selection you want.
5. Press the **ENT** key.
   The selection you made is shown in the measurement menu.
   The message “Partial Table” is shown at bottom left.
   The overall result (Total) is made up from the contributions of the selected table entries only (Scrambling Codes).

Resetting the maximum values

⇒ Press the **Max Reset** softkey.
The stored maximum values are deleted. The measurement results themselves are retained. The measurement continues.

Resetting the entire table

⇒ Press the **Table Reset** softkey.
The entire table including all results up till now, as well as the sort options and selections will be deleted. A new measurement starts.

9.3.2 Table Ratio display mode

This display mode directly shows how much each UMTS radio cell contributes to the overall field strength of an UMTS frequency channel. The ratios are expressed in dB.

✓ “UMTS P-CPICH Demodulation” mode is set.
✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Table Ratio** appears.
2. Press the **Table Ratio** softkey.
   The results are displayed as a table.
   The last column shows the ratio of the individual results to the result of the analog field strength measurement in dB (Value/Analog).
   The extrapolation factor is not applied to this calculation.

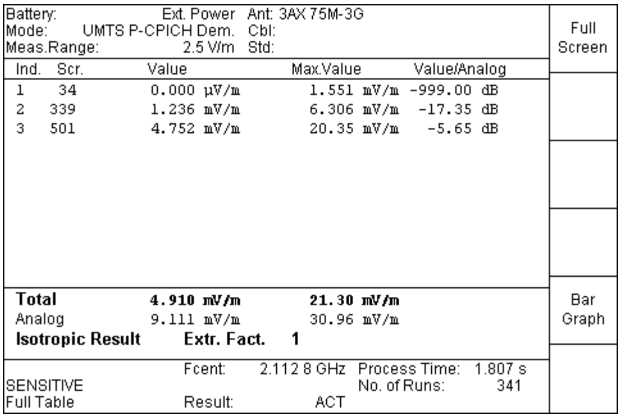


Fig. 9-4 Table Ratio display mode

3. Press the **ESC** key to return to the measurement menu.

↳ Selecting the result units: see page 9-6

↳ Selecting “Full Screen” display mode: see page 9-7

↳ Sorting table entries: see page 9-7

↳ Selecting table entries: see page 9-8

↳ Resetting the maximum values: see page 9-8

↳ Resetting the entire table: see page 9-8

9.3.3 Bar Graph display mode

This display mode shows the individual results, the overall result (Total) and the result of the analog field strength measurement (Analog) as a bar graph.

✓ “UMTS P-CPICH Demodulation” mode is set.
✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Bar Graph** appears.
2. Press the **Bar Graph** softkey.
   The results are displayed as a bar graph.
   Individual results are numbered from 1 to 16 to correspond with the index numbers in the table display. The scrambling code number is shown within each bar.
   The overall result is shown on the right (T = Total) along with the result of the analog field strength measurement (A = Analog). Maximum values are shown as horizontal lines.
   You can use the rotary control to position the marker on individual bars in the graph. The selected item (Scrambling Code No., Total, or Analog) is shown in plain text along with the corresponding measurement value at the top right of the measurement menu.
   The extrapolation factor is applied to all individual results and to the overall result (T), but not to the analog result (A).

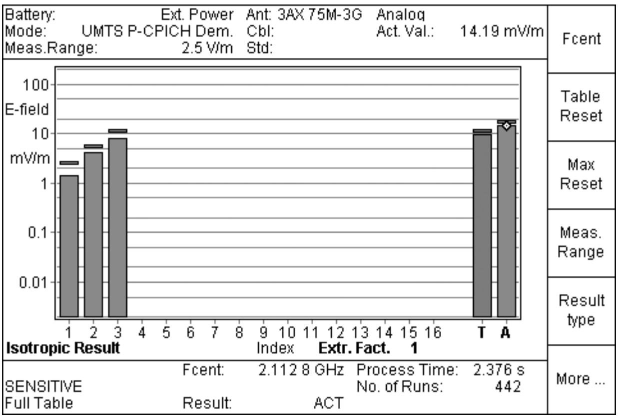


Fig. 9-5 Bar Graph display mode

3. Press the **ESC** key to return to the measurement menu.

↳ Selecting the result units: see page 9-6

↳ Setting the extrapolation factor (Extr. Fact.): see page 9-31

Selecting the Y-axis scale range

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Range softkey**.
   The “Select Y-Scale Range” selection box opens.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** key.
   The Y-axis scale is set to the new value.

Selecting the Y-axis reference point

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Ref** softkey.
   The “Select Y-Scale Reference” selection box opens.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** key.
   The Y-axis reference point is set to the desired value.

Selecting the reference point automatically

✓ The “Select Y-Scale Reference” selection box is displayed.
✓ The **Auto** softkey is displayed.

⇒ Press the **Auto** softkey.
The Y-axis reference value is the same as the measurement range.
The Y-axis reference adjusts automatically when you change the measurement range.
The selection box closes.

Selecting “Full Screen” display mode

↳ Selecting “Full Screen” display mode: see page 9-7

Sorting the display of individual results

The individual results (Scrambling Codes) are shown in the same order as their index numbers in table display mode, so you can use the **Sort Table** softkey function to change the sort order.

↳ Sorting table entries: see page 9-7

Selecting displayed individual results

You can select the individual results that are displayed in the same way as you select them from the table, so you can use the **Select Menu** softkey function to change the options for selecting results.
The overall result (Total) is made up from the contributions of the selected table entries only (Scrambling Codes).

↳ Selecting table entries: see page 9-8

Using the marker to read out numerical results

⇒ Use the rotary control to position the marker on a bar in the graph.
The corresponding Scrambling Code or the designation “Total” or “Analog” is shown together with the numerical measurement value in the top right of the measurement window.

Resetting maximum values

⇒ Press the **Max Reset** softkey.
The stored maximum values are deleted. The measurement results themselves are retained. The measurement continues.

Resetting the entire graph

⇒ Press the **Table Reset** softkey.
The entire graph including all results up till now, as well as the sort options and selections will be deleted. A new measurement starts.

9.3.4 Mixed display mode (numerical display with graphical display versus time)

The following are displayed in this mode for a selected individual result or for the overall result:

- The instantaneous (Value) and maximum (Max Value) field strength results as numerical values
- A graph of the field strength versus time.

✓ "UMTS P-CPICH Demodulation" mode is set.
✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Mixed** appears.
2. Press the **Mixed** softkey.
   The results are displayed numerically and graphically.
   The extrapolation factor is applied to all the results.

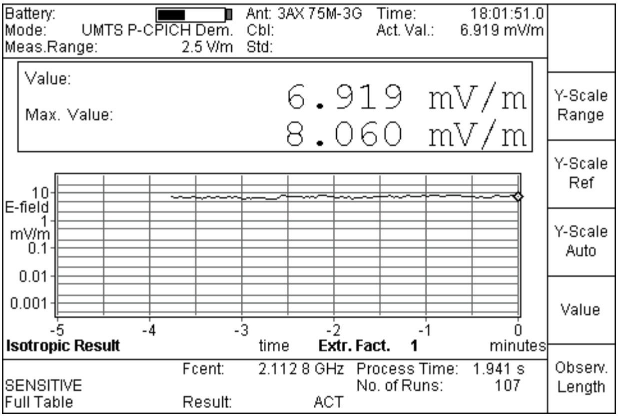


Fig. 9-6 Mixed display mode (numerical display with graphical display versus time)

3. Press the **ESC** to return to the measurement menu.

↳ Selecting the result units: see page 9-6

↳ Setting the extrapolation factor (Extr. Fact.): see page 9-31

Selecting the X-axis scale (Observation Length)

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the **Observ Length** softkey.
   The “Select Observation Length” selection box containing a range of available values opens.

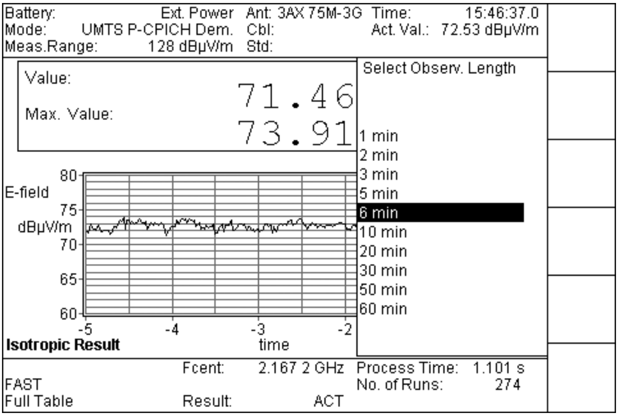


Fig. 9-7 “Select Observation Length” selection box

2. Use the rotary control to highlight the desired value.
3. Press the **ENT** key.
   The X-axis and the measurement values recorded so far will be redrawn using the new scale.

Note: The X-axis scale is independent of the averaging time setting (Selecting the averaging parameters: see page 9-28).

Selecting the Y-axis scale range

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Range softkey**.
   The “Select Y-Scale Range” selection box opens.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** key.
   The Y-axis scale is set to the new value.

Selecting the Y-axis reference point

✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Ref** softkey.
   The “Select Y-Scale Reference” selection box opens.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** key.
   The Y-axis reference point is set to the desired value.

Selecting the reference point automatically

✓ The “Select Y-Scale Reference” selection box is displayed.
✓ The **Auto** softkey is displayed.

⇒ Press the **Auto** softkey.
The Y-axis reference value is the same as the measurement range.
The Y-axis reference adjusts automatically when you change the measurement range.
The selection box closes.

Using the marker to read out numerical results

The default marker is always visible. During the measurement, it is positioned on the instantaneous measurement value at the right hand edge of the window.

⇒ Press the **HOLD** key.
You can now use the rotary control to move the marker across the measurement graph. The Time and Value corresponding to the marker position are displayed in the result box at the top right of the window.

Selecting displayed individual results

You can select the individual results that are displayed in the same way as you select them from the table, so you can use the **Select Menu** softkey function to change the options for selecting results.
The overall result (Total) is made up from the contributions of the selected table entries only (Scrambling Codes).

↳ Selecting table entries: see page 9-8

Resetting maximum values

⇒ Press the **Max Reset** softkey.
The stored maximum values are deleted. The measurement results themselves are retained. The measurement continues.

Resetting the entire graph

⇒ Press the **Table Reset** softkey.
The entire graph including all results up till now, as well as the sort options and selections will be deleted. A new measurement starts.

9.3.5 Value display mode (numerical)

The instantaneous (Value) and maximum (Max Value) field strength values of selected individual results are displayed numerically in this display mode.

✓ “UMTS P-CPICH Demodulation” mode is set.
✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Value** appears.
2. Press the **Value** softkey.
   The results are displayed numerically.
   The extrapolation factor is applied to all results.

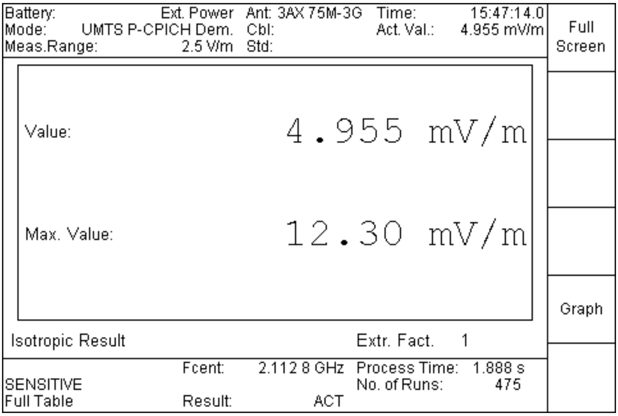


Fig. 9-8 Value display mode (numerical)

3. Press the **ESC** key to return to the measurement menu.

↳ Selecting the result units: see page 9-6

↳ Setting the extrapolation factor (Extr. Fact.): see page 9-31

↳ Selecting “Full Screen” display mode: see page 9-7

↳ Selecting table entries: see page 9-8

Note: The numerical result is made up from the contributions of the selected table entries only (Scrambling Codes).

↳ Resetting the maximum values: see page 9-8

↳ Resetting the entire graph: see page 9-12

9.3.6 Graph (versus time) display mode

The variation of field strength versus time is displayed graphically for selected individual results or for the overall result in this display mode.

✓ “UMTS P-CPICH Demodulation” mode is set.
✓ You have pressed the **DISPL** key.
✓ The corresponding softkeys are displayed.

1. Press the second to last softkey repeatedly until **Graph** appears.
2. Press the **Graph** softkey.
   The results are displayed graphically versus time along with the instantaneous measurement result value (Act. Value; shown in result box, top right).
   The extrapolation factor is applied to all results.

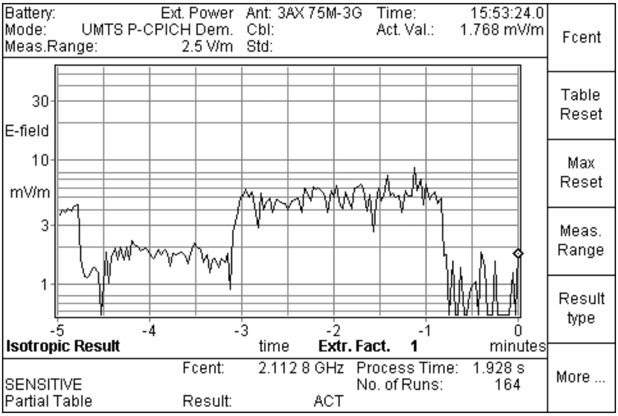


Fig. 9-9 Graph (versus time) display mode

3. Press the **ESC** key to return to the measurement menu.

↳ Selecting the result units: see page 9-6

↳ Setting the extrapolation factor (Extr. Fact.): see page 9-31

↳ Selecting the X-axis scale (Observation Length): see page 9-14

↳ Selecting the Y-axis scale range: see page 9-14

↳ Selecting the Y-axis reference point: see page 9-15

↳ Selecting the reference point automatically: see page 9-15

↳ Selecting “Full Screen” display mode: see page 9-7

↳ Using the marker to read out numerical results: see page 9-15

↳ Selecting table entries: see page 9-8

Note: The numerical result is made up from the contributions of the selected table entries only (Scrambling Codes).

↳ Resetting maximum values: see page 9-16

Note: The maximum value is saved continuously in the background even if it is not displayed in the graph versus time.

↳ Resetting the entire graph: see page 9-16

9.4 Selecting an UMTS frequency or channel

There are two ways to set the measurement frequency to an UMTS frequency channel in “UMTS P-CPICH Demodulation” mode:

- By entering the center frequency (Fcent)
- By entering the channel number (Channel)

Choosing between “Fcent” and “Channel”

1. Press the **CONF** button.
   The CONFIGURATION menu opens.

☞ Also refer to sec. 14.3, page 14-4.

2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
3. Press the **ENT** button.
4. Use the rotary control to highlight “Channel selection by ...”.
5. Press the **ENT** button.
   The current setting (FCENT or CHAN) is highlighted.
6. Use the rotary control to select “FCENT” or “CHAN”.

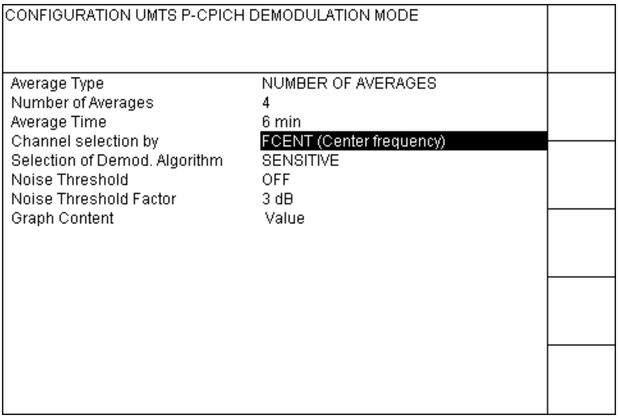


Fig. 9-10 CONFIGURATION UMTS P-CPICH DEMODULATION MODE menu (Channel selection by ...)

7. Press the **ENT** button.
8. Press the **MODE** and **ENT** buttons to return to “UMTS P-CPICH Demodulation” mode.

9.4.1 Selecting the center frequency

✓ The topmost softkey is labeled “Fcent”.

1. Press the **Fcent** softkey.
   The entry box for the center frequency opens.
2. Enter a value using the rotary control or the function keys.
   Once the first digit has been entered, the softkey labels change to indicate the possible units.

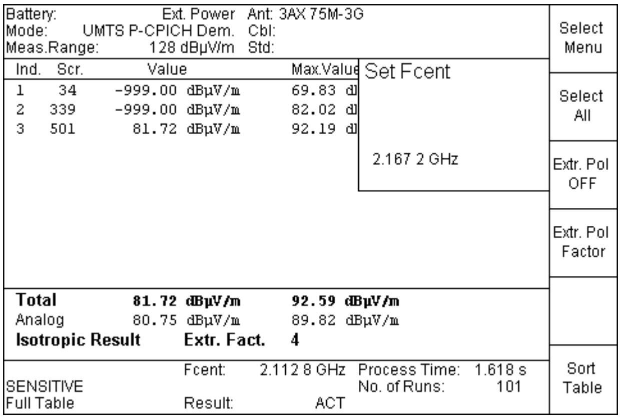


Fig. 9-11 “Set Fcent” entry box

3. Enter the units using the appropriate softkey.
4. Press the **ENT** button.
   The center frequency you defined will be shown in the “Measurement parameters” pane of the measurement menu.

9.4.2 Selecting the channel number

✓ The topmost softkey is labeled “Chann”.

1. Press the **Chann** softkey.
   The entry box for the channel number.
2. Enter a value using the rotary control or the function keys.
   Once the first digit has been entered, the softkey labels change.

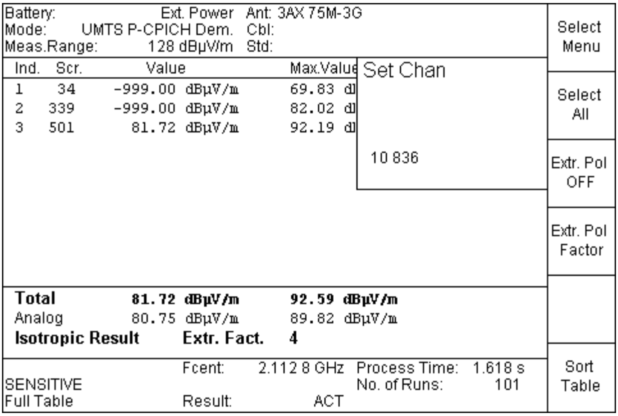


Fig. 9-12 “Set Channel” entry box

3. Press the **ENT** button.
   The channel number you defined will be shown in the “Measurement parameters” pane of the measurement menu.

9.5 Selecting the measurement range

The system sensitivity depends on the input attenuator setting, which is determined by the “Measurement Range” parameter. A high measurement sensitivity avoids any falsification of the results that might occur due to the intrinsic noise of the device. However, the device must not be overloaded. Overloading can also be caused by signals that are outside the frequency range of the services being measured, such as those from a powerful radio transmitter.

For the above reasons, the SRM allows you to

- select the measurement range manually,
- automatically search for the best measurement range,
- apply noise suppression.

Note: The selected measurement range applies to all operating modes, so you do not have to set it again when you change operating modes.

Note: Noise suppression is only applied to the numerical display of the analog measurement value.

9.5.1 Setting the measurement range manually

This method can be used if you know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens showing a list of possible input sensitivities.
2. Use the rotary control to highlight the desired input sensitivity.
3. Press the **ENT** button.
   The selected input sensitivity is set.

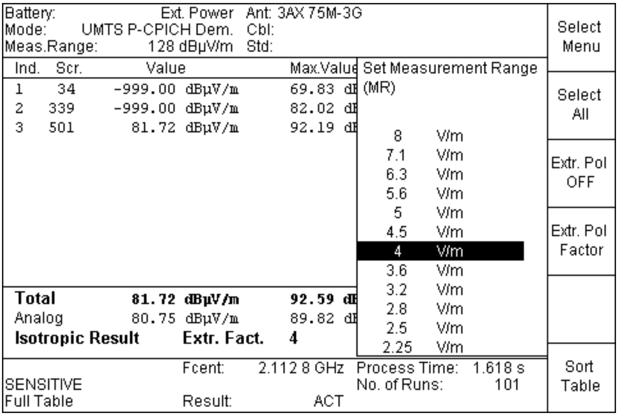


Fig. 9-13 “Set Measurement Range (MR)” selection box

9.5.2 Search for the best measurement range

This method is best if you do not know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens;
   the fourth softkey is labeled **MR Search**.
2. Press the **MR Search** softkey.
   The message “Searching for best measurement range. Please wait.” is displayed. The SRM makes a background measurement over the entire frequency range covered by the antenna you are using. This will take several seconds. When the measurement is finished, the SRM automatically sets the measurement range to the best value and displays the normal measurement menu again.

Note: Press the **ESC** key if you want to stop the automatic setting process.

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

9.5.3 Using noise suppression (Noise Threshold)

The intrinsic noise of the device is present in all frequency ranges, including those that are not occupied with payload signals. When you perform a spectrum analysis and display the results graphically, it is easy to see when a spectral line disappears into the noise floor. You can set a threshold so that you can also make this distinction when the results are presented numerically as in “UMTS P-CPICH Demodulation” mode. If the result is below this threshold level, the device displays the threshold value preceded by the “<” character (i.e. less than the threshold value) instead of the actual measured value. The results from decoding the scrambling codes are not affected by this.

You can set threshold levels of 0, 3, 6, 10, 15 and 20 dB. These values are relative to the level of the intrinsic noise floor.

Selecting the threshold value for noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Noise Threshold Factor”.
5. Press the **ENT** key.
6. Use the rotary control to select a value between 0 and 20 dB.

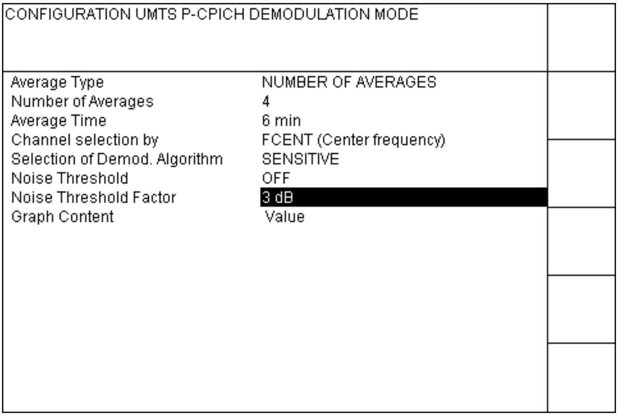


Fig. 9-14 CONFIGURATION UMTS P-CPICH DEMODULATION MODE menu, setting the noise suppression threshold (Noise Threshold Factor)

7. Press the **ENT** key.
   The threshold value is set.
8. Press the **ESC** twice to return to the measurement menu.

Activating and deactivating noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Noise Threshold”.
5. Press the **ENT** key.
6. Use the rotary control to select “ON” or “OFF”.
   Automatic noise suppression is activated or deactivated.
7. Press the **ESC** key twice to return to the measurement menu.
   When noise suppression is activated, the measurement menu displays the set threshold value preceded by the “<” character for all numerical measurement values that are below the threshold value.

9.6 Selecting the result type

The result type defines how the values recorded are displayed.

ACT	The actual (latest) measured values are displayed.
AVERAGE	A specified number of measured values are averaged. The resulting values are displayed. The number of values averaged is set in the CONFIGURATION menu.

➭ Selecting the averaging parameters: see page 9-28

Selecting the result type

1. Press the **Result type** softkey.
   The “Select Result Type” selection box opens showing a list of possible result types.
2. Use the rotary control to highlight the desired result type.
3. Press the **ENT** button.
   The selected result type is shown in the “Measurement parameters” pane of the measurement menu.

9.7 Selecting the averaging parameters

The SRM provides two ways of averaging the results:

- Averaging over a specified number of individual results (Number of Averages)
- Averaging over a specified time (Average Time)

You can set both parameters in the CONFIGURATION menu.
They will be effective only when you select “AVERAGE” or “MAX AVERAGE” evaluation mode.

Selecting averaging over a specified number of results (Number of Averages)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Number of Averages”.

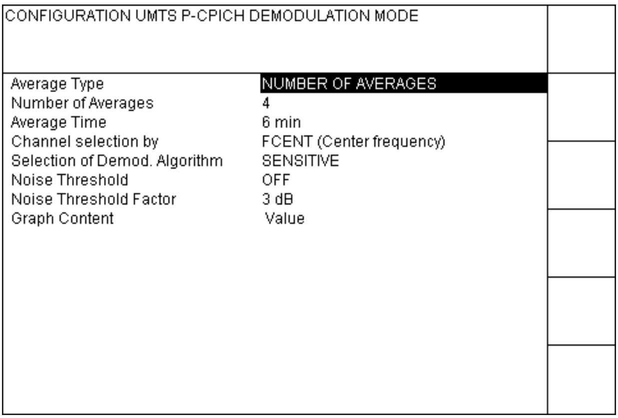


Fig. 9-15 CONFIGURATION UMTS P-CPICH DEMODULATION MODE menu

7. Press the **ENT** key.
8. Use the rotary control to highlight “Number of Averages”.

9. Press the **ENT** key.
10. Use the rotary control to set the number of averages (between 4 and 64).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

Selecting averaging over a specified time (Average Time)

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Average Type”.
5. Press the **ENT** key.
6. Use the rotary control to set the command to “Average Time”.
7. Press the **ENT** key.
8. Use the rotary control to highlight “Average Time”.
9. Press the **ENT** key.
10. Use the rotary control to set the averaging time (between 1 and 30 min).
11. Press the **ENT** key.
12. Press the **ESC** key twice to return to the measurement menu.
    The selected averaging parameter is shown in the “Measurement parameter” pane of the measurement menu.

9.8 Selecting the UMTS demodulation algorithm (FAST/SENSITIVE)

In FAST mode, the SRM-3000 is optimized for fast measurements (fast Process Time). The instrument detects all the UMTS channels that have a level which is not less than 10 dB below the highest measured channel level.

In SENSITIVE mode, the SRM-3000 also detects UMTS channels that have a level which is up to 15 dB below the highest measured channel level. This will, of course, slow down the measurement (extend the Process Time).

Choosing between FAST and SENSITIVE

1. Press the **CONF** button.
   The CONFIGURATION menu opens.

➩ Configurations for “UMTS P-CPICH Demodulation” mode: see page 14-4

2. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
3. Press the **ENT** button.
4. Use the rotary control to highlight “Selection of Demod Algorithm”.
5. Press the **ENT** button.
   The current setting (FAST or SENSITIVE) is highlighted.
6. Use the rotary control to select the setting you want.

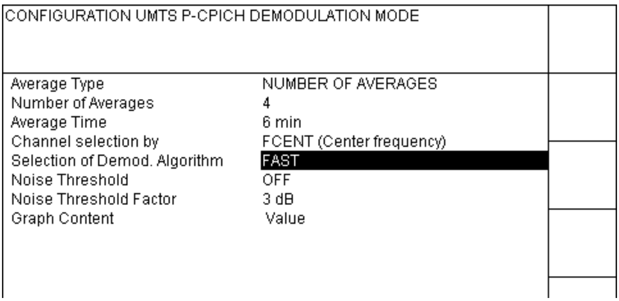


Fig. 9-16 CONFIGURATION UMTS P-CPICH DEMODULATION MODE menu (Selection of Demodulation Algorithm)

7. Press the **ENT** button.
8. Press the **MODE** and **ENT** buttons to return to “UMTS P-CPICH Demodulation” mode.

9.9 Setting the extrapolation factor (Extr. Fact.)

The extrapolation factor is applied to all the results of UMTS P-CPICH Demodulation, but not to the result of the analog field strength measurement for the entire UMTS frequency channel.
You can set the value of the extrapolation factor anywhere between 1 and 100 with a resolution of 0.001.
Extr. Fact. 1 means that the results are unchanged.

Note: The extrapolation factor always refers to the power level, even if you have selected field strength units (Selecting the result units: see page 9-6).

✓ “UMTS P-CPICH Demodulation” mode is set.

1. Press the **More** softkey.
   The softkey labels change.
2. Press the **Extr. Pol Factor** softkey.
   The “Set Extrapolation Factor” entry box opens.
3. Use the rotary control or the function keys to enter a value.
   The softkey labels change as soon as you have entered the first digit.

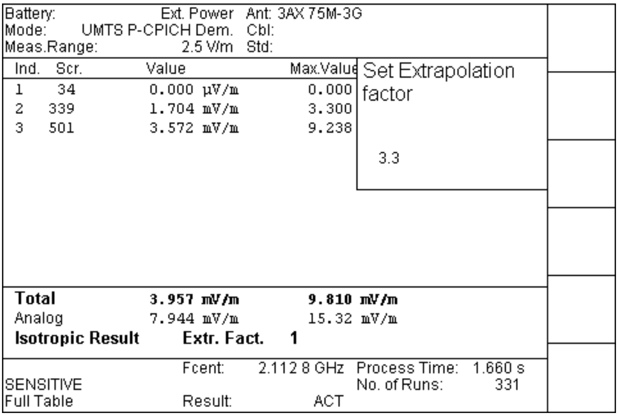


Fig. 9-17 CONFIGURATION UMTS P-CPICH DEMODULATION MODE menu (Set Extrapolation Factor)

4. Press the **ENT** key.
   The extrapolation factor setting is made. however, it is not effective until you activate the extrapolation function.

Activating and deactivating the extrapolation function

⇒ Press the **Extr. Pol ON** softkey.
The extrapolation factor you set will now be applied to the results. The value of the extrapolation factor is shown in the measurement menu.
The softkey label changes to **Extr. Pol OFF**.

⇒ Press the **Extr. Pol OFF** softkey.
The extrapolation factor you set will no longer be applied to the results.
The value 1 is shown in the measurement menu.
The softkey label changes to **Extr. Pol ON**.

9.10 Evaluating and interpreting measurement results

After you start the measurement, the SRM-3000 scans the UMTS frequency channel you set for scrambling codes and measures the corresponding field strengths. It also makes an analog measurement of the total power level of the UMTS frequency channel at the same time.

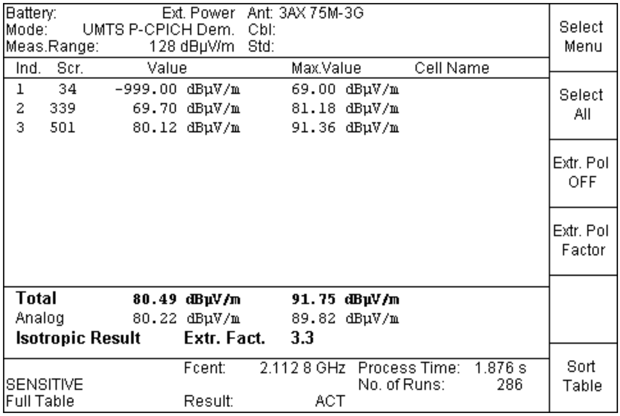


Fig. 9-18 Results of an UMTS measurement

9.10.1 Individual results

In the default display setting (“Table Normal”), the “Scr.” column successively lists in ascending order the numbers of the scrambling codes that have been detected (numbers between 0 and 511). They are also numbered consecutively in the “Ind.” column. The list can contain up to 16 scrambling codes.

The cell names are shown in plain text in the “Cell Name” column if you have recorded a corresponding table (see sec. 14.7, page 14-9).

The instantaneous measurement result multiplied by the extrapolation factor (Extr. Fact.) is shown for each scrambling code in the “Value” column.

The maximum values occurring since the start of the measurement multiplied by the extrapolation factor (Extr. Fact.) are shown in the “Max. Value” column. You can clear these values by pressing the **Max Reset** softkey.

You can clear the entire table by pressing the **Table Reset** softkey. You can use this function to clear unwanted scrambling codes from the list (i.e. ones that are not to be received any more), making room for new scrambling codes.

Note: A Table Reset occurs each time you change a parameter.

9.10.2 Overall result (Total)

This value corresponds to the total power of all the scrambling codes listed in the table, multiplied by the extrapolation factor (Extr. Fact.). The overall result is determined for the instantaneous values and for the maximum values of the individual results.

9.10.3 Partial results for specific radio cells (Scrambling Codes)

You will often only want to determine the contribution that certain radio cells in an UMTS frequency channel make to the overall field strength. You can use the **Select Menu** softkey function to select the radio cells you are interested in by means of their scrambling codes.

↳ Selecting table entries: see page 9-8

The selection you make will apply in all display modes and for all evaluations. This means that the numerical value of the overall result (Total) as well as the graphical display of results versus time will only take the selected scrambling codes into account.

If you only select one scrambling code, you can display the variation in the field strength of this radio cell versus time.

9.10.4 Analog measurement result (Analog)

This value is the direct result of an analog measurement of the selected UMTS frequency channel made using a fixed resolution bandwidth (RBW) of 5 MHz. The extrapolation factor is not applied to this result.

10 “Time Analysis” mode

10.1 Operating mode function

“Time Analysis” mode enables you to make selective measurements at a defined frequency (Fcent), e.g. to monitor the field strength of a GSM or UMTS channel. The resolution bandwidth (RBW) can be selected to match the channel bandwidth, and averaging over a user defined time period, e.g. 6 minutes, is also possible. Maximum hold functions simplify the on-site evaluation of results.

The results are displayed numerically and/or graphically.

One advantage of “Time Analysis” mode is that the results are recorded **continuously over time** if you use a single axis antenna or measure just one axis of a three axis antenna.

You cannot make isotropic measurements using a single axis antenna in “Time Analysis” mode, since a successive measurement of three separate axes naturally means that the results cannot all be recorded at the same (or the correct) point in time.

10.2 Selecting the operating mode

✓ The option is activated (see sec. 16.6).

1. Press the **MODE** button.
   The OPERATING MODES menu opens.

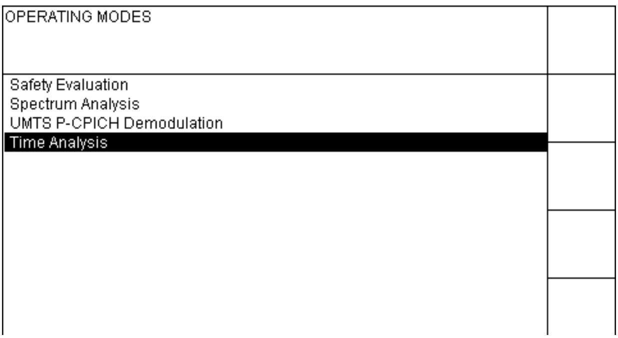


Fig. 10-1 OPERATING MODES menu

2. Use the rotary control to highlight “Time Analysis”.
3. Press the **ENT** button.
   The measurement menu for “Time Analysis” mode opens.
   The softkey functions change.

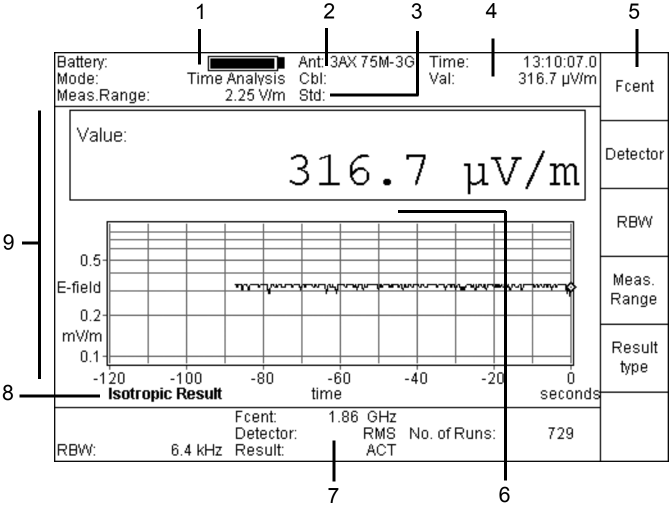


Fig. 10-2 “Time Analysis” mode measurement menu

No.	Name	Description
1	Operating states	
	Battery	Battery charge state
	Mode	Operating mode
	Meas. Range	Input attenuator setting (input sensitivity)
2	Antenna parameters	
	Type	Selected / connected antenna
	Cbl	Selected / connected measurement cable

Table 10-1 Key to “Time Analysis” mode measurement menu

No.	Name	Description
3	Evaluation	
	Std	Standard or regulation selected if result display is set to a percentage of a limit value
4	Numerical result	
	Time	Displays the time of day in hh:mm:ss during the measurement. Displays the timestamp (resolution 0.1 second) corresponding to the measured value when the results are read out.
	Value	Measured value.
5	Softkey functions	
6	OVERDRIVE - displayed if the instrument is overdriven	
7	Measurement parameter display	
	RBW	Resolution bandwidth
	Fcent	Center frequency
	Detector	Detector type: RMS or PEAK value
	No. of Runs	Number of measurements
	Result	Result type
	AVG	Averaging time. Only displayed if “Result Type” = “AVERAGE” or “MAX AVERAGE”. The detector must be set to “RMS”. A bar graph shows the progress of measurements until the set averaging time has elapsed.
8	Isotropic result	Measurement type display: Measurement of X, Y, or Z axis, or isotropic measurement
9	Result display	

Table 10-1 Key to “Time Analysis” mode measurement menu

10.3 Selecting display options

⇒ Press the **DISPL** button.
The second to last softkey has three possible functions:

Value	Switches the display to show the measured values numerically.
Graph	Switches the display to show the measured values as a graph.
Mixed	Switches the display to show the measured values numerically and as a graph.

10.3.1 Value display

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Value** softkey.
   The result is shown as a numerical value in the display.

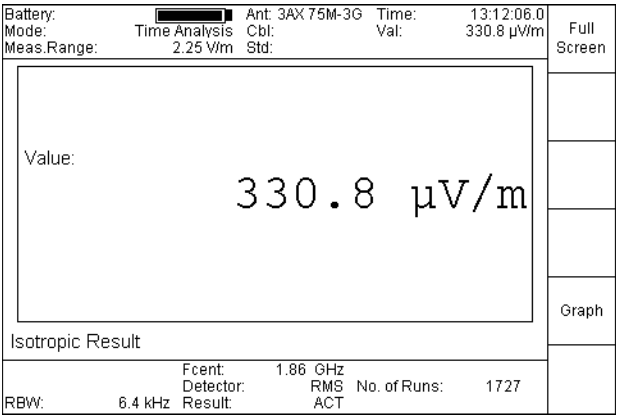


Fig. 10-3 Value display

2. Press the **ESC** button to revert to the default setting.

Selecting the result units

1. Press the **UNIT** key.
   The “Select Display Unit” selection box opens.

2. Use the rotary control to select the desired units.
3. Press the **ENT** key.
   The results are shown in the desired units in the “Time Analysis” mode measurement menu.

Selecting “Full Screen” display mode

1. Press the **DISPL** key.
   The softkey labels change.

⇒ Press the **Full Screen** softkey.
   The entire display area is used to display the results.

Press the **ESC** key to return to the default display mode.

10.3.2 Graph display

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Value** softkey.
   The result history is shown as a graph in the display:
   The current measured value is shown on the right as the zero position on the x axis. The previous values are shown as a graph to the left of this position.
   The times shown along the x axis are therefore negative values.

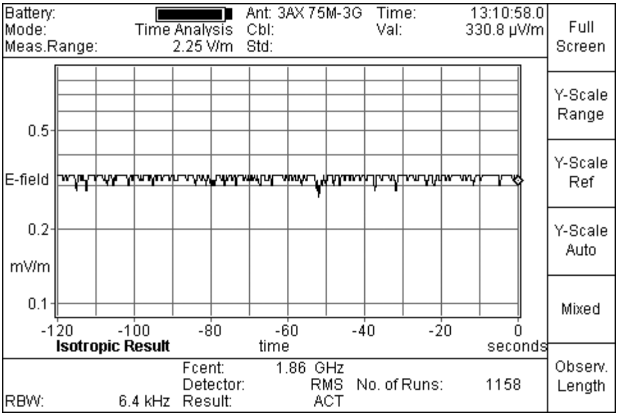


Fig. 10-4 Graph display

2. Press the **ESC** button to revert to the default setting.

Selecting the result units

1. Press the **UNIT** key.
   The “Select Display Unit” selection box opens.
2. Use the rotary control to select the desired units.
3. Press the **ENT** key.
   The results are shown in the desired units in the “Time Analysis” mode measurement menu.

Selecting the X axis scaling (Observation Length)

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Observ Length** softkey.
   The “Select Observation Length” selection box opens showing a list of available values.

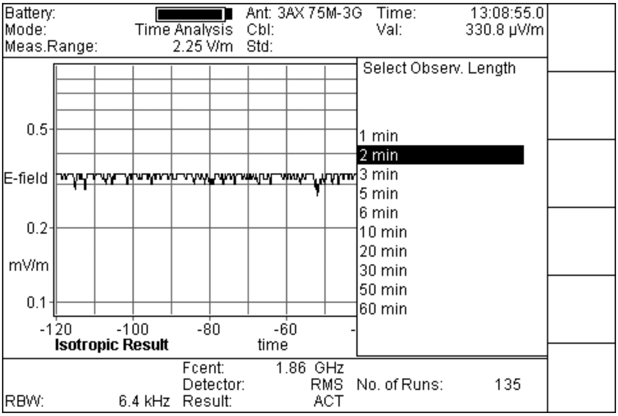


Fig. 10-5 “Select Observation Length” selection box

2. Use the rotary control to highlight the desired value.
3. Press the **ENT** button.
   The scaling of the x axis and the measured values recorded so far is adjusted.

Note: The X-axis scale is independent of the averaging time setting (Selecting the Averaging Time: see page 10-18).

Selecting the Y axis scale range

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Range** softkey.
   The “Select Y-Scale Range” selection box opens.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** button.
   The Y-axis scale range is adjusted.

Selecting the Y axis reference point

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Y-Scale Ref** softkey.
   The "Select Y-Scale Reference" selection box is displayed.
2. Use the rotary control to highlight the desired value.
3. Press the **ENT** button.
   The Y axis reference point is set to the selected value.

Selecting the reference value automatically

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

⇒ Press the **Y-Scale Auto** softkey.
The Y-axis reference value is the same as the measurement range.
The Y-axis reference adjusts automatically when you change the measurement range.

Selecting "Full Screen" display mode

1. Press the **DISPL** key.
   The softkey labels change.

⇒ Press the **Full Screen** softkey.
The entire display area is used to display the results.

Press the **ESC** key to return to the default display mode.

10.3.3 Mixed display

✓ The **DISPL** button has been pressed.
✓ The corresponding softkeys are displayed.

1. Press the **Mixed** softkey.
   The current measurement result is shown in the upper part of the display. The result history is shown as a graph in the lower part of the display
   (Graph display: see page 10-6).

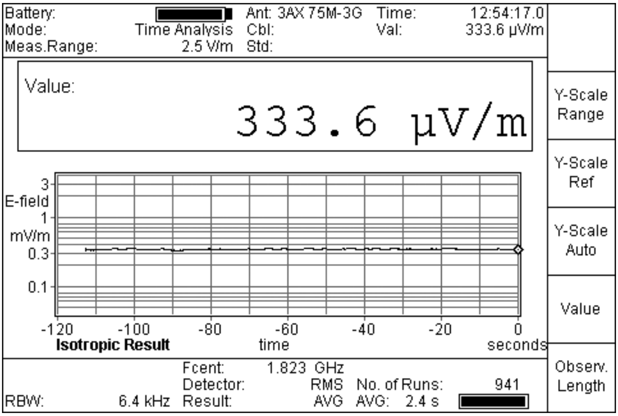


Fig. 10-6 Value display

↳ Selecting the X axis scaling (Observation Length): see page 10-6

↳ Selecting the Y axis scale range: see page 10-7

↳ Selecting the result units: see page 10-4

2. Press the **ESC** button to revert to the default setting.

10.4 Selecting the Center Frequency (Fcent)

1. Press the **Fcent** softkey.
   The entry box for the center frequency opens.
2. Enter a value using the rotary control or the function keys.
   Once the first digit has been entered, the softkey labels change to indicate the possible units.

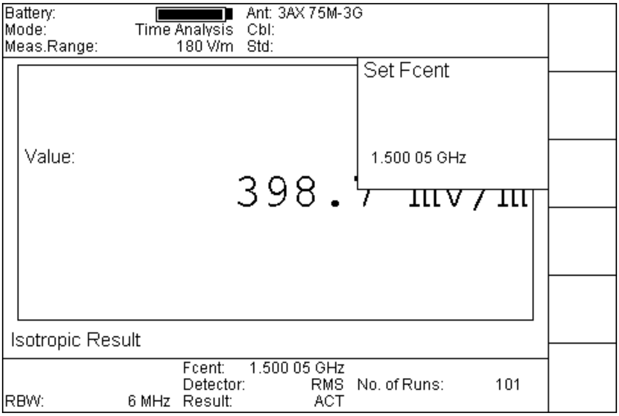


Fig. 10-7 “Set Fcent” entry box

3. Enter the units using the appropriate softkey.
4. Press the **ENT** button.
   The center frequency you defined will be shown in the “Measurement parameters” pane of the measurement menu.

10.5 Selecting the Detector Type (RMS value, peak value)

You can select either an RMS value detector or a PEAK value detector.

1. Press the **Detector** softkey.
   The detector type entry box opens.
2. Use the rotary control to highlight the required detector type.
3. Press the **ENT** button.
   The selected detector type will be shown in the “Measurement parameters” pane of the measurement menu.

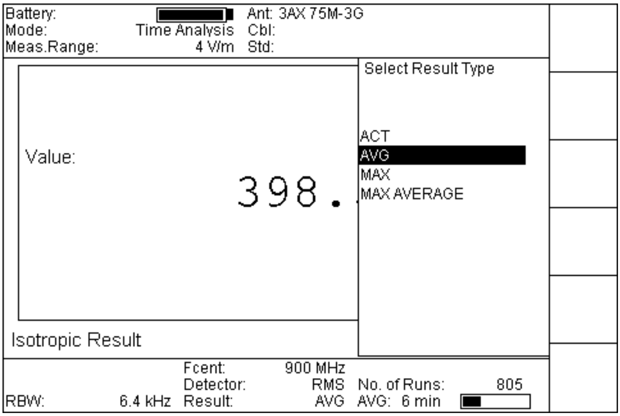


Fig. 10-8 “Select Result Type” entry box

Note: Because peak value detection only makes sense when you are displaying instantaneous or maximum values, the device automatically switches the result type to “ACT” if “AVG” or “MAX AVG” is set when you select “PEAK” detector type.

➯ Selecting the Result Type: see page 10-17.

Note: The peak value detector has a hold time of 480 ms. This means that the result displayed is the highest value that occurred during the last 480 ms. As a result, the numerical display is not jittery and the graph display is smoother.

10.6 Selecting the Resolution Bandwidth (RBW)

1. Press the **RBW** softkey.
   The resolution bandwidth entry box opens.
2. Use the rotary control to highlight the desired resolution bandwidth.

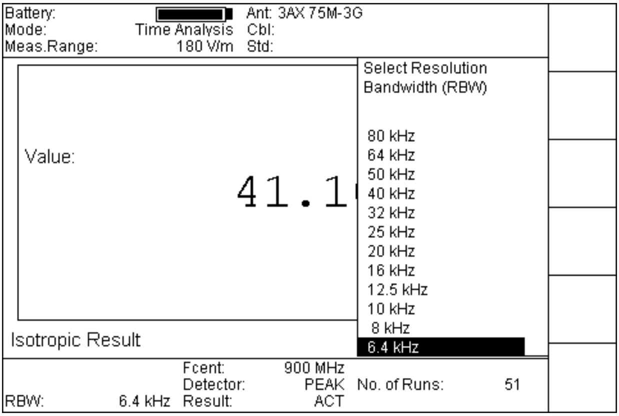


Fig. 10-9 “Select Resolution Bandwidth (RBW)” entry box

3. Press the **ENT** button.
   The selected resolution bandwidth will be shown in the “Measurement parameters” pane of the measurement menu.

10.7 Setting the measurement range

The system sensitivity depends on the input attenuator setting, which is determined by the “Measurement Range” parameter. A high measurement sensitivity avoids any falsification of the results that might occur due to the intrinsic noise of the device. However, the device must not be overloaded. Overloading can also be caused by signals that are outside the frequency range of the services being measured, such as those from a powerful radio transmitter which might be superimposed on the mobile telephone signals that you actually want to measure.

For the above reasons, the SRM allows you to

- select the measurement range manually,
- automatically search for the best measurement range,
- apply noise suppression.

Note: The measurement range you select will apply to all operating modes, so you do not have to set it each time you change from one operating mode to another.

Note: Noise suppression is only effective for the numerical display of results (Value).

10.7.1 Setting the measurement range manually

This method can be used if you know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens showing a list of possible input sensitivities.
2. Use the rotary control to highlight the desired input sensitivity.
3. Press the **ENT** button.
   The selected input sensitivity is set.

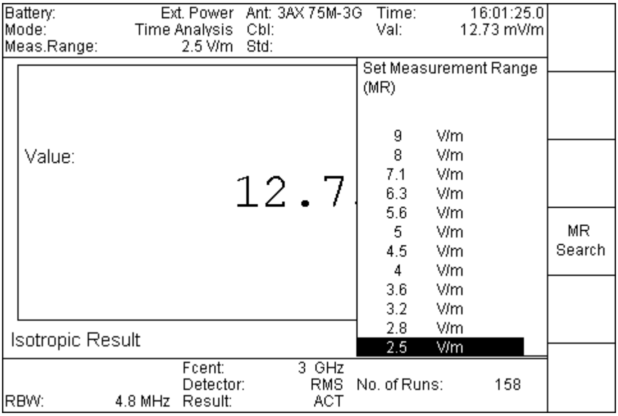


Fig. 10-10 “Set Measurement Range (MR)” selection box

10.7.2 Search for the best measurement range

This method is best if you do not know the field situation.

1. Press the **Meas Range** softkey.
   The “Set Measurement Range (MR)” selection box opens;
   the fourth softkey is labeled **MR Search**.
2. Press the **MR Search** softkey.
   The message “Searching for best measurement range. Please wait.” is displayed. The SRM makes a background measurement over the entire frequency range covered by the antenna you are using. This will take several seconds. When the measurement is finished, the SRM automatically sets the measurement range to the best value and displays the normal measurement menu again.

Note: Press the **ESC** key if you want to stop the automatic setting process.

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

10.7.3 Using noise suppression (Noise Threshold)

The intrinsic noise of the device is present in all frequency ranges, including those that are not occupied with payload signals. When you perform a spectrum analysis and display the results graphically, it is easy to see when a spectral line disappears into the noise floor. You can set a threshold so that you can also make this distinction when the results are presented numerically as in Mode “Safety Evaluation”. If the result is below this threshold level, the device displays the threshold value preceded by the “<” character (i.e. less than the threshold value) instead of the actual measured value.

You can set threshold levels of 0, 3, 6, 10, 15 and 20 dB. These values are relative to the level of the intrinsic noise floor.

Selecting the threshold value for noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Noise Threshold Factor”.
5. Press the **ENT** key.
6. Use the rotary control to select a value between 0 and 20 dB.

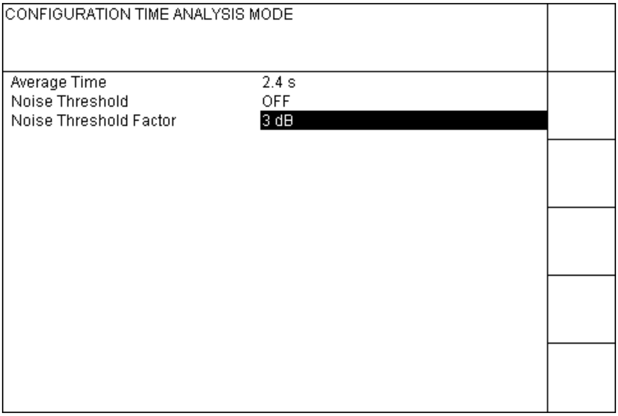


Fig. 10-11 CONFIGURATION TIME ANALYSIS MODE menu; setting the threshold value for noise suppression (Noise Threshold Factor)

7. Press the **ENT** key.
   The threshold value is set.
8. Press the **ESC** key twice to return to the measurement menu.

Activating and deactivating noise suppression

1. Press the **CONF** key.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
3. Press the **ENT** key.
   The current settings will be displayed.
4. To change the setting, use the rotary control to highlight “Noise Threshold”.
5. Press the **ENT** key.
6. Use the rotary control to select “ON” or “OFF”.
   Automatic noise suppression is activated or deactivated.
7. Press the **ESC** key twice to return to the measurement menu.
   When noise suppression is activated, the measurement menu displays the set threshold value preceded by the “<” character for all numerical measurement values that are below the threshold value.

10.8 Selecting the Result Type

The result type defines how the values recorded are displayed.

ACT	The current (actual) measured value is displayed.
AVG	For “Detector” = “RMS” only: The measured values are averaged over a defined time period. The resulting value is displayed. A bar graph shows the progress of the measurement until the averaging time has elapsed. As soon as the averaging time has elapsed (bar graph full), the instrument refreshes the result value using the latest measurement results and discards the oldest results. This gives a “sliding” average which reflects the status at the time. The averaging time is defined in the CONF menu. ↳ Selecting the Averaging Time: see page 10-18
MAX	The maximum value that occurred since the start of the measurement is displayed.
MAX AVERAGE	For “Detector” = “RMS” only: The maximum value of the average values that occurred since the start of the measurement is displayed.

Selecting the result type

1. Press the **Result type** softkey.
   A selection box opens showing a list of possible result types.

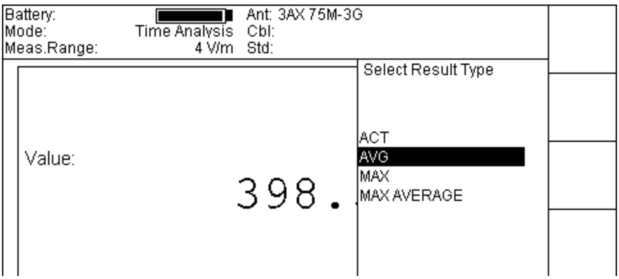


Fig. 10-12 CONFIGURATION TIME ANALYSIS MODE menu (Select Result Type)

2. Use the rotary control to highlight the desired result type.
3. Press the **ENT** button.
   The selected result type is shown in the “Measurement parameters” section of the measurement menu.

10.9 Selecting the Averaging Time

The averaging parameter is defined in the CONFIGURATION menu. It specifies the time period over which the measured values are averaged for the result types “AVERAGE” and “MAX AVERAGE”.

1. Press the **CONF** button.
   The CONFIGURATION menu opens.
2. Use the rotary control to highlight “Configure Time Analysis Mode”.
3. Press the **ENT** button.
4. Use the rotary control to highlight “Averaging Time”.
5. Press the **ENT** button.
   The current setting (0.96 s ... 30 min.) is highlighted.

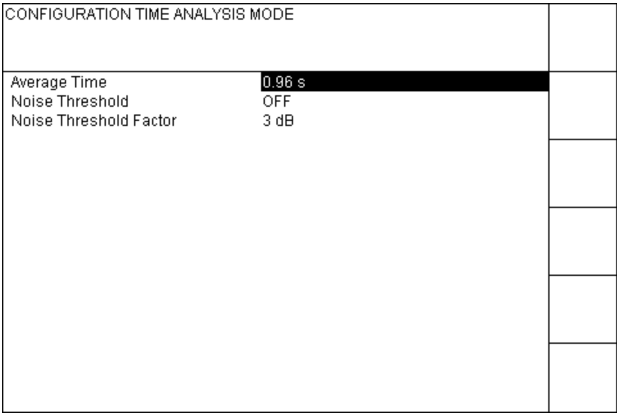


Fig. 10-13 CONFIGURATION TIME ANALYSIS MODE menu (Averaging Time)

6. Use the rotary control to highlight the desired averaging time.
7. Press the **ENT** button.
8. Press the **MODE** and **ENT** buttons to return to “Time Analysis” mode.
   The selected averaging time will be shown in the “Measurement parameters” pane of the measurement menu.

10.10 Evaluating the results

The SRM just stores the last value measured when it is in numeric display mode. When in graph display mode or mixed graph and numeric display mode, it stores the numerical results continuously along with a corresponding timestamp with a time resolution of 0.1 seconds.

Marker function

✓ Graph display mode or Mixed display mode

The default marker is always displayed and is located on the current measurement value at the right hand edge of the window during the measurement.

⇒ Press the **HOLD** key.
You can now use the rotary control to move the marker across the result graph. The Time and corresponding measurement result (Value) are displayed numerically in the results pane at the top right of the window.

Duty cycle function

✓ Graph display mode or Mixed display mode
✓ Detector = RMS
✓ Result Type = ACT or AVG

You can use the duty cycle function to automatically display the ratio of the average power level to the maximum power level (Pavg/Pmax), calculated over the displayed time period.

↳ Selecting the X axis scaling (Observation Length): see page 10-6.

You can use this evaluation to determine the duty cycle of transmitters. The function works in **HOLD** mode as well as during a measurement in progress.

1. Press the **EVAL** key.
   The EVALUATION FUNCTION menu containing the “Duty Cycle” command opens.
2. Press the **ENT** key.
   The duty cycle result is shown in the result pane at the top right of the window. The marker function is disabled.
3. Press the **ESC** key to deactivate the duty cycle function.

Notes:

11 Isotropic measurements

Measurement with a three axis antenna

Three axis antennas make simple, rapid isotropic measurements possible by automatically detecting the three spatial components of the field to be measured. Narda Safety Test Solutions offers a three axis antenna for measuring electric field strength which covers the frequency range from 75 MHz to 3 GHz. You can, of course, measure each axis separately using a three axis antenna.

Measurement with a single axis antenna

Isotropic measurement using a single axis antenna is much more time consuming than a measurement made with a three axis antenna because the three axes have to me measured separately one after the other.

The SRM provides support for sequential measurements made using a single axis antenna and for calculation of the isotropic result.

The following sections explain how such measurements can be made.

You can use any suitable antenna and appropriate cable regardless of the items supplied with the instrument.

11.1 Measurements with a three axis antenna

11.1.1 Isotropic measurement with a three axis antenna

✓ A Narda three axis antenna is connected to the SRM-3000 either directly or via a cable.

Isotropic measurement mode is selected automatically by default.
All three axes are measured one after the other and the isotropic result is then calculated and displayed by the SRM-3000.
The label “Isotropic result” is displayed next to the result.

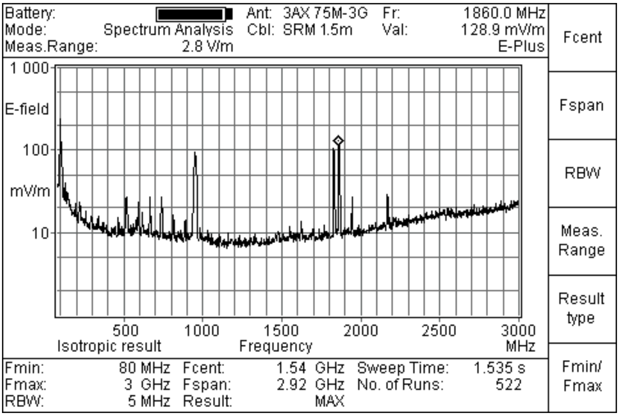


Fig. 11-1 “Spectrum Analysis” mode (Isotropic result)

To select this isotropic measurement mode again, e.g. after making a measurement on one axis (see sec. 11.1.2), use the MEASUREMENT MODE menu.

1. Press the **AXIS** button.
   The MEASUREMENT MODE menu opens.

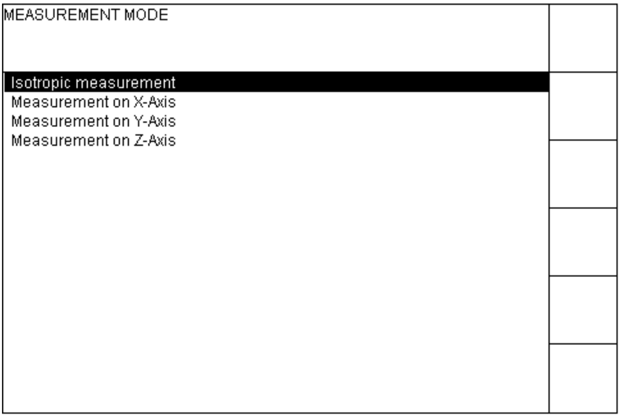


Fig. 11-2 MEASUREMENT MODE menu (Isotropic measurement)

2. Use the rotary control to select “Isotropic measurement”.
3. Press the **ENT** button.

↳ You will use the SRM-3000 most often for this application. It is described in detail in the sections describing the different operating modes.

11.1.2 Measuring a single axis with a three axis antenna

✓ A Narda three axis antenna is connected to the SRM-3000 either directly or via a cable.

As stated in sec. 11.1.1, page 11-2, isotropic measurement mode is selected automatically when a three axis antenna is used. When an application requires additional information about the individual spatial components of the field, the axes can be measured individually using the MEASUREMENT MODE menu.

This measurement is useful when the orientation of the sensors in the field is known. A tripod with a special antenna mount must be used for Narda antennas (see sec. 5, page 5-1). The positions of the three measurement axes are marked on this special device.

1. Press the **AXIS** button.
   The MEASUREMENT MODE menu opens.

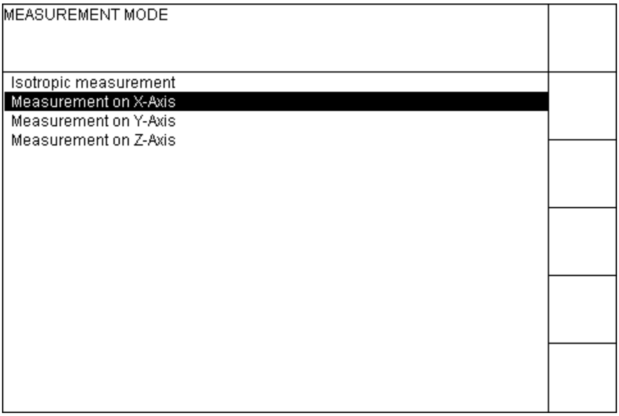


Fig. 11-3 MEASUREMENT MODE menu (Measurement on X-Axis)

2. Use the rotary control to select “Measurement on X-Axis” (or Y, or Z).
3. Press the **ENT** button.
   The selected axis will be measured and the result displayed. The selected axis will be indicated next to the result.

⇘ You will find more information about the settings and result display in the sections describing the different operating modes.

11.2 Measurement using a single axis antenna

11.2.1 Standard measurement using a single axis antenna

✓ A single axis antenna (e.g. customary antenna) is connected to the SRM-3000 either directly or via a cable.

A single spatial component is detected and displayed by default when a single axis antenna is used. Various methods can be applied in this configuration to determine the field strength exposure (see Appendix A).

To select the standard measurement mode again, e.g. after a sequential isotropic measurement (see sec. 11.2.2), use the MEASUREMENT MODE menu.

1. Press the **AXIS** button.
   The MEASUREMENT MODE menu opens.

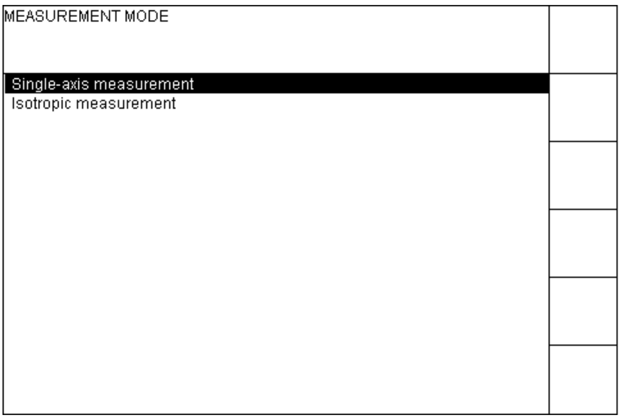


Fig. 11-4 MEASUREMENT MODE menu (Single-axis measurement)

2. Use the rotary control to select “Single-axis measurement”.
3. Press the **ENT** button.
4. Position the antenna along the desired axis.
   The axis is measured and the result displayed.

➷ You will find more information about the settings and result display in the sections describing the different operating modes.

11.2.2 Isotropic measurement with a single axis antenna

The SRM-3000 provides a sequential measurement for making isotropic measurements with a single axis antenna. The three separate measurements are made one after the other. The overall result is then calculated and displayed.

Note: Antennas with directional characteristics, such as log-periodic antennas, are generally not suitable for such sequential measurements.

✓ A single axis antenna (e.g. customary antenna) is connected to the SRM-3000 either directly or via a cable.

As mentioned in sec. 11.2.1, page 11-5, a single axis is measured by default when a single axis antenna is used. The MEASUREMENT MODE menu must be used to enable isotropic measurements.

1. Press the **AXIS** button.
   The MEASUREMENT MODE menu opens.

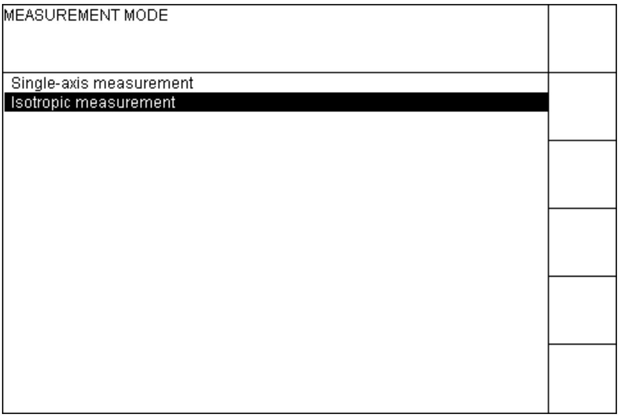


Fig. 11-5 MEASUREMENT MODE menu (Isotropic measurement)

2. Use the rotary control to select “Isotropic measurement”.
3. Press the **ENT** button.
   The following is displayed:

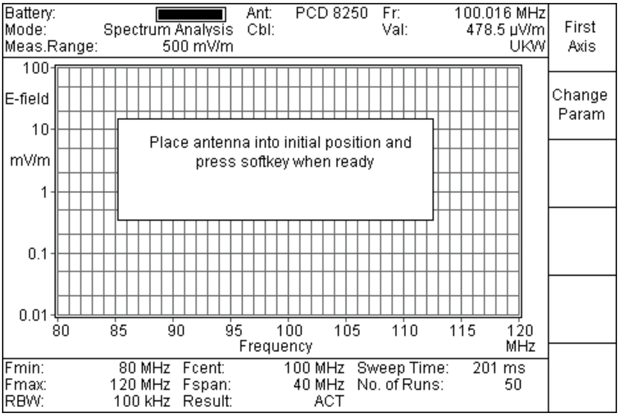


Fig. 11-6 “Spectrum Analysis” mode; isotropic measurement with a single axis antenna

4. Press the **Change Param** softkey if the measurement parameters need to be changed.
   Further softkey functions are shown which can be used to change the measurement parameters (see the sections describing the different operating modes).
5. To return to the sequential measurement, press the **Axis** button.
6. Position the antenna along the desired axis.
7. Press the **First (Next) Axis** softkey.
   The axis is measured and the result displayed.

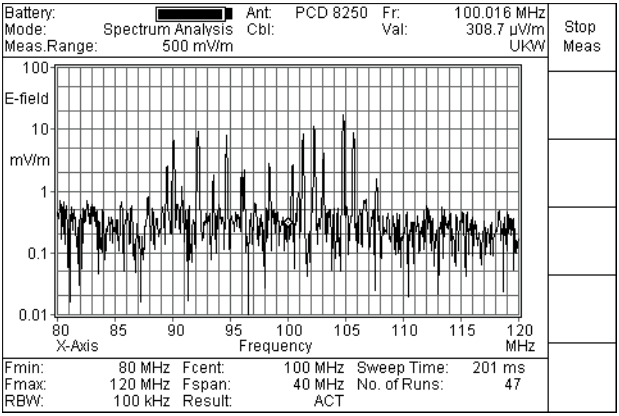


Fig. 11-7 “Spectrum Analysis” mode; separate sequential measurement

8. Press the **Stop meas** softkey.
   The result for the measurement of the first axis is saved.
9. Repeat steps 6 through 8 for the two other axes.
   The isotropic result is calculated and displayed from the results saved for the three perpendicular axes as soon as the third measurement is completed.

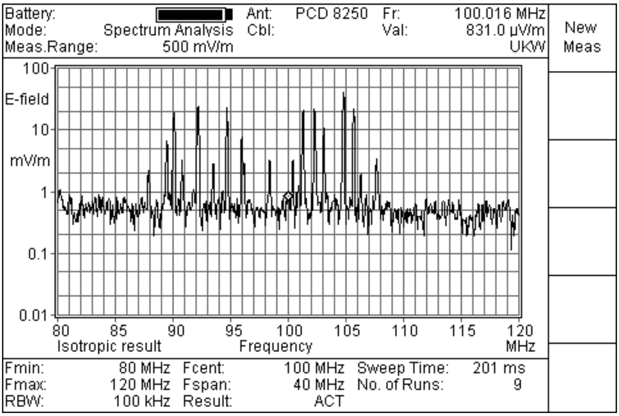


Fig. 11-8 “Spectrum Analysis” mode; display of result

Note: Further sequential measurements can be started using the **New Meas** softkey.
Exit from isotropic measurement mode is only by means of the MEASUREMENT MODE menu.

Notes:

12 Spatial Averaging (option)

The “Spatial Averaging” function of the SRM allows you to average the measured values recorded at different points within a room. The SRM determines the root mean square (RMS) value of the power level.

➯ For details of the “Spatial Averaging” function: see page B-9

Spatial averaging can be used in “Safety Evaluation” mode, “Spectrum Analysis” mode and “Time Analysis” mode but not in “UMTS P-CPICH Demodulation” mode.

There are two types of spatial averaging:

- Continuous averaging
- Discrete averaging (also possible with single-axis antennas).

Continuous Averaging

The SRM uses a start / stop function to record and average the values continuously. This allows you to traverse a specific path within a room. You can continue recording measurement values at a different point in the room by using the “Continue” button. The SRM takes the average of all the recorded measurement values. You can save intermediate results and the final result using the **SAVE** button at any time.

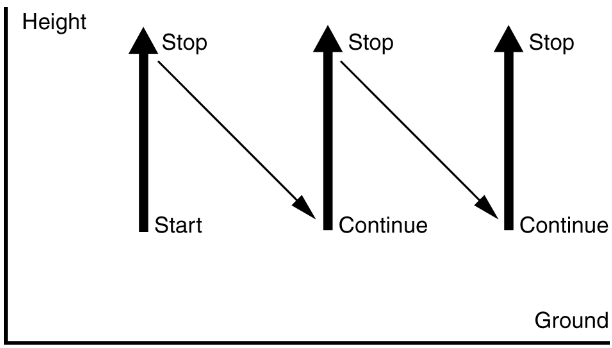


Fig. 12-1 Example of continuous measurement recording at three positions in a room

Discrete Averaging

Discrete Averaging with a three axis antenna

The SRM records and averages single measurement results each time a button is pressed. This allows you to record results for specific positions in the room. The antenna must not be moved while the individual measurement is being made. You can save intermediate results and the final result using the **SAVE** button at any time.

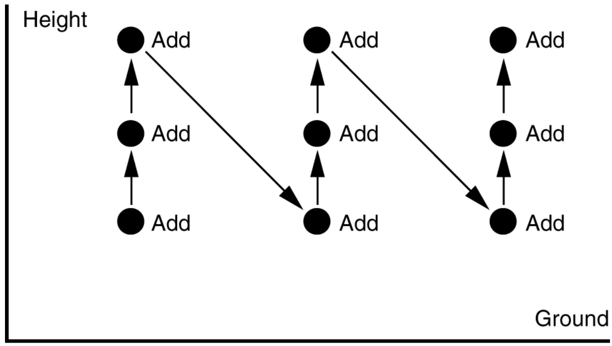


Fig. 12-2 Example of discrete measurement recording of three separate values at each of three positions in a room

Discrete Averaging with a single axis antenna

You can also perform discrete averaging using a single axis antenna. Three measurements must be made at each point to be measured in the room (Isotropic measurement with a single axis antenna: see page 11-6). The SRM calculates the isotropic result for each point and averages the isotropic results for all the points measured. You can save intermediate results and the final result using the **SAVE** button at any time.

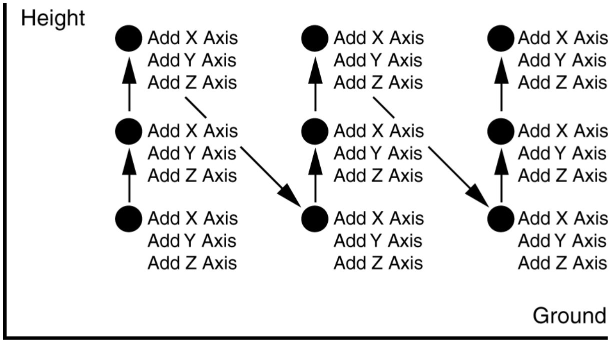


Fig. 12-3 Three separate measurements are needed at each point if a single axis antenna is used

12.1 Spatial Averaging in “Safety Evaluation” mode

✓ The Option has been enabled (see sec. 16.6, page 16-16).
✓ The SRM-3000 is in “Safety Evaluation” mode (see sec. 7, page 7-1) and all settings, such as the measurement range, selection of services to be measured, etc., have been made.

1. Press the **Result Type** softkey.
   The “Select Result Type” selection box opens.
   The **Spatial AVG**. softkey also appears.

Note: The SRM uses the instantaneous (ACT) value for spatial averaging regardless of the Result Type setting.

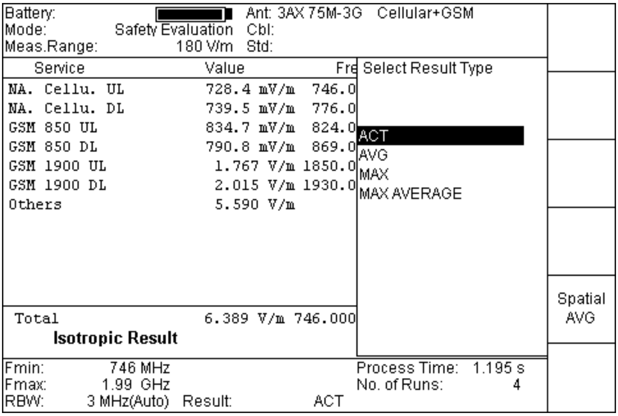


Fig. 12-4 The “Select Result Type” selection box and “Spatial AVG” softkey

2. Press the **Spatial AVG** softkey.
   The following functions are now provided by the last softkey:

Continuous	Sets the evaluation function to “Continuous Averaging”. The softkey label changes to the next available function.
Discrete	Sets the evaluation function to “Discrete Averaging”. The softkey label changes to the next available function.
Discrete Axis	Sets the evaluation function to “Discrete Averaging with single axis antenna”. The softkey label changes to the next available function. “Discrete Axis” is not shown unless a single axis antenna is connected.

12.1.1 Continuous Averaging

✓ Continuous Averaging is set (indicated by the **Start** softkey).

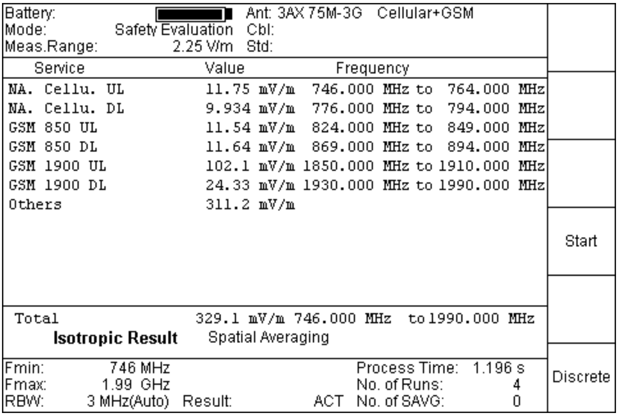


Fig. 12-5 Continuous Averaging, Start

1. Locate the desired position in the room and press the **Start** softkey.
   The softkey label changes.
   The SRM starts measuring and displays the number of measurements (No. of Runs) and the number of values averaged (No. of SAVG).
2. Move the antenna along the path to be measured within the room.

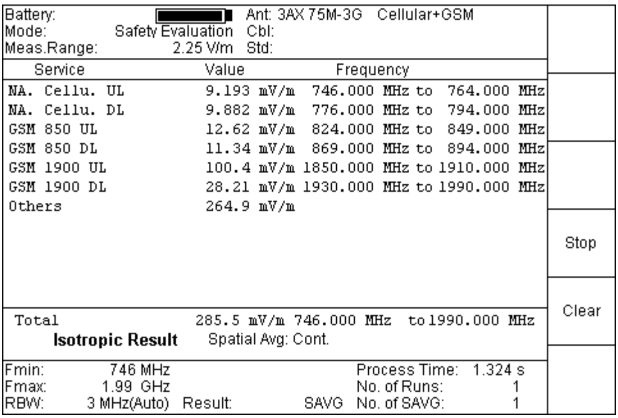


Fig. 12-6 Continuous Averaging, first measurement

3. Press the **Stop** softkey.
   The softkey label changes.
   The SRM stops averaging (No. of SAVG remains constant)
   and displays the averaged result.
   The SRM continues measuring in the background (indicated by No. of Runs), but does not use these measurement values to form the average.

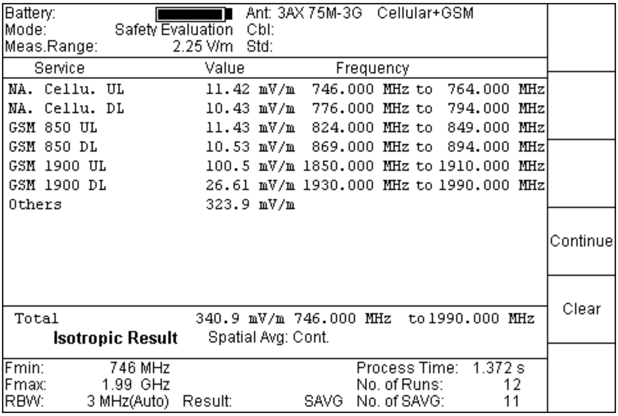


Fig. 12-7 Continuous Averaging after the first “Stop”

4. If required, locate the next point in the room to be measured and press the **Continue** softkey.
   The softkey label changes.
   The SRM resumes averaging (indicated by No. of SAVG).
5. Move the antenna along the second path to be measured within the room.
6. Press the **Stop** softkey.
   The softkey label changes.
   The SRM stops averaging (No. of SAVG remains constant)
   and displays the result averaged over the two paths traversed in the room. The SRM continues measuring in the background (indicated by No. of Runs).
7. Repeat this process until you have obtained the final result.
   This can be directly read off numerically.
8. Press the **SAVE** button to record the result in the result memory (Result memory: see page 13-1).
9. Press the **Clear** softkey to clear the result.
10. Press the **ESC** button to exit from Spatial Averaging.

Note: When you press the **SAVE** button, the SRM saves the current result of spatial averaging in the result memory. You can therefore use this function to record intermediate results. The SRM resumes averaging when you press the **Continue** softkey, incorporating the measured values already recorded. The SRM does not clear all the recorded measured values and start a new spatial averaging procedure until you press the **Clear** softkey.

12.1.2 Discrete Averaging

12.1.2.1 Discrete Averaging with a three axis antenna

✓ Discrete Averaging is set (indicated by the **Add Value** softkey).

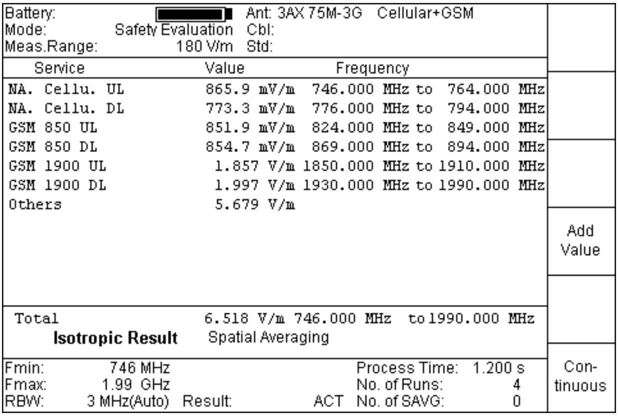


Fig. 12-8 Discrete Averaging, started by pressing the Add Value softkey

1. Position the antenna at the first point in the room to be measured.
2. Press the **Add Value** softkey.
   The SRM makes the measurement, indicates “RUN” under “No. of Runs” in the display, and confirms the measurement with a beep. The number of averaged values (No. of SAVG) shows “1”. Measurement continues in the background (indicated by No. of Runs), but does not use these measurement values to form the average.

Note: The antenna must not be moved during the measurement, i.e. between pressing the “Add Value” softkey and hearing the beep confirming the measurement.

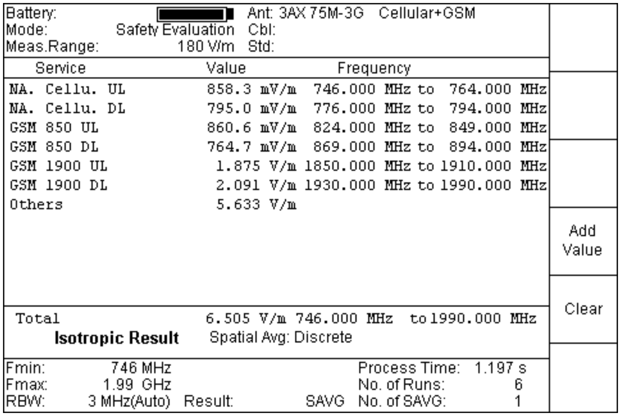


Fig. 12-9 Discrete Averaging after the first measurement

3. Move the antenna to the next point in the room to be measured.
4. Press the **Add Value** softkey.
   The SRM makes the measurement, indicates “RUN” under “No. of Runs” in the display, and confirms the measurement with a beep.
   The number of averaged values (No. of SAVG) now shows “2”.
   Measurement continues in the background (indicated by No. of Runs).
5. Repeat the above procedure for each point in the room to be measured.
   The final result can then be directly read off numerically.
6. Press the **SAVE** button to record the result in the result memory (Result memory: see page 13-1).
7. Press the **Clear** softkey to clear the result.
8. Press the **ESC** button to exit from Spatial Averaging.

Note: When you press the **SAVE** button, the SRM saves the current result of spatial averaging in the result memory. You can therefore use this function to record intermediate results. The SRM resumes averaging when you press the **Continue** softkey, incorporating the measured values already recorded. The SRM does not clear all the recorded measured values and start a new spatial averaging procedure until you press the **Clear** softkey.

12.1.2.2 Discrete Averaging with a single axis antenna

✓ The antenna is fitted on a tripod using the antenna holder.

↳ Measurement setup with a single axis antenna: see page 5-3.

↳ Isotropic measurement with a single axis antenna: see page 11-6.

✓ Discrete Averaging is set (indicated by the **Add X Axis** softkey).

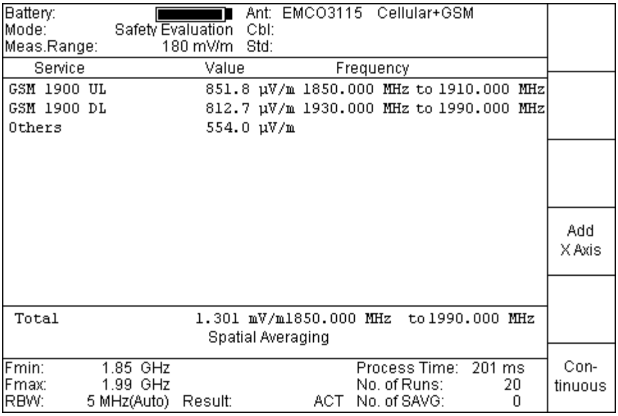


Fig. 12-10 Discrete Averaging using a single axis antenna, started by pressing the Add X Axis softkey

1. Position the antenna at the first point in the room to be measured and align it in the direction of the X axis.
2. Press the **Add X Axis** softkey.
   The SRM makes the measurement, indicates “RUN” under “No. of Runs” in the display, and confirms the measurement with a beep.
   The softkey label changes.
   The number of values averaged (No. of SAVG) remains “0”.
   Measurement continues in the background (indicated by No. of Runs), but does not use these measurement values to form the average.

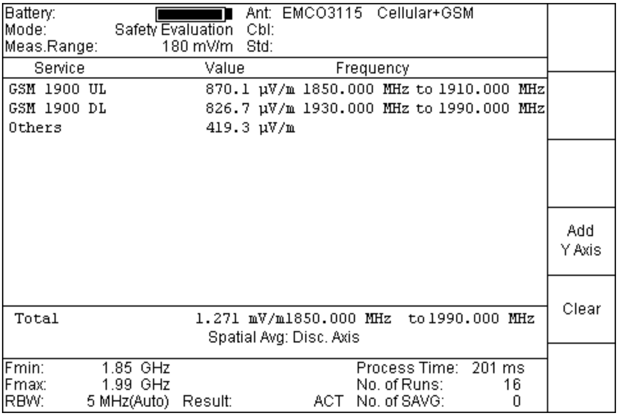


Fig. 12-11 Discrete Averaging with single axis antenna after the first partial measurement: X axis measurement.

3. Align the antenna with the Y axis.
4. Press the **Add Y Axis** softkey.
   The SRM makes the measurement, indicates “RUN” under “No. of Runs” in the display, and confirms the measurement with a beep.
   The softkey label changes.
   The number of values averaged (No. of SAVG) remains “0”.
   Measurement continues in the background (indicated by No. of Runs).

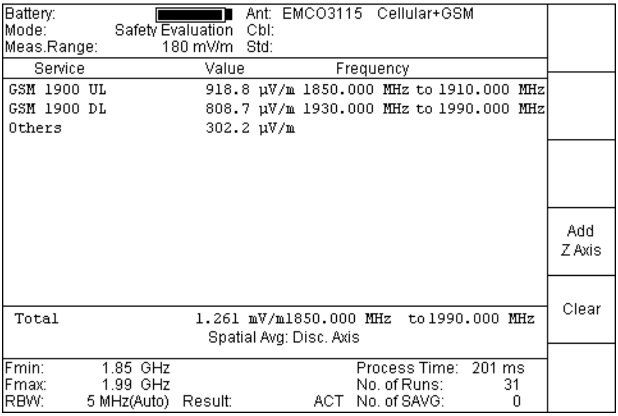


Fig. 12-12 Discrete Averaging with single axis antenna after the second partial measurement: Y axis measurement.

5. Align the antenna with the Z axis.
6. Press the **Add Z Axis** softkey.
   The SRM makes the measurement, indicates “RUN” under “No. of Runs” in the display, and confirms the measurement with a beep.
   The softkey label changes.
   The number of values averaged (No. of SAVG) is now “1”,
   as the isotropic measurement for the first point has now been completed.
   Measurement continues in the background (indicated by No. of Runs), but does not use these measurement values to form the average.

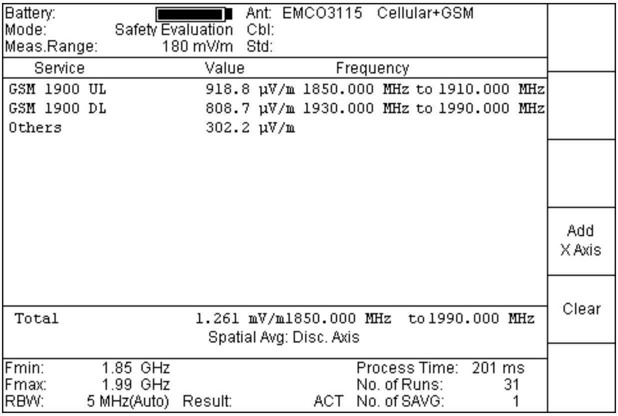


Fig. 12-13 Discrete Averaging with single axis antenna after the third partial measurement: Z axis measurement.

7. Move the antenna to the next point in the room to be measured and repeat the procedure for measuring the X, Y and Z axis positions as above.
   The number of values averaged (No. of SAVG) is now “2”.
   The SRM averages the two isotropic measurements and displays the overall result numerically.
   Measurement continues in the background (indicated by No. of Runs).
8. Repeat the above procedure for all the points in the room to be measured.
   The final result can then be directly read off numerically.
9. Press the **SAVE** button to record the result in the result memory (Result memory: see page 13-1).
10. Press the **Clear** softkey to clear the result.
11. Press the **ESC** button to exit from Spatial Averaging.

Note: When you press the **SAVE** button, the SRM saves the current result of spatial averaging in the result memory. You can therefore use this function to record intermediate results. The SRM resumes averaging when you press the **Continue** softkey, incorporating the measured values already recorded. The SRM does not clear all the recorded measured values and start a new spatial averaging procedure until you press the **Clear** softkey.

12.2 Spatial Averaging in “Spectrum Analysis” mode

✓ The Option has been enabled (see sec. 16.6, page 16-16).
✓ The SRM-3000 is in “Spectrum Analysis” mode (see sec. 8, page 8-1), and all settings, such as the measurement range, frequency, resolution bandwidth, etc., have been made.

1. Press the **Result Type** softkey.
   The “Select Result Type” selection box opens.
   The **Spatial AVG**. softkey also appears.

Note: The SRM uses the instantaneous (ACT) value for spatial averaging regardless of the Result Type setting.

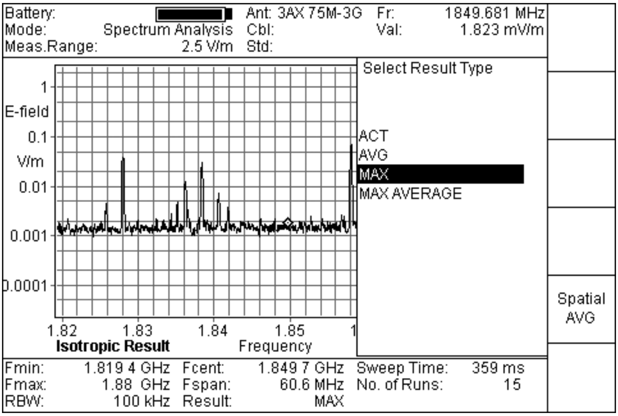


Fig. 12-14 The “Select Result Type” selection box and “Spatial AVG” softkey

2. Press the **Spatial AVG** softkey.
   The following functions are now provided by the last softkey:

Continuous	Sets the evaluation function to “Continuous Averaging”. The softkey label changes to the next available function.
Discrete	Sets the evaluation function to “Discrete Averaging”. The softkey label changes to the next available function.
Discrete Axis	Sets the evaluation function to “Discrete Averaging with single axis antenna”. The softkey label changes to the next available function. “Discrete Axis” is not shown unless a single axis antenna is connected.

The measurement procedures are described in detail above under Spatial Averaging in “Safety Evaluation” mode:

- Continuous Averaging: see page 12-5.
- Discrete Averaging with a three axis antenna: see page 12-8.
- Discrete Averaging with a single axis antenna: see page 12-10.

12.3 Spatial Averaging in “Time Analysis” mode

Spatial averaging assumes that the field strength in the room remains constant over time. For this reason, the spatial averaging function is only available in “Time Analysis” mode when the display is set to “Value”.

✓ The Option has been enabled (see sec. 16.6, page 16-16).
✓ The SRM-3000 is in “Time Analysis” mode (see sec. 10, page 10-1) and all settings, such as the measurement range, frequency, resolution bandwidth, etc., have been made.
✓ The display is set to “Value” (see sec. 10.3, page 10-4).

Note: The detector should be set to RMS (Selecting the Detector Type (RMS value, peak value): see page 10-11).

1. Press the **Result Type** softkey.
   The “Select Result Type” selection box opens.
   The **Spatial AVG**. softkey also appears.

Note: The SRM uses the instantaneous (ACT) value for spatial averaging regardless of the Result Type setting.

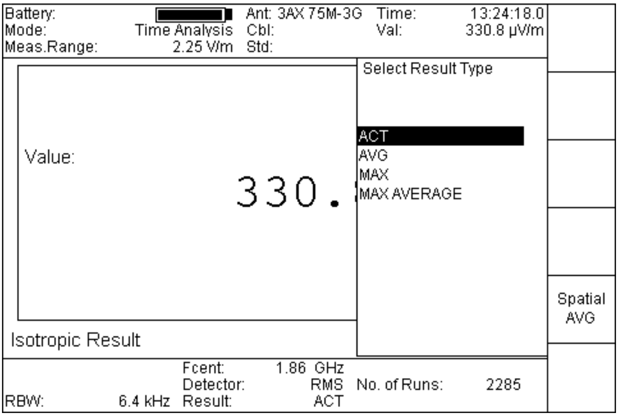


Fig. 12-15 The “Select Result Type” selection box and “Spatial AVG” softkey

2. Press the **Spatial AVG** softkey.
   The following functions are now provided by the last softkey:

Continuous	Sets the evaluation function to “Continuous Averaging”. The softkey label changes to the next available function.
Discrete	Sets the evaluation function to “Discrete Averaging”. The softkey label changes to the next available function.
Discrete Axis	Sets the evaluation function to “Discrete Averaging with single axis antenna”. The softkey label changes to the next available function. “Discrete Axis” is not shown unless a single axis antenna is connected.

The measurement procedures are described in detail above under Spatial Averaging in “Safety Evaluation” mode:

- Continuous Averaging: see page 12-5.
- Discrete Averaging with a three axis antenna: see page 12-8.
- Discrete Averaging with a single axis antenna: see page 12-10.

Notes:

13 Result memory

The results obtained in any operating mode can be saved. The SRM provides the following functions for this:

- Saving of the current result by pressing the **SAVE** key.
- Automatic saving of results when a threshold value is exceeded; set using the MEMORY menu.
- Timer controlled result storage, set using the MEMORY menu.

Data sets are generated when the results are saved. The data they contain is indicated by the name (type):

Type	**Contains results of**
TAB	“Safety Evaluation” mode
SPEC	“Spectrum Analysis” mode
UTAB	“UMTS P-CPICH Demodulation” mode (option)
VAL	“Time Analysis” mode
LIST	“Time Analysis” mode with “Time Controlled Storing” (option)

13.1 Saving data

The results that are determined are saved along with the following data:

- Index (consecutive number)
- Sub index
- Operating mode
- Operating mode parameters
- Antenna / cable data (where available)
- Measurement mode (isotropic measurement or single axis measurement)
- Date
- Time
- Comment (where available)

13.1.1 Saving a single measurement

Note: Single measurements can be saved without a comment, with a pre-defined standard comment or with your own comment. These settings are made in the MEMORY menu.
Also refer to sec. 13.3, page 13-17

✓ The appropriate operating mode is selected, e.g. Spectrum Analysis.
✓ All settings have been made.
✓ The result is displayed.

1. Press the **SAVE** key.
2. If the “Individual text” setting was selected in the MEMORY - Comment menu, enter your comment using the softkeys and keys (up to 15 characters).
3. Press the **ENT** key.
   The result is saved.

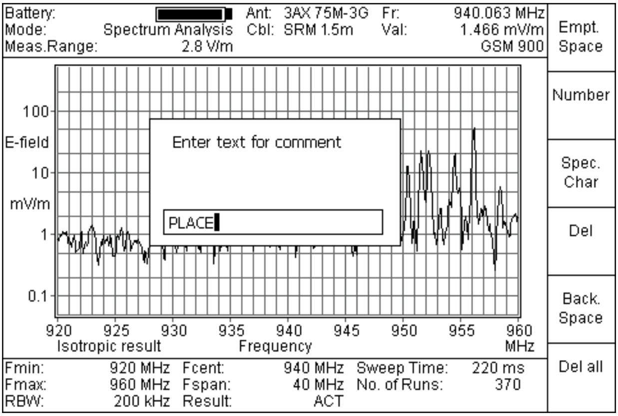


Fig. 13-1 Saving a result using the **SAVE** key and entering your own comment

Softkey functions

The softkeys have the following functions:

Empt. Space	Enters a space.
Number	Opens a list with numerical characters. The required character is selected with the rotary control and the **ENT** key.
Spec. Char	Opens a list with special characters. The required character is selected with the rotary control and the **ENT** key.
Del	Deletes the highlighted character.
Back Space	Moves the highlight back one character to the left and deletes the character.
Del all	Deletes all characters.

13.1.2 Automatic saving

The SRM can save results automatically. To do this, a threshold can be set and a save mode selected for the individual operating modes.

Note: Automatic saving can be done without a comment, with a predefined standard comment or with your own comment. These settings are made in the MEMORY menu.
See sec. 13.3, page 13-17.

Setting the threshold

✓ The appropriate operating mode is selected, e.g. Spectrum Analysis.

1. Press the **MEM** key.
   The MEMORY menu is displayed.
2. Use the rotary control to highlight “Conditional storing”.
3. Press the **ENT** key.
   The CONDITIONAL STORING menu is displayed.
4. Use the rotary control to highlight “Threshold”.
5. Press the **ENT** key.
   The current threshold value is highlighted.
6. Use the rotary control to highlight the desired threshold value.
7. Press the **ENT** key.
   The selected threshold value is set.

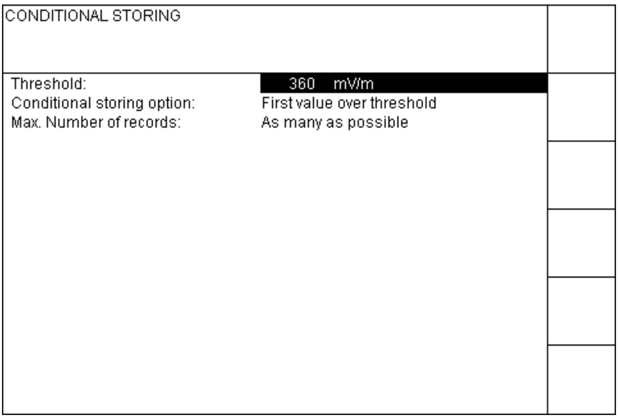


Fig. 13-2 CONDITIONAL STORING - Threshold menu

Selecting the store mode

✓ The appropriate operating mode is selected, e.g. Spectrum Analysis.
✓ The CONDITIONAL STORING menu is displayed.

1. Use the rotary control to highlight “Conditional storing options”.
2. Press the **ENT** key.
   The current option is highlighted.
3. Use the rotary control to highlight the desired option, e.g. “First value over threshold”.
4. Press the **ENT** key.
   The selected option is set.

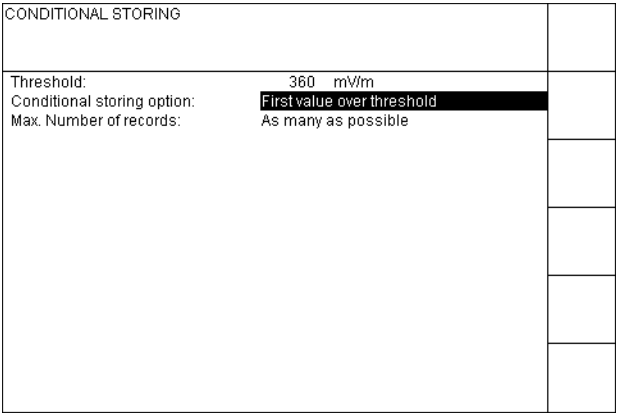


Fig. 13-3 CONDITIONAL STORING - Conditional storing option menu

First value over threshold	In “Spectrum Analysis” mode the first sweep which contains at least one spectral line that exceeds the threshold is stored. In “Safety Evaluation” mode the table containing the first result that exceeds the threshold is stored.
All value over threshold	In “Spectrum Analysis” mode all the sweeps containing at least one spectral line that exceeds the threshold are stored. In “Safety Evaluation” mode all the tables containing at least one result that exceeds the threshold are stored.

Selecting the maximum number of data sets

✓ The appropriate operating mode has been selected, e.g. “Spectrum Analysis”.
✓ The CONDITIONAL STORING menu is displayed.

1. Use the rotary control to highlight “Max. number of records”.
2. Press the **ENT** key.
   The current option is highlighted.
3. Use the rotary control to set the desired number (between 2 and 500) or “As many as possible”.
4. Press the **ENT** key.
   The selected option is set.

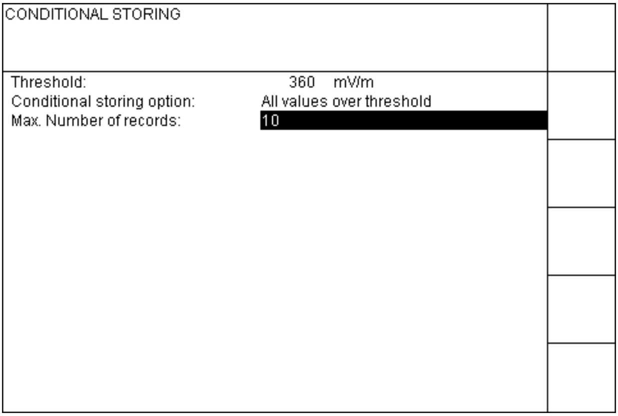


Fig. 13-4 CONDITIONAL STORING menu: Max. number of records

Starting storage

✓ The appropriate operating mode is selected, e.g. Spectrum Analysis.
✓ The CONDITIONAL STORING menu is displayed.
✓ The threshold and desired storing option are set.

⇒ Press the **Immd start** softkey.
Storage is activated.
The display changes to show the operating mode you selected previously.
“Conditional Storing ...” is also displayed.

– or –

1. If the “Individual Comment” setting was selected in the MEMORY - Comment menu, enter your comment using the softkeys and keys (up to 15 characters).
2. Press the **ENT** key.
The display changes to show the operating mode you selected previously.
“Conditional Storing ...” is also displayed.

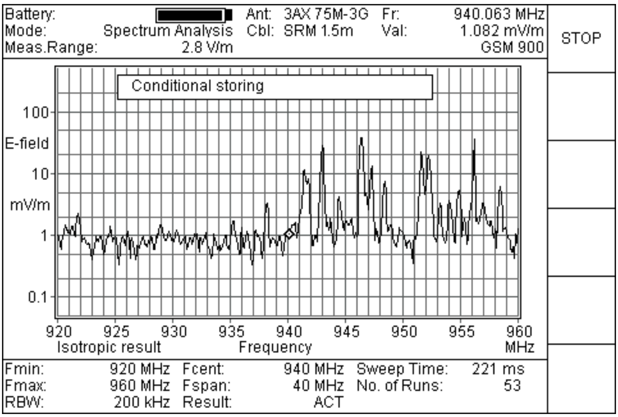


Fig. 13-5 Display during automatic storage

Note: When the memory is full, a warning will be displayed briefly and storage mode will then terminate.

Stopping automatic storage

✓ Automatic storage was activated using the **Immd start** softkey (see fig. 13-5).

⇒ Press the **STOP** softkey.
Automatic storage terminates.

13.1.3 Time Controlled Storing (option)

The SRM can store measurement results under timer control. To do this, you can set the start date, start time, measurement duration and other parameters in the TIME CONTROLLED STORING sub menu.

Note: You can save the results without any comments, or with a pre-defined (default) comment, or with an individual comment. These settings are made in the MEMORY menu. See sec. 13.3, page 13-17.

Preparing the settings

✓ The appropriate operating mode is set, e.g. “Spectrum Analysis”.

1. Press the **MEM** key.
   The MEMORY menu is displayed.
2. Use the rotary control to highlight “Time controlled storing”.
3. Press the **ENT** key.
   The TIME CONRTROLLED STORING menu is displayed.

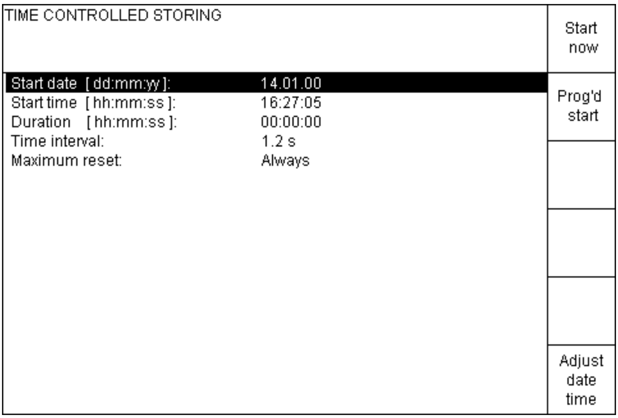


Fig. 13-6 TIME CONTROLLED STORING menu

You can make the following settings from this menu:

Start date	6 digits (Setting the number format (Configure General): see page 14-15)
Start time	Entered in hours:minutes:seconds
Duration	Measurement duration entered in hour:minutes:seconds maximum 99:99:99
Time interval	Time interval between result saves. Can be set to fixed values between 1.2 seconds and 60 minutes or to the maximum rate possible (As many as possible).
Maximum reset	Specifies when to reset the maximum value that is determined. • Always: Reset after every result save. • On start: Reset when the measurement starts. • Never: No reset. The maximum values from previous measurements are retained.

Setting:

1. Use the rotary control to highlight “Start date”.
2. Press the **ENT** key.
3. Use the rotary control to set the day, month and year one after the other.
   Use the “>” and “<” softkeys to switch between day, month, and year settings.
4. Press the **ENT** key.
   The start date is set.

5. Use the rotary control to highlight “Start time”.
6. Press the **ENT** key.
7. Use the rotary control to set the hours, minutes and seconds.
   Use the “>” and “<” softkeys to switch between the hours, minutes and seconds settings.
   Press the **ENT** key.
   The start time is set.

8. Use the rotary control to highlight “Duration” markieren.
9. Press the **ENT** key.
10. Use the rotary control to set the hours, minutes and seconds.
    Use the “>” and “<” softkeys to switch between the hours, minutes and seconds settings.
11. Press the **ENT** key.
    The measurement duration is set.

12. Use the rotary control to highlight “Time interval” markieren.
13. Press the **ENT** key.

14. Use the rotary control to set a value between 1.2 seconds and 60 minutes or select the setting “As many as possible”.
15. Press the **ENT** key.
    The time interval between result saves is set.
16. Use the rotary control to highlight “Maximum reset” markieren.
17. Press the **ENT** key.
18. Use the rotary control to highlight the desired option.
19. Press the **ENT** key.
    The desired option is set.

Setting the start date and time to the current date and time (Adjust date time)

You can set the start date and time more conveniently in many cases:

⇒ Press the **Adjust date time** softkey.
This automatically sets the current SRM date and time as the start date and time for the measurement.

Starting from these values, you can easily make further adjustment to the start date and time e.g. by changing one digit of the start time.

Setting the date and time: see page 14-13

Starting time controlled storing

1. Press the **Start now** softkey.
   The measurement starets immediately.
   The measurement duration and time, and all other parameters correspond to the option settings.
   A pane opens in the measurement menu containing the message “Time controlled storing”, together with the index numbers of the stored data sets and the remaining measurement time.
   The end of the measurement is indicated by the message “Time controlled storing: Finished“.

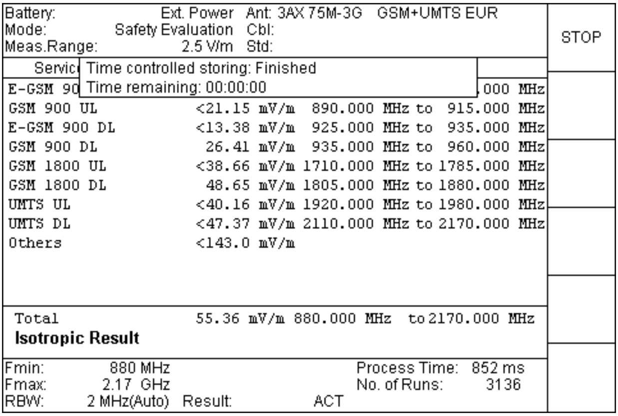


Fig. 13-7 “Safety Evaluation” measurement menu with TIME CONTROLLED STORING

2. Press the **Stop** softkey to exit from time controlled storing.

– or –

1. Press the **Prog’d Start** softkey.
   The measurement will start at the specified time.
   The message “Time controlled storing” together with the remaining time until the satrt of the measurement is shown in the measurement menu. This is replaced by the index numbers of the stored data sets and the remaining measurement time when the measurement starts.
   The end of the measurement is indicated by the message “Time controlled storing: Finished“.
2. Press the **Stop** softkey to exit from time controlled storing.

Note: You can stop the measurement at any time by pressing the **Stop** softkey.
The results stored up till that time will be retained.

13.2 Managing data sets

The MEMORY VIEWER is used to display and manage the data sets. The data sets are listed in a table. You can display or delete a single data set or delete all data sets.

Displaying a data set

1. Press the **MEM** key.
   The MEMORY menu is displayed.
2. Use the rotary control to highlight “Viewer”.
3. Press the **ENT** key.
   The MEMORY VIEWER menu opens. The data sets are shown with the following information:

Index	Consecutive index number
Sub	Consecutive sub index number if the data set contains more than one individual result.
Num	Number of individual results in the data set.
Type	Type: see page 13-1
Store	Storage mode: • MAN: Manual • COND: Automatic when a threshold is exceeded (Conditional Storing) • TIME (Time Controlled Storing)
Date	
Time	
Comment	If available

A small black triangle indicates that there is more than one page of information.

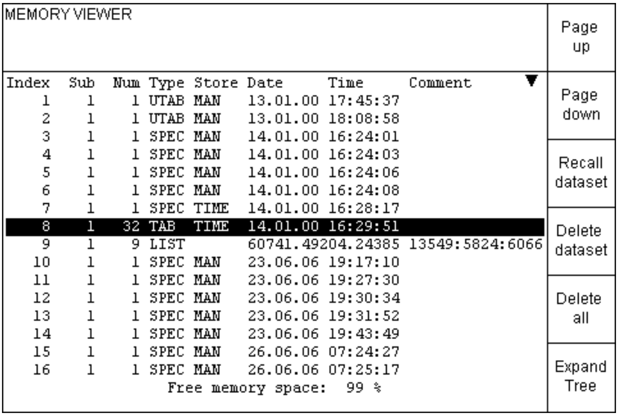


Fig. 13-8 MEMORY VIEWER showing stored data sets

4. Use the **Page up** or **Page down** softkeys and / or the rotary control to highlight the desired data set.
   The data set is highlighted in black.
5. Press the **Recall dataset** softkey.
   The data set is displayed along with its storage date and index number.

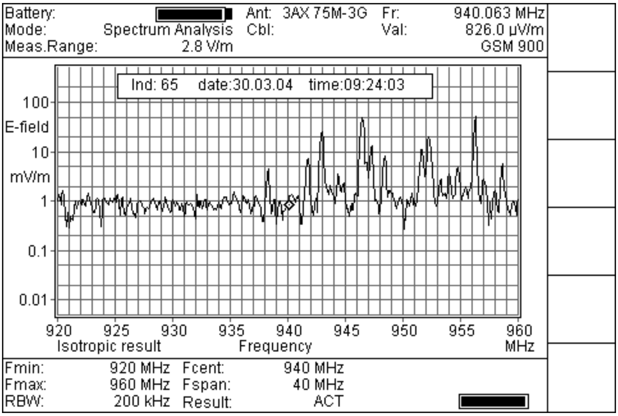


Fig. 13-9 Display of a stored data set using the MEMORY VIEWER

Displaying sub data sets

✓ The MEMORY VIEWER menu is open (see fig. 13-10).
✓ At least one data set containing sub data sets is stored.

1. Press the **Expand Tree** softkey.
   A list of all the data sets and sub data sets is now displayed.
   A small black triangle indicates that there is more than one page of information.

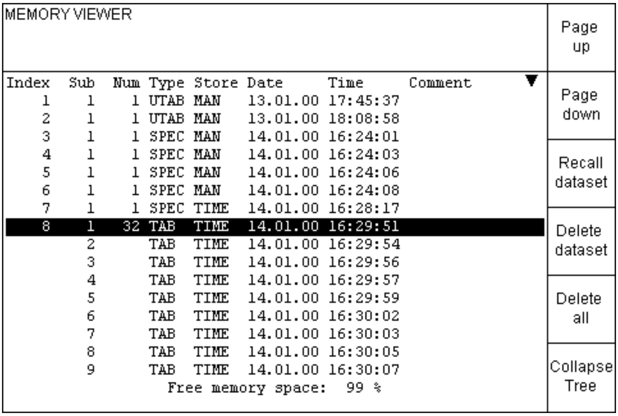


Fig. 13-10 MEMORY VIEWER mit den gespeicherten Sub-Datensätzen

2. Use the **Page up** or **Page down** softkeys and / or the rotary control to highlight the desired sub data set.
   The sub data set is highlighted in black.
3. Prsss the **Recall dataset** softkey.
   The sub data set and all the information in it (store date, index, sub index, etc.) is displayed.
4. Use the “>” or “<” softkeys to page forwards or backwards in the information.

Hiding sub data sets

⇒ Press the **Collapse Tree** softkey.

Deleting a data set

✓ The MEMORY VIEWER is displayed (see fig. 13-8).
✓ At least one data set has been stored.

1. Use the **Page up** or **Page down** softkeys and / or the rotary control to highlight the desired data set.
   The data set is highlighted in black.
2. Press the **Delete dataset** softkey.
   A warning message is displayed.
3. Press the **ENT** key.
   The data set is deleted.

Notice: You cannot delete a single sub data set. Even if you only highlight one sub data set, the entire data set is deleted when you press **Delete dataset**.

Deleting all data sets

✓ The MEMORY VIEWER is displayed (see fig. 13-8).
✓ At least two data sets have been stored.

1. Press the **Delete all** softkey.
   A warning message is displayed.
2. Press the **ENT** key.
   All the data sets are deleted.

13.3 Entering and editing comments

Each data set can be stored without a comment, with a pre-defined default comment or with your own comment. The comments are managed separately for each operating mode.

1. Press the **MEM** key.
   The MEMORY menu is displayed.
2. Use the rotary control to highlight “Comments”.
3. Press the **ENT** key.
   The COMMENTS menu is displayed.

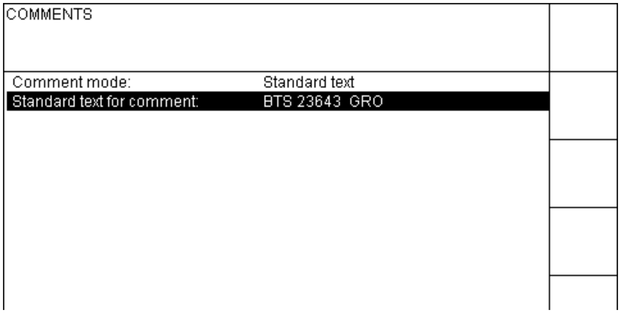


Fig. 13-11 COMMENTS menu

Selecting the comment mode

✓ The COMMENTS menu is displayed.

1. Use the rotary control to highlight “Comment mode”.
2. Press the **ENT** key.
   The available selections are activated.
3. Use the rotary control to highlight one of the following:
   – Individual text
     A comment must be entered for every data set to be stored.
   – No comment
     Data sets are stored without comments.
   – Standard text
     The data set is stored with the default comment (see next section).

Entering a default comment

✓ The COMMENTS menu is displayed.

1. Use the rotary control to highlight “Standard text for comment”.
2. Press the **ENT** key.
   The “Enter text for comment” dialog opens.
   The softkey functions change.

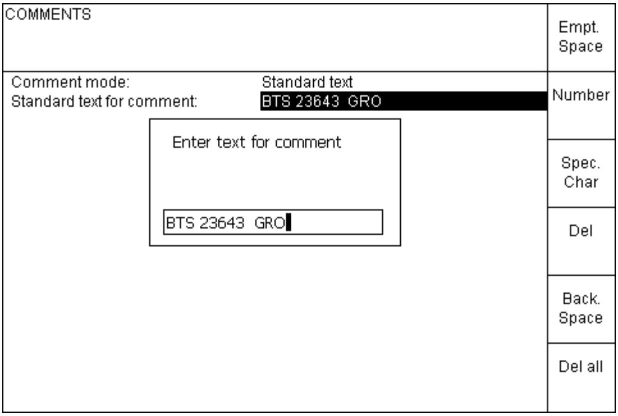


Fig. 13-12 Entering a standard comment

3. Use the softkeys and the keys (abc through wxyz) to enter the comment (up to 15 characters).

Softkey functions

The softkeys have the following functions:

Empt. Space	Enters a space.
Number	Opens a list with numerical characters. The required character is selected with the rotary control and the **ENT** key.
Spec. Char	Opens a list with special characters. The required character is selected with the rotary control and the **ENT** key.
Del	Deletes the highlighted character.
Back Space	Moves the highlight back one character to the left and deletes the character.
Del all	Deletes all characters.

13.4 Reading out stored data sets

Stored data sets can be transferred to a PC / laptop computer via the serial data interface (RS 232). The “SRM-Tools” PC software supplied with the instrument can be used for this.

↳ Also refer to sec. 16.4, page 16-13.

Notes:

14 General settings (Configuration)

General settings or configurations are selected using the **CONF** button.

Opening the Configuration menu

⇒ Press the **CONF** button.
The CONFIGURATION menu opens showing the following options:

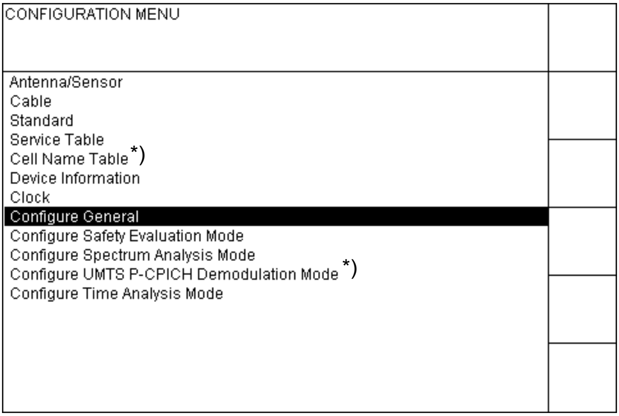


Fig. 14-1 CONFIGURATION menu
*) only if "UMTS P-CPICH Demodulation" option is installed

Option	Explanation
Antenna/Sensor	Selects an antenna See sec. 14.13, page 14-17
Cable	Selects a cable See sec. 14.14, page 14-18
Standard	Selects a safety standard See sec. 14.5, page 14-6
Service Table	Selects a service table See sec. 14.6, page 14-7

Table 14-1 Options in the CONFIGURATION menu

Option	Explanation
Cell Name Table	Selects a cell name table See sec. 14.7, page 14-9
Device Information	Displays instrument information See sec. 14.8, page 14-11
Clock	Sets the date / time See sec. 14.9, page 14-13
Configure General	Switches the numerical format between normal and exponential display See sec. 14.10, page 14-15 Switches the remote control interface between SERIAL (RS 232) and USB See sec. 14.11, page 14-15
Configure Spectrum Analysis Mode	Configures “Spectrum Analysis” mode See sec. 14.2, page 14-3
Configure Safety Evaluation Mode	Configures “Safety Evaluation” mode See sec. 14.1, page 14-3
Configure UMTS P-CPICH Demodulation Mode	Configures “UMTS P-CPICH Demodulation” mode See sec. 14.3, page 14-4
Configure Time Analysis Mode	Configures “Time Analysis” mode See sec. 14.4, page 14-5

Table 14-1 Options in the CONFIGURATION menu

Selecting an option

1. Use the rotary control to highlight an option.
2. Press the **ENT** button.
   Further sub-menus open.

These sub-menus are explained in the sections below.

14.1 Configurations for “Safety Evaluation” mode

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure Safety Evaluation Mode”.
2. Press the **ENT** button.
   The CONFIGURATION SAFETY EVALUATION menu opens. Configurations for the input attenuation (Measurement Range) and averaging parameters (Number of Averages) are set here.

↳ Setting the measurement range: see page 7-6

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

↳ Selecting the averaging parameters: see page 7-11

↳ Selecting the resolution bandwidth (RBW): see page 7-13

14.2 Configurations for “Spectrum Analysis” mode

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure Spectrum Analysis Mode”.
2. Press the **ENT** button.
   The CONFIGURATION SPECTRUM ANALYSIS menu opens. Configurations for the resolution bandwidth (RBW), input attenuation (Measurement Range) and averaging parameters (Number of Averages) are set here.

↳ Setting the resolution bandwidth (RBW): see page 8-7

↳ Setting the measurement range: see page 8-9

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

↳ Selecting the averaging parameters: see page 8-12

14.3 Configurations for “UMTS P-CPICH Demodulation” mode

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure UMTS P-CPICH Demodulation Mode”.
2. Press the **ENT** button.
   The CONFIGURATION UMTS EVALUATION menu opens.
   The following configurations can be selected here:
   Channel selection by entering the UMTS frequency or the channel number (Channel selection by ...)
   Measurement range
   UMTS channel recognition (Selection of Demodulation Algorithm)
   Number of averages.

↳ Selecting an UMTS frequency or channel: see page 9-20

↳ Selecting the measurement range: see page 9-23

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

↳ Selecting the UMTS demodulation algorithm (FAST/SENSITIVE): see page 9-30

↳ Selecting the averaging parameters: see page 9-28

14.4 Configurations for “Time Analysis” mode

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure Time Analysis Mode”.
2. Press the **ENT** button.
   The CONFIGURATION TIME ANALYSIS MODE menu opens.
   The following configurations can be selected here:
   Averaging time
   Measurement range.

↳ Selecting the Averaging Time: see page 10-18

↳ Setting the measurement range: see page 10-13

↳ Selecting the parameters for the measurement range search (Configure General): see page 14-16

14.5 Selecting a safety standard

Note: Safety standards can be selected and transferred to the SRM-3000 using the “SRM-Tools” or “SRM-TS” PC software.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Standard”.
2. Press the **ENT** button.
   The STANDARD LIST menu opens.
   The various safety standards stored in the SRM-3000 are listed here.

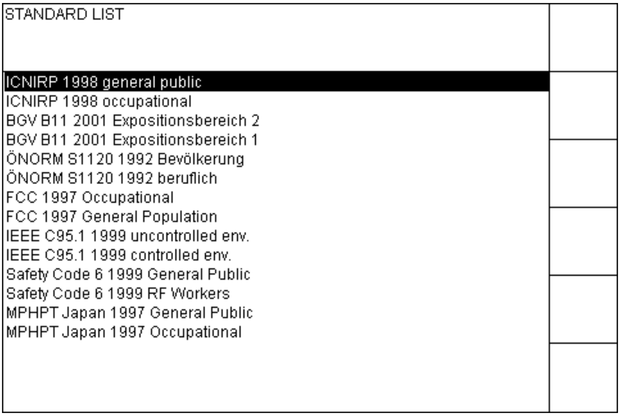


Fig. 14-2 “STANDARD LIST” selection box

3. Use the rotary control to highlight an option.
4. Press the **ENT** button.
   The selected standard will be used for the evaluation.

14.6 Selecting a service table

Service tables are lists of named frequency bands or so-called services.

A service is defined by three parameters:

- Lower limit of frequency band
- Upper limit of frequency band
- Text for service name

Service tables are used for various functions by the SRM-3000:

- Correlation of a measured level to a service using the frequency in the marker box and in the peak table (“Spectrum Analysis” mode)
- Automatic determination of field strength exposure for selected services (“Safety Evaluation” mode).

Note: Service tables can be created, edited and transferred to the SRM-3000 using the “SRM-Tools” or “SRM-TS” PC software.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Service Table”.
2. Press the **ENT** button.
   The “SERVICE TABLE LIST” selection box opens.
   The various service tables stored in the SRM-3000 are listed here.

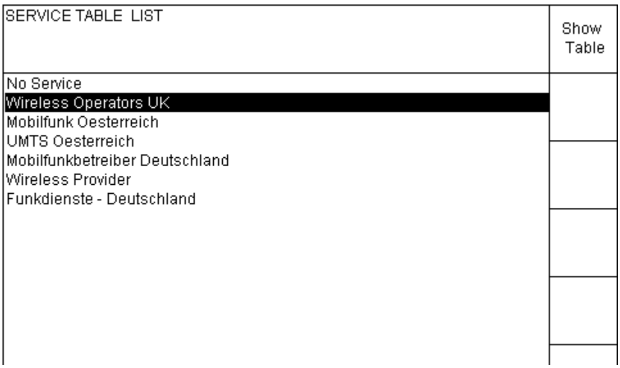


Fig. 14-3 “SERVICE TABLE LIST” selection box

3. Use the rotary control to highlight a service table.
4. Press the **ENT** button.
   The selected service table is used for the evaluation.

Displaying a service table

✓ The CONFIGURATION menu is open.
✓ The “Service Table List” is displayed.

1. Use the rotary control to highlight a service table.
2. Press the **Show Table** softkey.
   The selected service table is displayed.

SERVICE TABLE :Funkdienste - Deutschland

Langwelle	0.148 MHz	to	0.283 MHz
Mittelwelle	0.526 MHz	to	1.606 MHz
Kurzwelle	3.400 MHz	to	26.100 MHz
Band I	47.000 MHz	to	68.000 MHz
UKW	87.500 MHz	to	108.000 MHz
Band II/DAB	174.000 MHz	to	230.000 MHz
Band IV/V/DTVB	470.000 MHz	to	790.000 MHz
GSM 900	890.000 MHz	to	960.000 MHz
GSM 1800	1710.000 MHz	to	1880.000 MHz
UMTS	1920.000 MHz	to	2170.000 MHz

Fig. 14-4 “SERVICE TABLE: ...” display box

14.7 Selecting a cell name table

Cell name tables refer to UMTS cells and are only displayed if you have installed the “UMTS P-CPICH Demodulation” option. The tables contain lists of scrambling codes and the names assigned to them.

The SRM can store a maximum of 20 tables.

Each table may contain up to 50 pairs of values:

- Scrambling code number (Primary Scrambling Code divided by 16, i.e. a number between 0 and 511)
- Name (up to 15 characters)

Each table has a short name (up to 10 characters)
and a full name (long name, up to 35 characters).

Note: Cell name tables can be edited, created and transferred to the SRM-3000 using the “SRM-Tools” or “SRM-TS” PC software.

✓ The CONFIGURATION is open.

1. Use the rotary control to highlight “Cell Name Table”.
2. Press the **ENT** button.
   The “CELL NAME TABLE LIST” selection box opens.
   Cell name tables will now be displayed if they have been saved in the SRM-3000.

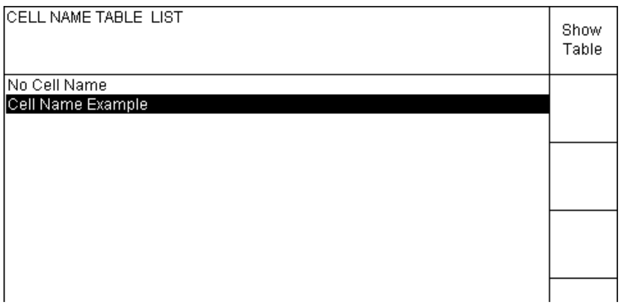


Fig. 14-5 “CELL NAME TABLE LIST” selection box

3. Use the rotary control to highlight an item.
4. Press the **ENT** button.
   The selected cell name table will be used for the evaluation.

Displaying a cell name table

✓ The CONFIGURATION menu is open.
✓ The “Cell Name Table List” is displayed.

1. Use the rotary control to highlight a cell name table.
2. Press the **Show Table** softkey.
   The selected cell name table is displayed.

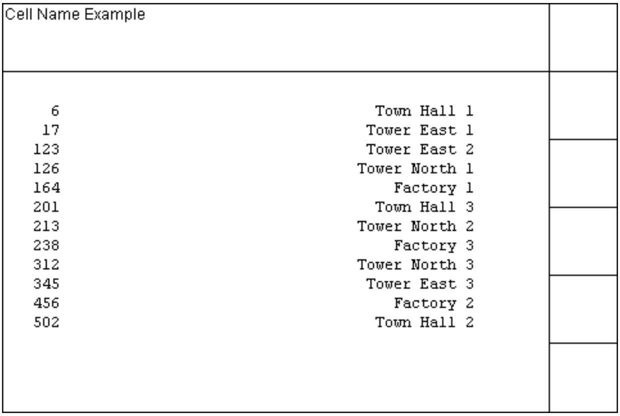


Fig. 14-6 “CELL NAME TABLE: ...” display box (cell name example)

14.8 Displaying device information

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Device Information”.
2. Press the **ENT** button.
   The “DEVICE INFORMATION” display box opens.
   Device-specific information such as the serial number, ID number, software version and date of last calibration is displayed here.

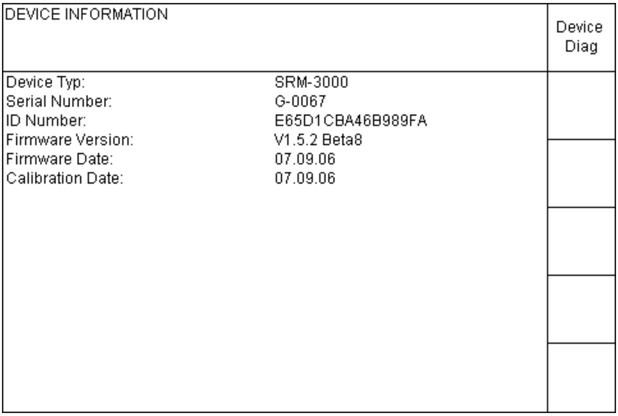


Fig. 14-7 “DEVICE INFORMATION” display box

Note: This information is needed when ordering options and also for servicing purposes.

Diagnostic function (Device Diagnostic)

This function delivers detailed information about the device. For example, it tells you which options are activated and provides assistance for Narda service.

✓ The “DEVICE INFORMATION” display pane is open.

1. Press the **Device Diag** softkey.
   The “DEVICE DIAGNOSTIC” display pane opens.

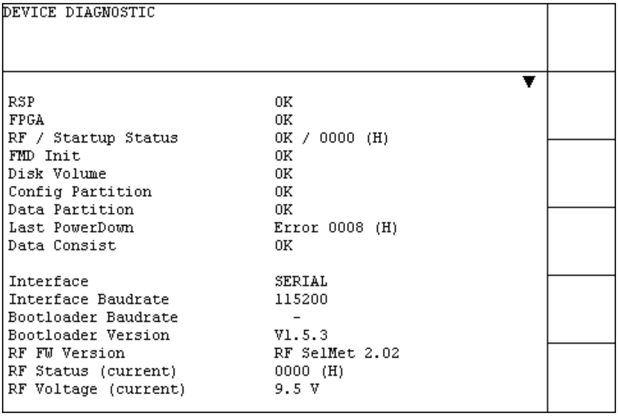


Fig. 14-8 “DEVICE INFORMATION” pane

2. Use the rotary control to see all the information on the screen.

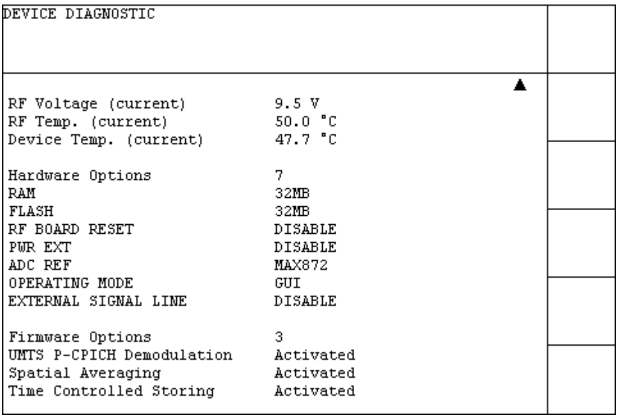


Fig. 14-9 “DEVICE INFORMATION” pane

14.9 Setting the date and time

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Clock”.
2. Press the **ENT** button.
   The CLOCK menu opens.
   The date format can be selected and the date and time entered or edited here.

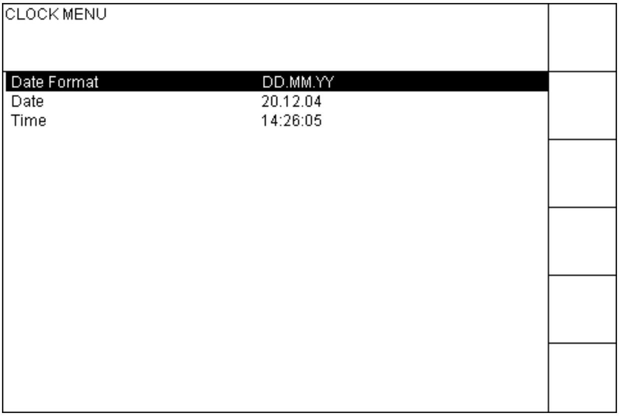


Fig. 14-10 CLOCK menu

Selecting the date format

1. Use the rotary control to highlight “Date Format”.
2. Press the **ENT** button.
3. Use the rotary control to highlight “DMY” (day, month, year) or “MDY” (month, day, year).
4. Press the **ENT** button.
   The selected date format is set.

Entering the date

1. Use the rotary control to highlight “Date”.
2. Press the **ENT** button.
3. Use the rotary control and the < and > softkeys to set the date.
4. Press the **ENT** button.
   The date is set.

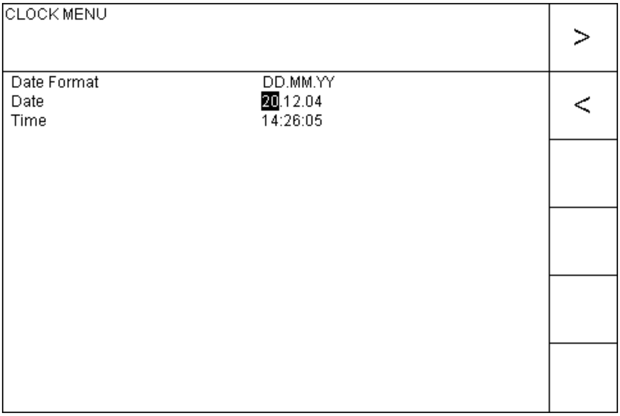


Fig. 14-11 CLOCK menu - Date entry

Entering the time

1. Use the rotary control to highlight “Time”.
2. Press the **ENT** button.
3. Use the rotary control and the < and > softkeys to set the time.
4. Press the **ENT** button.
   The time is set.

14.10 Setting the number format (Configure General)

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure General”.
2. Press the **ENT** button.
   The “CONFIGURE GENERAL” display box opens showing the “Number Format” line.
3. Press the **ENT** button.
4. Use the rotary control to set NORMAL or EXPONENTIAL.
5. Press the **ENT** button.
   The number format will be set to either NORMAL (e.g. 12.34 mV/m) or EXPONENTIAL (e.g. 12.34 E-3 V/m).

14.11 Selecting the remote control interface (Configure General)

You can use either the serial (RS 232) or the USB interface, but not both interfaces at the same time.

➪ To install the USB hardware driver on your PC, see sec. 16.2.2, page 16-4

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure General”.
2. Press the **ENT** button.
   The “CONFIGURE GENERAL” display box opens.
3. Use the rotary control to highlight “Remote Control Port”.
4. Press the **ENT** button.
5. Use the rotary control to select SERIAL or USB.
6. Press the **ENT** button.
   Either the serial or the USB interface is now set to be used for communication between the SRM and the PC.

14.12 Selecting the parameters for the measurement range search (Configure General)

The SRM uses two parameters to search for the best measurement range automatically.

- NORMAL is suitable for all signals that are more or less static.
- CONSERVATIVE gives a greater overload reserve for pulsed signals.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure General”.
2. Press the **ENT** key.
   The “CONFIGURE GENERAL” display pane opens.
3. Use the rotary control to highlight “MR Search Mode”.
4. Press the **ENT** key.
5. Use the rotary control to highlight NORMAL or CONSERVATIVE.
6. Press the **ENT** key.
   The parameter for the automatic measurement range search is set.
7. Press the **ESC** key to exit from the CONFIGURATION menu.

You can set the automatic measurement range search to start every time you recall a setup. You can also start a measurement range search at any time by pressing the appropriate softkey.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Configure General”.
2. Press the **ENT** key.
   The “CONFIGURE GENERAL” display pane opens.
3. Use the rotary control to highlight “MR Search on Setup Recall”.
4. Press the **ENT** key.
5. Use the rotary control to highlight ON or OFF.
6. Press the **ENT** key.
   This switches the automatic measurement range search when you recall a setup on or off.
7. Press the **ESC** key to exit from the CONFIGURATION menu.

14.13 Selecting an antenna / sensor

Note: This function is only needed when customary antennas are used.

You must select the type of antenna that you are using in order that the results can be displayed in units of field strength when a customary antenna is used for measurement. Otherwise the range of functions available from the SRM will be restricted. The stored antenna factors for the antenna type being used are taken into account in the result displayed.

The antenna factor describes the relationship between the existing field strength and the voltage generated at the antenna base at a specific frequency.

Note: Antenna or sensor data can be created, edited and transferred to the SRM-3000 using the “SRM-Tools” software.
This step is not required for Narda antennas because the SRM automatically recognizes the antenna or sensor data via the control cable as soon as it is connected to the multi pin connector.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Antenna/Sensor”.
2. Press the **ENT** button.
   The “ANTENNA/SENSOR LIST” display box opens.
   The data for the various antennas or sensors stored in the SRM is displayed here.

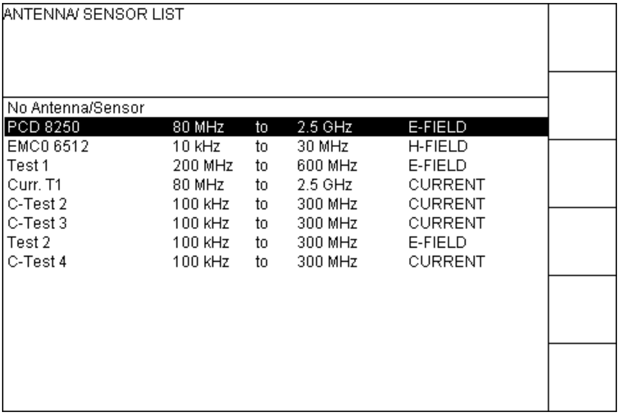


Fig. 14-12 “ANTENNA/SENSOR LIST” display box

3. Use the rotary control to highlight an item.
4. Press the **ENT** button.
   The data for the selected antenna will be used in the evaluations.

14.14 Selecting a cable

Note: This function is only needed if customary cables are used.

You must select the cable type that you are using if the effects of a customary cable on the measurement result are to be taken into account. The loss factors stored for this cable type will then be used automatically in displaying the result.

Note: Antenna or sensor cable data can be created, edited and transferred to the SRM using the “SRM-Tools” software.
This step is not needed if Narda cables are used because the SRM-3000 automatically recognizes the data via the control cable as soon as it is connected to the multi pin connector.

✓ The CONFIGURATION menu is open.

1. Use the rotary control to highlight “Cable”.
2. Press the **ENT** button.
   The “CABLE LIST” display box opens.
   The data for the various antenna or sensor cables stored in the SRM-3000 is listed here.

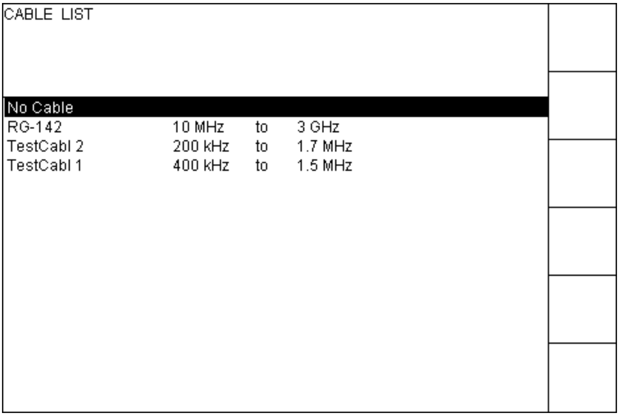


Fig. 14-13 “CABLE LIST” display box

3. Use the rotary control to highlight an item.
4. Press the **ENT** button.
   The data for the selected antenna cable will be used for the evaluations.

14.15 Creating and managing setups

The **SETUP** button is used for storing a complete instrument configuration.

The following settings are stored:

- Operating mode
- Operating mode parameters
- Antenna and cable
- Standard
- Service table
- Measurement mode (single axis, isotropic measurement)

✓ All the desired settings have been made.

⇒ Press the **SETUP** button.
The SETUP menu opens.
The softkey functions change.
All the setups that have been stored are displayed here with their name, date and time. If there is more than one page of setups, this will be indicated by a small black triangle.

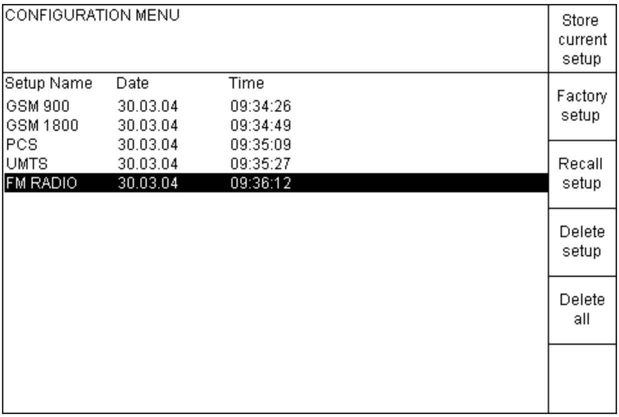


Fig. 14-14 SETUP menu

The softkeys have the following functions:

Store current setup	Stores the current settings. A setup name must be entered.
Factory setup	Loads the factory default setup.
Recall setup	Loads the highlighted setup.
Delete setup	Deletes the highlighted setup.
Delete all	Deletes all the setups after confirmation.

Storing the current setup

✓ The SETUP menu is open.

1. Press the **Store current setup** softkey.
   The “Enter a text for comment” dialog opens.
   The softkey functions change.
2. Enter a setup name using the softkeys and the buttons **ABC** through **WXYZ**.
3. Press the **ENT** button.
   The setup is stored.

Loading a setup

✓ The SETUP menu is open.
✓ At least one setup has been stored.

1. Use the rotary control to highlight a setup.
2. Press the **Recall setup** softkey.
   The setup is loaded.

Note: An error mesage (“SRM Setup Check”) is displayed if it is not possible to load a setup. This can happen if a different antenna to the one specified in the setup is being used, or if the configuration data (antenna lists, service tables, etc.) specified in the setup are unavailable.
This could occur if the configuration data has been edited using the “SRM-Tools” or “SRM-TS” PC software.
It may be possible to “repair” such setups in the SRM basic unit.

"Repairing" a saved setup

✓ The message "SRM Setup Check" is displayed.

1. Make a note of the error message that is displayed, e.g. "Could not find specified antenna".
2. Press the **ENT** key.
   The setup opens.
3. Press the **CONF** key.
   The CONFIGURATION menu opens.
4. Redefine each item of configuration data for which an error message was displayed.
5. Press the **ENT** key to complete each new definition.
6. Press the **SETUP** key.
7. Press the **Overwrite setup** softkey.
   The setup is "repaired" in the sense that it can now be used without restrictions using the changed configuration data.

Deleting a setup

✓ The SETUP menu is open.
✓ At least one setup has been stored.

1. Use the rotary control to highlight the setup you want to delete.
2. Press the **Delete setup** softkey.
   The setup is deleted.

Loading the factory default setup

✓ The SETUP menu is open.

⇒ Press the **Factory setup** softkey.
The factory default setup is loaded.

15 Maintenance and repairs

15.1 Changing the battery pack

1. Unscrew the battery holder lock.
2. Remove the cover.
3. Pull out the battery pack using the strap provided.
4. Slide in a new battery pack.
   The battery pack is designed so that it cannot be inserted wrongly.
5. Replace the cover and screw the lock closed.

Fig. 15-1 Changing the battery pack

No.	Function
1	Cover
2	Lock
3	Battery pack with strap

Table 15-1 Changing the battery pack

Battery pack disposal

Do not throw away battery packs with household trash. Take them to the appropriate recycling collection center or return them to the manufacturer for disposal.

15.2 Cleaning

- Never use solvents to clean the basic instrument, antennas or the AC Adapter / Charger. For cleaning, we recommend the use of lukewarm water to which a little liquid detergent has been added.
- Only lightly moisten the cleaning cloth. Do not let water get into the instrument.
- To avoid spots and drying marks, wipe of the still damp instrument parts with a dry cloth.

15.3 AC Adapter / Charger

The AC Adapter / Charger is not designed to be repaired.

If a defect occurs or operation is faulty, the entire unit must be replaced.

Opening the unit

Danger

Electric shock

Parts carrying live voltages may be exposed when the AC Adapter / Charger is opened.

⇒ Before opening the unit, disconnect it from the AC line and all other voltage sources.
Maintenance or repair of the opened AC Adapter / Charger under power must be performed by qualified service engineers familiar with the risks involved.

Damage to the unit

Caution

Damage to the unit

The AC Adapter / Charger can be destroyed or damaged by unprofessional repairs that result in short circuits across creepage and air paths, for example.

⇒ Repairs must only be performed by qualified service engineers.

Spare parts

Caution

Damage to the unit

The safety of the AC Adapter / Charger cannot be guaranteed if changes are made in the construction of the unit.

⇒ Only use original spare parts when making repairs to the AC Adapter / Charger.

Notes:

16 Adapting the instrument configuration using “SRM-Tools” or “SRM-TS”

16.1 Task of the “SRM-Tools” software

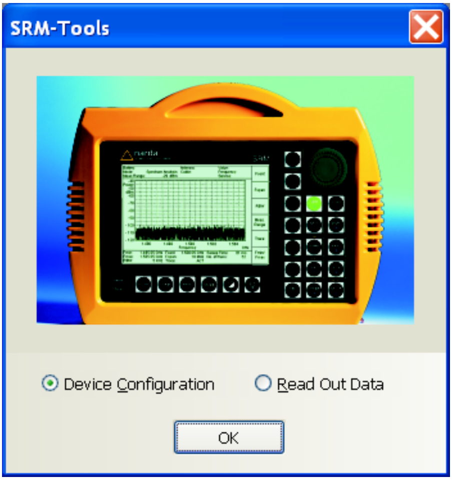


Fig. 16-1 “SRM-Tools” software

The PC configuration software “SRM-Tools” is a stand-alone software tool that runs on any customary PC under Windows 2000 or higher.

The software performs the following main tasks:

- Configuration of the SRM
- SRM software update
  (using Device Configuration or Read Out Data)
- Enabling options
  (using Device Configuration or Read Out Data)
- Uploading the saved results from an SRM
  (Read Out Data)

These tasks are described in the sections below.

Note: The PC configuration software "**SRM-Tools**" is included with the SRM-3000.
The PC software "**SRM-TS**" can be purchased. It includes all the functions of "SRM-Tools" combined with convenient remote-control, evaluation, and database functions. You do not need to install the "SRM-Tools" configuration software if "SRM-TS" is already installed.

➭ Further detailed information is found in the on-line help function of the "SRM-Tools" or "SRM-TS" software.

16.2 Connecting a PC to the SRM-3000

Note: You do not have to connect the SRM to a PC in order to process configuration data for the SRM. The connection is only required when data are to be transferred to or from the SRM.

The connectors for the serial (RS 232) and USB interfaces are at the bottom of the instrument.

Note: All the functions of SRM-Tools can be used with the serial interface. All the functions of SRM-Tools **except "Firmware update"** can be used with the USB interface.

Fig. 16-2 Serial (1) and USB (2) interfaces

16.2.1 Serial interface connection

✓ The SRM-3000 and PC are switched off.

1. Connect the serial interface (1) of the SRM to a serial port of the PC using a zero modem cable. You can also use a serial to USB adapter if you want to use the USB port on your PC.
2. Switch on the SRM and set Remote Control Port to SERIAL (see sec. 14.11, page 14-15).
3. Switch on the PC.
4. Start "SRM-Tools" or "SRM-TS".
   The start up screen is displayed.
5. Click on the "Device Configuration", "Read Out Data" or "Remote & Data Analysis" button, depending on the task you want to perform.
   The corresponding window opens.
6. Check the selected COM port.
   To do this, open the "Communication" dialog from the "Device" -> "Communication Settings" menu.
   The default transmission speed is 115200 Baud.
   Select the 230400 Baud option if your PC interface can handle this speed.

16.2.2 USB interface connection

✓ SRM is equipped with firmware version 1.5.2 or above (see sec. 14.8, page 14-11 for details of how to query the firmware version).
✓ PC operating system:
Windows 2000 Service Pack 4 or
Windows XP Service Pack 2 or
Windows Vista.
✓ "SRM-Tools" version 2.2.1 or above, or "SRM-TS" version 1.2.0 or above is installed on the PC (see page 16-18).

The PC requires a hardware driver for the USB link with the SRM. This driver is included on the CD-ROM with the "SRM-Tools" or "SRM-TS" software and is automatically installed correctly when you instal "SRM-Tools" or "SRM-TS" on the PC. Nevertheless, you need to run through a small installation routine when you make the connection for the first time.

First time connection
Description for the Windows 2000 operating system

✓ The “SRM-Tools” or “SRM-TS” software is installed on the PC, but the application is not running.

1. Switch on the SRM and set the Remote Control Port to USB (see sec. 14.11, page 14-15).
2. Connect the USB interface of the SRM to a USB port on the PC using a USB cable.
   The “Install Hardware Device Drivers” window opens.

Fig. 16-3 “Install Hardware Driver” window

3. Select the option “Search for a suitable driver for my device (recommended)” and click on “Next”.
   The program will automatically locate the only (i.e. correct) SRM USB driver. The driver file name is “nardcom.inf” and it is located in the Programs\NardaSafety\SRM USB Driver folder if you did not specify a different location when you were installing SRM-TS.
4. Follow the remainder of the installation routine through to completion.

First time connection
Description for Windows XP operating system

✓ The "SRM-Tools" or "SRM-TS" software is installed on the PC, but the application is not running.

1. Switch on the SRM and set the Remote Control Port to USB (see sec. 14.11, page 14-15).
2. Connect the USB interface of the SRM to a USB port on the PC using a USB cable.
   The message "Found New Hardware" appears and the "Found New Hardware Wizard" opens and displays the query: "Can Windows connect to Windows Update to search for software?".
3. Select "Yes, this time only" and click on "Next".
   The following message appears:

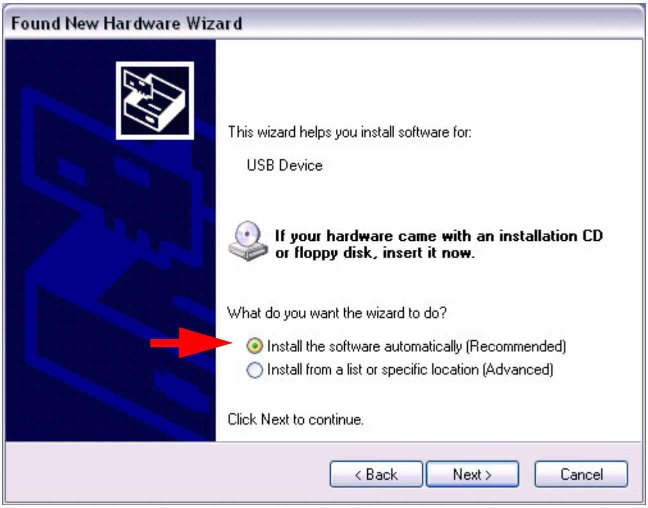


Fig. 16-4 "Found New Hardware Wizard"

4. Select the option "Install the software automatically (Recommended)" and click on "Next".

The following message appears:

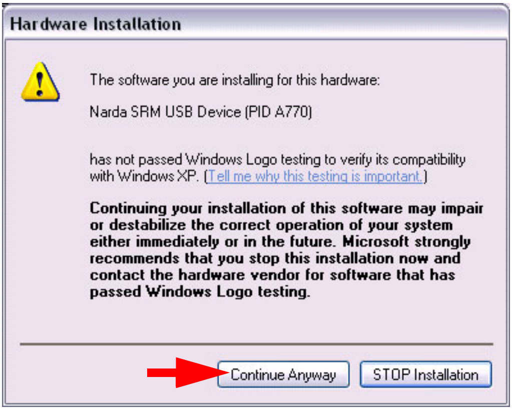


Fig. 16-5 “Hardware Installation” window

This message appears because the driver has not passed the “Windows Logo Test” routine provided by Microsoft. It has, however, been thoroughly tested and can be used without reservations.

5. Click on “Continue Anyway” and follow the remainder of the installation routine through to completion.

First time connection
Description for Windows Vista operating system

✓ The "SRM-Tools" or "SRM-TS" software is installed on the PC, but the application is not running.

1. Switch on the SRM and set the Remote Control Port to USB (see sec. 14.11, page 14-15).
2. Connect the USB interface of the SRM to a USB port on the PC using a USB cable.
   The message "Driver Software Installation" appears and installation starts automatically. The following message appears during the routine:

Fig. 16-6 "Windows Security" window

   This message appears because the driver has not passed the "Windows Logo Test" routine provided by Microsoft. It has, however, been thoroughly tested and can be used without reservations.
3. Click on "Install this driver software anyway" and follow the remainder of the installation routine through to completion.

Selecting the USB port on the PC

The USB driver sets up a virtual COM port when you connect the SRM basic unit to the PC using a USB cable. You will have to select this COM port manually if SRM-TS does not locate it automatically.

1. Start the “SRM-Tools” or “SRM-TS” software.
   The start-up screen is displayed.
2. Click on the “Device Configuration”, “Read Out Data” or “Remote & Data Analysis” button, depending on the task you want to perform.
   The corresponding window opens.
3. Select the “Communication Settings” command in the “Device” menu.
   The “Communication Settings” window opens.
4. Click on “Select port manually”
   A list of available COM ports is displayed.

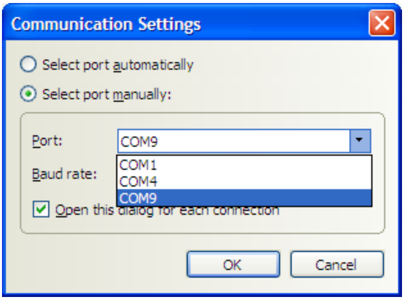


Fig. 16-7 “Communication Settings” window

   The last device connected to the PC using USB will normally be assigned the highest number.
5. Select the USB port and click on “OK”.

You can now use all the functions under “Device Configuration” and “Read Out Data” via the USB interface.
Exception: Firmware updates can only be performed via the serial interface.

16.3 SRM configuration

This section covers the following topics:

- Creating a configuration
- Transferring a configuration from the PC to the SRM
- Transferring a configuration from the SRM to the PC

Creating a configuration

The “SRM-Tools” software performs the following tasks:

- Creation and management of up to 20 antenna factor lists for non-Narda antennas. Antenna factors for Narda antennas do not need to be entered because the SRM-3000 detects them automatically.
- Creation and management of up to 20 cable loss lists for non-Narda cables. Cable losses for Narda cables do not need to be entered because the SRM detects them automatically.
- Creation and management of up to 50 service tables.
- Creation and management of up to 20 cell name tables (only for the “UMTS P-CPICH Demodulation” option).
- Management of safety standards (e.g. IEEE, FCC, ICNIRP, BGV B11, Ö NORM, Safety Code 6).
- Management of up to 20 instrument setups.
- Management and storage of all settings in libraries.

Note: Detailed information about the operation of the “SRM-Tools” or “SRM-TS” software is found in the on-line help for the software.

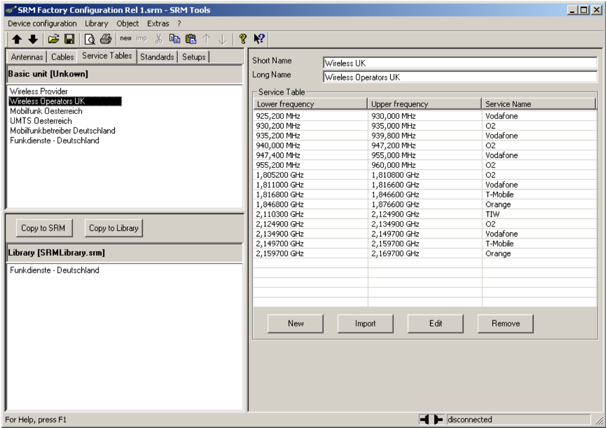


Fig. 16-8 “SRM-Tools” software in “Configuration” mode

Transferring a configuration from the PC to the basic instrument

✓ SRM and PC are connected together (see sec. 16.2, page 16-3).
✓ “SRM-Tools” or “SRM-TS” is running and is in “Device Configuration” mode.
✓ The configuration to be transferred to the basic instrument has been created and is shown in the upper left part of the window.

Notice: When configurations are transferred, any configurations already stored in the basic instrument will be deleted. The following warning message appears:

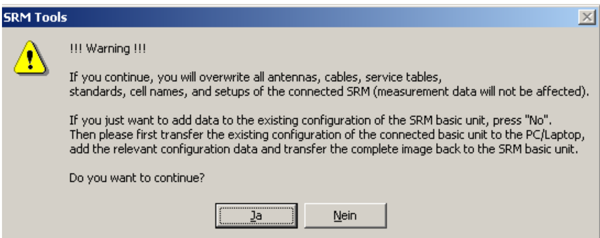


Fig. 16-9 “SRM-Tools” software: Warning before overwriting data

Always therefore transfer a complete data set with ALL the configurations that you want to save in the SRM, i.e the new ones AND the old ones.

If you are in any doubt, you can first transfer the configurations from the basic instrument to the PC (image).

⇒ Now click on the ⬇ icon in the toolbar.

– or –

⇒ Click on **Transfer from PC/Laptop to SRM** in the **Device configuration** menu.

The data are transferred to the SRM.

Transferring a configuration from the basic instrument to the PC

✓ SRM and PC are connected together (see sec. 16.2, page 16-3).
✓ "SRM-Tools" is running and is in "Configuration" mode.

⇒ Click on the ⬆ icon in the toolbar.

– or –

⇒ Click on **Transfer from SRM to PC/Laptop** in the **Device configuration** menu.
The data are transferred from the SRM to the PC, where they can be processed and stored.

Note: "SRM-Tools" and "SRM-TS" check the SRM setups for consistency and provide the same "repair" features that are described under "Creating and managing setups" (see page 14-20).

16.4 Reading out the stored results from a SRM

All the results saved by the SRM can be transferred to the PC using the “SRM-Tools” software.

✓ SRM and PC are connected together (see sec. 16.2, page 16-3).
✓ “SRM-Tools” is running and is in “Readout stored data” mode.

1. Click on the  icon in the toolbar.
   – or –
   Click on **Load** in the **Datasets** menu.
   The “Load data” dialog opens.

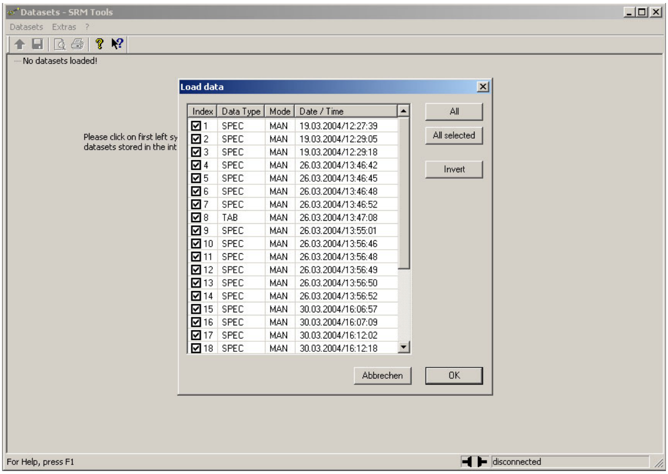


Fig. 16-10 Selection of data sets in the instrument memory

2. Select the data sets that you want to transfer from the instrument memory to the PC.
3. Click on “OK”.
   The selected data sets are transferred.

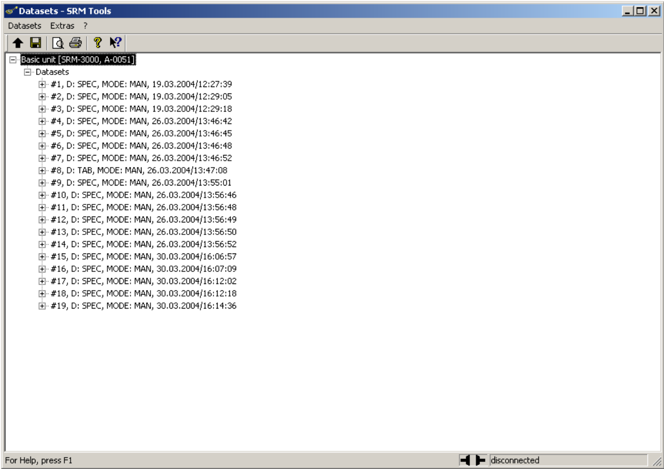


Fig. 16-11 List of transferred data sets

The "SRM-Tools" software provides the following features in this mode:

- Export all results or individual results in text or CSV format for further processing with other programs such as Microsoft EXCEL®. The separator character for CSV format can be selected.
- Printing out results (summary)

Note: Detailed information about the operation of the "SRM-Tools" or "SRM-TS" software is found in the on-line help for the software.

16.5 Updating the firmware of the SRM

⚠ **Caution**

Malfunction

Downgrading from a higher to a lower firmware version can cause the SRM-3000 to malfunction.

✓ The new firmware release is stored on the PC.

⚠ **Caution**

Data loss

Updating the firmware can take up to **10 minutes**. If the process is terminated prematurely, loss of data may occur so that the SRM no longer operates.

All the measurement results stored in the SRM basic unit will be deleted when you update the firmware. Configurations and setups are not deleted.

Before making the update:

⇒ Upload your saved measurement results to your PC (see page 16-13).
⇒ Finish all measurements.

During the update:

⇒ Avoid interruptions due to power failures.
⇒ Do not make any settings on the SRM until the message “Firmware update successfully achieved” is displayed.

1. Connect the AC Adapter / Charger to the SRM.
2. Start “SRM-Tools” or “SRM-TS”.
3. Select “Device Configuration” or “Read Out Data” mode.
4. Start the dialog from the “Device” -> “Update Firmware” menu.
5. Follow the program instructions:
   – Connect SRM and PC via their serial interfaces (see sec. 16.2, page 16-3).
   – Switch off the SRM.
   – Select the firmware release.
   – Start the update.
   The update process starts and its progress is indicated.
   When the update is complete, the message “Firmware update successfully achieved” is displayed.
6. Switch off the SRM.

7. Close "SRM-Tools".

Note: Detailed information about the operation of the "SRM-Tools" or "SRM-TS" software is found in the on-line help for the software.

16.6 Activating options

Options are delivered along with new firmware releases.
To activate them, you require a special code (Option Key) which you will find in the "SRM-3000 Options Passport". This document is supplied along with the purchase documents for the option.

1. Connect the AC Adapter / Charger to the SRM.
2. Start "SRM-Tools".
3. Click on the "Options" button.
   The "Connect Device" window opens.
4. Click on NEXT.
   The "Select Options" window opens displaying the available options. Options that have not been activated are marked LOCKED.
5. Highlight the option you want by clicking on it:

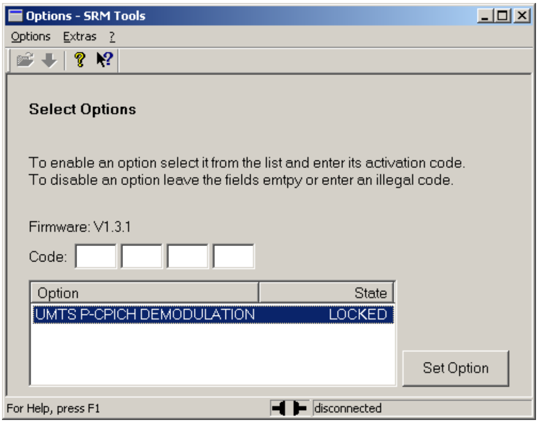


Fig. 16-12

6. Type in the Option Key.
7. Click on "Set Option".

If activation is successful, the option status will change to UNLOCKED.

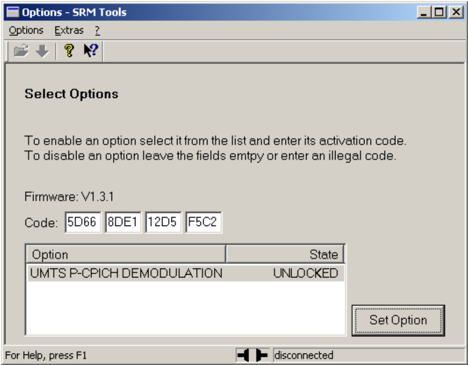


Fig. 16-13

8. Exit the "SRM-Tools" software.

16.7 Installing and uninstalling "SRM-Tools" or "SRM-TS"

To install "SRM-Tools" or "SRM-TS"

1. Insert the CD-ROM in the PC CD-ROM drive.
2. Open the "SRM Tools" or "SRM-TS" folder using the file manager (Windows Explorer).
3. Double click on "setup.exe" to start the program.
4. Follow the instructions displayed on screen.

To uninstall "SRM-Tools" or "SRM-TS"

1. Insert the CD-ROM in the PC CD-ROM drive.
2. Open the "SRM Tools" or "SRM-TS" folder using the file manager (Windows Explorer).
3. Double click on "setup.exe" to start the program.
   A message asking if you want to delete "SRM-Tools" or "SRM-TS" is displayed.
4. Click on "Yes".
   "SRM-Tools" or "SRM-TS" will be deleted.

You can use an uninstall link in the folder "Programme / NardaSafety / SRM Tools" or "Programme / NardaSafety / SRM TS" instead.

17 Remote control

All the instrument functions can be remote controlled using a remote control program (e.g. a standard terminal emulator such as “Hyperterminal”).

The following hardware is required for this:

- PC with serial interface
- Interface cable (zero modem cable supplied)

– or –

- PC with USB interface
- USB interface cable

The sections below describe how the SRM is connected to the PC as well as the steps to be taken to start the remote control process.

Note: The individual remote control commands are listed in a separate PDF document. The latest version of this PDF document can be downloaded from our homepage.

17.1 Connecting to the PC

1. Connect the serial interface of the PC to the serial interface of the SRM with a zero modem cable

– or –

   Connect the USB interfaces of the SRM and the PC with a USB cable.

2. Start the program for control and management of the PC interface (e.g. a standard terminal emulator such as “Hyperterminal”).
3. Set the following interface parameters in the interface control program that you have selected on your PC:
   – Select the communications port (COM port) to correspond with the physical connection made in step 1 above.

   If you are using the serial interface, set the following:

   – Baud rate: 115200 or 230400
   – No parity
   – 8 data bits
   – 1 stop bit
   – Handshake: None

4. Switch on the SRM and set its Remote Control Port to SERIAL or USB (see sec. 14.11, page 14-15).

The connectors for the serial (RS-232) and USB interfaces are found at the bottom of the instrument.

Fig. 17-1 Serial (1) and USB (2) interfaces

17.2 Switching the SRM to remote controlled operation

✓ The PC and the SRM are switched on.
✓ The data connection has been made.
✓ The interface parameters have been set.

⇒ Transmit the command **`Remote<ws>ON<SC>`**
(**`<ws>`** = white space, **`<SC>`** = semicolon)
The SRM-3000 should now display the following:

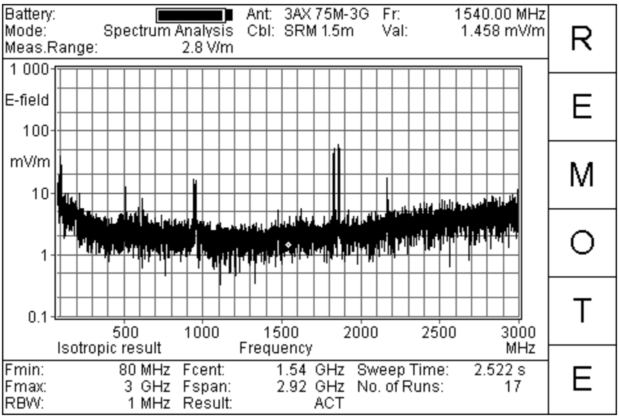


Fig. 17-2 SRM-3000 in remote control mode

Help for problems

Check the following if the SRM does not switch to remote control mode:

- Has the correct remote control cable been used (zero modem cable)?
- Do the interface parameters of the PC and the SRM match?
- Was the “Remote” command transmitted correctly?

17.3 Fundamentals of remote control

Some fundamental remote control terms are explained in the sections below.

The remote control command syntax is based on ASCII strings, which are made up from a remote control command and a certain number of parameters.

17.3.1 Remote control command syntax

An underline is sometimes used to improve legibility of the commands (e.g. **`F_MIN`**, **`BI_VALUE`**). Upper and lower case letters are not differentiated, i.e. **`F_MIN`** and **`f_min`** are processed identically.

17.3.2 Parameter syntax

The parameters in the commands have various formats:

Parameter	Explanation
String	The maximum number of characters or values that can be assumed by a parameter is specified in the remote control command. The use of upper or lower case letters is decided within a string by a block without a space. Example: **<REMOTE ON;>** switches on remote control mode.
Float/Double (32 bit or 64 bit floating point value)	Used for numerical parameters. Results that have specific units require a special format: d.dddE(-)e for linear units and (-)(d)(d)d.dd for logarithmic units. Example: **<F_MIN 1E6;>** sets the lower frequency to 1 MHz.
ShortInt (16 bit integer with sign)	The range of values that can be set is specified in the description of the remote control command. Example: **<CT_ANT_SEL 3;>** selects the third antenna in the internal list of antennas.
Date and time specific formats (dd.mm.yy and hh:mm:ss)	Example: **<TIME 12:15:00;>** sets the time to 12:15.

Table 17-1 Parameters

The parameters in a command containing several parameters must each separated by a comma (abbreviation: CO) or a “carriage return” (abbreviation: CR).

17.3.3 Command line termination

Remote control commands are terminated by a semicolon (abbreviation: SC).

17.4 Separate document about remote control

Because the software for the SRM is constantly being further developed and improved, a separate document about remote control is available. This document contains the individual remote control commands as well as some example programs.

You can obtain the latest version of this PDF document about remote control by requesting it from Narda.

Notes:

18 Specifications

18.1 Frequency range and operating modes

Frequency range	100 kHz to 3 GHz
Operating modes	Spectrum Analysis Safety Evaluation UMTS P-CPICH Demodulation (Option) Time Analysis –Time Controlled Storing (Option)

18.2 RF characteristics

18.2.1 Frequency

Resolution bandwidths (RBW)	See individual operating mode specifications	
Phase noise (SSB)	30 kHz carrier spacing 100 kHz carrier spacing 1 MHz carrier spacing	< -85 dBc (1 Hz) < -105 dBc (1 Hz) < -120 dBc (1 Hz)
Reference frequency	Initial deviation Aging Thermal drift	< 1.5 ppm < 0.5 ppm/year < 2.0 ppm (within the specified operating temperature range)

Amplitude

Upper measurement range (MR) limit	-27 dBm to +23 dBm (in 1 dB steps)
Display range	From noise floor up to +26 dBm
Maximum RF power level	+30 dBm
Maximum DC voltage	50 V

Intrinsic noise	-120 dBm for 1 kHz RBW, f > 20 MHz and measurement range (MR) = -27 dBm
RF attenuation	0 to 50 dB in 1 dB steps (coupled to measurement range)
Second order intermodulation products	< -57 dBc for two signals with levels 9 dB below the measurement range (MR) and a spectral line spacing greater than 100 kHz
Third order intermodulation products	< -68 dBc for two signals with levels 9 dB below the measurement range (MR) and a spectral line spacing greater than 500 kHz
Level measurement uncertainty	within the temperature range 15 °C to 30 °C: < 1.1 dB in the frequency range 20 MHz to 3 GHz
Interference, due to input	< -65 dBc or measurement range (MR) = -71 dB for signal levels less than MR = -6 dB (the worst value applies); input frequency f > 40 MHz < -60 dBc for a carrier spacing of 72 MHz
Interference, not due to input	< -94 dBm or measurement range (MR) = -67 dB for frequencies above 20 MHz (the worst value applies)
Units	dBm, dBV, dBmV, dBµV Units of field strength available if a measurement antenna is used (see “Measurement functions”)

RF input

Type	N connector, 50 Ω
Return loss	> 12 dB for frequencies from 200 kHz to 2.7 GHz

18.2.2 “Spectrum Analysis” mode

<table>
<tr><td>Measurement type</td><td colspan="2">Spectrum analysis</td></tr>
<tr><td>Resolution bandwidths (RBW, -3 dB)</td><td colspan="2">1 kHz to 5 MHz in decade steps of 1, 2, 3, 5, and 10.
List of available resolution bandwidths depends on the SPAN setting</td></tr>
<tr><td>Measurement range setting (MR)</td><td colspan="2">Manually from list or using the “MR Search” function to determine the current best measurement range</td></tr>
<tr><td>Sweep time</td><td colspan="2">50 ms to 1 s, depending on span setting, measurement in direction of one axis</td></tr>
<tr><td rowspan="2">Filter</td><td>Type</td><td>Gaussian filter</td></tr>
<tr><td>Form factor
(-3 dB / -60 dB)</td><td>< 3.8
for resolution bandwidths (RBW) less than 100 kHz</td></tr>
<tr><td>Detection</td><td colspan="2">Detection selected by Result Type function:
• AVG: root mean square value (RMS)
• MAX: peak value (PEAK)</td></tr>
<tr><td>Evaluation
(Result Type)</td><td colspan="2">• ACT: Displays the current spectrum
• MAX: Maximum hold function
• AVG: Average taken over a selectable number of spectra (4 to 64)
or over a selectable time period (1 to 30 min.)
• MAX AVG: Maximum hold function after averaging a defined number of spectra
• SAVG: Spatial averaging (option)</td></tr>
<tr><td>Marker functions</td><td colspan="2">Highest peak, right peak, left peak, next highest peak, next lowest peak
Marker display pane (frequency, level, service name according to the selected table)</td></tr>
<tr><td>Evaluation functions</td><td colspan="2">Peak table (list of the 50 highest peaks)
Integration over a user-defined frequency band</td></tr>
<tr><td>Measurement axis</td><td colspan="2">Isotropic measurement
(with direct display of isotropic result)
Measurement in X, Y, or Z axis direction
(for separate measurements in one direction only using an isotropic / three axis antenna)</td></tr>
</table>

Display functions	Y-axis display range: 20, 40, 60, 80 or 100 dB Y-axis reference point: -47 dB to +43 dB Full Screen mode: Function enabling the entire display to be used to show the spectrum
Zoom	Zoom Min: Zoom window lower frequency setting Zoom Max: Zoom window upper frequency setting Move Zoom Area: Shifts the zoom window along the frequency axis Reduce/Enlarge Zoom Area: Changes the scale of the zoom window Zoom to Marker: Shifts the zoom window to the marker position Execute Zoom: Sets the zoom window limits to the selected frequency values

18.2.3 “Safety Evaluation” mode

Measurement type	Spectrum analysis followed by integration in user defined frequency bands (“services”)
Resolution bandwidths (RBW, -3 dB)	Automatic, depending on the narrowest user defined service, or user defined
Measurement range setting (MR)	Manually from list or using the “MR Search” function to determine the current best measurement range
Filter	See “Spectrum Analysis” mode
Detection	Root mean square (RMS), integration time = 1/(2xRBW)
Evaluation (Result Type)	See “Spectrum Analysis” mode
Measurement axis	Isotropic measurement (with direct display of isotropic result) Measurement in X, Y, or Z axis direction (for separate measurements in one direction only using an isotropic / three axis antenna)

Display functions	Table view showing service names, field strength contributions, and corresponding frequency band (maximum three columns) Full Screen mode: Function enabling the entire display to be used to show the table
Noise suppression	Determines whether measured values are above the device noise floor by setting a threshold (0, 3, 6, 10, 15, 20 dB relative to the intrinsic noise). Measured values below the threshold are shown as the absolute threshold value preceded by “<” (less than).

18.2.4 “UMTS P-CPICH Demodulation” mode (Option)

Measurement type	P-CPICH (Primary Common Pilot Channel) demodulation used as the basis for assigning the measured field strength values to individual UMTS radio cells
UMTS channel selection	Enter the center frequency (Fcent) or channel number (Chann)
Resolution bandwidth (RBW)	3.84 MHz (-3dB)
Measurement range setting (MR)	Manually from list or using the “MR Search” function to determine the current best measurement range
Channel selection resolution	100 kHz for center frequency entries, 0.5 x channel number for channel number entries
Detection	RMS, integration time 10 ms
Filter	Root-raised cosine (RRC), roll-off factor $\alpha = 0.22$
Demodulation algorithms	• FAST • SENSITIVE
Evaluation (Result Type)	• ACT: Displays the instantaneous value as well as the maximum value which occurred since the last reset • AVG: Displays the average value taken over a selectable number of results (4 to 64) or over a selectable time period (1 to 30 min.) as well as the maximum of the average values which occurred since the last reset

Marker functions – in "Hold" status only, "Bar graph", "Mixed" and "Graph" display modes	Highest peak, right peak, left peak, next highest peak, next lowest peak Selection of Value or Max. Value display
Evaluation function	Extrapolation factor for multiplying the individual results and the overall result, selectable from 0 to 100 in steps of 0.001
Demodulated received signal	P-CPICH
Measurement axis	Isotropic measurement (with direct display of isotropic result) Measurement in X, Y, or Z axis direction (for separate measurements in one direction only using an isotropic / three axis antenna)
Display	Up to 16 scrambling codes simultaneously Instantaneous and maximum channel power level (Value and Max. Value) User defined cell names (from cell name tables) Number of sweeps since last reset Selection of individual scrambling codes Extrapolation factor, setting from 0 to 100 in steps of 0.001.
"Normal Table" display mode	Table format: Index number, Scrambling code, Value, Max. value, Cell name Total of all Value and Max. value results (Total) Analog measurement result (Analog)
"Table Ratio" display mode	Table format: Index number, Scrambling code, Value, Max. value, Ratio (Value/Analog) Total of all Value and Max. value results (Total) Analog measurement result (Analog)
"Bar graph" display mode	Bar graph display of the selected scrambling code, the total (Total) and the analog measurement result (Analog) with indication of maximum value in each case
"Mixed" display mode	Total of selected scrambling codes: Value and Max. value shown as enlarged numerical display, together with Graphic display of history for the past 1 to 60 minutes

“Value” display mode	Total of selected scrambling codes: Value and Max. value shown as enlarged numerical display
“Graph” display mode	Total of selected scrambling codes: Graphic display of history for the past 1 to 60 minutes
Noise suppression	Determines whether measured values are above the device noise floor by setting a threshold (0, 3, 6, 10, 15, 20 dB relative to the intrinsic noise). Measured values below the threshold are shown as the absolute threshold value preceded by “<” (less than).

18.2.5 “Time Analysis” mode

Measurement type	Selective measurement at a fixed frequency
Detection	Root mean square (RMS), integration time 480 ms, or peak value (PEAK)
Filter	Steep cut-off channel filter
Resolution bandwidths (RBW, -6 dB)	6.4 kHz to 6 MHz
Evaluation (Result Type)	• ACT: Displays the instantaneous value • AVG: Average over a specified time (with RMS detector only) • MAX: Maximum hold function • MAX AVERAGE: Maximum hold function for the averaged values (with RMS detector only) • SAVG: Spatial averaging in “Value” display mode (option)
Marker functions – in “Hold” status only, “Mixed” and “Graph” display modes	Highest peak, right peak, left peak, next highest peak, next lowest peak
Evaluation function	Duty Cycle: Displays the ratio of the average power level to the maximum power level (Pavg/Pmax), calculated over the displayed time period.
Time averaging	0.96 seconds to 30 minutes; selectable values 0.96, 1.2, 2.4, 3.6, 6, 12, 18, 30 s, 1, 2, 3, 5, 6, 10, 15, 20, 30 min.

Measurement axis	Measurement in X, Y, or Z axis direction (for separate measurements in one direction only using an isotropic / three axis antenna)
“Mixed” display mode	Measurement result at selected frequency: Value and Max. value shown as enlarged numerical display, together with Graphic display of history for the past 1 to 60 minutes
“Value” display mode	Measurement result at selected frequency: Value and Max. value shown as enlarged numerical display
“Graph” display mode	Measurement result at selected frequency: Graphic display of history for the past 1 to 60 minutes
Noise suppression	Determines whether measured values are above the device noise floor by setting a threshold (0, 3, 6, 10, 15, 20 dB relative to the intrinsic noise). Measured values below the threshold are shown as the absolute threshold value preceded by “<” (less than).

18.2.6 Measurement functions

Field strength measurements

Detection of Narda measurement antennas	Antenna parameters taken into account automatically when antenna connected: Antenna type, serial number, calibration date and antenna factors (see below) Automatic restriction of frequency range to correspond with that of the antenna connected
Antenna factors	Used for displaying results in units of field strength Stored in all Narda antennas during calibration Up to 20 antenna factor lists for non-Narda antennas can be saved (these lists are defined using “SRM-Tools” or “SRM-TS” PC software)
Detection of Narda cables	Cable parameters taken into account automatically when cable connected: Cable type, serial number, calibration date and attenuation factors (see below) Automatic restriction of frequency range to correspond with that of the cable connected

Cable attenuation factors	Used to correct the power level display Stored in all Narda cables during calibration Up to 20 cable attenuation factor lists for non-Narda cables can be saved (these lists are defined using “SRM-Tools” or “SRM-TS” PC software)
Units	With Narda antenna: % (percentage of permitted limit value), V/m, A/m or W/m^2, mW/cm^2, dBV/m, dBmV/m, dBµV/m, dBA/m Without antenna: dBV/m, dBmV/m, dBµV/m, dBA/m
Isotropic measurements	Automatic switching of antenna axis when Narda antenna used, with calculation of isotropic result Support for sequential measurements using single-axis antennas, with calculation of isotropic result The device shows the results in both cases immediately, either as spectrum or as numerical value
Weighted display	In % of human safety standard limit values (e.g. ICNIRP, IEEE, FCC, Safety Code 6, BGV B11, BImSchG, and similar) Updates of new developments in human safety standards possible using “SRM-Tools” (included) or “SRM-TS” PC software
Assignment of results to telecommunications services	Service tables can be defined and edited using “SRM-Tools” or “SRM-TS” PC software; these are lists of frequency bands (upper and lower limit frequencies, name of the defined frequency band) Up to 50 service tables can be saved in the basic unit These service tables are used to automatically assign the results to the specified services according to frequency (marker functions, peak table evaluation function, “Safety Evaluation” mode)

Setups

Quantity	Up to 20 device configurations can be saved in the basic unit. They can be uploaded or downloaded to or from a PC using “SRM-Tools” or “SRM-TS” PC software.

Memory

Storage modes	Instantaneous result storage: • Spectrum in “Spectrum Analysis” mode (SPEC) • Table in “Safety Evaluation” mode (TAB) • Values in “UMTS P-CPICH Demodulation” mode (UTAB) • Values in “Time Analysis” mode (VAL), Also lists of values with “Time Controlled Storing” option (LIST)
Conditional storing	Results stored when they exceed a threshold value (in all operating modes); with programmable storage rate and reset function
Time controlled storing (option)	Storage controlled by timer for long-term monitoring (in all operating modes). Start date and start time settable with one second resolution Measurement duration settable from 1 second to 99 hours in one-second steps Storage repetition rate, settable values 1.2, 2.4, 3.6, 6, 12, 18, 30 s, 1, 2, 3, 5, 6, 10, 15, 20, 30 min. Reset function for automatic reset of stored maximum values each time a result is stored (Always), or when a measurement is started (On start) or never (Never)
Memory capacity	16 MB, 48 MB from series F onwards (up to 9999 data sets)

18.2.7 General specifications

Operating temperature range	-10 °C to +50 °C for operation from batteries and AC adapter / charger unit 0 °C to +40 °C for recharging
Humidity	< 29 g/m3 (< 93% at +30 °C)
RF immunity	200 V/m in the frequency range 100 kHz to 3 GHz

Standards compliance

Climatic	Storage	1K3 (IEC 60721-3), extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3)
	Operation	7K2 (IEC 60721-3)
Mechanical	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operation	7M3 (IEC 60721-3)
ESD and EMC	EN 61326:2004	
Safety	EN 61010-1:2002	
CE (European Community)	Yes (Conformity declaration: see page 18-24)	

Dimensions and weight

Dimensions W x H x D (without antenna)	255 mm x 195 mm x 60 mm
Weight	1900 g (including built-in rechargeable batteries)

Display

Type	Monochrome, transflective LCD, with backlight for indoor and outdoor use.
Size, resolution	115 mm x 80 mm, 480 x 320 pixels

Interfaces

RS-232	Electrical or optical (with optional accessory); transmission speed 115.2 kbaud
USB	USB 1.1

Power supply

Rechargeable batteries

Battery	Lithium-ion rechargeable battery Typical operating time 4 hours Rechargeable using AC adapter / charger unit
External power supply (12 V DC / 2.5 A)	AC/DC Adapter Input: 100 to 240 V~, 47 to 63 Hz, 700 mA

Calibration interval

Recommended calibration interval	24 months

18.3 Three axis E-field measurement antenna specifications

The three axis measurement antenna is included with the SRM-3000.

18.3.1 Characteristics

Frequency range [1)]	75 MHz to 3 GHz The correction factors individually determined during calibration are stored in an EEPROM and are applied automatically when used together with the SRM basic unit.
Antenna type	E-field
Sensor type	Three axis dipole array with scanned axes
Dynamic range [2)]	0.25 mV/m to 200 V/m
Destruction limit (CW signal)	435 V/m or 50 mW/cm^2
Intrinsic noise displayed when used with SRM basic unit with separate measurement in direction of one axis [3)]	50 µV/m at 900 MHz with 1 kHz resolution bandwidth (RBW) 70 µV/m at 2,1 GHz with 1 kHz resolution bandwidth (RBW)
Intrinsic noise displayed when used with SRM basic unit with isotropic (three axis) measurement [3)]	87 µV/m at 900 MHz with 1 kHz resolution bandwidth (RBW) 120 µV/m at 2,1 GHz with 1 kHz resolution bandwidth (RBW)
Upper limit of measurement range (for a single carrier signal)	300 V/m 1000 V/m for frequencies up to 110 MHz
Upper limit of measurement range (when used with SRM basic unit) [3)]	200 V/m (without restrictions throughout the entire frequency range from 75 MHz to 3 GHz)
RF connector	N connector, 50 Ω

1 Available on request with extended setting range from 50 MHz
2 Characteristic dynamic range with 10 dB signal to noise ratio (RBW = 1 kHz)
3 Characteristic values

18.3.2 Measurement uncertainty

Extended measurement uncertainty [1)] (when used with SRM basic unit and 1.5 m RF cable)	Frequency range	Single axis measurement with three axis antenna	Isotropic measurement
	75-900 MHz	+2.4 / -3.4 dB	+2.4 / -3.3 dB
	901-1400 MHz	+2.3 / -3.1 dB	+2.4 / -3.3 dB
	1401-1600 MHz	+2.2 / -3.1 dB	+2.6 / -3.4 dB
	1601-1800 MHz	+1.8 / -2.2 dB	+2.2 / -3.7 dB
	1801-2200 MHz	+1.8 / -2.2 dB	+2.4 / -3.3 dB
	2201-2700 MHz	+1.8 / -2.3 dB	+2.6 / -3.6 dB
	2701-3000 MHz	+1.9 / -2.4 dB	+3.2 / -5.3 dB
Calibration uncertainty	< 1.5 dB		

1 Characteristic value k = 2
(k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

18.3.3 General specifications

Operating temperature range	-10 °C to +50 °C (same as SRM basic unit)
Humidity	< 29 g/m3 (< 93% at +30 °C)

Standards compliance

Climatic	Storage	1K3 (IEC 60721-3), extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3)
	Operation	7K2 (IEC 60721-3)
Mechanical	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operation	7M3 (IEC 60721-3)

ESD and EMC	EN 61326:2004
Safety	EN 61010-1:2002
CE (European Community)	Yes (Conformity declaration: see page 18-24)

Dimensions and weight

Dimensions	450 mm long, 120 mm antenna head diameter
Weight	450 g

Calibration

Calibration	18 calibration points: 75, 100, 200, 300, 433, 600, 750, 900 MHz, 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.45, 2.7, 3 GHz. The SRM basic unit interpolates linearly between the calibration points
Recommended calibration interval	24 months

18.4 Single axis E-field antenna specifications (3531/01)

The single axis E-field measurement antenna 3531/01 is available as an option.

18.4.1 Characteristics

Frequency range	27 MHz to 3 GHz
Antenna type	E-field
Sensor type	Single axis broadband dipole
Dynamic range [1)]	90 µV/m to 80 V/m
Destruction limit (CW signal)	> 300 V/m or 25 mW/cm^2
Intrinsic noise displayed when used with SRM basic unit [2, 3)]	30 µV/m in the range 100 MHz to 2.1 GHz with 1 kHz resolution bandwidth (RBW)
Upper limit of measurement range (for a single carrier signal)	100 V/m
RF connector	N connector, 50 Ω

1 Characteristic dynamic range with 10 dB signal to noise ratio (RBW = 1 kHz)
2 Characteristic values
3 Intrinsic noise increases by 0.5 dB per 100 MHz above 2 GHz

18.4.2 Measurement uncertainty

Extended measurement uncertainty [1, 2] (when used with SRM basic unit and 1.5 m RF cable)	Frequency range	Single axis measurement with antenna
	36 - 300 MHz	2.1 dB
	301 - 433 MHz	2.3 dB
	434 - 1600 MHz	2.1 dB
	1601 - 3000 MHz	1.8 dB
Calibration uncertainty	< 1.5 dB	

1 Characteristic values
2 Characteristic value k = 2
(k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

18.4.3 General specifications

Operating temperature range	-10 °C to +50 °C (same as SRM basic unit)
Humidity	< 29 g/m3 (< 93% at +30 °C)

Standards compliance

Climatic	Storage	1K3 (IEC 60721-3), extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3)
	Operation	7K2 (IEC 60721-3)
Mechanical	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operation	7M3 (IEC 60721-3)

ESD and EMC	EN 61326:2004
Safety	EN 61010-1:2002
CE (European Community)	Yes (Conformity declaration: see page 18-24)

Dimensions and weight

Dimensions	460 mm long, 135 mm x 90 mm antenna head dimensions
Weight	450 g

Calibration

Calibration	24 calibration points: 26, 30, 40, 50, 60, 75, 100, 200, 300, 433, 600, 750, 900 MHz, 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.45, 2.6, 2.8, 3 GHz The SRM basic unit interpolates linearly between the calibration points
Recommended calibration interval	24 months

18.5 Single axis E-field antenna specifications (3531/02B)

The single axis E-field measurement antenna 3531/02B is available as an option.

18.5.1 Characteristics

Frequency range	100 kHz to 300 MHz
Antenna type	E-field
Sensor type	Single axis, active broadband dipole
Dynamic range [1)]	125 µV/m to 16 V/m in the range 100 kHz to 10 MHz, 125 µV/m to 36 V/m in the range >10 MHz to 300 MHz
Destruction limit (CW signal)	> 1000 V/m
Intrinsic noise displayed when used with SRM basic unit [2)]	40 µV/m in the range 100 MHz to 300 MHz with 1 kHz resolution bandwidth (RBW)
Upper limit of measurement range (for a single carrier signal)	50 V/m
RF connector	N connector, 50 Ω

1 Characteristic dynamic range with 10 dB signal to noise ratio (RBW = 1 kHz)
2 Characteristic values

18.5.2 Measurement uncertainty

Extended measurement uncertainty [1, 2] (when used with SRM basic unit and 1.5 m RF cable)	Frequency range	Single axis measurement with antenna
	0.1 - 20 MHz	2.7 dB
	20.1 - 300 MHz	2.0 dB
Calibration uncertainty	< 1.2 dB	

1 Characteristic values
2 Characteristic value k = 2
(k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

18.5.3 General specifications

Operating temperature range	-10 °C to +50 °C (same as SRM basic unit)
Humidity	< 29 g/m3 (< 93% at +30 °C)

Standards compliance

Climatic	Storage	1K3 (IEC 60721-3), extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3)
	Operation	7K2 (IEC 60721-3)
Mechanical	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operation	7M3 (IEC 60721-3)
ESD and EMC	EN 61326:2004	
Safety	EN 61010-1:2002	
CE (European Community)	Yes (Conformity declaration: see page 18-24)	

Dimensions and weight

Dimensions	460 mm long, 135 mm x 90 mm antenna head dimensions
Weight	550 g

Calibration

Calibration	141 calibration points. The SRM basic unit interpolates linearly between the calibration points.
Recommended calibration interval	24 months

18.6 Single axis H-field antenna specifications (3551/01)

The single-axis H-field measurement antenna 3551/01 is available as an option.

18.6.1 Characteristics

Frequency range	100 kHz to 300 MHz
Antenna type	H-field
Sensor type	Single axis loop antenna
Dynamic range [1)]	0.4 µA/m to 71 mA/m
Destruction limit (CW signal)	> 2.65 A/m above 1 MHz
Intrinsic noise displayed when used with SRM basic unit [2)]	0.17 µA/m for each frequency > 20 MHz with 1 kHz resolution bandwidth (RBW)
Upper limit of measurement range (for a single carrier signal)	100 mA/m
RF connector	N connector, 50 Ω

1 Characteristic dynamic range with 10 dB signal to noise ratio (RBW = 1 kHz)
2 Characteristic values

18.6.2 Measurement uncertainty

Extended measurement uncertainty [1, 2)] (when used with SRM basic unit and 1.5 m RF cable)	Frequency range	Single axis measurement with antenna
	0.1 - 20 MHz	2.7 dB
	20.1 - 300 MHz	2.0 dB
Calibration uncertainty	< 1.2 dB	

1 Characteristic values
2 Characteristic value k = 2
(k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

18.6.3 General specifications

Operating temperature range	-10 °C to +50 °C (same as SRM basic unit)
Humidity	< 29 g/m3 (< 93% at +30 °C)

Standards compliance

Climatic	Storage	1K3 (IEC 60721-3), extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3)
	Operation	7K2 (IEC 60721-3)
Mechanical	Storage	1M2 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operation	7M3 (IEC 60721-3)
ESD and EMC	EN 61326:2004	
Safety	EN 61010-1:2002	
CE (European Community)	Yes (Conformity declaration: see page 18-24)	

Dimensions and weight

Dimensions	460 mm long, 43 mm x 100 mm antenna head dimensions
Weight	450 g

Calibration

Calibration	141 calibration points. The SRM basic unit interpolates linearly between the calibration points.
Recommended calibration interval	24 months

18.7 Conformity declaration

Supplier's Declaration of Conformity

(in accordance with ISO/IEC 17050-1)

SDoC no.:	2006-09		
Issuer's name:	Narda Safety Test Solutions GmbH (manufacturer)		
Issuer's address:	Sandwiesenstr. 7, D-72793 Pfullingen, Germany		
Object of declaration:	**Model no.**	**Order no.**	**Designation**
	SRM-3000	3001/01	Selective Radiation Meter

The object of the declaration described above is in conformity with the requirements of the following documents:

Documents No.	**Title**
89/336/EEC	EMC Directive of the Council of the European Union amended by 91/263/EEC, 92/31/EEC and 93/68/EEC
EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003	Electrical equipment for measurement, control and laboratory use. EMC requirements
73/23/EEC	Low Voltage Directive of the Council of the European Union amended by 93/68/EEC
EN 61010-1: 2002	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Signed for and on behalf of:	Narda Safety Test Solutions GmbH
Place and date of issue:	Pfullingen, 2006-01-26
Signature:	
Name, function:	Werner Kumbier, Technical Director

Supplier's Declaration of Conformity

(in accordance with ISO/IEC 17050-1)

SDoC no.: 2006-11

Issuer's name: Narda Safety Test Solutions GmbH (manufacturer)

Issuer's address: Sandwiesenstr. 7, D-72793 Pfullingen, Germany

Object of declaration:

Model no.	Order no.	Designation
SRM Antenna		
	3531/01	Single Axis E-Field, 27MHz-3GHz
	3531/02	Single Axis E-Field, 0.1-300 MHz
	3551/01	Single Axis H-Field, 0.1-300 MHz
	3501/01	Three Axis E-Field, 75MHz-3GHz

The object of the declaration described above is in conformity with the requirements of the following documents:

Documents No.	Title
89/336/EEC	EMC Directive of the Council of the European Union amended by 91/263/EEC, 92/31/EEC and 93/68/EEC
EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003	Electrical equipment for measurement, control and laboratory use. EMC requirements
73/23/EEC	Low Voltage Directive of the Council of the European Union amended by 93/68/EEC
EN 61010-1: 2002	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Signed for and on behalf of: Narda Safety Test Solutions GmbH

Place and date of issue: Pfullingen, 2006-01-30

Signature:

Name, function: Werner Kumbier, Technical Director

Notes:

Appendix A:

Measurement methods using a single axis antenna

This Appendix describes methods that can be used to determine field strength exposure using a single axis antenna, e.g. a customary antenna. It also describes how the SRM can be used with these methods.

Pendulum or sweep method (mobile measurement)

Measurement setup

The single axis antenna is fitted directly on to the basic instrument or the antenna and basic instrument are linked by a short cable.

- Fitting the antenna directly on the basic instrument: see page 5-6.
- Using a cable to connect the antenna to the basic instrument: see page 5-8.

Procedure

The user moves through the area to be measured during the course of the measurement, slowly sampling the entire volume using the manually held antenna by varying the preferred direction and the polarization direction simultaneously. In other words, the antenna is moved or “swept” round the area on a wave-like path.

The SRM should be set to “MAX” evaluation mode (maximum hold) during this procedure, regardless of the selected operating mode.

Experience has shown that recording times of a few minutes are generally sufficient to locate the maximum field strength within a given volume (e.g. a room in a house, or an office).

Advantages of this method

- Immediate determination of the maximum value of immissions for the area under consideration.
- Little time required.
- Operations within the affected area are only slightly disrupted.
- No time-consuming preparation needed for the measurement (e.g. moving of furniture).

Disadvantages of this method

- Measurement is not reproducible.
- Not possible to subsequently determine where within the measured area the maxima occurred.
- Requires a certain amount of experience in order to obtain meaningful results.
- Measurement uncertainty cannot be quantified.
  For example, only the components of the field that are parallel to the dipole axis will be detected when a dipole type antenna is used.
  If the antenna is not oriented correctly in the field, there is a risk that the exposure level measured will be zero or very low even if strong fields are present.

Rotation method

Measurement setup

The measurement can usefully be performed either manually or with the aid of a tripod.

For a manual measurement, the antenna is fitted directly on to the basic instrument or the antenna and basic instrument are linked by a short cable.

➯ Fitting the antenna directly on the basic instrument: see page 5-6.

➯ Using a cable to connect the antenna to the basic instrument: see page 5-8.

Alternatively, the single axis antenna can be fitted to a tripod and connected to the basic instrument by a long cable.

➯ Fitting the Narda antenna to a tripod: see page 5-11.

Procedure

The rotation method may be considered as a combination of the sweep method and the matrix method.

As with the matrix method, the volume to be measured is considered in terms of a cylinder that is supposed to represent the human body. The measurement is therefore made within a volume approximately 1 m in diameter and 2 m high, making measurements at different heights to ensure that the results are meaning.

To make the measurement, the antenna is rotated along a circular path about the axis. The measurement must be repeated at each measurement height with four different antenna polarizations (horizontal, vertical, +45°, -45°).

Movement along the circular path can be done manually like the sweep method or a tripod and antenna positioning device can be used, similar to a precision measurement.

Advantages of this method

- Not as time-consuming as the matrix method.
  The rotation procedure is simplified if a suitable antenna positioning device is available.
- Good measurement reproducibility.
- Allows spatial averaging of immisions (required by some standards).
- Local maxima can be located with a few measurement points.

Disadvantages of this method

- More time-consuming than the sweep method.
  Measurement of the defined volume must be repeated at different points in the area in order to cover the entire volume.
- Operations within the areas being measured are significantly disrupted.
  No conductive objects or persons may move within the defined measurement volume during the measurement.
  A minimum distance must be kept between the antenna and interfering objects such as furniture or walls in order that the reception characteristics of the antenna are not impaired.

Matrix method (precision measurement)

Measurement setup

The single axis antenna is mounted on a tripod and connected to the basic instrument by a long cable.

➭ Fitting the Narda antenna to a tripod: see page 5-11.

Defining the matrix

The measurement volume is sampled at points on a fixed matrix during a measurement using the matrix method.

If it is assumed that the immissions affect the body evenly, then the measurement volume can be defined as a cylinder approximately 2 m high and 1 m which is supposed to represent the human body.

Various measurement heights are set within the measurement volume. The resulting field strength is determined at each of these heights. The spacing between these measurement points should reflect the sensitivity of the corresponding body parts and organs.

Positioning the antenna

The antenna is mounted on a tripod to allow exact positioning of the sensors on the points of the matrix.

Only one component of the field strength can be detected at a time when a single axis antenna is used. For this reason, the antenna must be aligned in three orthogonal directions at each measurement point and a result (spectrum, table) obtained for each of these three directions. The field strength used for the assessment is given by the vector sum of the three orthogonal field strength values. The SRM provides support for such sequential measurements (see sec. 11.2.2, page 11-6).

An antenna positioning device is available in addition to the tripod to enable precise orthogonal positioning of the antenna axis when a making measurements with a single axis antenna.

Measurement procedure

1. Fit the antenna to the tripod with the antenna positioning device.
2. Place the tripod at the first point of measurement.
3. Set the tripod to the first measurement height.
4. Perform sequential measurement at this position as described in sec. 11.2.2, page 11-6.
5. Save the isotropic result that is determined.
6. Repeat steps 2 through 5 for further measurement heights.

Advantages of this method

- Good measurement reproducibility.
- Allows spatial averaging of immisions (required by some standards).
- Local maxima can be located with a few measurement points.

Disadvantages of this method

- The signal to be measured must remain constant for the entire measurement time while the three components are being detected.
- Very time-consuming.
  The already time-consuming measurement of the defined volume must be repeated at various points within the area to measure the complete area.
- Operations within the areas being measured are significantly disrupted.
  No conductive objects or persons may move within the defined measurement volume during the measurement.
  A minimum distance must be kept between the antenna and interfering objects such as furniture or walls in order that the reception characteristics of the antenna are not impaired.

Notes:

Appendix B:

Technical descriptions

Measurement principle

Signal frequencies of 3 GHz can hardly be sampled digitally. The SRM therefore uses a combination of analog and digital signal processing. The SRM is not a customary spectrum analyzer. It has been engineered specially to enhance particular characteristics for the analysis of electromagnetic fields. This includes a fast measurement speed at small resolution bandwidths (RBW). Intrinsic noise is also very low, -121 dBm at a resolution bandwidth of 1 kHz. Phase noise is extremely low, too; a YIG (Yttrium Iron Garnet) oscillator is employed internally to achieve this.
The SRM is thus right at the cutting edge of modern technology.

RF module, analog

The RF module is a screened unit that communicates serially with the main board. It includes the classic components of a superheterodyne receiver: input stage, 1st mixer, 2nd mixer, IF amplifier.

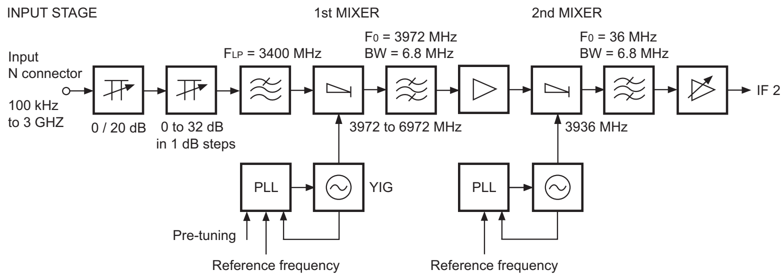


Fig. B-1 Block circuit diagram of RF module

The input stage itself contains a special feature: the two-stage attenuator. This optimizes the dynamic range with 1 dB steps over a range of 50 dB. The permitted input level is limited to +30 dBm because of thermal effects.

The 1st mixer converts the input signal to the first IF of 3972 MHz. The IF filter has a bandwidth of 6.8 MHz. The LO (local oscillator) can be set on a frequency raster of 400 kHz (coarse tuning). The oscillator is pre-tuned to a frequency close to the desired frequency so that the PLL (phase-locked loop) locks quickly to the correct frequency. Once settling has occurred, the mixer signals “PLL locked” to the main board so that the digital section can start collecting data.

The 2nd mixer operates with a fixed heterodyning frequency of the LO. The PLL converts only the reference frequency of 96 MHz to 3936 MHz.
The 2nd IF is around 36 MHz. Here, too, the IF filter has a bandwidth of 6.8 MHz.

Main board, digital

Spectrum analysis itself is performed in the digital section. Three modules downstream of the A/D converter take care of this function:

- A RSP (real-time signal processor) operates as a digital frequency converter with variable output filters.
- A DSP (digital signal processor) formed from a FPGA (field programmable gate array) assumes the function of a transient recorder. It captures the data and stores them in a SRAM (static random access memory).
- A µC (micro controller) reads the data from the DSP and performs the FFT (fast Fourier transformation).

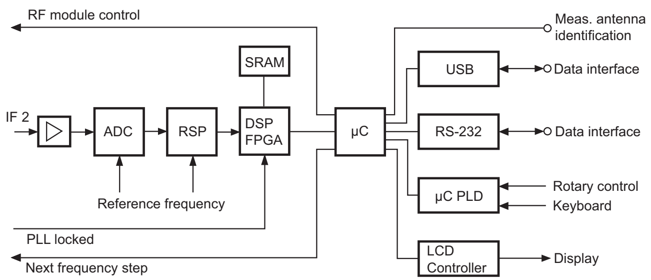


Fig. B-2 Block circuit diagram of main board

The RSP is a type of digital mixer and synthesizer. Because the analog IF signal can only be tuned in steps of 400 kHz, the RSP takes over the task of fine tuning in a ±200 kHz range. The RSP uses a programmable low pass filter to also limit the bandwidth of the output signal to correspond to the resolution bandwidth set by the user. The reduction factor can assume values from 4 to 3750.

The RSP also detects whether the A/D converter is overloaded. An overload is indicated by OVERLOAD in the display.

The DSP takes up the data from the RSP. The data are complex, i.e. real and imaginary parts are each present as 16-bit fixed point values packed into a 32-bit word.

Up to this point, all operations take place in the time domain. In “Spectrum Analysis” and “Safety Evaluation” modes, the µC transforms the data into the frequency domain. A FFT is unnecessary for the frequency range from 1 to 5 MHz, since the output from the RSP already corresponds to a single point FFT. For finer resolutions down to 1 kHz, the µC calculates a FFT with 16 to 8192 check points, of which up to 6709 are used.

Internal processes for a spectrum analysis

The interaction of analog preselection and digital fine tuning can lead to wide ranging internal processes which are unnoticed by the user. The instrument can cover a maximum frequency range of about 4 MHz with one FFT. If the FFT range is insufficient, the RF synthesizer may have to be retuned several times to other frequencies. The SRM-3000 then performs the FFT block by block and forms the overall result from the individual FFT results.

Display, measurement range and resolution

Spectrum analyzers designed for laboratory use have input attenuators and internal reference levels that can be set independently of one another in order to find a suitable compromise between signal to noise ratio and indermodulation. Simple, portable instruments often only allow selection of the reference level.This then determines the setting of the input attenuator and also usually the highest value on the y axis of the display. Problems arise if a few weak mobile radio channels close to a strong radio broadcast channel are to be measured. Either overloading and the attendant measurement error must be risked, or the mobile radio signals disappear at the bottom of the display.

For this reason, the SRM takes a different course, without requiring careful thought about the dynamic range on the part of the user, who simply sets a measurement range, preferably to the highest expected level. The instrument then automatically selects the corresponding input attenuation. The user can select the display range independently. So, for example, the user can set a measurement range of 100 V/m because the mobile radio antennas are mounted on a UHF transmitter mast, but still display the mobile radio channel field strengths on a scale of 1 V/m to fill the display screen.

It is similar for the x axis, which is linked to the frequency span and the resolution bandwidth (RBW). The SRM-3000 provides resolution bandwidths from 1 kHz up to 5 MHz - fine enough to separate long wave transmitters from one another and broad enough to capture an entire UMTS frequency block. In “Spectrum Analysis” mode, the SRM reduces the available resolution bandwidth to correspond with the frequency range setting so that the spectrum contains a maximum of 6709 lines or measurement points. The spacing between lines then corresponds to about half of the set resolution bandwidth. This is sufficient to resolve the entire 3 GHz frequency range at 1 MHz. 6709 lines are in any case still much more than the almost 300 pixels that the display panel can show along the x axis. The SRM must therefore combine more than 20 lines into a single result under certain circumstances. The display algorithm used by the SRM ensures that the displayed trace represents the minimum and maximum values. The high resolution set of raw data is retained, in contrast with many customary spectrum analyzers. This means that the display area can be changed subsequently or the entire data set can be processed further by an external PC. The markers and other evaluation functions also apply to the entire data set, thus giving these functions much higher precision and greater ease of use than has been the case up till now.

“Safety Evaluation” mode

Demonstrating the safety of electromagnetic fields requires answers to the initial questions:

- How high is the overall exposure relative to the permitted limit value?
- Who is contributing what to the exposure level?
- Who may therefore need to reduce transmitter output?

This requires selective measurement of the entire spectrum, but in the end only a few values are of interest, namely: the overall exposure level and the contributions made by the individual services expressed either in units of field strength or as a percentage of the permitted limit value.

The SRM as a special instrument has a separate operating mode for this purpose: “Safety Evaluation”. From the configuration menu, users select the services to be detected and the regulations to be used in assessing the results. The frequency tables for the most common services and the weighting factors for the standards and regulations are programmed into the instrument in the factory. The tables can be edited or new tables created using PC software. Simply assign a name to the service, set the upper and lower frequency limits and transfer the data to the instrument via the serial interface.

The measurement is then made by pushing a button. The SRM successively measures the bands corresponding to the services and also detects what is going on between these bands. The resolution bandwidth is set automatically so that there are still eight spectral lines in the narrowest band. The SRM-3000 thus achieves high measurement accuracy without wasting time on the measurement.

All of takes place unseen by the user, who does not need to worry about what is happening. The results are displayed: the contributions of the individual services (such as GSM and UTMS) towards the field strength as well as the contributions from the frequencies between them (Others) and the total field exposure level (Total). The SRM automatically integrates all the corresponding spectral lines in order to do this.

Measurement services usually want to see the result as a percentage of the permitted limit value. The SRM automatically evaluates each individual spectral line according to the standard or regulation that has been selected. If absolute values are required, a simple switch to displaying field strength (V/m) or power density (W/m^2) is all that is needed to ignore the evaluation.

“UMTS P-CPICH Demodulation” mode

The problem with measuring the electromagnetic fields that emanate from mobile phone base stations is that the output power level varies according to the level of traffic. As a result, the field strength also varies. However, both GSM and UMTS use at least one channel per base station that transmits at a constant, known power level. This is the BCCH (Broadcast Control Channel) in GSM, and the P-CPICH (Primary Common Pilot Channel) in UMTS. It is possible to estimate the maximum possible field exposure level from a measurement of this channel.

Because UMTS uses a modulation procedure called W-CDMA (Wideband Code Division Multiple Access), it is not possible to distinguish between the individual channels by means of a frequency-selective measurement. All the channels use the entire bandwidth of an UMTS frequency channel, which is about 5 MHz. The channels can only be separated by decoding them. The P-CPICHs and hence the UMTS cells can be distinguished by their different scrambling codes.

The SRM uses its analog superheterodyne receiver (RF module) for preselection for the UMTS measurement. The IF filters have a bandwidth of 6.4 MHz, sufficient to detect an UMTS frequency channel in its entirety. All further processing is done by the digital section after conversion in the 12 bit ADC:

- Zero conversion using the same type of filter as the UMTS transmitter uses
- Recording by a transient recorder
- Final demodulation.

The scrambling codes are determined using a correlation method. The SRM uses an algorithm capable of registering all the reflections from a transmitter separately if they are separated in time by more than a so-called chip width. If the same pilot channel is found several times, all the partial power levels are added together to give a total power level for this channel. If the reflections are closer together, it is neither possible nor necessary to separate them, since the total power level is the result in any case.

The SRM can also separate and detect two transmitters that accidentally have the same time structure. This “luxury” naturally requires more processing time. To make the measurements as fast as possible, you can switch between two demodulation algorithms. In FAST mode, the instrument reliably detects pilot channels having a power level of up to

10 dB below the total power level in the UMTS frequency channel. In SENSITIVE mode, the instrument also reliably detects pilot channels with power levels up to 15 dB below the total power level.

The frequency accuracy of the SRM is within 2.6 ppm, including adjustment accuracy, thermal response and aging. This corresponds to a maximum frequency offset of about 5.7 kHz for an UMTS frequency of 2200 MHz. This does not affect the demodulation process, but does result in a measurement error: The displayed field strength is less than the actual field strength. For this reason, the SRM-3000 automatically determines its frequency offset from the phase characteristic of the strongest P-CPICH during the first measurement run and corrects the tuning frequency accordingly for the next run. This automatic frequency control (AFC) means that the SRM-3000 is locked on to the output frequency of the strongest base station to an accuracy of a few Hertz. This is a highly precise frequency, since the prescribed deviation from the nominal frequency for base stations in the UMTS system is less than 0.1 ppm. The SRM-3000's AFC thus reduces the field strength measurement error due to mis-tuning to negligible values.

"Time Analysis" mode

"Time Analysis" mode is designed to monitor field sources that emit variable field strengths over a period of time. All mobile telephone base stations show such variations, since their exposure levels depend on the volume of traffic, i.e. the number of traffic channels in use at a given time. Pulsed radar equipment exhibits extreme variations; such equipment is used by flight controllers (all round radar).

"Time Analysis" mode is available from firmware release 1.4, and allows the SRM to continuously measure field exposure at a user defined frequency (Fcent). The bandwidth can be set between 6.4 kHz and 6 MHz to suit the source being measured, using the RBW parameter. The filters have very steep cutoffs and a stop band attenuation of at least 80 dB. This is advantageous when an individual service is to be measured without interference from neighboring services.

The special feature of "Time Analysis" mode is the gap-free measurement and recording of radiation power level versus time. The filters and internal processes in the SRM are arranged so that real-time recording of measurement results is not interrupted when the results are calculated. This is a particularly strong feature of the instrument. However, the measurement is restricted to a single axis to allow for continuous recording. If automatic isotropic measurement is selected, the SRM measures the three spatial axes one after the other, and no measurement results can be recorded while the instrument is switching from one axis to another. The three axis antenna can be used for continuous recording of results if one axis is selected for measurement. In this case, there is no advantage over the use of a single axis antenna.

The frequency range of 100 kHz to 3 GHz makes the SRM suitable, when used in conjunction with appropriate antennas, for monitoring all communications services from long wave up to UMTS, as well as for measuring radar equipment operating in the RF, VHF, UHF, L-band, or lower S-band. The filter settling time at a bandwidth of 6 MHz is around 330 ns. This is fast enough to correctly detect the peak values of radar signals with pulse widths of typically 1 µs.

RMS or peak value detectors can be selected, and the “Result Type” can be selected to display either current (actual) values (ACT), average values (AVG), or maximum values (MAX, MAX AVG), in each case as numerical values.

The averaging time can be set between 1 second and 30 minutes. In this way, the SRM matches the requirements of numerous human safety standards, including the German 26th BImSchV or the new European Guideline 2004/40/EG. These standards define limit values for the RMS value averaged (square law) over a period of 6 minutes, and they also specify the monitoring of peak values, which should not, for example, exceed 32 times the permitted RMS value.

If the “Result Type” is set to AVG or MAX AVG, the SRM indicates the progress of averaging by means of a bar graph at the lower edge of the window. When the bar graph is full, the averaging time has elapsed. The SRM then calculates the new average values continually by incorporating the new measurement values and deleting earlier values. Recording of measurement values is not interrupted at any time when a single axis measurement is being made.

“Spatial Averaging” function

The major standards concerned with human exposure to radio frequency radiation specify maximum exposure levels averaged over the whole body. The co-linear dipole antenna arrays that are very common in modern wireless communications systems, for example, have multiple lobes close to the antenna. The field strength typically varies by 6 to 7 dB along the length of an array. Therefore, the measured value is highly dependent on not only the distance from the antenna but also the height above the ground.

The traditional method of making spatial-averaged measurements is to use a “styropole”. A styropole is a non-conductive pole, often made of wood, equal in height to an average adult, having distance marks equally spaced along its length. Measurements are made alongside the styropole at each height and then mathematically averaged. The height and spacing of each measurement varies from standard to standard. For example, the IEEE C95.1-1999 standard specifies measurements from 0 centimeters (ground level) to 200 centimeters in 20 centimeter increments. Some exposure standards such as Canada’s Safety Code 6, require that measurements be averaged across two dimensions - vertically and horizontally. The Revised ECC Recommendation (02)04 of October 2003 used in Europe envisages averaging of three values, measured at heights of 1.1, 1.5 and 1.7 meters above floor level.

This manual technique is made more difficult than ever by modern wireless communications sites, particularly multi-user sites, because the field levels are continually varying. For example, paging systems go on and off and the number of cellular channels in use is always changing. Thus, a series of measurements made at different heights can vary more as a function of time than of location.

The averaging process

The SRM simplifies these measurements by automatically averaging the measurement values recorded at different positions within a room. The SRM determines the root mean square (RMS) value, i.e. the average power level, so it is sensible to set the detector function to RMS in “Time Analysis” mode, even though the PEAK setting is also available. The SRM always uses the instantaneous value (ACT) for the evaluation, although the other result type settings are also available (Result Type = ACT, AVG, MAX, MAX AVERAGE). These settings only affect the other measurement processes.

Spatial Averaging can be used in “Safety Evaluation” mode, “Spectrum Analysis” mode and “Time Analysis” mode, but not in “UMTS P-CPICH Demodulation” mode. Depending on the operating mode, the SRM averages

- the individual results for the different services (“Safety Evaluation” mode),
- the individual spectral values (“Spectrum Analysis” mode), or
- the individual measurement values (Value, “Time Analysis” mode).

Two types of spatial averaging with different time domain behavior are used.

Measurement sequence for Continuous Averaging

Users control recording of measured values using “Start” and “Stop” or “Continue” and “Stop”. The number of measured values recorded is shown under “No. of SAVG”.

The SRM measures at its maximum measurement speed continuously (even during “Stop”). This can be seen from the “No. of Runs” indicator in the display, which is incremented by one each time a value is recorded. Users must adjust the speed at which the measuring antenna is moved along the path to be measured within the room to match the measurement speed.

The measurement continues in the background even when the device is set to “Stop”. This can be seen by the fact that the “No. of Runs” indicator continues to increment. These results are not, however, used for the evaluation. This is indicated by the fact that the “No. of SAVG” indicator remains static.

The SRM averages all the measured values recorded between “Start” and “Stop” or between “Continue” and “Stop”, regardless of when the measurement was started or continued. If, for example, several parallel paths are swept with the measurement antenna in the same room, they should all be swept at approximately the same speed.

Measurement sequence for Discrete Averaging

Users control measurement using the “Add Value” function. Here, the SRM performs just one measurement, confirms this with a beep, and increments the value under “No. of SAVG” by one.

The SRM averages all the recorded measurement values. If the field remains constant over time, the order in which the measurement points within the room are sampled is unimportant.

When discrete averaging is performed using a single axis antenna, the SRM automatically calculates the isotropic result for each measurement point in the room. The spatial average therefore reflects the isotropic results rather than the results for the individual axis directions.

Notes:

Appendix C:

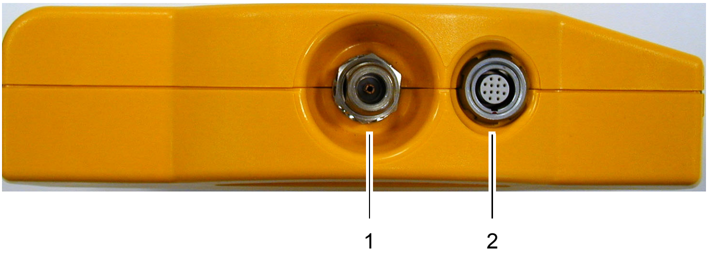
Instrument graphics

Complete instrument

No.	Element
1	Antenna
2	Side with antenna and cable connection
3	LCD panel, rotary control, operating keys, and Status and Charge LED
4	Side with battery holder, serial interface and connector for AC Adapter / Charger
5	Carrying strap

Side with antenna / cable connection

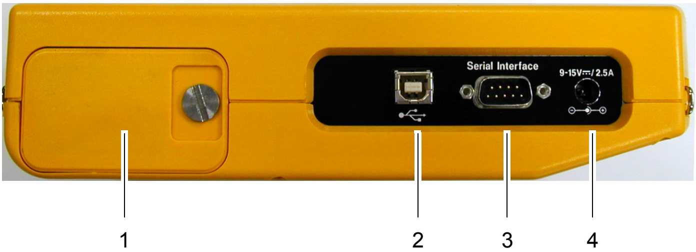
There are two sockets on the top side of the SRM. These are for connecting the antenna and the control cable.



No.	Function
1	Antenna connector socket • N connector
2	12 pole socket (multi pin connector) for connecting the control cable • If a Narda antenna or Narda cable is used this socket automatically detects the antenna and cable.

Side with battery holder and external connections

On the base of the instrument you will find the battery holder on the left and three further external connections on the right: USB, serial interface, AC Adapter / Charger.



No.	Function
1	Battery holder
2	USB interface for connecting to a computer (PC)
3	Serial data interface (RS 232) for connecting to a computer (PC): • 115200 or 230400 Baud • 8 data bits • 1 stop bit • No parity • Xon / Xoff protocol
4	AC Adapter / Charger connection • Nominal voltage: 9 V

Notes:

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Symbols

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