will'tek

9100 Handheld Spectrum Analyzer Series

For 9101 with serial numbers 5304001 and higher

For 9102 with serial numbers 0704001 and higher

For 9103

boosting wireless efficiency

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Ordering information This guide is issued as part of the **Willtek 9100 Handheld Spectrum Analyzer Series**. The order number for a published guide is M 295 204. The order number for the instrument depends on the model as follows:

Table 1   User guides for the 9100 series

Ordering number	User's guide
M 290 004	9101 Handheld Spectrum Analyzer
M 290 204	9102 Handheld Spectrum Analyzer
M 290 304	9103 Handheld Spectrum Analyzer

Table 1 shows the order numbers for the 9100 Handheld Spectrum Analyzer Product Packages. For details on the scope of delivery for the individual editions please refer to "Scope of delivery" on page 10.

Table 2   Ordering information

Order Number	Description
M 100 411	9101 Handheld Spectrum Analyzer Bench Edition
M 248 800	9101 Handheld Spectrum Analyzer Field Edition
M 100 412	9102 Handheld Spectrum Analyzer Bench Edition
M 248 806	9102 Handheld Spectrum Analyzer Field Edition
M 248 801	9102 Handheld Spectrum Analyzer Tracking Edition
M 248 802	9102 Handheld Spectrum Analyzer VSWR/DTF Edition
M 100 403	9103 Handheld Spectrum Analyzer Bench Edition
M 248 813	9103 Handheld Spectrum Analyzer Field Edition
M 248 814	9103 Handheld Spectrum Analyzer Tracking Edition
M 248 815	9103 Handheld Spectrum Analyzer VSWR/DTF Edition

Table of Contents

About This Guide

This section contains the following basic information:

Purpose and scope

The purpose of this guide is to help you successfully use the 9100 Handheld Spectrum Analyzer's features and capabilities. This guide includes task-based instructions that describe how to install, configure and use the 9100 Handheld Spectrum Analyzer. Additionally, this guide provides a description of Willtek's warranty, services, and repair information as well as the software license agreement.

Assumptions

This guide is intended for novice users who want to use the 9100 Handheld Spectrum Analyzer effectively and efficiently. We are assuming that you have basic computer experience and are familiar with basic RF test concepts and terminology.

Related information

Use this guide in conjunction with the following information:

Doc. no. M 290 004: Willtek 9101 Handheld Spectrum Analyzer – user's guide

Doc. no. M 290 204: Willtek 9102 Handheld Spectrum Analyzer – user's guide

Doc. no. M 290 304: Willtek 9103 Handheld Spectrum Analyzer – user's guide

Willtek also offers a glossary on "Spectrum and network analysis". The order number is SPEC/CT812/0105/EN.

Technical assistance

If you need assistance or have questions related to the use of this product call Willtek's technical support. You can also contact Willtek by e-mail at **customer.support@willtek.com**.

Table 1   Technical support contacts

Region	Phone number	Fax number
Europe, Middle East, Asia, Africa	+49 (0)89 99641 311	+49 (0)89 99641 440
Americas	+1 973 386 9696	+1 973 386 9191
China	+86 21 5836 6669	+86 21 5835 5238

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 2 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch.
Code and output messages appear in this `typeface`.	`All results okay`
Text you must type exactly as shown appears in this **`typeface`**.	Type **`a:\set.exe`** in the dialog box.
Variables appear in this **<typeface>**.	Type the new **<hostname>**.
Book references appear in this **typeface**.	Refer to **Newton's Telecom Dictionary**
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Square brackets [ ] indicate an optional argument.	`login [platform name]`
Slanted brackets < > group required arguments.	`<password>`

Table 3   Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive keystrokes.	Press **Alt+f,s**
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 4   Symbol conventions

	This symbol represents a general hazard.
	This symbol represents a risk of electrical shock.
	NOTE This symbol represents a note indicating related information or tip.

Table 5   Safety definitions

	WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Safety Information

This chapter provides the safety notes for the 9100 Handheld Spectrum Analyzer. Topics discussed in this chapter include the following:

Safety class

The external power supply of the 9100 Handheld Spectrum Analyzer is a safety class I equipment as defined in EN 60950:2000.

Do not try to open the power supply. There are no serviceable parts inside. If the power supply is defective you can obtain a new one from Willtek (order number M 860 224).

Safety notes

This product is designed for indoor use. As exposure to water may damage the instrument it has to be protected against moisture when used outdoors.

WARNING

The maximum input power level at the RF IN connector is 1 W. Higher input levels may result in serious damage of the instrument.

WARNING

Operate the instrument within the temperature range from 5°C (40°F) to 45°C (110°F) only. Operation outside this range will lead to invalid results.

Safety advice for the battery module

Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, it may vent or rupture! Do not charge below 0°C (32°F) nor above 45°C (110°F).

WARNING

Only use a 50 Ω N-type connector to connect to the RF IN port of the 9100 Handheld Spectrum Analyzer. Use of any other connector may result in damage of the instrument.

WARNING

Do not cover the ventilation slits (at the bottom left-hand corner and on the top). Covering them may result in serious damage and fire.

Battery module usage

The battery module is for use with the 9100 Handheld Spectrum Analyzer only. Willtek does not accept any liability for damage of the battery or other equipment if the battery module is used with other electric or electronic equipment.

Declaration of EU Conformity – 9101

Manufacturer	Willtek Communications GmbH Gutenbergstr. 2 – 4 85737 Ismaning Germany
Product designation	9101A
	The designated products conform to the following European directives:
The low voltage directive	**73/23/EEC**, has been superseded by the directive 93/68/EEC
EMC directive	**89/336/EEC**
	The conformity of these products to the above directives is demonstrated by application of the following standards:
EMC	**EN 61326 (Class A)**
Safety	**EN 61010, Part 1**

Ismaning,
March 1, 2005

_____
J. Schwarzhuber, R&D Director

This declaration is not a guarantee of features. Pay attention to the safety instructions in the product documentation.

Declaration of EU Conformity – 9102

Manufacturer	Willtek Communications GmbH Gutenbergstr. 2 – 4 85737 Ismaning Germany
Product designation	9102
	The designated products conform to the following European directives:
The low voltage directive	**73/23/EEC**, has been superseded by the directive 93/68/EEC
EMC directive	**89/336/EEC**
	The conformity of these products to the above directives is demonstrated by application of the following standards:
EMC	**EN 61326**
Safety	**EN 61010, Part 1**
Ismaning, November 23, 2004	

J. Schwarzhuber, R&D Director

This declaration is not a guarantee of features. Pay attention to the safety instructions in the product documentation.

Declaration of EU Conformity – 9103

Manufacturer	Willtek Communications GmbH Gutenbergstr. 2 – 4 85737 Ismaning Germany
Product designation	9103
	The designated products conform to the following European directive:
EMC directive	**89/336/EEC**
	The conformity of these products to the above directive is demonstrated by application of the following standards:
EMC	**EN 61326** (Class B)
Safety	**EN 61010, Part 1**

Ismaning,
September 26, 2007

J. Schwarzhuber, R&D Director

This declaration is not a guarantee of features. Pay attention to the safety instructions in the product documentation.

Overview
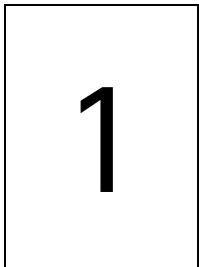
1

This chapter provides a general description of the 9100 Handheld Spectrum Analyzer. Topics discussed in this chapter include the following:

About the 9100 Handheld Spectrum Analyzer

The 9100 Handheld Spectrum Analyzer is a lightweight, full-featured spectrum analyzer for many applications:

– Used for installation troubleshooting, repair and maintenance e.g. in wireless local loop and modern 2.4 GHz Wi-Fi systems.

– Used for acceptance and installation troubleshooting of antenna and cable installations.

– Used in R&D labs to assess the electromagnetic radiation and to verify measures against EMI.

– Used in manufacturing to check and align the output of RF modules or units of RF modules.

– Used in the field to measure and verify base station emissions.

– Used in mobile phone repair to detect and locate faulty mobile phone parts and components.

Typical measurements with the 9100 Handheld Spectrum Analyzer include transmitter testing, alignment of modulators and measuring switch breakthrough. Measurement results and instrument settings can easily be transferred to a PC for presentation or post-processing.

Within the 9100 Handheld Spectrum Analyzer Series, Willtek offers the 9102 and 9103 Handheld Spectrum Analyzers whose capabilities can be expanded towards a scalar network analyzer by additional options such as a Tracking Generator, the 9160 VSWR/DTF Bridge and the 9130 VSWR/DTF Reflection Measurement Option. For base station installation or maintenance engineers the 9102 and 9103 offer the full scope of common performance measurements of the BTS antenna systems: Return Loss (Reflection), Tower-Mounted Amplifier (Transmission) and Distance to Fault measurement with a standard resolution of 500 points (min. 0.05 m) in one lightweight device. For the 9102 and 9103 also the 9131 EMF Measurement Option is available. In combination with the appropriate antenna the 9102 and 9103 both provide you with a handheld and easy-to-use solution for EMF measurements.

Features and capabilities

Frequency range from 100 kHz to 4 GHz (up to 7.5 GHz with the 9103, or with the 9102 and the 9151 Frequency Extension 7.5 GHz)

Digital IF for accurate measurements

Auto mode for basic parameters

Four markers, up to three delta markers

Large and bright display

Small footprint, large front

Lightweight, high battery power

Remote control via RS-232 or LAN

Options

The following options and accessories are available:

Table 6 Options and accessories for the 9100 Handheld
Spectrum Analyzer Series

Order number	Description
M 248 804	9102 Tracking Generator Upgrade
M 897 261	9130 VSWR/DTF Reflection Measurement Option (9102 and 9103)
M 897 274	9131 EMF Measurement Option
M 897 275	9132 RMS Detector Option (9102, 9103)
M 248 966	9160 VSWR/DTF Bridge (9102 and 9103)
M 248 968	9162 Insertion Power Sensor (9102, 9103)
M 248 811	9168 GPS Receiver Option (9102, 9103)
M 248 812	9151 Frequency Extension 7.5 GHz (option to the 9102)
M 205 012	9100 Battery module (rechargeable, 7.2 Ah)
M 204 097	1500 battery charger
M 241 015	9100 outdoor backpack
M 241 013	9100 soft carrying bag
M 248 328	9100 power supply
M 860 389	9100 12 V car adapter
M 867 037	9100 safety lock
M 897 137	9100 Data Exchange Software
M 860 388	9100 serial communication cable

Table 6 Options and accessories for the 9100 Handheld Spectrum Analyzer Series (continued)

Order number	Description
M 248 640	1205 RF Probe 20 dB Frequency range 100 kHz to 4 GHz RF attenuation (nominal at 50 Ω) 20 dB including adapter N (male), BNC (female)
M 248 971	1207 Inductive Probe Frequency range 4 MHz to 6 GHz
M 860 368	9170 Biconical Antenna (9102, 9103)
M 860 369	9171 Isotropic Antenna (9102, 9103)
M 860 158	9172 Directional Antenna, 80 to 1000 MHz (9102, 9103)
M 860 159	9173 Directional Antenna, 300 to 3000 MHz (9102, 9103)
M 860 264	Antenna, 400 MHz band (TNC)
M 860 261	Antenna, 900 MHz band (TNC)
M 860 262	Antenna, 1800 MHz band (TNC)
M 860 260	Antenna, 1880 MHz band (BNC)
M 860 146	Antenna, 2400 MHz band (TNC)
M 886 097	Adapter N (male) to BNC (female)
M 886 098	Adapter N (male) to TNC (female)
M 886 205	Matching pad N 50 Ω to N 75 Ω
M 886 204	Matching pad N 50 Ω to F 75 Ω
M 874 061	Attenuator 18 GHz, 6 dB
M 860 548	Calibration set Open/Short/Load, type DIN 7/16 inch male (9102)

Table 6   Options and accessories for the 9100 Handheld
Spectrum Analyzer Series (continued)

Order number	Description
M 860 549	Calibration set Open/Short/Load, type N male (9102, 9103)
M 860 396	Composite cable 10 m for 9171 (9102, 9103)
M 860 256	Antenna tripod (9102, 9103)
M 860 395	Bag for antenna tripod (9102, 9103)
M 897 828	OASIS Spectrum Monitoring Software

Physical description

The 9100 Handheld Spectrum Analyzer is delivered with the 9100 Data Exchange Software which can also be ordered separately (order number M 897 137).

The user-accessible parts of the 9100 Handheld Spectrum Analyzer can be broken down into several sections:

– Front panel with large screen, softkeys, numerical, cursor, and function keys.

– Connectors accessible from the top and the left-hand side of the instrument.

– On/off switch, power supply connector and battery shelf.

– Handle which can be turned in steps to serve as a stand, allowing the instrument to be operated at an angle.

Installation

2

This chapter describes how to install and set up the 9100 Handheld Spectrum Analyzer. The topics discussed in this chapter are as follows:

Scope of delivery

The following table provides an overview on the different items included in the scopes of delivery for the individual 9100 Handheld Spectrum Analyzer editions.

	9101, 9102, 9103 Bench Edition	**9101, 9102, 9103 Field Edition**	**9102, 9103 Tracking Edition**	**9102, 9103 VSWR/DTF Edition**
Power supply with mains cable	✓	✓	✓	✓
Dummy battery module	✓	–	–	–
High-capacity battery module	–	✓	✓	✓
Manual package containing the getting started manual and a CD with the user's guide	✓	✓	✓	✓
Null modem cable	✓	✓	✓	✓
Built-in Tracking Generator	–	–	✓	✓

Before first-time use

The Field Edition, the Tracking Edition and VSWR/DTF Edition are delivered with a high-capacity rechargeable battery module. This battery must be charged before first-time use. Please allow six hours to charge the battery while the instrument is connected to an external power supply and switched off. For more information, see section "Installing and maintaining the battery module" on page 13.

Using the handle

Carrying the instrument The 9100 Handheld Spectrum Analyzer can be carried easily by its handle. The handle should be kept in the upright position for transport to ensure that it is safely carried. To put the handle back in the upright position, press the button and turn the handle.

Positioning the instrument
The 9100 Handheld Spectrum Analyzer can be used in different positions: the upright position and two tilt positions. The first tilt position is recommended when using the instrument on a work-bench. The second tilt position is useful when standing while operating the 9100 Handheld Spectrum Analyzer.

– Put the instrument upright. With the handle in parallel with the instrument body, this takes up the least footprint. The connectors and the power switch are easily accessible from the top.

– The 9100 Handheld Spectrum Analyzer can also be operated in a slanted position.

1 Press the button at the handle and turn the handle back a little bit.

2 Release the button and continue turning the handle back. The button locks in the first tilt position.

3 Repeat steps 1 and 2 if you want to lock the handle in the second (and final) tilt position.

4 Release the instrument on the handle.

Installing and maintaining the battery module

The Field Edition, the Tracking Edition and the VSWR/DTF Edition are delivered with a high-capacity rechargeable battery module. This battery must be charged before first-time use. Please allow six hours to charge while the instrument is connected to an external power supply and switched off.

The battery charge status is indicated with a symbol on the screen. See the user's guide for detailed information on this symbol.

The battery can be recharged simply by connecting the DC power supply and turning the instrument off. A completely discharged battery takes about 6 hours to charge. While operating the 9100 Handheld Spectrum Analyzer, you can view the battery charge status on the display, at the bottom left.

Please refer also to section "Battery status LED" on page 25.

If the instrument is switched on, the battery takes about three times as long to charge compared to when the instrument is switched off. After eight hours of continuous charging, the battery charger is automatically switched off to ensure that the battery is not damaged by too long charging periods. The battery may not be fully charged at the time. Therefore Willtek recommends to charge the battery only while the 9100 Handheld Spectrum Analyzer is switched off.

> **NOTE**
>
> Disconnecting the mains cable from the power source resets the eight-hour maximum charging period. In order to make sure that the battery is fully charged when the instrument is switched off, unplug the mains cable first and plug it in again.

A completely discharged battery is not recharged, if the power supply is connected while the instrument is operating. Therefore it is advisable to switch off the instrument before connecting the power supply to the 9100 Handheld Spectrum Analyzer.

> Safety advice for the battery module
>
> Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, the battery may vent or rupture! Do not charge below 0°C (32°F) nor above 45°C (110°F).

> Battery module replacement
>
> To replace the battery module, use genuine Willtek spare parts only. For the ordering number please refer to .

The battery module compartment is situated on the back panel of the instrument. You can replace the battery module as follows:

1 Switch off the 9100 Handheld Spectrum Analyzer.

2 Remove the battery module by pushing the black rubber clasp downwards and pulling the battery module out of the compartment.
Do not try to open the battery module!

3 Line up the new battery module with the connectors to the bottom and pointing towards the compartment.

4 Gently slide the battery module into the compartment until it locks completely.

5 Fully charge the new battery.

For optimum performance and lifetime, please follow the advice below:

– Before first-time use, charge the battery completely while the 9100 Handheld Spectrum Analyzer is switched off. This takes about six hours.

– If you do not use the battery module for months: Fully charge the battery and remove it from the instrument. Check the battery twice a year and recharge it if necessary.

– Do not store the battery module above 45°C (110°F) or below 0°C (32°F).

– Do not touch the battery contacts with your fingers; keep them clean.

– Do not drop the battery module to the ground (risk of cracks).

Dispose of the battery module safely

Do not simply throw the battery module away. Dispose of the battery in line with national or regional regulations.

Getting Started

<div style="border:1px solid black; display:inline-block; padding:1em;">

3

</div>

This chapter describes the instrument's functions. Topics discussed in this chapter are as follows:

Connecting the 9100 Handheld Spectrum Analyzer

The instruments of the 9100 Handheld Spectrum Analyzer Series offer different connectors for a variety of applications. The following section describes the connectors available and provides information on technical data and application purposes. The connectors available on the top of the instrument differ between the 9101 and the 9102 or 9103. The connectors available on the left-hand side are identical.
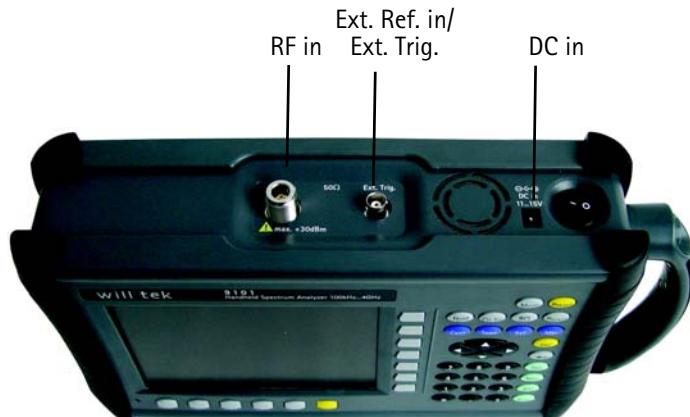

**Figure 1** Connectors on the top of the 9101

RF in   RF out   DC in

Multi Port   Ext. Ref. in/   Headphone jack
              Ext. Trig.
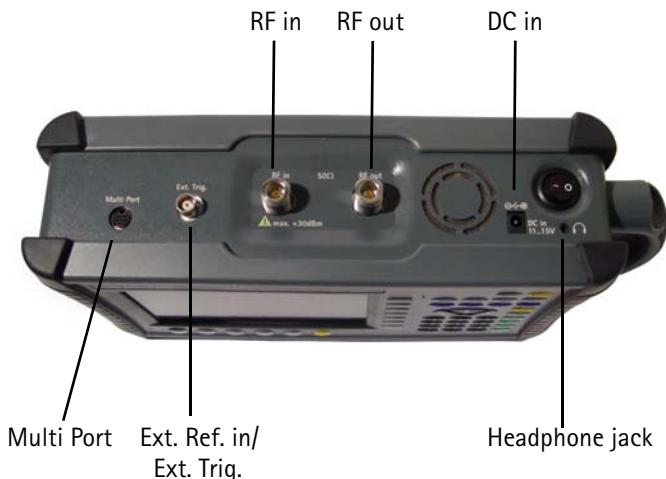
Figure 2   Connectors on the top of the 9102 and 9103

DC IN The 9100 Handheld Spectrum Analyzer can be operated either from
connector the internal battery or from an external DC source such as the
power supply which is delivered with the 9100, or a car battery. The
DC voltage must be in the range from 11 to 15 V.

In addition, the battery is loaded when an external DC source is
connected. The instrument should be switched off before
connecting the DC source.

Apply the source to the **DC IN** connector at the top of the 9100.

RF IN connector   **RF IN** is a 50 Ω N-type connector (female).

If you have a 50 Ω shielded RF cable with an N-type connector (male) to connect to the unit under test, simply screw the connector tightly to the instrument.

If you have a 50 Ω shielded RF cable with a BNC connector (male), use an N to BNC adapter to connect the cable to the 9100. Willtek offers an appropriate adapter; see section "Options" on page 5.

RF OUT connector   **RF OUT** is a 50 Ω N-type connector (male).

This connector caters for example for tracking generator measurments. See the user's guide contained on the User Documentation CD delivered with your 9100 Handheld Spectrum Analyzer for a detailed description of the measurement functions for which this connector is used.

NOTE

This connector is available on the 9102 Handheld Spectrum Analyzer for serial numbers 0404001 and higher.

⚠ CAUTION

The maximum allowable input level at the **RF IN** connector is 1 W. Higher levels at this port can damage the instrument!

⚠ CAUTION

Only use a 50 Ω N-type connector to connect to the **RF IN** port of the 9100. Use of any other connector may result in damage of the instrument.

Take care of proper termination

Use of cables and sources with an impedance other than 50 Ω results in inaccurate measurements.

EXT. REF. IN/ Can either be used as an input for an external time base (reference
EXT. TRIG. clock) or as an input for an external trigger signal for the spectrum
connector analyzer sweep (an external device that triggers the measurement
by sending an impulse can be connected for example). Only one of
the two signal types can be connected at any one time.

> ⚠️ WARNING
>
> The input for the external trigger signal is designed for TTL input
> levels only. Higher levels at this port can damage the instrument!

Multi Port In order to provide for external adapters, amplifiers and accessories
the instrument offers a multifunction connector. The Multi Port
enables the instrument to trigger a measurement onto an external
signal. Furthermore it can be used to read data stored in external
devices (e.g. calibration data).

> ◀ NOTE
>
> This connector is available on the 9102 Handheld Spectrum
> Analyzer for serial numbers 0404001 and higher.

Headphone In addition to the build-in loudspeaker the instrument also offers
jack a standard 3.5 mm headphone jack. When you connect the head-
phones to the instrument the loudspeaker will be automatically
disabled.

> ◀ NOTE
>
> This connector is available on the 9102 Handheld Spectrum
> Analyzer for serial numbers 0404001 and higher.
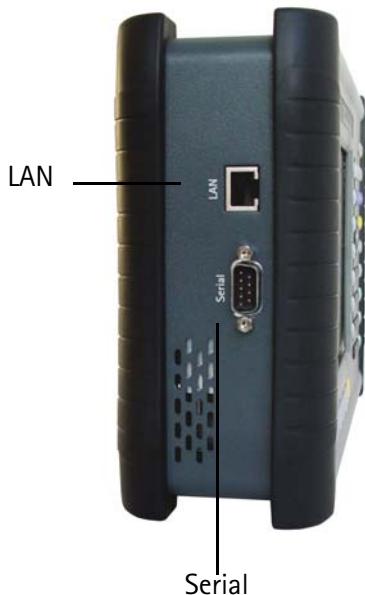
Figure 3   Connectors on the left-hand side of the
                  instrument

SERIAL This 9-pin sub-D connector on the left-hand side of the 9100
(RS-232) Handheld Spectrum Analyzer can be used to control the 9100
connector remotely via serial interface (RS-232). The command set and the
responses conform to the SCPI standard and are explained in the
user's guide.

The RS-232 connector can also be used to load and store results
and settings and to update the operating software in conjunction
with the 9100 Data Exchange Software. See the user's guide for
more details.

To connect the 9100 to a controlling PC over RS-232, use a null
modem (PC to PC) cable.

LAN connector The 9100 Handheld Spectrum Analyzer can also be controlled via local area network (LAN), using a TCP/IP connection. This high-speed connection can as well be used to transfer traces to a PC or to update the system software.

The IP address can be set up in the system configuration menu or via RS-232. The 9100 can be operated in networks using 100 Mbps, but is capable of transmitting and receiving at 10 Mbps only.

Setting up the IP address, the command set to control the 9100 and the responses from the 9100 Handheld Spectrum Analyzer are explained in the full user's guide.

Connect the instrument to the LAN with a standard LAN cable with RJ-45 connectors. Alternatively, you can connect the 9100 to a PC directly using a cross patch cable; this cable is included in the scope of delivery.

Powering the unit

The 9100 Handheld Spectrum Analyzer is switched on and off using the power switch located at the top of the instrument. It takes a couple of seconds for the instrument to load and start its software.

NOTE
The warm-up time for precision measurements is 30 minutes.

━━━━━━━▶ NOTE

Please wait a few seconds between switching the instrument off and on again. It will not start otherwise.

Using the front panel

**Overview** The front panel is divided into different sections as follows:
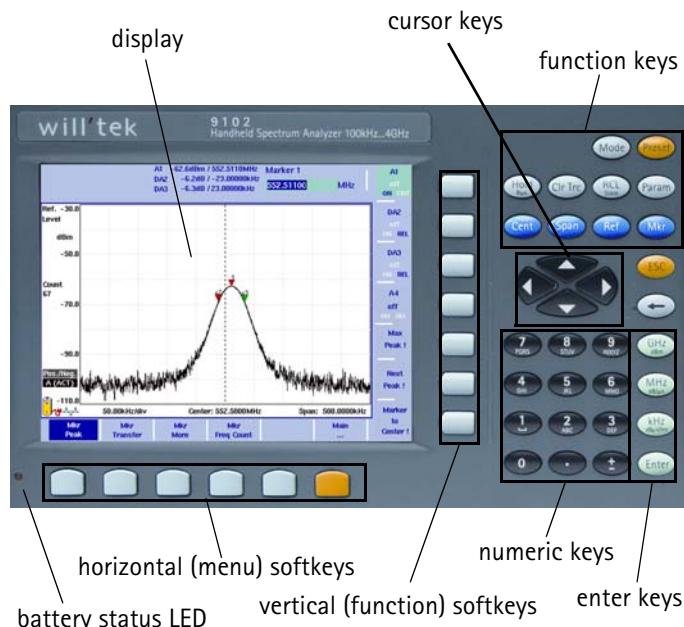
Figure 4   Front panel elements

Battery status   This LED has different states:
LED

– The LED lights green when the instrument is being operated from its battery and no external power is supplied.

– The LED lights yellow when the battery is connected to an external power supply and being loaded.

– The LED is off, when the loading procedure is completed, the battery is fully loaded or when there is no battery in the 9100's battery compartment.

– When the LED is flashing yellow quickly and permanently, there is a problem with the battery or the charger. Please report this problem to a Willtek service center.

For more information about the battery, see section "Installing and maintaining the battery module" on page 13.

Display   The 6.5 inch display is divided into the following sections (see Figure 5):

– Marker field

– Input field

– Status section

– Results area

– Softkey descriptions
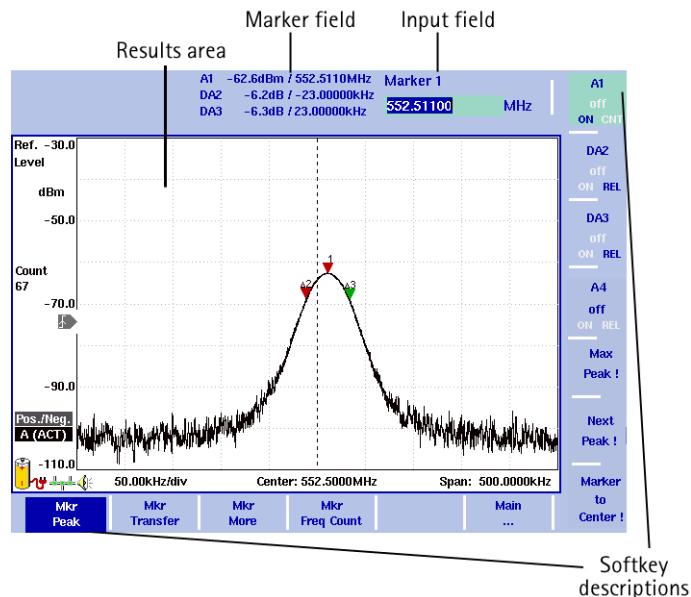
**Figure 5**   Display sections

Results area The results area utilizes most of the screen and provides you with the measurement results. A grid of ten vertical and eight horizontal rows eases readability of the results from the axes. There may be one or two graphs, depending on the number of traces selected.

Marker field

If any of the markers is active, the marker field is displayed, showing the measurement values at the marker positions. Up to four markers are displayed with their level and frequency values. A marker can be switched from absolute to relative values; the values are then shown relative to those of marker 1.

Input field

RBW
30.00
FStep: 1/3/10
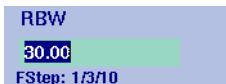
The input field allows you to enter numbers or text, depending on the selected function. The meaning of the input value is expressed by the header line. Values or text are entered using the numeric keys; the input field is closed with one of the green enter keys (see).

Softkey descriptions

Freq   Level

Start

Stop
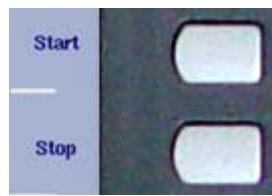
The softkey descriptions indicate the assignment of a function to a softkey. At the bottom side, they are aligned with the horizontal softkeys and with the vertical softkeys at the right-hand side. See below for more information about the softkeys.

Status section The status section provides you with more information about the present 9100 status and the measurement conditions. This includes information about:

– the battery status
– the network link (if available)
– trace settings
– Hold mode (if active)

Keypad The front panel carries a large number of keys, giving you direct access to functions and menus and allowing you to enter test parameters such as the center frequency. The keypad is divided into the following sections:

Function keys

The function keys have specific assigned functions which do not change. The function keys are described in more detail in the user's guide.

Cursor keys

In an input field, the up and down cursor keys are used to increase or decrease the current value. The left and right cursor keys move the cursor position by one digit or character.

If a marker field is active, the up and down cursor keys move the marker by half a division up or down, respectively. The left and right cursor keys move the marker pixelwise.

> **Immediate reaction**
>
> Any change of an input parameter with the cursor keys has immediate effect. With the straight feedback on the screen, you can easily adjust parameters to the optimum values with a trial-and-error approach.

Numeric keys

The numeric keys allow you to enter a value similar to a pocket calculator. On some input fields, you can enter text instead, as on a mobile phone.

Invalid entries

If you enter an invalid number or string, the 9100 beeps and corrects the entry to the closest valid value.

Enter keys Any input of numerical or alphanumerical entries must be closed or can be affected by one of the enter keys. The meaning of the keys is as follows:

Table 7 Enter keys

Key	Function
GHz/dBm	In frequency input fields, closes the entry by applying the unit GHz (giga-hertz). In power input fields, assigns the unit dBm to the entered value.
MHz/dB/µs	In frequency input fields, closes the entry by applying the unit MHz (mega-hertz). In power input fields, assigns the unit dB to the entered value. In time parameter input fields, assigns the unit µs (microsecond) to the value.

Table 7   Enter keys

Key	Function
kHz/dBμV/ms	In frequency input fields, closes the entry by applying the unit kHz (kilohertz). In power input fields, assigns the unit dBμV to the entered value. In time parameter input fields, assigns the unit ms (millisecond) to the value.
Enter	Confirms an entry without a unit or with the units hertz or seconds.

Escape key   If pressed while an input field is open, the **ESCAPE** key closes this input field without changing the previous value.

In a menu the **ESCAPE** key also leads to the main menu.

Backspace key   Deletes the last entered alphanumerical (backspace).

When an input field is entered, all digits are marked. By pressing the backspace key, the entire entry is deleted.

Softkeys The functions of the softkeys change with description on the
screen as given next to the respective key.

Horizontal (menu) softkeys
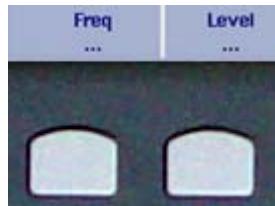
The horizontal softkeys provide access to the various menus. The
active menu is highlighted; the functions and parameters within a
menu are offered on the vertical softkeys.

Vertical (function) softkeys
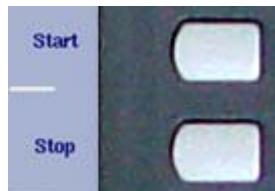
The vertical softkeys allow you to change the settings of the 9100.

Changing center frequency, span, or reference level

These functions are easily accessible from the main menu.

1 Push the respective function softkey on the vertical softkey
   bar.

2 Enter a new value.

3 Close the input field by pushing one of the enter keys.

The change takes effect immediately.

Changing RBW, VBW, sweep time, or attenuation

These parameters are accessible from the main menu. They can be changed automatically by the 9100 with a change of any of the other parameters, or can be adjusted manually.

In the main menu, the vertically aligned keys for resolution bandwidth (RBW), video bandwidth (VBW), sweep time, and attenuation indicate whether the parameter is in auto(matic) or manual mode: The current setting is highlighted.

Switching to automatic mode

To change the setting from manual to automatic, proceed as follows:

1 Push the function softkey once.
   The function softkey is activated. This is indicated by highlighting the softkey.

2 Push the same function softkey for a second time.
   The highlighting of "manual" disappears and "auto" is highlighted instead. Next time you change any of the other values, the parameter in automatic mode is changed by the instrument for best results and visibility.

Switching to manual mode

When the function softkey is set to automatic, you may want to adjust the parameter manually. Or you may want to adjust another parameter without the function in question being changed automatically. Both can be achieved by setting the function softkey to manual mode.

You can switch to manual mode

– either by selecting the function softkey and then entering a new input value,

– or by selecting the function softkey and pushing it again to change from auto to manual mode.

Maintaining your unit

The 9100 Handheld Spectrum Analyzer is a measurement device. As with all such instruments, the 9100 should be calibrated on a regular basis to ensure the accuracy. Willtek recommends calibration of the 9100 Handheld Spectrum Analyzer at yearly intervals.

Willtek seeks to permanently improve its products. Software updates are available on the Internet at www.willtek.com.

Please take also advantage of our Frequently Asked Questions and our electronic newsletter, both are available on the Internet.

Troubleshooting

<div style="text-align:right">

4

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This chapter provides information on handling errors and problems related to the 9100 Handheld Spectrum Analyzer.

Recharging problems with the 9102B

If a 9102B (serial number 0604001 and higher) is completely discharged then it may happen that the 9102B does not automatically re-charge the battery while connected to an external power supply.

In such a case, to reset the "safety power-off switch", please carry out the following steps:

1 Switch off the 9102B.

2 Remove the power connector from the 9102B.

3 Remove the battery.

4 Wait a few seconds.

5 Insert the battery again.

6 Re-connect the power connector and provide external power. The LED on the front will show that the battery is charged again.

Handling system errors

Should an error or problem occur that prevents you from controlling the instrument and thus requires the instrument software to be set up again, the 9100 offers the Setup Application Software menu. This menu provides you with access to the instrument without starting the instrument software and enables you to perform a software update.

Chapter 13 "Updating the Instrument Software" contains a detailed description of the processes involved in updating the instrument's software via the Setup Application Software menu.

End-User License Agreement
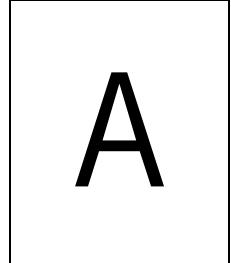
A

This appendix describes the conditions for using the 9100 Data Exchange Software.

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This end-user license agreement grants you the right to use the software contained in this product subject to the following restrictions. You may not:

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Warranty and Repair
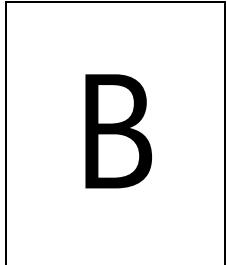
B

This chapter describes the customer services available through Willtek. Topics discussed in this chapter include the following:

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Warranty information

Willtek warrants that all of its products conform to Willtek's published specifications and are free from defects in materials and workmanship for a period of one year from the date of delivery to the original buyer, when used under normal operating conditions and within the service conditions for which they were designed. This warranty is not transferable and does not apply to used or demonstration products.

In case of a warranty claim, Willtek's obligation shall be limited to repairing, or at its option, replacing without charge, any assembly or component (except batteries) which in Willtek's sole opinion proves to be defective within the scope of the warranty. In the event Willtek is not able to modify, repair or replace nonconforming defective parts or components to a condition as warranted within a reasonable time after receipt thereof, the buyer shall receive credit in the amount of the original invoiced price of the product.

It is the buyer's responsibility to notify Willtek in writing of the defect or nonconformity within the warranty period and to return the affected product to Willtek's factory, designated service provider, or authorized service center within thirty (30) days after discovery of such defect or nonconformity. The buyer shall prepay shipping charges and insurance for products returned to Willtek or its designated service provider for warranty service. Willtek or its designated service provider shall pay costs for return of products to the buyer.

Willtek's obligation and the customer's sole remedy under this hardware warranty is limited to the repair or replacement, at Willtek's option, of the defective product. Willtek shall have no obligation to remedy any such defect if it can be shown: (a) that the product was altered, repaired, or reworked by any party other than Willtek without Willtek's written consent; (b) that such defects were the result of customer's improper storage, mishandling, abuse, or misuse of the product; (c) that such defects were the result of customer's use of the product in conjunction with equipment electronically or mechanically incompatible or of an inferior quality; or (d) that the defect was the result of damage by fire, explosion, power failure, or any act of nature.

The warranty described above is the buyer's sole and exclusive remedy and no other warranty, whether written or oral, expressed or implied by statute or course of dealing shall apply. Willtek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding, oral or written, made by an agent, distributor, or employee of Willtek, which is not contained in the foregoing warranty will be binding upon Willtek, unless made in writing and executed by an authorized representative of Willtek. Under no circumstances shall Willtek be liable for any direct, indirect, special, incidental, or consequential damages, expenses, or losses, including loss of profits, based on contract, tort, or any other legal theory.

Equipment return instructions

Please contact your local service center for Willtek products via telephone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

– Owner's name, address, and telephone number.

– The serial number, product type, and model.

– Warranty status (if you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note).

– A detailed description of the problem or service requested.

– The name and telephone number of the person to contact regarding questions about the repair.

– The return authorization (RA) number or reference number.

If possible, return the equipment using the original shipping container and material. Additional Willtek shipping containers are available from Willtek on request. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit. Willtek is not liable for any damage that may occur during shipping. The customer should clearly mark the Willtek-issued RA or reference number on the outside of the package and ship it prepaid and insured to Willtek.

Publication History

Revision	Changes
0503-100-A	First version.
0506-500-A	Added new options and a new Product Package for the 9102. Added new feature information for the 9102. Updated LED status information. Updated Willtek address information for UK.
0512-500-A	Added new options and accessories. Updated Willtek address information for France.
0602-600-A	B series of 9101 and 9102.
0709-700-A	New series; 9103 added.

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