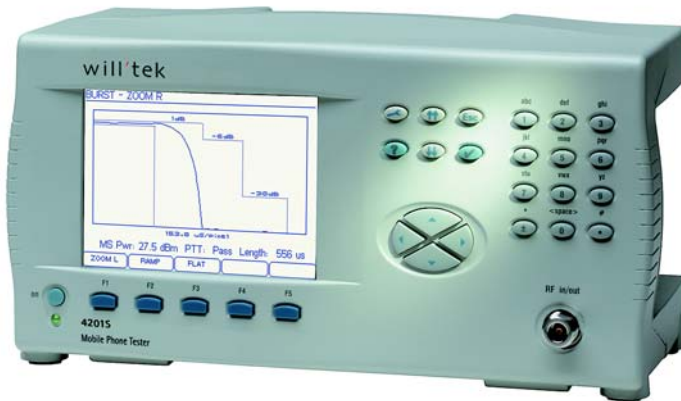


4200 Mobile Service Tester Series



boosting wireless efficiency

Notice Every effort was made to ensure that the information in this document was accurate at the time of printing. However, information is subject to change without notice, and Willtek Communications reserves the right to provide an addendum to this document with information not available at the time that this document was created.

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Ordering information This guide is issued as part of the **4200 Series Mobile Service Tester**. The ordering number for a published guide is M 295 013. The ordering number for the product depends on the exact model as follows:

Table 1 4200 Series models and ordering numbers

Model	Ordering number
4201S Mobile Service Tester	M 101 301
4202S Mobile Service Tester	M 101 302
4202R Mobile Service Tester	M 101 308
4202R Mobile Service Tester (incl. DC Option)	M 101 309
4208 Off-Air Mobile Tester	M 101 311
4208 Off-Air Mobile Tester (incl. DC Option)	M 101 312

EMC Directive Compliance This product was tested and conforms to the EMC Directive, 89/336/EEC as amended by 92/31/EEC and 93/68/EEC for electromagnetic compatibility. A copy of the Declaration of Conformity is provided with this manual.

Low Voltage Directive Compliance This product was tested and conforms to the Low Voltage Directive, 73/23/EEC as amended by 93/68/EEC. Conformity with this directive is based upon compliance with the harmonized safety standard, EN 60950. A copy of the Declaration of Conformity is provided with this manual.

Table of Contents

About This Guide	vii
Purpose and scope	viii
Assumptions	viii
Related information	viii
Technical assistance	ix
Conventions.	x

Safety Issues	xiii
Safety notes	xiv
Declaration of EU conformity	xvi

Chapter 1	Overview	1
	About the Willtek 4200	2
	Features and capabilities	3
	Standard delivery	3
	Options	4
	Physical description	6
	Front panel	6
	Mains connector.	6
	Digital interfaces	7

Chapter 2	Installation	9
	Unpacking the instrument.	10
	Installing and using the 4281 External Battery Kit	11
	Overview	11
	Status indication	11
	Installing the 4281 External Battery Kit.	12
	Charging the battery	13
	Checking the battery capacity.	14
	Replacing the battery.	14
<hr/>		
Chapter 3	Operation	17
	Using the front panel	18
	Keypad.	18
	Powering the unit.	20
	Using the start menu	22
	Configuring basic settings.	23
	Connecting test leads.	24
	4208 RX and TX connectors.	25
	Connection via antenna.	26
	Points in favor	26
	Points to note.	26
	Connection	27
	Connection via antenna on the 4208	28
	Connection via the Antenna Coupler	28
	Points in favor	29
	Points to note.	29
	Connection	30
	Cable-based connection	30
	Points in favor	30
	Points to note.	31
	Connection	31
	Installing the test SIM	32
	AUTOTEST mode	33
	Overview	33
	Running an AUTOTEST	33
	FAULT FIND mode	34
	Overview	34

	Available modes	35
	SPEECH	35
	DATA 9600	35
	SMS	36
	VGCS (GSM-R)	36
	ANALYZER	36
	RF GEN.	36
	DE-TUNING	36
	GPRS	36
<hr/>		
Chapter 4	Troubleshooting	37
	Troubleshooting	38
	Solving problems.	38
	Basic settings lost.	38
	Display is blank.	39
	Mobile phone does not recognize tester	39
	Tests not reproducible	39
	Print problems.	40
<hr/>		
Appendix A	Warranty and Repair	41
	Warranty information.	42
	Equipment return instructions.	43
<hr/>		
Appendix B	End-User License Agreement	45
<hr/>		
Publication History		49

Table of Contents

About This Guide

This section contains the following basic information:

- "Purpose and scope" on page viii
- "Assumptions" on page viii
- "Related information" on page viii
- "Technical assistance" on page ix
- "Conventions" on page x

Purpose and scope

The purpose of this guide is to help you successfully use the Willtek 4200 features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the Willtek 4200. Additionally, this guide provides a description of Willtek's warranty and repair information.

This manual shall help you getting started. It provides an overview of the functions of the instrument, independent of the firmware version installed in your 4200. For more detailed information, please refer to the user guide (see below).

Assumptions

This guide is intended for novice users who want to use the Willtek 4200 effectively and efficiently. We are assuming that you are familiar with basic telecommunication concepts and terminology.

Related information

Use this guide in conjunction with the following information:

Willtek 4200 Series Mobile Service Tester, User Guide, ordering number M 290 013 (available in English, German, French, and Italian).

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) 89 996 41 311	+49 (0) 89 996 41 440
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 <code>typeface</code> .	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.

About This Guide
Conventions

Safety Issues

This chapter provides the safety notes for the Willtek 4200. Topics discussed in this chapter include the following:

- ["Safety notes" on page xiv](#)
- ["Declaration of EU conformity" on page xvi](#)

Safety notes



AC power	Permissible line voltage: 90 V through 263 V (AC voltage; 47 Hz through 63 Hz). The power supply automatically adapts to the line voltage.
Use for intended purpose only	Use your Willtek 4200 only for its intended purpose for function testing, alignment and repairs on radio tele-phones of a GSM mobile radio system.
Ambient conditions	Store and operate your Willtek 4200 only in a dry and dust-free environ-ment. Operate your Willtek 4200 only in the permissible temperature range of 15°C through 35°C. Observe the permissible storage temperatures (see Appendix: Specification).
Air circulation	Keep the air vents free of obstruction.
Breakable display	Do not press down on the display.
Electromagnetic compatibility	The device emits RF radiation. For this reason, do not operate it in EMC-sensi-tive environments if this might result in danger (e.g. when traveling in automo-biles or during flights). The EMC and Safety directives to which the device conforms are listed in the Declaration of EU Conformity (see page xvi).

Do not open	<p>Do not make technical modifications to the device or its accessories. Do not open the device. There are no parts inside it which require maintenance or disposal.</p> <p>Do not open the device, otherwise you will lose your claim to warranty.</p>
Original accessories only	<p>Use original accessories only.</p>
No solvents	<p>Do not use agents which contain solvents to clean the equipment casing.</p>
Handling	<p>Avoid the following during operation and storage:</p> <ul style="list-style-type: none">– strong direct sunlight– vibrations, heavy impacts– ingress of liquids or small objects into the device– bending of the RF adapter cable– contamination of the electrical contacts
4281 External Battery Kit	<p>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).</p>

Declaration of EU conformity

Manufacturer	Willtek Communications GmbH Gutenbergstr. 2 – 4 85737 Ismaning Germany
Product designation	4200 Mobile Service Tester Series 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, February 18, 2004	



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 Willtek 4200. Topics discussed in this chapter include the following:

- ["About the Willtek 4200" on page 2](#)
- ["Features and capabilities" on page 3](#)
- ["Options" on page 4](#)
- ["Physical description" on page 6](#)

About the Willtek 4200

Thank you for choosing a model in the Willtek 4200 series. The equipment will give you valuable assistance in functional testing, alignment, tuning and troubleshooting of GSM mobile phones.

The series comprises the models shown in the table below:

Table 6 Supported frequency bands and network types

Feature	4201S	4202S	4202R	4208
GSM 900, 1800, 1900	✓	✓	✓	✓
GSM 850	✓ (Option)	✓ (Option)	✓ (Option)	✓ (Option)
GSM-R band	-	-	✓	-

Willtek 4201S: Basic model for all standard tests on the service.

Willtek 4202S: As 4201S, but with additional tests for GSM services such as data transfer and SMS.

Willtek 4202R: As 4202S, but also featuring Voice Group Call Service for testing GSM-R equipment (R = Rail) for rail companies.

Willtek 4208: As 4201S/4202S, but with separate RX and TX paths.

Features and capabilities

The Willtek 4200S Series is designed for the test and alignment of mobile phones in service centers and for final testing by manufacturers: For the test of AM Suppression, an AM Signal Generator Option is available. The Result Upload Option allows test results to be transferred to virtually any location in the corporate network with a push of a button. Built-in AUTOTESTs allow the execution of automatic test routines and give the user a pass/fail verdict at the end of the AUTOTEST to make testing simpler and easier.


The manual or FAULT FIND mode distinguishes two different operating modes. The synchronous mode allows standard signaling, that is the location update, call setup procedures, in order to get a phone onto a traffic channel and perform RF testing.

The asynchronous mode is dedicated to the service mode, where phones are controlled by a manufacturer's service software.

This mode is used to align mobile phones. To take testing even further, the 4202S offers testing of short message service. The data mode is intended to test data modems that do not support standard traffic channels but only data channels for RF testing.

Standard delivery

The standard delivery includes the items listed in section ["Unpacking the instrument" on page 10](#).



Cardboard box

Keep the cardboard box for shipping the 4200 back to Willtek e.g. for factory calibration or a model upgrade.

Options

The following options, accessories and upgrades are available for the 4200 Series:

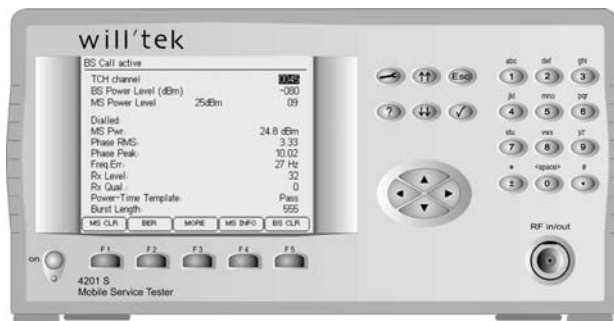
Table 7 Options, accessories and upgrade possibilities

Product designation	Ordering code
4273 Detuning Option	M 248 505
4270 AM Signal Generator Option	M 248 507
4271 AM Signal Generator Upgrade	M 248 506
4260 GSM 850 Option	M 248 418
4280 GSM 850 Upgrade Kit	M 248 404
4261 GPRS Go/NoGo Option	M 897 185
4261 GPRS Go/NoGo Upgrade	M 248 655
4262 GPRS Measurement Option	M 897 186
4262 GPRS Measurement Upgrade	M 248 656
GPRS Hardware Upgrade Package	M 248 657
4274 DC Option Upgrade	M 248 410
4281 External Battery Kit (incl. 8 Ah battery)	M 205 014
Battery pack, 8 Ah (additional battery)	M 205 012
Battery pack, 4 Ah (additional battery)	M 205 011
4272 Result Upload Option	M 897 136
4275 Remote Power Option	M 248 748
4190 Utility Software for 4100/4200	M 897 110
4192 GSM Phone Checker Software	M 897 132
7312 Lector Enhanced	M 897 310

Table 7 Options, accessories and upgrade possibilities

Product designation	Ordering code
7315 Scriptor	M 897 311
7360 Coupling Factor Update License (one year)	M 897 312
RF connecting cable (standard accessory for 4201S and 4202S)	M 860 407
4916 Antenna Coupler	M 248 641
RF cable N to TNC, 1.5 m	M 382 189
RF cable N to N, 0.2 m	M 382 826
4921 RF Shield (N) (including RF cable N – N)	M 248 346
RF Shield Package (4921 RF Shield, 4916 Antenna Coupler)	M 248 348
Antenna, 900 MHz	M 860 261
Antenna, 1.8/1.9 GHz	M 860 262
4200 Centronics cable, 3 m (for 4201S and 4202S)	M 860 378
4200 RS-232 cable, 2 m (standard accessory)	M 860 379
1103 USIM and GSM Test SIM Card (stan- dard accessory for 4201S, 4202S and 4208)	M 860 164
1101 GSM-R Test SIM (standard accessory for 4202R)	M 860 174
4210 Upgrade 4201S to 4202S	M 248 500

Physical description



The main elements of the 4200 are the front panel with an LCD screen, keys and the RF connector, the mains connector at the right-hand side and the digital interface connectors at the back.

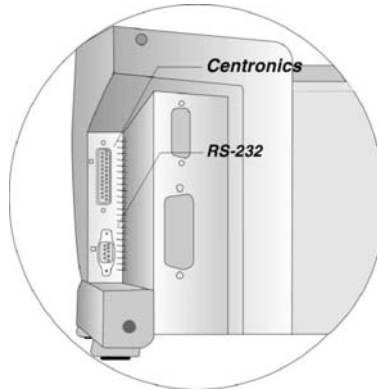
Front panel The front panel consists of the LCD screen, various keys and the RF connector.

The keys are explained in section ["Using the front panel"](#) on page 18.

Details about connecting a mobile phone to the 4200 via the RF connector are given in section ["Connecting test leads"](#) on page 24.

Mains connector The mains connector is located on the right-hand side of the 4200. See section ["Powering the unit"](#) on page 20 for more details and observe the specified voltage range printed on the back of the 4200.

Digital interfaces



The 4200 includes a D sub-25 socket to connect to a printer (Centronics interface) and a D sub-9 socket to connect to a PC (serial or RS-232 interface). See the user guide for a description of different applications.

Chapter 1 Overview
Physical description

Installation

2

This chapter explains how to get the 4200 going. The topics include:

- ["Unpacking the instrument" on page 10](#)
- ["Installing and using the 4281 External Battery Kit" on page 11](#)

Unpacking the instrument

- Do not throw the packaging of your Willtek 4200 away. It will make shipment easier for you in repair cases.
- Check that the unit is undamaged.
- Check that the delivery is complete:

Table 8 Standard items supplied with the 4200

Ordering number	Quantity	Product designation
M 101 3XX	1	Willtek 420X
M 860 164	1	1103 USIM & GSM SIM Card, plug-in format (4201S, 4202S and 4208)
M 860 174	1	GSM-R Test SIM (4202R only)
M 297 005	1	Manual pack 4200 (this getting started manual and CD with user guide)
M 860 603	1	Power cord
M 382 189	1	RF cable (N to TNC, 1.5 m) (4202R only)
M 860 378	1	Centronics cable (4201S, 4202S only)
M 860 379	1	RS-232 cable



WARNING

Do not attempt to operate a Willtek 4200 if there is obvious damage to the device, the power cord or the accessories. Retain the packaging and contact the office who supplied the equipment.

Installing and using the 4281 External Battery Kit

Overview The 4281 External Battery Kit is for use with the 4200 Series Mobile Phone Tester equipped with the 4274 DC Option.

The External Battery Kit gives you the freedom to operate the 4200 wherever you want, without the need to have a nearby mains outlet. The installation instructions can be found in section ["Installing the 4281 External Battery Kit" on page 12.](#)

The External Battery Kit can be used with the charger that is part of the 4274 DC Option and has a removable battery, so you can replace a discharged battery with a charged one. To learn how to do this, see section ["Replacing the battery" on page 14.](#)



Safety advice for the battery

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).

Status indication The External Battery Kit has three different modes of operation:

- Loading state. The External Battery Kit is connected to a DC source and the 4200 is switched off. In this state, the green power LED is on; as long as the battery is loaded, the yellow LED is also on. When the battery is fully loaded, the yellow LED goes off.
- Loading and operation state. The External Battery Kit is connected to a DC source and the 4200 is switched on. The green power LED is on, and so is the yellow LED while the battery is being loaded.
- Operation state. The External Battery Kit is disconnected from any DC source and may power the 4200. In this case, none of the LEDs are on.

Chapter 2 Installation

Installing and using the 4281 External Battery Kit

Installing the 4281 External Battery Kit The 4281 External Battery Kit is an option that requires a 4200 Series Mobile Service Tester equipped with the 4274 DC Option.

- 1 Turn the clamps of the External Battery Kit outside.



- 2 Place the 4200 with the 4274 DC Option on top of the External Battery Kit, with its feet in front of the circles indicating the final position for the feet.
- 3 Gently move the 4200 to the back as far as possible, so that the feet are located over the circles.



- 4 Turn the clamps over the 4200 so that the 4200 is safely held on top of the External Battery Kit.

- 5 Connect the cable from the External Battery Kit (DC out) to the DC input jack at the left-hand side of the 4200.



- 6 Connect the DC In jack of the External Battery Kit with a suitable DC source, e.g. the power supply that is delivered with the 4274 DC Option.



Charging the battery The 4281 External Battery Kit includes a preinstalled, rechargeable lithium-ion (Li-Ion) battery. A fully charged battery is good for two to three hours of continuous use.

Chapter 2 Installation

Installing and using the 4281 External Battery Kit

The battery can be charged simply by connecting the DC power supply. A completely discharged battery takes about eight hours to charge. You can check the battery charge status on the LEDs while pushing the **TEST** button.

The 4200 can be operated while the battery is charged.

Checking the battery capacity

Keep the **TEST** button pressed to view the battery capacity.

Up to five capacity LEDs light, depending on the capacity. One LED indicates that the capacity is quite low while five LEDs indicate full capacity.

Note

The capacity indication is most accurate while the 4200 is switched on.

Replacing the battery

The battery compartment can be found on the bottom side of the External Battery Kit. You can replace the battery even during operation using an external DC power supply:



- 1 Press the black rubber and push it down.
This will unlock the battery from the compartment.

- 2 Remove the battery.
Do not try to open it!
- 3 Line up the new battery with the contacts to the bottom and pointing towards the battery compartment.
- 4 Gently slide the battery into the battery compartment until it locks completely.
- 5 Fully charge the new battery.

Battery replacement

To replace the battery, use genuine Willtek spare parts only. The ordering numbers can be found on [page 4](#).

Dispose of battery safely

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

Li-Ion batteries can stand about 1000 charging cycles and work for about three years before significantly losing capacity. The risk of memory effect is low. For optimum performance and lifetime, please follow the advice below:

- Before first-time use, charge the battery completely. This takes 12 to 16 hours.
- If you do not use the battery for months: Fully charge the battery and remove it from the External Battery Kit. Check the battery twice a year and recharge it if necessary.
- Do not store battery above 45°C (110°F) nor below 0°C (32°F).
- Do not touch the battery contacts with your fingers; keep them clean.
- Operating the battery at low temperature decreases (around or below 0°C) its capacity, meaning that the battery is discharged after a relatively short period of time.
- Do not drop battery to the ground (risk of cracks).

Chapter 2 Installation

Installing and using the 4281 External Battery Kit

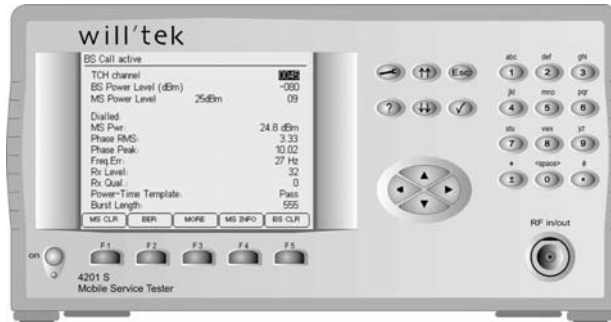
Operation

3

This chapter describes the functionality of the instrument. Topics discussed in this chapter are as follows:

- ["Using the front panel" on page 18](#)
- ["Powering the unit" on page 20](#)
- ["Using the start menu" on page 22](#)
- ["Configuring basic settings" on page 23](#)
- ["Connecting test leads" on page 24](#)
- ["AUTOTEST mode" on page 33](#)
- ["FAULT FIND mode" on page 34](#)

Using the front panel



Keypad



The cursor keys have two functions:

- selecting menu items
- when entering numbers/letters: moving to the required location

Softkeys **F1 – F2 – F3 – F4 – F5**

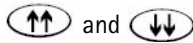
The current function of a key is assigned by the currently visible menu. If no such assignment has been made, the softkey is irrelevant.



Calls up the start menu to select the desired operation mode via softkeys



Online help: Explanations of the currently visible menu



These keys have two functions:

- quick browsing (page by page) in lists shown on the screen (stored AUTOTEST logs and MS TYPE test parameter sets)
- Increments/decrements a value (+1/-1) entered in the entry fields for the RF power level (BS Power Level and MS Power Level) and for the channel numbers (BCCH and TCH). Holding the button down changes the value automatically (autorepeat).



The key has two functions:

- returning to the next menu up
- aborting the current test



The key has three functions:

- confirming input
- opening a submenu
- launching a program

1ABC ... 9YZ

The number-and-letter keys have the following functions:

entering the numbers 1 through 9 (e.g. phone numbers)

entering the letters A through Z (e.g. comments)

*

Enters the asterisk

0 <SPACE>

Enters the digit 0 or a space (e.g. between two words in a comment)

.

Enters a decimal point (e.g. 2.5 dB)



On/off button with power-on LED

- Yellow: standby
- Green: powered on

Powering the unit

All you need to do to start up your Willtek 4200 the first time round is connect it to the power via the accompanying power cord.



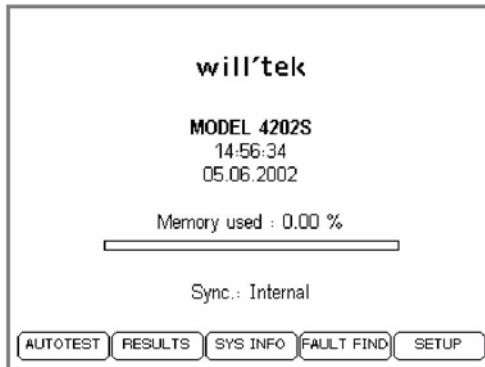
- 1 Plug the power connector into the matching socket on your Willtek 4200.
- 2 Connect the power cord to the wall power outlet.
- 3 Press the on/off button to switch your Willtek 4200 on.

Immediately after being switched on, the Willtek 4200 briefly displays an initialization menu (in this period among other things the operability of the device is checked).

The tester is fitted with a maintenance-free fan in order to keep the semiconductor components cool. The level of noise produced by the fan is normal.

Once you see the start menu, the device is ready for use.

The first time you start up the device, you should at this point press the **SETUP** softkey to adapt the basic configuration of your Willtek 4200 to match your specific requirements.



Using the start menu

The start menu displays softkeys with the following meaning:

AUTOTEST

Switches to AUTOTEST mode (quick test of mobile phones). Detailed instructions about this mode you will find in ["AUTOTEST mode" on page 33](#).

RESULTS

Displays a list of AUTOTEST logs you have stored (e.g. if you want to print a certain log). Detailed instructions about the log handling you will find in the user guide.

SYS INFO

Calls the SYSTEM INFORMATION menu (see user guide).


FAULT FIND

Switches to FAULT FIND mode (alignment, troubleshooting). Detailed instructions about this mode you will find in ["FAULT FIND mode" on page 34](#).

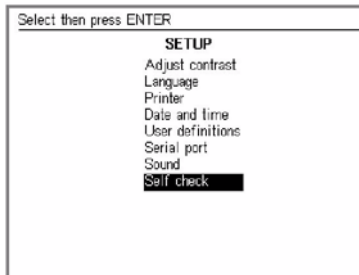
SETUP

Calls the setup menu (for basic parameter settings such as language and contrast). You will find detailed instructions about the setup procedure in the user guide.

Configuring basic settings

Press  > **SETUP** to enter the menu for the basic settings.

The following menu will appear:

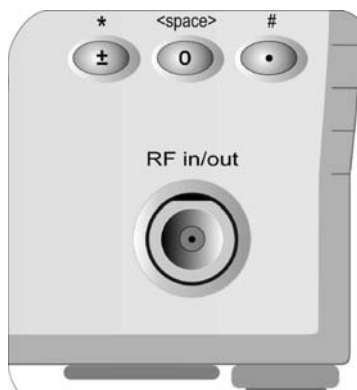


As a rule, the basic settings need only be configured once during initial startup. A powerful capacitor ensures that the settings and the stored test result are preserved when your Willtek 4200 is off.

NOTE

The tester needs to be switched on for about 4 hours at least every 14 days (for capacitor charging) to ensure that no data is lost.

Connecting test leads



A Willtek 4200 supports three methods of attaching a mobile phone for testing:

- wireless connection via antenna (extra accessory).
- connection via the Universal Antenna Coupler (extra accessory).
- Cable-based connection via RF adapter cable and an RF adapter which matches the phone (extra accessory).

4208 RX and TX connectors

The 4208 Off-Air Mobile Tester is the only model in the 4200 series which offers two separate connectors for radio frequency input and output. Using these two connectors an external amplifier can for example be connected to the 4208 to further increase the operating range to up to 20 m.



NOTE

It is the user's responsibility to take precautions against interfering with public cellular networks.

Appropriate shielding arrangements can help to attenuate the signal outside the building so that the signal level does not violate regulations set by local authorities.

Connection via antenna



Points in favor Very quick to set up.

Any GSM mobile phone can be tested.

The entire RF signal path of the phone is tested (antenna included).

No RF adapter required.

Points to note Some tests call for clearly defined conditions (accurately known RF input level at the radio's antenna input). With a wireless connection, these particular test values cannot be correctly measured.

In order to keep RF signal attenuation in the space between the devices to within reasonable bounds, the distance between the tester and the mobile phone must not exceed 50 cm.

Make sure that no conductive objects are lying between the tester and the mobile phone (screening effect). The two devices must not be placed on a conductive surface.

Nearby base stations of a GSM mobile radio network may cause the test results to be distorted.

The radio is likely to get registered into a public mobile radio network (unintentionally). Additional measures must be taken at the start of a test run to ensure that this does not happen.

Connection Select the correct antenna for the mobile radio system (extra accessory, see also [page 4](#)) which matches the mobile phone frequency range and secure it to the N connection of your Willtek 4200 by tightening the coupling ring.

NOTE

Do not use the wrong antenna, as this will falsify the results of the test. The antenna for GSM 850/900/E-GSM mobile phones has an overall length of approximately $\lambda/4 = 165$ mm (or 6.5") and has two yellow rings at the end. The antenna for GSM 1800/1900 mobile phones has an overall length of approximately $\lambda/2 = 229$ mm (9") and has no rings.

**Connection via
antenna on the
4208**

As explained in section ["4208 RX and TX connectors"](#) on page 25 the 4208 offers two separate connectors for radio frequency input and output. Using these two connectors the 4208's operating range can be increased by using external amplifiers for example.

The following picture shows two antennas connected to the TX and RX connectors. Isolation between receive and transmit paths can be improved by arranging the two antennas in an 90° angle.



**Connection via
the Antenna
Coupler**



The important feature with the Antenna Coupler is that mobile phones of the same type are always placed in exactly the same position in the clamp.



An additional RF Shield (extra accessories) reduce interferences with surrounding RF signals. It is recommended to use the shield in common with the coupler.

Points in favor The Antenna Coupler is suitable for all radio systems (GSM, PCN, PCS). It combines most of the benefits of wireless connection via antenna with those of cable-based connection. The more precisely defined test conditions mean that measurements and tests which were too inaccurate with the simple antenna connection method are more reliable.

Points to note The Antenna Coupler can also react to changes in the environmental conditions (such as the proximity of a hand). Precision measurements can therefore still only be performed with a cable-based connection. RF interference from nearby base stations can also create problems. To reduce these interferences (about approx. 50 dB) we strongly recommend to use the Antenna Coupler in common with the RF Shield (extra accessories).

Chapter 3 Operation
Connecting test leads

Connection Connect the Antenna Coupler to the Willtek 4200 with the RF adapter cable supplied.

Release the jaws of the clamp by pressing the small button and insert the mobile phone in such a way that its display points to the Willtek logo and the housing touches the bottom restraint. Press the jaws of the clamp together firmly.

NOTE

Ensure that mobile phones of one type are always mounted in exactly the same position. Only in this way can constant test conditions and appropriate test results be guaranteed. If you select an automatic start for an AUTOTEST, you must observe any special instructions for the test which may appear (e.g. fully extend the antenna or check size of battery pack).

Cable-based connection



Points in favor RF adapter with cable coupling guarantees a set of defined testing conditions. That means that all tests produce results which can be correctly evaluated against specifications.

As all the tests are suitable for evaluation, the PASS/FAIL evaluation is more broadly based than with wireless connection.

It is not possible for the test unit to (unintentionally) register in a public mobile radio network.

There is no chance of interference from nearby GSM base stations.

Points to note Test preparation takes longer.

Only mobile phones which have an RF connection socket can be tested with this method.

Defects in the mobile phone's antenna circuit are not detected.

Connection Select the RF adapter (extra accessory) which matches the mobile phone. First securely attach the RF adapter cable (1.5 m) to the N connection on the Willtek 4200 and to the RF adapter. Then attach the mobile phone to the RF adapter. Use original equipment only (otherwise you may risk false readings or damage of the mobile phone).



CAUTION

When attaching the RF adapter, take great care with the alignment of the contacts. Do not use force. If an adapter does not fit properly, you may have chosen the wrong one. Make sure that there is good contact on all plug-in connections (loose contacts lead to errors in test results).



CAUTION

When connecting a mobile via cable to the 4208 the maximum input level is +19 dBm. If the mobile sends at its maximum output power of +33 dBm the connector could be damaged. In order to prevent the connector from being damaged an attenuator (e.g. 20 dB) has to be inserted.

Installing the test SIM



Make sure that you insert the test SIM in the mobile phone before carrying out an AUTOTEST. This is because during the test, the Willtek 4200 will attempt to perform measurements which are not generally permitted by original SIMs. The test SIM is not absolutely necessary for FAULT FIND mode, although it is useful.

- 1 Make sure the mobile phone is switched off.

NOTE

Observe the equipment manufacturer's handling instructions.

- 2 Replace the original SIM with the test SIM. Plug-in SIMs are usually hidden behind a small flap that you see when you take out the battery.

Do not forget to remove the test SIM before returning an intact mobile phone. With the test SIM in the phone, the customer will no longer be able to check into a radio network; so even though the phone is intact, it will be of no use to the customer.



CAUTION

Please note that the SIM card has an embedded chip and the contacts to this can become damaged with repeated flexing or a very large number of insertions and removals from a mobile phone.

NOTE

If you insert a new SIM card that has never been used before, allow the phone to register with the network simulated by the 4200. Registration (location updating) is supported with any of the following keys in AUTOTEST mode: **MS CALL**, **LOC UPD**, **BS CALL**.

AUTOTEST mode

Overview An AUTOTEST performs a series of different measurements largely automatically. By comparing its measurements with stored target values, the Willtek 4200 detects faults in the mobile phone. The tolerances allowed with respect to the target values are used to decide PASS or FAIL of each measurement.

At the end of the AUTOTEST, an overall evaluation of PASSED or FAILED is derived from the evaluations of the individual tests.

AUTOTEST PASSED: The mobile phone is within the tolerances, and is in full working order. There is no need for further measurements in FAULT FIND mode.

AUTOTEST FAILED: The mobile phone is outside the tolerances. The test unit is defective. Further measurements in FAULT FIND mode can be used to identify the cause of the fault.

A group of test parameters can be assigned to any model of mobile phone and then stored. Once the parameters have been stored for a given model, these preparatory steps are no longer required if a further test is carried out on the same model. The AUTOTEST can be started immediately. In these cases, the two steps of preparing and running an AUTOTEST are totally separate. The advantage is that the two tasks can be carried out at different times and by people with different levels of expertise.

Running an AUTOTEST Running an AUTOTEST requires only a few actions, provided that the test specifications have been created and saved as an MS TYPE record. See the user guide for more information about creating an MS TYPE record.

- 1 Select  > **AUTOTEST**.
- 2 Call up the list of stored MS TYPE records on the tester.

- 3 Select the appropriate record for the mobile phone. Is this record missing? Entering a new MS TYPE data record only takes a few minutes and is described in the user guide (chapter 3).
- 4 Connect the mobile phone to the tester and insert the test SIM.
- 5 Start the AUTOTEST and follow the instructions on the tester display.
- 6 Analyze the test results. In the event of an error, the tester does not just return FAILED, but also lists all the measured values outside the tolerance.

Find more information about the AUTOTEST features and capabilities in the user guide!

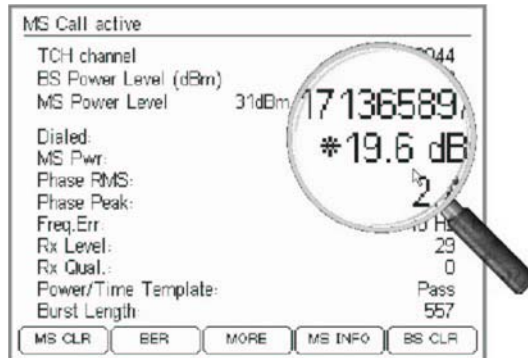
FAULT FIND mode

Overview In FAULT FIND mode you have access to all the tests that a Willtek 4200 is capable of performing. This includes those tests which are run automatically in AUTOTEST mode. You can also add further tests, and numerically displayed measurements help you to selectively identify important quality parameters of a mobile phone.

In FAULT FIND mode a Willtek 4200 shows its sophisticated test capability; but correct interpretation of the test results and measurements does demand a certain amount of expertise with GSM and measurement techniques.

In the FAULT FIND operating mode, the measurements that lie outside the permitted tolerances are marked with a * (an asterisk). Unlike the AUTOTEST operating mode, FAULT FIND offers the user a way of individually specifying the tolerance limits for measurements (e. g. permitted frequency offset). That means that FAULT

FIND tests are more suitable for experts who want to pinpoint the source of faults on the basis of individual test results and measurements or for alignment of mobile phones.



The asterisk in front of a measurement draws your attention to the fact that this measurement is outside the permitted tolerances.

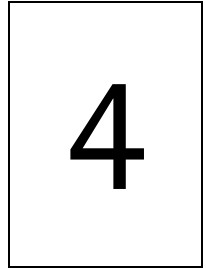
Available modes Depending on the precise model of the Willtek 4200 series, FAULT FIND mode provides the following modes for tests on mobile phones:

SPEECH The tester simulates transmit/receive voice operation of a base station by exchanging signals with the mobile phone depending on the situation. It is possible to carry out tests on unknown mobile phones.

DATA 9600 Available in full in Willtek 4202S + 4202R, partially available in Willtek 4201S. Identical to speech mode, but testing of data connections at 9600 bit/s and no acoustic voice test. Restriction for Willtek 4201S: If user-specific AUTOTESTs contain data calls (programmed using the Utility Software option), these will be ignored by the tester.

- SMS** Available in Willtek 4202S + 4202R. The tester simulates the SMS function of a base station in transmit/receive mode by exchanging signals with the mobile phone depending on the situation.
- VGCS (GSM-R)** Available in Willtek 4202R. Tester simulates Voice Group Call Service functions of a GSM-R base station in transmit/receive mode.
- ANALYZER** Available in all Willtek 4200. The mobile phone is in a special test mode. The tester evaluates RF signals from the mobile phone and does not send any signals. This is the factory service mode.
- RF GEN** In this mode the 4200 feeds a defined carrier signal into the mobile phone for test and adjustment purposes. The Willtek 4200 sends a carrier signal defined by the values entered in the RF GEN menu.
- DE-TUNING** Option for all Willtek 4200. Special mode which permits a defined frequency offset for the BCCH signaling channel.
- For details about setting up and performing these tests, please refer to the user guide.
- GPRS** Option for the Willtek 4202S (available with firmware version 4.00 and higher). The tester simulates a GPRS base station. The test depth depends on the GPRS option installed (Go/NoGo or Measurement Option).

Troubleshooting



This chapter describes how to identify and correct problems related to the Willtek 4200. Topics discussed in this chapter are as follows:

- ["Troubleshooting" on page 38](#)
- ["Solving problems" on page 38](#)

Troubleshooting

If you are unable to resolve problems related to the Willtek 4200, refer to ["Technical assistance" on page ix](#).

When contacting Willtek for product support please call up  **> Setup > Self check > System info** and have the information on this menu available. Press **Print** to start printing the menu.

```
SYSTEM INFORMATION
-----
Serial number :      313482
Model :             4202R
Version :          3.00 from Oct 10 2002 14:25:55

MCU Serial number : 313482
HF Serial number  : 313491
HW Revision :     0, 4, 3
Last Calibration : 06.04.2001
```

Solving problems

If you experience difficulties using the Willtek 4200, refer to the related topic. Each topic describes problems and solutions that may be pertinent to your task. If you are unable to resolve your problem, please contact ["Technical assistance" on page ix](#).

Basic settings lost To store the basic settings, the tester uses a powerful capacitor, not a battery. If a tester is left switched off for more than about 14 days, the energy reserves may drain away. The tester must be switched on in order to load the capacitor. Simply supplying power via the power supply unit whilst the tester is switched off is not sufficient. To reenter lost settings, see chapter 2 of the user guide.

Display is blank Contrast correctly set?

Supply voltage present?

Mobile phone Test SIM correctly mounted?

**does not
recognize
tester**

When using the 4208: is the Test Sim setting on the parameter screen correct, i.e. is it switched on or off depending on the SIM card used?

Battery in mobile phone OK?

Correct radio system (GSM 900/1800/1900)?

Tester's RF output level set to maximum value (BS Power Level)?

In the case of a wireless connection: is the distance between the tester and the mobile phone less than approx. 50 cm?

Is a base station in the vicinity sending on the same channel? If so, change the channel and perform a scan.

In the case of a cable-based connection: are you using the correct RF adapter and is this installed correctly?

**Tests not
reproducible** Test channels (BCCH and TCH) are being used by nearby base stations?

Battery in mobile phone OK?

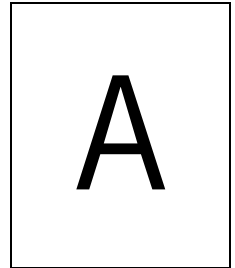
In the case of a wireless connection: are there any metallic objects lying between the tester and the mobile phone?

In the case of Universal Antenna Coupler: are there any nearby base stations on same channels as test frequencies? Is the mobile phone fitting snugly in the cradle/clamp?

Chapter 4 Troubleshooting
Solving problems

Print problems See user guide (chapter 6).

Warranty and Repair



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

- ["Warranty information" on page 42](#)
- ["Equipment return instructions" on page 43](#)

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:

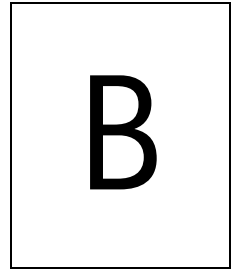
- Owner's name, address, and telephone number.
- Serial number, product type, and model.
- Warranty status. (If you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note.)
- Detailed description of the problem or service requested.
- Name and telephone number of the person to contact regarding questions about the repair.
- Return authorization (RA) number (US customers), or reference number (European customers).

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

Appendix A Warranty and Repair
Equipment return instructions

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.

End-User License Agreement



This appendix describes the conditions for using the software of the Willtek 4200, including the 4xxx Data Exchange Software.

All copyrights in and to the software product are owned by Willtek Communications or its licensors. The software is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties.

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:

- (i) use the software and/or any copy of the software in different computers concurrently, unless the software is an update that has been downloaded from the Internet at www.willtek.com;
- (ii) copy the software, except for archive purposes consistent with your standard archive procedures;
- (iii) transfer the software to a third party apart from the entire product;
- (iv) modify, decompile, disassemble, reverse engineer or otherwise attempt to derive the source code of the software;
- (v) export the software in contravention of applicable export laws and regulations of the country of purchase;
- (vi) use the software other than in connection with operation of the product.

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Willtek Communications shall not be held liable for any damages suffered or incurred by you or any other third party (including, but not limited to, general, special, consequential or incidental damages including damages for loss of business profits, business interruption, loss of business information and the like), arising out of or in connection with the delivery, use or performance of the software.

Room for your notes

Publication History

Revision	Changes
0301-100-A	First revision.
0304-110-A	New declaration of EU conformity for 0613xxx series. List of deliverables added.
0312-600-A	Installation and operation of 4281 External Battery Kit, end-user license agreement added.
0402-700-A	Modified standard delivery list. New declaration of EU conformity for 0713xxx series.
0504-900-A	Information for new 4208 Off-Air Mobile Tester added. Information for new 4916 Antenna Coupler and 4921 RF Shield added.
0504-900-B	Modified standard delivery list.
0602-800-A	New list of Technical Assistance Centres.
0801-100-A	Standard delivery list and accessories updated.

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