

**Wavetek 4200S Series**

**WAVETEK**

## La semplicità al servizio dei test sui cellulari GSM 900 - 1800 - 1900



Con il nuovo Wavetek 4200 effettuare i test sui cellulari GSM, comprensivi di Handover test e fax & dati test è ancora più semplice. I laboratori possono disporre in questo modo di una maggiore capacità produttiva, l'assistenza dei clienti può essere migliorata riducendo contemporaneamente i tempi di lavoro.

Il 4200 dispone di procedure di test automatiche inerenti alle correnti specifiche GSM. Le procedure e i parametri possono essere modificati a piacimento per essere adattate alle differenti esigenze dell'utilizzatore.

I cellulari dell'ultima generazione possono essere testati grazie alla capacità di analisi del 4200 su EFR

(Enhanced Full Rate)

Codec, fax & dati e invio e ricezione di SMS.

Le ulteriori funzioni accrescono notevolmente l'efficienza dei test.

La funzione Analizzatore di Spettro permette l'allineamento dei modula-

tori I/Q. In più la funzione Warping garantisce la misura per la sintonizzazione in frequenza ed offre un ampio campo di ricezione per i cellulari difettosi una volta posti in test mode.

Gli AUTOTEST eseguono delle rapide verifiche del telefono e possono essere modificati grazie all'utilizzo dell'opzione UTILITY software. Con la modalità FAULT FIND il controllo manuale di tutti i parametri GSM semplifica la ricerca dei guasti.

Con la modalità Asincrona, mediante un segnale GMSK, viene eseguito il controllo completo dei cellulari oppure delle piastre a circuito stampato non ancora calibrate.

Tutti i processi di misura possono essere effettuati tramite PC grazie all'interfaccia standard RS-232-C. In questo modo è possibile automatizzare l'esecuzione dei test e gestire su PC i risultati dei test effettuati.

Gli aggiornamenti software possono essere facilmente e gratuitamente scaricati da Internet. E' disponibile una vasta gamma di adattatori RF per i vari cellulari ed inoltre un accoppiatore di antenna ora disponibile con o senza schermatura RF, per semplificare la connessione con i cellulari senza ricorrere agli adattatori RF.





# Wavetek 4200S Series

WAVETEK®

## Summary Technical Data

For details please refer to Technical Data Sheets.

### ◆ RF Signal Generator

#### Frequency range

GSM 900: 935 MHz bis 960 MHz  
E-GSM 900: 925 MHz to 935 MHz  
GSM 1800: 1805 MHz to 1880 MHz  
GSM 1900: 1930 MHz to 1990 MHz

#### Frequency error (without external oscillator)

< 1ppm

#### Output power level

-39 dBm to -117 dBm

#### Output power level accuracy

0.9 dB in the range of -39 dBm to -110 dBm  
(GSM 900 / 1800 / 1900)  
temperature: 20 °C to 30 °C  
1.0 dB in the range of -39 dBm to -110 dBm  
(GSM 900)  
temperature: 15 °C to 35 °C  
1.0 dB in the range of -43 dBm to -110 dBm  
(GSM 1800 / 1900)  
temperature: 15 °C to 35 °C

### ◆ TX Measurement

#### Frequency range

GSM 900: 890 MHz to 915 MHz  
E-GSM 900: 880 MHz to 890 MHz  
GSM 1800: 710 MHz to 1785 MHz  
GSM 1900: 1850 MHz to 1910 MHz

#### Frequency measurement

GSM 900  
< 15 Hz (+ error of external reference oscillator)  
< 25 Hz (internal reference)

GSM 1800 / 1900  
< 30 Hz (+ error of external reference oscillator)  
< 50 Hz (internal reference)

Frequency error (within ±5 kHz frequency offset)

#### Input power level accuracy

Conditions: -10 dBm to +39 dBm  
Impedance: 50 Ω  
VSWR: 1 : 1.3  
0.9 dB temperature: 20 °C to 30 °C  
1.0 dB temperature: 15 °C to 35 °C

#### Dynamic range

> 40 dB

#### Phase error

GSM 900  
< 1.3° rms (up to 20°)  
GSM 1800, 1900  
< 1.5° rms (up to 20°)

## General Data

H x W x T 165 x 310 x 160 mm  
Weight 2.4 kg  
Power consumption 18 W  
Voltage: 94 V to 264 V  
Operating temperature +15 °C up to +35 °C

### ◆ Ordering Information

Wavetek 4201S ..... 101 301  
Universal Antenna Coupler ..... 248 330  
RF Shielded Box ..... 248 369  
RF Shield Box: ..... 378 282  
(RF Shield + Universal Antenna Coupler)  
Antenna 900 MHz ..... 860 261  
Antenna 1800 / 1900 MHz ..... 860 262  
Test SIM (full size) ..... 860 178

\* Software features described in this brochure if not available at the time of purchasing, will be provided in future versions of the Wavetek 4200S firmware, and supplied free of charge either by web or disk.

All technical data is still preliminary.

## Worldwide Sales Offices

### Wavetek Wandel & Goltermann Western European Sales Region

Wandel & Goltermann GmbH & Co.  
Vertriebsgesellschaft  
PO Box 1155  
Arbachtalstrasse 6  
72794 Eningen u.A.  
GERMANY  
Tel: +49 7121 86 22 22  
Fax: +49 7121 86 12 22

### Wavetek Wandel & Goltermann Eastern European Sales Region

Wandel & Goltermann GmbH  
PO Box 13  
Elisabethstrasse 36  
2500 Baden  
AUSTRIA  
Tel: +43 2252 85 52 10  
Fax: +43 2252 80 727

### Wavetek Wandel & Goltermann North American Sales Region

Wavetek Corporation  
5808 Churchman Bypass  
Indianapolis, IN 46203  
USA  
Tel: +1 317 788 9351  
Fax: +1 317 614 8307

### Wavetek Wandel & Goltermann Latin American Sales Region

Wandel & Goltermann Instrumentação Ltda & Cia  
Av Eng Luis Carlos Berrini  
936-9 Andar  
04571-000 São Paulo, SP  
BRAZIL  
Tel: +55 11 5503 3800  
Fax: +55 11 5505 1598

### Wavetek Wandel & Goltermann Asia / Pacific Sales Region

Wandel & Goltermann Pty. Ltd.  
PO Box 419  
World Trade Centre  
Melbourne, Victoria 3005  
AUSTRALIA  
Tel: +61 3 9690 6700  
Fax: +61 3 9690 6750

A closely linked network of 29 affiliated companies and more than 65 representatives ensure that our customers receive the best possible advice in solving specific measurement problems.

For any further information or to get the address of your local Sales Office, please contact Wavetek Wandel & Goltermann at the following address:

### Wavetek Wandel & Goltermann, Inc.

Wandel & Goltermann GmbH & Co.  
Marketing International  
PO Box 1262  
72795 Eningen u.A.  
GERMANY  
Tel: +49 7121 86 16 16  
Fax: +49 7121 86 13 33

www.wwg-solutions.com

Your nearest representative:

Wavetek is a registered trademark of Wavetek Wandel Goltermann, Inc. STABLOCK is a registered trademark of Wavetek GmbH  
Subject to alterations. WIIS / 220B / 06 99 / AE © Wavetek Wandel Goltermann 1999

## Wavetek 4200S Series

### Satisfying Service Needs

#### **Automated Tests**

*Measuring all relevant GSM parameters and specifications is automatic with individual test procedures easy to generate.*

#### **FAULT FIND Mode**

*Manual control of all the GSM conditions simplifies troubleshooting with dynamic display of parameters and graphical screens.*

#### **Asynchronous Mode**

*Complete mobiles or uncalibrated PCBs can be measured with a GMSK signal.*

#### **Easy Remote Control**

*All measurements and signaling procedures can be remotely controlled to automate tests and integrate the results into local data systems.*

#### **Firmware Updates**

*Download the latest firmware from the Internet ([www.wwg-solutions.com](http://www.wwg-solutions.com)) to meet the future technology extension.*

#### **Local language**

*Operation in local language is available in English, German, French, Italian and Chinese.*

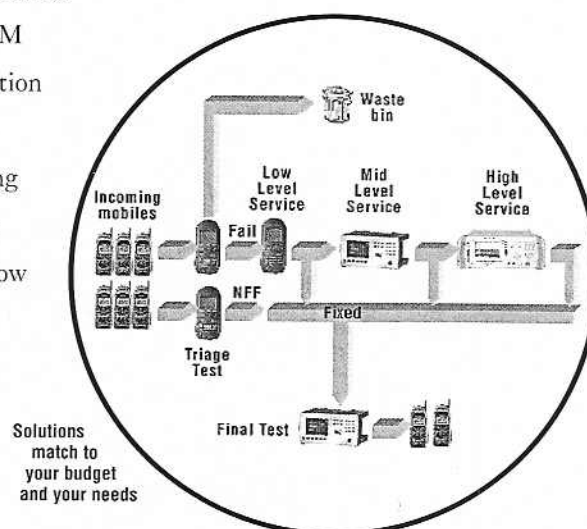
Phone service is changing to meet the demands of faster turn-around times, limited budgets and skill shortages. Service work now starts with a "filter" or Triage Test sorting returned phones into NFF (No Fault Found) from phones needing repair.

Low-level repair of mechanical items and pre-customer test is easy. At mid-level service, board swaps and module exchanges need alignment. After chip-level repair, complete and accurate fast alignment stations based upon factory test systems are needed.

The new Wavetek 4201S is ideal for mid-level service and delivers accurate RF measurements plus a full range of new function tests including data, fax and SMS for dual-band GSM mobiles. Prompts for operation and test results are clearly displayed for ease of viewing and the small size takes up minimal bench space to allow focus on the mobile itself.

In spite of its low price, the 4201S has 0.9 dB power output, and 0.9 dB level accuracy for assurance in BER measurements and confidence in power testing.

Features match the latest generation of mobiles with dual-band testing supplied as standard, modulation spectrum measurements for I/Q alignment, SMS, data and fax testing for digital messaging and timing advance testing for correct phone alignment. In addition, the audio loopback mode tests the latest EFR Codec performance at low signal levels.





**WAVETEK**

Features increase test throughput, provide faster fault finding and extend test capability.

### Automatic Dual-Band Power Level Switching

The MS power levels are different in GSM 900 and 1800/1900 systems. The Wavetek 4201S switches automatically to the



Measurements are possible in GSM 900, GSM 1800, GSM 1900 and dual-band

correct – pre-selected – MS power level when making cross-band handover tests.

### Audio Quality Test EFR

The EFR check provides more than a Go/NoGo test of the EFR-Codec. During Audiotest, the Full Rate path of the Codec is first tested, then, at a low signal level, e.g. -100 dBm, the mobile is

switched to EFR. The audio improvement can then be heard using voice echo.

### FAULT FIND Limits Flexibility

Repairing a mobile in FAULT FIND Mode (manual mode) lets the user set test limits.

This flexibility allows different tests depending on the make and model of phone. This feature provides flexibility for incoming inspection versus alignment and final test applications. Exceeding the limits gives an optical or audible output. Calls can be originated either from BS or MS.

### Faster Operation with ↑ ↓ Keys

Finding the best BER needs successive approximation to the right power level which is now faster and simpler using the increase / decrease buttons on the Wavetek 4201S.

### Min/Max Table Flexibility

The complete Min./Max. table of measured values can be stored or printed out or also transferred to a PC for analysis.

### Auto MS Clear

Whilst in FAULT FIND Mode the Wavetek 4201S detects automatically, if the END button of the mobile has been pressed. No hang-up occurs and no waiting for time-out is needed.

### Oscillator Autosync Detection

The Wavetek 4201S automatically detects if an external reference oscillator is connected and switches to use this reference, choosing the appropriate frequency.

FAULT FIND			
BCCH channel			0000
TCH channel			0555
BS Power Level (dBm)			-060
GSM 900 band			
MS Power Level	25dBm		09
Pre attenuation (dB) RX			01.5
Pre attenuation (dB) TX			01.5
GSM 1800 / 1900 band			
MS Power Level	24dBm		09
Pre attenuation (dB) RX			020
Pre attenuation (dB) TX			020
MS CALL			BS CALL

Comprehensive  
FAULT FIND Mode  
simulates network  
conditions to troubleshoot  
mobiles

## Wavetek 4200S Series

### All GSM Tests Included as Standard

#### Automatic Transmitter Tests

AUTOTEST mode provides up to six channels measured for power level, burst profile, frequency and phase measurements. Burst profile is fully displayed with a zoom feature and more than 60 dB dynamic range so that falling edge failures due to output stages faults can be pinpointed.

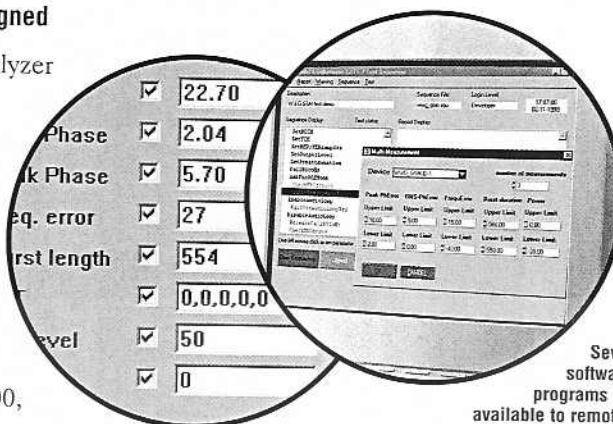
#### Dual-Band Mobile Tests

The extended frequency range allows modern mobiles to be tested by switching for instance, between TCH 900 to TCH 1800 on a control channel and vice versa. This reduces test time and meets modern mobile service needs.

#### I/Q Modulators Aligned

The spectrum analyzer function displays the signal levels at the channel and  $\pm 67.5$  kHz in tabular form.

The spectrum is shown at  $\pm 100$ , 200, and 500 kHz with 1, 2, 5 and 10 kHz steps.



Several software programs available to remote control the 4201S

#### Flexible Receiver Sensitivity

Measurements can be obtained with a variable number of samples for BER between 500 and 100,000 bits. Start level and step size of power can be selected with the test ending at 2.44 % BER (or other user-selected values).

#### Battery Performance Checks in Standby Mode

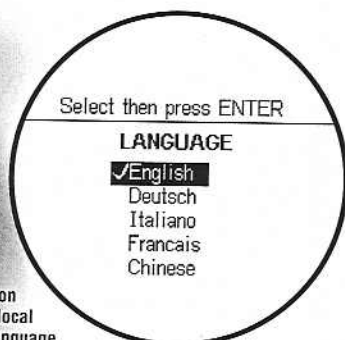
By setting the BS PA MFRMS Multiframe rate to between 2 and 9, battery lifetime tests can be made.

#### Automatic Operation

In addition to AUTOTEST mode, complete automatic test routines are easy. RS-232 control from a PC uses industry standard SCPI commands; a LabWindows™ driver is also available.

#### Audio Loopback Tests

Microphone and loudspeaker checks with loop back mode find the most common mobile phone audio failure points.



Operation in local language makes testing faster and easier



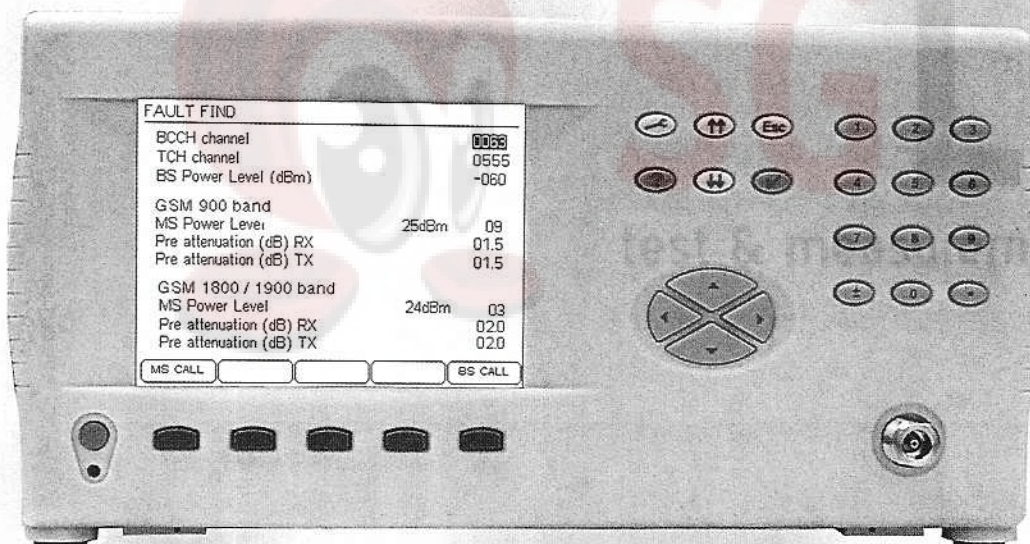
WAVETEK

Bright display,  
optimal contrast  
from all viewing  
angles

Forced location  
updates simulates  
intracell handover

Up to 500 complete  
mobile phone results

Alphanumeric  
keyboard for  
rapid entries



Flexible network  
parameters allow  
easier registration  
and set up of  
home network

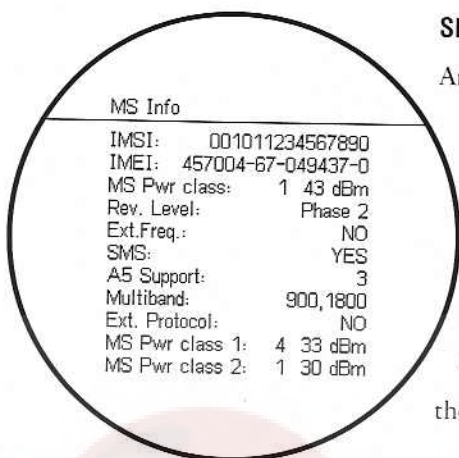
Auto detection of  
external oscillator  
enables very high  
stability reference

Remote control via SCPI  
commands and Lab

Forced MS release speeds  
up clear-down when MS

## Wavetek 4200S Series

### High Performance Data Tests



MS Info	
IMSI:	001011234567890
IMEI:	457004-67-049437-0
MS Pwr class:	1 43 dBm
Rev. Level:	Phase 2
Ext.Freq.:	NO
SMS:	YES
A5 Support:	3
Multiband:	900,1800
Ext. Protocol:	NO
MS Pwr class 1:	4 33 dBm
MS Pwr class 2:	1 30 dBm

#### Data and Fax Testing

Testing modern phones for data services is easy. This gives confidence by checking both the phone capabilities and if the subscriber has subscription access to these features.

Connecting the phone to a laptop allows data messages to be sent. With the data loopback mode 1024 bits are generated in the PC, sent to the mobile at low signal level, and then returned to the PC which identifies any errors.

Messages at up to 9600 baud can also be sent to a mobile and a logo is shown on the display.

#### SMS Testing

An SMS message can be sent from the Wavetek 4200S and its receipt confirmed on the phone's display. The return path can be checked with a message sent from the phone e.g. "SMS OK" and displayed on the Wavetek 4201S.

#### Timing Advance Checks

By forcing the mobile to follow the Wavetek 4200S the timing advance is changed. The setting can be from 0 to 63 bits with a resolution of 0.25 bit. This tests, if the phone will work correctly at the edge of the service area, or being used in a high-speed vehicle.

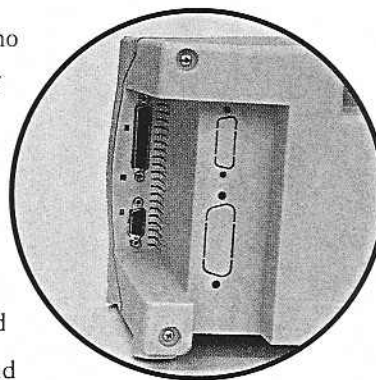
#### Well thought-out cable storage system

The neat cable storage system means the technician's desk is no longer filled with a mountain of loose cables.

All cables (power cable, printer cable, cables for data exchange and the cable for the external oscillator) can be stored neatly at the back of the unit and are easily accessible.

#### Local Mobile Oscillator Test

The Wavetek 4200S has a wide frequency capture range of  $\pm 100$  kHz, so that signals from a mobile outside the normal frequency can be measured\*, the appropriate correction factors applied and the mis-aligned mobile brought into specification. To check the range of frequency tuning available on the mobile, a special test is available in FAULT FIND Mode that allows the RF signals to be "pulled"  $\pm 25$  or  $\pm 50$  kHz. This meets the test needed by several types of mobiles.



\* May require special calibration.



**WAVETEK**

### Free Software

Download the latest firmware for the Wavetek 4200S using web access and a PC at no charge, including some of the features described in this brochure\*.

### Utility Software Provides

#### User Test Flexibility

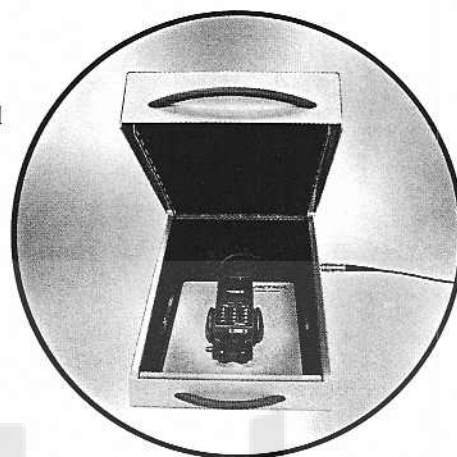
Running on a PC, this optional software package allows the user to modify test limits, change the test order or other parameters. Up to 20 user-defined AUTOTESTs can be stored on a Wavetek 4201S.

### AIC-Scanner Avoids Interference

Optional Automatic Interference Checker software scans through all channels. The resulting list shows all the occupied channels. This avoids local channels giving false results through interfering signals.

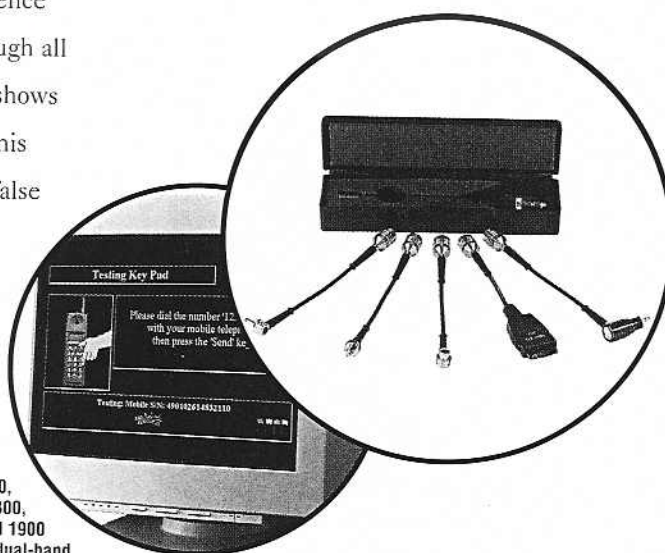
### New Screened Box

A new screened box is available which, fitted with the Universal Antenna Coupler, provides easy connection to any mobile (900, 1800, 1900 MHz) without the need for special connectors.



### Wide Range of Phone Adapters

Connectors for most popular phones are available as accessories. The list includes over a hundred different makes and models.



Measurements  
are possible in  
GSM 900,  
GSM 1800,  
GSM 1900  
and dual-band



# Wavetek 4200S Series

**WAVETEK®**

## Summary Technical Data

For details please refer to Technical Data Sheets.

### ◆ RF Signal Generator

#### Frequency range

GSM 900: 935 MHz bis 960 MHz  
E-GSM 900: 925 MHz to 935 MHz  
GSM 1800: 1805 MHz to 1880 MHz  
GSM 1900: 1930 MHz to 1990 MHz

#### Frequency error (without external oscillator)

< 1ppm

#### Output power level

-39 dBm to -117 dBm

#### Output power level accuracy

0.9 dB in the range of -39 dBm to -110 dBm  
(GSM 900 / 1800 / 1900)  
temperature: 20 °C to 30 °C  
1.0 dB in the range of -39 dBm to -110 dBm  
(GSM 900)  
temperature: 15 °C to 35 °C  
1.0 dB in the range of -43 dBm to -110 dBm  
(GSM 1800 / 1900)  
temperature: 15 °C to 35 °C

### ◆ TX Measurement

#### Frequency range

GSM 900: 890 MHz to 915 MHz  
E-GSM 900: 880 MHz to 890 MHz  
GSM 1800: 710 MHz to 1785 MHz  
GSM 1900: 1850 MHz to 1910 MHz

#### Frequency measurement

GSM 900  
< 15 Hz (+ error of external reference oscillator)  
< 25 Hz (internal reference)

GSM 1800 / 1900  
< 30 Hz (+ error of external reference oscillator)  
< 50 Hz (internal reference)

Frequency error (within ±5 kHz frequency offset)

### Input power level accuracy

Conditions: -10 dBm to +39 dBm

Impedancy: 50 Ω

VSWR: 1 : 1.3

0.9 dB temperature: 20 °C to 30 °C

1.0 dB temperature: 15 °C to 35 °C

### Dynamic range

> 40 dB

### Phase error

GSM 900  
< 1.3° rms (up to 20°)

GSM 1800,1900  
< 1.5° rms (up to 20°)

## General Data

H x W x T 165 x 310 x 160 mm

Weight 2.4 kg

Power consumption 18 W

Voltage: 94 V to 264 V

Operating temperature +15 °C up to +35 °C

### ◆ Ordering Information

Wavetek 4201S ..... 101 301  
Universal Antenna Coupler ..... 248 330  
RF Shielded Box ..... 248 369  
RF Shield Box: ..... 378 282  
(RF Shield + Universal Antenna Coupler)  
Antenna 900 MHz ..... 860 261  
Antenna 1800 / 1900 MHz ..... 860 262  
Test SIM (full size) ..... 860 178

\* Software features described in this brochure if not available at the time of purchasing, will be provided in future versions of the Wavetek 4200S firmware, and supplied free of charge either by web or disk.

All technical data is still preliminary.

## Worldwide Sales Offices

### Wavetek Wandel & Goltermann Western European Sales Region

Wandel & Goltermann GmbH & Co.  
Vertriebsgesellschaft  
PO Box 1155  
Arbachtalstrasse 6  
72794 Eningen u.A.  
GERMANY  
Tel: +49 7121 86 22 22  
Fax: +49 7121 86 12 22

### Wavetek Wandel & Goltermann Eastern European Sales Region

Wandel & Goltermann GmbH  
PO Box 13  
Elisabethstrasse 36  
2500 Baden  
AUSTRIA  
Tel: +43 2252 85 52 10  
Fax: +43 2252 80 727

### Wavetek Wandel & Goltermann North American Sales Region

Wavetek Corporation  
5808 Churchman Bypass  
Indianapolis, IN 46203  
USA  
Tel: +1 317 788 9351  
Fax: +1 317 614 8307

### Wavetek Wandel & Goltermann Latin American Sales Region

Wandel & Goltermann Instrumentação Ltda & Cia  
Av Eng Luis Carlos Berrini  
936-9 Andar  
04571-000 São Paulo, SP  
BRAZIL  
Tel: +55 11 5503 3800  
Fax: +55 11 5505 1598

### Wavetek Wandel & Goltermann Asia / Pacific Sales Region

Wandel & Goltermann Pty. Ltd.  
PO Box 419  
World Trade Centre  
Melbourne, Victoria 3005  
AUSTRALIA  
Tel: +61 3 9690 6700  
Fax: +61 3 9690 6750

A closely linked network of 29 affiliated companies and more than 65 representatives ensure that our customers receive the best possible advice in solving specific measurement problems.

For any further information or to get the address of your local Sales Office, please contact Wavetek Wandel & Goltermann at the following address:

### Wavetek Wandel & Goltermann, Inc.

Wandel & Goltermann GmbH & Co.  
Marketing International  
PO Box 1262  
72795 Eningen u.A.  
GERMANY  
Tel: +49 7121 86 16 16  
Fax: +49 7121 86 13 33

www.wwg-solutions.com

Your nearest representative:

Wavetek is a registered trademark of Wavetek Wandel Goltermann, Inc. STABLOCK is a registered trademark of Wavetek GmbH  
Subject to alterations. WIIS / 220B / 06 99 / AE © Wavetek Wandel Goltermann 1999