

# SG200

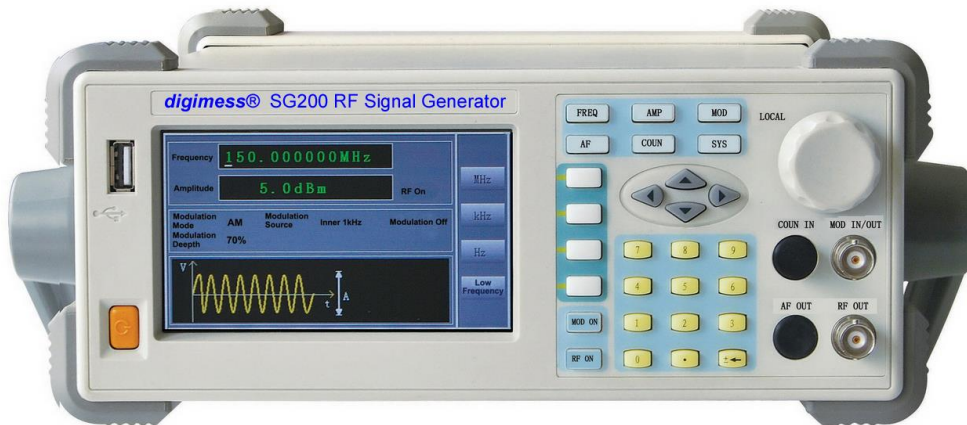
HF SIGNALGENERATOR

RF SIGNAL GENERATOR

**GEBRAUCHSANWEISUNG**

OPERATING INSTRUCTIONS

**digimess®**



Bestell-Nr.  
Order No.

HUC64-00

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# SG200 RF Signal Generator

## Operating Instructions

### 1.0 Mains Connection

The design of the unit meets the requirements of safety class I according to EN 61010-1, i.e. all metal parts accessible from outside and exposed to contact are connected with the protective conductor of the supply network.

Power is supplied via a mains cable with earthing contact

### 1.1 Installing the signal generator

The signal generator should not be operated close to equipment that develops heat. To protect the unit from thermal overload the air vents must not be covered and a free space of about 10 cm should be ensured.

### 1.2 Switching on

The signal generator is switched on using the power switch at the front. The power switch separates the unit completely from the primary side of the transformer.

### 1.3 EMC

The signal generator is interference-free according to EN 50081-1 and EN 50081-2. In order to fulfil the limit values in line with present standards, it is absolutely necessary that only cables which are in perfect condition be connected to the unit.

### 1.4 Inspection and Maintenance

If service is needed, due attention should be paid to the regulations according to VDE 0701. The signal generator should only be repaired by trained personnel.

## 1.5 Warranty

The perfect working order of the signal generator is guaranteed for 12 months as from delivery. There is no warranty for faults arising from improper operation or from changes made to the signal generator or from inappropriate application.

If a fault occurs please contact or send your signal generator to:

Agents details :

The signal generator should be sent in appropriate packing - if possible in the original packing. Please enclose a detailed fault report (functions working incorrectly, deviating specifications and so on) including unit type and serial number.

Would you also kindly verify warranty cases by enclosing your supply delivery note. Any repairs carried out without reference to a valid warranty will initially be at the owner's expense.

Should the warranty have expired, we will, of course, be glad to repair your signal generator as per our General Terms Of Assembly And Service.

## 1.6 Description

The *digimess*<sup>®</sup> SG200 is a DDS synthesised RF signal generator. The unit covers the frequency 9kHz to 450MHz with a resolution of 1Hz and auto switches between the Internal or an External frequency reference. The SG200 has a 4.3 inch TFT colour display, numeric keypad or rotary control data input and amplitude can be entered in either dBm, mV,  $\mu$ V or dB $\mu$ V. The generator includes AM, FM and Phase modulation along with FSK, PSK and Sweep facilities. Up to 8 instrument set-ups can be stored in the non-volatile memory and the unit features both USB and RS232 interfaces with a USB lead and software supplied.

## 2 Technical Data

### 2.1 General Data

Nominal temperature:	+ 23 °C $\pm$ 1 °C
Operating temperature:	+ 0°C to + 40 °C
Relative humidity:	>75%
Atmospheric pressure:	70 to 106 kPa
Operating position:	horizontal or inclined by $\pm$ 15 °
Operating voltage:	sinusoidal alternating voltage (distortion factor < 5 %) 200-250Vac $\leq$ 30VA
Frequency:	50/60 Hz
Safety class:	1, according to EN 61010 Part 1
Radio interference suppression:	EN 55011 Class B

## 2.2 Specifications

<b>Specification</b>			
<b>DISPLAY</b>		<b>FREQUENCY SWEEP</b>	
Size	4.3 inch	Frequency (start)	100kHz - 450MHz resolution 1Hz
Type	TFT colour LCD	Ranges	100kHz - 75MHz, 75MHz - 140MHz, 140MHz - 260MHz, 260MHz - 360MHz, 360MHz - 450MHz
<b>FREQUENCY</b>		Sweep width	1kHz - 99.99MHz
Range	9kHz - 450MHz ( $< 100\text{kHz}$ amplitude un-calibrated)	Step frequency	1Hz - 99.99MHz
Resolution	1Hz	Step time	10 $\mu\text{s}$ - 10s, 10 $\mu\text{s}$ steps
Accuracy	See Frequency Reference	Stop frequency	= start frequency + sweep width (within above ranges)
Settling	$< 100\text{ms}$ to within 100Hz	<b>AM MODULATION</b>	
<b>FREQUENCY REFERENCE</b>		Carrier frequency	$\geq 1.5\text{MHz}$
Internal or external	Automatic switch over	Range	0 - 120% ( $> 70\%$ un-calibrated) 0 - 70% ( $\leq +4\text{dBm}$ , $\leq 75\text{MHz}$ ) 0 - 50% ( $\leq +4\text{dBm}$ , $> 75\text{MHz}$ )
Internal Reference	TCXO 10.000MHz	Resolution	1% (modulation $\geq 10\%$ ) 0.1% (modulation $< 10\%$ )
Stability	$\pm 2.5\text{ppm}$ $+15^\circ\text{C}$ - $+30^\circ\text{C}$	Accuracy	$< \pm 7\%$ settled value $\pm 1.5\%$ (Internal, 1kHz $\leq 30\%$ )
External frequency input	10MHz 0.3V <sub>rms</sub> - 1V <sub>rms</sub> 50 $\Omega$	Source	Int or Ext 20Hz - 10kHz
<b>OUTPUT</b>		Distortion	$< 5\%$ (1kHz, 30%, 300Hz - 3kHz)
Level	-127dBm - +13dBm (0.1 $\mu\text{V}$ - 1000mV into 50 $\Omega$ )	<b>PHASE MODULATION</b>	
Resolution	0.1dB, 0.1 $\mu\text{V}$ , 0.1dB $\mu\text{V}$	Source	Internal 400Hz or 1kHz
Entry format	dBm, mV, $\mu\text{V}$ , dB $\mu\text{V}$	Phase deviation	0.1 rads - 6.0 rads
Accuracy	$\pm 1\text{dB}$ at level +4dBm $> 400\text{kHz}$	Resolution	0.1 rads
Attenuation precision	$\pm 2\text{dB}$ at $< -105\text{dBm}$	<b>PSK</b>	
SWR	$< 1.5$ at carrier freq $> 300\text{kHz}$ and level $< -6\text{dBm}$	Source	External TTL level
RF output impedance	50 $\Omega$	Ranges	See FSK
Harmonics	$< -15\text{dBc}$ at level $\leq +4\text{dBm}$	Phase 1 and Phase 2	0.1 $^\circ$ - 360 $^\circ$
Non-harmonics	$< -40\text{dBc}$ at level $\leq +4\text{dBm}$	Resolution	0.1 $^\circ$
Sub-harmonics	$< -40\text{dBc}$ at level $\leq +4\text{dBm}$	<b>NON-VOLATILE STORAGE</b>	
<b>MODULATION SOURCE</b>		Number of instrument set-ups	8
Type	Internal or external	<b>INTERFACE</b>	
Internal	400Hz or 1kHz, output 1V <sub>pk</sub>	Type	Standard USB and RS232
External	0 - 1V <sub>pk</sub> 600 $\Omega$	<b>GENERAL</b>	
<b>FM MODULATION</b>		Input voltage	200-250Vac 50/60Hz $\leq 30\text{VA}$
Peak deviation	0 - 100kHz	Weight	3kg
Resolution	100Hz	Size W x H x D	250 x 120 x 400 mm
Accuracy	$\pm 5\%$ $\pm 50\text{Hz}$ 1kHz Int, $> 5\text{kHz}$	Temperature	Operating 0 $^\circ\text{C}$ - 40 $^\circ\text{C}$ Storage -10 $^\circ\text{C}$ - +60 $^\circ\text{C}$
Distortion	$< 3\%$ 1kHz Int, $> 10\text{kHz}$ 300Hz-3kHz	Humidity	Up to 75%
Source	Internal 400Hz or 1kHz	<b>ORDERING INFORMATION</b>	
<b>FSK</b>		HUC64-00 SG200	RF signal generator
Source	External TTL level	Accessories supplied	Operators manual, BNC test lead, software, USB and mains lead
Ranges	100kHz - 1.5MHz FSK $< 25\text{kHz}$ 1.5MHz - 20MHz FSK $< 25\text{kHz}$ 20MHz - 75MHz FSK $< 50\text{kHz}$ 75MHz - 140MHz FSK $< 2\text{kHz}$ 140MHz - 260MHz FSK $< 2\text{kHz}$ 260MHz - 360MHz FSK $< 2\text{kHz}$ 360MHz - 450MHz FSK $< 2\text{kHz}$		

## **3.0 Operating instructions**

### **3.1 Mains input**

The mains input connector is located on the rear of the unit. Before connecting to the mains supply the user should verify that the unit is set to the correct voltage for the country of use.

### **3.2 Mains input fuse**

The mains fuse is located on the rear of the unit.

### **3.3 Power on/off**

The mains power to the unit is switched on and off using the POWER on/off pushbutton.

### **3.4 Data entry**

The desired value for all parameters can be set by either using the numeric keypad or by using a combination of the cursor buttons and the rotary control.

## **FREQ**

### **3.5 Frequency setting**

The output frequency is selected using the FREQ button, button illuminates when selected. Select frequency 9kHz - 450MHz (resolution 1Hz).

**Note :** Output amplitude between 9kHz and 100kHz is un-calibrated.

### **3.6 Frequency display**

The set frequency is shown on screen by the 9 digit display.

## **AMP**

### **3.7 Amplitude setting**

The amplitude is selected using the AMP button, button illuminates when selected.

The value can be entered in either dBm, mV,  $\mu$ V or dB $\mu$ V using one of the 4 buttons adjacent to the screen. Select amplitude 0.1 $\mu$ V - 1000mV into 50 $\Omega$  (resolution 0.1 $\mu$ V)

### **3.8 Amplitude display**

The set amplitude is shown on screen by the 4 digit display in either dBm, mV,  $\mu$ V or dB $\mu$ V.

## **RF ON**

### **3.9 Output on**

The RF output can be turned on and off using the RF ON button, button illuminates in the on position.

## **MOD**

### **3.10 Modulation**

The modulation menu is accessed by the MOD button, button illuminates when selected.

### **3.11 Modulation type**

AM, FM, FSK, PSK, PM and sweep modes can be selected using one of the 4 buttons adjacent to the screen.

#### **3.11.1 AM**

Select modulation depth from 0 - 120% (resolution 0.1% <10%, 1% >10%)

Select source from either INT 1kHz, INT 400Hz or External

**Note :** modulation depth 70% - 120% is un-calibrated

#### **3.11.2 FM**

Select frequency deviation 0 - 100kHz (resolution 100Hz)

Select source from either INT 1kHz or INT 400Hz

#### **3.11.3 PAM**

Not available on SG200

#### **3.11.4 FSK**

Select frequency 9kHz - 450MHz (resolution 1Hz)

Select Hop frequency 0 - 74MHz

Modulation source is external only

Refer to paragraph 2.2 Specifications for frequency ranges

#### **3.11.5 PSK**

Select Phase 1 0.1° - 360° (resolution 0.1°)

Select Phase 2 0.1° - 360° (resolution 0.1°)

Modulation source is external only

Refer to paragraph 2.2 Specifications for frequency ranges

#### **3.11.6 PM**

Select Phase deviation 0.1 rads - 6.0 rads (resolution 0.1 rads)

Select source from either INT 1kHz or INT 400Hz

### **3.11 Modulation type (continued)**

#### **3.11.7 SWEEP**

Select frequency (Start frequency) 100kHz - 450MHz (1Hz resolution)

Select sweep width (Stop frequency = Start frequency + Sweep width) 1kHz - 99.99MHz

Select step frequency (Frequency increment) 1Hz - 99.99MHz

Select step time (Time for each frequency increment) 10 $\mu$ s - 10s (10 $\mu$ s increments)

Refer to paragraph 2.2 Specifications for frequency ranges showing maximum sweep widths

#### **3.11.8 STEREO**

Not available on SG200

### **MOD ON**

#### **3.12 Modulation on**

The modulation can be turned on and off using the MOD ON button, button illuminates in the on position

### **AF**

#### **3.13 Audio generator**

Not available on SG200

### **COUN**

#### **3.14 Counter**

Not available on SG200

### **SYS**

#### **3.15 System**

The System menu is accessed by the SYS button, button illuminates when selected.

##### **3.15.1 STORE**

Non-volatile storage of upto 8 instrument settings using address locations between 00 and 07.

##### **3.15.2 RECALL**

Recalls upto 8 instrument settings using address locations between 00 and 07.

##### **3.15.3 GPIB**

Not available on SG200



### **3.15 System (continued)**

#### **3.15.4 RESET**

System reset

### **INPUT/OUTPUT CONNECTORS**

#### **3.16 RF OUT**

The RF signal is output from the RF OUT connector located on the front panel.

#### **3.17 MOD IN/OUT**

The MOD IN/OUT connector allows the connection of both input and output modulation signals and is located on the front panel.

#### **3.18 FSK/BPSK (TTL)**

The FSK/BPSK (TTL) connector allows the connection of the input signal and is located on the rear panel.

#### **3.19 REF IN**

The REF IN connector allows the connection of an external frequency reference of 10MHz with an amplitude 0.3Vrms - 1Vrms (50Ω load) and is located on the front panel.

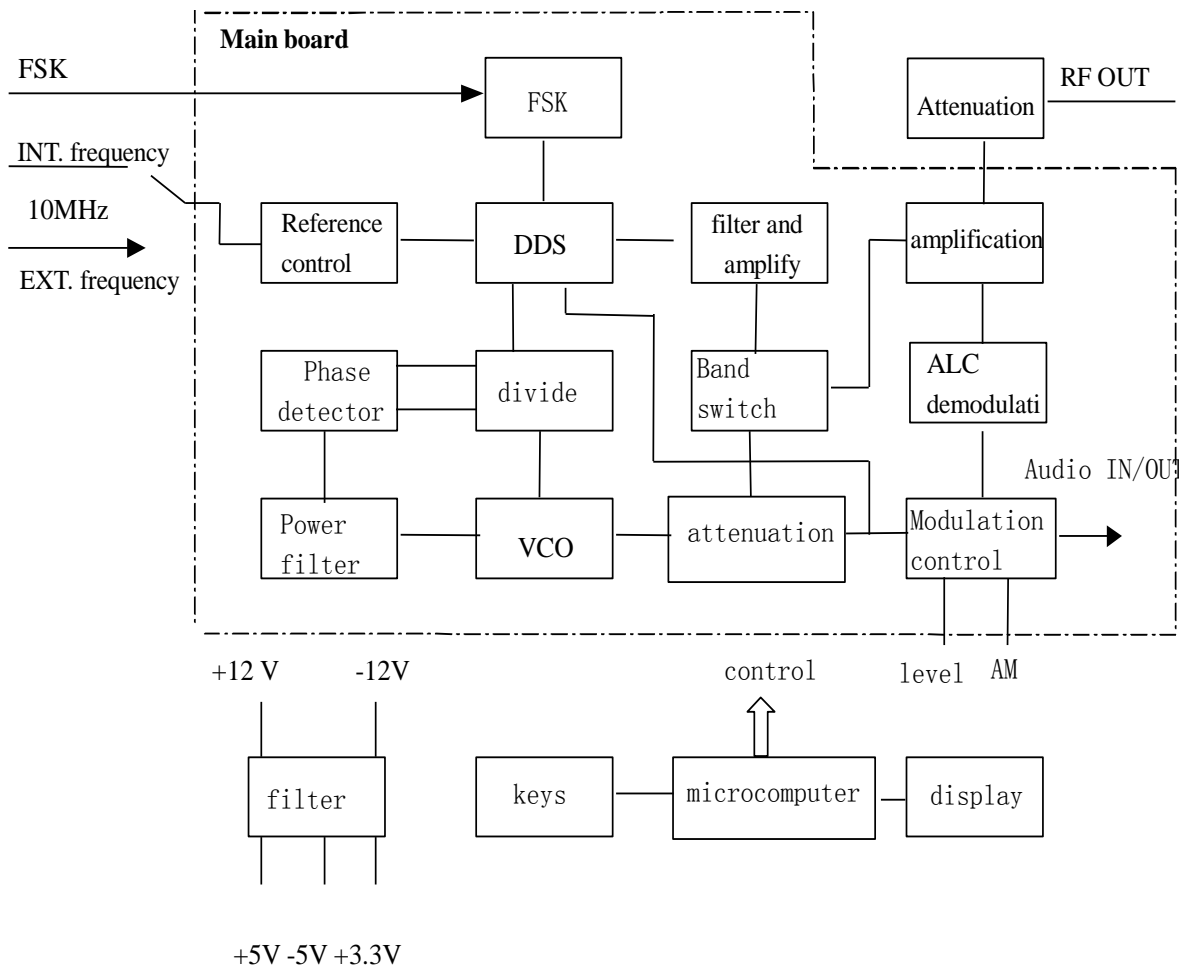
#### **3.20 USB**

The USB connectors are located on the front and rear panel and allow the unit to be connected to a pc. Software is supplied with the equipment and the USB protocol is given in paragraph 5.

#### **3.15 RS232**

The RS232 connector is located on the rear panel and allows the unit to be connected to a pc. Software is supplied with the equipment.

## 4.0 Principle of operation



## 5.0 USB Protocol

### 1) Connection:

- 1) Connect the SG200 to the PC using a USB cable.
- 2) Power on the SG200. When connecting to the PC for the first time the PC will prompt found new hardware and need to install the driver. Choose the folder “USB Driver” to install the driver.
- 3) After the installation of the driver is completed, run USBTest.exe. The following commands can then be used to control the SG200.

### 2) SG200 Command Set for USB communication:

#### 1) Carrier wave frequency set:

Command: **F:XX.XXXXXXMHz(kHz, Hz)**  
Description: set carrier wave frequency (no space between characters)  
Example: **F:20MHz** (set carrier wave frequency at 20MHz)

#### 2) Carrier wave amplitude set:

Command: **Amp:XX.XXdBm(dBuV, mV, uV)**  
Description: set carrier wave amplitude (no space between characters)  
Example: **Amp:5dBm** (set carrier wave amplitude at 5dBm)  
**Amp:5dBuV** (set carrier wave amplitude at 5dBuV)  
**Amp:5mV** (set carrier wave amplitude at 5mV)  
**Amp:5uV** (set carrier wave amplitude at 5uV)

#### 3) AM set:

Command: **AM**  
Description: set AM modulation  
Command: **F:XX.XXXXXXMHz(kHz, Hz)**  
Description: set carrier frequency (no space between characters)  
Example: **F:12MHz** (set carrier frequency at 12MHz)  
Command: **Dep:XX**  
Description: set modulation depth (no space between characters)  
Example: **Dep:23** (set modulation depth at 23%)

#### 4) FM set:

Command: **FM**  
Description: set FM modulation  
Command: **F:XX.XXXXXXMHz(kHz, Hz)**  
Description: set carrier frequency (no space between characters)  
Example: **F:2MHz** (set carrier frequency at 2MHz)  
Command: **Dev:XX.XkHz(Hz)**  
Description: set deviation (no space between characters)  
Example: **Dev:23kHz** (set deviation at 23kHz)

#### 5) FSK set:

Command: **FSK**  
Description: set FSK modulation  
Command: **Freq1:XX.XXXXXXMHz(kHz, Hz)**  
Description: set frequency 1 (no space between characters)  
Example: **Freq1:500kHz** (set frequency 1 at 500kHz)  
Command: **Freq2:XX.XXXXXXMHz(kHz, Hz)**  
Description: set frequency 2 (no space between characters)

Example: **Freq2:1MHz** (set frequency 2 at 1MHz)

6) Sweep set:

Command: **SWP**

Description: set sweep mode

Command: **StartF:XX.XXXXXXXMHz(kHz, Hz)**

Description: set start frequency (no space between characters)

Example: **StartF:500kHz** (set start frequency at 500kHz)

Command: **StopF:XX.XXXXXXXMHz(kHz, Hz)**

Description: set stop frequency (no space between characters)

Example: **StopF:10MHz** (set stop frequency at 10MHz)

Command: **StepF:XX.XXXXXXXMHz(kHz, Hz)**

Description: set step frequency (no space between characters)

Example: **StepF:1MHz** (set step frequency at 1MHz)

Command: **HoldTime:XXXmS**

Description: set hold time of each step (no space between characters)

Example: **HoldTime:200mS** (set hold time at 200mS)

7) Store/Recall (No. 00~07):

Command: **Recall:XX**

Description: recall no. XX setting (no space between characters)

Example: **Recall:02** (recall no. 02 setting)

Command: **Store:XX**

Description: Store no. XX setting (no space between characters)

Example: **Store:00** (store no. 00 setting)

8) Internal modulation wave selection:

Command: **1kHz**

Description: select 1kHz internal modulation wave

Command: **400Hz**

Description: select 400Hz internal modulation wave

9) Internal/External modulation selection:

Command: **Internal**

Description: select internal modulation wave

Command: **External**

Description: select external modulation wave

10) Modulation on/off selection:

Command: **ModuOn**

Description: turn on modulation

Command: **ModuOff**

Description: turn off modulation

11) RF on/off selection:

Command: **RFOn**

Description: turn on RF output

Command: **RFOff**

Description: turn off RF output

Note: All commands are case sensitive, Click "SEND" button to send command. ENTER" key on keyboard has no effect.

**Der Hersteller/importeur  
The manufacturer/importer  
Le producteur/importateur**

Digimess Instruments Ltd

**Anschrift/Address/Adresse**

Stenson House  
Stenson  
Derby  
DE73 1HL  
ENGLAND

**erklärt hiermit eigenverantwortlich, dass das  
Produkt :  
hereby declares that the product :  
declare, que le produit :**

**Bezeichnung/Name/Description**

HF Signalgenerator  
RF Signal Generator  
Générateur de signaux HF

**Type/Model/Type**

SG200

**Bestell-Nr/Order No/No de ref**

HUC64-00

**folgenden Normen entspricht :  
is in accordance with the following  
specifications :  
correspond aux normes suivantes :**

EN61010-1 (1994)  
DIN EN 50081-1 (1993) DIN EN 50081-2 (1994)  
EN50082  
EN 55011 (1991) Class B  
EN 55022 (1987) Class B  
IEC 801-2 (1991)/prEN 55024-2 (1992) 2kV  
IEC 801-4 (1988)/prEN 55024-4 (1993) 1kV Burst  
IEC 801-3 (1984) 3V/m ; 0,15-150MHz  
EN61000-3-2  
EN61000-3-3  
2002/95/EC RoHS  
2002/96/EC WEEE

**Das Produkt erfüllt somit die Forderungen  
folgender EG-Richtlinien :  
Therefore the product fulfills the demands of  
the following EC-Directives :  
Le produit satisfait ainsi aux conditions des  
directives suivantes de la CE :**

**73/23/EWG**

Richtlinie betreffend elektrische Betriebsmittel zur  
Verwendung innerhalb bestimmter Spannungsgrenzen  
Directive relating to electrical equipment designed for  
use within certain voltage limits  
Directive relatives au matériel électrique destiné à être  
employé dans certaines limites de tension

**89/336/EWG**

Richtlinie über die elektromagnetische Verträglichkeit  
Directive relating to electromagnetic compatibility  
Directive relatives à la compatibilité électromagnétique

**Derby, 7.10.2012**

.....  
A.P. Smith  
Leiter Qualitätsmanagement  
Quality Manager/Directeur Contrôle de Qualité