



raditeq

Product Manual

RadiGen[®]
Signal Generator



Models:

RGN2400A | RGN2006A | RGN2006B

www.raditeq.com

RadiGen® Product Manual

This product manual pertains to the RadiGen®.

Models: RGN2400A - RGN2006B

Made by Raditeq.

Read this manual carefully before operating the product and make sure all the safety instructions are strictly followed.

For your convenience, a Quick Start Guide has been added to this product. This Quick Start Guide contains the basic start-up steps and the safety warnings.

Please keep the Quick Start Guide (and this regular manual) close at hand when you operate your new Raditeq product(s).

Please contact your local reseller if you have any questions.

Supplier Information

Raditeq B.V.

Vijzelmolenlaan 3
3447 GX, Woerden
The Netherlands

Tel.: +31 (0)348 200 100
Internet: www.raditeq.com
Email: sales@raditeq.com

Publish date: 14/09/2021

Table of contents

WARNINGS & PRECAUTIONS	6
The RadiGen® Series	8
Modulation types	9
Explanation and examples regarding Gated Pulse Modulation	10
Components	11
Hardware installation	12
Software Configuration	14
How to configure the RadiGen® in RadiMation®	14
How to connect the RadiGen® to the RadiCentre®	15
How to setup the communication of the RadiGen® to the RadiCentre®	16
How to check whether the RadiGen® is properly connected to RadiMation®	17
Manual or stand-alone use of the RadiGen®	18
Remote Control	21
RadiGen® Command Set	22
Understanding Command Set	22
Understanding Command Replies	22
Commands	23
General commands	24
Carrier frequency commands	25
Carrier frequency commands 2	26
Carrier frequency commands 3	27
Internal Frequency Modulation (FM) Commands	28
Pulse Modulation Commands	29
Gated Pulse Modulation (Burst) Commands	30
External 10MHz Reference Input	31
Status commands	31
RadiGen® Specifications	32

WARNINGS & PRECAUTIONS



Read the contents of this product manual carefully and become familiar with the safety markings, the product instructions and the handling of the system. Please refer to the applicable product manual(s) for further information regarding the operation and control of the product(s).



This equipment is designed to be used as a plug-in card for the RadiCentre® series. Do not use this card on its own or in combination with any other mainframe. Using this product with any other mainframe can cause harm and will void warranty.



Only Raditeq qualified maintenance personnel is allowed to perform maintenance and/or repair service on the equipment.



Position the product in such a fashion that power cables are easily accessible or connect the equipment to a mains network that can be easily disconnected from the mains.



This product® contains materials that can be recycled and reused to minimize material waste. At the 'end-of-life', specialized companies can dismantle the discarded system to collect the reusable and recyclable materials. If your product is at its 'end-of-life', please return it to your local reseller or to Raditeq for recycling.



For cleaning, use a clean, dry cloth (or a damp cloth where needed) and wipe the surface of equipment.



This product contains no hazardous substances as described in the RoHS Directive (2015/863/EU).

Introduction

Product Introduction

The primary test signal of an Electric Magnetic Compatibility (EMC) immunity test system is generated by an RF signal generator. It produces a modulated or un-modulated RF signal at a certain frequency and signal level. The RadiGen® generators are designed for EMC test purposes in order to perform fast and accurate EMC tests without the need for external modulation sources.



RadiCentre® System

The RadiCentre® is a modular EMC/RF test system that serves as the user and computer interface for all the RadiCentre® plug-in cards and modules.



RadiMation® Software

RadiMation® is the EMC software package from Raditeq used for remote control and automated testing of the RadiCentre® plug-in cards and modules and is sold separately.



RadiField® Electric Field Generator

The patented RadiField® Triple A is no less than a revolution in EMC immunity testing. A complete paradigm shift involves a combination of high-level integration and a field combining technique, making several discrete components like combiner, coupler, power meters and cabling superfluous. This product is sold separately.

The RadiGen® Series

Description and capabilities

The RadiGen® RF signal generator is currently available in three models:

- RGN2400A
- RGN2006B

Offering a broad frequency spectrum, the RadiGen® is the perfect solution for conducted and radiated immunity test applications.

RadiGen® RGN2400A - Single output

- **Output 1** - Signal generator from 9 kHz to 400 MHz Suitable for conducted immunity measurements.

RadiGen® RGN2006B - Single output

The RadiGen® model RGN2006B has one full band RF output ranging from 4 kHz to 6 GHz. This ultra wide frequency range allows testing for most military, aerospace, automotive and commercial immunity tests.

Accuracy

The RadiGen® RF signal generator has a frequency drift of less than 10 ppm/year. For higher frequency accuracy, the RadiGen® can be used in combination with an external frequency reference standard. The LF-signal generator and modulators are fully digital, eliminating any drift in the modulation accuracy.

10 MHz frequency reference output

The RadiGen® has a 10 MHz frequency reference output which is available as a BNC connector. This output can be used to synchronize other T&M devices.

10 MHz frequency reference input

The RadiGen® has a frequency reference BNC input connector for synchronization using an external 10 MHz frequency reference.

Reliability

Defects to the output attenuator and RF switches are eliminated due to the fully solid-state design of the RadiGen®, which results in a better Mean Time Between Failures (MTBF).

Modulation types

AM modulation

The RadiGen® supports AM modulation depths of 0 to 100% and modulation frequencies from 1 Hz to 100 kHz, covering the requirements of all relevant EMC standards.

FM modulation

The RadiGen® supports FM modulation deviations of 1 Hz to 100 kHz and modulation frequencies from 1 Hz to 100 kHz.

Pulse modulation: 200 ns – 100 s

The RadiGen® supports pulse modulation with ON- and OFF times ranging from 200 ns to 100 s with a resolution of 100 ns.

Pulse modulation settings

The pulse interval (on/off) of the RadiGen® can be set from 200 ns to 100 s. This broad range allows for ultimate flexibility in the configuration of pulse modulation.

Gated Pulse

In addition to standard pulse modulation the RadiGen® can also be used to perform Gated Pulse modulation. Gated Pulse testing is necessary to perform automotive radar pulse testing as prescribed in several automotive standards. (E.G. Ford, General Motors and PSA)

Explanation and examples regarding Gated Pulse Modulation

Several automotive manufactures use EMC standards that define specific Radar Pulse tests. These tests consist of a certain amount of pulses with a specific pulse duration and pulse repetition rate.

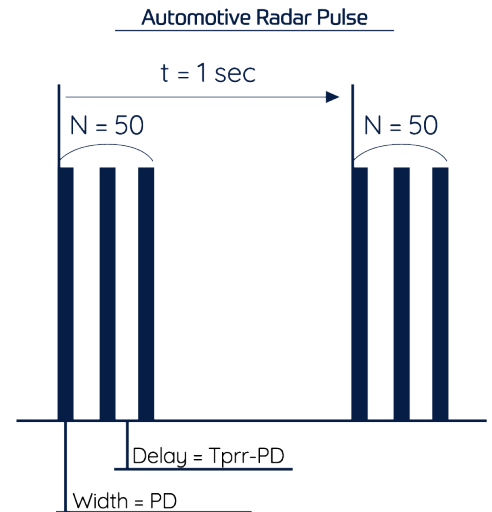
Explanation of Automotive Radar Pulse testing

Ford RI-114 Radar Pulse test (FMC1278) and PSA B21 7110 are using:

- Pulse Repetition Rate (PRR) = 300 Hz
- Pulse duration (PD) = 3 μ s
- No. of pulses per second (N) = 50

GM GMW3097-2019 uses:

- Pulse Repetition Rate (PRR) = 300 Hz
- Pulse duration (PD) = 6 μ s
- No. of pulses per second (N) = 50



The RadiGen® plug-in card can generate the requested RF bursts as defined in these automotive standards, using Gated Pulse Modulation. Normal pulse modulation must be used to set the pulse ON/OFF times, using respectively the PULSE:WIDTH and PULSE:DELAY command on the RadiCentre® system user interface. For more information go to the command section of this manual.

Limitations

The Pulse ON and OFF times apply to the specific limitations to the number of pulses per period for the Gated Pulse Modulation. The RadiCentre® system user interface makes use of equations to intelligently adapt the buttons, prohibiting invalid settings. When the RadiGen® plug-in card is controlled externally by PC-software, this limitation must be controlled by the PC-software. The limitations are given by the following formula:

$$N_{\max} = \frac{\text{Gateperiod} - 1\text{ms}}{\text{Pulse}_{\text{width}} + \text{Pulse}_{\text{Delay}}} - 1$$

The maximum number of pulses in one burst is limited by the settings of the pulse modulation. For example; using the Ford standard with a repetition rate of 300 Hz, a pulse width of 3 μ s and period time of 1 second, results in a maximum of 298 pulses.

$$\text{Pulse}_{\text{Delay}(\text{MAX})} = \frac{(\text{Gateperiod} - 1\text{ms}) - (N * \text{Pulse}_{\text{width}})}{N}$$

The formula can also be rewritten to calculate the pulse parameters:

$$\text{Pulse}_{\text{width}(\text{MAX})} = \frac{(\text{Gateperiod} - 1\text{ms}) - (N * \text{Pulse}_{\text{delay}})}{N}$$

Components

The RadiGen® signal generator (plug-in card) is delivered with the following items:

- **RadiGen® plug-in card** - model: RGN2400A, RGN2006B or RGN2006A The RF signal generator plug-in card needs to be inserted into the RadiCentre® system before it can be used. The plug-in card can only be operated with the RadiCentre® modular test system (model CTR1004B or CTR1009B with processor boards PRO2001A or PRO2001B).

NOTE: The RadiGen® cannot be used in combination with the 1-slot RadiCentre® model CTR1001S or with older RadiCentre® systems.

Supporting documentation provided on USB-Stick containing:

- The Product Manual
- The Quick Start Guide
- Factory verification certificate
- Optional, ISO17025 Calibration certificate.

Hardware installation

Please follow the instructions below on how to install the Raditeq plug-in card into the RadiCentre® correctly. **NOTE: before installing and inserting a new plug-in card make sure that the RadiCentre® is turned OFF.**

Step 1

Choose an empty slot in the RadiCentre® in which the plug-in card can be installed. Remove the blind panel from the slot by unscrewing the four (4) screws on the panel (two at the top and two at the bottom).

Step 2

Insert the plug-in card in the rail of the empty slot as shown in the picture A. Position the plug-in card into the slot and slowly push it, using the lower part of the plug-in card. When it reached the end of the rail, gently push and secure the plug-in card into the backplane socket.

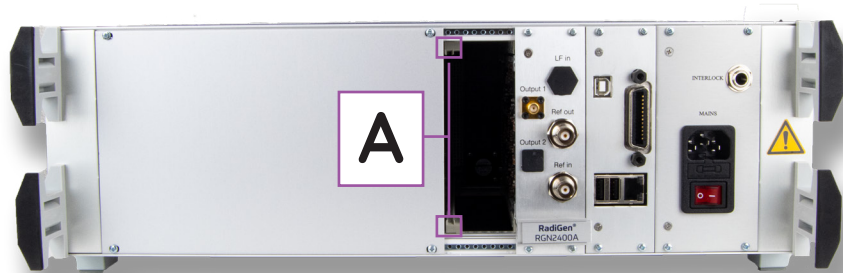
Step 3

When the plug-in card is inserted correctly into the backplane socket, fix it by tightening the four screws at the top and the bottom of the plug-in card (shown at B). For connection of the panels into the RadiCentre® a screwdriver type Pozzi, size PZ1 should be used'

Step 4

After installation of the plug-in card, connect the AC mains power cord on the back of the RadiCentre® and switch the ON/OFF button to the ON position. The RadiCentre® can now be started by tapping the touch screen.

When installed properly, the plug-in card should be recognized and shown automatically on the front screen of the RadiCentre® when turned ON.





Step 6

Connect the RadiCentre® with a PC using any of the available interfaces of the RadiCentre® system;

- USB
- Ethernet
- IEEE-488 (optional)

Be noted that the RadiCentre® can only be controlled by one PC at the same time.

Step 7

Attach the hardware interlock protection plug, which has a safety function! Please make sure that this is plugged into the interlock connector at the backside of the RadiCentre®.

In case the hardware interlock plug is used in series with your interlock system, for example an emergency stop circuitry. please cut the RED shorting wire and connect the open ends to your interlock safety system.

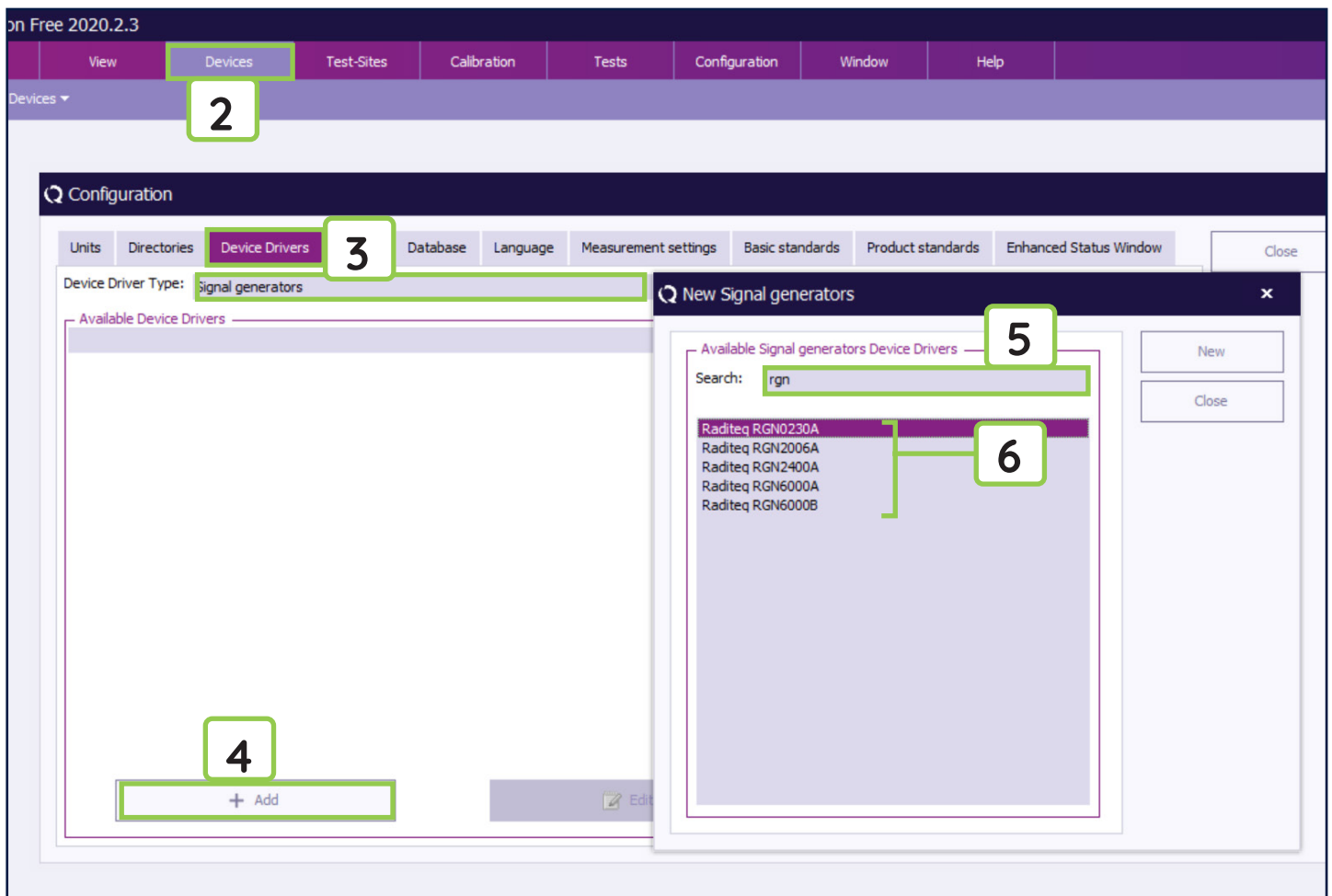
Software Configuration

In order to control the RadiGen® from a computer, either custom made software, third party software or the RadiMation® EMC software package can be used. RadiMation® from Raditeq is sold separately. If the RadiGen® is operated manually, this chapter can be skipped.

The RadiGen® device driver is part of the Signal Generator Device Driver family

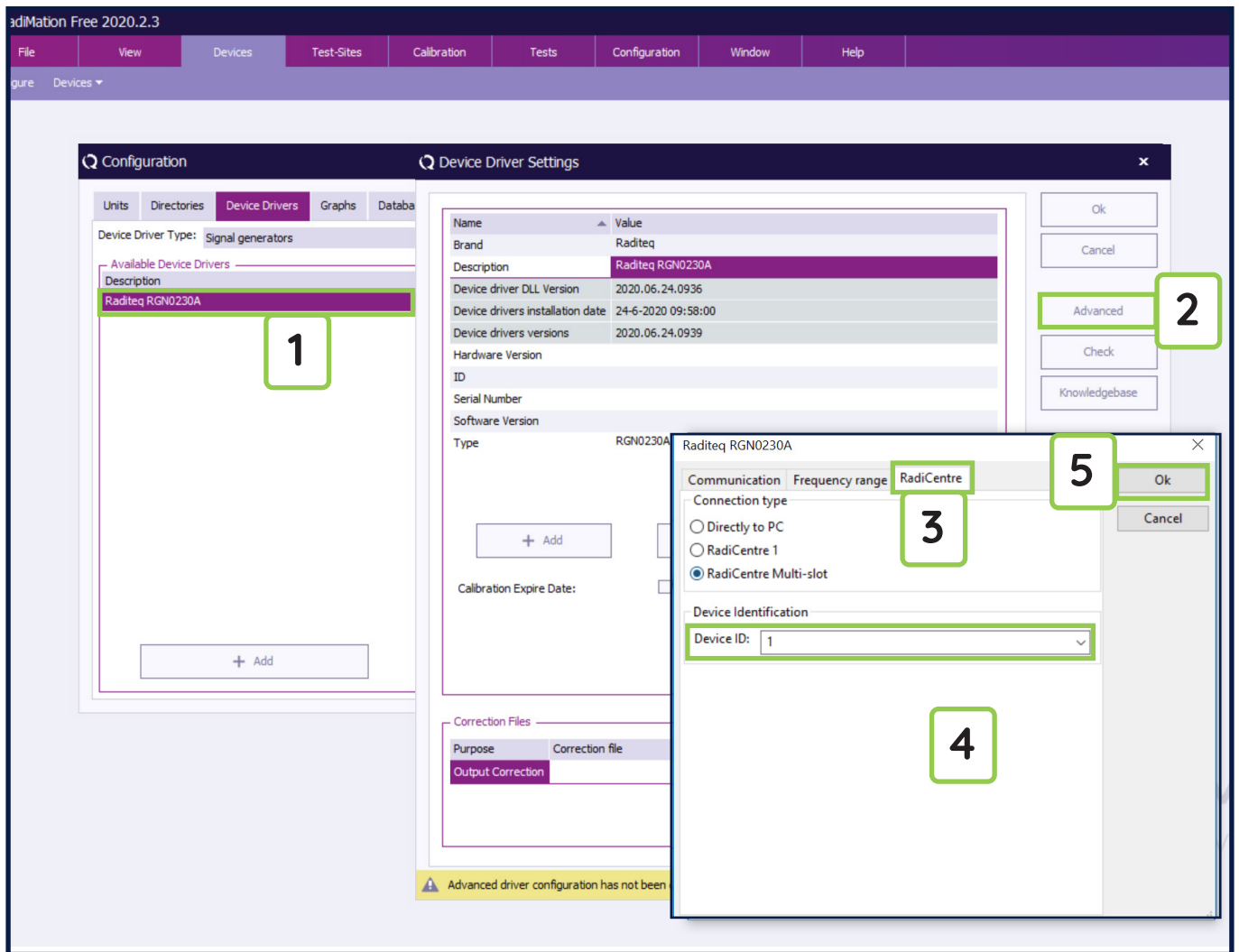
How to configure the RadiGen® in RadiMation®

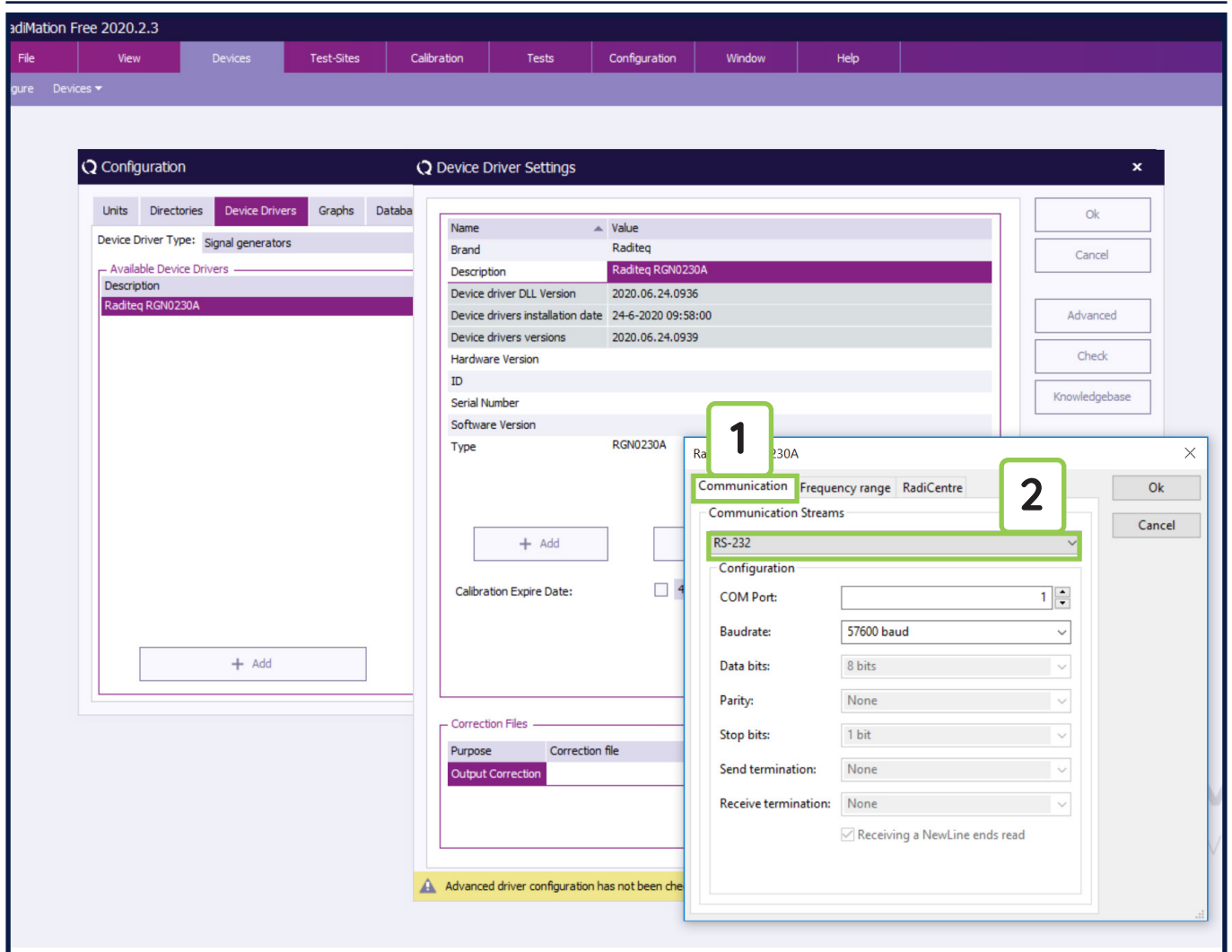
1. Start the latest version of RadiMation®; **Download the latest version here.**
2. Select the button 'Device' at the top menu bar, followed by clicking 'Configure';
3. In the configuration screen select 'Device Drivers' and Select 'Signal Generators' as driver type;
4. Click the 'Add' button to open the selection of available drivers in RadiMation®;
5. Enter 'RGN' in the search bar which will show all available RadiGen® drivers;
6. Select the correct driver, double click it (Optional, rename it) and press 'OK'.



How to connect the RadiGen® to the RadiCentre®

1. Select the recently added RadiGen® driver
2. Select 'Advanced'
3. Click on the tab 'RadiCentre®'
4. Under device identification select the RadiCentre slot number the RadiGen® plug-in card is installed in
5. When the correct slot number is chosen, continue to set the communication of the RadiGen® by clicking the tab 'Communication' (next page)



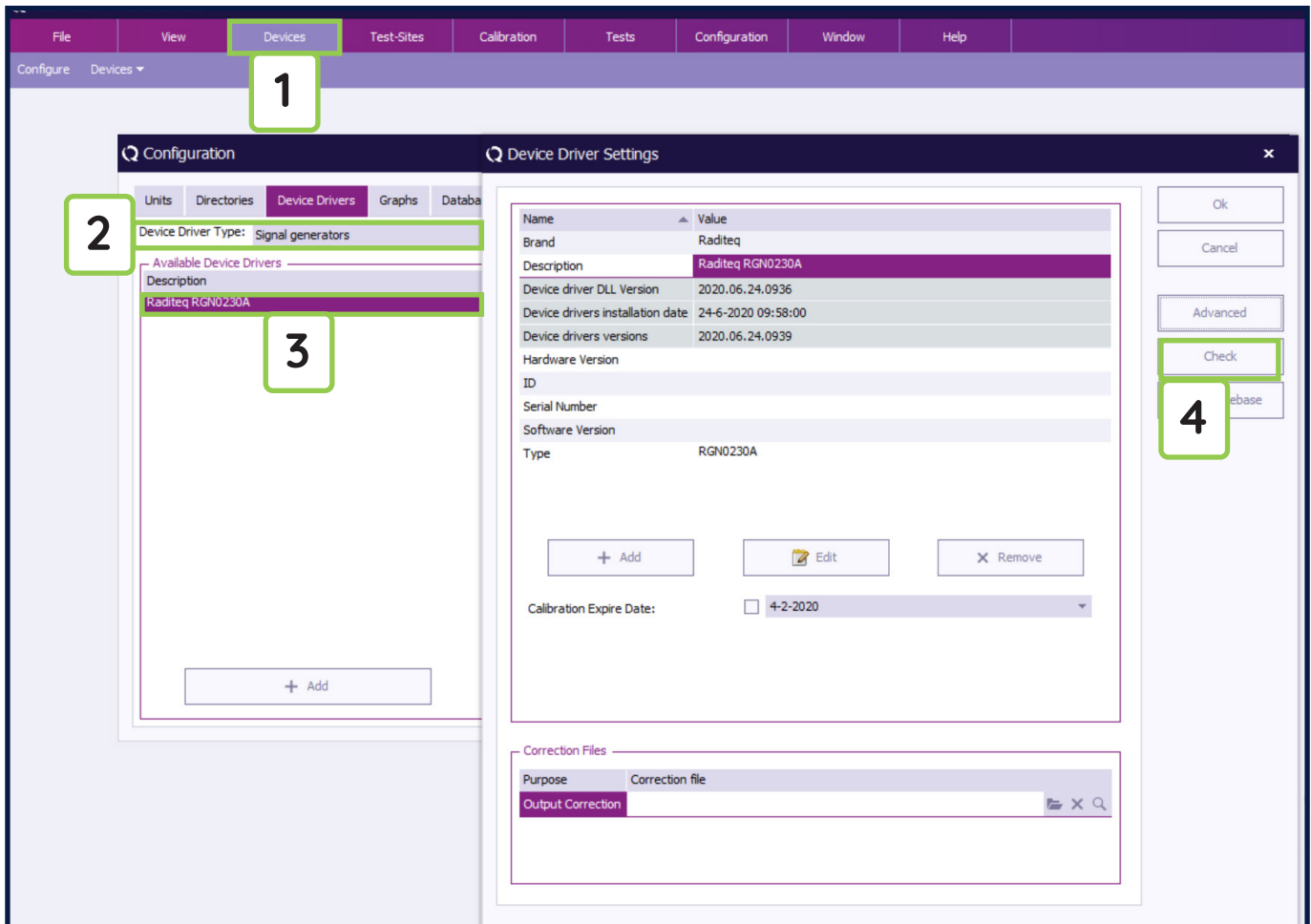


How to setup the communication of the RadiGen® to the RadiCentre®

1. Click on the tab 'Communication'
2. Select the interface to be used, for example:
 - a. GPIB
 - b. TCPIP
 - c. USB
 - d. VISA
3. When these steps are performed continue to the next steps for checking the communication of the RadiGen®.

How to check whether the RadiGen® is properly connected to RadiMation®

1. Select 'Devices' in the top menu bar
2. Open 'Device Drivers' and select Device driver Type: 'Signal Generators'
3. Double click the recently configured RadiGen or click 'Edit'.
4. Finally select the 'Check' button on the right side of the opened screen.
5. When correctly configured, RadiMation will notify you that the device is correctly installed.



Important Information:

If you encounter problems with the configuration of any Raditeq Product in RadiMation®, please consult the RadiMation® support team by email: support@radimation.com

A free download of RadiMation is available at: <https://www.raditeq.com/downloads>

It is also strongly advised to visit the RadiMation® Wiki to find answers to frequently asked questions (FAQ).

<https://wiki.raditeq.com/>

Manual or stand-alone use of the RadiGen®

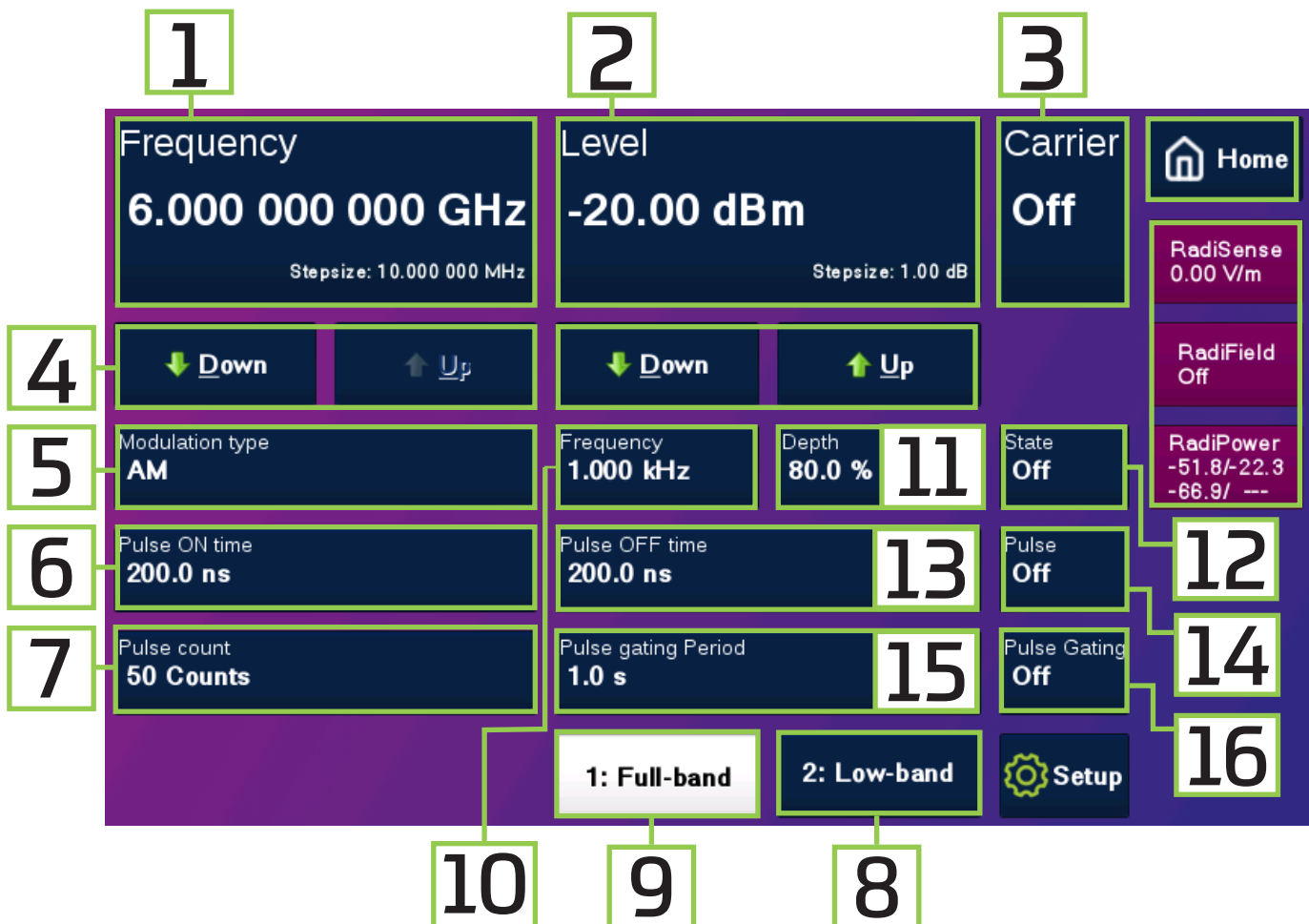
Manual Control

Once the RadiCentre® is switched on at the rear, the RadiGen® can be activated from the 'main' screen of the RadiCentre®, using the touch screen.

Use the RadiGen® 'status' button in the main screen to access the control screen of the RadiGen® (shown on the right). All parameters of the generator can be manually controlled from this screen. The buttons in this screen are divided over separate rows. The top row contains buttons regarding the frequency setting, output power and the 'Carrier' On/Off button

Buttons

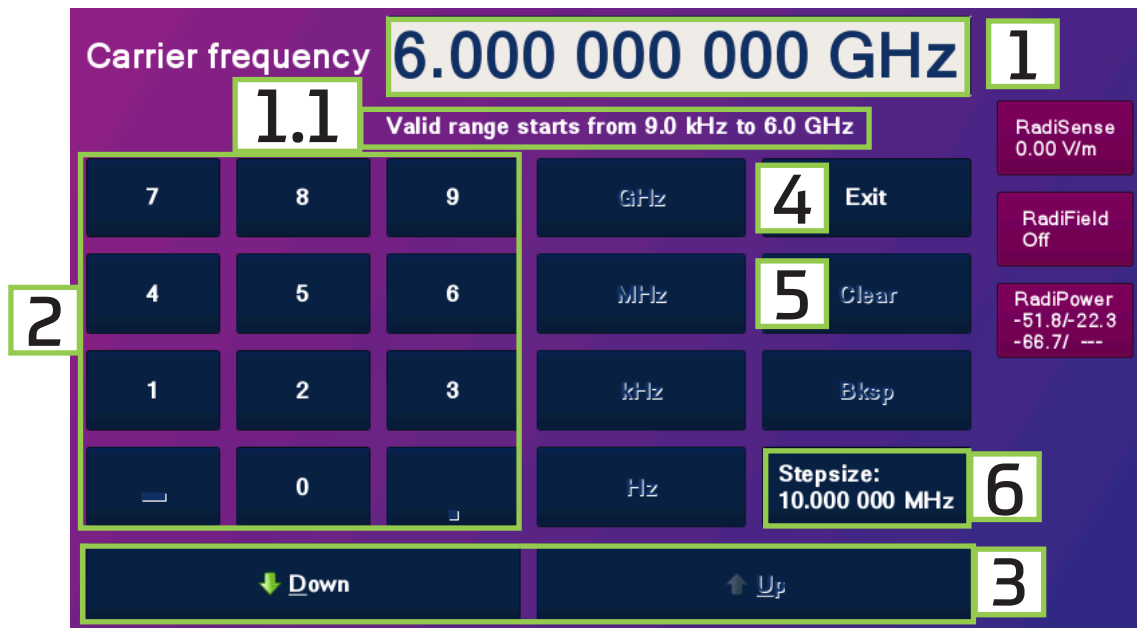
Each button on the RadiCentre® has a specific use and can be followed up by another screen for an additional action. On the next page, all buttons will be explained by following the numbers displayed on the picture below.



No.	Usage
1	Frequency The Frequency button is used to set the desired carrier frequency of the RadiGen®. When selected it will pop up another screen. The new screen shows a numeric pad and some other options, which will be explained in more details of the numeric pad section.
2	Level The level button defines the carrier output amplitude of the RadiGen® signal generator. This can be set in the same way as the frequency button.
3	Carrier The carrier can be selected (toggled) between: <ul style="list-style-type: none"> - On - Carrier signal is generated - Off - No carrier signal is generated Toggling of the carrier signal can be achieved by tapping the carrier button.
4	Down/up Positioned under Frequency and Level four buttons are displayed. Two stating Down and two stating Up. The 'Down' and 'Up' buttons can be selected to quickly change the frequency or level without the use of the numeric pad. The step size can be set in the frequency and level menu and is displayed in the right corner of the frequency and level buttons.
5	Modulation type The button Modulation Type can be used to toggle the modulation type from AM to FM or the other way around. Make sure that when one of the types is selected the other signal is turned OFF.
6	Pulse On time The Pulse on time Button is used to define the time for which the pulse is active. The pulse can be turned off by pressing the Pulse Button. (See point 14)
7	Pulse Count The Pulse Count is the amount of pulses generated within the specified time frame.
8	LF Output The LF Output button needs to be selected to use the Low frequency (LF) output. Only one of these settings works at the same time, therefore in this picture only the HF output is in use. (Only applicable for the RGN2006A)
9	HF output The HF Output Button is used to select (as shown in the picture) the Full band / High frequency range is operational. Note that only one of the HF or LF outputs can be active at the same time. (Only applicable for the RGN2006A)
10	(Modulation) Frequency This frequency is specifically for the modulation of the generated signal. This can be changed to modify the modulation of the current selected frequency and type of modulation (AM or FM).
11	Depth The Depth button shows the depth of the modulation of the AM signal which can be used to change to depth of the modulation, when AM modulation is selected.
12	State - The State button shows whether the modulation is 'On' or 'Off' and can be used to activate the AM or FM modulation.
13	Pulse OFF Time The Pulse OFF Time shows the time during which the pulse is OFF. This pulse off time can be changed to a longer or shorter duration or be completely turned off by selecting the Pulse button shown at number 14.
14	Pulse The Pulse button can be toggled on or off by tapping the button.
15	Gating Pulse The Pulse Gating button States (and can change) the pulse gating period of the duration in which the pulses are generated.
16	Pulse Gating The Pulse Gating button can be selected to turn the pulse gating On or Off.

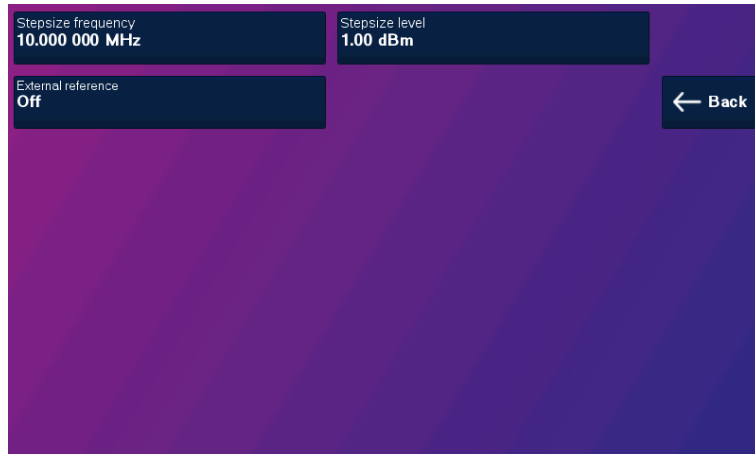
Numeric Pad

By pressing the Frequency or Level button, a numeric pad window will appear which can be seen below. On the numeric pad, new values can be entered for the selected parameter. After selecting the desired unit (for example “dBm”), the control screen will reappear. The numeric pad is used for multiple values and functions in the same way. Be aware that when parameters are changed the valid range may change too.



No.	Usage
1	This button shows the actual level of the chosen parameter. This level and + / - sign can be changed using the numeric pad as shown below at point 2.
1.1	The valid range shows the minimum and maximum values that can be selected.
2	The numeric pad to set the correct value and + /- sign.
3	The down and up button, which changes the step size (see at point 6).
4	Exit the numeric pad.
5	Clears the settings of the actual level (point 1).
6	Indicates the actual step size.

The step size for the parameters for frequency and power on the control screen can be set from this configuration screen. By selecting one of the step buttons, a numeric pad appears where the new value can be entered. By pressing the unit, the value will be entered.



Remote Control

The RadiGen® can be controlled remotely through the interfaces of the RadiCentre®:

1. Ethernet
2. USB
3. GPIB (optional)

The exact communication protocol can be found in the RadiCentre® manual. The specific commands for the RadiGen® are shown in the next chapter “RadiGen® Command Set”.

RadiGen® Command Set

The commands listed in the following tables, can be used to control the RadiGen® plug-in card. For use in the RadiCentre® CTR1004B or CTR1009B, a prefix must be used for each command. This prefix, or device number, corresponds with the slot number of RadiCentre®. Please refer to the RadiCentre® manual for more information on the 'Device number' of a module.

Understanding Command Set

The command tables contain the 'full' commands. These commands can also be entered in several shorter versions.

Example 1 - [:SOURce]:FREQuency?

Requesting the state of the carrier frequency can be entered as follows:

- [:SOURce]:FREQuency?
- [:SOURce]:FREQ?
- [:SOUR]:FREQuency?
- [:SOUR]:FREQ?
- :FREQuency?
- :FREQ?

Example 2 - [:SOURce]:FREQuency<space><value>

Setting the state of the carrier frequency (to, for example: 50.000.000 Hz) can be entered as follows:

- [:SOURce]:FREQuency 50000000
- [:SOURce]:FREQ 50000000
- [:SOUR]:FREQuency 50000000
- [:SOUR]:FREQ 50000000
- :FREQuency 50000000
- :FREQ 50000000

Understanding Command Replies

The replies from the RadiGen® are always preceded by the command that they reply to.

Example 3 - reply to :OUTPut:SELECTed?

This command returns the current active output. The reply can be: '1' (= main output is selected) or '2' (= secondary output is selected). The reply will be given as:

- 'OUTPut:SELECTed 1' or 'OUTPut:SELECTed 2'

Commands

The following tables show the various Standard Commands for Programmable Instruments (SCPI) commands for the RadiGen®.

Command	Description & Reply
:*CLS	CLS (Clears status) Clears the status byte and event status enable register STB (Status Byte) and ESR (Event Status Enable Register) are set to 0
:*ESE?	ESE (Event Status Enable) Returns the result of the standard event enable register Reply: <value> = number from 0 - 128
:*ESE<space><value>	ESE (Event Status Enable) Set bits in the standard event status enable register <value> = number from 0 - 128
:*ESR?	ESR (Event Status Enable Register) Returns the ESR Reply: <value> = number from 0 - 128
:*IDN?	IDN (Requests the device identification) The IDN consists of: <Manufacturer>, <Product name> <Product code>, <Embedded software version> For example: Raditeq, RadiGen RGN2400A, 1.0.0
:*OPC?	OPC (Operation complete query) Queries whether the last command has been executed Reply: '0' = not executed Reply: '1' = executed
:*RST	Reset all parameters to their specified default values
:*SRE?	SRE (Service Request Enable) The SRE command reads the current state of the service request enable register Reply: <value> = number from 0 - 128
:*SRE<space><value>	SRE (Service Request Enable) The SRE command enables bits in the service request register <value> = number from 0 - 128
:*STB?	STB (Status Byte Query) The STB command reads the value of the instrument status byte Reply: <value> = number from 0 - 128

General commands

Command	Description & Reply
:SVERsion?	Requests the current software version For example: 'SVERSION 1.0.0'
:HVERsion?	Requests the current hardware version For example: 'HVERSION 1'
[:SENSe]:TEMPerature?	Requests the temperature of the attenuators and internal 10 MHz reference on the PCB board (in °C) For example: ':TEMPERATURE 41.0 / :TEMPERATURE 40.9'
:SYSTem:PRESet	Resets all the user parameters. This command does the same as *RST
:SYSTem:SAVECONfiguration	Saves the following system parameters of the outputs into memory: <ul style="list-style-type: none"> - Frequency - Amplitude - AM frequency - AM depth - AM state - FM frequency - FM dev - FM state - PM delay - PM width - PM state - BM number - BM period - BM state These settings will be loaded as default when the RadiGen® is restarted
:SYSTem:IDNNumber?	Requests the system ID number of the plug-in card including header command For example: 'SYSTEM:IDNUMBER 1.44.65.178.27.0.0.207'
:ID_number?	Requests the system ID number without header command For example: '1.44.65.178.27.0.0.207'
:SYSTem:BUSAddress?	Requests the bus address For example: 'SYSTEM:BUSADDRESS 0'

Carrier frequency commands

Command	Description & Reply
<code>[:SOURce]:FREQuency?</code>	Requests the carrier frequency of the selected output For example: <code>'FREQ 125000000'</code>
<code>[:SOURce]:FREQuency<space><value></code>	<p>Sets the carrier frequency of the selected output <code><value></code> = frequency (in Hz),</p> <p>RGN2400A: LF Output: 9 kHz – 400 MHz HF Output: Not available</p> <p>RGN2006A: LF Output: 9 kHz – 400 MHz HF Output: 9 kHz – 6 GHz</p> <p>Value can also be set with step size: 'UP' = Increase frequency with step size 'DOWN' = Decrease frequency with step size</p>
<code>[:SOURce]:FREQuency:STEP?</code>	Requests the step size of the carrier frequency (in Hz) For example: <code>'FREQ:STEP 10000000'</code>
<code>[:SOURce]:FREQuency:STEP<space><value></code>	<p>Sets the step size of the carrier frequency <code><value></code> = frequency step size (in Hz) For example: 1000</p>
<code>[:SOURce]:FREQuency:MINimum?</code>	Requests the minimum carrier frequency
<code>[:SOURce]:FREQuency:MAXimum?</code>	Requests the maximum carrier frequency
<code>[:SOURce]:FREQuency:STEP:MINimum?</code>	Requests the minimum step size of the carrier frequency For example: <code>'FREQ:STEP:MIN 1'</code>
<code>[:SOURce]:FREQuency:STEP:MAXimum?</code>	Requests the maximum step size of the carrier frequency For example: <code>'FREQ:STEP:MAX 1000000000'</code>

Carrier frequency commands 2

Command	Description & Reply
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]?	Requests the carrier amplitude power of the selected output. For example: 'POWER -30.0'
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]<space><value>	Sets the amplitude power level of the selected output in dBm. The value can be set between -70 dBm and +13 dBm The value can also be set in step size: 'UP' = Increase amplitude with step size 'DOWN' = Decrease amplitude with step size
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:MINimum?	Requests the minimum carrier amplitude For example: 'POWER:MIN -70.0'
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:MAXimum?	Requests the maximum carrier amplitude For example: 'POWER:MAX 13.0'
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:STEP?	Requests the step size of the carrier amplitude For example: 'POWER:STEP 1.0'
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:STEP<space><value>	Sets the step size of the carrier amplitude in dB. The power step is applied when using the UP and DOWN parameters The value can be set between 0.1 – 100 dB
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:STEP:MINimum?	Requests the minimum step size of the carrier amplitude For example: 'POWER:STEP:MIN 0.1'
[:SOURce]:POWer:[LEVel]:[IMMediate]: [AMPLitude]:STEP:MAXimum?	Requests the maximum step size of the carrier amplitude For example: 'POWER:STEP:MAX 100'

Carrier frequency commands 3

Command	Description & Reply
<code>[:SOURce]:AM:STATe?</code>	Requests the state of the amplitude modulation For example: <code>‘AM:STATE OFF’</code>
<code>[:SOURce]:AM:STATe<space><value></code>	Sets the amplitude modulation ON or OFF <code><value> = ON</code> <code><value> = OFF</code>
<code>[:SOURce]:AM:INTErnal:FREQUency?</code>	Requests the amplitude modulation frequency (in Hz) For example: <code>‘AM:INT:FREQ 1000’</code>
<code>[:SOURce]:AM:INTErnal:FREQUency <space><value></code>	Sets the amplitude modulation frequency <code><value> = frequency (in Hz),</code> for example: 1000 <code><value> = UP</code> <code><value> = Down</code>
<code>[:SOURce]:AM:INTErnal:FREQUency: STEP?</code>	Requests the step size of the amplitude modulation frequency For example: <code>‘AM:INT:FREQ:STEP 10’</code>
<code>[:SOURce]:AM:INTErnal:FREQUency: STEP<space><value></code>	Sets the step size of the amplitude modulation frequency <code><value> = step size (in Hz),</code> for example: 10
<code>[:SOURce]:AM:INTErnal:FREQUency: MINimum?</code>	Requests the minimum amplitude modulation frequency For example: <code>‘AM:INT:FREQ:MIN 1’</code>
<code>[:SOURce]:AM:INTErnal:FREQUency: MAXimum?</code>	Requests the maximum amplitude modulation frequency For example: <code>‘AM:INT:FREQ:MAX 100000’</code>
<code>[:SOURce]:AM:INTErnal:FREQUency: STEP:MINimum?</code>	Requests the minimum step size of the amplitude modulation frequency For example: <code>‘AM:INT:FREQ:STEP:MIN 1’</code>
<code>[:SOURce]:AM:INTErnal:FREQUency: STEP:MAXimum?</code>	Requests the maximum step size of the amplitude modulation frequency For example: <code>‘AM:INT:FREQ:STEP:MAX 1000’</code>
<code>[:SOURce]:AM:[DEPT]h?</code>	Requests the amplitude modulation depth. for example: <code>‘AM:DEPTH 80.0’</code>
<code>[:SOURce]:AM:[DEPT]h<space><value></code>	Sets the amplitude modulation depth from 0 to 100% <code><value></code> = percentage (in %), For example: 0, 40 or 54,3
<code>[:SOURce]:AM:[DEPT]h:MINimum?</code>	Requests the minimum amplitude modulation depth For example: <code>‘AM:DEPTH:MIN 0.0’</code>
<code>[:SOURce]:AM:[DEPT]h:MAXimum?</code>	Requests the maximum amplitude modulation depth For example: <code>‘AM:DEPTH:MAX 100.0’</code>
<code>[:SOURce]:AM:POWER:[LEVEl]:[IMMediate]: [AMPLitude]:MINimum?</code>	Requests the minimum carrier level which is applicable in case the AM is turned ON For example: <code>‘AM:POW:MIN -70.0’</code>
<code>[:SOURce]:AM:POWER:[LEVEl]:[IMMediate]: [AMPLitude]:MAXimum?</code>	Requests the maximum carrier level which is applicable in case the AM is turned ON For example: <code>‘AM:POW:MAX 4.0’</code>

Internal Frequency Modulation (FM) Commands

Command	Description & Reply
<code>[:SOURce]:FM:STATe?</code>	Requests the state of the frequency modulation For example: <code>‘FM:STATE OFF’</code>
<code>[:SOURce]:FM:STATe<space><state></code>	Sets the frequency modulation ON or OFF <state> = ON (or 1) <state> = OFF (or 0)
<code>[:SOURce]:FM:INTErnal:FREQUency?</code>	Requests the frequency modulation frequency (in Hz). For example: <code>‘FM:INTERNAL:FREQUENCY 1000’</code>
<code>[:SOURce]:FM:INTErnal:FREQUency <space><value></code>	Sets the frequency modulation frequency <value> = frequency (in Hz) The FM frequency can be set between 1 Hz and 100 kHz
<code>[:SOURce]:FM:DEVIation?</code>	Requests the frequency modulation deviation For example: <code>‘FM:INTERNAL:FREQUENCY 1000’</code>
<code>[:SOURce]:FM:INTErnal:FREQUency <space><value></code>	Sets the frequency modulation deviation <value> = frequency (in Hz) The FM deviation can be set between 1 Hz and 100 kHz. Note: The deviation frequency can be limited by the carrier frequency. The minimum carrier frequency is 9 kHz. For example, if the carrier frequency is set to 20 kHz the maximum deviation frequency is 11 kHz (20 kHz – 9 kHz)

Pulse Modulation Commands

Command	Description & Reply
<code>[:SOURce]:PULSe:STATe?</code>	Requests the state of the pulse modulation For example: <code>'PULM:STATE OFF'</code>
<code>[:SOURce]:PULSe:STATe<space><value></code>	Sets the pulse modulation ON or OFF <value> = ON (or 1) <value> = OFF (or 0)
<code>[:SOURce]:PULSe:WIDTh?</code>	Requests the width (ON-time) for the pulse modulation For example: <code>'PULSE:WIDTH 0.0000050'</code>
<code>[:SOURce]:PULSe:WIDTh<space><value></code>	Sets the width (ON-time) for the pulse modulation. <value> = time (in s) and can be set between 200 ns and 100 second with 100 ns resolution
<code>[:SOURce]:PULSe:WIDTh:MINimum?</code>	Requests the minimum width (ON-time) pulse modulation For example: <code>'PULSE:WIDTH:MINIMUM 0.00000020'</code>
<code>[:SOURce]:PULSe:WIDTh:MAXimum?</code>	Requests the maximum width (ON-time) pulse modulation For example: <code>'PULSE:WIDTH:MAXIMUM 100.000000000'</code>
<code>[:SOURce]:PULSe:DELay?</code>	Requests the delay (OFF-time) for the pulse modulation For example: <code>'PULSE:DELAY 0.00000020'</code>
<code>[:SOURce]:PULSe:DELay<space><value></code>	Sets the delay (OFF-time) for the pulse modulation <value> = time (in s) and can be set between 200 ns and 100 second with 100 ns resolution
<code>[:SOURce]:PULSe:DELay:MINimum?</code>	Requests the minimum delay (OFF-time) for the pulse modulation For example: <code>'PULSE:DELAY:MINIMUM 0.00000020'</code>
<code>[:SOURce]:PULSe:DELay:MAXimum?</code>	Requests the maximum delay (OFF-time) for the pulse modulation For example: <code>'PULSE:DELAY:MAXIMUM 100.000000000'</code>

Gated Pulse Modulation (Burst) Commands

Command	Description & Reply
<code>[:SOURce]:PULM:BURST:STATe?</code>	Requests the state of the pulse burst modulation For example: <code>':PULM:BRST:STATE OFF'</code>
<code>[:SOURce]:PULM:BURST:STATe <space><value></code>	Sets the pulse burst modulation ON or OFF <value> = ON (or 1) <value> = OFF (or 0)
<code>[:SOURce]:PULM:BURST:NUMber?</code>	Requests the number of pulses in a period for the pulse burst modulation For example: <code>':PULM:BURST:NUMBER 50'</code>
<code>[:SOURce]:PULM:BURST:NUMber <space><value></code>	Sets the number of pulses in a period for the pulse burst modulation. <value> = number of pulses, which can be set between 1 - 1000. Note that the maximum number is depending on the period time, pulse width and delay, as the number of pulses will need to fit in the selected burst period time
<code>[:SOURce]:PULM:BURST:NUMber: MINimum?</code>	Requests the minimum number of pulses which is set for burst modulation For example: <code>':PULM:BURST:NUMBER:MINIMUM 1'</code>
<code>[:SOURce]:PULM:BURST:NUMber: MAXimum?</code>	Requests the maximum number of pulses which is set for burst modulation For example: <code>':PULM:BURST:NUMBER:MAXIMUM 1000'</code>
<code>[:SOURce]:PULM:BURST:PERiod?</code>	Requests the period time for the pulse burst modulation For example: <code>':PULM:BURST:PERIOD 1.000'</code>
<code>[:SOURce]:PULM:BURST:PERiod <space><value></code>	Sets the period time for the pulse burst modulation <value> = time (in s) and can be set between 2 ms and 100 sec with 1 ms resolution
<code>[:SOURce]:PULM:BURST:PERiod: MINimum?</code>	Requests the minimum pulse burst modulation period For example: <code>':PULM:BURST:PERIOD:MINIMUM 0.002'</code>
<code>[:SOURce]:PULM:BURST:PERiod: MAXimum?</code>	Requests the maximum pulse burst modulation period For example: <code>':PULM:BURST:PERIOD:MAXIMUM 100.000'</code>

External 10MHz Reference Input

Command	Description & Reply
REFerence:EXTernal:CLK? REFerence:EXTernal:CLOCK?	Requests if the external clock input is used For example: 'REFERENCE: EXTERNAL:CLOCK OFF'
REFerence:EXTernal:CLK<space><state> REFerence:EXTernal:CLOCK<space><state>	Requests if the internal reference or the external reference is being used State can be: 'OFF' = internal clock is used 'ON' = external clock input is used

Status commands

Command	Description & Reply
:STATus:PRESet	The Status Operation Enable and Status Questionable Enable registers are cleared.
:STATus:OPERation?	Replies the Status Operation Event register. Reply: <value> = number from 0 - 128
:STATus:OPERation:EVENT?	
:STATus:OPERation:CONDition?	Replies the Status Operation Condition register. Reply: <value> = number from 0 - 128
:STATus:OPERation:EVENT:CONDition?	
:STATus:OPERation:ENABLE<space><value>	Sets the Status Operation Enable register. <value> = number from 0 - 128
:STATus:OPERation:EVENT:ENABLE <space><value>	
:SYSTem:ERRor?	Requests the first system error. When this command is sent again the second/next error is replied. Etc. Reply: <command><space><errorcode> <comma><space>"<error text>"
:SYSTem:ERRor:[NEXT]?	For example: :SYSTEM:ERROR? -222, "Data out of range"

RadiGen® Specifications

Model	RGN2400A	RGN2006B
Frequency range		
Output 1:	9 kHz – 400 MHz	4 kHz – 6 GHz
Output 2:		
RF output connector	1x SMA	1x SMA
Frequency resolution	1 Hz	
Internal frequency standard		
Accuracy	1 ppm	
Frequency	10 MHz reference	
Aging	1 ppm / year	
Internal reference output level	+10 dBm typical	
Internal reference output connector	BNC	
External reference standard		
Frequency	10 MHz	
Input level range	-10 dBm to +10 dBm	
External reference input connector	BNC	
Output level		
Range	+ 13 dBm to -70 dBm (guaranteed over whole frequency range)(!) Output level limited to +7 dBm when AM is applied.	
Level resolution	0.01dB	
Amplitude accuracy (0dBm reference)	±1 dB ±0.01 dB/dB	
Output level setting time	< 1 ms	
Output impedance	50 Ohm	
Signal purity		
Harmonics	< -40 dBc (typical < -50 dBc)	
Sub harmonics	< -90 dBc	
Non harmonic spurious	< -50 dBc (9 kHz – 400 MHz)	< -60 dBc (4 kHz – 400 MHz) < -50 dBc (400 MHz – 6 GHz)
Environmental		
Dimensions (Height, Depth, Width)	100 mm (3U) , 220 mm, 40 mm (Occupies one RadiCentre slot)	
Temperature range (operating)	0 to +35 °C (up to 40 °C with reduced specifications)	
Temperature range (storage)	-20 to +70 °C	
Relative humidity (operating)	10% to 90% (non-condensing)	
Relative humidity (storage)	0% to 95% (non-condensing)	
Supply voltage	12V	
Power consumption	<30W	

Model	RGN2400A	RGN2006B
Modulation types	CW, AM, FM, Pulse and gated pulse	
VSWR (9 kHz – 400 MHz):	<1 : 2.5 typical	
VSWR (400 MHz – 6 GHz)	<1 : 3 typical	
LF modulation generator		
Frequency range	1 Hz – 100 kHz	
Frequency resolution	0.1%	
Frequency accuracy	0.5%	
AM Modulation		
Modulation depth range	0 – 100%	
AM modulation resolution	0.1%	
AM accuracy	0.5%	
FM modulation		
Frequency modulation range	1 Hz – 100 kHz	
FM deviation resolution	0.1%	
FM accuracy	0.5%	
Pulse modulation		
Pulse modulation range	200 ns – 100 s	
Pulse accuracy	0.1% ± 20 ns	
On/Off ratio	> 100 dB	
Warranty		
Warranty	3 Years*	

Unless otherwise noted, all specifications are measured after 10 minutes warm up time and with 0 dBm output level.

Typical specifications indicate the measured values are met on at least 80% of the points.

Three years warranty will be granted only after you register your product at www.raditeq.com. Without registration, a 1 year warranty period applies.

For more information about the current and new Raditeq products at:

T: +31 348 200 100 M: Sales@raditeq.com

W: www.raditeq.com

EU Declaration of Conformity

We

Raditeq B.V.

of

Vijzelmolenlaan 3
NL-3447GX Woerden
The Netherlands

declare under our sole responsibility that the

Product: RadiGen®
models: RGN2400A - RGN2006B

are in accordance with the European directives:

EMC Directive 2014/30/EU
Low Voltage Directive 2015/35/EU
RoHS Directive: 2015/863/EU

per the provisions of the applicable requirements of the following harmonized standards:

Emission: EN 61326-1:2013, Class A1
Electrical equipment for measurement, control and laboratory use.

Immunity: EN 61326-1:2013, Industrial level, performance criteria A
Electrical equipment for measurement, control and laboratory use.

Safety: EN 61010-1:2010, Safety requirements for electrical equipment
for measurement, control, and laboratory use

The technical construction files are maintained at the adress specified above.

Date of issue: Publish date: 14/09/2021
Place of issue: Woerden, the Netherlands
Authorized by: P.W.J. Dijkstra
Title of authority: Director

Warranty

Raditeq B.V. offers a standard warranty term of three (3) years on their products, calculated from the shipping date, under the condition that the product is registered on www.raditeq.com. For registration of the product, the customer should provide the product model, serial number and the responsible reseller (if applicable). If the product is not registered, a limited warranty term of one (1) year will be applicable.

Return Material Authorization (RMA) & Warranty repair

If a defect occurs to our product within the warranty term, a Return Material Authorization (RMA) 'Warranty Repair' request can be issued using the RMA link at www.raditeq.com/support. Upon receipt of the request, an RMA number will be provided. Please do not send the product without this RMA number! The defective product should be shipped to our service department at the following address:

Raditeq B.V. – Service Department
Vijzelmolenlaan 3
3447GX WOERDEN
The Netherlands

There will be no charge for repair services (materials or labour) within the (extended) warranty term. These warranty terms are not applicable to:

- Normal wear and tear
- Fibre optic cables
- Products that have been improperly used
- Products that have been used outside their specified range
- Products that have been improperly installed and/or maintained
- Products that have been modified without approval of Raditeq
- Calibration and/or re-calibration of the product

Repair services on products that are not covered by the Raditeq warranty will be charged to the customer.

Repairs outside warranty

If a defect is not covered under warranty, an RMA fixed-repair can be ordered on the RMA link: www.raditeq.com/support. If a re-calibration is needed after repair, this calibration should be ordered separately. The calibration will be performed at the ISO17025 accredited calibration laboratories of DARE!! Calibrations, based on the applicable service code / prices.

Warranty after repair

For repairs outside the original warranty period, a limited warranty of six months is applicable on the performed repair. Shipping conditions are the same as with repairs that are covered within the original warranty period.

Shipping

The customer will need to arrange shipping and cover for the costs (like e.g. transportation costs, duties, taxes) for sending the defect product the service department of Raditeq in The Netherlands. Raditeq will arrange the courier and cover for the costs for the return shipment after repair.



raditeq

Raditeq B.V. | Vijzelmolenlaan 3 | 3447GX Woerden | The Netherlands

www.raditeq.com | T: +31 348 200 100