

# RB900SG

USER MANUAL



2G/3G/LTE



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## APPLICABILITY TABLE:

Modem	Short description
RB900SG-E5	4G Cat. 4 modem version

## RELATED DOCUMENTS:

1. [Teleorigin Manager User Manual](#)
2. RB900SG-E5 RED Declaration of Conformity

## Overview

The RB900SG Terminal is the complete modem solution for wireless IoT applications. It offers high level LTE features, RS232/485 communication interfaces and USB interface for configuration. Together with its small size and wide power supply range, it is easy to integrate it with energy meters.

The RB900SG terminal enabling high speed data transmission, SMS and TCP/IP communication. The device can be controlled by standard AT commands and configured by Teleorigin Manager application, thus making it the complete SMT platform for IoT solutions.

This document contains full RB900SG modem description and gives information about installation and using it.

## Product variants

RB900SG modem variants and its description are listed below.

Model	Description
RB900SG-E5.X.X.2.X.X	LTE Cat. 4 modem

It is possible to use SIM-CHIP solution. Example P/N of the modem with SIM-CHIP: RB900SG-E5.X.C.2.X.X – LTE Cat. 4 modem with SIM-CHIP. Last parameter in P/N depends on modem accessories. Please check available accessories in 11. Accessories

## Complete package contents



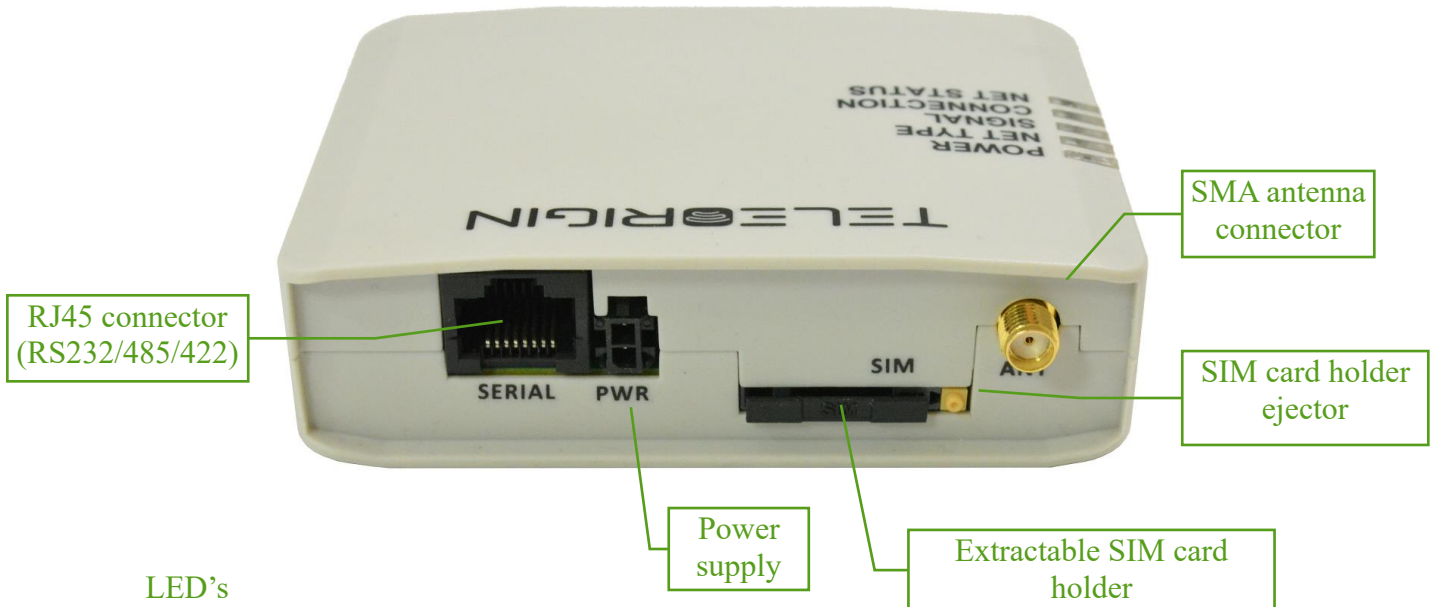
Standard package contains:

- RB900SG modem (item A)
- RJ45 cable (item B)

Please check additional accessories in 11. Accessories

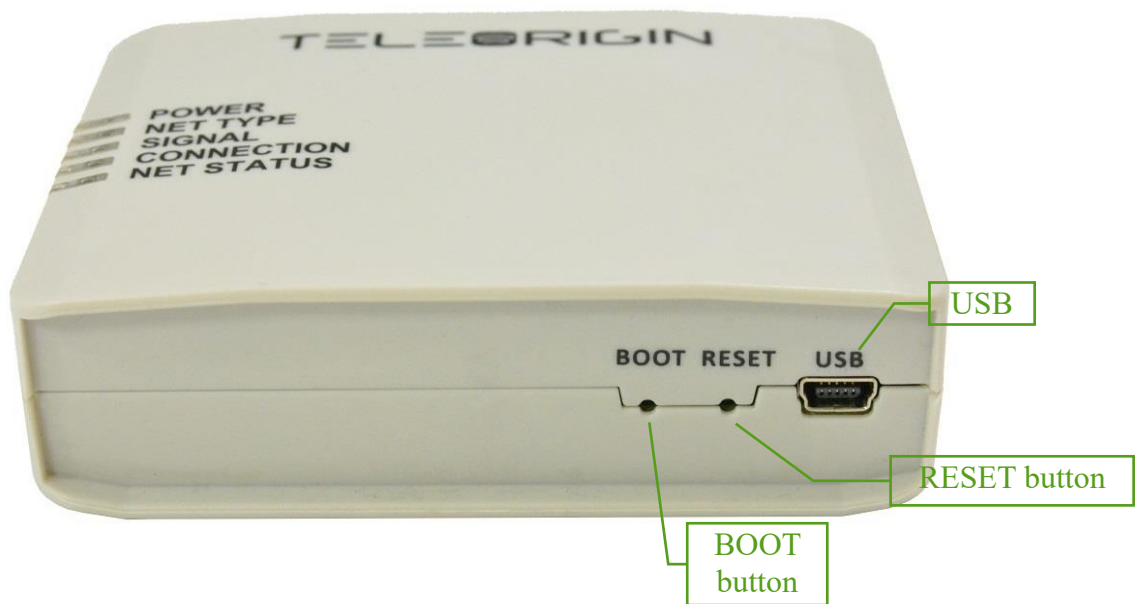
# General presentation

## Product pictures



LED's

- POWER ●
- NET TYPE ●
- SIGNAL ●
- CONNECTION ●
- NET STATUS ●





## External connections

### GSM antenna connector



An SMA “ANT” input is used to connect external GSM/UMTS/LTE antenna. To establish a connection with a GSM/UMTS/LTE network, an external antenna must be used. Type of antenna depends of GSM/UMTS/LTE coverage. In good circumstances (level of received signal is high) use antenna contained in the package. If the range of GSM/UMTS/LTE is low or none, an outdoor or indoor (for instance in place where GSM/UMTS/LTE range is sufficient) antenna should be used.

**Note:** *If there is no antenna connected to SMA connector, the connection with GSM/UMTS/LTE network is impossible.*

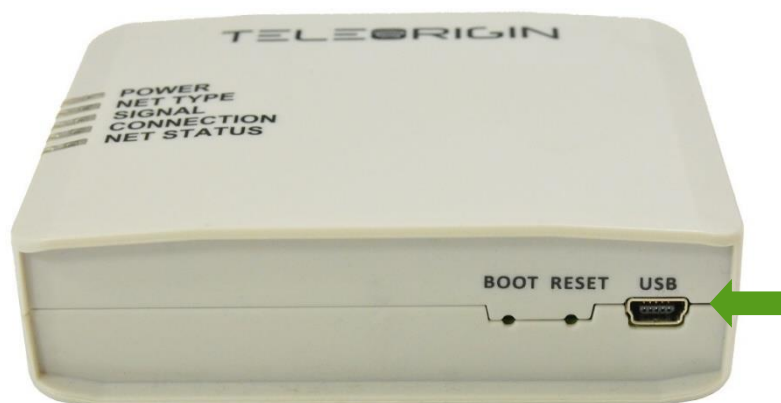
### GNSS antenna connector

An SMA “GNSS” input is used to connect an external GPS/Glonass antenna. To establish connection with GPS/Glonass satellites and check the coordinates of the device, an external antenna must be used and should be located outdoors. GNSS is optionally available in RB900SG-L5 modem variant.

## USB interface

RB900SG terminal is equipped with a USB interface (as shown below). Type of connector is miniUSB. It is used for device configuration.

**NOTE:** To configure the modem with SIM card inside, please plug also the power adaptor.



## RS232/RS485 interfaces

The RB900SG terminal is equipped with RS232/RS485 interfaces on RJ45 socket. Use the jumper to switch between interfaces as described in 7.1. Setting up the modem. The connector also carries the power supply from the ITRON SL7000 or ACE6000 meter, therefore it is not necessary to use an external power supply when connected to a meter.

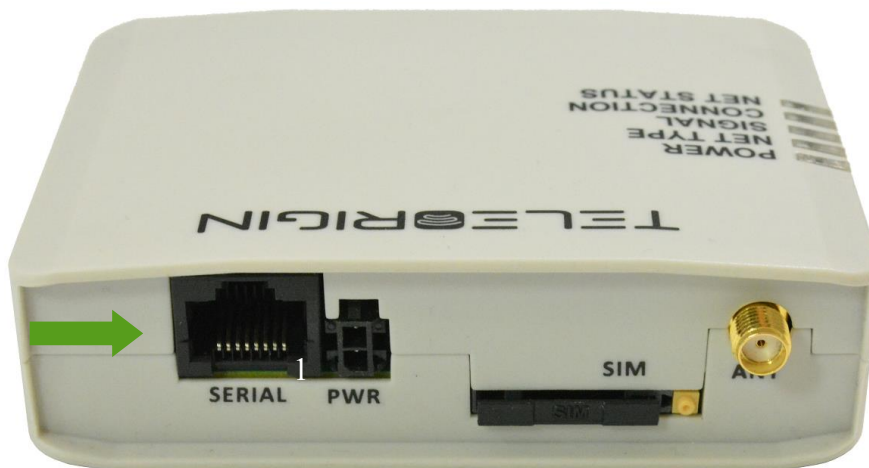


Table of RJ45 serial connector:

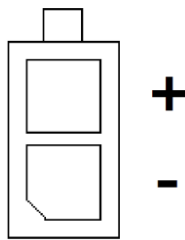
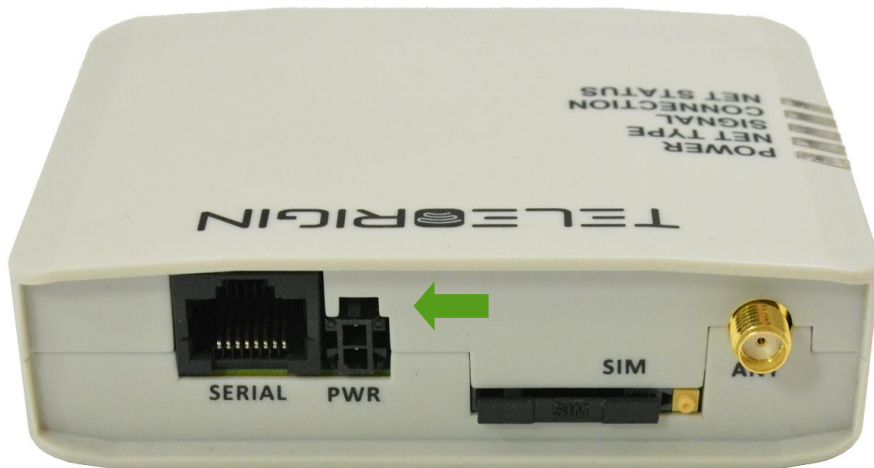
RJ45	RS232	RS422	RS485
1	VCC	VCC	VCC
2	-	TX-	DATA-
3	-	-	-
4	TX	TX+	DATA+
5	RX	RX+	DATA+
6	GND	GND	GND
7	DTR	RX-	DATA-
8	-	-	-

Pinout of the RJ45 - DB9 adapter (female) for the RS232 interface:

RJ45	DB9 female RS232
1 VCC	-
2 -	-
3 -	-
4 TX	2
5 RX	3
6 GND	5
7 DTR	-
8 -	-

## Power supply connector

The power supply connector is a 2-pin connector for external DC power supply connection, which can handle voltage from range 5..30 V DC, 2.5 W max. continuous power. (for modem with internal battery).



Pin	I/O	Description
+		5 V...30 V DC
-	-	Ground

### Attention!

An attempt to power terminal from a DC source outside of 5..30 V range may result in the physical destruction of the device.

## Battery disposal

The RB900SG terminal contains a Li-Po battery.

### SAFETY INFORMATION:

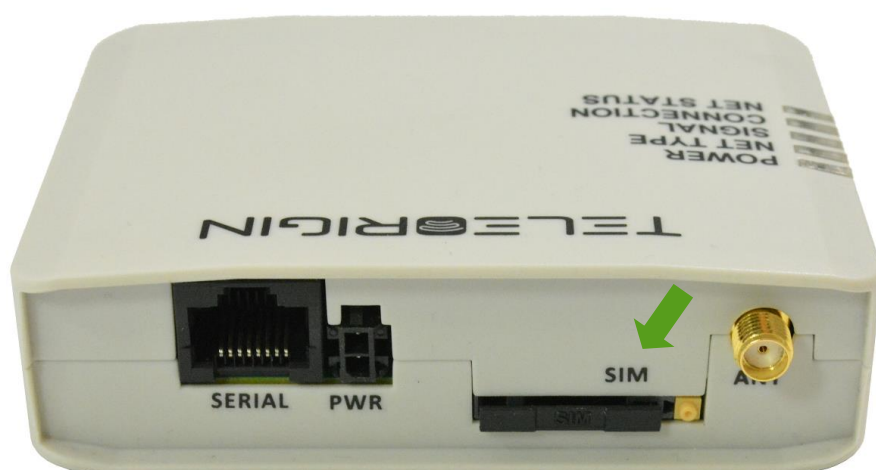
Please connect power supply adaptor at least once every three to six months to avoid shortening battery life. Do not use any other supply adapters than those recommended. Keep the device away from water, fire, humidity or hot environments (do not long-term store and use in temperatures above 45°C). Do not attempt to disassemble, repair, or modify the device. Do not deliberately drop or impact this device. If the product appears to be bulging or any other visible abnormalities, stop using the product immediately and contact us or Elproma distributor. Please recycle this device at an approved disposal location.

### CAUTION:

Risk of fire or explosion or defeat the safeguard of equipment if the battery is replaced by an incorrect type. Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion. High or low extreme temperatures or low air pressure at high altitude that the battery can be subjected to during use, storage or transportation. Leaving the battery in an extremely high temperature and/or low air pressure surrounding environment that can result in an explosion or the leakage of flammable liquid or gas. Please read and follow the above safety information when operating the device. We cannot guarantee that no accidents or damage will occur due to improper use of the device. Please use this product with care and operate at your own risk.

## SIM card holder

A SIM card holder is placed at the front of the RB900SG terminal (as shown below), and is accessible externally. To insert a SIM card into the holder, press the **yellow button**, eject the little drawer, place the SIM card inside and insert drawer into the modem (you will hear „click”). To operate the module in a GSM/UMTS/LTE network, it is necessary to insert a SIM card obtained from the network operator.







## Basic features and services

Basic features and available services for RB900SG are contained in table below.

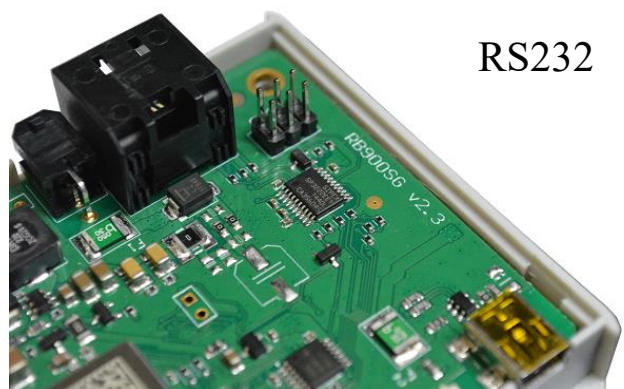
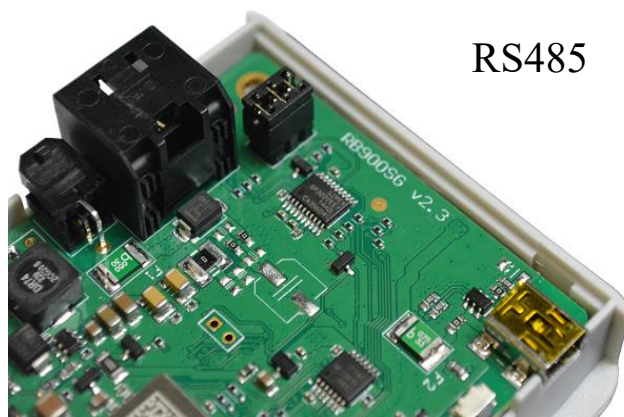
Feature/service	Description
<b>Standard</b>	<p>Supported bands:</p> <p><u>RB900SG-E5:</u></p> <ul style="list-style-type: none"> <li>• LTE FDD: B1/B3/B7/B8/B20/B28A</li> <li>• WCDMA: B1/B8</li> <li>• GSM: 900/1800MHz</li> </ul> <p>Work with Itron electricity meters:</p> <ul style="list-style-type: none"> <li>• SL7000</li> <li>• ACE6000</li> </ul> <p>Physical:</p> <ul style="list-style-type: none"> <li>• Size: 100 x 70 x 27 mm</li> <li>• Weight: 170 g</li> </ul>
<b>Interfaces</b>	<p>Connectors:</p> <ul style="list-style-type: none"> <li>• SMA for GSM/LTE antenna</li> <li>• SMA for GNSS antenna (option)</li> </ul> <p>SIM card:</p> <ul style="list-style-type: none"> <li>• 3.0V / 1.8V</li> <li>• STK 3.1</li> </ul> <p>Connectivity:</p> <ul style="list-style-type: none"> <li>• RS232/RS485/RS422</li> <li>• USB 2.0 HS (configuration)</li> </ul>
<b>Functions</b>	<p>Hardware reset, periodic reboot</p> <p>Connection self-check</p> <p>VPN (OpenVPN)</p> <p>System logs</p> <p>Local and remote update and configuration</p> <p>TCP/IP, DLMS, CSD, SMS suport</p> <p>AT commands and special RB900SG commands</p> <p>Phone allowlist</p> <p>Network provider changing</p> <p>Cofiguration export and import</p>
<b>Power supply</b>	5V...30V DC

## Using the modem

### Setting up the modem

To set up the modem, follow these steps:

- At the production stage, the device is set up with a RS232 serial interface (without the jumper inside). If there is a need to change the interface to RS485 please open the device housing and plug the jumper on the appropriate connector of the internal board (as in the picture below) and close the housing.



- Connect the USB cable to the computer. If you want to configure the modem with SIM card inside, please connect also the power adaptor.
- Configure the modem using the Teleorigin Manager program. If you plug the jumper inside the modem (for RS485 interface), please set „485-4W” (full-duplex) or „485-2W” (half-duplex) in „Serial” -> „Serial type” in „Basic” menu tab, save the configuration and reboot the modem. The detailed configuration procedure is described in the [Teleorigin Manager User Manual](#) document.
- If you can't connect to the modem, follow these steps:
  - check if the modem is connected to the computer via USB interface
  - check if the COM port number is correct
- Disconnect the USB cable after setting up the device.
- Screw the GSM/LTE antenna on if an external antenna is to be used.
- Remove the SIM card tray by pressing the yellow button as shown in the picture below.



- Insert your SIM card into the drawer.
- Verify if SIM card fits in the drawer properly (as shown below).



- Insert the drawer into the modem.
- Connect the modem with the meter using RJ45 cable (the modem will be powered directly from the meter) and mount it in the meter housing. For assembly description, see Modem assembly.
- Now the modem is ready to work

## Mounting the modem

To mount the modem inside the meter housing, please use one of the handles. The available handles are shown in the photos below.





The method of mounting the modem in the ITRON SL7000 housing is shown in the photo below.



## Status of the modem (LEDs)

The operation of the modem is indicated by LED diodes on the top of the device housing. The table below shows the description and signaling of the LEDs.

LED name	LED color	Description
POWER	red	Lights when modem is power on
NET TYPE	green	- off: no network, - 1 blink: 2G network, - 2 blinks: 3G network, - 3 blinks: 4G network.
SIGNAL	green	- off: CSQ < 6 or device not registerd to the network, - 1 blink: CSQ >= 6 and CSQ < 16, - 2 blinks: CSQ >= 16 and CSQ < 25, - 3 blinks: CSQ >= 25.
CONNECTION	green	- off: tcp server off, - 1 blink: tcp server on, no client connected, - 2 blinks: tcp server on and client connected to the server.
NET STATUS	green	- on: voice calling - 125ms on, 125ms off: data transfer is ongoing - 1800ms on, 200ms off: idle - 200ms on, 1800ms off: network searching - off: gsm off

## RESET and BOOT buttons

To reset the device, use the RESET button located to the right of the USB connector. The BOOT button is used to program the device firmware in service mode.

## Text commands

Below is a list of the available RB900SG modem text commands. All below commands are available from 3.0.x modem firmware version. They can be send over USB, SMS or Teleorigin Manager.

Special characters:

<EXT> - End of Text 0x03 character

<CR> - Carriage Return 0x0D character

<LF> - Line Feed 0x0A character

**NOTE:** <CR><LF> characters can be omitted when the command is sent via SMS and Teleorigin Manager („Console” tab).

### 1. Device commands

<b>RB900SG Commands</b>	
Available since firmware version: 3.0.0	
<b>RB900SG GET FW VERSION&lt;CR&gt;&lt;LF&gt;</b>	Downloads the firmware version number of the microcontroller
Response	x.x.x<CR><LF> where x – version number
Response example	3.0.0<CR><LF>
<b>RB900SG GET IP&lt;CR&gt;&lt;LF&gt;</b>	Retrieves the IP address of the device
Response	x.x.x.x<CR><LF>
Response example	10.43.210.2<CR><LF>
<b>RB900SG GET RTCTIME&lt;CR&gt;&lt;LF&gt;</b>	Gets device time in Unix time or unless the clock is out of sync then rtc time is equal uptime
Response	xxxx<CR><LF>



<b>RB900SG Commands</b>	
Response example	868<CR><LF>
<b>RB900SG GET UPTIME&lt;CR&gt;&lt;LF&gt;</b>	Gets the number of seconds since the device startup
Response	xxxx<CR><LF>
Response example	868<CR><LF>
<b>RB900SG RESET&lt;CR&gt;&lt;LF&gt;</b>	Resets the device
Response	-
Response example	-
<b>RB900SG TIME&lt;CR&gt;&lt;LF&gt;</b>	Returns the current time in human-readable version
Response	Time: xxxxxxxxxxxx, mm-dd-yyyy hh:mm:ss<CR><LF>
Response example	Time: 1619618224, 11-30-2021 13:57:04 <LF><CR><LF>
<b>RB900SG LOG PRINT&lt;CR&gt;&lt;LF&gt;</b>	Sends all entries from the event log
Response	----- Sep 12:30:05 - x.x.x<CR><LF> Sep 12:30:08 - SIM ready<CR><LF> Sep 12:30:09 - Cfg port opened<CR><LF> Sep 12:30:11 - PDP activated<CR><LF>
Response example	----- Sep 12:30:05 - x.x.x<CR><LF> Sep 12:30:08 - SIM ready<CR><LF> Sep 12:30:09 - Cfg port opened<CR><LF> Sep 12:30:11 - PDP activated<CR><LF> Sep 12:30:12 - IP: 46.77.88.87 Sep 12:30:14 - Sync to NTP success<CR><LF><ETX>
<b>RB900SG LOG FORMAT&lt;CR&gt;&lt;LF&gt;</b>	Removes all entries from the event log

<b>RB900SG Commands</b>	
Response	OK<CR><LF>
Response example	As above
<b>RB900SG GET HW VERSION&lt;CR&gt;&lt;LF&gt;</b>	Downloads the hardware version number of the device
Response	x.x.x<CR><LF> where x – version number
Response example	2.3.1<CR><LF>
<b>RB900SG BATTERY VOLTAGE&lt;CR&gt;&lt;LF&gt;</b>	Downloads battery voltage in volts
Response	X.XX<CR><LF>
Response example	4.08<CR><LF>
<b>RB900SG GET TEMPERATURE&lt;CR&gt;&lt;LF&gt;</b>	Downloads temperature of the device
Response	XX.X *C<CR><LF>
Response example	30.5 *C<CR><LF>

## 2. Allowlist commands

<b>PHONE ALLOWLIST Commands</b>	
Available since firmware version: 3.0.0	
<b>PHONE ALLOWLIST ENABLE&lt;CR&gt;&lt;LF&gt;</b>	Turns allowlist on
Response	OK<CR><LF>
Response example	As above
<b>PHONE ALLOWLIST DISABLE&lt;CR&gt;&lt;LF&gt;</b>	Turns allowlist off
Response	OK<CR><LF>
Response example	As above
<b>PHONE ALLOWLIST STATUS&lt;CR&gt;&lt;LF&gt;</b>	Returns information whether allowlist is on or off
Response	xxxxxxx<CR><LF>
Response example	DISABLE<CR><LF>
<b>PHONE ALLOWLIST LIST&lt;CR&gt;&lt;LF&gt;</b>	Returns a list of numbers added to an allowlist
Response	Phone allow list is empty  or  xxxxxxxxx +xxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxx<CR><LF>
Response example	Phone allow list is empty  or  123456789 +0012123456789<CR><LF>
<b>PHONE ALLOWLIST ADD &lt;phone_number&gt;&lt;CR&gt;&lt;LF&gt;</b>	Adds a <phone_number> to the allowlist  Where:

<b>PHONE ALLOWLIST Commands</b>	
	<p>&lt;phone_number&gt; - phone numer in national or international format</p> <p>NOTE: it is recomended to add the numer in national and international format separately (without and with the area code)</p>
Response	OK<CR><LF>
Response example	As above
<b>PHONE ALLOWLIST REMOVE</b> <b>&lt;phone_number&gt;&lt;CR&gt;&lt;LF&gt;</b>	<p>Removes the given &lt;phone_number&gt; from the allowlist</p> <p>Where:                      &lt;phone_number&gt; - phone numer in national or international format</p>
Response	OK<CR><LF>
Response example	As above
<b>PHONE ALLOWLIST CLEAR&lt;CR&gt;&lt;LF&gt;</b>	Removes all phone numbers from allowlist
Response	OK<CR><LF>
Response example	As above

### 3. Config commands

<b>CONFIG Commands</b>	
Available since firmware version: 3.0.0	
<b>CONFIG SET APN &lt;apn&gt; &lt;username&gt;</b> <b>&lt;password&gt;&lt;CR&gt;&lt;LF&gt;</b>	<p>Sets &lt;apn&gt;</p> <p>Where:                      &lt;apn&gt; - string with Access Point Name                      &lt;username&gt; - apn username (optional)</p>

<b>CONFIG Commands</b>	
	<password> - apn password (optional)
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET APN&lt;CR&gt;&lt;LF&gt;</b>	Returns apn and username (optional) and password (optional)
Response	XXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX<CR><LF>
Response examples	internet <CR><LF>  or  internet username password<CR><LF>  Where: internet is <apn> username is <username> password is <password>
<b>CONFIG SET TCP PORTS &lt;data_port&gt; &lt;config_port&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets TCP ports (data and config)  Where: <data_port> - TCP data port (range from 0 to 65535) <config_port> - TCP port for remote configuration (range from 0 to 65535)
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET TCP PORTS&lt;CR&gt;&lt;LF&gt;</b>	Returns TCP <data_port> and <config_port> ports
Response	xxx xxx<CR><LF>
Response example	703 704<CR><LF> Where: 703 is <data_port> and 704 is <config_port>
<b>CONFIG SET SIM PIN &lt;pin&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets the PIN code of the SIM card

<b>CONFIG Commands</b>	
	Where: <pin> - PIN code of the SIM card (range from 0000 to 9999)
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET SIM PIN&lt;CR&gt;&lt;LF&gt;</b>	Returns the PIN code of the SIM card
Response	xxxx<CR><LF>
Response example	1111<CR><LF>
<b>CONFIG SET ANTENNA &lt;type&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets the antenna to external or internal <type>  Where: <type> - type of antenna, options: EXTERNAL INTERNAL
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET ANTENNA&lt;CR&gt;&lt;LF&gt;</b>	Returns the antenna type
Response	xxxxxxxx<CR><LF>
Response example	EXTERNAL<CR><LF>
<b>CONFIG SET PERIODIC REBOOT &lt;time&gt; &lt;start_time&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets the periodic restart time Where: <time> - restart time in hours (from 0 to 8760). When it is set to 0, the device will not perform periodic reboot <start_time> - Unix time* - optional. If it is omitted, <start_time> equals device startup time  * - there will be added also the HH:MM format option (under development)

<b>CONFIG Commands</b>	
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET PERIODIC REBOOT&lt;CR&gt;&lt;LF&gt;</b>	Returns periodic restart time and start time in hours
Response	x xxxxxxxxxxxx<CR><LF>*
	* - there will be added also x xx:xx format option (under development)
Response example	1 1619515560<CR><LF>*
	Where: 1 is <time> 1619515560 is <start_time>
	* - there will be added also 1 10:30 format option (under development)
<b>CONFIG SET UART &lt;configuration&gt;&lt;CR&gt;&lt;LF&gt;</b>	Configures UART Where: <configuration> - configuration string in the format <b>xxxx abc</b> where xxxx = baudrate, a = start bits, b = parity, c = stop bits
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET UART&lt;CR&gt;&lt;LF&gt;</b>	Returns UART configuration
Response	xxxx xxx<CR><LF>
Response example	9600 8N1<CR><LF>
	Where: 9600 is baudrate 8 is start bits N is parity 1 is stop bits
<b>CONFIG SET TEXT INFO 1 &lt;data&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets text information Where:

<b>CONFIG Commands</b>	
	<data> - string with additional comment (up to 128 characters)
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET TEXT INFO 1&lt;CR&gt;&lt;LF&gt;</b>	Returns text information
Response	Xxxxxx<CR><LF>
Response example	Test comment<CR><LF>
<b>CONFIG SET RTC SOURCE &lt;source&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets the internal clock sync source Where: <source> - clock source, options: <b>GSM</b> (time from GSM network)  <b>NTP ntp_addr ntp_port</b> (time from NTP server, ntp_addr – string with NTP server address, ntp_port – NTP port (range from 0 to 65535), optional, usually 123)
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET RTC SOURCE&lt;CR&gt;&lt;LF&gt;</b>	Returns the internal clock synchronization source
Response	xxx<CR><LF>
Response examples	GSM<CR><LF>  or  NTP ntp.elproma.com.pl 123<CR><LF>
<b>CONFIG SET NETWORK SEARCH MODE &lt;mode&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets the network search mode Where: <mode> - <b>AUTO</b> or <b>2G</b> or <b>3G</b> or <b>4G</b>



<b>CONFIG Commands</b>	
	sets the search mode to auto, 2G (GSM) only, 3G (WCDMA) only or 4G (LTE) only
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET NETWORK SEARCH MODE&lt;CR&gt;&lt;LF&gt;</b>	Returns the network search mode
Response	xx<CR><LF>
Response example	2G<CR><LF>
<b>CONFIG SAVE&lt;CR&gt;&lt;LF&gt;</b>	Saves configuration to device memory
Response	OK<CR><LF>
Response example	As above
<b>CONFIG SET SERIAL TYPE &lt;type&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets serial port hardware layer type where: <type> - 232 or 422 or 485
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET SERIAL TYPE&lt;CR&gt;&lt;LF&gt;</b>	Returns serial port hardware layer type
Response	XXX<CR><LF>
Response example	232<CR><LF>
<b>CONFIG SET WATCHDOG PING SERVER &lt;en&gt; &lt;addr&gt; &lt;timeout&gt; &lt;ping_num&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets options for pinging external server, where: <en> - enable (0 or 1), <addr> - address (max. 32 chars), <timeout> - timeout in seconds 1-255 (optional), <ping_num> - number of ping repetitions 1-10 (optional)

<b>CONFIG Commands</b>	
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET WATCHDOG PING SERVER&lt;CR&gt;&lt;LF&gt;</b>	Returns options for pinging external server
Response	xxxxxxx<CR><LF>  or  <domain or IP> <timeout> <ping_num>
Response example	DISABLE<CR><LF>  or  domain.com 20 4
<b>CONFIG RESET&lt;CR&gt;&lt;LF&gt;</b>	Resets configuration *requires CONFIG SAVE and reset of the device (RB900SG RESET) to apply
Response	OK<CR><LF>
Response example	As above
Available since firmware version: 3.0.3	
<b>CONFIG SET VPN &lt;option&gt;&lt;CR&gt;&lt;LF&gt;</b>	Sets VPN on or off where: <option> - ENABLE or DISABLE
Response	OK<CR><LF>
Response example	As above
<b>CONFIG GET VPN&lt;CR&gt;&lt;LF&gt;</b>	Returns VPN status
Response	xxxxxxx<CR><LF>
Response example	ENABLE<CR><LF>  or

CONFIG Commands	
	DISABLE<CR><LF>

NOTE: To save new configuration use **CONFIG SAVE** command and reboot the device using **RB900SG RESET** or manually reset the device by disconnecting the power supply.

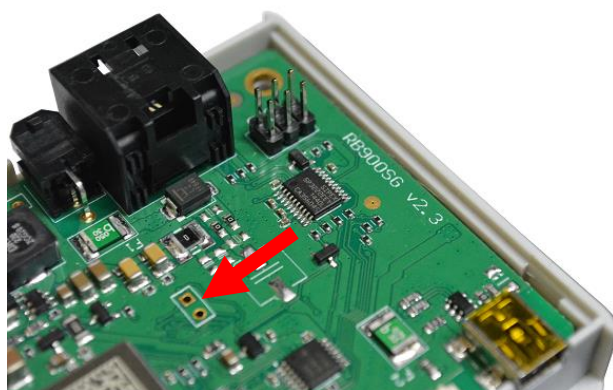
## Firmware update

Use the Teleorigin Manager software to update the device firmware. Details of the update procedure are described in the [Teleorigin Manager User Manual](#).

**NOTE:** It is recommended not to disconnect the modem's power supply during the update procedure.

## Emergency update

If the update was unsuccessful, open the device housing, short the two pins shown in the picture below and then perform the update again. See the [Teleorigin Manager User Manual](#) for details about the emergency update.



# Troubleshooting

## No connection with the modem

If there is no communication with the modem take the following steps:

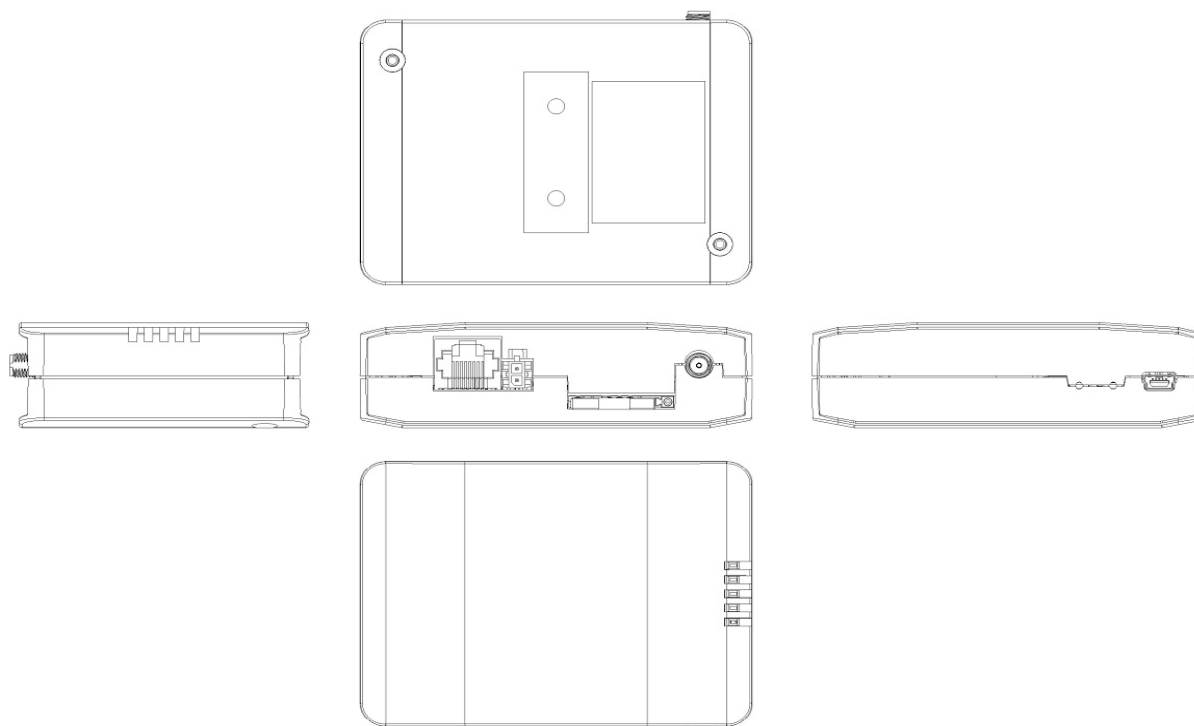
- check all external connections with the modem (serial interfaces, USB, power supply).
- check that the power supply is correct (see Power connector).
- check that the COM port is correct.
- check that the Teleorigin Manager program is working properly and that no other program is interfering with it.
- when connecting the modem with the meter, check whether the meter is powered and the POWER diode in the modem is on.

# Technical specifications

## Mechanical specifications

Max, dimensions	100 x 70 x 27 mm
Weight	≈ 120 g
Volume	170 cm <sup>3</sup>

## Sketch of the housing



## Electrical specification

### Power supply

- Nominal voltage range: 5..30 V, 10%.
- Maximum continuous (average) supply range: 2.5 W.
- Maximum continuous (average) supply current: 200 mA at 12V, 100 mA at 24V.

## RF specification

RB900SG-E5:

Frequency	Primary	Diversity	SIMO	3GPP
EGSM900	-108.6dBm	NA	NA	-102dBm
DCS1800	-109.4 dBm	NA	NA	-102dbm
WCDMA B1	-109.5dBm	-110dBm	-112.5dBm	-106.7dBm
WCDMA B8	-109.5dBm	-110dBm	-112.5dBm	-103.7dBm
LTE-FDD B1 (10M)	-97.5dBm	-98.3dBm	-101.4dBm	-96.3dBm
LTE-FDD B3 (10M)	-98.3dBm	-98.5dBm	-101.5dBm	-93.3dBm
LTE-FDD B7 (10M)	-96.3dBm	-98.4dBm	-101.3dBm	-94.3dBm
LTE-FDD B8 (10M)	-97.1dBm	-99.1dBm	-101.2dBm	-93.3dBm
LTE-FDD B20 (10M)	-97dBm	-99dBm	-101.3dBm	-93.3dBm
LTE-FDD B28A (10M)	-98.3dBm	-99dBm	-101.4dBm	-94.8dBm



## External antenna

The antenna must meet the requirements as in the table below:

Antenna frequency range	Supporting GSM, UMTS or LTE frequencies
Impedance	50 $\Omega$
DC impedance	0 $\Omega$
Gain	0 dBi w/o cable; 2dBi w/ cable
VSWR (with cable)	-10 dB

The antenna chosen for working with the modem should best fit to the circumstances of the environment it is used in. When the modem is placed in a room, or somewhere where the range of networks signal is too low, an outdoor or a specific indoor antenna should be used.

## Environmental characteristic

Table below gives the environmental operating conditions of RB900SG terminal.

Parameter	Condition	Min	Max	Unit
Ambient operating temperature		-20	60	$^{\circ}\text{C}$
Storage temperatura		-40	85	$^{\circ}\text{C}$
ESD	At antenna connector Contact Air At interface connector		$\pm 6$ $\pm 15$ $\pm 1$	KV
Humidity		5	85	%

### Warning!

Exceeding the above values may cause permanent damage to the modem.

## Accessories

The pictures below show the available accessories for the RB900SG modem.

**RJ45 – RJ45 25cm cable:**



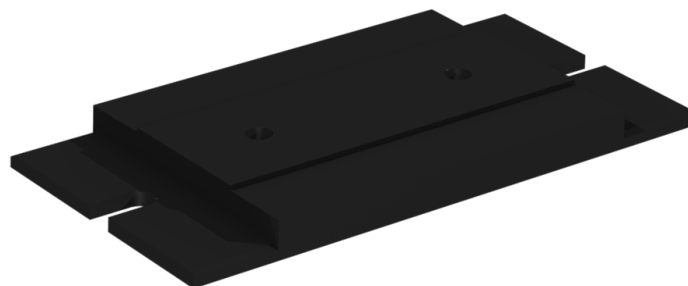
**Meter handle 1**



**Meter handle 2:**



**Wall handle:**



**Screws for handles:**



**LTE antenna:**



The product codes are listed in the table below.

Accessory	Product code
RJ45 - RJ45 25cm cable	RJ451125CMCA
Handle 1	RB9HANDLEA1
Handle 2	RB9HANDLEA2
Wall handle	RB9HANDLEA3
Screws for handles	RB9SCREWS03
LTE antenna	LTEANT0B04EX
Internal antenna	LTEANTP062IN
Battery operation option (additional battery)	ACC700B000IN

## Declaration of conformity

The RB900SG product was assessed with the participation of a Notified Body in terms of meeting the essential requirements of Directive 2014/53/EU (RED) regarding radio equipment to demonstrate compliance with harmonized standards.



# Safety Recommendations

## PREAD CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc

Where there is risk of explosion such as gasoline stations, oil refineries, etc

It is responsibility of the user to enforce the country regulation and the specific environment laws.

Do not dismantle the product; any sign of tampering will compromise the warranty validity.

We recommend following the instructions of the hardware user guides for the correct wiring of the product. The product has to be fitted with a stabilized voltage source and the wiring has to be conform to the security and fire prevention regulations.

The product has to be handled with care, avoiding any contact with the pins, because electrostatic discharges may damage the product itself. The same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.

The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the GSM network or external devices or having impact on the security. Should there be any doubt, please refer to the technical documentation and the regulations in force.

Every module has to be equipped with a proper antenna with the correct specifications. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from people (20 cm). If these requirements cannot be met, the system integrator has to assess the final product against the SAR regulations.

1. The unit does not provide protection from lightning and surge. For outdoor installation use outdoor nonmetallic case, safety approved according UL 50. Additionally you should provide protection from lightning and over-voltage according to the national code.

2. Be sure that the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas: Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc. Where there is risk of explosion such as gasoline stations, oil refineries, etc. It is responsibility of the user to enforce the country regulation and the specific environment regulation. Do not dismantle the product; any sign of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for the correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to conform to security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharge may cause damage. Same caution have to be

taken when handling the SIM, please carefully check the instructions for its use. Do not insert or remove the SIM when the product is in power saving mode. The system integrator is responsible for the functioning of the final product; therefore, care has to be taken with the external components of the unit, as well as with any project or installation issue, because the risk of disturbing the GSM network and external devices, or having an impact on security. If in doubt, please refer to the technical documentation and the regulations in force. Every unit has to be equipped with a proper antenna with exact specifications. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm/8"). In case this requirement cannot be satisfied, the system integrator should assess the final product against the SAR regulations. The European Community provides some directives for the electronic equipment introduced on the market. All the relevant information available on the European Community website:

<http://europa.eu.int/comm/enterprise/rtte/dir99-5.htm>

The text of the Directive RED 2014/53/EU regarding telecommunication equipment is available, while the applicable Directives (Low Voltage and EMC) are available at:

[http://europa.eu.int/comm/enterprise/electr\\_equipment/index\\_en.htm](http://europa.eu.int/comm/enterprise/electr_equipment/index_en.htm)

## List of acronyms

ACM	Accumulated Call Meter
ASCII	American Standard Code for Information Interchange
AT	Attention commands
CB	Cell Broadcast
CBS	Cell Broadcasting Service
CCM	Call Control Meter
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CMOS	Complementary Metal-Oxide Semiconductor
CR	Carriage Return
CSD	Circuit Switched Data
CTS	Clear To Send
DAI	Digital Audio Interface
DCD	Data Carrier Detected
DCE	Data Communications Equipment
DRX	Data Receive
DSR	Data Set Ready
DTA	Data Terminal Adaptor
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Equipment Institute
FTA	Full Type Approval (ETSI)
GPRS	General Radio Packet Service
GSM	Global System for Mobile communication
HF	Hands Free
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IRA	Internationale Reference Alphabet
ITU	International Telecommunications Union
IWF	Inter-Working Function



LCD	Liquid Crystal Display
LED	Light Emitting Diode
LF	Linefeed
ME	Mobile Equipment
MMI	Man Machine Interface
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
OEM	Other Equipment Manufacturer
PB	Phone Book
PDU	Protocol Data Unit
PH	Packet Handler
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PUCT	Price per Unit Currency Table
PUK	PIN Unblocking Code
RACH	Random Access Channel
RLP	Radio Link Protocol
RMS	Root Mean Square
RTS	Ready To Send
RI	Ring Indicator
SAR	Specific Absorption Rate (e.g. of the body of a person in an electromagnetic field)
SCA	Service Center Address
SIM	Subscriber Identity Module
SMD	Surface Mounted Device
SMS	Short Message Service
SMSC	Short Message Service Center
SPI	Serial Protocol Interface
SS	Supplementary Service
TIA	Telecommunications Industry Association
UDUB	User Determined User Busy
USSD	Unstructured Supplementary Service Data

## Online support

Elpoma provides a range of online support which includes:

- the latest version of this document
- technical support
- latest version of Teleorigin Manager software and documentation

This information can be found also on our website at [www.teleorigin.com](http://www.teleorigin.com)

For further information you can contact us at:

E-mail: [info@teleorigin.com](mailto:info@teleorigin.com)

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