RT-60 Quick Start Manual

Hardware Description

The RT-60 consists of following parts.

1. Detection Probe - BGO detector and electronic are built in durable aluminum housing. The housing is sealed with rubber to ensure high pressure water resistance (up 4 Bar). Electronic is located on two separate boards. The first board carries MCA spectrometer and high voltage supply for biasing the detector. It includes also a simple CPU (Central Processor Unit), what controls measurement activities and data exchange with surface computer. The second board interfaces communication line to RS 485.
2. Durable cable. The cable core is made of four twisted wires, surface is made of twisted stainless-steel wires. The cable guarantees very high mechanical resistance when exposed to a tension. The cable is permanently fixed to the detection probe on one side.
3. Wrench mounted on tripod. The wrench hosts up 30 meters of the cable. Wrench operation is controlled by a handle (wrench rotation) and a brake to hold wrench on certain position. The brake is made of a plate of bronze attached to a plastic rotating drum. Force of plates attachment is defined by a screw. The second side of the cable is hardwired to a central rotating connector installed in axis of the drum. Connection terminal is accessible from side of the body of the wrench.
4. USB/RS 485 interface is a small box with two outlet connectors. There is USB Type C connector for connection via USB and 5 pin linear connector for RS 485. The interface box can be attached to tripod's leg or body of the wrench. Simple cable for connection between the interface and rotation connector is made as extension of original socket delivered by vendor of rotating connector. Both connectors are protected by mechanical locks against incorrect insert position. There are two light indicators (RED and GREEN) integrated inside wall of the interface. The RED indicates power supply presence and GREEN lights on when data communication is in progress.
5. Standard USB Type C cable.

Supporting Programs

Program Geomon is used for diagnostic, maintenance and measurement. The Geomon works on all PCs with Windows platforms. Additionally, there is required USB Driver for Windows platforms. Geousb.exe Is self installing driver for Windows 8 and 10. Geousb-win7-only.exe is only for systems with Windows 7 used.

Power Supply

The RT-60 uses energy delivered via USB from a PC. As long as there is electrical connection between a PC and the RT-60 regardless of any command or data exchange, the detector is powered and continues auto-stabilization process. It is important to know that the energy is taken from a PC. This fact has to be considered in case of long-time operations in a field without power NET available.

Connection and Activation

Before activation of the RT-60 it is necessary to install right USB driver and application Geomon. Both programs are continuously updated to reflect changes and updates of Windows operation system. Geousb and Geomon delivered with the RT-60 can became obsolete. Updated programs are available on FTP server. Both can be downloaded from folders using a web browser connected to following sites.

data.georadis.com/data/geomon
data.georadis.com/data/geousb

Installation of both programs is performed after start of downloaded exe files. Process of installation is controled by messages.

1. Install USB driver first. Run geousb.exe. After completing geousb.exe it is necessary to activate the driver and register it in Windows. This process will start automatically after first connection of the interface with PC. Plug in USB cable in the PC and in the interface on other side of the cable. RED light of the interface lights on and Windows must announce any USB activity. A message that RT-60 has been recognized and Windows performs installation of the driver must be present. Successful registration is announced, and driver is ready. Next unplug the USB cable.
2. Install Geomon. Installation is similar. Start geomon_verxxxx.exe. Follow instructions to final end. Start geomon.exe - icon will be present on Desktop. After starting the Geomon has to be assigned to a device. Then it switches in right mode suited for the device.
3. Connect the RT-60 with the Interface and the PC. The RED light is on, Windows recognized activity on USB port and correct driver is being assigned.
4. Start Geomon if not started yet.
5. Use a shortcut button on left up corner or activate from main menu line Connect Device.
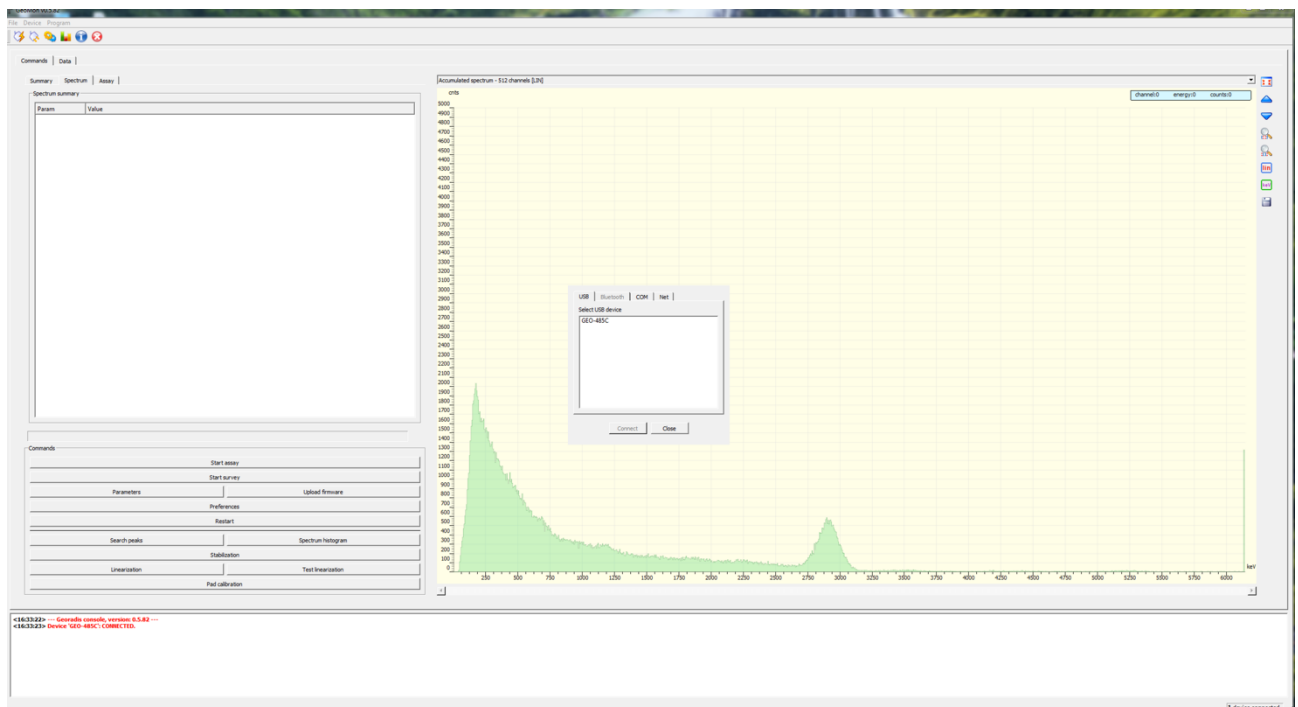
6. A new window with four TABs is shown on screen. Select TAB USB if not activated by default.
7. If all works OK there is present a serial number of the RT-60 on a list. (more devices can be present)
8. Select the serial number and touch button connect.

9. The Geomon reconfigures for the active device.

Operation Modes and warmup procedure.

Primary function of the RT-60 is gamma ray spectroscopy in 1024 channels. Additionally, there were added functions of direct ASSAY of KUTh of measured spectra. The unit is calibrated for measurement in boreholes and concentrations in % and ppm are traceable to IAEA standard materials. Special incorporated function is Automated Stabilization. This function is essential for correct ASSAY. Gain Stabilization (Energy Calibration of spectra) is fully automated process performed all the time since the detector is powered on. A stabilization spectrum is measured on backstage (no interference with regular measurement spectrum), position of expected peaks of KUTh are evaluated and gain is corrected to hold peaks on right positions.

The RT-60 operation is fully controlled by Geomon or any other suitable application.

Warm Up procedure.

Due strong influence of ambient temperature on amount of emitted light from BGO it is important to stabilize the RT-60 after powering on before start of measurements. The procedure is fully automated and requires only powering the unit and user's attention. After switching on and opening geomon application status of the instrument is displayed on window. Beside other information about the RT-60 there is important to attend information about stabilization. Since the status of Stabilization is changed to stabilized, the unit is calibrated and measurement can proceed.
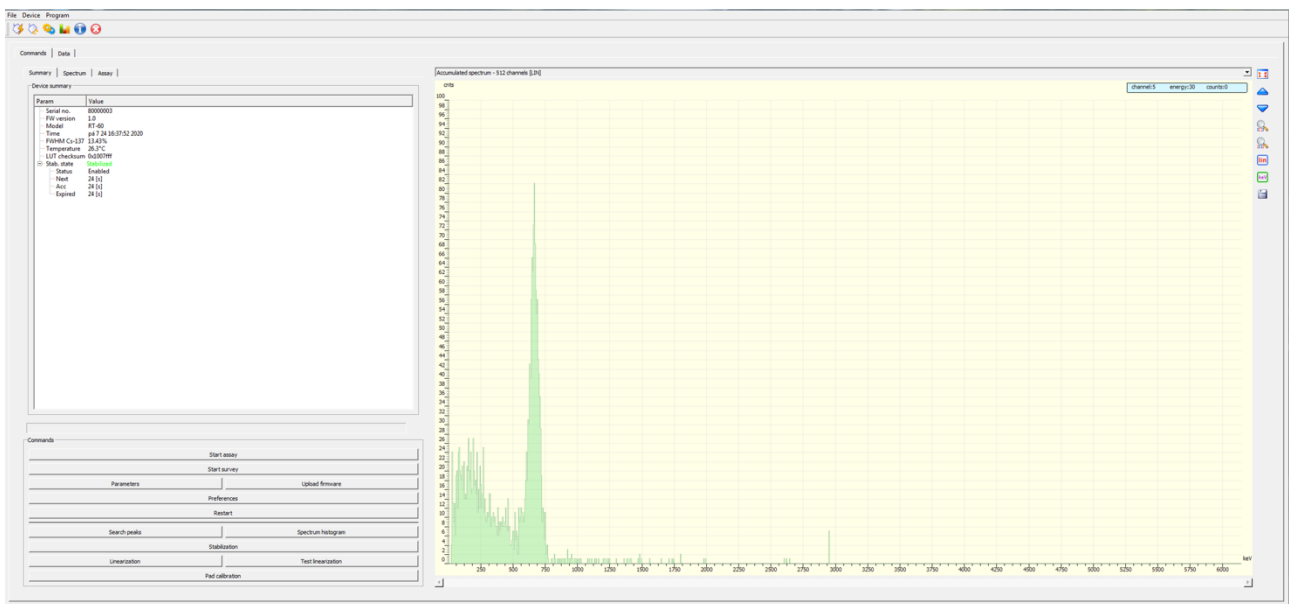

Browsing and Saving measured spectra or survey profiles.

The RT-60 cannot record all type of spectra and survey together in the same time. It is essential to select what type of data will be measured and recorded. Selection is made from list box located above spectrum/profile browser. There can be chosen Total in time, single event spectra 1024RAW or 512LIN or accumulated 1024RAW or 512LIN spectra.

Icons located on right side of the window serves to spectrum/profile browser. Arrows and magnifying glasses arrange spectrum details browsing. Button **lin** switches between linear or logarithmic format of Y scale. Button **ch** flips between X scale units in channels or keV.

Last icon (Diskette) starts data storage service.
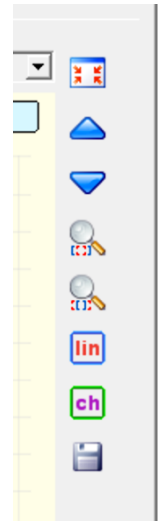
ASSAY

Evaluation of KUTh concentrations is performed every 30 second up to the end of measurement. Use Start ASSAY button to begin measurement. Results are printed in special TAB – ASSAY.
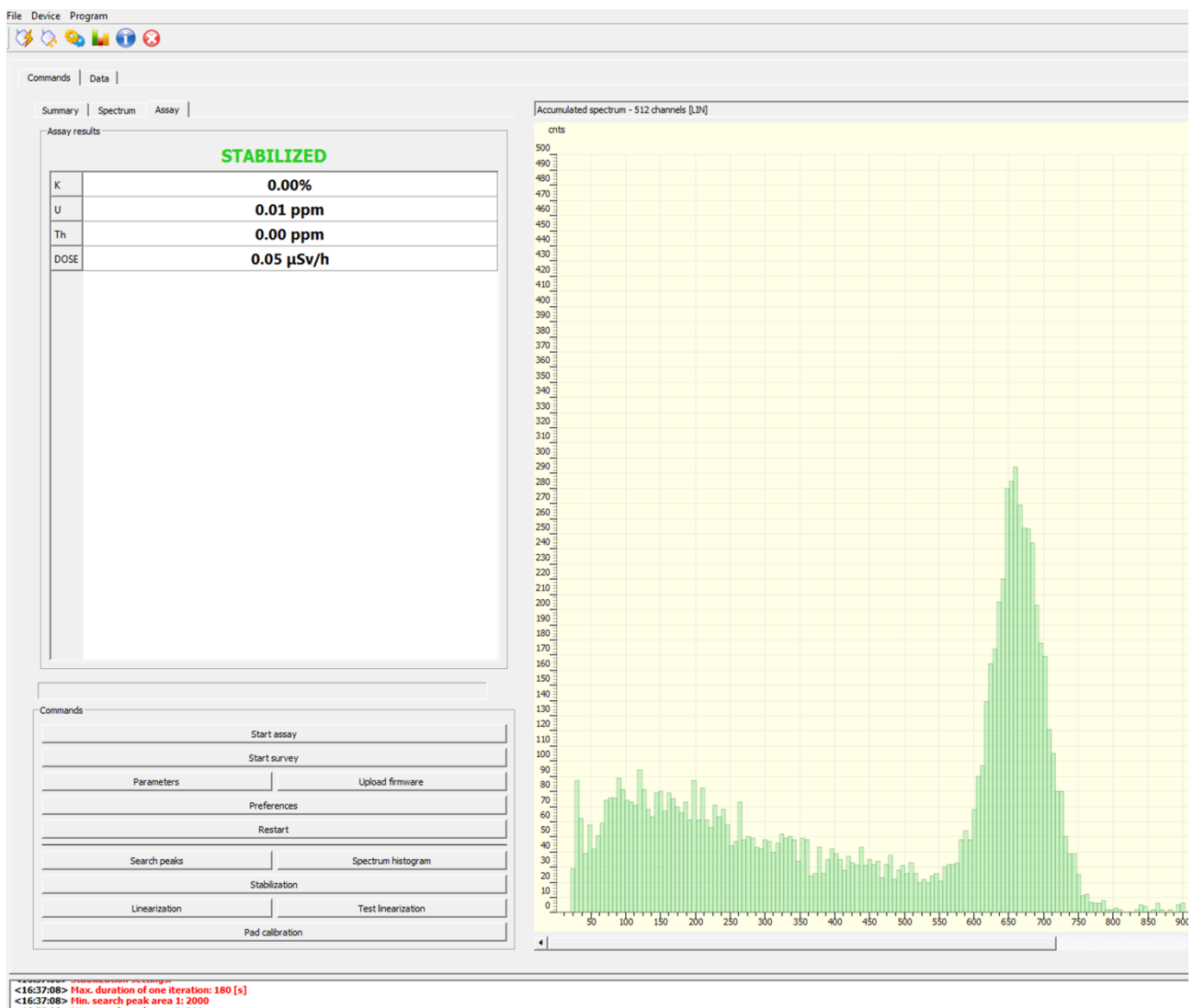
Total count recording

Beside spectrum there is broadcasted from detector also number of incidents per second. Logging it within time user gets gamma ray profile. This is very usefully with detector's slow motion inserting or withdrawing in or from a borehole to see borehole's profile. Select Total Counts from list box above browser window. Use Start Survey button to begin.

Linear spectra recording

Linear spectrum is 512 channel spectrum where is applied corrective function between position of channel and its energy. The native dependency channel versus energy is polynomic. Linear spectrum is corrected to get fully linear function. E = ch number * 6 [keV]. Select Linearized spectrum accumulated from the list box. Start with Start assay button.
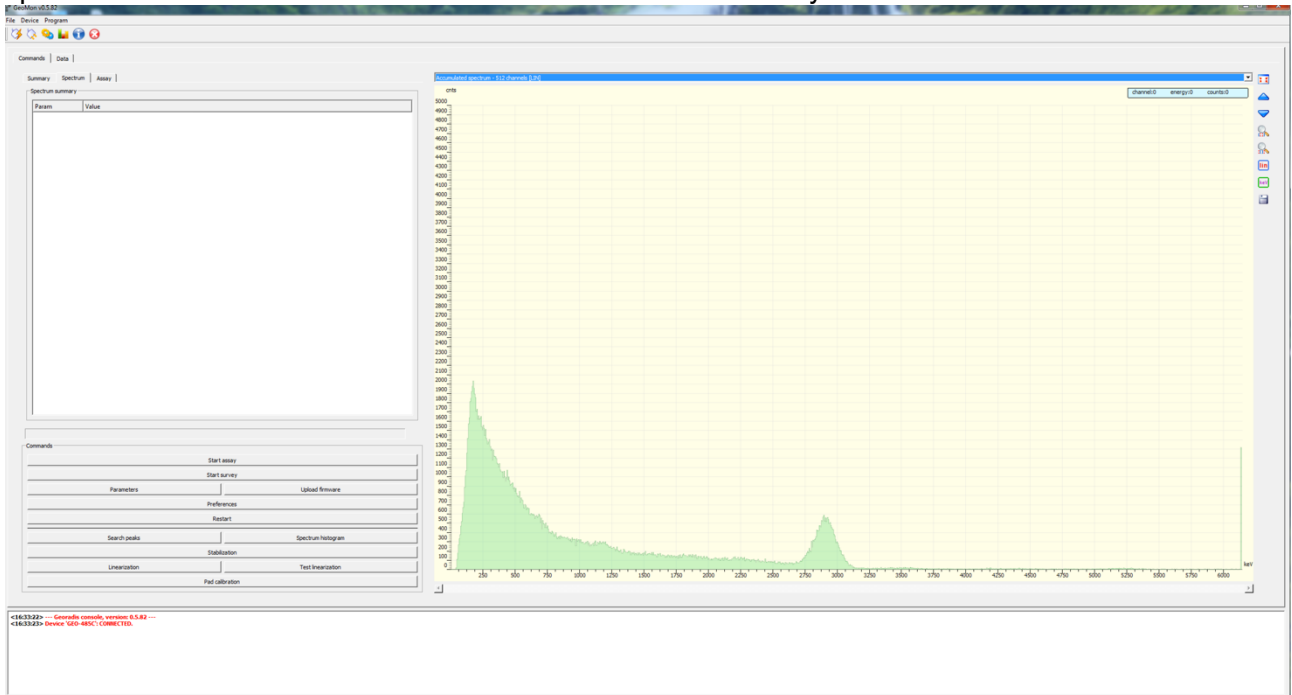
RAW spectra recording

RAW spectra are 1024 channels spectra recorded without any previous correction. Select RAW spectrum accumulated and start with Start assay button.

Additional maintenance functions.
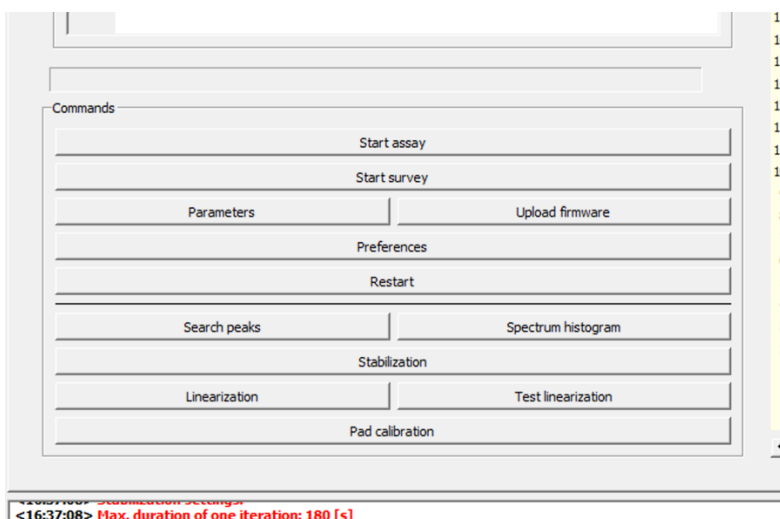
Preferences.

Use preferences to preset integration time. The RT-60 spectrometer delivers one spectrum per second. Acquisition process is performed in Geomon. Therefore the integration time is not a parameter of the detector.

Gain Stabilization.

Gain stabilization is maintenance function. Regular gain stabilization is running all the time since the spectrometer is powered on. In case of any failure (too big temperature difference during warm up time or presence of unknown peaks due contaminated background) the stabilization process may diverge. To recover function Gain Stabilization shall be used. An external Cs 137 source is required.

Linearization.

Function allows to recalibrate spectrum linearization function. **Warning.** There must be used man made radioactive sources (Am-241,Cs-137, Ba-133, Co-60, Th-232). Deleting LUT (lookup table) feature 512LIN will be lost. In case of trouble contact manufacturer.

Parameters.

Parameters set accessible for regular user is very limited. Inserting of unproper parameters may lead to malfunction of the RT-60.

Pad calibration

The RT-60 can be recalibrated for ASSAY. Consult with manufacturer how to arrange suitable calibration pads and perform calibration.