SVANTEK

USER MANUAL

SV 200A

NOISE MONITORING STATION

Warsaw, 2025-06-29

Rev. 2.06

Note: *Due to our policy of continuous product improvement, SVANTEK reserves the right to change product specifications without notice. To download the latest user manual, please visit our website at www.svantek.com.*

This manual refers to firmware revision named ***1.08****.*

Subsequent software revisions (marked with higher numbers) may change the appearance of some of the displays described in this manual.

WEEE Notice: *Do not dispose of this product with unsorted municipal waste at the end of its life. Instead, return it to an authorised collection point for recycling. This will help to protect the environment.*

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Technical Support Contact Information:

www.svantek.com/contact

IMPORTANT NOTES BEFORE USE

- ✓ *SV 200A should be installed vertically with the microphone facing upwards! Incorrect installation may cause damage to the instrument due to possible water ingress, resulting in loss of warranty.*
- ✓ *When connecting your SV 200A to a PC with the SC 256A cable, plug the Lemo connector into the MULT. I/O socket first and then plug the USB connector into the PC!*
- ✓ *SV 200A should not be stored for long periods with the Li-ion battery discharged. Storage with a discharged battery may damage the battery. In this case the warranty for the Li-ion battery is void.*
- ✓ *If the SV 200A is to be stored for a long period, it is recommended that the battery is charged to 60% capacity. The battery should be charged at least every 6 months.*
- ✓ *Before installing the station at the measurement site, ensure that the protective caps on the four anti-bird spikes are removed. It is recommended to use the protective caps during transport and storage or other operations with the instrument, such as laboratory calibration, etc., to avoid personal injury.*
- ✓ *Tripod or pole with 3/8" thread not recommended for permanent installation.*
- ✓ *The windscreen affects the free-field characteristics of the instrument, so it is important to check its condition regularly. If there is any visible deterioration of the foam surface, it must be replaced with a new one.*
- ✓ *Although the SB 274 power supply unit has a high IP (Ingress Protection) rating, for safety reasons it is not recommended to leave it on the ground. It is good practice to mount it on a pole or on a mast.*
- ✓ *When opening the control panel cover, the coin-operated screw should be loosened with a coin, for example, and then unscrewed with the fingers as far as it will go. Opening the cover with the screw in the middle position may damage the paint finish on the case.*
- ✓ *The maximum sound pressure level that can be applied to the microphone without damaging the diaphragm is 146 dB.*

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1 INTRODUCTION

The **SV 200A** is a Noise Monitoring Station that combines in a single portable housing: outdoor microphone, sound level meter and 1/1 & 1/3 octave analyser, advanced data logger, sound direction detector and communication systems (mobile 2G/3G/4G, Bluetooth, LAN and WLAN). This system can be easily transported and installed in the field by one person.

The SV 200A is an ideal choice for unattended permanent and semi-permanent environmental noise and weather monitoring, e.g. community and airport noise monitoring.

The SV 200A allows easy communication, data download and configuration via PC or mobile device over the Internet or local network.

T**he** SV 200A meets the Class 1 requirements of the IEC 61672-1:2013 standard and provides broadband results with all required weighting filters, 1/1 octave and 1/3 octave spectra with statistical analysis.

The SV 200A can be easily calibrated in the field using a sound calibrator. Built-in electrostatic actuator can be activated remotely or periodically in automatic mode for self-testing.

The SV 200A offers extensive logging capabilities including time history of broadband results and spectra with two selectable logging steps down to 20 milliseconds and audio recording on various types of triggers. Data is stored in the instrument's memory and can be transferred via the Internet on demand or in automatic mode.

Remote communication option for the *SvanPC++* software and the *SvanNET* web server provides advanced communication with file download, data visualisation and export of measurement results. Environmental monitoring option for *SvanPC++* is dedicated to measurement data management, advanced data processing, analysis, visualisation and reporting.

Thanks to its robust housing, protection against overheating and condensation, and built-in rechargeable battery, this instrument is ideal for permanent installation in all environmental conditions.

Thanks to four MEMS microphones built into the body of the SV 200A, you can detect the source of the dominant energy occurring in two planes - horizontal "XY" and vertical "Z".

1.1 SOUND LEVEL METER & ANALYZER FEATURES

- noise measurements: SPL (**L**), **Leq**, SEL (**LE**), **Lden**, **Ltm3**, **Ltm5**, **Lpeak**, **Lmax**, **Lmin**, **LEPd**, measurement time and overload time % (**OVL**), two rolling Leq (**LR1** and **LR2**) and two estimated directional Leq (**LE1** and **LE2**)
- Leq statistics: **Ln** (L_1 ÷ L_{99}) and histograms for the broad band Leq and for all 1/1 & 1/3 octaves
- Class 1 accuracy in the frequency range **3.5 Hz – 20 kHz** and with 48 kHz sampling rate
- total dynamic measurement range: **25 dBA LEQ ÷ 133 dB PEAK**
- dynamic range: **115 dB**
- parallel **Impulse**, **Fast** and **Slow** detectors for measurements with **A**, **C**, **B** or **Z** weighting filters
- software selectable community and airport **direction characteristics**
- digital **True RMS detector** with peak detection, resolution 0.1 dB
- **1/1 octave** real-time analysis meeting class 1 requirements of IEC 61260-1:2014, 4 Hz ÷ 16 kHz
- **1/3 octave** real-time analysis meeting Class 1 requirements of IEC 61260-1:2014, 4 Hz ÷ 20 kHz
- **audio signal** recording to logger files or separate WAV format files on demand with selectable sampling frequency and recording period

1.2 General features of SV 200A

- Instrument for unattended continuous and short-term noise monitoring
- Built-in, non-removable microphone preamplifier
- Noise measurements according to IEC 61672-1:2013, Class 1 standard
- Real-time 1/1 & 1/3 octave analysis
- Audio event and waveform recording
- AAC audio compression (future option)
- Statistical analysis with up to 10 percentiles
- Community and airport directional characteristics, software selectable
- Remote automated system check (built-in acoustic actuator)
- Built-in 32 GB memory
- High efficiency windscreen
- Designed for outdoor use in all weather conditions
- Communication over mobile (2G/3G/4G) and WLAN/LAN networks
- GPS module
- Bluetooth module
- eCompass sensor
- Supports Vaisala WXT5xx and GILL GMX600 weather monitoring modules
- Easy connection configuration via *SVANNET APP* software
- Easy remote access via PC or smartphone using Sv*anNET* web service
- Precise time synchronisation and GPS position of the device
- Up to 6 days of autonomous operation (internal battery operation time with all radio modules switched off)
- Advanced data processing and reporting software *SvanPC++_EM*
- 72.4 Wh Li-Ion battery (non-removable)
- Direct connection to solar panel (without controller) or DC power supply
- Robust construction
- Ingress Protection Rating IP 54
- Quick and easy on-site installation
- Directivity of dominant sound source detection

1.3 Accessories included

- **MK 255S** Microtech Gefell, 50 mV/Pa, prepolarised ½” condenser microphone
- **SB 274** waterproof external DC power supply
- **SA 209** 5” foam windscreen
- **SC 256A** USB cable
- **SA 219** windscreen for SV 200A directivity microphones
- Anti-bird spikes
- Extension and microphone protective sleeves
- Mobile and WLAN antennas
- Mounting kit
- **SvanPC++_RC** Remote Communication module for the *SvanPC++* software (single license)

1.4 Accessories available (optional)

- **SV 36** Class 1 Sound Calibrator 94/114 dB @ 1000 Hz
- **SB 276** solar panel
- **SA 206** 4 m telescopic mast
- **SP 275** weather station based on Vaisala WXT53x module (with SC 209A cable)
- **SP 276** weather station based on GILL GMX600 module (with SC 276 cable)
- **SA 274** bracket for the SP 275 weather station
- **SP 272A** alarm lamp with cable
- **SP 200** LAN adapter
- **SvanPC++_EM** Environmental monitoring module for the *SvanPC++* software (single license)

1.4.1 Sound calibrator

Most standards require the measurement channel to be calibrated before and after each measurement or measurement session in order to verify the results.

A sound calibrator is a device that generates a sound pressure at a specific level and frequency.

The **SV 36** is a Class 1 Sound calibrator that produces a sound pressure of a defined level of 94/114 dB at a frequency of 1 kHz.

1.4.2 Solar panel

The **SB 276** solar panel (40 W, 17.5 V) extends the operating time of monitoring stations. The size and weight of the panel makes it easy to transport in the supplied carrying case.

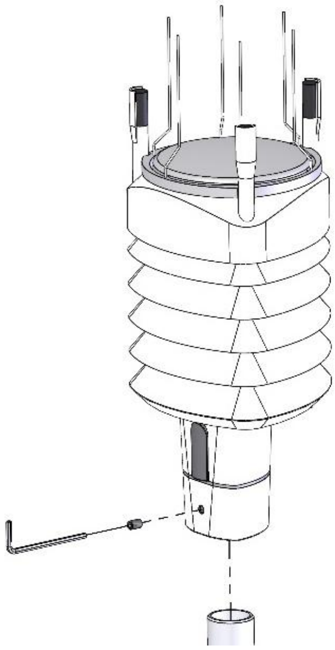
The SB 276 requires no additional batteries or external controllers.

The SB 276 is fitted with a military standard connector cable for direct connection to the monitoring station.

1.4.3 Telescopic mast

The **SA 206** is a Manfrotto 269BU mast with adjustable height from 1.5 meter to 4 meters.

1.4.4 Weather station SP 275



The **SP 275** is a Vaisala Weather Transmitter WXT5xx weather station used optionally with the SV 200A monitoring station. It is connected to the SV 200A via the RS 232C serial interface (MULTI I/O socket) using the special SC 209A cable and can be mounted on the mast using the SA 274 bracket.

The SP 275 measures 6 key weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) plus rain and hail intensity. It is compact and lightweight, has no moving parts, is internally heated and is easy to install with a single bolt mounting method.

The SP 275 has an automatic control circuit that switches on the heater when the temperature drops.

Five meteorological parameters (barometric pressure, humidity, temperature, wind speed and direction) are transmitted from the SP 275 to the monitoring station every second.

Precipitation and 3 values for rain and hail (intensity, accumulation and duration) are transmitted every 10 seconds only rain or hail occurs.

The SV 200A can store them in the logger file as summary results with the **Integration Period** step and as a time history results with the **Logger Step**.

Note: *See also Vaisala WXT5xx User Guide.*

1.4.5 Weather station SP 276

The **SP 276** is a GILL GMX600 type weather station used optionally with the SV 200A monitoring station. It is connected to the SV 200A via the RS 232C serial interface (MULTI I/O socket) using the special SC 276 cable and can be mounted on the mast using the SA 276 bracket.

The SP 276 measures 6 key weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) plus rain intensity. It is compact and lightweight, has no moving parts and is easy to install with a single bolt mounting method.

All meteorological parameters (barometric pressure, humidity, temperature, wind speed and direction) are transmitted from the SP 276 to the monitoring station every second.

The SV 200A can store them in the logger file as summary results with the **Integration Period** step and as a time history results with the **Logger Step**.

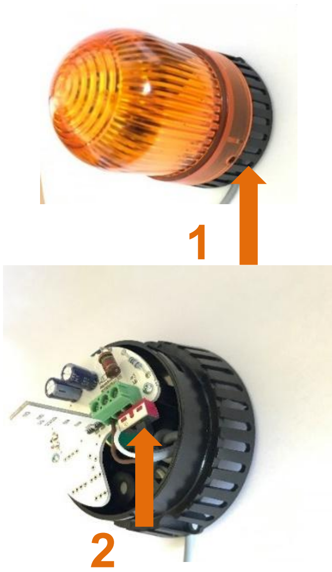
Note: *See also GILL GMX600 User Guide.*

Note: *If your weather station is equipped with the wind sensor, it is important to set the correct orientation of the sensor. North is marked on the bottom of the weather station. Use a real compass or mobile app to determine the north direction.*

1.4.6 *Alarm lamp*

The **SP 272A** is a WERMA type, LED/Buzzer alarm lamp (12V DC).

The alarm lamp is connected to the **MULTI I/O** connector instead of the Meteo module.



The buzzer is disabled by default. To activate it:

1. open the housing by pressing the black button and turning the plafond, and
2. move the switch to the left.

2 INSTALLING THE MONITORING STATION

2.1 RECOMMENDED ORDER OF INSTALLATION

After unpacking, check that the kit is complete according to Chapter 2.2.

Note: *It is advisable to read Chapters 2.3 to 2.9 of the User Manual carefully before installation.*

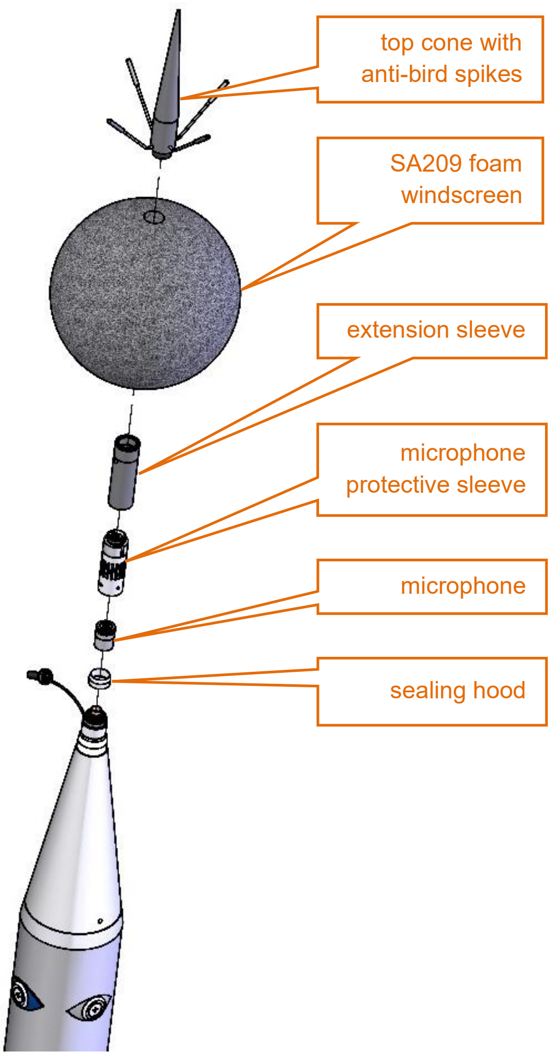
Recommended order of installation:

1. pre-assemble of the SV 200A (see Chapter 2.3),
2. mounting the SV 200A (see Chapter 2.4),
3. power supply installation (see Chapter 2.7),
4. installing the optional weather station (see Chapter 2.8),
5. arrangement of the cabling (see Chapter 2.9).

2.2 DELIVERED KIT

The kit supplied to the customer consists of the following items:

1. the SV 200A instrument, which includes the following permanently integrated elements:
   - built-in, non-removable microphone preamplifier
   - built-in electrostatic actuator, manually or automatically activated
   - Li-Ion rechargeable battery
   - 16 GB micro-SD card
   - mobile modem
   - WLAN module
   - Bluetooth module
   - eCompass sensor
   - GPS receiver
   - control panel
   - 4 x MEMS microphones.
2. and detachable elements:
   - Microtech Gefell MK 255S, 50 mV/Pa, prepolarised ½” condenser microphone
   - top cone with anti-bird spikes
   - microphone extension sleeve
   - microphone protective sleeve
   - microphone sealing hood
   - SA209 5” foam windscreen
   - mobile antenna
   - WLAN antenna

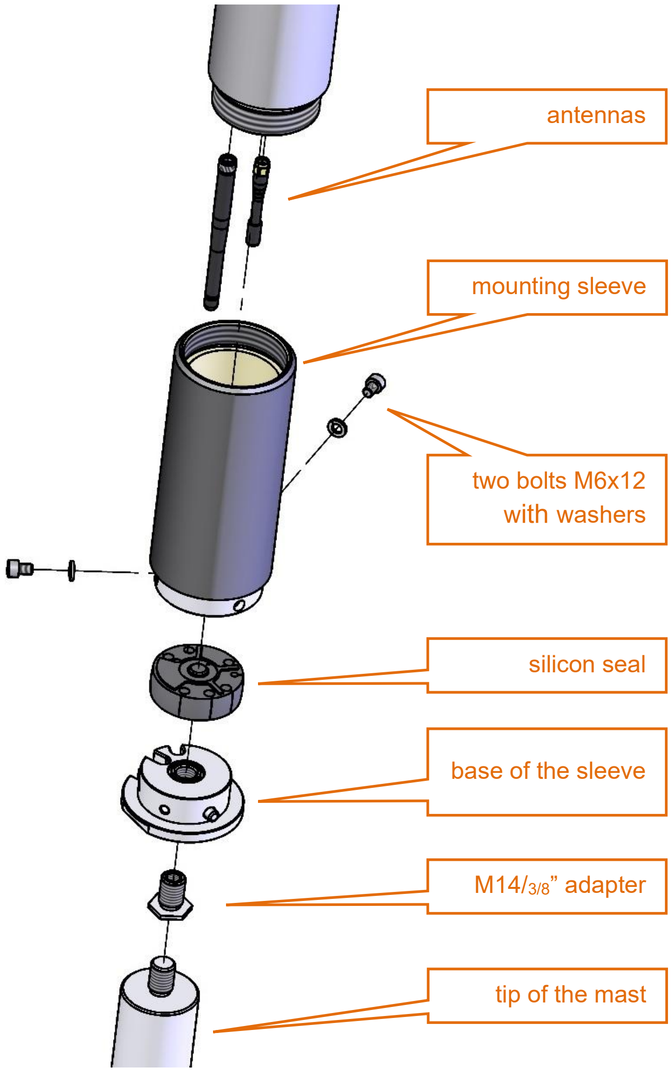


3. SC 256A cable or communication with SV 200A via USB interface

4. axial mounting kit:
   - mounting sleeve
   - silicon seal
   - base of the sleeve
   - two screws M6x12 with spring washers
   - M14/3/8” adapter

5. set of tools:
   - 22mm special ring spanner
   - 3mm Allen wrench
   - 5mm Allen wrench

6. SB 274 weatherproof DC power supply



The instrument kit is delivered in a special case, which is also used for storing and transporting the instrument.

2.3 PRE-ASSEMBLING

Install the microphone and the foam windscreen in the following order:

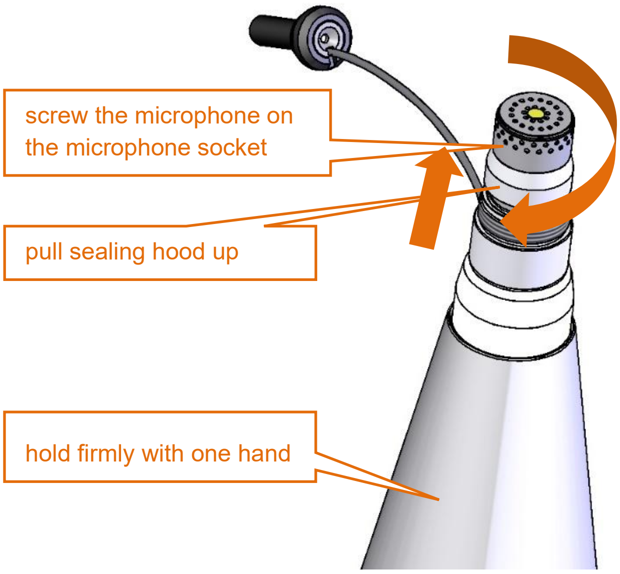
1. Check that the SV 200A is switched off. If it is on, switch it off (see Chapter 3.2)

2. Place the instrument upright (outer cone upwards) on a stable, horizontal and flat surface.

3. Remove the protective cap from the microphone jack.

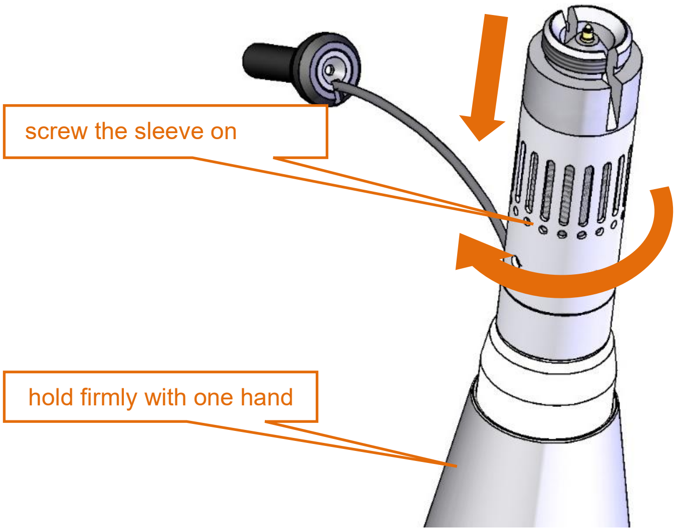
4. Hold the outer cone in one hand and with the other hand screw the microphone onto the matching thread extending from the outer cone (turn the microphone clockwise).

5. The sealing hood should be pulled up (to contact the microphone).



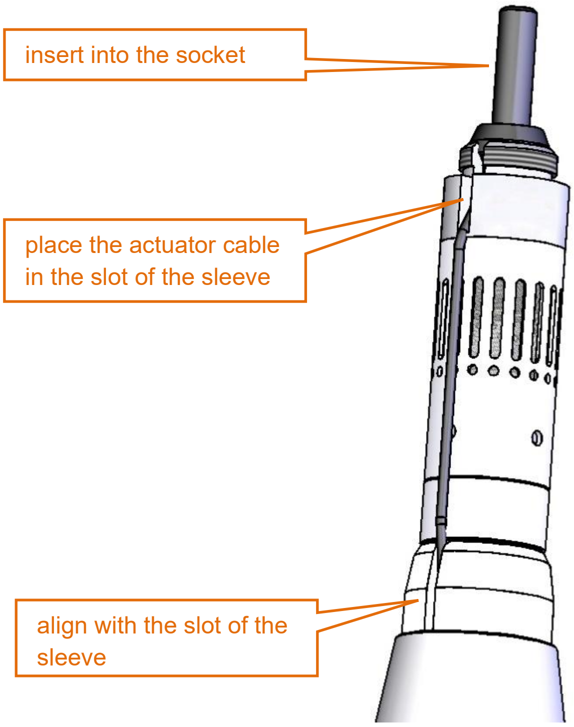
Note: *It is recommended to calibrate the SV 200A at this point. See Chapters 4.2, 4.3, 4.4 for more information.*

6. Hold the outer cone with one hand and screw on the microphone protective sleeve with the other hand, turning it clockwise.



7. Align the movable ring with the slot in the microphone protective sleeve so that the cable is not bent in any direction. Carefully insert the actuator into the special socket. Insert the actuator cable into the slot in the sleeve.

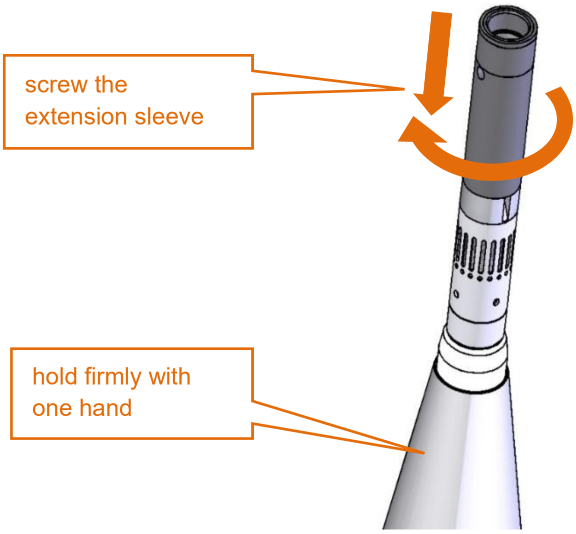
   If the actuator cable is too long, shorten it by pushing the lower end into the sleeve.



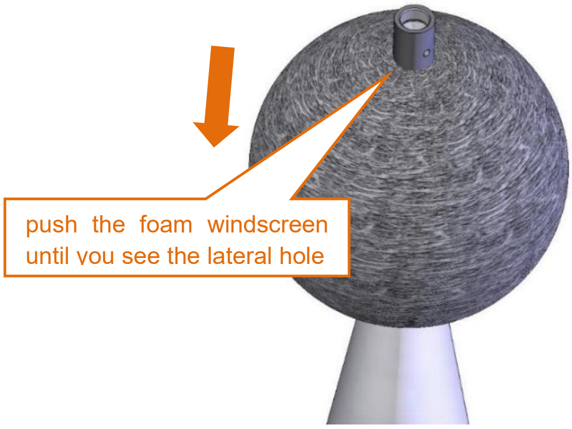
Note: *It is important to keep the microphone protective sleeve still to avoid damaging the actuator cable.*

8. Hold the microphone protective sleeve and the top cone with one hand and screw on the extension sleeve with the other hand, turning it clockwise.

   Tighten as far as it will go, but "carefully" - overtightening may cause the left inside screw to come loose.



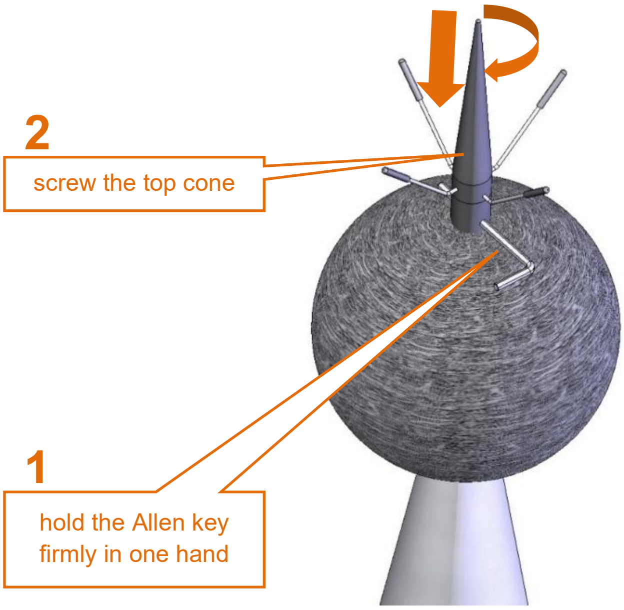
9. Slide the foam windscreen onto the extension sleeve and push the foam until you can see the lateral hole.



10. Insert the 3 mm Allen wrench into the hole.

11. Holding the Allen wrench and the extension sleeve in one hand to keep them still, use the other hand to screw on the top cone with the anti-bird spikes, turning it clockwise.

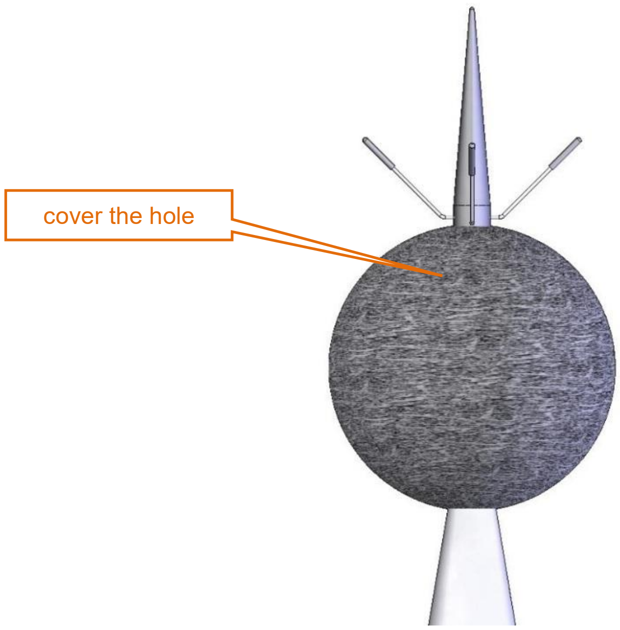
    Tighten as far as it will go, but "carefully" - overtightening may cause the left inside screw to come loose.



Note: *It is important to keep the extension sleeve still to protect the actuator cable from damage.*

12. Remove the Allen wrench from the extension sleeve.

13. Slide the foam windscreen into position just below the spikes of the anti-bird device, ensuring that it covers the microphone sleeve.

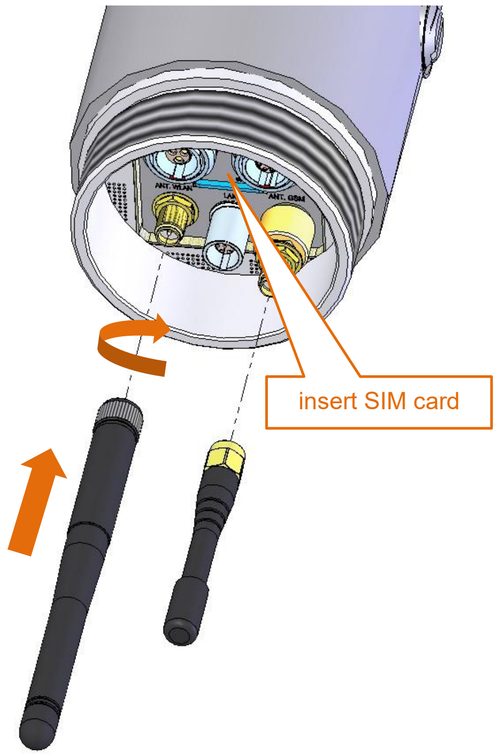


14. Position the instrument horizontally for easy access to the socket panel.

15. Ensure that the instrument is switched off.

16. Insert the SIM card into the SIM card slot (according to Chapter 3.1.1).

17. Connect the wireless antennas.



The device prepared in this way is ready for remote connection configuration (see Chapter 6).

2.4 MOUNTING

The mounting described in this manual is based on the mast type systems recommended by Svantek.

Note: *If other types of mounting than mast mounting are to be used, please contact Svantek, as only the recommended type of mounting guarantees the declared acoustic characteristics of the station.*

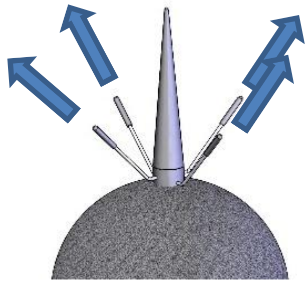
It is recommended that the unit be coaxially mounted on a Φ45 mm mast with an M14 screw.

Note: *The M14/3/8” adapter is intended for mounting the SV 200A on photographic tripods. It should not be used for unattended environmental monitoring.*

Note: *Ensure that the SB 274 power supply is disconnected from the mains supply prior to full system installation.*

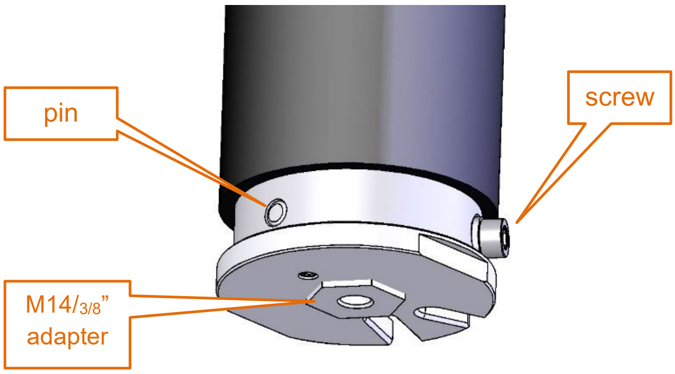
Note: *Before installing the station at the measurement site, ensure that the protective caps on the four anti-bird spikes are removed.*

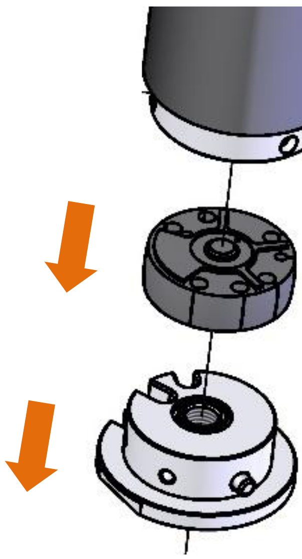
It is recommended to use the protective caps during transport.



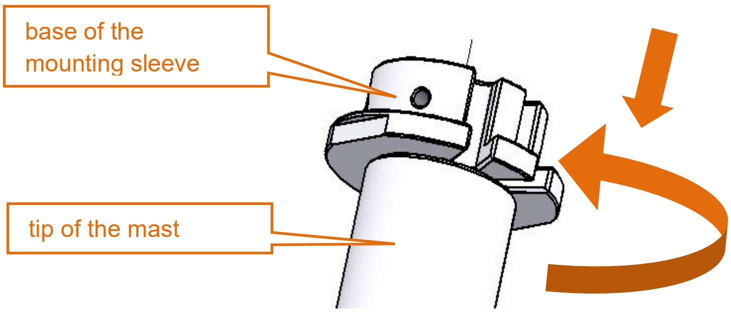
2.4.1 Mounting on a mast

1. Using a 5mm Allen wrench, unscrew the two screws that secure the mounting sleeve to its base.
2. Using the longer arm of the Allen wrench, push the pin into the third hole in the base and remove the base from the sleeve.
3. If the mast has an M14 thread, unscrew the M14/3/8” adapter from the bottom of the mounting sleeve base using the special 22mm and 65mm open spanners.
4. Remove the base from the sleeve.
5. Remove the seal from the cylinder by pulling it by the handle.

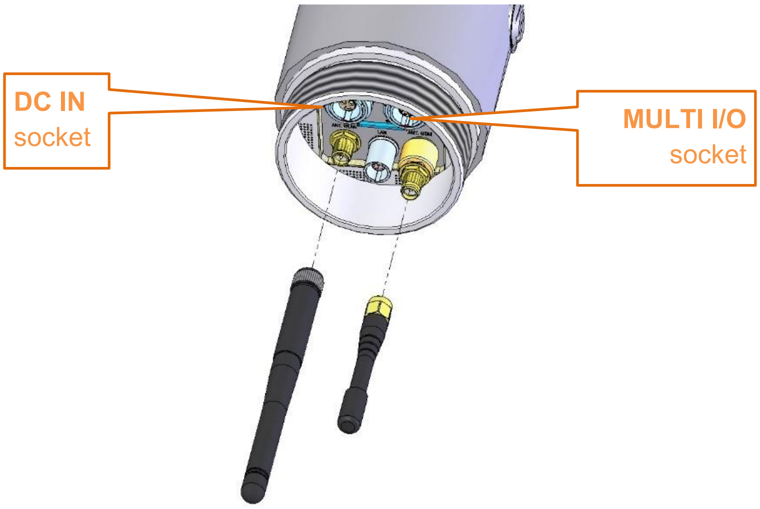




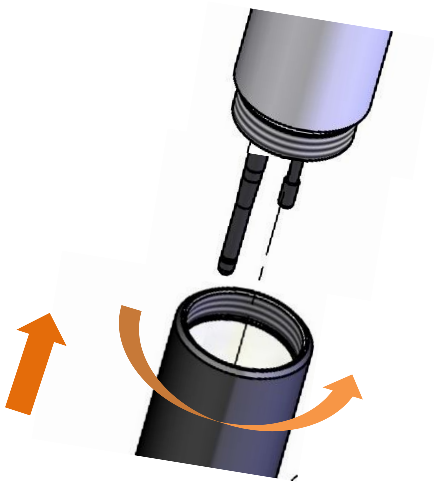
6. Screw the base of the mounting sleeve onto the M14 thread of the mast (if you are using a North point, see Chapter 2.4.3).
7. If you don't use the North point, tighten the bottom of the mounting sleeve using the special 65mm open spanner.

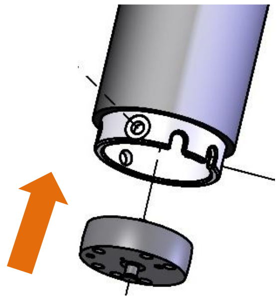


8. Ensure that the instrument is switched off.
9. Feed any cables you wish to connect to the instrument through the mounting sleeve.
10. Plug the connector of the power supply cable into the **DC IN** socket on the connector panel.
11. Optionally, plug the Lemo connector of the USB, the weather station or alarm lamp cable into the **MULTI I/O** socket on the connector panel.
12. Connect the antenna(s).

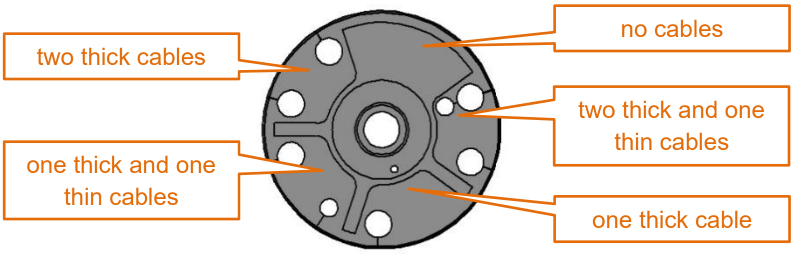


13. Screw the mounting sleeve onto the thread of the SV 200A.





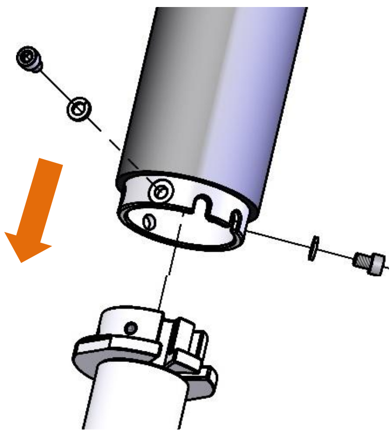
14. Insert the cables into the holes in the seal through the cuts in the edge of the seal.
15. Insert the seal inside the mounting sleeve as far as it will go, pushing it by the handle.
16. While holding the seal, pull the cables out to the stop.



The silicone seal is designed to protect the instrument from atmospheric humidity and, more importantly, to eliminate acoustic resonance.

The seal is designed to provide 5 positions for 5 combinations that can be made from 3 cables.

Each hole has a cut in the seal to allow the cable to be easily inserted into the hole.

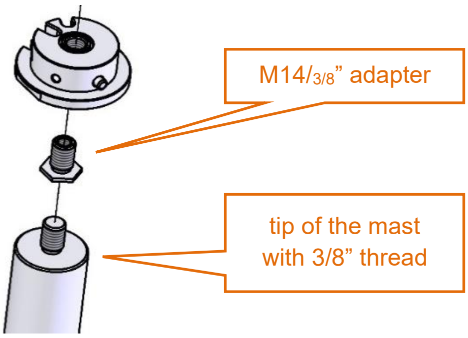


17. Use a 5mm Allen wrench to press the pin into the base of the sleeve.
18. Place the mounting sleeve on the base, holding the cables in the slots of the sleeve.
19. When the pin is in the third hole of the sleeve, place the cables in the slots of the base.
20. Use the 5mm Allen wrench to tighten the two screws that secure the sleeve to the base.

Note: *When laying the cables in the slots, the seal is positioned so that unused holes are closed by the base, ensuring reliable sealing and sound insulation of the instrument.*

2.4.2 Mounting on the 3/8” thread

To mount the SV 200A on the 3/8” thread, use the M14/3/8” adapter.

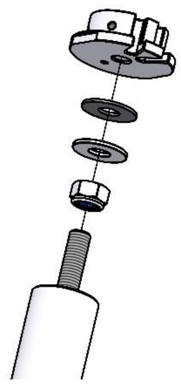


Note: *A tripod or pole with a 3/8” thread is not recommended for permanent installation.*

2.4.3 *Mounting facing North*

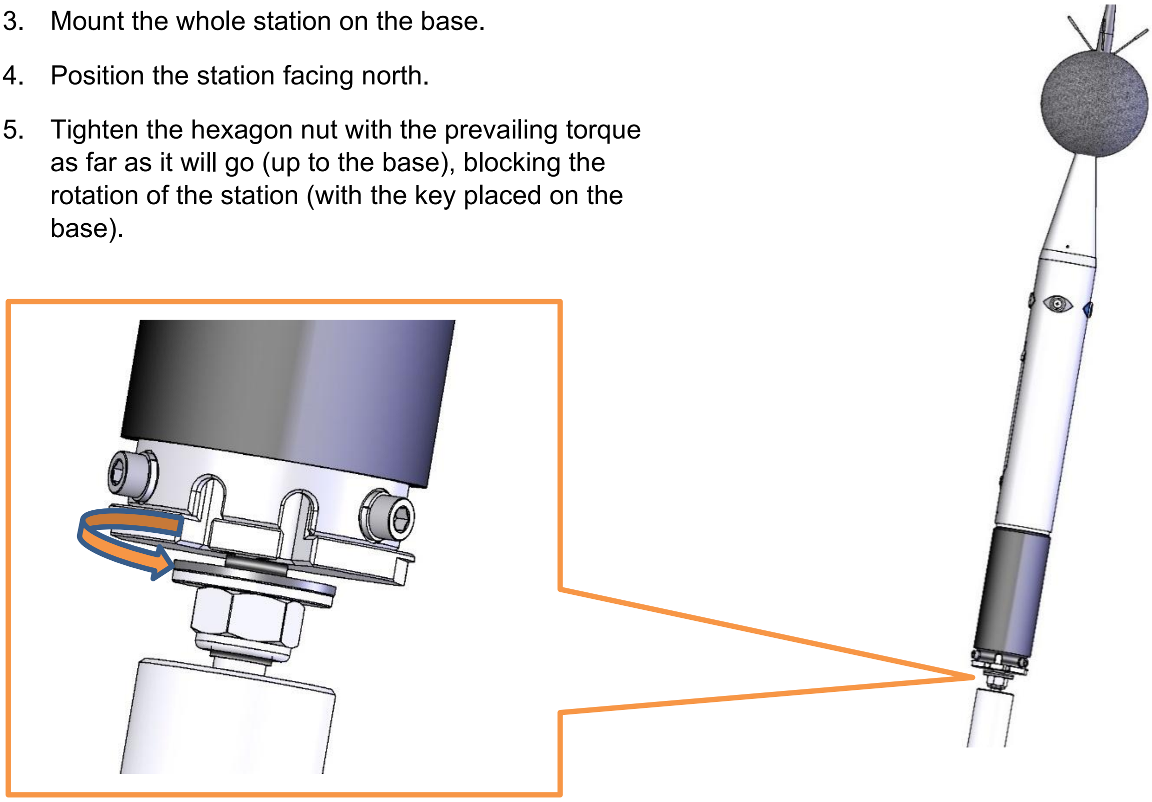
Mast requirement: the length of the threaded bolt should be at least 45 mm.

Additional elements: steel washer, rubber washer, prevailing torque hex nut (with plastic insert).



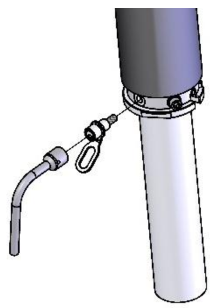
Mounting method:

1. Screw on the prevailing torque hex nut (plastic down), apply a steel washer and a rubber washer.
2. Screw on the base of the sleeve as far as it will go (resistance will be on the screw of the sealer inside the base) and unscrew about 1 turn.
3. Mount the whole station on the base.
4. Position the station facing north.
5. Tighten the hexagon nut with the prevailing torque as far as it will go (up to the base), blocking the rotation of the station (with the key placed on the base).



2.5 ANTI-THEFT PROTECTION

There is a special swivel eye in the kit that can be used as an anti-theft protection of your SV 200A with the use of locking cable. It must be screwed to the base of the socket with the special key.



2.6 WINDSCREEN PROTECTION

The SA 209 and SA 219 foam windscreens reduce the effect of wind on measurement results.

Note: *The SA 209 windscreen affects the free-field characteristics of the instrument, so it is important to check its condition regularly. If there is any visible deterioration of the foam surface, it must be replaced with a new one.*

During continuous use the foam is exposed to various weather conditions which can cause mechanical damage to the foam structure. It is therefore recommended to check the condition of the foam at least once every quarter (3 months) by squeezing the foam and checking the surface for cracks. If cracks or holes are found, the foam must be replaced.

The foam must be replaced when small pieces of its surface are torn off by squeezing.

Replacement of the SA 209 windscreen should be carried out according to steps 1 to 5 in Chapter 4.1 and steps 8 to 12 in Chapter 2.3.

2.7 POWER SUPPLY UNIT

The **SB 274** is a single output waterproof switching power supply featuring:

- Universal AC input / Full range (90 ~ 305 V AC)
- Rated power 40 W
- Built-in active PFC function
- Class 2 power unit
- Protections: Short circuit / Over load / Over voltage / Over temperature
- Fully encapsulated with IP 66 waterproof rating
- Lemo 1B.303 connector
- SC 270 power cable

It is recommended that the SB 274 is mounted on a mast in a location that is not exposed to direct sunlight.

Note: *Before installing SB 274, check that the connectors are tightened to ensure that they are watertight.*

Note: *Although the power supply has a high IP (Ingress Protection) rating, it is still not recommended to leave it on the ground for safety reasons. It is best to mount it on a pole or mast.*

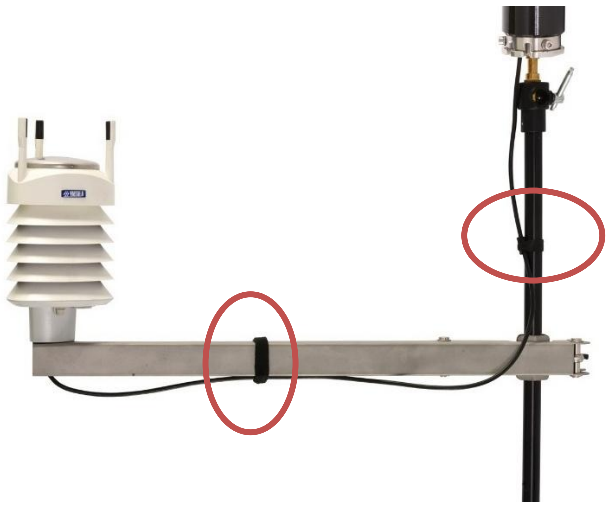
2.8 ASSEMBLING THE WEATHER STATION ON A MAST (OPTIONALLY)

The weather station is mounted on a special bracket that can be mounted on the mast below the SV 200A. The distance from the bracket to the SV 200A should be as large as possible, but it is limited by the length of the interface cable.

Note: *If your weather station has a wind sensor, it is important to set the correct orientation of the sensor. Use a real compass or mobile application to determine north.*

2.9 FINISHING ASSEMBLY

Attach the cables to the mast and the optional meteorological bracket. Use several band clamps spaced no more than 50 cm (20 inches) apart on the mast and the Velcro cable holders supplied with the kit on the meteorological bracket. Lay the cables so that they are loose at the ends. The loose cable should hang slightly lower than the connector to prevent rainwater from collecting.

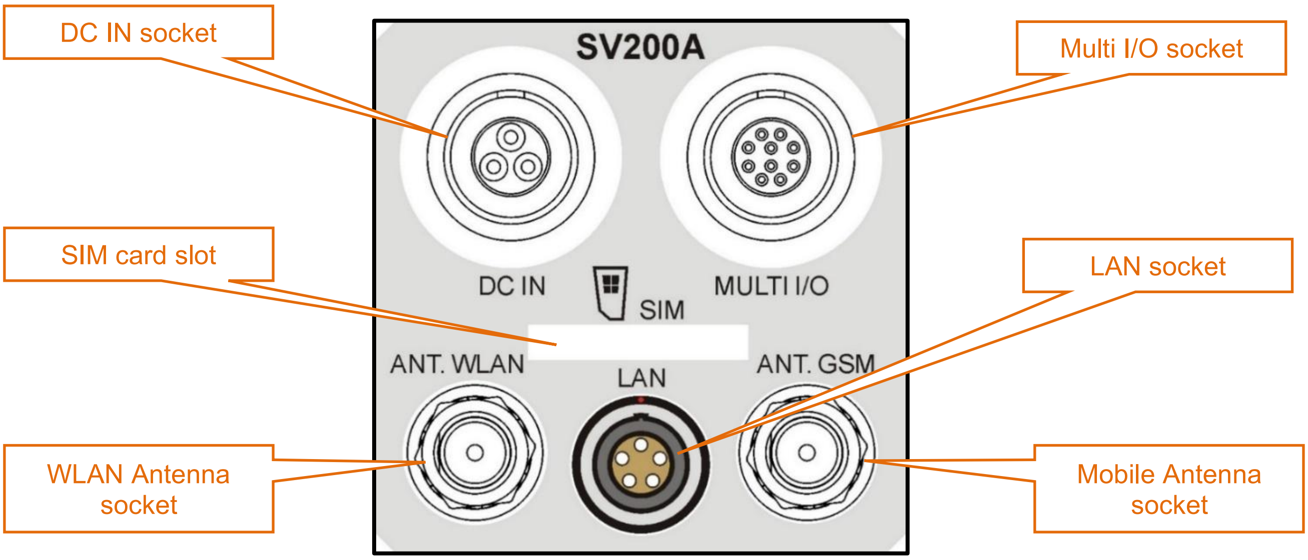


Note: *It is important to secure the cables as loose cables can cause additional noise. An alternative is to wrap the cables around the mast.*

At the end of the installation, connect the SB 274 power supply unit and switch on the station.

3 SV 200A CONNECTOR AND CONTROL PANELS

3.1 CONNECTOR PANEL



3.1.1 *SIM card slot*

Note: *The SV 200A uses a mini-SIM card (25mm x 15mm).*

The SIM card should be inserted into the slot as shown on the connector panel. Push the card in until you feel a click.

To remove the SIM card from the slot, press it until you feel a click and pull the card out. Use tweezers to remove the SIM card from the slot.

For more information on configuring the mobile connection, see Chapter 5.2, 6 and 8.3.

3.1.2 *DC IN socket*

The **DC IN** socket is used to connect an external power source, i.e. the supplied mains adapter, an optional solar panel or an external 12-24 V battery.

The SV 200A can be powered from one of the following sources:

- Internal Li-Ion batteries. The operating time with the internal Li-Ion batteries depends on the power consumption:
  - up to 7 days – all modem and modules switched off,
  - up to 4 days[1] – only the mobile modem is switched on,
  - up to 2.8 days[2] – only the WLAN module is switched on,
  - up to 3 days[2] – only the LAN module is switched on.
- AC power supply unit SB 274 included. Input 90-305 VAC, output +15 VDC 2.7A, IP67 housing.
- Optional solar panel. MPPV voltage 15-20 V, connected directly to SV 200A, without using a power conditioner.
- External DC source. Voltage range 10.5 V – 24 V, e.g. 12 V or 24 V battery.

[1] One-minute data transmission with one hour cycle

The internal battery is charged in a fully automatic cycle when the instrument is connected to any external power source. The SV 200A charges itself regardless of whether it is switched on or off. The ambient temperature is taken into account during charging in order to prevent damage to the battery caused by charging at too high or too low a temperature.

Note: *The SV 200A is equipped with a mechanism that protects the internal Li-Ion batteries from damage caused by critical discharge. When the battery discharged, the instrument switches off automatically.*

Note: *The SV 200A should not be stored for long periods with discharged Li-Ion batteries. Storage of discharged batteries may damage them. This will void the warranty on the Li-ion battery.*

Note: *If the SV 200A is to be stored for an extended period, it is recommended that the batteries are charged to 60% of their capacity. The batteries should be charged at least once every 6 months.*

3.1.3 External Communication Interface socket

The **MULT. I/O** socket allows the user to connect the instrument to one of the following devices:

- PC (via USB)
- weather station (via RS232)
- alarm lamp (passive, 12V 1A max)
- external trigger (digital input/output signal)

Note: *When connecting your SV 200A to a PC with the SC 256A cable, first plug the Lemo connector into the instrument's MULT. I/O socket and then the USB plug into the PC!*

3.1.4 LAN socket

The LAN socket is used to connect the SV 200A to the local area network using the **SP 200** adapter.

3.1.5 Antenna sockets

There are two antenna sockets: one for the mobile communication and one for WLAN communication.

After inserting the antenna into the socket, tighten the screw slightly. Do not overtighten.

3.2 CONTROL PANEL

The SV 200A is designed for outdoor monitoring and remote control via the mobile network, LAN or WLAN. It can also be controlled from the control panel using five buttons and a 128 x 32 pixel display.

When operating outdoors, the control panel should be closed with the flap. Closing the panel protects the instrument's user interface from environmental influences and, more importantly, ensures that the acoustic directional characteristics are within the declared tolerances.

To release the control panel, unscrew the coin-operated screw slightly (with your fingers, or the first turn with the coin and then with your fingers) until it stops. If the unit is in the vertical position, the flap should slide down and its upper (rectangular) part should slide out from under the eaves. If the flap does not slide down, press lightly on the lower part with your finger and move it down. Then turn the flap clockwise (or counterclockwise).

Note: *The coin-operated screw should be loosened with a coin, for example, and then unscrewed with your fingers until it stops. Opening the flap with the screw left in the middle position may damage the finish of the casing.*

To close the control panel, turn the flap so that its upper rectangular part jumps into the notch of the casing. When the lower part of the flap is pressed against the screw head by the internal spring, it should be pressed lightly (so as not to damage the paint on the flap). Move the flap upwards (with your finger), by pressing it all the time so that the upper part of the flap is hidden under the notch. Tighten the screw to the stop (your finger, or the last turn of the coin), pressing the flap constantly.

Note: *Be careful that the metal edges of the flap do not damage the finish on the surface of the casing, especially at the edge of the notch.*

Five control keys provide the following functions:

Enter 3 sec.

- switch on/off the instrument by pressing for 3 sec,
- open an item in the menu list,
- enter the editing mode of the parameter,
- confirm changes made,
- change the main results/status views,

ESC

- return to the upper menu list,
- exit the current parameter edition without saving changes,
- change the measurement/status view,

10 sec.

- start or stop measurements,
- reset the instrument by pressing for 10 sec,
- start calibration,
- start the system check,

,

- select the item in the menu or parameter list,
- change the parameter value,
- open the Menu by pressing both keys simultaneously,
- change profiles/results in the measurement view.

Note: *Pressing and holding the and* Enter *keys simultaneously for more than 3 seconds during power-up will enter the SV 200A BOOTSTRAP mode, which is used to update the firmware (see Chapter 9).*

Note: *Pressing and holding the key during the firmware boot process when the Svantek icon is displayed will load the factory settings before starting instrument. This* ***Factory Settings*** *function will reset all settings including communication.*

4 CALIBRATION

The instrument is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The sensitivity of the microphone is a function of temperature, ambient pressure and humidity, and if the absolute value of the sound pressure level is required, the absolute calibration of the measurement channel should be performed.

4.1 PREPARATION FOR CALIBRATION

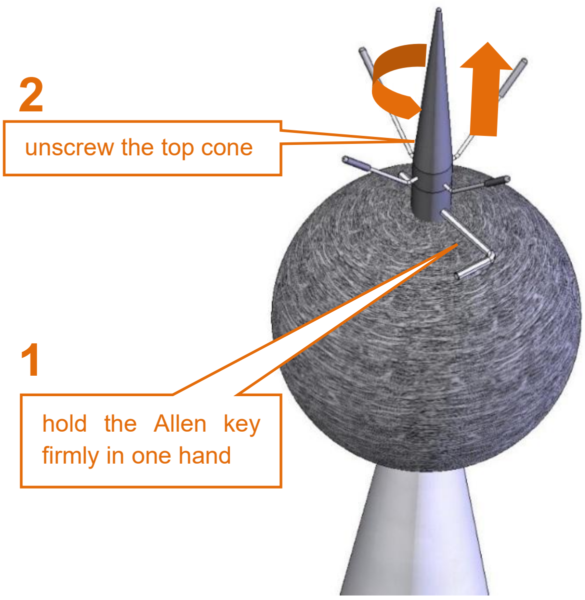
If the SV 200A instrument is assembled and needs to be calibrated, it is necessary to disassemble the following parts of the SV 200A:

- con nozzle,
- SA 209 foam windscreen,
- extension sleeve,
- microphone protective sleeve.

To access the microphone, proceed as follows:

1. Slide the foam windscreen until you can see the lateral hole.

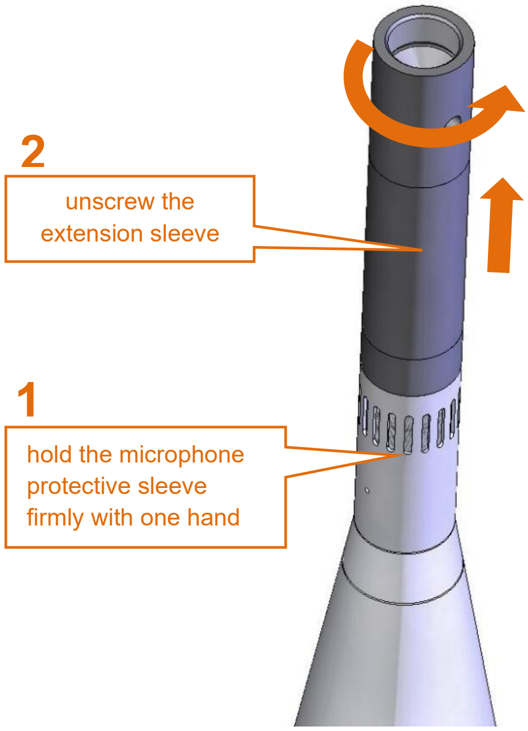
2. Insert the 3mm Allen wrench into the hole.
3. Holding the Allen wrench and the extension sleeve in one hand to keep them still, use the other hand to unscrew the top cone with the anti-bird spikes by turning it counter-clockwise.



Note: *It is important to keep the extension sleeve still to protect the actuator cable from damage.*

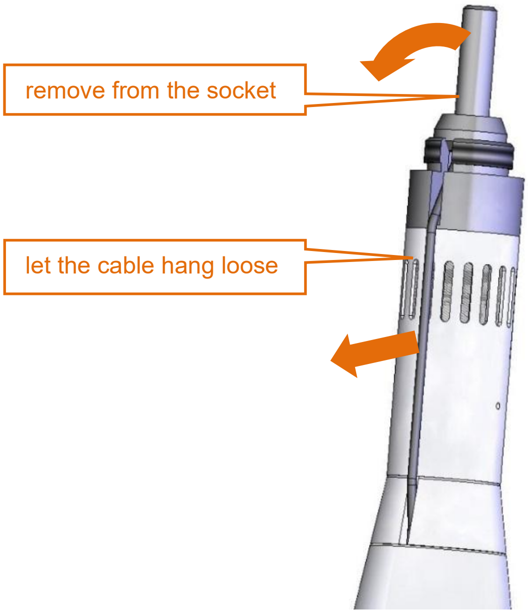
4. Remove the Allen wrench from the extension sleeve.
5. Remove the foam windscreen from the extension sleeve.

6. Hold the microphone protective sleeve and the outer cone with one hand and with the other hand unscrew the extension sleeve by turning it counter-clockwise.

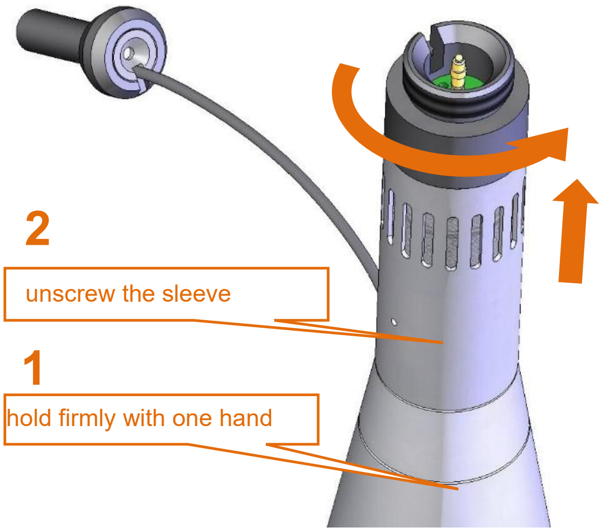


Note: *It is important to keep the microphone protective sleeve still to protect the actuator cable from damage.*

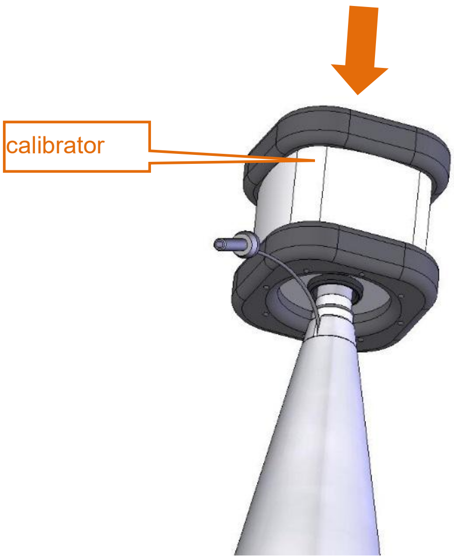
7. Carefully remove the actuator from the socket. Leave the cable hanging.



8. Hold the outer cone with one hand and use the other hand to unscrew the microphone protective sleeve by turning it counter-clockwise.



9. Carefully attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) to the microphone.



10. Switch on the calibrator and wait for the tone to stabilise (according to the calibrator specification) before starting the calibration measurement.

11. Perform the calibration measurement, see Chapter 4.2, 4.3 and 4.4.

12. Remove the calibrator after calibration.

13. Assemble SV 200A according to Chapter 2.3.

***Note:** During the calibration measurement, the level of external disturbances (acoustic noise or vibration) should not exceed a value of 20 dB below the level of the signal generated by the calibrator (94 dB when using a calibrator that generates 114 dB).*

***Note:** It is also possible to use an electromechanical pistonphone, which generates the signal (approximately 124 dB), or another type of sound calibrator designed for ½" microphones. In any case, before starting the calibration measurement, set the level of the signal in the instrument to the level specified in the calibrator's certificate.*

4.2 AUTOMATIC CALIBRATION

The automatic calibration function has been implemented to make calibration as easy as possible and to enable technical personnel to calibrate the SV 200A with a minimum of knowledge and steps. Automatic calibration doesn't require the use of any interface with the SV 200A.

***Note:** The automatic calibration function is disabled by default. You can enable this function via the control panel or via the appropriate software (see Chapter 5.1 and 7.3).*

When the automatic calibration is enabled, the instrument periodically compares the measured Leq(C) level, averaged over 1 second, with the calibration level set by the user. To perform the automatic calibration, follow the steps below:

1. Attach the calibrator to the microphone and switch it on (if the calibrator you are using doesn't have an automatic switch-on function).
2. When the calibrator is switched on, the automatic calibration process starts if the difference between the calibration **Level** value set up in the Auto Calibration screen and the signal level generated by the calibrator is ±5dB.

3. During the calibration measurement, the level of the calibration signal is displayed. When three consecutive 1-second results are stable within ±0.1dB, the calibration measurement is stopped and the calibration factor is calculated.

4. If the new calibration factor is within ±3dB, the automatic calibration is successful, and the new calibration factor is stored and displayed. From that moment on, the new calibration factor will be the current calibration factor without user confirmation.

5. If the calculated calibration factor is outside the range of ±3dB, the automatic calibration will fail and the message "Failed!" will appear on the display. In this case, the new calibration factor will not be stored and the calibration factor just before the calibration will still be valid.

6. Remove the calibrator from the microphone.

During the automatic calibration, the measurements are stopped (if running) and the outdoor filter is switched off. After removing the calibrator from the microphone, main measurements will restart after 1 minute (auto-start safety mechanism) with the outdoor filter switched on.

***Note:** Main measurements in progress are always stopped during automatic calibration.*

4.3 CALIBRATION WITH THE USE OF THE CONTROL PANEL

Calibration via the control panel (manual calibration) allows the user to decide whether the new calibration factor should replace the current one.

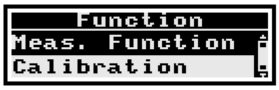
Note: *Before proceeding with the manual calibration, make sure that automatic calibration is disabled (see Chapter 4.2).*

To perform manual calibration, follow the steps below:

1. Open the control panel of the SV 200A by unlocking and moving the control panel flap.

2. Press the ▼ and ▲ keys simultaneously to open the Menu window of the control panel display.

3. Press the Enter key to open the **Function** item, select the **Calibration** item with the ▼ key and press the Enter key to open it.



Enter

4. Press the Enter key to open the **By Measurement** item and set the required calibration **Level** according to the calibration card of your calibrator. Press the Enter key to confirm the new calibration level.

5. Attach the calibrator to the microphone and switch it on (if the calibrator in use doesn't have an automatic switch-on function).
6. Press the ▶ key to start the calibration measurement. During the calibration measurement, the level of the calibration signal is displayed. If three consecutive 1-second results are stable within ±0.1dB, the calibration measurement is stopped, and the calibration factor is calculated. Otherwise, the instrument will stop the measurement and display "Failed!" after 10 seconds from the start of the calibration measurement.

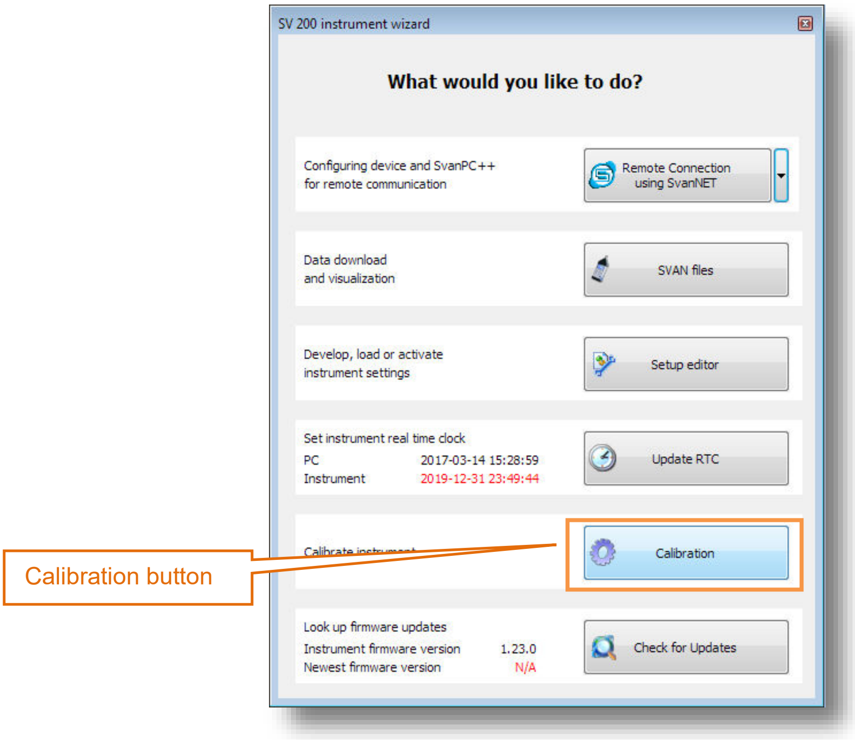
7. The successful calibration results in the calculation of the new calibration **Factor**, which should be confirmed (**Yes**) with the Enter key or rejected (**No**) with the ESC key. After confirmation, the calculated calibration factor becomes the current calibration factor.

8. If the calculated calibration factor is outside ±20dB, calibration fails and the message "Failed!" appears on the display.

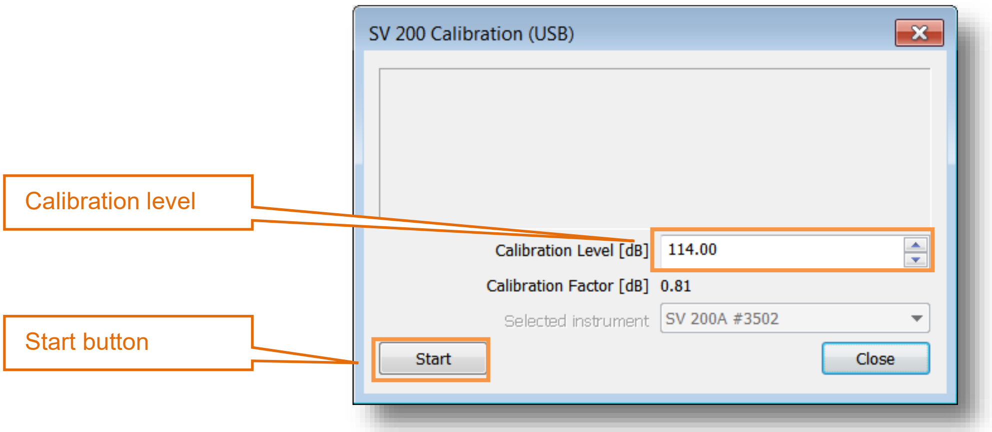
9. Remove the calibrator from the microphone.

4.4 CALIBRATION USING SVANPC++ AND USB CONNECTION

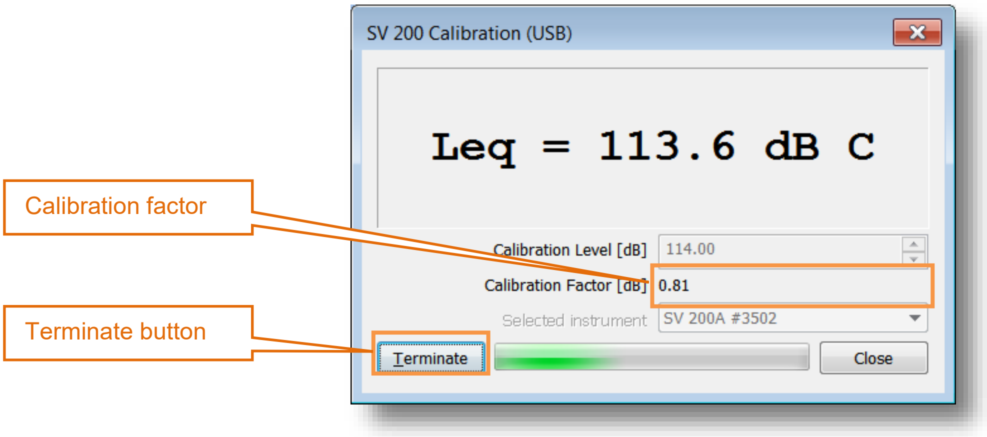
1 Connect the SV 200A to a PC with the SC 256A cable and run **SvanPC++** (see Chapter 8).
2 When the **SV 200A instrument wizard** appears on the screen, click on **Calibration.**



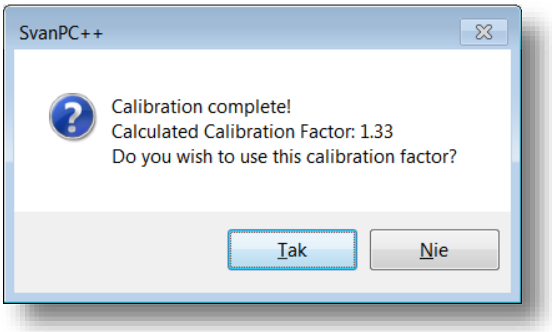
3 Set the required calibration level in the **SV 200A Calibration** window. The current **Calibration Factor** is displayed below the **Calibration Level**.



4 Attach the calibrator to the microphone, switch it on (if the calibrator used doesn't have an automatic switch-on function) and start the calibration measurement by pressing the **Start** button. If the calibration is successful, the calibration factor will be calculated. The calibration measurement can be terminated by pressing the **Terminate** button.



5 Confirm the calibration factor obtained by clicking **Yes**. The new calibration factor replaces the previous one in the instrument memory and will be used for all subsequent measurements.



4.5 CHECKING THE SYSTEM USING THE ELECTROSTATIC ACTUATOR

The electrostatic actuator is used to remotely check of the acoustic measurement input of the instrument.

The system check procedure consists of a series of measurements of background noise and a level generated by the electrostatic actuator (94 dB). The measurement of the background noise is made before and after the measurement of a signal level from the actuator. It is assumed that a one-second RMS(C) of the background noise measured for 3 consecutive seconds must be at least 20 dB below the nominal level generated by the electrostatic actuator (94 dB). If this condition is not met, the system check fails. If the background condition is met, the station switches on the actuator and waits for stable one-second RMS(C) values with an accuracy of ±0.1dB. The stabilised RMS(C) value of the signal from the actuator shall not deviate by more than ±1dB from the nominal value (94dB). The result of the system check (OK or Failed) together with the measured levels, the background noise and the signal from the actuator are recorded in the calibration and system check history file. The duration of the system check sequence is typically <15s and can be extended to <25s in the case of a longer stabilisation time of the RMS(C) generated by the actuator. In the case of the automatic system check function, if the test result is negative, it is repeated 4 more times every 1 minute to obtain a positive test result. If the result is still negative, further attempts are cancelled until the next scheduled system check.

Measurements are paused for the duration of the system check (active pause).

Note: *Unlike the calibration procedure, the system check does not change the calibration factor of the instrument.*

The electrostatic actuator generates a 1 kHz tone, equivalent to a sound pressure level of 94 dB (re. 20 µPa).

It can be switched on or off and programmed remotely by the user:

- via the *SvanNET* web service, in the **Calibration** section (see Chapter 7.3) or
- via the *SVAN PC++* Remote Control software, in the **Live Results** window (see Chapter 8.6.1).

The Auto System Check function of the SV 200A allows you to configure and schedule an automatic check of the instrument via the *SvanNET* web service, in the **Automatic system check** panel (see Chapter 7.3).

Note: *During the system check, the instrument will pause the measurement and close the WAV file if a signal is being recorded. Signal recording will resume in a new wave file after a pause caused by the system check is released.*

5 OPTIONS OF THE STATION CONTROL

Basic control operations include:

- Start/stop measurements
- Viewing measurement results
- System check/calibration
- Download/upload files
- Instrument/measurement configuration
- Firmware upgrade.

Most of these operations can be performed manually from the instrument's control panel. However, SV 200A is designed for the outdoor monitoring and must be remotely controlled via the mobile network using the internal mobile modem (2G (GPRS) / 3G (HSPA+) / 4G (LTE)), via LAN or WLAN using the internal WLAN module or via Bluetooth.

SVANTEK offers two tools to support remote functionality:

- *SvanNET* web service for monitoring purposes and full system control functions. This tool uses the 4G connection.
- *SvanNET App* software for Windows or application for smartphones, dedicated to configuring remote communication with the Internet and giving access to the *SvanNET* web service.

SvanNET has an **Automatic Monitoring Services** option that offers automatic control of many measurement points, data sharing with other *SvanNET* users and data preview in the form of a customised website with either public or restricted access. The preview website can be customised with a logo and individual project name. Access to the preview can be either public or password protected.

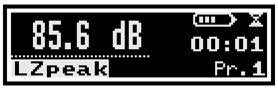
SVANTEK also offers the *Assistant Pro* application for smartphones and tablets, which provides the current result viewing, remote control with instrument settings and data download functions via Bluetooth®, and the *SvanPC++* PC software for data post-processing and report generation with optional tools for this software:

- **SvanPC++_RC** (Remote Communication) module of SvanPC++, dedicated to all types of communication channels of the mobile network as well as for WLAN, has advanced capabilities for remote configuration, control and data retrieval.
- **SvanPC++_EM** (Environmental Measurements) module of SvanPC++, designed for post-processing of data recorded by monitoring stations. The module provides a powerful calculator and an automatic noise event finder for noise source identification. Thanks to the "Projects" functionality, SvanPC++_EM allows you to combine and compare data from multiple measurements and to create and save reports in MS Word™ templates.

Licences for optional tools can be activated at any time with an activation code.

5.1 SV 200A MANUAL CONTROL FROM THE CONTROL PANEL

When SV 200A is switched on, the measurement is started and stopped with the  key. The live dots underlining the displayed result indicate that the measurement is in progress.



After pressing the Start button, the measuring delay is counted down and the measuring starts.

5.1.1 Measurement mode

In measurement mode you can view the selected measurement results and/or status information in different views. The views can be changed using the Enter or ESC keys.

The SV 200A has the following views:

- Charging view,
- Running SPL view (only active when measurement is stopped),
- Basic view,
- Large view,
- Vertical view,
- Power status view,
- Communication information view.

When the external power supply is connected, the large battery icon appears with the percentage of charge, and after 10 seconds the floating battery icon appears instead of the large battery icon.

If the power supply is disconnected, the SV 200A will switch off after a short time.

When the USB cable is connected to a PC or when the Enter key is pressed, the SV 200A will start to execute the firmware programme and will finally switch to the Running SPL view.

Running SPL view

The Running SPL view is used when the measurement is not running, e.g. when the instrument is in standby mode before or after a measurement. In this mode, the current SPL result is calculated and displayed, but not stored in the instrument's memory. The purpose of this is to give the user an initial indication of the noise level. In this view the instrument behaves as a simple general purpose sound level meter.

Basic view

The measurement result name and value are displayed on the left of the screen. The right part of the screen shows the battery icon, real time and profile number.

Use the ▼ or ▲ keys to select the desired measurement result.

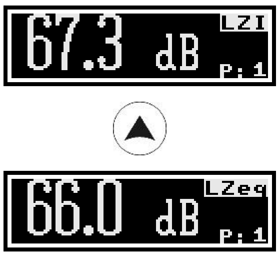
Two icons are displayed in the top right corner of the screen:

- the “battery” icon, indicating the status of the internal battery or
- the “lighting” icon, indicating the status of the external power supply

and

- the “clock” icon with real time below or
- the “sandglass” icon with elapsed measurement time below.

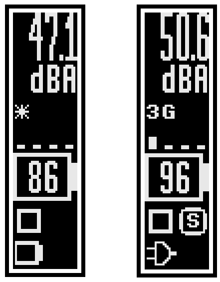
Large view



The measurement result is displayed in a large font on the left of the screen. The right part of the screen shows the name of the measurement result and the profile number.

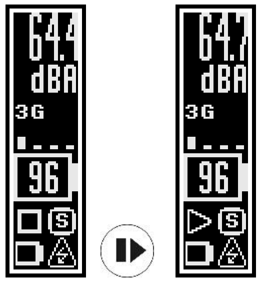
Use the ▼ or ▲ keys to select the desired measurement result.

Vertical view

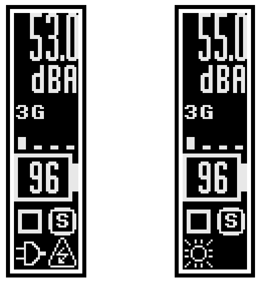


The measurement result is displayed in such a way that it can be read when the instrument is in a vertical position. Below the result, the status information is displayed in the form of icons relating to the following:

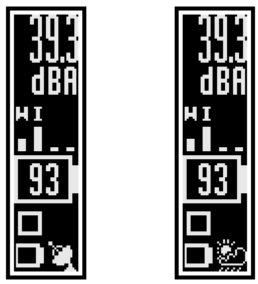
- connection status:
  - no active interface { * },
  - active interface {**2G/3G/4G**, **WI** (WLAN infrastructure mode), **WA** (WLAN access point mode) and **LN** (LAN mode)},
  - radio signal power { , , , , },
  - connection to the remote peer { (SnanNET), (remote server, e.g. SvanPC++)},
- internal battery capacity { 86 },



- measurement status:
  - measurement stopped { },
  - measurement in progress {blinking / },

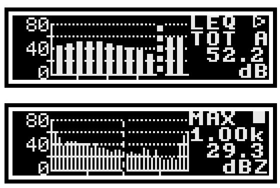


- power source status:
  - internal battery { },
  - solar panel { - solar charging, - solar not charging },
  - power supply or external DC source { },
  - power over Ethernet { PoE },
  - USB power { USB },
- other statuses:
  - actuator switched on { },
  - GPS active { , blinking when GPS is not fixed },
  - weather station connection status (, still when the station is connected to SV200A and blinking otherwise).



When both GPS and weather station are active, use the or key to toggle between the statuses.

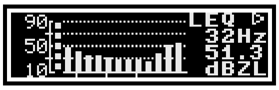
Spectrum view



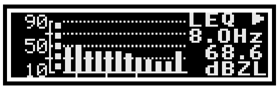
1/1 octave or 1/3 octave spectra are displayed for the **LEQ** and **MAX** band results together with three TOTAL values (**TOT A**, **TOT C** and **TOT Z**). The cursor shows the result for the band or the result for the TOTAL value: centre band frequency, result in dB (for LEQ spectra) and filter (A, C, B, Z) (for MAX spectra).

Use the or key to change the cursor position.

If **Full** band is selected in the **Spectrum** item of the **Measurement** section, the instrument will by default display the same bands as in the case of the **Audio** band.



To display lower centre frequencies, move the cursor to the left position and press the key to move the whole spectrum to the right.



Power Supply status view presents:

- type of the power **Source**: internal **Battery**, power supply (**Mains**), **Solar** panel, **USB** or Ethernet (**PoE**),
- charging **Status**: **Charging** or **Not Charging**,
- estimated working time without recharging or time until the internal batteries are fully charged (**Time Left**),
- battery **Charge** status in %,
- battery **Capacity** in Ah,
- battery temperature in °C (**Temp.**).

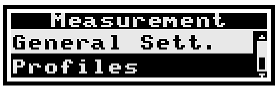
Communication information presents:

- **Interface** type: **2G/3G/4G**, **LAN**, **WLAN**, **BT** (Bluetooth),
- Connection **Status**: **None** (if the modem is switched off), **Init OK** (if the modem is switched on, but there is no connection), **Internet** (if the instrument is connected to the Internet), **Connected** (if connection with remote peer, but not SvanNET, has been established), **SvanNET** (if the instrument has established connection with the SvanNET web service),
- **Signal** level (RSSI) in dBm or **None**,
- **Traffic** (number of bytes sent and received since the modem was switched on),
- Modem **Manufacturer**,
- Modem **Model**,
- Internal firmware **Revision** of the modem,
- modem **IMEI** number,
- WLAN module **MAC** address.

5.1.2 Configuration mode

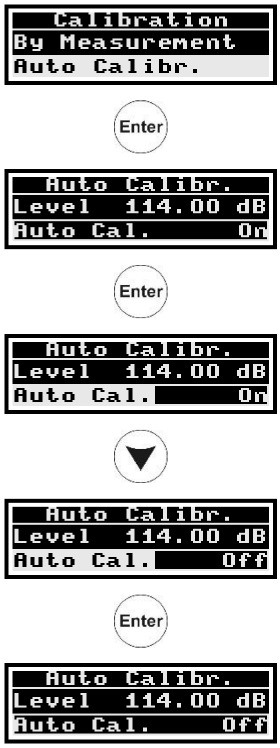
The instrument control panel provides a limited number of tools for configuring the instrument and measurements. Configuration can be carried out from the instrument's **Menu**, which is opened by simultaneously pressing the and keys, and consists of several sections:

- **Function**, which allows you to select the measurement function or perform calibration.
- **Measurement**, which allows you to configure measurement parameters.
- **Display**, which allows you to configure the automatic screen saving.
- **Instrument**, which allows you to configure the instrument's real time clock and display the instrument's serial number and firmware version.
- **Auxiliary Setup**, which allows you to select the interface language and restore factory settings.



The desired section can be selected with the or keys and opened with the Enter key. Press the ESC key to exit the current section.

In the **Menu** screens, you can:

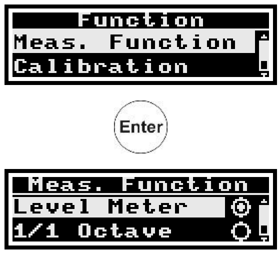


- select the desired item using the ▼ or ▲ key,
- open a new screen of the selected item using the Enter key,
- return to the upper menu using the ESC key,
- make the selected parameter ready for modification using the Enter key,
- select the parameter value using the ▼ or ▲ key,
- confirm changes using the Enter key,
- exit the current screen with the parameters unchanged using the ESC key.

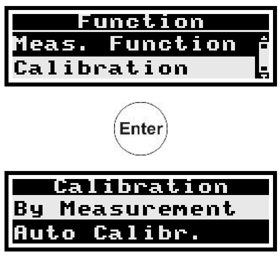
For example, to enable the auto calibration, select the **Auto Cal.** item, press the Enter key and select **On** or **Off** using the ▼ or ▲ key. Confirm the selection using the Enter key and exit the **Auto Calibration** screen using the ESC key.

The **Function** section contains the following items:

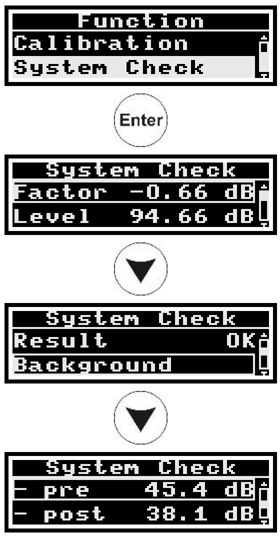
- **Measurement Function**, which allows you to select the measurement function: **Level Meter**, **1/1 Octave** or **1/3 Octave**.



- **Calibration**, which allows you to perform calibration **By Measurement** using a sound calibrator, and to switch on/off the **Auto Calibration**.



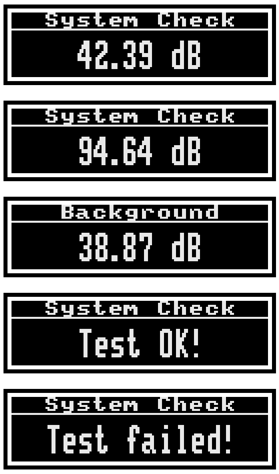
- **System Check**, which allows you to check the measurement path using the built-in electrostatic actuator. The System Check screen shows the result of the previous system check:
  - calculated **Factor**,
  - measured **Level** of the actuator signal,
  - **Result** of the check: **OK** (if **Factor** is within ±1 dB) or **Failed**,
  - **Background** noise before (**- pre**) and after (**- post**) the measurement,
  - **Date** and **Time** of the system check.



When the key is pressed, the instrument starts the measurement and measures:

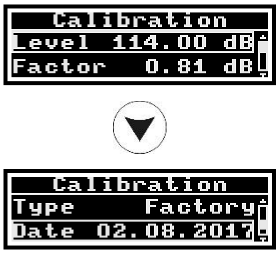
- the level of the background noise (**- pre**) for 3 seconds,
- the level of the actuator signal (**Level**) during the next 5 seconds, and
- the level of the background noise (**- post**) during the next 3 seconds.

The result of the system check is displayed after the measurement: "**Test OK!**" or "**Test Failed!**"



In the **Calibration** list:

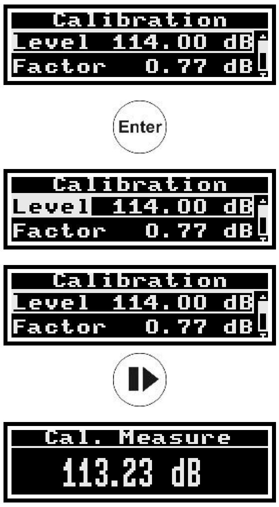
- Item **By Measurement** allows you to:
  - View information about the last calibration: **Level** of the calibration signal, calibration **Factor** value, calibration **Type** (**Factory**, **Manual**, **Auto** or **Remote**), calibration **Date** and **Time.**



The **Factory** calibration is the default calibration, and you can always return to it by using the **Factory Settings** command.

Other calibration types are automatically defined depending on how the last calibration was performed.

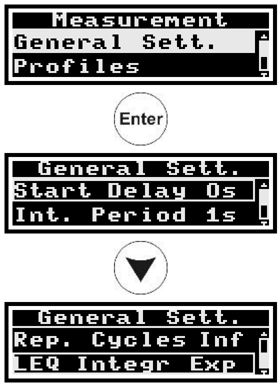
  - Set the **Level** of the calibration signal according to the calibrator used by pressing the Enter key on the **Level** item, changing the level with the or key and confirming the changes with the Enter key.
  - Perform the calibration measurement by pressing the key (remembering that the sound calibrator is attached!). During the calibration measurement, the level of the calibration signal is displayed.



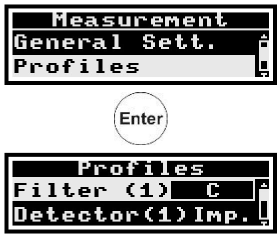
After the calibration measurement, the new calibration factor should be confirmed (**Yes**) by the Enter key or rejected (**No**) with the ESC key.

- The **Auto Cal.** item opens a screen in which you can change the level of the calibrator signal and switch the auto calibration function **On** or **Off**. When **Auto Calibration** is **On**, the calibration measurement will start automatically after the instrument detects the stable noise level equal to the one set in the **Level** item ±5dB.

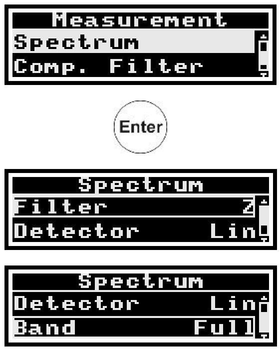
The **Measurement** section contains the following items:



- **General Settings**, which allows you to set the general measurement parameters: measurement **Start Delay** (the delay between pressing the key and the real start of the measurement), **Integration Period**, number of measurement **Repetition Cycles** (if **Infinite** is selected, the measurements are repeated until the key is pressed) and type of the RMS integration for the main results (**LEQ Integration**) and for the statistics (**Stat. Integration**) - **Linear** or **Exponential**.



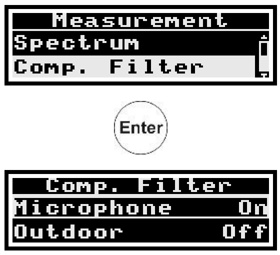
- **Profiles**, which allows you to set input **Filter** and exponential LEQ **Detector** time constant for each measurement profile.
  - **Filter** can be **A**, **C** (Class 1 according to IEC 61672-1:2013), **B** (Class 1 according to IEC 60651) or **Z** (Class 1 according to IEC 61672-1:2013),
  - **Detector** type can be **Impulse**, **Fast** or **Slow**.



- **Spectrum**, which allows you to set:
  - **Filter** for the 1/1 octave or 1/3 octave analysis: **Z**, **A**, **C** or **B**,
  - **Detector** type: **Linear**, **Fast** or **Slow**,
  - **Band**: **Audio** or **Full**.

  Audio band ranges: 20 Hz ÷ 16 kHz for 1/1 octave and 20 Hz ÷ 20 kHz for 1/3 octave.

  Full band ranges: 4 Hz ÷ 16 kHz for 1/1 octave and 4 Hz ÷ 20 kHz for 1/3 octave.

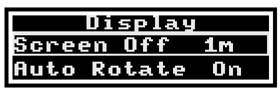


- **Compensation Filter**, which allows you to set the compensation filter: **Microphone** (for laboratory use only) and **Outdoor** (**Environmental**, **Airport** or **Off** (none)).

Note: *For the electrical conformance tests, the* ***Microphone*** *compensation must be* ***Off****.*

Note: *For the acoustical conformance tests, the* ***Microphone*** *compensation must be* ***On****.*

The **Display** section contains the following items:



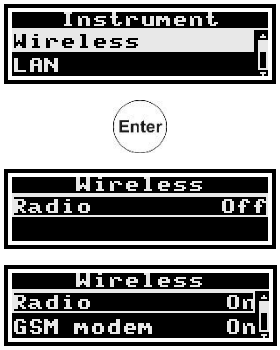
- **Screen Off**, which allows you to set the duration of the screen shutdown off after the last use of any key. Selecting **Off** disables this function.
- **Auto Rotate**, if **On**, activates the correct view on the screen: vertical view mode when the instrument is in vertical position or other views when the instrument is in horizontal position.

The **Instrument** section contains the following items:

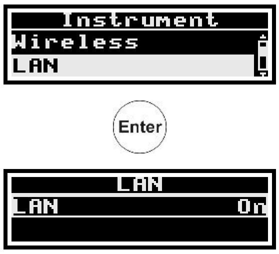
- **Wireless**, which allows you to switch on/off all communication modules (**Radio**).

  If the **Radio** item is **On**, you can activate wireless communication modes (**GSM modem**, **WLAN Mode** and **Bluetooth**) and **GPS**.

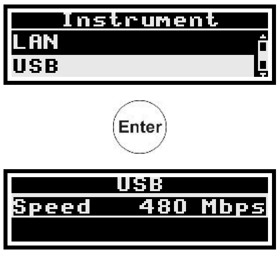
  WLAN Mode switches on/off the WLAN interface mode to the access point (**WA**) or infrastructure (**WI**).



- **LAN**, which allows you to activate the LAN interface.

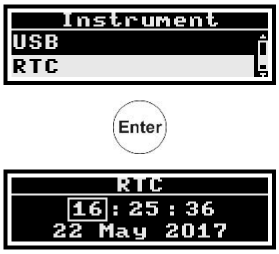


- **USB**, which allows you to configure the transmission speed of the USB port: **12 Mbps** or **480 Mbps**.

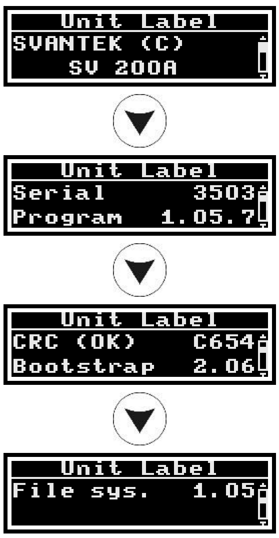


- **RTC**, which allows you to set the instrument's internal real time clock.

To set the RTC, select one of the fields in the RTC screen (hh:mm:ss) and press the Enter key; the selected field will change it's background to white. Use the ▼ or ▲ key to select the required hour, minute or second and press the Enter key to confirm the changes.



- **Unit Label**, which allows you to view:
  - instrument's type (SV 200A) and serial number (Serial…),
  - firmware version (Program…) and its check sum (CRC…),
  - bootstrap version (Bootstrap…),
  - system version (File sys…),
  - class of the instrument and its compliance with standards.



The **Auxiliary Setup** section contains the following items:

- **Language**, which allows you to select the interface language,
- **Factory Settings**, which allows you to restore the factory settings (including the factory calibration factor).

5.2 MOBILE COMMUNICATION

The mobile modem enables wireless remote control of the instrument, downloading of measurement files, managing the configuration of the instrument, sending alarm emails, etc. via the Internet.

The mobile modem provides the user with a wide range of interface options through the main communication channel, *SvanNET* email functionality and SMS alarm notifications as well as FTP Client service.

You can configure the remote communication via the mobile modem using the instrument's keyboard or via *SvanNET App* or *SvanPC++.*

5.2.1 Main communication channel

The main communication channel is a TCP/IP connection (a lossless data exchange protocol), which can be used to exchange commands according to Appendix A of the SV 200A User Manual. *SvanPC++_RC* ensures this connection and provides data download, configuration, performance validation and measurement start/stop.

The main communication channel of the SV 200A can be established by one of two available methods: TCP/IP Client or TCP/IP Server. The SV 200A firmware does not support SSL (Secure Socket Layer) connections.

The **TCP Client** is a mode of the main communication channel in which the SV 200A is configured to initiate a connection to a specified address (***remote host***). The SV 200A will automatically attempt to establish a TCP/IP connection to a specified address on a specified port (***Data Port***). If the connection is successful, the SV 200A can exchange commands with the remote server. If the connection attempt fails or is disconnected by the ***remote host***, the SV 200A will attempt to reconnect. In order to prevent the connections from becoming *idle* (a state where the TCP/IP connection appears to be active, but no data can be transferred), the station maintains the connection to the server by sending small packets of data at the keep alive period (which is one minute by default). If the transfer is not properly acknowledged by the other side, the connection is terminated.

Note: *The* ***TCP Client*** *mode is used in the SvanNET web service. SvanPC++_RC supports all of TCP/IP connection modes.*

The SV 200A uses the **TCP Client** mode to connect to *SvanNET* (this is the default setting of the station) or another user defined server. The user also connects to *SvanNET* via web browser or *SvanPC++_RC*, and the service creates a "bridge" between the station and the user. In this case there are no restrictions on the SIM card tariff for mobile communication (no public IP address is required) and simple Internet access is sufficient. The essence of *SvanNET* is to simplify the procedures and requirements for connection.

TCP Server is a mode in which the SV 200A is configured to act as a server for incoming connections. The SV 200A waits for the first connection to be established on a designated port (called *Data Port*; default 8000). Such a connection can come from any application - a TCP/IP connection initiator (e.g., *SvanPC++*) called *remote peer*. For mobile communication, this mode requires a SIM card with a *public address* (called *public IP*).

5.2.2 SMS / Email alarming

The SMS/Email alarm functionality allows the SV 200A to inform the user of various events, e.g. exceeded thresholds, low battery, etc., by SMS and/or e-mail notification. The SV 200A can send an SMS to a defined number(s) and/or an email to a defined address(es) with the alarm and its details.

The SV 200A has an advanced alarm mode. The advanced alarm configuration can be done via *SvanNET*. The email alarm uses the *SvanNET* to send emails. The advantages of *SvanNET* emails are that the user does not need an email client account on the SMTP server and that the emails are SSL encrypted. The content of the message is created automatically.

Note: *SvanNET email service uses SSL connection.*

It should be noted that SMS alarms do not require an Internet connection, and therefore the SIM card does not require a data plan, as the SMS messages are sent entirely over the mobile network. Email still requires Internet access.

5.2.3 FTP Client option

The purpose of the FTP (File Transfer Protocol) option is to enable the SV 200A to exchange data via an FTP server, allowing communication when both the SV 200A and a PC have private IP addresses.

The **FTP Push** feature allows you to download a set of files from the instrument's memory to a user-specified server using FTP. This action is repeated periodically at a set interval so that the new files stored in the instrument's memory can be uploaded to the FTP server. The FTP Push operation is limited to the working folder and performs the file upload intelligently - it only uploads data that is new compared to the status after the previous FTP Push operation.

The **FTP Pull** feature allows you to upload a setup file from a specified location on an FTP server to the instrument and change the configuration based on the contents of that file. The name of the file is uniquely specified (complete with instrument type and number) and its content is a text string containing configuration parameters.

The FTP server can be accessed from *SvanPC++* using the *Remote Communication Center* (see Chapter 8.6 and SvanPC++ User Manual).

Note: *FTP works as stand-alone communication channel or in parallel with TCP communication channel.*

5.3 WLAN/LAN COMMUNICATION

The SV 200A is equipped with the WLAN/LAN module, which uses a different method of remote connection. Instead of connecting to the Internet via the mobile operator, it connects directly to the Local Area Network via the Ethernet cable (LAN) or wireless communication (WLAN). The user must provide a network environment for the instrument to connect to.

The WLAN/LAN module can be configured to operate in one of two modes: Wireless (default) or Wired.

The ***Wireless*** connection does not require any cables, although it must remain in close proximity to the equipment it is to connect to (typically 100m in open space), due to the limitations of the wireless connection protocol. If properly configured, the module will remain connected to the intended network when it is switched on. The wireless connection can be set up in two ways: ***Access Point*** (default) or ***Infrastructure***.

The ***Access Point*** connection method allows direct wireless connection to a computer equipped with a wireless communication module. To establish the connection with the SV 200A it is necessary to find the network with SSID “SV200A_#xxxxx” (xxxxx is a SV 200A serial number) on your PC and connect to it using a password. The default password is “Svantek”.

The ***Infrastructure*** connection is not a direct wireless connection between the computer and SV 200A, but a standalone, dedicated device called an ***Access Point*** to which all wireless devices connect. This requires the SV 200A to be configured to connect to such an Access Point using its SSID (network name) and security settings. The module will remain connected to the network once properly configured.

The ***Wired*** connection requires a physical connection to the LAN network. Once connected, the WLAN/LAN module becomes part of the Local Area Network and all PCs that are also members of the network can connect to it.

Note: *At any given time, the WLAN/LAN module can only operate in Wired or in Wireless mode. For example, connecting an Ethernet cable when the module is configured for Wireless will have no effect.*

The WLAN/LAN module provides the main communication channel and *SvanNET* email functionality. The details of the connection behaviour depend on the WLAN/LAN settings, where it is possible to configure **TCP Server** and **TCP Client** modes.

In a local area network environment (wired or wireless) the SV 200A provides a broadcast packet to identify itself in the network subnet. It uses UDP protocol and port 7000 to send a packet, e.g. "#1,U200A,N12345,I192.168.1.1,P8000;" see Appendix A for details of #1 protocol description. The packet will be sent every 5 seconds.

5.4 BLUETOOTH COMMUNICATION

The SV 200A has a built-in Bluetooth Low Energy module that complies with the Bluetooth 4.0 standard. Data exchange between the instrument and external devices is performed using Svantek proprietary Bluetooth Low Energy characteristics.

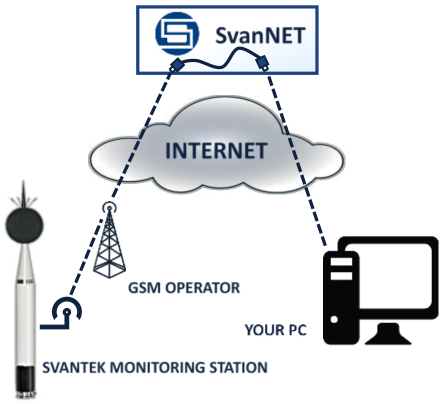
SVANTEK offers the *Assistant Pro* application for smartphones and tablets equipped with Bluetooth® to view measurement results and remotely control of the instrument.

5.5 REMOTE CONTROL USING SVANNET

SvanNET is an Internet service that simplifies remote connection to Svantek monitoring stations using all types of computers and mobile devices with Internet access.

SvanNET makes it possible to use all types of SIM cards with the station modem, regardless of whether they have a public or private IP.

The connection via *SvanNET* allows users to view real-time measurement results, control monitoring stations and measurements, download files (manually or automatically), configure monitoring stations using any available Internet browser.



Note: *Establishing a mobile connection requires the use of a SIM card without PIN protection and with activated Internet access. Installation of the SIM card is described in Chapter 3.1.1.*

Note: *The factory configuration of the SV 200A enables automatic connection with SvanNET when the instrument is switched on.*

Note: *Ask your local SVANTEK distributor to create the SvanNET account for you and assign your new station to your SvanNET account.*

Before you start using the *SvanNET* web service:

1. Make sure that your local distributor has created the *SvanNET* account for you and assigned your station to your *SvanNET* account.
2. Check the Access Point Name (APN). The default setting for the APN is "internet". It is possible that your Internet provider uses different APN. In this case, the APN must be entered manually via the *SvanNET App* or *SvanPC++* software.
3. Check the connection with *SvanNET*. Successful connection with *SvanNET* is indicated by the icon on the SV 200A display.
4. To access *SvanNET*, log in to your account at: https://www.svannet.com/

Select your language before logging in.

Once logged in, you can use the web interface to control the monitoring stations.

The functionality of SvanNET is described in detail in Chapter 7.

5.6 Remote control using SvanPC++_RC

SvanPC++ is a software that enables various remote-control options of SV 200A from your PC:

- via the USB connection,
- via the Internet connection via mobile modem,
- via the LAN or WLAN connections.

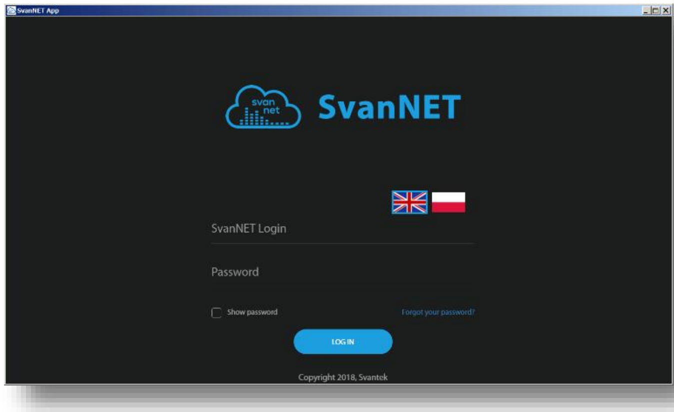
SvanPC++ is a free of charge software, that every user can download from Svantek's website. It supports basic USB connection to the instrument, while wireless connection requires activation of the remote communication module (*SvanPC++_RC*).

Remote control of SV 200A via *SvanPC++_RC* is described in Chapter 8.

6 INSTALLING REMOTE CONNECTION – SVANNET APP

SvanNET App is an application for personal computers and mobile devices that enables quick and easy automatic configuration of the remote connection of your SV 200A to the Internet. The application also provides easy access to the *SvanNET* web service and the *SvanPC++* software.

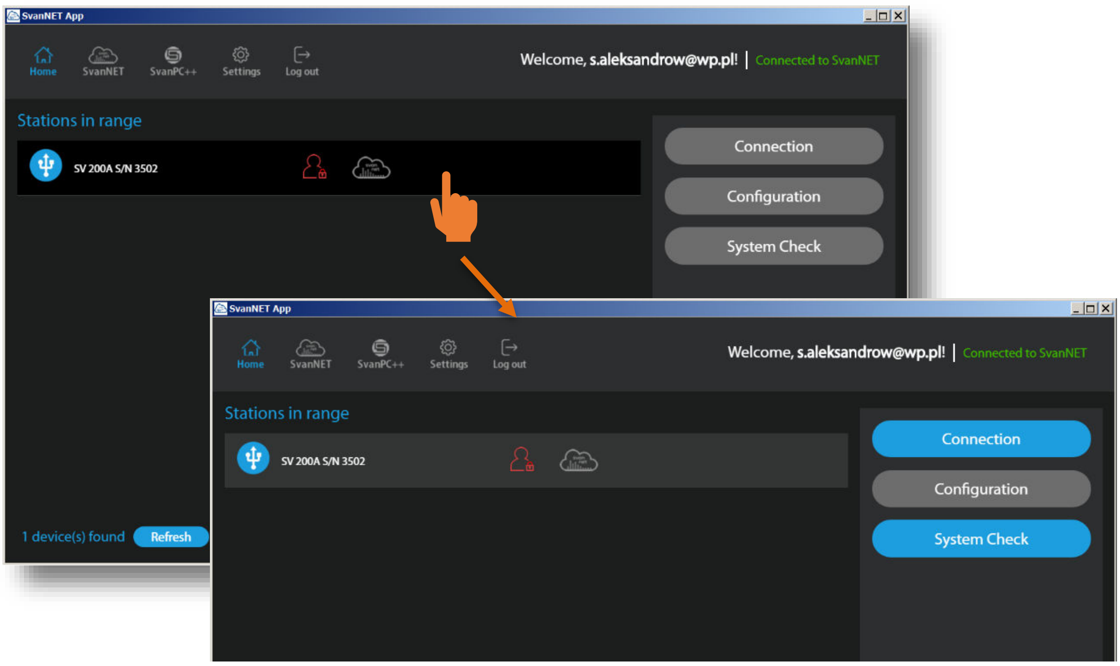
SvanNET App automatically scans all available interfaces to find Svantek devices in the surround. If the Bluetooth module of SV 200A is switched on, the application will show the available Bluetooth connection. If SV 200A is already connected to a WLAN network or acts as an access point, the application will also find this station. If a cable connection is possible, a USB cable can be used to connect SV 200A to the device with the application.



Note: *To have access to **SvanNET App**, ask your local Svantek distributor to create the user's account and assign your monitoring stations to it.*

After logging in, the screen with all the Svantek instruments found in the surround will appear.

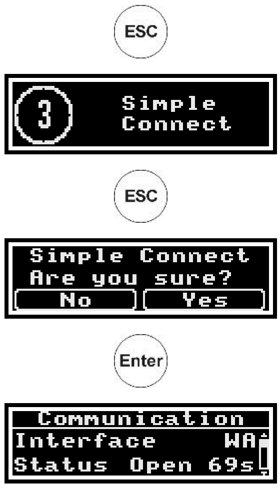
Select the instrument you want to communicate with by clicking on it in the left section. Some buttons on the right side will change their colour from grey to blue depending on the connection status with the *SvanNET* web service. The blue colour means that the screen element (button, icon) is active.



If your instrument is not connected to the *SvanNET* web service via 2G/3G/4G, LAN or WLAN, the **Configuration** button is not active.

The **Refresh** button is used to search for stations connected to the PC via USB, WLAN or visible as an access point. The search lasts 30 seconds and during the search the button changes to **Stop**. You can stop searching at any time by clicking the **Stop** button.

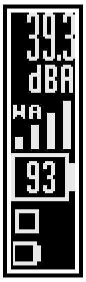
If the application cannot find your SV 200A, you can use the “Simple Connect” mode of SV 200A to establish a WLAN or Bluetooth connection between SV 200A and *SvanNET App*. The Simple Connect mode is a “one-button” function that provides a known configuration for WLAN and Bluetooth of SV 200A and allows *SvanNET App* to connect to the station.



To activate the **Simple Connect** mode:

- press and hold the  key for more than 3 seconds,
- confirm entry into the Simple Connect mode by pressing the  key.

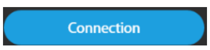
SV 200A automatically switches on the WLAN and sets the Access Point mode (“WA” index on the screen) during the Simple Connect mode.

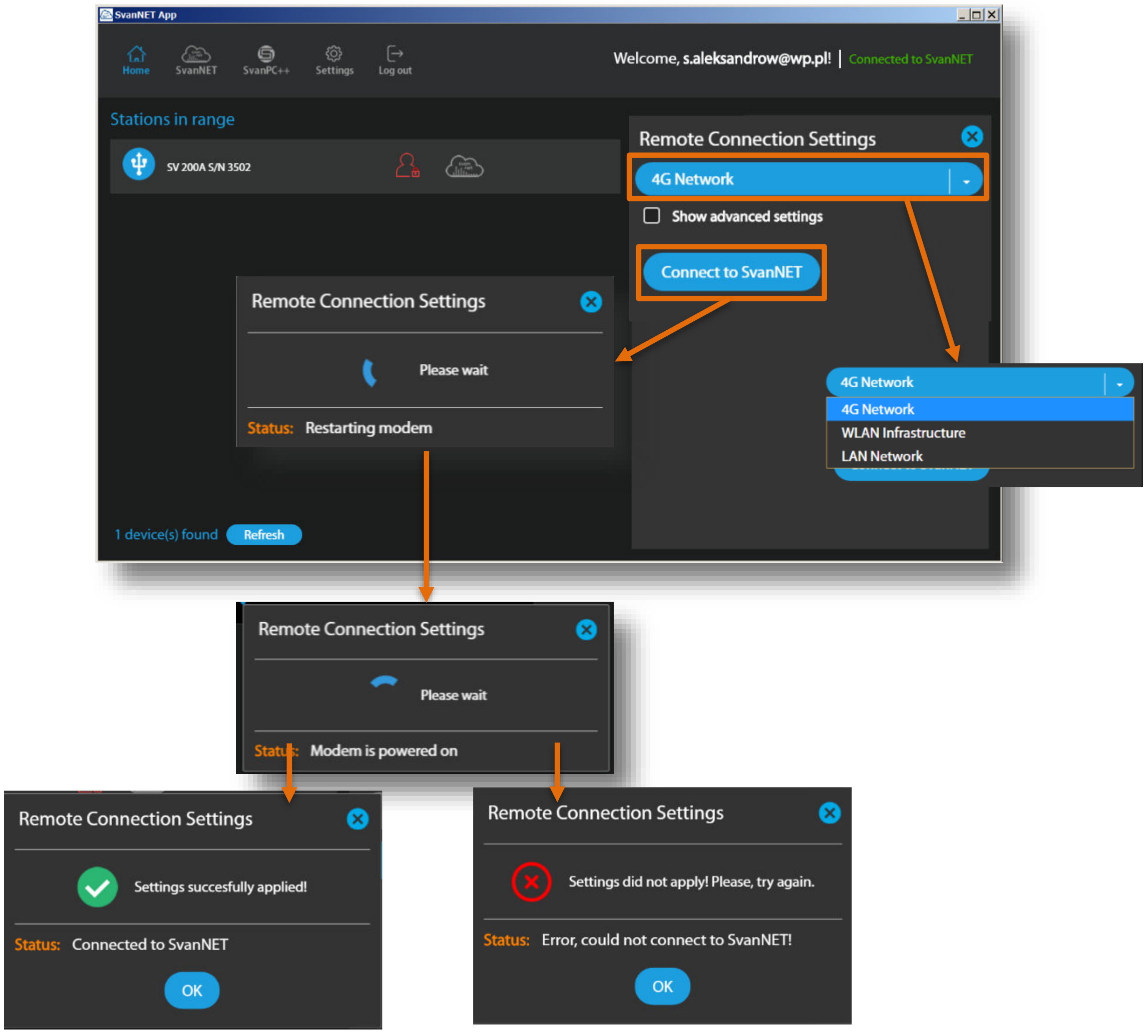


From this moment *SvanNET App* has 90 seconds to establish the connection. The timer counts down this time.

The Simple Connect mode is switched off if the timer runs out and no connection is established. The timer is frozen after a connection has been established. The status of the Simple Connection mode is shown in the **Communication** window as “Open” together with the countdown timer.

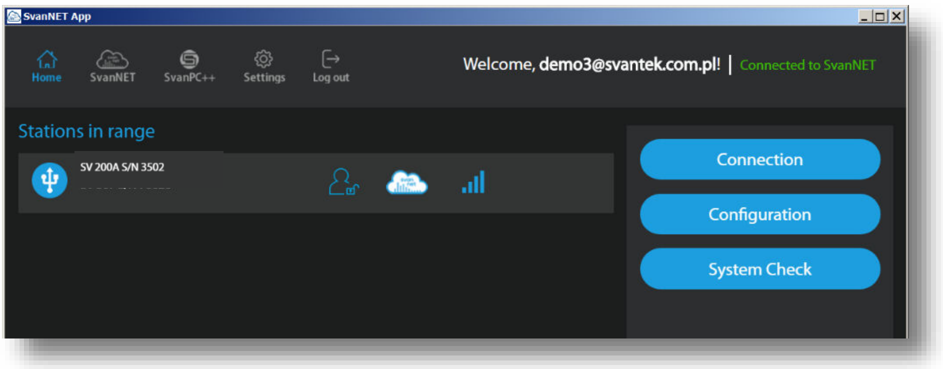
6.1 CONFIGURING REMOTE CONNECTIONS

Click on the  button and the **Remote Connection Settings** sidebar will change its view, offering a selection of connection types: **4G Network** (when using the mobile modem), **WLAN Infrastructure** and **LAN Network** (when using the WLAN/LAN module) and the button that connects the station to the Internet (**Connect to SvanNET** or **Connect to Other Server**).



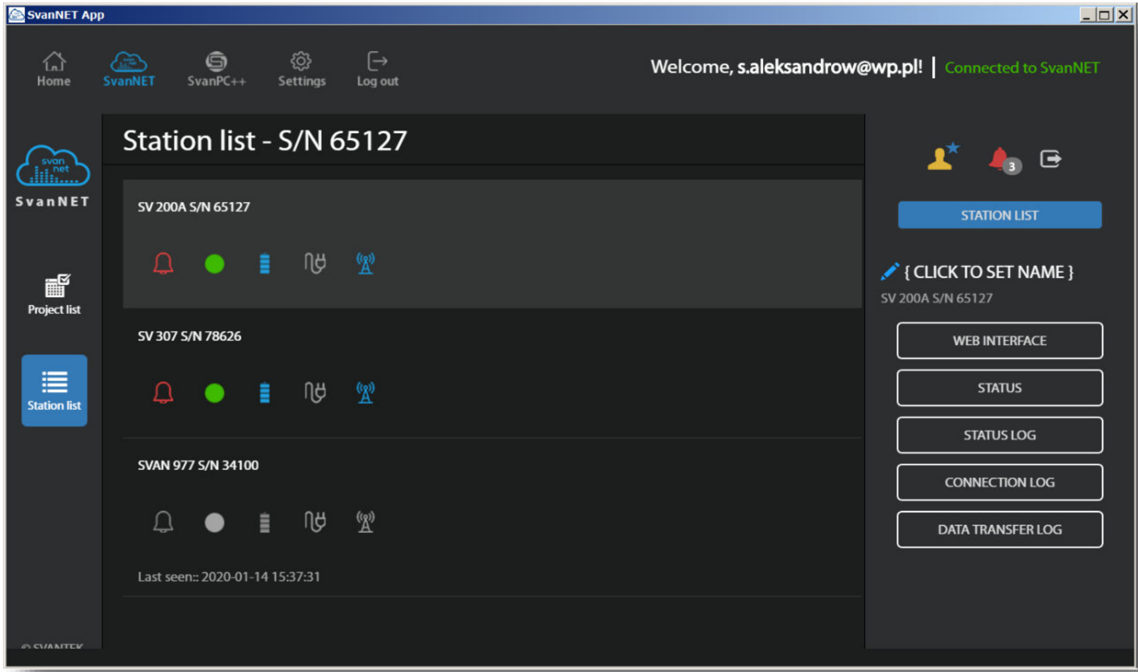
If the connection is successful, the 

button turns blue.



When you click on the 

button, the *SvanNET* Configuration section opens, allowing you to configure the SV 200A settings.



To return to *SvanNET App*, click the  icon or the SvanNET App logo.

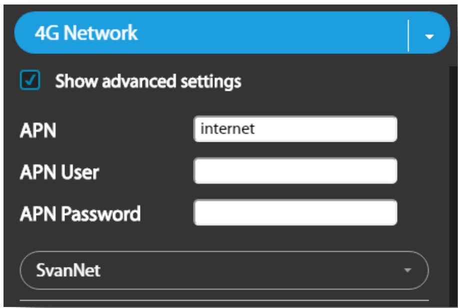
6.1.1 Remote Communication Settings

By default, the **4G Network** connection type and the connection to the *SvanNET* web service configuration (**Connect to SvanNET**) is proposed. Clicking the **Show Advanced settings** check box will cause appearance of additional settings below.

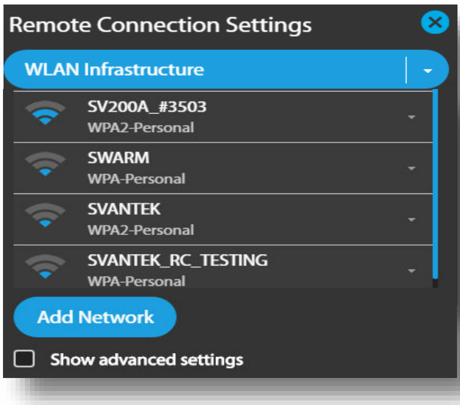
If the **4G Network** connection is selected, the advanced settings consist of **APN** name, **APN User** name and **APN Password**.

These settings are used when establishing a connection to the mobile network.

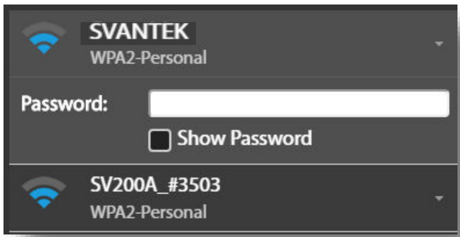
If the advanced settings are disabled, the instrument will use default network settings.



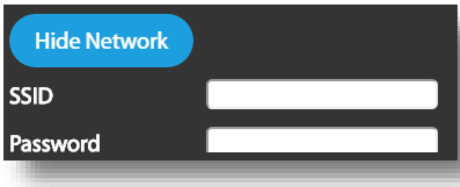
If the **WLAN Infrastructure** connection is selected, the programme displays the list of available WLAN networks.



When you click on the selected network, a pop-up window will appear where you can enter the network **Password**.

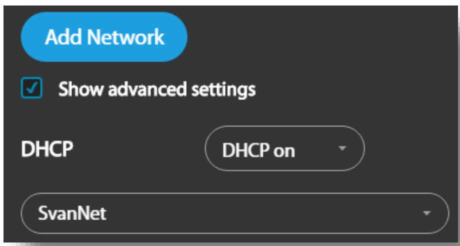


Click the **Add Network** button to define the Service Set Identifier (**SSID**) and the network **Password**.



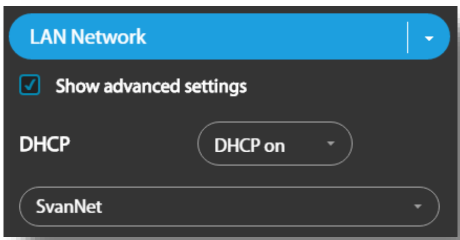
Click the **Show Advanced Settings** check box to enable or disable the Dynamic Host Configuration Protocol (**DHCP**).

Usually, **DHCP** should be enabled.



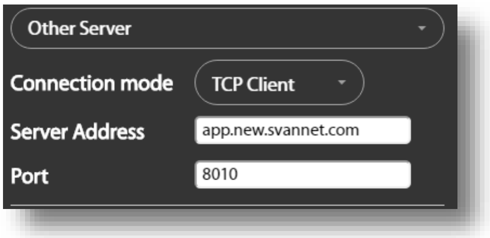
The **LAN Network** connection doesn't require any parameters to be configured, except for Dynamic Host Configuration Protocol (**DHCP**), which can be enabled or disabled by clicking on the **Show Advanced Settings** checkbox.

Usually, **DHCP** should be enabled.



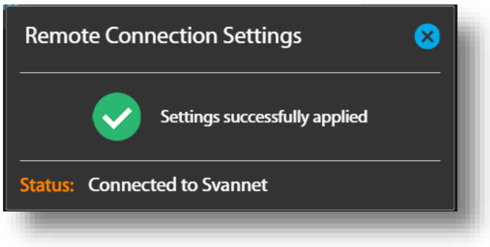
Selecting **Other Server** brings up the drop-down menu where you can select **TCP Server** or **TCP Client** (**Connection mode**), remote address for TCP/IP client connection (**Server Address**) and **Port** for this connection.

.



To set the selected connection, press the 

button. If the connection is successful, the message “Settings successfully applied!” appears.

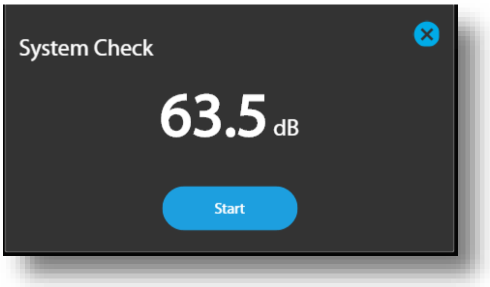


6.2 SV 200A System Check

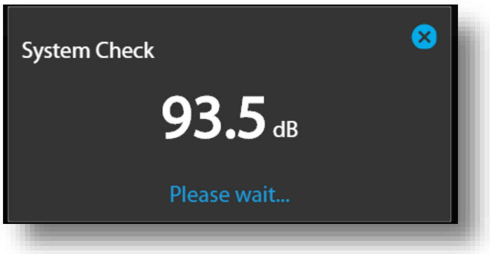
Click on the 

button to run the System check.

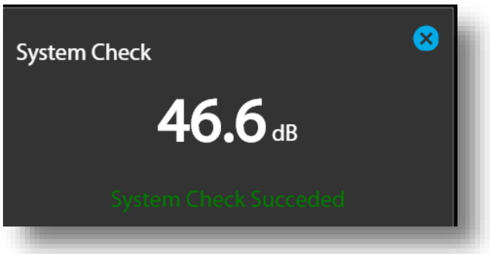
The **System Check** pop-up window will appear with the current SPL result.



Press the **Start** button and SV 200A will pause the current measurement, switch on the electrostatic actuator, measure its level and display it in the **System Check** pop-up window.

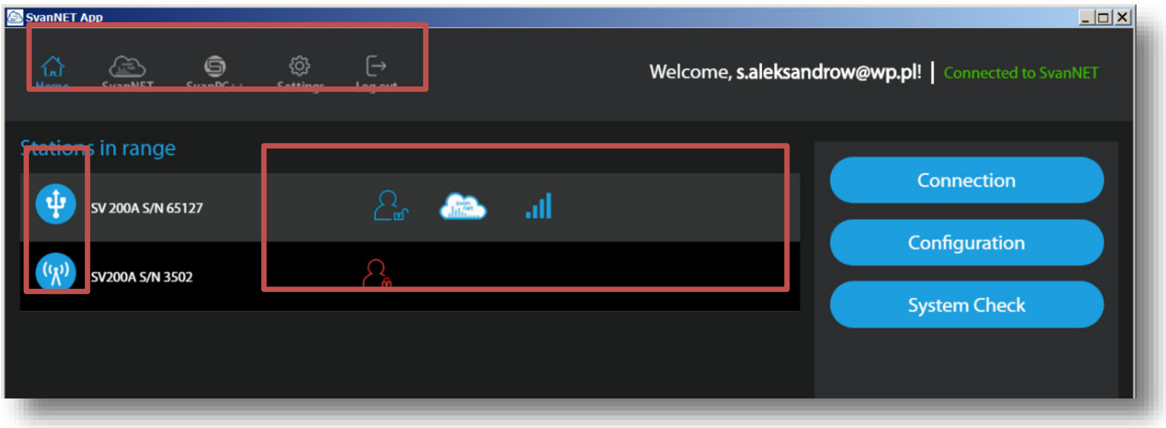


When the system check is complete, the current SPL result will be displayed in the **System Check** pop-up window with the message “**System Check Successful**”.



6.3 Icons of SvanNET App

Other functions of *SvanNET App* are related to the icons in the top line of the window.

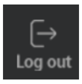


- return to the main screen

- open the *SvanNET* web service

- open the *SvanPC++* program

- application settings



- quit *SvanNET App*

The icons in the instrument bar are informative. The icon to the left side of the instrument bar provides information about the type of connection between the instrument and the PC:


- USB connection,


- WLAN connection,


- LAN connection,


- Access Point connection.

The first icon to the right of the instrument bar tells you if the station is assigned to your account:


- not assigned,


- assigned.

The second icon to the right of the instrument bar gives information about the connection status with the *SvanNET* web service:


- not connected,


- connected.

The third icon to the right of the instrument bar gives information about the type of connection to the Internet:

 - mobile connection,

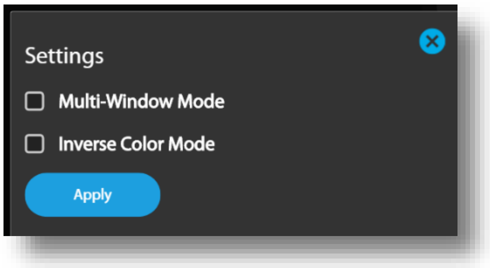
 - WLAN connection,

 - LAN connection.

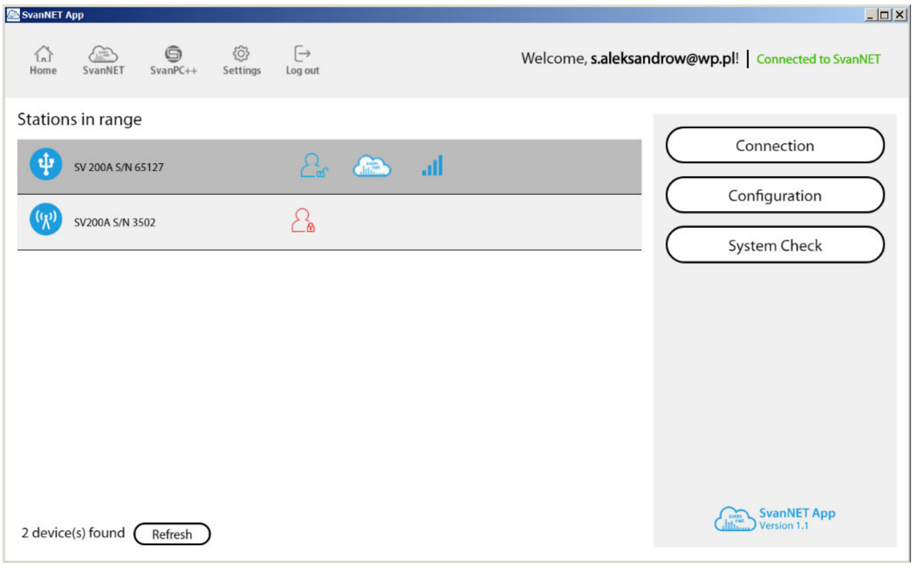
6.4 OTHER OPTIONS

When you click on the  icon, a pop-up window will appear allowing you to make additional settings: **Multi-Window Mode** or **Inverse Color Mode**.

In **Multi-Window Mode**, the SvanNET Configuration section appears in a separate window.



The **Inverse Color Mode** screen is shown below.



7 SVANNET WEB SERVICE

The *SvanNET* web service offers you simple access to the instrument's settings, results and status information.

To start using *SvanNET*, go to www.svannet.com and log in to your account.

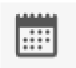
Note: *To have access to the SvanNET web service, the local SVANTEK distributor should create the user account and assign monitoring stations to it.*

SvanNET includes the standard function - *Remote Communication Services*, which is available to all *SvanNET* users, and the optional extension - *Automatic Monitoring Services*, which is offered via a licence.

Remote Communication Services maintain a remote connection to the monitoring stations and the service includes status alarms (e.g., battery, memory), remote access to station settings and measurement files, and provides a preview of current results and the latest time history graph.

Automatic Monitoring Services offers automatic control of measurement points, data sharing with other *SvanNET* users and data preview in the form of a customised website with either public or restricted access. The preview website can be customised with a logo and individual project name. Access to the preview can either be public or password protected.

You can switch between the two services using icons on the Main panel:



– *Automatic Monitoring Services* (**Project list**)

– *Remote Communication Services* (**Station list**).

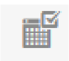
If you have the extended *SvanNET* package, you can use both tools. If you have the standard *SvanNET* package, only the Station list tool is available.

Note*: This manual only describes the* ***Station list****. For more information about the* ***Project list****, see SvanNET User Manual.*

7.1 STATION LIST VIEW

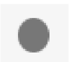
The **Station list** shows all the stations assigned to your account – both on and off.

The station bar contains six icons indicating the status of the station:



Project status: this icon appears when this station is involved in the project. Clicking on this icon project displays the project name and a link to it.

Alert status: blue - everything is OK, red – an irregular event has happened.

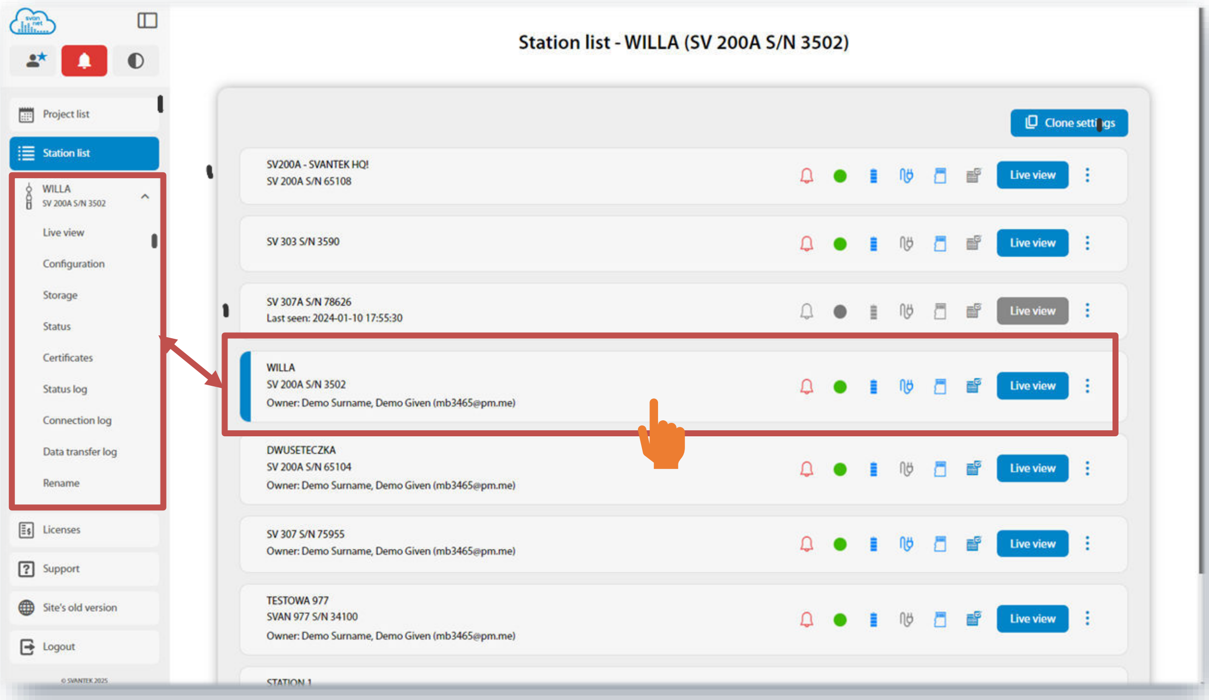


Station connection status: green – online; grey – offline; yellow - station doesn't respond to command for a long time.

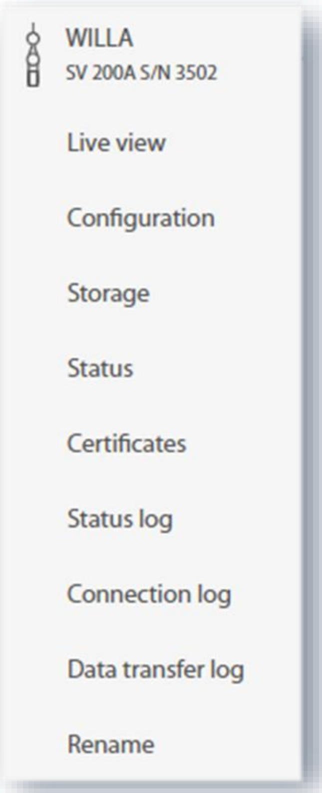
Battery status. Clicking on this icon displays the battery status information.

External power source status: blue – the instrument is powered by the external source, grey - there is no external power.

Memory status. Clicking this icon displays information about the available memory.



When you click on a station, the drop-down menu for that channel will appear on the left panel.



The **Live view** button switches to the **Live data** view (see Chapter 7.2), where you can view measurement results and 1/1 octave or 1/3 octave spectra and start/stop measurements.

The **Configuration** button switches to the station **Configuration** view (see Chapter 7.3), where you can configure measurement and instrument parameters.

The **Storage** button switches to the **Storage** view (see Chapter 7.4), where you can download instrument files manually.

The **Status** button switches to the **Status** view (see Chapter 7.5), where you can check the station status and configure status alarms.

The **Certificates** button opens the dialogue box that shows the available certificates for this station and allows you to add a new certificate (see Chapter 7.6).

The **Status log** button switches to the **Status log** view (see Chapter 7.7), where you can check the power source (type and charge level), free memory, mobile signal quality and the history of the system check.

The **Connection log** button switches to the **Connection log** view (see Chapter 7.7), where you can check the history of station connections.

The **Data transfer log** button switches to the **Data transfer log** view (see Chapter 7.7), where you can check the history of data transfers (uploads).

The **Rename** button allows you to set the new station name instead of the default.

The icons in the Main Panel tool allow you to:

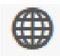
 manage user account

 display alarms for all stations

 change the colour scheme of *SvanNET* from “dark” to “light”

 activate licences

 contact Svantek support team

 Change to the old version of *SvanNET*.

 Log out of *SvanNET*.

7.2 LIVE VIEW

The **Live view** contains three sections: **Overview**, **Time history results** and **Spectrum results**.

In each section you can start and stop the measurement (**Measurements** button) and activate the system check using the built-in actuator (**Actuator** button).

Overview section

The **Overview** section displays current broadband results:

1. one **Instantaneous Result**, measured/averaged by 1-second period in the selected profile,
2. three **Summary Results** (**Current** and **Previous**), measured/averaged in the selected profiles over the **Summary step** period (which is equal to the *Integration Period*).

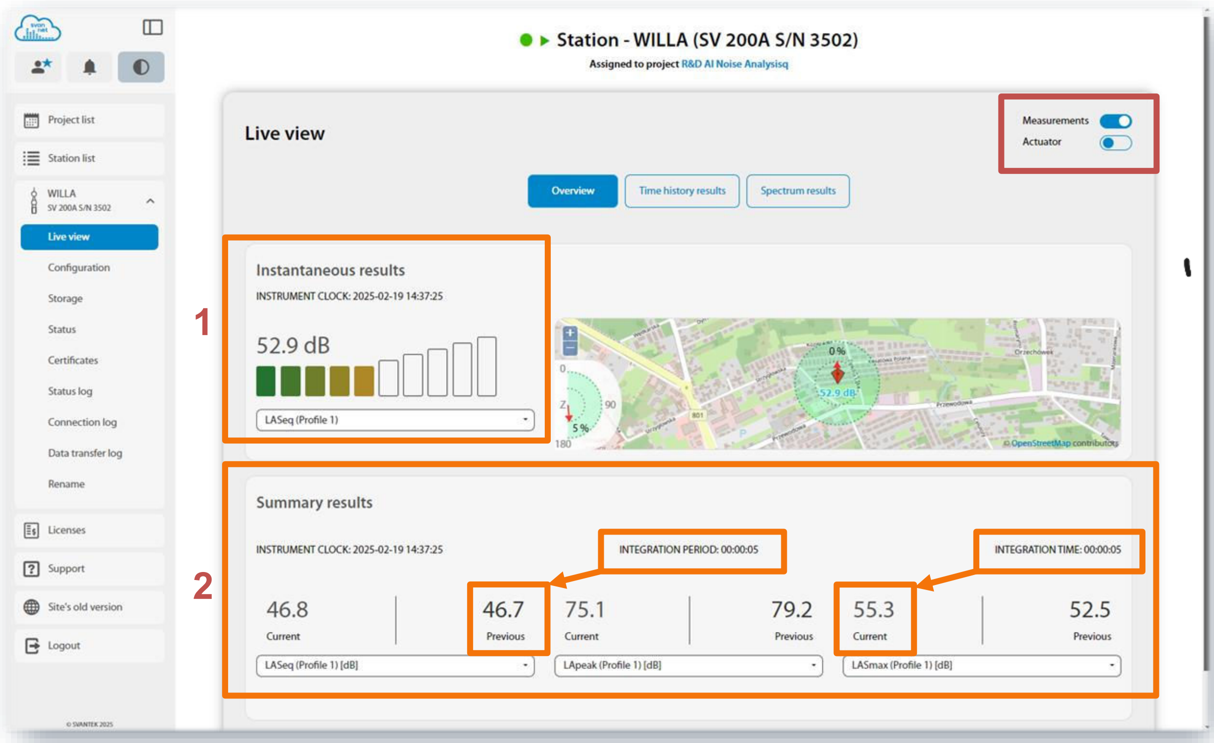
and the map that shows the position of the instrument, meteorological data (if the weather station is used) and the direction (sector) of the dominant of sound energy distribution (see Chapter 9).

Instantaneous and Summary results are updated every second.

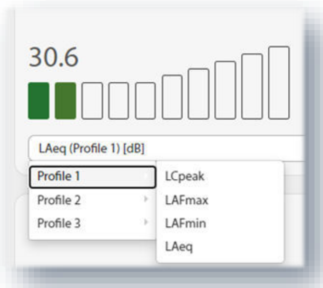
Current results are updated every second and averaged over the INTEGRATION TIME.

Previous results show the results measured by the INTEGRATION PERIOD (Summary step) before the current integration cycle.

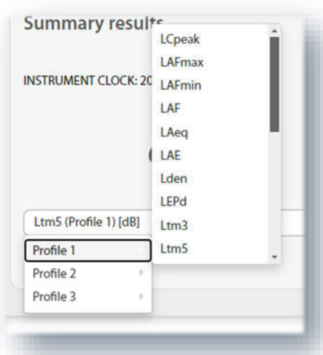
The type of result measured, along with the filter and detector, and the profile in which this result was measured, are displayed in the drop-down box below the result value. To change the displayed result, click on the the drop-down button and select the profile and the result.



- for **Instantaneous results**, you can select a result from the list: **Lpeak**, **Lmax**, **Lmin** or **Leq**.



- for **Summary results**, you can select a result from the list: **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **OVL**, ten statistical results (**Ln**) and two rolling Leq (**RLeq**).



Results such as **Lpeak**, **Lmax**, **Lmin**, **Leq**, **L**, **LE** and **RLeq** include the filter abbreviation (**A**, **C** or **Z**) in their names. Results such as **Lmax**, **Lmin** and **LE** also include the detector type abbreviation (**F**=Fast, **S**=Slow, **I**=Impulse).

All results are described, and formulae are given in Appendix D.

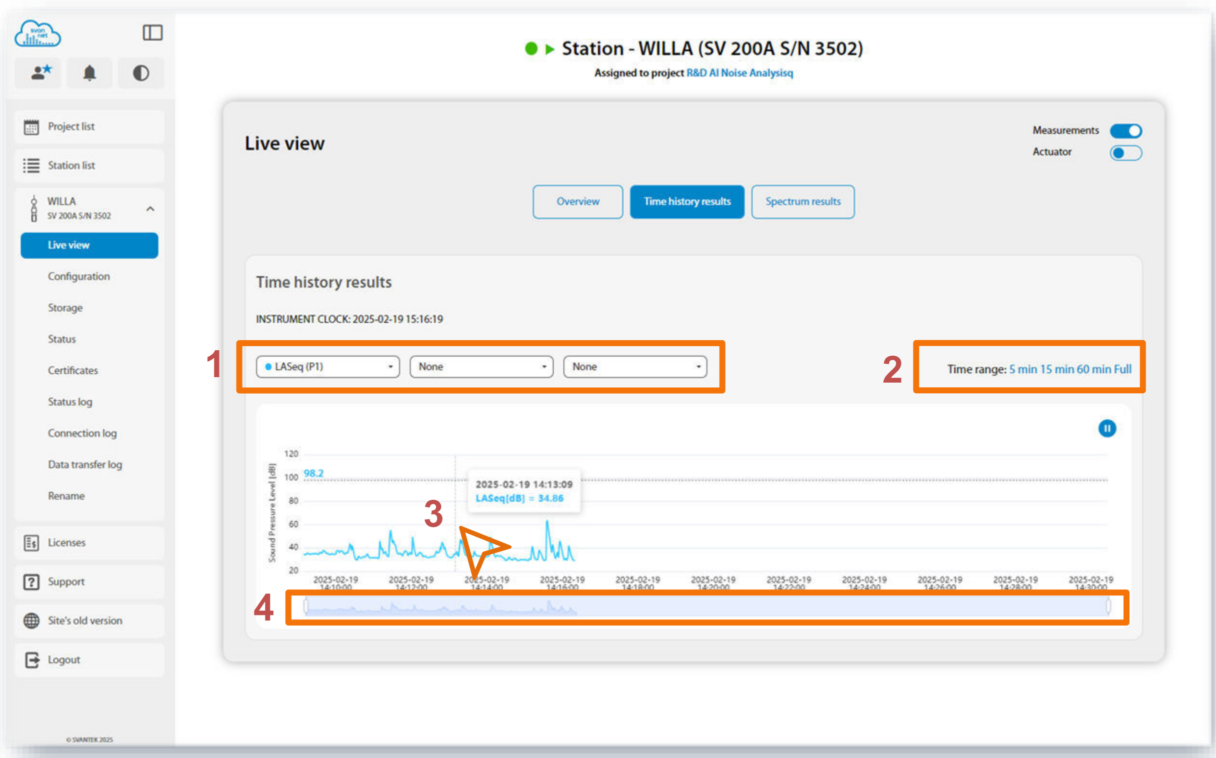
***Note**: The Instantaneous results are not saved in the instrument files, but the Summary results can be saved if the **Save summary results** option is enabled in the **Storage** section of the Configuration view.*

<u>Time history results</u> <u>section</u>

The **Time history results** section displays the time history of the selected measurement results.

In this section, you can:

1. Select the results to be displayed simultaneously using the selector buttons (Leq, Lpeak, Lmax, Lmin or RLeq), measured in profiles with weighting filters (A, B, C or Z) and detectors (Fast, Slow or Impulse).
2. Change the time range for displaying the results.
3. Move the mouse pointer over the graph to read the values for that point in time, or click on the desired sound level to set the level line.
4. Scroll the time window over the time history.



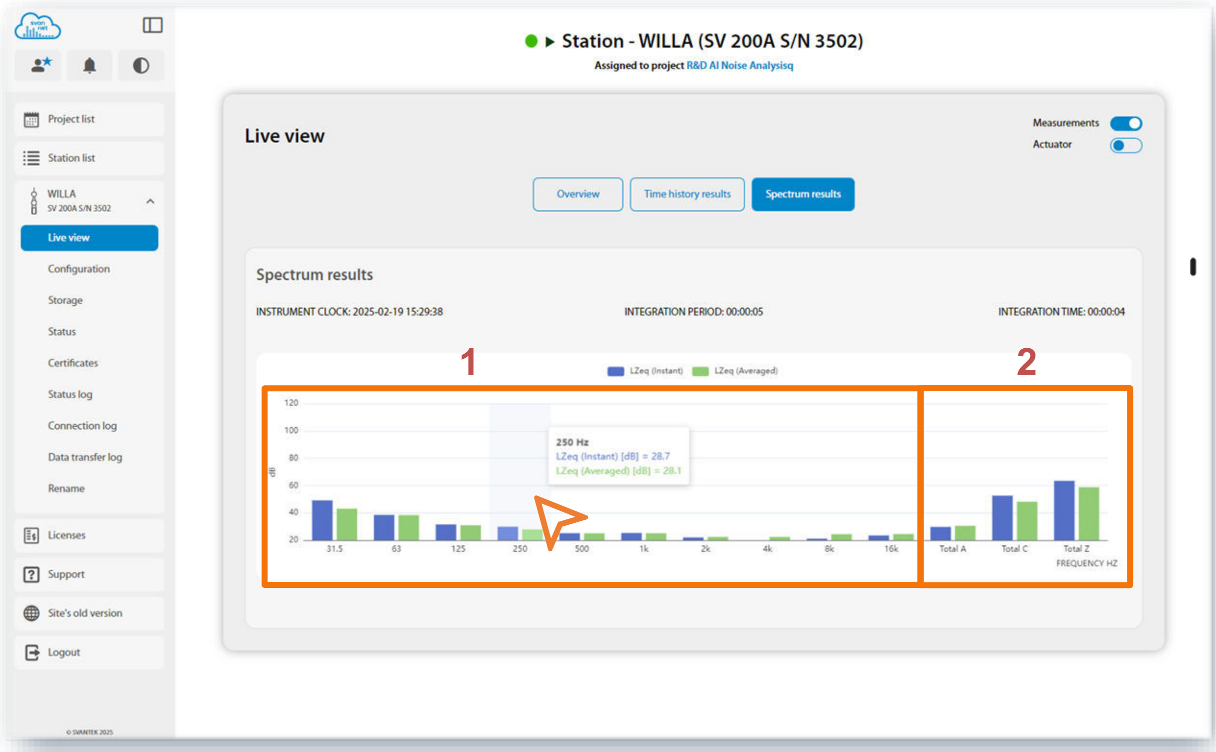
<u>Spectrum results</u> <u>section</u>

The **Spectrum results** section displays the current instantaneous and averaged 1/1 octave or 1/3 octave spectra and three Total results (**LZeq**).

Note: *Spectra can only be displayed if the* ***Octave 1/1*** *or* ***Octave 1/3*** *measurement function has been selected in the* ***Configuration → Measurement setup*** *section.*

In the **Spectrum results** section, you can:

1. Move the mouse pointer over the graph to read the instantaneous and averaged results for each 1/1 octave or 1/3 octave band.
2. Point the mouse cursor at the last three bars of the graph to read the values of the three instantaneous and averaged Total results.



7.3 CONFIGURATION VIEW

The **Configuration** view consists of several sections that allow you to configure measurement parameters (**Measurement setup**), data storage (**Storage**), measurement data export as CSV files (**CSV export**), recording of audio signal (**Audio recording**), event triggered alarms (**Event trigger**), automatic system check (**Calibration**), auxiliary parameters (**Auxiliary settings**) and perform firmware upgrade (**Firmware upgrade**).

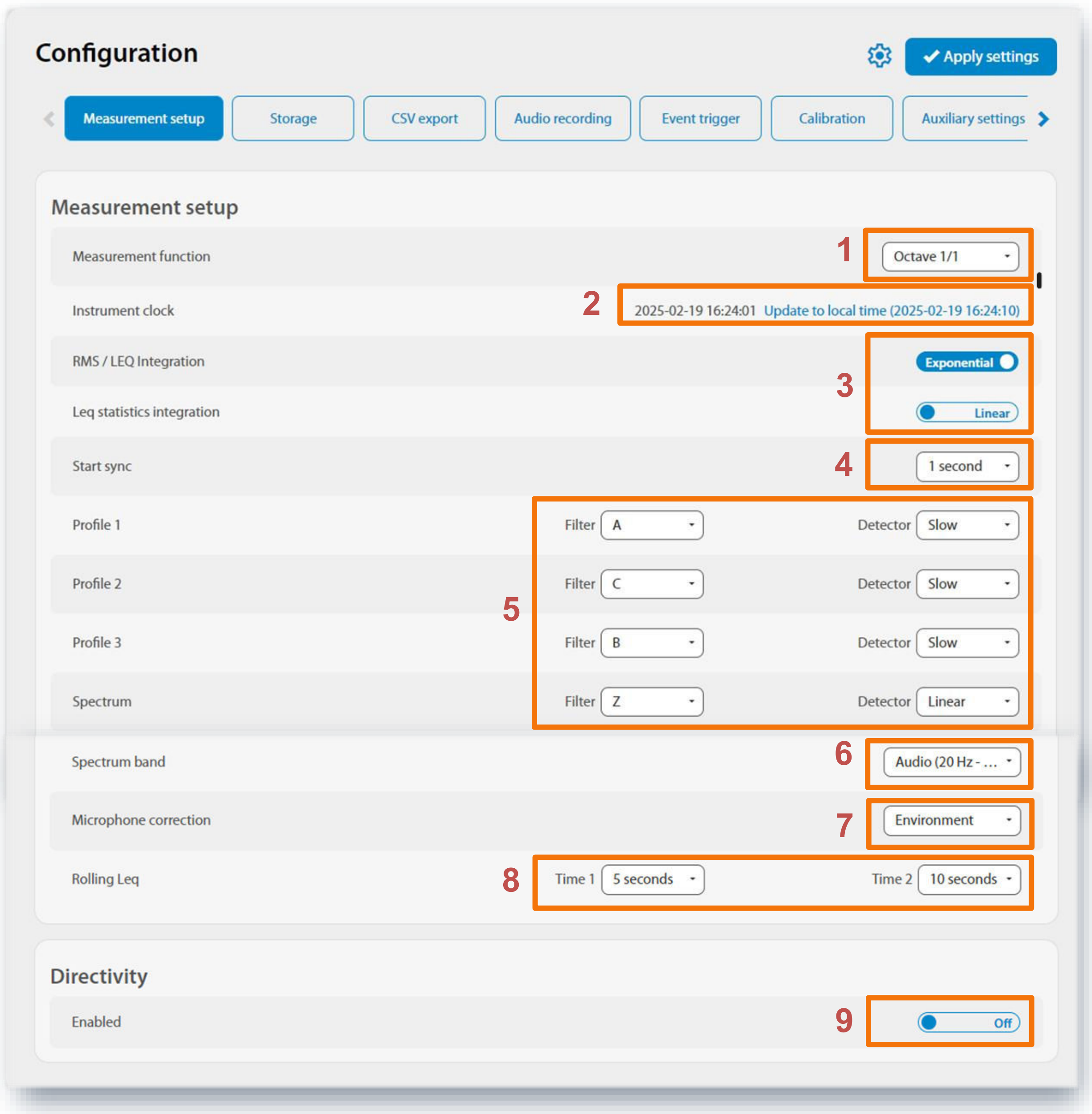
To send the new configuration to the station, click the ✔ Apply settings button.

__Note__: The content of the __Configuration__ sections depends on the selected parameters. This manual does not present all possible combinations, but the principles of working with SvanNET.

Measurement setup

In the **Measurement setup** section, you can:

1. Select **Measurement function**: *Level Meter*, *Octave 1/1* or *Octave 1/3.*
2. Update **Instrument clock.**
3. Select type of **RMS/Leq Integration** and **Leq statistics integration**: *Linear* or *Exponential.*
4. Set synchronization of the measurement start with the real-time clock (**Start sync).**
5. Select **Filter** (*Z, A, C*) and **Detector** type (*Impulse*, *Fast*, *Slow*) for profiles and spectrum (the **Spectrum** item appears when the **Octave 1/1** or **Octave 1/3** function is selected).
6. Set **Spectrum band**: *Audio (20 Hz – 20 kHz)* or *Full (4 Hz – 20 kHz).*
7. Set **Microphone correction**: *Environment* or *Airport*.
8. Set time frames for averaging of the two **Rolling Leq** results (**Time 1** and **Time 2**).
9. Set **Directivity** parameters.



RMS/Leq Integration allows you to define the detector type for calculating the Leq, LEPd, Ln and SEL results. *Linear* integration is required if the true RMS value of the measured signal is to be obtained. When this option is selected, the values of the Leq, LEPd, Ln and SEL results are independent of the detector time constant (*Fast*, *Slow* or *Impulse*) defined for the profiles.

Some standards require *Exponential* integration for Leq measurements. When this option is selected, the values of the Leq, LEPd, Ln and SEL results depend on the detector time constant (*Fast*, *Slow* or *Impulse*) defined for the profiles.

Results such as Lmax, Lmin, Ltm3 or Ltm5 will always be calculated using *Exponential* integration and time constants. And vice versa, such result as Lpeak doesn't use integration at all.

Note: *Definitions and formulae for measurement results are given in Appendix D.*

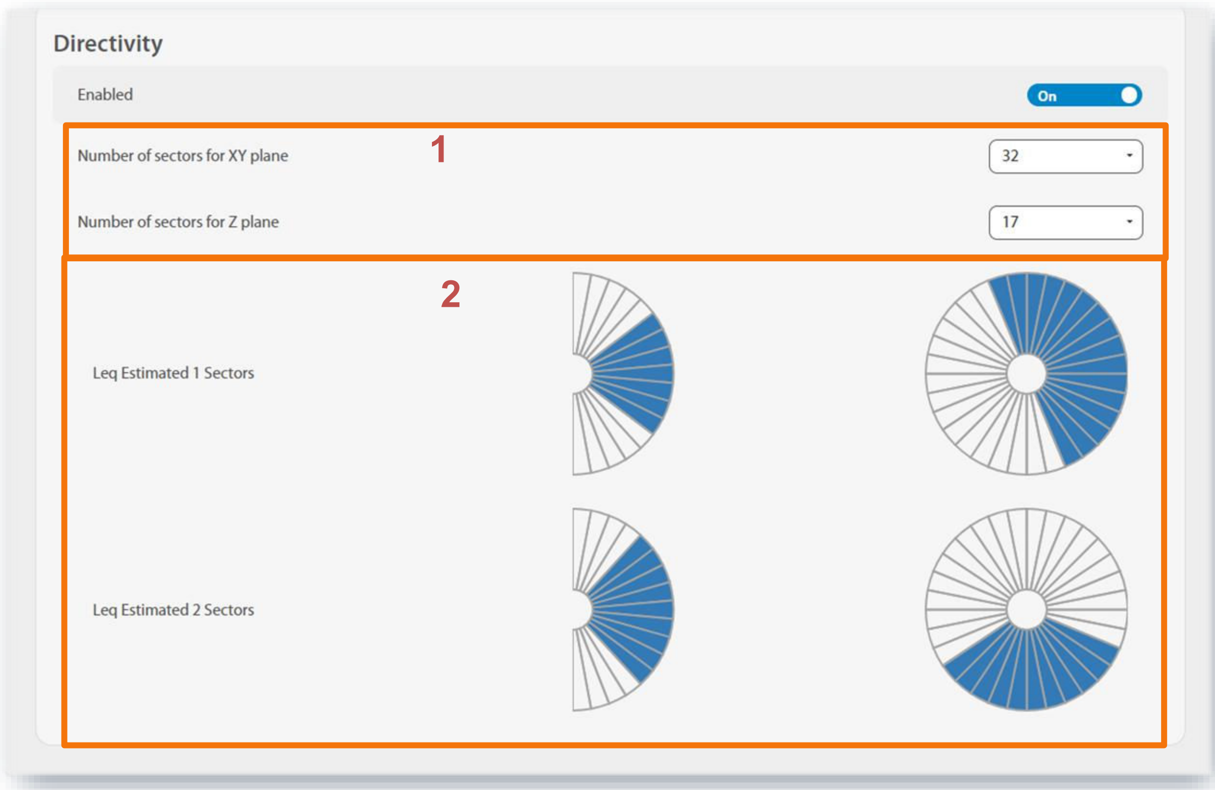
Filter means a frequency weighting filter applied to all measurement results calculated for individual profiles or for the spectrum:

- *Z* Class 1 according to IEC 61672-1:2013,
- *A* Class 1 according to IEC 61672-1:2013,
- *C* Class 1 according to IEC 61672-1:2013.

Environment compensation is used when an acoustic signal is parallel to the microphone grid. *Airport* compensation is used when an acoustic signal is perpendicular to the microphone grid. The characteristics of the compensation filters are given in Appendix C.

When **Directivity** is enabled, you can define:

1. the number of sectors for the XY plane (2, 4, 8, 16 or 32) and the Z plane (2, 3, 5, 9 or 17), and
2. the sectors to be taken into account when calculating two **Estimated Leq** results.



Storage

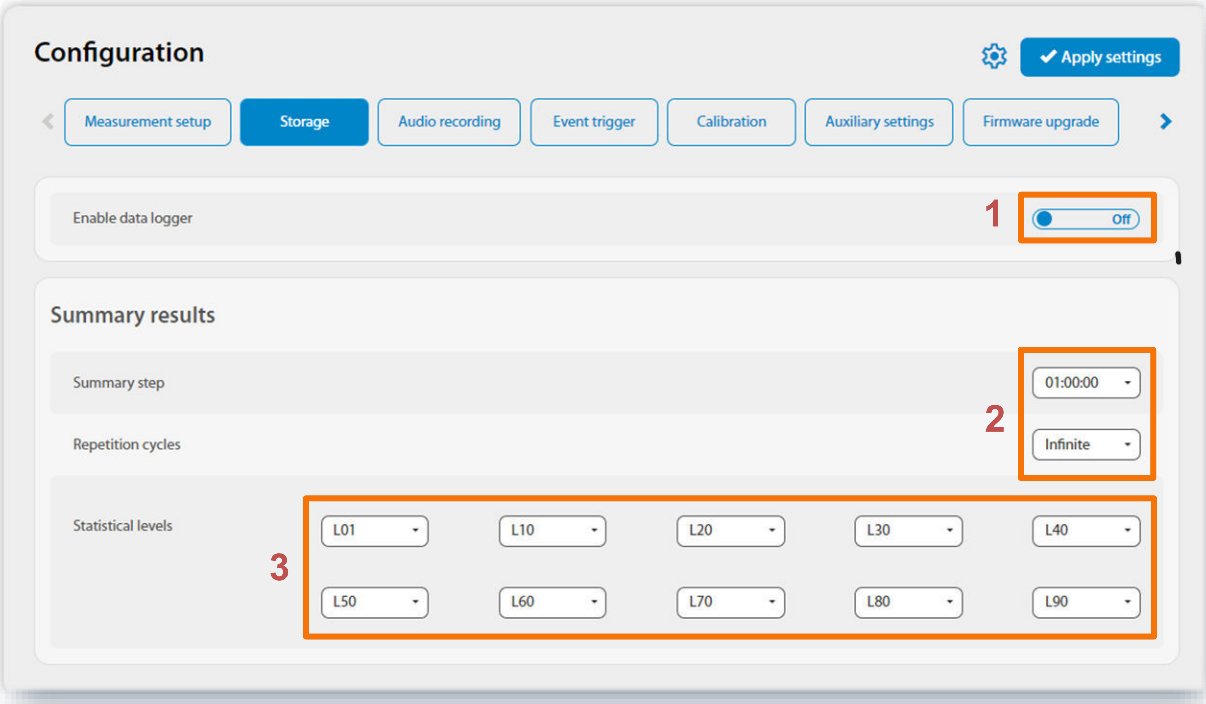
The **Storage** section allows you to program which results and with what step will be saved in a logger file.

1. To start the configuration, enable data logging (**Enable data logger**).

***Note**: To ensure saving of any results you should enable data logger. Without enabling the data logger, no data files will be created and the results currently displayed will be replaced by the new results after each measurement cycle.*

Even if data logging is disabled, you can still set some important parameters for **Summary results**, such as:

2. the period of measurement of the Summary results and, if logging is enabled, the step at which all Summary results are logged to a file (the **Summary step** is equal to the *Integration Period*, see Chapter 5.1.2) and the number of measurement repetitions (**Repetition cycles**),
3. ten **Statistical levels** to be calculated and saved with the Summary results.



The **Summary step** (Integration period) item allows you to define the period over which the Summary results are measured (integrated) using the frequency weighted filters and RMS detector time constants defined in the **Measurement setup** section and saved to a file.

The **Summary step** can be selected from the pop-up list in the range 1s to 24h.

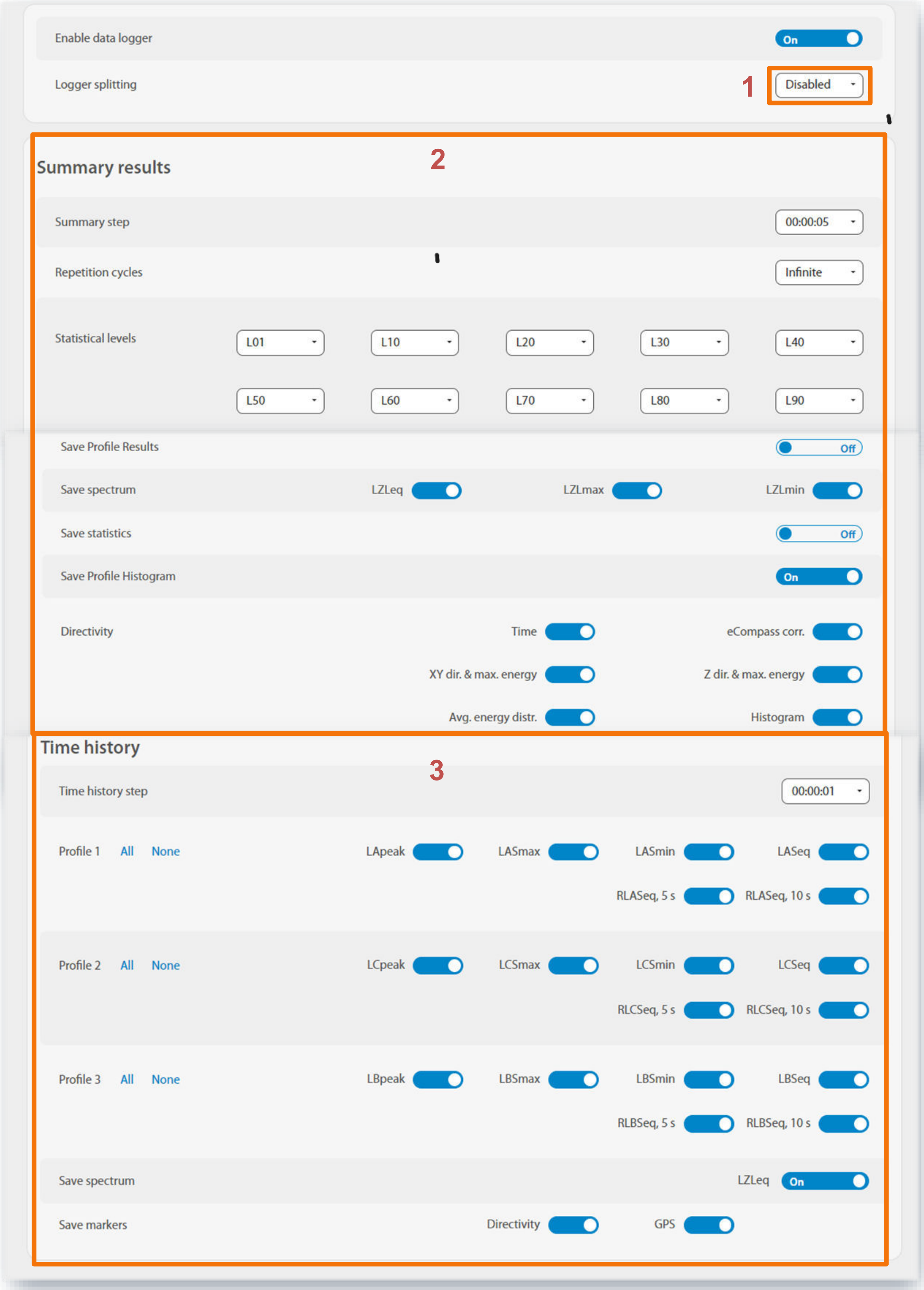
The **Repetition cycles** item allows you to define the number of automatic repetitions of measurements with the defined integration period. If *Infinite* is selected, the measurements will be repeated until manually stopped. If the number of cycles is defined, the measurement cycles will be stopped automatically after this number of measurements or earlier if stopped manually.

***Note**: For monitoring purposes, it is recommended to set the value to Infinite, which is also the default value of this parameter.*

Statistical level (**Ln**) is a level in dB exceeded during **n** per cent of the Integration period. Statistical noise levels are calculated from a histogram, based on 100ms Leq results (see Appendix D).

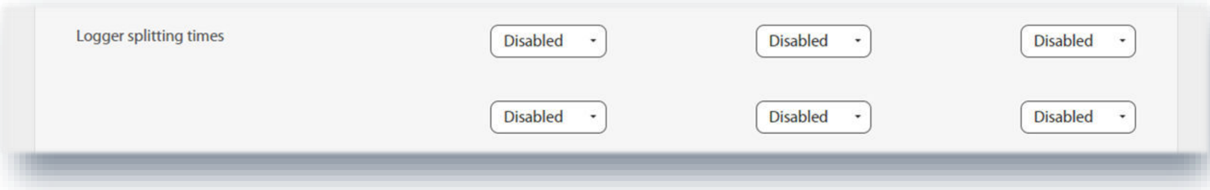
Once data logging is enabled, you can:

1. Program logger file splitting (**Logger splitting**)
2. Select **Summary results** to be saved in a file: Profile Results, spectra (Leq, Lmax and Lmin), statistics, profile Histogram, meteo and directivity results (Time, eCompas corrections, XY dir.&max. energy, Z dir.&max.energy, Average energy distribution, Histogram)
3. Configure the storage of the results of the **Time history** in a file: step of logging (**Time history step**) and results to be saved for three profiles (Lpeak, Lmax, Lmin, Leq and 2xRLeq), 1/1 or 1/3 octave spectra, results taken from the weather station (if the SP 275 meteo station is selected in the **Auxiliary settings** section) and GPS and Directivity markers.



The **Logger splitting** item allows you to split logger files by selecting the split mode: *Every SR* (with the **Summary step** ≥ 1m), *Every 15 m*, *Every 30 m*, *Every 1 h* and *Every day*.

If *Every day* is selected, you can set up to six points during the day when splitting will take place.



The **Time history step** can be selected from the set: 10, 20, 50, 100, 200 and 500 milliseconds, from 1 second to 59 seconds, from 1 minute to 59 minutes and 1 hour.

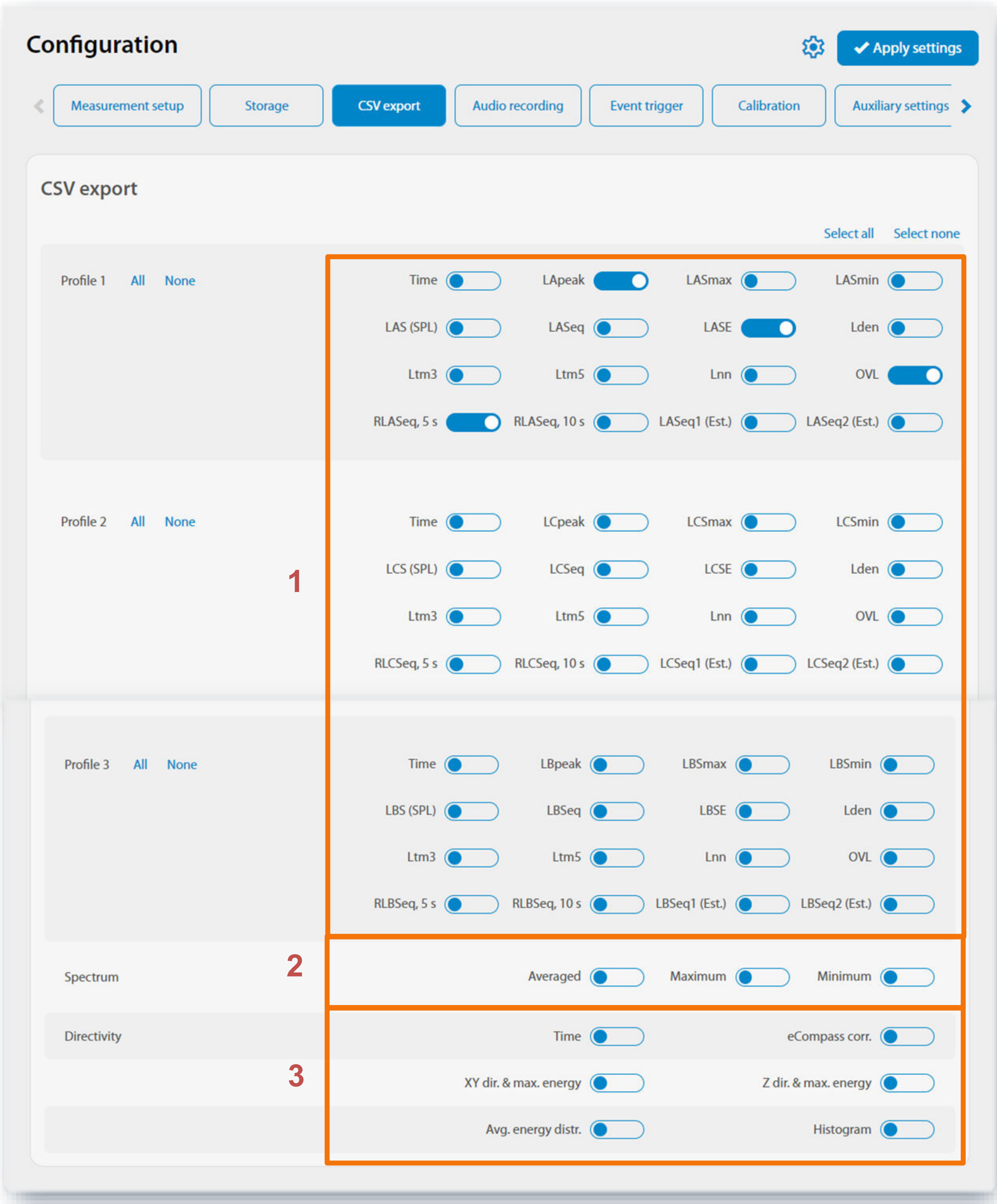
If **Save Profile Results** is enabled, the Summary results section will be expanded to include additional settings enabling saving results for three profiles (Lpeak, LE, Lmax, Lmin, L(SPL), Leq, Lden, Ltm3, Ltm5, 2 x rolling Leq and 2 x estimated Leq).

If **Save Statistics** is enabled, the Summary results section will be expanded to include toggles for the Leq statistics defined above for the three profiles.

***Note**: All files with measurement results (also files created after the split) are automatically named according to the rule: a prefix (string of letters) followed by a number (string of digits) increased by one for the newly created file. The default prefix is "L" and it can be changed using the instrument keyboard or SvanPC++.*

CSV export

The **CSV export** section allows you to select measurement data to be directly exported to CSV (Comma Separated Values) files and saved in the instrument memory.



In the **CSV export** section, you can:

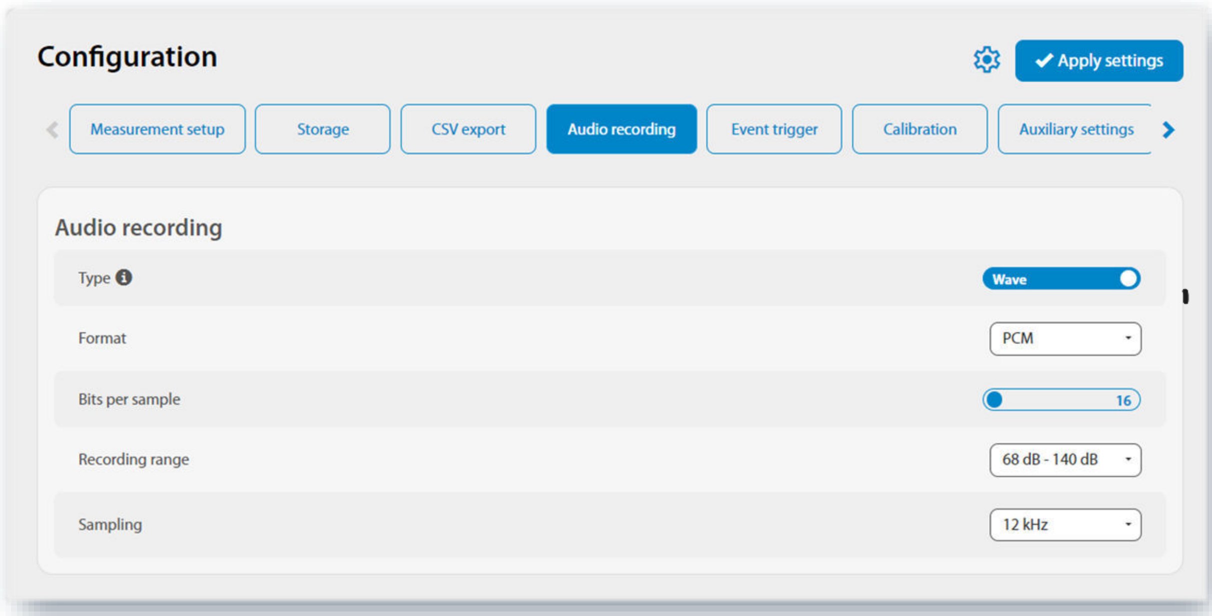
1. Select results to be exported for each profile individually.
2. Select **Averaged**, **Maximum**, **Minimum** and **Peak** spectra for each integration period if the *Octave 1/1* or *Octave 1/3* function is enabled.
3. Select **Directivity** results.

Note: *CSV files can be quite large, and it is recommended that you only use this feature if absolutely necessary.*

The CSV file structure is shown in Appendix B.

Audio recording

The **Audio recording** section allows you to configure the recording of the audio signal . The audio signal can be recorded in the logger file together with the time history and summary results (as *Events* type) or in a separate file of the *.wav type (as *Wave* type). To change the type of the signal recording, use the **Type** button.



You can configure four audio recording parameters: **Format** of the file for Wave recording (*PCM* or *Extensible*), **Bits per sample** (*16* or *24*), **Recording range** (from *28 dB – 100 dB* to *68 dB - 140 dB*) and **Sampling** frequency (*12kHz*, *24kHz* and *48kHz*).

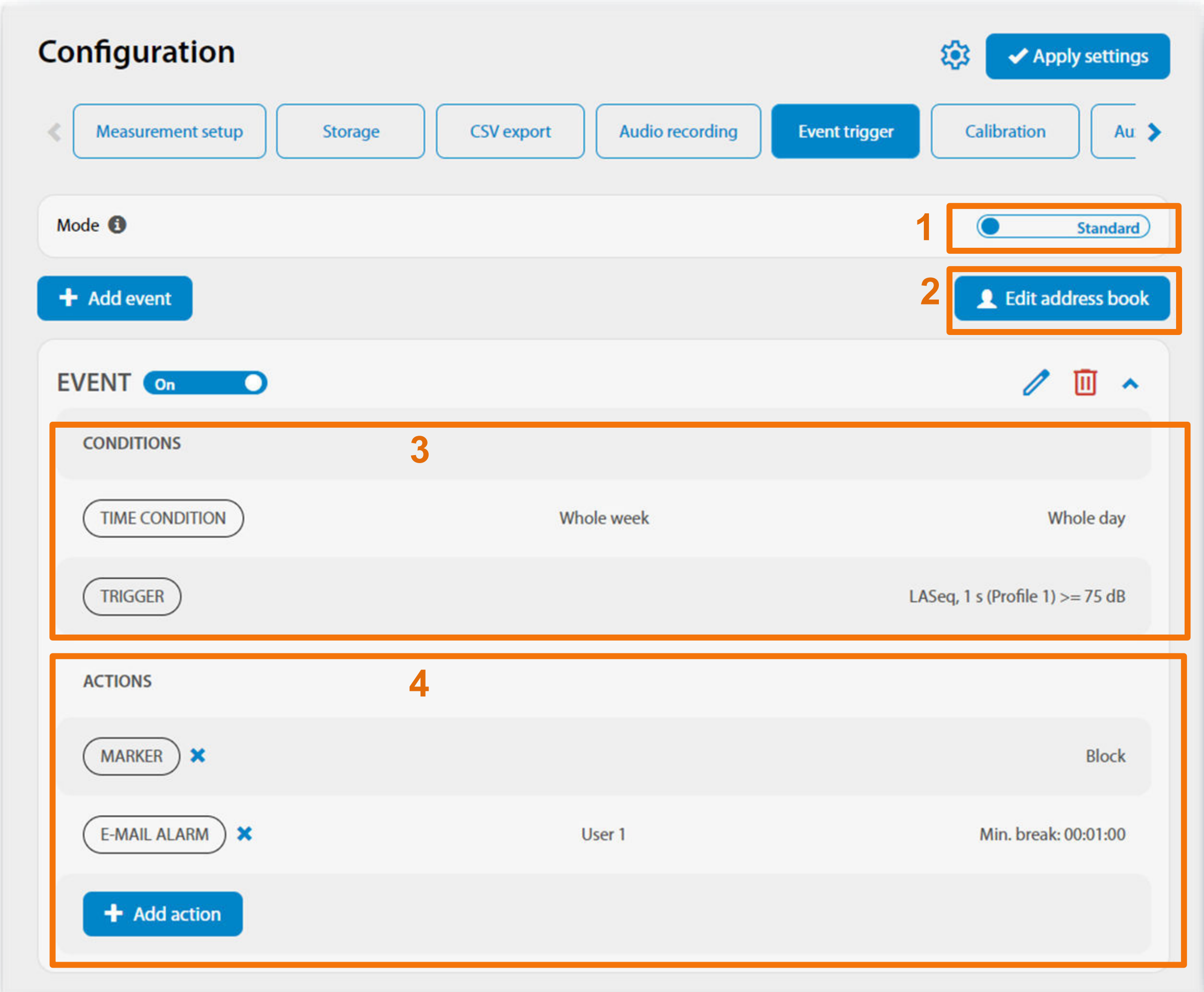
Selecting a higher sampling rate ensures that higher frequencies are recorded but also increases the file size.

The audio recording trigger is configured in the **Event trigger** section.

Event trigger

The **Event trigger** section allows you to define event conditions for triggering audio recording and alarms. In this section you can:

1. Select the **Mode** for the event: *Standard* or *Advanced*. In *Standard* mode, you can select only one **TRIGGER** condition per event. In *Advanced* mode, you can select several **TRIGGER** conditions per event. In this case, all conditions have the AND logic, i.e. they are superimposed.
2. Edit the book containing the addresses of SMS and e-mail recipients by clicking on **Edit address book**.
3. Specify Events as a combination of superimposed **CONDITIONS** (logical AND), such as specific time intervals (**TIME CONDITION**) in which measurement thresholds are exceed or system events occur in a logical OR (**TRIGGER**).
4. Specify actions (**Actions**) to be triggered when events occur, such as recording a block marker to the logger file (**MARKER**), recording the audio signal to the logger file or wave file (**AUDIO**), generating an alarm signal on the I/O socket (**I/O ALARM**), sending an SMS (**SMS ALARM**) or an email (**E-MAIL ALARM**) with the alarm notification.



When events are defined, the **Event trigger** section shows the list of events.

You can configure **CONDITIONS** and **Actions** using the corresponding buttons. The settings are displayed in the row of this button.

For example, the EVENT configuration in the above screen means that the event will appear when the LASeq value averaged over 1 second in the first profile exceeds the threshold of 75 dB. The occurrence of such an event will generate a block marker and an email with the alarm notification.

Creating Events

To create a new event, click on **+Add event**. The new **Event** sector will appear where you can:

1. Rename, delete and hide the event settings.
2. Configure the Conditions by clicking on the corresponding button (**TIME CONDITION**, **TIME LIMITS** and **TRIGGER**).
3. Add and configure the Actions.

Configuring Conditions

Click the **TIME CONDITION** button to open the TIME CONDITION configuration ox.

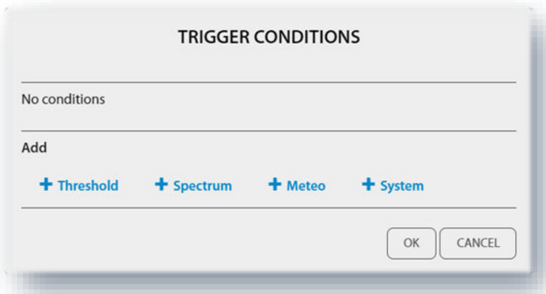
This box allows you to select days and time periods for event registration.

Press **OK** to confirm the settings.

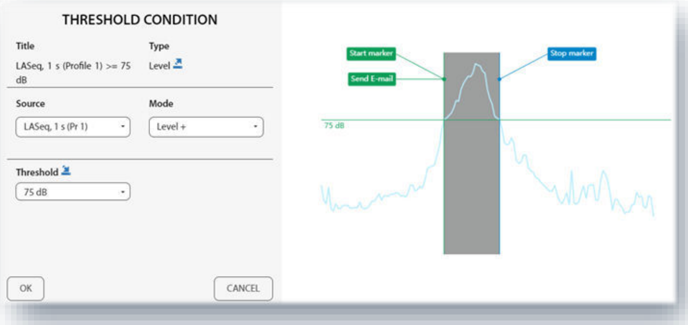
Click the **TRIGGER** button to open the TRIGGER CONDITIONS configuration box.

This box allows you to add the type of condition: **Threshold**, **Spectrum**, **Meteo** or **System**.

These conditions are mutually exclusive for the same event.

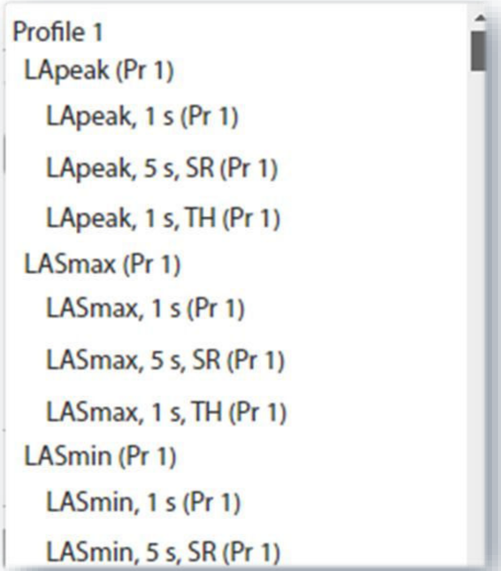


The **Threshold** condition can be of the type **Level+** or **Level-** (**Mode**). The condition is met during the period in which the controlled value of the selected result (**Source**) is higher/lower than the **Threshold** level.

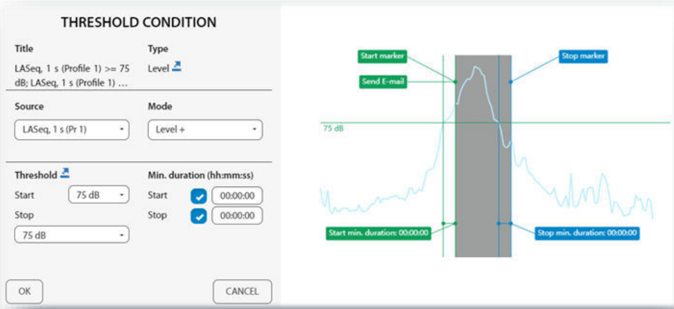


As a **Source**, you can select different results (Leq, Lpeak, Lmax, Lmin, LAE, etc.) for three profiles (Pr 1, Pr 2 and Pr 3) measured over: 1s, integration period (e.g., 1m, SR) or time-history step (e.g., 50, TH).

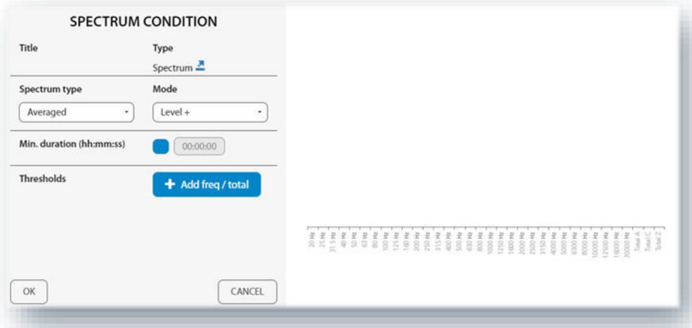
In the example on the right, “1m, SR” means that the Integration period for the Summary results has been set to 1 minute, while “50, TH” means that the Step for the time history has been set to 50 milliseconds.



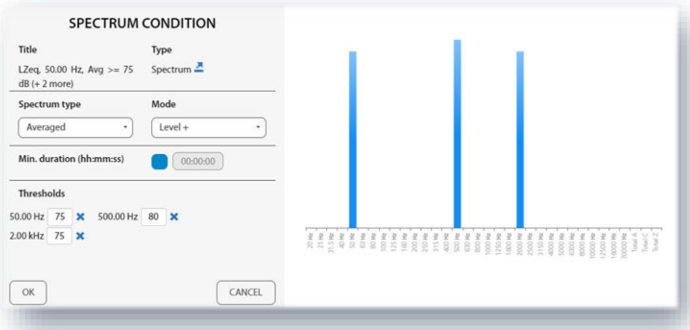
If you expand the **Threshold** item by clicking the Threshold field, you can define the **Start** and **Stop** thresholds and delays (**Min. duration**) of the start and stop of the condition.



In the **SPECTRUM CONDITION** pop-up box, you can define a mask for the thirty one 1/3 octave bands spectrum and three Total results. If the measured spectrum (**Averaged**, **Instant**, **Maximum** or **Minimum**) will show the excess of the levels (**Level + Mode**) or the lowering of the levels (**Level - Mode**) defined for the mask, then the condition will be active during **Min. duration** time.



To start mask creation, click **+Add freq/total** and select the spectrum frequency or the Total result.



Then select the threshold level for that frequency/Total in the **Thresholds** position.

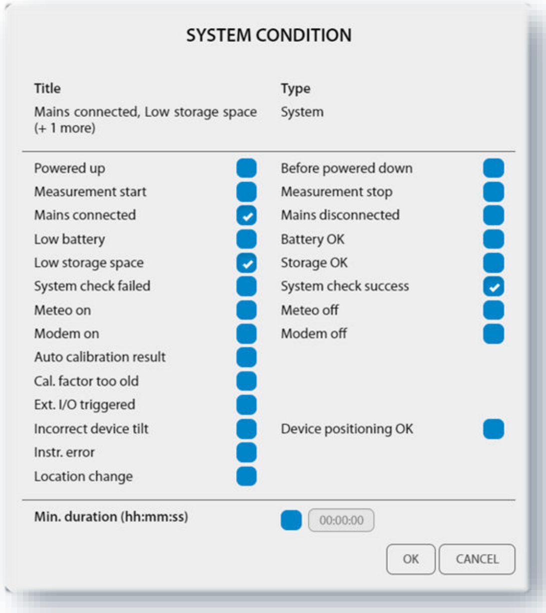
The **Meteo** condition is similar to the **Threshold** condition and can be of the **Level+** or **Level-** type (**Mode**). The condition is fulfilled during the period in which the controlled value of the selected result (**Source**) is higher/lower than the **Threshold** level.

As a **Source**, you can select different results (MAX WIND, AVG WIND or RAIN) measured over: 1s, Summary results Integration period (for example, 1m, SR) or Time History step (for example, 50, TH).

In the example on the right, 1m, SR means that the Integration period has been set to 1 minute, while 50, TH means that the time history step has been set to 50 milliseconds.

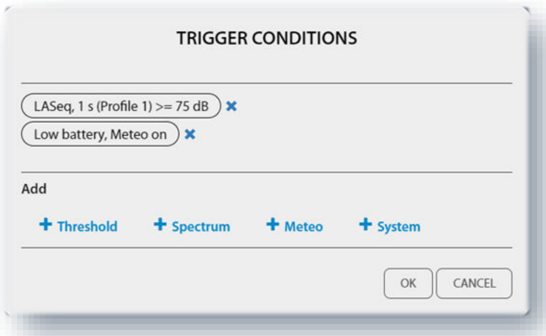
The **System** trigger activates the event when some of the system conditions occur: **Low battery**, **Low storage space** etc.

You can define the duration for which these conditions will be active (**Min. duration**). If the new condition occurs during this time, the duration will be extended to another **Min. duration**, and so on.



As mentioned above, in *Standard* mode you can only select one **TRIGGER** condition per event.

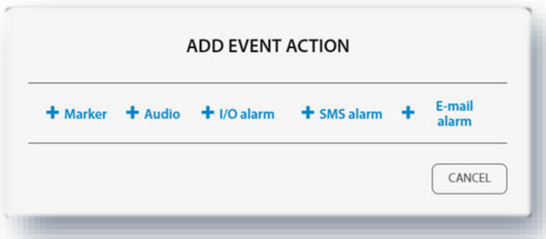
In *Extended* mode, you can select several **TRIGGER** conditions per event. In this case, all the conditions have AND logic, i.e. they are superimposed.



All **CONDITIONS** settings will be presented in the row of appropriate buttons.

Creating Actions

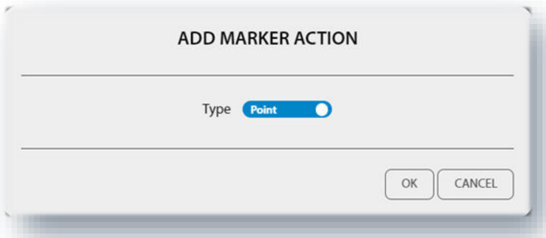
To create additional action, click on **+Add action** and in the ADD EVENT ACTION pop-up box, click on the action you wish to add and to configure: **Marker** (marker recording), **Audio** (audio signal recording), **I/O alarm** (generation of positive voltage on the MULT.I/O connector, see Appendix C to the SV 200A User Manual), **SMS alarm** or **E-mail alarm**.



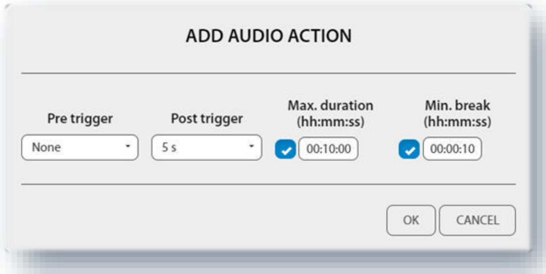
After occurrence of the event, actions will be performed during the time the event is active, at its beginning or at the end depending on the action type.

The **Marker** action registers a marker in the logger file.

The marker can be of the **Point** or **Block** type. The Point marker is registered at the beginning of the event. The Block marker is registered at the beginning and at the end of the event.



The **Audio** action starts recording the signal to the logger file (Event recording) or to the WAV file (Wave recording). depending on the mode selected in the **Audio recording** section.



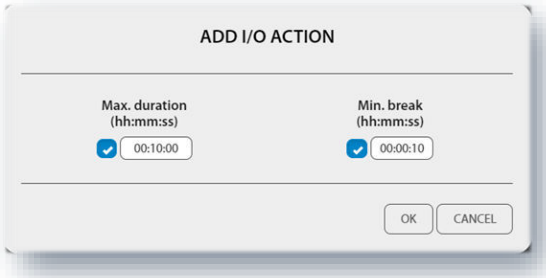
Pre trigger allows the recording to start earlier of than the event start.

Post trigger allows the recording to stop later than the event stop.

Max. duration defines the maximum recording time after the event start.

Min. break defines the minimum interval between two consecutive recordings.

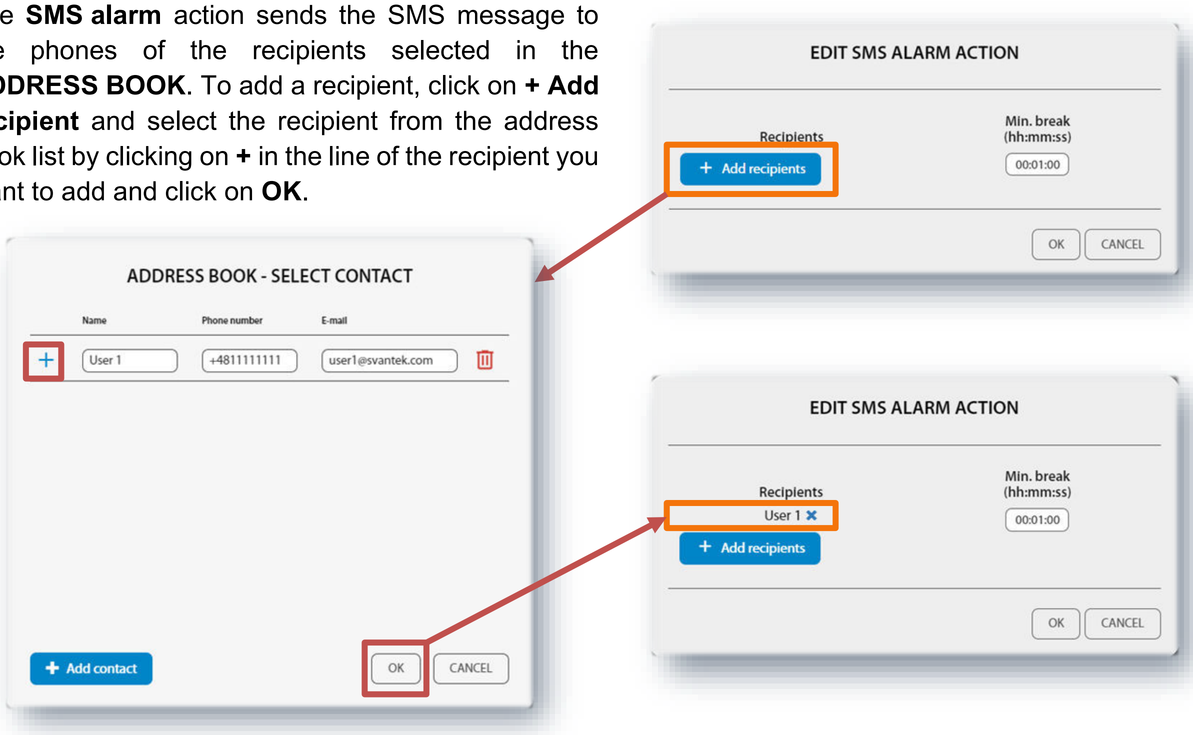
The **I/O alarm** action starts an alarm signal on the output of the MULTI I/O socket to which an alarm device can be connected (e.g. alarm lamp), see Appendix C.



Max. duration defines the maximum duration of the alarm signal after the start of the event.

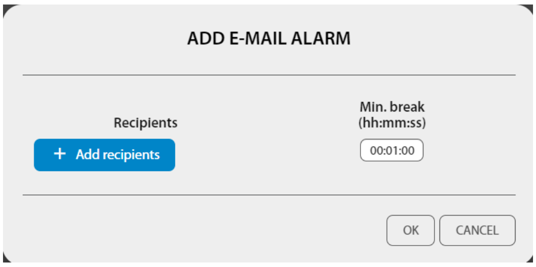
Min. break defines the minimum interval between two consecutive alarms.

The **SMS alarm** action sends the SMS message to the phones of the recipients selected in the **ADDRESS BOOK**. To add a recipient, click on **+ Add recipient** and select the recipient from the address book list by clicking on **+** in the line of the recipient you want to add and click on **OK**.

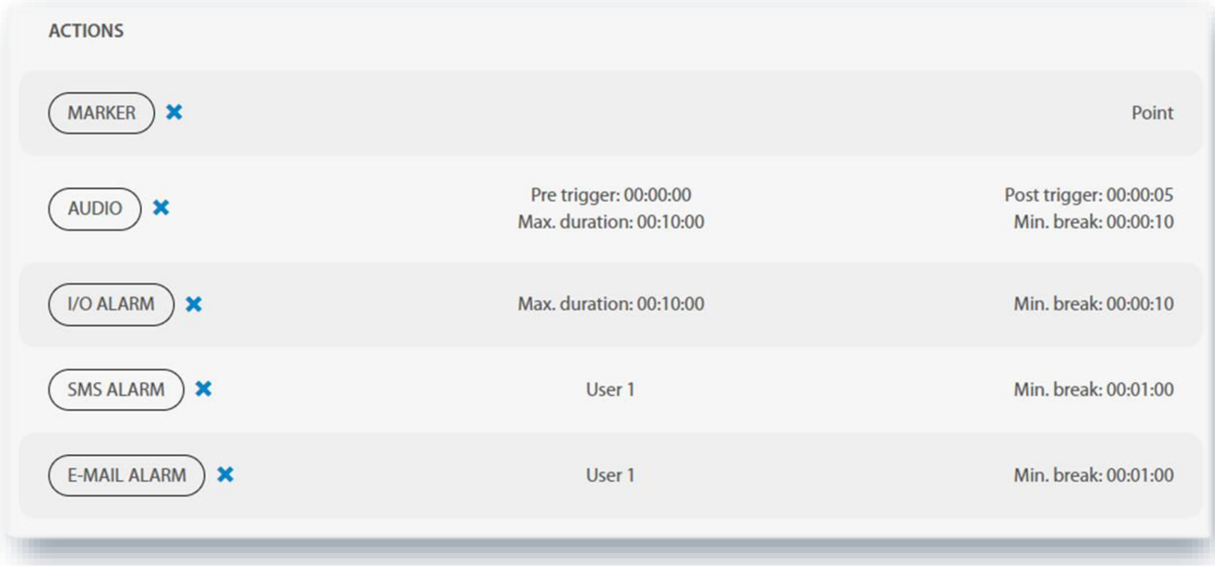


The **E-mail** action sends the email message to the mailboxes of the recipients selected in the **ADDRESS BOOK**.

Min. break defines the minimum time break between two consequent SMSs or emails.



All **Actions** settings are displayed in the rows of the corresponding buttons.

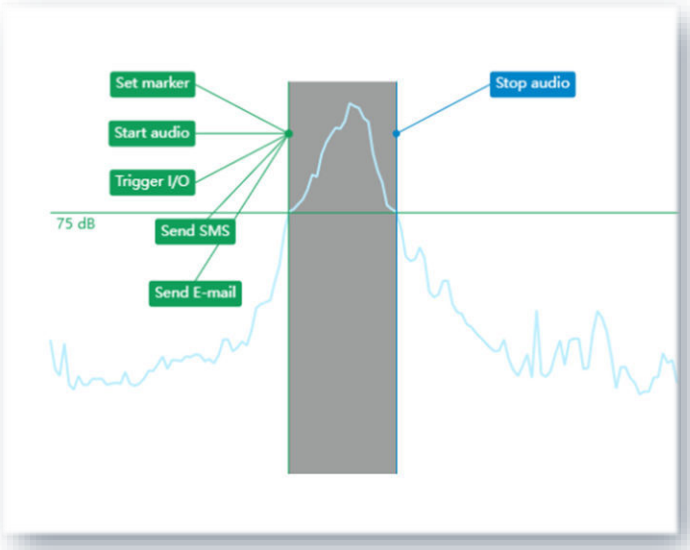


When actions are defined for the Threshold, Spectrum and Meteo trigger, the THRESHOLD CONDITION configuration box shows their start and stop at the illustrative graph.

As can be seen, the I/O, SMS and E-mail actions are performed at the start of the event.

Actions defined for the System triggers start when the system events occur.

The Point Marker is recorded in the SVL file at the start of the event. The Block Marker is recorded at the beginning and at the end of the Threshold, Spectrum and Meteo event.

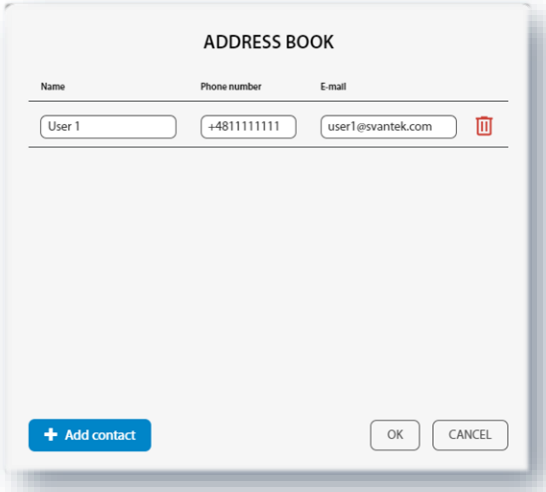


The execution of Audio actions depends on the duration of the event and the settings of the Pre trigger, Post trigger, Maximum duration and Minimum break. Audio actions start for the Pre trigger period before the event starts and end for the shorter of the event plus Post trigger or Maximum duration.

Address book

You can edit the address book by clicking **Edit address book** in the **Event trigger** section of the **Configuration** view.

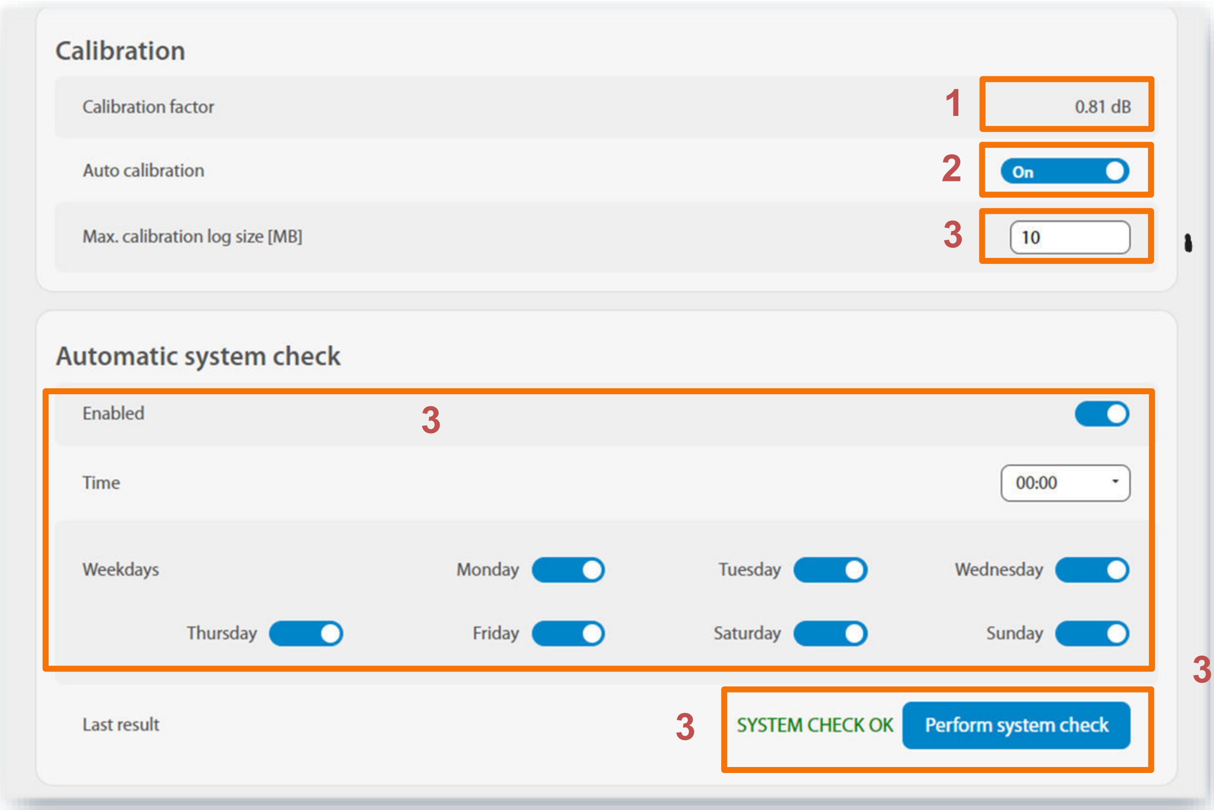
To add the address, click on **+Add contact**. To remove the address, click on the trash icon.



Calibration

In the **Calibration** section, you can:

1. Check the calibration factor,
2. Activate the **Auto calibration** function,
3. Define the **Maximum calibration log size in MB**,
4. Enable the **Automatic system check** (**Enabled** button) and set the time and days of the week when the system check will be performed,
5. **Perform system check now**. manually.



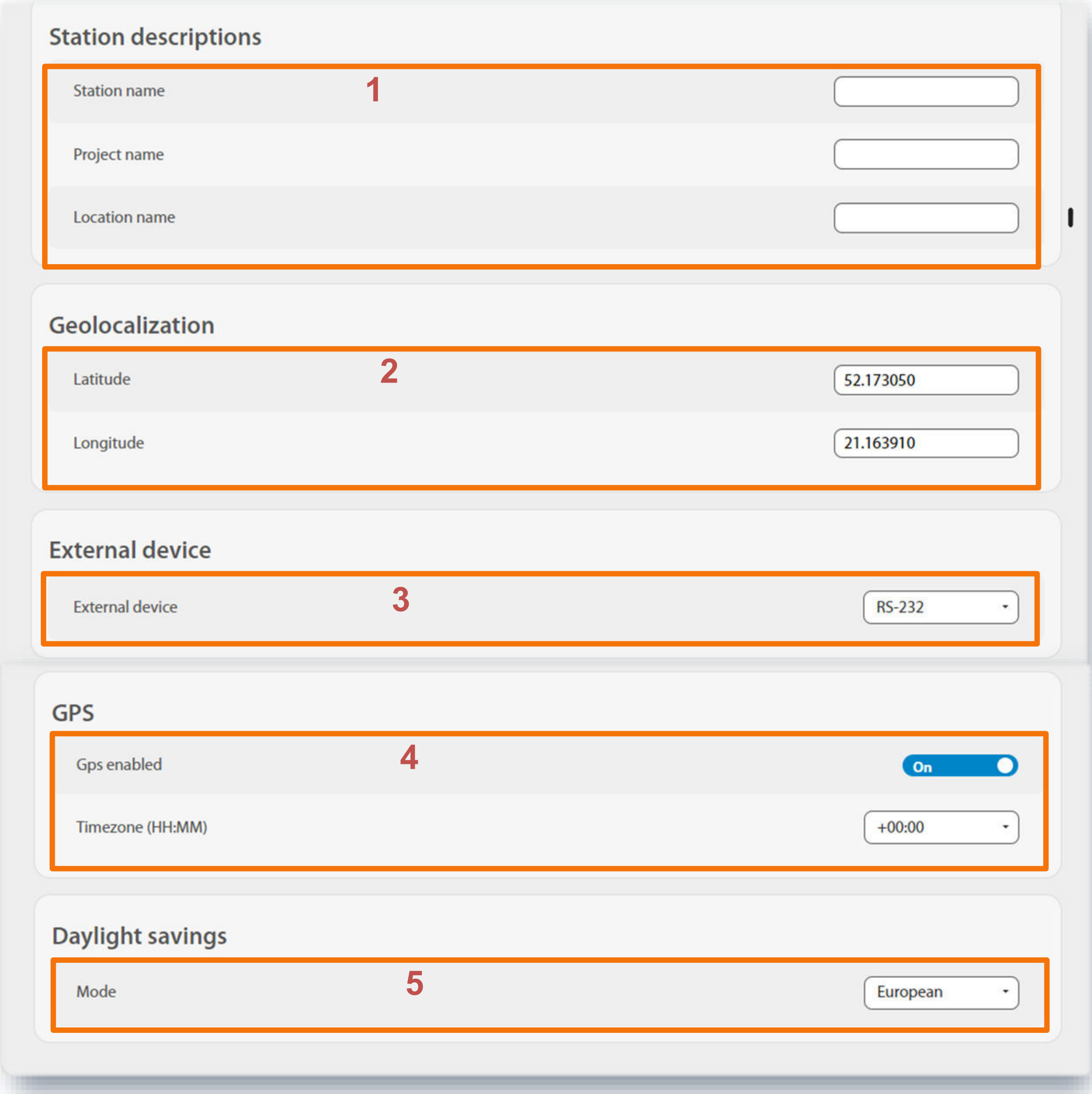
When the **Automatic system check** is enabled, the instrument's calibration factor is periodically checked using the built-in electrostatic actuator.

Note: *System check cannot be considered as a calibration. The calibration factor is not updated during the* ***Automatic system check*** *procedure.*

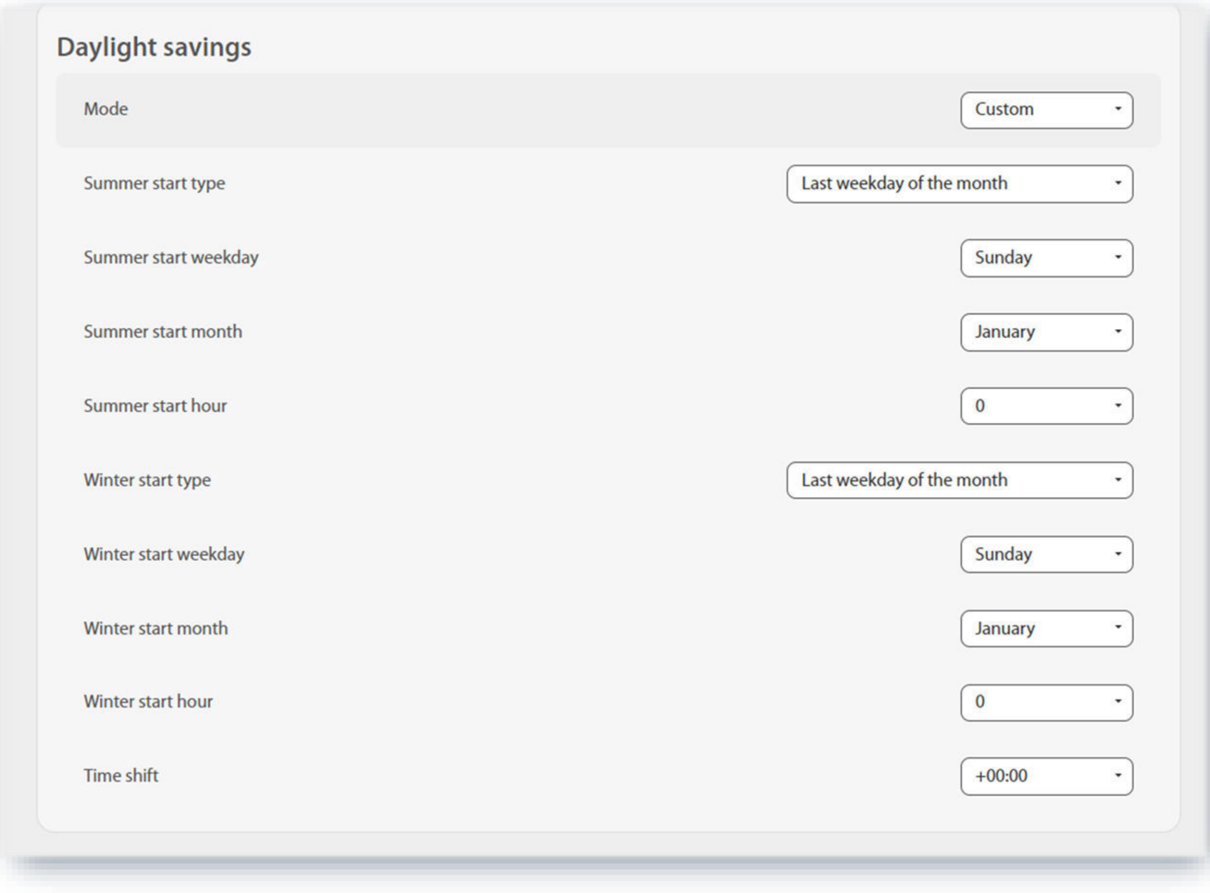
Auxiliary settings

In the **Auxiliary settings** section, you can:

1. Enter **Station description**: **Station name**, **Project name** and **Location name**.
2. Enter the instrument's **Geolocalization** (**Latitude** and **Longitude**). If instrument's GPS is active, the latitude and longitude are automatically read out from the GPS.
3. Select the **External device**: **RS 232** or weather station **Meteo** (SP 275, SP 277),
4. Configure GPS: switch on GPS (**GPS enabled**) and select **Timezone,**
5. Configure the **Daylight savings**: *None*, according to the *European* or *United States* rules or *Custom*.



If the *Custom* is selected, you can define your own daylight saving time rules.



Firmware upgrade

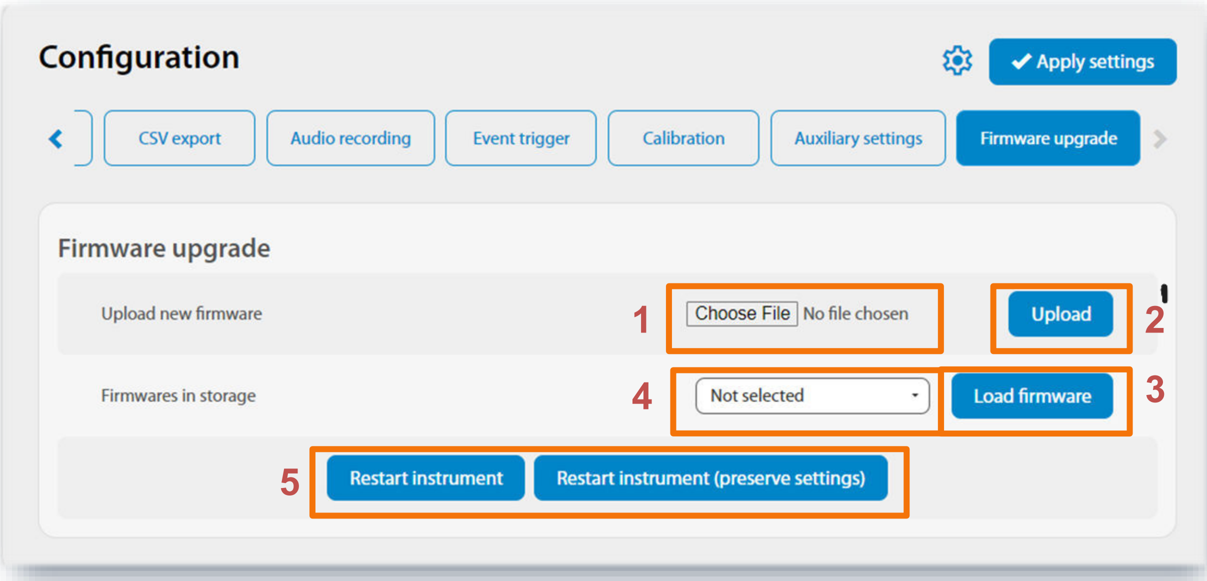
In the **Firmware upgrade** section, you can upload new firmware to the instrument memory and perform the upgrade remotely.

Before upgrading, it is essential to download the correct firmware file from the Svantek website to your PC.

To load new firmware:

1. Click **Choose file** and select the firmware *.bin file on your PC.
2. Upload the selected file by clicking the **Upload** button.
3. When the upload is complete, select the new firmware file in the firmware selector.
4. Click on **Load firmware**.
5. Click on **Restart instrument** or **Restart instrument (preserve settings)** to complete the process and wait 60 seconds for the connection to be reestablished. Measurements will start automatically.

Note: *After clicking on* **Restart instrument (preserve settings)***, all previous instrument settings are retained. After clicking on* **Restart instrument***, only the communication settings are retained, all other parameters are reset to default.*

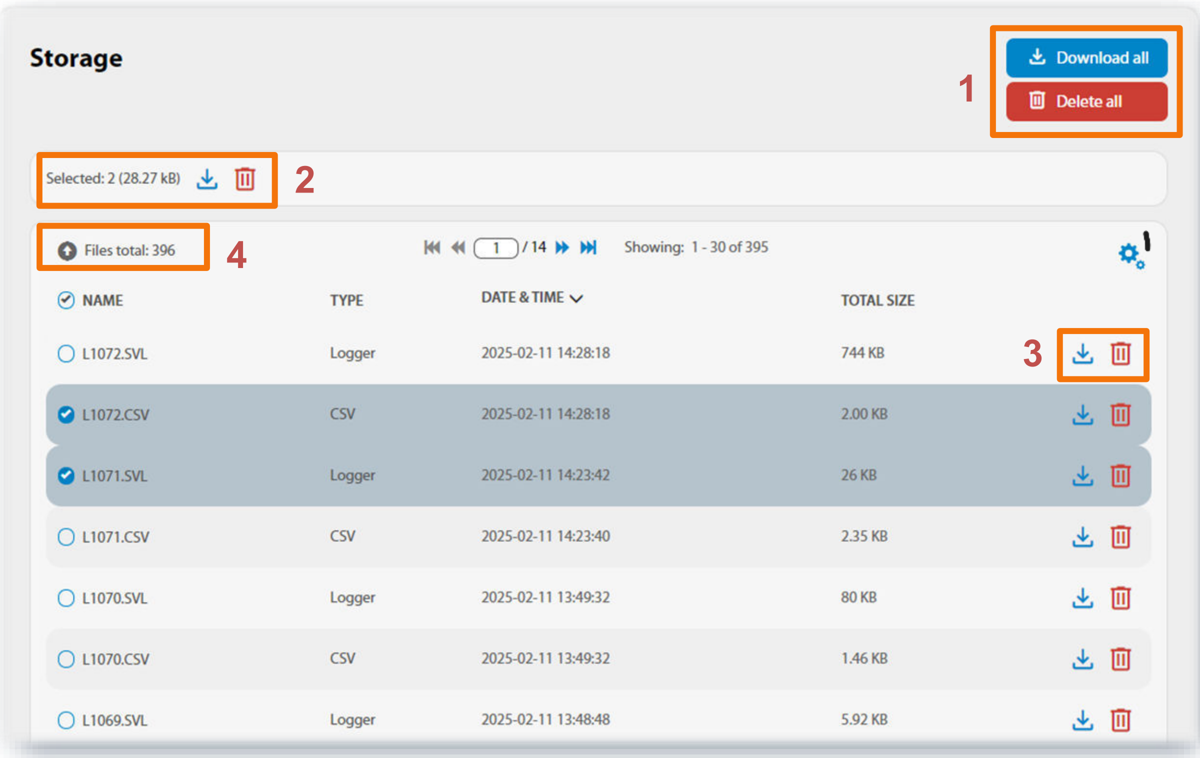


7.4 STORAGE VIEW

The file **Storage** view displays a list of files saved in the instrument memory. The list contains only files from a single directory and initially displays the contents of the current working directory.

In the **Storage** view, you can:

1. Download or delete all files.
2. Select multiple files and download or delete the selected files.
3. Download or delete individual files by clicking the right icons on the file row.
4. Navigate through the folder structure by clicking the “folder up” button.

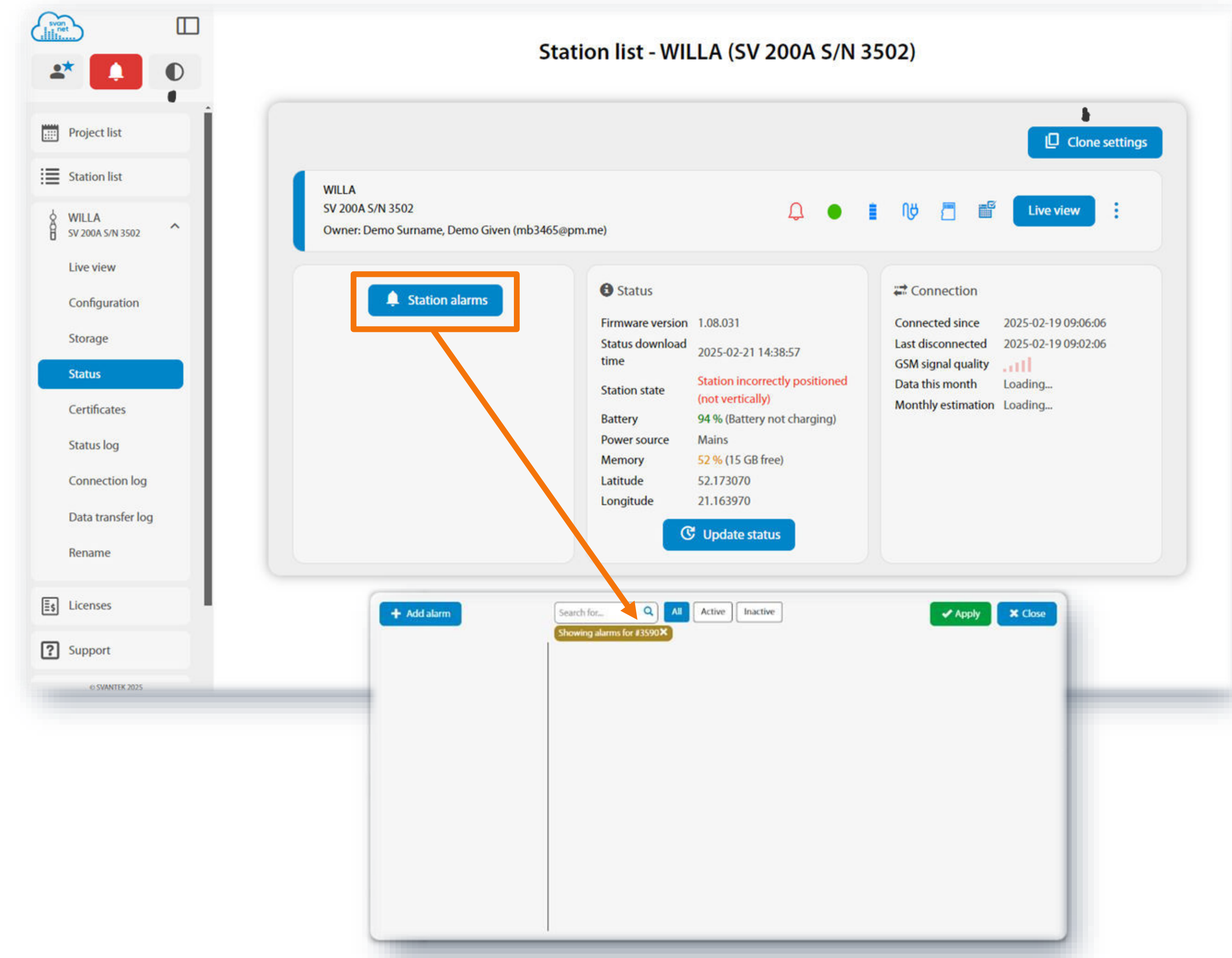


7.5 STATUS VIEW

In the **Status** view you can:

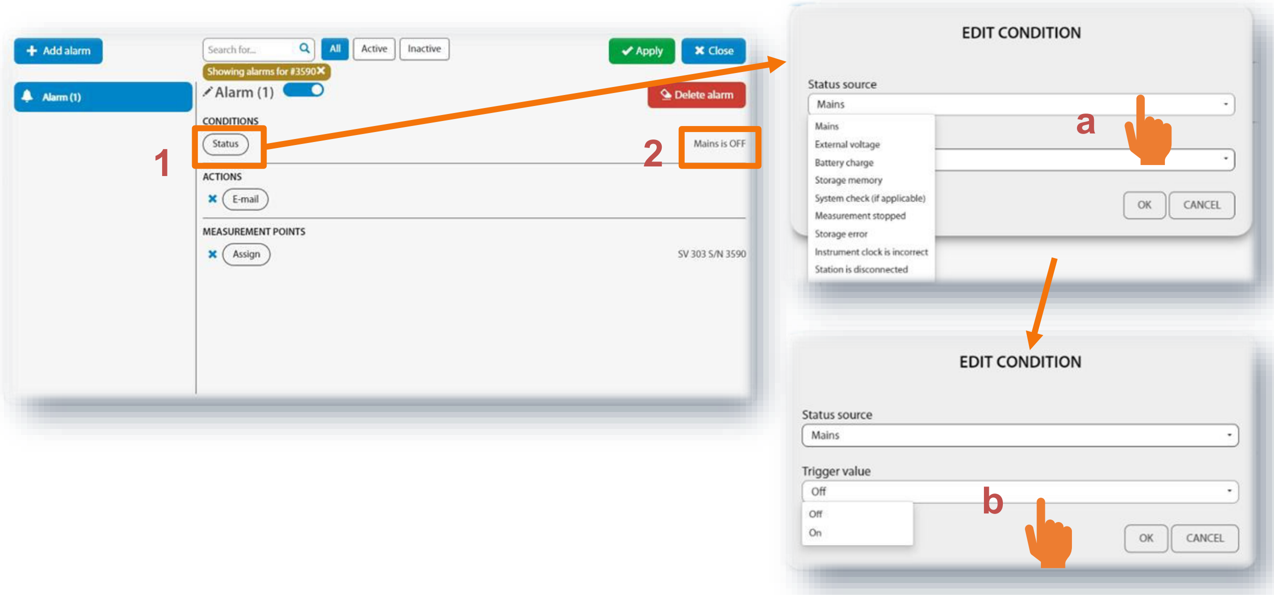
- check the status of the station (firmware version, battery charge, memory, connection, etc.),
- configure alarms for the respective states that *SvanNET* will generate and send to the defined recipients in the form of an email (**Station alarms** button),
- update the status of the station (**Update status** button).

Note*: In this view you can configure alarms generated by SvanNET based on data received from all stations assigned to your account. Some stations can also generate their own alarms, which can be configured via the Configuration view (see Chapter 7.3).*



After clicking the **Station alarms** button, click **+Add alarm** in the pop-up box and the new **Alarm(1)** will appear with CONDITIONS, ACTIONS and MEASUREMENT POINTS settings. Alarms are based on conditions and relate to selected measurement points. They generate actions – emails to the specified recipients. To configure an alarm:

1. Click on the **Status** button and in the EDIT CONDITION configuration box:
   a. select **Status source**: **Mains**, **External voltage**, **Battery charge**, **Storage memory**, **System check**, etc.,
   b. click on the **Trigger value** selector and choose the required value of the selected **Status source**.



2. Click **OK** and the new condition will appear in the CONDITIONS area.
3. Click on the **E-mail** button to enter/edit email recipients or additional options depending on the selected Status source (e.g. **Instrument** if the *Measurement Stopped* status source was selected).
4. Click on the **Assign** button to assign the alarm to the station(s).

The selections made are displayed in the ACTIONS and MEASUREMENT POINTS sections.

The *SvanNET* alarms have the following meanings:

- **Mains**
  - Trigger Value: Off – alarm is generated when the system detects a loss of power.
  - Trigger Value: On – alarm is generated when the system detects appearance of power supply.
- **External voltage**
  - Trigger Value: xx.xx V – alarm is generated when the system detects that the external power supply has dropped below the set value. In this case, external power means the power supply and all various battery packs.
- **Battery charge**
  - Trigger Value: xx % - alarm is generated when the system detects a decrease in the percentage of battery charge below the selected threshold.
- **Storage memory**
  - Trigger Value: xx MB/GB - alarm is generated when the system detects a decrease in free storage space below the selected threshold.
- **System check (if applicable)**
  - Alarm is generated when the system detects an error in the execution of the system check procedure (not live check).
- **Measurement stopped**
  - Alarm is generated when the system detects that a measurement has been stopped. Applies to stopped measurements only - condition such as start delay, waiting for synchronisation and pause are treated as a running measurement.
  - Instrument action: Start measurement.
- **Storage error**
  - Alarm is generated when the system detects an SD card error. The check assumes that a measurement is running, and data is being recorded; the writing of the logger file is checked by changing of the free space on the card (which means that the instrument is writing data).
  - Instrument action: Restart the measurement.
- **Instrument clock is incorrect**
  - Trigger value: xx seconds / xx minutes – alarm is generated if the RTC indication of the instrument differs from the current system time (based on owner's time zone) by ± of the selected value.
  - Instrument action: Set instrument clock to server time (based on owner's time zone) – measurement is stopped, instrument clock is set (based on owner's time zone), measurement is resumed.
- **Station is disconnected**
  - Trigger value: xx minutes / xx hours – alarm is generated when the station remains disconnected from *SvanNET* for a time equal to the selected value.

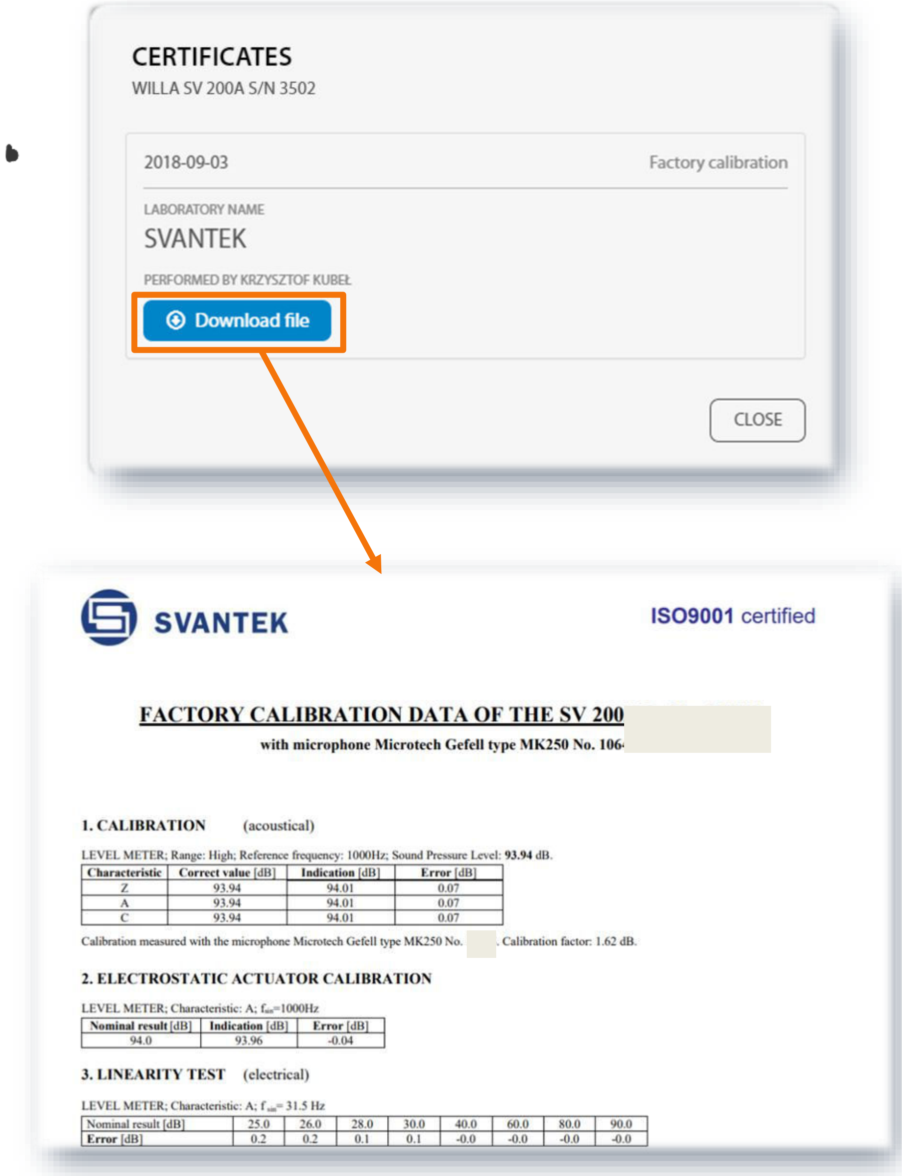
Alarms are reported once after the occurrence of an alarm condition. The occurrence of an alarm condition will generate selected actions (e.g., e-mail) at the moment the status changes compared to the previous check (i.e., if at 8:15 there is power supply, at 8:30 mains is off, at 8:45 mains is still off, the system will generate an alarm at 8:30 and will be still until mains is on and off again).

7.6 CERTIFICATES VIEW

The **Certificates** button opens the CERTIFICATES dialogue box showing a list of available certificates for this station.

The certificate is attached to each instrument and contains a calibration card and instrument specifications.

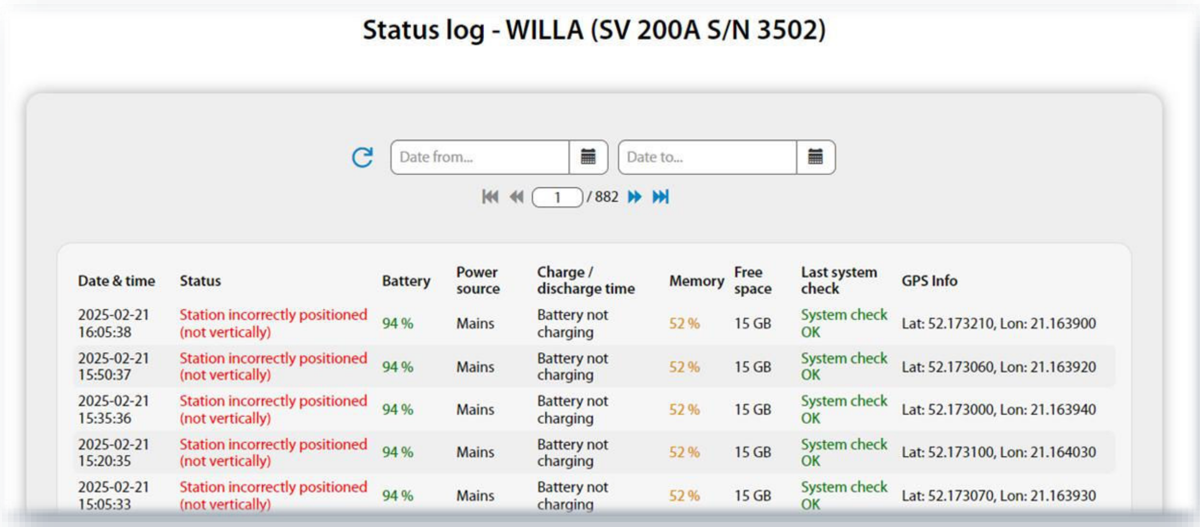
You can download the certificate as a PDF file by clicking **Download file**.



7.7 LOG VIEWS

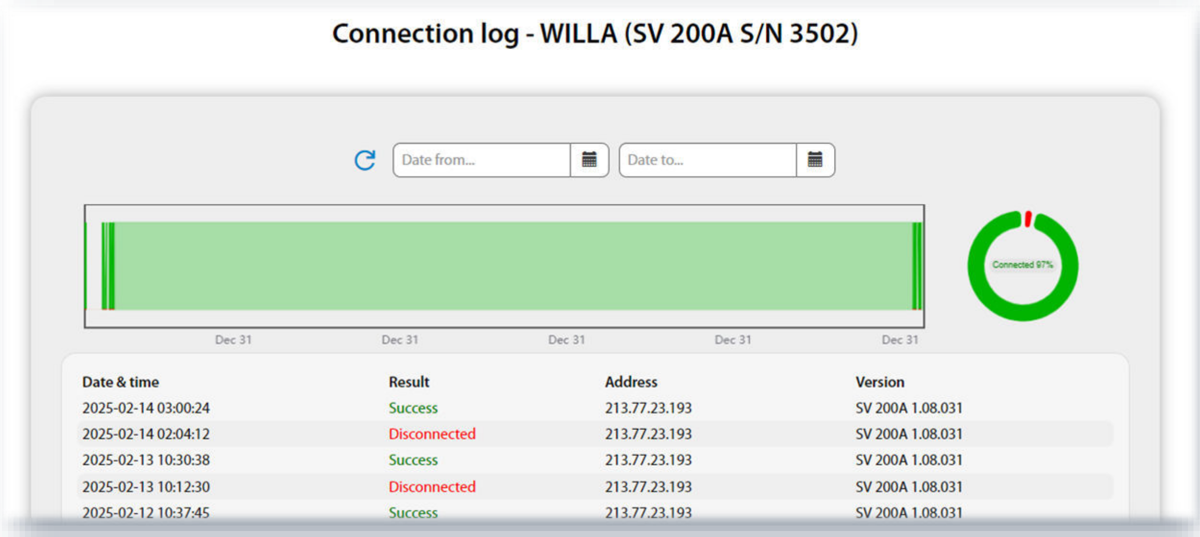
There are three station logs that register system events, connections, and data transfer:

- **Status log** that registers the power source type and charge level, free memory space, GSM signal quality, system check history and GPS information.
  In the upper line you can: refresh the log, select the period of records to be displayed and rewind records.



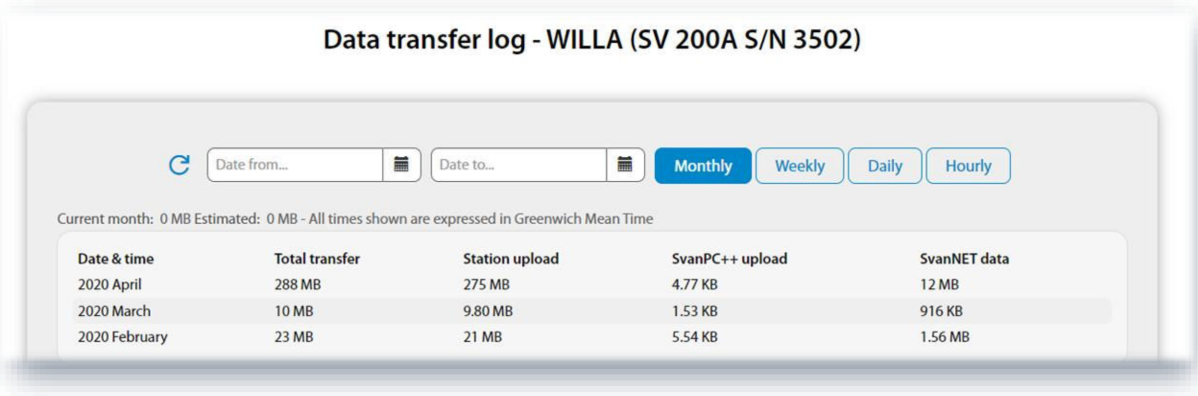
Date & time	Status	Battery	Power source	Charge / discharge time	Memory	Free space	Last system check	GPS Info
2025-02-21 16:05:38	Station incorrectly positioned (not vertically)	94 %	Mains	Battery not charging	52 %	15 GB	System check OK	Lat: 52.173210, Lon: 21.163900
2025-02-21 15:50:37	Station incorrectly positioned (not vertically)	94 %	Mains	Battery not charging	52 %	15 GB	System check OK	Lat: 52.173060, Lon: 21.163920
2025-02-21 15:35:36	Station incorrectly positioned (not vertically)	94 %	Mains	Battery not charging	52 %	15 GB	System check OK	Lat: 52.173000, Lon: 21.163940
2025-02-21 15:20:35	Station incorrectly positioned (not vertically)	94 %	Mains	Battery not charging	52 %	15 GB	System check OK	Lat: 52.173100, Lon: 21.164030
2025-02-21 15:05:33	Station incorrectly positioned (not vertically)	94 %	Mains	Battery not charging	52 %	15 GB	System check OK	Lat: 52.173070, Lon: 21.163930

- **Connection log** that registers the history of station connections – result (successful or disconnected), IP address, firmware version and reason of the disconnection.
  In the upper line you can: refresh the log, select the desired period of records to be displayed and rewind records. Below is the time history of connections with *SvanNET*. The pie chart shows the total connection time as a percentage of the total working time.



Date & time	Result	Address	Version
2025-02-14 03:00:24	Success	213.77.23.193	SV 200A 1.08.031
2025-02-14 02:04:12	Disconnected	213.77.23.193	SV 200A 1.08.031
2025-02-13 10:30:38	Success	213.77.23.193	SV 200A 1.08.031
2025-02-13 10:12:30	Disconnected	213.77.23.193	SV 200A 1.08.031
2025-02-12 10:37:45	Success	213.77.23.193	SV 200A 1.08.031

- **Data transfer log** that registers the history of data transfers (uploads).
  In the upper line you can: refresh the log, select the desired period of records to be displayed and select the period for the data transfer presentation: Monthly, Weekly, Daily or Hourly.



8 SVANPC++ PC SOFTWARE

SV 200A can be fully controlled via the *SvanPC++* software, which also provides a wide range of data post-processing and reporting functions.

Note: *All SvanPC++ functionalities are well described in SvanPC++ User Manual. In this manual only the most useful and device-specific functions are described.*

SV 200A must be connected to the PC either using the USB cable or mobile, WLAN or LAN connection. In all cases except USB, *SvanPC++* should be supplemented with the *Remote Communication (RC)* module.

8.1 SVANPC++ SOFTWARE INSTALLATION AND ACTIVATION

To download and install *SvanPC++* and Svantek *USB Drivers* go the website: SVANTEK Support and Service - Sound and Vibration.

SvanPC++ requires Windows operating system and minimum system parameters of the PC: 1GHz CPU, 1 GB RAM (2GB RAM for x64 system), 20 GB HDD, 1024x768 display.

Note*: The Remote Communication module should be activated for each individual Svantek device. Remember to enter the activation key for each new device you want to manage with the RC module.*

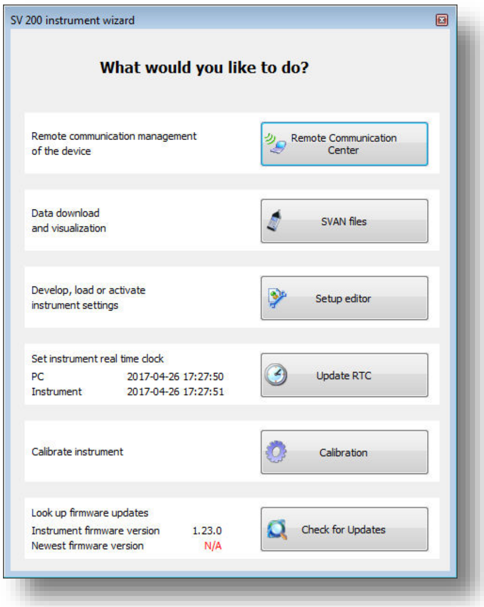
8.2 SV 200A CONTROL VIA USB INTERFACE

Although SV 200A is designed for wireless remote control, it can also be easily configured and controlled via the USB interface. The USB interface or WLAN in AP mode can be used for the initial wireless communication configuration. The USB interface can also be used in an emergency, when the wireless connection has been interrupted or when the wireless communication is not available for some reason, or in situations where the measurement process doesn't require wireless control of the instrument.

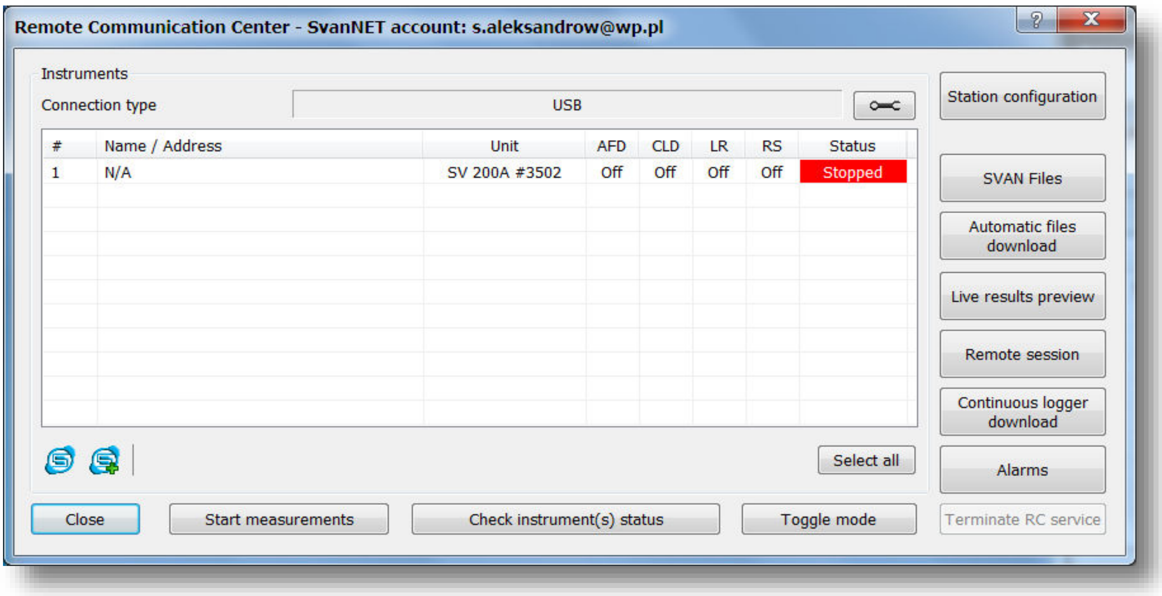
The philosophy of controlling the instrument from SvanPC++ either via USB or via wireless communication is generally the same.

After connecting the instrument to the PC with *SvanPC++* running via the SC 256A USB cable the **SV 200 instrument wizard** dialog box appears on the screen. It allows you to:

- Configure the connection with *SvanNET* (**Remote Connection using SvanNET** button). Once the connection is configured, the **Remote Communication Center** button will be displayed instead.
- Download or upload files (**SVAN files**).
- Configure the instrument settings (**Setup editor**).
- Set the instruments' real time clock (**Update RTC**).
- Calibrate the instrument (**Calibration**).
- Compare the firmware version installed on the instrument with the latest available version (**Check for Updates**).



When the **Remote Communication Center** button is pressed, the **Remote Communication Center** dialog box appears, allowing full control of the instrument.



8.3 CONFIGURING WIRELESS CONNECTION

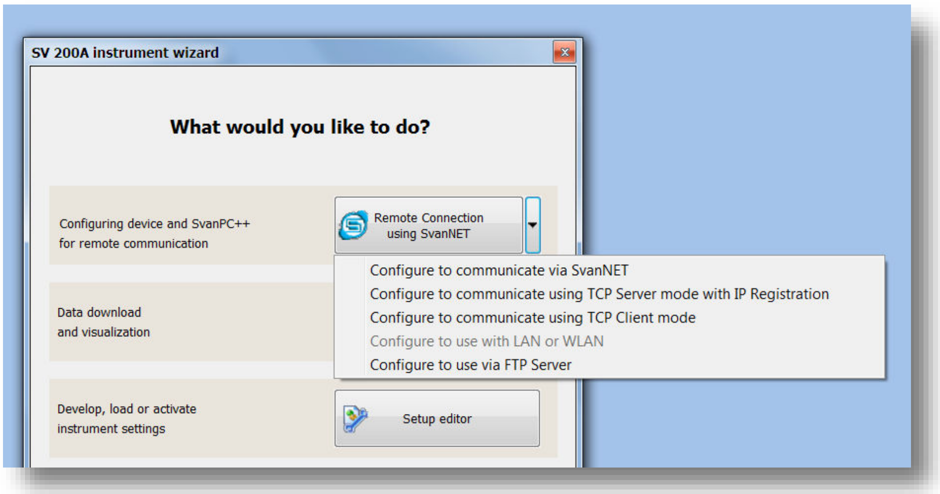
SV 200A is equipped with an internal mobile modem and LAN/WLAN module, which allow wireless remote control of the instrument, downloading measurement files, configuring settings, sending alarm emails, etc. To access SV 200A remotely, the instrument must first be properly configured via the USB connection.

All types of connections can be configured using the **SV 200A instrument wizard** described below.

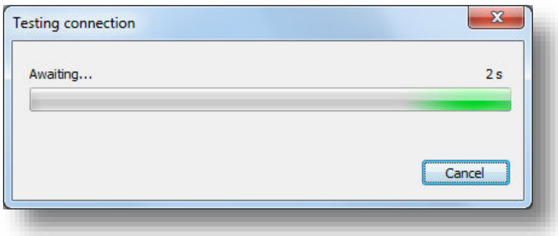
Note: *SVANTEK does not provide a SIM card for the instrument. It is necessary to purchase the SIM card with a data plan. If the instrument is intended for continuous monitoring, select a service provider that ensures good reception at the measurement point.*

Note: *Before inserting the SIM card into SV 200A, make sure that the PIN code is deactivated.*

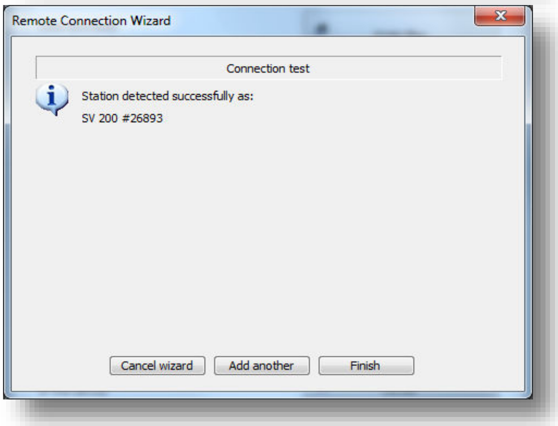
1. Connect the instrument to the PC using the SC 256A USB cable.
2. In the **SV 200A instrument wizard** dialog box, click on the **Remote Connection using SvanNET** button that allows you to create and manage a connection to the *SvanNET* web service, the easiest way to remotely control all types of instruments with mobile modems and all types of SIM card credentials, or open the pop-up list with other connection options.



3. Each item in the pop-up list opens the **Remote Connection Wizard** window where you can add new stations. All **Remote Connection Wizard** windows are self-explanatory, so you should only fill in the required fields based on the mobile operator information.
4. After entering all the required information, *SvanPC++* will check the connection settings. Wait until the process is finished. It may take a few minutes.



5. When the configuration is complete, you can exit the wizard or add another instrument.

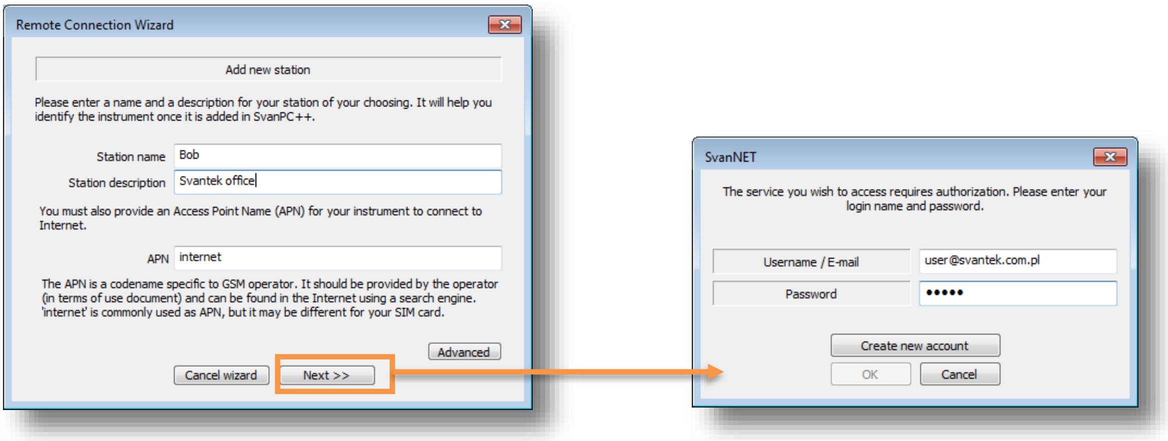


8.3.1 *Connections via the mobile modem*

As mentioned above, **Remote Connection using SvanNET** is the easiest way to install wireless communication. All other options require more effort. If you want to use other options, you must refer to the SvanPC++ User Manual for details.

In the **Remote Connection Wizard** dialog box, enter the **Station name**, **Station description** and **APN** of the mobile operator. If necessary, use the **Advanced** button to enter additional parameters required by the mobile operator.

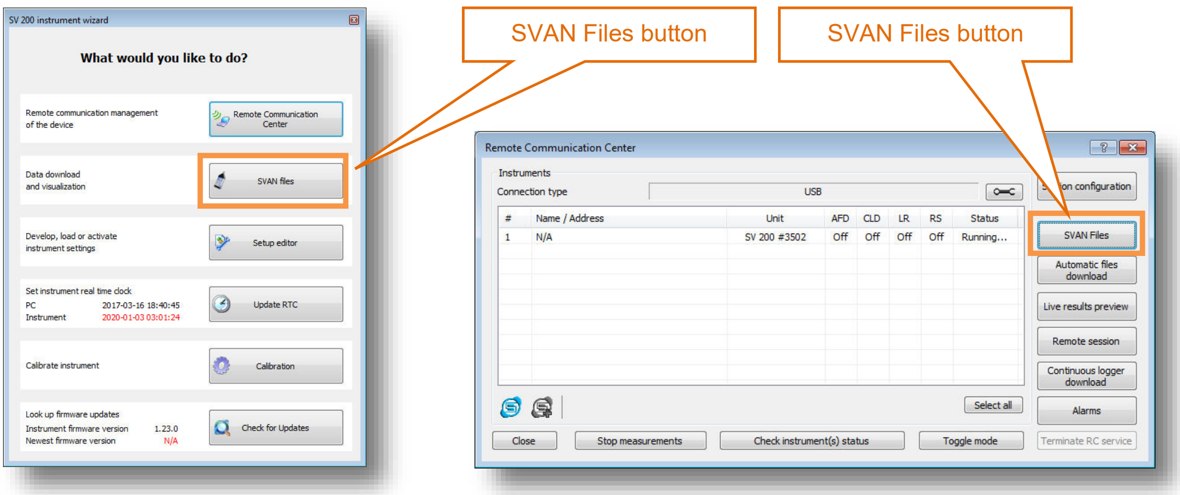
After filling in the required fields in the **Remote Connection Wizard**, press the **Next>>** button and enter the login and the password of your registered account.



Press the **OK** button and *SvanPC++* will make the connection settings (step 4 of the above procedure).

8.4 MANAGING INSTRUMENT FILES

Instrument files are accessed from the **SVAN Files** dialogue box where you can manage instrument files, open data files and configure setup files. The **SVAN Files** dialogue box can be accessed either from the main SvanPC__ tool, from the **SV 200 Instrument wizard** or from the **Remote Communication Center**.



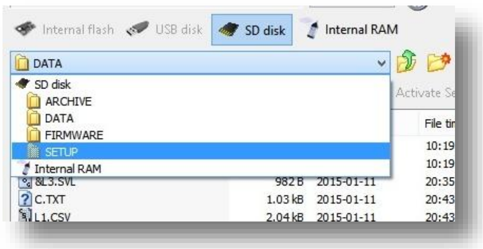
The **SVAN Files** dialogue box consists of two sections: instrument (left) and PC (right). Each section contains tools for managing files (selecting memory, directory and files, deleting files, creating directories, applying filters, etc.).

8.4.1 *Browsing memory contents*

SV 200A has two types of memory that you can view: **SD disk** for measurement files and **Internal RAM** for current settings.

By default, the SD card contains the following directories:

- **ARCHIVE**, where old measurement files can be stored,
- **DATA**, which is the default working directory of the instrument,
- **FIRMWARE**, which contains firmware packages uploaded via the web interface,
- **SETUP**, which contains setup files created by users.

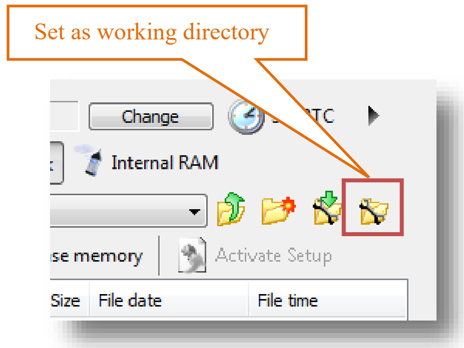


You can create or delete your own directory.

8.4.2 *Changing the working directory*

The working directory is a folder in the instrument's memory where all the measurement files are stored. To change the working directory:

1. Select the desired working directory in the left section of the **SVAN Files** dialogue box.
2. Click the **Set as working directory** button.

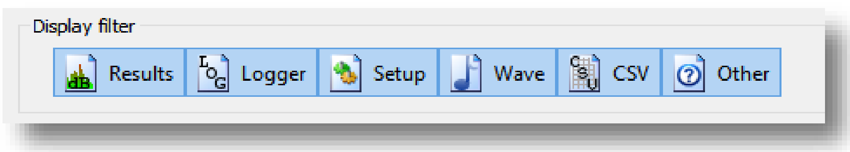


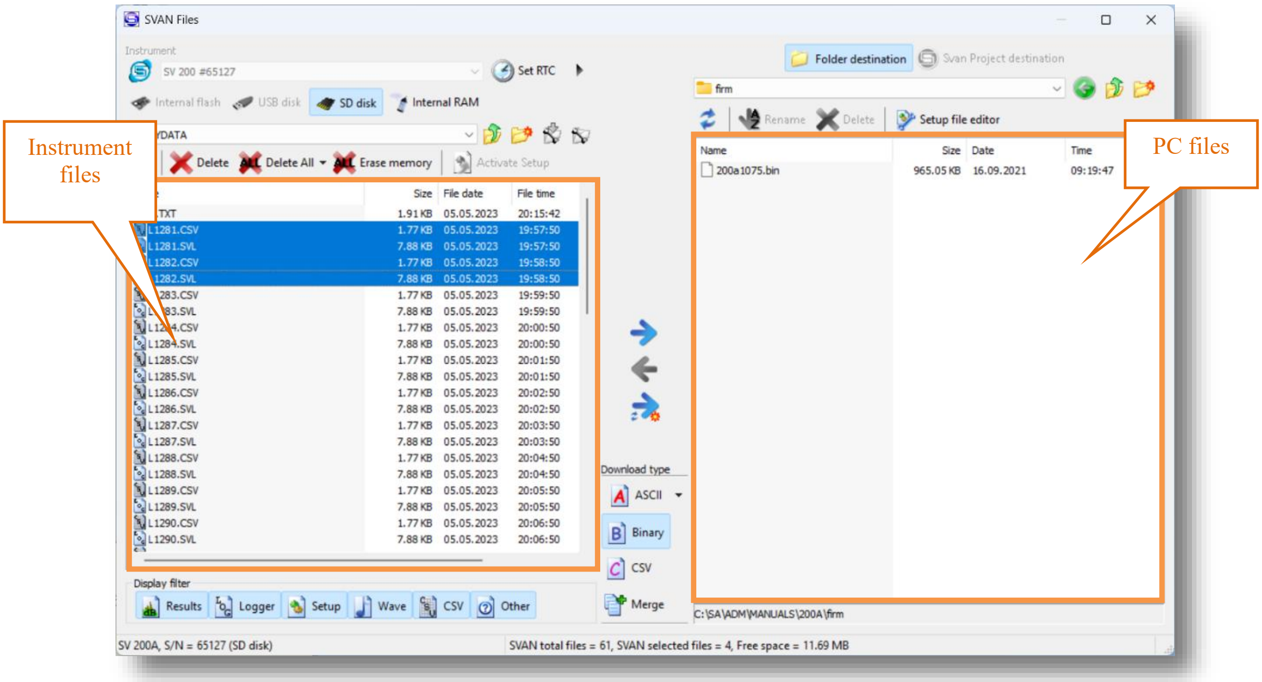
From this point on, all results files will be stored in the selected director.

8.4.3 *Download/upload files*

The arrows between the instrument and PC sections are used to download files from the instrument to the PC and upload files from the PC to the instrument.

The **Display filter** can be used to select specific file types to be displayed in the navigation pane.



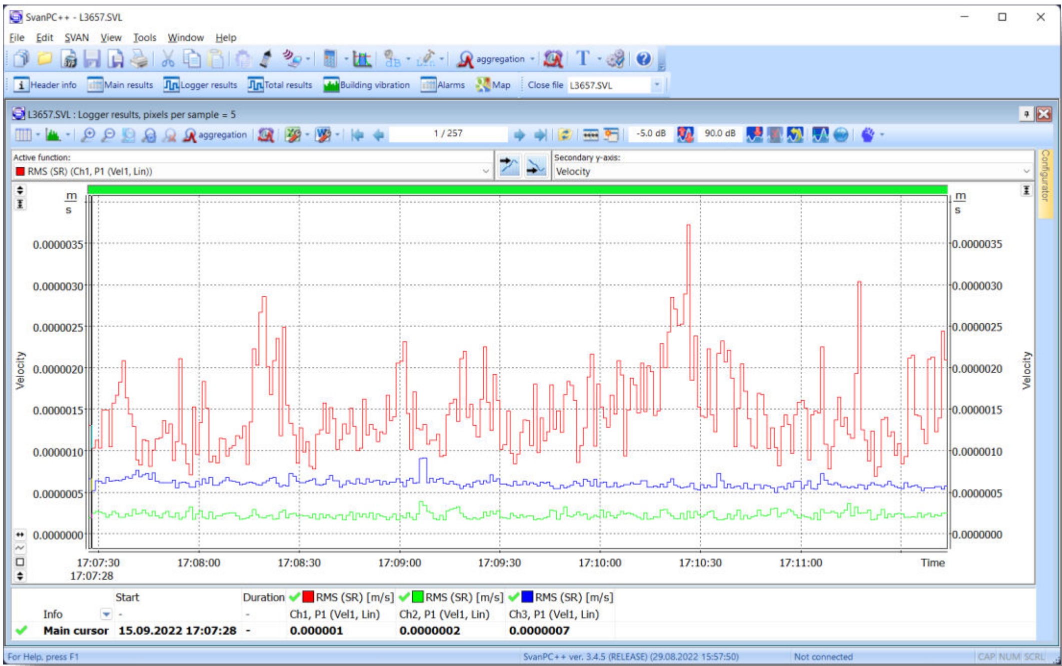


To download files from the instrument to a PC:

1. Select the directory on a PC to download files (right section).
2. Select the instruments file to be download (left section) and
3. Press the right arrow button (centre section).

8.4.4 Opening files

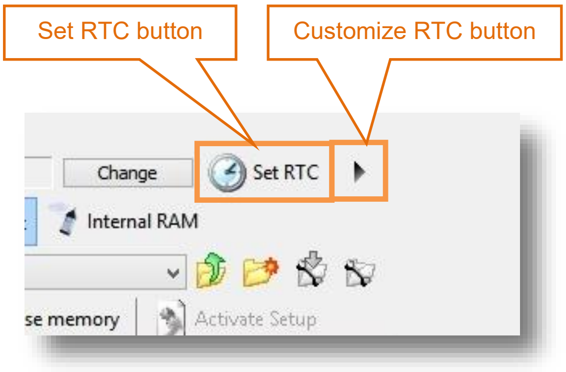
Double-click on the file name to open the **Viewer** module, which provides various tools for viewing the data. This module is described in detail in *SvanPC++ User Manual*.



8.4.5 Updating RTC

SVAN Files enables setting the real time clock (**RTC**) of SV 200A. Current PC time can be set as well as manually selected value.

To synchronize SV 200A time with the current PC time click **Set RTC** button. To enter other value click **Customize RTC** button.

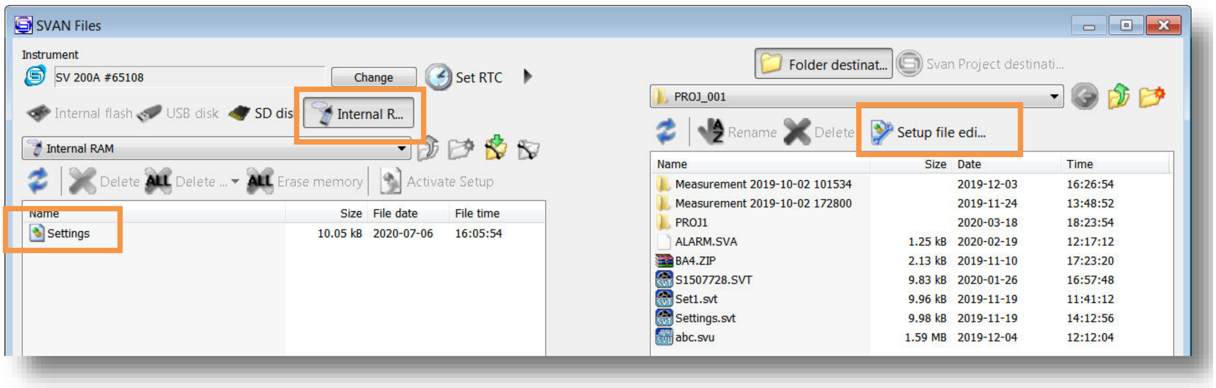


8.5 CONFIGURING INSTRUMENT SETTINGS

The instrument settings can be configured using *Setup file editor*, which can be opened from the **SVAN Files** dialog box.

In order to edit a setup file:

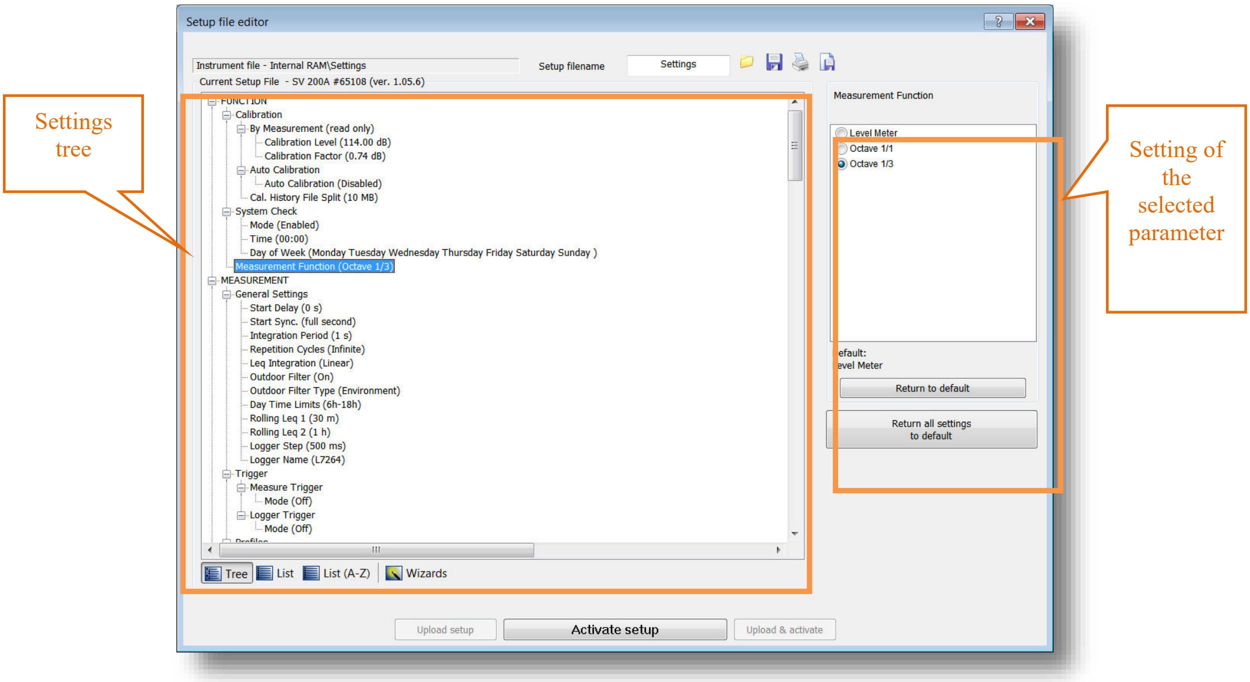
- press the **Internal RAM** button, select the *Settings* file and double click it, or
- press the **Setup file editor** button, located in the top right corner of the window.



All the settings available in the SV 200A are visible and available for editing in the advanced mode of the setup file editor. The list of settings on the left side of the window can be displayed in a tree view or a list view. You can change the view using the buttons at the bottom of the window.

To change settings in the *Extended* mode, use the controls that appear in the panel at the top right of the window after selecting parameter from the list.

At the top of the *Setup file editor* window, there are several file management buttons that allow you to open a setup file stored on the PC, save the currently edited setup file to the PC, print the currently edited setup file, or save the contents of the currently edited setup file in a simple text format.



The default, *Tree View*, offers the settings arranged in the form of a tree, similar to the structure of the instrument menu. The nodes represent menu sections, while the leafs represent parameter settings that can be edited in the top right corner of the window. The settings are sorted according to the menu structure accessible via the instrument's display panels.

Some of the settings are linked to each other, which means that one of them will only be available for editing if the other one is set to a certain value.

When you have finished configuring the settings, press the **Activate setup** button.

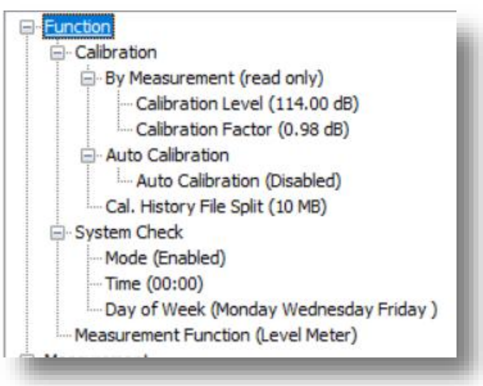
In *Extended* mode, you can restore the factory (default) settings by pressing the **Return all settings to default** button.

The *Setup file editor* allows you to edit all settings (except Alarms). Some settings can only be edited through the *Setup file editor*. For example, you can set the **Display** parameters, such as: **Y-axis scale** (*10dB, 20dB, 40dB, 80dB, 120dB*), **X-Axis grid** (*On, Off*), **Display off time** (*Off, 15 ÷ 900 second*), **Auto rotate** (*On, Off*).

The settings tree consists of sections which allows you to configure measurement and hardware settings of the SV 200A: **Function**, **Measurement**, **Instrument**, **Auxiliary Setup** and **Display**.

The **Function** section allows you to:

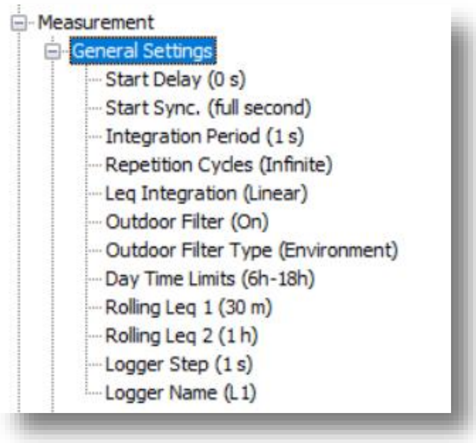
- Check the **Calibration Level** used during calibration and the **Calibration Factor**.
- Enable/disable **Auto Calibration**.
- Set the maximum size in MB when the **Calibration History File** is **Split**.
- Configure **System Check** tests:
    - Select **Mode**: *Enabled* or *Disabled*,
    - Set the **Time**,
    - Set the **Day of Week**.
- Select **Measurement Function**: *Level Meter*, *Octave 1/1* or *Octave 1/3*.



The **Measurement** section allows you to set measurement parameters and contains the following sub-sections: **General Settings**, **Trigger**, **Profiles**, **Logging**, **Statistics**, **Wave/Event Recording**, **Event Recording** and **Directivity**.

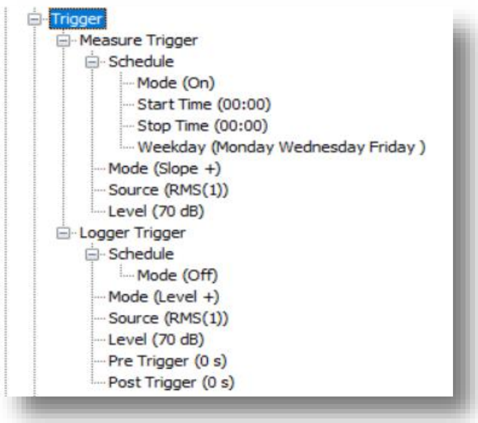
The **General Settings** sub-section allows you to set:

- **Start Delay**: *0 s ÷ 1 h*.
- **Start Synchronisation**: *Off*, *full second*, *full minute, quarter of an hour*, *half-hour* or *an hour*.
- **Integration Period**: *1 s ÷ 24 h* or *Infinite*.
- **Repetition Cycles**: *1 ÷ 1000* or *Infinite*.
- **Leq Integration**: *Linear* or *Exponential*.
- **Outdoor Filter**: *On* or *Off*.
- **Outdoor Filter Type**: *Environment* or *Airport*.
- **Day Time Limits**: *6h-18h* or *7h-19h*.
- **Rolling Leq 1**: *1 s ÷ 1 h*.
- **Rolling Leq 2**: *1 s ÷ 1 h*.
- **Logger Step**: *20 ms ÷ 1 h*.
- **Logger Name.**



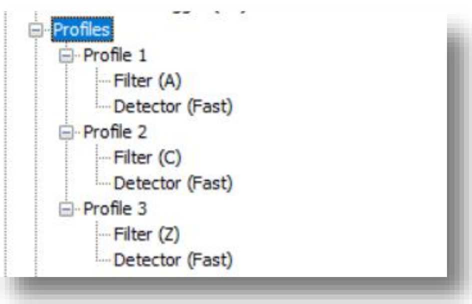
The **Trigger** sub-section allows you to:

- Set the **Measurement Trigger**:
  - Set **Schedule**:
    - Select **Mode**: *On* or *Off*,
    - Set the **Time**,
    - Set the **Day of Week**.
  - Select trigger **Mode***: Off*, *Slope+*, *Slope-*, *Level+*, *Level-*, *Gradient+* or *External I/O*.
  - Select trigger **Source**: *RMS(1*).
  - Set the threshold **Level**: *25 dB ÷ 130 dB*.
- Set the **Logger Trigger**:
  - Set **Schedule**:
    - Select **Mode**: *On* or *Off*,
    - Set the **Time**,
    - Set the **Day of Week**.
  - Select trigger **Mode***: Off, Level+* or *Level-.*
  - Select trigger **Source**: *RMS(1*).
  - Set the threshold **Level**: *25 dB ÷ 130 dB*.
  - Set **Pre Trigger** time: *0 s ÷ 10 s*.
    Set **Post Trigger** time: *0 s ÷ 3 m*.

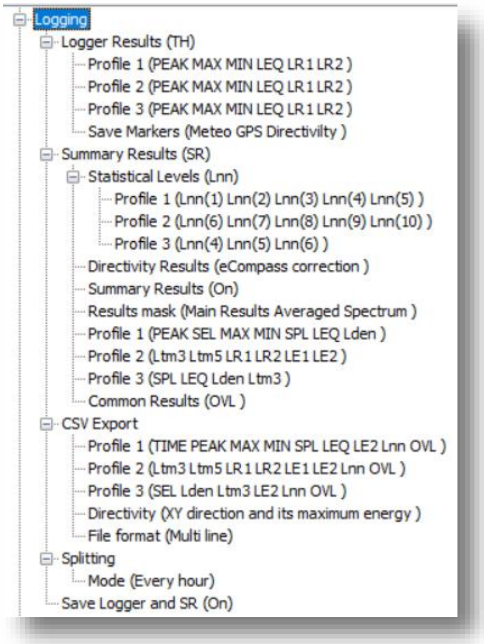


The **Profiles** sub-section allows you to:

- Set parameters for the **Profile 1**:
  - Weighting **Filter**: *Z, A, C* or *B*.
  - RMS **Detector**: *Impulse, Fast* or *Slow*.
- Set parameters for the **Profile 2**:
  - Weighting **Filter**: *Z, A, C* or *B*.
  - RMS **Detector**: *Impulse, Fast* or *Slow*.
- Set parameters for the **Profile 3**:
  - Weighting **Filter**: *Z, A, C* or *B*.
  - RMS **Detector**: *Impulse, Fast* or *Slow*.

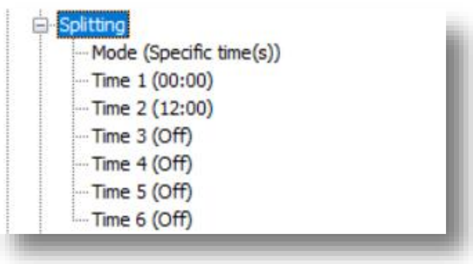


The **Logging** sub-section allows you to:



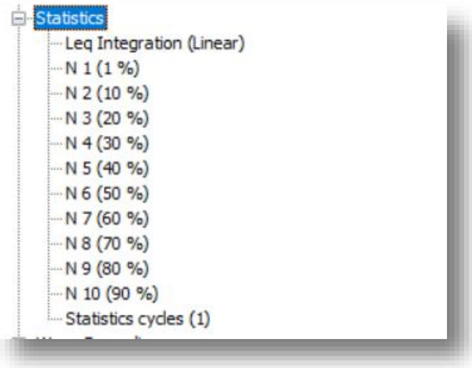
- For **Logger Results (TH)**:
  - Select results for the **Profile 1/2/3**: *PEAK, MAX, MIN, LEQ, LR1* and *LR2*.
  - **Save Markers**: *Meteo, GPS* and *Directivity*.
- For **Summary Results (SR)**:
  - Select **Statistical Levels (Lnn)** for
    - **Profile 1/2/3**: *Lnn(1) – Lnn(10)*.
  - Select **Directivity Results**: *Time, eCompass correction, XY direction and its maximum energy, Z direction and its maximum energy, Average energy distribution* and *Directivity histogram*.
  - Enable/disable storage of **Summary Results:** *On* or *Off.*
  - Select the **Results mask**: *Main Results, Averaged Spactrum, Maximum Spectrum, Minimum Spectrum, Statistical Levels (Lnn), Histograms* and *Meteo*.
  - Select results for **Profile 1/2/3**: *TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR1, LR2, LE1, LE2, Lnn* and *OVL.*
  - Select **Common Results**: *OVL*.

- For **CSV Export**:
  - Select results for the **Profile 1/2/3**: *TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR1, LR2, LE1, LE2, Lnn* and *OVL.*
  - Select **Directivity** results: *Time, eCompass correction, XY direction and its maximum energy, Z direction and its maximum energy, Average energy distribution* and *Directivity histogram*.
  - Select **File format**: *Multi line or Single line*.
- Configure logger file **Splitting**:
  - **Mode**: *Disabled, Integration time, Every 15 minutes, Every half an hour, Every hour* or *Specific time(s)*.
  - Set split times for *Specific time(s)* mode **Time 1/2/3/4/5/6**: *Off* or *00:00 ÷ 23:59*.
- Enable/disable **Save Logger and SR:** *On* or *Off.*

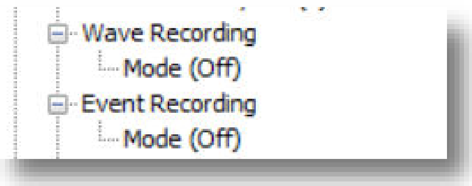


The **Statistics** sub-section allows you to:

- Select the **Leq Integration** for statistics: *Linear* or *Exponential*.
- Set the probability (in %) **N 1/2/3/4/5/6/7/8/9/10** for the Lnn results.
- Set the number of **Statistics Cycles**: *1, 2, 3 ….*



Wave Recording and **Event Recording** are mutually exclusive functions. If you switch one of them, the other becomes inaccessible.

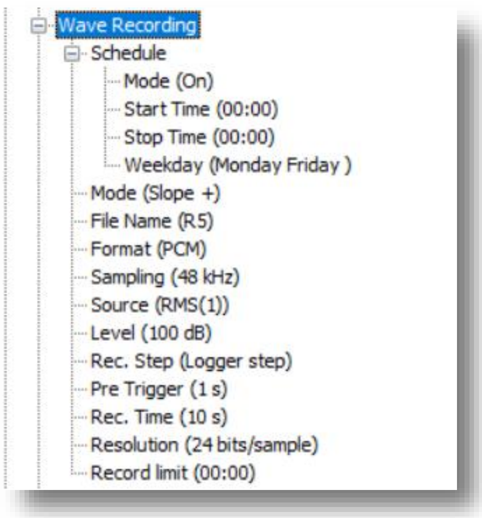


The difference is that the Wave Recording function records the audio signal to a separate file of the *.wav type, while the Event Recording function records the audio signal to the logger file along with the time history and summary results.

The settings of both types of recording are similar. The difference is that for the Wave Recording, you should set the file name and file format. For the Event Recording, you need to set the **Gain** parameter.

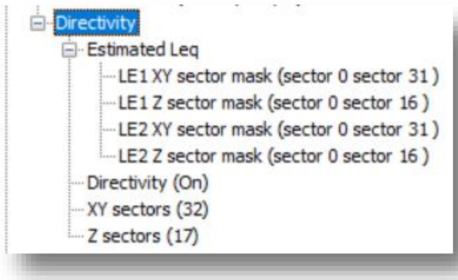
The **Wave Recording** sub-section allows you to:

- Set the **Schedule** for recording:
  - Select **Mode**: *On* or *Off*,
  - Set the **Start Time**,
  - Set the **Stop Time**,
  - Select the **Weekday**.
- Select recording **Mode**: *Off, Continuous, Slope+, Slope-, Level+, Level-, Gradient+, Integration Period* or *Advanced Alarms*.
- Set the WAV **File Name**.
- Select the WAV file **Format**: *PCM* or *Extensible*.
- Select the **Sampling** frequency: *12 kHz, 24 kHz* or *48 kHz*.
- Select the trigger **Source**: *RMS(1)*.
- Set the threshold **Level**: *25 dB ÷ 130 dB*.
- Set the **Recording Step**: *Logger Step, 0.5 ms, 0.1 s* or *1 s*.
- Set **Pre Trigger** time: *0 s ÷ 5 s*.
- Set **Recording Time**: *1 s ÷ 8 h*.
- Select **Resolution**: *16 bits/sample* or *24 bits/sample*.
- Set the **Record limit**: *00:00 ÷ 8:00*.



The **Directivity** sub-section allows you to:

- Set the sector masks for the **Estimated Leq**:
    - for **LE1 XY sector mask**: *sector 0 ÷ last XY sector*,
    - for **LE1 Z sector mask**: *sector 0 ÷ last Z sector*,
    - for **LE2 XY sector mask**: *sector 0 ÷ last XY sector*,
    - for **LE2 Z sector mask**: *0 ÷ last Z sector*.
- Enable/disable **Directivity** calculation: *On* or *Off*.
- Set number of **XY sectors**: *2, 4, 8, 16, 32*.
- Set number of **Z sectors**: *2, 3, 5, 9, 17*.



The **Instrument** section allows you to configure instrument settings and contains the following sub-sections: **External Interface**, **Remote Communication**, **GPS Location**, **Descriptions**, **Time synchronization** and the **USB interface** item.

The **GPS Location** sub-section allows you to set the location of the station – Latitude and Longitude.

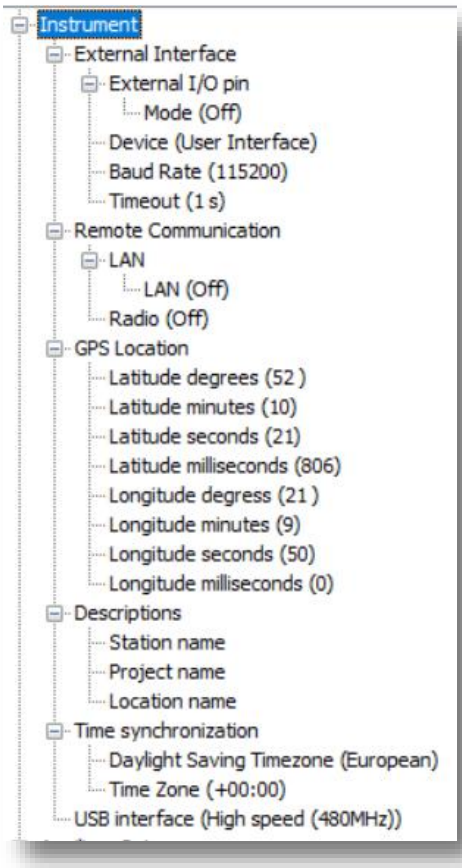
The **Description** sub-section allows you to set the Station, Project and Location names.

The **Time synchronization** sub-section allows you to:

- Select the **Daylight Saving Timezone**: *None, Custom, European* or *United States*.
- Set **Timezone**.

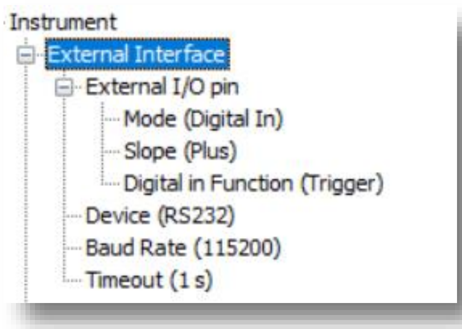
In the case of **Custom** Daylight Saving Timezone, you can customize you own timezone.

The **USB interface** item allows you to select the USB speed: *High speed (480MHz)* or *Full speed (12MHz)*.

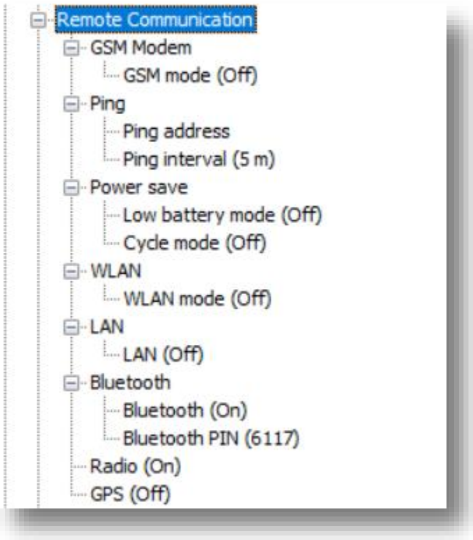


The **External Interface** sub-section allows you to:

- Configure the **External I/O pin**:
    - Select **Mode**: *Off* or *Digital In*,
    - Select **Slope**: *Plus* or *Minus*,
    - Select **Digital in Function**: *Trigger* or *Sampling*.
- Select connected **Device**: *RS 232*, *Meteo, Meteo (SV209)* or *Alarm Lamp*.
- Set **Baud Rate** for tramsmission: *1200 ÷ 921600.*
- Set **Timeout**: *1 s ÷ 1 m.*

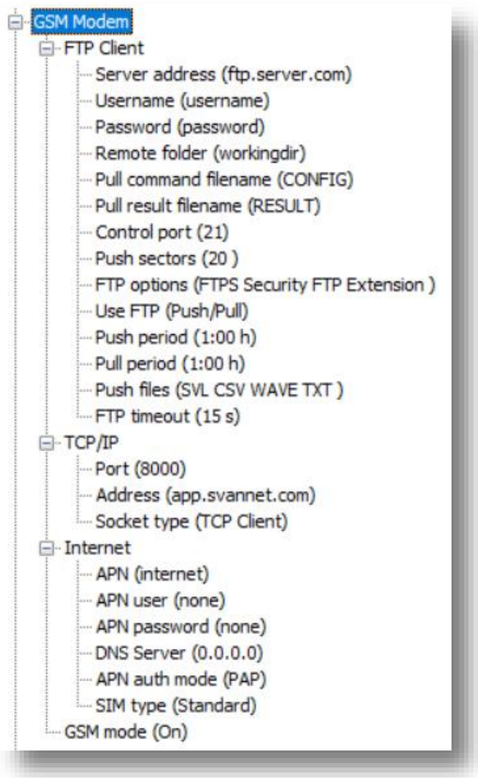


The **Remote Communication** sub-section allows you to:



- Configure **GSM Modem**:
  - Select **GSM mode**: *On, Off* or *On and Off when Battery is Low*.
- Configure **Ping**:
  - Set **Ping address**,
  - Set **Ping interval**: *0 s ÷ 5 m.*
- Configure **Power save**:
  - Enable/disable **Low battery mode**: *On* or *Off*.
  - Enable/disable **Cycle mode**: *On* or *Off*.
- Configure **WLAN**:
  - Select **WLAN mode**: *Off, Infrastructure* or *Acess point*.
- Configure **LAN**:
  - Enable/disable **LAN**: *On* or *Off.*
- Configure **Bluetooth**:
  - Enable/disable **Bluetooth**: *On* or *Off,*
  - Set **Bluetooth PIN**.
- Enable/disable all **Radio** communication options (GSM, WLAN, Bluetooth): *On* or *Off.*
- Enable/disable **GPS**: *On* or *Off.*

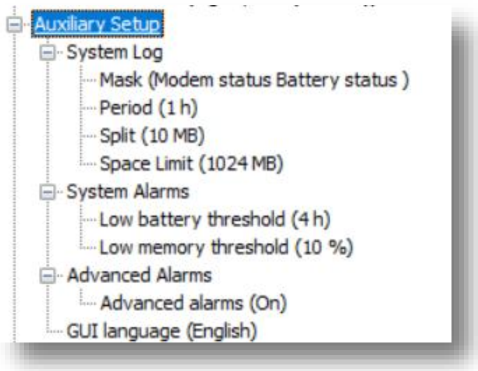
If the **GSM** is enabled, you can configure the mobile communication in the following sub-sections:



- **FTP Client** by setting (for the *Push/Pull* FTP option):
  - **Server address**,
  - **Username**,
  - **Password**,
  - **Pull command filename**,
  - **Control port**,
  - **Push sector**,
  - **FTP options**: *Private IP ignoring, FTPS Security, FTP Extension* and *FTP passive mode connection*,
  - **Use FTP**: *Off, Push, Pull* or *Push/Pull*,
  - **Push period**,
  - **Push files**: *SVL, CSV, WAVE* and *TXT*,
  - **FTP timeout**: *10 s ÷ 4 m.*
- **TCP/IP**:
  - **Port**,
  - **Address**,
  - **Socket type**: *Off, TCP Server, TCP Client* or *UDP*.

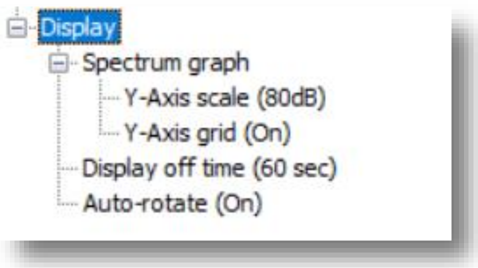
- **Internet**:
  - **APN**,
  - **APN user**,
  - **APN password**,
  - **DNS Server**,
  - **APN auth mode**: *Off*, *PAP* or *CHAP*,
  - **SIM type**: *Standard* or *Data only*.

The **Auxiliary Setup** section allows you to:



- Configure the **System Log**:
  - Select the **Mask**: *System events, Modem communication, Modem configuration, Modem ststus, Battery status, Internal status, Modem debug, GPS status, External interface communication, Remote commands, Advanced alarms, WLAN configuration, WLAN communication, WLAN debug* and *External interface debug,*
  - Set the time **Period** for recording System Log records: *10 s ÷ 1 h*,
  - Set the Log file size to **Split**: *5 MB ÷ 255 MB*,
  - Set the **Space limit**: *Off* or *1024 MB ÷ 4096 MB*.
- Configure **System Alarms**:
  - **Low battery threshold**: *Off* or *1 h ÷ 12 h,*
  - **Low memory threshold**: *Off* or *10 % ÷ 50 %.*
- Configure **Advanced Alarms**:
  - Activate/deactivate **Advanced Alarms**: *On* or *Off*.
- Select the **GUI language.**

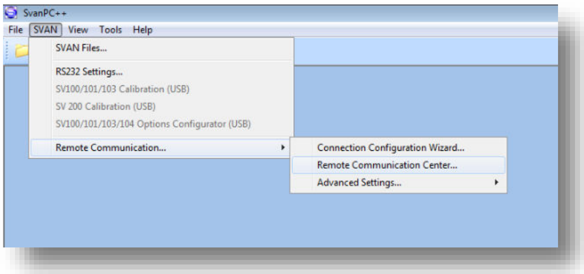
The **Display** section allows you to:

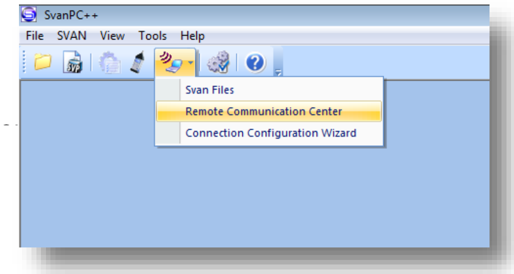


- Customize the **Spectrum graph**:
  - Select the **Y-Axis scale**: *10 dB, 20 dB, 40 dB, 80 dB* or *120 dB,*
  - Activate/deactivate the **X-Axis grid**: *On* or *Off*.
- Set **Display off time**: *Off* or *15 s ÷ 900 s.*
- Activate/deactivate the **Auto-rotate** function: *On* or *Off*.

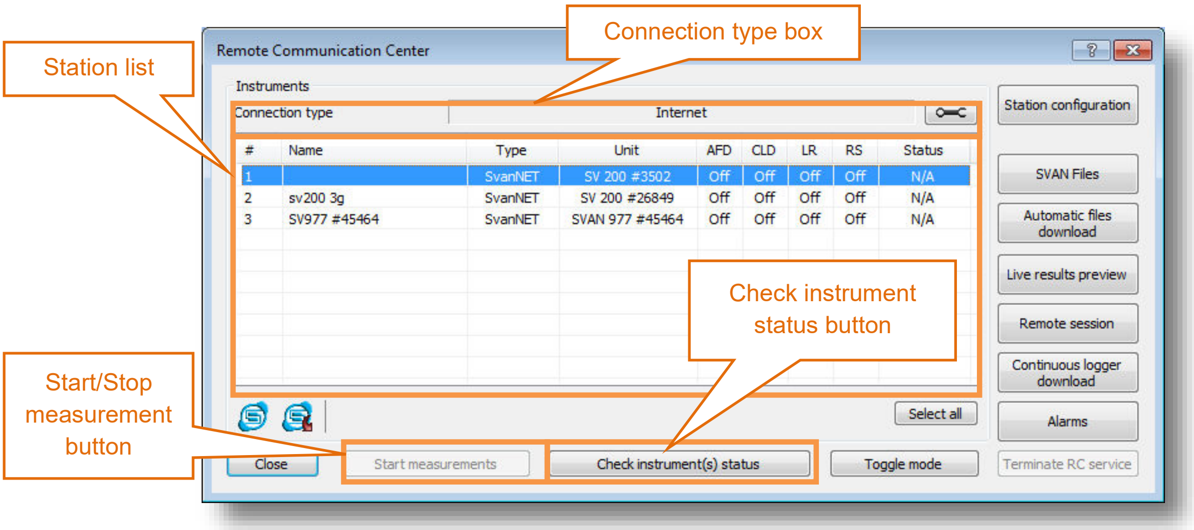
8.6 WORKING WITH REMOTE COMMUNICATION CENTER

1. Open the **Remote Communication Center** dialog box.





2. Make sure the appropriate **Connection type** is selected. The default connection type is ***Internet***, but when the instrument is connected to the PC using the USB cable, the connection type is automatically changed to ***USB***.
3. Select the instrument in the station list. To select multiple instruments, use the *Ctrl+Click* combination.
4. Click the **Check instrument(s) status** button.



The **Remote Communication Center** allows you to:

- start/stop the measurement (**Start/Stop measurement** button),
- check the instrument status (**Check instrument(s) status** button),
- station configuring (**Station configuration** button),
- download and upload files manually (**SVAN Files** button),
- communicate with instruments using different types of RC sessions (**Automatic files download**, **Live results preview**, **Remote session**, **Continuous logger download**)
- configure alarms (**Alarms** button),
- open the *SvanNET* web service in the default browser (icon) and
- synchronise the station list with the *SvanNET* account (icon).

Note: Station configuration *mode is* *<u>not available</u>* *for SV 200A firmware version 1.04.7 and above.*

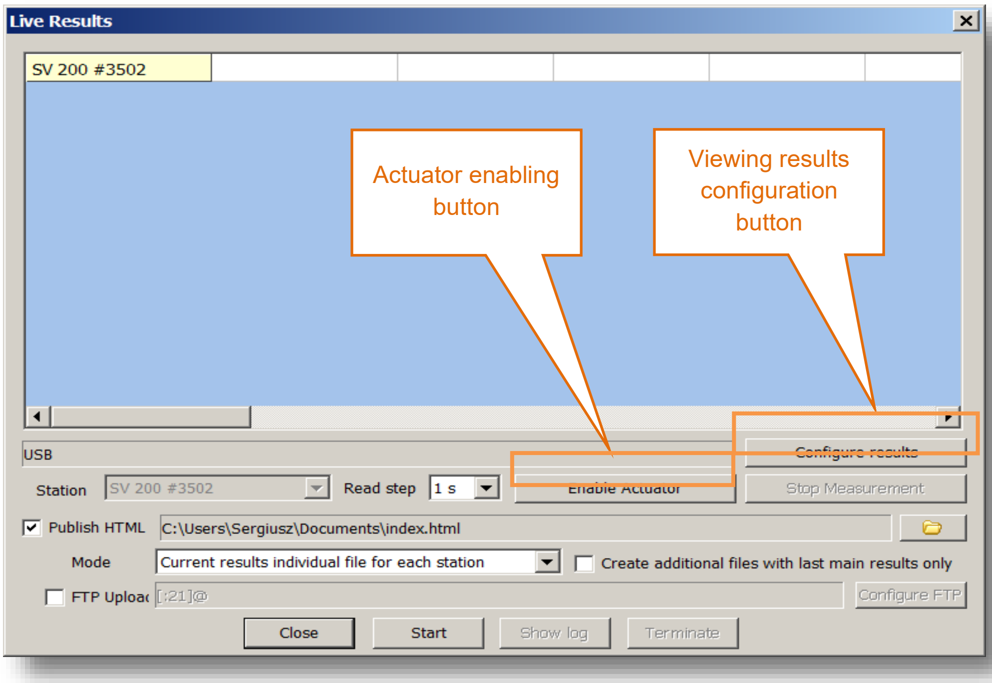
Note: Remote session *mode is now obsolete and no longer supported. It is not recommended to use the* ***Remote session*** *mode.*

8.6.1 *Viewing live results*

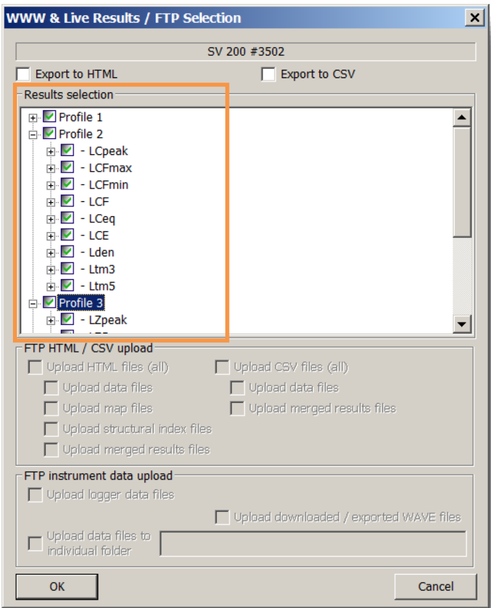
The **Live Results** (LR) mode is used to easily view current SV 200A results without need to store measurement files on a PC. This mode is capable of publishing HTML results on the WEB server and also uploading measurement files from the instrument directly to the FTP server.

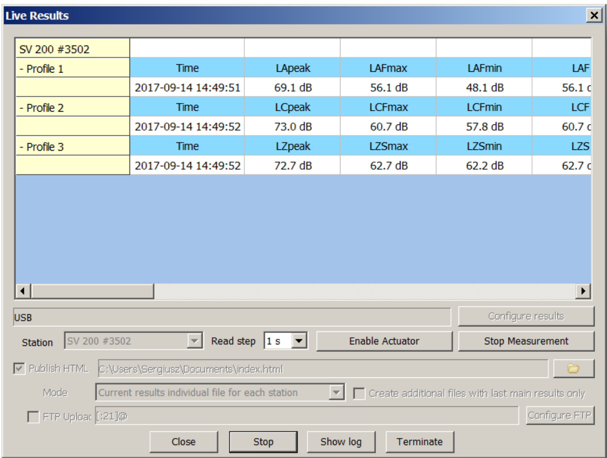
To view live results:

1. Click on the **Live results preview** button on the **Remote Communication Center** panel.



2. Click on the **Configure results** button to select the results to be dispalyed in the **WWW & Live Results / FTP Selection** click on the **OK** button to return to the **Live Results** window. Then press the **Start** button to start the results presentation.

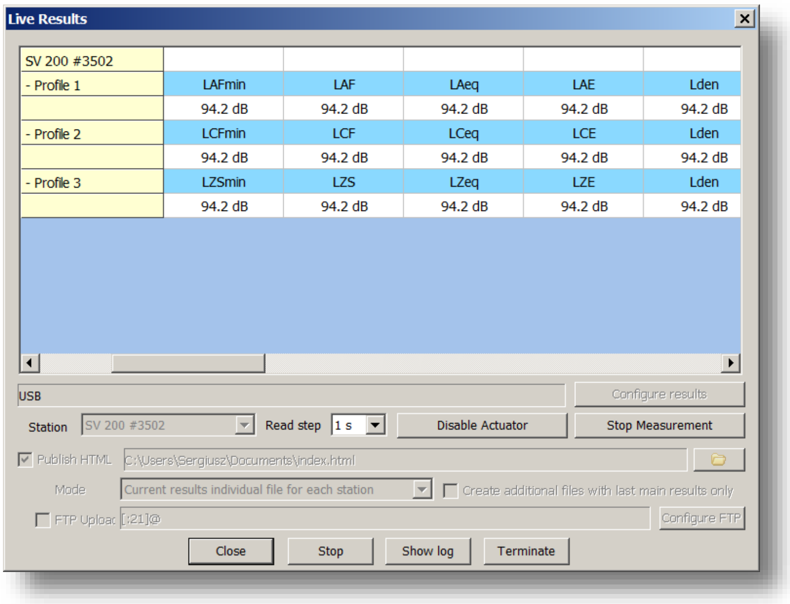




In the **Live Results** window, you can also:

- change how often the data is readt (**Read step** button),
- start or stop measurements (**Start Measurement** / **Stop Measurement** button),
- view system log information (**Show log** button),
- end the Live view session (**Terminate** button),
- enable the SV 200A actuator and perform the instrument's check (**Enable Actuator** button).

Once the actuator is switched on, the instrument begins to measure the signal that it produces. This signal is at a level of 94 dB. If the **Read step** is set to **1s**, you can see the measured actuator level.



The **HTML publishing** section allows you to set the path of HTML and CSV files with your current measurement results.

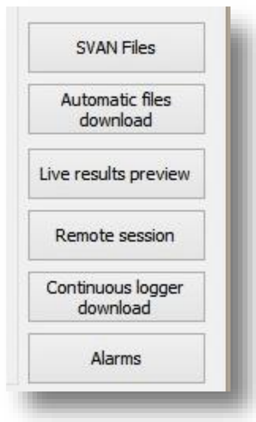
8.7 COLLECTING DATA

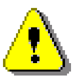
SvanPC++ with the *Remote Communication module* offers the configuration and control of the instrument, data collecting, publishing and presentation functions. The RC module can work in different modes and communication protocols.

The **Remote Communication** module can work in four different data collecting modes:

- **SVAN Files** for direct manual data download.
- **Automatic Files Download** (**AFD**) for automatic data download at specified intervals.
- **Continuous Logger Download** (**CLD**) for continuous data download.
- **Live Results Preview** for real-time data publishing and presentation.

SvanPC++ can generate alarms in addition to the alarms of the SV 200A instrument. To configure *SvanPC++* alarms, click on the **Alarm** button (see Chapter 8.7.4).



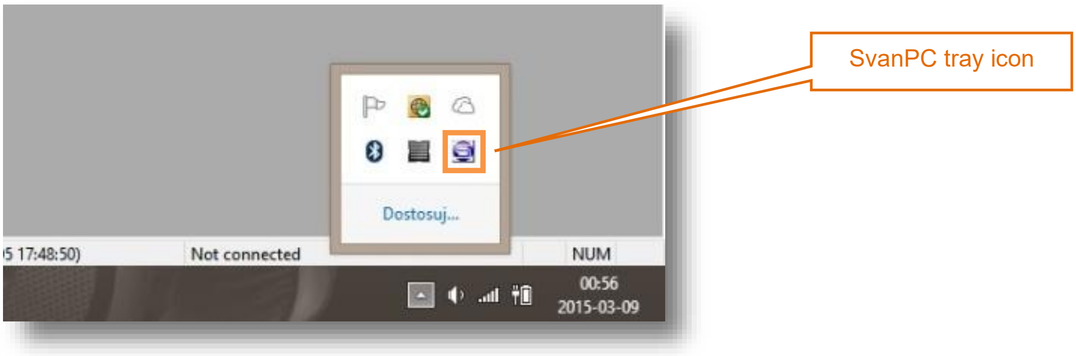


***Note: Remote session** mode is now obsolete and no longer supported. It is not recommended to use remote session mode*

8.7.1 Remote Communication Service

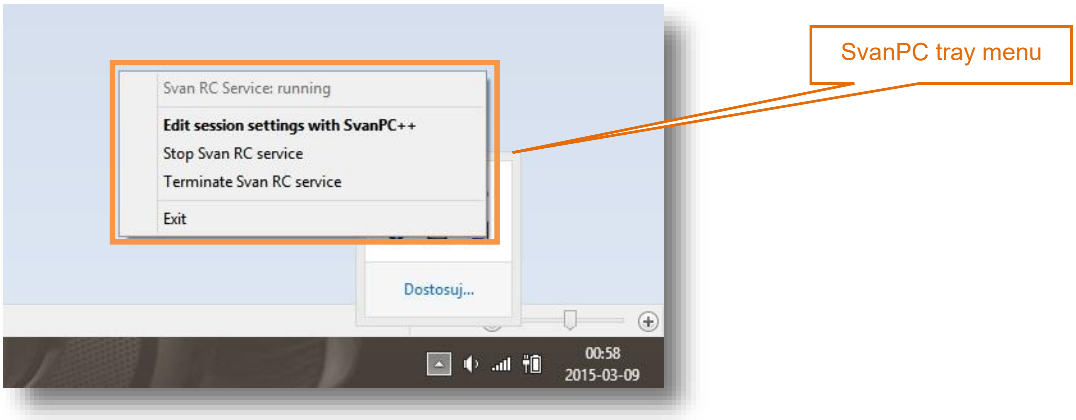
Automatic Files Download (AFD), Continuous Logger Download (CLD) and Live Results Preview run within the **Remote Communication Service** (RC Service). It is a program that runs in the background, regardless of whether *SvanPC++* is running or not. The user doesn't even need to be logged into his Windows user profile. All data collection features of *SvanPC++* are active once set up.

The Remote Communication Service is automatically restored to its previous state when the PC is rebooted.



The status of the RC Service can be easily monitored with the *SvanPC++* tray icon. It is active when *SvanPC++* is not running.

Right-clicking on the icon expands the menu, allowing the user to view the status of the RC Service, edit the settings (after opening the *SvanPC++* window), pause the service while waiting for all download tasks to be completed, or terminate it immediately.

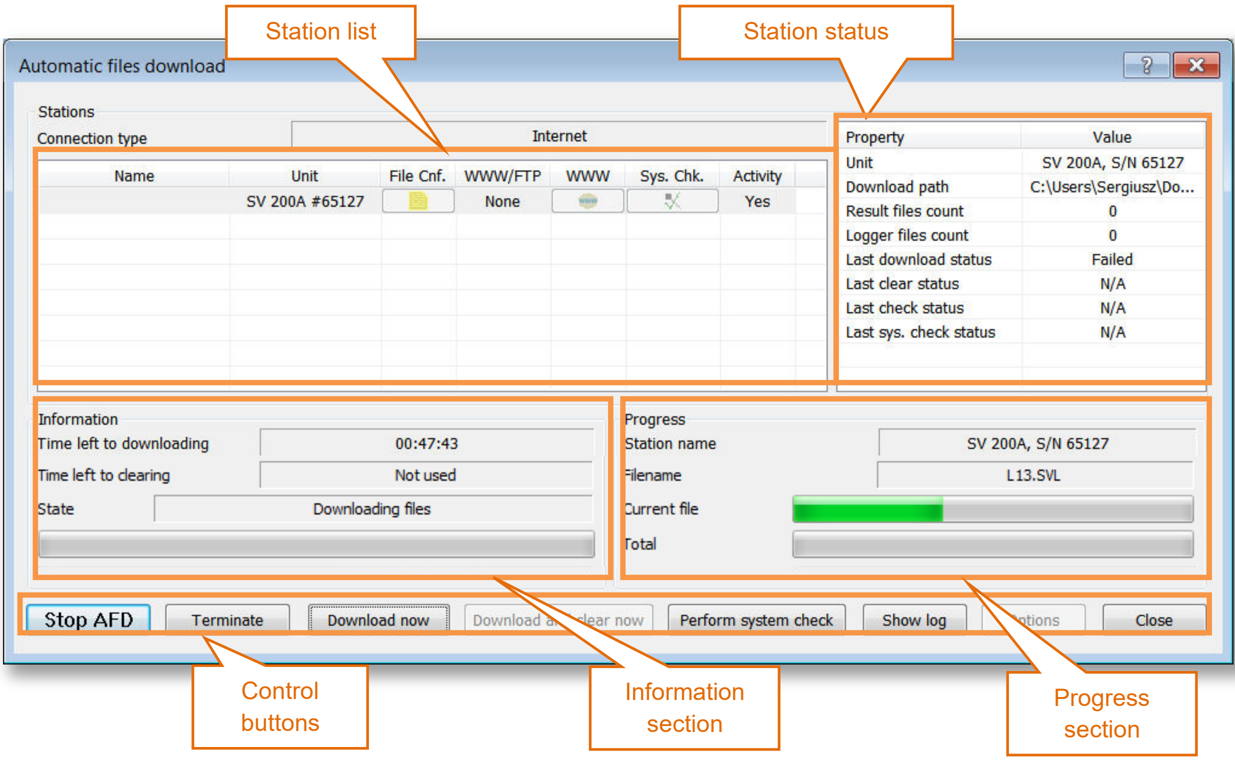


Double-clicking on the *SvanPC++* tray icon opens the *SvanPC++* window where you can edit the session settings.

Note: *You must have administrator privileges to change the* ***Remote Communication Session*** *settings.*

8.7.2 Automatic Files Download

Automatic Files Download (**AFD**) is the most used data collection method. In this mode, *SvanPC++* automatically downloads data from any number of SV 200A monitoring stations and stores it in a selected local or remote directory.



In addition to downloading files, **AFD** performs other tasks such as:

- checking the status of the station and sending notifications when one of the instruments requires attention,
- automatic time synchronisation,
- remote system checks with built-in electrostatic actuator,
- verification of instrument setups,
- deleting already downloaded files,
- publishing measurement data on the web server as an HTML file,
- upload measurement files to the FTP server.

Note: *More information about* ***Automatic Files Download*** *can be found in the SvanPC++ User Manual: https://svantek.com/softwares/svanpc-software.*

Basic information

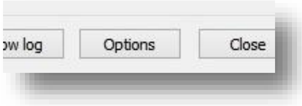
Automatic Files Download runs as a Windows service. It does not require *SvanPC++* to be running. A Windows user running **AFD** does not need to be logged on to the PC. **AFD** automatically returns to its previous state after the PC is rebooted.

The **AFD** window shows the list of stations running in **AFD** mode. Status information is available for selected stations. It shows basic information (instrument's serial number and download path), download statistics and a summary of the last download, purge, settings and system checks.

The **Information** section displays the time left for downloading and the time left for clearing. These values depend on **Downloading period** and **Clearing period** settings, described below. The current status of the **AFD** module is also displayed.

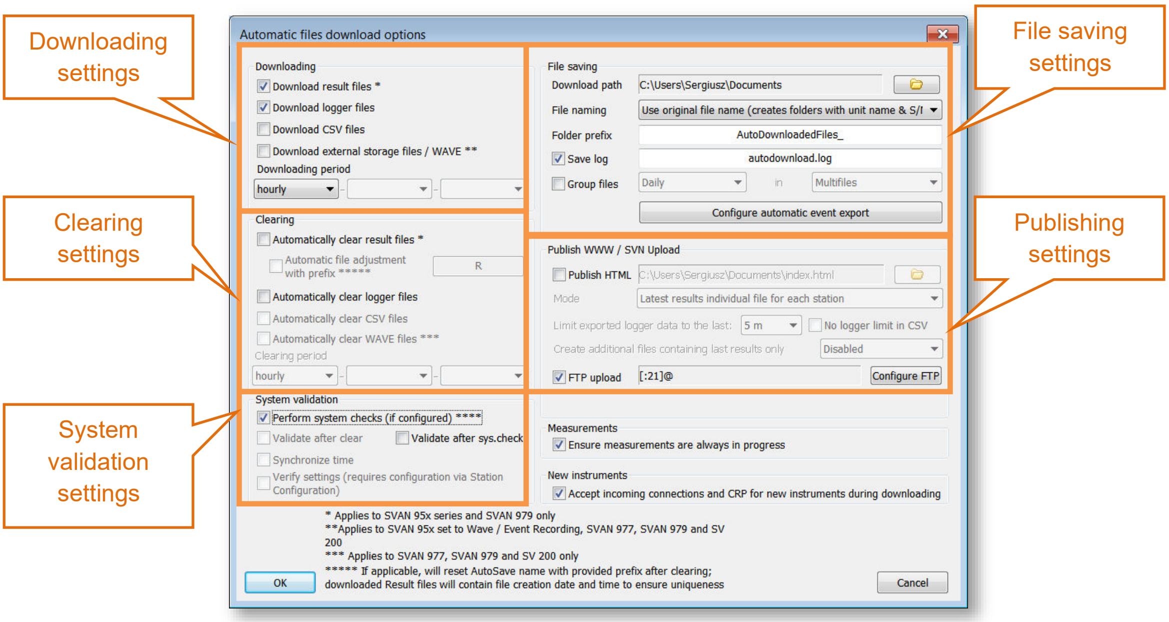
The **Progress** section refers to the station selected in **station list**. It shows the type and serial number of the station and the name of the file currently being downloaded.

Configuration



To configure the **Automatic Files Download** session settings, click the **Options** button. The automatic files download options window will appear, allowing you to make any necessary adjustments.

The **Options** button is only active when the **AFD** is not running.



Downloading allows you to select which files to download with **AFD**. Logger files containing measurement results are most commonly used.

⚠ ***Note:*** CSV and WAVE files contain raw, uncompressed data. Ensure sufficient bandwidth for their transmission. If using the mobile modem, ensure that the SIM card data plan covers large transfers.

Downloading period allows you to set how often data is downloaded from SV 200A to a PC. Five different periods can be selected: **hourly**, **daily** (at a specified hour), **weekly** (at specified day of week, at specified hour), **monthly** (at a specified day of the month, at a specified hour) and **custom** (at a specified time interval between downloads). You can apply these settings only when files to download are selected.

Automatic cleaning allows you to select which files to delete from the instrument's memory after downloading.

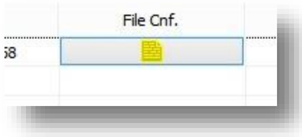
Cleaning period allows you to set how often data from SV 200A is to be erased. Five different periods can be selected: **hourly**, **daily** (at a specified hour), **weekly** (at specified day of week, at specified hour), **monthly** (at a specified day of the month, at a specified hour) and **custom** (at a specified time interval between downloads). You can apply these settings only when automatic cleaning is active. Files will only be deleted from the instrument if they have been previously downloaded using **AFD**.

The **System validation** section allows you to configure the following settings:

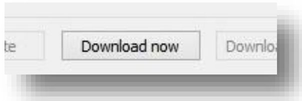
- system checks with built-in electrostatic actuator,
- validation of instrument settings after cleaning measurement files,
- validation of instrument settings after performing system check (if enabled),
- automatic synchronisation of the real time clock,
- verification of instrument settings.

Starting the session

To start the **Automatic Files Download** session, click the **Start AFD** button. The **AFD** session will start with the global settings configured in the **Options** window. The download will start after the time specified by the **Downloading period**.



It is also possible to override the global file saving settings of the **AFD** session by clicking the **File Conf.** button next to each individual station in the **Station list**.

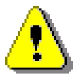


To start the **Automatic Files Download** session and download files from SV 200A, click the **Download now** button.

Ending the session

To end the **Automatic Files Download** session after measurement files have been downloaded, click the **Stop AFD** button.

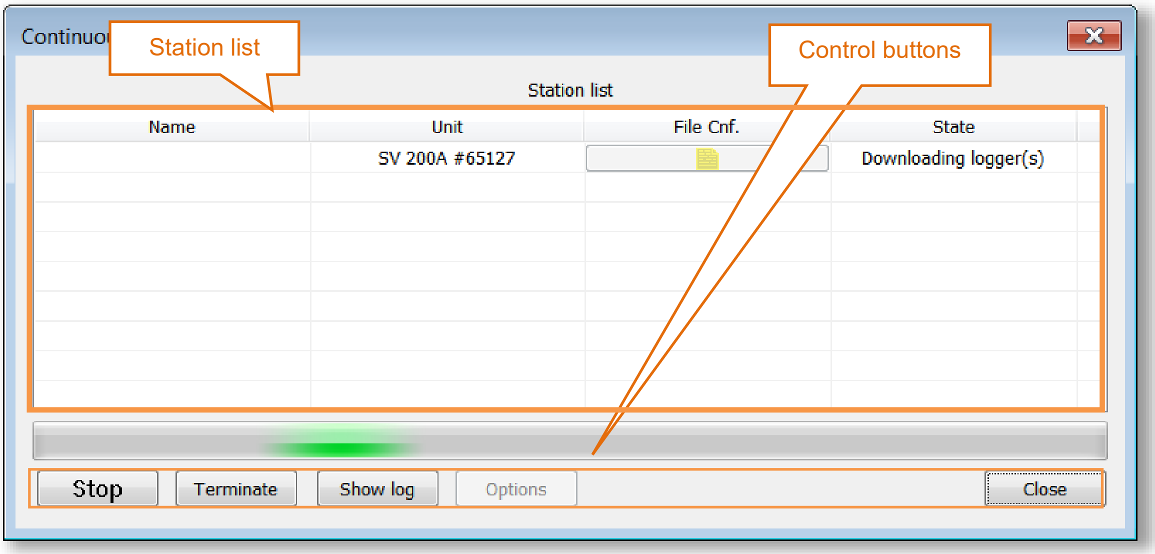
To end the **Automatic Files Download** session immediately without downloading all the data files, click the **Terminate** button.



***Note:** Terminating the session may result in some measurement files being incomplete. However, the download will resume when the session is restarted.*

8.7.3 Continuous Logger Download

Continuous Logger Download (**CLD**) is used to continuously download measurement data from SV 200A. Measurement results can be displayed in real time and stored in the selected local or remote directory. In this mode only the logger (SVL) files are downloaded.



In addition to downloading files, **CLD** performs other tasks such as:

- checking station status and sending notifications when any of the instruments require attention,
- automatic time synchronisation,
- remote system checks with built-in electrostatic actuator,
- verification of instrument setups,
- deleting already downloaded files,
- publishing measurement data on the web server as an HTML file,
- uploading measurement files to the FTP server.

***Note:** More information about **Continuous Logger Download** can be found in the SvanPC++ User Manual: https://svantek.com/softwares/svanpc-software*

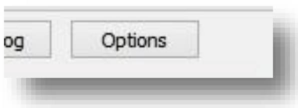
Basic information

Continuous Logger Download runs as a Windows service. It does not require *SvanPC++* to be running. The Windows user running the **CLD** does not need to be logged on to the PC. **CLD will** automatically return to its previous state after the PC is rebooted.

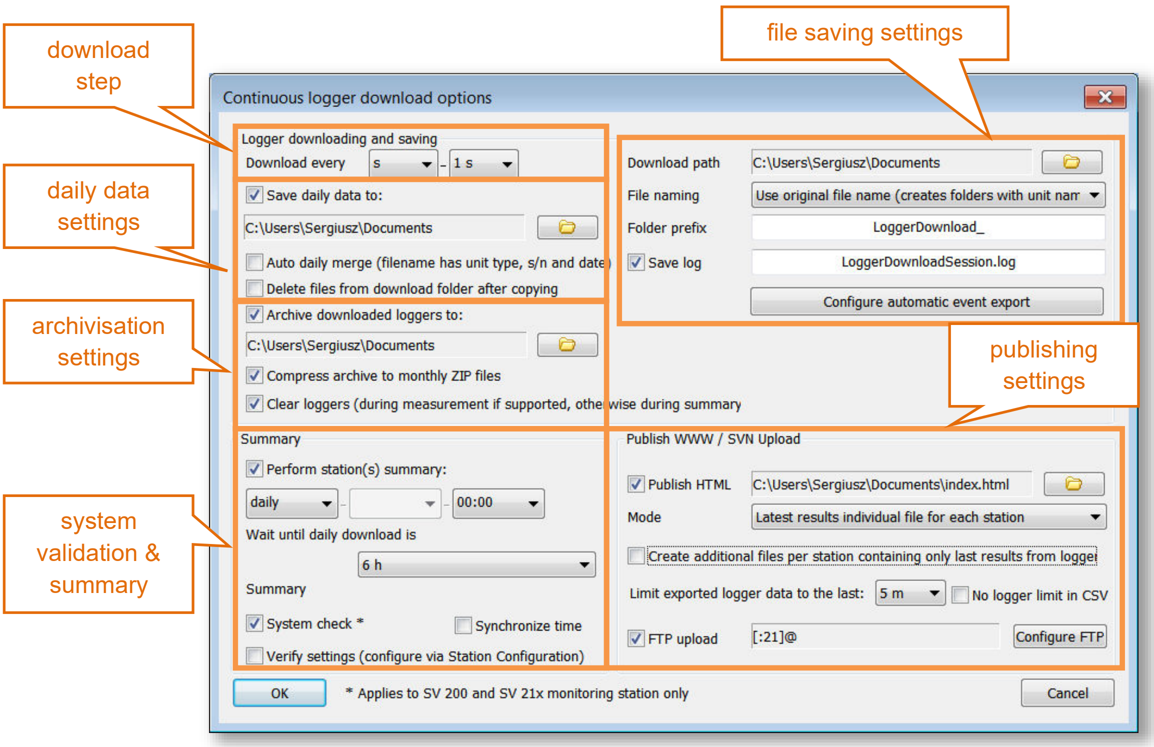
The **CLD** window shows the list of stations running in **CLD** mode, together with the current status of each station. The progress bar shows the activity of the **CLD** mode.

Configuration

To configure the **Continuous Logger Download** session settings, click the **Options** button. The CLD options window will appear, allowing you to make any necessary adjustments.



The **Options** button is only active when **CLD** is not running.



The **Download step** determines how often data is downloaded from SV 200A to a PC.

File saving settings allow you to configure basic file download settings such as download path, file naming rules and session log writing.

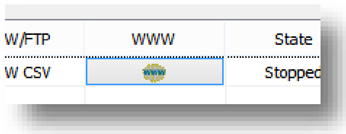
Daily data settings allow you to configure the path to which files downloaded from the instrument are copied after each day of measurements. Files can be automatically merged if more than one file is generated during the day.

Archivisation settings allow you to configure the path to which all downloaded files are copied for archive purposes. Files can be compressed into a monthly zip file.

The **System validation & summary** section allow you to configure the following settings:

- time of station summary (hourly, daily, weekly or monthly),
- clearing downloaded loggers from the instrument during measurements,
- system checks with built-in electrostatic actuator,
- automatic synchronisation of the real time clock,
- verification of instrument settings during station summary.

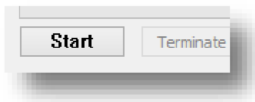
The **Publish WWW/SVN Upload** section allows you to configure basic settings for HTML publishing of the results and FTP uploads. Detailed settings can be configured for each individual station by clicking on the WWW button that appears in the station list.



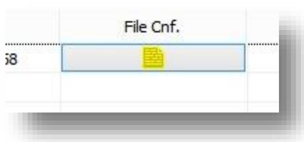
The **Configure FTP** button allows you to configure the FTP server to be used for uploading data.

Starting the session

To start the **Continuous Logger Download** session, click **the Start** button. The CLD session will start immediately with the global settings configured in the **Options** window.

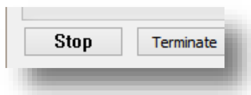


It is also possible to override the global file saving settings of the CLD session by clicking the **File Conf.** button next to each individual station in the **Station list**.

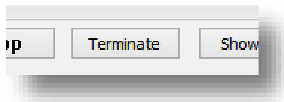


Ending the session

To end the CLD session after downloading all measurement files, click the **Stop** button.



To end the CLD session immediately without downloading all the data files, click the **Terminate** button.

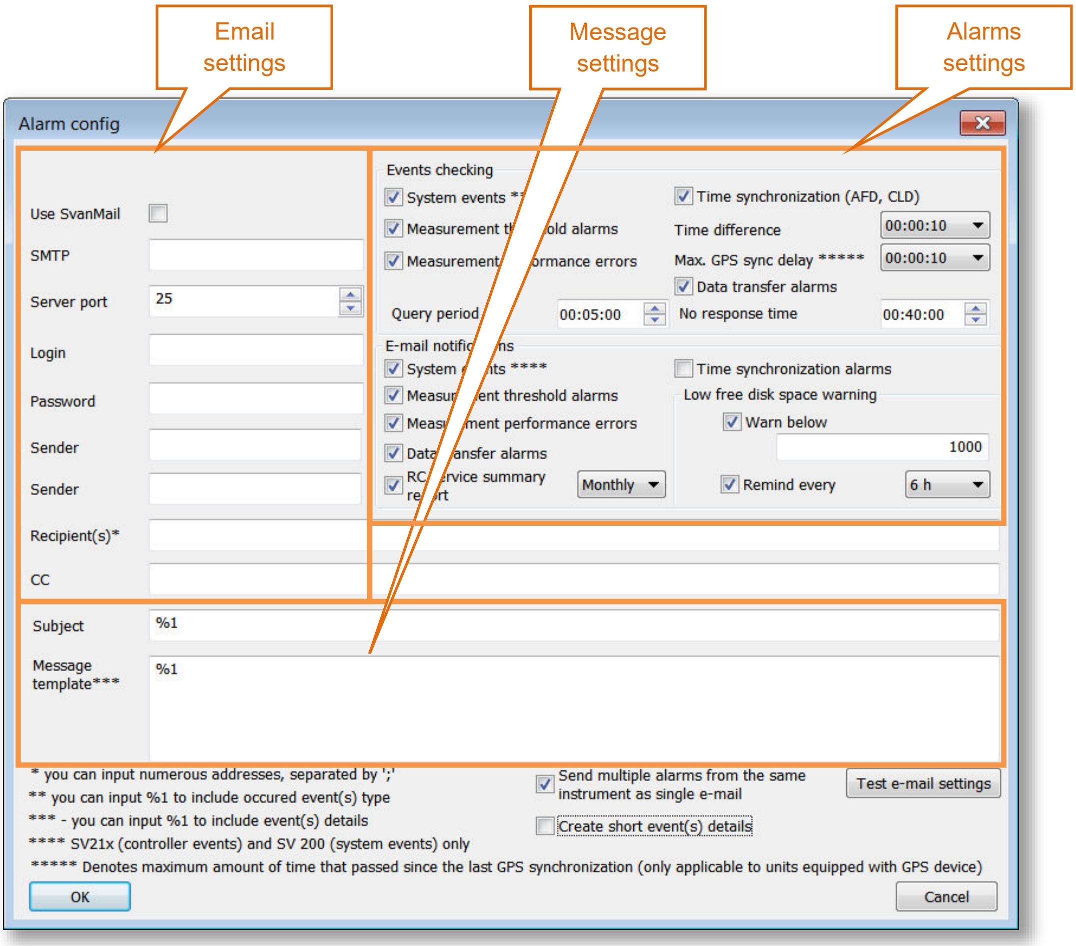


Note: *Terminating the session may result in some measurement files being incomplete. However, the download will resume when the session is restarted.*

Note: *Termina*
after restarting

8.7.4 Alarms

The *SvanPC++* Remote Communication **Alarms** button opens the **Alarm config** window, where you can configure customised e-mail notifications for specific events.



Alarms can be used to notify you of the following events:

- System events, such as disconnection and reconnection to the network, loss of external power, exceeding the maximum temperature inside the station, etc.
- Measurement performance events, such as failed system check, stopped measurements etc.
- Time synchronisation errors.
- Low disk space.

Email alarms require the credentials of the email server to be used, including SMPT server name, port number, sender name, login and password. Alarm messages can be sent to multiple recipients simultaneously.

The current implementation of the functionality does not support SSL (Secure Socket Layer) connections to mail servers – the user is expected to use an account on an unsecured SMTP server.

***Note:** You can find more information about **Alarms** settings in SvanPC++ User Manual.*

9 NOISE DIRECTIVITY

The noise source direction determination algorithm used in the SV 200A is based on the phase shift of the signals between the individual microphones of the instrument (4 x MEMS microphones) placed around the SV 200A' housing. The main idea is to detect the source of the dominant energy in a given time interval. Detection is performed in two planes - horizontal "XY" and vertical "Z". The user receives information about the direction of the noise source with the dominant energy together with the percentage of this energy in the whole signal and the distribution of the total energy as a function of the angle.

The instrument is designed to detect sources at a minimum distance of 2 m. The user should also install the instrument so that the reflecting surfaces (nearby objects) have the greatest distance.

There are two measurement results that the instrument measures and stores in a file: the sound energy distribution for the "XY" and "Z" planes as logger results with the **Logger Step** (if the logger step is less than 1 second, the sound energy distribution is recorded with a 1 second step) and the estimated directional Leq as summary results with the **Integration Period** step.

The energy in a given direction is expressed as a percentage of the total energy in all directions.

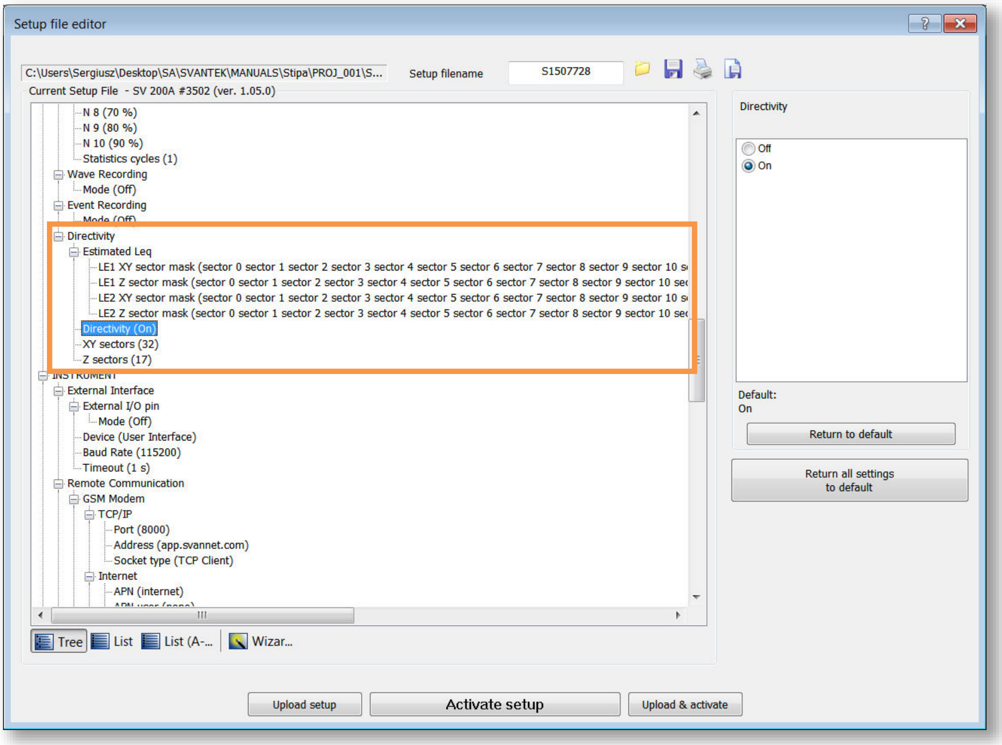
The direction is the angle of the deviation:

- For the "XY" plane - from the north direction clockwise in the range from 0 to 359 degrees.
- For the "Z" plane - from the vertical direction in the range from 0 to 180 degrees (top = 0 degrees, bottom = 180 degrees).

To simplify the perception of the results, instead of degrees, the calculations give results for sectors, the number of which can be defined by the user.

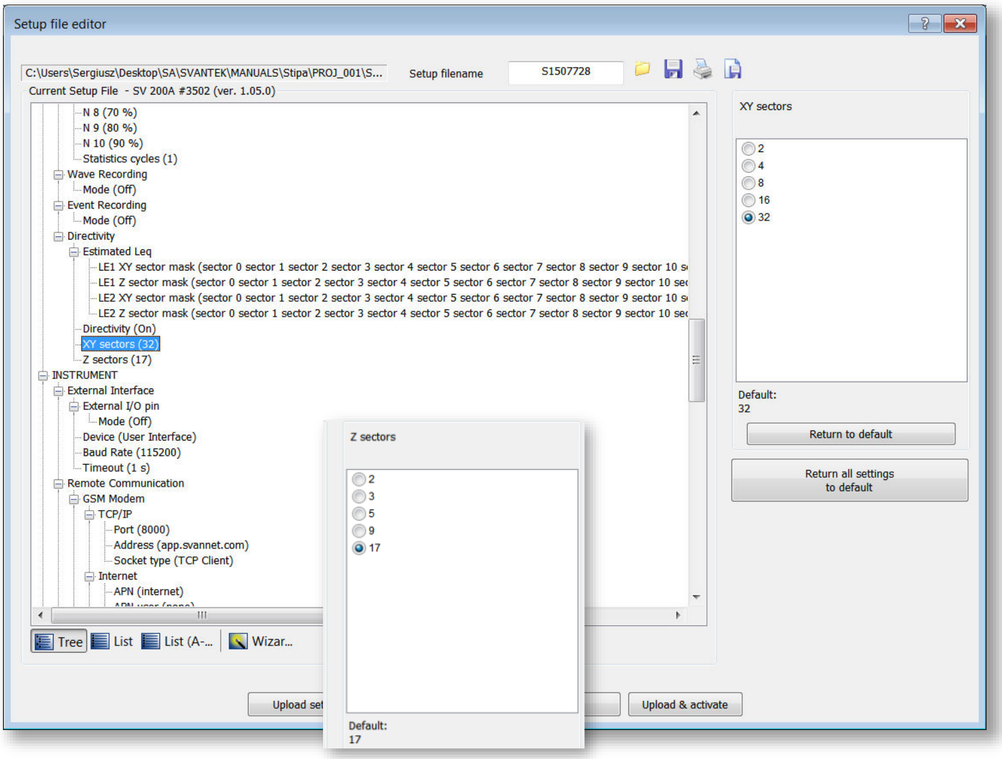
The estimated Leq is calculated from the general Leq multiplied by the percentage of energy from the selected sectors.

Directivity settings can be set in the **Setup file editor** of *SvanPC++*.

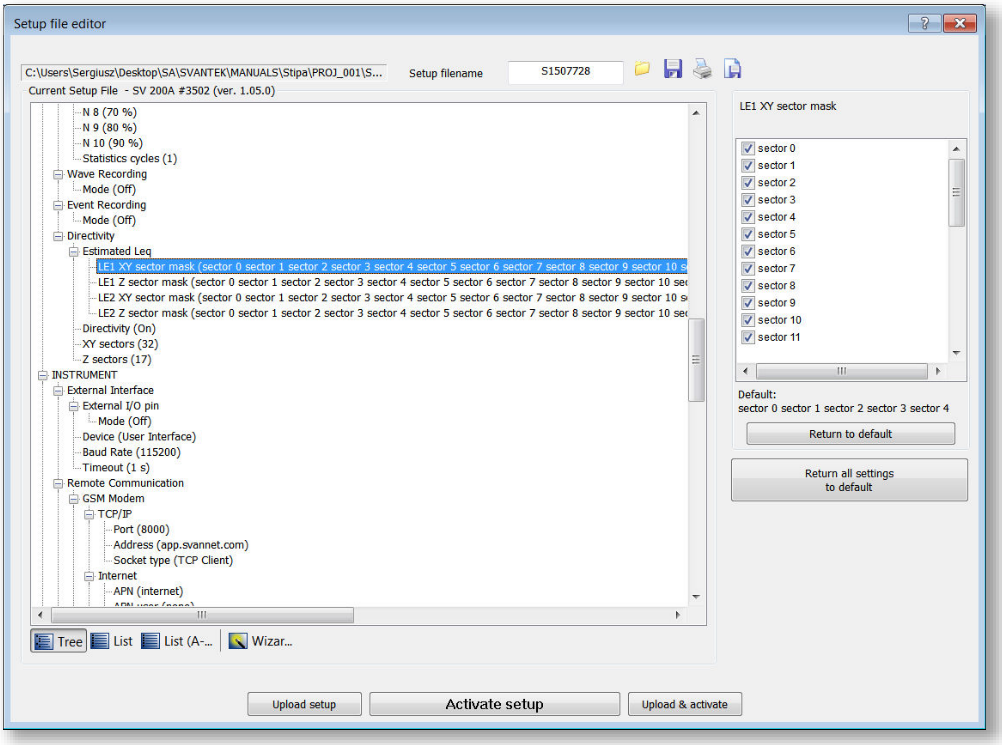


You can switch all directivity calculations on or off.

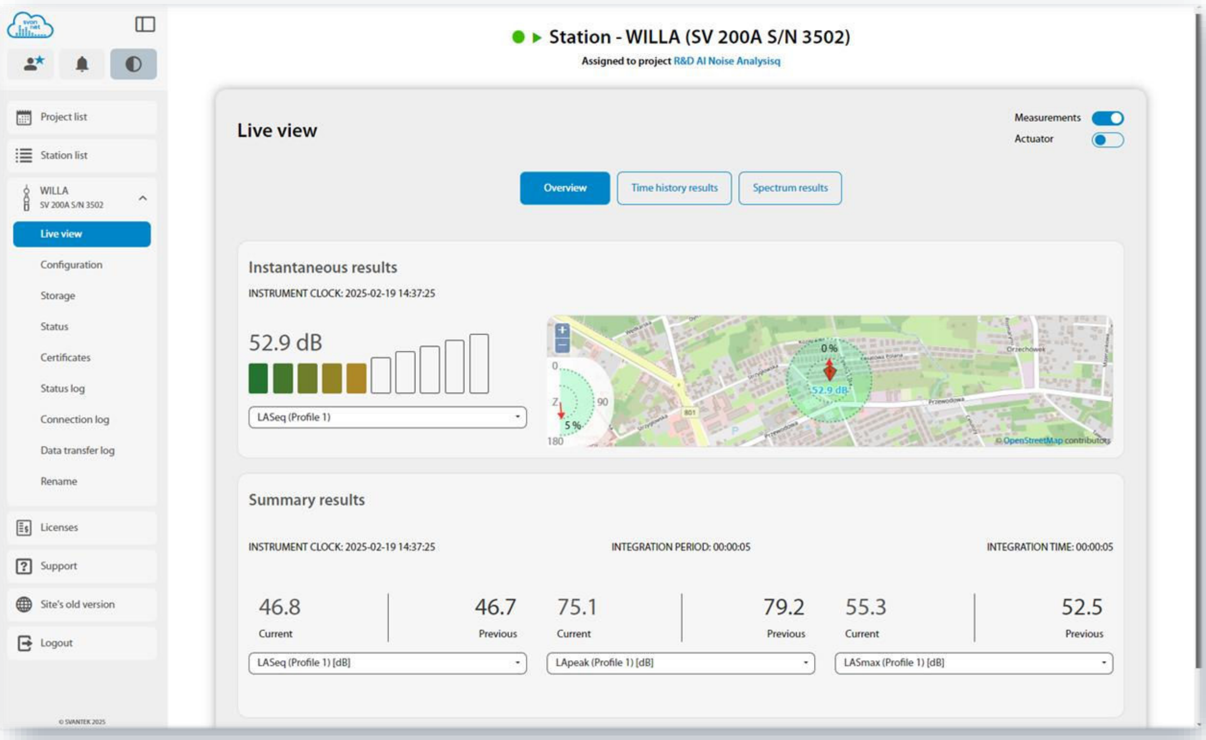
You can define the number of sectors in both planes. For the “XY” plane it is possible to select 32, 16, 8, 4 and 2 sectors. For the “Z” plane it is possible to select 17, 9, 5, 3 and 2 sectors.



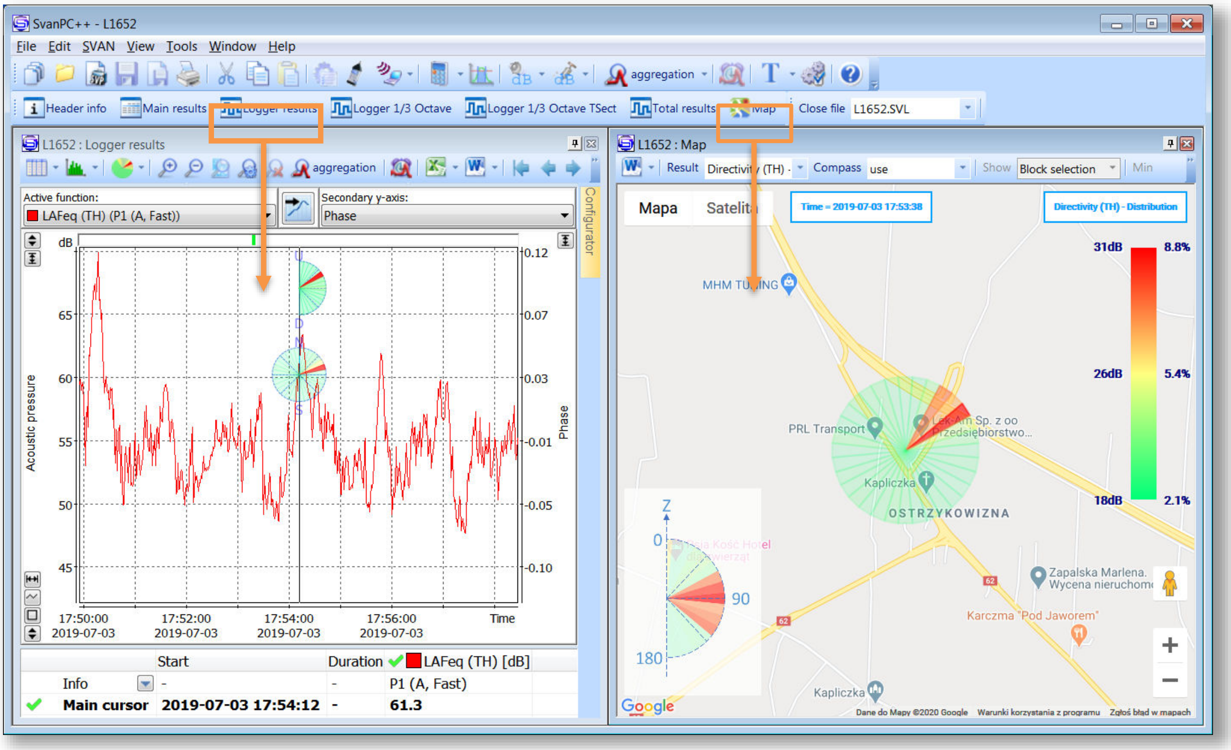
You can set sectors for two estimated Leq results (**LE1** and **LE2**) for both planes (XY and Z).



The direction (sector) of the dominant of sound energy distribution and the percentage of the total energy for this sector is shown in the *SvanNET* Live data view (see Chapter 7.2).

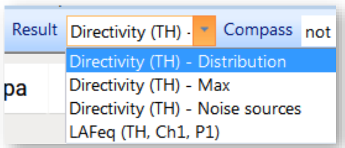


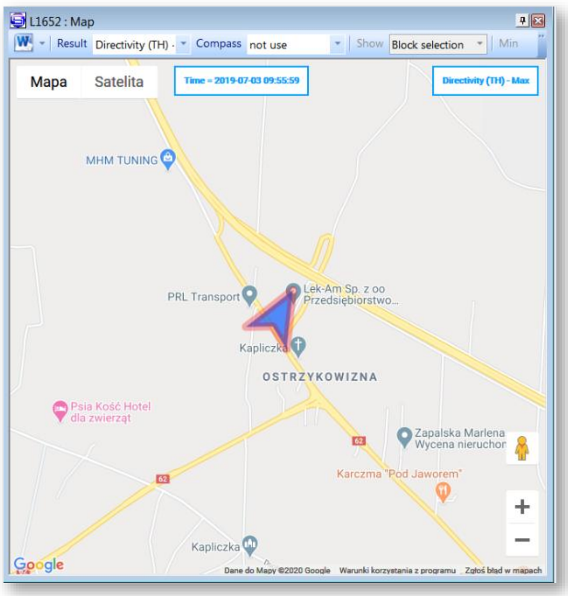
You can also view logger results with directional characteristics and map with the SV 200A localisation and direction of the noise or its distribution in *SvanPC++* by clicking on the corresponding buttons: **Logger results** and **Map**.

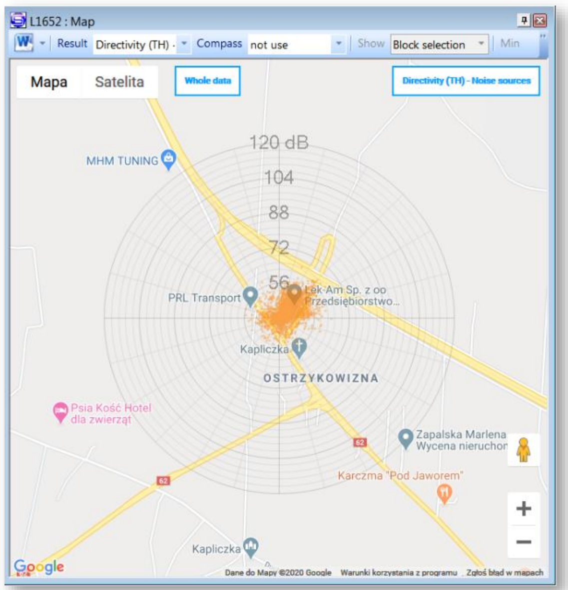


The direction or distribution of the noise on the map corresponds to the time of the cursor position on the **Logger results** screen.

You can select the type of results to be displayed in the Map view: noise distribution (**Directivity (TH) – Distribution**), direction of maximum energy (**Directivity (TH) – Max**), noise sources (**Directivity (TH) – Noise sources**) or **Leq**.







10 ASSISTANT PRO APPLICATION FOR MOBILE DEVICES

Assistant Pro is a mobile application for smartphones, tablets and MacBooks with M processors that allows you to view measurement results, configure management and instrument settings, download data files and connect to the *SvanNET* web service via Bluetooth®.

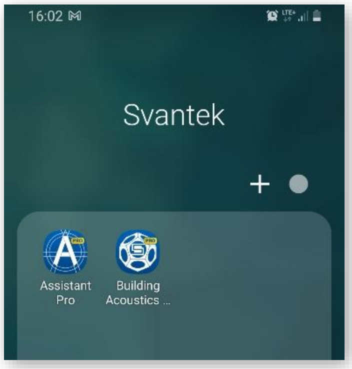
10.1 START ASSISTANT PRO

To install the the *Assistant Pro* on your mobile device, use the *Google Play Store or App Store* platforms.

To start working with the *Assistant Pro* application, tap the *Assistant Pro* icon on your mobile device.

The application requires turned on Bluetooth® and location services.

The application will detect devices in range.

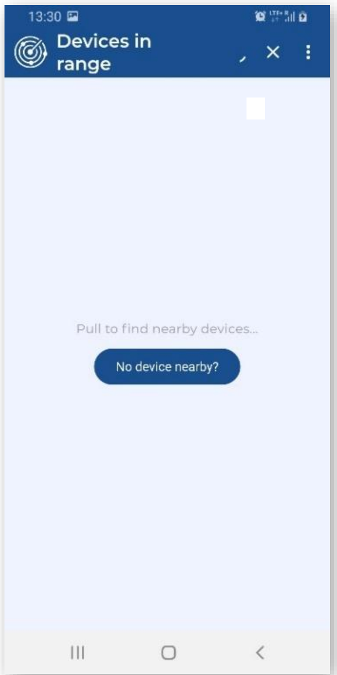


10.2 GENERAL INFORMATION

Assistant Pro compatible instruments with Bluetooth® enabled will broadcast their basic status and some basic data will be visible on a mobile device running the application.

While scanning the instruments, the “scanning” icon is displayed in the upper right corner. You can stop scanning by tapping . When scanning is complete, the “scanning” icon changes to . To restart scanning, tap .

The “No device nearby?” button opens a quick guide on how to prepare an instrument for use with the *Assistant* mobile application.

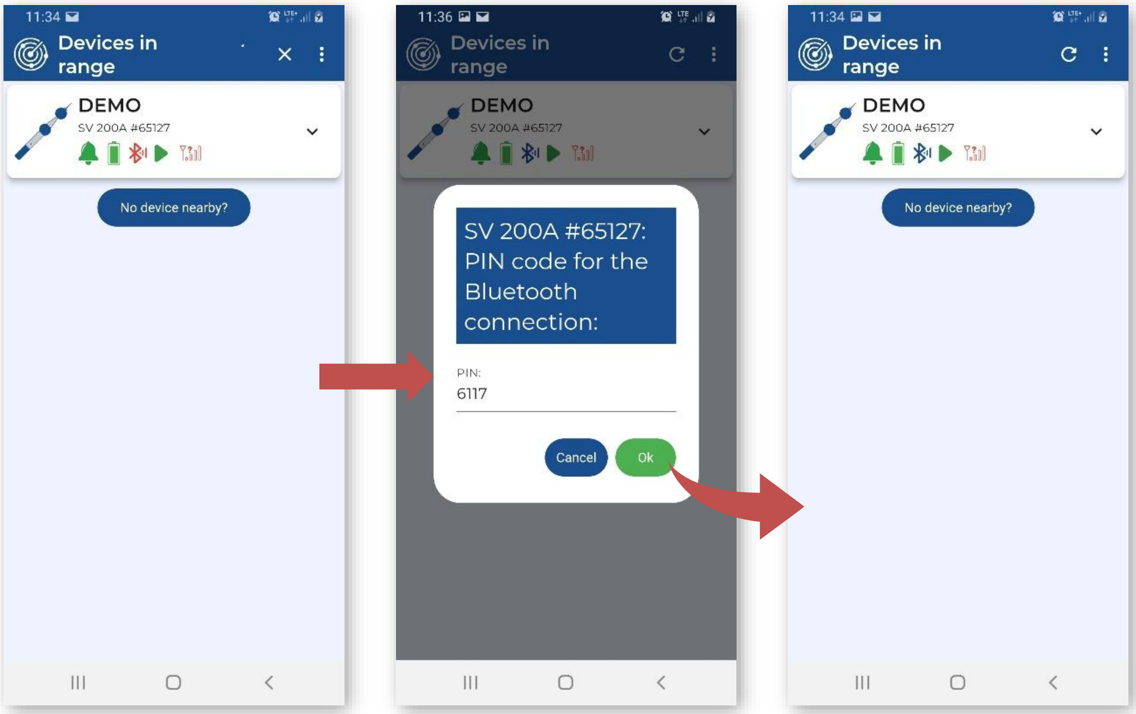


The visible instruments appear on the **Devices in range** screen as a panel with the status icons.

If there is no connection to the instrument, the Bluetooth icon on the instrument bar will be red. During the connection, it “emits waves”. If the connection is successful, the Bluetooth icon changes to blue.

Note: *Svantek device can handle only one simultaneous connection.*

The first time you pair an instrument, the application will try to use the default PIN code (1234). If it does not match, you will be prompted to enter the PIN.



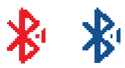
After the connection is established, you can control this instrument and view measurement results.

The instrument status icons have the following meanings:

 Event alarms. If the icon is green there is no current event alarm; if it is red, there is a current event alarm.

 Battery status. When the battery is low, the icon changes colour to red.

 Bluetooth connection being used by another mobile device.

 Bluetooth connection: red – not paired, blue - paired.

 Mobile modem connection: red – not connected, blue – connected.

 The instrument is measuring.

 The instrument is not measuring.

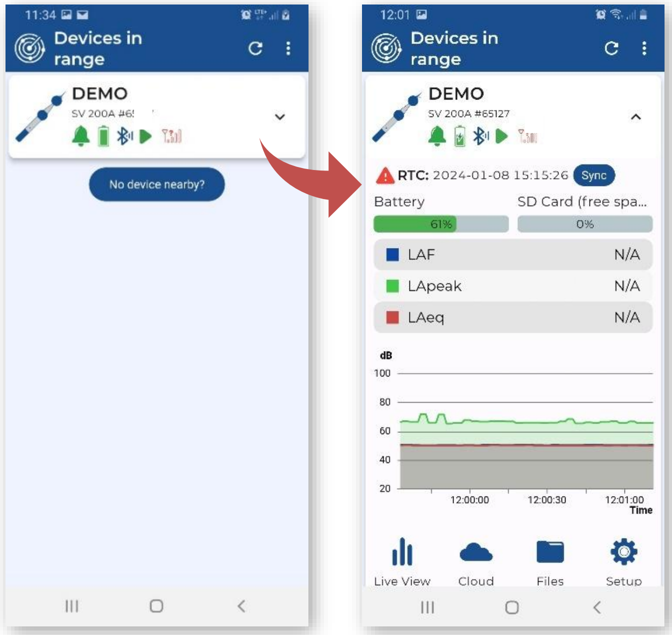
10.3 Controlling the Instrument

Devices in range appear as a bar that can be expanded by tapping it. Once expanded, the instrument panel displays the real-time clock (**RTC**), the status of the instrument's battery (**Battery**) and memory (**SD Card (free space)**) status as well as the values of some predefined readings.

To synchronise the real-time clock with the clock on the mobile device, tap the **Sync** button.

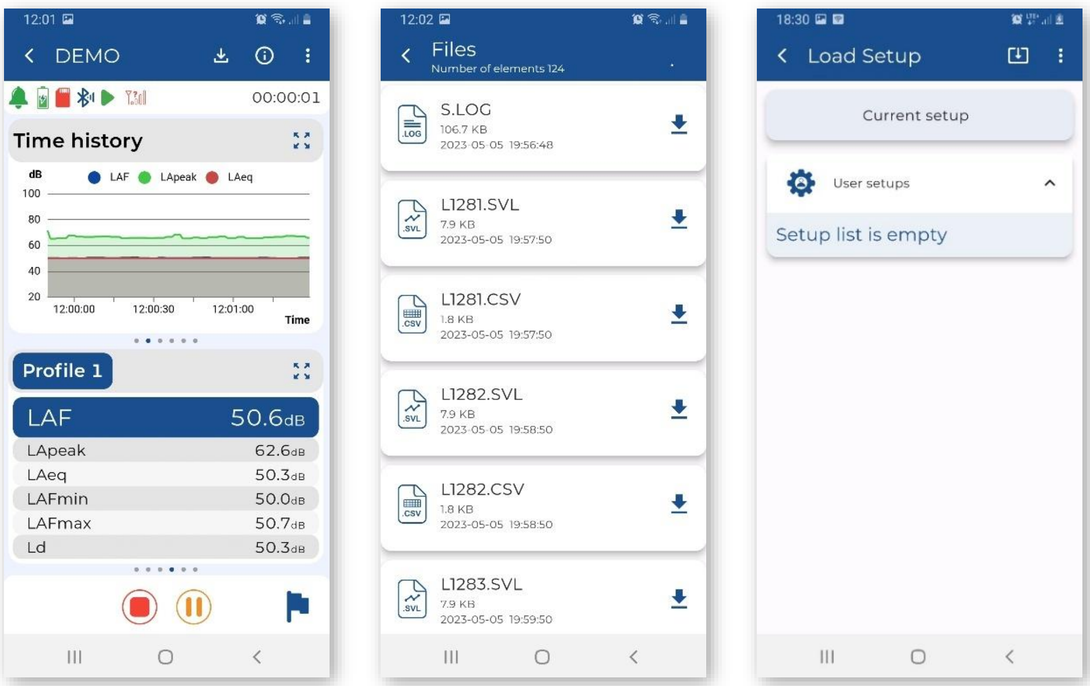
Four icons at the bottom of the panel give you quick access to some functions:

- **Live View** – viewing live results with the possibility to start/stop the measurement,
- **Cloud** – connecting to the *SvanNET* web service,
- **Files** – downloading instrument files,
- **Setup** – configuring instrument settings.



Note: *The* ***Files*** *icon is hidden by default. To make it visible and to be able to manage instrument files, you should activate it (see Chapter 10.4).*

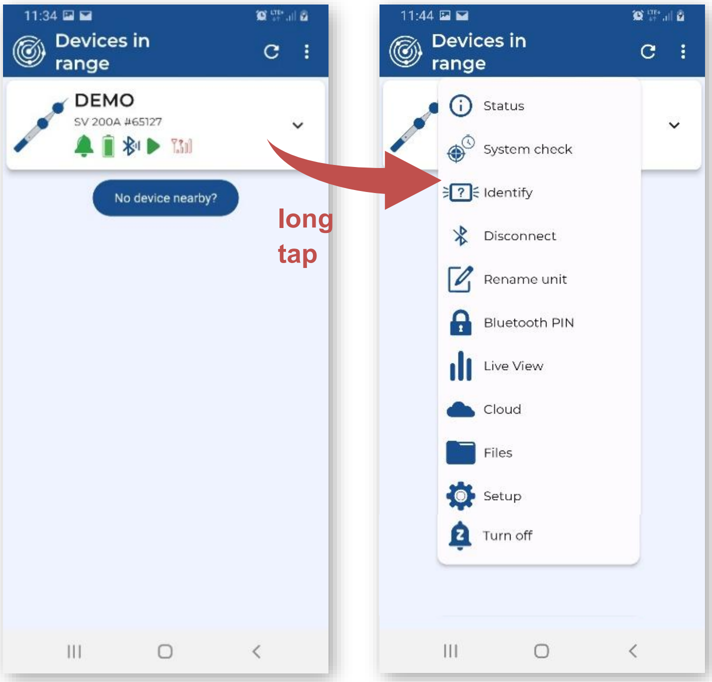
Below are screens after tapping function icons: **Live View**, **Files** and **Setup**.



You also have access to these and other functions by long tapping on the instrument panel.

The pop-up menu that appears after a long tap on the instrument panel allows you to:

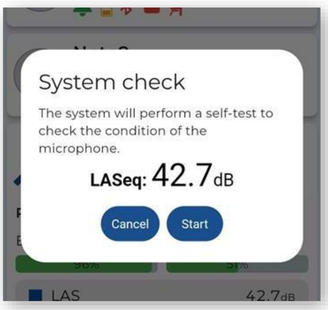
- check the **Status** of the instrument,
- perform **System check**,
- **Identify** the instrument connected,
- **Connect** or **Disconnect** the instrument,
- **Rename unit** for personalisation,
- enter the **Bluetooth PIN** during connection or change the PIN in the instrument after successful connection,
- view current measurement results - **Live View**,
- open the file list - **Files**; this icon can be hidden (see Chapter 10.4),
- configure instrument settings - **Setup**,
- **Turn off** the instrument.

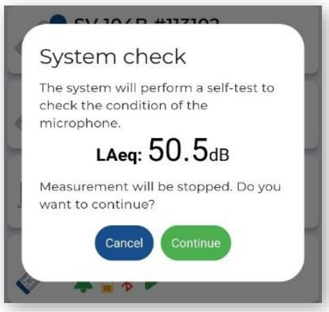


10.3.1 System check

With *Assistant Pro* you can perform the system check (see Chapter 4.5) manually, following the steps suggested by the application.

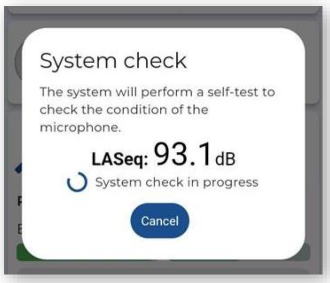
When you start the system check, you will be informed that the current measurement will be stopped during the system check.

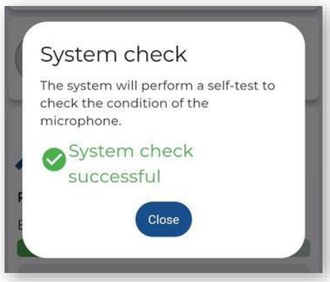




When you tap **Continue**, the instrument activates the electrostatic actuator and measures the signal generated (94 dB).

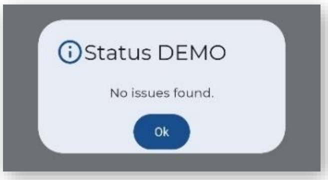
The application will then display theresult of the system check – successful or failed.





10.3.2 Auxiliary commands

When you tap **Status**, the **Status** dialogue box will tell you if the measurement and communication configurations are correct (*No issues found*). If not, the anomalies are listed.



When you tap **Identify**, the instrument name will flash on the instrument's display to indicate which device you are currently working with.

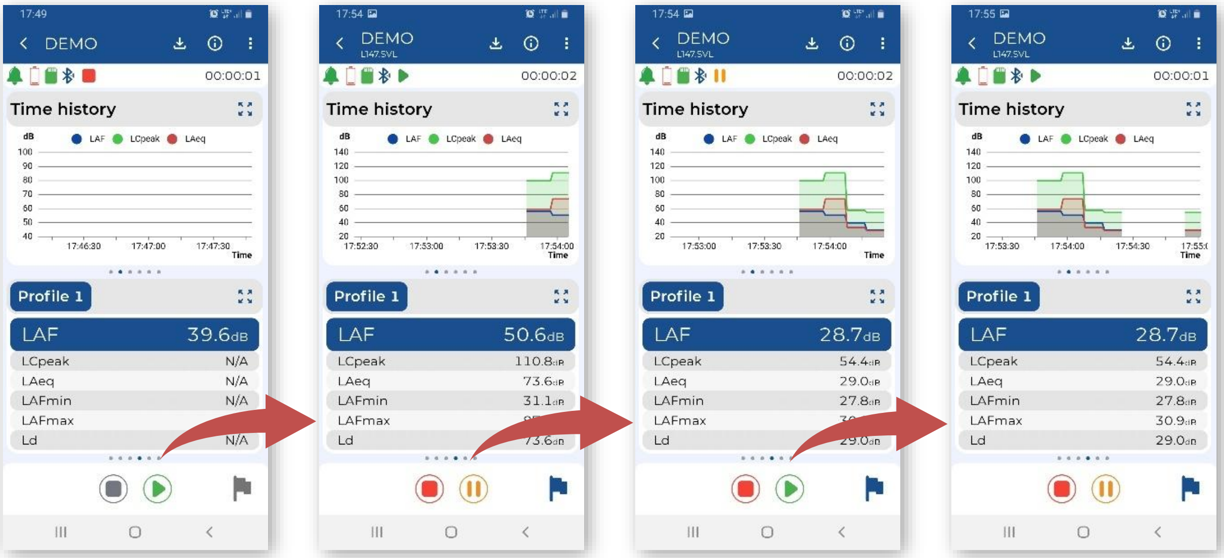
When you tap **Connect**, your mobile device begins to connect to this instrument via Bluetooth. When the connection is successful, this command changes to **Disconnect**. And vice versa.

When you tap **Rename Unit**, the **Device Name** dialogue box appears with the current instrument name, which you can edit.

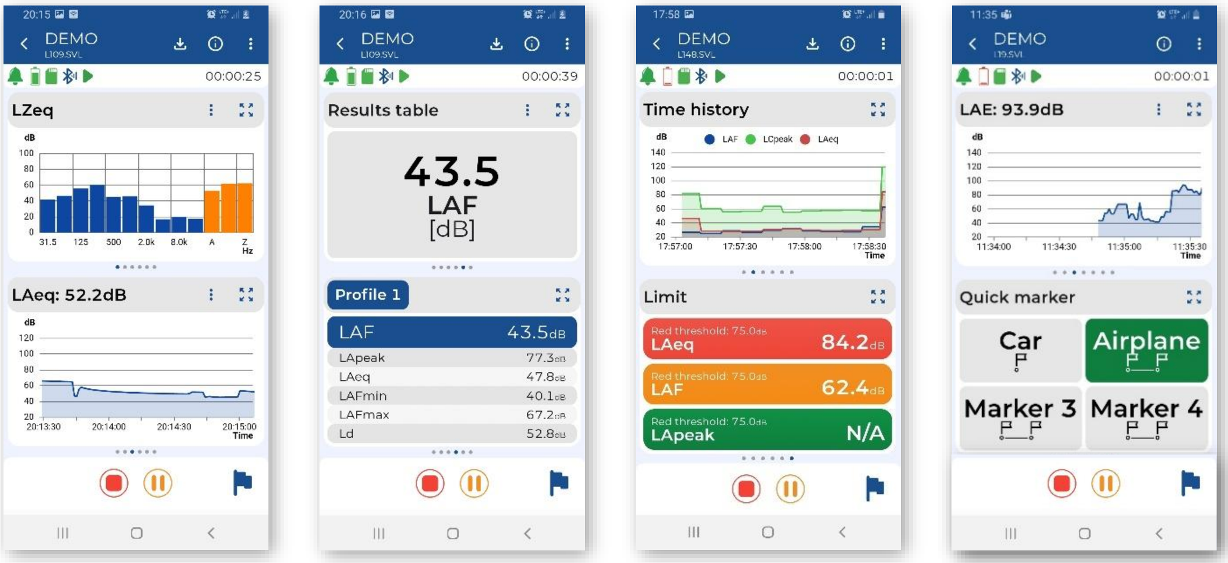
When you tap **Bluetooth PIN**, the dialog appears where you can change the Bluetooth PIN code.

10.3.3 Live View

From the **Live View** screen, you can control the measurement and set a marker - a note during the measurement. The measurement results are displayed in sections (widgets) which you can adjust by scrolling through the presentation views. The top line shows the battery, memory and measurement status, as well as the integration time.



Below are some combinations of widgets, including spectra, time histories, current results, alarm values and quick markers.

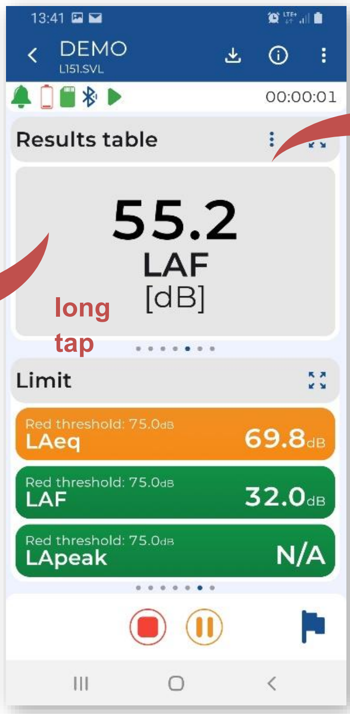


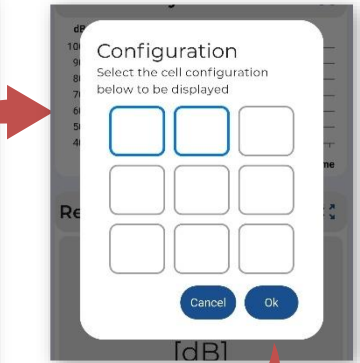
Note: Live view *shows the limited set of measurement results. The full set of measured results is stored in the instrument files and can be viewed using SvanPC++.*

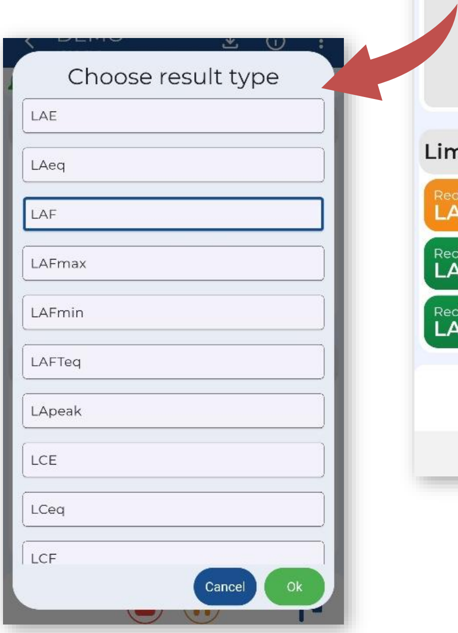
Note: *The* ***LAF*** *(SPL) result is measured continuously even when the measurement is stopped.*

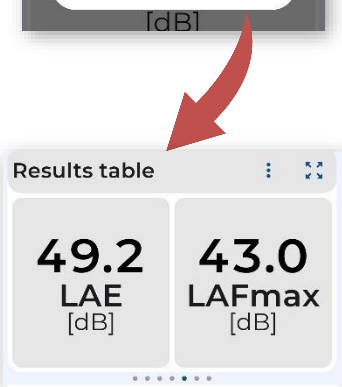
Tap the ⋮ icon to configure the **Result table** or **Quick Marker** sections.

Long tap on the section to change the measurement results to be displayed.



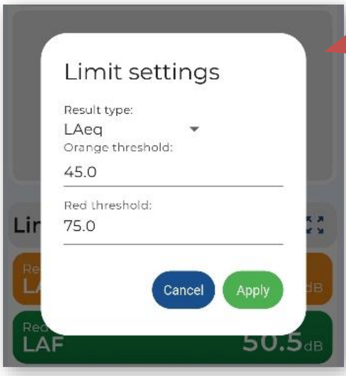


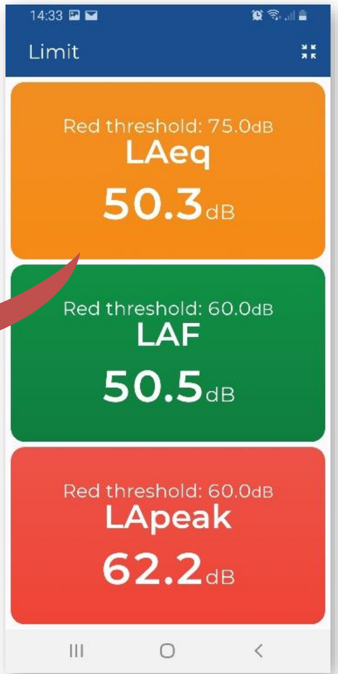


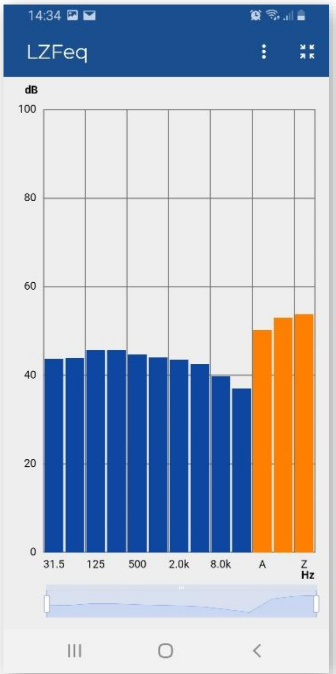


Tap on the icon to expand the section.

Long tap on the **Limit** section to set the thresholds for the colours of the result's background.







The horizontal screen enables you to view the graph at a higher resolution.

Tap on the graph area to activate the cursor with the readings.

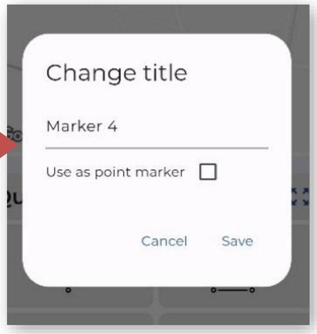
Tap outside the graph to deactivate the cursor.

Use the bar below the graph or two fingers to zoom in or out on the selected time or frequency range.

Quick markers are used to label (or highlight) special events during the measurement, such as the passing of a car or aeroplane, and indicate the duration of the event in the logger results. Point markers have start and end at the same time.

First tap on block marker activates it, the second one deactivates it.

To configure the marker, long tap on it.



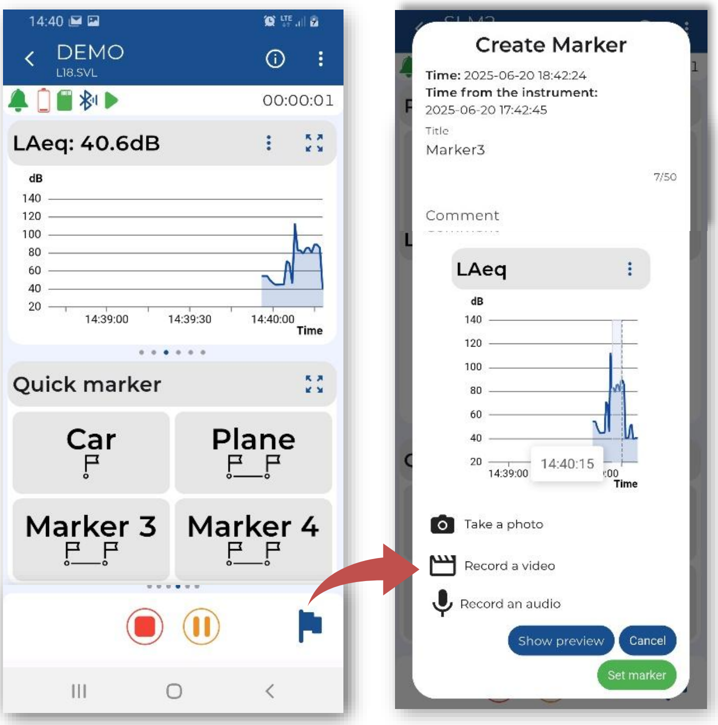
Tap the flag button to create an extended marker to describe an event during a measurement. This will open the **Create Marker** dialogue box, which contains descriptive options.

On the given chart, select the area of the event. Enhance the data by attaching details in the form of a comment, photo, video, audio file or location information.

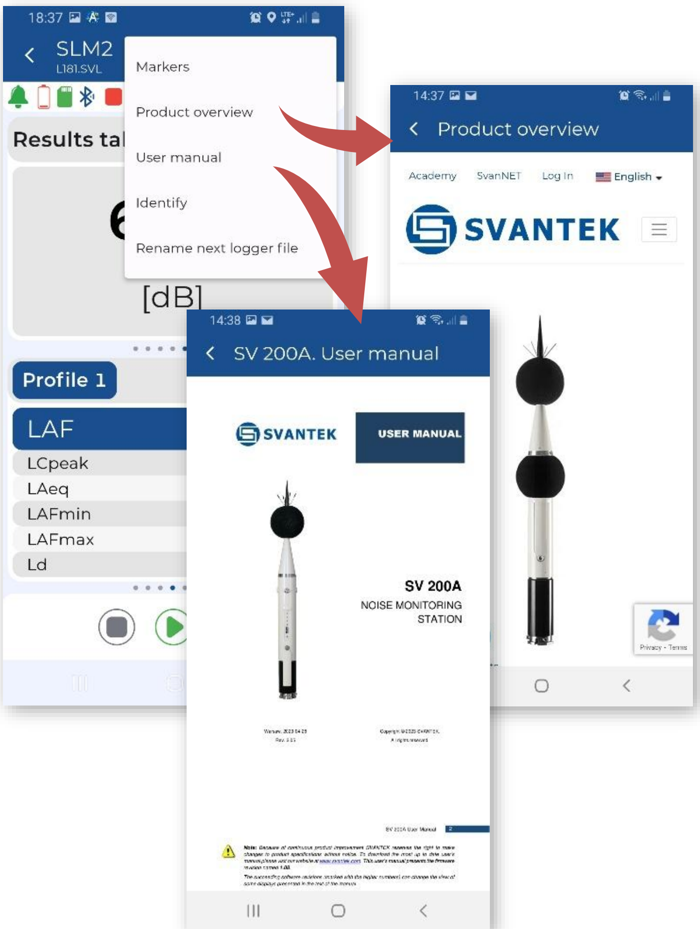
If the **Automatic Download** feature is enabled, any new marker will be automatically linked to the corresponding downloaded measurement file.

Once you have finished, tap **Set marker** to save it.

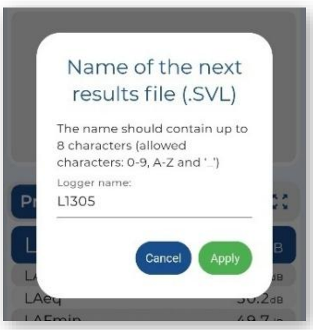
When a marker or measurement file is shared, they will be bundled together as a single package. The bundle can be opened using SvanPC++ software, which will display the markers directly on the time history plot.



Tap the icon to access the list of the marker records, the **Product overview** or **User manual**, to **Identify** the instrument (see Chapter 10.3.2) and to **Rename next logger file**.



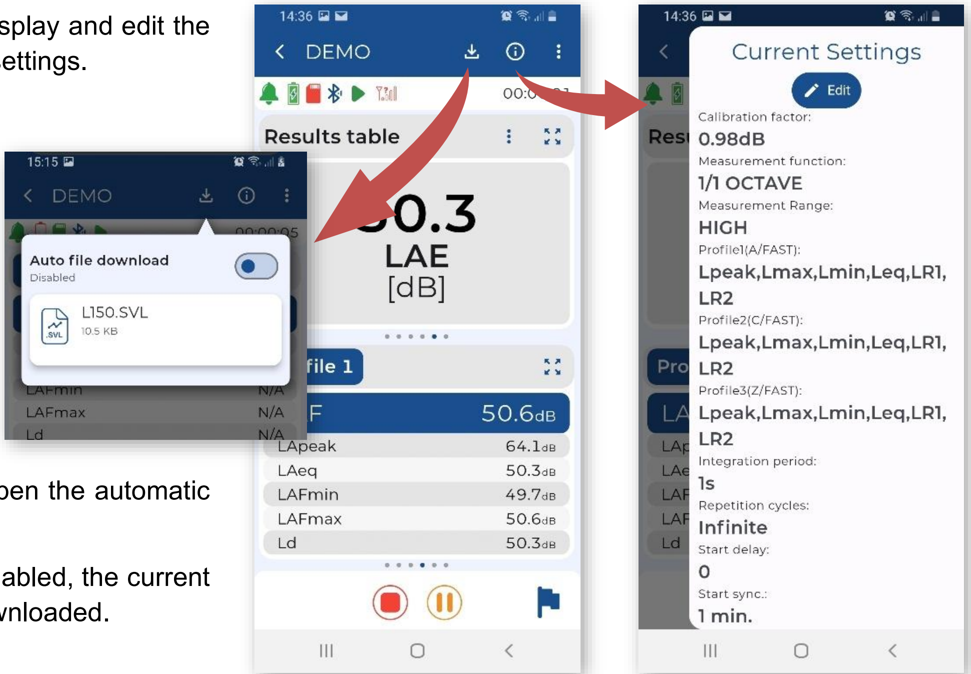
You can change the name of the results file only during a stopped measurement.



Tap the icon to display and edit the current measurement settings.

Tap the icon to open the automatic file downloads.

When this feature is enabled, the current file is automatically downloaded.

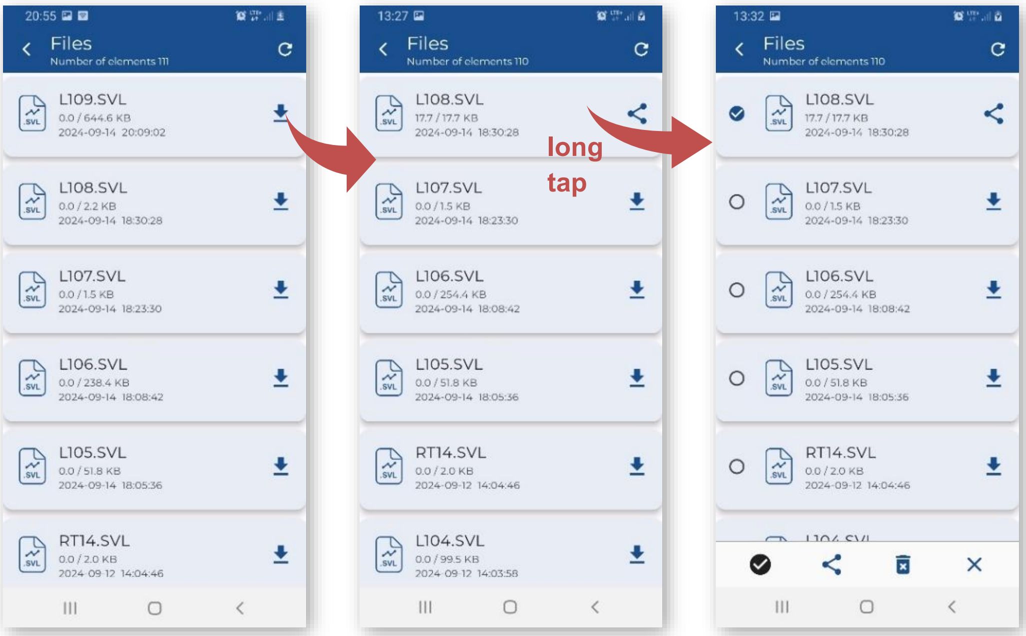


When you tap **Identify**, the name of the device appears on the display.

10.3.4 Files

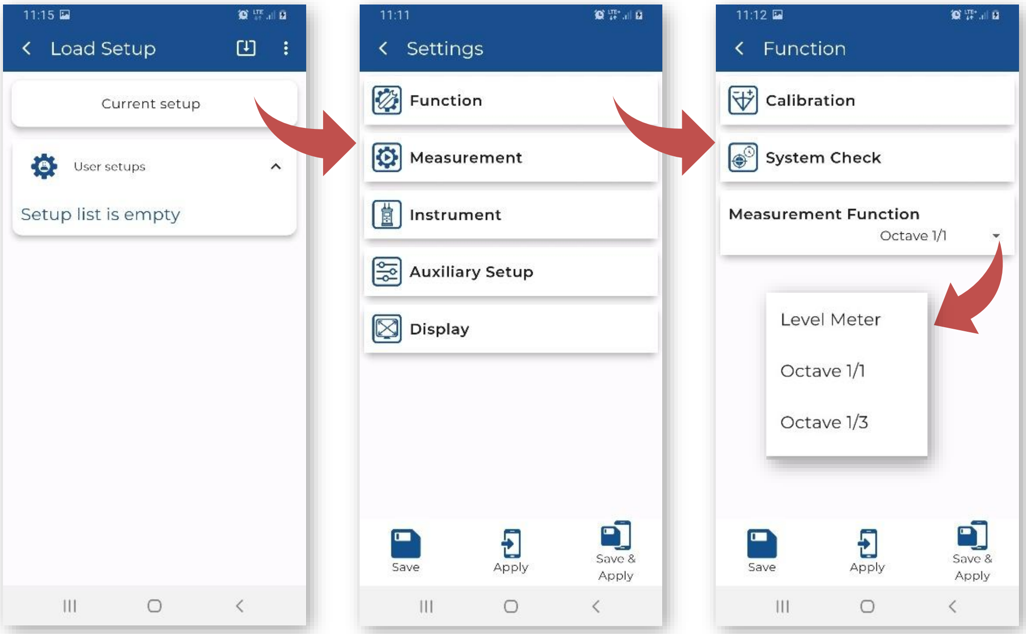
The **Files** section displays the list of files created by the instrument on the instrument's memory card.

You can download any file to your mobile device. Once the file is downloaded, you can share it. To delete the file, long tap on the file to select this file or multiple files, then tap the icon.



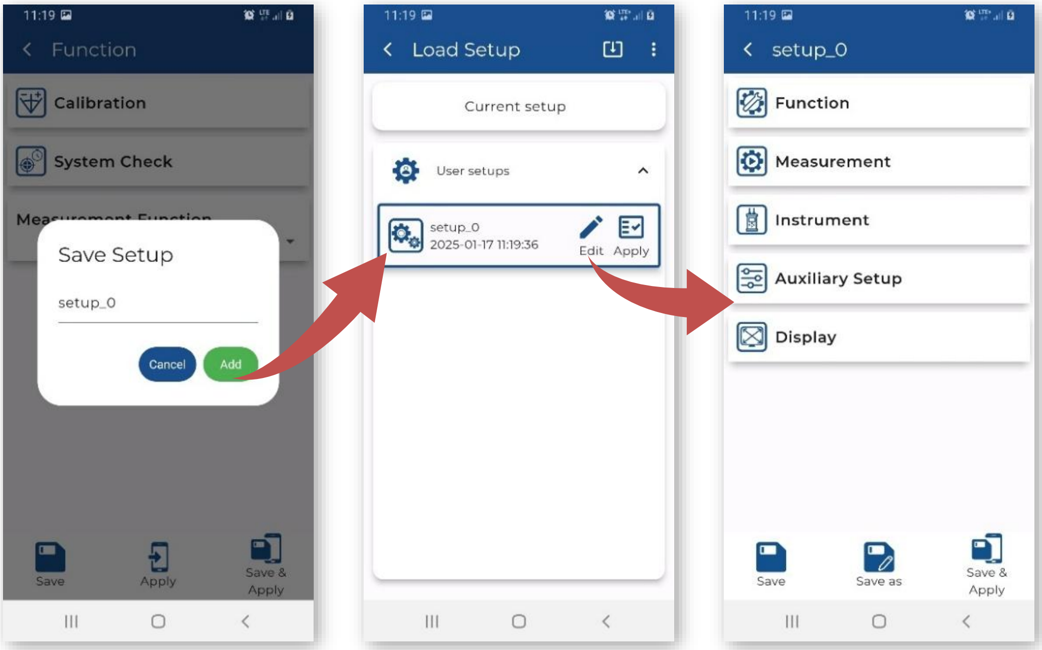
10.3.5 Instrument and measurement settings

The **Settings** section allows you to configure the measurement and instrument settings. The settings are grouped in sections such as **Function**, **Measurement**, etc., which contain sub-sections. The last item in such a hierarchy contains the parameters to be set, e.g. **Measurement Function**: *Level Meter*, *1/1 Octave,* etc.

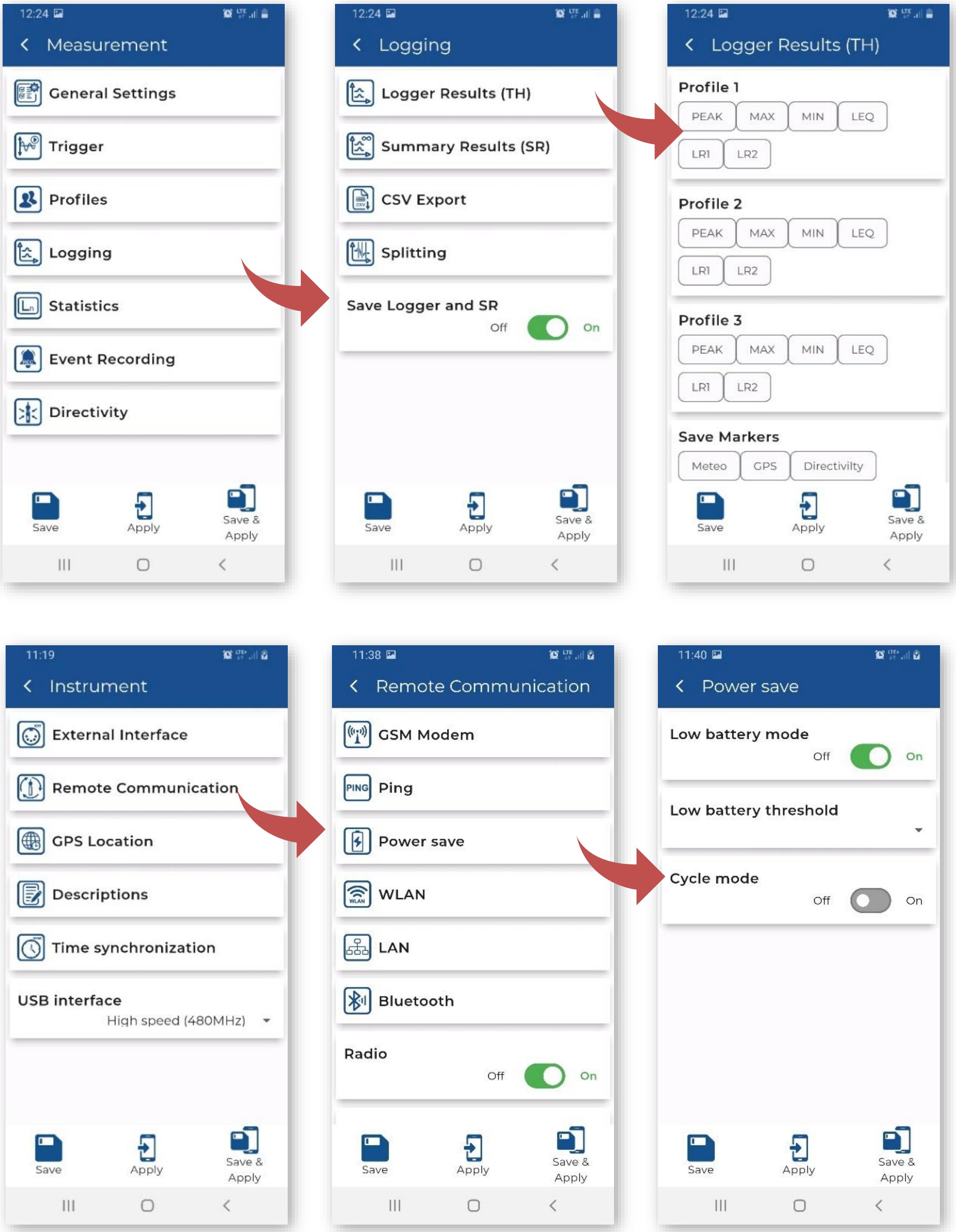


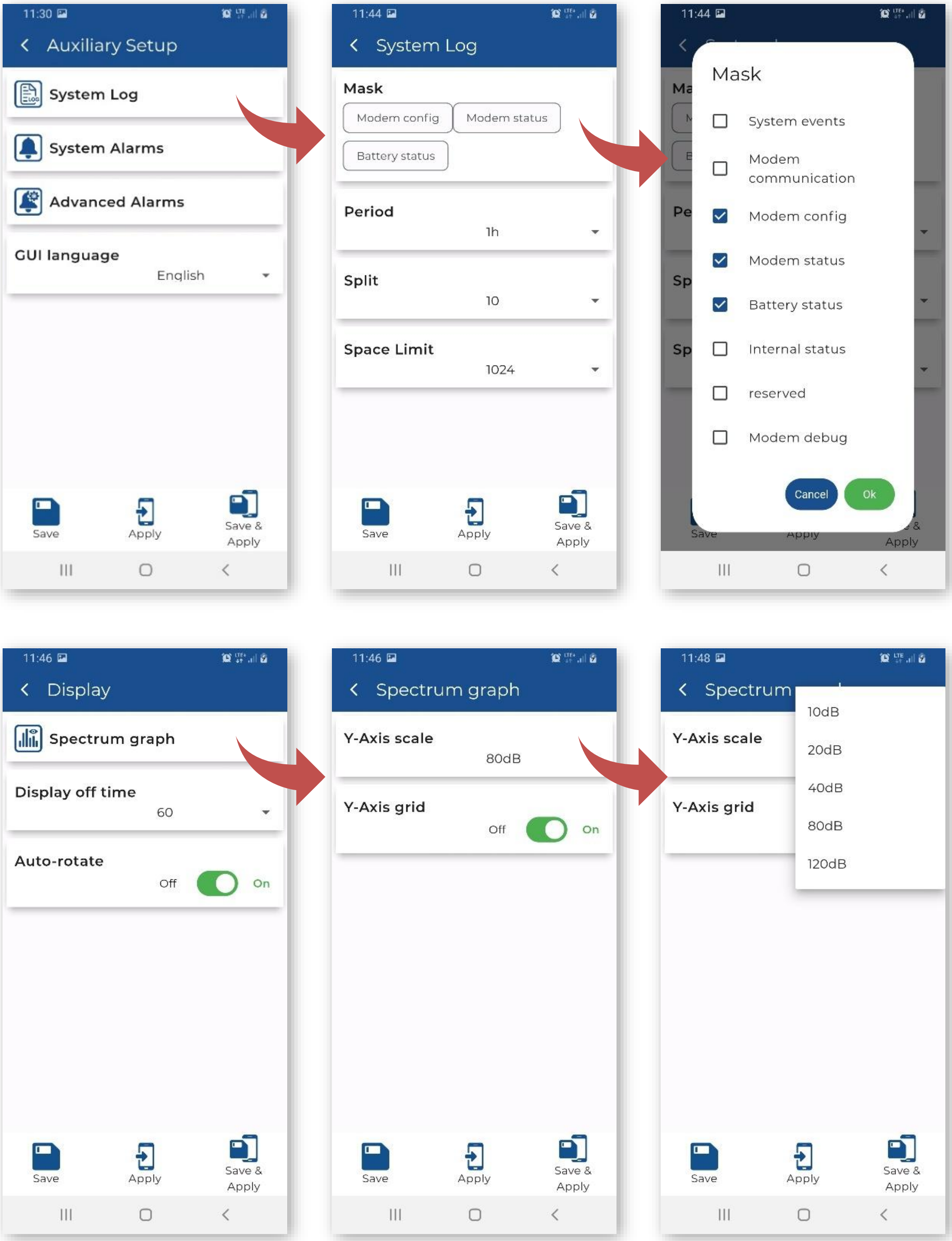
After configuring the settings, you can save them to the mobile device catalogue (**Save**), load them to the instrument as the current settings (**Apply**), or save and load them simultaneously (**Save & Apply**).

When you save settings, a new setup file is created in the dedicated application's directory on your mobile device, but the current instrument settings are not changed. You can load the settings saved in the file to the instrument. To do this, open the **User Setups** section, select the file with the desired settings, tap it, and select **Apply**. You can **Edit** these settings if necessary.



The hierarchy structure of the **Settings** section is similar to the *Setup file editor* of *SvanPC++* (see Chapter 8.5). Below are some examples of **Settings** screens.

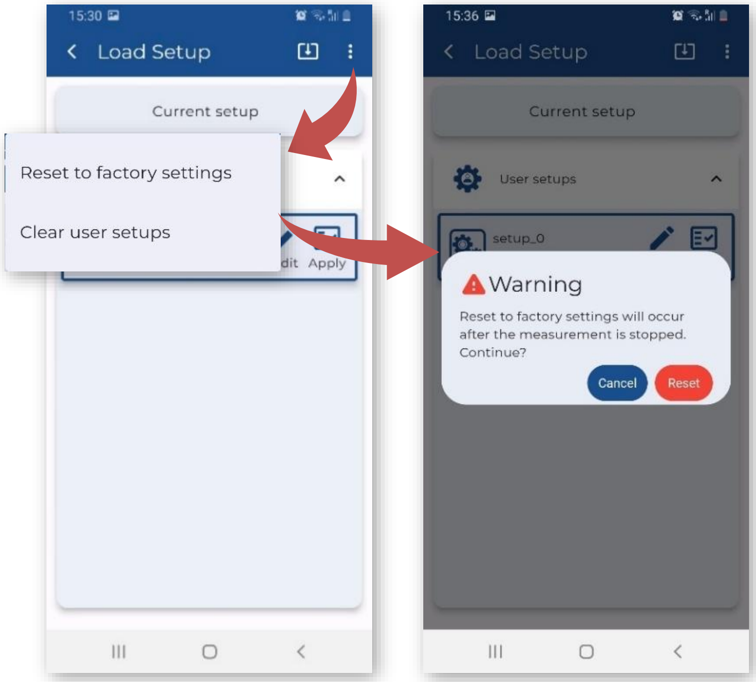



11:30
Auxiliary Setup
System Log
System Alarms
Advanced Alarms
GUI language
English
Save
Apply
Save & Apply
11:44
System Log
Mask
Modem config
Modem status
Battery status
Period
1h
Split
10
Space Limit
1024
Save
Apply
Save & Apply
11:44
Mask
System events
Modem communication
Modem config
Modem status
Battery status
Internal status
reserved
Modem debug
Cancel
Ok
11:46
Display
Spectrum graph
Display off time
60
Auto-rotate
Off
On
Save
Apply
Save & Apply
11:46
Spectrum graph
Y-Axis scale
80dB
Y-Axis grid
Off
On
Save
Apply
Save & Apply
11:48
Spectrum
Y-Axis scale
Y-Axis grid
10dB
20dB
40dB
80dB
120dB
Save
Apply
Save & Apply

10.3.6 *Restoring factory settings*

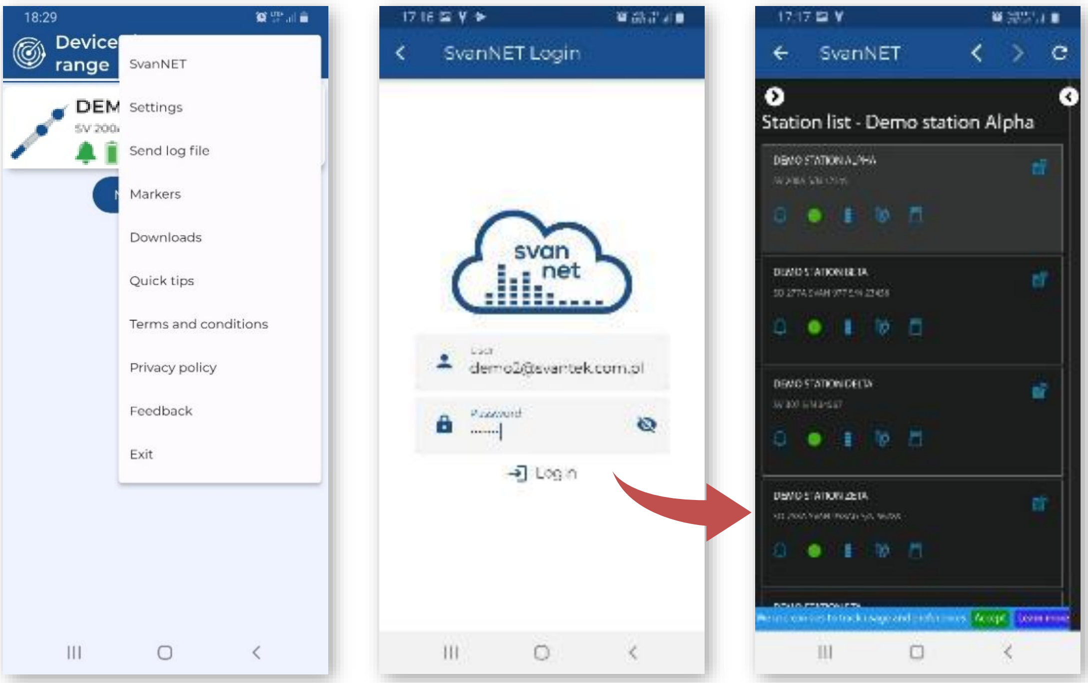
By tapping in the **Load Setup** screen, you can:

- **Reset to factory settings** and
- **Clear user setups**.

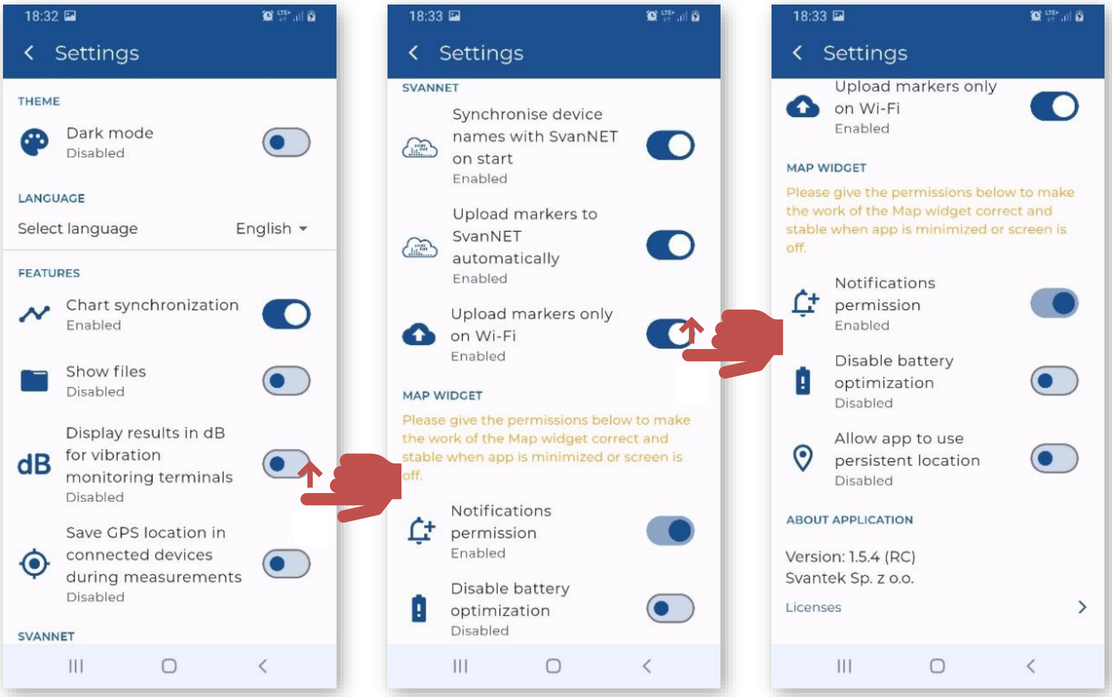


10.4 ASSISTANT PRO AUXILIARY FUNCTIONS AND SETTINGS

Tap the icon in the **Devices in range** screen to open *SvanNET* in your mobile device, configure *Assistant Pro* settings, share the log file using Android applications and view, edit and share earlier created markers, get quick tips , get acquainted with terms and conditions and privacy policy, send the screen with the description to Svantek Support and exit the application.

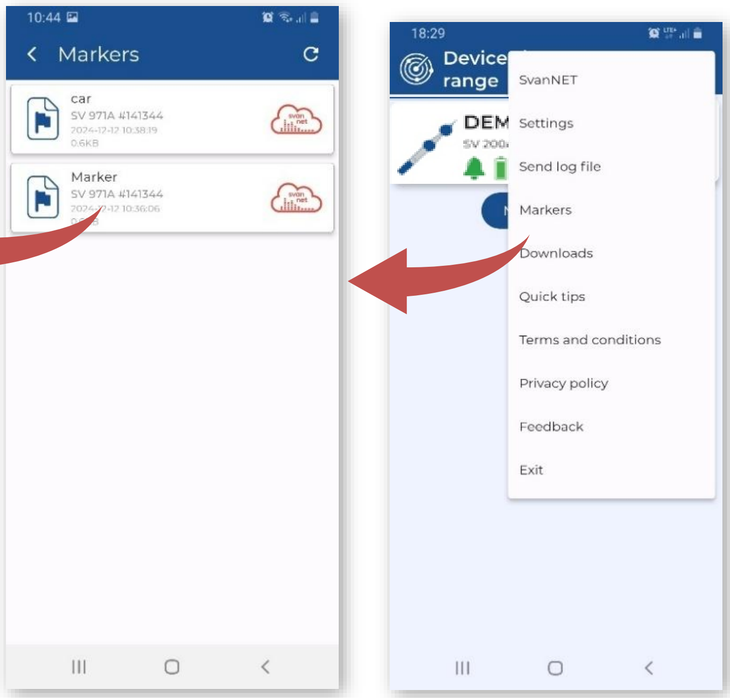


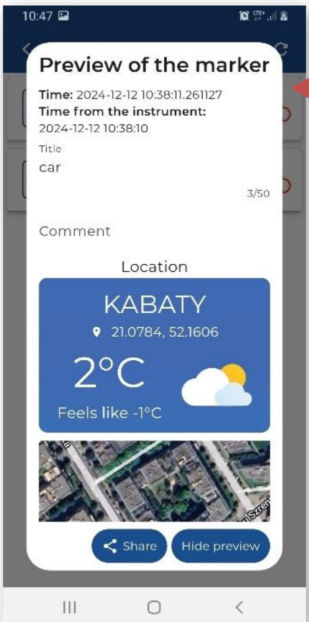
On the *Settings* screen, you can select the application THEME (enable **Dark Mode**), select the application LANGUAGE and enable some FEATURES (synchronise the cursors on different charts, make the Files item visible in the pop-up menu and in the instrument panel, select the units for displaying the vibration results and save the GPS location in the measurement files). You can also enable SVANNET options (synchronising the station name with SvanNET at startup, automatically uploading markers to SvanNET and only uploading markers on Wi-Fi. You can also give permissions regarding the Map widget, such as notifications, battery optimisation and persistent location, and get information about the application version and licences (ABOUT APPLICATION).



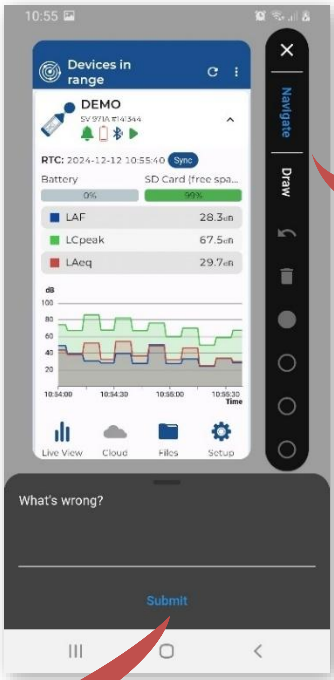
Tap the Markers item to get access to the created markers.

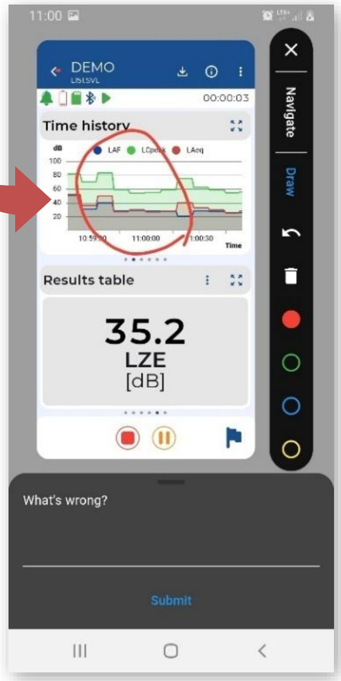
In the Markers screen you can open, share or delete the marker.

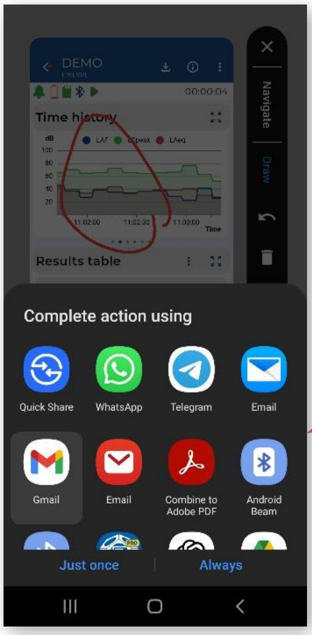




In the Feedback screen, you can select the screen you want to share with, for example, the Svantek support team using the **Navigate** option, then draw any helpful drawing using the **Draw** option, write what is wrong and finally send it where you want using the **Submit** button and the sharing options available on your smartphone.







11 INSTRUMENT UPGRADE

There are three programmes loaded in the instrument memory: FIRMWARE BOOTSTRAP and HARDBOOT.

FIRMWARE is a program dedicated to the main processor of the instrument, which maintains functions related to the user interface, measurements, files and communication. SVANTEK is constantly improving the functionalities of its instruments, so it is recommended to install the lates firmware upgrade.

BOOTSTRAP is a program for the main processor dedicated to the FIRMWARE upgrade.

HARDBOOT is a non-erasable programme designed to carry out only the BOOTSTRAP upgrade or repair process.

The user can upgrade the FIRMWARE and BOOTSTRAP programmes of the instrument.

11.1 INSTRUMENT UPGRADE VIA USB

To upgrade the FIRMWARE program the BOOTSTRAP mode should be entered.

1. Unpack the updated firmware package (provided as a suitable compressed file).
2. Make sure that the instrument is switched off.
3. Connect the SV 200A to the PC using the SC 256A cable.
4. Hold down the  key and switch on the instrument by briefly pressing the  key. This will put the instrument in BOOTSTRAP mode.
5. Run the *go-usb.bat* file on the PC.
6. Switch off the instrument.

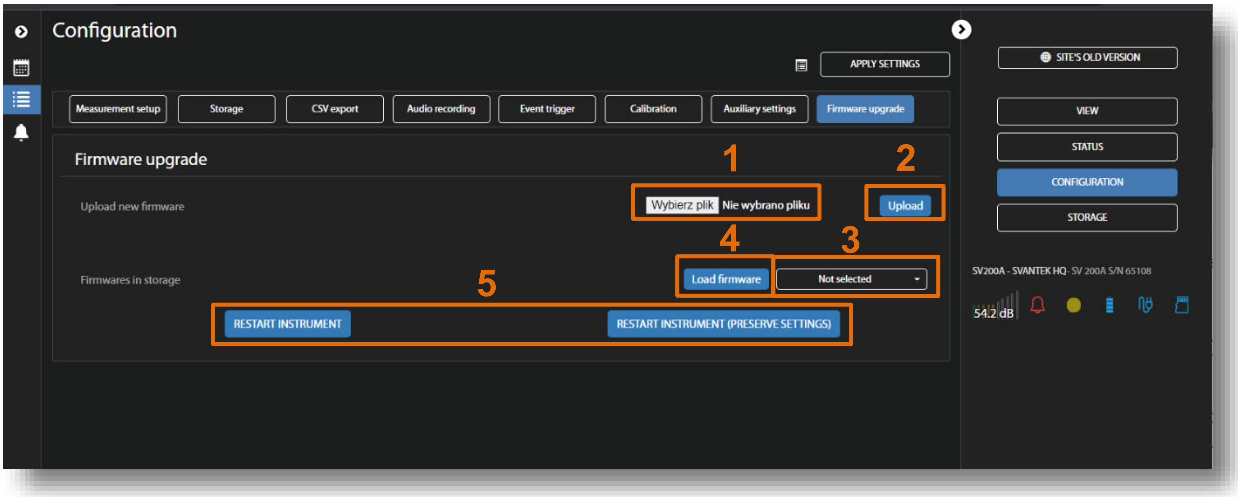
The BOOTSTRAP programme is upgraded via the HARDBOOT service programme. It can only be done via the USB cable.

1. Connect the SV 200A to the PC using the SC 256A cable.
2. Hold down the  and  keys simultaneously and switch on the instrument by briefly pressing the  key. This will put the instrument in HARDBOOT mode.
3. Run the batch file included in the upgrade package on your PC.
4. Switch off the instrument.

11.2 Firmware upgrade via SvanNET

To upgrade the SV 200A firmware via the *SvanNET* web service, go to the **CONFIGURATION** view and open the **FIRMWARE UPGRADE** tab.

Before upgrading it is essential to download the new firmware file from the SVANTEK website to your PC.



To load new firmware:

6. Click **Choose file** and select the firmware *.bin file in your PC.
7. Upload the selected file by clicking the **Upload** button.
8. When the upload is complete, select the new firmware filein the firmware selector.
9. Click **Load firmware**.
10. Click **RESTART INSTRUMENT** or **RESTART INSTRUMENT (PRESERVE SETTINGS)** to complete the process and wait 60 seconds for the connection to be reestablished. Measurements will start automatically.

Note: *After* ***RESTART INSTRUMENT (PRESERVE SETTINGS)****, all previous instrument settings are retained. After* ***RESTART INSTRUMENT****, only the communication settings are retained, all other parameters are set to default.*

12 MAINTENANCE

12.1 TRANSPORT AND STORAGE

For transport and storage, we recommend using the packaging provided by the manufacturer. In a potentially dirty industrial environment, it is advisable to use the carrying case supplied by the manufacturer, which provides excellent mechanical and environmental protection and long-term storage conditions.

12.2 CLEANING

Clean the surface of the instrument with a damp, soft cloth.

Note: *Do not allow water to enter the bottom panel. It can damage the SV 200A!*

The instrument sockets should be cleaned with compressed air.

Note: *In case of major contamination, such as oil or grease, contact your local authorised distributor or Svantek Service Office.*

12.3 RESETTING THE INSTRUMENT

- **SYSTEM RESET:** The internal software reset clears any setup configuration and restores the default **Factory Settings** (see Chapter 5.1.2).
- **HARDWARE RESET:** The internal hardware reset does not change any user data. Make sure the battery is not flat, and the instrument is switched off. Press and hold the 10 sec. key for more than 10 seconds, then release it. Switch on the instrument in the normal way by pressing the Enter 3 sec. key for more than 3 seconds (see Chapter 3.2).

Note: *The hardware reset should only be used in extreme situations, such as when the instrument is hanging up.*

Note that a hardware reset:

- will stop any pre-programmed auto-run modes,

- will stop the measurement run.

12.4 TROUBLESHOOTING

- If your instrument does not respond proceed with hardware reset of the instrument (see Chapter 12.3).
- If the reset does not help, contact your local authorized distributor or Svantek Service.

Should your SVANTEK professional measurement equipment need to be returned for repair or for calibration, please contact the service office at the following number or contact via the SVANTEK's website.

If your Svantek professional measuring equipment needs to be returned for repair or calibration, please contact the service office at the following number or contact via the Svantek website.

Service Office: +48 (22) 51-88-320 or +48 (22) 51-88-322.

Office hours are 9:00 a.m. to 5:00 p.m. Central European Time.

Internet: www.svantek.com/contact

Address: SVANTEK Sp. z o.o.

Strzygłowska 81

04-872 Warszawa,

Poland

Appendix A. REMOTE CONTROL CODES

USB 2.0 interface is a serial interface working with 480 MHz clock which enables one to control remotely the device. Its speed is relatively high, and it ensures the common usage of USB in all produced nowadays Personal Computers.

Alternatively, all commands described in this appendix are valid for any other kinds of interfaces (if present) like **mobile (3G/4G)** communication, **WLAN**, **LAN**, **RS232** and **Bluetooth** Low Energy. Mobile, WLAN and LAN use TCP/IP or UDP communication protocols while Bluetooth LE uses proprietary characteristics to exchange data with the instrument. Some of the instruments can also be controlled via SMS.

Functions, which are developed in order to control data flow in the serial interfaces, ensure:
- Bi-directional data transmission,
- Remote control of the instrument.

In order to program the serial interface, the user has to:
1. send a "function code",
2. get a response to the “function code”
3. send/receive a data file (optionally)

A.1 INPUT / OUTPUT TRANSMISSION TYPES

The following basic input / output transmission types (called functions) are available:

FUNCTION #1 – GENERAL CONTROL FUNCTIONS

FUNCTION #2 – MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

FUNCTION #3 – MEASUREMENT RESULTS READ-OUT IN 1/1 OCTAVE AND 1/3 OCTAVE MODES

FUNCTION #4 – SETUP FILE READ-OUT

FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

FUNCTION #9 – SETUP FILE WRITE-IN

FUNCTION #D – DATA FILES ACCESS

FUNCTION #S – DIRECT SETUP ACCESS

A.2 FUNCTION #1 – GENERAL CONTROL FUNCTIONS

#1 function enables the user to send the control setting codes to the instrument and read out a file containing the current control state. A list of the control setting codes is given in Chapter A.11. The format of #1 function is defined as follows:

#1,Xccc,Xccc,(...),Xccc; **(1)**

or

#1,Xccc,X?,Xccc,(...),X?,Xccc; **(2)**

or

#1,X?,X?,(...),X?; **(3)**

where:

X - group code, **ccc** – new code value,

X? - request to send the current X code setting.

In the first case (1) the instrument does not respond to a command, even if an error occurs.

In the second and third cases (2), (3) the instrument outputs control settings for all requests X? in the following format:

#1,Xccc,Xccc,(...),Xccc;

Note: *All bytes of that transmission are ASCII characters.*

Note: *Changing settings using #1 functions during measurements running state (#1,S1;) is blocked. Stop the measurements (#1,S0;) before changing the settings.*

In order to read out all current control settings the user should send to the device the following sequence of characters:

#1;

In this case the instrument outputs all control settings given in Chapter A.11 in the format:

#1,Xccc,Xccc,(...),Xccc;

Example: The instrument sends the following sequence of characters as an answer for the mentioned above request:

#1,U200,N1234,W1.08.1,Z1,V0,Q0.01,M1,R2,F2:1,F3:2,F1:3,f1,C1:1,C1:2,C1:3,B0:1,B3:2,B15:3,b8,d1s,D10s,K5,L0,m0,s0,l70,n70,Y0,Xa0,Xb0,Xc0,Xf0,Xg0,Xh0,Xi0,Xk1,Xl0,Xm0,Xn70,Xo1,Xq0,Xs0,Xt1800,Xu3600,Xw0,Xx0,Xy0,Xz0,XA0,XB1,XC1,XD-1:1,XD-1:2,XD-1:3,XD-1:4,XD-1:5,XD-1:6,XE32,XF0,XG1,XH300,XIapp.svannet.com,XJ8000,XK80,XL70,XM70,XNinternet,XOnone,XP0,XQ0,XS0,XT0,XUnone,XV0.0.0.0,XW0,XXdsmtp.server.com,XXeusername,XXfpassword,XXgSender Name/Address,XXhreceiver@mail.com,XXisubject,XXjmessage,XXk0,XXl0,XXm0,XXn16,XXo2,XXp0,XXq70,XXr0,XXs10,XXt1,XXu0,XXv100,XXw10,XXx0,XXy10,XXz1,XXA16,XXB0,XXC15,XXD0,XXEadresystacji.svantek.com,XXFmembers.dyndns.org,XXGhostname.dyndns.org,XXHlogin,XXIpassword,XXJ0,XXKftp.server.com,XXLusername,XXMpassword,XXN21,XXO20,XXPworkingdir,XXQ0,XXR60,XXS60,XXTCONFIG,XXURESULT,XXV25,XXW15,XXY0,XXZ10,XZ1,S0,O10,k10,T1,e0,c0,h0,x0,q114.00,y-1,A1,a1,j623,r1,H8191:1,H8191:2,H8191:3,J1023:1,J1023:2,J1023:3,o63,p7;

means that:

- SV 200(A) is investigated (**U200**); see #7,US; command for unit subtype information
- its serial number is 1234 (**N1234**)
- software version number is 1.05.5 (**W1.08.1**)
- meter mode is sound (**Z1**)
- input mode is prepolarized microphone (**V0**)
- calibration factor is equal to 0.01 dB (**Q0.01**)
- **LEVEL METER** is selected as the measurement function (**M1**)
- measurement range is high **(R2)**
- **A** filter is selected in profile 1, SLM function (**F2:1**)
- **C** filter is selected in profile 2, SLM function (**F3:2**)
- **Z** filter is chosen in profile 3, SLM function (**F1:3**)
- **Z** filter is selected for **1/1 OCTAVE** or **1/3 OCTAVE** analysis (**f1**)
- **FAST** detector is selected in profile 1, SLM function (**C1:1**)
- **FAST** detector is chosen in profile 2, SLM function (**C1:2**)
- **FAST** detector is selected in profile 3, SLM function (**C1:3**)
- logger's buffer is not filled by the results from profile 1 (**B0:1**)
- **Lpeak** and **Lmax** values are stored in the files of the logger from profile 2 (**B3:2**)
- **Lpeak**, **Lmax**, **Lmin** and **Leq** values are stored in the files of the logger from profile 3 (**B15:3**)

- results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis are not stored in the files of the logger (**b8**)
- results are stored in a logger's file every 1 second (**d1s**)
- integration period is equal to 10 seconds (**D10s**)
- measurement has to be repeated 5 times (**K5**)
- linear detector is selected to the **Leq** calculations (**L0**)
- ... and so on.

See Chapter A.11 for more details.

Note: *Control settings presented in the instrument's response and not described in Chapter A.11 considered as reserved. Do not change these settings!*

A.3 FUNCTION #2 – MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

#2 function enables one to read out the current measurement results from the selected profile.

#2 function has the format defined as follows:

#2 [,<aver>[<flags>]] [,<profile>] [[[,X?] ,X?] ,(...)];

where:

<aver> – type of results:

i – instantaneous results, i.e. results from the current cycle (default),

a – averaged results, i.e. results from the previous cycle,

c – 1 second results, i.e. results integrated for the last 1 second,

<flags> – flags:

s – measurements flags, i.e. measurements running,

<profile>– profile number:

1, 2 or 3 – one of the profile, i.e. only results from the given profile will be sent;

X – code of the specified result (see below); if no codes are specified all results will be sent;

In the case of **<profile> = 1, 2 or 3** the instrument sends results in the format defined as follows:

#2 [,<aver>[<flags>f]],<profile>,Xccc,(...);

where **f** is a flags value, e.g. 1 – measurements are running; **ccc** is the value of the result **X** or question mark (**?**) if result **X** is not available;

In order to read out all current results for all three profiles the user should send to the device the following sequence of characters:

#2;

In this case the instrument sends results in the format defined as follows:

#2 ,1,Xccc,(...),2,Xccc,(...),3,Xccc,(...);

where **1**, **2** and **3** are the profiles and **ccc** is the value of the result **X**.

If no results are available, the instrument returns:

#2,?;

The **X** codes of the results from the SLM mode are defined as follows:

v under-range flag (ccc equals to 0 when the overload did not occur, 2 when the under-range took place during the last measurement period but did not occur in the last second of the measurement and 3 when the under-range took place during the last measurement period and it lasted in the last second of the measurement)

V overload flag (ccc equals to 0 or 1)

t statistics cycles (ccc – the number of cycles statistics are calculated for)

T time of the measurement (ccc – value in seconds)

F start date of the measurement in format ***dd/mm/yyyy*** (***dd*** – day, ***mm*** – month, ***yyyy*** - year)

G start time of the measurement in format ***hh/mm/ss*** (***hh*** – hour, ***mm*** – minute, ***ss*** - second)

P **Lpeak** value (ccc – the value in dB)

M **Lmax** value (ccc – the value in dB)

N **Lmin** value (ccc – the value in dB)

S **L** result (ccc – the value in dB)

R **Leq** result (ccc – the value in dB)

U **LE** result (ccc – the value in dB)

B(k) **Lden** result (ccc – the value in dB; k – flag determining the kind of the result)

Y **Ltm3** result (ccc – the value in dB)

Z **Ltm5** result (ccc – the value in dB)

o **LR1** result (ccc – the value in dB)

O **LR2** result (ccc – the value in dB)

q **LE1** result (ccc – the value in dB)

Q **LE2** result (ccc – the value in dB)

L(nn) value L of the nn statistics (ccc – the value in dB)

A time of the directivity measurements (ccc – the value in seconds)

C e-compass value for directivity measurements (ccc – the value in degrees)

D a sector for a maximum value of averaged energy XY distribution (ccc – the value is directivity XY sector number)

E a maximum value of averaged energy XY distribution (ccc – the value in %)

H a sector for a maximum value of averaged Z energy distribution (ccc – the value is directivity Z sector number)

I a maximum value of averaged energy Z distribution (ccc – the value in %).

Note: *In the case of* ***Lden****, the value k placed in the parenthesis after the code* ***B****, denotes the kind of the currently measured result. The kind of the* ***Lden*** *result depends on the time during which the measurements were performed (****d*** *denotes day,* ***e*** *denotes evening and* ***n*** *denotes night). The corresponding values of k parameter and the kind of the measured* ***Lden*** *result are presented below:*

k = 1 ***Ld*** *result,*

k = 2 ***Le*** *result,*

k = 3 ***Lde*** *result,*

k = 4 ***Ln*** *result,*

k = 5 ***Lnd*** *result,*

k = 6 ***Len*** *result,*

k = 7 ***Lden*** *result.*

The exemplary results of the instrument's response after sending to it the following sequence of characters: **#2,1;** coming from the first profile are given below:

#2,1,F20/05/2020,G17:38:03,v0,V0,t2,T1,P65.80,M49.21,N37.03,S49.21,R43.99,U43.99,B(1)43.99,Y49.21,Z49.21,o?,O?,q43.98,Q43.98,L(01)52.00,L(10)51.10,L(20)46.10,L(30)44.10,L(40)38.60,L(50)38.10,L(60)37.60,L(70)37.10,L(80)36.60,L(90)36.10,A1,C0,D270.00,E5.05,H11.25,I6.97;

***Note:** The presented above order of the measurement results sent out by the instrument does not depend about the characters sent to the unit.*

Example: After sending to the instrument the string:

#2,1,T?,R?,V?,P?,L?;

the unit sends out the results of measurement coming from the first profile in predefined, described above, order:

#2,1,V0,T1,P65.80,R43.99,L(01)52.00,L(10)51.10,L(20)46.10,L(30)44.10,L(40)38.60,L(50)38.10,L(60)37.60,L(70)37.10,L(80)36.60,L(90)36.10;

***Note:** All bytes of that transmission are ASCII characters.*

A.4 FUNCTION #3 – MEASUREMENT RESULTS READ-OUT IN 1/1 OCTAVE AND 1/3 OCTAVE MODES

#3 function enables one to read out the current measurement results in **1/1 OCTAVE** or **1/3 OCTAVE** modes, depends on device function selected.

#3 function format is defined as follows:

#3[,T]; - displayed spectrum

#3[,T],A; - averaged spectrum

#3[,T],I; - instantaneous spectrum

#3[,T],M; - max spectrum

#3[,T],N; - min spectrum

T - include measurement time in the instrument's response

The device responds, sending the last measured spectrum (when the instrument is in STOP state) or currently measured spectrum (when the instrument is in RUN state) in the following format:

#3[,T<time>];<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <data byte> (...) <data byte>

<time> is the measurement time given in seconds

<Status Byte> gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means that "overload does not happen",
= 1 means that "overload appeared",
D5 = 0 instantaneous current result (RUN State),

= 1 final result (STOP State),

D3 = 1 results in **1/3 OCTAVE** mode,

D2 = 1 results in **1/1 OCTAVE** mode,

D6, D4, D1, D0 - reserved bits.

Note: *ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

Note: *The measurement result is coded in binary form as dB•100 (e.g., 34.5 dB is sent as binary number 3450).*

A.5 FUNCTION #4 – SETUP FILE READ-OUT

#4 function enables the user to read-out a file from the internal Flash-disk or RAM memory. The data file formats are given in Appendix B.

#4 function formats are defined as follows:

#4,0,\; file containing the catalogue,

#4,0,?; count of the files,

#4,0,index,count; part of the file containing the catalogue,

where:

index - first record,

count - number of records in the catalogue.

The catalogue of the files is a set of the records containing 16 words (16 bits each). Each record describes one file saved in the instrument's Flash-disk or RAM. The record structure is as follows:

words 0 - 3 8 characters of the file name,

word 4 type (binary number),

word 5 reserved,

word 6 least significant word of the file size,

word 7 most significant word of the file size,

words 8 - 15 reserved.

#4,4; current setup file,

#4,4,?; size of the current setup file,

#4,4,offset,length; part of current setup file,

where:

offset - offset from the beginning of the current setup file,

length - number of bytes to read,

Note: *The "\" character is treated as the file name of the catalogue and must be sent to the instrument.*

All data words are sent **<LSB>** (least significant byte) first.

When an error is detected in the file specification or data, the instrument responds with:

#4,?;

Note: *Current setup file placed in RAM is serviced by this command in the SV 200A only. For data files access see Chapter* *A.9**.*

A.6 FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

#5 function enables one to read out the statistical analysis results.

#5 function format is defined as follows:

#5,p;

where:

p - the number of the profile (1, 2 or 3)

The device responds, sending the current classes of the statistics in the following format:

#5,p;<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <NofClasses><BottomClass><ClassWidth><Counter of the class> (...) <Counter of the class>

Status Byte gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means "overload does not happen",
= 1 means "overload appeared",

D6 = 1 reserved,

D5 = 0 instantaneous current result (RUN State),
= 1 final result (STOP State),

D0 to D4 reserved bits.

Note: *There is no any succeeding transmission in the case when the* ***Status Byte*** *is equal to zero.*

The **transmission counter** is a two-byte word denoting the number of the remaining bytes to be transmitted. Its value is calculated from the formulae:

Transmission counter = 6+n * (4 * the number of the classes in the statistics)

where:

n is a number of the transmitted statistics. For p = 1, 2 or 3 only one statistic is transmitted (n = 1),

NofClasses is a two-byte word denoting the number of classes in the statistic,

BottomClass is a two-byte word denoting the lower limit of the first class (*100 dB),

ClassWidth is a two-byte word denoting the width of the class (*100 dB),

Counter of the class is a four-byte word containing the number of the measurements belonging to the current class.

Note: *The bytes in the words are sent* ***<LSB>*** *(least significant byte) first.*

Note: *ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

A.7 FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

#7 function enables the user to perform special control functions. **Some of them should be used with the extreme care.**

#7 function format is defined as follows.

To read settings a query should be send to the device:

#7,<code>;

where **<code>** is a two ASCII letter code.

The device responds with a control settings:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

where **<code>** is the same code sent in the query and **set1, set2,... setN** are settings.

To write settings to the device follow the opposite procedure. Send to the device:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

In case of success the device responds with:

#7,<code>;

In case of an unknown function or error the device returns:

#7,?;

Codes and settings for #7 function are described in Chapter A.11.

Note: *#7 function protocol consist of ASCII characters only.*

Note: *Some of the #7 functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.8 FUNCTION #9 – SETUP FILE WRITE-IN

#9 function enables the user to write a configuration file into the instrument's storage or non-volatile memory. SV 200A supports two types of configuration files: setup file and advanced alarms configuration file.
The data file formats are given in Appendix B.

#9 function formats are defined as follows:

#9,<FILE_TYPE>,<FILE_LENGTH>,<DATA>

where:

<FILE_TYPE>	type of the file 2 - setup file (file is saved on SD card; does not change current setup), 4 - current setup file, 6 – advanced alarm configuration file,
<FILE_LENGTH>	length of the file in bytes,
<DATA>	binary content of the file.

Note: *#9 function is blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before using the function.*

A.9 FUNCTION #D – DATA FILES ACCESS

#D functions are used to access data files in the instrument's storage like microSD card or USB Flash Disc with FAT file system. A basic knowledge of FAT file system is necessary to use these functions.

#D function format is defined as follows.

To read parameters a query should be send to the device:

#D,<code>,?;

where **<code>** is one ASCII letter code, described in the below table.

The device responds with parameters:

#D,<code>,par1[,par2[,par3[,...[,parN]]]];

or

#D,<code>,?;

in case of an unknown **<code>** or any other error,

where **<code>** is the same code sent in the query and **par1, par2,... parN** are parameters.

To execute command or read/write data to the device storage use the following procedure. Send to the device:

#D,<code>,par1[,par2[,par3[,...[,parN]]]];[data][CRC]

In case of successful command execution the device responds with:

#D,<code>;

In case of read/write command the device responds with:

#D,<code>,par1[,par2[,par3[,...[,parN]]]];[data][CRC]

In case of an unknown function or error the device returns:

#D,<code>,?;

#D functions take the following parameters:

<disk>	logical disk number: 0 – SD-card,
<address>	directory address (cluster number),
<offsetB>	offset of the first byte to read (an even number),
<nB>	number of bytes to read (an even number),
<data>	binary data,
<count>	directory size in bytes,
<name>	filename in the format XXXXXXXX.YYY (XXXXXXXX – filename, YYY- filename extension),
<dirName>	directory name,
<nBwr>	number of bytes to write,
<cFlag>	closed file flag; 0 – file is not closed, file is closed,
<CRC>	16-bit CRC checksum,
<size>	size of a file in bytes,

<firstClust> a first cluster of the file,

<dirClust> a cluster of the file's directory,

<dirEntry> an absolute offset of the file entry in the directory,

<calNum> number of calibration history files in the working directory.

Notes:

*- function codes marked in green are **read only**!*

*- function codes marked in red are **locked during measurements run state**! Stop measurements before changing these settings.*

*- values in square brackets are **[optional]**!*

Group name	#D code	Code description
Disk information	c	Getting a list of available disks and its types Command: **#D,c,?;** Response: **#D,c,<disk1>[,<disk2>[,<disk3>]];** where: **<disk1>** - 0 – microSD card **<disk2>** - N/A **<disk3>** - N/A
Working directory	d	Reading parameters of the working directory. Command: **#D,d,?;** Response: **#D,d,<disk>,<address>,<count>;** Changing current working directory. Command: **#D,d,<disk>,<address>;** *Note: Changing a working directory during measurements is not possible.*
Reading files	r	Reading a file from the working directory. Command: **#D,r,<disk>,<address>,<offsetB>,<nB>;** Response: **#D,r,<disk>,<address>,<offsetB>,<nB>;[<data>]**
	z	Reading a file from the working directory with CRC. Command: **#D,r,<disk>,<address>,<offsetB>,<nB>;** Response: **#D,r,<disk>,<address>,<offsetB>,<nB>;[<data>][CRC]**
	R	Reading a file from the working directory with file closed flag. Command: **#D,r,<disk>,<address>,<offsetB>,<nB>;** Response: **#D,r,<disk>,<address>,<offsetB>,<nB>,<cFlag>;[<data>]**
	Z	Reading a file from the working directory with file closed flag and CRC. Command: **#D,r,<disk>,<address>,<offsetB>,<nB>;** Response: **#D,r,<disk>,<address>,<offsetB>,<nB>,<cFlag>;[<data>][CRC]**
Writing files	w	Writing a file to the working directory. Command: **#D,w,<name>,<nBwr>;<data>** *Note: <data> must be <nBwr> length.*

Group name	#D code	Code description
Deleting files	e	Deleting a file in the working directory. Command: **#D,e,<name>;** Deleting all files in the working directory. Command: **#D,e;**
Creating a directory	m	Creating a directory. Command: **#D,m,<address>,<dirName>;**
Deleting a directory	f	Deleting a directory and its contents (files and subdirectories). Command: **#D,f,<address>;**
Special services	s	Get SETUP directory cluster number. Response: **#D,s,<disk>,<address>;**
	j	Get ARCHIVE directory cluster number. Response: **#D,j,<disk>,<address>;**
Current logger file information	l	Reading of the current logger file name, its size and size of corresponding CSV file. Response: **#D,l,<name>,<sizeSVL>,<sizeCSV>;** *Note: if measurements are stopped, the function returns **#D,l;***
	L	Reading of the current logger file extended information. Response: **#D,L,<name>,<size>,<firstClust>,<dirClust>,<dirEntry>;** *Note: if measurements are stopped, the function returns **#D,L;***
Advanced alarms file information	a	Reading of the advanced alarms file information (ALARMS.SVA). Response: **#D,a,<disk>,<dirClust>,<firstClust>,<size>;**
Calibration history file information	h	Reading of the calibration history file information (C.TXT). Response: **#D,h,<name>,<size>,<firstClust>,<calNum>;** *Note: the function returns #D,h; if no files found.*

A.10 FUNCTION #S – DIRECT SETUP ACCESS

#S function enables to read/write instrument's settings in a direct manner. Any settings changed by this command affect current setup, are written into non-volatile memory and are available on the next power up.

#S function format is defined as follows.

To read settings a query should be send to the device:

#S[,<code1>[,<code2>[,code3[,...]]]];

where **<codeN>** is a two to four ASCII letter setting code.

The device responds with control settings:

#S[,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]]];

where **<codeN>** is the same settings code sent in the query and <**setN>** is a settings value.

To return all settings available send:

#S;

To write settings to the device follow the opposite procedure. Send to the device:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of success the device responds with the same ASCII string:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of an error (e.g., settings code does not exist or parameter value is out of range) the device respond with “?” instead of **<setN>** value:

#S,<codeN>:?;

For example, if three parameters are set and <set2> is out of range the device response is:

#S,<code1>:<set1>,<code2>:?,<code3>:<set3>;

Codes and settings for #S function are described in Chapter A.11.

***Note:** #S function protocol consist of ASCII characters only.*

***Note:** Some of the #S functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.11 CONTROL SETTING CODES (FIRMWARE VERSION 1.08.1)

The control setting codes used in the SV 200A instrument are given in the below tables.

Notes:

*- function codes marked in green are **read only**!*

*- function codes marked in red are **locked during measurements run state**! Stop measurements before changing these settings.*

- *values in square brackets are **[optional]**!*

Table A.1 Unit information

Group name	#1 code	#7 code	#S code	Code description
Unit type	**U**			200
Unit subtype		**US**		Returns unit subtype. 2 - SV 200A (standard version) 3 - SV 200A (Austrian type approved version) 4 - SV 200A (German type approved version)
Serial number	**N**			xxxxxx
Software version	**W**			a.bb.c – firmware version a.bb.**0**c – beta firmware version
			AA	abbc – firmware version in hex format
PIC version		**PI**		x.xx - version of auxiliary microcontroller
Display PIC version		**PQ**		x.xx - version of display microcontroller
Hardboot version		**VH**		x.xx - version of hardboot program
Bootstrap version		**VB**		x.xx - version of bootstrap program
Firmware information		**FF**		Information about firmware images which reside in the flash memory. Instrument's response: #7,FF,<act>,<id_0>,<ver_0>,<date_0>,<id_1>,<ver_1>,<date_1>; where: <act> - ID of an active firmware ∊ (0 ÷ 1) <id_x> - ID of firmware x ∊ (0 ÷ 1) <ver_x> - version of firmware x (n.nn.n) <date_x> - release date of the firmware x (dd.mm.yyyy)
Firmware date		**FD**		Date of issue of actually running firmware. Instrument's response: #7,FD,<dd>,<mm>,<yyyy>; where: <dd> - day of a month <mm> - month <yyyy> - year
Production date		**PD**		Production date of the instrument. Reading: #7,PD,<dd>,<mm>,<yyyy>; where: <dd> - day of a month <mm> - month <yyyy> - year
Unit identification		**DN**		After receiving the command instrument is displaying its name on the screen. Send #7,DN,<sec>; to enable the function for <sec> seconds ∊ (1 ÷ 60).

Group name	#1 code	#7 code	#S code	Code description
				Instrument's response: #7,DN,<mode>; where: <mode> - unit identification activity; 0 – off, 1 - on

Table A.2 Measurements settings and control

Group name	#1 code	#7 code	#S code	Code description
Measurement function	M		BA	1 - **LEVEL METER** 2 - **1/1 OCTAVE** analyser 3 - **1/3 OCTAVE** analyser
Meter mode	Z			1 - sound
Input mode	V			0 - prepolarized microphone
Range	R			2 - **HIGH**
Measurement state	S			0 - **STOP** 1 - **START** 2 - **PAUSE**
Start delay	Y		BD	nn - delay given in seconds ∊ (0 ÷ 59) and (60 ÷ 3600) with step 60s
Start synchronization	y		BE	0 - switched off (**OFF**) -1 - synchronization to full second 1 - synchronization to 1 min. 15 - synchronization to 15 min. 30 - synchronization to 30 min. 60 - synchronization to 1 hour.
Integration period	D			0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nns - nn number in seconds nnm - nn number in minutes nnh - nn number in hours
			BF	0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) 1 - 24 hours 2 - 8 hours 3 - 1 hour 4 - 15 minutes 5 - 5 minutes 6 - 1 minute x ∊ (7 ÷ 65) - (x-6) seconds x ∊ (66 ÷ 124)- (x-65) minutes x ∊ (125÷148)- (x-124) hours 149 - infinity
Repetition number	K		BG	Repetition number of the measurement cycles.

Group name	#1 code	#7 code	#S code	Code description
				0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nnnn - nnnn number of repetitions ∈(1 ÷ 1000)
Detector type in the **LEQ** function	**L**		**BH**	0 - **LINEAR** 1 - **EXPONENTIAL**
Day time limits		**DL**	**BL**	0 - **6h-18h** 1 - **7h-19h**
Rolling time (1)	**Xt**		**BW**	nn - time in seconds ∈(1 ÷60) nn - time in minutes multiplied by 60 ∈(60 ÷3600)
Rolling time (2)	**Xu**		**BX**	nn - time in seconds ∈(1 ÷60) nn - time in minutes multiplied by 60 ∈(60 ÷3600)
Microphone compensation		**MC**		0 - **Off** 1 - **On** *Notes:* *- in case of SV 200A microphone compensation means MK255 microphone noise and temperature compensations;* *- there is no limitation on minimal displayed and logged values for A, C and Z filters, if microphone compensation is off*
Outdoor filter		**OF**	**BJ**	0 - Off 1 - On
Outdoor filter type		**FT**	**BK**	0 - **ENVIRONMENTAL** 1 - **AIRPORT**
Meteo sectors	**XE**		**JD**	x - meteo wind direction sectors nr ∈(1 ÷72). Default is 32, eg. 360°/32 = 11.25°
Meteo tip size			**JZ**	x - rain gauge tip size, [0.001 mm/hour] *Note: the parameter is relevant for Maximet GMX meteo stations family only*
Start synchronized		**RS**		Function allows you to start measurements synchronously to GPS clock Reading (response from the instrument): #7,RS,<n>; where <n> -1 – cannot perform synchronous start (e.g. logger is off, USB is connected, GPS is not selected etc.) 0 - OK, waiting for synchronized start 1 - measurements are started
Directivity settings		**DM**		To read/write settings send #7,DM,<sel>; where <sel> is settings selector: 0 - directivity settings 1 - estimated LEQ settings

Group name	#1 code	#7 code	#S code	Code description
				Reading directivity settings: #7,DM,0,<mode>,<sectXY>,<sectZ>; Writing directivity settings: #7,DM,0,<mode>[,<sectXY>[,<sectZ>]]; where: <mode> - directivity measurements mode of operation 0 - Off 1 - On <sectXY> - resolution of the directivity measurements in X-Y plane given as a number of sectors of full circle 360°; <sectXY> ∈(2, 4, 8, 16, 32), default 32 <sectZ> - resolution of the directivity measurements in half Z plane given as a number of sectors of half circle 180°; <sectZ> ∈(2, 3, 5, 9, 17), default 17 Reading estimated LEQ settings: #7,DM,1,<maskXY1>,<maskZ1>,<maskXY2>,<maskZ2>; Writing estimated LEQ settings: #7,DM,1,<maskXY1>[,<maskZ1>[,<maskXY2>[,<maskZ2>]]]; where: <maskXYn> - mask of X-Y plane sectors participating in calculations of the LEn value; least significant bit corresponds to a first sector starting at 0° (North) <maskZn> - mask of Z half plane sectors participating in calculations of the LEn value; least significant bit corresponds to a first sector starting at 0° (Up) *Notes:* *- all masks are 32-bit hexadecimal values* *- <maskXYn> corresponds to <sectXY> value and <maskZn> corresponds to <sectZ> value, which means that <masks> should be corrected each time <sect> values are changing* *- special case when all <mask> bits are set to 1 causes LEn = LEQ* For example, if <sectXY> = 32 and <sectZ> = 17 and estimated LEQ should be set as: - LE1 for aircraft noise measurements and - LE2 for environmental noise measurements excluding North direction then the following command should be sent: #7,DM,1,FFFFFFFF,FF,FFFF00,1FE00;

Group name	#1 code	#7 code	#S code	Code description
				LE1 - (FFFFFFFF,FF) all 32 X-Y sectors and 8 upper Z sectors (0°-90°) are selected LE2 - (FFFF00,1FE00) 16 X-Y sectors from East through South to West (90°-270°) and 8 lower Z sectors (90°-180°) are selected.
			EA	<mode> - directivity measurements mode of operation
			EB	<sectXY> - resolution of the directivity measurements in X-Y plane
			EC	<sectZ> - resolution of the directivity measurements in half Z plane
			ED	<maskXY1> - mask of X-Y plane sectors participating in calculations of the LE1 value
			EE	<maskZ1> - mask of Z half plane sectors participating in calculations of the LE1 value
			EF	<maskXY2> - mask of X-Y plane sectors participating in calculations of the LE2 value
			EG	<maskZ2> - mask of Z half plane sectors participating in calculations of the LE2 value

Table A.3 Calibration settings

Group name	#1 code	#7 code	#S code	Code description
Calibration factor	Q			nn.nn - calibration factor [dB] represented as real number ∈(-20.00 ÷ 20.00)
			AG	nnnn - calibration factor [dB] multiplied by 100 ∈(-2000 ÷ 2000).
Last calibration type			AC	Previously performed calibration type 1 - **AUTO-CALIBRATION** 2 - **REMOTE**; factor was changed by #1,Q 3 - **FACTORY** calibration 5 - **MANUAL**; using user interface of the instrument

Last calibration date			AD	d - coded data ∈(0 ÷ 65535)
				Date decoding in C language:
				day = (d & 0x1F);
				month = ((d>>5) & 0x0F);
				year = ((d>>9) & 0x7F) + 2000;

Last calibration time			AE	t - t coded time ∈(0 ÷ 65535)
				Time decoding in C language:
				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);

Group name	#1 code	#7 code	#S code	Code description
				Note: time resolution is 2 seconds!
Last calibration ref. level	**q**			nnn.nn - calibration reference level [dB]
			AF	nnnn - calibration reference level [dB] multiplied by 100
Calibration history file version			**AH**	v - version of calibration history file “**C.TXT**”
Calibration history file split size			**AJ**	s - a size limit of the calibration history “**C.TXT**” file [MB] ∈(0 ÷ 255) *Note: A new file is created after the size limit is reached.*
Auto calibration settings		**AA**		To read/write settings send #7,AA[,<sel>]; where <sel> is settings selector: 0 (or empty) - read auto calibration status 1 - read/write auto calibration settings Reading status (response from the instrument): #7,AA,0,<detect>,<active>,<result>,<assigned>,<level>,<factor>; where: <detect> - calibrator detection flag 0 - calibrator is not detected 1 - calibrator is detected <active> - status of the auto calibration 0 - inactive 1 - active <result> - result of the last auto calibration 0 - negative 1 - positive <assigned> - flag of calibration assignment 0 - calibration was not assigned 1 - calibration was assigned <level> - last auto calibration sense level [dB] <factor> - last auto calibration factor [dB] Reading/writing settings: #7,AA,1,<mode>[,<fileSize>[,<level>]]; where: <mode> - automatic calibration function enable 0 - Off 1 - On <fileSize> - max size of the “Cx.TXT” calibration history file [MB]; next “C(x+1).TXT” file is created after reaching <fileSize>; default 10MB <level> - auto calibration reference level [dB]; default 114.00 dB
			AI	<mode> - automatic calibration function enable
			AJ	<fileSize> - max size of the “Cx.TXT” calibration history file [MB];

Group name	#1 code	#7 code	#S code	Code description
			AN	<level100> - auto calibration reference level [dB] *Notes: the value is integer defined as <level> multiplied by 100.*

Table A.4 Profile settings

Group name	#1 code	#7 code	#S code	Code description
Filter type in profile n	**F**			Fk:n - k filter in profile n k: 1 - **Z** filter, 2 – **A** filter, 3 – **C** filter, 5 – **B** filter n: 1, 2, 3 – profile number*:* 1, 2 or 3
			BM	k - k filter in profile 1
			BO	k - k filter in profile 2
			BQ	k - k filter in profile 3
Detector type in profile n	**C**			Ck:n - k detector in profile n k: 0 - **IMPULSE**, 1 – **FAST**, 2 – **SLOW** n: 1, 2, 3 – profile number*:* 1, 2 or 3
			BN	k - k detector in profile 1
			BP	k - k detector in profile 2
			BR	k - k detector in profile 3

Table A.5 Spectrum settings

Group name	#1 code	#7 code	#S code	Code description
1/x OCTAVE analysis band	**A**		**BY**	0 - **FULL** 1 - **AUDIO**
Filter type in **1/x OCTAVE** analysis	**f**		**BS**	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Detector type in **1/x OCTAVE** analysis	**XXB**		**BT**	0 - **LINEAR** 1 - **FAST** 2 - **SLOW**
1/x OCTAVE lowest frequency	**Xf**			f - central frequency of the first **1/x OCTAVE** band pass filter [Hz]; the value is multiplied by 100

Table A.6 Statistical settings

Group name	#1 code	#7 code	#S code	Code description
Detector type for statistics calculations	**XP**		**BI**	0 - **LINEAR** 1 - **EXPONENTIAL**

Group name	#1 code	#7 code	#S code	Code description
Statistical levels		SL		Reading (response from the instrument): #7,SL,<sl1>,<sl2>,<sl3>,<sl4>,<sl5>,<sl6>,<sl7>,<sl8>,<sl9>,<sl10>; Writing: #7,SL,<sl_index>,<sl_level>; This function sets statistical levels where <sl_index> is the statistical index ∈(1 ÷ 10), <sl_level> is the statistical level [%] ∈(1 ÷ 99)
			CA	<sl1> - statistical level 1
			CB	<sl2> - statistical level 2
			CC	<sl3> - statistical level 3
			CD	<sl4> - statistical level 4
			CE	<sl5> - statistical level 5
			CF	<sl6> - statistical level 6
			CG	<sl7> - statistical level 7
			CH	<sl8> - statistical level 8
			CI	<sl9> - statistical level 9
			CJ	<sl10> - statistical level 10
Statistical cycles	XC		CO	n - a number of integration period cycles statistics are calculated for ∈(1 ÷ 32767)

Table A.7 Audio settings

Group name	#1 code	#7 code	#S code	Code description
Wave file name			GB	xxxxxxxx – up to 8 characters (permitted characters: 0:9, a:z, A:Z, and '_'). Default name "R1"
Last wave file name		LW		a name of a previous wave file
Wave recording mode	XXu		GA	0 - Off 1 - continuous 2 - slope+ 3 - slope- 4 - level+ 5 - level- 6 - gradient+ 7 - external I/O 8 - integration period 9 - manual
Format	XXm		GC	0 - PCM 1 - Extensible
Sampling	XXl		GE	0 - 48 kHz 1 - 24 kHz 2 - 12 kHz

Group name	#1 code	#7 code	#S code	Code description
Filter			GD	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Bits per sample	XXn		GO	16 - 16 bits per sample 24 - 24 bits per sample
Gain	XXx		GN	x - x gain [dB] used in 16 bit mode ∈(0 ÷ 40)
Trigger level	XXv		GI	x - x level [dB] ∈(25 ÷ 130); default 100dB
Trigger period	XXY		GJ	0 - logger step 5 - 0.5 ms 1000 - 100 ms 10000 - 1 s
Trigger gradient	XXZ		GK	x - x gradient [dB] ∈(1 ÷ 100); default 10dB/(trigger period)
Pre trigger	XXz		GL	x - x pre trigger time [s] (default 1s) ∈ 24 bits per sample: (0 ÷ 5) - for 48 kHz sampling (0 ÷ 10) - for 24 kHz sampling (0 ÷ 20) - for 12 kHz sampling 16 bits per sample: (0 ÷ 8) - for 48 kHz sampling (0 ÷ 15) - for 24 kHz sampling (0 ÷ 30) - for 12 kHz sampling
Recording time	XXy		GM	x - x recording time [s]; ∈ (1 ÷ 59), (60 ÷ 3600) with 60s steps and (3600 ÷ 28800) with 3600s steps

Table A.8 Logger settings

Group name	#1 code	#7 code	#S code	Code description
Logger file name			DC	xxxxxxxx – up to 8 characters (permitted characters: 0:9, a:z, A:Z, and '_'). Default name "L1"
Last logger file name		LB		a name of a previous logger file
Logger step	d			nn - nn number of milliseconds ∈(20,50,100,200,500) nns - nn number of seconds ∈(1 ÷ 60) nnm - nn number of minutes ∈(1 ÷ 60)
			DB	nn - nn number of milliseconds ∈ (100,200,500), (1000 ÷ 60000) with 1000ms steps and (60000 ÷ 3600000) with 60000ms steps
Logger	T		DA	0 - Off 1 - On *Note: this setting must be on in order to create a logger data file!*

Group name	#1 code	#7 code	#S code	Code description
Logger results in profile n	B			Bx:n - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - logger with **Lpeak** values in profile n 2 - logger with **Lmax** values in profile n 4 - logger with **Lmin** values in profile n 8 - logger with **Leq** values in profile n 16 - logger with **LR1** values in profile n 32 - logger with **LR2** values in profile n n – profile $\in (1 \div 3)$
			DD	x - x logger results in profile 1
			DE	x - x logger results in profile 2
			DF	x - x logger results in profile 3
Logger markers	p		DI	x - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - **meteo** results 2 - **GPS** results 4 - **directivity** results
Summary results	a		EP	0 - Off 1 - On *Note: this is a main switch for all summary results.*
Summary results selection	j		EQ	x - – sum of the following flags: 0 - Off (results are not saved) 1 - summary results for profiles 2 - averaged 1/x OCTAVE spectrum 4 - maximum 1/x OCTAVE spectrum 8 - minimum 1/x OCTAVE spectrum 16 - *reserved* 32 - statistical histograms 64 - profile statistics Ln 128 - meteo results
Summary result in profile n	H			Hx:n - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - save **Lpeak** summary results in profile n 2 - save **SEL** summary results in profile n 4 - save **Lmax** summary results in profile n 8 - save **Lmin** summary results in profile n 16 - save **SPL** summary results in profile n 32 - save **Leq** summary results in profile n 64 - save **Laden** summary results in profile n 128 - save **Ltm3** summary results in profile n 256 - save **Ltm5** summary results in profile n 512 - save **LR1** summary results in profile n 1024 - save **LR2** summary results in profile n 2048 - save **LE1** summary results in profile n 4096 - save **LE2** summary results in profile n n – profile $\in (1 \div 3)$

Group name	#1 code	#7 code	#S code	Code description
			ER	x - x summary results in profile 1
			ES	x - x summary results in profile 2
			ET	x - x summary results in profile 3
Summary results common	**r**		**EU**	x - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - save overload flag for summary results
Summary results statistics	**J**			Jx:n - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - save 1st **Ln** summary results in profile n 2 - save 2nd **Ln** summary results in profile n 4 - save 3rd **Ln** summary results in profile n 8 - save 4th **Ln** summary results in profile n 16 - save 5th **Ln** summary results in profile n 32 - save 6th **Ln** summary results in profile n 64 - save 7th **Ln** summary results in profile n 128 - save 8th **Ln** summary results in profile n 256 - save 9th **Ln** summary results in profile n 512 - save 10th **Ln** summary results in profile n
			EV	x - x **Ln** summary results in profile 1
			EW	x - x **Ln** summary results in profile 2
			EX	x - x **Ln** summary results in profile 3
1/x OCTAVE analysis results	**b**		**DG**	0 - logger without spectrum results 8 - logger with **Leq** spectrum
Directivity results	**o**		**EH**	x - x – sum of the following flags: 0 - **Off** (results are not saved), 1 - **time** of directivity measurements 2 - **e-Compass** results 4 - **X-Y direction and energy** results 8 - **Z direction and energy** results 16 - **distribution** of averaged noise energy 32 - **histogram** of maximum noise energy
Logger File Splitting Mode	**XA**		**JG**	0 switched off (**OFF**) -1 - a file is created for each measurement cycle. 15 - a file is created every 15 min, synchronized to RTC. 30 - a file is created every 30 min, synchronized to RTC. 60 - a file is created every 1 hour, synchronized to RTC. 1440 - a file is created on the specified times, see next parameter *Note: for "-1" – integration period must be at least 60s*

<table>
<tr><th>Group name</th><th>#1 code</th><th>#7 code</th><th>#S code</th><th>Code description</th></tr>
<tr><td rowspan="7">Specified Time for Logger File Splitting</td><td>XD</td><td></td><td></td><td>XDx:n – x = -1 (switched off)
x = 0 □ 1439 (time in minutes)
n = 1 □ 6 (specified time number)
Note: valid only if Split Mode is equal to 1440</td></tr>
<tr><td></td><td></td><td>JH</td><td>x - x time for time number n=1</td></tr>
<tr><td></td><td></td><td>JI</td><td>x - x time for time number n=2</td></tr>
<tr><td></td><td></td><td>JJ</td><td>x - x time for time number n=3</td></tr>
<tr><td></td><td></td><td>JK</td><td>x - x time for time number n=4</td></tr>
<tr><td></td><td></td><td>JL</td><td>x - x time for time number n=5</td></tr>
<tr><td></td><td></td><td>JM</td><td>x - x time for time number n=6</td></tr>
<tr><td>User text</td><td></td><td></td><td>BV</td><td>text – up to 128 characters of user text added to each data file. Default text “ ”. Permitted characters: 0-9, a-z, A-Z, space and the following characters !"#$%&')(*+-./:<=>?@[\]^}_{`|~</td></tr>
</table>

Table A.9 CSV export settings

<table>
<tr><th>Group name</th><th>#1 code</th><th>#7 code</th><th>#S code</th><th>Code description</th></tr>
<tr><td>Summary results saved in CSV file</td><td></td><td>CV</td><td></td><td>Reading (response from the instrument):
#7,CV,<err>,<prof1>,<prof2>,<prof3>,<spec>,<dir>
Writing:
#7,CV,<prof1>,<prof2>,<prof3>,<spec>,<dir>;
where:
<err> - CSV file error; 0 – no error
<prof1>, <prof2>, <prof3> - profile summary results defined as a sum of the following flags:
0 - Off (results are not saved),
1 - TIME,
2 - PEAK,
4 - MAX,
8 - MIN,
16 - SPL,
32 - LEQ,
64 - SEL,
128 - Laden,
256 - Ltm3,
512 - Ltm5,
1024 - LR1,
2048 - LR2,
4096 - LE1,
8192 - LE2,
16384 - Ln,
32768 - OVL</td></tr>
</table>

Group name	#1 code	#7 code	#S code	Code description
				<spec> - spectrum results defined as a sum of the following flags: 0 - **Off** (results are not saved), 1 - **averaged 1/x OCTAVE spectrum,** 2 - **maximum 1/x OCTAVE spectrum,** 4 - **minimum 1/x OCTAVE spectrum** <dir> - directivity results defined as a sum of the following flags: 0 - **Off** (results are not saved), 1 - directivity **integration time** (the same as integration period) 2 - **e-compass** value, [deg] 4 - maximum energy **direction in X-Y axis**, [deg] 8 - maximum energy **direction in Z axis**, [deg] 16 - **averaged energy distribution** over directivity integration time 32 - **directivity histograms** over its integration time *Note: the command accepts values in hex format! E.g., If <prof1> = 1A (26 in decimal), it means that PEAK, MIN and SPL values from 1st profile are saved into CSV file.*
			CR	<prof1> - profile 1 summary results *Note: the command accepts values in decimal format!*
			CS	<prof2> - profile 2 summary results *Note: the command accepts values in decimal format!*
			CT	<prof3> - profile 3 summary results *Note: the command accepts values in decimal format!*
			CU	<spec> - spectrum results *Note: the command accepts values in decimal format!*
			CR	<dir> - directivity results *Note: the command accepts values in decimal format!*

Table A.10 System check settings

Group name	#1 code	#7 code	#S code	Code description
System check settings		SC		To read/write settings send #7,SC[,<sel>]; where <sel> is settings selector: 0 (or empty) - read system check status 1 - read/write system check settings 2 - manual start of the system check procedure

Group name	#1 code	#7 code	#S code	Code description
				Reading status (response from the instrument): #7,SC,0,<active>,<result>,<hh>,<mm>,<ss>; where <active> - status of the system check 0 - inactive 1 - active <result> - result of the last system check 0 - negative 1 - positive <hh> - hours left to the next system check <mm> - minutes left to the next system check <ss> - seconds left to the next system check Reading/writing settings: #7,SC,1,<mode>[,<time>[,<wlan>[,<wday>]]]; where <mode> - automatic system check function enable 0 - Off 1 - On <time> - time of a day [min] when system check should be performed 0 - Off 1...1439 –minutes since midnight <wday> - day of week mask; sum of the following values representing days of week 1 - **Monday** 2 - **Tuesday** 4 - **Wednesday** 8 - **Thursday** 16 - **Friday** 32 - **Saturday** 64 - **Sunday** *Notes: the mask value is given in hexadecimal. For example, 1F means working days of a week Monday-Friday.*
			AK	<mode> - automatic system check function enable
			AL	<time> - time of a day [min] when system check should be performed
			AM	<wday> - day of week mask *Notes: the mask value is given in decimal. For example, 31 value means working days of a week Monday-Friday.*

Last system check date			**AO**	d - coded data ∈(0 ÷ 65535)
				Date decoding in C language:
				day = (d & 0x1F);
				month = ((d>>5) & 0x0F);
				year = ((d>>9) & 0x7F) + 2000;

Last system check time			**AP**	t - t coded time ∈(0 ÷ 65535) Time decoding in C language:

Group name	#1 code	#7 code	#S code	Code description

				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);
				Note: time resolution is 2 seconds!

Last system check result			AQ	nnnn - system check result [dB] multiplied by 100
Last system check level			AR	9400 - system check reference level [dB] multiplied by 100 (94dB)
Last system check factor			AS	nnnn - system check factor [dB] multiplied by 100
Last system check pre background noise			AT	nnnn - background noise [dB] multiplied by 100 measured before system check
Last system check post background noise			AU	nnnn - background noise [dB] multiplied by 100 measured after system check
Actuator control		AC		This function is used to manually switch on/off the system check actuator. 0 - manual control of system check actuator is off 1 - system check actuator is on *Notes:* *- this function can be used remotely to quick check of the measurements path of the instrument* *- this function will not switch on actuator if auto-calibration or auto-system check functions are enabled and active* *- there is a 1-minute actuator auto-off timer*

Table A.11 Display settings

Group name	#1 code	#7 code	#S code	Code description
Graph Y axis for 1/x OCTAVE			CY	0 - 10dB 1 - 20dB 2 - 40dB **3 - 80dB (default)** 4 - 120dB
Graph grid for 1/x OCTAVE			CZ	0 - Off **1 - On (default)**
Display off timeout			JU	0 - disabled, display stays on all the time nn - timeout [s] for display to turn off; nn delay given in seconds ∊ (15 ÷ 45) with 15s step and ∊ (60 ÷ 900) with 60s step; **default is 60s** *Note: it is not recommended to disable this feature!*
Display auto rotate			JV	0 - Off 1 - **On (default)**

Table A.12 Setup settings

Group name	#1 code	#7 code	#S code	Code description
Load setup		**LS**		name - a name of a setup file to be loaded (activated) *Notes:* *- name is given without “svt” extension* *- a setup file must be placed into the SETUP directory of the instrument’s SD card prior using this command; see Chapter A.8 or A.9 on file upload*
Save setup		**SS**		name - a current instrument setup will be saved as a “name.svt” file in the SETUP directory of the instrument’s SD card; 8 characters is a maximum name length *Notes:* *- name is given without “svt” extension*
Clear setup		**CS**		This command restores factory defaults of the instrument. To execute command send #7,CS[,<sel>]; where <sel> is settings selector: 0 (or empty) - clear measurements setup (preserve communication settings) 1 - clear all settings *Notes: it is not advised to use this function remotely via Internet with <sel>=1 since communication with the instrument may be lost!*
Delete setup		**DS**		name - a name of a setup file to be deleted from the SETUP directory of the instrument’s SD card *Notes:* *- name is given without “svt” extension*

Table A.13 Alarms settings

Group name	#1 code	#7 code	#S code	Code description
Alarms control		**AE**	**JT**	This function activates previously written /SETUP/ALARM.SVA file. For details on the file format see Appendix B. 0 - **Off (default)** 1 - **Advanced alarms mode** 2 - **Standard alarms mode**

Table A.14 General settings

Group name	#1 code	#7 code	#S code	Code description
Language			**BZ**	0 - **English (default)** 1 - **German** 2 - **Spanish** 3 - **French**

Group name	#1 code	#7 code	#S code	Code description
				4 - **Hungarian** 5 - **Italian** 6 - **Dutch** 7 - **Polish** 8 - **Portuguese** 9 - **Russian** 10 - **Turkish**
USB			**JW**	0 - **USB High Speed (480 MHz) (default)** 1 - **USB Full Speed (12 MHz)**
'#' parser timeout		**HT**		To read settings send #7,HT;. Response: #7,HT,<hashTo>,<hashToTCP>; To write settings send: #7,HT,<hashTo>[,<hashToTCP>]; where: <hashTo> - timeout [s] for all '#' commands; default 2s <hashToTCP> - timeout [s] for all '#' commands during socket (eg. TCP/IP) communication; default 30s *Notes: it is not advised to change these settings unless you know what you are doing.*
			JX	<hashTo> - timeout [s] for all '#' commands
			JY	<hashToTCP> - timeout [s] for all '#' commands during socket (eg. TCP/IP) communication
External interface device	**Xy**		**DX**	0 - RS232 interface (default) 1 - Meteo station 2 - reserved 3 - Meteo station
RS232 baud rate		**BD**	**JE**	1 - 1200 bps 2 - 2400 bps 3 - 4800 bps 4 - 9600 bps 5 - 19200 bps 6 - 38400 bps 7 - 57600 bps 8 - 115200 bps (default) 9 - 230400 bps 10 - 460800 bps 11 - 921600 bps
RS232 timeout		**TO**	**JF**	nn - timeout [s] □ (1 □ 60); default 1s
Instrument description		**AX**		To read settings send #7,AX;. Response: #7,AX,<station>,<res1>,<res2>; <station> - station name <res1>, <res2> - reserved values To write settings send #7,AX,<sel>,<text>;. where: <sel> - value selector 0 - station name <text> - user text up to 128 characters in UNICODE format. Permitted characters: 0-9, a-f, A-F
			MX	<text> - user text for station name

Group name	#1 code	#7 code	#S code	Code description
SD card free space		**BF**		n - free space in bytes [B]
SD card free sectors		**NF**		n - number of free sectors (512B)
Measurement files number		**BN**		n - number of "*.svl" files in the instrument's working directory
Microphone temperature		**TP**		xx.x - temperature of the microphone [°C]
Internal meteo		**MT**		To read settings send #7,MT;. Response: #7,MT,<Tint>,<Tmic>,<Text>,<RH>,<DP>,<Tmpl>,<Pmpl>; where: <Tint> - internal instrument's temperature [°C] <Tmic> - microphone temperature [°C] <Text> - external temperature [°C] <RH> - relative humidity [%] <DP> - dew point [°C] <Tmpl> - pressure sensor temperature [°C] <Pmpl> - absolute pressure [hPa] *Notes: it is not recommended to use any of these results as reference (except pressure), since they can be inaccurate!*
External meteo		**MR**		Read external meteo station (e.g. WXT5xx) results. To read settings send #7,MR[,I];. Response: #7,MR,<time>,T<temp>,P<press>,H<RH>,V<vel>,D<dir>,R<rain>; where: I - integrated results for last integration period <time> - integration time for the meteo results <temp> - temperature [°C] <press> - absolute pressure [hPa] <RH> - relative humidity [%] <vel> - maximum wind velocity [m/s] <dir> - direction of the maximum wind velocity [°] <rain> - rain detector; 0 – no rain, 1 - raining
Firmware upgrade		**FU**		To read status of firmware upgrade send #7,FU;. Response: #7,FU,<stat>; To start firmware upgrade send: #7,FU,<name>.<ext>; where: <name> - a name of a firmware binary to be used for upgrade; file must reside in the FIRMWARE directory of the instrument's SD card. <ext> - three characters extension of the firmware file; usually it is "BIN" <stat> - status of upgrade; negative value is an error 0 - not upgrading or upgrade finished successfully (if started with #7,FU,<name>.bin;) 1 - start of upgrade 2- checking a firmware image

Group name	#1 code	#7 code	#S code	Code description
				3 - erasing Flash 4 - writing Flash 5 - checking a firmware after write 6 - finishing After 6 the state always comes to 0.
Firmware list		**FL**		Returns firmware file list in the FIRMWARE directory of the instrument's SD card. Response: #7,FL,<name1>,<len1>[,<name2>,<len2>[...]]; where: <namex> - name of the firmware file with extension, e.g. "firmware.bin"; max 8 characters for name and 3 characters for extension <lenx> - length of the firmware filex [B]
Working directory information		**WD**		Returns a number of directory and file entries in the current working directory on SD card of the instrument. Response: #7,WD,<dirNo>,<fileNo>; where: <dirNo> - a number of directory entries; min 2: root and directory itself <fileNo> - a number of file entries in the directory including deleted ones!
Manual recording		**EW**		This function allows remote manual triggering of the wave/event recording. Reading: #7,EW,<run>,<time>; where: <run> - recording status 0 - not active 1 - active <time> - recording time [s] Writing: #7,EW,<mode>[,<time>]; <mode> - recording mode 0 - disabled 1 - enabled <time> - recording time [s] *Notes: function is active only during measurements running state.*
Remote markers		**MM**		Remote markers function allows you to put a marker into a measurement file. Reading/ writing a marker: #7,MM,<nr>,<type>,<name>; where: <nr> - marker number $\in$ (1 $\div$ 16) <type> - marker type

Group name	#1 code	#7 code	#S code	Code description
				0 - point marker 1 - start of a block marker 2 - end of a block marker <name> - marker name (user text) To stop all block markers send: #7,MM,0;
Flash size		**SF**		Flash program memory size [B]. *Notes: function is not available during measurements.*
SD card information		**SI**		Reading: #7,SI,<mid>,<oid>,<pnm>; where: <mid> - manufacture ID <oid> - OEM ID <pnm> - product name
SPL on stop		**LL**		SPL value [dB]. *Notes: function is not available during measurements.*
Buffered time history		**TH**		This function allows you to read buffered time history results. The time history buffer is organized in circular mode; when the buffer is full new TH results are written in place of the oldest results. The function has an auto-increment feature with possibility to reset the data pointer. To read as many results as possible (max 1024B) send #7,TH; To read selected results send #7,TH,<mask>,<nr>; where: <mask> - mask of the returned results, see below <nr> - number of the results to read Instrument's response: #7,TH,<run>,<mask>,<step>,<cnt>,<left>,<dd/mm/yyyy>,<hh:mm:ss>,<result1>,<result2>,...<result>; where: <run> - measurements run flag 0 - measurements are running 1 - measurements are stopped <mask> - mask of the returned results in hexadecimal notation 00001 - **Lpeak** values in profile 1 00002 - **Lmax** values in profile 1 00004 - **Lmin** values in profile 1 00008 - **Leq** values in profile 1 00010 - **LR1** values in profile 1 00020 - **LR2** values in profile 1 00040 - **Lpeak** values in profile 2 00080 - **Lmax** values in profile 2 00100 - **Lmin** values in profile 2 00200 - **Leq** values in profile 2

Group name	#1 code	#7 code	#S code	Code description
				00400 - **LR1** values in profile 2 00800 - **LR2** values in profile 2 00040 - **Lpeak** values in profile 3 00080 - **Lmax** values in profile 3 00100 - **Lmin** values in profile 3 00200 - **Leq** values in profile 3 00400 - **LR1** values in profile 3 00800 - **LR2** values in profile 3 *Notes: in order to read results from the time history buffer, the corresponding results must be enabled, see <u>Logger results</u> group name in Table A.8 for details.* <step> - time history buffer step [s] (equals to logger step) <cnt> - returned records count <left> - number of records left unread in the buffer <dd/mm/yyyy> - date of the first returned record <hh:mm:ss> - time of the first returned record <resultX> - results according to <mask> For example, #7,TH,0,20A,1,2,0,17/06/2020,14:45:27,28.80,28.04,44.75,45.12,39.50,49.33; 0 – measurements are stopped 20A – Lmax and Leq from profile 1 and Leq from profile 2 has been returned 1 – buffer (logger) step is 1s 2 – 2 records where returned 0 – zero records left unread in the buffer 17/06/2020 – date of the first record 14:45:27 – time of the first record First record: 28.80 – Leq profile 2 28.04 – Leq profile 1 44.75 – Peak profile 1 Second record: 45.12 – Leq profile 2 39.50 – Leq profile 1 49.33 – Peak profile 1 To reset data pointer of the time history buffer send #7,TH,0,0; *Notes: the function is not available when logger step is below 1s!*
Station status		II		This function provides cumulative station status. Reading (response from the instrument): #7,II,<rms>,Fx<flags>,B<bat>,D<disk>,ex<err>,Rx<rst>,O<dd:hh:mm:ss>; where: <rms> - RMS value from profile 1 integrated for 1s

Group name	#1 code	#7 code	#S code	Code description
				<flags> - station status flags defined in hexadecimal format as a sum of the following flags: 0x00001 – measurements are running, 0x00002 – pause is active, 0x00004 – reserved, 0x00008 – battery is charging, 0x00010 – reserved, 0x00020 – external power supply is present, 0x00040 – time is synchronized with GPS, 0x00080 – reserved, 0x00100 – reserved, 0x00200 – reserved, 0x00400 – reserved, 0x00800 – reserved, 0x01000 – reserved, 0x02000 – reserved, 0x04000 – solar panel is connected, 0x08000 – battery charging is finished, 0x10000 – microphone heater is on, 0x20000 – battery heater is on, <bat> - battery relative state of charge [%] <disk> - SD card occupation [%] <err> - error flags defined in hexadecimal format as a sum of the following flags: 0x000001 – reserved, 0x000002 – SD card is not ready, 0x000004 – logger file error, 0x000008 – reserved, 0x000010 – reserved, 0x000020 – reserved, 0x000040 – reserved, 0x000080 – meteo module error, 0x000100 – reserved, 0x000200 – temperature sensor error, 0x000400 – system check error, 0x000800 – instrument is not standing upright, 0x001000 – reserved, 0x002000 – external battery is low, 0x004000 – reserved, 0x008000 – reserved, 0x010000 – reserved, 0x020000 – reserved, 0x040000 – reserved, 0x080000 – internal PIC error, 0x100000 – main program CRC error,<rst> - last instrument power on/off and reset cause 0x0001 – hardware reset, 0x0002 – watchdog reset, 0x0004 – reserved,

Group name	#1 code	#7 code	#S code	Code description
				0x0008 – reserved, 0x0010 – reserved, 0x0020 – reserved, 0x0040 – reserved, 0x0080 – reserved, 0x0100 – reserved, 0x0200 – system was on because of: - external power supply had been connected or - battery charging had begun or - USB cable had been connected, 0x0400 – system was on because of RTC alarm, 0x0800 – reserved, 0x1000 – system was on because EXT I/O line had triggered, 0x2000 – reserved, 0x4000 – system was previously off because ambient temperature was too high/low, 0x8000 – system was previously off because system voltage was too low, <dd:hh:mm:ss> - system *on* time since last power-up where: <dd> - days <hh> - hours <mm> - minutes <ss> - seconds

Table A.15 Power settings

Group name	#1 code	#7 code	#S code	Code description
Power status		BS		To read settings send #7,BS;. Response: #7,BS,<bat>,<src>,<time>,<chrg>; where: <bat> - battery state of charge [%]; -1 when state of charge cannot be read <src> - power source 0 - internal battery -1 - external power supply, e.g. SB274 -2 - solar panel (battery is charging) -3 - solar panel (battery is not charging) -4 - Power Over Ethernet (PoE) -5 - USB <time> - battery time [h]; either “time to full” if battery is charging or “time to empty” if battery is discharging <chrg> - charging indication 0 - not charging 1 - charging is finished 2 - charging is in progress

Group name	#1 code	#7 code	#S code	Code description
Power voltage		BV		volt - main power supply voltage [mV]; it is either external power supply or internal battery voltage
Power off		PO		Power off the instrument. *Notes: take care using this command remotely via Internet*
Reset		XR		Hardware reset of the instrument (power off and on). Send #7,XR[,<n>]; n - delay [s] before reset
Battery pack information		BM		To read settings send #7,BM;. Response: #7,BM,<err>,<manuf>,<date>,<sn>,<dev>,<chem>,<chemId>,<designV>,<designC>,<ver>,<hw>; where: <err> - error reading battery pack 0 - no error, the settings are valid (<manuf>, <date>, etc.) not 0 - error, the settings are not valid; repeat read command <manuf> - manufacture name, "Svantek sp. z o.o." <date> - manufacture date, "dd.mm.yyyy" <sn> - serial number of packet (production code) <dev> - device name <chem> - chemistry of the battery, "LION" <chemId> - internal chemistry ID <designV> - design voltage [mV] <designC> - design capacity [mAh] <ver> - firmware version of the battery pack; x.xx <hw> - hardware revision of the battery pack; one ASCII letter
Battery status		BT		To read settings send #7,BT;. Response: #7,BT,<err>,<temp>,<volt>,<curr>,<Merr>,<soc>,<fcc>,<cell1>,<cell2>,<cell3>,<cell4>,<tte>,<ttf>,<pow>,<cycleCnt>,<health>; where: <err> - error reading battery pack 0 - no error, the settings are valid (<temp>, <volt>, etc.) not 0 - error, the settings are not valid; repeat read command <temp> - temperature of the battery pack [°C] <volt> - voltage of the battery pack [mV] <curr> - actual current of the battery pack [mA]; negative value means discharging <Merr> - maximum error [%] of the gauging algorithm <soc> - state of charge [%] <fcc> - actual full charge capacity of the battery pack [mAh]

Group name	#1 code	#7 code	#S code	Code description
				<cellx> - voltage of battery pack cellx [mV]; cells connected in serial with cell1 most close to ground <tte> - "time to empty" [min]; value of 65353 means, that battery pack is not discharging <ttf> - "time to full" [min]; value of 65353 means, that battery pack is not charging <pow> - actual power consumption [W] supplied to or from the battery pack <cycleCnt> - battery cycle counter <health> - state of health of the battery pack, [%]

Table A.16 System log settings

Group name	#1 code	#7 code	#S code	Code description
System log file		**LG**		To read settings send #7,LG;. Response: #7,LG,<mask>,<time>,<size>,<totSize>,<err>; To write settings send: #7,LG,<mask>,<time>,<size>,<totSize>; where: <mask> - events written to a system log file (S.LOG) defined in hex format as a sum of the following flags: 0x0 - **Off** (logs are not saved), 0x0001 – log system events, 0x0002 – log modem communication events, 0x0004 – log modem configuration, 0x0008 – log periodic modem status, 0x0010 – log periodic battery status, 0x0020 – log periodic SV200A status, 0x0040 – log FTP communication events, 0x0080 – log modem debug (off by default), 0x0100 – log periodic GPS status, 0x0200 – log External Interface events, 0x0400 – log remote commands events, 0x0800 – log advanced alarms events, 0x1000 – log WLAN configuration, 0x2000 – log WLAN communication events, 0x4000 – log WLAN debug (off by default), 0x8000 – reserved <time> - interval [s] for periodic logs, <size> - maximum size [MB] of a single S.LOG file, <sizeTot> - maximum size [MB] of all S.LOG files in the current working directory, <err> - S.LOG file error; 0 – no error. *Notes:* *- it is not advised to switch off the log file! This file*

Group name	#1 code	#7 code	#S code	Code description
				is useful in case of support. *- do not set reserved flags!*
			JA	<mask> - events written to a system log file "Sx.LOG"; see above
			JB	<time> - interval [s] for periodic logs
			JR	<size> - maximum size [MB] of a single "Sx.LOG" file
			JS	<sizeTot> - maximum size [MB] of all "Sx.LOG" files in the current working directory
Remote Log		**RL**		Remote log function allows you to put a user text into a system log file. This function is "write" only: #7,RL[,<info>]; where <info> - user text to be put into a system log file. If <info> parameter is omitted a "Remote Log!" text is logged.

Table A.17 Position and time settings

Group name	#1 code	#7 code	#S code	Code description
GPS		**RA**		See *Table A.18 Radio settings* for more details
			SS	0 - Off 1 - **On (default)**
Position settings		**GL**		To read settings send #7,GL[,<sel>];. Response: #7,GL,<LatDeg>,<LongDeg>; To write settings send: #7,GL,<LatDeg>,<LongDeg>; where <sel> - 0 – automatic read mode. Coordinates are read from GPS if it is active and position is fixed or from the memory otherwise. 1 – coordinates are read from the memory <LatDeg> - Latitude degrees (fractional value); value has '-' sign for South hemisphere, <LongDeg> - Longitude degrees (fractional value); value has '-' sign west of Greenwich,
			MP	<LatDeg> - Latitude degrees; value has '-' sign for South hemisphere,
			PQ	<LatMin> - Latitude minutes,
			MR	<LatSec> - Latitude seconds,
			MS	<LatmSec> - Latitude milliseconds,
			MT	<LongDeg> - Longitude degrees; value has '-' sign west of Greenwich,
			MU	<LongMin> - Longitude minutes,
			MV	<LongSec> - Longitude seconds,

Group name	#1 code	#7 code	#S code	Code description
			MW	<LongmSec> - Longitude milliseconds,
GPS last synchronization		GT		Last time RTC of the instrument was synchronized with GPS clock. Reading (response from the instrument): #7,GT,<sec>,<start>; where: <sec> - number of seconds since last synchronization <start> - start synchronized flag 0 - measurements had started **without** synchronization with GPS clock 1 - measurements had started synchronously to GPS clock
GPS status		GS		Reading (response from the instrument): #7,GS,<mode>,<state>; where: <mode> - GPS mode 0 - Off 1 - On <state> - GPS signal state 0 - GPS signal is not fixed or GPS time is not synchronized (lack of PPS) 1 - GPS signal is fixed and GPS time is synchronized (PPS)
Real Time Clock (RTC)		RT		Current instrument's date/time settings. Reading (response from the instrument): #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; Writing: #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; where: <hour> - hour $\in$ (0 ÷ 23) <min> - min $\in$ (0 ÷ 59) <sec> - sec $\in$ (0 ÷ 59) <day> - day $\in$ (1 ÷ 31) <month> - hour $\in$ (1 ÷ 12) <year> - hour $\in$ (2000 ÷ 2099)
Time zone		TZ	OG	x - time zone [min] $\in$ (-720 ÷ 840) in 15 minutes step
Summer time			OL	-1 - not defined yet 0 - winter time 1 - summer time
Daylight Saving Time (DST) rules		DT		Reading (response from the instrument): #7,DT,<rules>,<startType>,<startWeekday>,<startDay>,<startMonth>,<startHour>,<stopType>,<stopWeekDay>,<stopDay>,<stopMonth>,<stopHour>,<shift>; Writing: #7,DT,<rules>[,<startType>,<startWeekday>,<startDay>,<startMonth>,<startHour>[,<stopType>,<stop

Group name	#1 code	#7 code	#S code	Code description
				WeekDay>,<stopDay>,<stopMonth>,<stopHour>[,<shift>]]]; where: <rules> - DST rules used to set summer time -1 - disabled 0 - custom DST rules 1 - European DST rules 2 - USA DST rules <startType> - start type of custom DST <stopType> - stop type of custom DST -1 - none – time changes at specified day of month -2 - last – time changes at last day of week of a month -3 - count – time changes at specified day of week in a month -4 - mday – time changes at first day of week after specified day of month <startWeekday> - start day of week of custom DST <stopWeekday> - stop day of week of custom DST 0 - Sunday 1 - Monday 2 - Tuesday 3 - Wednesday 4 - Thursday 5 - Friday 6 - Saturday <startDay> - start day of custom DST <stopDay> - stop day of custom DST d - day $\in$ (1 $\div$ 31) <startMonth> - start month of custom DST <stopMonth> - stop month of custom DST m - month $\in$ (0 $\div$ 11); 0 – January,... 11 - December <startHour> - start hour of custom DST <stopHour> - stop hour of custom DST h - hour $\in$ (0 $\div$ 23) <shift> - time shift for summer time [min]
			OF	<rules> - DST rules used to set summer time
			NU	<startType> - start type of custom DST
			NV	<startWeekday> - start day of week of custom DST
			NW	<startDay> - start day of custom DST
			NX	<startMonth> - start month of custom DST
			NY	<startHour> - start hour of custom DST
			NZ	<stopType> - stop type of custom DST
			OA	<stopWeekday> - stop day of week of custom DST
			OB	<stopDay> - stop day of custom DST
			OC	<stopMonth> - stop month of custom DST

Group name	#1 code	#7 code	#S code	Code description
			OD	<stopHour> - stop hour of custom DST
			OE	<shift> - time shift for summer time [min]
On time		RO		Time elapsed since last power up. Reading (response from the instrument): #7,RO,<dd>,<hh>,<mm>,<ss>; where: <dd> - days <hh> - hours <mm> - minutes <ss> - seconds

Table A.18 Radio settings

Group name	#1 code	#7 code	#S code	Code description
Radio control		RA		To read/write settings send #7,RA,<sel>; where <sel> is settings selector: 0 - radio power settings 1 - reserved 2 - reserved 3 - available communication interfaces Reading power settings (response from the instrument): #7,RA,0,<radio>,<mobile>,<wlan>,<lan>,<bluetooth>,<gps>; Writing: #7,RA,0,<radio>[,<mobile>[,<wlan>[,<lan>[,<bluetooth>[,<gps>]]]]]; where: <radio> - main radio power switch 0 - all radio modules are disabled 1 - selected radio modules are enabled <mobile> - mobile network modem 0 - Off 1 - On <wlan> - Wireless LAN adapter 0 - Off 1 - Infrastructure mode 2 - Access point mode <lan> - LAN interface 0 - Off 1 - On <bluetooth> - Bluetooth interface 0 - Off 1 - On <gps> - GPS module 0 - Off 1 - On Reading communication interfaces (response from the instrument):

Group name	#1 code	#7 code	#S code	Code description
				#7,RA,3,1,<mobile_int>,<wlan_int>,<lan_int>,<bluetooth_int>,<gps_mod>; *Note: this command is read only.* <mobile_int> - mobile network modem 0 - not available 1 - available <wlan_int> - Wireless LAN adapter 0 - not available 1 - available <lan_int> - LAN interface 0 - not available 1 - available <bluetooth_int> - Bluetooth interface 0 - not available 1 - available <gps_mod> - GPS module 0 - not available 1 - available
			QA	<radio> - main radio power switch
	Xk		**KA**	<mobile> - mobile network modem
			QB	<wlan> - Wireless LAN adapter
			RF	<lan> - LAN interface
			SR	<bluetooth> - Bluetooth interface
			SS	<gps> - GPS module
SIM lock/unlock		**PN**		This function provides a SIM card lock/unlock feature. To read status send #7,PN,0; Instrument's response: #7,PN,0,<stat>,<cnt>; where: <stat> - SIM card status -1 - SIM card error, e.g. SIM not inserted 0 - SIM is unlocked 1 - SIM is locked; PIN is required 2 - SIM is locked; PUK is required <cnt> - SIM PIN/PUK counter; it shows a number of remaining attempts To lock/unlock SIM card send: #7,PN,<lock>,<pin>[,<puk>]; where: <lock> - lock/unlock flag 0 - unlock SIM with given PIN code 1 - lock SIM <pin> - 4 digit PIN code of the SIM card <puk> - 10 digit PUK code of the SIM card *Notes:* *- use this function with care! Entering a wrong PIN/PUK code to many times can make a SIM card*

Group name	#1 code	#7 code	#S code	Code description
				useless *- function is not active when mobile network modem is off*
Bluetooth PIN		**BP**	**ST**	<pin> - 4 digit Bluetooth PIN code *Notes: set to 0 to disable Bluetooth PIN*
		bp		read only version of **BP** command
Bluetooth info		**BI**		To read Bluetooth info send #7,BI,<sel>; where: <sel> - is a info selector: 0 - hardware info 1 - connection info Reading a hardware info: #7,BI,0,<manuf>,<model>,<ver>,<chip>; <manuf> - manufacture of the Bluetooth module <model> - model of the Bluetooth module <ver> - Bluetooth firmware version <chip> - chip ID of the Bluetooth module Reading a connection info: #7,BI,1,<state>; <state> - state of Bluetooth connection 0 - not connected 1-9 - reading period set by a connected client
PING settings		**PG**		Reading (response from the instrument): #7,PG,<interval>,<ip4>,<ip3>,<ip2>,<ip0>; Writing: #7,PG,<interval>[,<ip3>,<ip2>,<ip1>,<ip0>]; where: <interval> - time interval [s] between consecutive PING commands; default is 300s = 5min <ipx> - octets of the Ipv4 address in dot notation; <ip3> is a most significant octet and <ip0> is a least significant octet of the ping address
			KO	<interval> - time interval [s] between consecutive PING commands
			KN	<pingAddr> - user defined address of the remote host used for pinging. *Notes: This parameter can be either a valid IPv4 address "xxx.xxx.xxx.xxx" or a host name to be solved by DNS.*
SMS and e-mail test		**TE**		This function is used to send a test SMS or e-mail message to a defined phone or address. Reading status: #7,TE,<test>,<stat>; where: <test> - active test 0 - no active test 1 - SMS test pending 2 - e-mail test pending

Group name	#1 code	#7 code	#S code	Code description
				<stat> - test status -1 - test pending or no test 0 - test finished To send a message #7,TE,<sel>,<dest>; where: <sel> - is a message selector: 0 - SMS test 1 - e-mail test <dest> - destination phone number or e-mail address
Internet information		II		Internet connection status. -1 - no Internet 0 - LAN 1 - WLAN 2 - 2G network 3 - 3G network 4 - 4G network

Table A.19 Mobile network settings and status

Group name	#1 code	#7 code	#S code	Code description
Mobile settings		**GM**		To read/write settings send #7,GM,<sel>; where <sel> is settings selector: 0 - mobile settings Reading (response from the instrument): #7,GM,0,<apn>,<auth>,<user>,<pass>,<dns>,<connType>,<addr>,<port>,<simMode>,<lteDefault>,<actFirmware>; Writing: #7,GM,0,<apn>[,<auth>[,<user>[,<pass>[,<dns>[,<connType>[,<addr>[,<port>[,<simMode>[,<lteDefault>[,<actFirmware>]]]]]]]]]]; where <apn> - Access Point Name is a gateway to the operator’s Internet; default “internet” or empty “”; (permitted characters: 0:9, a:z, ‘.’, ‘-‘ and ‘_’). <auth> - authentication mode to be used during Internet connection; default 0 0 - Off 1 - PAP 2 - CHAP <user> - username to be used during Internet connection; default is empty string <pass> - password to be used during Internet connection; default is empty string <dns> - Domain Name Server (DNS) address Ipv4 in dot notation <connType> - connection type; default 1

Group name	#1 code	#7 code	#S code	Code description
				-1 - socket connection is off 0 - TCP server (listener) mode 1 - TCP client mode 2 - UDP mode <addr> - remote address of TCP/UDP connection; default "app.svannet.com" *Note: the setting can be a name to be resolved by DNS or Ipv4 address in dot notation, e.g. "192.168.1.1"* <port> - remote port of TCP/UDP connection ∊ (0 ÷ 65535); default 8000 *Note: it is not advised to use ports < 1024!* <simMode> SIM mode 0 - data + SMS mode 1 - data only mode <lteDefault> - default settings for LTE 0 - user defined settings for LTE 1 - use modem's default settings for LTE <actFirmware> - some LTE modems has selectable firmware for different operators LE910Cx-NF modem supports firmwares: 0 - AT&T Config 1 - Verizon Config 2 - T-Mobile Config LE910Cx-AP modem supports firmwares: 10 - NTT Docomo Config 11 - Telstra Config 12 - KDDI Config 13 - Softbank Config 14 - Vodafone New Zealand LE910Cx-CN modem supports 20 - China Mobile Config 21 - China Unicom Config 22 - China Telecom Config
	XN		KE	<apn> -Access Point Name
	XF		KJ	<auth> - authentication mode to be used during Internet connection
	XO		KG	<user> - username to be used during Internet connection
	XU		KH	<pass> - password to be used during Internet connection
	XV		KI	<dns> - Domain Name Server (DNS) address written as a single 32-bit number x=<aa>*2^{24}+<bb>*2^{16}+<cc>*2^{8}+<dd> where: x - DNS written as single number <aa>.<bb>.<cc>.<dd> - DNS in dot notation (e.g. 192.168.1.1 written as 3232235777 = 192*2^{24}+168*2^{16}+1*2^{8}+1)

Group name	#1 code	#7 code	#S code	Code description
	XB		KL	<connType> - connection type
	XI		KD	<addr> - remote address of TCP/UDP connection
	XJ		KC	<port> - remote port of TCP/UDP connection
			KX	<simMode> - SIM mode
			KR	<lteDefault> - default settings for LTE
			KT	<actFirmware> - some LTE modems has selectable firmware for different operators
Mobile information		GI		To read settings send #7,GI,<sel>; where <sel> is a settings selector: 0 - mobile equipment information 1 - mobile network information 2 - mobile connection information Reading mobile equipment information: **#7,GI,0,<manuf>,<model>,<rev>,<id>;** where: <manuf> - modem's manufacture name <model> - model of the modem <rev> - modem's firmware revision <id> - modem's IMEI number Reading mobile network information: **#7,GI,1,0x<flags>,<oper>,<simId>,<reg1>,<reg2>,<rssi>,<ber>,<act>;** where: <flags> - modem state in hex format defined as a sum of flags: 0x00000001 - modem is powered on, 0x00000002 - modem is initialized, 0x00000004 - modem is connected to the operator's network, 0x00000008 - modem is connected to the Internet, 0x00000010 - modem has established a TCP/IP connection, 0x00000020 - modem is connected to SvanNET, 0x01000000 - modem SIM was read, 0x02000000 - modem is requesting a SIM PUK, 0x04000000 - modem is requesting a SIM PIN, 0x08000000 - SIM error, e.g. SIM not inserted, *Notes:* *- all other flags are reserved!* *- when modem is **not** initialized,* "modem SIM was read" flag reflects validity of SIM PUK, SIM PIN and SIM error flags. <oper> - ID of the network operator defined as Mobile Country Code (MCC – 3 digits) and Mobile Network Code (MNC – 2 or 3 digits) <simId> - MCC + MNC read from a SIM card

Group name	#1 code	#7 code	#S code	Code description
				<reg1> - GSM network registration indicator; 0 – not registered, 1 – registered <reg2> - GPRS/UMTS/LTE network registration indicator; 0 – not registered, 1 – registered <rssi> - Received Signal Strength Indicator 0 – (-113) dBm or less 1 – (-111) dBm 2..30 – (-109)dBm..(-53)dBm / 2 dBm per step 31 – (-51)dBm or greater 99 – not known or not detectable <ber> - Bit Rate Error [%] (2G) 0 – less than 0.2% 1 – 0.2% to 0.4% 2 – 0.4% to 0.8% 3 – 0.8% to 1.6% 4 – 1.6% to 3.2% 5 – 3.2% to 6.4% 6 – 6.4% to 12.8% 7 – more than 12.8% 99 – not known or not detectable Signal Quality [dBm] (4G) 0: (-4) to (-3) 1: (-6) to (-5) 2: (-8) to (-7) 3: (-10) to (-9) 4: (-13) to (-11) 5: (-15) to (-14) 6: (-17) to (-16) 7: (-19) to (-18) 99 – not known or not detectable <act> - Access Technology 0, 3 – 2G (GSM) 2, 4, 5, 6 – 3G (UMTS) 7, 8, 9 – 4G (LTE) Reading mobile connection information: **#7,GI,2,0x<flags>,<serviceIP>,<trafficUp>,<trafficDown>,<dataUp>,<dataDown>;** where: <flags> - modem state in hex format, see <u><flags></u> for definition. <serviceIP> - IP address of the remote side in dot notation, e.g. 192.168.0.1 <trafficUp> - amount of raw data [kB] sent out from the instrument to the Internet

Group name	#1 code	#7 code	#S code	Code description
				<trafficDown> - amount of raw data [kB] received by the instrument from the Internet <dataUp> - amount of user data [kB] sent out from the instrument to the Internet <dataDown> - amount of user data [kB] received by the instrument from the Internet *Notes:* *- "user data" means any commands sent to the instrument and any responses received from the instrument, e.g.* *#7,GI,2; – command sent to the instrument is 8 bytes of <dataDown>* *#7,GI,2,0x3F,100.101.102.1,229373,26494,11885,1254; - response received from the instrument is 51 bytes of <dataUp>* *- raw data means user data + protocols overhead*
Modem reset		**RM**		Force modem reset. 0 (or empty) - software reset 1 - hardware reset (power off and on)
Signal quality		**SQ**		Modem signal quality, see <rssi>

Table A.20 Local network settings and status

Group name	#1 code	#7 code	#S code	Code description
Local network settings (general)		**WL**		To read/write settings send #7,WL,<sel>; where <sel> is settings selector: 0 - LAN settings 1 - WLAN Infrastructure settings 2 - WLAN Access Point settings
LAN settings		**WL**		**LAN settings** Reading (response from the instrument): #7,WL,0,<res1>,<res2>,<res3>,<connType>,<remAddress>,<port>,<dhcp>,<locAddress>,<subMask>,<gate>,<dns1>,<dns2>,<res4>; Writing: #7,WL,0,<res1>[,<res2>[,<res3>[,<connType>[,<remAddr>[,<remPort>[,<dhcp>[,<locAddr>[,<subMask>[,<gate>[,<dns1>[,<dns2>[,<res4>]]]]]]]]]]]]; where: <res1> - reserved; this parameter is an empty string and must be left unchanged <res2> - reserved; this parameter has value of 0 and must be left unchanged <res3> - reserved; this parameter is an empty string and must be left unchanged <connType> - connection type

Group name	#1 code	#7 code	#S code	Code description
				0 - TCP server (listener) mode 1 - TCP client mode (default) 2 - UDP mode <remAddr> - remote address of TCP/UDP connection; default “app.svannet.com” *Note: the setting can be a name to be resolved by DNS or IPv4 address in dot notation, e.g. “192.168.1.1”* <port> - port used for TCP/UDP connection ∈ (0 ÷ 65535); default 8000 *Note: it is not advised to use ports < 1024!* <dhcp> - Dynamic Host Configuration Protocol 0 – disabled (manual network configuration) 1 – enabled (automatic network configuration) (default) *Notes: below settings from <locAddr> through <dns2> are valid when <dhcp> = 0 only!* <locAddr> - local IP address <subMask> - submask of the network <gate> - gateway of the network <dns1> - IP address of the primary DNS server <dns2> - IP address of the secondary DNS server <res4> - reserved; this parameter has value of 0 and must be left unchanged
			RM	<connType> - connection type
			RN	<remAddr> - remote address of TCP/UDP connection
			SO	<port> - port used for TCP/UDP connection
			RG	<dhcp> - Dynamic Host Configuration Protocol
			RH	<locAddr> - local IP address
			RI	<subMask> - submask of the network
			RJ	<gate> - gateway of the network
			RK	<dns1> - IP address of the primary DNS server written as a single 32-bit number, see <dns> for a definition.
			RL	<dns2> - IP address of the secondary DNS server written as a single 32-bit number, see <dns> for a definition.
WLAN module installed			**QD**	0 – ConnectOne CO2144- D 1 – uBlox ODIN-W260
WLAN Infrastructure settings		**WL**		**WLAN Infrastructure settings** Reading (response from the instrument): #7,WL,1,<ssid>,<secType>,<secKey>,<connType>,<remAddress>,<port>,<dhcp>,<locAddress>,<subMask>,<gate>,<dns1>,<dns2>,<res4>;

Group name	#1 code	#7 code	#S code	Code description
				Writing: #7,WL,1,<ssid>[,<secType>[,<secKey>[,<connType>[,<remAddr>[,<port>[,<dhcp>[,<locAddr>[,<subMask>[,<gate>[,<dns1>[,<dns2>[,<res4>]]]]]]]]]]]]; where: <ssid> - SSID – the name of the Access Point to connect to <secType> - security type 0 - none (open network) 1 - WEP 64-bit 2 - WEP 128-bit 3 - WPA/PSK 4 - WPA2/PSK (default) <secKey> - security key; password used to connect to the Access Point <connType> - connection type 0 - TCP server (listener) mode 1 - TCP client mode (default) 2 - UDP mode <remAddr> - remote address of TCP/UDP connection; default “app.svannet.com” *Note: the setting can be a name to be resolved by DNS or IPv4 address in dot notation, e.g., “192.168.1.1”* <port> - port used for TCP/UDP connection ∈ (0 ÷ 65535); default 8000 *Note: it is not advised to use ports < 1024!* <dhcp> - Dynamic Host Configuration Protocol 0 – disabled (manual network configuration) 1 – enabled (automatic network configuration) (default) *Notes: below settings from <locAddr> through <dns2> are valid when <dhcp> = 0 only!* <locAddr> - local IP address <subMask> - submask of the network <gate> - gateway of the network <dns1> - IP address of the primary DNS server <dns2> - IP address of the secondary DNS server <res4> - reserved; this parameter has value of 0 and must be left unchanged
			QE	<ssid> - SSID – the name of the Access Point to connect to
			QF	<secType> - security type
			QG	<secKey> - security key
			QN	<connType> - connection type
			QO	<remAddr> - remote address of TCP/UDP connection

Group name	#1 code	#7 code	#S code	Code description
			QP	<port> - port used for TCP/UDP connection
			QH	<dhcp> - Dynamic Host Configuration Protocol
			QI	<locAddr> - local IP address
			QJ	<subMask> - submask of the network
			QK	<gate> - gateway of the network
			QL	<dns1> - IP address of the primary DNS server written as a single 32-bit number, see <dns> for a definition.
			QM	<dns2> - IP address of the secondary DNS server written as a single 32-bit number, see <dns> for a definition.
WLAN Access Point settings		**WL**		**WLAN Access Point settings** Reading (response from the instrument): #7,WL,2,<ssid>,<secType>,<secKey>,<connType>,<remAddress>,<port>,<dhcp>,<locAddress>,<subMask>,<gate>,<dns1>,<dns2>,<res4>; Writing: #7,WL,2,<ssid>[,<secType>[,<secKey>[,<connType>[,<remAddr>[,<remPort>[,<dhcp>[,<locAddr>[,<subMask>[,<gate>[,<dns1>[,<dns2>[,<res4>]]]]]]]]]]]]; where: <ssid> - SSID – the name of the WLAN network created by the instrument; default SV200A_#<serial number> <secType> - security type 0 - none (open network) 1 - WEP 64-bit 2 - WEP 128-bit 3 - WPA/PSK 4 - WPA2/PSK (default) <secKey> - security key; password used to connect to the Access Point; default value is unique for every instrument <connType> - connection type 0 - TCP server (listener) mode (default) 1 - TCP client mode 2 - UDP mode <remAddr> - remote address of TCP/UDP connection; default is an empty string “” <port> - port used for TCP/UDP connection $\in$ (0 $\div$ 65535); default 8000 *Note: it is not advised to use ports < 1024!* <dhcp> - Dynamic Host Configuration Protocol 0 – disabled (manual network configuration) 1 – enabled (automatic network configuration) (default) <locAddr> - local IP address; default 192.168.2.1

Group name	#1 code	#7 code	#S code	Code description
				<subMask> - submask of the network; default 255.255.255.0 <gate> - gateway of the network; default 192.168.2.1 <dns1> - IP address of the primary DNS server; default 0.0.0.0 <dns2> - IP address of the secondary DNS server; default 0.0.0.0 <res4> - reserved; this parameter has value of 0 and must be left unchanged
			QR	<ssid> - SSID – the name of the WLAN network created by the instrument
			QS	<secType> - security type
			QT	<secKey> - security key
			RA	<connType> - connection type
			RB	<remAddr> - remote address of TCP/UDP connection
			RC	<port> - port used for TCP/UDP connection
			QU	<dhcp> - Dynamic Host Configuration Protocol
			QV	<locAddr> - local IP address
			QW	<subMask> - submask of the network
			QX	<gate> - gateway of the network
			QY	<dns1> - IP address of the primary DNS server written as a single 32-bit number, see <dns> for a definition.
			QZ	<dns2> - IP address of the secondary DNS server written as a single 32-bit number, see <dns> for a definition.
			RE	<chan> - WLAN channel used by the Access Point $\in (1 \div 11)$; default 6
Local network information		**WI**		To read settings send #7,WI,<sel>; where <sel> is a settings selector: 0 - WLAN/LAN module hardware information 1 - local network information 2 - connection information Reading module hardware information: **#7,WI,0,<manuf>,<model>,<rev>,<id>,<sn>,<region>;** where: <manuf> - module's manufacture name <model> - model of the module <rev> - firmware revision of the module <id> - MAC address of the module <sn> - serial number of the module <region> - currently selected region 0 - USA

Group name	#1 code	#7 code	#S code	Code description
				1 - Europe 2 - Japan Reading local network information: **#7,WI,1,<act>,0x<flags>,<status>,<rate>,<level>,<link>,<ssid>,<bssid>,<secType>,<wpaStat>,<chan>,<snr>;** where: <act> - active network interface 0 - LAN 1 - WLAN Infrastructure mode 2 - WLAN Access Point mode <flags> - module state in hex format defined as a sum of flags: 0x00000001 - module is powered on, 0x00000002 - module is initialized, 0x00000004 - module is connected to the network, 0x00000008 - module has Internet connection, 0x00000010 - module has established a TCP/IP connection, 0x00000020 - module is connected to SvanNET, *Notes: all other flags are reserved!* <status> - present port status 0 - Wireless LAN adapter is not present 1 - Wireless LAN adapter is disabled 2 - Searching for initial connection 4 - Connected 5 - Out of range <rate> - transfer rate [Mb/s] $\in$ (1 $\div$ 54); <level> - signal level [%] <link> - link quality [%] <ssid> - SSID – the name of the Access Point instrument is connected to <bssid> - MAC address of the Access Point instrument is connected to <secType> - network security type 0 - none (open network) 1 - WEP 64-bit 2 - WEP 128-bit 3 - WPA/PSK 4 - WPA2/PSK <wpaStat> - status of WPA negotiation 0 - not completed 1 - completed <chan> - channel used by the network $\in$ (1 $\div$ 13) <snr> - signal to noise ratio Reading connection information: **#7,WI,2,<act>,0x<flags>,<serviceIP>,<subMask>**

Group name	#1 code	#7 code	#S code	Code description
				,<gate>,<dns1>,<dns2>,<trafficUp>,<trafficDown>,<dataUp>,<dataDown>; where: <act> - active network interface 0 - LAN 1 - WLAN Infrastructure mode 2 - WLAN Access Point mode <flags> - module state in hex format, see <flags> for definition <serviceIP> - IP address of the remote side in dot notation, e.g. 192.168.0.1 <subMask> - submask of the network <gate> - gateway of the network <dns1> - IP address of the primary DNS server; default 0.0.0.0 <dns2> - IP address of the secondary DNS server; default 0.0.0.0 <res1> - reserved; read the same as <dataUp> <res2> - reserved; read the same as <dataDown> <dataUp> - amount of user data [kB] sent out from the instrument to the Internet <dataDown> - amount of user data [kB] received by the instrument from the Internet *Notes:* *- "user data" means any commands sent to the instrument and any responses received from the instrument, e.g.* *#7,WI,2; – command sent to the instrument is 8 bytes of <dataDown>* *#7,WI,2,1,0x3F,192.168.1.103,255.255.255.0,192.168.1.1,192.168.1.1,0.0.0.0,6463,455,6463,455; - response received from the instrument is 93 bytes of <dataUp>*

Table A.21 FTP connection settings

Group name	#1 code	#7 code	#S code	Code description
FTP settings	**XXK**		**LK**	<addr> - remote address of an FTP server; (permitted characters: 0:9, a:z, '.', '-' and '_').
	XXL		**LL**	<user> - username used to login to an FTP server
	XXM		**LM**	<pass> - password used to login to an FTP server
	XXP		**LN**	<pushDir> - FTP server directory, where the measurement files are to be copied; default "workingdir"

Group name	#1 code	#7 code	#S code	Code description
				Note: this directory must be created on the FTP server manually!
	XXT		LO	<pullFile> - the name of the configuration file to be downloaded from FTP server and applied; default "CONFIG"
	XXU		LP	<pullResult> - the name of the file with current configuration to be uploaded to the FTP server after <pulFile> is applied; default "RESULT"
	XXN		LQ	<controlPort> - remote port of FTP control connection ∈ (0 ÷ 65535); default 21
			LR	<pushSect> - the number of SD card sectors (512B) sent in one package; range 0 or 4-128 in step of 4; default is 0 – which means auto
	XXQ		LS	<config> - FTP connection configuration defined as decimal sum of flags ∈ (0 ÷ 15); default 14 1 - privet IP ignoring, 2 - FTPS security, 4 - FTP extension, 8 - FTP active/passive mode connection, *Note: FTPS security is different from SFTP!*
	XXJ		LT	<UseFtp> - FTP mode defined as decimal sum of flags ∈ (0 ÷ 3); default 0 0 - FTP is off, 1 - FTP Push is active, 2 - FTP Pull is active, 3 - both FTP Push and Pull modes are active,
	XXR		LU	<pushPer> - FTP Push period, [min]; default 60 -1 - push is performed after each file size change 0 - push is performed after each file split 1 to 5 - minutes in step of 1 minute 10 to 30 - minutes in step of 5 minute 60 to 1440 – minutes in step of 30 minutes
	XXS		LV	<pullPer> - FTP Pull period, [min]; default 60 0 - FTP pull is performed after each successful FTP push 1 to 5 - minutes in step of 1 minute 10 to 30 - minutes in step of 5 minute 60 to 1440 – minutes in step of 30 minutes
	XXW		LW	<pushFiles> - files to be pushed to an FTP server; defined as a decimal sum of flags ∈ (0 ÷ 15); default 15 1 - SVL files, 2 - CSV files, 4 - WAVE files, 8 - TXT files (eg. calibration history file),
	XXC		LX	<timeout> - timeout value for FTP communication, ∈ (10 ÷ 240), [s]; default 30s
FTP status and control		FP		To read settings send #7,FP; Response of the instrument:

Group name	#1 code	#7 code	#S code	Code description
				#7,FP,<err>,<flags>,<done>,<fileNr>/<filesToSend>,<hh1>:<mm1>:<ss1>,<hh2>:<mm2>:<ss2>; where: <err> - FTP client error; 0 - ok, 1 - FTP Push or Pull is finished successfully <0 - negative value means error <flags> - of the status of the FTP client 0x0001 – FTP client is active 0x0002 – FTP server is tested 0x0004 – FTP client is sending data 0x0008 – reserved 0x0010 – FTP Push is active 0x0020 – FTP Push is finished 0x0040 – FTP Pull is active 0x0080 – FTP Pull is finished 0x0100 – FTP Push error flag 0x0200 – FTP Pull error flag 0x0400 – file is not found on the FTP server 0x0800 – reserved 0x1000 – FTP server supports SIZE command 0x2000 – reserved 0x4000 – reserved 0x8000 – FTP server supports APPE command <done> - advancement of the FTP Push or Pull, [%] <fileNr> - in case of FTP Push: <fileNr> is a number of the file which is actually sent to the FTP server in case of FTP Pull: <fileNr> is an actual state of the FTP Pull <filesToSend> - in case of FTP Push: <fileToSend> is a total number of files to be sent to the FTP server in case of FTP Pull: <filesToSend> is a total number of the FTP Pull states <hh1>:<mm1>:<ss1> - is a time left to start FTP Push <hh2>:<mm2>:<ss2> - is a time left to start FTP Pull To write settings send #7,FP,<reset>; where: <reset> - reset mode of the FTP client 0 - full reset of both FTP Push and Pull 1 - start FTP push immediately 2 - start FTP pull immediately

Appendix B. DATA FILE STRUCTURES

There is a number of files generated by the SV 200A instrument automatically and saved in the internal non-removable SD-card. Some of these files are binary, other are ASCII one. In the case of SV 200A (the internal file system rev. **1.08**), there are five different types of files:

- **SVL** - a binary file which contains miscellaneous results (cf. B.1 and B.2);
- **CSV** - an ASCII file which contains miscellaneous results (cf. B.3);
- **SVT** - a binary file with instrument's setup data (cf. B.4).
- **SVA** - an ASCII XML file with advanced alarm setup data (cf. B.5)
- **TXT** - an ASCII file named "C*.txt" which contains calibration and system check history data (cf. B.6)
- **LOG** - an ASCII file which contains miscellaneous information about instrument's status used for debugging purpose (cf. B.7)

B.1 GENERAL STRUCTURE OF THE SVL FILE

Each SVL file containing data from the SV 200A instrument consists of several blocks and logger records. A block is rather a header with static information which usually appears at the beginning of the file or data which may present anywhere in the file. Each block has its unique ID and length specified. A logger record can be a time history (TH) results block, record of audio data, marker information, pause information or a special block containing summary results (SR), meteo data, GPS data etc.

Each file has the following obligatory blocks:

- SvanPC++ file header (cf. Table B.1.1)
- file header (cf. Table B.1.2)
- instrument and internal software specifications (cf. Table B.1.3)
- user's text (a header) stored together with the measurement data (cf. Table B.1.4)
- parameters and global settings, common for all profiles (cf. Table B.1.5)
- parameters for measurement trigger (cf. Table B.1.6)
- parameters for logger trigger (cf. Table B.1.7)
- parameters for Time-domain signal recording (cf. Table B.1.8)
- parameters for Wave-file recording (cf. Table B.1.9)
- Extended I/O settings (cf. Table B.1.10)
- special settings for profiles (cf. Table B.1.11)
- RTF parameters (cf. Table B.1.12)
- main results saved as Summary Results (SR) Record (cf. Table B.1.13)
- header of the file from the logger (cf. Table B.1.20)
- contents of the file from the logger (cf. Table B.1.21)

Other blocks of the file structure are not obligatory. They depend on the instrument's current mode and connected accessories. These blocks are as follows:

- statistical levels saved in the Summary Results record (cf. Table B.1.14)
- header of the statistical analysis (cf. Table B.1.15)
- results of the statistical analysis (cf. Table B.1.16)
- 1/1 OCTAVE analysis results saved in the Summary Results record (cf. Table B.1.17)
- 1/3 OCTAVE analysis results saved in the Summary Results record (cf. Table B.1.18)
- settings of the instrument saved in the setup file (cf. Table B.1.19)
- Meteo data - (cf. Table B.1.22)
- Alarm parameters - (cf. Table B.1.23)
- Directivity results – (cf. Table B.1.25)

Below, all file structure groups are described separately in Tab. B.1.1 – Tab. B.1.24. The format used in the columns, named **Comment** in square parenthesis ([xx, yy]), means the contents of the word with; **xx** is the most significant byte (MSB) and **yy** the lowest one (LSB) of the word. The format 0xnnnn means that the nnnn is four-digit number in hexadecimal form.

Table B.1.1. SvanPC file header

Word number	Name	Comment
0..2	"SvanPC"	reserved
3	26	reserved
4	32	reserved
5	3	reserved
6..15	Reserved	reserved
…	…	…

Table B.1.2. File header

Word number	Name	Comment
0	0xnn01	[01, nn=header's length]
1..4	FileName	name of the file (8 characters)
5	Reserved	reserved
6	CurrentDate	file creation date (cf. App. B.5)
7	CurrentTime	file creation time (cf. App. B.5)
8..13	Reserved	reserved
…		…

Table B.1.3. Unit and software specification

Word number	Name	Comment
0	0xnn02	[02, nn=specification's length]
1	UnitNumberL	unit number (least significant word)
2	UnitType	type of the unit: 200
3	SoftwareVersion	software version; for example, 106 means version 1.06
4	SoftwareIssueDate	software issue date
5	DeviceMode	mode of the instrument
6	UnitSubtype	subtype of the unit: 2 - SV 200A 3 – SV 200A (Austria type approval) 4 – SV 200A (Deutsche (PTB) type approval)
7	FileSysVersion	file system version; for example value 107 means version 1.07
8	SoftwareBetaSubVer	software Beta subversion; for example, if Beta subversion is 21, then full Beta software identifier is 1.07.021, where 1.07 – software version 0 – software subversion (for Beta must be 0) 21 – Beta subversion
9	SoftwareSubversion	software subversion $\in (0 \div 9)$; for example, if software subversion is 2, then full software identifier is 1.07.2, where 1.07 – software version 2 – software subversion

Word number	Name	Comment
		Note: software subversion 0 is a special case, which means that the software is Beta
10	UnitNumberH	unit number (most significant word)
…		…

Table B.1.4. USER's text

Word number	Name	Comment
0	0xnn03	[03, nn=specification's length]
1…	title text	the user's text (two characters in a word) finished with one or two null bytes

Table B.1.5. Parameters and global settings

Word number	Name	Comment
0	0xnn04	[04, nn=block's length]
1	MeasureStartDate	measure start date (cf. App. B.5)
2	MeasureStartTime	measure start time (cf. App. B.5)
3	DeviceFunction	device function: 1 - **SOUND LEVEL METER**, 2 - **1/1 OCTAVE** analyser, 3 - **1/3 OCTAVE** analyser
4	MeasureInput	measurement input type: 2 - **Microphone**
5	Range	measurement range: 2 - **SINGLE**
6	UnitFlags	unit flags: b1 - if set to 1: overload occurred b9 – measurement start synchronized with GPS other bits - reserved
7	RepCycle	repetition cycle: 0 - infinity nnnn - number of repetitions $\in(1 \div 1000)$
8	NofProf	number of profiles (3)
9	StartDelay	start delay time
10..11	IntTimeSec	integration time specified in seconds
12	StatDet	detector's type for statistical analysis: 0 - **LINEAR**, 1 - **EXPONENT.**
13	LeqInt	detector's type in the **LEQ** function: 0 - **LINEAR**, 1 - **EXPONENT.**

Word number	Name	Comment
14	SpectrumFilter	**1/1** or **1/3 OCTAVE** analysis filter: 1 - **Z**, 2 - **A**, 3 - **C**, 5 - **B**
15	SpectrumBuff	**1/1** or **1/3 OCTAVE** logger: 0 - off, 8 - logger with **LEQ** values in other cases, reserved
16	SpectrumDetector	**1/1** or **1/3 OCTAVE** analysis detector: 0 - **LIN.**, 1 - **FAST**, 2 - **SLOW**
17	StartSync	Synchronization the start of measurement with RTC -1 - synchronization to **1 sec**. 0 - switched off. 1 - synchronization to **1 min**. 15 - synchronization to **15 min**. 30 - synchronization to **30 min**. 60 - synchronization to **1 hour**.
18	SpectrumBand	spectrum band: 0 - **FULL**, 1 - **AUDIO**
19	MicComp	compensating filter for microphones: 0 - switched off, 1 - switched on
20	CalibrType	last calibration type: 0 - none, 1 - auto (using auto-calibration feature), 2 - remote (using remote #1,Q command), 3 - factory, 4 - system check (using built-in actuator), 5 - manual (using MENU->Function->Calibration ->By Measurement)
21	CalibrDate	last calibration date
22	CalibrTime	last calibration time
23	RollLeq1	rolling time (1) in seconds
24	RollLeq2	rolling time (2) in seconds
25	OutdoorFilter	outdoor filter: 0 - **OFF**,

Word number	Name	Comment
		1 - **ON**
26	OutdoorType	outdoor filter type: 0 - **ENVIRONMENT**, 1 - **AIRPORT**
27		reserved
28		reserved
29		reserved
30	MainResBuff	Summary results. Contents defined as a sum of flags: b0 - Main Results b1 - Spectrum b2 - Spectrum MAX b3 - Spectrum MIN b5 - Statistical levels b6 - Statistical analysis in profiles b9 - Meteo
31	SplitMode	Logger files splitting mode: 0 - off. -1 - The file is created for each measurement cycle. 15 - The file is created every 15 min synchronized to RTC. 30 - The file is created every 30 min synchronized to RTC. 60 - The file is created every 1 hour synchronized to RTC. 1440 - The file is created on the specified times.
32	SplitTime[1]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
33	SplitTime[2]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
34	SplitTime[3]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
35	SplitTime[4]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
36	SplitTime[5]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
37	SplitTime[6]	Logger files splitting time:

Word number	Name	Comment
		-1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
38	GpsLastSyncTime	The time [s] between clock synchronization from GPS module and the start of measurement. 0xffff - no synchronization
39	StatisticsCycles	Number of IntTimes statistics are calculated for 1:32767
40..41	MeasureStartTimeMs	measurement start time in milliseconds
42	NofDirDistXY	number of elements for directivity distribution vector for X-Y axis
43	NofDirDistZ	number of elements for directivity distribution vector for Z axis
44	DirResBuff	Mask of included directivity SR results. Content defined as a sum of values: 1 – dirTime 2 – eCompassCorr 4 – AverSectorXY and AverEnergyXY 8 – AverSectorZ and AverEnergyZ 16 – AverEnergyDistXYZ 32 – HistEnergyDistXYZ
45	Reserved	Reserved
46	Logger_main_prof[1]	Main results in the 1st profile saved in the file. Contents defined as a sum of flags: b0 - Lxpeak[1] value b1 - LxyE[23] value b2 - maximal value (Lxymax[2]) b3 - minimal value (Lxymin[2]) b4 - Lxy[2] value b5 - Lxyeq[23] value b6 - **Lden** value b7 - **Ltm3** value b8 – **Ltm5** value b9 - **LR1** value b10 – **LR2** value b11 – **LE1** value b12 – **LE2** value
47	Logger_main_prof[2]	Main results in the 2nd profile saved in the file. Contents defined the same as in Logger_main_prof[1].
48	Logger_main_prof[3]	Main results in the 3rd profile. Contents defined the same as in Logger_main_prof[1].
49	Logger_main_common	Main common results saved in the file. Contents defined as a sum of flags: b0 - overload time (sec)
50	Logger_stat_prof[1]	Statistical results in the 1st profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.

Word number	Name	Comment
51	Logger_stat_prof[2]	Statistical results in the 2nd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
52	Logger_stat_prof[3]	Statistical results in the 3rd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
53..55	Reserved	Reserved
56..57	Segment[0]_maskXY	Mask of X-Y sectors included in estimated Leq (LE1) calculations
58..59	Segment[0]_maskZ	Mask of Z sectors included in estimated Leq (LE1) calculations
60..61	Segment[1]_maskXY	Mask of X-Y sectors included in estimated Leq (LE2) calculations
62..63	Segment[1]_maskZ	Mask of Z sectors included in estimated Leq (LE2) calculations
...		

Table B.1.6. MEASUREMENT TRIGGER parameters

Word number	Name	Comment
0	0xnn2B	[2B, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 2 - measurement on trigger **SLOPE+** 3 - measurement on trigger **SLOPE–** 4 - measurement on trigger **LEVEL+** 5 - measurement on trigger **LEVEL–** 6 - measurement on trigger **GRAD+** 7 - measurement on trigger **EXT I/O**
2	TriggerSource	source of the triggering signal: 0 - **RMS(1)** the **RMS** result from the first profile
3	TriggerLevel	level of triggering: 25 ÷ 130 dB (*10)
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10)
5	TriggerPre	reserved
6	TriggerPost	reserved
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	reserved
10	TriggerFilter	reserved
11	TriggerBitsPerSample	reserved
12	Range	reserved
...		

Table B.1.7. LOGGER TRIGGER parameters

Word number	Name	Comment
0	0xnn2C	[2C, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 4 - measurement on trigger **LEVEL+**, 5 - measurement on trigger **LEVEL–**
2	TriggerSource	source of the triggering signal: 0 - **RMS(1)** the **RMS** result from the first profile
3	TriggerLev	level of triggering: 25 ÷ 130 dB (*10)
4	TriggerGrad	reserved
5	TriggerPre	number of the records taken into account before the fulfilment of the triggering condition $\in(1 \div 50)$
6	TriggerPost	number of the records taken into account after the fulfilment of the triggering condition $\in(1 \div 200)$
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	reserved
10	TriggerFilter	reserved
11	TriggerBitsPerSample	reserved
12	Range	reserved
…		

Table B.1.8. Time-domain signal recording parameters

Word number	Name	Comment
0	0xnn31	[31, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 1 - recording whole measurement 2 - recording on trigger **SLOPE+** 3 - recording on trigger **SLOPE–** 4 - recording on trigger **LEVEL+** 5 - recording on trigger **LEVEL–** 6 - recording on trigger **GRAD+** 8 - recording on **Integration Period** trigger 9 - recording on **Advanced Alarms** trigger
2	TriggerSource	source of the triggering signal: 0 - **RMS(1)** the **RMS** result from the first profile in the case of TriggerMode=**SLOPE+** or **SLOPE–**:

Word number	Name	Comment
		1 - **External IO** *Note: the parameter is not used in Advanced Alarms trigger mode*
3	TriggerLevel	level of triggering: 25 ÷ 130 dB (*10) *Note: the parameter is not used in Advanced Alarms trigger mode*
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10) *Note: this parameter is used for TriggerMode = GRAD+ only*
5	TriggerPre	pre-trigger time given in 10ms
6	TriggerPost	reserved
7	TriggerSampling	sampling frequency in 10 Hz
8	TriggerRecTime	recording time of single data block: 0 - recording to the end of measurement or to the end of the condition in Advanced Alarms trigger mode 1..28800 (sec)
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15) *Note: the parameter is not used in Advanced Alarms trigger mode*
10	TriggerFilter	filter type: 1 - **Z**, 2 - **A**, 3 - **C**, 5 - **B**
11	TriggerBitsPerSample	bits per sample: 16 or 24
12	Range	range value for audio signals, [dB]
…		

Table B.1.9. Wave-file recording parameters

Word number	Name	Comment
0	0xnn2D	[2D, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 1 - recording whole measurement 2 - recording on trigger **SLOPE+** 3 - recording on trigger **SLOPE–** 4 - recording on trigger **LEVEL+** 5 - recording on trigger **LEVEL–** 6 - recording on trigger **GRAD+** 8 - recording on **Integration Period** trigger 9 - recording on **Advanced Alarms** trigger

Word number	Name	Comment
2	TriggerSource	source of the triggering signal: 0 - **RMS(1)** the **RMS** result from the first profile *Note: the parameter is not used in Advanced Alarms trigger mode*
3	TriggerLevel	level of triggering: 25 ÷ 130 dB (*10) *Note: the parameter is not used in Advanced Alarms trigger mode*
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10) *Note: the parameter is not used in Advanced Alarms trigger mode*
5	TriggerPre	pre-trigger time given in 10ms
6	TriggerPost	reserved
7	TriggerSampling	sampling frequency in 10 Hz
8	TriggerRecTime	recording time of single data block: 0 - recording to the end of measurement or to the end of the condition in Advanced Alarms trigger mode 1..28800 (sec)
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15) *Note: the parameter is not used in Advanced Alarms trigger mode*
10	TriggerFilter	filter type: 1 - **Z**, 2 - **A**, 3 - **C**, 5 - **B**
11	TriggerBitsPerSample	bits per sample: 16 or 24
12	Range	range value for audio signals, [dB]
…		

Table B.1.10. EXTended I/O parameters

Word number	Name	Comment
0	0xnn2E	[2E, nn=block's length]
1	Mode	mode: 0 - **OFF**, 1 - **DIGITAL IN**, 2 - **DIGITAL OUT**
2	Function	in the case of **DIGITAL IN**: 0 - **EXTERNAL TRIGGER** in the case of **DIGITAL OUT**: 0 -**TRIG. PULSE**, 1 - **ALARM PULSE** in other cases reserved

Word number	Name	Comment
3	ActiveLevel	in the case of **DIGITAL OUT** and **ALARM PULSE**: 0 - **LOW**, 1 - **HIGH** in other cases, reserved
4	Source	in the case of **DIGITAL OUT** and **ALARM PULSE**: 0 - **PEAK(1)**, 1 - **SPL(1)**, 2 - **LEQ(1)** in other cases, reserved
5	AlarmLevel	in the case of **DIGITAL OUT** and **ALARM PULSE**: 30 ÷ 130 dB (*10) in other cases reserved
6	Device	device selected on the External Interface: 0 – **RS232 Interface**, 1 – **Meteo** (auto mode) 2 – reserved 3 – **Meteo** (auto mode)
7	Reserved	reserved
8	Reserved	reserved
9	Polarisation/Slope	in the case of **DIGITAL OUT** and **TRIG. PULSE**: Polarisation (0 - **POSITIVE**, 1 - **NEGATIVE**) in the case of **DIGITAL IN** Slope (0 - **POSITIVE**, 1 - **NEGATIVE**) in other cases, reserved
...		

Table B.1.11. Special settings for profiles

Word number	Name	Comment
0	0xnn05	[05, nn=block's length]
1	0x0307	[used_profile, profile's mask]
2	0xmm06	[06, mm=sub-block's length]
3	DetectorP[1]	detector type in the 1st profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
4	FilterP[1]	filter type in the 1st profile: 1 - **Z**, 2 - **A**, 3 - **C**, 5 - **B**

Word number	Name	Comment
5	BufferP[1]	logger contents in the 1st profile defined as a sum of: 0 - none, 1 - **PEAK**, 2 - **MAX**, 4 - **MIN**, 8 – **RMS** 16 - **LR1** 32 - **LR2**
6	CalibrFactor[1]	calibration factor (*10 dB) in the 1st profile
7	ProfileFlags[1]	flags in the 1st profile
8	0xmm06	[06, mm=sub-block's length]
9	DetectorP[2]	detector type in the 2nd profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
10	FilterP[2]	filter type in the 2nd profile: 1 - **Z**, 2 - **A**, 3 - **C**, 5 - **B**
11	BufferP[2]	logger contents in the 2nd profile defined as a sum of: 0 - none, 1 - **PEAK**, 2 - **MAX**, 4 - **MIN**, 8 – **RMS** 16 - **LR1** 32 - **LR2**
12	CalibrFactor[2]	calibration factor (*10 dB) in the 2nd profile
13	ProfileFlags[2]	flags in the 2nd profile
14	0xmm06	[06, mm=sub-block's length]
15	DetectorP[3]	detector type in the 3rd profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
16	FilterP[3]	filter type in the 3rd profile: 1 - **Z**, 2 - **A**, 3 – **C**, 5 – **B**
17	BufferP[3]	logger contents in the 3rd profile defined as a sum of: 0 - none, 1 - **PEAK**,

Word number	Name	Comment
		2 - **MAX**, 4 - **MIN**, 8 – **RMS** 16 - **LR1** 32 - **LR2**
18	CalibrFactor[3]	calibration factor (*10 dB) in the 3rd profile
19	ProfileFlags[3]	flags in the 3rd profile
…		

Table B.1.12. Header of the Summary Results Record (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn59	[59, nn=header's length]
1..2	RecNumber	Summary Results Record number: 1..
3..4	MeasureTime	Time of the measurement
5	Flags	Measurement flags. Contents defined as a sum of flags: b1 - if set to 1: overload occurred b5,b4,b3: type of the result **Lden** 000 – **Lden** result is not available 001 – **Ld** result 010 – **Le** result 011 – **Lde** result 100 – **Ln** result 101 – **Lnd** result 110 – **Len** result 111 – **Lden** result b9 - if set to 1: measurement start synchronized with GPS b10 - if set to 1: under-range occurred in the 1st profile b11 - if set to 1: under-range occurred in the 2nd profile b12 - if set to 1: under-range occurred in the 3rd profile
…	…	…

Table B.1.13. Main results in SLM mode (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn66	[66, nn=block's length]
1st profile results[4]. Presence depending on the value of Logger_main_prof[1] (cf. Tab. B.1.6)		
	Result[1][1]	Lxpeak[1] value
	Result[1][2]	LxyE[2,3] value
	Result[1][3]	Lxymax[2] value
	Result[1][4]	Lxymin[2] value
	Result[1][5]	Lxy[2] value
	Result[1][6]	Lxyeq[2,3] value
	Result[1][7]	**Lden** value
	Result[1][8]	**Ltm3** value
	Result[1][9]	**Ltm5** value
	Result[1][10]	**LR1** value
	Result[1][11]	**LR2** value
	Result[1][12]	**LE1** value
	Result[1][13]	**LE2** value
2nd profile results[4]. Presence depending on the value of Logger_main_prof[2] (cf. Tab. B.1.6)		
	Result[2][1]	Lxpeak[1] value
	Result[2][2]	LxyE[2,3] value
	Result[2][3]	Lxymax[2] value
	Result[2][4]	Lxymin[2] value
	Result[2][5]	Lxy[2] value
	Result[2][6]	Lxyeq[2,3] value
	Result[2][7]	**Lden** value
	Result[2][8]	**Ltm3** value
	Result[2][9]	**Ltm5** value
	Result[2][10]	**LR1** value
	Result[2][11]	**LR2** value
	Result[2][12]	**LE1** value
	Result[2][13]	**LE2** value
3rd profile results[4]. Presence depending on the value of Logger_main_prof[3] (cf. Tab. B.1.6)		
	Result[3][1]	Lxpeak[1] value
	Result[3][2]	LxyE[2,3] value
	Result[3][3]	Lxymax[2] value
	Result[3][4]	Lxymin[2] value

Word number	Name	Comment
	Result[3][5]	Lxy[2] value
	Result[3][6]	Lxyeq[2,3] value
	Result[3][7]	**Lden** value
	Result[3][8]	**Ltm3** value
	Result[3][9]	**Ltm5** value
	Result[3][10]	**LR1** value
	Result[3][11]	**LR2** value
	Result[3][12]	**LE1** value
	Result[3][13]	**LE2** value
Common results. Presence depending on the value of Logger_main_common (cf. Tab. B.1.6)		
	OVL	Overload time in seconds. (results written in 2 words)

1 x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)
2 x - depends of the filter type in selected profile: A, C, Z, B (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: **I** (imp.), F (fast), S (slow) (cf. Tab. B.1.12)
3 y - only for exponential detector's type (cf. Tab. B.1.6)
4 all results are integer values presented as *100 dB

Table B.1.14. Statistical levels (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn65	[65, nn=block's length]
	Lnn[i,p]	Value of the **Ln** statistics for profile p (p=1..pp) (*100 dB) i=0.. N_stat_level -1, (cf. Tab. B.1.27) Presence depending on the value of Logger_stat_prof[p] (cf. Tab. B.1.6) Number of the **Ln** statistics defined in Tab. B.1.27
…	…	…

Table B.1.15. Header of the statistical analysis (the presence depends on the SAVE STAT. position)

Word number	Name	Comment
0	0xnn09	[09, nn=block's length]
1	0x0307	[03=number of profiles, 07=active profiles mask]
2	0xmm0A	[0A, mm=sub-block's length]
3	NofClasses[1]	number of classes in the first profile (120)

Word number	Name	Comment
4	BottomClass[1]	bottom class boundary (*10 dB) in the first profile
5	ClassWidth[1]	class width (*10 dB) in the first profile
6	0xmm0A	[0A, mm=sub-block's length]
7	NofClasses[2]	number of classes in the second profile (120)
8	BottomClass[2]	bottom class boundary (*10 dB) in the second profile
9	ClassWidth[2]	class width (*10 dB) in the second profile
10	0xmm0A	[0A, mm=sub-block's length]
11	NofClasses[3]	number of classes in the third profile (120)
12	BottomClass[3]	bottom class boundary (*10 dB) in the third profile
13	ClassWidth[3]	class width (*10 dB) in the third profile
…	…	…

Table B.1.16. Results of the statistical analysis

Word number	Name	Comment
0	0x010B	[0B, prof_mask#1]
1	SubblockLength	2 * number of classes in the first profile + 2
2..3	Histogram[1][1]	the first counter in the first profile
4..5	Histogram[1][2]	the second counter in the first profile
.....	.....	.....
0	0x020B	[0B, prof_mask#2]
1	SubblockLength	2 * number of classes in the second profile + 2
2..3	Histogram[2][1]	the first counter in the second profile
4..5	Histogram[2][2]	the second counter in the second profile
.....	.....	.....
0	0x040B	[0B, prof_mask#3]
1	SubblockLength	2 * number of classes in the third profile + 2
2..3	Histogram[3][1]	the first counter in the third profile
4..5	Histogram[3][2]	the second counter in the third profile
.....	.....	.....

Table B.1.17. 1/1 OCTAVE analysis results

Word number	Name	Comment
0	0xnn0E, 0xnn26, 0xnn27	[block_id, nn=block_length] 0xnn**OE** - averaged spectrum results, 0xnn**26** - min. spectrum results, 0xnn**27** - max. spectrum results

1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz)
3	NOct	number of **1/1 OCTAVE** values
4	NOctTot	number of **TOTAL** values: 3
5÷20	Octave[i]	1/1 octave[i] value (*100 dB); i=1÷NOct+NoctTot (1÷13)
…	…	…

Table B.1.18. 1/3 OCTAVE analysis results

Word number	Name	Comment
0	0xnn10, 0xnn28, 0xnn29	[block_id, nn=block_length] 0xnn**10** - averaged spectrum results, 0xnn**28** - min. spectrum results, 0xnn**29** - max. spectrum results
1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz)
3	NTer	number of **1/3 OCTAVE** values
4	NTerTot	number of **TOTAL** values: 3
5÷50	Tercje[i]	1/3 octave[i] value (*100 dB); i=1÷NTer+NTerTot (1÷34)
…	…	…

Table B.1.19. SETUP file

Word number	Name	Comment
0	0x0020	[20, 00=block's length in the second word]
1	BlockLength	length of the block
2..BlockLength-1	SetupData	saved setup values

Table B.1.20. Header of the file from the logger

Word number	Name	Comment
0	0xnn0F	[0F, nn=header's length]
1	BuffTSec	logger time step - full seconds part
2	BuffTMilisec	logger time step - milliseconds part
3	LowestFreq	the lowest **1/1 OCTAVE** or **1/3 OCTAVE** frequency (*100 Hz)
4	NOctTer	number of **1/1 OCTAVE** or **1/3 OCTAVE** results
5	NOctTerTot	number of **TOTAL** values
6..7	BuffLength	logger length (bytes)
8..9	RecsInBuff	number of records in the logger
10..11	RecsInObserv	number of records in the observation period equal to:

		number of records in the logger + number of records not saved
12..13	AudioRecords	number of audio records in the logger
14..15	MstUnitNumber	monitoring station unit number (ignored if 0xFFFFFFFF)
16	MstUnitType	type of the connected meteo station: - 205 (SV 205B), - 209 (SV209), - 520 (Vaisala WXT520), - 531-536 (Vaisala WXT53x series), - 275 (SP275), - 276 (SP276), - 600 (GILL GMX600) (ignored if 0xFFFF)
17..18	MstSoftwareVersion	monitoring station software version (ignored if 0xFFFFFFFF)
19..20	MstIntTimeSec	integration period of meteo results in seconds (ignored if 0xFFFFFFFF)
21	MstCalDate	last calibration date (ignored if 0xFFFF)
…	…	…

Note: *The current logger time step in seconds can be obtained from the formulae:*

T = BuffTSec + BuffTMillisec / 1000

Table B.1.21. Contents of the file from the logger

Word number	Name	Comment
0..(BuffLength/2-1)		result#1, result#2, ... result#(BuffLength/2-1)

Table B.1.22. METEO data

Word number	Name	Comment
0	0xnn2F	[**2F** = id, nn = block's length]
1	BlockLength	block length
2..3	UnitNumber	unit serial number
4	UnitType	type of the connected meteo unit: - 205 (SV205B), - 209 (SV209), - 520 (Vaisala WXT520), - 531-536 (Vaisala WXT53x series), - 275 (SP275), - 276 (SP276), - 600 (GILL GMX600)

Word number	Name	Comment
5..6	SoftwareVersion	unit software version; two formats are supported A.BB.CC (for SP276 and GMX600) where CC = version %100 (two characters) BB = (version / 100)%100 (two characters) A = version / 10000 e.g. 0x00004E2E mean 2.00.14 and AA.BB (for other units) where BB = (version %100) (two characters) AA = version / 100
7..8	N_1s	number of averaged 1 second PTH results
9	Temperature	temperature [0.1 °C]
10	Pressure	pressure [0.1 hPa]
11	Humidity	humidity [0.1 %]
12..13		reserved
14	AvgWindSpeed	average wind speed [0.1 m/s]
15	WindDirection	wind direction for max wind speed [°] (0xFFFF if direction is unavailable)
16	MaxWindSpeed	max wind speed [0.1 m/s] (ignored if WindDirection is unavailable)
17..18	WindDirTotalPuffs	wind direction distribution vector number of total wind puffs
19	N	number of elements of the wind direction distribution vector
20…	WindDir[N]	wind direction distribution vector – value [0.1 %]
20+N	M	number of elements of the max wind speed distribution vector
21+N…	WindMax[M]	max wind speed distribution vector – value [0.1 m/s]
21+N+M	V	number of elements of the average wind speed distribution vector
22+N+M…	WindAvg[V]	average wind speed distribution vector – value [0.1 m/s]
22+N+M+V	RainDetection	Rain/hail detection flag Note: if the flag is zero, the next 12 words of precipitation parameters are not present in this block
+[0]	RainIntens	Rain Intensity [0.1 mm/h]
+[1..2]	RainAcc	Rain Accumulation [0.01 mm]
+[3..4]	RainDuration	Rain Duration [s]
+[5]	HailIntens	Hail Intensity [0.1 hits/cm^2 h]
+[6..7]	HailAcc	Hail Accumulation [0.01 hits/cm^2]
+[8..9]	HailDuration	Hail Duration [s]
+[10]	RainPeakIntens	Rain Peak Intensity [0.1 mm/h]
+[11]	HailPeakIntens	Hail Peak Intensity [0.1 hits/cm^2 h]
...	...	...

Table B.1.23. Statistical levels settings

Word number	Name	Comment
0	0xnn64	[64, nn=block's length]
1	N_stat_level	number of statistical levels = N
2+i	nn[i]	number of the **Ln** statistics, i=0..N-1
…	…	…

Table B.1.24. Directivity results (saved in Summary Results Record)

Word number	Name	Comment
0	0x0070	[**70** = id, 00 = block's length in the second word]
1	BlockLength	Block's length
2..3	dirTime	time of the directivity measurement, [s]
4	eCompassCorr	eCompass result which is a deviation from North direction ∊(-179° ÷ 180°). This value should be treated as a correction for DirectionXY result
5	AverSectorXY	Direction of the average energy noise source for X-Y axis, [0.01°]
6	AverEnergyXY	Average energy calculated for AverSectorXY to entire energy ratio for X-Y axis multiplied by 10000
7	AverSectorZ	Direction of the average energy noise source for Z axis, [0.01°]
8	AverEnergyZ	Average energy calculated for AverSectorZ to entire energy ratio for Z axis multiplied by 10000
9	AverEnergyDistXYZ [NofDirDistXY+ NofDirDistZ]	Distribution of averaged energy noise source
9 + (NofDirDist XY+ NofDirDist Z)	HistEnergyDistXYZ [2*(NofDirDistXY+ NofDirDistZ)]	Histogram of maximum energy noise source (2 words per element)
…	…	…

Table B.1.25. Alarm parameters settings

Word number	Name	Comment
0	0x0061	[**61** = id, 00 = block's length in the second word]
1	BlockLength	block length in words
2	EventCount	

Word number	Name	Comment
+[0]	0xmm67	[67, mm=sub-block's length]
+[1]	EventId[i]	
+[2]	Active[i]	event active: 0 - switched off, 1 - switched on
+[3..10]	Name[i]	
+[11]	Source[i]	Event Source = (CondType << 8) | Source: CondType: 0 – Threshold, 1 – reserved, 2 – System, 3 – Spectrum, 4 – Meteo, Source in case CondType = Threshold: 0 – PEAK, 1 – MAX, 2 – MIN, 3 – LEQ, 4 – SPL, 5 – SEL, 6 – LDEN, 7 – LTM3, 8 – LTM5, 9 – LR1, 10 – LR2, 11 – LE1, 12 – LE2, 13-22 – Lnn, Source in case CondType = System: SysEventMask[i] defines a mask of events Source in case CondType = Spectrum: 0 – 1/1 octave averaged, 1 – 1/3 octave averaged, 2 – 1/1 octave instant, 3 – 1/3 octave instant, 4 – 1/1 octave max, 5 – 1/3 octave max, 6 – 1/1 octave min, 7 – 1/3 octave min, Source in case CondType = Meteo: 0 – Maximum Wind Speed, 1 – Averaged Wind Speed, 2 – Rain,

Word number	Name	Comment
+[12]	Integration[i]	event integration time 0 – 1s, 1 – SR, 2 – TH,
+[13..16]	SysEventMask[i] FreqEventMask[i]	system event mask in case CondType = System defined as a sum of: b0 - Powered Up b1 - Powered Down b2 - Measurement Start b3 - Measurement Stop b4 - Mains On b5 - Mains Off b6 - Low Battery b7 - Low Storage b8 - System Check Failed b9 - Modem On b10 - Modem Off b11 - Auto Calibration Result b12-b15 - reserved b16 - System Check OK b17 - Battery is OK b18 - Storage is OK b19 - Meteo is on b20 - Meteo is off b21 - Device is tilted b22 - Device is vertical b23 - Device location b24 - Instrument error b23-b31 – reserved frequency mask in case CondType = Spectrum defined as sum of following flags. 1/1 octave FULL: b2 – 4 Hz to b14 – 16 kHz, b15-17 Totals 1/1 octave AUDIO: b5 – 31,5 Hz to b14 – 16 kHz, b15-17 Totals 1/3 octave FULL: b7 – 4 Hz to b44 – 20 kHz, b45-47 Totals 1/3 octave AUDIO: b14 – 20 Hz to b44 – 20 kHz, b45-47 Totals
+[17]	Threshold1[i]	in case CondType = Spectrum: threshold1 of FreqEventMask[i] in other cases: value in [0.01dB]
+[18]	Threshold2[i]	in case CondType = Spectrum: threshold2 of FreqEventMask[i]

Word number	Name	Comment
		in case of Lnn source: LN in other cases: reserved
+[19]	Threshold3[i]	in case CondType = Spectrum: threshold3 of FreqEventMask[i] in other cases: reserved
+[20]	StartHour[i]	
+[21]	StartMinute[i]	
+[22]	StopHour[i]	
+[23]	StopMinute[i]	
+[24]	Weekday[i]	day of week mask defined as a sum of: b0 – Mo, b1 – Tu, b2 – We, b3 – Th, b4 – Fr, b5 – Sa, b6 – Su,
+[25]	TriggerMode[i]	reserved
+[26]	MinDuration[i]	value in seconds
+[27]	Counter[i]	reserved
+[28]	MinBreak[i]	min. break between successive events in seconds
+[29]	SMSActive[i]	sms active: 0 - switched off, 1 - switched on
+[30]	SMSRecipMask[i]	
+[31]	Email Active[i]	email active: 0 - switched off, 1 - switched on
+[32]	EmailRecipMask[i]	
+[33]	AudioActive[i]	audio active: 0 - switched off, 1 - switched on
+[34]	IOActive[i]	IO active: 0 - switched off, 1 - switched on
+[35]	PreTrigger[i]	value in seconds
…	…	…

B.2 RECORDS IN THE SVL LOGGER FILE

Records with results and the records with states of the markers as well as the records with breaks in the results registration are saved in the logger files. All results are written as 16-bit integer values presented in *100 dB units. For example, value of 4312 = 43.12 dB.

B.2.1 Record with the results

Content of the record with results depends on the selected measurement result and the value set in the **LOGGER** position of the **PROFILE x** and **SPECTRUM** sub-lists. The following elements can be present (in the given sequence):

(1) flag record

< flags > :

- b0: 1- the overload detected, 0 - the overload not detected

- b1: 1- the excessive self-vibration detected, 0 - the excessive self-vibration overload not detected

(2) results of the measurement from the first profile if the corresponding **LOGGER** position was active (BufferP [1] in Table B.1.11); up to four words are written:

<result1> - **PEAK** result, depending on the value of BufferP[1]
<result2> - **MAX** result, depending on the value of BufferP[1]
<result3> - **MIN** result, depending on the value of BufferP[1]
<result4> - **RMS** result, depending on the value of BufferP[1]
<result5> - **LR1** result, depending on the value of BufferP[1]
<result6> - **LR2** result, depending on the value of BufferP[1]

(3) results of the measurement from the second profile if the corresponding **LOGGER** position was active (BufferP [2] in Table B.1.11); up to four words are written:

<result1> - **PEAK** result, depending on the value of BufferP[2]
<result2> - **MAX** result, depending on the value of BufferP[2]
<result3> - **MIN** result, depending on the value of BufferP[2]
<result4> - **RMS** result, depending on the value of BufferP[2]
<result5> - **LR1** result, depending on the value of BufferP[1]
<result6> - **LR2** result, depending on the value of BufferP[1]

(4) results of the measurement from the third profile if the corresponding **LOGGER** position was active (BufferP [3] in Table B.1.11); up to four words are written:

<result1> - **PEAK** result, depending on the value of BufferP[3]
<result2> - **MAX** result, depending on the value of BufferP[3]
<result3> - **MIN** result, depending on the value of BufferP[3]
<result4> - **RMS** result, depending on the value of BufferP[3]
<result5> - **LR1** result, depending on the value of BufferP[1]
<result6> - **LR2** result, depending on the value of BufferP[1]

(5) results of **1/1 OCTAVE** analysis if **1/1 OCTAVE** analysis was selected as the measurement function and the **LOGGER** was active (SpectrumBuff in Table B.1.5); the sequence of words is written:

<Octave[1]> <Octave[2]> ÷. <Octave[NOct+NOctTot]>

where:
Octave[i] - result of **1/1 OCTAVE** analysis (*10 dB); i = 1÷NOct+NOctTot (1÷13)

(6) results of **1/3 OCTAVE** analysis if **1/3 OCTAVE** analysis was selected as the measurement function and **LOGGER** was active (SpectrumBuff in Table B.1.5); the sequence of words is written:

<Terave[1]> <Terave [2]> ÷. <Terave[NT]>

where:
Terave[i] - result of **1/3 OCTAVE** analysis (*10 dB); i = 1÷NT (1÷34)

B.2.2 Record with the state of the markers

The record with the state of the markers consists of one word:

<0x8nnn>

in which 12 bits nnn denote the state of the markers:

b11 = state of #12 marker

b10 = state of #11 marker

...

b1 = state of #2 marker

b0 = state of #1 marker

B.2.3 Record with the breaks in the results registration

The record with the breaks in the results registration consists of four words:

<0xB0ii> <0xB1jj> <0xB2kk> <0xB3nn>

in which ii, jj, kk, nn bytes denote 4-bytes counter of left or skipped records: nnkkjjii (ii is the least significant byte, nn – the most significant byte).

B.2.4 Record with the breaks account PAUSE in the results registration

The record with the breaks in the results registration consists of four words:

<0xA0ii> <0xA1jj> <0xA2kk> <0xA3nn>

in which ii, jj, kk, nn bytes denote 4-bytes counter duration of PAUSE in milliseconds:

nnkkjjii (ii is the least significant byte, nn - the most significant byte).

B.2.5 Record with the wave file name

The record with the wave file name consists of six words:

<0xC2aa>

<0xccbb>

<0xeedd>

<0xggff>

<0xiihh>

<0xCAaa>

in which:

aa - size of records,

bb cc dd ee ff gg hh ii - 8-bytes name of wave file name

B.2.6 Record with Summary Results

The format of the data frame is as follows:

HS	L (optional)	D	L (optional)	HE

where:

HS starting header (1 word)
L length of the block (field is optional and occurs only when b7..b0 in header are set to zero)
D Summary Data:
- Main results (cf. Table B.1.12)
- Statistical levels (optional, cf. Table B.1.14)
- 1/1 OCTAVE analysis results (optional, cf. Table B.1.17)
- 1/3 OCTAVE analysis results (optional, cf. Table B.1.18)

HE ending header (1 word), which differs from the HS only on b11 bit (thanks to it, it is possible to analyse the recorded file starting from its end)

The HEADER format is as follows:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

where:

b15 - 1
b14 - 1
b13 - 0
b12 - 0,
b11 - header type:
0 - HS
1 - HE
b10 - 0
b9 - 1
b8 - 1
b15÷b8 - HS (0xC3), HE (0xCB)
b7÷b0 - length of the block (if zero length of the block is saved in additional word L)

B.2.7 Record with audio data

This record exists only in the case when the **EVENT RECORDING** function is active (Table B.1.8). Samples of the signal, taken in the periods from 1 second to 60 seconds, are saved in the blocks. Each lock is divided into frames, which are stored in a file among the logger results. The frame starting block and the frame ending it are marked with the set b10 and b9 bits in the header of the frame, respectively. It happens in the case of stopping the recording that the ending frame does not exist.

The format of the data frame is as follows:

HS	L	S	L	HE

where:

HS starting header (1 word)

L block length (1 word), expressed in words (4 + (number of samples)*1.5)

S samples of the measured signal (in the case of SV 200 each sample is written according to BitsPerSample parameter; the recording starts with the least significant byte)

HE ending header (1 word), which differs from the HS only on b11 bit (thanks to it, it is possible to analyse the recorded file starting from its end)

The HEADER format is as follows:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

where:

b15 - 1

b14 - 0

b13 - 0

b12 - 1, bits b15 ÷ b12 = 9 constitute the marker of the frame

b11 - header type:

0 - HS

1 - HE

b10 - 1 denotes the first frame in the block

b9 - 1 denotes the last frame in the block

b7 - 1 denotes an error (the samples were overwritten in the cycle buffer, which means that the recording in the analysed block is not correct)

b8, b6÷b0 – reserved

B.2.8 Record with meteo data

Word number	Name	Comment
0	0xC704	record ID (start)
1	Length	length of the block together with IDs, [words]
2	N_1s	number of averaged 1 second PTH results
3	Temperature	ambient temperature measurement result [0.1 °C]
4	Pressure	atmospheric pressure measurement result [0.1 hPa]
5	Humidity	relative humidity measurement result [0.1 %]
6	WindDirTotalPuffs	number of non-zero wind samples
7	AvgWindSpeed	average wind speed measurement result [0.1 m/s]

8	WindDirection	wind direction for max wind speed [°] (0xFFFF if WindDirection is undefined)
9	MaxWindSpeed	max wind speed measurement result [0.1 m/s] (ignored if WindDirection is undefined)
10	RainDetection	flag of rain/hail; 1 – rain/hail was detected during the last observation period, 0 – no rain/hail was detected
…		reserved
…	Length	length of the block together with IDs, [words]
…	0xCF04	record ID (end)

B.2.9 Record with rainfall meteo data

Word number	Name	Comment
0	0xC705	record ID (start)
1	Length	length of the block together with IDs, [words]
2	RainIntens	Rain Intensity [0.1 mm/h]
3..4	RainAcc	Rain Accumulation [0.01 mm]
5..6	RainDuration	Rain Duration [s]
7	HailIntens	Hail Intensity [0.1 hits/cm^2 h]
8..9	HailAcc	Hail Accumulation [0.01 hits/cm^2]
10..11	HailDuration	Hail Duration [s]
12	RainPeakIntens	Rain Peak Intensity [0.1 mm/h]
13	HailPeakIntens	Hail Peak Intensity [0.1 hits/cm^2 h]
…		reserved
…	Length	length of the block together with IDs, [words]
…	0xCF05	record ID (end)

B.2.10 Record with system check data

Word number	Name	Comment
0	0xC701	record ID (start)
1	Length	length of the block together with IDs, [words]
2	Type	system check type: 4 - system check (built-in actuator)
3	Date	date of the performed system check
4	Time	time of the performed system check
5	Result	result of the system check: 0 - failed 1 - OK
6	Factor	system check factor, [*100 dB]
7	Level	measured level of system check, [*100 dB]
8	PreBackGround	maximum level of the background noise measured before actuator was turned on, [*10 dB]. This is a maximum value of three 1s measurements of RMS(C)

9	PostBackGround	maximum level of the background noise measured after actuator was turned off, [*10 dB]. This is a maximum value of three 1s measurements of RMS(C)
10	Assigned	was the result of the system check assigned to calibration factor? 0 - No 1 - Yes
11	Length	length of the block together with IDs, [words]
12	0xCF01	record ID (end)
…	…	…

B.2.11 Record with remote marker data

Word number	Name	Comment
0	0xC702	record ID (start)
1	Length	length of the block together with IDs, [words]
2	MarkerNr	Number of the marker (1-16, 0 - end of all block markers when MarkerType=2)
3	MarkerType	Type of the marker: 0 - point 1 - block (start) 2 - block (end)
4	MarkerNameLen	Marker Name Length in words. Field is optional and is absent for MarkerType = 2.
5..5+MarkerNameLen	MarkerName	Name of the marker. In case of odd number of MarkerName bytes last byte is 0x00. Field is optional and is absent for MarkerType = 2.
5+MarkerNameLen+1	Length	length of the block together with IDs, [words]
5+MarkerNameLen+2	0xCF02	record ID (end)
…	…	…

B.2.12 Record with the state of the alarm markers

The record with the wave file name consists of six words:

<0xC5nn>

<AlarmMarkerStateP>

<AlarmMarkerState>

<AlarmMarkerSMS>

<AlarmMarkerEmail>

<0xCDnn>

in which:

nn - size of records,

Each of word <AlarmMarkerStateP>, <AlarmMarkerState>, <AlarmMarkerSMS> and <AlarmMarkerEmail> denotes the state of the markers:

b15 = state of #16 alarm marker
...
b1 = state of #2 alarm marker

b0 = state of #1 alarm marker

<AlarmMarkerStateP> denotes the state of point markers

<AlarmMarkerState> denotes the state of continuous markers

<AlarmMarkerSMS> denotes the state of SMS markers

<AlarmMarkerEmail> denotes the state of Email markers

B.2.13 Record with directivity results

Word number	Name	Comment
0	0xC706	record ID (start)
1	Length	length of the block together with IDs, [words]
2	eCompassCorr	eCompass result which is a deviation from North direction $\in(-179^\circ \div 180^\circ)$. This value should be treated as a correction for DirectionXY result
3	DirectionXY	direction of the maximum energy noise source for X-Y axis [0.01°]. -1 value means no dominant direction
4	EnergyXY	energy calculated for DirectionXY to entire energy ratio multiplied by 10000
5	DirectionZ	direction of the maximum energy noise source for Z axis [0.01°]. -1 value means no dominant direction
6	EnergyZ	energy calculated for DirectionZ to entire energy ratio multiplied by 10000
7	EnergyDistXY[i]	energy distribution calculated for i-direction to entire energy ratio for X-Y axis [*10000]
7+NofDirDistXY	EnergyDistZ[i]	energy distribution calculated for i-direction to entire energy ratio for Z axis [*10000]
7+NofDirDistXY+ NofDirDistZ	Length	length of the block together with IDs, [words]
7+NofDirDistXY+ NofDirDistZ+1	0xCF06	record ID (end)
…	…	…

B.2.14 Record with GPS data

The value equal to -12288 (0xd000) denotes the undefined value.

Word number	Name	Comment
0	0xC703	record ID (start)
1	Length	length of the block together with IDs, [words]
2	Quality	Signal quality: 0 - GPS_NOT_FIX (no signal) 1 - GPS_FIX

		2 - GPS_FIX_DIF
3	Time.Sec	Seconds part of time
4	Time.Min	Minutes part of time
5	Time.Hour	Hours part of time
6	Date.Day	Day
7	Date.Month	Month
8	Date.Year	Year
9	Latitude.Deg	Degree part of latitude
10	Latitude.Min	Minutes part of latitude
11	Latitude.Sec	Seconds part of latitude
12	Latitude.MiliSec	Miliseconds part of latitude
13	Latitude.Dir	Latitude direction: N, S
14	Longitude.Deg	Degree part of longitude
15	Longitude.Min	Minutes part of longitude
16	Longitude.Sec	Seconds part of longitude
17	Longitude.MiliSec	Miliseconds part of longitude
18	Longitude.Dir	Longitude direction: E, W
19	Altitude	Altitude (meters)
20	Altitude.10	Decimal part of altitude
21	Speed	Speed * 100 (km/h)
22	Heading	degree * 10
23	HDOP	Horizontal Dilution of Precision * 10
24	Length	length of the block together with IDs, [words]
25	0xCF03	record ID (end)
…	…	….

B.2.15 Record with alarm data

Word number	Name	Comment
0	0xC708	0xC708 = block start identifier
1	0xnnnn	block length in words
2	Marker	number of the marker defined in Tab. B.1.26
3	AlarmDate	Alarm date
4..5	AlarmTimeMs	Alarm time, [ms]
6	Value[1]	cf. Tab. B.1.26 in case of “System **“source**: LSW of system event defined in SysEventMask in case of “Spectrum **“source**: mask of three thresholds FreqEventMask

		in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 1
7	Value[2]	cf. Tab. B.1.26 in case of "System **"source**: MSW of system event defined in SysEventMask in case of "Spectrum **"source**: Value 1 of exceeding the alarm threshold defined in FreqEventMask in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 2
8	Value[3]	in case of "System **"source**: Instrument Error x - sum of the following flags flags: b0 - RTC error b1 - SD card error b2 - Temperature sensor error b3 - Battery error b4 - Battery temperature too high in case of "Spectrum **"source**: Value 2 of exceeding the alarm threshold defined in FreqEventMask in other cases: reserved
9	Value[4]	in case of "System **"source**: System Check Error x - sum of the following flags flags: b0 - High background noise error b1 - Level stability error in case of "Spectrum **"source**: Value 3 of exceeding the alarm threshold defined in in other cases: reserved
nn-2	0xnnnn	block length in words
nn-1	0xCF08	0xCF08 = block end identifier

B.3 Structure of the CSV file

Multi line CSV file format

Section	File contents

File header	// ***
	// CSV file version, 1.02
	// Created, 08/07/2020, 11:29:10
	// Unit, SV 200A, SN, 65108
	// Firmware, 1.05.6, 03/07/2020
	// Corresponding logger file name, L7313.SVL
	// Device function, 1/3 octave
	// Integration time, 00:01:00
	// Leq integration, exponential
	// Outdoor filter, environmental
	// Profile 1, A, FAST
	// Profile 2, C, FAST
	// Profile 3, Z, FAST
	// Statistical levels, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90
	// Statistical integration, exponential
	// Spectrum, Z, LIN
	// Spectrum band, AUDIO
	// Directivity sectors (XY,Z), 32, 17
	// CSV save mask, FFFF, FFFF, FFFF, 7, 003F
	// CSV file version, 1.02
	// Created, 08/07/2020, 11:29:10
	// Unit, SV 200A, SN, 65108
	// Firmware, 1.05.6, 03/07/2020
	// Corresponding logger file name, L7313.SVL
	// Device function, 1/3 octave
	// SLM results, profile 1, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// SLM results, profile 2, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// SLM results, profile 3, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// Spectrum results, AVER, MAX, MIN
	// Meteo results, TIME, TEMP, PRES, HUMI, AVG_WIND, MAX_WIND_DIR, MAX_WIND_SPD, PRECI
	// Directivity results, TIME, ECOMP, AVER_SECT_XY, AVER_ENRG_XY, AVER_SECT_Z, AVER_ENRG_Z
	// Directivity distributions, AVER_ENRG_DIST, HIST_ENRG_DIST

	// SLM results, profile 1, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// SLM results, profile 2, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// SLM results, profile 3, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR5m, LR10m, LE1, LE2, Lnn, OVL
	// Spectrum results, AVER, MAX, MIN
	// Meteo results, TIME, TEMP, PRES, HUMI, AVG_WIND, MAX_WIND_DIR, MAX_WIND_SPD, PRECI
	// ***

Record number	// Record No, 1
Time sgnature	DT, 08/07/2020, 11:30:10
Measurement data	P1, 60, 78.2, 56.6, 48.3, 52.2, 52.2, 69.9, 52.2, 53.8, 54.1, 61.0, 60.8, 49.2, 49.3, 55.8, 54.6, 53.7, 52.6, 51.9, 51.2, 50.7, 50.4, 50.0, 49.4, 0 P2, 60, 77.3, 66.6, 55.8, 61.9, 60.8, 78.6, 60.8, 63.1, 63.6, 69.6, 70.2, 57.8, 58.0, 64.6, 63.2, 62.3, 61.3, 60.6, 59.9, 59.5, 59.0, 58.5, 57.9, 0 P3, 60, 85.6, 77.4, 58.8, 64.3, 65.4, 83.2, 65.4, 70.9, 71.8, 78.5, 78.4, 62.4, 62.6, 73.5, 67.8, 66.6, 65.7, 64.8, 63.8, 62.9, 62.3, 61.7, 61.0, 0 SA, 49.3, 54.4, 50.0, 49.9, 52.6, 44.8, 47.5, 55.0, 50.4, 44.0, 47.9, 46.7, 47.0, 43.9, 43.1, 42.5, 42.6, 43.6, 41.8, 41.7, 40.1, 37.2, 35.3, 34.4, 34.3, 33.2, 30.5, 27.8, 26.2, 22.3, 18.6, 52.1, 60.8, 65.4 SM, 64.0, 66.7, 59.4, 60.7, 63.7, 54.5, 59.4, 49.4, 48.5, 45.2, 46.2, 47.5, 40.9, 39.4, 41.0, 38.0, 38.4, 41.5, 41.1, 42.5, 42.4, 40.3, 37.3, 35.4, 32.4, 30.9, 28.6, 25.0, 22.9, 19.2, 18.4, 51.5, 58.0, 59.5 SN, 49.8, 52.6, 52.0, 40.0, 51.4, 46.2, 37.7, 49.4, 48.5, 45.2, 46.2, 47.5, 40.9, 39.4, 41.0, 38.0, 38.4, 41.5, 41.1, 42.5, 42.4, 40.3, 37.3, 35.4, 32.4, 30.9, 28.6, 25.0, 22.9, 19.2, 18.4, 51.5, 58.0, 59.5 DR, 60, 0, 90.00, 10.75, 101.25, 20.47 DA, 1.76, 1.78, 1.94, 3.58, 4.94, 6.06, 5.52, 7.06, 10.75, 6.17, 3.87, 3.19, 4.95, 1.90, 2.95, 2.21, 2.72, 1.36, 1.31, 1.62, 1.79, 2.04, 1.55, 2.10, 3.66, 2.92, 1.94, 1.72, 1.67, 1.67, 1.50, 1.59, 2.71, 1.79, 1.89, 2.13, 1.89, 1.96, 3.05, 5.79, 16.07, 20.47, 15.18, 10.68, 6.72, 3.13, 2.38, 2.33, 1.72 DH, 1, 0, 0, 0, 3, 3, 3, 8, 16, 5, 4, 2, 5, 1, 2, 1, 2, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 13, 22, 12, 10, 2, 0, 0, 0, 0 MT, 60, 26.3, 1001, 35.6, 2.5, 185, 3.1, 0
Record number	// Record No, 2
Time sgnature	DT, 08/07/2020, 11:31:10
Measurement data	P1, 60, 71.1, 57.4, 48.7, 52.6, 52.2, 70.0, 52.2, 53.8, 54.2, 61.0, 60.8, 49.2, 49.4, 56.5, 54.4, 53.5, 52.5, 51.8, 51.4, 51.0, 50.7, 50.3, 50.0, 0 P2, 60, 85.6, 75.7, 55.8, 62.6, 61.2, 78.9, 61.2, 66.4, 67.9, 69.6, 70.1, 58.2, 58.3, 66.6, 63.4, 62.1, 61.1, 60.4, 59.8, 59.3, 58.9, 58.3, 57.6, 0 P3, 60, 90.8, 81.3, 57.6, 65.3, 63.8, 81.6, 63.8, 70.4, 72.2, 78.5, 78.4, 60.9, 61.0, 71.0, 65.3, 64.5, 63.8, 63.2, 62.6, 62.0, 61.4, 60.8, 59.8, 0 SA, 51.4, 55.4, 55.9, 52.5, 55.0, 51.0, 46.8, 49.4, 47.8, 44.8, 48.3, 46.2, 45.0, 42.5, 41.5, 42.4, 43.4, 43.9, 41.9, 41.7, 41.0, 39.0, 37.8, 35.1, 34.6, 32.4, 29.5, 25.6, 23.2, 19.5, 18.3, 52.2, 61.2, 63.8 SM, 71.6, 76.5, 72.0, 65.3, 69.2, 40.6, 42.8, 49.4, 46.3, 37.7, 46.3, 44.9, 46.1, 41.7, 37.9, 42.7, 42.2, 41.1, 41.5, 42.4, 40.1, 38.6, 38.0, 37.0, 35.0, 33.8, 29.0, 25.7, 23.4, 19.0, 18.2, 51.6, 59.3, 60.7 SN, 39.8, 45.5, 58.4, 44.5, 52.8, 40.6, 42.8, 49.4, 46.3, 37.7, 46.3, 44.9, 46.1, 41.7, 37.9, 42.7, 42.2, 41.1, 41.5, 42.4, 40.1, 38.6, 38.0, 37.0, 35.0, 33.8, 29.0, 25.7, 23.4, 19.0, 18.2, 51.6, 59.3, 60.7 DR, 60, 0, 90.00, 9.69, 101.25, 24.05 DA, 1.63, 2.04, 2.19, 2.97, 4.59, 4.96, 6.59, 6.82, 9.69, 6.09, 4.41, 2.91, 3.07, 2.33, 1.95, 2.11, 1.61, 1.54, 1.93, 2.18, 2.25, 2.18, 2.35, 3.88, 4.19, 2.22, 2.06, 1.71, 2.04, 2.05, 1.55, 1.69, 3.65, 2.23, 2.31, 2.42, 2.48, 2.76, 2.84, 5.15, 12.98, 24.05, 12.74, 8.24, 6.21, 3.65, 3.30, 2.57, 2.33 DH, 0, 0, 1, 1, 3, 3, 6, 10, 14, 8, 4, 2, 1, 0, 0, 1, 0, 0, 0, 0, 2, 1, 0, 2, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 2, 40, 10, 4, 3, 1, 0, 0, 0 MT, 60, 26.5, 1001, 36.6, 2.1, 180, 3.0, 0
...	...

Single line CSV file format

The single line CSV file format is especially useful for importing and post-processing data in spreadsheet applications.

Section	File contents

File header	// **
	 // CSV file version, 1.03
	 // Created, 24/07/2021, 18:08:07
	 // Unit, SV 200A, SN, 3502
	 // Firmware, 1.07.4, 20/07/2021
	 // Corresponding logger file name, L23123.SVL
	 // Device function, 1/3 octave
	 // Integration time, 00:01:00
	 // Leq integration, Linear
	 // Outdoor filter, Environmental
	 // Profile 1, A, Fast
	 // Profile 2, C, Fast
	 // Profile 3, Z, Fast
	 // Statistical levels, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90
	 // Statistical integration, Linear
	 // Spectrum filter, Z, Linear
	 // Spectrum band, Audio
	 // Directivity sectors (XY-Z), 32, 17
	 // CSV save mask, FFFF, FFFF, FFFF, 7, 003F
	 // **

Results header (1 line)	Record, Date, Record End Time, SLM results profile 1, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR30m, LR60m, LE1, LE2, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), OVL, SLM results profile 2, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR30m, LR60m, LE1, LE2, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), OVL, SLM results profile 3, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, LR30m, LR60m, LE1, LE2, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), OVL, Spectrum AVER, 20Hz, 25Hz, 31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 20kHz, Total A, Total C, Total Z, Spectrum MAX, 20Hz, 25Hz, 31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 20kHz, Total A, Total C, Total Z, Spectrum MIN, 20Hz, 25Hz, 31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 20kHz, Total A, Total C, Total Z, Directivity results, TIME, ECOMP, AVER_SECT_XY, AVER_ENRG_XY, AVER_SECT_Z, AVER_ENRG_Z, Average directivity distribution, XY(0.00), XY(11.25), XY(22.50), XY(33.75), XY(45.00), XY(56.25), XY(67.50), XY(78.75), XY(90.00), XY(101.25), XY(112.50), XY(123.75), XY(135.00), XY(146.25), XY(157.50), XY(168.75), XY(180.00), XY(191.25), XY(202.50), XY(213.75), XY(225.00), XY(236.25), XY(247.50), XY(258.75), XY(270.00), XY(281.25), XY(292.50), XY(303.75), XY(315.00), XY(326.25), XY(337.50), XY(348.75), Z(0.00), Z(11.25), Z(22.50), Z(33.75), Z(45.00), Z(56.25), Z(67.50), Z(78.75), Z(90.00), Z(101.25), Z(112.50), Z(123.75), Z(135.00), Z(146.25), Z(157.50), Z(168.75), Z(180.00), Directivity histogram, XY(0.00), XY(11.25), XY(22.50), XY(33.75), XY(45.00), XY(56.25), XY(67.50), XY(78.75), XY(90.00), XY(101.25), XY(112.50), XY(123.75), XY(135.00), XY(146.25), XY(157.50), XY(168.75), XY(180.00), XY(191.25), XY(202.50), XY(213.75), XY(225.00), XY(236.25), XY(247.50), XY(258.75), XY(270.00), XY(281.25), XY(292.50), XY(303.75), XY(315.00), XY(326.25), XY(337.50), XY(348.75), Z(0.00), Z(11.25), Z(22.50), Z(33.75), Z(45.00), Z(56.25), Z(67.50), Z(78.75), Z(90.00), Z(101.25), Z(112.50), Z(123.75), Z(135.00), Z(146.25), Z(157.50), Z(168.75), Z(180.00)

Record 1 (1 line)	1, 24/07/2021, 18:09:07, P1, 60, 105.7, 83.7, 37.7, 39.9, 60.2, 78.0, 65.2, 71.3, 76.1, -, -, 60.2, 60.2, 71.0, 52.8, 45.6, 41.9, 40.5, 39.8, 39.5, 39.1, 38.7, 38.3, 0, P2, 60, 104.0, 83.7, 47.8, 51.1, 63.2, 81.0, 68.2, 73.2, 77.3, -, -, 63.2, 63.2, 73.7, 59.6, 53.4, 52.0, 51.3, 50.8, 50.4, 49.9, 49.5, 49.0, 0, P3, 60, 105.9, 94.6, 48.9, 53.0, 73.6, 91.4, 78.6, 83.9, 86.3, -, -, 73.6, 73.6, 90.0, 63.8, 57.2, 54.8, 53.6, 52.8, 52.2, 51.7, 51.1, 50.3, 0, SA, 56.8, 61.4, 49.7, 42.8, 42.8, 43.9, 45.7, 41.3, 46.8, 51.3, 49.7, 44.5, 46.6, 44.3, 49.2, 50.6, 45.7, 46.0, 47.4, 48.9, 48.4, 47.7, 48.5, 49.4, 49.7, 48.7, 47.9, 50.3, 46.5, 39.1, 30.8, 60.2, 63.2, 73.6, SM, 80.0, 83.8, 73.2, 63.0, 67.0, 63.4, 66.4, 60.9, 67.2, 76.8, 73.4, 63.0, 70.6, 66.6, 71.0, 73.5, 68.2, 69.1, 70.6, 73.4, 72.0, 72.8, 73.2, 75.7, 75.9, 75.4, 75.2, 16.2, 17.1, 18.1, 19.6, 38.8, 48.6, 50.4, SN, 40.9, 43.4, 42.0, 25.7, 33.8, 31.3, 34.8, 30.4, 41.8, 41.4, 43.0, 39.0, 35.6, 32.8, 30.6, 28.7, 31.2, 26.8, 20.5, 17.5, 14.9, 13.8, 15.7, 14.6, 14.4, 14.9, 15.1, 16.2, 17.1, 18.1, 19.6, 38.8, 48.6, 50.4, DR, 58, 0, 11.25, 3.56, 112.50, 6.33, DA, 3.17, 3.56, 3.11, 3.23, 3.04, 3.15, 2.94, 3.15, 3.22, 3.35, 3.24, 2.95, 3.44, 2.85, 3.41, 3.29, 3.13, 2.94, 2.95, 2.99, 3.07, 3.05, 3.14, 3.02, 3.03, 2.97, 3.22, 3.09, 2.99, 2.96, 2.92, 3.23, 5.47, 5.58, 5.68, 5.76, 5.74, 5.77, 5.95, 6.26, 6.27, 5.99, 6.33, 6.02, 5.88, 5.95, 5.70, 5.99, 5.58, DH, 1, 4, 1, 2, 0, 2, 1, 3, 1, 1, 4, 1, 6, 0, 6, 4, 1, 1, 1, 0, 1, 0, 4, 1, 1, 0, 4, 3, 1, 0, 0, 3, 0, 1, 0, 3, 2, 3, 2, 8, 6, 3, 10, 5, 2, 4, 0, 9, 0
Record 2 (1 line)	2, 24/07/2021, 18:10:07, P1, 60, 54.8, 43.8, 37.7, 39.6, 39.6, 57.4, 44.6, 41.3, 41.5, -, -, 39.6, 39.6, 42.8, 40.8, 40.3, 39.9, 39.6, 39.4, 39.1, 38.9, 38.5, 38.2, 0, P2, 60, 65.7, 55.7, 48.5, 52.6, 51.2, 69.0, 56.2, 53.3, 53.7, -, -, 51.2, 51.2, 54.6, 52.9, 52.2, 51.7, 51.2, 50.8, 50.4, 50.1, 49.6, 49.1, 0, P3, 60, 68.4, 61.1, 49.5, 55.3, 52.9, 70.7, 57.9, 55.9, 56.6, -, -, 52.9, 52.9, 57.8, 54.8, 53.8, 53.2, 52.7, 52.3, 51.8, 51.4, 51.0, 50.4, 0, SA, 42.3, 44.3, 43.1, 32.7, 37.2, 35.0, 39.1, 36.5, 44.5, 43.9, 42.7, 39.8, 37.3, 34.2, 32.0, 27.6, 30.1, 25.9, 21.4, 18.1, 15.2, 13.7, 14.4, 15.0, 14.3, 15.1, 15.4, 16.1, 17.3, 18.2, 19.5, 39.6, 51.2, 52.9, SM, 55.0, 53.4, 50.2, 44.1, 46.0, 43.0, 52.2, 43.7, 50.3, 53.0, 49.2, 46.1, 44.4, 42.1, 40.3, 30.7, 33.0, 28.8, 23.7, 20.7, 17.2, 16.6, 16.3, 20.7, 19.4, 16.0, 16.6, 17.0, 19.2, 18.9, 21.0, 44.2, 56.0, 61.5, SN, 15.5, 24.3, 23.8, 14.2, 21.9, 19.5, 19.3, 25.9, 34.2, 34.4, 33.6, 31.7, 30.0, 29.0, 26.3, 24.0, 26.8, 22.9, 18.5, 15.7, 12.5, 11.6, 12.5, 13.3, 12.9, 13.9, 14.4, 15.3, 16.6, 17.6, 18.8, 37.2, 47.9, 48.7, DR, 59, 0, 303.75, 3.31, 90.00, 6.36, DA, 2.96, 3.04, 3.03, 3.20, 3.15, 3.08, 3.08, 3.22, 3.25, 3.21, 3.13, 2.91, 3.09, 3.06, 3.11, 3.30, 3.15, 3.13, 3.27, 3.13, 2.94, 2.96, 3.02, 3.08, 3.25, 3.30, 3.27, 3.31, 2.96, 3.12, 2.95, 3.15, 5.50, 5.50, 5.65, 5.73, 5.75, 5.74, 6.05, 6.14, 6.36, 6.02, 5.99, 6.12, 5.89, 5.76, 5.83, 6.12, 5.73, DH, 1, 2, 0, 3, 1, 0, 0, 3, 3, 1, 5, 1, 0, 2, 3, 2, 1, 1, 6, 3, 0, 0, 0, 2, 4, 3, 3, 4, 1, 2, 1, 1, 1, 1, 2, 3, 2, 1, 5, 5, 10, 2, 6, 8, 3, 1, 2, 4, 3
…	…

B.4 STRUCTURE OF THE SVT FILE

File header - cf. Tab. B.1.1.

Unit and software specification - cf. Tab. B.1.2.

SETUP DATA - cf. Tab. B.1.20

File-end-marker - cf. Tab. B.1.23.

B.5 STRUCTURE OF THE SVA FILE

Format

The XML configuration file has the form:

```
<?xml version="1.0" encoding="us-ascii"?>
```

```
<alarm unit="977/200/200A" version="8">
  <conditions>
  ...
  </conditions>
  <events>
  ...
  </events>
  <addresses>
  ...
  </addresses>
</alarm>
```

- **unit** – instrument type
- **version** – specification version

<conditions>

The **<conditions>** is the set of <**condition**> items

```
<conditions>
      <condition id="1" name="Condition1">
      ...
      </condition>
      <condition id="2" name="Condition2">
      ...
      </condition>
      ...
      <condition id="N" name="ConditionN">
      ...
      </condition>
</conditions>
```

<condition> has the attributes **id** (value of type int) and **name** (string of max 10 characters)

<**condition**> consists of <**condition_start**> and <**condition_stop**> item. The **<condition_stop>** item is optional.

```
<condition id="N" name="ConditionN">
      <condition_start>
      ...
      </condition_start>
     <condition_stop>
     ...
     </condition_stop>
</condition>
```

The **<condition_start>** and **<condition_stop>** items consist of:

- **condition_type** – condition type (<condition_type type="enum">"THRESHOLD/TIME/SYSTEM/SPECTRUM/METEO</condition_type>)

Available types of conditions: THRESHOLD/TIME/SYSTEM/SPECTRUM/METEO

The optional **<condition_stop>** item must be of the same type as **<condition_start>**. Depending on the condition type, the **<condition_start>** and **<condition_stop>** items contain additional items.

THRESHOLD type condition

- **source** – trigger source, e.g.

<source type="enum">PEAK/MAX/MIN/LEQ/SPL/SEL/LDEN/LTM3/LTM5/L<i>/P-P/RMS/LR1/LR2/LE1/LE2</source>, gdzie <i> - is a statistics index: “1”, “2” do “10”;

Available results: PEAK/MAX/MIN/LEQ/SPL/SEL/LDEN/LTM3/LTM5/LR1/LR2/LE1/LE2/L<i>.

- **profile** – profile number for which the result specified by source is to be the source of the trigger
- **integration** - result integration time (e.g. <integration type="enum">1S/INT_TIME/LOGGER_STEP</integration>)
- **threshold** – trigger threshold (e.g. <threshold type="dB">75.00</threshold>)
- **min_duration** – optional, minimum threshold crossing time (e.g. <min_duration type="time">00:00:10</min_duration>)
- **operation** – determines whether the threshold is to be exceeded from above or below: +,- (e.g. <operation>+</operation>

TIME type condition

- **time** – trigger time range
- **weekday** – days of activity (e.g., <weekday type="weekday">"SU,MO,TU,WE,TH,FR,SA"</weekday>)

<time> contains items:

- **start** (time in format hh:mm:ss)
- **stop** (time in format hh:mm:ss)

SYSTEM type condition

- **source** - (description below)
- **thresholds** - (description below)
- **min_duration** – optional, minimum condition duration (e.g., <min_duration type="time">00:00:10</min_duration>)

<source> contains items:

- **trigger** – trigger source (e.g., <trigger type="enum">LOW_BAT</source>)

The values that **trigger** takes:

POWER_ON/POWER_OFF/START/STOP/EXT_POW_ON/EXT_POW_OFF/LOW_BAT/LOW_MEM/SYS_CHECK_FAIL/MODEM_ON/MODEM_OFF/AUTO_CAL_RESULT/FTP_PUSH_FAIL/FTP_PULL_FAIL/CAL_TOO_OLD/EXTIO_TRIG/SYS_CHECK_OK/BAT_OK/MEM_OK/METEO_ON/METEO_OFF/DEVICE_TILT/DEVICE_VERTICAL/LOCATION/INSTR_ERROR

<thresholds> contains items:

- **low_bat** – low battery threshold (1-12), [h] (e.g. <low_bat type="int">3</low_bat>)
- **low_mem** – memory occupancy threshold on the SD card (5,10,15,20,30,40,50), [%] (e.g. <low_mem type="int">10</low_mem>)

SPECTRUM type condition

- **source** – spectrum (e.g., <source type="enum">1_3_OCTAVE</source>). Source takes values: OCTAVE/1_3_OCTAVE.
- **spectrum_type** – type of spectrum (e.g., <spectrum_type type="enum">AVERAGED </spectrum_type>). Spectrum type takes values: AVERAGED/INSTANT/MAX/MIN

- **thresholds** (description below)
- **min_duration** – optional, minimum threshold crossing time (e.g., <min_duration type="time">00:00:10</min_duration>)
- **operation** – determines whether the threshold is to be exceeded from above or below: +,- (e.g., <operation>+</operation>

<thresholds> contains items:

- **spectrum_threshold** – has the attributes **freq** (value of double type) and **type** (e.g., <spectrum_threshold freq=”1000.00” type="dB">70.00</spectrum_threshold>)
- **total_threshold** – has the attributes **filt** (value of text type) and **type** (e.g., <total_threshold filt=”A” type="dB">70.00</total_threshold>)

***Note:** The **freq** attributes must match the selected spectrum (OCTAVE/1_3_OCTAVE). The **filt** attributes take values: „A”, „C” lub „Z”.*

METEO type condition

- **source** – trigger source (e.g., <source type="enum"> WIND_MAX/WIND_AVER/RAIN</source>)
- **integration** - (e.g., <integration type="enum">1S/INT_TIME/LOGGER_STEP</integration>)
- **threshold** – trigger threshold for wind (e.g., <threshold type="m/s">1.0</threshold>)
- **direction** – wind direction (e.g., <direction type="degree">185</direction>)
- **sector** – wind sector (e.g., <sector type="degree">10</sector>)
- **min_duration** – optional, minimum threshold crossing time (e.g., <min_duration type="time">00:00:20</min_duration>)
- **operation** – determines whether the threshold is to be exceeded from above or below: +,- (e.g., <operation>+</operation>

<events>

<**events**> is the set of <**event**> items

```
<events>
      <event id="1" name="Event1">
      ...
      </event>
      <event id="2" name="Event2">
      ...
      </event>
      ...
      <event id="N" name="EventN">
      ...
      </event>

</events>
```

<event> has the attributes **id** (value of type int) and **name** (string of max 16 characters).

<**event**> contains items:

- **active** (e.g., <active>TRUE</active>)
- **trigger_condition** – logical operation on conditions being the sum of products, max 25 characters string (e.g. <trigger_condition type="enum">(1AND2)OR(3AND4)</trigger_condition> where

(1AND2)OR(3AND4) means a logical operation of conditions with identifiers 1,2,3,4)

- **action** – action on triggering

<action>

The **<action>** item may include actions of type:

- marker
- audio
- i_o
- sms
- email

<marker> action

- **active** (e.g., <active>TRUE</active>)
- **marker_point** (e.g., <marker_point>FALSE</marker_point>)

<audio> action

- **active** (e.g., <active>TRUE</active>)
- **max_duration** – optional, maximum duration of the action (time in format hh:mm:ss)
- **min_break** – optional, minimum interval between successive actions (time in format hh:mm:ss)
- **pre_trigger** – optional (time in format hh:mm:ss)
- **post_trigger** – optional (time in format hh:mm:ss)

<io> action

- **active** (e.g., <active>TRUE</active>)
- **max_duration** – optional, maximum duration of the action (time in format hh:mm:ss)
- **min_break** – optional, minimum interval between successive actions (time in format hh:mm:ss)

<sms> action

- **active** (e.g., <active>TRUE</active>)
- **min_break** – optional, minimum interval between successive actions (time in format hh:mm:ss)
- **number_ids** (description below)
- **message** (e.g., <message type="text">text</message>)
- **action_trigger** (<action_trigger type="enum">START/STOP/DELAY/CONTINUOUS</action_trigger>
- **action_delay** – optional time from the start of the event, after which the action is to take place, applies to the case when action_trigger is set to DELAY (time in the format hh:mm:ss)

Note: *The "message" item is not presented in SV 200/200A! Entering this parameter will NOT be treated as an error.*

<number_ids> contains items:

- **number_id** – item id <number> (e.g., <number_id type="int">1</number_id>)

<email> action

- **active** (e.g., <active>TRUE</active>)
- **min_break** – optional, minimum interval between successive actions (time in format hh:mm:ss)
- **recipient_ids** (description below)
- **subject** (e.g., <subject type="text">Temat</subject>)
- **message** (e.g., <message type="text">text</message>)
- **action_trigger** (<action_trigger type="enum">START/STOP/DELAY/CONTINUOUS</action_trigger>
- **action_delay** – optional time from the start of the event, after which the action is to take place, applies to the case when action_trigger is set to DELAY (time in the format hh:mm:ss)

Note: *The „subject" and "message" items are not presented in SV 200/200A! Entering these parameters will NOT be treated as an error.*

The **<recipient_ids>** item contains items:

- **recipient _id** – item id <**recipient**> (e.g., <recipient _id type="int">2</recipient _id>)

<addresses>

<addresses> is a set of items <**email_address**>, <**phone_nr**>, <**url_address**>

```
<addresses>
      <emails>
      ...
      </emails>

      <phones>
      ...
      </phones>

      <urls>
      ...
      </urls>
</addresses>
```

<emails> contains items:

- **recipient** - has the attributes **id** (value of type int) and **type** (e.g., <recipient id="1" name="recipient" type="text">email@smtp.pl</recipient>)

<phones> contains items:

- **number** - has the attributes **id** (value of type int) and **type** (e.g., <number id="3" name="number" type="text">+48123456789</number>)

Data types

Each basic element stores the value of one of the following types:

- function
- enum

- bool
- int
- dB
- dB10
- dB100
- time (time in the format hh:mm:ss)
- min (minutes)
- day of week
- text

Parameters depending on the instrument type

Parameter	Description	SVAN 977	SV 200A	SV 200
N_ALARM_CONDITIONS	number of conditions	10	10	5
N_ALARM_EVENTS	Number of events	10	10	5
N_ALARM_EMAILS	number of e-mail addresses (number of characters per address)	5(48)	5(48)	5(48)
N_ALARM_PHONES	Number of telephone numbers (number of characters per number)	5(15)	5(15)	5(15)
N_CONDITION_NAME	maximum length of the condition name field	15	15	not used
N_EVENT_NAME	maximum length of the event name field	16	16	16

B.6 STRUCTURE OF THE TXT FILE

C.TXT files are calibration and system check history files. These files contain records of every calibration or system check performed on the instrument.

Note: *Do not delete these files since they might be useful in case of support.*

C.TXT files are text files which can be opened by any text editor. The format of these files is described as follows.

Every C.TXT file starts with a header separated by lines containing stars “*”, for example:

*// ***

// Calibration and system check history file

// File version, 1.21

// Created, 01/01/2020, 01:49:11

// Unit, 200A, SN, 3500

// Date, Time, Calibration Type, Calibration Result, Calibration Applied, Calibration Factor, Calibration Level, pre Background Level, post Background Level

*// **

"//" at the beginning of each line identifies a header line. Each parameter is comma separated from values and other parameters like "*Created, 01/01/2020, 01:49:11"* which makes it easy to import into Excel or other spreadsheet program.

After the header C.TXT file contains calibration and system check records; one record per one line of the file. The line of the header starting with "// Date, Time…" identifies calibration and system check records contents, for example:

"01/01/2020, 06:01:22, Factory , OK, YES, 0.81, 114.00, -, -"

A Factory calibration of +0.81dB was recovered by Clear Setup feature at 6:01 January 1, 2020.

"26/01/2020, 18:41:22, Manual , OK, YES, 0.20, -, -, -"

The instrument was calibrated "manually" using instrument's menu at 18:41 January 26, 2020. Calibration result was in tolerance "OK" and calibration factor of +0.20dB was applied "YES".

"27/01/2020, 23:02:34, System Check, OK, NO, -0.18, 94.18, 54.1, 62.9"

A System Check was performed at 23:02 January 27, 2020. System Check result of -0.18dB was in tolerance and background noise was at least 20dB below System Check level "OK". System Check result was not applied as calibration factor "NO". System Check measured level was 94.18dB. During this System Check pre and post background noise (1s LeqC value) was accordingly 54.1dB and 62.9dB.

Possible Calibration Types for SV 200A are:

"Automatic" – using acoustical calibrator and auto-calibration feature

"Remote" – by means of remote commend #1,Q, see appendix A

"Factory" – using Clear Setup feature

"System Check" – System Check record

"Manual" – using acoustical calibrator and instrument's calibration menu

B.7 STRUCTURE OF THE LOG FILE

S.LOG files are system log files which contain different information about SV200A behaviour. This information is intended to be used by a programmer in case of debugging or support and normally is not useful for an end user.

1GB of disk space is reserved for log files by default. It means that older files above 1GB space are deleted automatically. It is possible to change this limit and some other settings of S.LOG files using Setup Editor of SvanPC++, but leaving defaults is recommended.

Note: *Do not delete these files since they might be useful in case of support.*

S.LOG files are text files which can be opened by any text editor. The format of these files is more or less readable by a human, but to keep file size as small as possible a lot of abbreviations were introduced. Since the format of S.LOG files is continuously updated only several basic rules are explained in this manual.

Every S.LOG file starts with a header separated by lines containing stars "*", for example:

```
**********************************************************************
System log v1.01
Created: 2020.12.28 18:17:01
System log mask: 3FF7
System log split: 10MB
System log limit: 1024MB
Unit: BETA 200A, SN 3503
Firmware v1.05.076 (7.12.2020)
Firmware CRC: FE63(OK)
COP CRC: 74AD(OK)
File system v1.05
Bootstrap v2.06
Hardboot v2.02
PIC v1.06
SD card: 15185MB
-----------------------------------
All radio modules are off
-----------------------------------
Battery info
Manufacture: "Svantek Sp. z o.o."
Manuf. date: 01.01.2020
SN: 00001
Chemistry: "LION" (2012)
Design: 10800V, 6700mAh
FullChargeCap: 6320mAh
RelStateOfCharge: 100%
MaxError: 1%
PermanentFail: 0000, 0000
-----------------------------------
SD card last state: OK!
-----------------------------------
System start state
SysState: 0x2105,0x80
PicReset: 0
WdtReset: 0
```

****

After the header S.LOG file includes different events like communication, remote commands, advanced alarms, system etc. The main rule for the events is one event per one line of the S.LOG file. For example:

31 09:32:51 M > at+csq

31 09:32:51 M < +CSQ: 6,2

31 09:32:51 M < OK

where:

“31” is a day of a month

“09:32:51” is a time

“M” – is event identifier (M for the (3G/4G) modem)

“>” is direction identifier (command sent to the modem)

Possible direction identifiers:

“>” – a command sent to the module

“<” – a response received from the module

“–“ – unspecified direction

Possible event identifiers are:

“–“ – a system event

“E” – an email event

“S” – an SMS event

“RC” – a remote command event

“A” – an advanced alarms event

“M” – a 3G/4G modem event

“W” – a WLAN module event

“L” – a LAN module event

“B” – a Bluetooth module event

“U” – an USB event

“R” – a Serial Interface event

B.8 DATE AND TIME

Following function written in C explain how the date and time are coded:

```
void ExtractDateTime(int date, unsigned int time, int dt[])
{
      dt[0] = time % 30;                  /* sec */
      dt[1] = (time/30) % 60;             /* min */
      dt[2] = time/1800;                  /* hour */

      dt[3] = date & 0x001F;              /* day */
      dt[4] = (date>>5) & 0x000F;         /* month */
      dt[5] = (date>>9) & 0x007F + 2000;  /* year */
}
```

Appendix C. TECHNICAL SPECIFICATIONS

C.1 SPECIFICATION OF SV 200A IN THE STANDARD CONFIGURATION

Statement of performance

SV 200A working as the sound level meter (SLM) with all listed below accessories meets requirements of IEC 61672:2013 for the Class 1 Group X instruments.

Configuration of the complete SLM

SV 200A	sound analyser with built-in microphone preamplifier, MK 255S, prepolarised free-field microphone (1/2", nominal sensitivity 50 mV/Pa) and SA 209 windscreen with the antibird spike
Recommended calibrator:	
SV 36	Class 1 sound calibrator: 94/114 dB@1000 Hz or equivalent (not included in the standard set)

Accessories included in SV 200A instrument set

SB 274	power supply unit (IP66)
SC 256A	USB cable
Antennas	mobile, WLAN

Accessories available:

SB 270	solar panel
SP 200	adapter for the LAN network
SA 206	Manfrotto telescopic mast

External complementary units

SP 275	weather station based on Vaisala WXT53x module
SP 276	weather station based on GILL module

Measured quantities

The measured quantities in the sound meter mode: **SPL**, **Leq**, **SEL**, **Lden**, **Ltm3**, **Ltm5**, **Lpeak**, **Lmax**, **Lmin, Ln**.

The definitions for measured quantities are given in Appendix D.

Additional features

- Overload indication
- Under-range indication
- Battery state indication
- GPS positioning and time synchronization
- Temperature, pressure and humidity sensors
- Noise sources direction determination
- Electrostatic actuator for system check
- Bluetooth module
- mobile modem (2G/3G/4G)
- WLAN/LAN module

Normal operating mode

SV 200A complete instrument including the MK 255S microphone and the SA 209 windscreen with the antibird spike and with following settings: **Microphone** compensation - **On**, **Outdoor** compensation – **Environment** or **Airport** (path: *<Menu> / Measurement / Comp. Filter* – see Chapter 5.1.2).

Conformance testing

This chapter contains the information needed to conduct conformance testing according to the specified standards.

Mounting for acoustical tests	The microphone must be mounted on the preamplifier.
Electrical substitute for the microphone	To obtain a BNC type electrical input, the microphone must be replaced by the electrical microphone impedance ST 02 with the serial capacitance 18 pF +/- 10%.

Note: *For the electrical conformance tests, the* ***Microphone*** *compensation must be set to* ***Off*** *(path: <Menu> / Measurement / Comp. Filter).*

Note: *For the comparison coupler evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Outdoor*** *compensation must be set to* ***Off*** *(path: <Menu> / Measurement / Comp. Filter).*

Note: *For the free filed evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Outdoor*** *compensation must be set to* ***Environment*** *or* ***Airport*** *(path: <Menu> / Measurement / Comp. Filter).*

Periodical test upper frequency	8 kHz

Linear operating range

Table C.1.1. Linear operating ranges for 0 deg incidence angle (**Airport** filter), for the sinusoidal signal and microphone sensitivity 50 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	25	90	25	113	25	127	30	130	25	90	25	113	25	127	28	93	50	130
500 Hz	25	126	25	129	25	130	30	130	25	126	25	129	25	130	28	129	50	133
1 kHz	25	130	25	130	25	130	30	130	25	130	25	130	25	130	28	133	50	133
4 kHz	25	131	25	129	25	129	30	130	25	131	25	129	25	129	28	134	50	133
8 kHz	25	129	25	127	25	127	30	130	25	129	25	127	25	127	28	132	50	130
12.5 kHz	25	125	25	124	25	124	30	130	25	125	25	124	25	124	28	128	50	127

Table C.1.2. Linear operating ranges for 90 deg incidence angle (Environmental filter), for the sinusoidal signal and microphone sensitivity 50 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	25	90	25	113	25	127	30	130	25	90	25	113	25	127	28	93	50	130
500 Hz	25	126	25	129	25	130	30	130	25	126	25	129	25	130	28	129	50	133
1 kHz	25	130	25	130	25	130	30	130	25	130	25	130	25	130	28	133	50	133
4 kHz	25	131	25	129	25	129	30	130	25	131	25	129	25	129	28	134	50	133
8 kHz	25	129	25	127	25	127	30	130	25	129	25	127	25	127	28	132	50	130
12.5 kHz	25	125	25	124	25	124	30	130	25	125	25	124	25	124	28	128	50	127

Note: *For the signals with the crest factor **n >1.41** upper measuring range of the RMS (**LEQ** and **SPL**) is reduced. The valid upper limit can be calculated according to the below given formula:* $A_n = 130 - 20\log(n/\sqrt{2})$, *where **A** is the upper limit for the sinusoidal signal.*

*Example: For the crest factor **n = 10** the upper limit is* A_{10} *= **113 dB**.*

Starting point at which tests of level linearity shall begin 114.0 dB (74.0 dB @ 31.5 Hz)

Measuring frequency range of the acoustic pressure (-3 dB) 3.5 Hz ÷ 20 000 Hz.

Basic measurement error of the acoustic pressure < 0.7 dB (measured for the reference conditions, see below).

Weighting filters (see C.3)

- **Z** meeting requirements of IEC 61672-1:2013 for the Class 1 “**Z**“ filter
- **A** meeting requirements of IEC 61672-1:2013 for the Class 1 “**A**” filter
- **C** meeting requirements of IEC 61672-1:2013 for the Class 1 “**C**” filter
- **B** meeting requirements of IEC 60651 for the Class 1 “**B**” filter

Table C.1.3. Self-generated noise for different weighting filters

	Electrical *)			**Acoustical compensated**		
Weighting filter	**A**	**C**	**Z**	**A**	**C**	**Z**
Noise	< 13 dB	< 14 dB	< 15 dB	< 15 dB	< 15 dB	< 20 dB

*) measured with the **ST 02** microphone equivalent impedance **18 pF +/-10%**

Special filters

Frequency response of SV 200A is compensated by means of two digital filters:

- **Environment** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 90 deg
- **Airport** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 0 deg

RMS detector

- Digital “True RMS“ with Peak detection,
- Resolution 0.1 dB
- Range 327.7 dB
- Crest Factor unlimited (for signals in 20 kHz band).

Overload detector

The instrument has the built-in overload detectors. Both A/D converter and input amplifier overload conditions are detected. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The “overload” indication appears when the input signal amplitude is 0.5 dB above the declared “Peak measurement range”.

Underrange detector

The instrument has the built-in under-range detector. The “underrange” indication appears when the RMS value for the elapsed time is below the lower linear operating range.

Time weighting characteristics (Exponential averaging)

Slow “**S**“ according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 1000 ms
Fast “**F**” according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 125 ms
Impulse “**I**” according to IEC 60804:2000 Class 1, Equivalent Time Constant 35 ms, Hold Time 1500 s

Reference conditions as per IEC 61672-1:2013

• Class of the acoustic field	Free field
• Reference acoustic pressure	114.0 dB (related to 20 μPa)
• Reference frequency	1000 Hz
• Reference temperature	+23°C
• Reference relative humidity	50 %
• Reference static pressure	1013.25 hPa
• Reference incidence direction	perpendicular to the microphone diaphragm.

Maximum peak voltage	30 V Peak-Peak (Maximum peak voltage of input sinusoidal signal, which can be lead to the SLM without destruction the meter)
Auto-start time	1 min. (for 0.1 dB accuracy)
Typical stabilization time after change in environmental conditions	1 minute
Time shift after completion of a measurement, before a measurement is shown	< 1 sec

Note: *When the instruments are moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the instruments. In this case, much longer stabilization periods may be necessary.*

Environmental, electrostatic and radio frequency criteria

Effect of humidity	< 0.5 dB (for 30%<RH<90% at 40°C and 1000 Hz)
Effect of magnetic field	< 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz)
Effect of radio frequency fields	< +/-0.5 dB @ 74 dB and 10V/m electromagnetic field

The greatest susceptibility (the least immunity) is achieved when the SLM is placed parallel to the radio frequency field and **Z** filter and time weighting **F** are selected and the SPL measurements are considered.

Effect of electrostatic discharge	meets requirements of IEC 61672-1:2013

During electrostatic discharge, the influence of the displayed results could be observed.

No changes in instrument operation state, configuration or stored data corruption were found out.

Effect of ambient pressure	< 0.01 dB/kPa
Effect of temperature	< 0.5 dB (from -10°C to + 50°C)
Operating temperature range	from -30°C to + 60°C
Storage temperature range	from -40°C to + 60°C
Humidity	99% RH in 40°C (not-condensed)
Battery state indication	0-100% of the battery state of charge
Ingres Protection	IP54 - significant protection from dust, protection from rain, spraying and splashing

Calibration

Acoustical - with the SV 36 sound calibrator (or equivalent):

• Calibration level for the pressure field	114.0 dB (equal to the calibrator pressure level - see calibration chart of the used calibrator)
• Calibration level for the free field and 0 deg incidence angle	114.0 dB (equal to the calibration level for the pressure field minus free field correction of MK 255S at 1000 Hz – see Table C.1.3)

***Note:** The above levels correspond to 114 dB of calibrator's sound pressure. If the calibrator has a different sound pressure than 114 dB, the calibration levels must be accordingly adjusted.*

Microphone

MK 255S	prepolarised free-field ½" condenser microphone
Nominal sensitivity	50 mV/Pa (corresponding to -26 dBV/Pa re 1 V/Pa)
Capacitance	17 pF.
Reference point	geometric center of the microphone diaphragm.

***Note:** Maximum sound pressure level that can affect the microphone without destroying its membrane is 146 dB.*

MK 255S typical Free Field frequency response

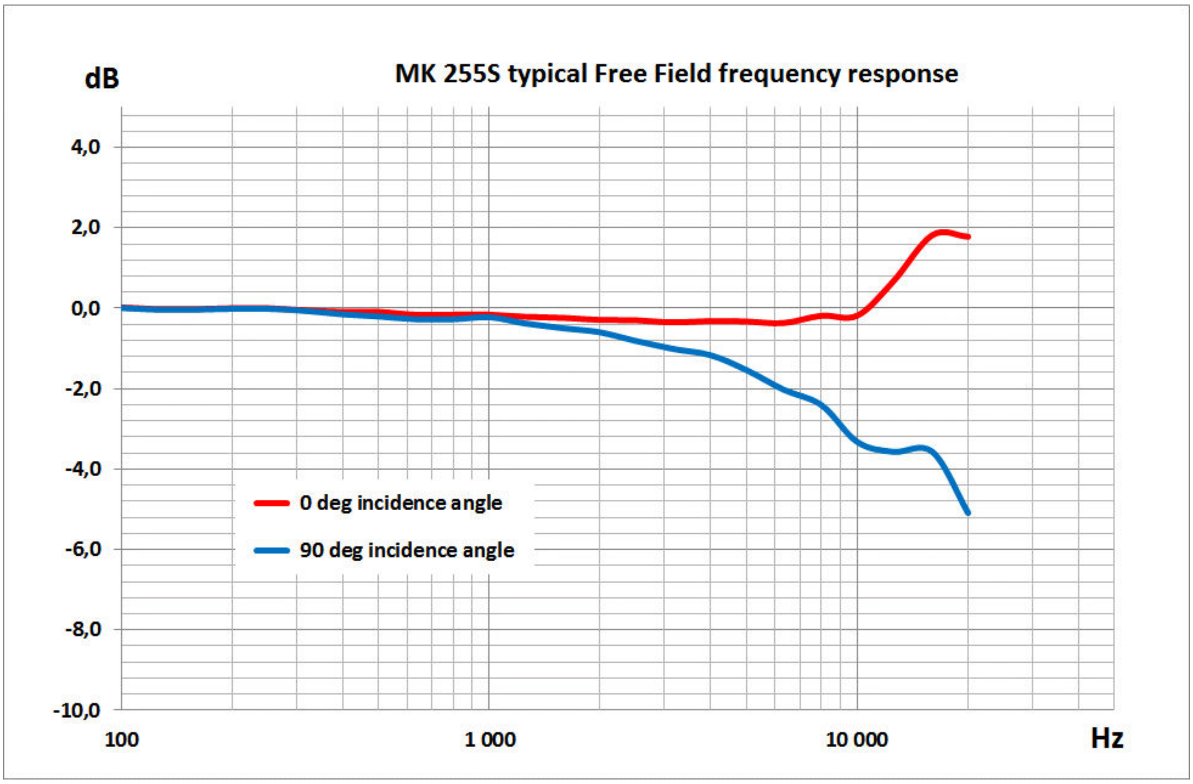
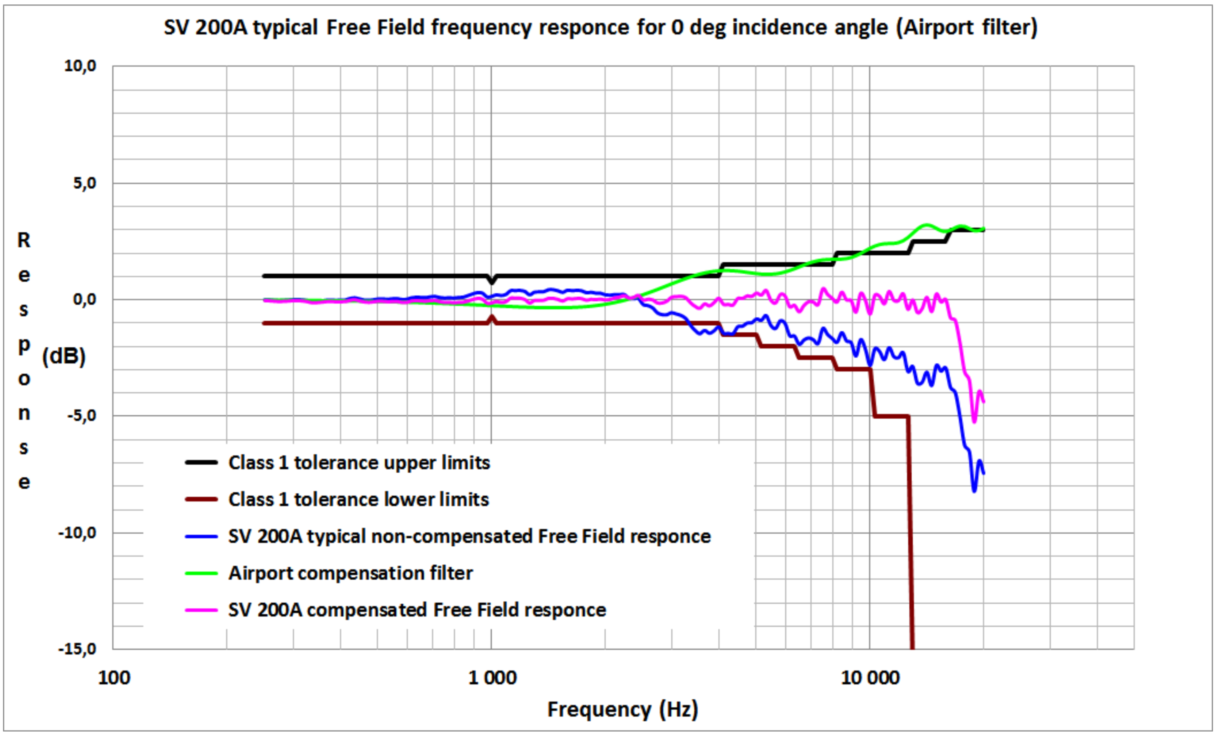


Table C.1.4. MK 255S typical Free Field frequency response and corrections for 0 deg and 90 deg incidence angle

Frequency	MK 255S Free Field response		MK 255S Free Field corrections		Uncertainty (IEC 62585)
	0 deg incidence angle	90 deg incidence angle	0 deg incidence angle	90 deg incidence angle	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]
20	-0.50	-0.50	0.00	0.00	--
25	-0.34	-0.34	0.00	0.00	--
32	-0.20	-0.20	0.00	0.00	--
40	-0.12	-0.12	0.00	0.00	--
50	-0.10	-0.10	0.00	0.00	--
63	-0.02	-0.02	0.00	0.00	0.25
80	0.02	0.02	0.00	0.00	0.25
100	0.02	0.02	0.00	0.00	0.25
125	-0.02	-0.02	0.00	0.00	0.25
160	-0.02	-0.02	0.00	0.00	0.25
200	0.00	0.00	0.00	0.00	0.25
250	0.00	0.00	0.00	0.00	0.25
315	-0.05	-0.05	-0.05	-0.05	0.25
400	-0.09	-0.14	-0.07	-0.12	0.25
500	-0.09	-0.19	-0.07	-0.17	0.25
630	-0.16	-0.26	-0.06	-0.16	0.25
800	-0.16	-0.26	-0.04	-0.14	0.25
1 000	-0.16	-0.21	-0.04	-0.09	0.25
1 250	-0.21	-0.36	-0.03	-0.18	0.25
1 600	-0.24	-0.49	0.02	-0.23	0.25
2 000	-0.29	-0.59	0.13	-0.17	0.25
2 500	-0.30	-0.80	0.30	-0.20	0.25
3 150	-0.35	-1.00	0.55	-0.10	0.25
4 000	-0.32	-1.16	1.00	0.16	0.25
5 000	-0.33	-1.53	1.55	0.35	0.35
6 300	-0.37	-2.02	2.21	0.56	0.35
8 000	-0.19	-2.41	3.35	1.12	0.35
10 000	-0.18	-3.33	4.83	1.68	0.35
12 500	0.66	-3.58	6.94	2.71	0.50
16 000	1.82	-3.58	9.16	3.76	0.50
20 000	1.78	-5.11	11.59	4.71	0.50

SV 200A Free Field frequency response



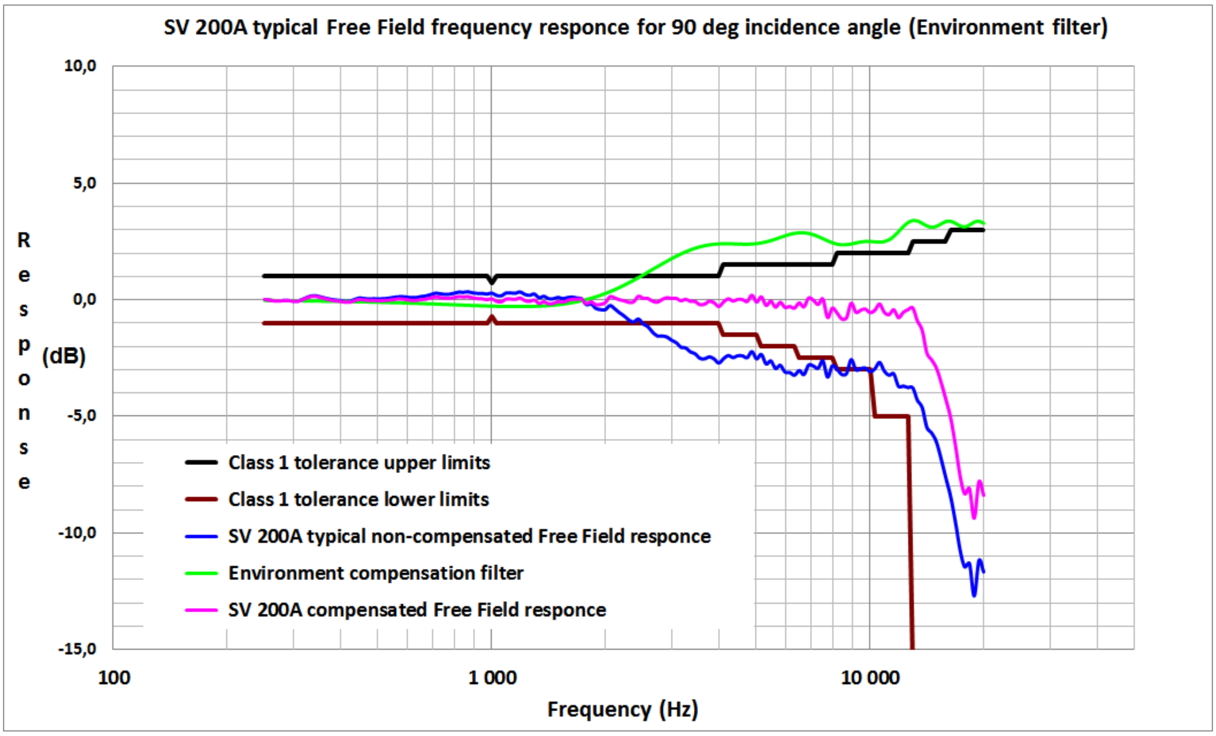


Table C.1.5. SV 200A typical Free Field frequency response [dB]

f [Hz]	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environment'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
251	0.01	-0.02	-0.01	0.03	-0.03	0.00
259	0.00	-0.02	-0.03	0.00	-0.03	-0.03
266	-0.02	-0.03	-0.04	-0.03	-0.03	-0.06
274	-0.03	-0.03	-0.05	-0.03	-0.03	-0.07
282	-0.02	-0.03	-0.05	-0.02	-0.04	-0.05
290	0.00	-0.03	-0.03	-0.02	-0.04	-0.06
299	0.02	-0.03	-0.02	-0.04	-0.04	-0.08
307	0.02	-0.03	-0.02	-0.04	-0.04	-0.08
316	0.01	-0.04	-0.03	0.03	-0.04	-0.01
325	-0.03	-0.04	-0.06	0.12	-0.05	0.07
335	-0.06	-0.04	-0.10	0.18	-0.05	0.13
345	-0.06	-0.04	-0.10	0.18	-0.05	0.12
355	-0.04	-0.04	-0.08	0.13	-0.05	0.07
365	-0.01	-0.05	-0.06	0.07	-0.06	0.01
376	0.00	-0.05	-0.05	0.03	-0.06	-0.03
387	-0.01	-0.05	-0.07	0.00	-0.06	-0.07
398	-0.01	-0.06	-0.07	-0.02	-0.07	-0.08
410	0.00	-0.06	-0.06	-0.05	-0.07	-0.12
422	0.06	-0.06	0.00	-0.04	-0.08	-0.12
434	0.09	-0.07	0.03	0.03	-0.08	-0.05
447	0.04	-0.07	-0.03	0.08	-0.08	0.00
460	0.00	-0.07	-0.07	0.07	-0.09	-0.02
473	-0.01	-0.08	-0.09	0.04	-0.09	-0.05
487	0.01	-0.08	-0.07	0.06	-0.10	-0.04
501	0.04	-0.09	-0.04	0.05	-0.10	-0.06
516	0.04	-0.09	-0.05	0.06	-0.11	-0.05
531	0.03	-0.10	-0.07	0.07	-0.11	-0.04
546	0.05	-0.10	-0.05	0.11	-0.12	-0.01
562	0.05	-0.11	-0.05	0.14	-0.12	0.01
579	0.02	-0.11	-0.09	0.14	-0.13	0.01
596	0.03	-0.12	-0.09	0.13	-0.14	-0.01
613	0.09	-0.12	-0.04	0.10	-0.14	-0.04
631	0.12	-0.13	-0.01	0.11	-0.15	-0.04
649	0.10	-0.14	-0.03	0.15	-0.16	-0.01
668	0.10	-0.14	-0.04	0.17	-0.16	0.01
688	0.13	-0.15	-0.02	0.23	-0.17	0.06
708	0.15	-0.16	-0.01	0.29	-0.18	0.11
729	0.10	-0.17	-0.06	0.27	-0.19	0.09

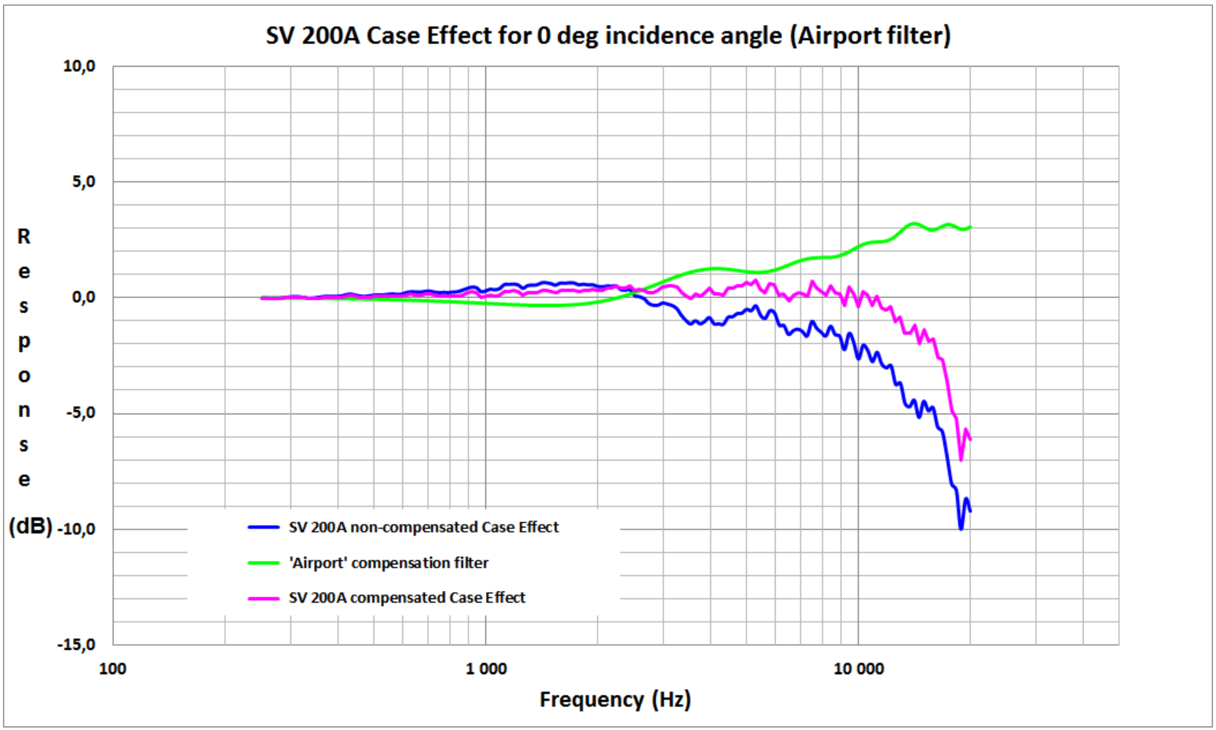
f [Hz]	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environment'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
750	0.08	-0.17	-0.09	0.24	-0.20	0.05
772	0.09	-0.18	-0.09	0.25	-0.20	0.05
794	0.08	-0.19	-0.11	0.29	-0.21	0.08
818	0.10	-0.20	-0.09	0.34	-0.22	0.12
841	0.12	-0.21	-0.09	0.33	-0.23	0.11
866	0.19	-0.22	-0.03	0.35	-0.24	0.12
891	0.26	-0.23	0.04	0.31	-0.24	0.06
917	0.31	-0.24	0.08	0.28	-0.25	0.03
944	0.29	-0.24	0.05	0.28	-0.26	0.03
972	0.13	-0.25	-0.13	0.26	-0.26	-0.01
1 000	0.15	-0.26	-0.11	0.30	-0.27	0.03
1 029	0.22	-0.27	-0.05	0.20	-0.28	-0.08
1 059	0.19	-0.28	-0.09	0.18	-0.28	-0.10
1 090	0.24	-0.29	-0.06	0.30	-0.29	0.02
1 122	0.40	-0.30	0.10	0.31	-0.29	0.02
1 155	0.40	-0.31	0.09	0.29	-0.29	0.00
1 189	0.41	-0.32	0.09	0.35	-0.29	0.06
1 223	0.36	-0.33	0.03	0.24	-0.29	-0.05
1 259	0.22	-0.34	-0.12	0.20	-0.29	-0.08
1 296	0.33	-0.34	-0.01	0.26	-0.28	-0.02
1 334	0.34	-0.35	0.00	0.10	-0.27	-0.17
1 372	0.35	-0.35	0.00	0.16	-0.26	-0.10
1 413	0.44	-0.36	0.08	0.06	-0.25	-0.19
1 454	0.44	-0.36	0.08	0.06	-0.23	-0.17
1 496	0.39	-0.36	0.04	0.11	-0.21	-0.10
1 540	0.33	-0.35	-0.03	0.06	-0.18	-0.12
1 585	0.41	-0.35	0.06	0.11	-0.15	-0.05
1 631	0.40	-0.34	0.06	0.13	-0.12	0.01
1 679	0.41	-0.33	0.08	0.08	-0.08	0.00
1 728	0.39	-0.32	0.07	0.05	-0.04	0.01
1 778	0.31	-0.31	0.00	-0.20	0.01	-0.18
1 830	0.33	-0.29	0.04	-0.17	0.07	-0.10
1 884	0.29	-0.26	0.03	-0.36	0.13	-0.23
1 939	0.29	-0.24	0.05	-0.41	0.20	-0.21
1 995	0.22	-0.21	0.01	-0.41	0.27	-0.14
2 054	0.20	-0.17	0.03	-0.23	0.35	0.12
2 113	0.23	-0.13	0.10	-0.38	0.44	0.06
2 175	0.22	-0.08	0.14	-0.55	0.53	-0.01
2 239	0.23	-0.03	0.20	-0.68	0.63	-0.05
2 304	0.07	0.02	0.09	-0.86	0.73	-0.12

f [Hz]	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environment'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
2 371	0.05	0.08	0.12	-0.94	0.84	-0.10
2 441	0.07	0.14	0.21	-0.81	0.95	0.14
2 512	-0.20	0.21	0.01	-1.02	1.07	0.04
2 585	-0.24	0.28	0.04	-1.14	1.19	0.04
2 661	-0.34	0.36	0.02	-1.38	1.30	-0.07
2 738	-0.55	0.44	-0.12	-1.54	1.42	-0.12
2 818	-0.63	0.52	-0.12	-1.54	1.54	0.00
2 901	-0.64	0.60	-0.04	-1.58	1.65	0.07
2 985	-0.55	0.68	0.13	-1.72	1.76	0.04
3 073	-0.60	0.76	0.15	-1.83	1.87	0.04
3 162	-0.67	0.83	0.17	-2.02	1.97	-0.05
3 255	-0.80	0.91	0.11	-2.06	2.06	0.00
3 350	-1.08	0.98	-0.10	-2.22	2.14	-0.08
3 447	-1.31	1.04	-0.26	-2.30	2.21	-0.09
3 548	-1.45	1.10	-0.35	-2.50	2.27	-0.23
3 652	-1.30	1.15	-0.15	-2.52	2.32	-0.20
3 758	-1.43	1.19	-0.24	-2.43	2.36	-0.08
3 868	-1.32	1.22	-0.10	-2.52	2.38	-0.14
3 981	-1.16	1.24	0.09	-2.70	2.40	-0.31
4 097	-1.43	1.25	-0.18	-2.51	2.40	-0.11
4 217	-1.43	1.25	-0.18	-2.38	2.40	0.02
4 340	-1.45	1.24	-0.21	-2.46	2.40	-0.07
4 467	-1.15	1.23	0.07	-2.39	2.39	0.00
4 597	-1.13	1.20	0.08	-2.39	2.38	-0.01
4 732	-0.99	1.18	0.18	-2.47	2.38	-0.09
4 870	-0.97	1.15	0.17	-2.21	2.39	0.18
5 012	-0.81	1.12	0.31	-2.52	2.41	-0.11
5 158	-0.88	1.10	0.22	-2.33	2.44	0.11
5 309	-0.67	1.09	0.42	-2.74	2.48	-0.26
5 464	-1.09	1.09	0.00	-2.61	2.54	-0.07
5 623	-1.22	1.11	-0.11	-2.93	2.60	-0.33
5 788	-0.90	1.14	0.24	-2.80	2.67	-0.12
5 957	-1.00	1.19	0.19	-3.08	2.74	-0.34
6 131	-1.53	1.26	-0.28	-3.11	2.80	-0.30
6 310	-1.55	1.33	-0.22	-3.22	2.85	-0.37
6 494	-1.91	1.41	-0.50	-3.02	2.88	-0.15
6 683	-1.72	1.49	-0.23	-3.19	2.88	-0.32
6 879	-1.63	1.57	-0.06	-2.78	2.85	0.06
7 079	-1.71	1.63	-0.08	-2.83	2.79	-0.04
7 286	-1.87	1.68	-0.19	-2.93	2.71	-0.22

f [Hz]	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environment'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
7 499	-1.22	1.71	0.49	-2.61	2.62	0.01
7 718	-1.48	1.73	0.25	-3.30	2.53	-0.77
7 943	-1.66	1.74	0.08	-2.82	2.45	-0.37
8 175	-1.82	1.74	-0.08	-2.97	2.39	-0.58
8 414	-1.40	1.75	0.35	-3.19	2.36	-0.83
8 660	-1.76	1.77	0.01	-3.15	2.36	-0.79
8 913	-1.83	1.82	-0.01	-2.55	2.40	-0.16
9 173	-2.40	1.90	-0.51	-2.99	2.44	-0.55
9 441	-1.70	1.99	0.29	-2.94	2.48	-0.46
9 716	-2.11	2.11	-0.01	-2.92	2.50	-0.41
10 000	-2.81	2.22	-0.59	-3.07	2.50	-0.57
10 292	-2.10	2.31	0.22	-2.95	2.49	-0.46
10 593	-2.21	2.38	0.17	-2.67	2.47	-0.20
10 902	-2.56	2.41	-0.15	-3.05	2.49	-0.56
11 220	-2.04	2.42	0.38	-3.22	2.57	-0.65
11 548	-2.43	2.43	0.00	-3.16	2.72	-0.44
11 885	-2.48	2.46	-0.02	-3.70	2.92	-0.78
12 232	-2.26	2.54	0.28	-3.69	3.14	-0.55
12 589	-3.07	2.68	-0.39	-3.75	3.31	-0.44
12 957	-2.85	2.86	0.01	-3.76	3.39	-0.37
13 335	-3.57	3.04	-0.53	-4.30	3.38	-0.92
13 725	-3.53	3.18	-0.36	-4.60	3.28	-1.32
14 125	-3.10	3.22	0.13	-5.46	3.17	-2.29
14 538	-3.67	3.18	-0.49	-5.69	3.11	-2.58
14 962	-2.81	3.08	0.27	-6.08	3.15	-2.94
15 399	-3.05	2.98	-0.08	-6.79	3.25	-3.54
15 849	-2.92	2.94	0.03	-7.62	3.35	-4.27
16 312	-3.76	3.00	-0.76	-8.41	3.37	-5.05
16 788	-3.97	3.10	-0.86	-9.48	3.28	-6.20
17 278	-5.02	3.18	-1.85	-10.70	3.17	-7.54
17 783	-6.24	3.16	-3.08	-11.44	3.13	-8.31
18 302	-6.51	3.07	-3.45	-11.29	3.21	-8.09
18 836	-8.21	2.98	-5.23	-12.68	3.33	-9.36
19 387	-6.90	2.98	-3.92	-11.16	3.37	-7.79
19 953	-7.43	3.08	-4.35	-11.65	3.28	-8.37

SV 200A Case Effect

Effect of reflections and diffraction of the acoustic plane wave from the case of SV 200A (“Case Effect”)



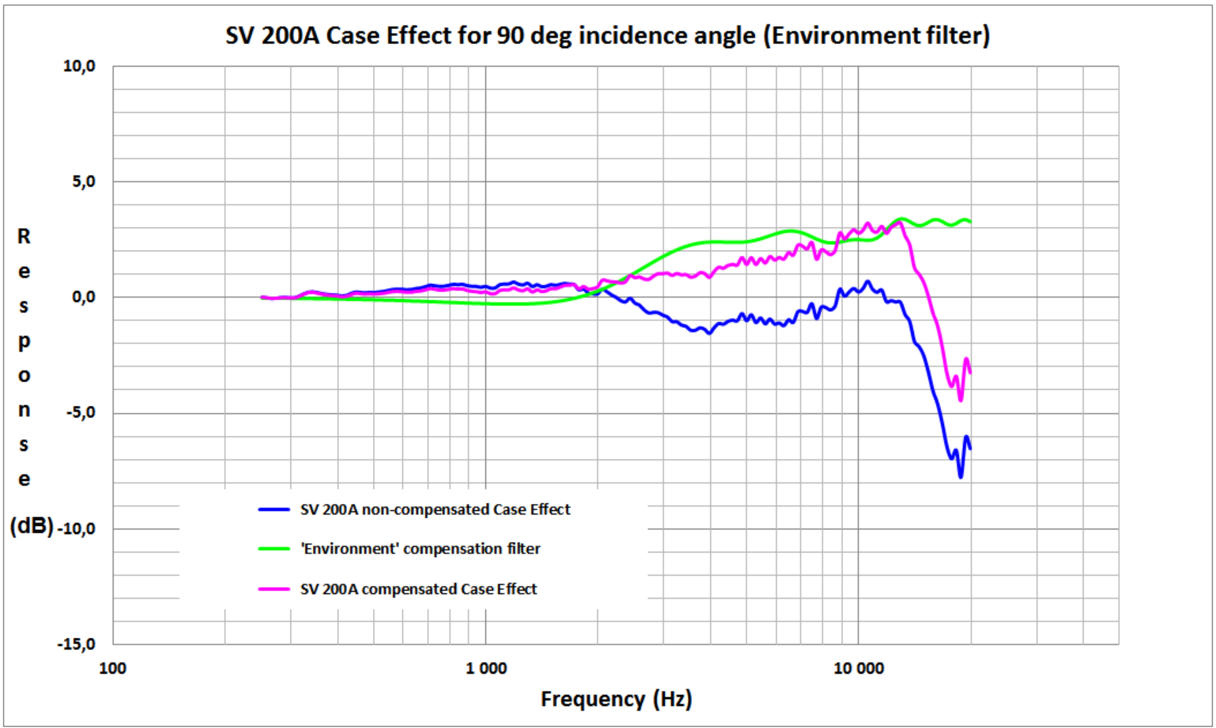


Table C.1.6. SV 200A compensated Case Effect for 0 deg incidence angle

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
251	0.00	0.00	-0.01	0.25
259	-0.03	-0.01	-0.02	0.25
266	-0.04	-0.01	-0.03	0.25
274	-0.05	-0.02	-0.03	0.25
282	-0.05	-0.03	-0.02	0.25
290	-0.03	-0.04	0.00	0.25
299	-0.02	-0.04	0.03	0.25
307	-0.02	-0.05	0.03	0.25
316	-0.03	-0.05	0.02	0.25
325	-0.06	-0.06	-0.01	0.25
335	-0.10	-0.06	-0.04	0.25
345	-0.10	-0.07	-0.04	0.25
355	-0.08	-0.07	-0.01	0.25
365	-0.06	-0.08	0.02	0.25
376	-0.05	-0.08	0.04	0.25
387	-0.07	-0.09	0.02	0.25
398	-0.07	-0.09	0.02	0.25
410	-0.06	-0.09	0.03	0.25
422	0.00	-0.09	0.08	0.25
434	0.03	-0.09	0.11	0.25
447	-0.03	-0.09	0.06	0.25
460	-0.07	-0.09	0.02	0.25
473	-0.09	-0.09	0.00	0.25
487	-0.07	-0.09	0.02	0.25
501	-0.04	-0.09	0.05	0.25
516	-0.05	-0.10	0.05	0.25
531	-0.07	-0.11	0.04	0.25
546	-0.05	-0.12	0.07	0.25
562	-0.05	-0.13	0.08	0.25
579	-0.09	-0.14	0.05	0.25
596	-0.09	-0.15	0.06	0.25
613	-0.04	-0.16	0.12	0.25
631	-0.01	-0.16	0.15	0.25
649	-0.03	-0.16	0.13	0.25
668	-0.04	-0.16	0.12	0.25
688	-0.02	-0.16	0.14	0.25
708	-0.01	-0.16	0.15	0.25
729	-0.06	-0.16	0.10	0.25
750	-0.09	-0.16	0.07	0.25
772	-0.09	-0.16	0.07	0.25
794	-0.11	-0.16	0.05	0.25
818	-0.09	-0.16	0.07	0.25
841	-0.09	-0.16	0.07	0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
866	-0.03	-0.16	0.13	0.25
891	0.04	-0.16	0.20	0.25
917	0.08	-0.16	0.24	0.25
944	0.05	-0.16	0.21	0.25
972	-0.13	-0.16	0.03	0.25
1 000	-0.11	-0.16	0.05	0.25
1 029	-0.05	-0.17	0.11	0.25
1 059	-0.09	-0.17	0.08	0.25
1 090	-0.06	-0.18	0.12	0.25
1 122	0.10	-0.19	0.28	0.25
1 155	0.09	-0.20	0.28	0.25
1 189	0.09	-0.20	0.29	0.25
1 223	0.03	-0.21	0.24	0.25
1 259	-0.12	-0.21	0.09	0.25
1 296	-0.01	-0.21	0.20	0.25
1 334	0.00	-0.22	0.22	0.25
1 372	0.00	-0.22	0.22	0.25
1 413	0.08	-0.23	0.31	0.25
1 454	0.08	-0.23	0.31	0.25
1 496	0.04	-0.24	0.27	0.25
1 540	-0.03	-0.24	0.21	0.25
1 585	0.06	-0.24	0.30	0.25
1 631	0.06	-0.25	0.30	0.25
1 679	0.08	-0.25	0.33	0.25
1 728	0.07	-0.26	0.33	0.25
1 778	0.00	-0.27	0.27	0.25
1 830	0.04	-0.28	0.32	0.25
1 884	0.03	-0.28	0.31	0.25
1 939	0.05	-0.29	0.34	0.25
1 995	0.01	-0.29	0.30	0.25
2 054	0.03	-0.29	0.32	0.25
2 113	0.10	-0.29	0.39	0.25
2 175	0.14	-0.29	0.43	0.25
2 239	0.20	-0.30	0.49	0.25
2 304	0.09	-0.30	0.39	0.25
2 371	0.12	-0.30	0.42	0.25
2 441	0.21	-0.30	0.51	0.25
2 512	0.01	-0.30	0.31	0.25
2 585	0.04	-0.31	0.35	0.25
2 661	0.02	-0.31	0.33	0.25
2 738	-0.12	-0.32	0.20	0.25
2 818	-0.12	-0.33	0.21	0.25
2 901	-0.04	-0.33	0.29	0.25
2 985	0.13	-0.34	0.47	0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
3 073	0.15	-0.35	0.50	0.25
3 162	0.17	-0.35	0.52	0.25
3 255	0.11	-0.34	0.46	0.25
3 350	-0.10	-0.34	0.24	0.25
3 447	-0.26	-0.34	0.07	0.25
3 548	-0.35	-0.33	-0.01	0.25
3 652	-0.15	-0.33	0.17	0.25
3 758	-0.24	-0.32	0.08	0.25
3 868	-0.10	-0.32	0.22	0.25
3 981	0.09	-0.32	0.40	0.25
4 097	-0.18	-0.32	0.14	0.35
4 217	-0.18	-0.32	0.14	0.35
4 340	-0.21	-0.32	0.11	0.35
4 467	0.07	-0.32	0.40	0.35
4 597	0.08	-0.33	0.40	0.35
4 732	0.18	-0.33	0.51	0.35
4 870	0.17	-0.33	0.50	0.35
5 012	0.31	-0.33	0.64	0.35
5 158	0.22	-0.33	0.56	0.35
5 309	0.42	-0.34	0.76	0.35
5 464	0.00	-0.35	0.35	0.35
5 623	-0.11	-0.35	0.24	0.35
5 788	0.24	-0.36	0.60	0.35
5 957	0.19	-0.36	0.55	0.35
6 131	-0.28	-0.37	0.09	0.35
6 310	-0.22	-0.37	0.15	0.35
6 494	-0.50	-0.34	-0.15	0.35
6 683	-0.23	-0.31	0.09	0.35
6 879	-0.06	-0.29	0.23	0.35
7 079	-0.08	-0.26	0.19	0.35
7 286	-0.19	-0.24	0.05	0.35
7 499	0.49	-0.21	0.70	0.35
7 718	0.25	-0.19	0.43	0.35
7 943	0.08	-0.19	0.27	0.35
8 175	-0.08	-0.18	0.10	0.35
8 414	0.35	-0.18	0.53	0.35
8 660	0.01	-0.18	0.20	0.35
8 913	-0.01	-0.18	0.17	0.35
9 173	-0.51	-0.18	-0.33	0.35
9 441	0.29	-0.18	0.47	0.35
9 716	-0.01	-0.18	0.17	0.35
10 000	-0.59	-0.18	-0.41	0.35
10 292	0.22	-0.06	0.28	0.35
10 593	0.17	0.06	0.11	0.35

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
10 902	-0.15	0.18	-0.33	0.35
11 220	0.38	0.30	0.08	0.35
11 548	0.00	0.42	-0.42	0.35
11 885	-0.02	0.54	-0.55	0.35
12 232	0.28	0.66	-0.38	0.35
12 589	-0.39	0.66	-1.05	0.35
12 957	0.01	0.82	-0.81	0.35
13 335	-0.53	0.99	-1.52	0.35
13 725	-0.36	1.15	-1.51	0.35
14 125	0.13	1.32	-1.19	0.35
14 538	-0.49	1.49	-1.97	0.35
14 962	0.27	1.65	-1.38	0.35
15 399	-0.08	1.82	-1.89	0.35
15 849	0.03	1.82	-1.79	0.35
16 312	-0.76	1.81	-2.57	0.35
16 788	-0.86	1.81	-2.67	0.35
17 278	-1.85	1.80	-3.65	0.35
17 783	-3.08	1.79	-4.88	0.35
18 302	-3.45	1.79	-5.23	0.35
18 836	-5.23	1.78	-7.01	0.35
19 387	-3.92	1.78	-5.69	0.35
19 953	-4.35	1.78	-6.13	0.35

Table C.1.7. SV 200A compensated Case Effect for 90 deg incidence angle

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
251	0.00	0.00	0.00	0.25
259	-0.03	-0.01	-0.02	0.25
266	-0.06	-0.01	-0.05	0.25
274	-0.07	-0.02	-0.05	0.25
282	-0.05	-0.03	-0.02	0.25
290	-0.06	-0.04	-0.02	0.25
299	-0.08	-0.04	-0.03	0.25
307	-0.08	-0.05	-0.03	0.25
316	-0.01	-0.05	0.04	0.25
325	0.07	-0.06	0.14	0.25
335	0.13	-0.08	0.21	0.25
345	0.12	-0.09	0.21	0.25
355	0.07	-0.10	0.17	0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
365	0.01	-0.11	0.12	0.25
376	-0.03	-0.13	0.10	0.25
387	-0.07	-0.14	0.07	0.25
398	-0.08	-0.14	0.06	0.25
410	-0.12	-0.15	0.02	0.25
422	-0.12	-0.15	0.03	0.25
434	-0.05	-0.16	0.11	0.25
447	0.00	-0.17	0.17	0.25
460	-0.02	-0.18	0.16	0.25
473	-0.05	-0.18	0.13	0.25
487	-0.04	-0.19	0.15	0.25
501	-0.06	-0.19	0.13	0.25
516	-0.05	-0.20	0.15	0.25
531	-0.04	-0.21	0.17	0.25
546	-0.01	-0.22	0.21	0.25
562	0.01	-0.23	0.24	0.25
579	0.01	-0.24	0.25	0.25
596	-0.01	-0.25	0.24	0.25
613	-0.04	-0.26	0.22	0.25
631	-0.04	-0.26	0.22	0.25
649	-0.01	-0.26	0.25	0.25
668	0.01	-0.26	0.27	0.25
688	0.06	-0.26	0.32	0.25
708	0.11	-0.26	0.37	0.25
729	0.09	-0.26	0.35	0.25
750	0.05	-0.26	0.31	0.25
772	0.05	-0.26	0.31	0.25
794	0.08	-0.26	0.34	0.25
818	0.12	-0.25	0.37	0.25
841	0.11	-0.25	0.35	0.25
866	0.12	-0.24	0.36	0.25
891	0.06	-0.23	0.30	0.25
917	0.03	-0.22	0.26	0.25
944	0.03	-0.22	0.24	0.25
972	-0.01	-0.21	0.20	0.25
1 000	0.03	-0.21	0.24	0.25
1 029	-0.08	-0.23	0.15	0.25
1 059	-0.10	-0.25	0.15	0.25
1 090	0.02	-0.28	0.29	0.25
1 122	0.02	-0.30	0.32	0.25
1 155	0.00	-0.32	0.32	0.25
1 189	0.06	-0.34	0.40	0.25
1 223	-0.05	-0.36	0.32	0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
1 259	-0.08	-0.36	0.28	0.25
1 296	-0.02	-0.38	0.36	0.25
1 334	-0.17	-0.40	0.23	0.25
1 372	-0.10	-0.42	0.32	0.25
1 413	-0.19	-0.43	0.25	0.25
1 454	-0.17	-0.45	0.28	0.25
1 496	-0.10	-0.47	0.37	0.25
1 540	-0.12	-0.49	0.37	0.25
1 585	-0.05	-0.49	0.44	0.25
1 631	0.01	-0.50	0.51	0.25
1 679	0.00	-0.52	0.52	0.25
1 728	0.01	-0.53	0.54	0.25
1 778	-0.18	-0.55	0.36	0.25
1 830	-0.10	-0.56	0.46	0.25
1 884	-0.23	-0.57	0.35	0.25
1 939	-0.21	-0.59	0.38	0.25
1 995	-0.14	-0.59	0.45	0.25
2 054	0.12	-0.62	0.74	0.25
2 113	0.06	-0.65	0.71	0.25
2 175	-0.01	-0.68	0.67	0.25
2 239	-0.05	-0.71	0.66	0.25
2 304	-0.12	-0.74	0.62	0.25
2 371	-0.10	-0.77	0.67	0.25
2 441	0.14	-0.80	0.94	0.25
2 512	0.04	-0.80	0.85	0.25
2 585	0.04	-0.83	0.88	0.25
2 661	-0.07	-0.86	0.79	0.25
2 738	-0.12	-0.89	0.77	0.25
2 818	0.00	-0.92	0.92	0.25
2 901	0.07	-0.94	1.02	0.25
2 985	0.04	-0.97	1.02	0.25
3 073	0.04	-1.00	1.04	0.25
3 162	-0.05	-1.00	0.95	0.25
3 255	0.00	-1.02	1.03	0.25
3 350	-0.08	-1.05	0.96	0.25
3 447	-0.09	-1.07	0.98	0.25
3 548	-0.23	-1.09	0.87	0.25
3 652	-0.20	-1.12	0.92	0.25
3 758	-0.08	-1.14	1.06	0.25
3 868	-0.14	-1.16	1.02	0.25
3 981	-0.31	-1.16	0.86	0.25
4 097	-0.11	-1.22	1.11	0.35
4 217	0.02	-1.27	1.29	0.35

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
4 340	-0.07	-1.32	1.25	0.35
4 467	0.00	-1.37	1.38	0.35
4 597	-0.01	-1.43	1.42	0.35
4 732	-0.09	-1.48	1.39	0.35
4 870	0.18	-1.53	1.71	0.35
5 012	-0.11	-1.53	1.42	0.35
5 158	0.11	-1.60	1.71	0.35
5 309	-0.26	-1.67	1.42	0.35
5 464	-0.07	-1.74	1.67	0.35
5 623	-0.33	-1.81	1.48	0.35
5 788	-0.12	-1.88	1.76	0.35
5 957	-0.34	-1.95	1.61	0.35
6 131	-0.30	-2.02	1.72	0.35
6 310	-0.37	-2.02	1.65	0.35
6 494	-0.15	-2.08	1.93	0.35
6 683	-0.32	-2.13	1.81	0.35
6 879	0.06	-2.19	2.25	0.35
7 079	-0.04	-2.24	2.21	0.35
7 286	-0.22	-2.30	2.09	0.35
7 499	0.01	-2.36	2.37	0.35
7 718	-0.77	-2.41	1.64	0.35
7 943	-0.37	-2.41	2.04	0.35
8 175	-0.58	-2.54	1.96	0.35
8 414	-0.83	-2.68	1.84	0.35
8 660	-0.79	-2.81	2.02	0.35
8 913	-0.16	-2.94	2.78	0.35
9 173	-0.55	-3.07	2.52	0.35
9 441	-0.46	-3.20	2.74	0.35
9 716	-0.41	-3.33	2.92	0.35
10 000	-0.57	-3.33	2.76	0.35
10 292	-0.46	-3.37	2.90	0.35
10 593	-0.20	-3.40	3.20	0.35
10 902	-0.56	-3.44	2.88	0.35
11 220	-0.65	-3.47	2.82	0.35
11 548	-0.44	-3.51	3.06	0.35
11 885	-0.78	-3.54	2.76	0.35
12 232	-0.55	-3.58	3.02	0.35
12 589	-0.44	-3.58	3.14	0.35
12 957	-0.37	-3.58	3.21	0.35
13 335	-0.92	-3.58	2.66	0.35
13 725	-1.32	-3.58	2.26	0.35
14 125	-2.29	-3.58	1.28	0.35
14 538	-2.58	-3.58	1.00	0.35

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	A-B	
[Hz]	[dB]	[dB]	[dB]	[dB]
14 962	-2.94	-3.58	0.64	0.35
15 399	-3.54	-3.58	0.04	0.35
15 849	-4.27	-3.58	-0.69	0.35
16 312	-5.05	-3.80	-1.25	0.35
16 788	-6.20	-4.02	-2.18	0.35
17 278	-7.54	-4.23	-3.30	0.35
17 783	-8.31	-4.45	-3.86	0.35
18 302	-8.09	-4.67	-3.42	0.35
18 836	-9.36	-4.89	-4.47	0.35
19 387	-7.79	-5.11	-2.69	0.35
19 953	-8.37	-5.11	-3.26	0.35

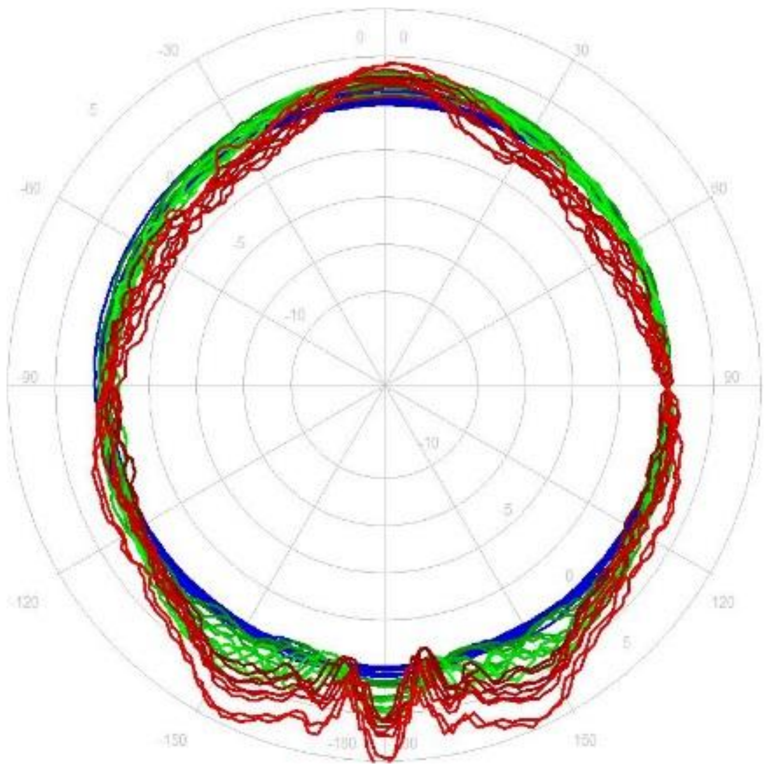
Table C.1.8. Combined Free Field correction (MK 255S + Case Effect) for the electrostatic actuator for 0 deg and 90 deg incidence angle

Frequency	Combined Free Field corrections for 0 deg incidence angle	Combined Free Field corrections for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]
20	0.00	0.00	0.25
25	0.00	0.00	0.25
32	0.00	0.00	0.25
40	0.00	0.00	0.25
50	0.00	0.00	0.25
63	0.00	0.00	0.25
80	0.00	0.00	0.25
100	0.00	0.00	0.25
125	0.00	0.00	0.25
160	0.00	0.00	0.25
200	0.00	0.00	0.25
250	-0.01	0.00	0.25
315	0.02	0.04	0.25
400	0.02	0.06	0.25
500	0.05	0.13	0.25
630	0.15	0.22	0.25
800	0.05	0.34	0.25
1 000	0.05	0.24	0.25
1 250	0.09	0.28	0.25
1 600	0.30	0.44	0.25

Frequency	Combined Free Field corrections for 0 deg incidence angle	Combined Free Field corrections for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]
2 000	0.30	0.45	0.25
2 500	0.31	0.85	0.25
3 150	0.52	0.95	0.25
4 000	0.40	0.86	0.25
5 000	0.64	1.42	0.35
6 300	0.15	1.65	0.35
8 000	0.27	2.04	0.35
10 000	-0.41	2.76	0.35
12 500	-1.05	3.14	0.50
16 000	-1.79	-0.69	0.50
20 000	-6.13	-3.26	0.50

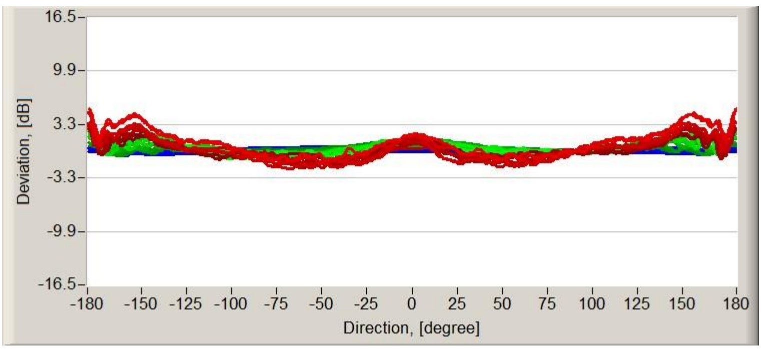
SV 200A directional characteristics

Combined typical directional characteristics



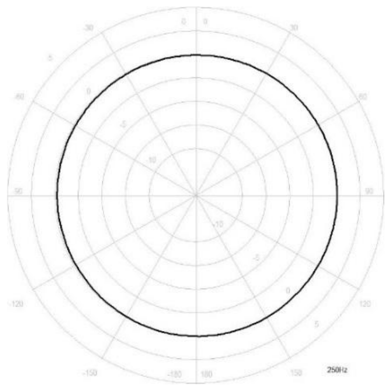
LEGEND

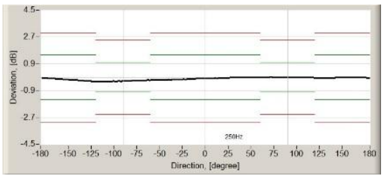
Fmin (250Hz) **Fmax (12,5kHz)**



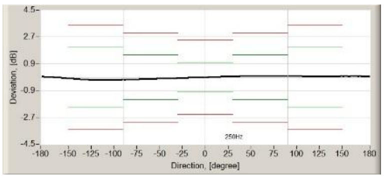
Below the typical directional characteristics and tolerances for 90 degree and 0 degree incidental angles are presented.

250 Hz



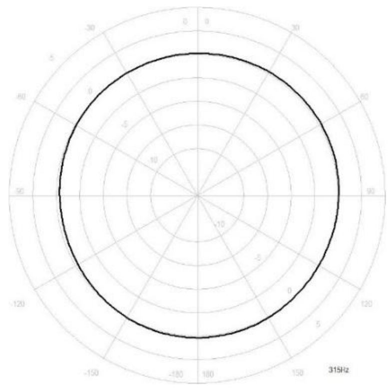


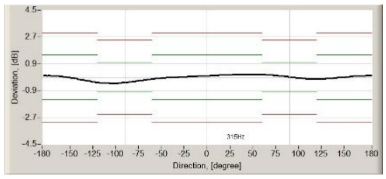
90 deg



0 deg

315 Hz





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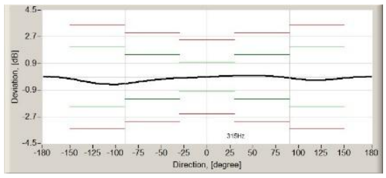
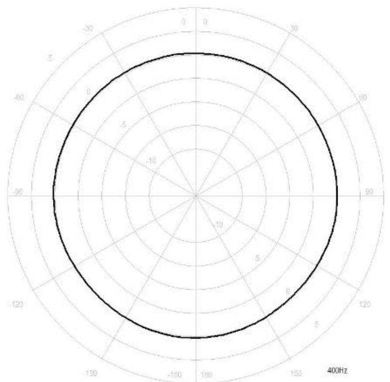
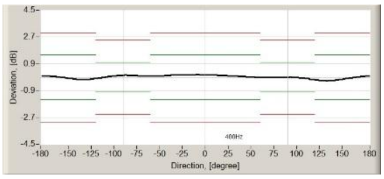


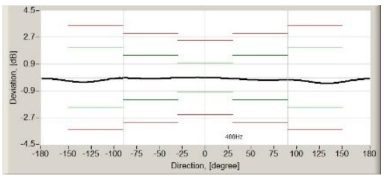
0 deg

400 Hz



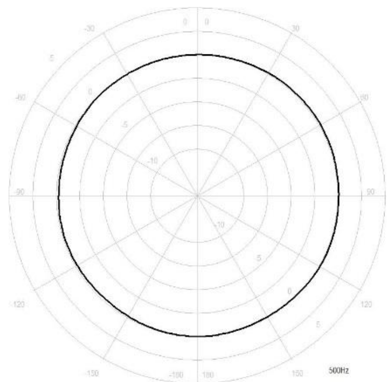


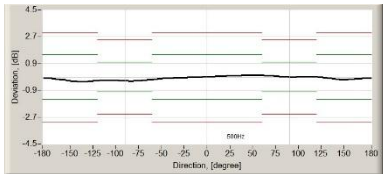
90 deg



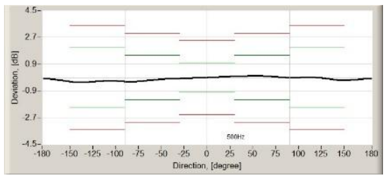
0 deg

500 Hz



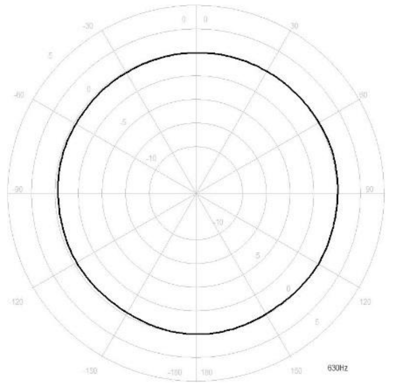


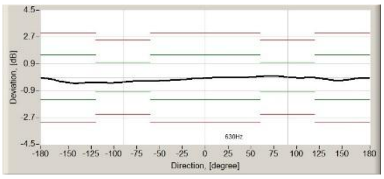
90 deg



0 deg

630 Hz





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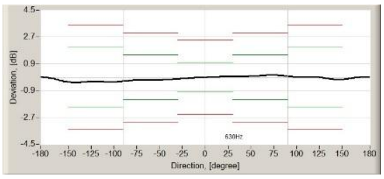

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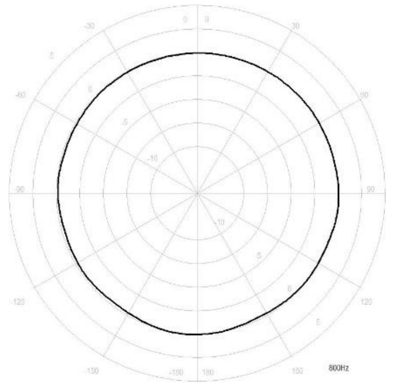
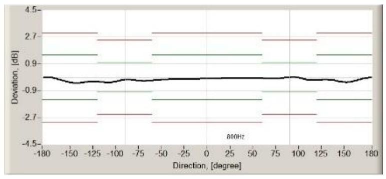
800 Hz





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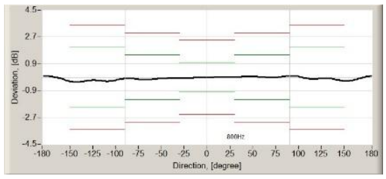

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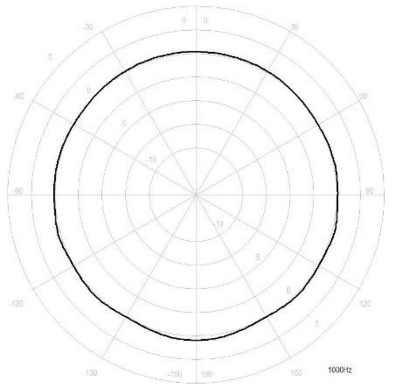
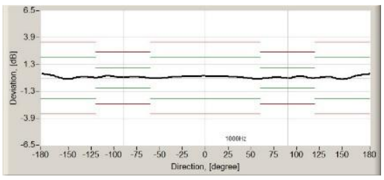
1000 Hz





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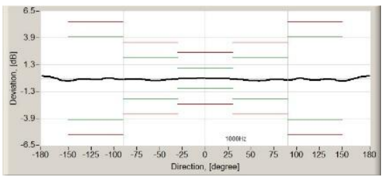
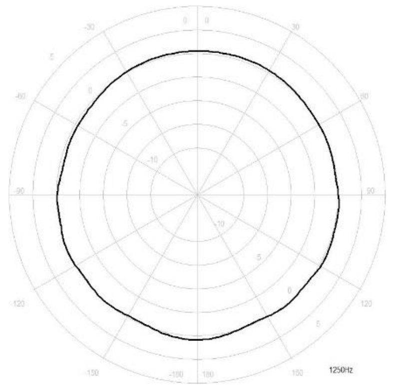
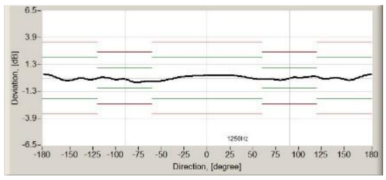


0 deg

1250 Hz





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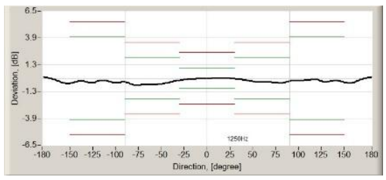

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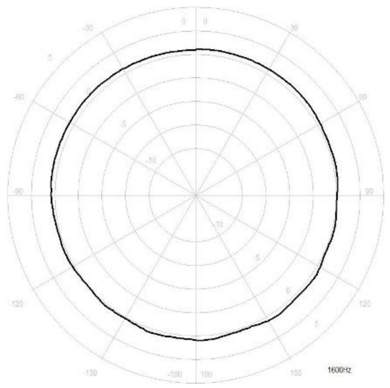
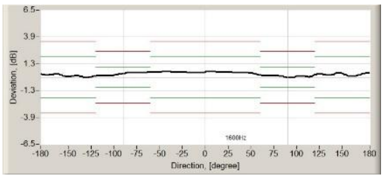
1600 Hz





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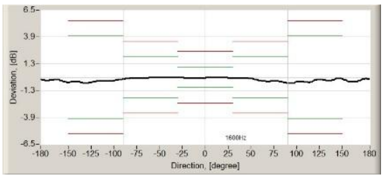

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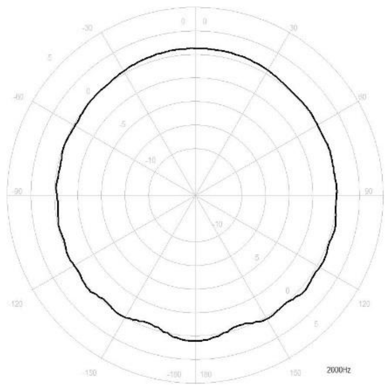
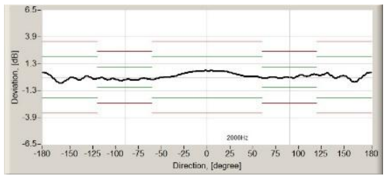
2000 Hz





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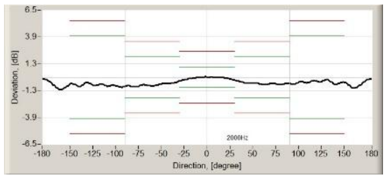

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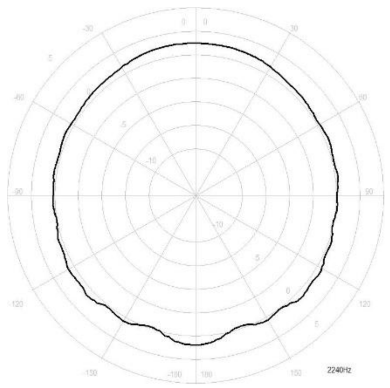
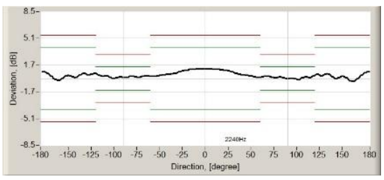
2240 Hz





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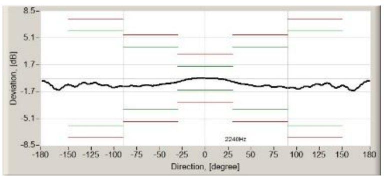
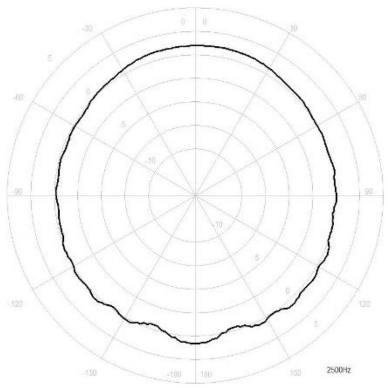
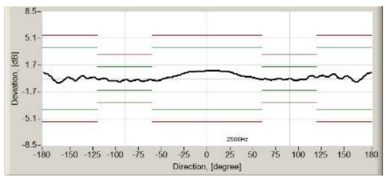


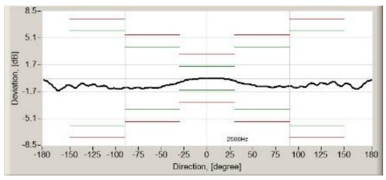
0 deg

2500 Hz



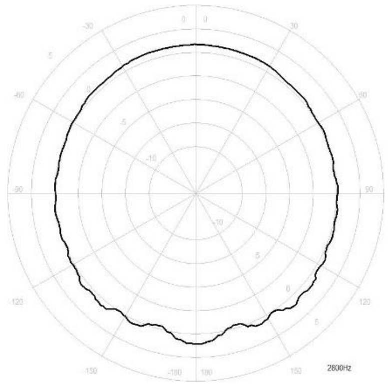


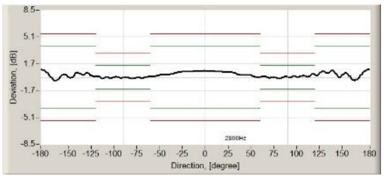
90 deg



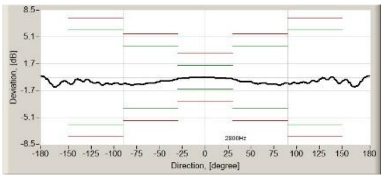
0 deg

2800 Hz



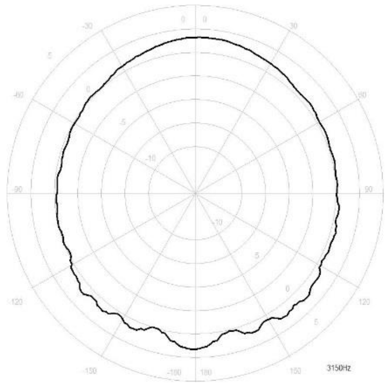


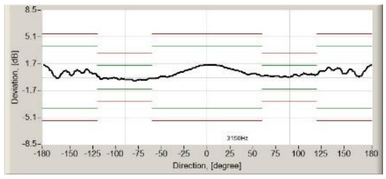
90 deg



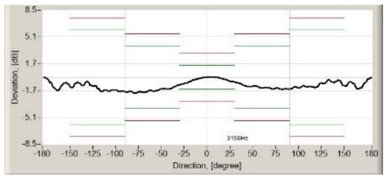
0 deg

3150 Hz



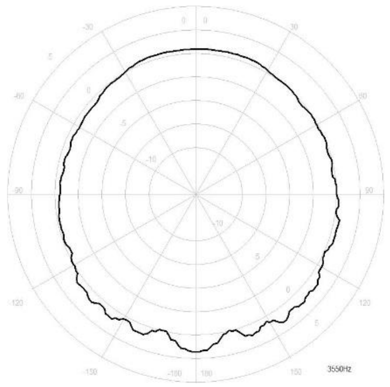


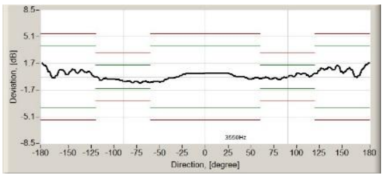
90 deg



0 deg

3550 Hz





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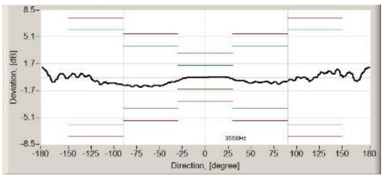
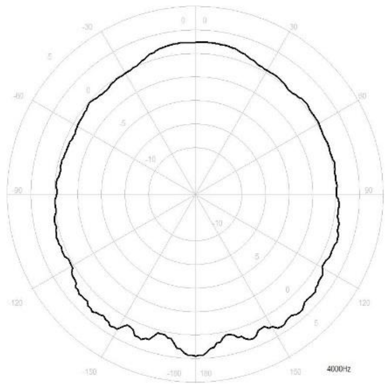
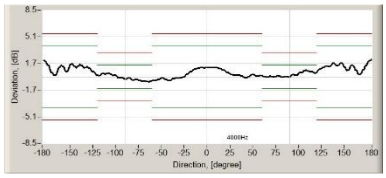


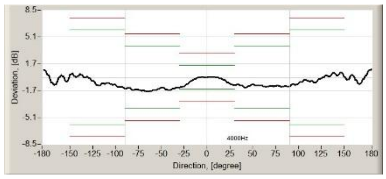
0 deg

4000 Hz



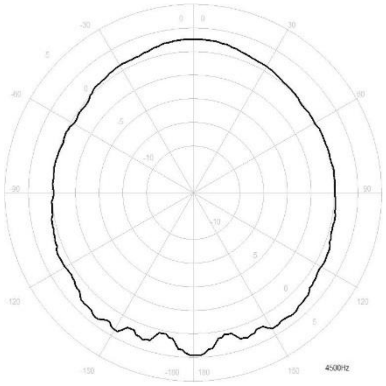


90 deg

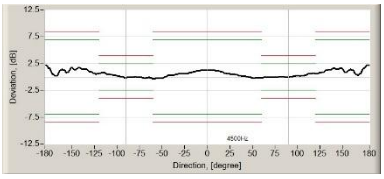


0 deg

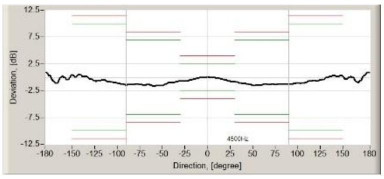
4500 Hz



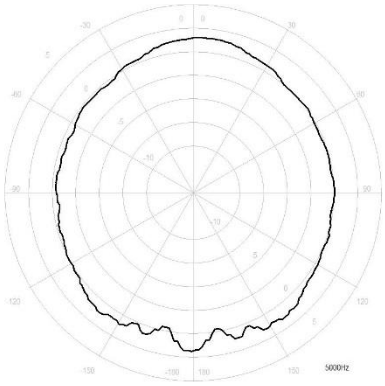
90 deg



0 deg



5000 Hz



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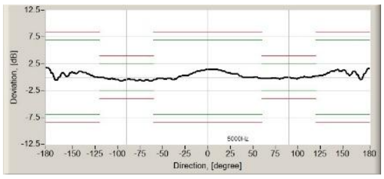

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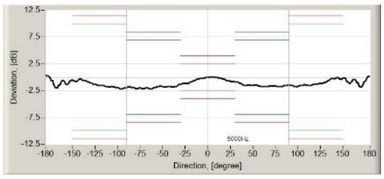
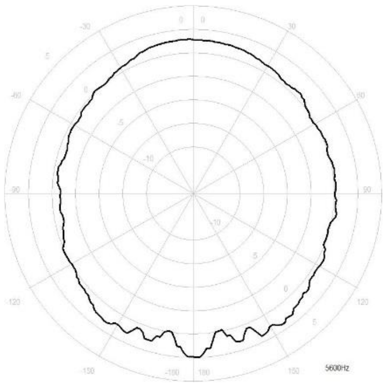


5600 Hz



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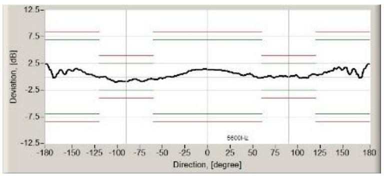
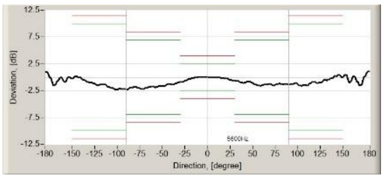
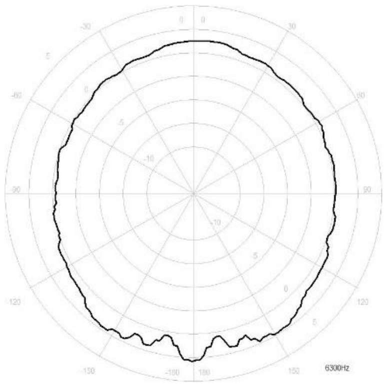


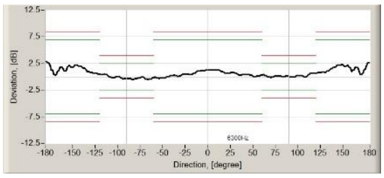
0 deg



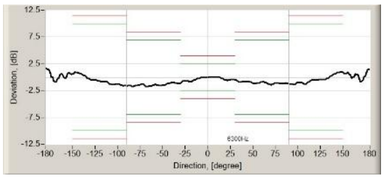
6300 Hz



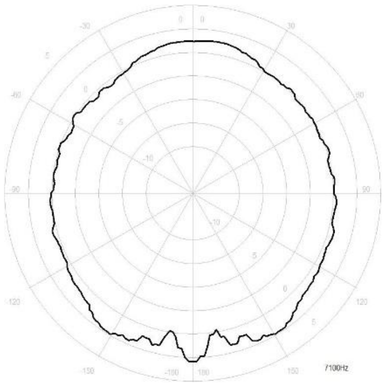
90 deg

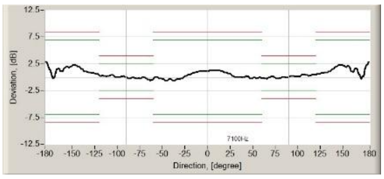


0 deg

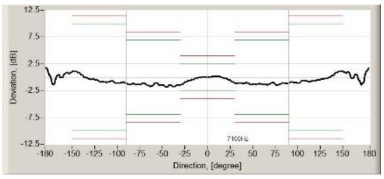


7100 Hz



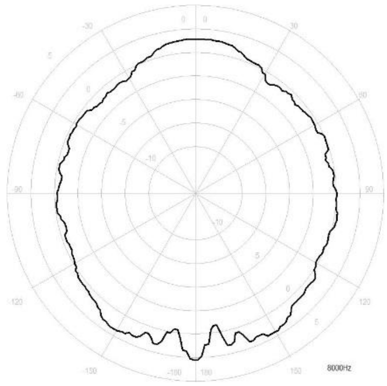


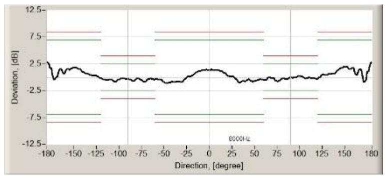
90 deg



0 deg

8000 Hz





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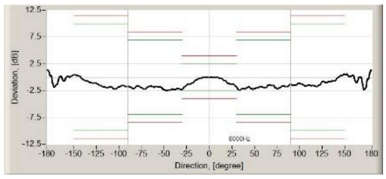
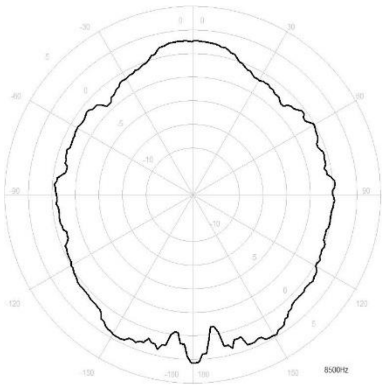
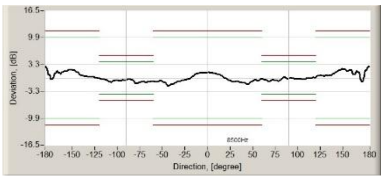


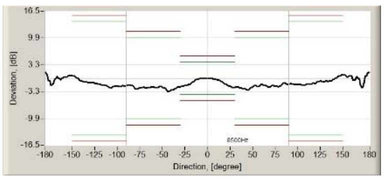
0 deg

8500 Hz



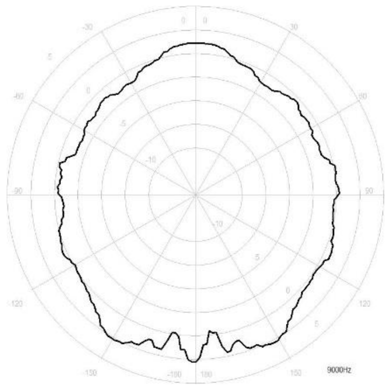


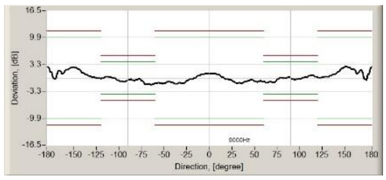
90 deg



0 deg

9000 Hz





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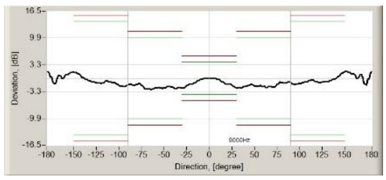
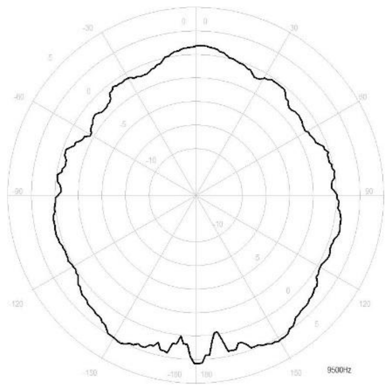
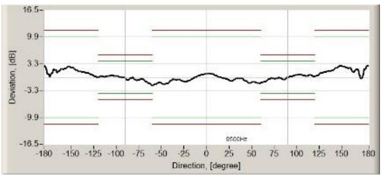


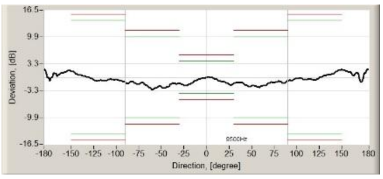
0 deg

9500 Hz



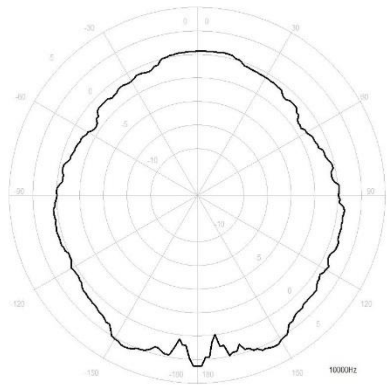


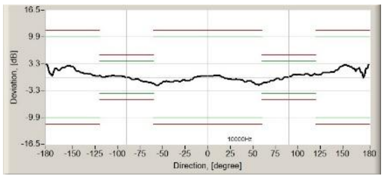
90 deg



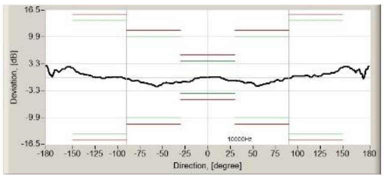
0 deg

10000 Hz



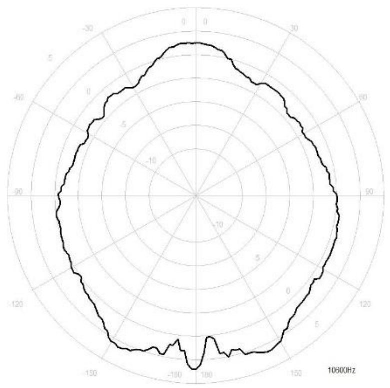


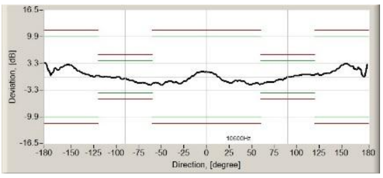
90 deg



0 deg

10600 Hz





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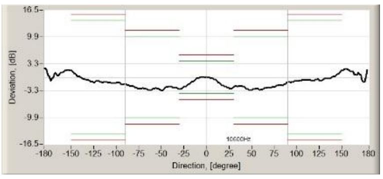
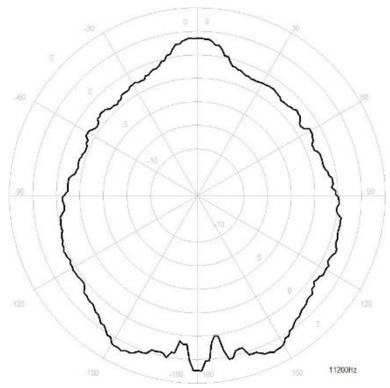
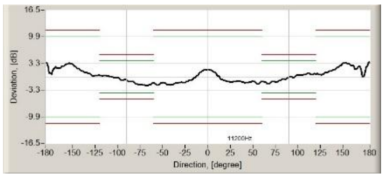


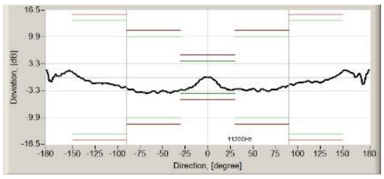
0 deg

11200 Hz



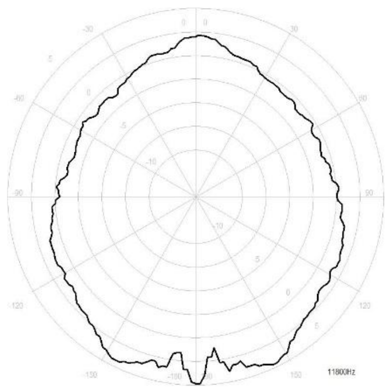


90 deg

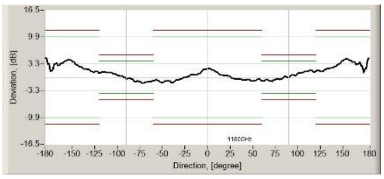


0 deg

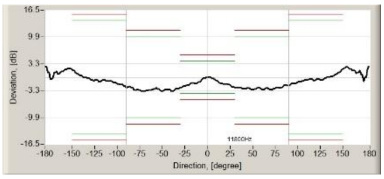
11800 Hz



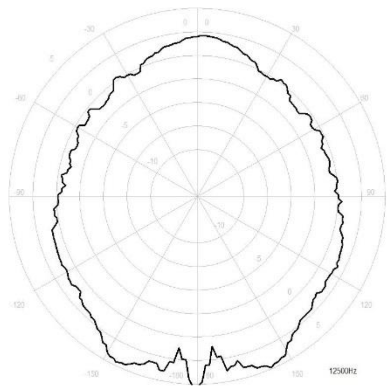
90 deg



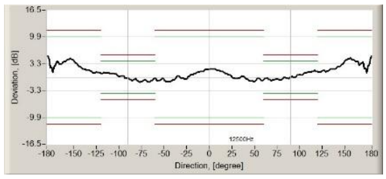
0 deg



12500 Hz



90 deg



0 deg

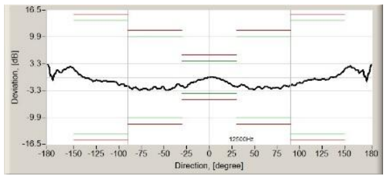


Table C.1.9. SV 200A typical directional response

f [Hz]	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	0,03	0,04	0,06	0,07	0,08	0,09	0,09	0,1	0,09	0,08
315	0,03	0,04	0,07	0,08	0,09	0,09	0,07	0,04	-0,1	-0,15
400	-0,02	-0,05	-0,08	-0,11	-0,14	-0,17	-0,18	-0,18	-0,16	-0,17
500	0,03	0,05	0,08	0,1	0,11	0,11	0,1	0,06	-0,01	-0,01
630	0,03	0,04	0,04	0,05	0,07	0,11	0,15	0,15	0,12	0,05
800	0,01	0,02	0,02	0,04	0,04	0,04	-0,01	0,02	0,08	0,09
1 000	-0,01	-0,02	-0,06	-0,13	-0,22	-0,25	-0,24	-0,14	-0,18	-0,18
1 250	0,02	0,02	-0,03	-0,15	-0,33	-0,38	-0,37	-0,46	-0,45	-0,22
1 600	0	-0,03	-0,06	-0,07	-0,14	-0,31	-0,39	-0,38	-0,57	-0,57
2 000	0,01	-0,09	-0,26	-0,55	-0,56	-0,69	-0,71	-0,72	-0,71	-0,68
2 240	-0,03	-0,16	-0,39	-0,76	-0,89	-1,07	-0,99	-1,13	-1,22	-1,34
2 500	0	-0,07	-0,36	-0,71	-0,89	-1,07	-1,18	-1,17	-1,14	-1,27
2 800	-0,07	-0,12	-0,23	-0,55	-0,61	-0,83	-0,89	-1,01	-0,97	-0,85
3 150	-0,04	-0,29	-0,62	-1,02	-1,19	-1,37	-1,45	-1,51	-1,56	-1,44
3 550	0,01	0,03	-0,25	-0,44	-0,76	-0,66	-0,7	-0,83	-0,81	-0,43
4 000	0,02	-0,5	-0,97	-1,28	-1,28	-1,07	-1,24	-1,22	-1,2	-1
4 500	-0,16	-0,55	-0,8	-1,19	-1,52	-1,52	-1,39	-1,35	-1,31	-1,23

5 000	-0,05	-0,58	-0,86	-1,52	-1,53	-1,7	-1,76	-1,77	-1,71	-1,78
5 600	-0,06	-0,28	-0,65	-1,11	-1,18	-1,6	-1,46	-1,5	-1,35	-1,34
6 300	0,06	-0,52	-0,57	-0,89	-1,2	-1,2	-1,42	-1,25	-1,24	-1,32
7 100	0,16	-0,26	-1,12	-1,21	-1,35	-1,36	-1,44	-1,41	-1,31	-1,05
8 000	-0,12	-1,13	-1,75	-2,42	-2,26	-2,05	-1,96	-2,18	-1,77	-1,51
8 500	-0,38	-1,45	-2,33	-2,53	-2,92	-2,08	-2,13	-2,16	-1,54	-1,56
9 000	-0,34	-1,44	-2,35	-2,36	-1,92	-2,1	-2,23	-2,12	-1,19	-1,5
9 500	-0,46	-1,19	-1,9	-1,54	-2,32	-2,48	-2,21	-1,34	-1,48	-0,77
10 000	0,06	-0,68	-0,85	-1,28	-1,59	-2,22	-1,79	-1,16	-0,93	0,34
10 600	-0,55	-2,29	-2,8	-2,31	-3,18	-3,09	-3,07	-2,58	-1,99	-1,31
11 200	-1,61	-2,82	-3,1	-3,31	-3,26	-3,53	-3,45	-3,03	-2,49	-1,93
11 800	-0,85	-1,63	-2,49	-2,79	-3,01	-3,01	-3,01	-3,12	-2,53	-2,01
12 500	-0,33	-1,3	-2,3	-2,44	-3,06	-2,8	-2,93	-2,74	-2,44	-2,03

f [Hz]	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180	180-190	190-200
250	0,07	0,06	0,05	0,05	0,07	0,07	0,07	0,06	0,04	-0,03
315	-0,21	-0,23	-0,22	-0,2	-0,15	-0,08	-0,02	0,02	0,01	-0,05
400	-0,26	-0,34	-0,39	-0,4	-0,37	-0,28	-0,18	-0,11	-0,1	-0,15
500	0,02	0,02	-0,07	-0,14	-0,18	-0,18	-0,14	-0,1	-0,12	-0,18
630	0,03	0,03	-0,05	-0,15	-0,16	-0,14	-0,05	0,02	-0,05	-0,21
800	-0,09	-0,12	-0,1	-0,14	-0,25	-0,26	-0,15	0,08	0,08	-0,09
1 000	-0,09	-0,18	-0,17	-0,14	-0,29	-0,27	0,11	0,21	0,21	-0,15
1 250	-0,23	-0,15	-0,35	-0,33	-0,43	-0,47	-0,35	0,1	0,09	-0,42
1 600	-0,48	-0,5	-0,29	-0,31	-0,19	-0,41	-0,41	-0,21	-0,3	-0,25
2 000	-0,54	-0,52	-0,47	-0,7	-0,69	-1,07	-1,02	-0,45	-0,58	-1,19
2 240	-1,36	-1,1	-0,84	-1,02	-1,22	-1,58	-1,55	-0,79	-0,95	-1,47
2 500	-1,12	-0,84	-0,77	-0,73	-1,02	-1,24	-1,4	-0,64	-0,95	-1,54
2 800	-0,77	-0,8	-0,57	-0,28	-0,82	-1,2	-1,25	-0,27	-0,79	-1,26
3 150	-1,38	-1,36	-0,9	-0,73	-1,1	-1,1	-1,51	-0,76	-1,04	-1,66
3 550	-0,22	-0,51	0,65	0,77	0,98	0,69	-0,55	1,27	1,17	-0,6
4 000	-0,62	-0,69	0,21	0,55	0,58	-0,38	-0,89	0,99	0,92	-0,97
4 500	-1,14	-0,7	-0,69	0,33	0,33	-0,37	-0,96	0,9	-1,1	-1,05
5 000	-1,65	-1,51	-1,25	-0,78	-0,41	-1,17	-1,86	-1,45	-1,95	-1,97
5 600	-1,6	-1,54	-1,04	-0,62	0,43	-0,95	-1,56	1,04	-1,48	-1,37
6 300	-1,29	-0,85	-0,48	0,62	1,02	0,96	-0,84	1,64	1,44	-0,89
7 100	-1,04	-0,87	-0,52	0,66	1,14	0,96	-1,47	1,73	1,73	0,62
8 000	-1,61	-1,7	-1,48	-0,79	0,59	0,57	-2,25	-2,25	-1,83	-1,35
8 500	-1,72	-1,47	-0,91	-0,79	0,89	0,83	-2,23	-2,23	-1,73	-0,45
9 000	-1,27	-1,01	-1,06	-0,82	1,62	1,62	0,87	-1,65	1,35	0,9
9 500	-0,6	-0,68	-0,47	0,81	1,9	1,77	-1,22	1,92	1,2	1,11
10 000	0,44	0,53	0,81	0,99	2,45	2,64	2,02	2,78	2,78	2,1
10 600	-0,94	-0,77	-0,85	-0,37	1,68	2	1,41	2,2	2,2	1,2

11 200	-1,35	-1,26	-1,4	-0,7	1,62	1,79	0,98	1,84	-1,2	0,91
11 800	-1,02	-0,77	-0,65	0,62	2,07	2,48	1,72	2,71	2,51	1,68
12 500	-1,46	-0,69	-0,72	-0,53	2,27	2,77	1,84	3,21	2,35	1,89
f [Hz]	**200-210**	**210-220**	**220-230**	**230-240**	**240-250**	**250-260**	**260-270**	**270-280**	**280-290**	**290-300**
250	-0,07	-0,13	-0,16	-0,18	-0,19	-0,19	-0,18	-0,17	-0,14	-0,12
315	-0,13	-0,24	-0,36	-0,44	-0,5	-0,52	-0,51	-0,45	-0,38	-0,29
400	-0,23	-0,3	-0,31	-0,3	-0,24	-0,14	-0,06	-0,05	-0,07	-0,08
500	-0,27	-0,33	-0,33	-0,3	-0,26	-0,23	-0,27	-0,28	-0,27	-0,23
630	-0,31	-0,35	-0,34	-0,3	-0,31	-0,32	-0,31	-0,26	-0,2	-0,18
800	-0,27	-0,32	-0,29	-0,22	-0,27	-0,27	-0,16	-0,1	-0,16	-0,16
1 000	-0,27	-0,26	-0,09	-0,14	-0,14	-0,06	-0,11	-0,1	-0,11	-0,2
1 250	-0,52	-0,46	-0,41	-0,43	-0,28	-0,42	-0,42	-0,66	-0,67	-0,6
1 600	-0,49	-0,46	-0,57	-0,56	-0,38	-0,38	-0,28	-0,16	-0,07	-0,06
2 000	-1,13	-0,9	-0,88	-0,8	-0,88	-0,86	-0,98	-0,92	-0,92	-0,85
2 240	-1,37	-1,1	-0,73	-0,75	-0,91	-1,2	-1,11	-1,08	-1,05	-0,93
2 500	-1,39	-1,24	-0,96	-1,06	-1,06	-1,29	-1,39	-1,3	-1,32	-1,27
2 800	-0,76	-0,91	-0,51	-0,75	-0,98	-0,92	-0,94	-1	-0,91	-0,91
3 150	-1,18	-1,33	-1,04	-1,44	-1,8	-1,76	-1,87	-2,02	-2,02	-1,9
3 550	0,44	0,5	0,45	-0,51	-0,9	-0,77	-1,07	-1,17	-1,23	-1,18
4 000	-0,51	0,51	0,26	-0,98	-1,02	-1,03	-1,46	-1,62	-1,72	-1,83
4 500	-0,46	0,48	-0,34	-0,77	-0,77	-1,19	-1,47	-1,38	-1,49	-1,66
5 000	-1,35	-0,75	-1,11	-1,55	-1,85	-1,93	-2,2	-2,06	-2,15	-2,21
5 600	-0,88	-0,19	-0,96	-1,46	-1,78	-2,31	-2,25	-2,25	-2,2	-2,03
6 300	0,83	0,94	-0,47	-0,81	-1,26	-1,4	-1,62	-1,71	-1,7	-1,71
7 100	1,17	1,11	0,39	-0,87	-0,99	-1,11	-1,12	-1,4	-1,4	-1,72
8 000	0,41	-0,43	-1,06	-1,69	-1,95	-2,19	-1,71	-2,09	-2,18	-1,89
8 500	0,71	-0,72	-1,02	-1,6	-2,32	-2,39	-2,03	-2,66	-2,69	-2,39
9 000	1,55	1,48	-0,87	-1,3	-1,12	-1,88	-2,04	-1,8	-2,63	-2,76
9 500	1,69	1,47	0,39	-0,94	-0,84	-0,62	-1,28	-1,56	-1,71	-2,98
10 000	2,5	2,08	0,75	0,32	-0,32	0,09	-0,39	-0,92	-1,44	-1,91
10 600	1,85	1,42	-0,76	-1,31	-1,35	-1,46	-1,8	-2,5	-2,76	-3,21
11 200	1,61	0,88	-1,31	-1,55	-1,62	-2,02	-2,72	-3,61	-3,97	-3,95
11 800	2,2	1,68	-0,72	-0,99	-0,97	-1,65	-2,63	-3,19	-3,46	-3,27
12 500	2,6	1,49	-1,01	-1,04	-1,06	-1,89	-2,22	-3	-3,26	-3,14
f [Hz]	**300-310**	**310-320**	**320-330**	**330-340**	**340-350**	**350-360**				
250	-0,11	-0,1	-0,08	-0,05	-0,03	-0,01				
315	-0,21	-0,15	-0,12	-0,08	-0,05	-0,03				
400	-0,08	-0,06	-0,04	-0,01	0,01	0,01				
500	-0,16	-0,11	-0,09	-0,06	-0,04	-0,02				
630	-0,18	-0,17	-0,14	-0,11	-0,06	-0,03				

800	-0,12	-0,08	-0,05	-0,04	-0,04	-0,03				
1 000	-0,21	-0,19	-0,1	-0,04	-0,01	0,02				
1 250	-0,59	-0,52	-0,36	-0,15	-0,08	-0,03				
1 600	-0,04	-0,01	-0,03	-0,06	-0,08	-0,1				
2 000	-0,84	-0,63	-0,58	-0,31	-0,13	0,06				
2 240	-0,96	-0,8	-0,66	-0,39	-0,1	0,02				
2 500	-1,24	-1	-0,8	-0,4	-0,15	-0,06				
2 800	-0,72	-0,47	-0,43	-0,18	-0,07	0,03				
3 150	-1,74	-1,5	-1,43	-0,86	-0,56	-0,14				
3 550	-1,16	-1,08	-0,65	-0,28	-0,05	-0,04				
4 000	-1,64	-1,64	-1,54	-1,27	-0,48	-0,06				
4 500	-1,66	-1,44	-0,95	-0,7	-0,53	-0,08				
5 000	-1,92	-1,87	-1,87	-1,18	-0,9	-0,27				
5 600	-1,89	-1,62	-1,34	-0,86	-0,2	0,08				
6 300	-1,59	-1,45	-1,17	-0,79	-0,79	-0,13				
7 100	-1,44	-1,78	-1,77	-1,34	-0,51	0,06				
8 000	-2,25	-2,52	-2,33	-1,77	-1,07	-0,13				
8 500	-2,32	-3,27	-2,73	-1,97	-1,27	-0,1				
9 000	-2,57	-2,38	-2,56	-2,37	-1,38	-0,21				
9 500	-2,77	-2,62	-1,61	-2	-1,69	-0,45				
10 000	-2,32	-1,57	-1,49	-1,2	-0,89	-0,1				
10 600	-3,3	-3,01	-2,94	-2,81	-1,39	-0,08				
11 200	-3,84	-3,85	-3,69	-3,21	-2,59	-0,55				
11 800	-3,41	-3,38	-3,38	-2,37	-1,51	-1,18				
12 500	-2,89	-3,13	-2,68	-2,49	-1,35	-0,54				

C.2 SPECIFICATION OF THE SV 200A 1/1 AND 1/3 OCTAVE ANALYSIS

Statement of performance

SV 200A can operate as 1/1 octave or 1/3 octave analyser with all listed below accessories meeting requirements of the IEC 61260-1:2014 standard for the pass band filters for the Class 1 Group X instruments.

Note: *Simultaneously to the frequency analysis SV 200A operates as Sound Level Meter - see Chapter C.1 for specification.*

Configuration of the complete analyser

SV 200A	without the MK 255S microphone and the SA 209 windscreen
ST 02	microphone adapter

Normal operating mode

SV 200A in configuration with the **ST 02** adapter with following settings: **Microphone** compensation - **Off**, **Outdoor** compensation - **Off** (path: *<Menu> / Measurement / Comp. Filter* – see Chapter 5.1.2).

Note: *For conformance electrical tests with the ST 02 adapter, the* ***Microphone*** *compensation must be* ***Off*** *(path: <Menu> / Measurement / Comp. Filter).*

Note: *When the 1/1- or 1/3 octave analyser is used with the microphone installed (for acoustic signals), the* ***Microphone*** *compensation must be* ***On*** *(path: <Menu> / Measurement / Comp. Filter).*

Signal input

- SV 200A microphone input throughout the ST 02 adapter
- Maximum input voltage: the **SV 200A** meets the requirements of IEC 348 for the 2nd class device. The input voltage shall not exceed the limits between -15 V and +15 V.
- Impedance: ≥ 10 GΩ , ≤ 2 pF

Linear operating range

Table C.2.1. Linear operating ranges

Weighting	**Linear operating range** (with 10 dB margin from noise) (**RMS** for the sinusoidal signal at reference conditions @ 1 kHz, 0.0 dB calibration factor)	
A	from 18 μV_{RMS}	to 3.15 V_{RMS}
B	from 18 μV_{RMS}	to 3.15 V_{RMS}
C	from 18 μV_{RMS}	to 3.15 V_{RMS}
Z	from 25 μV_{RMS}	to 3.15 V_{RMS}

Table C.2.2. Peak for the sinusoidal signal 1 kHz, at reference conditions (@ 114 dB indication)

Peak for the sinusoidal signal **1 kHz**, at reference conditions @ 1 kHz (0.0 dB calibration factor)	
Weighting	**Max Peak value**
A	0.707 V
B	0.707 V
C	0.707 V
Z	0.707 V

Measuring frequency range 3.15 Hz ÷ 22.4 kHz with the **Z** filter (-3 dB)

Centre Frequency Ranges for 1/1 Octave 4.0 Hz ÷ 16 kHz

Centre Frequency Ranges for 1/3 Octave 4.0 Hz ÷ 20 kHz

Maximum peak voltage 30 V Peak-Peak (Maximum peak voltage of input sinusoidal signal, which can be lead to the SLM without destruction the meter)

RMS detector

- Digital “True RMS“ with Peak detection
- Resolution 0.1 dB
- Range 327.7 dB
- Crest Factor unlimited (for signals in 20 kHz band)

Reference conditions as per IEC 61260-1:2014

- Reference temperature +23°C
- Reference relative humidity 50%
- Static pressure 101.325 kPa

Calibration (electrical)

Calibration level 0.5 V_{RMS} (@ 114 dB indication)

Basic accuracy < ± 0.2 dB (for the temperature T=+23°C ± 5°C for sinusoidal signal 120 dB_{RMS} in the band 10 Hz ÷ 20 kHz with the **Z** input filter)

Measurement error in the full temperature range

< ± 0.1 dB (when the temperature is from -10°C to +50°C for the sinusoidal signal 120 dB_{RMS} in the band 10 Hz ÷ 20 kHz with the **Z** input filter).

Warm-up time / Auto-start delay	1 min. (for 0.1 dB accuracy).
Effect of humidity	< 0.5 dB (for 30%<RH<90% at 40°C re Reference conditions).
Effect of magnetic field	< 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz).
Effect of Vibration	< 0.1 dB (from 20 Hz to 1000 Hz at 1 m/s^2).

Overload detector

The instrument has the built-in overload detectors. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication is when the input signal amplitude **is 0.5 dB above** the declared "Peak measurement range"

Antialiasing filter

Built-in antialiasing filter. Second-order analogue filter, passive Class, combined with on-chip FIR digital filter of the analog-to-digital converter, ensuring correct sampling of the measured signal.

Pass band (-1 dB)	22.200 kHz
Pass band (-3 dB)	23.520 kHz
Stop band	26.256 kHz
Attenuation in the stop band	> 80 dB.
Sampling frequency	48 kHz
Analogue to digital converter	1 x 24 bit resolution
Input attenuator accuracy	± 0.1 dB (for f = 1 kHz and T = +23°C)
Internal oscillator accuracy	0.01 % (for f = 1 kHz and T = +23°C).

Digital Filters

Weighting filters

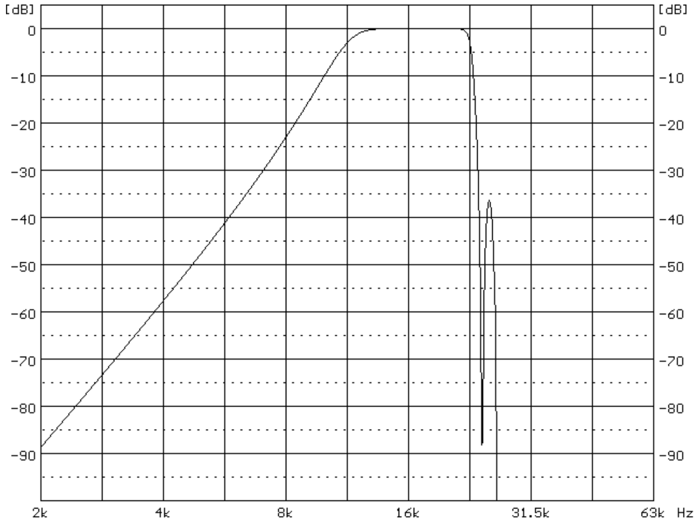
- A meeting requirements of IEC 61672-1:2013 for the Class 1 "A" filters,
- C meeting requirements of IEC 61672-1;2013 for the Class 1 "C" filters,
- Z meeting requirements of IEC 61672-1;2013 for the Class 1 "Z" filters,
- B meeting IEC 60651 for the Class 1 "B" filters

See part C.3 for the A , C, B and Z filters characteristics,

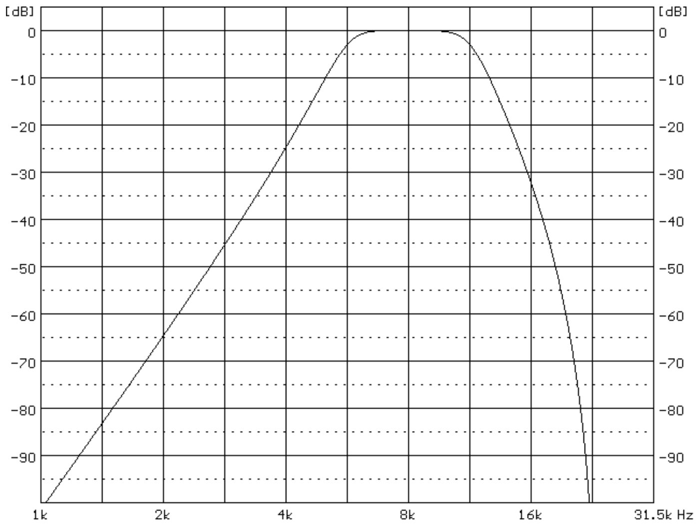
Noise levels measured with the ST 02 adapter and 50 Ω input impedance for 20kHz Bandwidth.

• "A" weighting	< 5.6 μV_{RMS}
• "B" weighting	< 5.6 μV_{RMS}
• "C" weighting	< 5.6 μV_{RMS}
• "Z" weighting	< 7.9 μV_{RMS}.

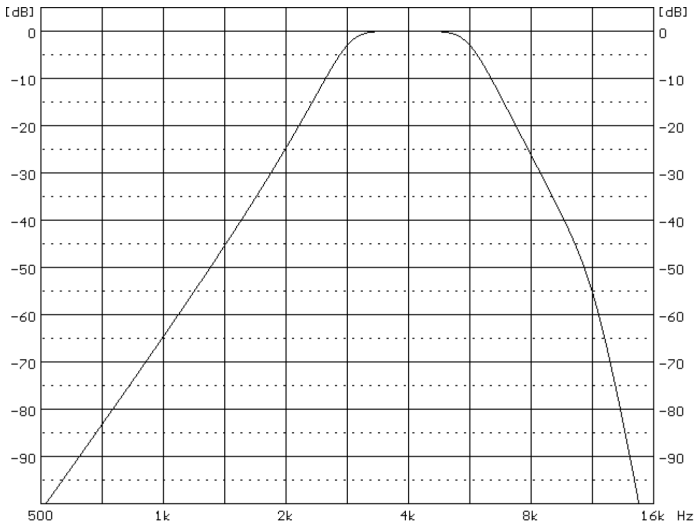
1/1 Octave filters 13 filters with centre frequencies from 4 Hz to 16 kHz (base 10), meeting the IEC 61260-1:2014 standard for Class 1



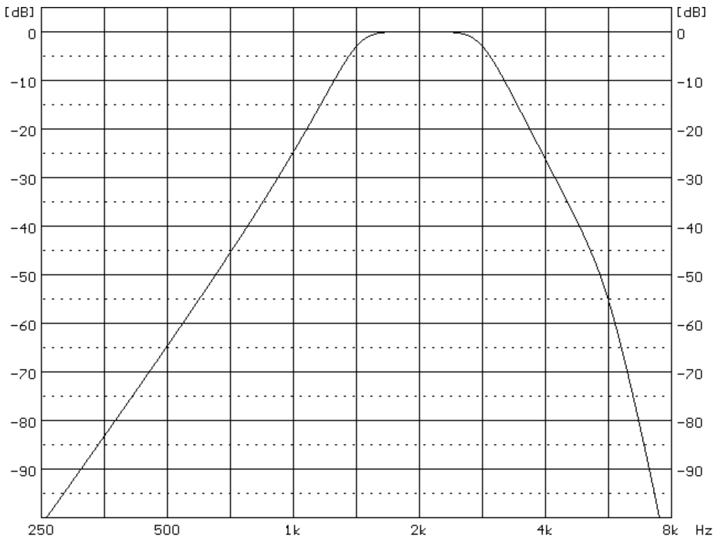
16.0 kHz 1/1 octave filter



8.0 kHz 1/1 octave filter

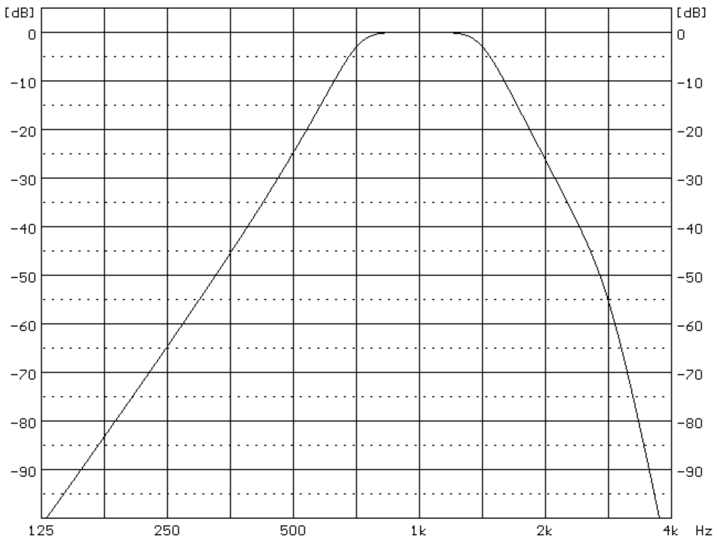


4.0 kHz 1/1 octave filter

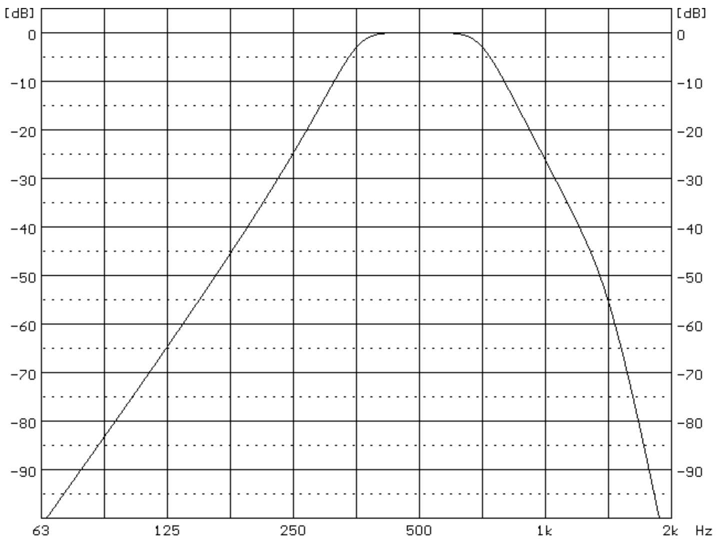


2.0 kHz 1/1 octave filter

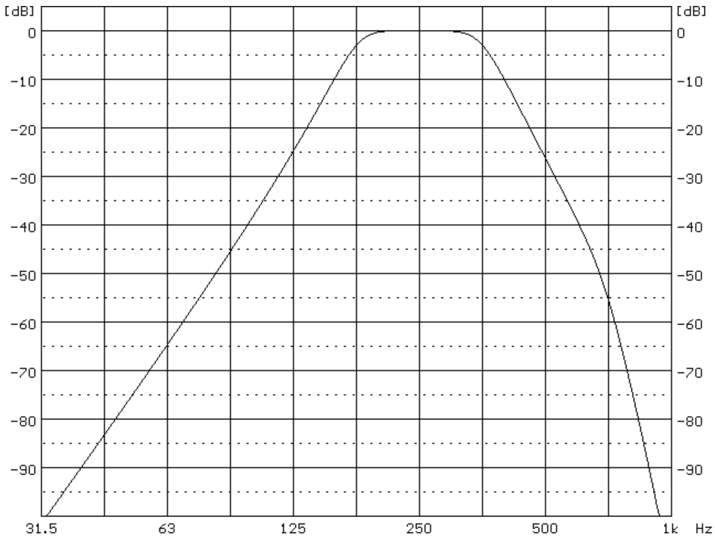
2.1



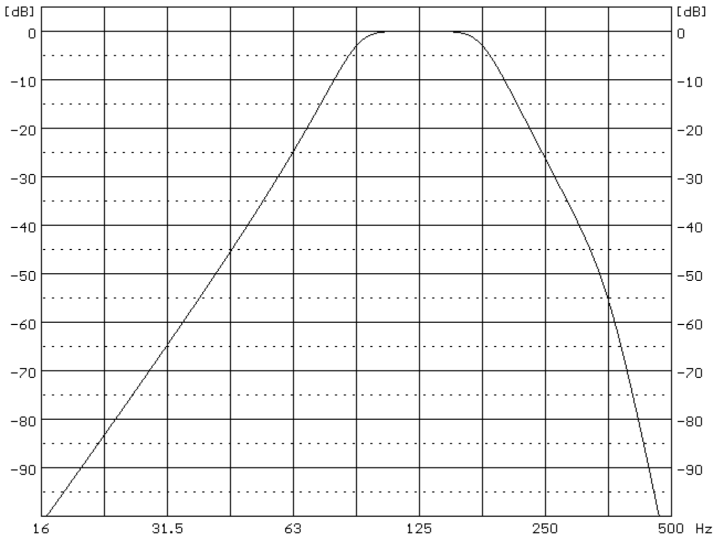
1.0 kHz 1/1 octave filter



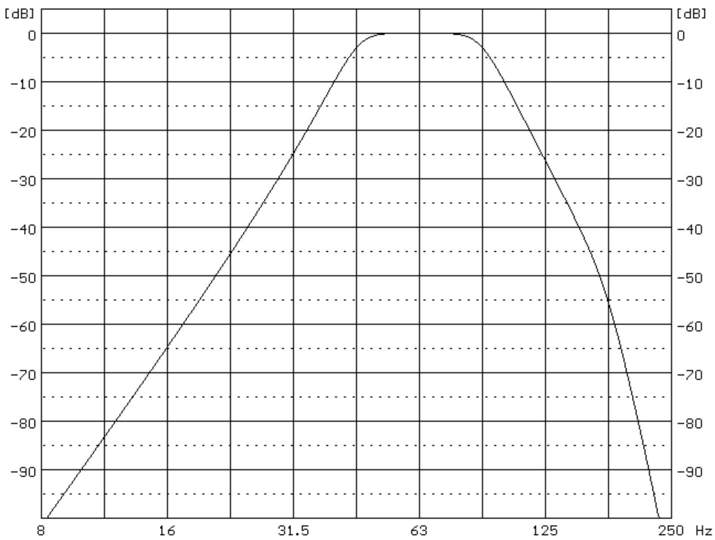
500 Hz 1/1 octave filter



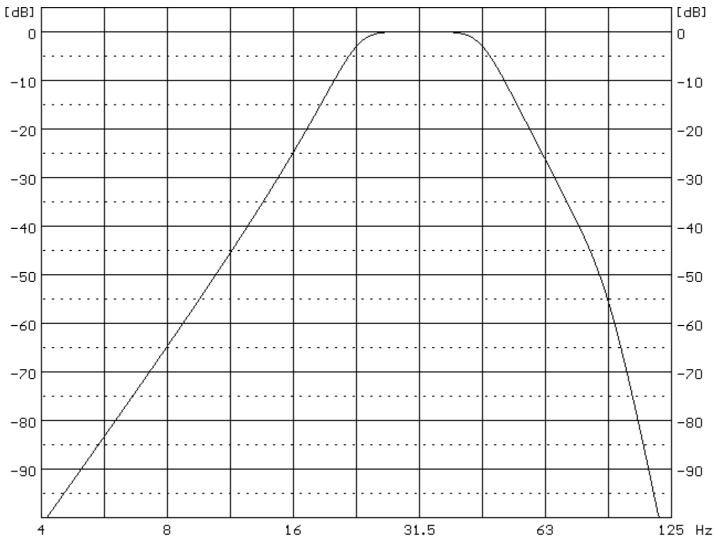
250 Hz 1/1 octave filter



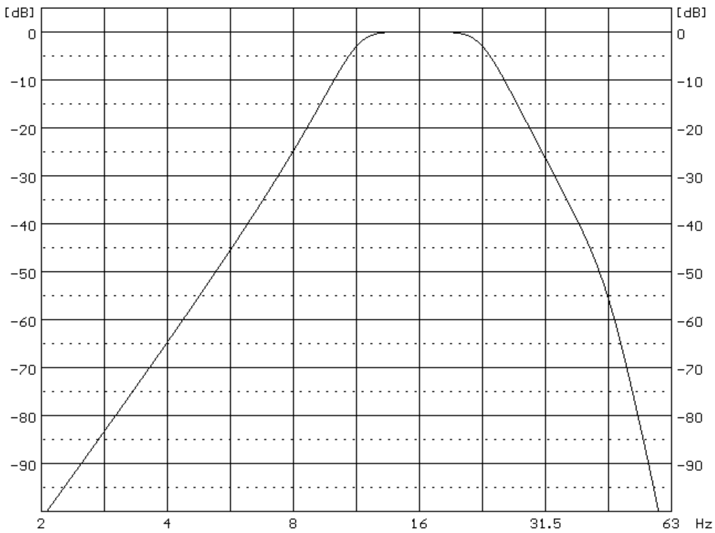
125 Hz 1/1 octave filter



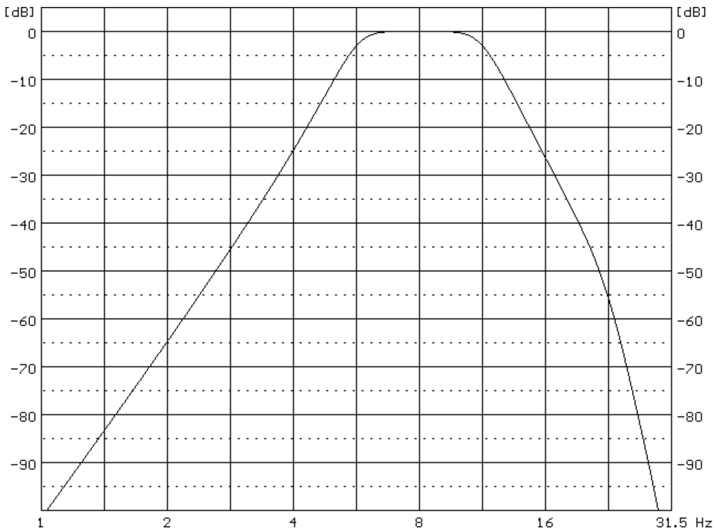
63.0 Hz 1/1 octave filter



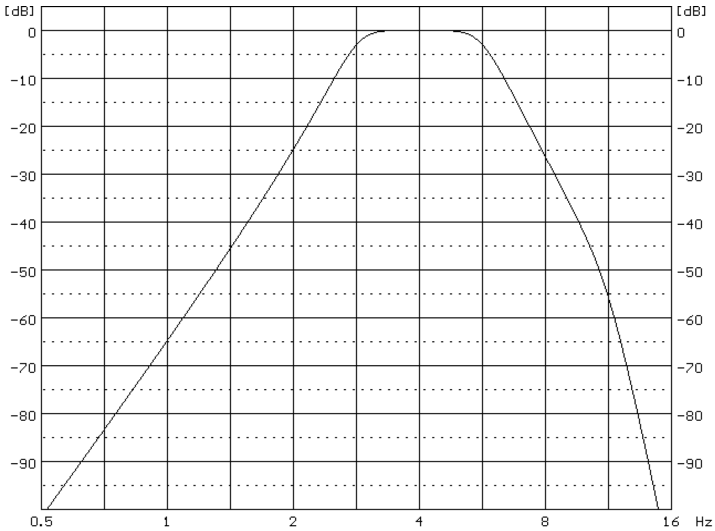
31.5 Hz 1/1 octave filter



16.0 Hz 1/1 octave filter

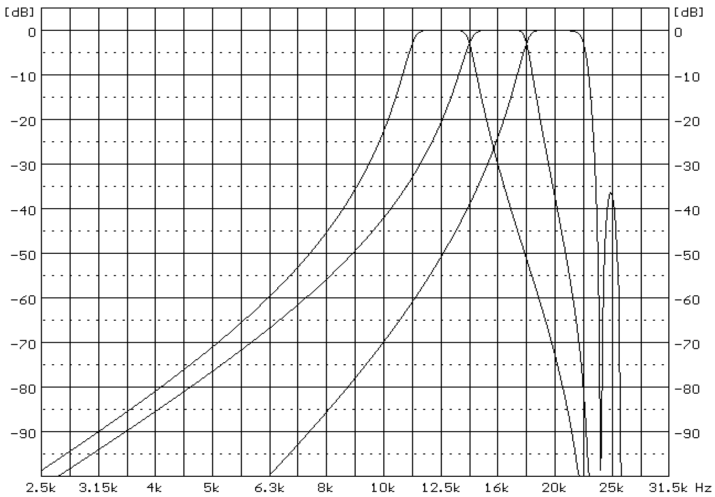


8.00 Hz 1/1 octave filter

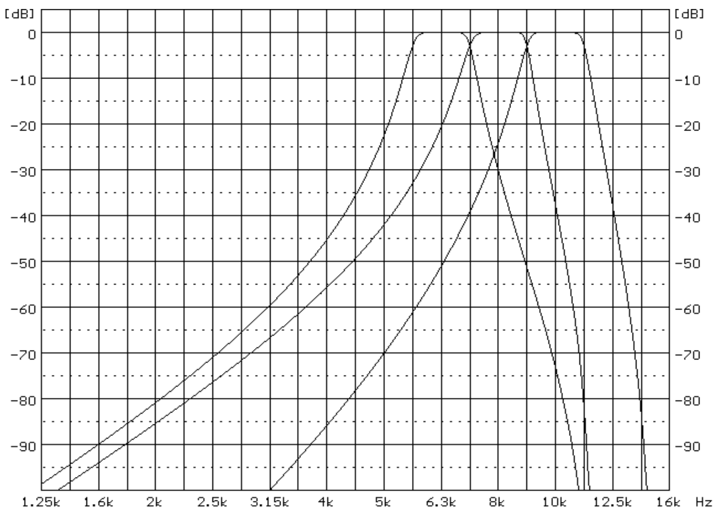


4.00 Hz 1/1 octave filter

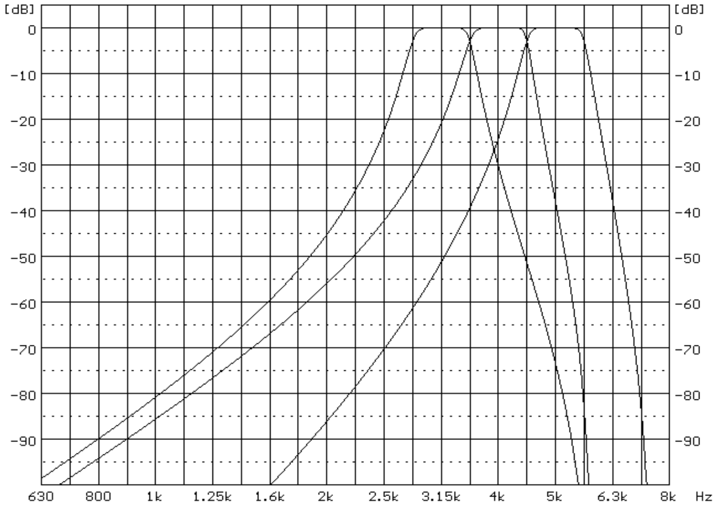
1/3 Octave filters 38 filters with centre frequencies from 4 Hz to 20 kHz (base 10), meeting the IEC 61260-1:2014 standard for Class 1



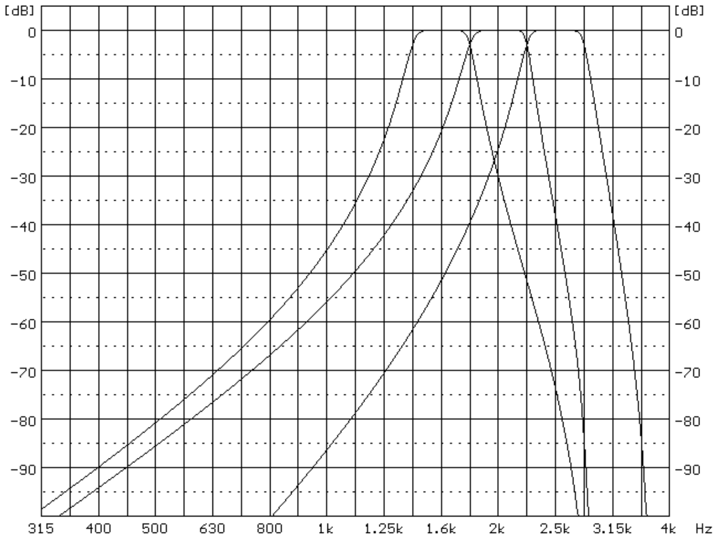
1/3 octave filters for 16.0 kHz 1/1 octave filter



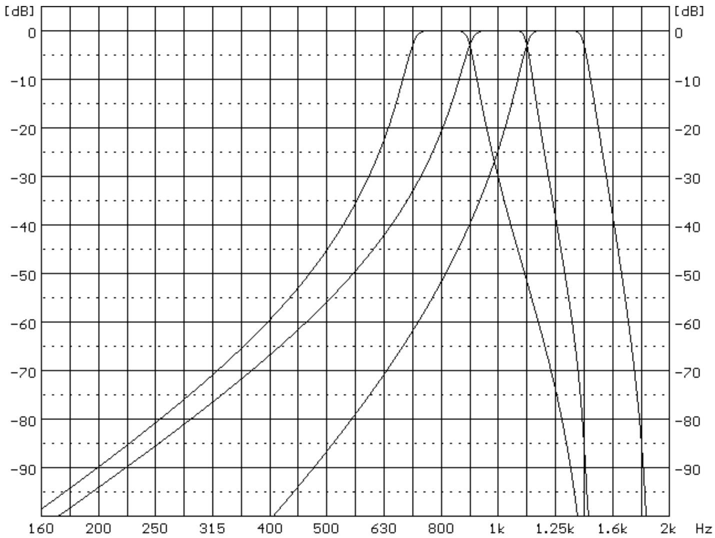
1/3 octave filters for 8.0 kHz 1/1 octave filter



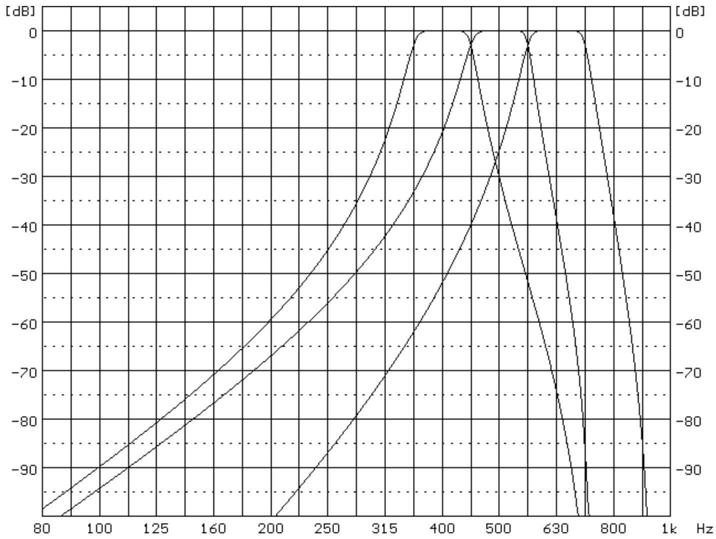
1/3 octave filters for 4.0 kHz 1/1 octave filter



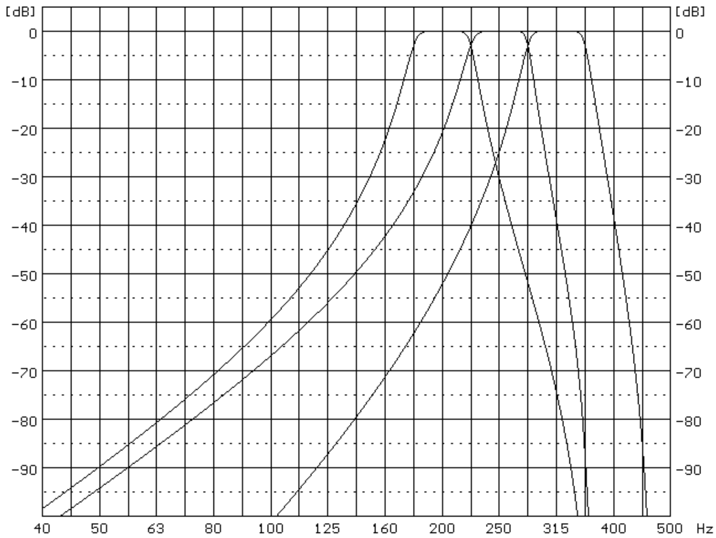
1/3 octave filters for 2.0 kHz 1/1 octave filter



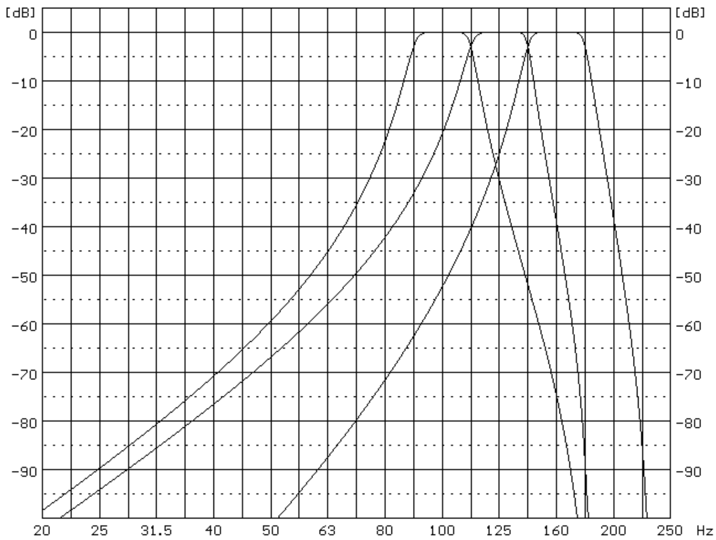
1/3 octave filters for 1.00 kHz 1/1 octave filter



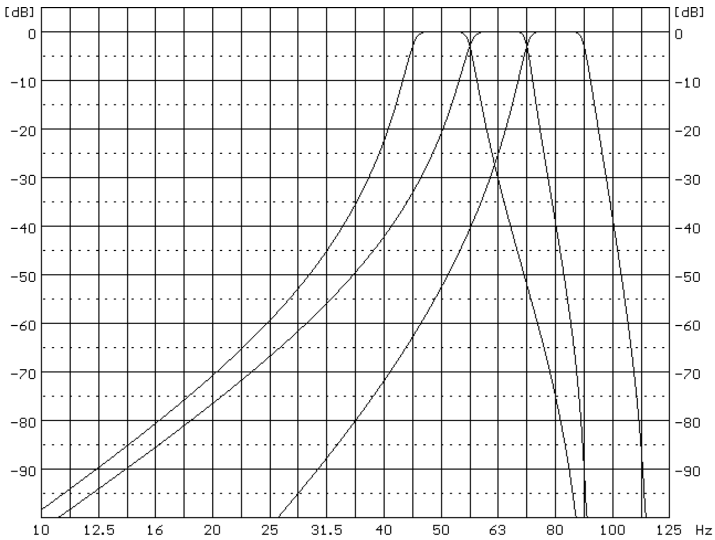
1/3 octave filters for 500 Hz 1/1 octave filter



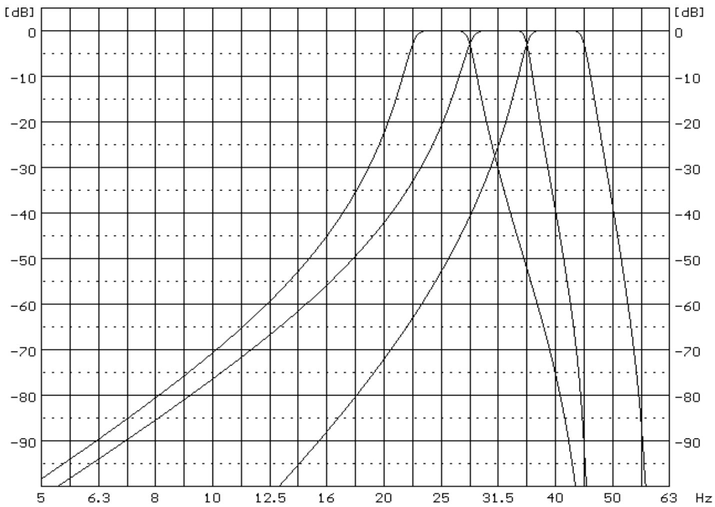
1/3 octave filters for 250 Hz 1/1 octave filter



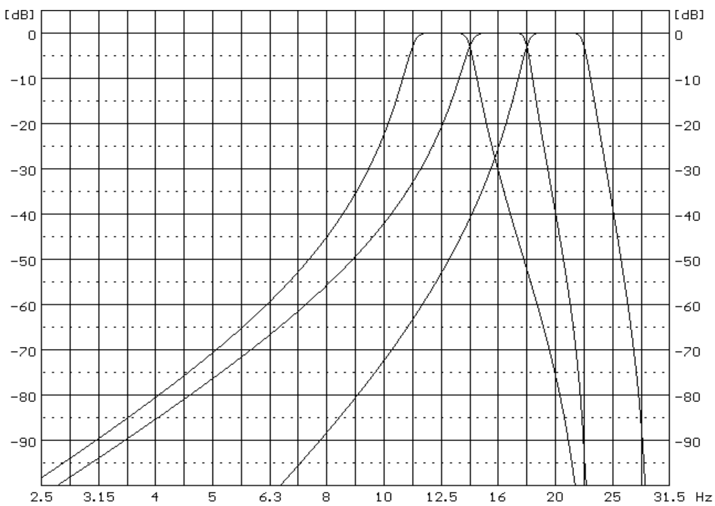
1/3 octave filters for 125 Hz 1/1 octave filter



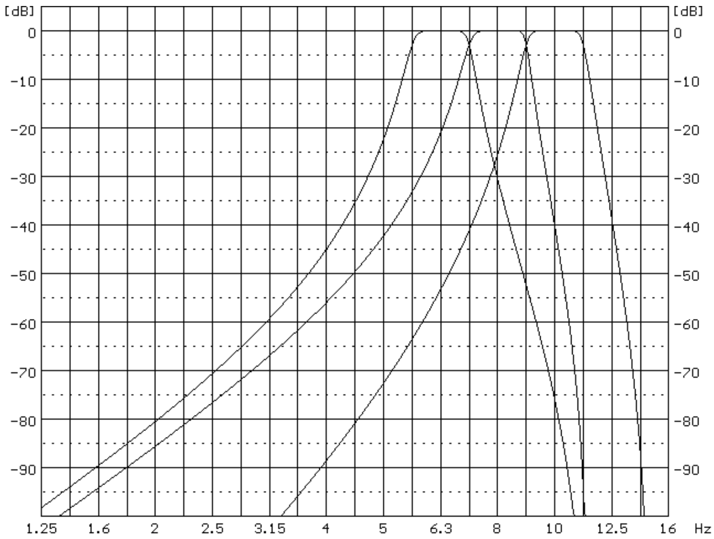
1/3 octave filters for 63.0 Hz 1/1 octave filter



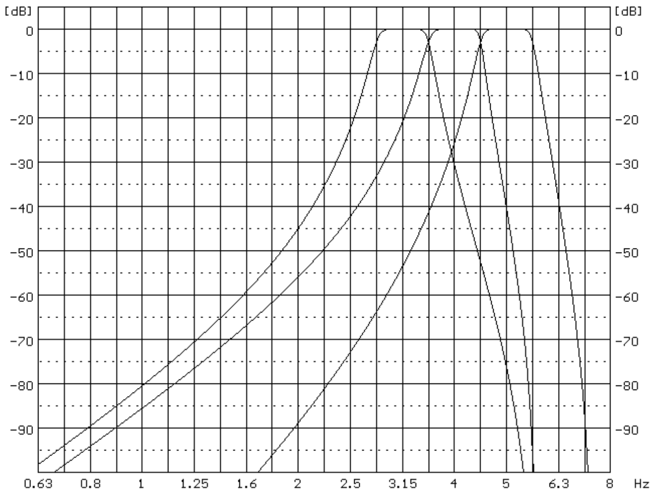
1/3 octave filters for 31.5 Hz 1/1 octave filter



1/3 octave filters for 16.0 Hz 1/1 octave filter



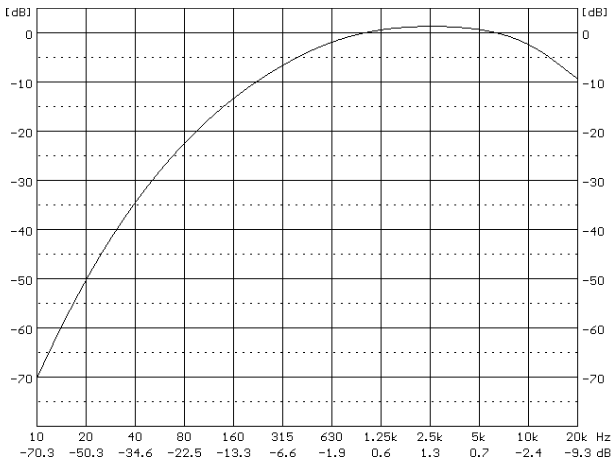
1/3 octave filters for 8.00 Hz 1/1 octave filter



1/3 octave filters for 4.00 Hz 1/1 octave filter

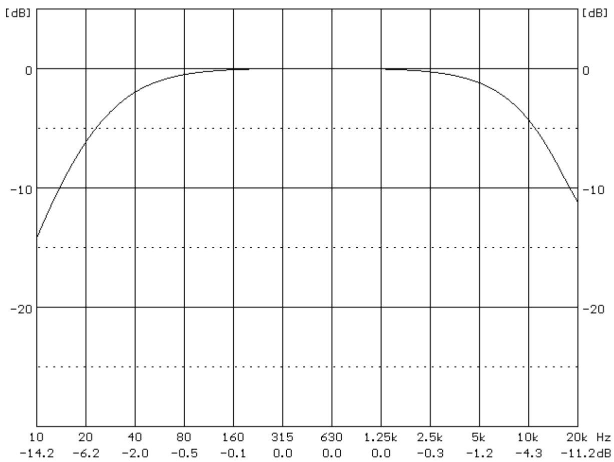
C.3 FREQUENCY CHARACTERISTICS OF THE IMPLEMENTED BROADBAND DIGITAL FILTERS

"A" filter Class 1 according to IEC 651 and IEC 61672-1:2013



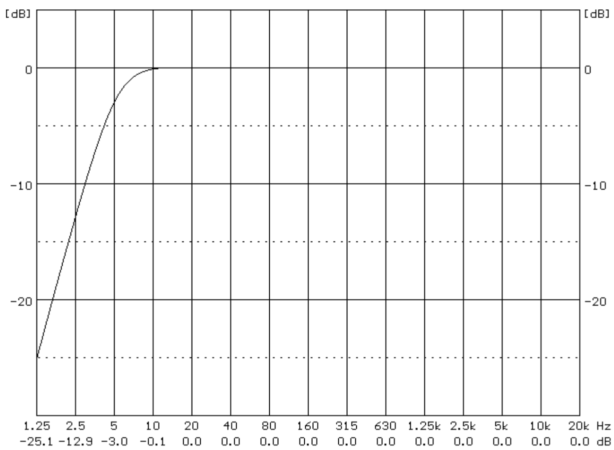
"A" filter characteristic

"C" filter Class 1 according to IEC 651 and IEC 61672-1:2013



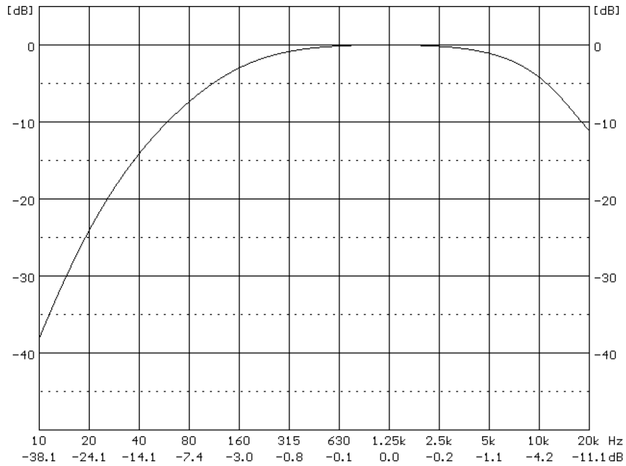
"C" filter characteristic

"Z" filter Class 1 according to IEC 61672-1:2013



"Z" filter characteristic

“B” filter Class 1 according to IEC 651



“B” filter characteristic

C.4 MISCELLANEOUS SPECIFICATION OF SV 200A

Display

Super contrast OLED monochrome white display (128 x 32 pixels).

Memory

2 MB of the RAM memory.

4 MB of the FLASH memory allocated to the program.

32 GB built-in, non-removable micro SD or SDHC industrial grade card (supported for up to 128 GB).

Internal sensors

Temperature	measurement range: -30° to +100°, typical accuracy ±0.3°
Pressure	measurement range: 50 kPa to 115 kPa, typical accuracy ±1 kPa (uncalibrated)
Humidity	measurement range: 0% to 100%, typical accuracy ±3%

Internal battery (non-removable)

Li-Ion rechargeable battery	10.8V, 6.7 Ah / 72.4 Wh, electronically protected (short circuit / over load / over voltage / over temperature)

Table C.4.1. SV 200A operation time with a fully charged battery *)

SV 200A operation mode		Power consumption mW	Operation time hours	days
All transmission modules are switched off		410	177	7.3
Mobile modem	always on 1/60 **)	700	103	4.3
	periodic on 1/24 ***)	440	164	6.8
WLAN module	always on 1/60 **)	1085	66	2,7
	periodic on 1/24 ***)	440	164	6.8
LAN module	always on 1/60 **)	875	82	3.4
	periodic on 1/24 ***)	430	169	7.0

*) Measurement conditions: nominal battery capacity (72.4 Wh), T=20°C, measurements are running, Logger Step=1s, Integration Period=1s (no matter which Function is selected), USB is disconnected, directivity measurements are off, OLED display is off, microphone heater is off, battery heater is off

**) Modem/module is constantly switched on, one minute data transmission in one hour

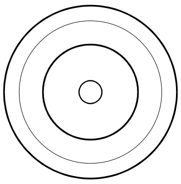
***) Modem/module is normally switched off, and is switched on for an hour in a day

Build-in electrostatic actuator

Frequency	sinusoidal wave 1 kHz.
Nominal level	94.0±0.1 dB (factory calibrated).
Duration	13 s (max 25 s).
Criterium for successful check	actuator level: 94.0±1 dB, background noise: < 74dB.

Microphone input

The input of the measured signal taken form the ½" microphone:



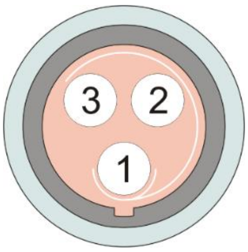
½" microphone connector (external view)

Table C.4.2. Pin out of the microphone connector

Pin number	Connector
Central	Input
Shield	Ground

Power supply (DC IN connector)

SV 200A is intended to work with the external power supply unit SB 274 or solar panel SB 276 for permanent noise monitoring. SB 274 power supply unit 100-240 V AC / 15 V DC, 2.5 A.



DC IN connector (front view)

Table C.4.3. Pin-out of the DC IN connector

Pin number	Signal name	**SB 274** power supply	**SB 276** solar panel	external DC connection (e.g. 12V acc.)
1	DC_IN-	GND	V-	V-
2	SOL_ID-	-	V-	-
3	DC_IN+	"+15V"	V+	V+

Alternative power sources (not included)

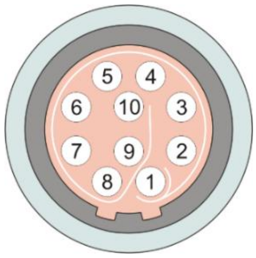
- Solar panel MPPT voltage 15.0V ÷ 20.0V, OCV < 28V

Note: *Solar panel must have enough power to supply system continuously (all seasons)! For example, to supply SV200A continuously a minimum 130W solar panel is necessary for use in Warsaw, Poland. Please contact Svantek while planning to use solar panel power supply.*

- External DC source voltage range 10.5V – 24V, e.g. 12V or 24V accumulator

External interface (MULTI I/O connector)

MULTI I/O connector has several interfaces, such as: USB 2.0, RS232, UART (TTL level), digital I/O pin and 12V, 1A power source.



MULTI I/O connector (front view)

Table C.4.4. Pin-out of the MULTI I/O connector

Pin number	Signal name	SC 256A (USB)	SP 275 (meteo)	RS232 device	UART device	Alarm lamp	External trigger
1	reserved *)	-	-	-	-	-	-
2	RX_RXD	-	RxD	RxD	-	-	-
3	RS_TXD	-	TxD	TxD	-	-	-
4	reserved *)	-	-	-	-	-	-
5	EXT_INT	USB+5V	-	-	-	-	EXT_INT-
6	reserved *)	-	-	-	-	-	-
7	EXT_12V **)	-	V+	-	-	V+	-
8	EXT_GND	GND	GND	GND	GND	GND	GND
9	USB_D-	D-	-	-	TxD	-	-
10	USB_D+	D+	-	-	RxD	-	-

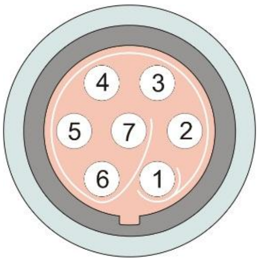
*) do not connect these pins

**) Power supply delivered from the SV 200A to a device 12V, 1A max

Note: *While connecting your SV 200A to a PC by the SC 256A cable, first insert the lemo plug into the instrument's MULT. I/O socket and then the USB plug into the PC!*

LAN connector

The LAN connector is used for connection of the SV 200A to the LAN through the SP 200 adapter.



LAN connector (front view)

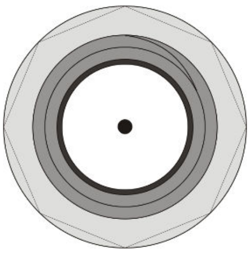
Table C.4.5. Pin-out of the LAN connector

Pin number	Signal
1	RD+
2	RD-
3	TD+
4	TD-
5	+3V3
6	POE_V+
7	POE_GND

Note: *When connecting to the LAN always use the SP 200 adapter!*

WLAN antenna connector

Recommended WLAN antenna: band 2.4GHz, gain 2.0dBi, impedance 50Ω, omni-directional, 1.4 wavelength dipole configuration. SV 200A is equipped with Pulse W1030 antenna of Pulse Finland Oy.

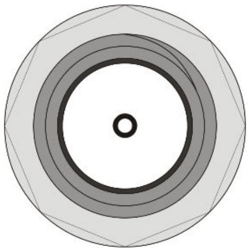


WLAN antenna connector – SMA-RP (front view)

GSM/UMTS/LTE antenna connector

The recommended GSM/UMTS antenna for 3G modem HE910-D: bands 850 / 900 / 1800 / 1900/ 2100 MHz, gain 1.0-2.5 dBi max, impedance 50Ω, omni-directional, dipole configuration. SV 200A is equipped with Pulse W1910 antenna of Pulse Finland Oy.

The recommended LTE antenna for 4G modem LE910C1-xx: frequency range 617-3800 MHZ or according to the frequency bands supported by particular model (contact Svantek for details), gain 3.0 dBi max, impedance 50Ω, recommended VSWR ≤ 2:1, omni-directional. SV 200A is equipped with Pulse W1696-M monopole stick antenna of Pulse Finland Oy.



GSM/UMTS/LTE antenna connector – SMA (front view)

Real Time Clock

Built-in real time. Accuracy better than 1 minute/month.

Weight with the battery 2.8 kg

Dimensions 700 mm length; 70 mm diameter excluding windscreen (windscreen diameter 130 mm)

Mobile modem

SV 200A has a built-in Telit HE910-D (3G) or LE910C1-EU (4G) modem depending on instrument variant.

The **HE910-D** is a GSM global module that features high-speed HSUPA/HSDPA connectivity while still leveraging backwards compatibility with GSM/GPRS and EDGE networks.

Some of the module features are:

- Quad Band GSM: 850/900/1800/1900 MHz
- UMTS/HSPA bands: 800/850/900/AWS1700/1900/2100 MHz
- HSPA+ data up to 21.0 Mbps downlink / 5.76 Mbps uplink
- WCDMA up to 384kbps downlink/uplink
- Output power
  - Class 4 (2W) @ 850/900 MHz, GSM
  - Class 1 (1W) @ 1800/1900 MHz, GSM
  - Class E2 (0.5W) @ 850/900 MHz, EDGE
  - Class E2 (0.4W) @ 1800/1900 MHz, EDGE
  - Class 3 (0.25W) @ 850/900/1700/1900/2100 MHz, WCDMA
- Sensitivity:
  - 109 dBm (typ.) @ 850/900 MHz (GSM)
  - 110 dBm (typ.) @ 1800/1900 MHz (GSM)
  - 111 dBm (typ.) @ 850/900/1700/1900/2100 MHz (WCDMA)

- Advanced E-GPRS/WCDMA/HSDPA/HSUPA Software protocol stack (Layer 1 to 3) – Version: 3GPP Release 7
- Control via AT commands according to 3GPP TS27.005, 27.007 and Telit customized AT commands
- Embedded TCP/IP stack, including TCP, IP, UDP, and FTP protocols

Approvals of the module:

- Fully type approved confirming with RED directive
- CE, GCF (Global and EUx variants)
- FCC, IC, PTCRB (NAx variants)
- RoHS and REACH (all versions)

FCC and IC

This product contains an FCC and Industry Canada certified 2.5G, 3.5G wireless transmission module:

- FCC ID: RI7HE910
- Industry Canada ID: 5131A-HE910
- Producer: Telit Communications S.p.A.
- Model: HE910-D

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

The **LE910C1-EU** is a 4G European module that features Long-Term Evolution LTE connectivity, high-speed HSUPA/HSDPA connectivity while still leveraging backwards compatibility with GSM/GPRS and EDGE networks.
Some of the module features are:
• GSM bands: B3, B8 (1800/900 MHz)

• UMTS/HSPA bands: B1, B3, B8 (2100/1800/900 MHz)

• LTE FDD bands: B1, B3, B7, B8, B20, B28A (2100/1800/2600/900/800/700 MHz)

• Output power:
2G:
- Class 4 (2W, 33dBm) @ LB, GSM
- Class 1 (1W, 30dBm) @ HB, GSM
- Class E2 (0.5W, 27dBm) @ LB, EDGE
- Class E2 (0.4W, 26dBm) @ HB, EDGE
3G:
- Class 3 (0.25W, 24dBm), WCDMA
4G:
- Class 3 (0.2W, 23dBm), LTE-FDD

• Sensitivity:
- 106 dBm @ 2G
- 111 dBm @ 3G
- 101 dBm @ 4G FDD (BW=5MHz)

Approvals of the module:
• RED (CE)

• RoHS

***Note:** 2G GPRS/EDGE network support of LE910C1-EU modem embedded in the SV 200A monitoring station is blocked.*

WLAN/LAN module

SV 200A has a built-in Connect One iW-SMG2SMT-EX or u-blox AG ODIN-W260 WLAN/LAN module depending on instrument variant.

The iW-SMG2SMT-EX is a highly integrated 802.11b/g/n wireless module which adds WLAN/LAN connectivity to SV 200A instrument.

Key features of the module are:

- Standards supported: IEEE 802.11b/g/n
- Frequency: Europe – 2.412-2.472 GHz
  USA – 2.412-2.462 GHz
  Japan – 2.412–2.484 GHz
- Channels: Europe – 13 channels
  USA – 11 channels
  Japan – 14 channels
- Transmit Power Levels (typ): 802.11b 17 dBm
  802.11g 14 dBm
  802.11n 12 dBm
- Receiver Minimum Input Level Sensitivity (typ):
  802.11b (Data Rate = 11Mbps PER < 8%) -87 dBm
  802.11b (Data Rate = 1Mbps PER < 8%) -94 dBm
  802.11g (Data Rate = 54Mbps PER <10%) -73 dBm
  802.11g (Data Rate = 6Mbps PER <10%) -86 dBm
  802.11n (MCS0 PER <10%) -86 dBm
  802.11n (MCS7 PER <10%) -70 dBm
- Maximum Transmit Rate: 802.11b 11 Mbps
  802.11g 54 Mbps
  802.11n @ (MCS7, HT20) 72.2 Mbps
- Supports Ethernet connectivity
- Built-in TCP/IP protocol stack and web-based application framework
- Multiple internet protocols: ARP, ICMP, IP, UDP, TCP, DHCP, DNS, NTP, SMTP, POP3, MIME, HTTP, FTP and TELNET
- Security protocols: SSL3/TLS1, HTTPS, FTPS, RSA, AES-128/256, 3DES, RC-4, SHA-1, MD-5, WEP, WPA/WPA2 (PSK and Enterprise)
- Host data rates up to 3Mbps using UART serial interface
- Optional configuration and firmware upgrade through a web interface

Certifications

- Radio & EMC:
  - USA: FCC Modular Approval; CFR Title 47 FCC Part 15, Subpart B and C
  - Canada: Industry Canada Module Approval; Industry Canada ICES-003, RSS-Gen, RSS-210

- EU: 2014/53/UE RED (Radio Equipment Devices) Directive

- Safety:

  - UL 60950

  - CAN/CSA-C22.2 No. 60950

  - 2014/53/UE RED (Radio Equipment Devices) Directive

The ODIN-W260 is a highly integrated 802.11a/b/g/n wireless module which adds WLAN/LAN connectivity to SV 200A instrument.

Key features of the module are:

- Standards supported: IEEE 802.11a/b/g/n
- Frequency range: 802.11b/g/n – 2.400-2.500 GHz
  802.11a/n – 5.180-5.825 GHz*
- Channels in station mode: 802.11b/g/n – 1-13
  802.11a/n – 36-165*
- Channels in access point mode: 802.11b/g/n – 1-11
  802.11a/n – 36-48*
- Supported data rates: 802.11b – 1, 2, 5.5, 11 Mbps
  802.11a/g – 6, 9, 12, 18, 24, 36, 48, 54 Mbps
  802.11n SISO – MCS0-MCS7, HT20 (6.5-65 Mbit/s)
  802.11n MIMO – MCS8-MCS15, HT20 (13-130 Mbit/s)*
- Supported bandwidth: 802.11n – 20 MHz
- Maximum conducted output power: 15 dBm
- Maximum radiated output power: 18 dBm (incl. +3 dBi antenna gain)
- Conducted sensitivity 2.4 GHz: -95 dBm
- Conducted sensitivity 5 GHz: -90 dBm*
- Receiver Minimum Input Level Sensitivity (type):

  802.11b (Data Rate = 1Mbps, PER <= 8%, channel = 6 / 2437[MHz]) -95 dBm

  802.11b (Data Rate = 11Mbps, PER <= 8%, channel = 6 / 2437[MHz]) -86 dBm

  802.11g (Data Rate = 6Mbps, PER <= 10%, channel = 6 / 2437[MHz]) -90 dBm

  802.11g (Data Rate = 54Mbps, PER <= 10%, channel = 6 / 2437[MHz]) -72 dBm

  802.11n (SISO, MCS0, PER <=10%, channel = 6 / 2437[MHz]) -82 dBm

  802.11n (MISO, MCS8, PER <=10%, channel = 6 / 2437[MHz]) -82 dBm*

  802.11n (SISO, MCS7, PER <=10%, channel = 6 / 2437[MHz]) -64 dBm

  802.11n (MISO, MCS15, PER <=10%, channel = 6 / 2437[MHz]) -64 dBm*

- Transmitter output power (type):

  802.11b (Data Rate = 1Mbps, PER <= 8%, channel = 6 / 2437[MHz]) 11.2 dBm

  802.11b (Data Rate = 11Mbps, PER <= 8%, channel = 6 / 2437[MHz]) 11.3 dBm

  802.11g (Data Rate = 6Mbps, PER <= 10%, channel = 6 / 2437[MHz]) 14.2 dBm

  802.11g (Data Rate = 54Mbps, PER <= 10%, channel = 6 / 2437[MHz]) 12.1 dBm

802.11n (SISO, MCS0, channel = 6 / 2437[MHz]) 14.4 dBm

802.11n (MISO, MCS8, channel = 6 / 2437[MHz]) 11.5 dBm*

802.11n (SISO, MCS7, channel = 6 / 2437[MHz]) 12.0 dBm

802.11n (MISO, MCS15, channel = 6 / 2437[MHz]) 9.3 dBm*

- Supports Ethernet connectivity
- Built-in TCP/IP and UDP protocol stack
- Multiple internet protocols: ARP, ICMP, IP, UDP, TCP, DHCP, DNS
- Security protocols: TLS, WEP, TKIP, AES/CCMP, WPA/WPA2 (PSK)
- Host data rates up to 5Mbps using UART serial interface

Note (*): 802.11a/n mode (5GHz bandwidth and MIMO) of ODIN-W260 module embedded in the SV 200A monitoring station is blocked.

Certifications

- Radio & EMC:

  - EU: 2014/53/UE RED (Radio Equipment Devices) Directive

  - USA: FCC Modular Approval; CFR Title 47 FCC Part 15, Subpart B; (FCC ID: PVH0965)

  - Canada: Industry Canada Module Approval; Industry Canada IC RSS-102; (IC: 5325A-0965)

- Safety:

  - 2014/53/UE RED (Radio Equipment Devices) Directive

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.(*)

Wireless Bluetooth®[2] 4.0

This instrument supports wireless connection via Fully Qualified Bluetooth system v4.0 + EDR, CE and FCC. This connectivity is compatible with mobile and PC devices that support Bluetooth® 2.0.

The instrument contains a wireless transmission module, BLE121LR from Bluegiga technologies. Copies of the modules regional approvals certificates may be obtained from Svantek or Bluegiga.

- Bluetooth version: 4.0
- Operating frequency range: 2.402 – 2.480 GHz
- Transmit power (max): 8 dBm
- Sensitivity: standard mode -92 dBm
  high gain mode -98 dBm
- Channels: 40
- Modulation: GFSK

[2] “The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by SVANTEK is under license. Other trademarks and trade names are those of their respective owners.

- Internal antenna gain: 0 dBi
- Range: up to 450 m line-of-sight and depending on local RF conditions.

Certifications: FCC and IC

This product contains an FCC and Industry Canada certified Bluetooth® Low energy wireless transmission module:

- FCC ID: QOQBLE121LR
- Industry Canada ID: 5123A-BGTBLE121LR
- Producer: Silicon Laboratories
- Model: BLE121LR-A-M256K Smart Long Range Module

FCC Statements:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Operation is subject to the following two conditions:

- This device may not cause interference and
- This device must accept any interference, including interference that may cause undesired operation of the device.

GPS

The instrument has a built-in A2235-H GPS module of Maestro Wireless Solutions (HK) Ltd. intended for logging position and time definition.

GPS is an antenna module with SiRF Star IV ROM based chip and an on-board integrated antenna.

- Position Accuracy (horizontal): < 2.5 m CEP (autonomous),
- Tracking Sensitivity: -163dBm
- Time accuracy: <1µs (directly depends on position deviation)

Sound Directivity Measurement System

Four MEMS microphones frequency range: 50 Hz to 2500 Hz, typical accuracy ±10° for all X, Y and Z directions

Table C.4.6. System specification

	Direction XY	**Direction Z**
Band	20 -2500 [Hz]	50 -1500 [Hz]
Minimum level of RMS	40 [dB]	40 [dB]
Maximum level of RMS	120 [dB]	120 [dB]
Resolution	1 deg	1 deg
Accuracy	+/-10 deg	+/- 10 deg

Compliance with EU Directives (see Chapter C.5)

CE mark indicates compliance with:

- RED Directive 2014/53/EU

Note: *EMC compatibility is guaranteed only with the original accessories supplied by SVANTEK!*

C.5 CE Declaration of Conformity

Manufacturer:	**SVANTEK Sp. z o. o**
Address:	Strzyglowska 81 04-872 Warszawa Poland
Kind of product:	NOISE MONITORING TERMINAL
Type:	**SV 200A**
Directive:	**Directive 2014/53/EU** of The European Parliament and of The Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (OJ L 153/62 of 22.5.2014).
Standards:	
Art 3.1a: Safety	EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
Art 3.1b: EMC	ETSI EN 301 489-1 V2.1.1 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU ETSI EN 301 489-17 V3.1.1 ElectroMagnetic Compatibility (EMC)standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU ETSI EN 301 489-19 V2.1.1 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU ETSI EN 301 489-52 VI-I.O Electromagnetic Compatibility (EMC)standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU EN 55032:2015 Electromagnetic compatibility of multimedia equipment — Emission requirements (PN -EN 55032:2015, IDT) EN 61000-4-2:2009 Electromagnetic compatibility (EMC)-Part 4-2: Test-ing and measuring techniques— Electrostatic discharge immunity test

EN 61000-4-3:2006+A1 2008+A2 2010+1SI 2009 Electromagnetic compatibility (EMC) - Part 4 - 3: Testing and measurement techniques - Radiated, radiofrequency, electromagnetic field immunity test

EN 61000-4-8:2010 Electromagnetic compatibility (EMC) - Part 4 - 8: Testing and measurement techniques - Power frequency magnetic field immunity test

EN 61000-4-11:2004+A1:2017 Electromagnetic compatibility (EMC) - Part 4 11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

EN 61000-4-20:2010 Electromagnetic compatibility (EMC) - Part 4-20: Testing and measurement techniques Emission and immunity testing in transverse electromagnetic (TEM) waveguides

Art 3.2: Radio

ETSI EN 300 328 V2.1.1 Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

ETSI EN 301 511 V12.5.1 Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

ETSI EN 301 908-1 V 11.1.1 IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements

ETSI EN 301 908-2 VI 1.1.2 IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)

ETSI EN 303 413 VI.I.I Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1164 MHz to 1300 MHz and 1559 MHz to 1610 MHz frequency bands; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Directive: **Restriction of Hazardous Substances** (ROHS II) 2011/65/EU

Standards: EN 50581:2012 *Assessment of electronic products with respect to RoHS*

Auxiliary industry standards:

IEC 61672-1:2013.Electroacoustics - Sound level meters – Part 1:Specifications.

IEC 61260-1:2014. Octave-band filters

Appendix D. DEFINITIONS AND FORMULAE OF MEASURED VALUES

D.1 BASIC TERMS AND DEFINITIONS

T Current time period of the measurement in seconds.

T_1 Last second of the measurement.

T_e Exposure time in seconds (time period during which a person is exposed to the action of noise). This parameter can be set in the **Exposure Time** setup (**Measurement** menu). The available values are from 1 minute to 12 hours with 1 minute step.

T_{8h} Time period equal to 8 hours (28 800 seconds).

τ Exponential time constant in seconds for the giving time-weighting. Three time constant are available: **Slow** (1000 ms), **Fast** (125 ms), **Impulse** (35 ms, but on falling values a longer time constant of 1500 ms is applied).

W Frequency-weighting filter: **A**, **C, B** or **Z**.

$p_W(t)$ Instantaneous frequency-weighted sound pressure with the weighting filter **W**. Sound pressure is expressed in pascals (Pa).

$p_{W\tau}(t)$ Instantaneous frequency and time-weighted sound pressure with the weighting filter **W** and time constant τ calculated from the equation:

$$p_{W\tau}(t) = \sqrt{\frac{1}{\tau}\int_{-\infty}^{t} p_W^2(\xi)\, e^{-(t-\xi)/\tau}\, d\xi}$$

where: ξ – variable of integration.

$r(t)$ Instantaneous sound pressure depends on the <**RMS Integration**> parameter:

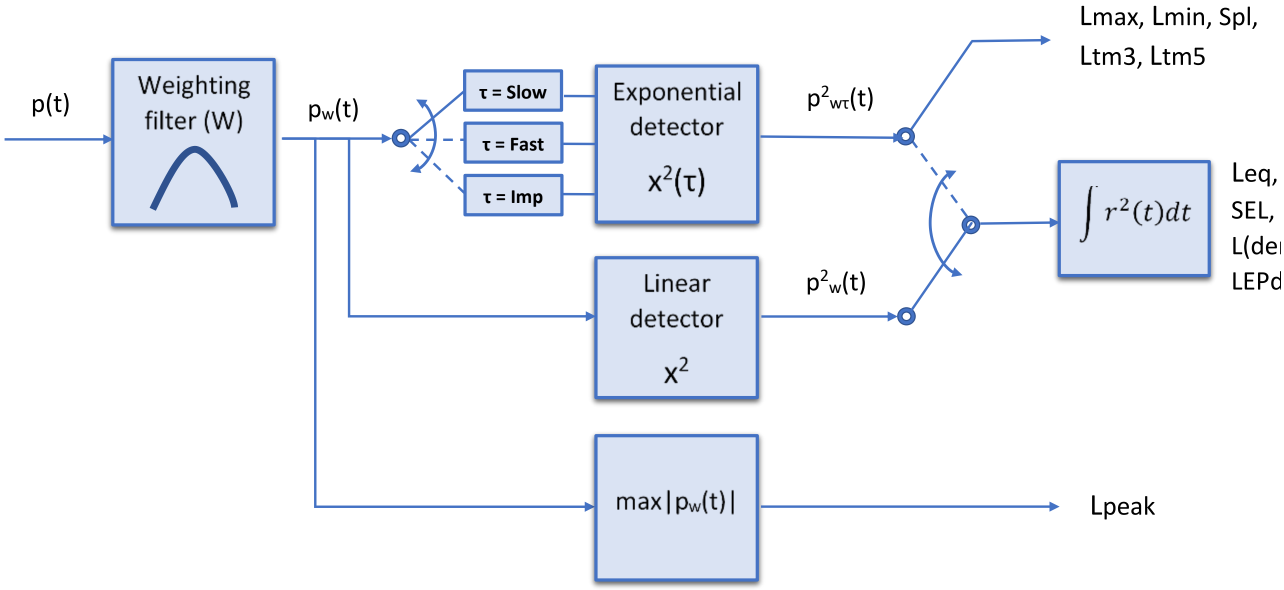
$$r(t) = \begin{cases} p_W(t) & \textbf{RMS Integration} = \textbf{Lin} \\ p_{W\tau}(t) & \textbf{RMS Integration} = \textbf{Exp} \end{cases}$$

p_0 Reference value (20 μPa).

$\log(x)$ Logarithm of x to the base 10.

D.2 Definitions and formulas of the SLM results

The instrument calculates the sound measurement results for three profiles. The calculation flow diagram for one profile is presented below:



OVL Percentage of the overloaded input signal, which occurred during the current time period of the measurement (**T**)

L(A/C/Z)peak Peak sound level expressed in dB, for frequency weightings A, C, Z, symbols are **LApeak**, **LCpeak** and **LZpeak**. Peak sound level is calculated for the given **T**.

$$\mathbf{Peak} = 10\log\left(\max_T \frac{p_W^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I)max The highest time weighted sound level (**Max**) expressed in dB, within a stated time interval, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAFmax, LASmax, LCFmax, LCSmax etc.

$$\mathbf{Max} = 10\log\left(\max_T \frac{p_{W\tau}^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I)min The lowest time weighted sound level (**Min**) expressed in dB, within a stated time interval, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAFmin, LASmin, LCFmin, LCSmin etc.

$$\mathbf{Min} = 10\log\left(\min_T \frac{p_{W\tau}^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I)

Time weighted sound level (SPL) expressed at observation time, expressed in dB, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAF, LAS, LCF, LCS etc.

$$\mathbf{L} = 10 \log \left(\frac{p_{w\tau}^2(t)}{p_0^2} \right)$$

L(A/C/Z)eq

Time averaged equivalent continuous sound level (**Leq**) expressed in dB, for frequency weightings A, C, Z symbols are LAeq, LCeq and LZeq. In principle time weighting is not involved in a determination of time averaged sound level. Time-averaged sound level is calculated for current time period of the measurement (**T**).

$$\mathbf{Leq} = 10 \log \left(\frac{1}{T} \int_0^T \left(r(t)/p_0 \right)^2 dt \right)$$

L(A/C/Z)E

Sound Exposure Level (SEL) expressed in dB, for frequency weightings A, C, Z, symbols are LAE, LCE and LZE. SEL is essentially the subset of the **Leq** result. Its value is equal to the **Leq** result referred to the integration time equal to one second (so, for the Integration time equal to 1 s, SEL is always equal to **Leq**).

$$\mathbf{SEL} = 10 \log \left(\int_0^T \left(r(t)/p_0 \right)^2 dt \right) = \mathbf{Leq} + 10 \log \frac{T}{1s}$$

L(den)

Only one result from: **Ld**, **Le**, **Ln**, **Lde**, **Len**, **Lnd**, and **Lden** is available in the instrument. It depends on the day and night time in which the measurement was performed. Day and night time depend on the **<Day Time Limits>** option (**6h-18h** or **7h-19h**).

If **<6h-18h>** option is selected for the <**Day Time Limits>** in the instrument then:

$\mathbf{T_d}$ (day-time) starts from 6 am and ends at 6 pm,

$\mathbf{T_e}$ (evening-time) starts from 6 pm and ends at 10 pm,

$\mathbf{T_n}$ (night-time) starts at 10 pm and ends at 6 am.

If **<7h-19h>** option is selected for the <**Day Time Limits>** in the instrument then:

$\mathbf{T_d}$ (day-time) starts from 7 am and ends at 7 pm,

$\mathbf{T_e}$ (evening-time) starts from 7 pm and ends at 11 pm,

$\mathbf{T_n}$ (night-time) starts at 11 pm and ends at 7 am.

Ld

Ld is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} = 0$.

$$\mathbf{Ld} = 10 \log \left(\frac{1}{T_d} \int_{T_d} \left(r_w(t)/p_0 \right)^2 dt \right)$$

Le

Le is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} = 0$.

$$\mathbf{Le} = 5\ \mathrm{dB} + 10 \log \left(\frac{1}{T_e} \int_{T_e} \left(r_w(t)/p_0 \right)^2 dt \right)$$

Ln

Ln is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} \neq 0$.

$$\mathbf{Ln = 10\ dB + 10\ log\left(\frac{1}{T_n}\int_{T_n}(r_w(t)/p_o)^2\,dt\right)}$$

Lde

Lde is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} = 0$.

$$\mathbf{Lde = 10\ log\left[\frac{1}{12+4}\left(12\cdot 10^{Ld/10} + 4\cdot 10^{Le/10}\right)\right]}$$

Len

Len is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} \neq 0$.

$$\mathbf{Len = 10\ log\left[\frac{1}{4+8}\left(4\cdot 10^{Le/10} + 8\cdot 10^{Ln/10}\right)\right]}$$

Lnd

Lnd is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} \neq 0$.

$$\mathbf{Lnd = 10\ log\left[\frac{1}{8+12}\left(8\cdot 10^{Ln/10} + 12\cdot 10^{Ld/10}\right)\right]}$$

Lden

Lden is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} \neq 0$.

$$\mathbf{Lden = 10\ log\left[\frac{1}{12+8+4}\left(12\cdot 10^{Ld/10} + 4\cdot 10^{Le/10} + 8\cdot 10^{Ln/10}\right)\right]}$$

LEPd

Daily Personal Noise Exposure is the noise exposure level for a nominal 8-hour working day. The **LEPd** result is calculated on the base of the **LEQ**

$$\mathbf{LEPd = Leq + 10\ log\frac{T_e}{T_{8h}}}$$

Ltm3 and **Ltm5**

The **Ltm3** and **Ltm5** results (Takt-Maximal Levels) are calculated according to the German standard TA Lärm.

Ln

Statistical level is the certain boundary level surpassed by the temporary noise level values in not more than **n%** of the observation period

Example: Let us assume that **L35** is equal to 76.8 dB. It means that during the measurements the noise level 76.8 dB was exceeded in not more than 35% of the observation period.

D.3 STATISTICAL LEVELS – LN DEFINITION

The noise level **L(t)** is the continuous random variable. The probability that the temporary noise level **L(t)** belongs to the interval $\langle L_k, L_k + \Delta L \rangle$ is called the class density and it can be expressed by the equation:

$$P_k\left[L_k \le L(t) \le L_k + \Delta L\right] = \sum_{i=1}^{n} \Delta t_i \Big/ P$$

where:

- Δt_i - time intervals, in which the noise level $L(t) \in \langle L_k, L_k + \Delta L \rangle$ occurs,
- ΔL - so-called class interval or distribution class of the series,
- P - total observation period.

In case when the class interval approaches infinity, the probability of **L(t)** tends to the probability of L_k. In practice, ΔL value is strictly determined and it depends mainly on the dynamics of the measurements performed in the instrument. There are 120 classes in the instrument and the width of each class is equal to 1 dB. The histogram is the set of the class density values calculated for all classes.

The statistical distribution function, which determines the probability (expressed in %) of the noise occurrence on the level equal or less than $L_k + \Delta L$ is given by the formulae:

$$P\left[L(t) \le L_j\right] = \sum_{k=1}^{j} P_k(L)$$

The cumulative density function, expressed by the equation:

$$P\left[L(t) > L_j\right] = 1 - P\left[L(t) \le L_j\right]$$

is directly used to determine so-called statistical levels **Ln** or position parameters of the distribution.

The **Ln** is the certain boundary level surpassed by the temporary noise level values in not more than **n%** of the observation period.

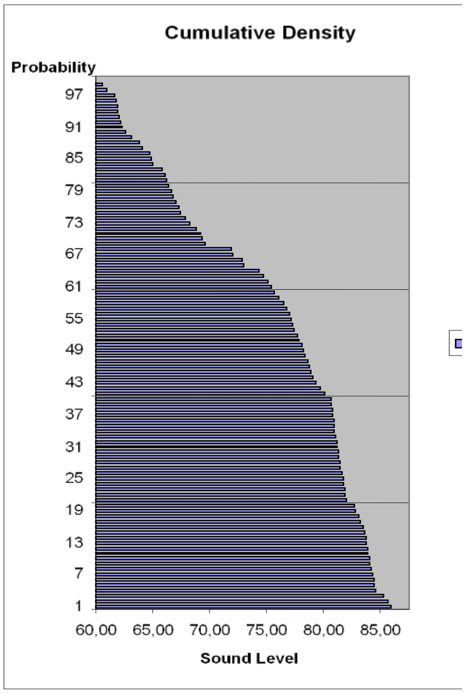
Example:

Let us assume that **L35** is equal to 76.8 dB. It means that during the measurements the noise level 76.8 dB was exceeded in not more than 35% of the observation period.

The cumulative density function for the exemplary data is presented in Figure on the right side. In order to determine the **Ln** level one has to draw the horizontal cursor and find out the crossing point between the cumulative density function and the cursor. In the instrument the user can determine 10 statistical levels - from **L01** to **L99** (1% step of observation period).

The display in the instrument presents only first statistical level N1 (set to: L01 up to L99).

The statistical level **LN%** value, the profile's number the statistics are taken from, the RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp.**), the filter's name (**A**, **C** or **Z**) and real time are displayed in the top-right side of the display in one-result view mode.



Exemplary cumulative density