SVANTEK

USER MANUAL

SV 200A

NOISE MONITORING STATION

Warsaw, 2023-04-25

Rev. 2.05

Note: *Because of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date user's manual please visit our website at www.svantek.com. This user's manual presents the firmware revision named* ***1.08****.*

The succeeding software revisions (marked with the higher numbers) can change the view of some displays presented in the text of the manual.

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IMPORTANT NOTES BEFORE USE

- ✓ *SV 200A should be installed vertically with the microphone pointing 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, first plug the lemo connector into MULT. I/O socket 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 will be 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 once 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. Good practice is to mount it on the pole or mast.*
- ✓ *When opening the control panel flap, the coin-operated screw should be loosened with a coin, for example, and then unscrewed with your fingers to the stop. Opening the flap with the screw in the middle position, the paint finish on the case may be damage.*
- ✓ *The maximum sound pressure level that can affect the microphone without damaging its diaphragm is 146 dB.*

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1 INTRODUCTION

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

The instrument is an ideal choice for an unattended permanent and semi-permanent environmental noise and weather monitoring. Instrument can be used for community and airport noise monitoring.

The system enables easy communication, data download and configuration using PC or mobile device over the Internet or local network.

SV 200A meets Class 1 requirements of IEC 61672-1:2013 standard and provides broad band results with all required weighting filters, 1/1 octave & 1/3 octave spectra with complete statistical analysis.

Instrument can be easily calibrated in-field using sound calibrator. Built-in electrostatic actuator can be activated remotely or periodically in automated mode for self-testing.

SV 200A enables great logging capability which includes time history of broad band results and spectra with two selectable logging steps down to 20 milliseconds and audio recording on trigger of different types. Data are stored in the instrument's memory and can be transferred over the internet on demand or in automatic mode.

Remote communication option for the *SvanPC++* software and the *SvanNET* web server provides advanced communication with files downloading, data visualization and measurement results exporting. Environmental monitoring option for the *SvanPC++* software is dedicated for measurement data management, advanced data processing, analysis, visualization and reporting.

Thanks to robust casing, protection against overheating & humidity condensation, built-in rechargeable battery, this instrument is excellent for permanent installation in all environmental conditions.

Thanks to four MEMS microphones built into the body of SV 200A you can detect the source of the dominant energy occurs 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** ($L_1 \div L_{99}$) 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 dedicated for unattended permanent and short period noise monitoring
- Integrated, non-removable microphone preamplifier
- Noise measurements meeting IEC 61672-1:2013, class 1 standard
- 1/1 & 1/3 octave real-time analysis
- Audio events and wave recording
- AAC audio compression (future option)
- Statistical analysis with up to 10 percentile values
- Community and airport direction 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
- Vaisala WXT5xx and GILL GMX600 weather monitoring modules support
- Easy connection configuration by means of *SVANNET APP* software
- Easy remote access over PC or Smartphone by means of the Sv*anNET* web service
- Precise time synchronization and GPS position of the instrument
- Up to 6 days of autonomy operation (internal battery operating time with all radio modules off)
- Advanced software for data processing and reporting *SvanPC++_EM*
- Li-Ion 72.4 Wh rechargeable battery (non-removable)
- Direct connection of solar panel (without controller) or DC power supply
- Robust design
- Ingress Protection Rating IP 54
- Easy and fast installation in-field
- 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 SV 36 – Class 1 sound calibrator

For results verification purposes, most norms and standards impose the requirement to calibrate the measurement channel before and after each measurement or measurement session.

A sound calibrator is a device which produces an acoustic pressure of defined level and frequency.

SV 36 produces an acoustic pressure of defined level 94/114 dB at a frequency of 1 kHz.

1.4.2 SB 276 – solar panel

The **SB 276** solar panel (40 W, 17.5 V) extends the working time of the monitoring station. Size and weight of the panel enables easy transportation in the dedicated carrying bag.

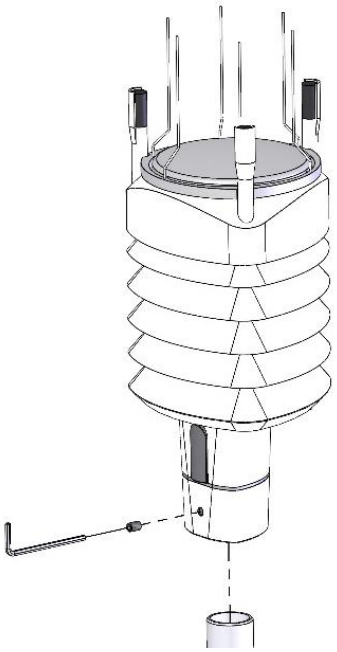
SB 276 does not require additional batteries or external controllers.

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

1.4.3 SA 206 – telescopic mast

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

1.4.4 SP 275 – weather station



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

SP 275 measures 6 most essential weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) and also rain and hail intensity. It is compact and light-weight, has no moving parts, has internal heating and can be easily installed with a one-bolt mounting method.

SP 275 has an automatic control circuit that switches the heating on at low temperatures.

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

Precipitation and 3 values for rain and hail (intensity, accumulation and duration) are transferred, every 10 seconds, only when it is raining or hailing.

SV 200A may save them in the logger file as a **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 SP 276 – weather station

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

SP 276 measures 6 most essential weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) and also rain. It is compact and light-weight, has no moving parts and can be easily installed with a one-bolt mounting method.

All measurement weather parameters (barometric pressure, humidity, temperature, wind speed and direction) are transferred from the SP 276 to the SV 200A monitoring station every second.

SV 200A may save them in the logger file as a **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, then it is critical to set the correct sensor orientation. The North direction is marked at the bottom of the weather station. Use real-life compass or mobile app to determine North direction.*

1.4.6 SP 272A – alarm lamp

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

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

In this lamp, the buzzer is disabled by default. To enable it:

1. open the case by pushing the black button and turning the plafond and
2. shift the switch to the left.

2 ASSEMBLING THE INSTRUMENT

2.1 RECOMMENDED ORDER OF ASSEMBLY

After unpacking, check the completeness of the set according to Chapter 2.2.

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

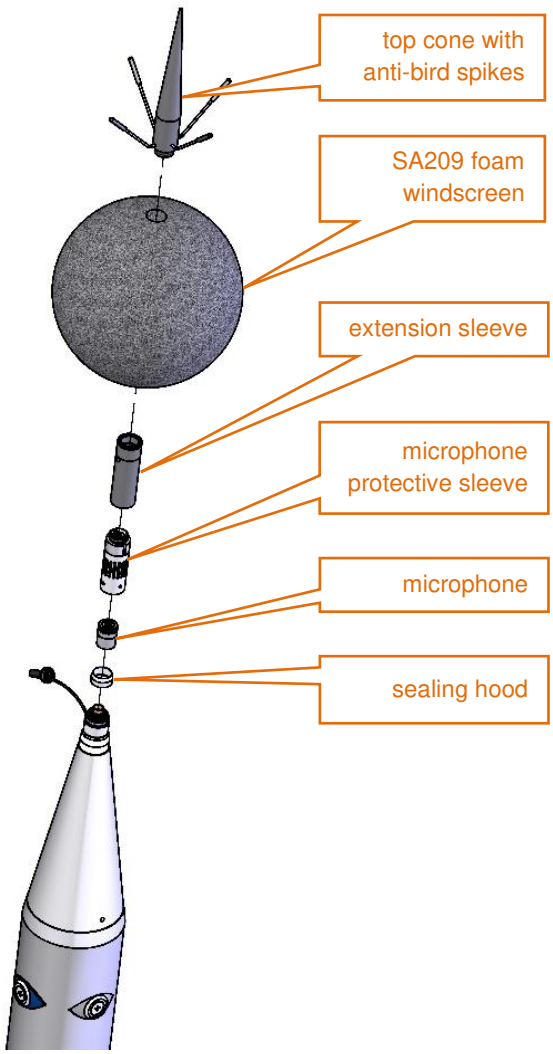
Recommended order of installation:

1. pre-assembling 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. optional meteorological station installation (see Chapter 2.8),
5. arrangement of the cabling (see Chapter 2.9).

2.2 DELIVERED KIT

The kit delivered to the client consists of the following elements:

1. the SV 200A instrument includes next permanently integrated elements:
   - integrated, non-removable microphone preamplifier
   - built-in electrostatic actuator triggered manually or in automatic mode
   - 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 elements that can be disconnected:
   - 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

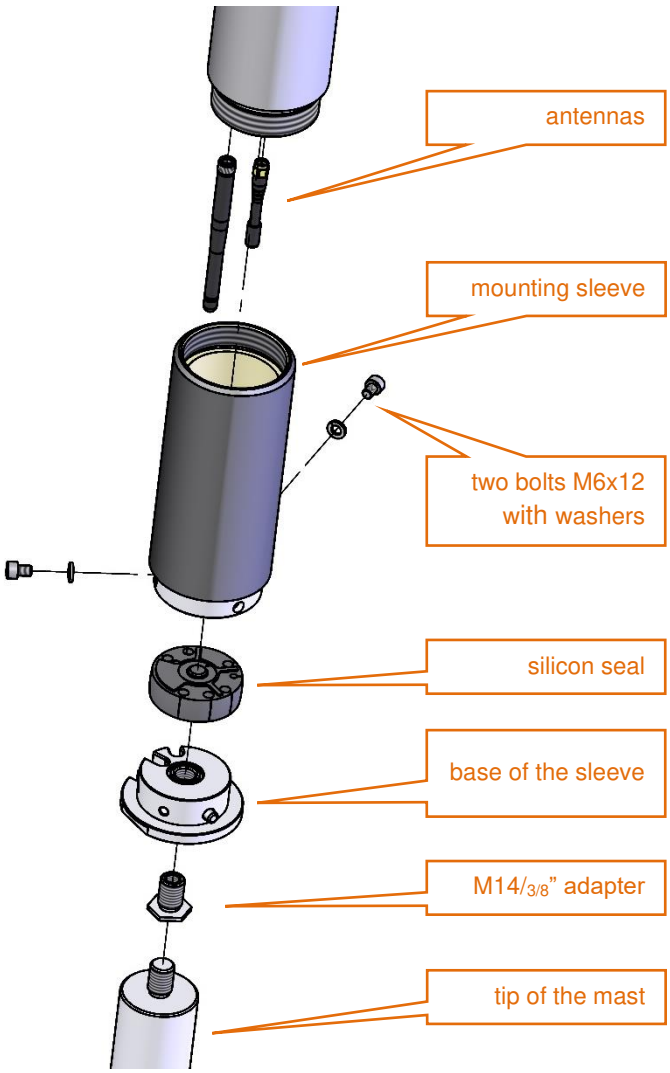


3. SC 256A cable to communicate with SV 200A using USB interface

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

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

6. SB 274 weatherproof DC power unit



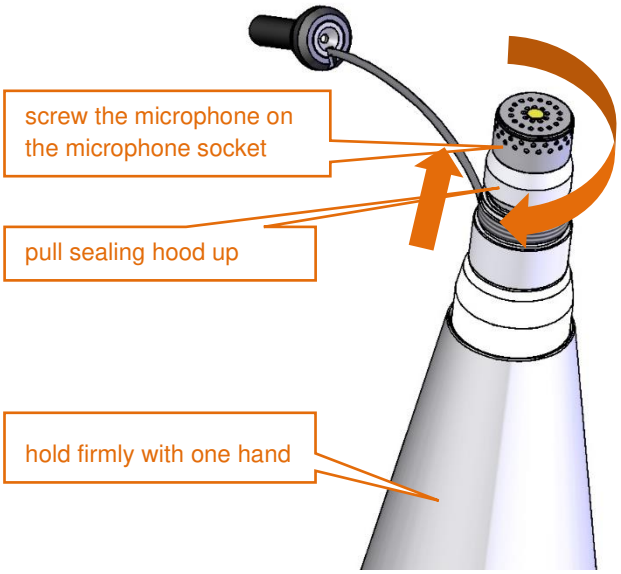
The instrument kit is delivered in the special case, which is dedicated also for storage and transportation of the instrument.

2.3 PRE-ASSEMBLING

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

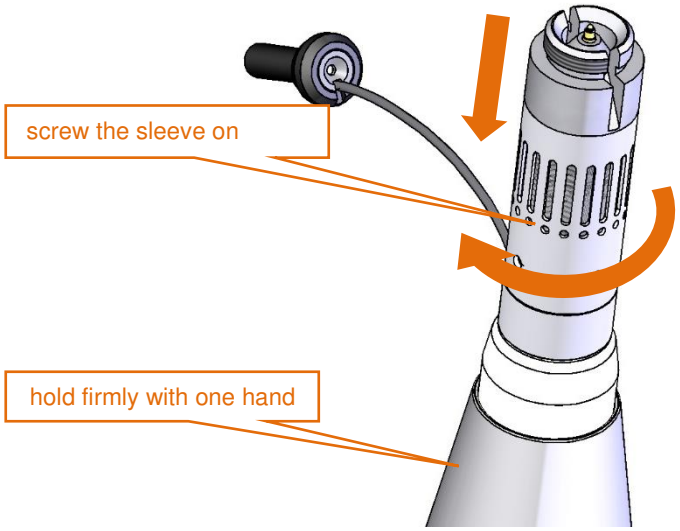
1. Check that SV 200A is switched off. If the device is on, turn it off (see Chapter 3.2)
2. Place SV 200A upright (outer cone facing up) on a stable horizontal flat surface.
3. Take off the protective cap from the microphone socket.

4. Holding outer cone in one hand, use the other hand to screw the microphone on the matching thread extending from the outer cone (rotating the microphone clockwise).
5. The sealing hood should be pulled up to the top (to contact the microphone).



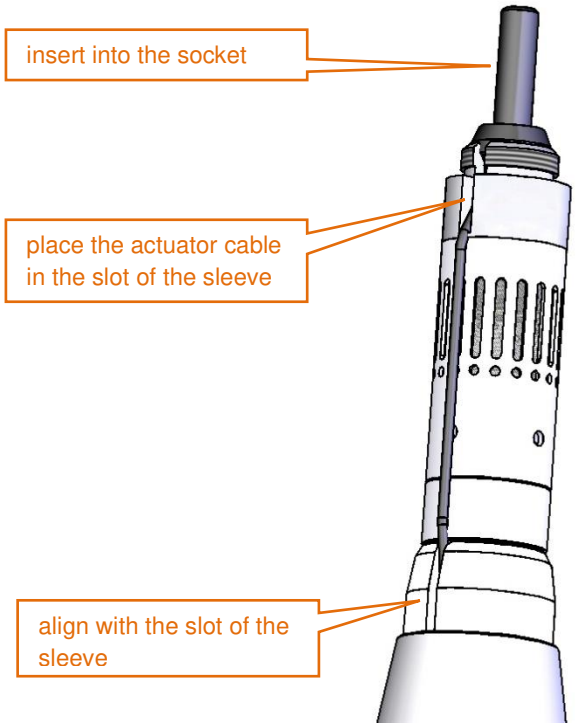
Note: *It is advised to calibrate the SV 200A at this point. For more information see Chapters 4.2, 4.3, 4.4.*

6. Hold the outer cone with one hand, use the other hand to screw on the microphone protective sleeve rotating it clockwise.



7. Align moving ring with the slot of the microphone protective sleeve so that the cable is not bent in any direction. Gently place the actuator located at the end of the cable in the dedicated socket. Put the actuator's cable into the slot of the sleeve.

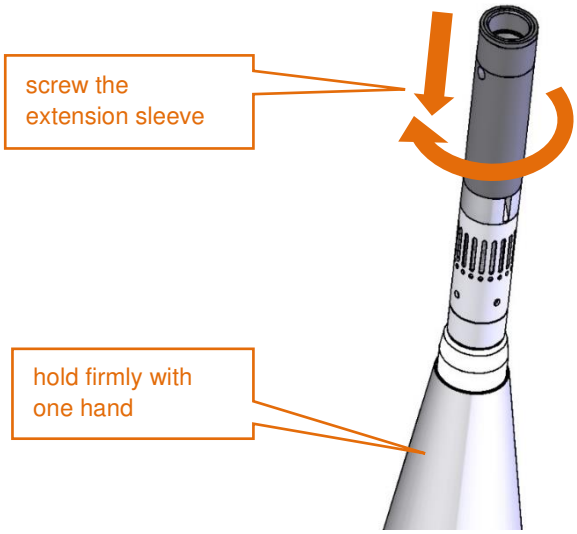
   If the actuator's cable is too long, decrease the length pushing its lower end inside the casing.



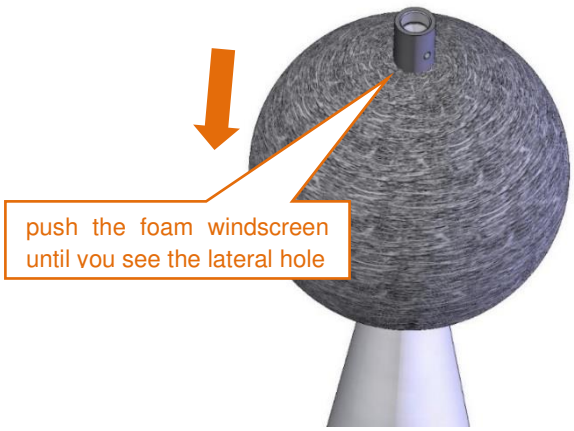
Note: *It is important to keep the microphone protective sleeve still, to protect actuator's cable from damage.*

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

   Tighten it to the stop, but "carefully" - too strong tightening can cause loosening of the left screw inside.



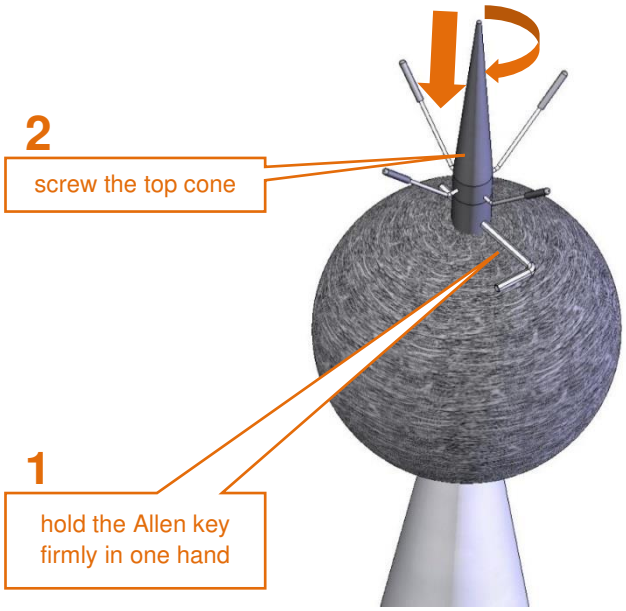
9. Slide the foam windscreen onto the extension sleeve and push the foam until you see the lateral hole.



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

11. Holding the Allen key 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, rotating it clockwise.

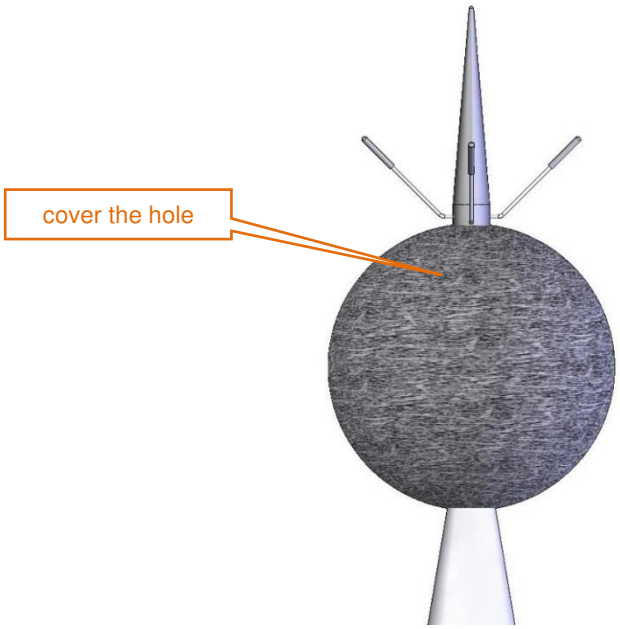
    Tighten it to the stop, but "carefully" - too strong tightening can cause loosening of the left screw inside.



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

12. Take the Allen key out from the extension sleeve.

13. Move the foam windscreen to the place right under the spikes of the anti-bird device, make sure it covers the microphone protective sleeve.

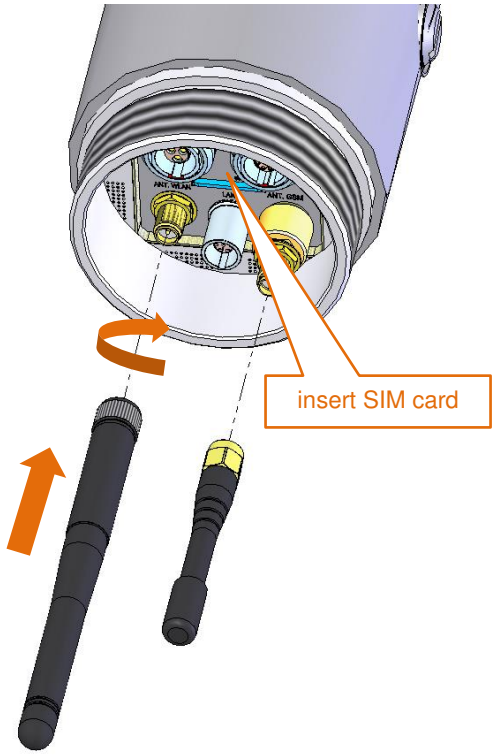


14. Put the device horizontally to gain an easy access to the socket panel.

15. Make sure that the instrument is switched off!

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

17. Connect wireless antennas.



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

2.4 MOUNTING

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

Note: *If other types of mounting than mounting on the mast is going to be applied, consult Svantek, since only recommended type of mounting assures declared acoustical characteristics of the station.*

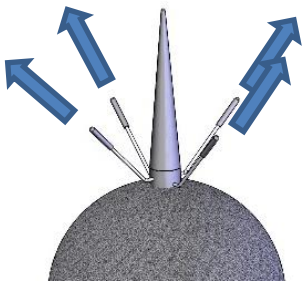
Coaxial mounting of the device on the mast Φ45 mm ended with a bolt M14 is recommended.

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

Note: *Make sure the SB 274 power supply unit is not connected to mains before full system installation.*

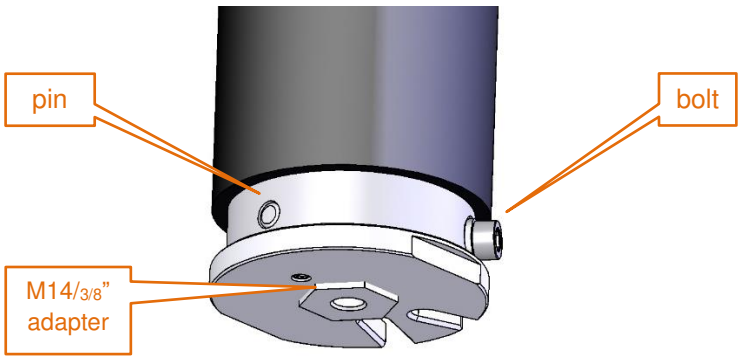
Note: *Before installing the station at the measurement site, make sure that the protective caps on the four anti-bird spikes are removed.*

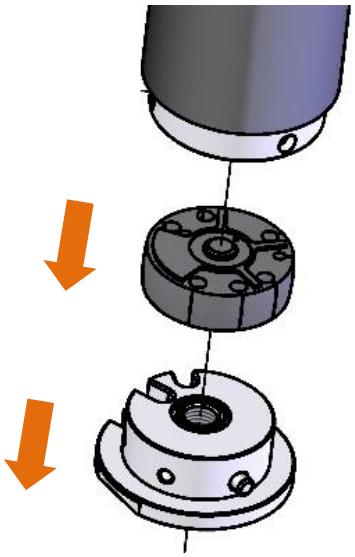
It is recommended to use the protective caps during transportation.



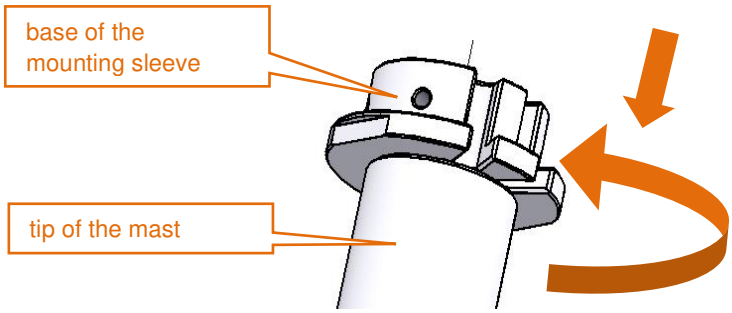
2.4.1 Mounting SV 200A on the mast

1. Unscrew two bolts attaching the mounting sleeve to its bottom with the 5mm Allen key.
2. Push the pin in the third hole in the bottom using a longer arm of the Allen key and take the bottom off the sleeve.
3. If the mast has M14 thread unscrew the M14/3/8" adapter from the bottom of the mounting sleeve base using the special 22 and 65 mm spanners.
4. Remove the base out of the sleeve.
5. Remove the seal from the cylinder pulling it by the grip.

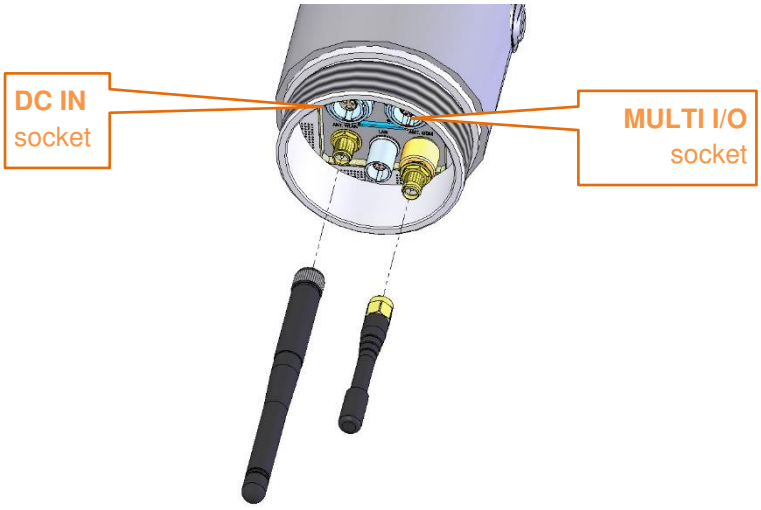




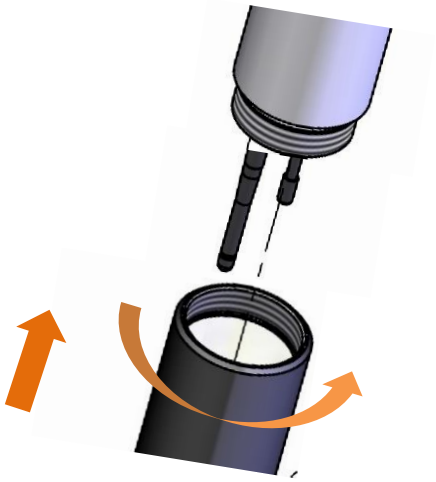
6. Screw the base of the mounting sleeve on the M14 thread of the mast (if you use aligning to the North set see Chapter 2.4.3).
7. If you don't use aligning to the North set tighten the bottom of the mounting sleeve up with the special open spanner 65 mm.



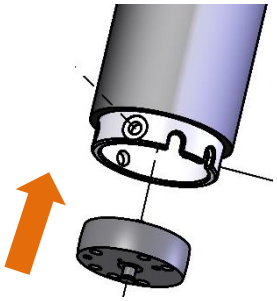
8. Make sure SV 200A is switched off.
9. Pass all cables you wish to connect to the instrument through the mounting sleeve.
10. Plug the power supply cable connector in to the **DC IN** socket on the connector panel.
11. Optionally, plug the lemo connector of the USB, the weather station or alarm lamp cable into the **MULTI I/O** socket on the connector panel.
12. Connect the antenna(s).



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



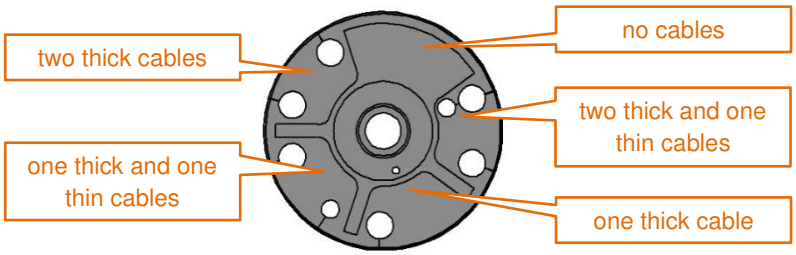
14. Insert the cables into the holes of the seal through the cuts in the seal edge.
15. Insert the seal inside the mounting sleeve until it stops, pushing it by the plastic grip.
16. Holding the seal pull the cables out to the stop.



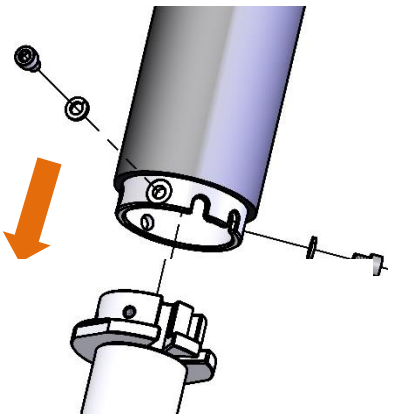
The silicon seal is designed to protect the instrument from atmospheric humidity and what is more important to dump acoustic resonances.

The seal is designed so that 5 positions are foreseen for 5 combinations that can be created from 3 cables.

Each hole has a cut in the seal that enables simple insertion of the cable into the hole.



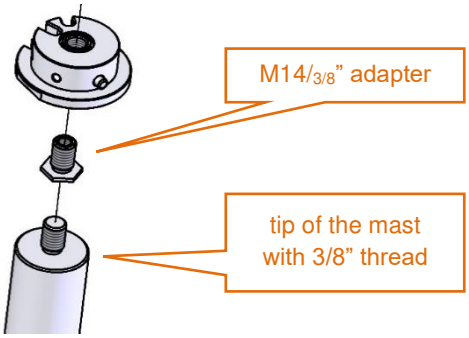
17. Push the pin in the base of the sleeve with 5 mm Allen key.
18. Put the mounting sleeve on the base holding the cables in the slots of the sleeve.
19. When the pin is in the third hole of the sleeve, lay the cables in the slots of the base.
20. Screw both bolts fastening the sleeve to the base using the 5 mm Allen key.



Note: *During laying the cables in the slots, the seal will be positioned so that not used holes will be closed by the base providing reliable tightness and sound insulation of the instrument.*

2.4.2 Mounting on the 3/8” thread

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

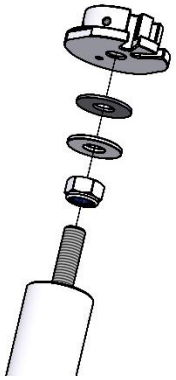


Note: *Tripod or pole with 3/8” thread is not recommended for permanent installation.*

2.4.3 Mounting the SV200A station on the mast aligning to the North

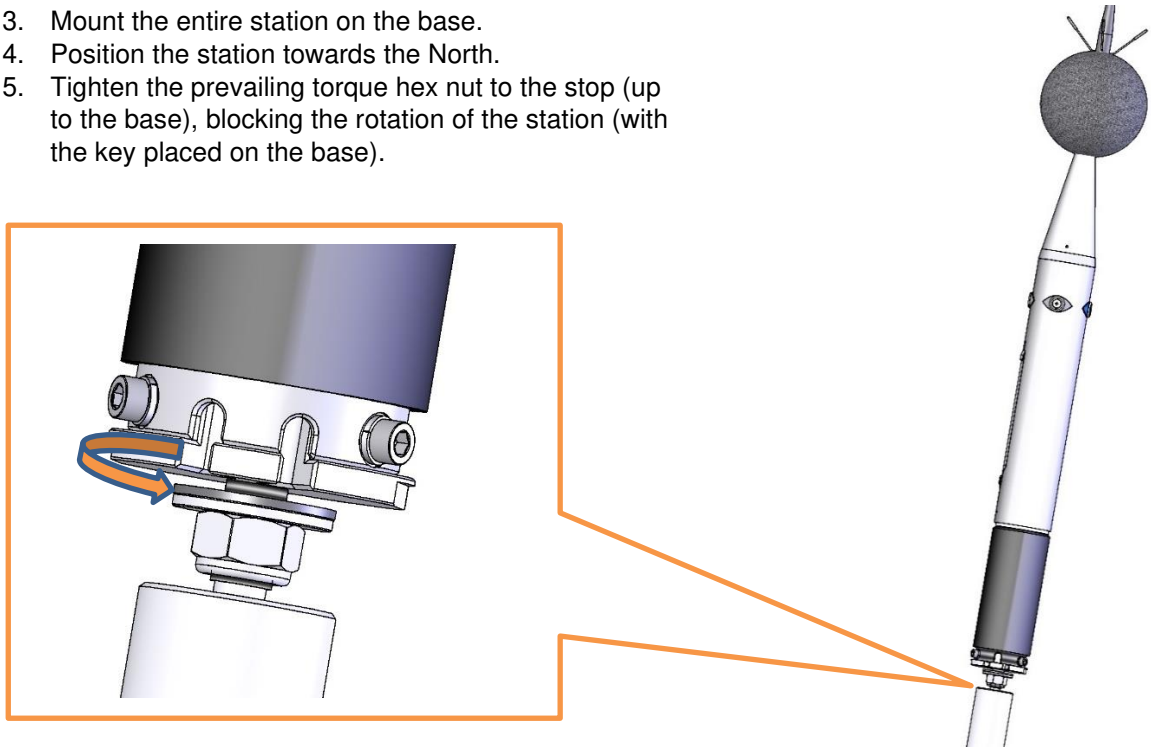
Mast requirement: the length of the threaded bolt should be at least 45 mm.

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



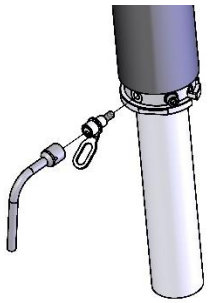
Mounting method:

1. Screw the prevailing torque hex nut (plastic down), apply a steel washer and a rubber washer.
2. Screw the base of the sleeve to the stop (resistance will be on the screw of the sealer inside the base) and unscrew it again by approx. 1 turn.
3. Mount the entire station on the base.
4. Position the station towards the North.
5. Tighten the prevailing torque hex nut to the stop (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 anti-theft protection of your SV 200A with the use of locking cable. It is necessary to screw it to the base of the sleeve 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 influences the free-field characteristics of the instrument, therefore it is important to check its condition regularly. In the case of visible degradation of the foam surface it must be replaced by the new one.*

During continuous usage, the foam is exposed to different weather conditions with possibility of causing mechanical damage to the foam's structure. Therefore, it is recommended, at least once a quarter (3 months), to check the condition of the foam by examining the surface for cracks by squeezing the foam. If cracks or holes are observed, the foam must be replaced.

The foam must be replaced whenever squeezing it causes severing of small pieces of its surface.

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

2.7 POWER SUPPLY UNIT

SB 274 is a waterproof single output switching power supply which is characterised by:

- 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 level
- Lemo 1B.303 connector
- SC 270 mains cable

It is recommended to install the SB 274 power supply unit on a mast in the place not exposed to direct sun light.

Note: *Before installing SB 274 check out the connectors are securely tightened to ensure their waterproofness.*

Note: *Even though the power supply has a high IP index (Ingress Protection), it is still not recommended to leave it on the ground for safety reasons. Good practice is to mount it on the pole or mast.*

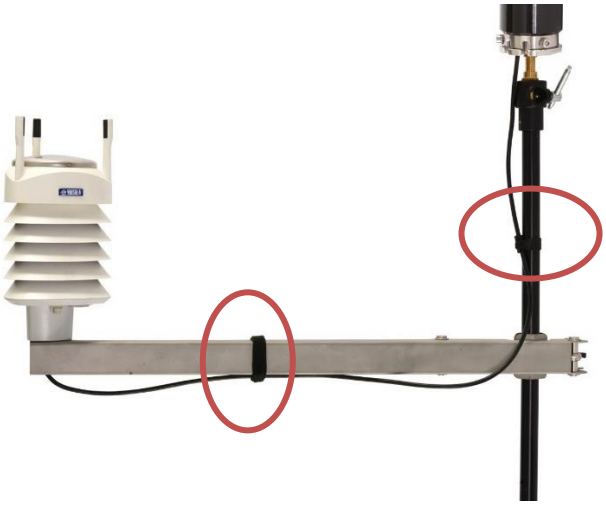
2.8 ASSEMBLING THE WEATHER STATION ON THE MAST (OPTIONALLY)

The weather station is mounted on the dedicated bracket that can be installed on the mast below SV 200A. The distance from the bracket to the SV 200A device should be as great as possible, but it is limited to the length of the interface cable.

Note: *If your weather station is equipped with the wind sensor, then it is critical to set the correct sensor orientation. Use real-life compass or mobile app to determine the North direction.*

2.9 FINISHING

Attach cables to the mast and the optional meteorological bracket. Use some band clips at intervals not greater than 50 cm (20”) on the mast and the cable holders delivered with the kit (Velcro fasteners) on the meteorological bracket. Lay the cables so that they are loose at the ends. The loose cable should hang a bit lower than the connector to avoid accumulation of rainwater.

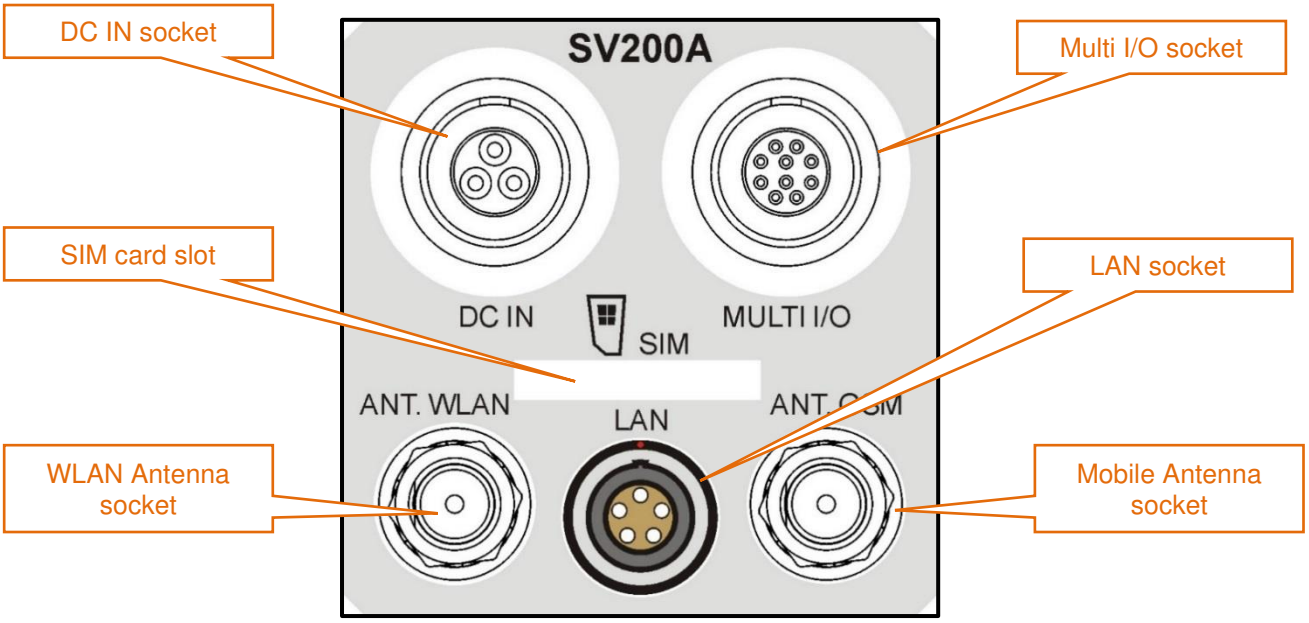


Note: *Fixation of cables is important because loosen cables may generate additional noise. As an alternative way, wrap the cables around the mast.*

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

3 SV 200A CONNECTORS AND CONTROL PANELS

3.1 CONNECTORS PANEL



3.1.1 SIM card slot

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

The SIM card should be inserted into the slot according to the drawing on the panel. Push the card in until you feel a click.

To remove the SIM card from the slot push it until you feel the click and pull the card out. Use tweezers to remove the SIM-card from the slot.

Further information on configuration of the mobile connection can be found in 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. included power supply, optional solar panel or external 12-24 V battery.

SV 200A can be powered using one of the following power sources:

- Li-Ion batteries fitted internally. Operation time with the internal Li-Ion batteries depends on the power consumption:
  - up to 7 days – both modems are off,
  - up to 4 days[2] – only mobile modem is on,
  - up to 2.8 days[2] – only WLAN module is on,
  - up to 3 days[2] – only LAN module is on.
- Included AC power supply unit SB 274. 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 power conditioner.

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

- External DC source. Voltage range 10.5 V – 24 V, e.g. 12 V or 24 V battery.

The internal battery is charged in a fully automatic cycle, when the instrument is connected to any external power source. SV 200A charges itself regardless of whether it is turned on or off. The weather conditions (i.e. temperature) are taken into account while charging to prevent any damage of the battery caused by charging in too high or too low temperature.

Note: *SV 200A is equipped with the mechanism which protects the internal Li-Ion batteries from damage caused by critical discharge. When the battery is running flat, the instrument is automatically switched off.*

Note: *SV 200A should not be stored for a long time with discharged Li-Ion batteries. Storing batteries in discharged condition may damage them. If so, warranty for Li-Ion battery is void.*

Note: *If SV 200A is planned to be stored for a long period of time, it is recommended to charge its batteries up to 60% of their capacity. Batteries should be charged at least once per 6 months.*

3.1.3 External Communication Interface socket

The **MULT. I/O** socket enables 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: *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!*

3.1.4 LAN socket

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

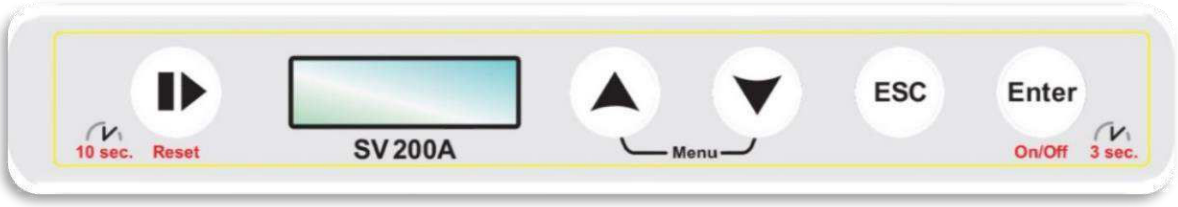
3.1.5 Antenna sockets

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

After plugging the antenna into the socket, the screw should be tightened to light resistance only. Do not over tighten this connector.

3.2 CONTROL PANEL

SV 200A is dedicated for the outdoor monitoring and remote control via the mobile mobile network, LAN or WLAN. However, it can be also controlled from the control panel with the use of five keys and a display (128 x 32 pixel resolution).



During outdoor operation, the control panel should be closed by the flap. Closed flap assures protection of the instrument's user interface from environmental impact and, what is more important, assures that acoustical direction characteristics are within declared tolerances.

To uncover the control panel, unscrew the coin-operated screw (with your fingers, or the first turn with the coin and then the fingers) slightly to the stop. If the instrument is in 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, slightly press the lower part with your finger and move it down. Then turn the flap clockwise (or counter-clockwise).

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

To close the control panel, turn the flap so that its upper, rectangular part jumps into the notch of the casing. If the lower part of the flap is pressed against the head of the screw through the inner spring, it should be lightly pressed (so as not to damage the lacquer on the flap). Move the flap up (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 (finger, possibly the last rotation by the coin) by pressing the flap all the time.

Note: *Operate carefully so that the metal edges of the flap do not damage the varnish on the surface of the casing, especially at the edge of the notch.*

Five control keys enable following functions:

Enter (3 sec.)
- turning On/Off the instrument when holding 3 sec,
- opening a position in the menu list,
- entering editing mode for the parameter,
- confirming made changes,
- changing main results/status views,

ESC
- returning to the upper menu list,
- exiting the current parameter edition without saving changes,
- changing measurement/status views,

(10 sec.)
- starting or stopping measurements,
- resetting the instrument when holding 10 sec,
- starting the calibration,
- staring the system check,

,
- selecting position in the menu or parameter list,
- changing the parameter value,
- opening the Menu by pressing both keys simultaneously,
- changing profiles/results in the measurement view.

Note: *Pressing and holding* ▲ *and* Enter *keys simultaneously during the instruments switching on longer than 3 seconds, starts the BOOTSTRAP mode of SV 200A, used for firmware update (see Chapter 9).*

Note: *Pressing and holding* ▲ *during the firmware booting when Svantek icon appears, enables loading factory settings before the instrument's start. This* ***Factory Settings*** *function will reset all settings including communication one.*

4 CALIBRATION

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

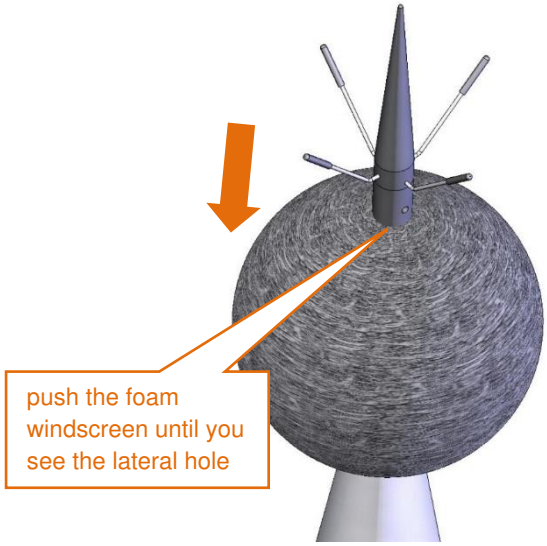
4.1 PREPARATION FOR CALIBRATION

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

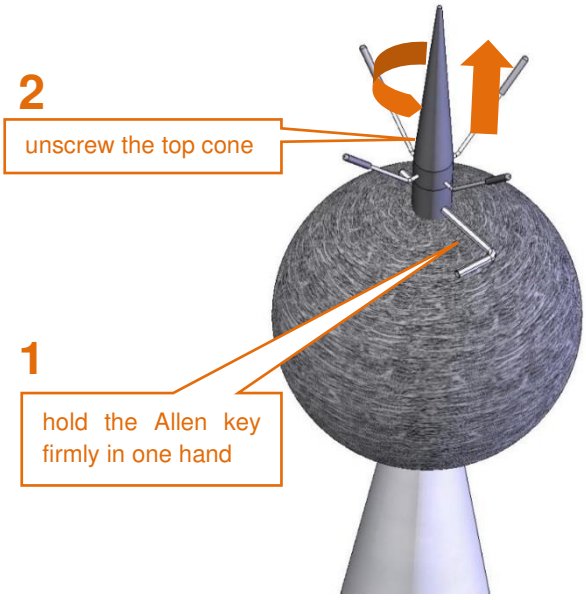
- con nozzle,
- SA 209 foam windscreen,
- extension sleeve,
- microphone protective sleeve.

To access the microphone, do what follows:

1. Push the foam windscreen until you see the lateral hole.



2. Insert the 3 mm Allen key into the hole.
3. Holding the Allen key 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, rotating it counter-clockwise.

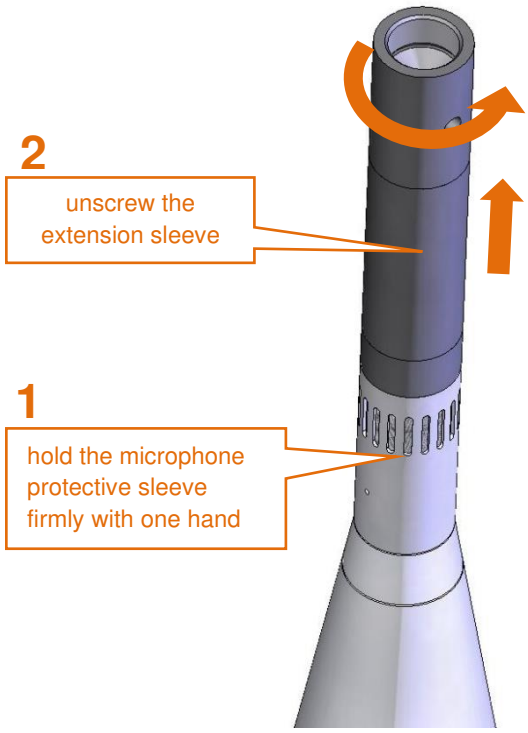


Note: *It is important to keep the extension sleeve still, to protect actuator cable from damage.*

4. Take the Allen key out from the extension sleeve.

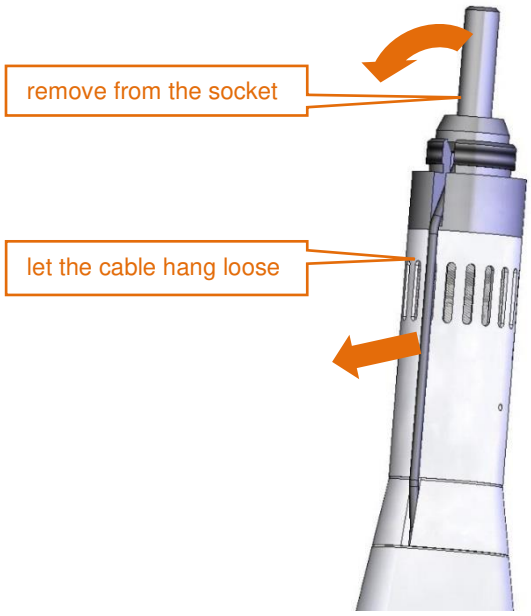
5. Take the foam windscreen off the extension sleeve.

6. Hold the microphone protective sleeve and the outer cone with one hand, use the other hand to unscrew the extension sleeve, rotating it counter-clockwise.

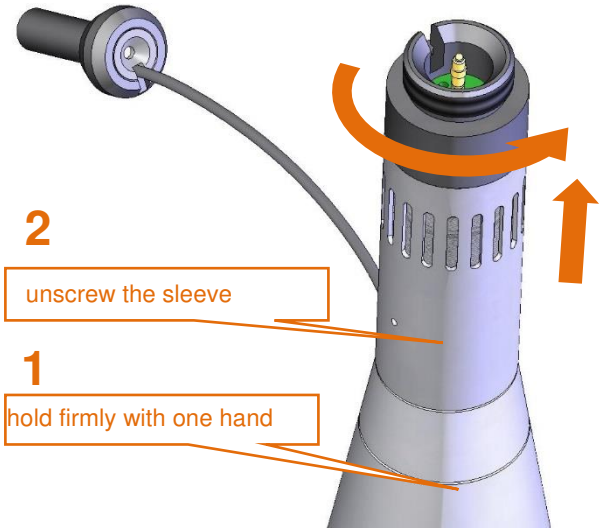


Note: *It is important to keep the microphone protective sleeve still, to protect actuator cable from damage.*

7. Gently remove the actuator form the socket. Let the cable hang loose.



8. Take the outer cone with one hand, use the other hand to unscrew the microphone protective sleeve rotating it counter-clockwise.



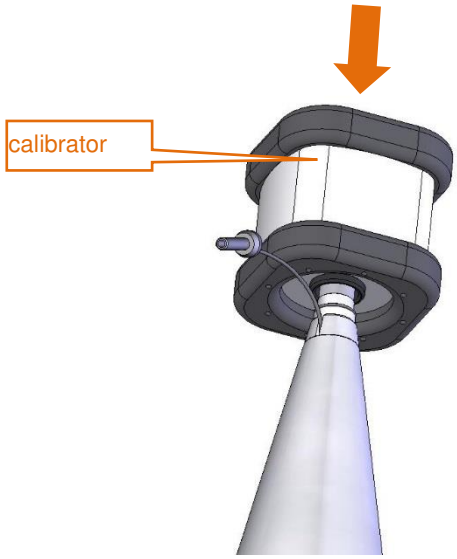
9. Attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully on the microphone.

10. Switch on the calibrator and wait for the tone to stabilize (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. Take the calibrator off after the calibration.

13. Assemble SV 200A according to Chapter 2.3.



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

Note: *It is also possible to use an electro-mechanical pistonphone, which generates the signal (ca 124 dB) or different type of sound calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, you should set in the instrument the level of the signal, which is stated in the certificate of the calibrator.*

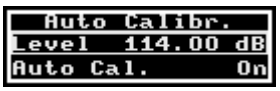
4.2 AUTOMATIC CALIBRATION

Automatic calibration feature was implemented to make calibration as easy as possible and to allow technical personnel to perform a calibration of SV 200A with minimum knowledge and with minimum steps. Automatic calibration doesn't require usage of any interface with SV 200A.

Note: *Automatic Calibration feature is switched off by default. You can switch this feature on from the control panel or via applicable software (see Chapter 5.1 and 7.2.3).*

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

1. Attach the calibrator to the microphone and switch it on (if the used calibrator doesn't have switch-on automatic feature).
2. Switching the calibrator on begins the Automatic Calibration process 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 will be displayed. If three consecutive 1-second results are stable within ±0.1dB margin, the calibration measurement is stopped, and the calibration factor is calculated.

4. If new calibration factor is in the range ±3dB, Automatic Calibration will be successful, and new calibration factor will be saved and displayed. From that moment, new calibration factor will be the current calibration factor without confirmation from the user.

5. If the calculated calibration factor is out of the range ±3dB, Automatic Calibration will fail and the message "Failed!" will appear on the display. In such case the new calibration factor will not be saved and the calibration factor just before the calibration will still be valid.

6. Detach the calibrator from the microphone. After detaching the calibrator from the microphone SV 200A returns to its previous state.

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

Note: *Running main measurements are always stopped during automatic calibration procedure.*

4.3 CALIBRATION WITH THE USE OF THE CONTROL PANEL

The calibration via the control panel (manual calibration) gives the user an option to decide whether the new calibration factor should replace the current one.

Note: *Before proceeding with the manual calibration you should be sure that the Automatic calibration is Off (see Chapter 4.2).*

To perform the manual calibration, follow next steps:

1. Uncover the control panel of SV 200A by unlocking and shifting the control panel flap.

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

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

Enter

4. Press the Enter key to open the **By Measurement** position and set up 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 on the microphone and switch it on (if the used calibrator doesn't have switch-on automatic feature).

6. Start the calibration measurement by pressing the ▮▶ key. During the calibration measurement, the level of the calibration signal will be displayed. If three consecutive 1-second results are stable within **±0.1dB** margin, the calibration measurement is stopped, and the calibration factor is calculated. Otherwise the instrument will stop the measurement and display the message "Failed!" after 10 seconds from the calibration measurement start.

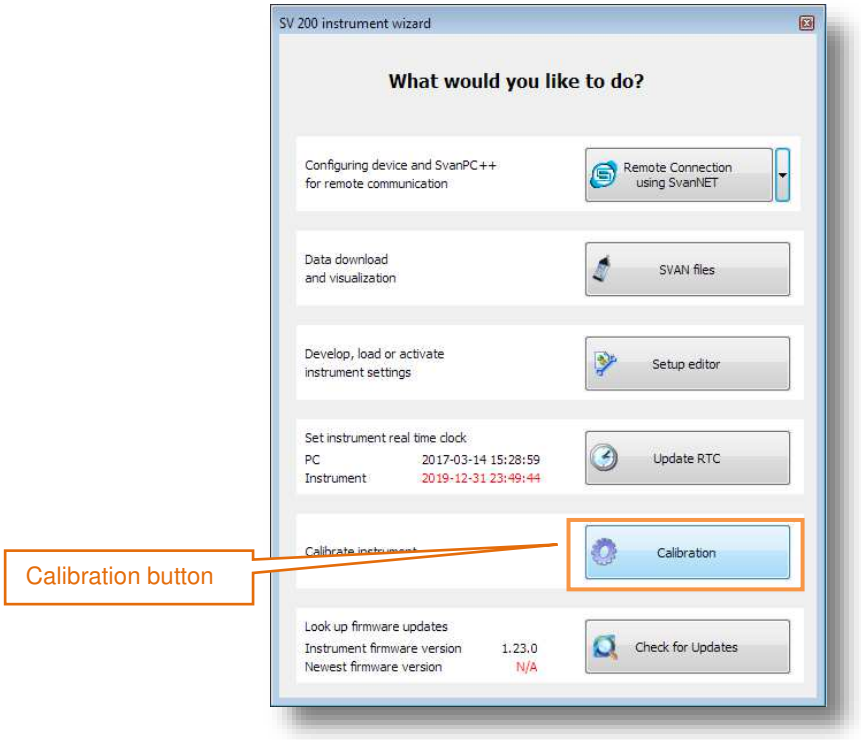
7. The successful calibration will result in calculation of the new calibration **Factor**, which should be confirmed (**Yes**) with the Enter key or rejected (**No**) with the ESC key. After confirmation, the calculated calibration factor will be the current calibration factor.

8. If the calculated calibration factor is out of the range **±20dB**, the calibration will fail and the message "Failed!" will appear on the display.

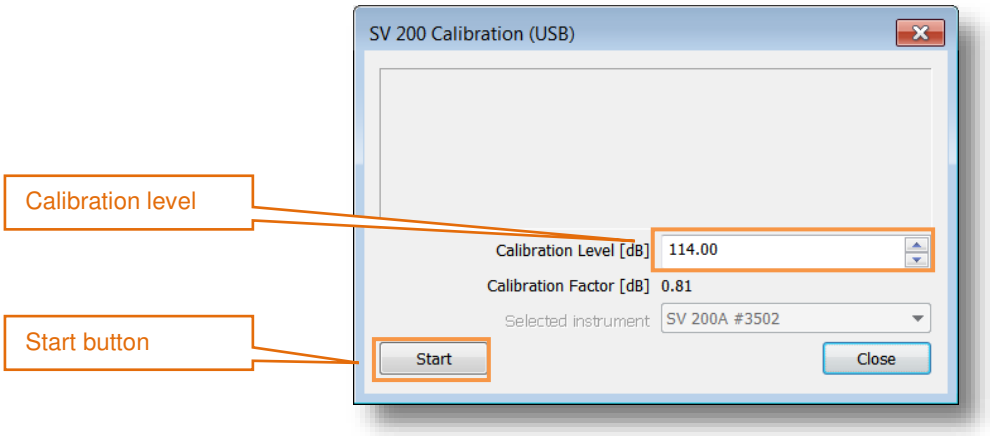
9. Detach the calibrator from the microphone.

4.4 CALIBRATION WITH THE USE OF SVANPC++ AND USB CONNECTION

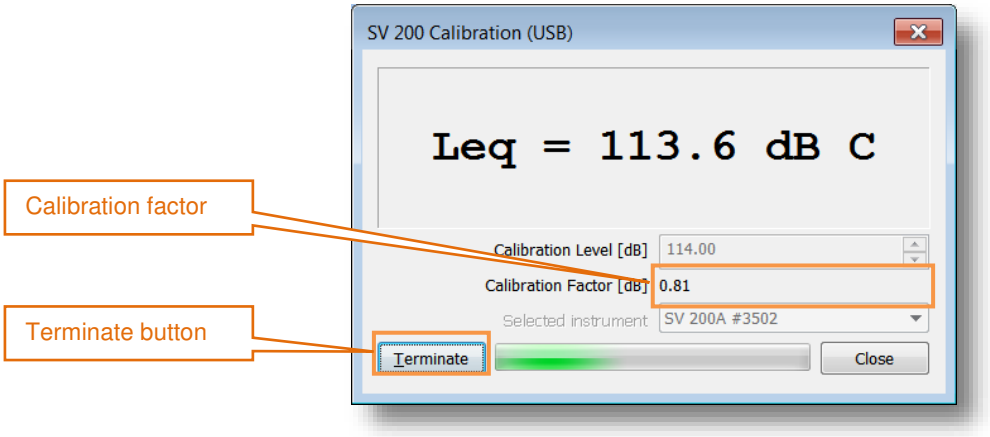
1 Connect SV 200A with the PC using SC 256A cable and start **SvanPC++**.
2 When **SV 200A instrument wizard** appears on the screen, click **Calibration.**



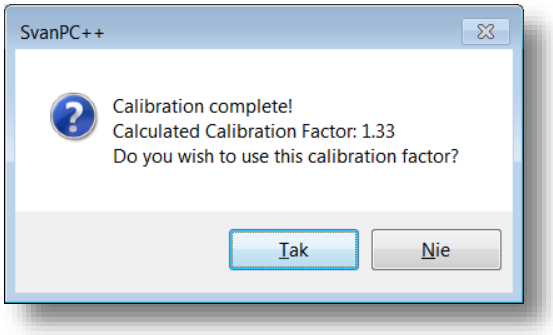
3 Set desired calibration level in the **SV 200A Calibration** window. The current **Calibration Factor** is displayed below the **Calibration Level**.



4 Attach the calibrator on the microphone, switch it on (if the used calibrator doesn't have switch-on automatic feature) and start the calibration measurement by pressing the **Start** button. The successful calibration will result in calculation of the calibration factor. Calibration measurement can be terminated by pressing the **Terminate** button.



5 Confirm obtained calibration factor by clicking **Yes**. New calibration factor will replace the previous one in the instrument's memory and will be applied to all subsequent measurement results.



4.5 SYSTEM CHECK WITH THE USE OF ELECTROSTATIC ACTUATOR

The electrostatic actuator is used for remote system check of the instrument, which enables checking the acoustical measurement input of the instrument.

The System Check procedure consists of a sequence of measurements of background noise and a level generated by the electrostatic actuator (94dB). The measurement of background noise is carried out 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 lower than the nominal level generated by the electrostatic actuator (94dB). If this condition is not met, system check is unsuccessful. 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 stabilized RMS(C) value of the signal from the actuator cannot deviate from the nominal value (94dB) more than ±1dB. The system check result (OK or Failed) together with the measured levels the background noise and the signal from the actuator is recorded in the calibration and system check history file. The duration of the system check sequence is typically <15s and can be extended up to <25s in the case of longer stabilization period of the RMS(C) generated by the actuator. In the case of the automatic system check function, when the test result is negative, it is repeated 4 times more every 1 minute to obtain a positive test result. If the result is still negative, subsequent attempts are abandoned to the next planned system check.

The measurements are paused for the duration of the system check procedure (active pause).

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

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

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

- via the *SvanNET* web service, in the **Status** tool (see Chapter 7.2.2) or
- via the *SVAN PC++* Remote Control software, in the **Live Results** window (see Chapter 8.5.1).

The Auto System Check feature of SV 200A enables configuring and scheduling automatic check of the instrument via *SvanNET* web service, in the **Automatic system check** panel (see Chapter 7.2.3).

Note: *During the system check, the instrument pauses the measurement and closes the wave file in the event when a signal is being recorded. Signal recording continues 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:

- Measurements start/stop
- Measurement results viewing
- System checking/calibration
- Files downloading/uploading
- Instrument/measurement configuration
- Firmware upgrading.

Most of these operations can be performed manually using the instrument's **Control panel**.

However, SV 200A is dedicated for the outdoor monitoring and must be controlled remotely via the mobile network with the use of internal mobile modem (2G (GPRS) / 3G (HSPA+) / 4G (LTE)), via LAN or WLAN with the use of 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 for configuring the remote communication with the Internet and for giving access to the *SvanNET* web service.

Apart from the control operations of SV 200A, SVANTEK offers the **SvanPC++** software for data post-processing and report generating.

SVANTEK offers also optional tools:

- **Automatic Monitoring Services** of *SvanNET* which offers automatic control of many measurement points, data sharing with other *SvanNET* users as well as 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 open to the public or protected by a password.
- ***SvanPC++_RC*** (Remote Communication) module of *SvanPC++* which is dedicated to all types of communication channels of mobile network as well as for WLAN. *SvanPC++* has also advanced capability of remote configuration control, data retrieving, data processing and reporting.
- ***SvanPC++_EM*** (Environmental Measurements) module of *SvanPC++* which is designed for post-processing of data recorded by monitoring stations. The module offers a powerful calculator and an automated noise event finder for noise source identification. Thanks to its "Projects" functionality, *SvanPC++_EM* allows you to combine and compare data from multiple measurements as well as create and save reports in MS Word™ templates.

Licences for optional tools can be activated at any time by ordering an activation code or hardware key.

5.1 SV 200A MANUAL CONTROL VIA THE CONTROL PANEL

When SV 200A is turned on, the measurement Start and Stop is done with  key. The running measurement is signalled by the live dots underlining of the displayed result.

After pressing the start key, the measurement delay is counting down and after this the measurement starts.

5.1.1 Measurement results viewing

The View mode is a mode in which the measurement parameters are presented. In other words, when you change the View mode, specific measurement parameters and status information will be presented in different manner. The View modes can be changed with the Enter or ESC key.

SV 200A has the following View modes:

- Charging view mode,
- Running SPL view mode (active only when measurements are stopped),
- Basic view mode,
- Large view mode,
- Vertical view mode,
- Powering status view mode,
- Communication information view mode.

After connection of the external power supply the big battery icon with percentage of charging is displayed and after 10 seconds the floating battery icon appears instead of big battery icon.

If power supply unit is disconnected SV 200A will be switched off after a short period.

If the USB cable is connected to a PC or the Enter key is pressed, SV 200A will start executing firmware program and finally enter the Running SPL view.

Running SPL view mode

Running SPL view is used when the measurement is not running, e.g. when the instrument is in standby mode before or after the 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 a first indication of the noise level. In this view mode the instrument behaves as a simple general-purpose sound level meter.

Basic view mode

The measurement result and its value is displayed in the left part of the screen. In the right part of the screen, battery icon, real time and profile number are displayed.

The required measurement result is selected with the ▼ or ▲ key.

In the right upper corner of the screen, two icons are displayed:

- "battery" icon, showing the status of the internal battery or
- "lighting" icon, showing the status of the external power supply

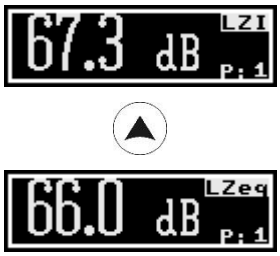
and

- "clock" icon and real time beneath it or
- "sandglass" icon and elapsed measurement time beneath it.

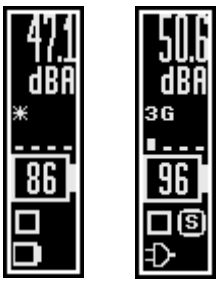
Large view mode

The measurement result is displayed with big font in the left part of the screen. In the right part of the screen, the measurement result name and profile number are displayed.

The required measurement result can be selected with the ▼ or ▲ key.

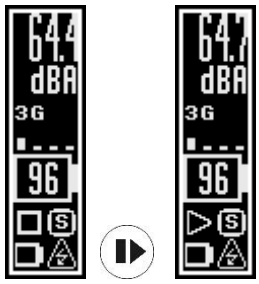


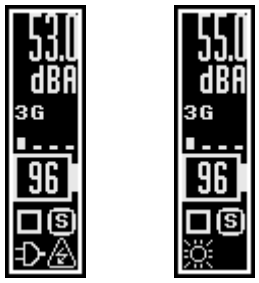
Vertical view mode

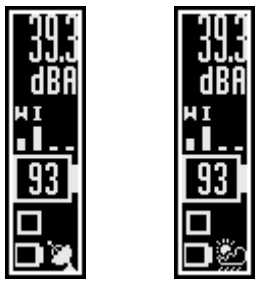


The measurement result is displayed in a way to enable reading when the instrument is in the vertical position. Below the result, information about the instrument status is displayed in the form of icons regarding:

- 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 is stopped { □ },
  - measurement is running {blinking ▶ / ▷ },
- power source:
  - internal battery { ▭ },
  - solar panel { ☀ - solar charging, ☼ - solar not charging },
  - power supply unit or external DC source { ⊐ },
  - power over Ethernet { PoE },
  - USB power { USB },
- other statuses:
  - switched on actuator { ⚠ },
  - active GPS { , blinking when GPS is not fixed },
  - weather station connection status (, still when the station is connected to SV200A and blinking otherwise).

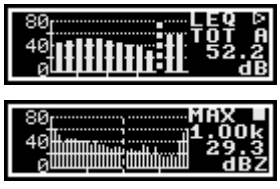






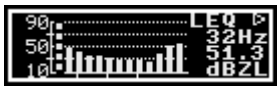
When both GPS and weather station are active use the ▭ or ▭ key to switch between statuses.

Spectrum view mode



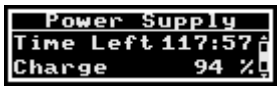
1/1 or 1/3 spectra are displayed for the **LEQ** and **MAX** band results together with three TOTAL values (**TOT A**, **TOT C** and **TOT Z**). The cursor shows the result for the band or the result for the TOTAL value: central band frequency, result in dB (for LEQ spectra) and filter (A, C, B, Z) (for MAX spectra). The cursor position can be changed with the ▼ or ▲ key.

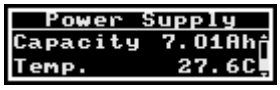
In case the **Full** band is selected in the **Spectrum** position of the **Measurement** section the instrument will display by default the same bands as in case of the **Audio** band. To display lower central frequencies, you should shift the cursor to the left position and press the ▲ key to shift whole spectrum to the right.



Power Supply status view presents:

- type of the power **Source**: internal **Battery**, power supply unit (**Mains**), **Solar** panel, **USB** or from the Ethernet (**PoE**),
- charging **Status**: **Charging** or **Not Charging**,
- estimated working time without charging or time to full charging of the internal batteries (**Time Left**),
- the 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** (amount of sent and received bytes since modem on),
- Modem **Manufacturer**,
- Modem **Model**,
- Internal firmware **Revision** of the modem,
- **IMEI** number of the modem,
- **MAC** address of the WLAN module.

5.1.2 Configuration Menu

The instrument control panel enables limited tools for configuration the instrument and measurements. The configuration can be performed through the instrument's **Menu**, which is opened by simultaneous pressing of the ▼ and ▲ keys and consists of several configuration sections:

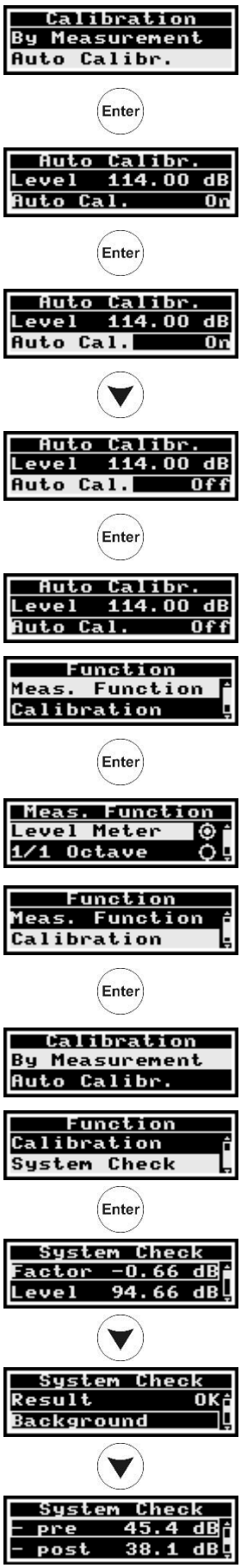
- **Function**, which enables selecting of the measurement function or performing calibration;
- **Measurement**, which enables configuring measurements,
- **Display**, which enables configuring automatic switching off the screen;
- **Instrument**, which enables configuring the instrument's real-time clock and viewing instrument's serial number and firmware version;
- **Auxiliary Setup**, which enables selecting of the interface language and recovering factory settings.

The required section can be selected with the ▼ or ▲ key and opened with the Enter key. Using the ESC key you can exit the current section.

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

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

For example, to switch the auto calibration, you should select the **Auto Cal.** position, press the Enter key and select **On** or **Off** with the ▼ or ▲ key. To confirm the selection, press Enter, and press ESC to exit the **Auto Calibration** screen.



Function section contains positions:

- **Measurement Function**, which enables selecting of the measurement function: **Level Meter**, **1/1 Octave** or **1/3 Octave**.

- **Calibration**, which enables performing the calibration **By Measurement** using a sound calibrator and switching on/off the **Auto Calibration**.

- **System Check**, which enables checking 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 checking: **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 performance.

After pressing the key the instrument starts measurement and measures:

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

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

In the **Calibration** list:

- Position **By Measurement** allows 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 come back to it after **Factory Settings** command.

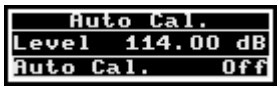
Other calibration type is defined automatically depending on how the last calibration was performed.

- set the **Level** of the calibration signal, according to the used calibrator, by pressing the Enter key on the **Level** position, changing the level with the or key and confirming made changes with the Enter key,

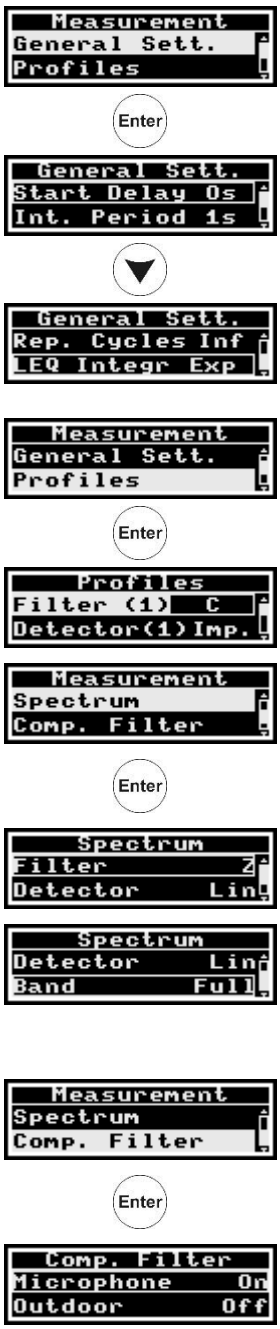
- and perform calibration measurement by pressing the key (considering that the sound calibrator is attached!). During the calibration measurement, the level of the calibration signal will be displayed.

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

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



Measurement section contains positions:



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

- **Profiles**, which enables setting for each measurement profile input **Filter** and exponential LEQ **Detector** time constant.
  - **Filter** can be **A**, **C** (type 1 according to IEC 651 and IEC 61672-1:2013), **B** (type 1 according to IEC 651) or **Z** (type 1 according to IEC 61672-1:2013),
  - **Detector** type can be: **Impulse**, **Fast** or **Slow**.

- **Spectrum**, which enables setting of:
  - weighting filter for the 1/1 Octave and 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 octaves and 20 Hz ÷ 20 kHz for 1/3 octaves

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

- **Compensation Filter**, which enables setting of the compensation filter: **Microphone** (for laboratory purposes 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****.*

Display section contains positions:

- **Screen Off**, which enables setting the period of the screen switching off after last use of any key. Selecting **Off** disables this function;
- **Auto Rotate**, if switched **On**, activates the proper view on the screen: vertical view mode in the situation when the instrument is in vertical position or any other views when the instrument is in horizontal position.

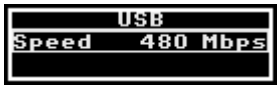
Instrument section contains positions:

- **Wireless**, which enables switching on/off all communication modules (**Radio**) and activating wireless communication modules (**GSM modem**, **WLAN Mode** or **Bluetooth**) and **GPS** in the case the **Radio** position is **On**.

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

- **LAN**, which enables activating the LAN interface.

- **USB**, which enables configuring the transmission speed of USB port: **12 Mbps** or **480 Mbps**.



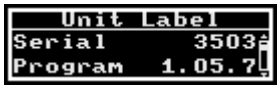
- **RTC**, which enables setting the internal real-time clock of the instrument.

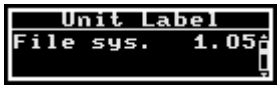
For setting the RTC, it is necessary to select one of the field in the RTC screen (hh:mm:ss) and press the 

key, as a result of which the selected field changes it's background to the white. Select the necessary hour, minute or second with the  or  key and confirm made changes by the 

key.

- **Unit Label**, which enables viewing:
  - instrument's type (SV 200A) and serial numer (Serial…),
  - firmware version (Program…) and its check sum (CRC…),
  - bootstrap version (Bootstrap…),
  - file system version (File sys…),
  - instrument's class and standards, it confirms.





Auxiliary Setup section contains positions:

- **Language**, which enables selecting the interface language,
- **Factory Settings**, which enables recovering factory settings (including the factory calibration factor).

5.2 REMOTE COMMUNICATION

The mobile modem enables the user a wide spectrum of interfacing capabilities for access to the Internet.

The mobile modem offers the main communication channel, *SvanNET* e-mail functionalities and SMS alarms notifications.

5.2.1 Main communication channel

Main communication channel is the TCP/IP connection (a lossless data exchange protocol) that can be used to exchange commands as specified by Appendix A to SV 200A User Manual. *SvanPC++* assures this connection and provides data download, configuration, performance validation and measurement start/stop.

Main communication channel of SV 200A can be established by one of two available methods: TCP/IP Client or TCP/IP Server. The SV 200A stations firmware version 1.03.4 does not support SSL (Secure Socket Layer) connections.

The **TCP Client** is a mode of main communication channel in which SV 200A is configured to initiate connection to a designated address (*remote host*). SV 200A attempts to establish a TCP/IP connection to a designated address on a designated port (*Data Port*) automatically. Should the connection be established successfully, SV 200A can exchange commands with the remote server. Should the connection attempt fail or is broken by the *remote host*, SV 200A will attempt to reconnect again. To prevent the connections from going *idle* (a state in which the TCP/IP connection seems to be active, but no data can be transferred), the station maintains the connection to the server by sending small packages of data at keep alive period (which by default is one minute). If the transfer is not properly acknowledged by the other party, the connection will be terminated.

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

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++*, and the service creates a "bridge" between the station and the user. In this case for mobile communication there are no restrictions on the SIM-card tariff (no public IP address is required) and simple internet access is enough. The essence of *SvanNET* is to simplify the procedures and requirements necessary for the connection.

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

5.2.2 SMS / E-mail alarming

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

SV 200A has implemented advanced alarm mode. Advanced alarms configuration can be performed via *SvanNET*. The E-mail alarming uses *SvanNET* e-mails feature to send e-mails. The benefits of *SvanNET* e-mails is that the user does not required to have any e-mail client account on SMTP server and that e-mails are SSL encrypted. The content of the message is created automatically.

Note: *SvanNET e-mail service uses SSL connection.*

It should be noted that SMS alarming does not require the internet connection and, as such, the SIM-card does not require any data transfer plan as sending SMS messages is done entirely over the mobile network. E-mails still require access to the internet.

5.3 INTERFACE CAPABILITIES OF THE MOBILE MODEM

The mobile modem (2G/3G/4G) enables a wide spectrum of interfacing capabilities using the mobile based internet access. The mobile modem offers the main communication channel, *SvanNET* e-mail functionalities and SMS alarms notifications.

5.4 INTERFACE CAPABILITIES OF THE WLAN/LAN MODULE

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

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

Wireless connection requires no cables, although it still needs to remain in close proximity to the devices (normally 100m at the open area) it is intended to connect with (as per limitation of the wireless connection protocol). When properly configured, the module will remain connected to the designated network when powered up. The wireless connection can be set up in two ways: Access Point (default) or Infrastructure.

Access Point connection method allows direct wireless connection to a computer equipped with a wireless communication module. To establish the connection with 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. Default password is “Svantek”.

Infrastructure connection, rather than being a direct wireless link between the computer and SV 200A, facilitates a standalone, dedicated device called ***Access Point*** to which all wireless devices connect to. This requires SV 200A to be configured to connect to such Access Point using its SSID (network name) and security settings. The module will remain connected to the network once properly configured.

Wired connection requires physical link to the LAN network. Upon connection, the WLAN/LAN module will become a part of the Local Area Network, and all PCs that also are members of the network will be able to connect to it.

Note: *In any given moment, the WLAN/LAN module can only work in Wired or in Wireless mode. For example, connecting Ethernet cable while the module is configured for Wireless will have no effect.*

The WLAN/LAN module offers main communication channel and *SvanNET* e-mail functionalities. Details of the connections’ behaviour depend on the WLAN/LAN settings, allowing the configuration of **TCP Server** and **TCP Client** modes.

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

5.5 INTERFACE CAPABILITIES OF THE BLUETOOTH MODULE

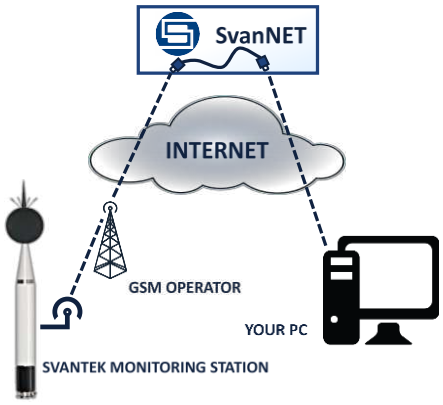
SV 200A has the built-in Bluetooth Low Energy module compliant with the Bluetooth 4.0 standard. Data exchange between the instrument and external devices is performed using the Bluetooth Low Energy Svantek proprietary characteristics.

5.6 REMOTE CONTROL VIA SVANNET

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

SvanNET allows usage of all type of SIM cards with the station modem regardless of having a public or private IP.

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

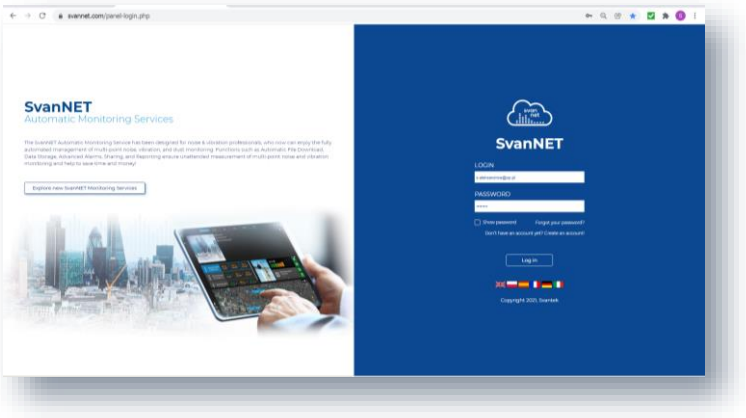


Note: *Establishing mobile connection requires usage of the SIM card without PIN protection and with activated Internet access. Installation of the SIM card is described in Chapter 3.1.1.*

Note: *The factory configuration of SV 200A enables automatic connection with SvanNET after turning the instrument on.*

Before you start using the *SvanNET* web service:

1. Check 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 is using 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/panel-login.php



Before logging, select your language.

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

SvanNET functionalities are described in detail in Chapter 7.

5.7 REMOTE CONTROL VIA SVANPC++_RC

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

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

SvanPC++ is the free of charge program, that every user can download from SVANTEK website. *SvanPC++* supports the USB connection with SV 200A, while wireless connections require activation of the remote communication module (**RC**).

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

6 CONFIGURATION OF THE REMOTE CONNECTION – SVANNET APP

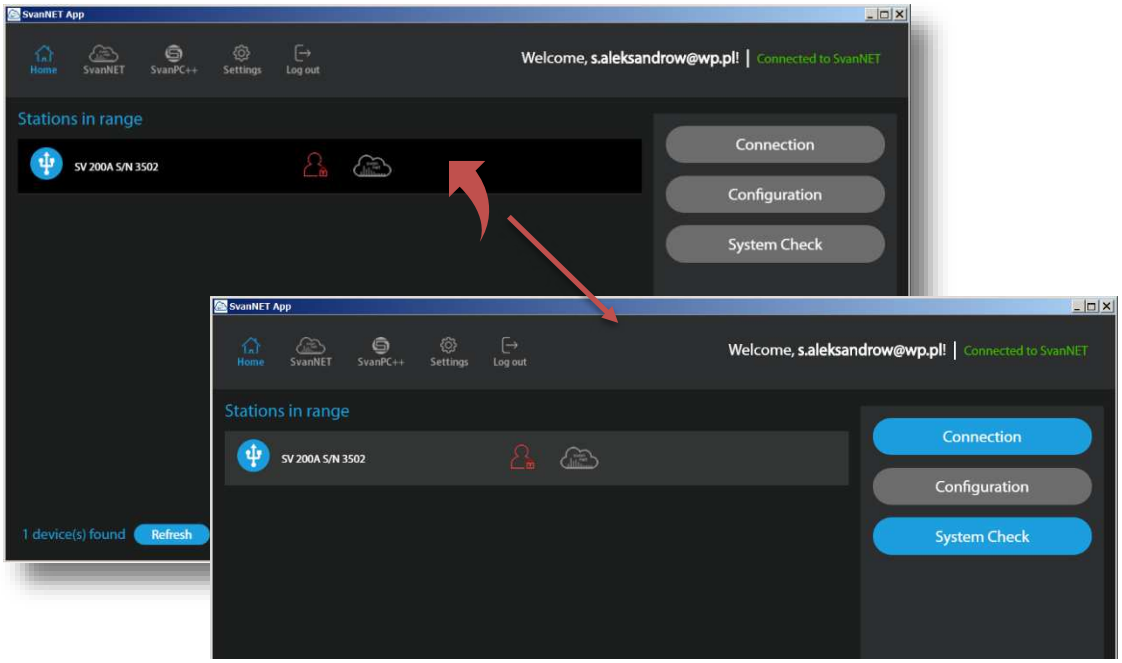
SvanNET App is an application for personal computers and mobile devices that enables quick and simple automatic configuration of the remote connection of your SV 200A with the Internet. The application also enables easy access to the *SvanNET* web service and *SvanPC++* program.

SvanNET App automatically scans all available interfaces to find Svantek devices in the surround. If Bluetooth module of SV 200A is switched on, the application will show available Bluetooth connection. If SV 200A is already connected to a WLAN network or is acting as Access Point, application will find this station also. If a cable connection is possible, a USB cable can be used to establish a connection between the SV 200A and the application.

Note: *To have access to* ***SvanNET App*** *the local SVANTEK distributer should create the user's account and assign monitoring stations to it.*

After logging to *SvanNET App* account, the screen with all Svantek instruments devices found in the surround will appear.

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



If your instrument is not connected to the *SvanNET* web service by means of 4G, LAN or WLAN the **Configuration** button will not be active.

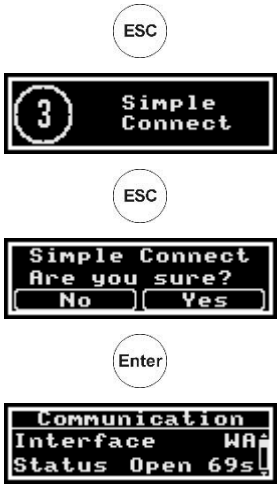
Refresh button is used for searching stations connected to the PC via USB, WLAN or visible as Access Point. Searching lasts 30 seconds and during searching the button is changed to **Stop**. You can stop searching at any time by clicking the **Stop** button.

If the application cannot find SV 200A you may 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" feature which provides a known configuration for WLAN and Bluetooth of SV 200A and allows *SvanNET App* to connect to the station.

To enable the **Simple Connect** mode:

- press and hold the ESC key more than 3s,
- confirm entering the Simple Connect mode by pressing the Enter key,

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

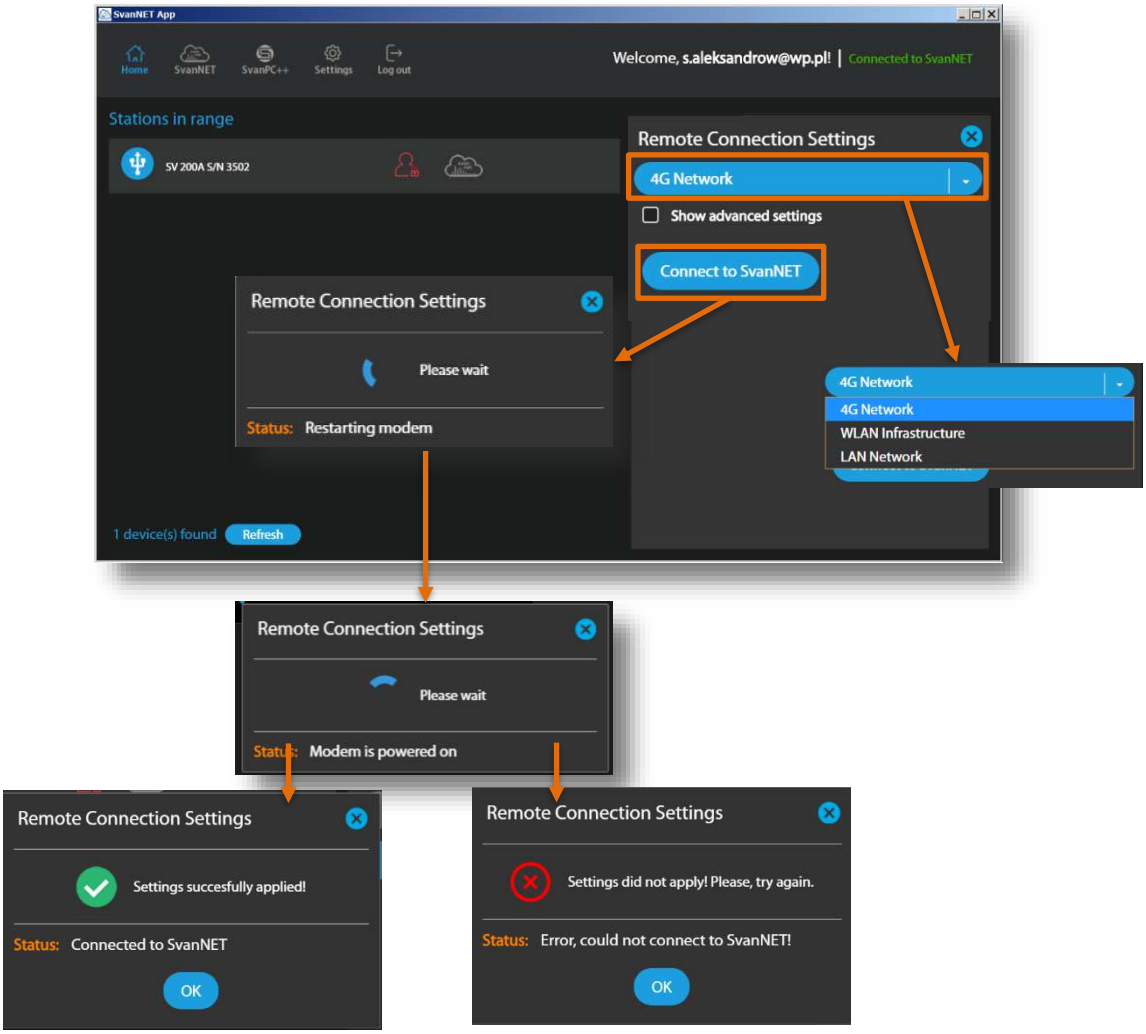


From this moment *SvanNET App* has 90 seconds to establish the connection. The timer is counting down this time.

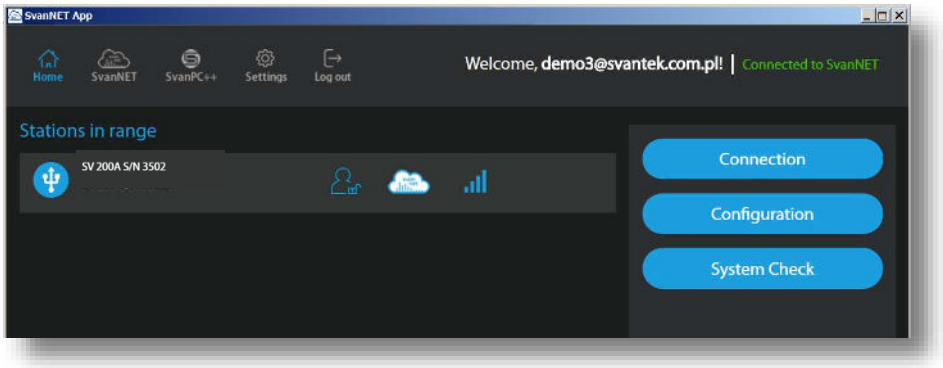
The Simple Connect mode is switched off if timer elapse and no connection is made. The timer is frozen after established connection. Status of the Simple Connection mode is displayed in the **Communication** window as "Open" together with its counting down timer.

6.1 CONFIGURING REMOTE CONNECTIONS

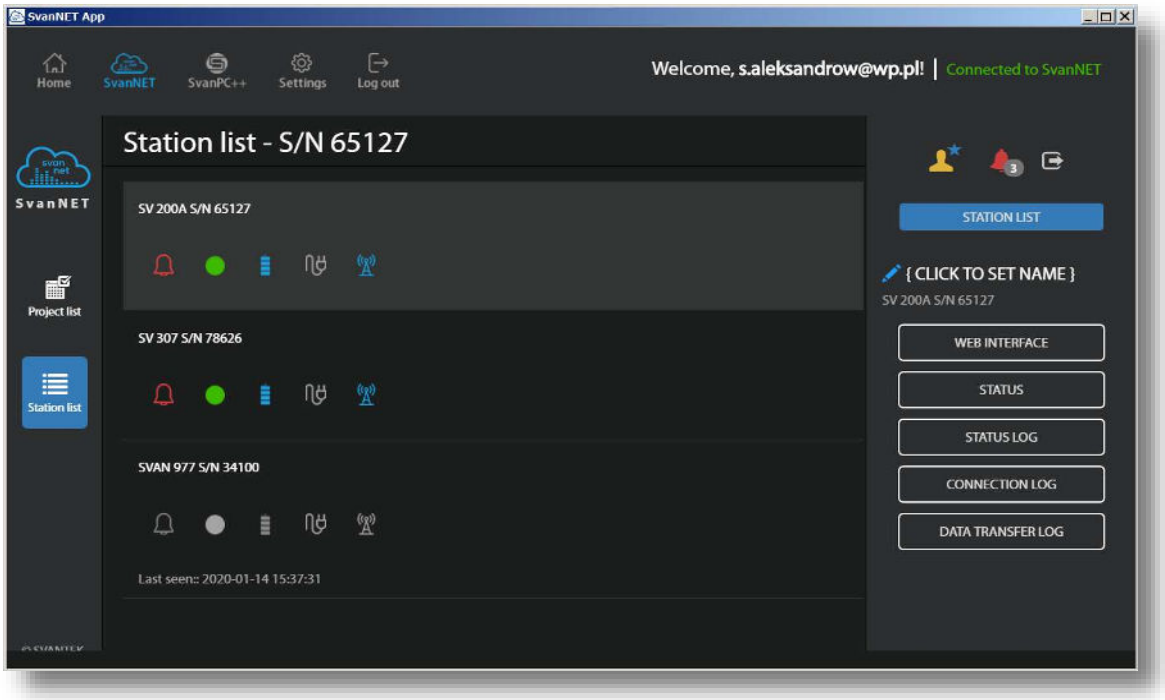
Click on the Connection button and the **Remote Connection Settings** sidebar will change its view, offering selection of the connection type: **4G Network** (with the use of the mobile modem), **WLAN Infrastructure** and **LAN Network** (with the use of the WLAN/LAN module) and the button that connects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



If connection is successful, the Configuration button turns blue.



If you click on the Configuration button the program will open the SvanNET Configuration section where you can configure the SV 200A settings.



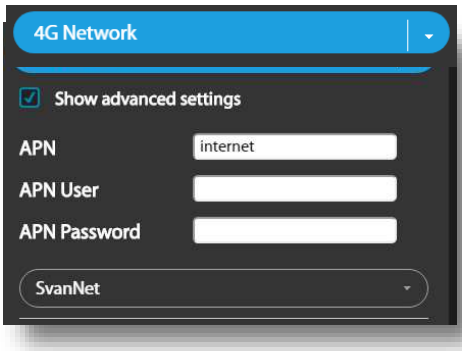
To return to the *SvanNET App* click the 

icon or 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** tick box will cause appearance of additional settings below.

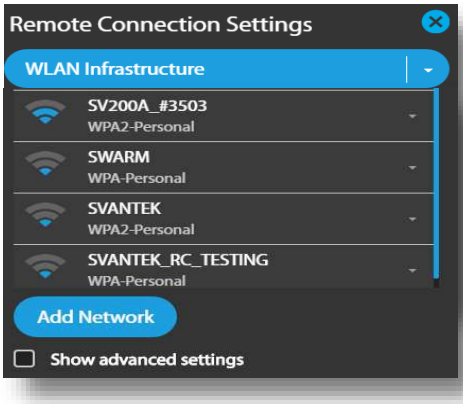
If the **4G Network** connection is selected, advanced settings will consist of **APN** name, **APN User** name and **APN Password**.



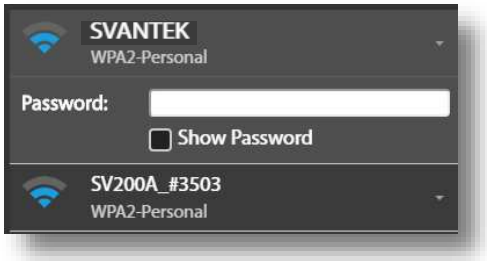
These settings will be applied while installing connectivity with the mobile network.

If the advanced settings are switched off the instrument will apply default network settings.

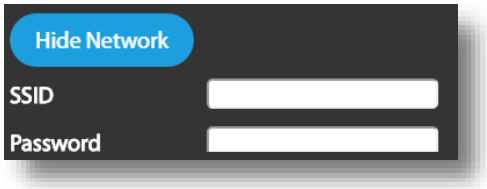
If the **WLAN Infrastructure** connection is selected, the program will show the list of available WLAN networks.



If you click on the selected network, it will drop down letting you to key in the network **Password**.

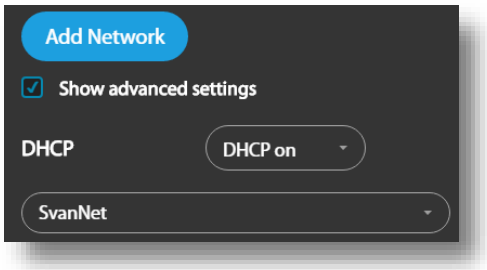


Clicking on the **Add Network** button you will be able to define: Service Set Identifier (**SSID**) and the network **Password**.



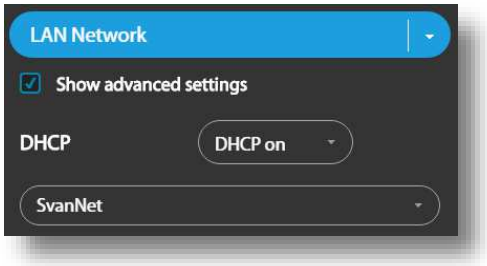
Clicking on the **Show Advanced Settings** tick box you can switch on or off the Dynamic Host Configuration Protocol (**DHCP**).

Usually, **DHCP** should be **On**.



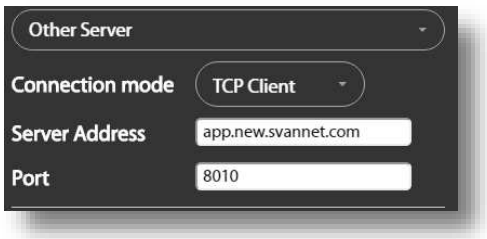
The **LAN Network** connection doesn't require any parameters to configure except Dynamic Host Configuration Protocol (**DHCP**), which can be switched on or off after clicking on the **Show Advanced Settings** tick box.

Usually, **DHCP** should be **On**.



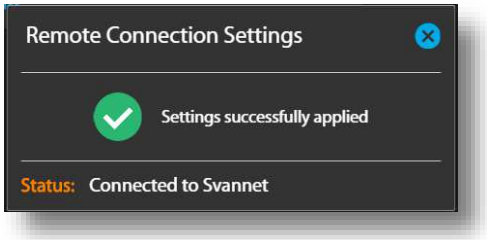
By selecting **Other Server**, the dropdown menu appears in which you can select: **TCP Server** or **TCP Client** (**Connection mode**), remote address for TCP/IP client connection (**Server Address**) and **Port** for this connection.

.



To set the selected connection press the 

button. In case of successful connection, the message "Settings successfully applied!" appears.

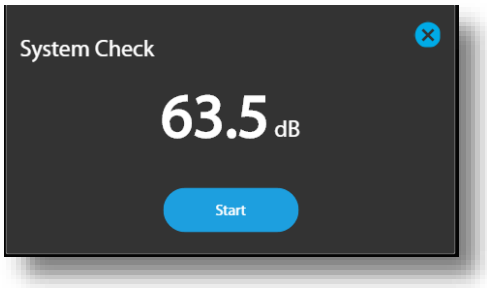


6.2 SV 200A System Check

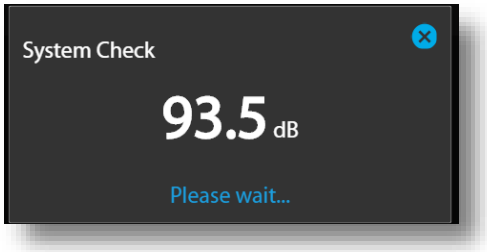
Click on the 

button if you wish to perform the System check.

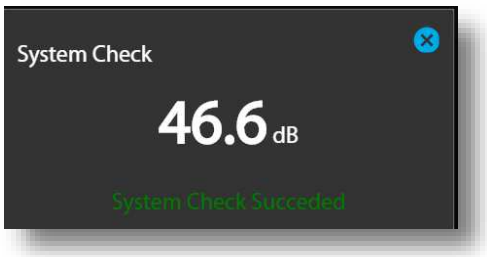
The **System Check** pop-up window with the current SPL result will appear.



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

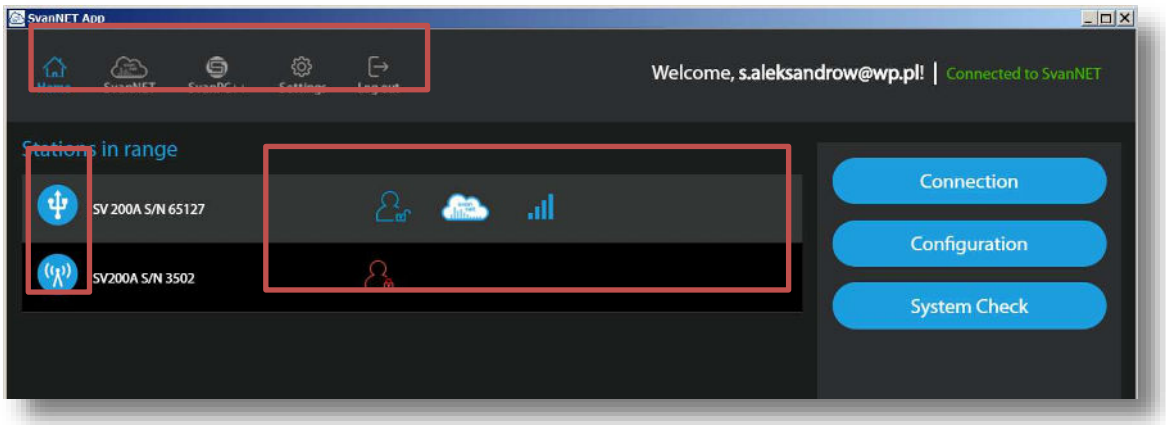


After finishing system checking the current SPL result will be displayed in the **System Check** pop-up window with the message "**System Check Successful**".



6.3 Icons of SVANNET APP

Other functions of SVANNET APP relate to icons-buttons, located in the upper line of the window.



- returning to the main screen

- opening the SvanNET web service

- opening the SvanPC++ program

- application settings

- exiting SvanNET APP

Icons in the instrument's line have informative nature. Icon located at the left side of the instrument's bar informs about the instrument connection type with the PC:

- USB connection,

- WLAN connection,

- LAN connection,

- Access Point connection.

First icon at the right side of the bar line informs about state of connection with the SvanNET web service:

- not assigned,

- assigned.

Second icon at the right side of the bar line informs about state of connection with the SvanNET web service:

- not connected,

- connected.

Third icon at the right side of the bar line informs about connection type with the SvanNET web service:

- mobile connection,

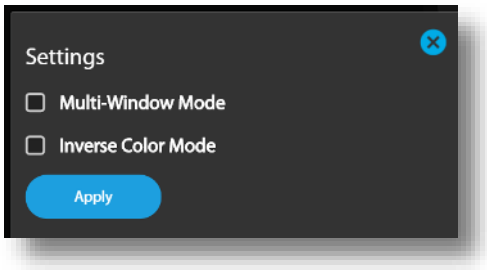
- WLAN connection,

- LAN connection.

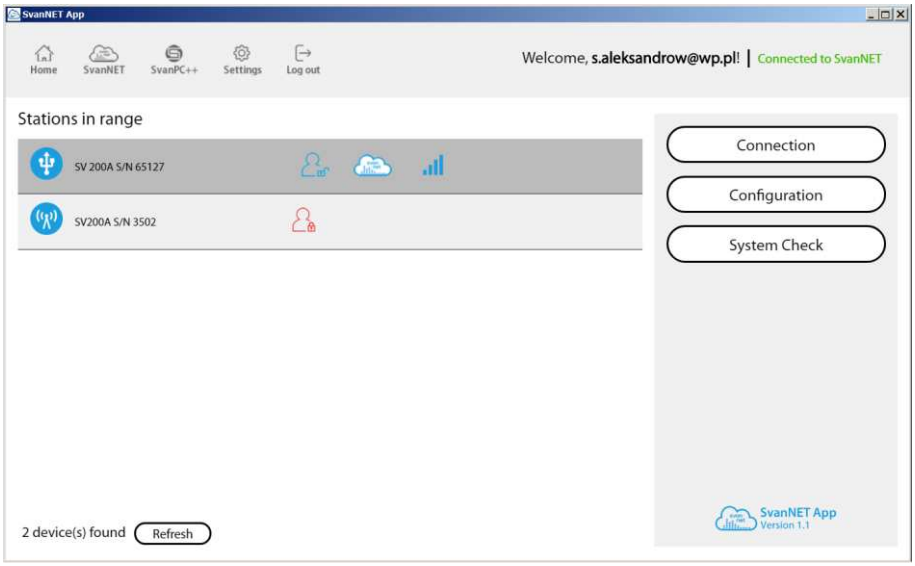
6.4 OTHER OPTIONS

If you click the  icon the pop-up window appears in which you can define additional **Settings**: **Multi-Window Mode** or **Inverse Color Mode**.

In the **Multi-Window Mode**, the SvanNET Configuration section will appear in the separate window.



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



7 SVANNET WEB SERVICE

When enabled, and the instrument is properly configured, the *SvanNET* web service offers you simple access to the instrument's settings, results and status information.

To start use *SvanNET*, browse www.svannet.com and log-in to your account.

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

SvanNET includes the standard function - *Remote Communication Services* available for all the *SvanNET* users and the optional extension - *Automatic Monitoring Services* offered via a license.

Remote Communication Services maintain remote connection with the monitoring devices and service includes status alarms (e.g., battery, memory), remote access to device settings and measurement files stored in the device and preview of the current results and recent time-history graph.

Automatic Monitoring Services offers automatic control of measurement points, data sharing with other *SvanNET* users as well as 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 open to the public or protected by a password.

You can switch both 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 Station list tool will be available.

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

7.1 STATION LIST VIEW

Station list displays all stations assigned to your account – turned on and off. When you click the station, it becomes active and the tools at the right panel will be dedicated to this particular station.

The station bar except station name with serial number includes six icons that indicate the station state. When a station is disconnected from *SvanNET* all icons are of grey colour.

If you click the station name, station information will be displayed. If you click the icon, this icon status information will be displayed:

Project status: this icon appears when this station is involved in the project. When you click this icon, the project name and link to it will be displayed.

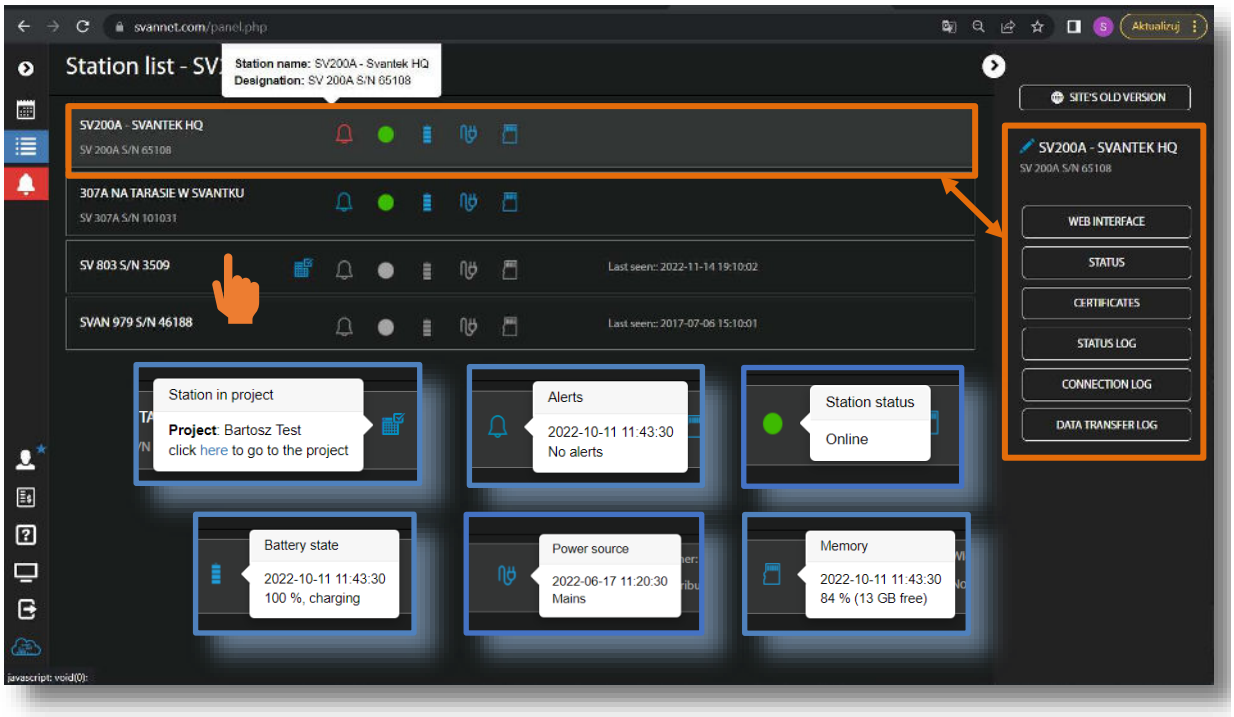
Alert status: blue - everything is OK, red – unregular event is happening.

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

Battery state. When you click this icon, the information about battery state will be displayed.

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

Memory status. When you click this icon, the information about available memory will be displayed.



Icons in the Main panel tool allows you to:


display alarms for all stations


manage user account


activate licences

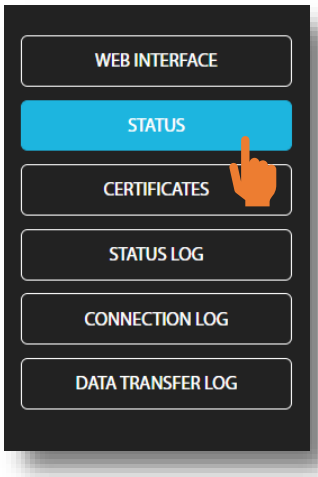

contact Svantek Support team


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


logout from *SvanNET*.

The Tool panel provides some functions for station control. To switch the function, point a cursor on the appropriate button (it will change its colour to blue) and click it.

The **WEB INTERFACE** button switches you to the Live data view (see Chapter 7.2) in which you can view measurement results and use additional tools to configure station parameters, download data files, start/stop measurements and perform station checking. This button is available for the stations connected to SvanNET.



The **STATUS** button switches you to the Station status view (see Chapter 7.1.1) in which you can check the station status and configure status alarms.

The **CERTIFICATES** button activates the dialog box which shows available certificates for this instrument and allows you to add new certificate (see Chapter 7.1.2).

The **STATUS LOG** button switches you to the Status log view (see Chapter 7.1.3) in which you can check the power source (type and charge level), memory free space, mobile signal quality and history of system checking.

The **CONNECTION LOG** button switches you to the Connection log view (see Chapter 7.1.3) in which you can check the history of station connections.

The **DATA TRANSFER LOG** button switches you to the Data transfer log view (see Chapter 7.1.3) in which you can check the history of data transfers (uploads).

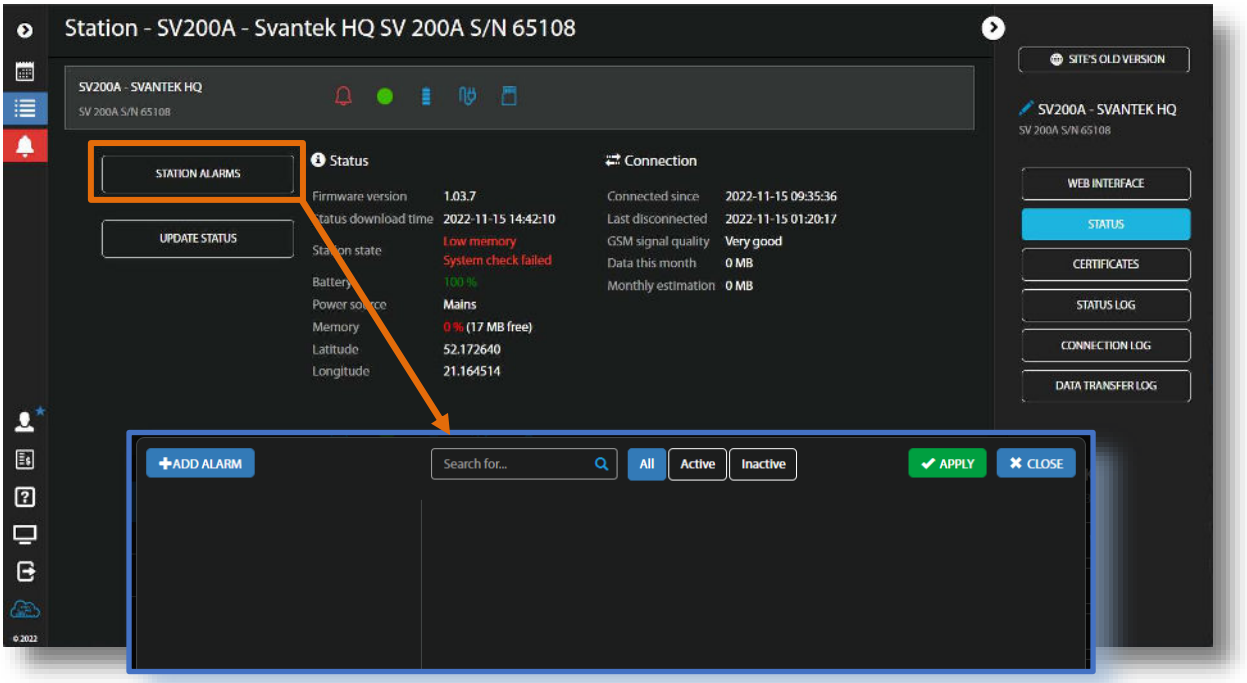
Clicking  you can set the new station name instead of the default.

7.1.1 STATUS view

In the STATUS view, you can:

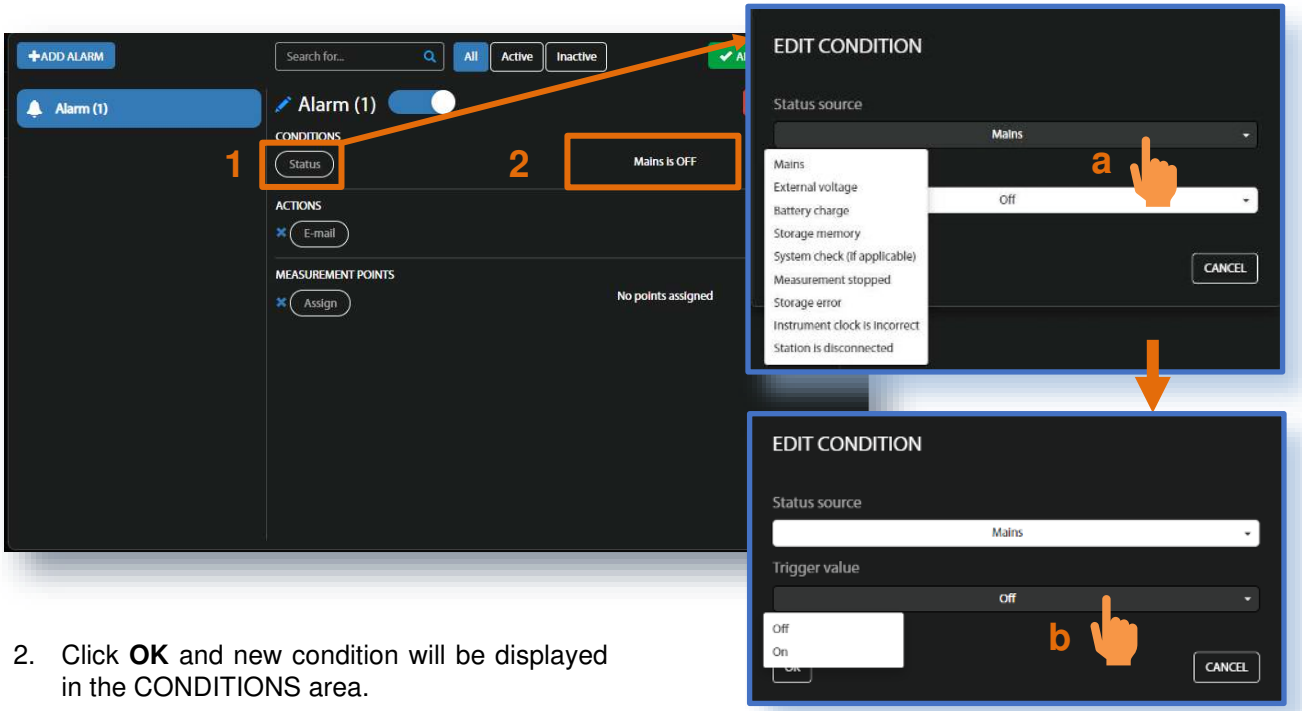
- check the station status (firmware version, battery charging, memory, connection etc.),
- configure alarms for the respective states that *SvanNET* will generate and send to the defined recipients in the form of e-mail. (**STATIONS ALARMS** button),
- update the instrument's status (**UPDATE STATUS** button).

***Note**: In this view, you can configure alarms generated by SvanNET based on data received from all stations belonged to your account. Some stations may also generate their own alarms which can be configured via WEB INTERFACE in the CONFIGURATION view – see Chapter 7.2.3).*



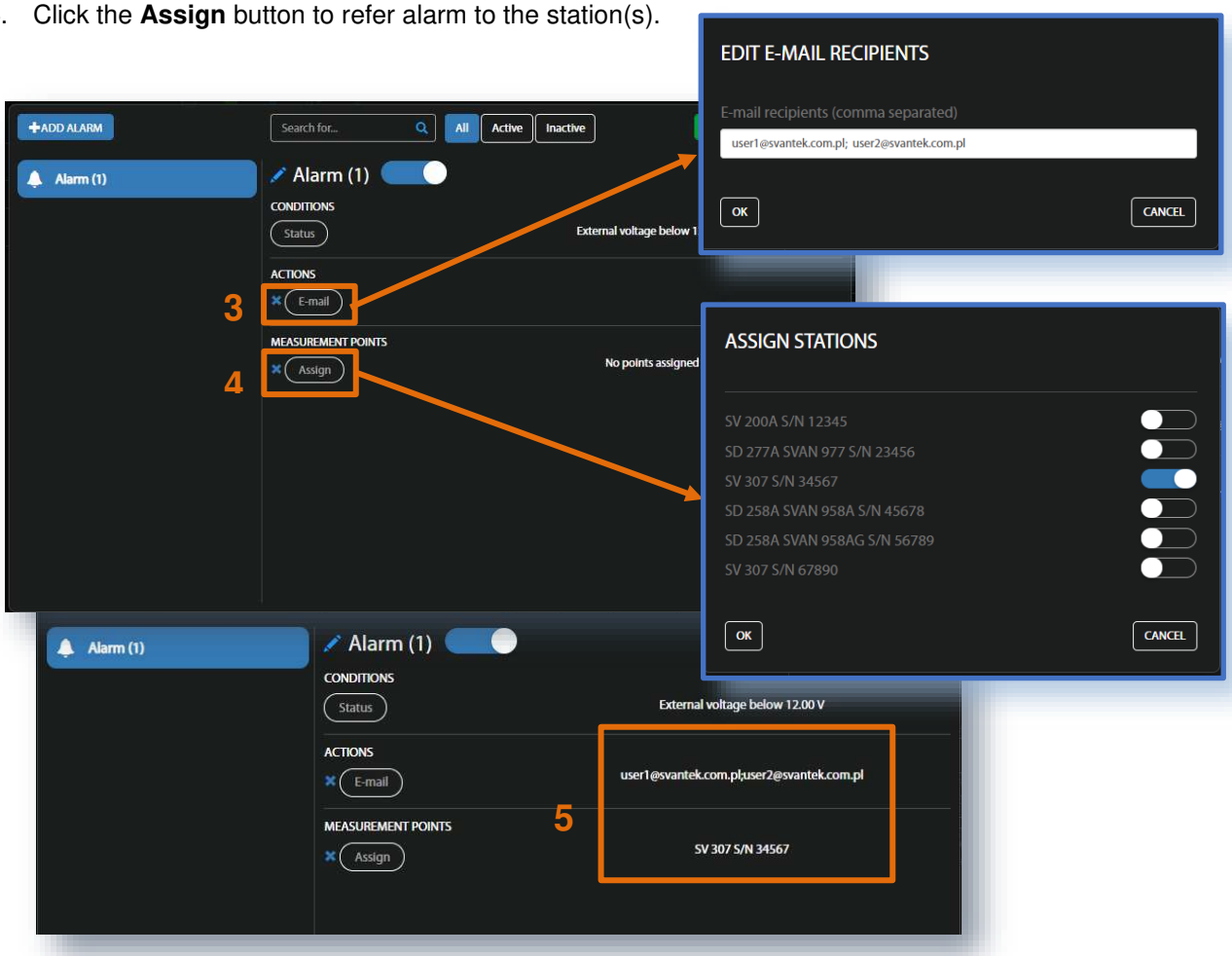
After clicking STATION ALARMS, click **+ADD ALARM** in the pop-up box and the new **Alarm(1)** with CONDITIONS, ACTIONS and MEASUREMENT POINTS settings will appear. Alarms are based on Conditions and relate to Actions, that are default e-mails to the specified recipients, and refer to selected Measurement points. To configure Alarm:

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



2. Click **OK** and new condition will be displayed in the CONDITIONS area.

3. Click the **E-mail** button to enter/edit e-mail recipients.
4. Click the **Assign** button to refer alarm to the station(s).



5. Made selections are displayed in the ACTIONS and MEASUREMENT POINTS sections.

The SvanNET alarms have next meanings:

- **Mains**
  - Trigger Value: Off – alarm is generated when the system detects loss of power supply.
  - 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 an external power drop below the selected value. In this case, external power means 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 the free storage memory below the selected threshold.
- **System check (if applicable)**
  - Alarm is generated when the system detects failure in execution of the system check procedure (not live check).
- **Measurement stopped**
  - Alarm is generated when the system detects lack of measurement. Applies only to stopped measurements - states such as start delay, waiting for synchronization 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 in progress and data are recorded; the writing of the logger file is checked by changing of the free space on the card (which means that the device is writing data).
  - Instrument action: Restart measurement.
- **Instrument clock is incorrect**
  - Trigger value: xx seconds / xx minutes – alarm is generated if the RTC indication of the device is inconsistent with 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.

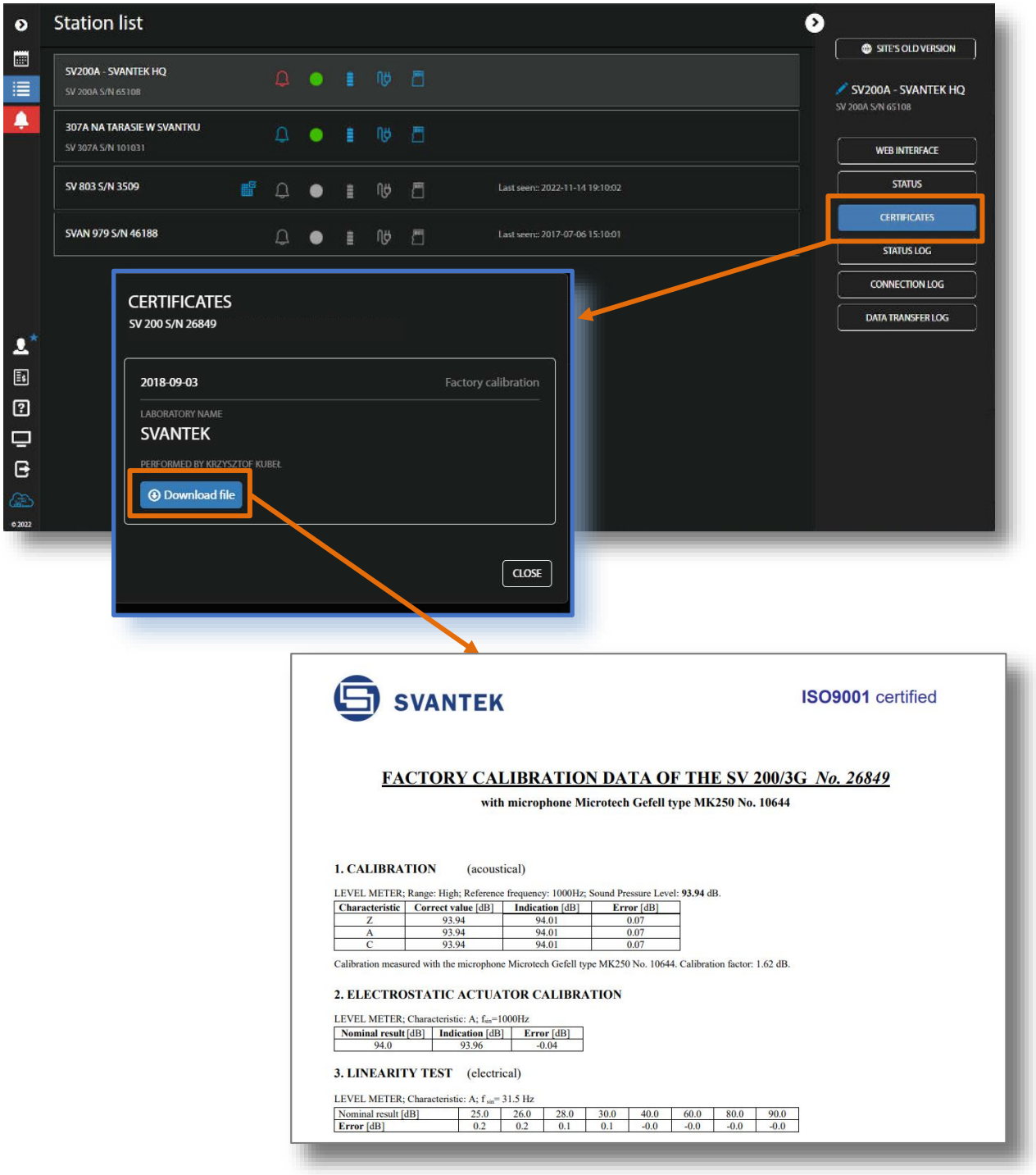
Alarms are reported once after the occurrence of an alarm condition. The occurrence of an alarm condition will generate selected actions (e.g., e-mail) at the moment of changing the status compared to the previous check (i.e., if at 8:15 there is power supply, at 8:30 mains is off, at 8:45 mains is still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

7.1.2 CERTIFICATES view

The **CERTIFICATES** button opens the CERTIFICATES dialog box which shows 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 pdf file clicking **Download file**.

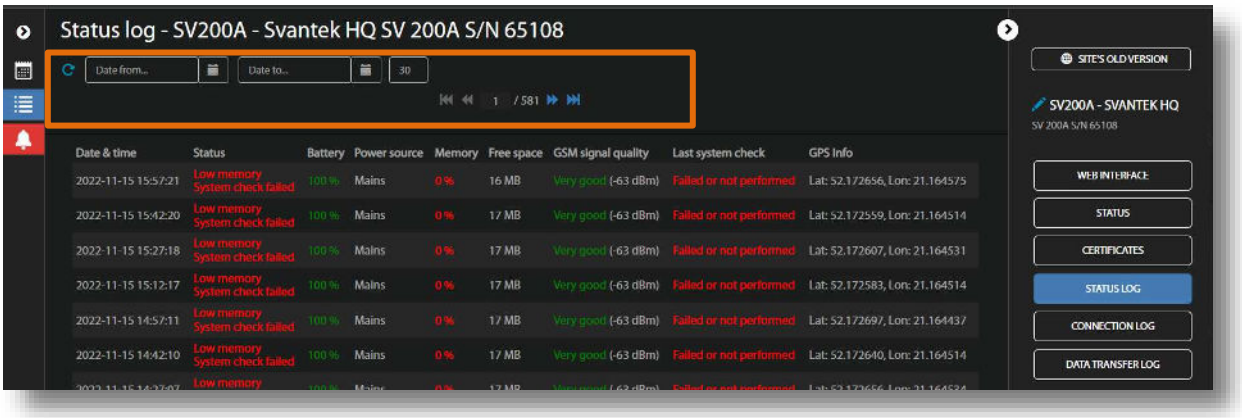


7.1.3 LOG views

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

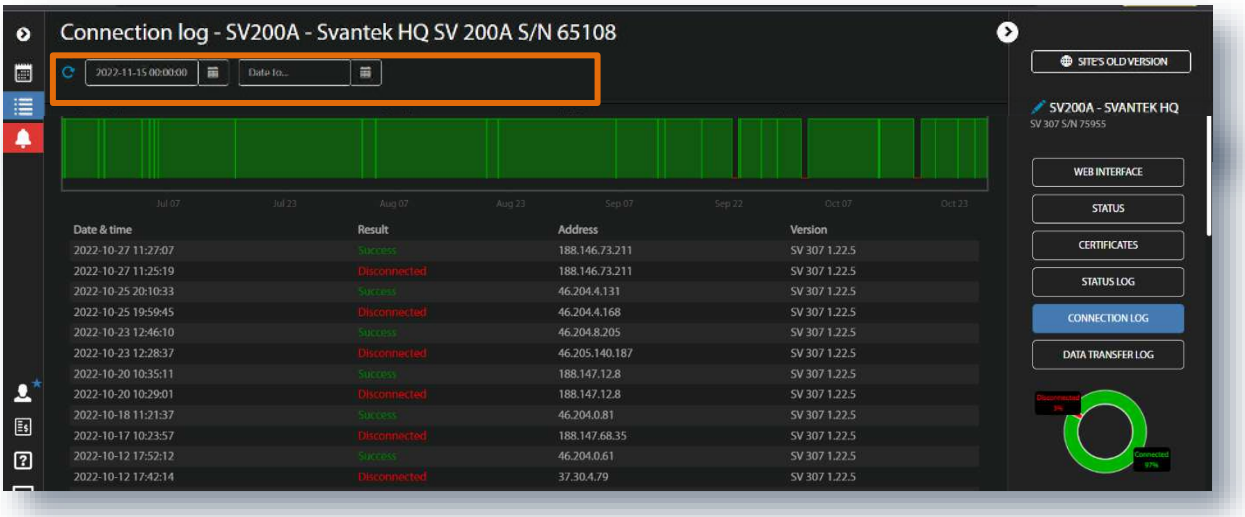
- **Status log** which registers power source type and charge level, memory free space, GSM signal quality, system check history and GPS information.

  In the upper line, you can: refresh the log, select the required period of records and rewind records.



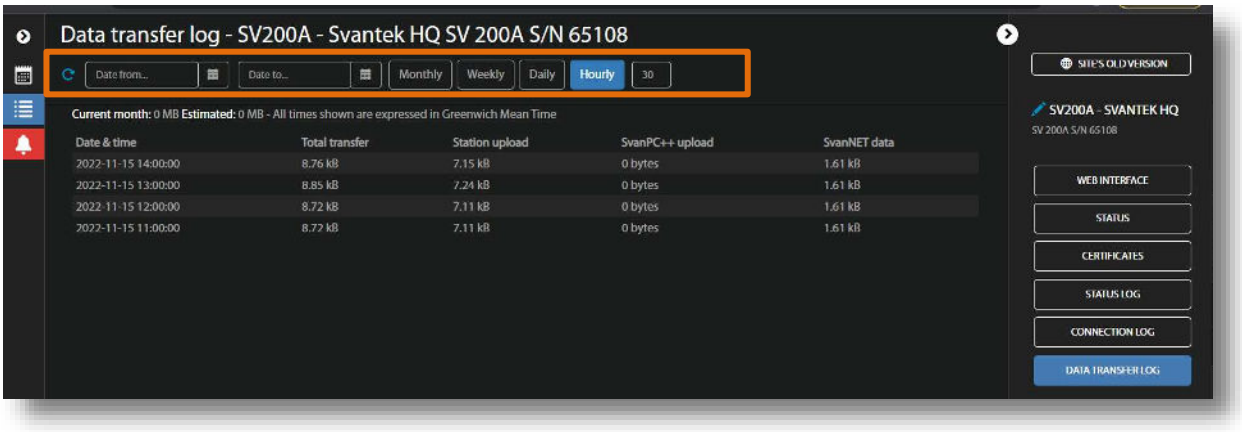
- **Connection log** which registers history of station connections – result (success or disconnected), IP address, firmware version and reason of the disconnection.

  In the upper line you can: refresh the log, select the required period of records to be displayed and rewind records, below is the time-history of connections with the SvanNET and the pie chart shows the total connection time in percentage to the whole working time.



- **Data transfer log** which registers history of data transfers (uploads).

  In the upper line you can: refresh the log, select the required period of records to be displayed and select the period for data transfer presentation: Monthly, Weekly, Daily or Hourly.



7.2 WEB INTERFACE VIEW

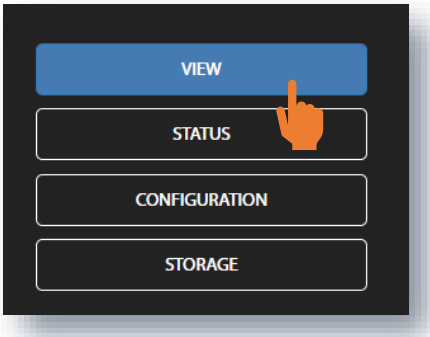
The **WEB INTERFACE** view is available for the stations connected to *SvanNET* and enables measurement results viewing, station parameters configuring, data files downloading, measurement start/stop and station checking.

The **VIEW** button switches you to the **Live data** view (see Chapter 7.2.1) in which you can view broadband results, 1/1 or 1/3 octave spectra and time-history results.

The **STATUS** button switches you to the station status view (see Chapter 7.2.2) in which you can check the station status and start/stop measurements.

The **CONFIGURATION** button switches you to the station **Configuration** view (see Chapter 7.2.3) in which you can configure measurement and instrument parameters.

The **STORAGE** button switches you to the **Storage** view (see Chapter 7.2.4) in which you can download files manually.



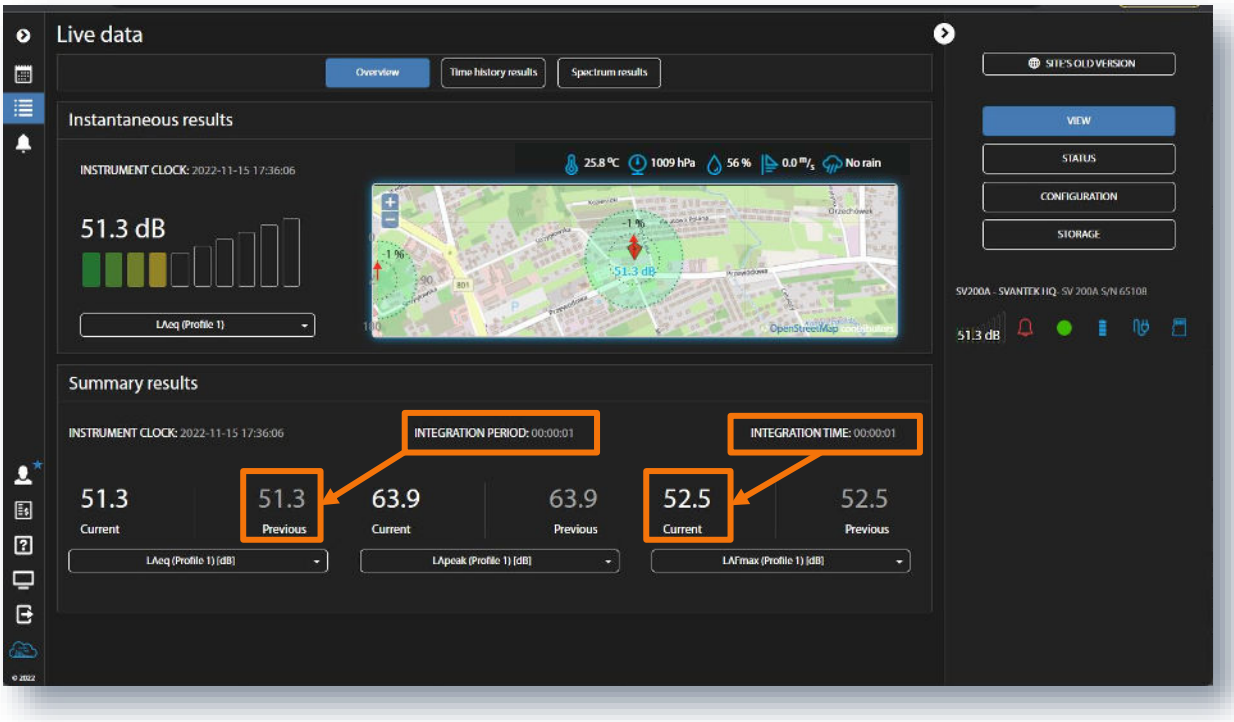
***Note**: Content of the **Configuration** tabs depends on the chisen parameters. The objective of this manual is not to present all possible combinations of parameters, but to indicate the principles of working with SvanNET.*

7.2.1 Live data view

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

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

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



The map shows the instrument's position, meteorological data (if the Meteo module is applied) and the direction (sector) of the dominant of sound energy distribution (see Chapter 9).

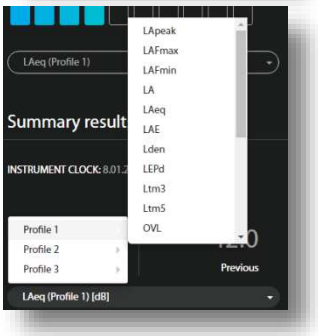
Current results are updated every second and averaged by the INTEGRATION TIME.

Previous results present result measured by the INTEGRATION PERIOD (Summary step) before the current integration time.

The measured result with the used filter and detector as well as the profile in which this result is measured is presented in the selector field below the result value:

- for **Instantaneous results**, you can choose a result from the list (**LXpeak**, **LXYmax**, **LXYmin** or **LXeq**) measured in one of three profiles (**Profile 1**, **Profile 2**, **Profile 3**) with **X** filter (**A**, **C**, **Z**) and **Y** detector (**I**mpulse, **F**ast, **S**low),
- for **Summary results**, you can choose a result from the list (**LXpeak**, **LXYmax**, **LXYmin**, **LX**, **LXeq**, **LXE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **OVL**, ten statistical level results **Ln**, two rolling **LXeq** and two estimated **LXeq**) measured in one of three profiles (**Profile 1**, **Profile 2**, **Profile 3**) with **X** filter (**A**, **C**, **Z**) and **Y** detector (**I**mpulse, **F**ast, **S**low).

All measured results are described, and formulas are presented in the Appendix D for this manual.



***Note**: The Instantaneous results are not saved in the instrument's files, while the Summary results can be saved if the **Save summary results** option is switched on in the **Storage** section of the CONFIGURATION view.*

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

In this section, you can:

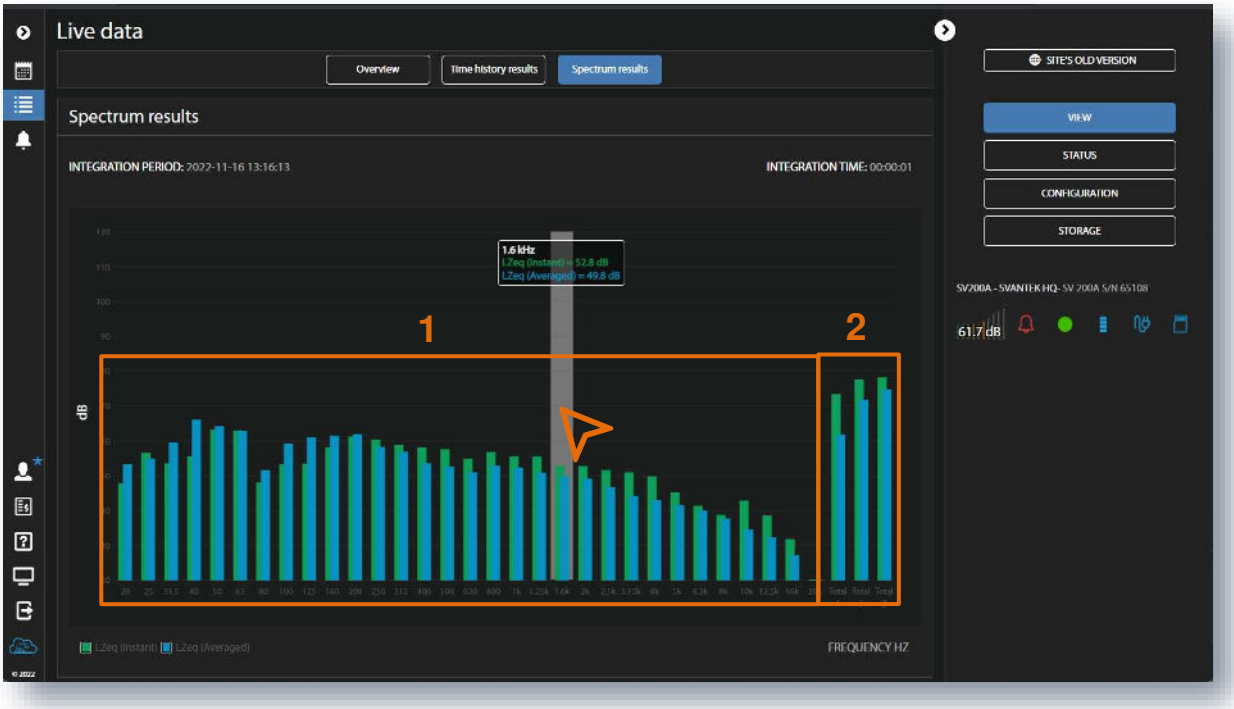
1. Choose results for simultaneous displaying with the use of selector buttons (Leq, Lpeak, Lmax, Lmin or RLeq) measured in profiles with weighting filters (A, B, C or Z) and detectors (Fast, Slow or Impulse).
2. Change the time range for presentation of results.
3. Point your mouse cursor on the plot to readout the values for this time point or click at the height of the required sound level to set the level line.
4. Scroll the time window over the time history.

The **Spectrum results** section displays current 1/1 or 1/3 octave Instant and Averaged results (LZeq) and three Total results.

In this section, you can:

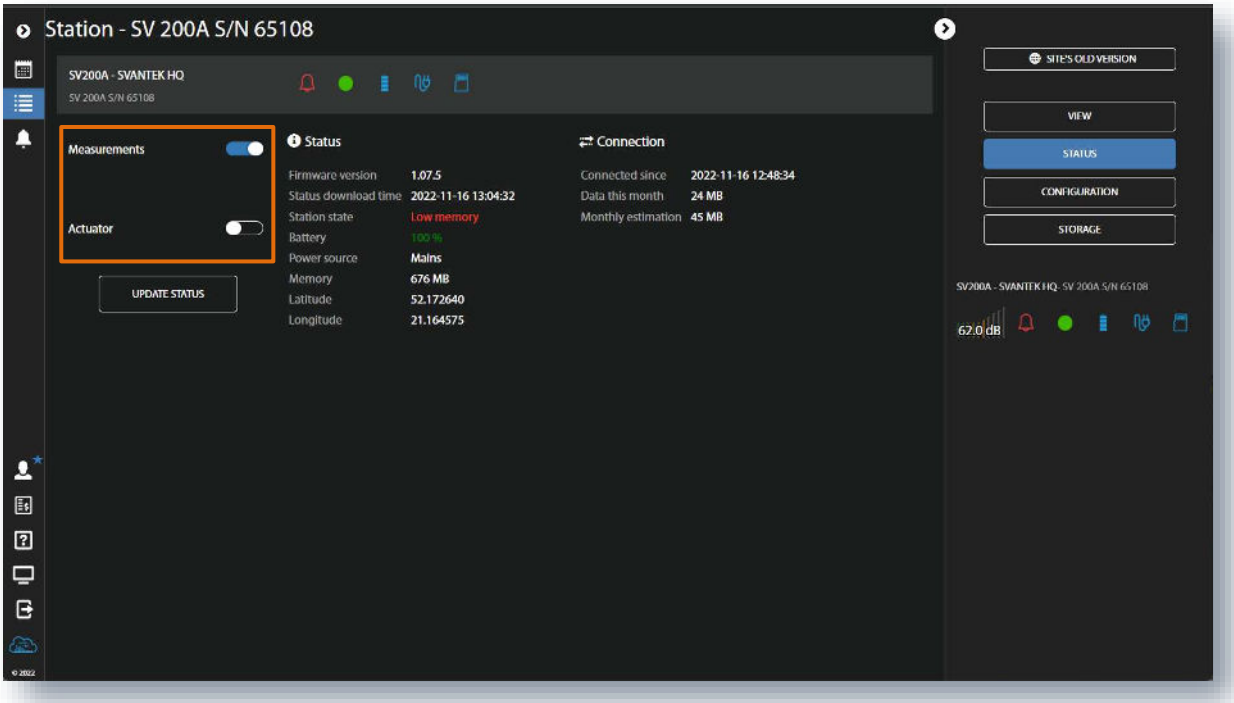
1. Point your mouse cursor on the plot to readout the values of instantaneous and averaged results for each 1/1 or 1/3 octave band.
2. Point your mouse cursor on the last three bars of the plot to readout the values of instantaneous and averaged three Total results.

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



7.2.2 STATUS view

The **STATUS** view is similar to that described in the Chapter 7.1.1). The difference is that instead of configuring STATUS ALARMS, in this view, you can start/stop measurements and switch on the actuator for system checks.



7.2.3 CONFIGURATION view

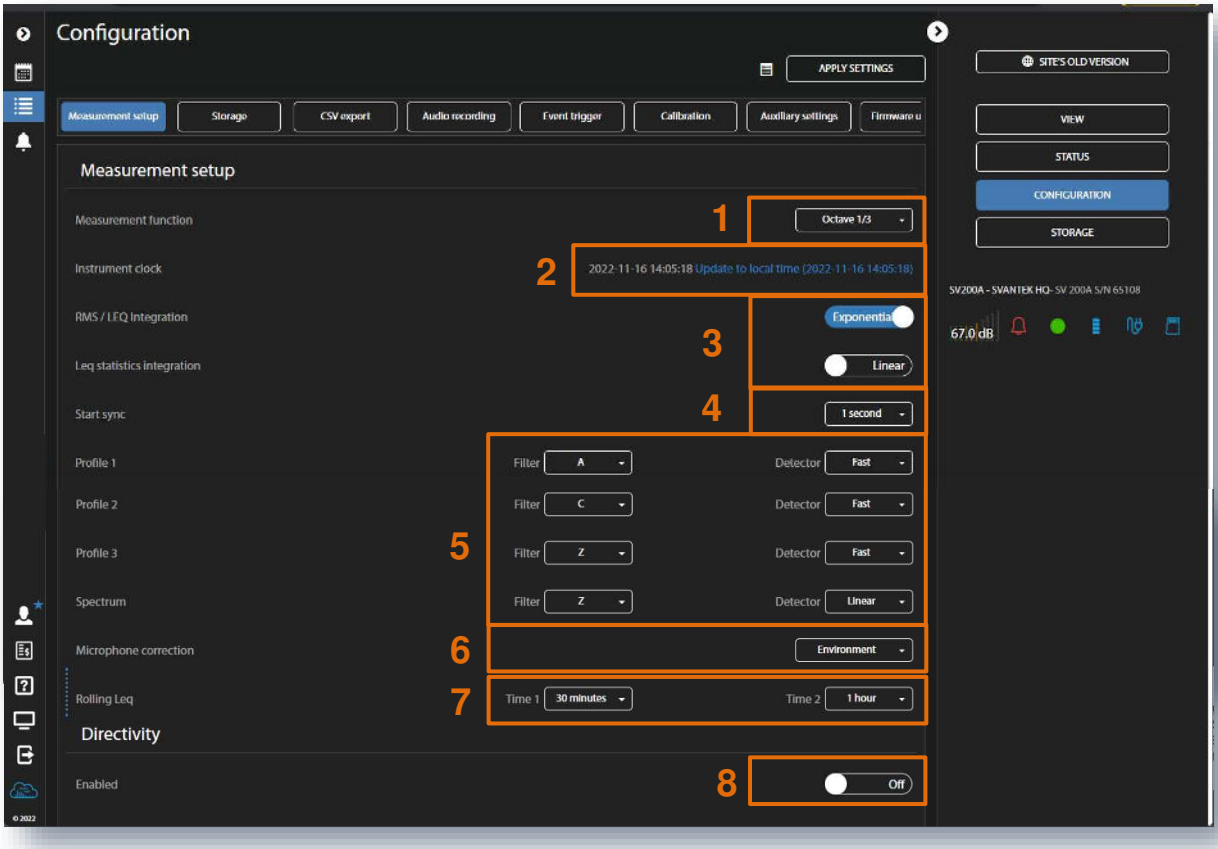
The **Configuration** view consists of several sections that enable configuring measurement parameters (**Measurement setup**), data saving (**Storage**), export of measurement data as CSV files (**CSV export**), recording of audio signal (**Audio recording**), events triggering (**Event trigger**), automatic system check (**Calibration**), auxiliary parameters (**Auxiliary settings**) and performing firmware upgrade (**Firmware upgrade**).

To send new configuration to the station, click the APPLY SETTINGS button.

7.2.3.1 Measurement setup

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

1. Select **Measurement function**: *Level Meter*, *Octave 1/1*, *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. Choose **Filter** (*Z, A, C*) and **Detector** type (*Impulse*, *Fast*, *Slow*) for profiles and spectrum (**Spectrum** position appears when the **Octave 1/1** or **Octave 1/3** function is selected)
6. Set **Microphone correction**: *Environment* or *Airport*
7. Set time frames for averaging of the two **Rolling Leq** results (**Time 1** and **Time 2**)
8. Enable **Directivity** settings.



RMS/Leq Integration defines the detector type for calculation of the Leq, LEPd, Ln and SEL measurement results. *Linear* integration is required when you need to get the true RMS value of the

measured signal. When this option is chosen, values of the Leq, LEPd, Ln and SEL results do not depend on the detector time constant (*Fast*, *Slow* or *Impulse*), defined for the profiles.

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

Such measurement results like Lmax, Lmin, Ltm3 or Ltm5 are always calculated with the *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 presented in Appendix D.*

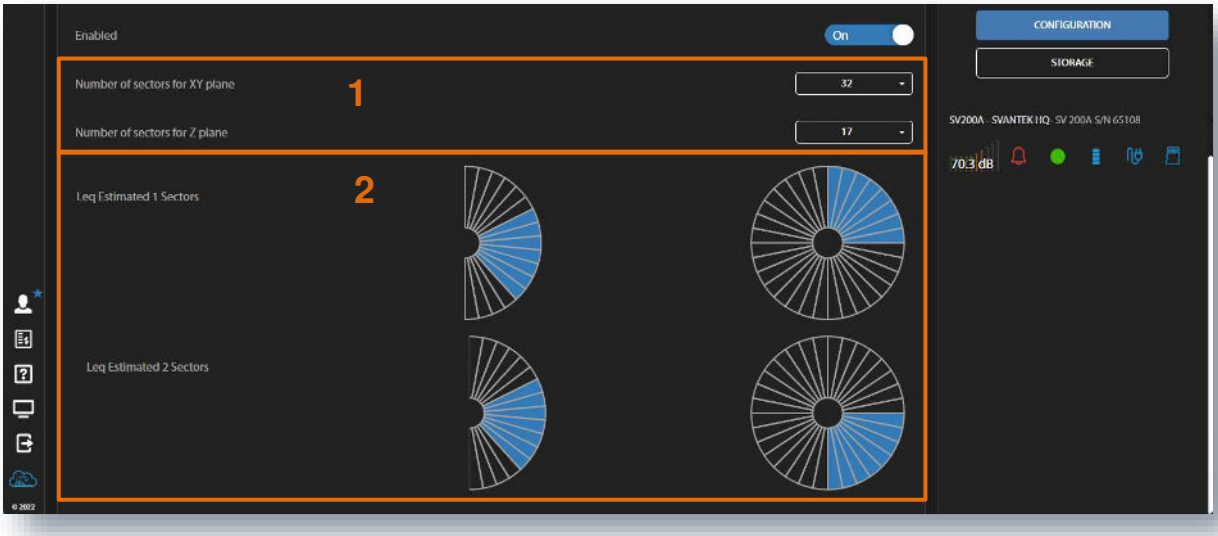
Filter means a frequency weighting filter applied for all measurement results calculated for individual profiles or for the spectrum:

- Z Class 1 according to IEC 61672-1:2013,
- A Class 1 according to IEC 651 and IEC 61672-1:2013,
- C Class 1 according to IEC 651 and IEC 61672-1:2013,

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

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

1. number of sectors for XY plane (2, 4, 8, 16 or 32) and Z plane (2, 3, 5, 9 or 17) and
2. sectors which will be considered during calculation of two Estimated Leq results.



7.2.3.2 Storage

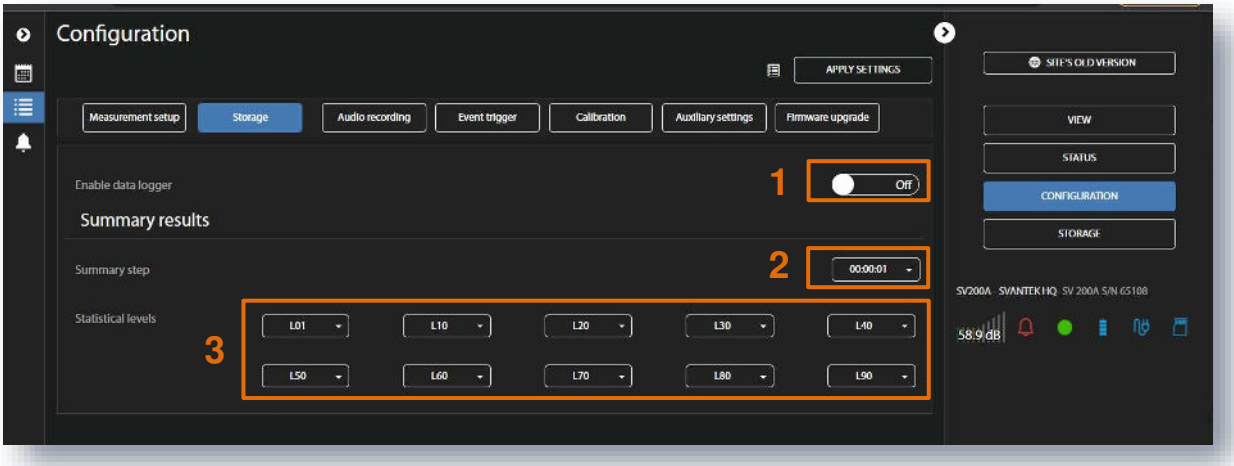
The **Storage** section allows you to program which results and with what step will be saved in the logger file.

1. To start configuring, you should enable data logging (**Enable data logger**).

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

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

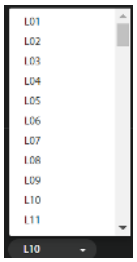
2. period of the Summary results measurement and, if logging is enabled, step with which all Summary results will be logged to a file (**Summary step** is equal to the *Integration Period* – see Chapter 5.1.2),
3. ten **Statistical levels** to be calculated and saved with the Summary results.



Summary step (Integration period) defines the period during which Summary results are measured (integrated) using frequency weighted filters and RMS detector time constants defined in the **Measurement setup** section and saved in a file as the set of Summary Results.

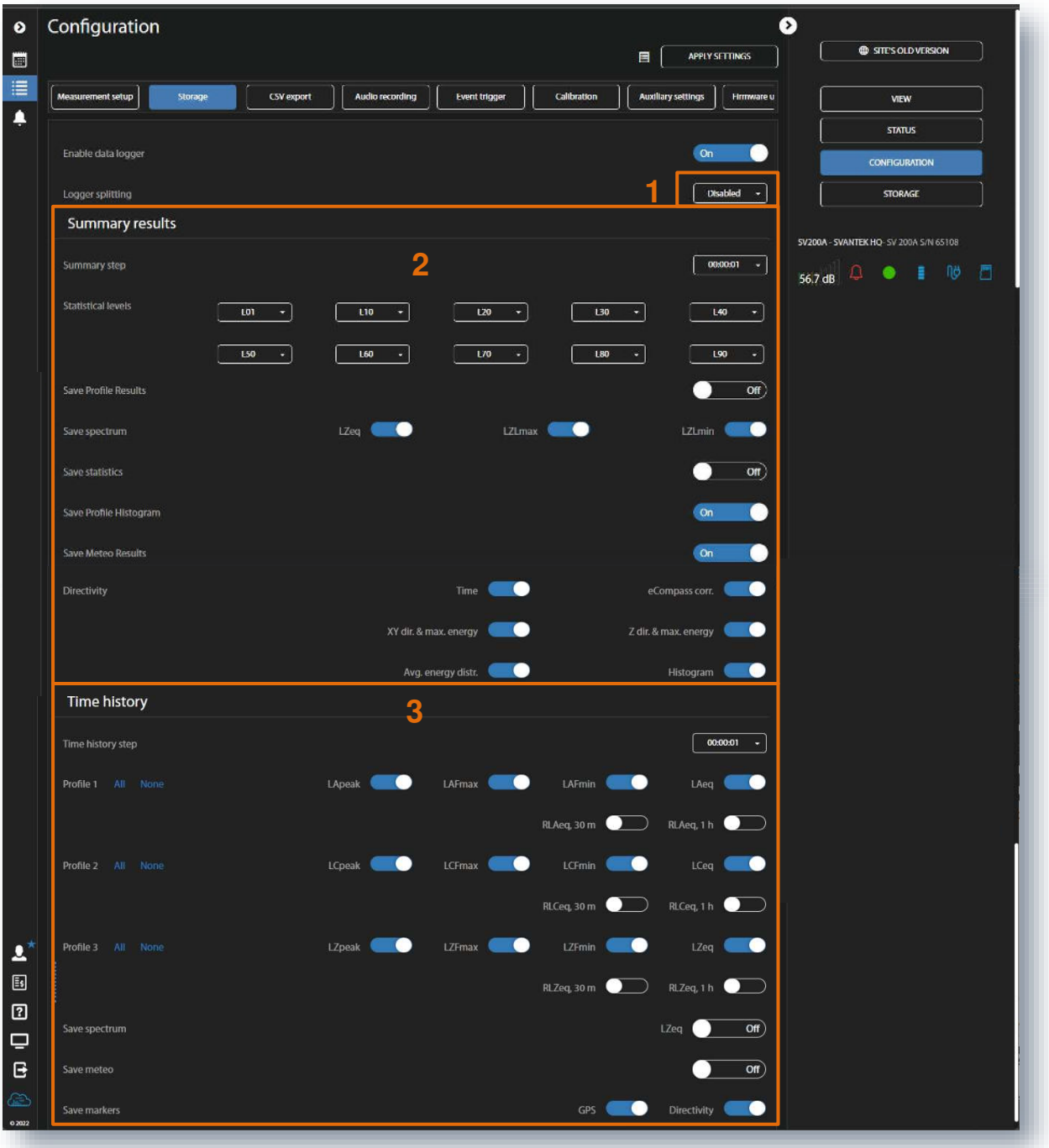
The **Summary step** can be chosen in the pop-up list in the range from 1s to 24h.

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

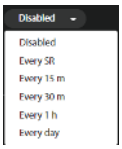


As soon as the data logging is switched on, you can:

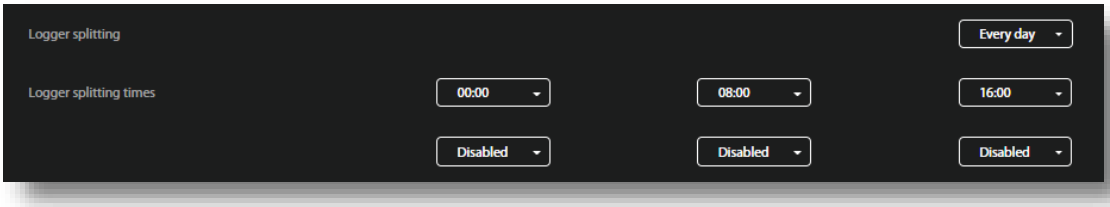
1. Program splitting of the logger file (**Logger splitting**)
2. Select what **Summary results** will be saved in a file: Profile Results, spectra (Leq, Lmax and Lmin), statistics, profile Histogram, meteo and directivity results (Time, eCompas corrections, XY dir.&max. energy, Z dir.&max.energy, Average energy distribution, Histogram)
3. Configure saving of the **Time history** results in a file: step of saving (**Time history step**) and results to be saved as a Time history 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 chosen in the **Auxiliary settings** section) and GPS and Directivity markers.



The **Logger splitting** position enables splitting of logger files by choosing the splitting mode: *Every SR* (with the **Summary step** ≥ 1m), *Every 15 m*, *Every 30 m*, *Every 1 h* and *Every day*.



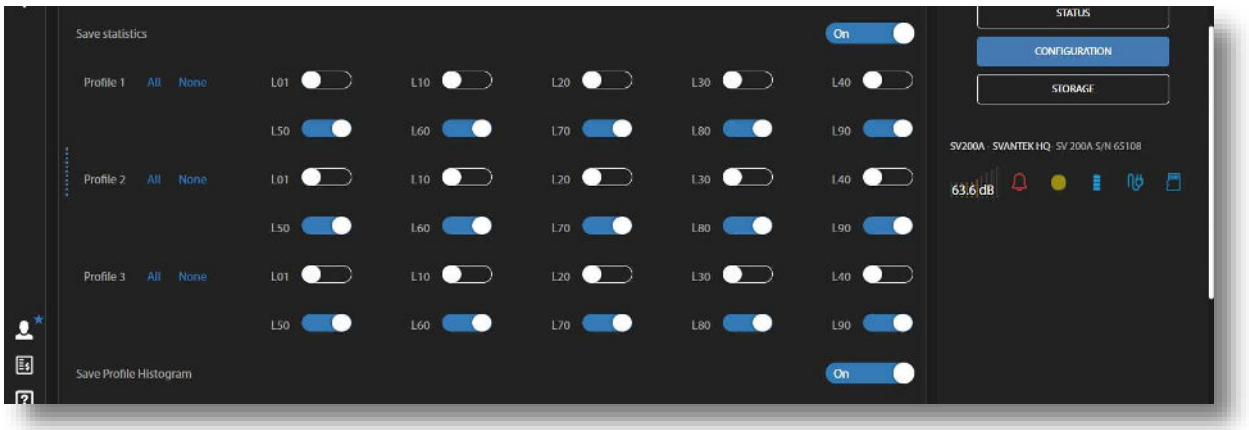
If *Every day* is selected, you can define up to six points during a day when splitting will take place.



Time history step can be chosen 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 you switch on **Save Profile Results**, the Summary results section will be extended by main results toggles for three profiles (Lpeak, LE, Lmax, Lmin, L(SPL), Leq, Lden, Ltm3, Ltm5, 2 x rolling Leq and 2 x estimated Leq).

If you switch on **Save Statistics**, the Summary results section will be extended by toggles for Leq statistics defined above for three profiles.



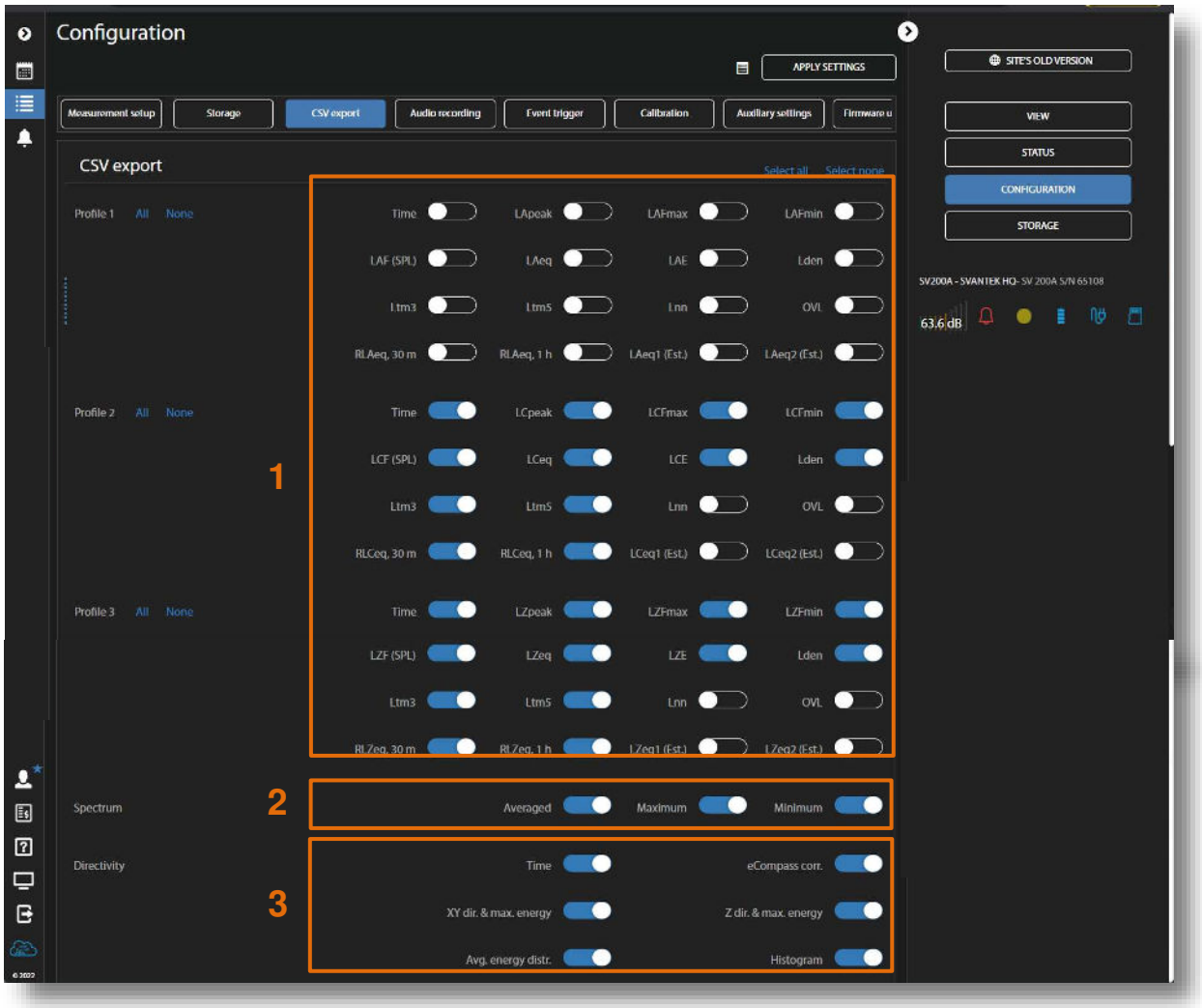
***Note**: All files with measurement result are automatically named in accordance with the rule: a prefix (string of letters) supplemented with a number (string of digits) increased by one for the new created file. Default prefix is "L" and it can be changed via SvanPC++.*

7.2.3.3 CSV export

The **CSV export** section allows you to choose measurement data for direct export to CSV files (Comma Separated Values) and saving them on the instrument's SD card.

In this section, you can:

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

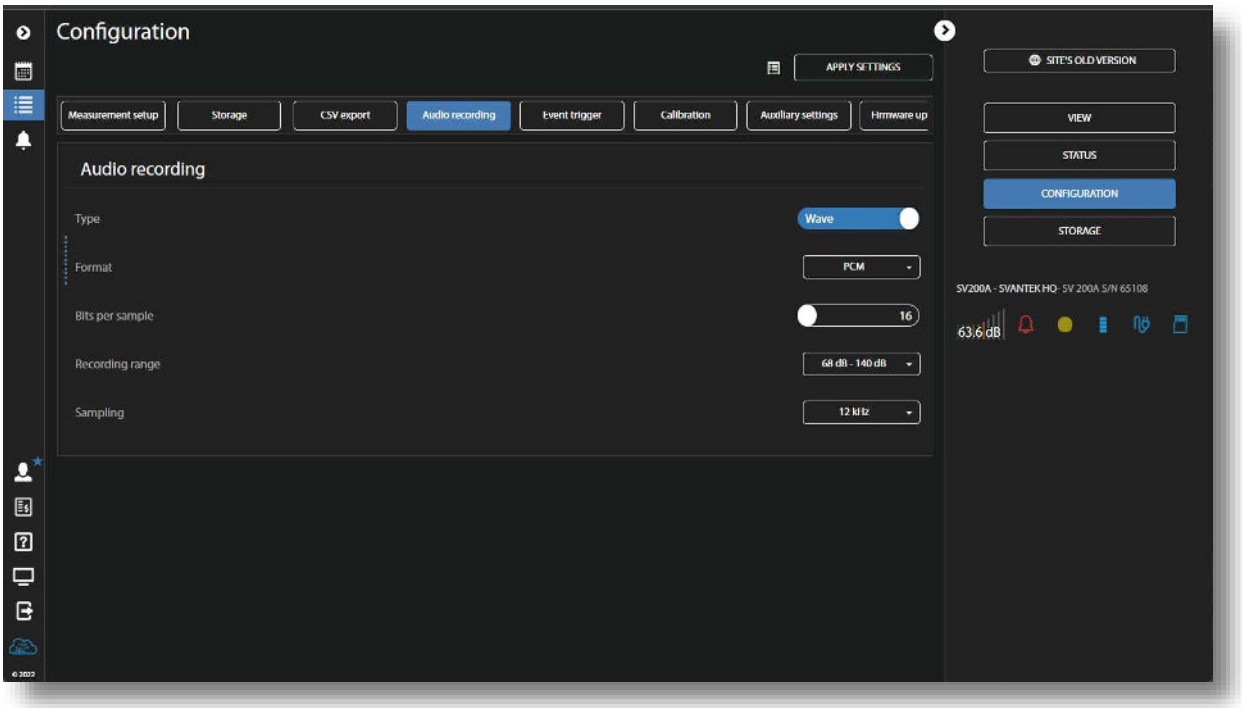


Note: *CSV files can be quite large, and it is advised to use this feature when absolutely necessary.*

The CSV file structure is presented in Appendix B.

7.2.3.4 Audio recording

In the **Audio recording** section, you can configure an audio signal recording. The audio signal can be recorded in the logger file together with Time history and Summary results (like *Events* type), or in a separate *.wav type file (like *Wave* type). To switch the type of the signal recording, use the **Type** button.



In this tab you can configure four parameters of audio recording: **Format** of the file in the case of 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*).

Choosing of higher sampling rate ensures recording of higher frequencies but at the same time increases size of files.

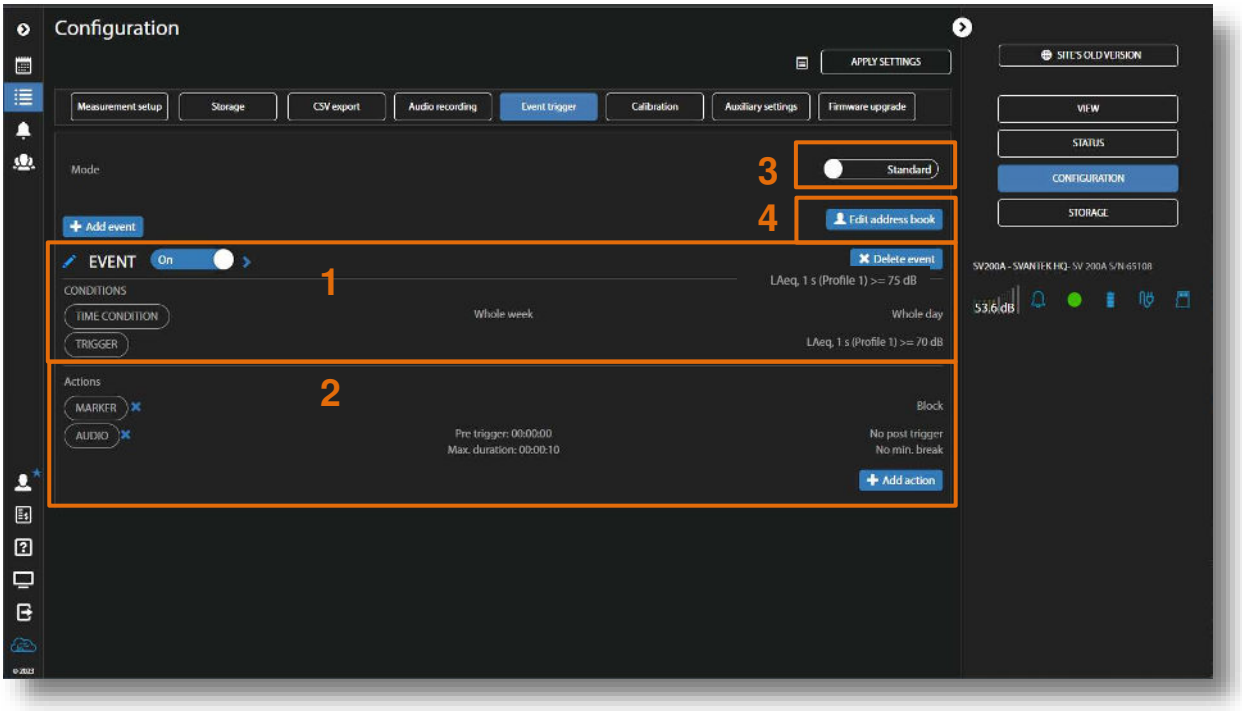
The audio recording trigger is configured in the **Event trigger** section.

7.2.3.5 Event trigger

The **Event trigger** section allows you to define events conditions for triggering audio recording, markers and different alarms.

1. Events are specified as a combination of superimposed **CONDITIONS** (logical AND) such as specific time intervals (**TIME CONDITIONS**) in which measurement threshold levels are exceed or system events occur (**TRIGGER**).
2. Each Event triggers special actions (**Actions**), such as: recording a block marker to the logger file (**MARKER**), recording the audio signal to the logger file or wave file (**AUDIO**), generation of the alarm signal on the I/O socket (**I/O ALARM**), sending SMS (**SMS ALARM**) or sending e-mail (**E-MAIL ALARM**) with the alarm notification.
3. You can choose the **Mode** for the event: *Standard* or *Advanced*. In the *Standard* mode, you can choose only one **TRIGGER** condition per Event. In the *Extended* mode, you can select several **TRIGGER** conditions per Event. In such a case, all conditions have the AND logic, e.g., are superimposed.
4. You can edit the book containing SMS and E-mail recipients addresses clicking **Edit address book**.

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



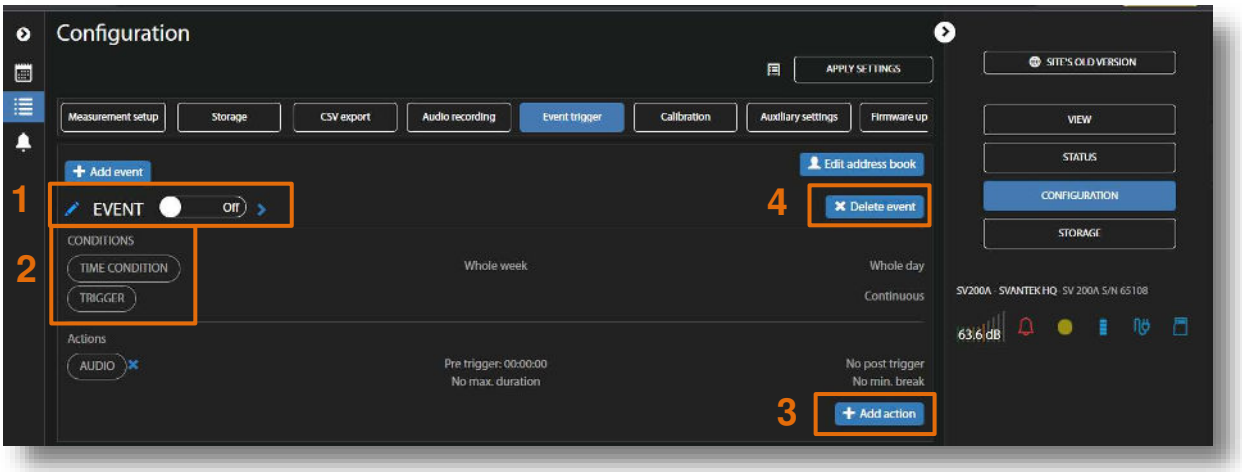
You can configure **CONDITIONS** and **Actions** using the appropriate buttons. Settings are presented in the line of this button.

For example, the EVENT configuration in the above screen means that the event will appear when the LAeq value averaged by 1 second in the first profile exceeds the threshold level of 75 dB. The occurrence of such an event will generate alarms throughout the week and will trigger the audio signal recording without time limitation.

Creating Events

To create new event, click **+Add event**. The new **Event** area will appear, in which you can:

1. rename the event, if necessary, clicking  , switch it on/off or hide the event settings clicking 
2. configure conditions, clicking the appropriate button (**TIME CONDITIONS** and **TRIGGER**)
3. add actions clicking **+Add action**,
4. delete the event clicking **x Delete event**.

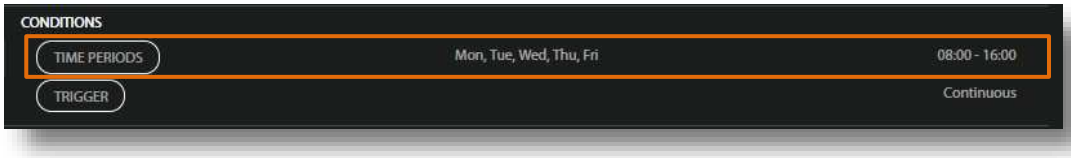


Configuring Conditions

If you click the **TIME CONDITIONS** button the TIME CONDITION configuration box will pop-up.

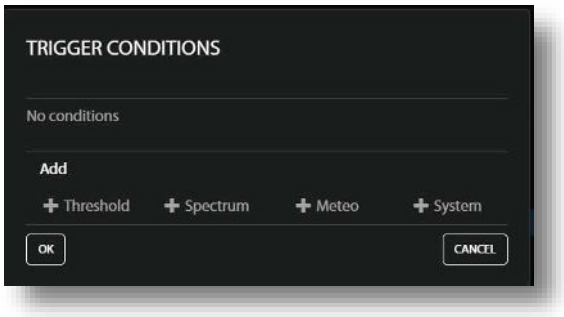
In this box, you can select days and periods for events registration.

After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TIME CONDITIONS** button.

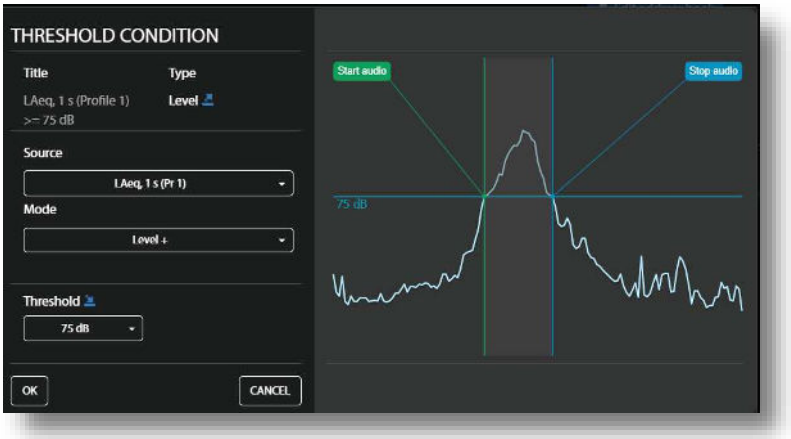


If you click the **TRIGGER** button, the TRIGGER CONDITIONS configuration box will pop-up.

In this box, you can add the condition type: **Threshold**, **Spectrum**, **Meteo** and **System**.



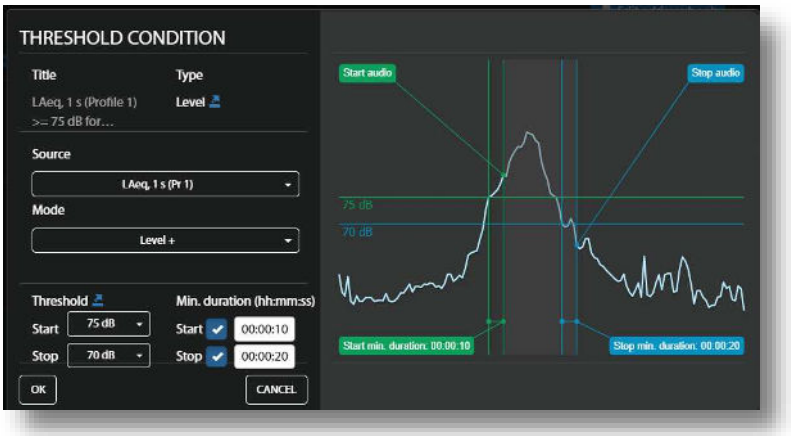
The **Threshold** condition can be of **Level+** or **Level-** type (**Mode**). The condition is fulfilled during the period in which the controlled value of the selected result (**Source**) will be higher/lower than the **Threshold** level.



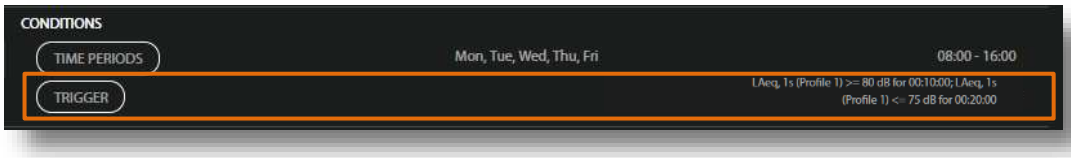
As a **Source**, you can select different results (Leq, Lpeak, Lmax, Lmin, LAE, etc.) for three profiles (Pr 1, Pr 2 and Pr 3), measured by: 1s, integration period (for example, 1m, SR) or time-history step (for example, 50, TH).

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

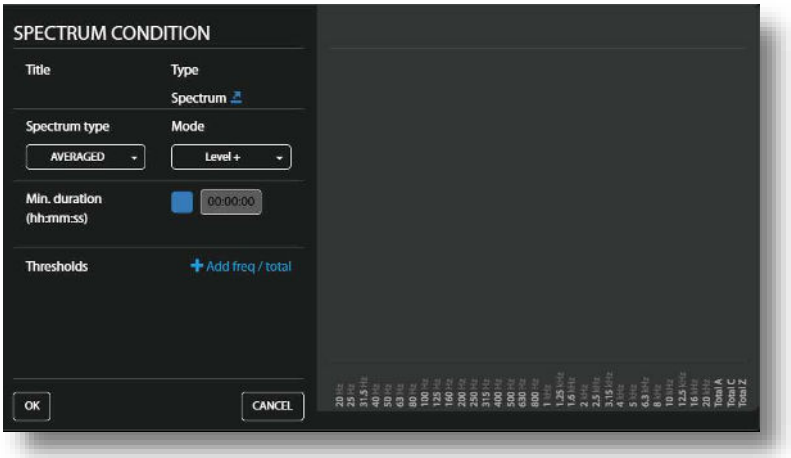
If you expand the **Threshold** by clicking the Threshold field, you can define **Start** and **Stop** threshold levels and delays (**Min. duration**) of the condition start and stop.



After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.

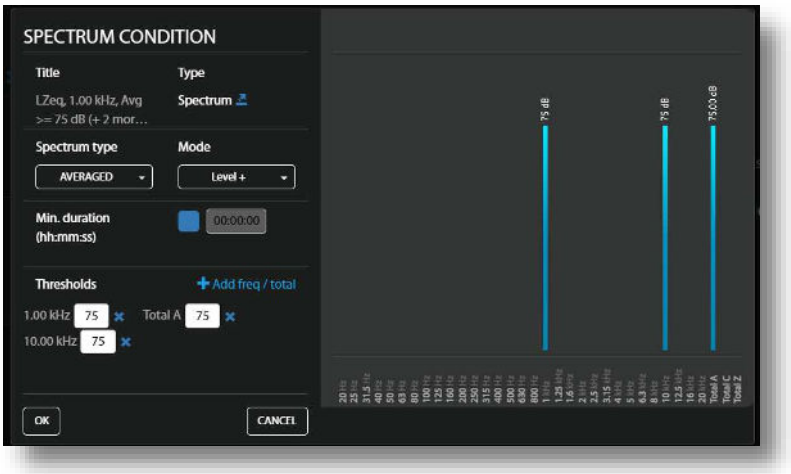


In the **SPECTRUM CONDITION** pop-up box, you can define a mask for the thirty one 1/3 octave bands spectrum and three Total results. If the measured spectrum (**AVERAGED**, **INSTANT**, **MAX** or **MIN**) will show the excess of the levels (**Level + Mode**) or the lowering of the levels (**Level -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

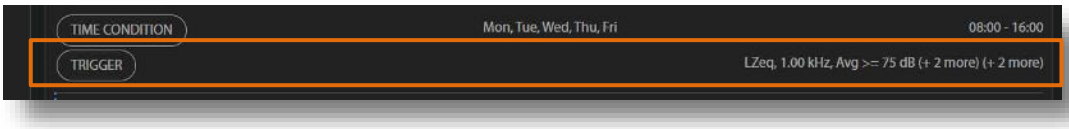


To start mask creation, click **+Add freq/total** and select the spectrum frequency or the Total result.

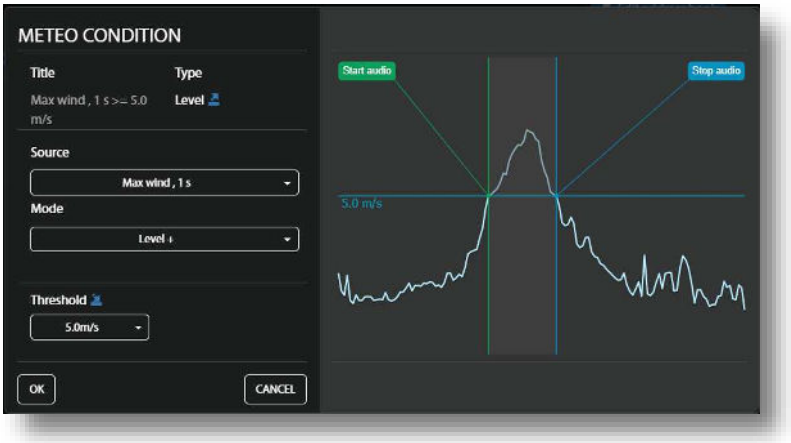
Then select the threshold level for that frequency/Total in the **Thresholds** position.



After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.



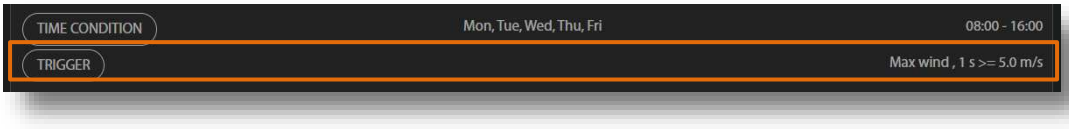
The **Meteo** condition is similar to the **Threshold** one and can be of **Level+** or **Level-** type (**Mode**). The condition is fulfilled during the period in which the controlled value of the selected result (**Source**) will be higher/lower than the **Threshold** level.



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

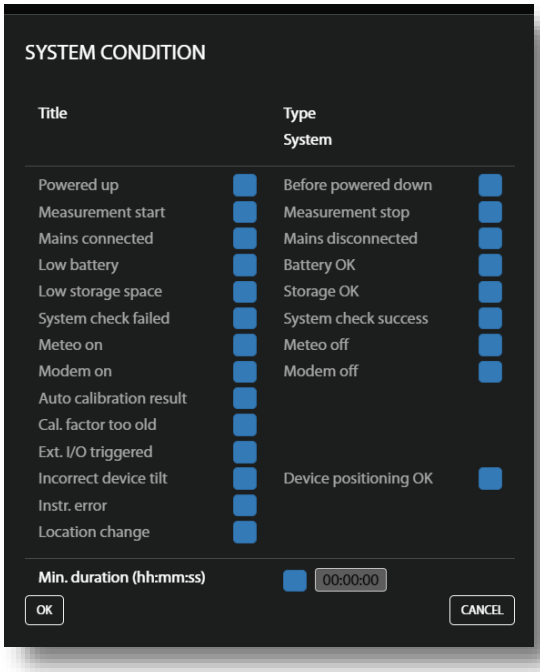
In the right-hand example, 1m, SR means that the Integration period was set to 1 minute, while 50, TH means that the Step for the Time-history was set to 50 milliseconds.

After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.

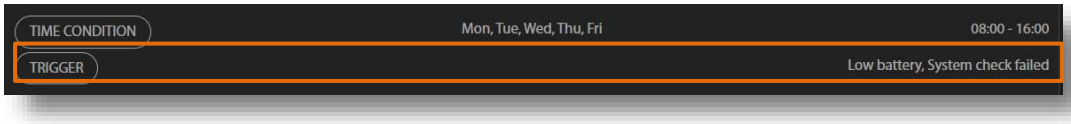


In the **SYSTEM CONDITION** pop-up box, you can select conditions that describe the system state, such as: **Low battery**, **Low storage space** etc.; and define duration during which these conditions will be active (**Min. duration**).

If during this time the new condition will be fixed, the duration will be prolonged to another **Min. duration** time and so on.

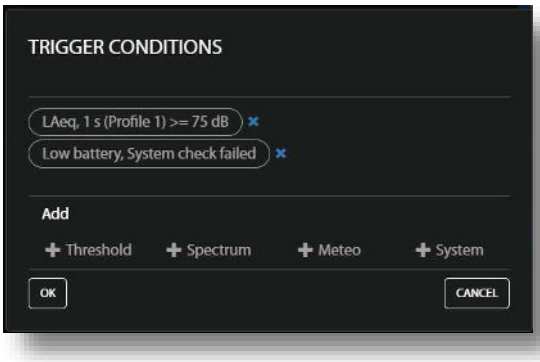


After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.

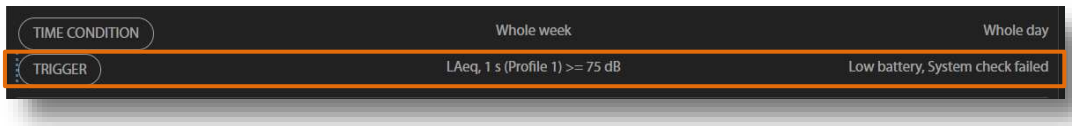


As was said above, in the *Standard* mode, you can choose only one **TRIGGER** condition per Event.

In the *Extended* mode, you can select several **TRIGGER** conditions per Event. In such a case, all conditions have the AND logic, e.g., are superimposed.



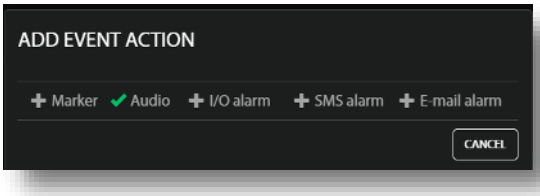
After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.



Creating Actions

To create new action, click **+Add action** and in the ADD EVENT ACTION pop-up box, click the action you wish to add and to configure: **Marker**, **Audio**, **I/O alarm**, **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 **Point** or **Block** type. The Point marker means, that it will be registered only at the beginning of the event. The Block marker will be registered at the beginning and at the end of the Event.

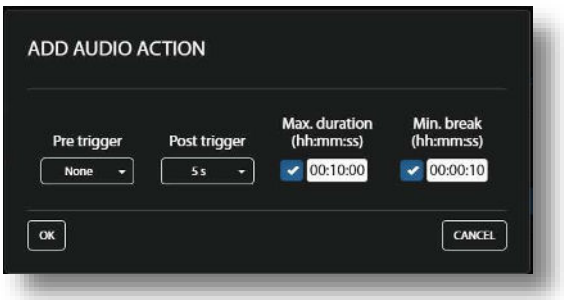
The **Audio** action starts the signal recording in the logger file (Event recording) or in the WAV file (Wave recording) depending what mode is chosen in the **Audio recording** section.

Pre trigger enables earlier start of the recording with respect to the event start.

Post trigger enables later stop of the recording with respect to the event stop.

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

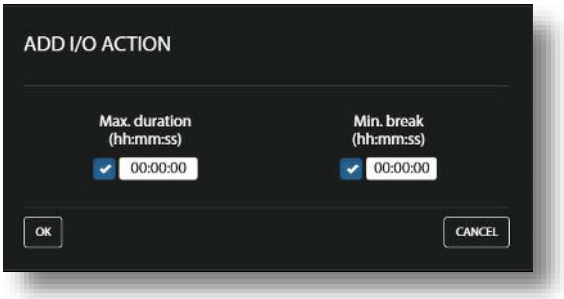
Min. break defines the minimum time break between two consequent records.



The **I/O alarm** action starts an alarm signal at the MULTI I/O socket output to which some alarm device can be connected (for example, alarm lamp) – see Appendix C.

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

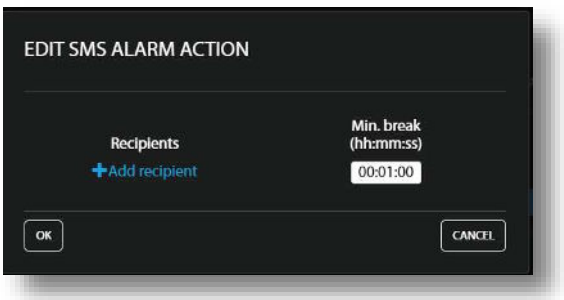
Min. break defines the minimum time break between two consequent alarms.



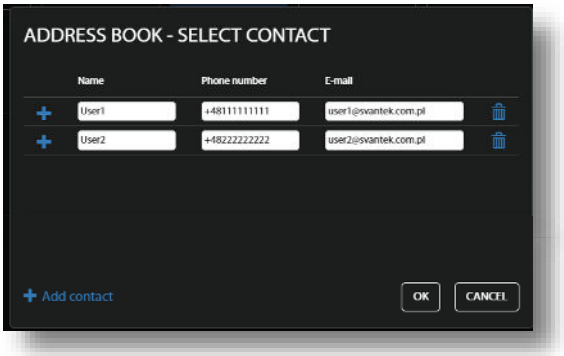
The **SMS alarm** action sends the SMS note to the defined recipient's phones, which are selected from the **ADDRESS BOOK**.

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

The SMS text is generated automatically in accordance with the event definition.



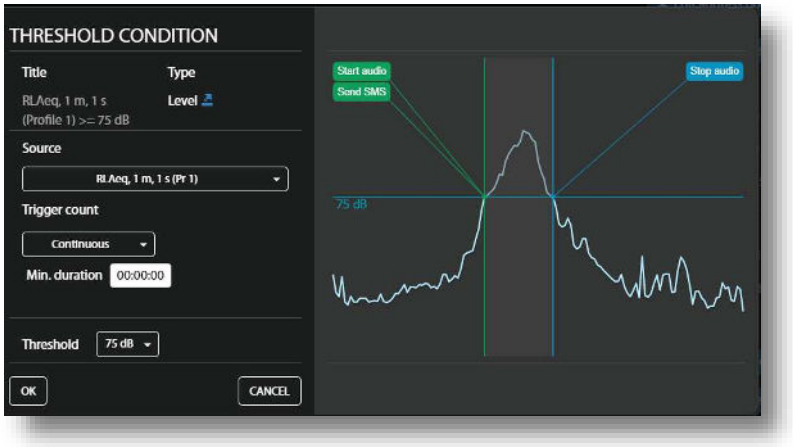
To add a recipient, click **+ Add recipient** and select the recipient from the address book list by clicking **+** in the line of the recipient you want to add and click **OK**.



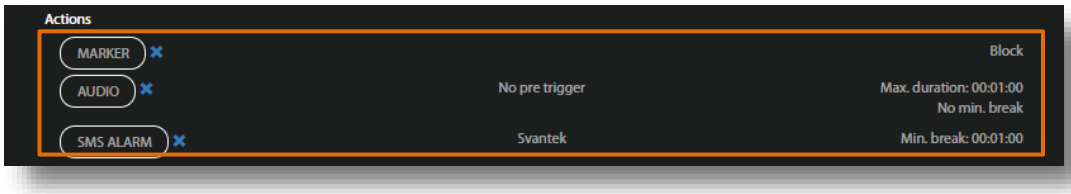
When actions are defined for the threshold trigger, the THRESHOLD CONDITION configuration box shows their start and stop at the illustrative graph.

As can be seen Audio and SMS actions are performed at the event start. Audio record lasts from the beginning till the end of the threshold event.

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



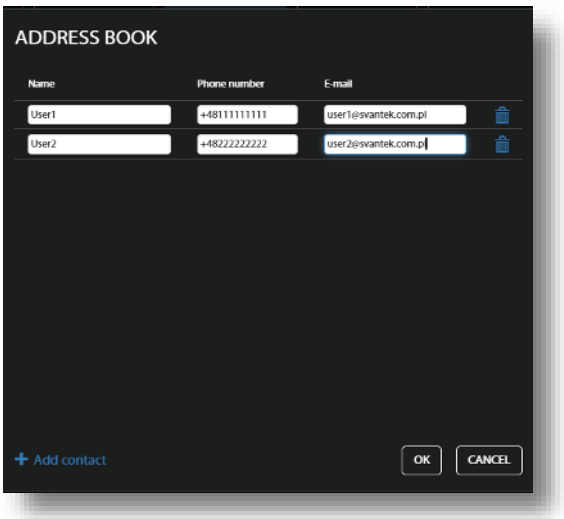
After confirmation (**OK**) the pop-up window closes, and the selection will be presented in the lines of the appropriate button of the **Actions** section.



Address book

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

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



7.2.3.6 Calibration

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

1. Check the calibration factor,
2. Switch on the **Auto calibration** function,
3. Define the **Maximum calibration log size in MB**,
4. Switch on the **Automatic system check** (**Enabled** button) and set time and days of the week when system check is going to be performed,
5. Manually **Perform system check now**.

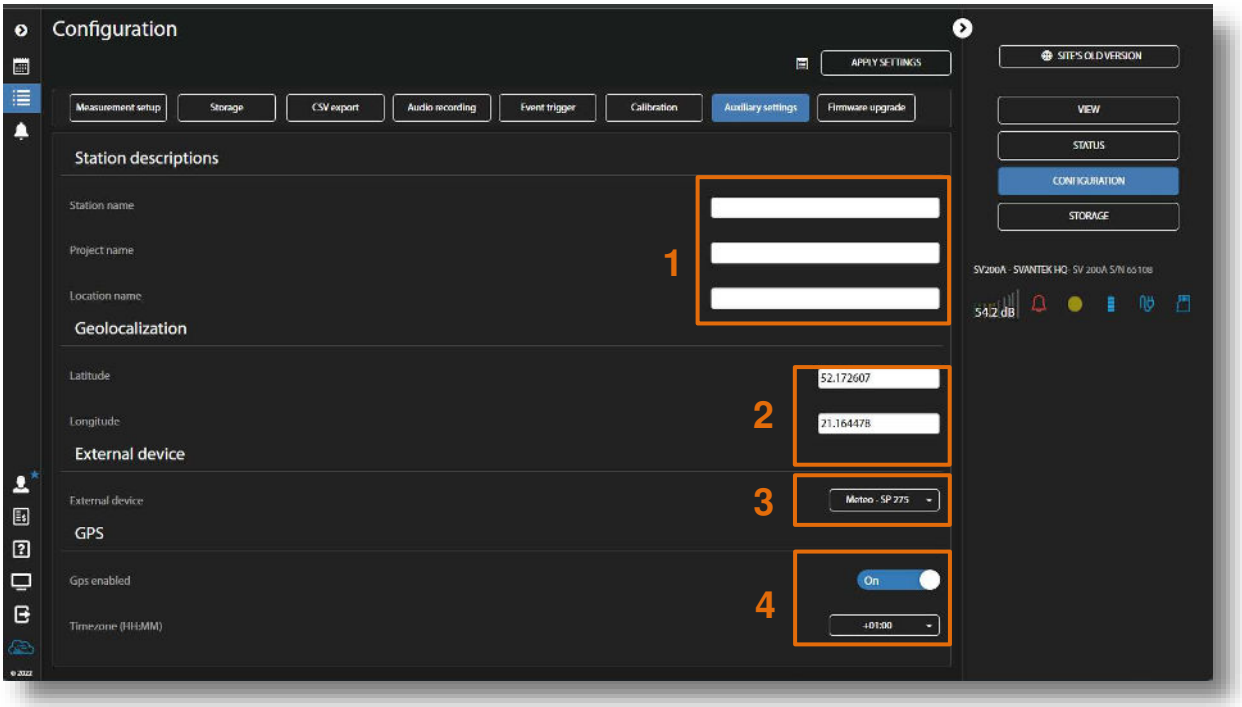
When the **Automatic system check** feature is enabled the calibration factor of the instrument will be periodically verified using built-in electrostatic actuator.

Note: *System check cannot be considered as a calibration. Calibration factor will not be updated during* ***Automatic system check*** *procedure.*

7.2.3.7 Auxiliary settings

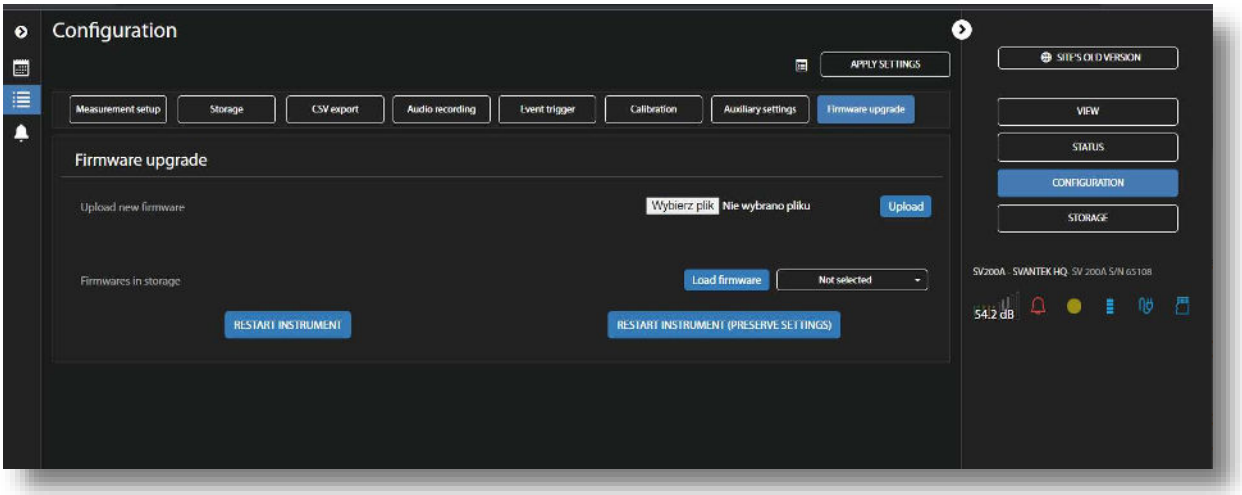
In the **Auxiliary settings** section, you can:

1. enter **Station description**: **Station name**, **Project name** and **Location name**,
2. enter the instrument's geographical location in **Latitude** and **Longitude** coordinates (if GPS is switched on),
3. select the **External device**: **RS 232** or weather station **Meteo-SP 275**,
4. configure GPS: switch on GPS (**GPS enabled**) and select **Timezone**.



7.2.3.8 Firmware upgrade

In the **Firmware upgrade** section, you can upload new firmware on the instrument's SD card and perform upgrade process remotely.



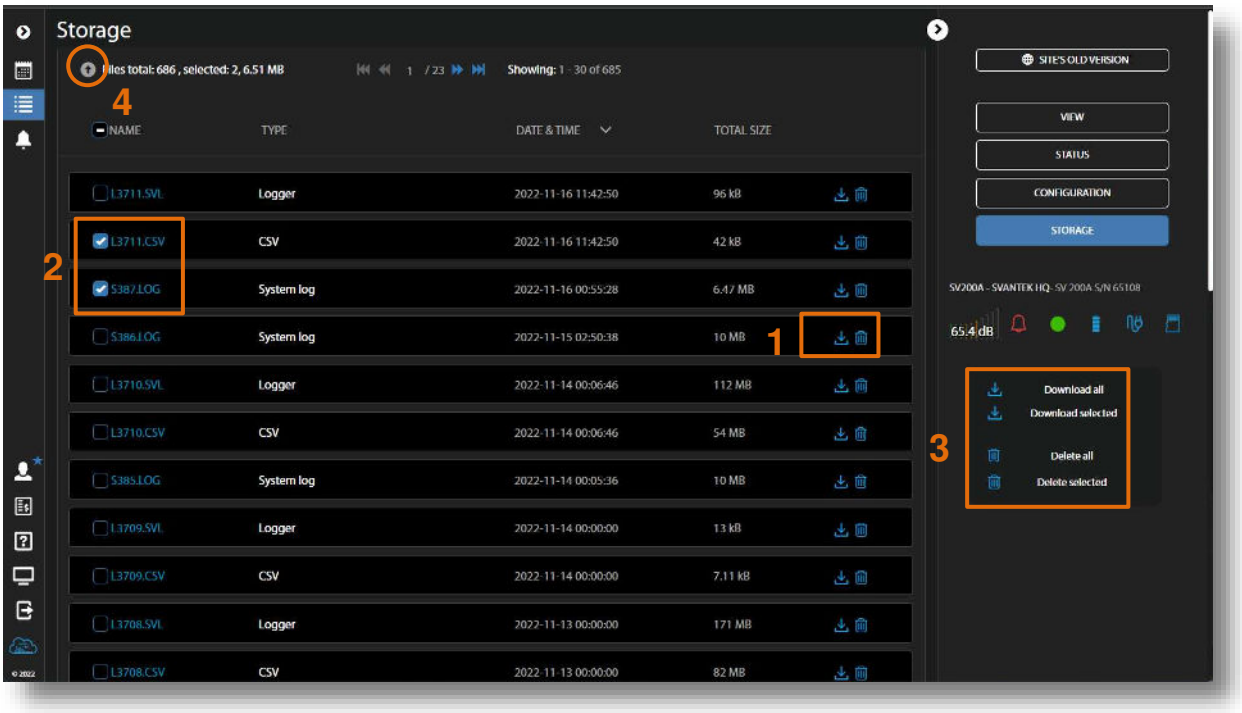
Complete upgrade process is described in detail in Chapter 10.2.

7.2.4 STORAGE view

The file storage window presents a list of files saved in the instrument's SD card memory. The list includes only files from a single directory on the memory card and it initially shows the content of the current working directory.

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

1. Download or delete individual files by clicking the righthand icons on the file line
2. Select several files and download or delete selected files
3. Download or delete all files
4. Navigate through the folder structure by clicking the "folder up" button.



8 SVANPC++ SOFTWARE

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

Note: *All SvanPC++ functionalities are well described in SvanPC++ User Manual. In the current manual only most useful and instrument specific functionalities and screens are described.*

SV 200A needs to be connected to the computer running SVAN PC++ either by USB cable, mobile, WLAN or LAN connection. In all cases except USB, *SvanPC++* should be supplemented with the **Remote Communication** module.

8.1 SVANPC++ SOFTWARE INSTALLATION AND ACTIVATION

To install the *SvanPC++* software on your PC:

1. Make sure that your PC has active Internet connection if you wish to operate your SV 200A via the Internet. PC should have Windows operating system. Minimum system requirements: 1GHz CPU, 1 GB RAM (2GB RAM for x64 system), 20 GB HDD, 1024x768 display.
2. Download and install *SvanPC++* and Svantek *USB Drivers* from the website: http://svantek.com/lang-en/support/software.html.
3. Prepare the activation key for the *Remote Communication* (RC) module, that has been provided with the device.
4. In the **Help** menu click ***Enter Activation Keys…*** option and enter the key to activate the *Remote Communication* module.
5. Your *SvanPC++* is ready for use with SV 200A.

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

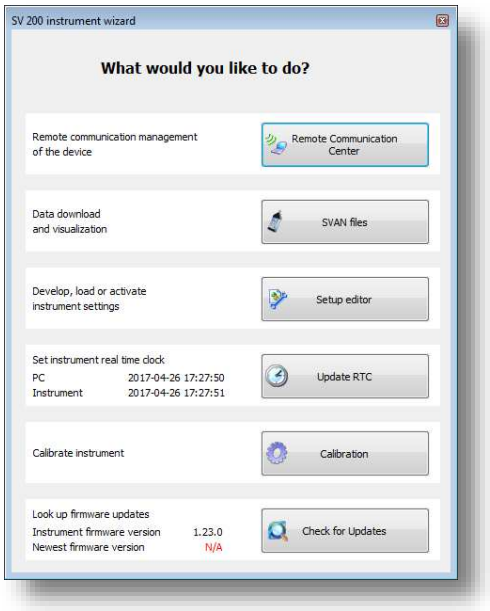
8.2 SV 200A CONTROL VIA USB INTERFACE

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

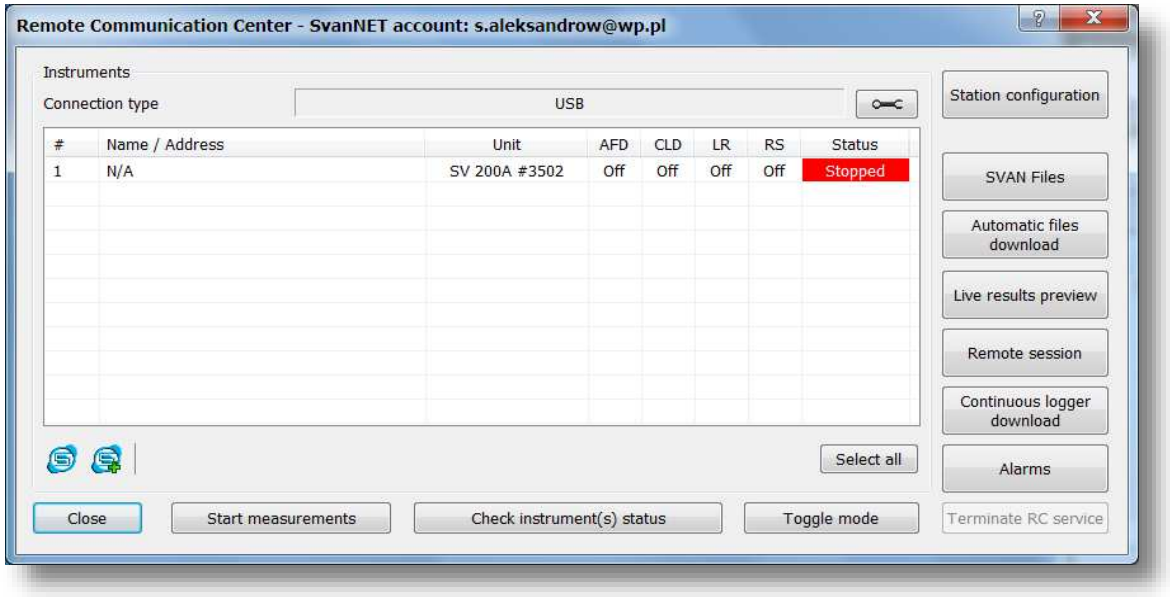
The philosophy of the instrument control from *SvanPC++* either via USB or via wireless communication is generally the same. Therefore, this manual will be concentrated mostly on the wireless instrument control.

After connecting the instrument to the computer with running *SvanPC++* by SC 256A USB cable the **SV 200 instrument wizard** dialog box appears on the screen. It enables 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** button).
- Unload, edit and upload the instrument's setup files (**Setup editor** button).
- Set the instruments' real time clock to be equal with computer clock (**Update RTC** button).
- Calibrate the instrument (**Calibration** button).
- Compare the firmware version installed on the device with the latest available version (**Check for Updates** button).



After pressing the **Remote Communication Center** button, the **Remote Communication Center** dialog box, enabling full instrument control, will appear.



8.3 CONFIGURING WIRELESS CONNECTION

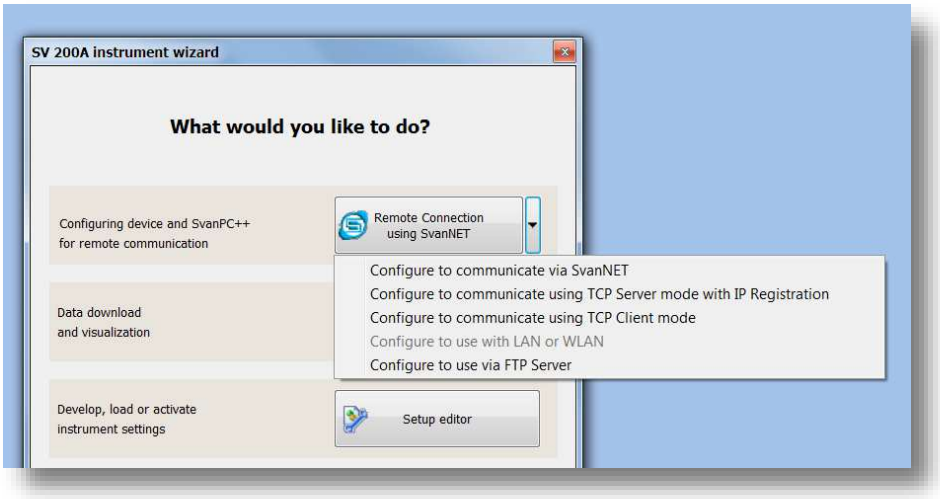
SV 200A is equipped with the internal mobile modem and LAN/WLAN module which enable wireless remote control of the instrument and downloading measurement files, managing configuration, sending alarm e-mails, etc. To access SV 200A remotely, the instrument first must be properly configured via the USB connection.

All types of connections can be configured via **SV 200A instrument wizard**, which is described below.

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

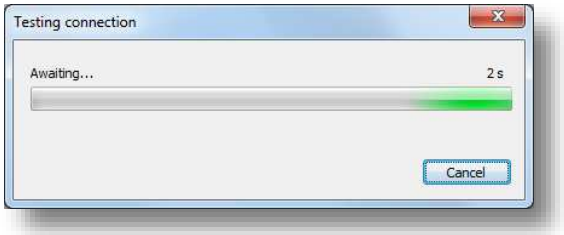
Note: *Make sure the SIM-card has deactivated PIN-code before insertion into SV 200A.*

1. Connect the instrument to the PC with the SC 256A USB cable.
2. In the **SV 200A instrument wizard** window, click the **Remote Connection using SvanNET** button or right-hand button which opens the pop-up list of other connections configurations. The **Remote Connection using SvanNET** button enables creating and managing connection with the *SvanNET* web service, easiest way of remote control of all type of stations with mobile modems and any type of SIM-card credentials.



3. Every position opens the **Remote Connection Wizard** window in which you can add new station. First position opens the same window that the **Remote Connection using SvanNET** button. All **Remote Connection Wizard** windows are well self-described, so you should only fill the required fields based on the mobile provider information.

4. After entering all the required information *SvanPC++* will check connection settings. Wait until process is finished. It may take few minutes.



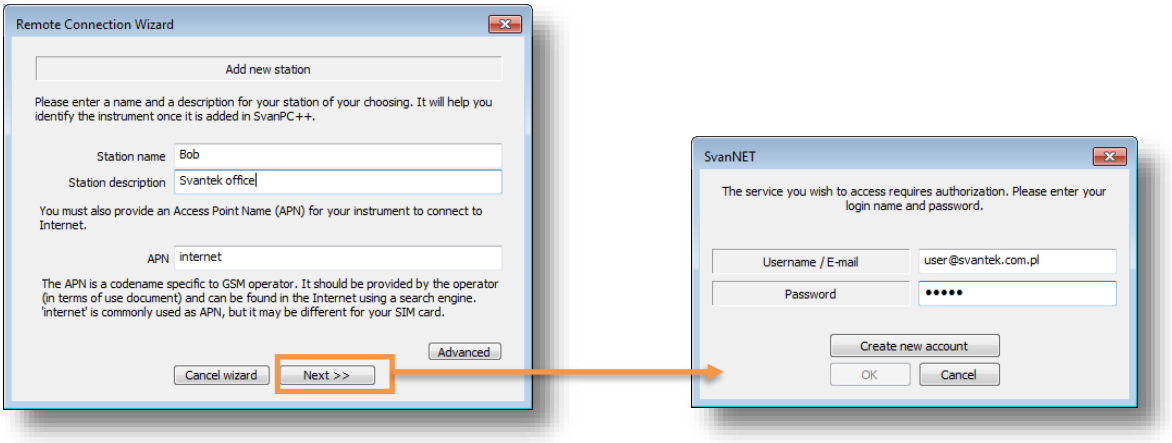
5. After finishing configuration, you can exit the wizard or add another instrument.

8.3.1 Connections via the mobile modem

As was said above the **Remote Connection using SvanNET** mode is the simplest way to install wireless communication. All other modes require more efforts and are not recommended by the producer. If you wish to use other modes, you must refer to the SvanPC++ User Manual for details.

You can enter **Station name** and **Station description** for easy instrument identification after the wizard is finished. **APN** is mandatory field required to set up the connection. APN value is specific for each mobile operator, who should deliver such information.

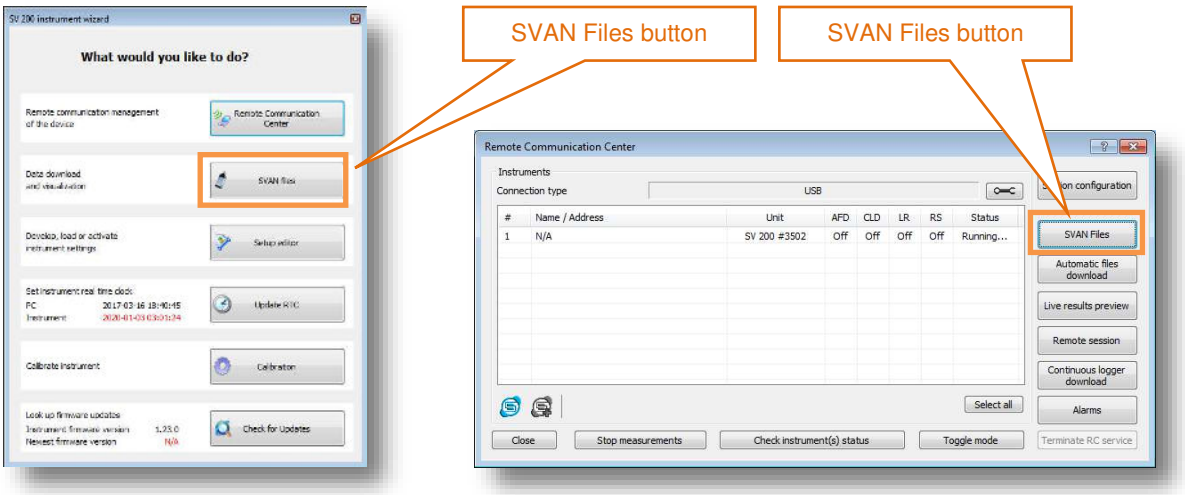
After filling in the required fields in the **Remote Connection Wizard**, press the **Next>>** button and enter the login and the password of your registered account.



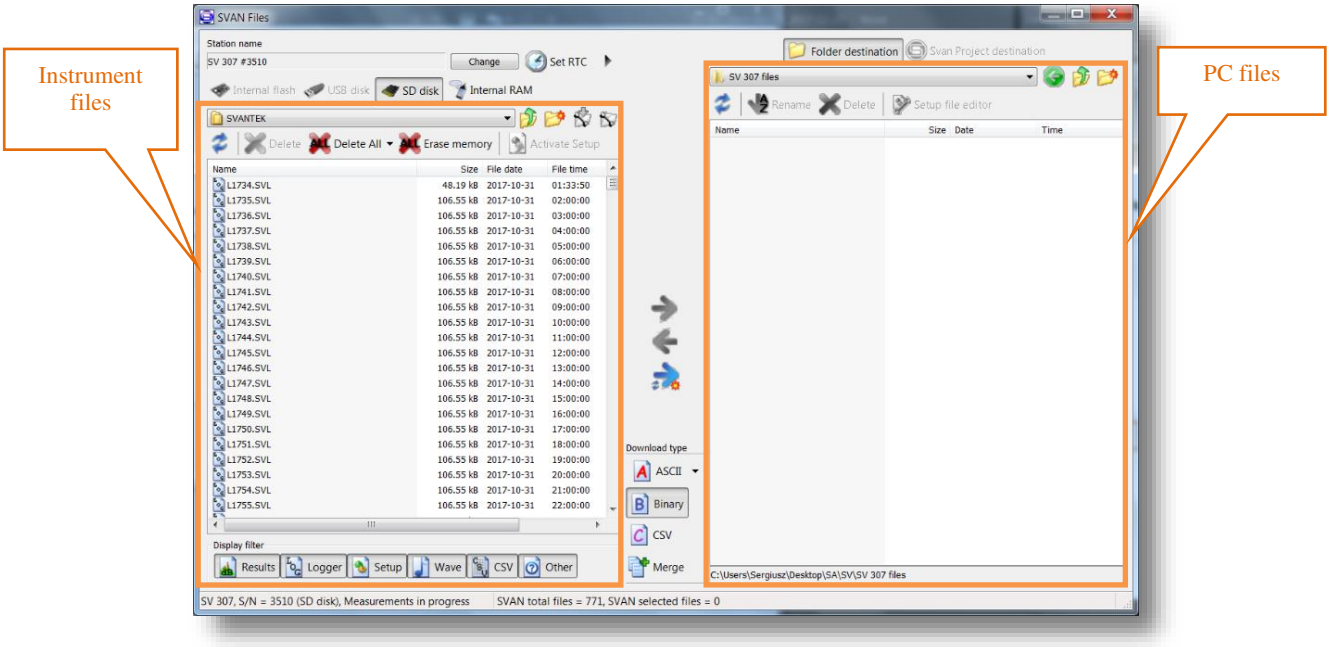
Press the **OK** button and *SvanPC++* will run connection settings (step 4 of above procedure).

8.4 MANAGING INSTRUMENT FILES, CONFIGURING INSTRUMENT

Access to the instrument's files is carried out from the **SVAN Files** dialog box opened either via **SV 200 Instrument wizard** or via **Remote Communication Center**.

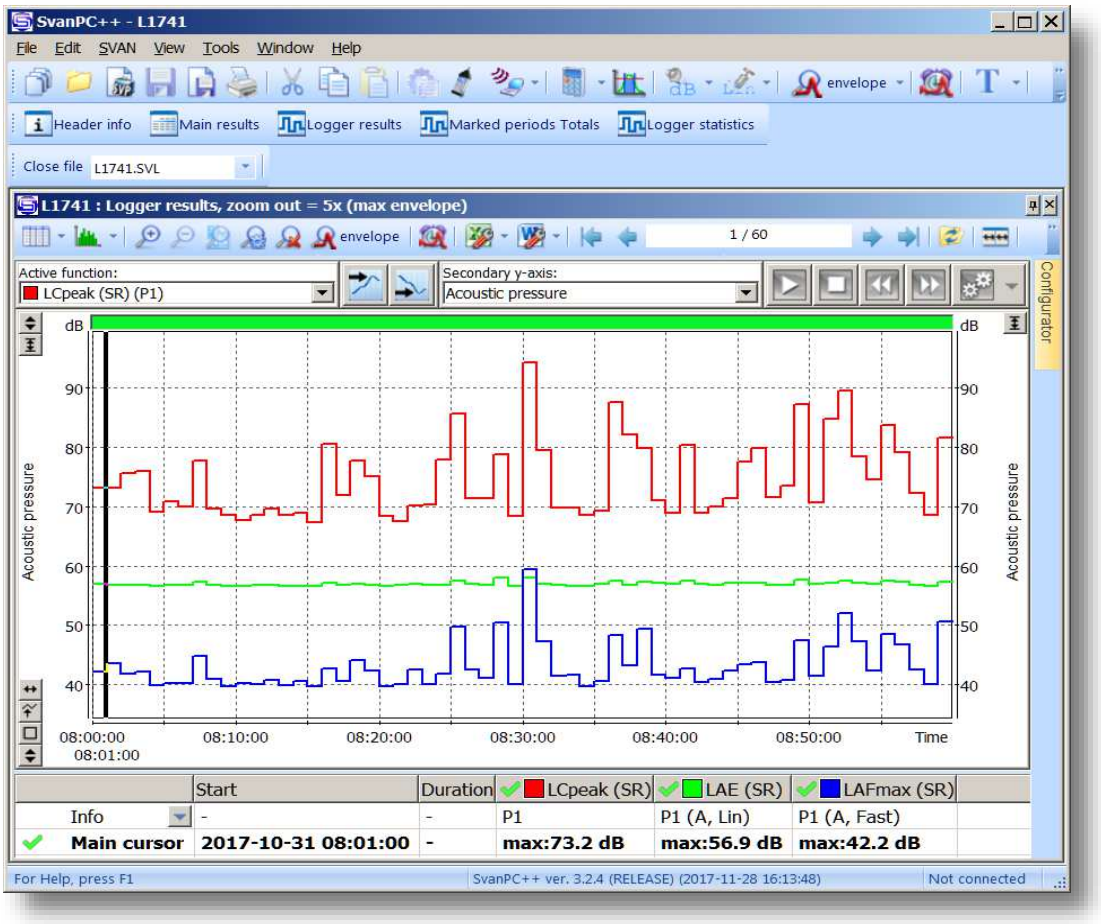


The **SVAN Files** dialog box consists of two parts: instrument (left) and PC (right). Each part includes tools for files managing (selecting memory, directory and files, deleting files, creating directory, applying filters etc.).
Arrows in between serve to copy files from the instrument to the PC and from the PC to the instrument.



The **SVAN Files** dialog box is described in Chapter 0.

Double click the file name to open the **Viewer** module that enables different tools for data viewing. This module is described in detail in the SvanPC++ User Manual.

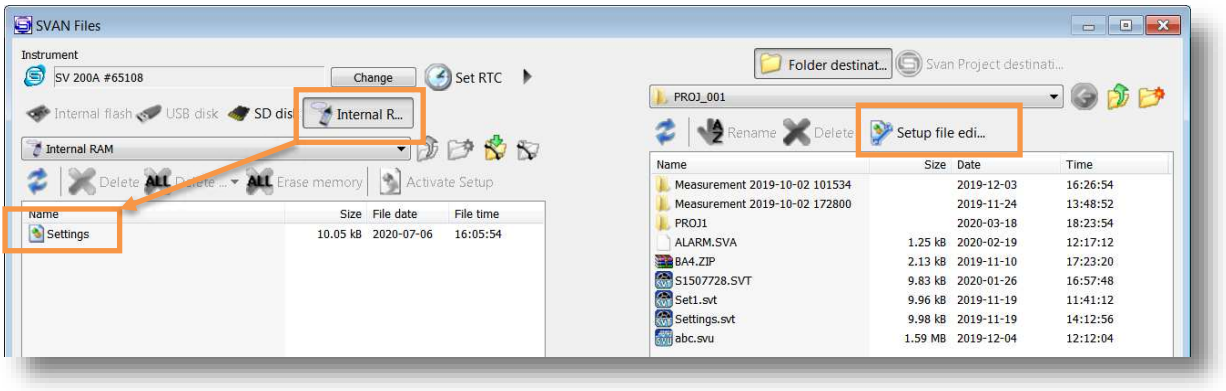


8.4.1 Configuring instrument settings

The instrument settings can be configured with the use of *Setup file editor* opened from the **SVAN Files** dialog box.

In order to edit a setup file (*.svt*), you should either:

- 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.

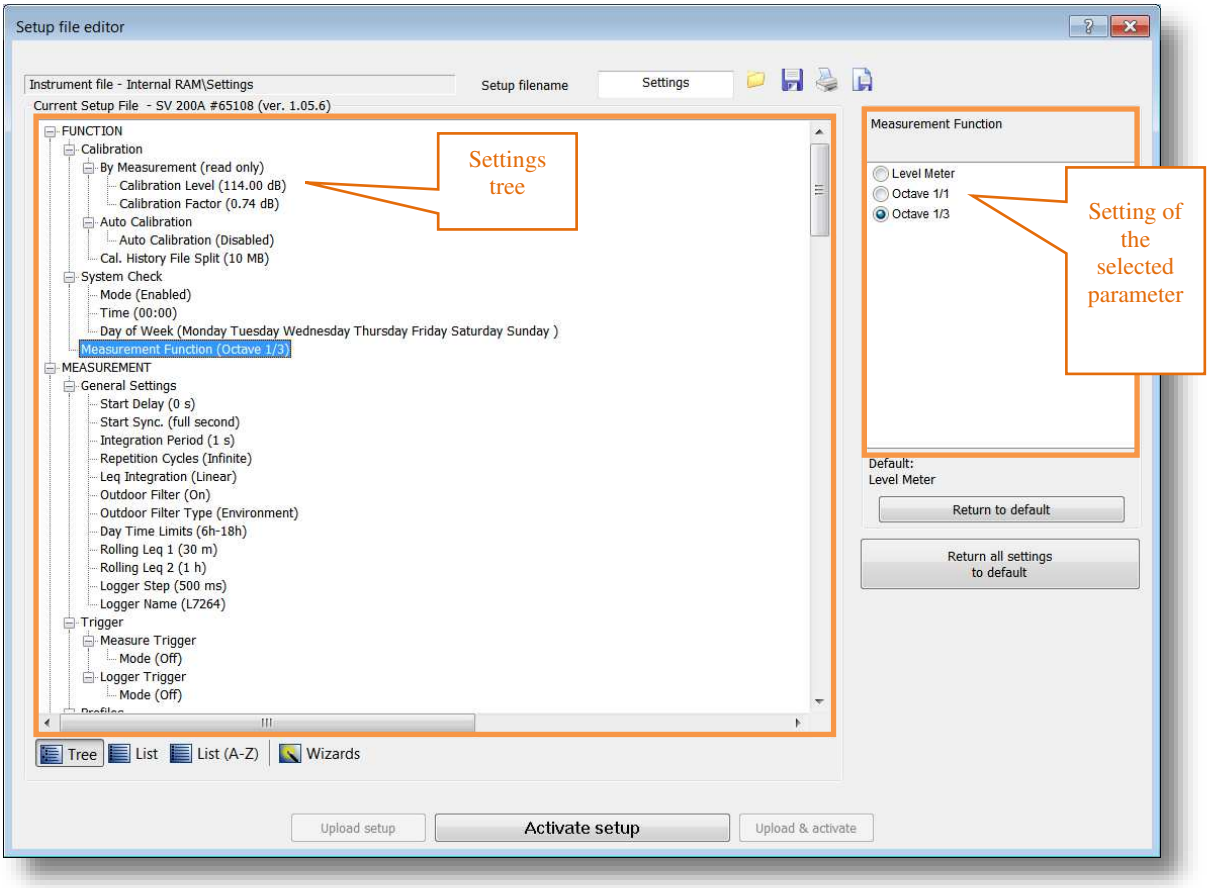


The *Setup file editor* is available in the Extended mode, in which all the settings available in the SV 200A instrument are visible and available for editing. The list of settings, located at the left-hand side of the window, can be displayed in a tree view or a list view. You can switch the view using the buttons located in the lower part of the window.

In order to change some particular settings, use the controls that appear in the panel at the top-right corner of the window after selecting parameter from the list.

The default, *Tree View*, offers the settings arranged in a form of a tree, resembling structure of settings in SV 200A. The nodes denote menu sections, while the leafs – parameter's settings which can be edited at the top-right corner of the window. The settings are sorted in accordance with menu structure accessible through display panels of the instrument.

Some settings are related to each other. It means that one of them is available for editing only when the other is set to a certain value.

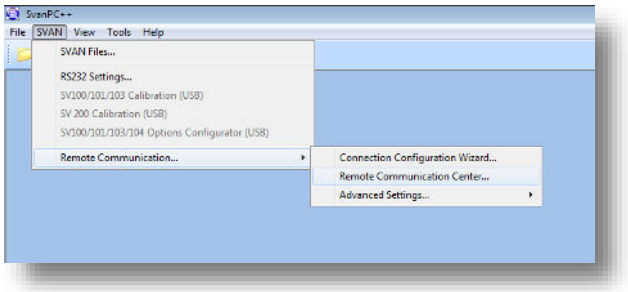


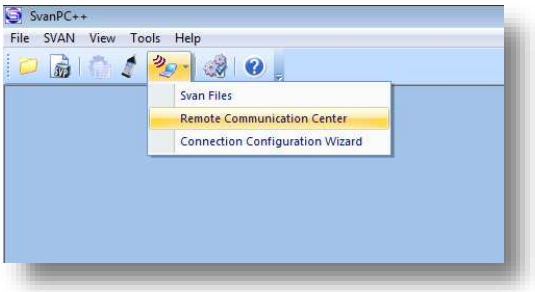
After finishing the setup configuration, press the **Activate setup** button.

At the top of the Setup file editor window, next to the Setup filename field, there are several buttons responsible for the file management: opening a setup file stored on the PC, saving the currently edited setup file on the PC, printing currently edited setup file or saving the contents of the currently edited setup file in a simple text format.

8.5 WORKING WITH REMOTE COMMUNICATION CENTER

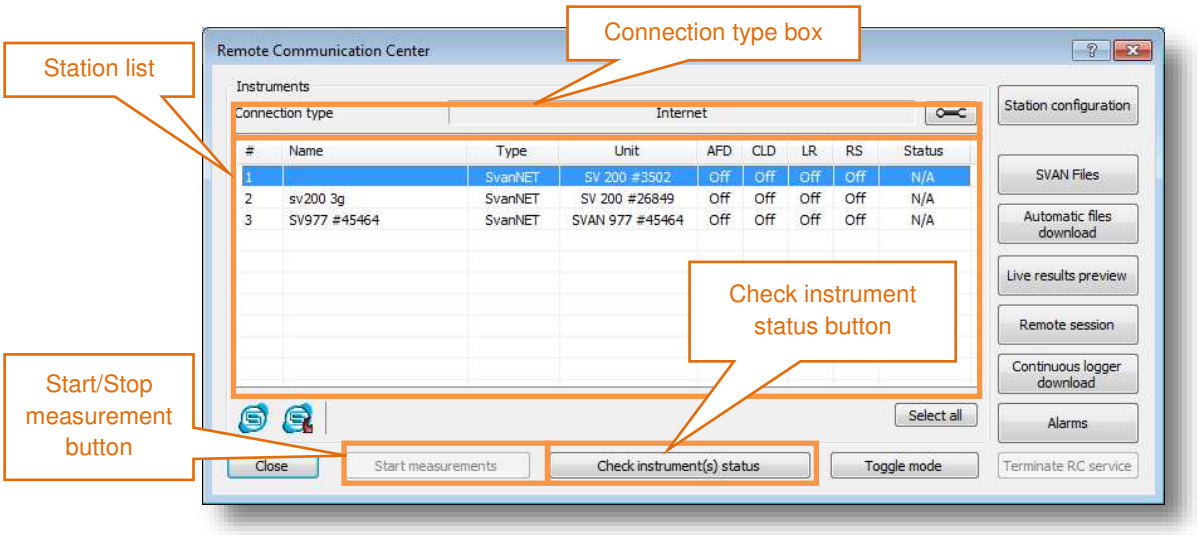
1. Open the **Remote Communication Center** dialog box.





2. Make sure that suitable **Connection type** is chosen. The default connection type is ***Internet***, however when the instrument is connected to the PC by the USB cable, connection type is automatically changed to ***USB***.
3. Choose the instrument in the station list. To select multiple instruments, use *Ctrl+Click* combination.

4. Click **Check instrument(s) status** button.



The **Remote Communication Center** enables:

- starting/stopping the measurement (**Start/Stop measurement** button),
- checking the instrument status (**Check instrument(s) status** button),
- station configuring (**Station configuration** button),
- manual files downloading and uploading (**SVAN Files** button),
- communicating with instruments using various types of RC sessions (**Automatic files download**, **Live results preview**, **Remote session**, **Continuous logger download**)
- alarm setting (**Alarms** button),
- opening the *SvanNET* web service in the default browser (icon) and
- synchronizing the instruments list with the *SvanNET* account (icon).

Note: *The **Station configuration** mode is not available for the SV 200A firmware version 1.04.7 and higher.*

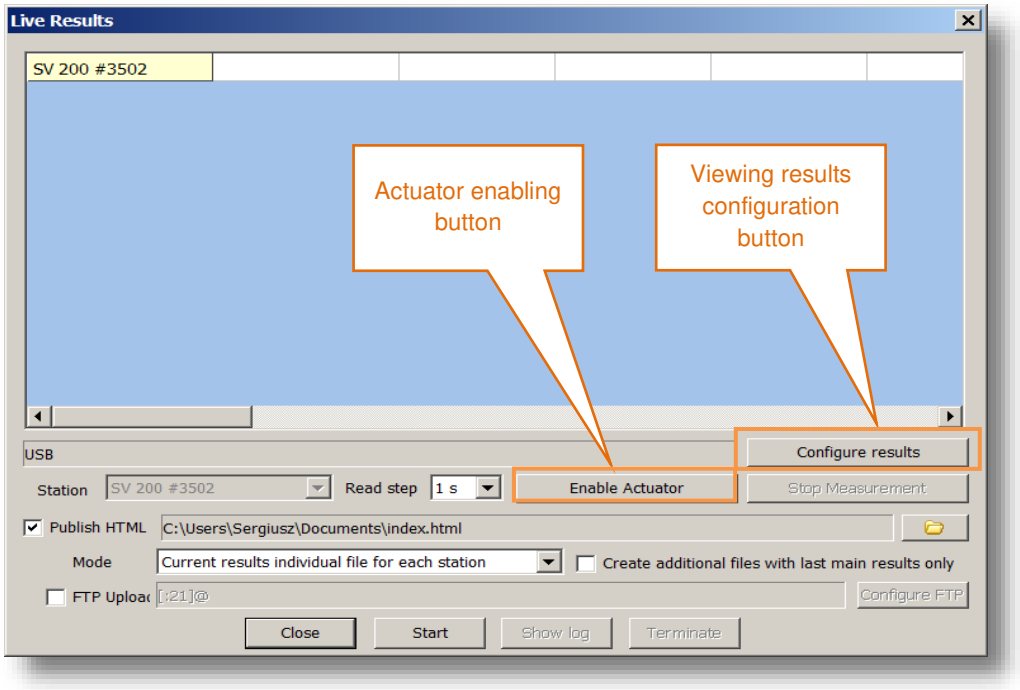
Note: *The **Remote session** mode is now obsolete and not supported. Using the **Remote session** mode is not recommended.*

8.5.1 Viewing live results

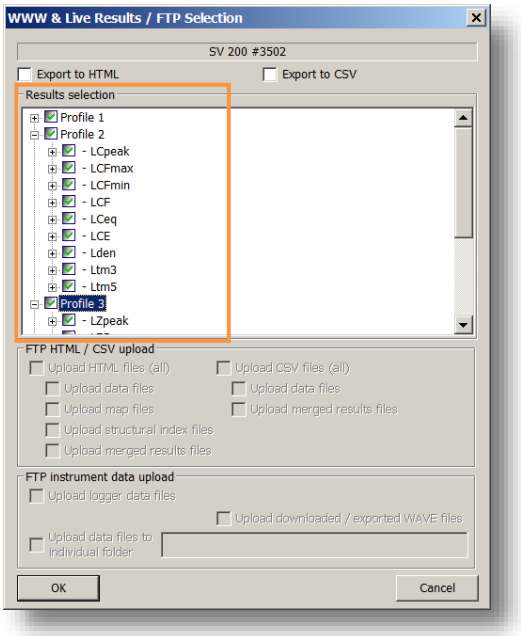
The **Live Results** (LR) mode is used to easily view current SV 200A results without necessity to save the measurement files on the computer. This mode is capable of publishing HTML results on the WEB server and also uploading measurement files from the instrument directly on the FTP server.

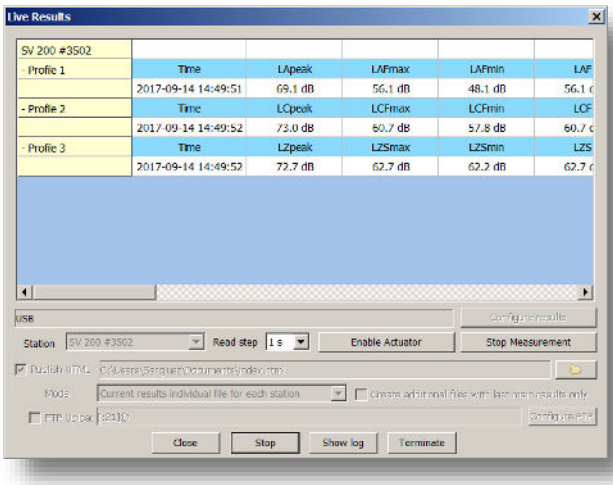
To observe live results:

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



2. Click the **Configure results** button to select results for viewing in the **WWW & Live Results** / **FTP Selection** window and return to the **Live Results** window by clicking the **OK** button. Then press the **Start** button in the **Live Results** window to start results presentation.

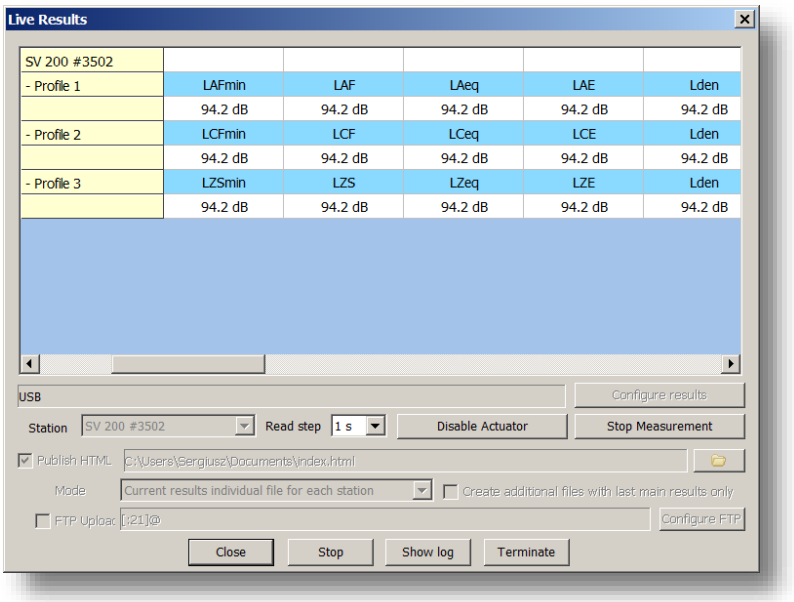




In the **Live Results** window, you can also:

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

After enabling the actuator, the instrument starts measuring of the signal, generated by the actuator at the level of 94 dB. If **Read step** is equal to **1s** then it is possible to observe the measured actuator level.



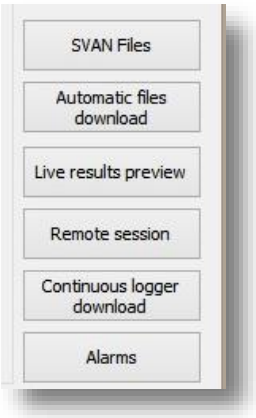
The **HTML publishing** section enables configuring the path of HTML and CSV files containing current measurement results.

8.6 DATA COLLECTING

SvanPC++ with Remote Communication module offers the most versatile configuration and control of the instrument, data collecting as well as publishing and presentation features. The RC module can cooperate in a variety of modes and communication protocols.

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

- **SVAN Files** for direct, manual data download
- **Automatic Files Download** (**AFD**) for automatic data download in specified time periods
- **Continuous Logger Download** (**CLD**) for constant data download
- **Live Results Preview** for real-time data publishing and presentation

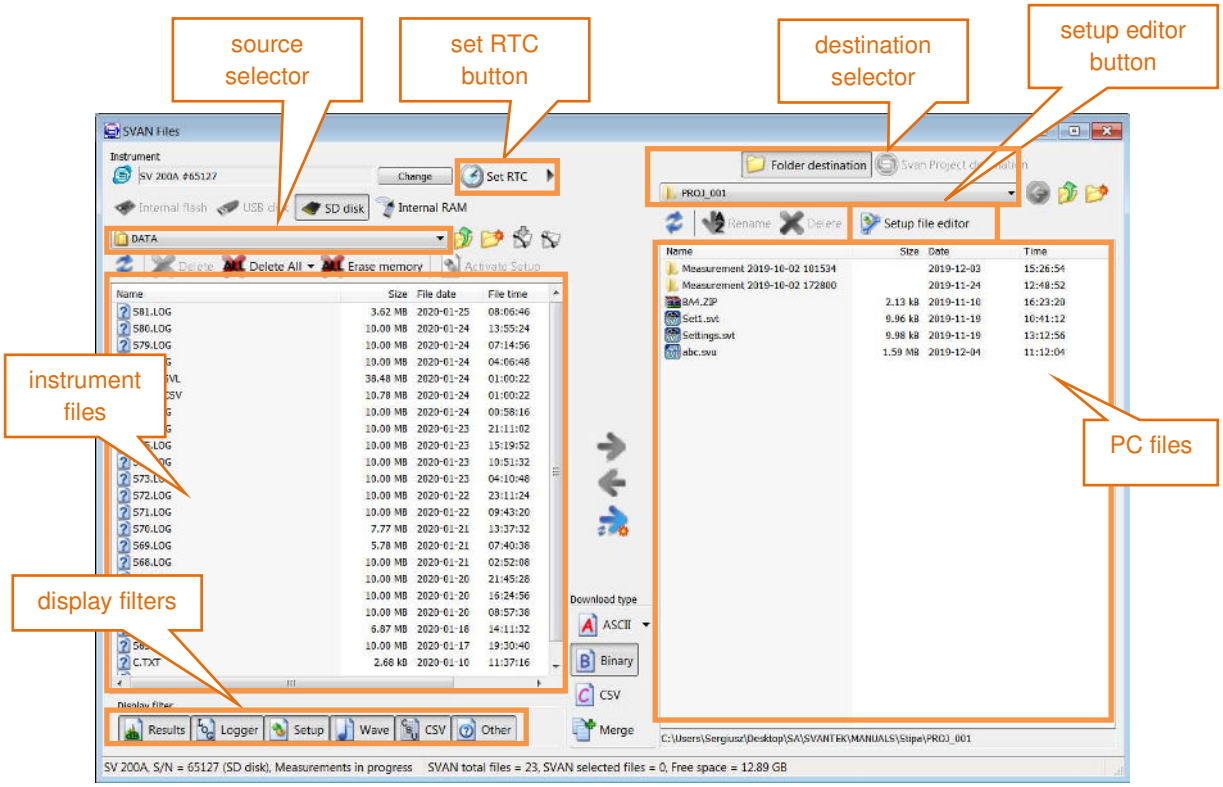


SvanPC++ can generate alarms, which are additional to the SV 200A instrument's alarms. To configure the *SvanPC++* alarms, click the Alarm button (see Chapter 8.6.5).

***Note: Remote session** mode is now obsolete and not supported. Using **Remote session** mode is not recommended.*

8.6.1 SVAN Files

SVAN Files is the simplest data collecting mode available in the **RC** module. This mode is suitable for browsing the contents of the SV 200A SD-card (including working directory), downloading or deleting files, changing the working directory of the instrument (see Chapter 8.4) and WEB interface files update.

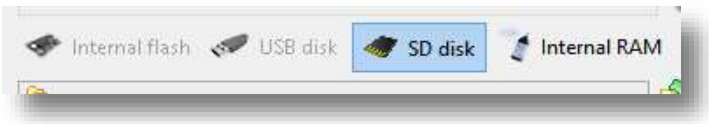


Note: *More information on* ***SVAN Files*** *can be found in SvanPC++ User Manual available online: http://svantek.com/lang-en/support/19/svanpc_software.html#PDF.*

Browsing the contents of the device

SVAN Files window contains two main panes. The left pane displays contents of the instrument's memory. The right pane is used to browse local PC files.

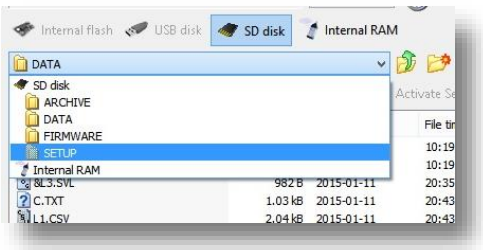
Source selector enables the user to change source of files to display in the instrument navigation pane. In case of SV 200A there are two sources available: SD disk and Internal RAM. No measurement data can be stored in the Internal RAM memory of the instrument.



Note: *Choosing* ***Internal RAM*** *data source enables accessing the settings file with* ***Setup file editor*** *button. The file contains current detailed setup of the instrument and should not be modified unless necessary.*

By default, SD-card contains following directories:

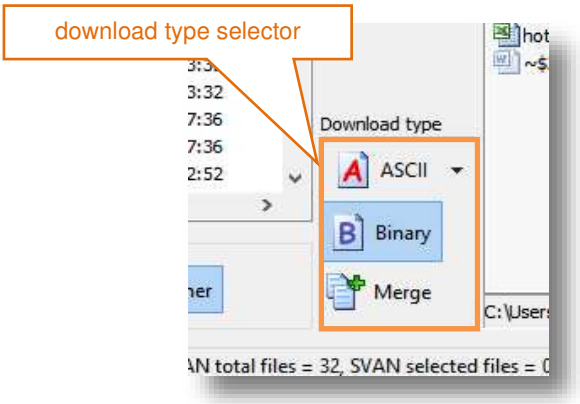
- **ARCHIVE**, where old measurement files can be stored,
- **DATA**, which is default working directory of the instrument,
- **FIRMWARE**, which contains firmware packages uploaded via web interface,
- **SETUP**, which contains setup files created by users.

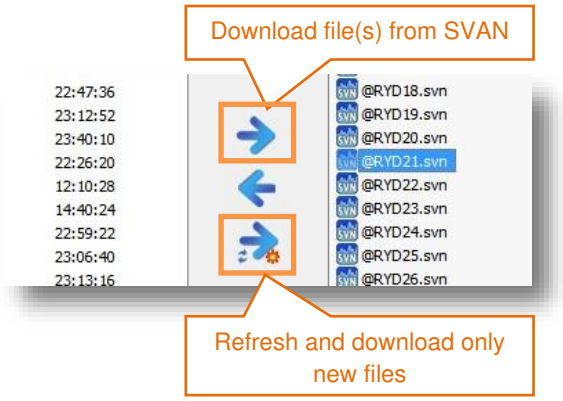


The **Display filter** can be used for selecting specific types of files to be displayed in the navigation pane.

Downloading files

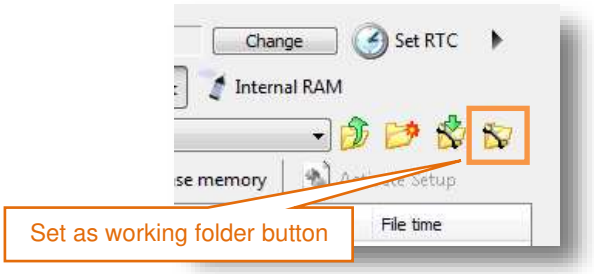
1. In the **instrument pane** navigate to the directory where necessary measurement files are stored. By default, **SVAN Files** display current working directory of the instrument.
2. Select the **Download type**. By default, binary **SVL** files are downloaded, however **CSV** files are also available. Click expand button to see the details. Automatic merging is possible for binary files. Use **Merge** option to download one file containing data from all selected files.
3. Select the files to download and click **Download file(s) from SVAN** button to copy files from instrument's memory to the PC. Multiple files can be selected using Ctrl and Shift buttons.
4. **Refresh and download only new files** button can be used to synchronize content of the instrument's memory with the local folder. Click that button to quickly download all files displayed in the instrument navigation pane.





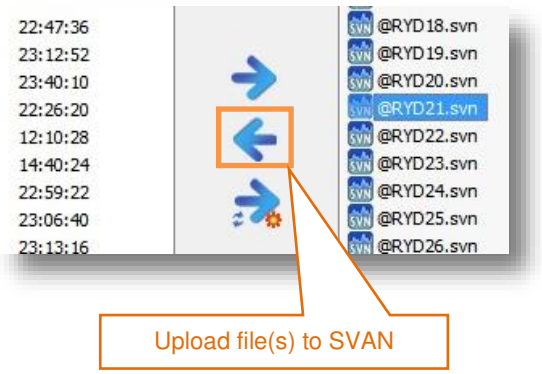
Changing working directory

1. Navigate to the desired directory using the left pane. Create new directory if necessary.
2. Click **Set as working folder** button.



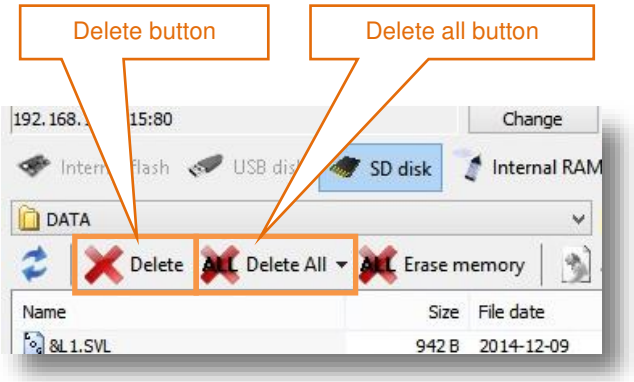
Uploading files

1. In the **instrument pane** navigate to the desired directory. By default, **SVAN Files** display current working directory of the instrument.
2. Files can be uploaded only to the current working directory of the instrument. Set the current directory to be the working directory.
3. Select the files to upload in the right pane and click **Upload file(s) to SVAN** button to copy files from to the PC instrument's memory. Multiple files can be selected using Ctrl and Shift buttons.



Deleting files

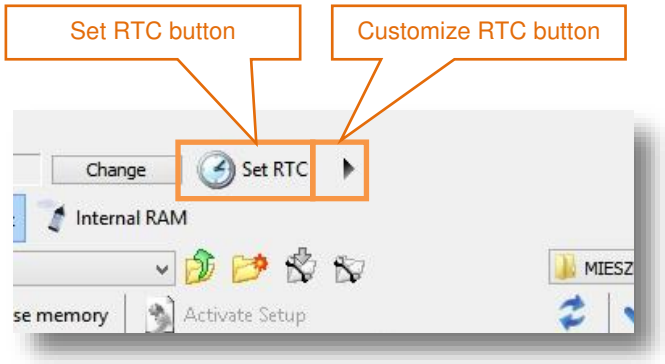
1. In the **instrument pane** navigate to the desired directory. By default, **SVAN Files** display current working directory of the instrument.
2. If all SVAN files (logger and setup) are to be deleted click **Delete All** button.
3. If only selected files or files other than SVAN files are to be deleted, select them (multiple files can be selected using *Ctrl* or *Shift* buttons, all files can be selected with *Ctrl+A* combination) and click **Delete** button.



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.

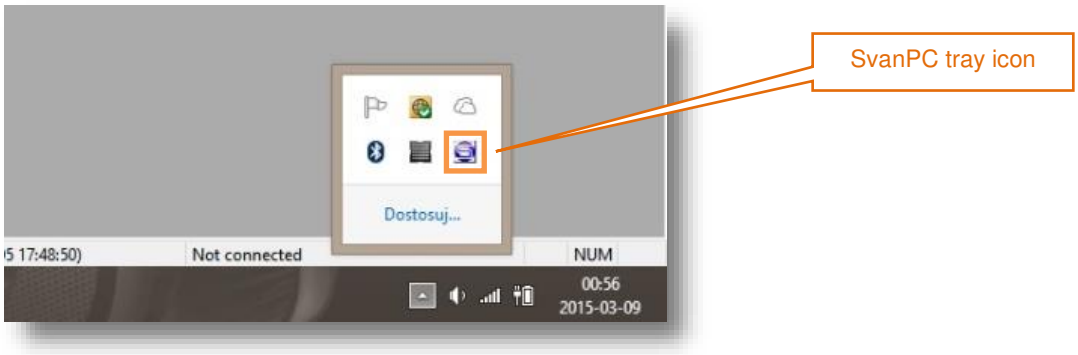
To synchronize SV 200A time with the current PC time click **Set RTC** button. To enter other value click **Customize RTC** button.



8.6.2 Remote Communication Service

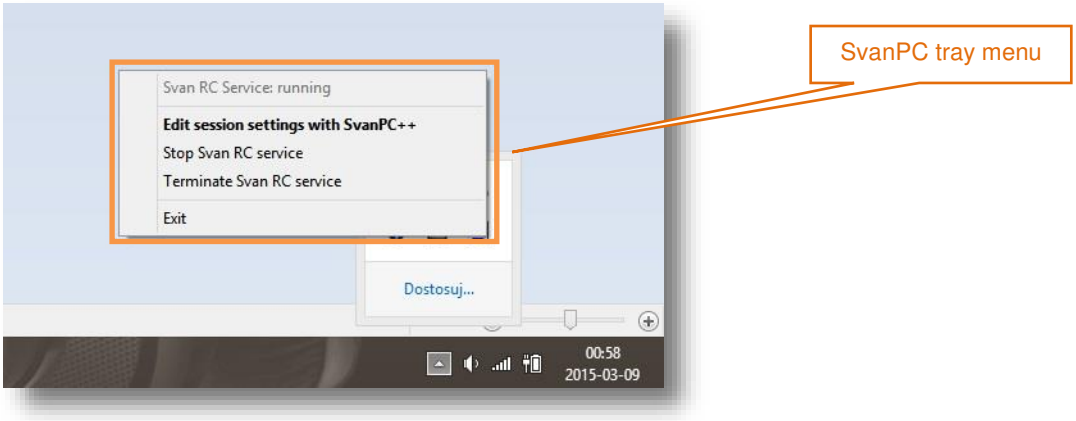
Automatic Files Download (AFD), Continuous Logger Download (CLD) and Live Results Preview run within **Remote Communication Service**. It is a program operating in background regardless of whether SvanPC++ is running or not. The user doesn't even have to be logged in his Windows user profile. All data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

Remote Communication Service automatically resumes to its previous state after booting the PC.



The state of the **Remote Communication Service** can be easily monitored with the *SvanPC++* tray icon. It becomes active when *SvanPC++* is not running.

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

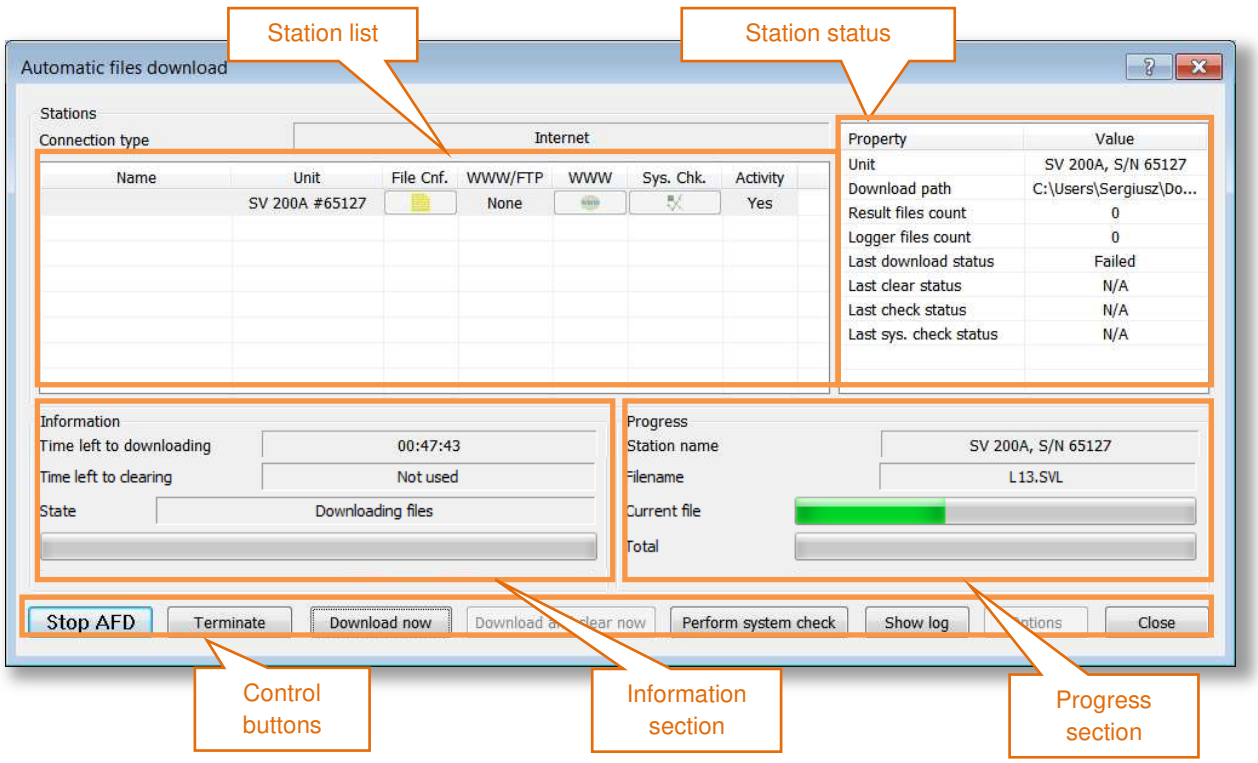


Double-clicking the *SvanPC++* tray icon opens the *SvanPC++* window enabling you to edit the session's settings.

Note: *Changing* ***Remote Communication Session*** *settings requires administrative privileges.*

8.6.3 Automatic Files Downloading

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



Besides downloading files **AFD** performs other tasks such as:

- checking station status and sending notifications when one of the instruments requires attention,
- automatic time synchronization,
- remote system check with in-built electrostatic actuator,
- verification of instrument's setups,
- deleting already downloaded files,
- publishing measurement data on the web server as a HTML file,
- uploading measurement files on the FTP server.

Note: *More information on* ***Automatic Files Download*** *can be found in SvanPC++ User Manual: http://svantek.com/lang-en/support/19/svanpc_software.html#PDF.*

Basic information

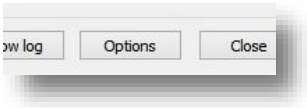
Automatic Files Download runs as a Windows service. It does not require *SvanPC++* to be running. A Windows user who runs the **AFD** does not have to be logged on the PC. **AFD** automatically resumes to its previous state after booting the PC.

The **AFD** window displays the list of stations running in the **AFD** mode. For selected instrument station status information is available. It displays basic information (instrument's serial number and download path), downloads statistics and summary for last downloading, clearing, settings and system checks.

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

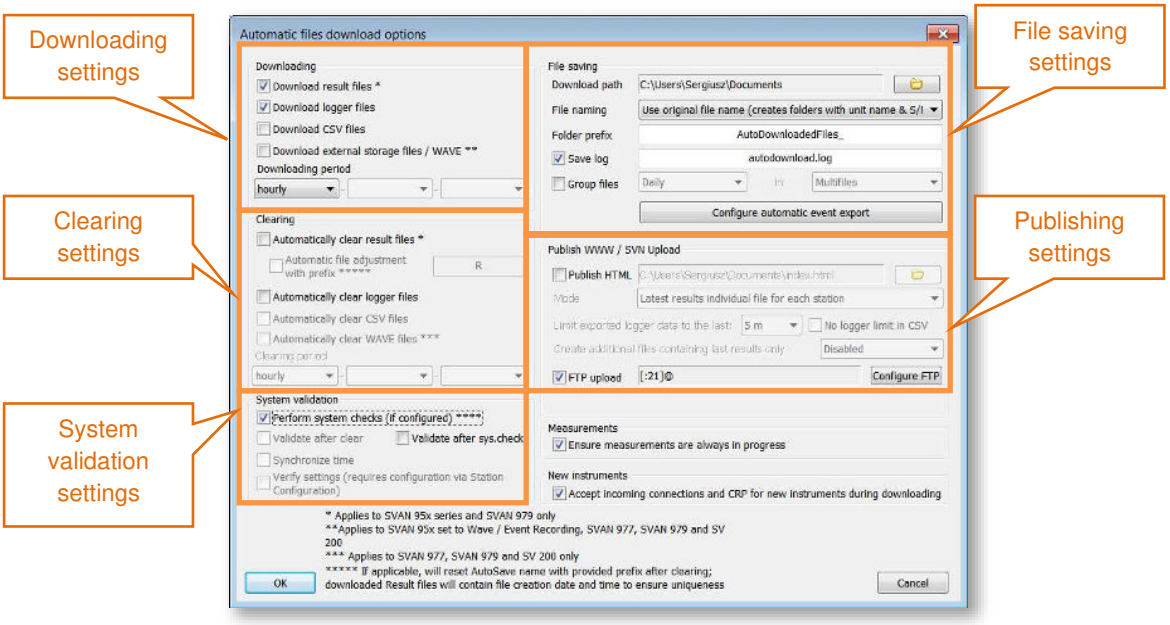
Progress section refers to the station selected in **station list**. It displays stations type and serial number and the name of the file currently being downloaded.

Configuration



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

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



Downloading enables choosing which files are going to be downloaded with **AFD**. Logger files containing measurement results are most used.

Note: CSV and WAVE files contain raw, uncompressed data. Make sure that bandwidth is sufficient. If the mobile modem is used, make sure that SIM-card data plan covers large transfers.

Downloading period setting determines how often data from SV 200A will be downloaded to the PC. Five different periods can be chosen: **hourly**, **daily** (at specified hour), **weekly** (at specified day of week, at specified hour), **monthly** (at specified day of month, at specified hour) and **custom** (specified time interval between downloads). Apply these settings only when **Files to download** are selected.

Automatic cleaning enables choosing which files are going to be erased from the instrument's memory after downloading.

Cleaning period determines how often data from SV 200A will be erased. Five different periods can be chosen: **hourly**, **daily** (at specified hour), **weekly** (at specified day of week, at specified hour), **monthly** (at specified day of month, at specified hour) and **custom** (specified time interval between downloads). This setting applies only when **Automatic cleaning** is active. Files are erased from the instrument only after they had been previously downloaded with **AFD**.

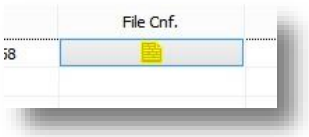
System validation section enables configuring the following settings:

- 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 synchronization of real time clock,
- verification of instrument settings.

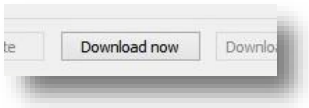
Starting session

To start **Automatic Files Download** session, click the **Start AFD** button. The **AFD** session will start with global settings configured in the **Options** window. Download will begin after the time defined in **Downloading period** is over.

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



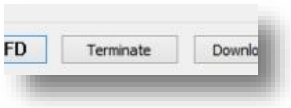
To start the **Automatic Files Download** session and download files from SV 200A, immediately click **Download now** button.



Stopping session

To finish the **Automatic Files Download** session after downloading all measurement files, click the **Stop AFD** button.

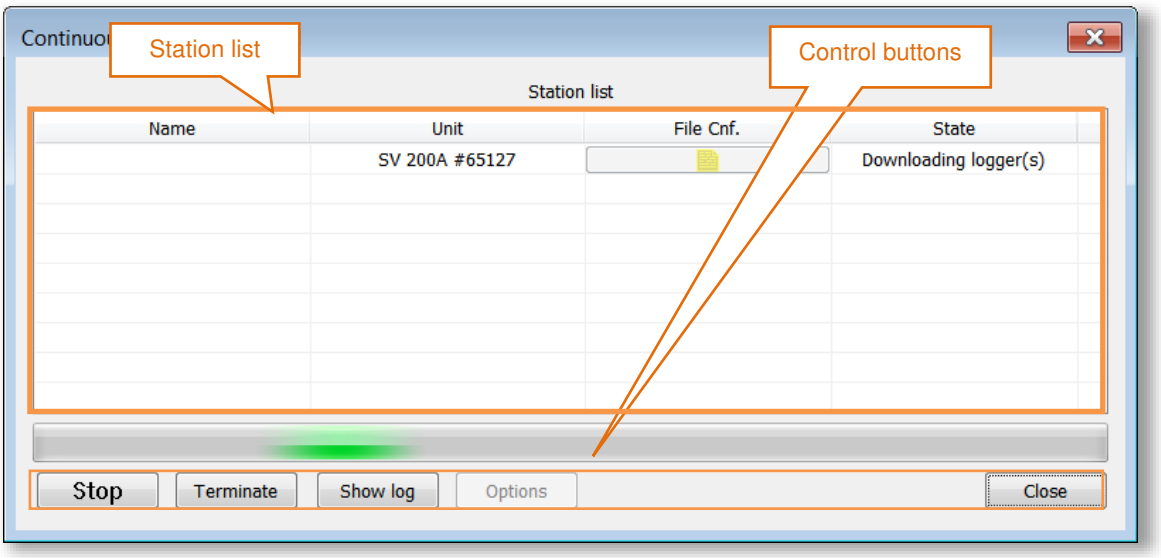
To terminate the **Automatic Files Download** session immediately, without downloading all measurement files, click the **Terminate** button.



Note: Terminating session may cause some measurement files to be incomplete. However, after restarting the session downloading will resume.

8.6.4 Continuous Logger Download

CLD (Continuous Logger Download) mode is used for continuous downloading of measurement data from SV 200A. Measurement results can be presented in real time while saving in the selected local or remote directory. In this mode the logger (SVL) files are downloaded only.



Besides downloading files **CLD** performs other tasks such as:

- checking station status and sending notifications when one of the instruments requires attention,
- automatic time synchronization,
- remote system check with in-built electrostatic actuator,
- verification of instrument's setups,
- deleting already downloaded files,
- publishing measurement data on the web server as a HTML file,
- uploading measurement files on the FTP server.

Note: *More information on* **Continuous Logger Download** *can be found in the SvanPC++ User Manual available online:*

http://svantek.com/lang-en/support/19/svanpc_software.html#PDF.

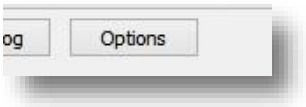
Basic information

Continuous Logger Download (**CLD**) runs as a Windows service. It does not require *SvanPC++* to be running. Windows user who runs the **CLD** does not have to be logged on the PC. **CLD** automatically resumes to its previous state after booting the PC.

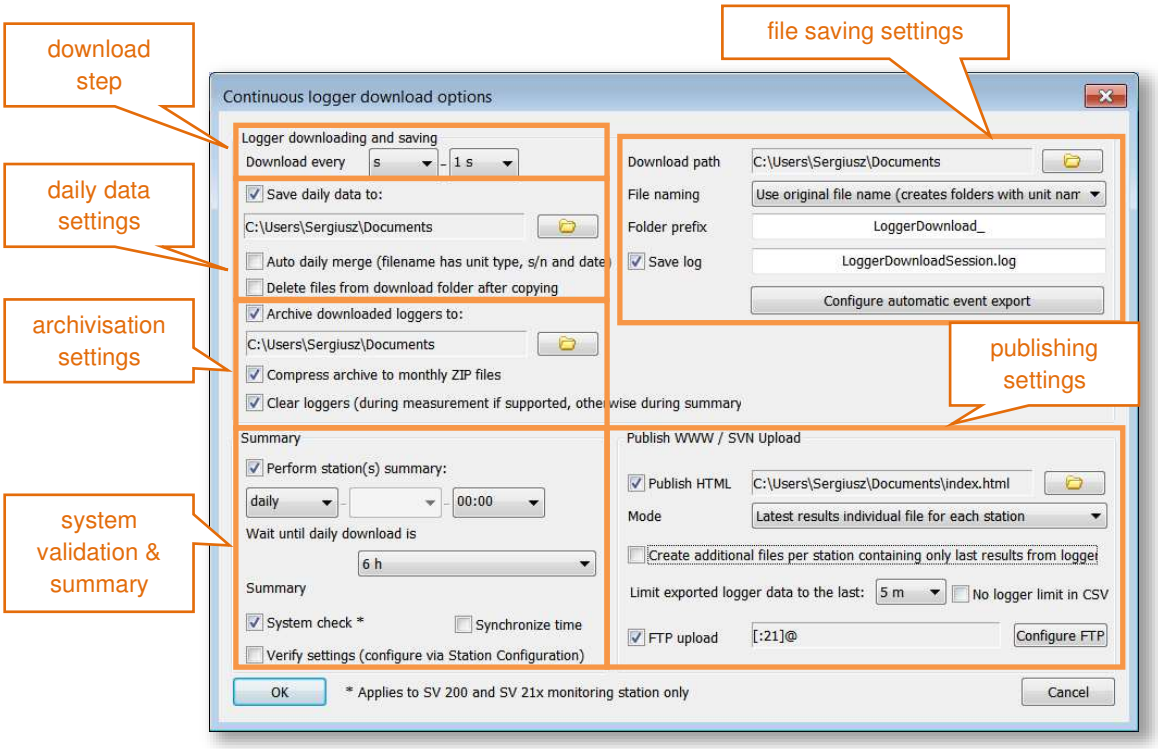
CLD window displays list of stations running in the **CLD** mode along with the current state of each station. The progress bar indicates activity of the **CLD** mode.

Configuration

To configure **Continuous Logger Download** session settings, click **Options** button. Continuous logger download options window will appear allowing you to make necessary adjustments.



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



Download step determines how often data from SV 200A will be downloaded to the PC.

File saving settings enable configuring basic settings for files download such as download path, file naming rules and writing session log.

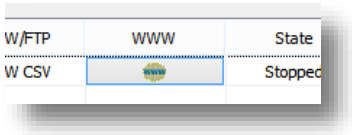
Daily data settings enable configuring the path where files downloaded from the instrument will be copied after each day of measurements. Files may be automatically merged, if more than one file is generated throughout the day.

Archivisation settings enable configuring the path where all downloaded files are copied for archivisation purposes. Files may be compressed into monthly zip file.

The **System validation & summary** section enables configuring 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 synchronization of real time clock,
- verification of instrument settings during station summary.

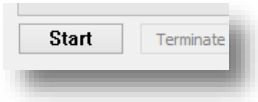
The **Publish WWW/SVN Upload** section enables configuring basic settings for HTML publishing of the results and FTP uploads. Detailed settings can be configured for each individual station by clicking WWW button which becomes visible in the station list.



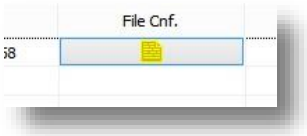
The **Configure FTP** button enables configuring the FTP server which is going to be used for data upload.

Starting session

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

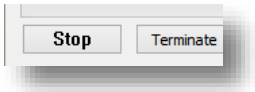


It is also possible to override global file saving settings of the CLD session by clicking the **File Conf.** button next to each individual station in the **Station list**.

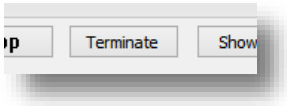


Stopping session

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



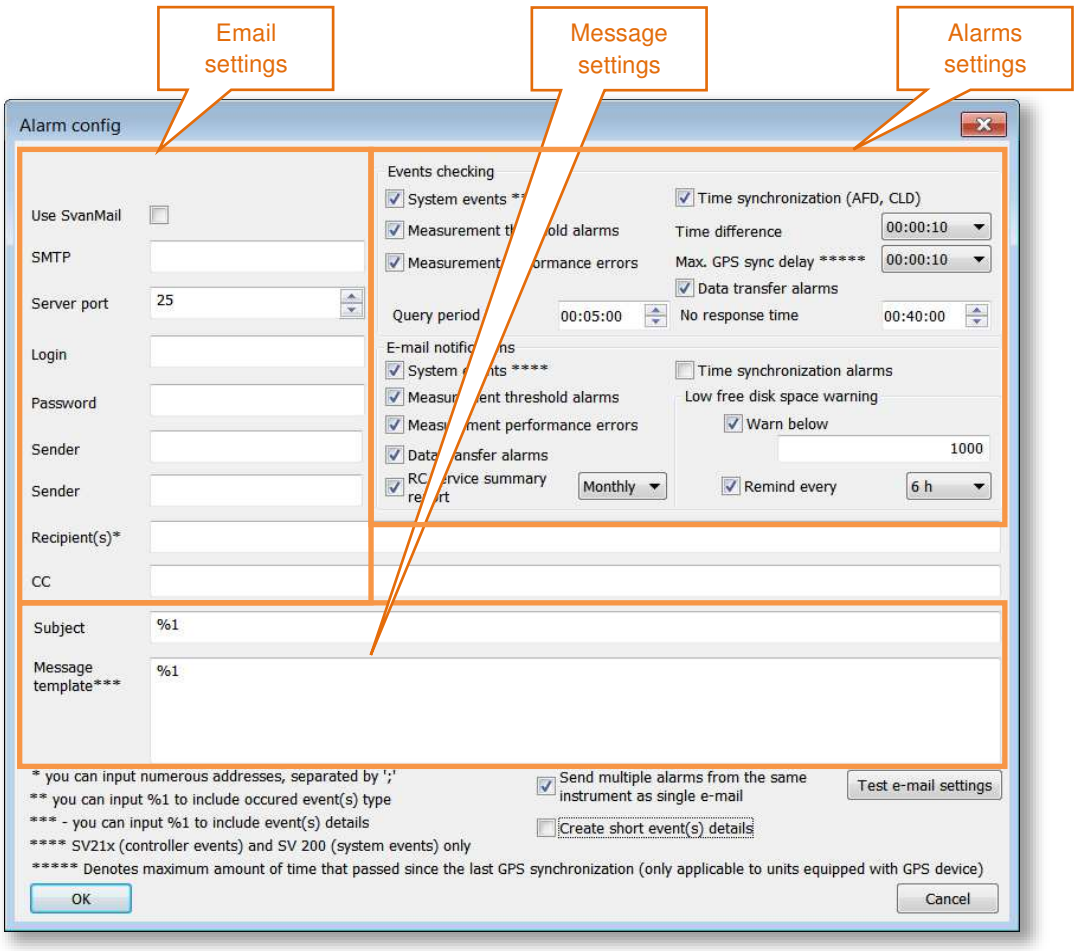
To terminate the CLD session immediately, without downloading all measurement files, click the **Terminate** button.



Note: *Terminating session may cause some measurement files to be incomplete. However, after restarting the session downloading will resume.*

8.6.5 Alarms

The *SvanPC++* Remote Communication **Alarms** button opens the **Alarm config** window which enables configuring customized email notifications for certain events.



With **Alarms** you can be informed about following events:

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

The e-mail alarming requires the credentials of the e-mail server to be used for it, including the SMPT server name, port number, sender name, login, and password. Alarm messages can be sent to multiple recipients simultaneously.

Current implementation of the functionality does not support SSL (Secure Socket Layer) connections to e-mail servers – the user is expected to use an account on a non-secured SMTP server.

Note: *More information about* ***Alarms*** *settings can be found in SvanPC++ User Manual.*

9 NOISE DIRECTIVITY

The noise source direction determination algorithm applied in SV 200A is based on the phase shift of the signals between the individual microphones of the system (4 x MEMS microphones) placed around the case of SV 200A. Its main idea is to detect the source of the dominant energy in a given time interval. Detection occurs in two planes - horizontal "XY" and vertical "Z". The user receives information about the direction of the noise source with the dominant energy along with the percentage of that energy in the whole signal and the distribution of 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 device so that the reflecting surfaces (nearby objects) are in the greatest distances.

There are two measurement results that the instrument measures and saves in a file: sound energy distribution for the “XY” and “Z” planes as logger results with the **Logger Step** (if the logger step is lower than 1 s the acoustic energy distribution will be recorded with 1 s step) and estimated directional Leq as summary results with the **Integration Period** step.

Energy in a given direction is expressed in % of the total energy in all directions.

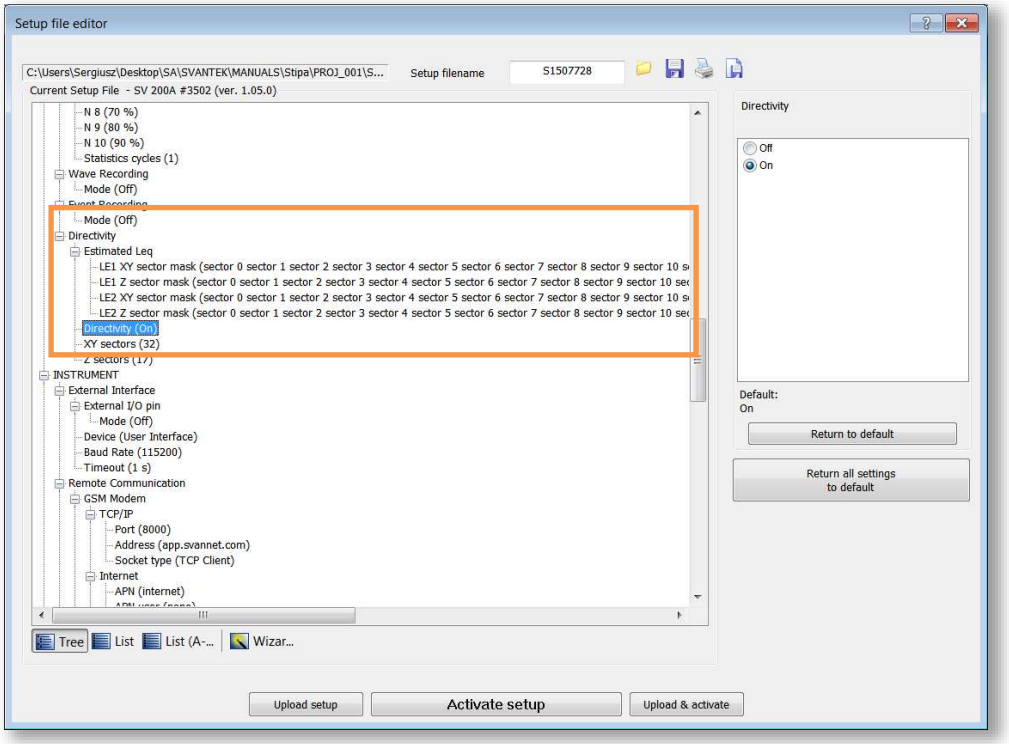
Direction is the angle of the deviation:

- for “XY” plane - from the north direction clockwise in the range from 0 to 359 degrees,
- for “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 results, instead of degrees, the calculations give results for sectors, the number of which the user can define.

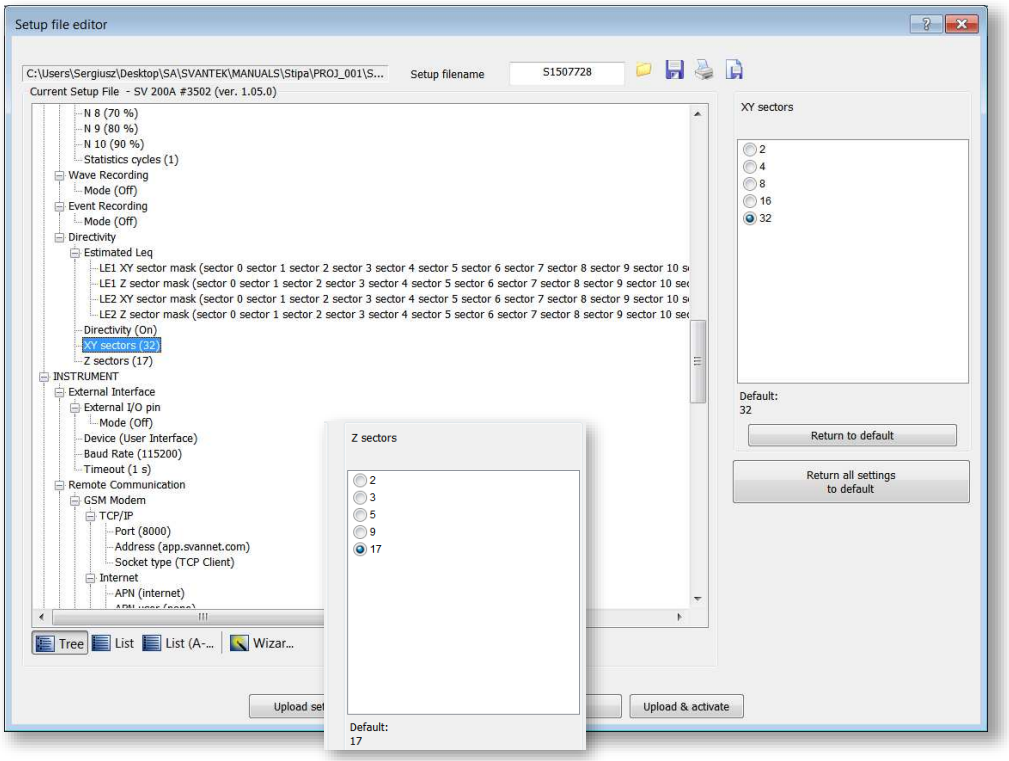
Estimated Leq is calculated from general Leq multiplied by the percentage of energy from the selected sectors.

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

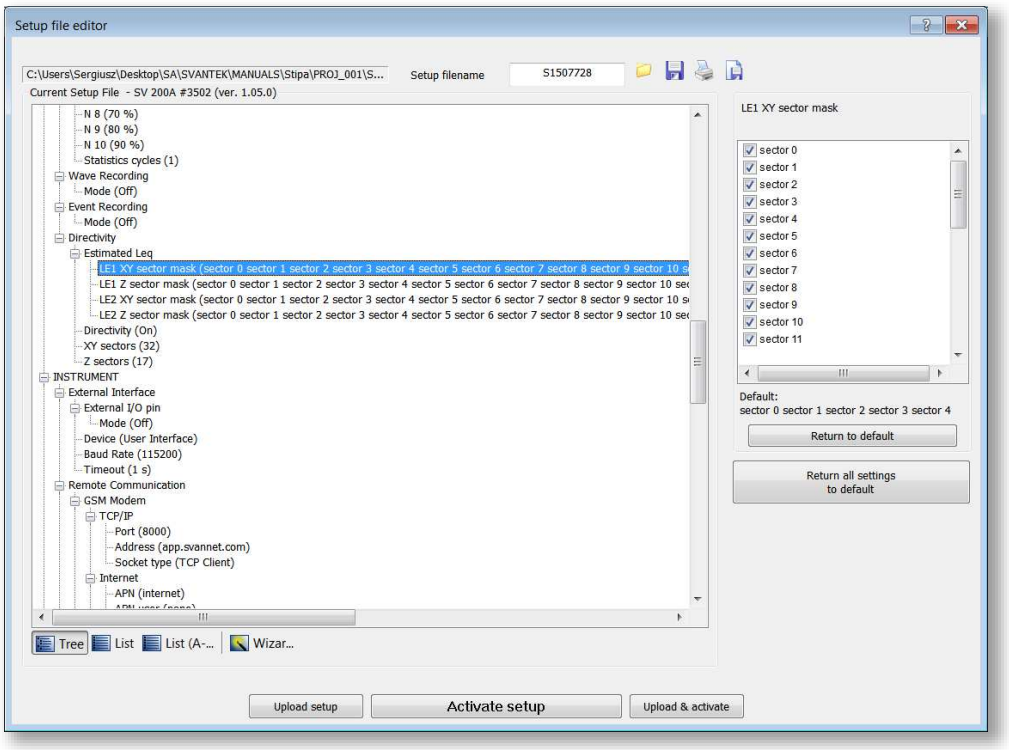


You can switch on or off all directivity calculations.

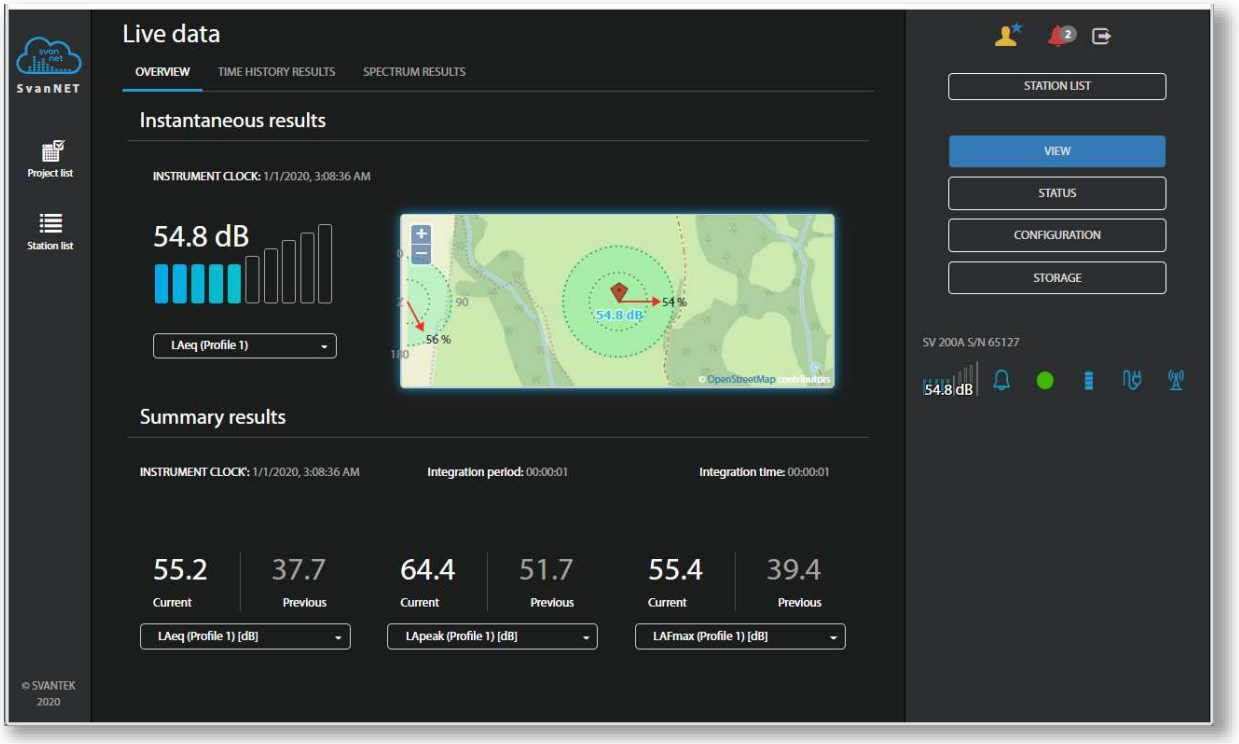
You can define the number of sectors in both planes. For the “XY” plane it is possible to select 32, 16, 8, 4 and 2 sectors. For the “Z” plane it is possible to select 17, 9, 5, 3 and 2 sectors.



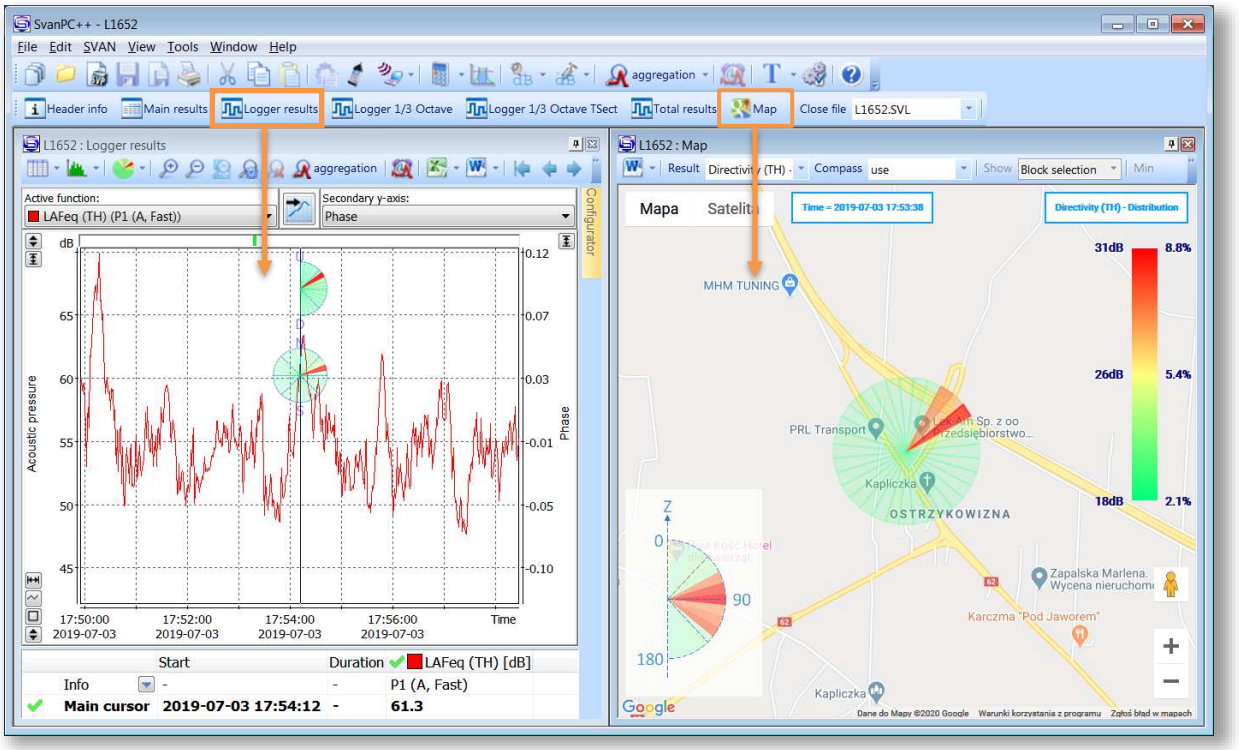
You can set sectors for two estimated Leq results (**LE1** and **LE2**) for both planes (XY and Z).



The direction (sector) of the dominant of sound energy distribution and the percentage of whole energy for that sector is shown at the *SvanNET* Live data view (see Chapter 0).

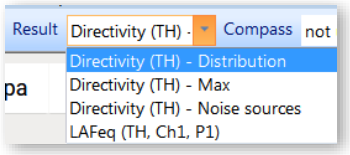


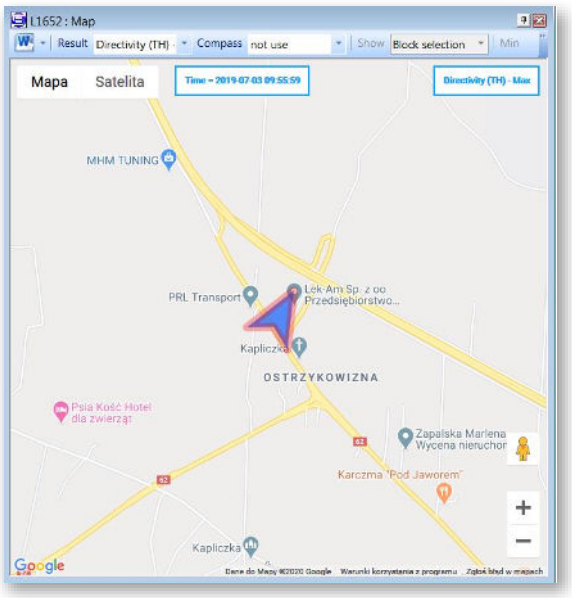
You can also observe logger results with directional characteristics and map with the SV 200A localization and direction of the noise or its distribution in *SvanPC++* by clicking on appropriate buttons: **Logger results** and **Map**.

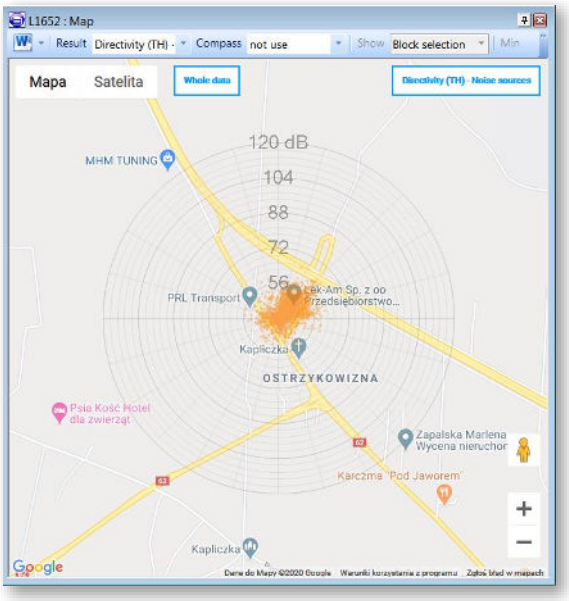


The direction or distribution of the noise on the map corresponds to the time of the cursor position on the **Logger results** screen.

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







10 INSTRUMENT UPGRADE

There are three separate programs loaded into the instrument's memory:

1. FIRMWARE,
2. BOOTSTRAP,
3. HARDBOOT.

The **FIRMWARE** is a program dedicated for the main processor of the instrument which maintains functions in relation to the user interface, measurements, files and communication. SVANTEK constantly improves functionalities of their instruments, so it is recommended to install the most recent firmware upgrade.

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

The **HARDBOOT** is inerasable program designed to conduct the upgrade or repair process of the **BOOTSTRAP** only.

The user can upgrade **FIRMWARE** and **BOOTSTRAP** programs of the SV 200A instrument.

10.1 INSTRUMENT UPGRADE VIA USB CABLE

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

1. Switch the instrument off if it is switched on.
2. Connect SV 200A to the PC using SC 256A cable.
3. Press and hold the ▲ key and switch on the instrument, shortly pressing simultaneously the Enter key. That boots the instrument into **BOOTSTRAP** mode.
4. Run batch file from the upgrade package on your PC.

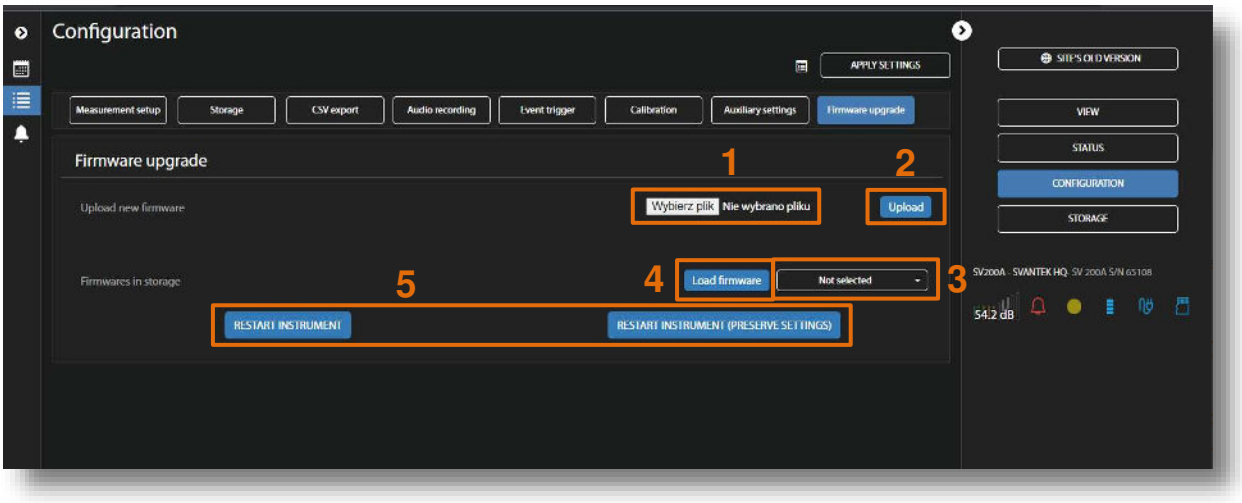
Upgrade of the **BOOTSTRAP** program is conducted through the **HARDBOOT** service program. It can be done via the USB cable only.

1. Switch the instrument off if it is switched on.
2. Connect SV 200A to the PC using provided the SC 256A cable.
3. Press and hold the ▼ and ▲ keys simultaneously and switch on the instrument, shortly pressing simultaneously the Enter key. That boots the instrument into **HARDBOOT** mode.
4. Run batch file included in the upgrade package on your PC.

10.2 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 that the proper firmware file is downloaded from SVANTEK website to your PC.



To load new firmware:

1. Click **Choose file** and select the firmware *.bin file in your PC.
2. Upload the selected file by clicking the **Upload** button.
3. After the upload is finished select new firmware file in the firmware selector.
4. Click **Load firmware**.
5. Click **RESTART INSTRUMENT** or **RESTART INSTRUMENT (PRESERVE SETTINGS)** to finalize the process and wait 60 seconds for the connection to renew. The measurements will start automatically.

Note: *After **RESTART INSTRUMENT (PRESERVE SETTINGS)**, all previous instrument settings will be preserved. After **RESTART INSTRUMENT**, only the communication settings will remain, and all other parameters will be set to default.*

11 MAINTENANCE

11.1 TRANSPORTATION AND STORAGE

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

11.2 CLEANING

Clean the surface of the instrument with damp soft cloth.

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

The instrument sockets should be cleaned with the use of compressed air.

Note: *In cases of larger dirt, such as oil or grease, contact your Local Authorized Distributor or Svantek Service Office.*

11.3 RESETTING THE INSTRUMENT

- **SYSTEM RESET:** internal software reset clears any setup configuration and brings back the default **Factory Settings** (see Chapter 5.1.2).
- **HARDWARE RESET:** internal hardware reset, no user data is changed. Make sure the battery is not exhausted, and the unit is turned off. Press and hold the 

key for more than 10 seconds, and then release it. Turn on the instrument as usually by pressing the 

key for more than 3 seconds (see Chapter 3.2).

Note: *Hardware reset is only to be used in extreme situations such as an instrument hang-up.*

Be aware, that a hardware reset:

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

- will stop measurement run!

11.4 TROUBLESHOOTING

- In the case your instrument does not respond proceed with hardware reset of the instrument (see Chapter 11.3).
- In the case the reset does not help call your Local Authorized Distributor or Svantek Service Office.

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.

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.

E-mail: support@svantek.com.pl
office@svantek.com.pl

Internet: www.svantek.com

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,Xlapp.svannet.com,XJ8000,XK80,XL70,XM70,XNinternet,XOnone,XP0,XQ0,XS0,XT0,XUnone,XV0.0.0.0,XW0,XXa,XXbmessage,XXc0,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;

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.*
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;***

Group name	#D code	Code description
	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)

Group name	#1 code	#7 code	#S code	Code description
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

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

Group name	#1 code	#7 code	#S code	Code description
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. 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)

Group name	#1 code	#7 code	#S code	Code description
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 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

Group name	#1 code	#7 code	#S code	Code description
				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; 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

Group name	#1 code	#7 code	#S code	Code description
			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);
				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:

Group name	#1 code	#7 code	#S code	Code description
				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];
			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

Group name	#1 code	#7 code	#S code	Code description
			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**
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

Group name	#1 code	#7 code	#S code	Code description
			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
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

Group name	#1 code	#7 code	#S code	Code description
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!*
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

Group name	#1 code	#7 code	#S code	Code description
				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 $\in (1 \div 3)$
			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:

Group name	#1 code	#7 code	#S code	Code description
				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*
Specified Time for Logger File Splitting	**XD**			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*

Group name	#1 code	#7 code	#S code	Code description
			JH	x - x time for time number n=1
			JI	x - x time for time number n=2
			JJ	x - x time for time number n=3
			JK	x - x time for time number n=4
			JL	x - x time for time number n=5
			JM	x - x time for time number n=6
User text			BV	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 !"#$%&')(*+-./:<=>?@[\]^}_{`|~

Table A.9 CSV export settings

Group name	#1 code	#7 code	#S code	Code description
Summary results saved in CSV file		CV		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** <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**

Group name	#1 code	#7 code	#S code	Code description
				<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 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

Group name	#1 code	#7 code	#S code	Code description
				<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:
				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

Group name	#1 code	#7 code	#S code	Code description
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*

Group name	#1 code	#7 code	#S code	Code description
				- 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** 4 - **Hungarian** 5 - **Italian** 6 - **Dutch** 7 - **Polish** 8 - **Portuguese**

Group name	#1 code	#7 code	#S code	Code description
				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
SD card free space		**BF**		n - free space in bytes [B]
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]

Group name	#1 code	#7 code	#S code	Code description
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 3 - erasing Flash 4 - writing Flash 5 - checking a firmware after write 6 - finishing After 6 the state always comes to 0.

Group name	#1 code	#7 code	#S code	Code description
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 ∈ (1 ÷ 16) <type> - marker type 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;

Group name	#1 code	#7 code	#S code	Code description
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 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

Group name	#1 code	#7 code	#S code	Code description
				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 Logger results 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,ll,<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 <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,

Group name	#1 code	#7 code	#S code	Code description
				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, 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

Group name	#1 code	#7 code	#S code	Code description
				- 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
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

Group name	#1 code	#7 code	#S code	Code description
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>; 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] <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

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 – reserved, 0x0080 – log modem debug (off by default), 0x0100 – log periodic GPS status, 0x0200 – reserved, 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 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,
			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)

Group name	#1 code	#7 code	#S code	Code description
				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 ∈ (0 ÷ 23) <min> - min ∈ (0 ÷ 59) <sec> - sec ∈ (0 ÷ 59) <day> - day ∈ (1 ÷ 31) <month> - hour ∈ (1 ÷ 12) <year> - hour ∈ (2000 ÷ 2099)
Time zone		TZ	OG	x - time zone [min] ∈ (-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>,<stopWeekDay>,<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

Group name	#1 code	#7 code	#S code	Code description
				3 - Wednesday 4 - Thursday 5 - Friday 6 - Saturday <startDay> - start day of custom DST <stopDay> - stop day of custom DST d - day ∈ (1 ÷ 31) <startMonth> - start month of custom DST <stopMonth> - stop month of custom DST m - month ∈ (0 ÷ 11); 0 – January,... 11 - December <startHour> - start hour of custom DST <stopHour> - stop hour of custom DST h - hour ∈ (0 ÷ 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
			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

Group name	#1 code	#7 code	#S code	Code description
				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): #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

Group name	#1 code	#7 code	#S code	Code description
	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 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:

Group name	#1 code	#7 code	#S code	Code description
				#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 <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 0 - Off 1 - PAP 2 - CHAP <user> - username to be used during Internet connection <pass> - password to be used during Internet connection <dns> - Domain Name Server (DNS) address Ipv4 in dot notation <connType> - connection type 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:

Group name	#1 code	#7 code	#S code	Code description
				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 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 = $192*2^{24}+168*2^{16}+1*2^{8}+1$)
	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

Group name	#1 code	#7 code	#S code	Code description
				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 <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%

Group name	#1 code	#7 code	#S code	Code description
				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 <flags> 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 <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 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

Group name	#1 code	#7 code	#S code	Code description
			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>; 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 $\in (0 \div 65535)$; default 8000 *Note: it is not advised to use ports < 1024!*

Group name	#1 code	#7 code	#S code	Code description
				<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
			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>

Group name	#1 code	#7 code	#S code	Code description
				<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 <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

Group name	#1 code	#7 code	#S code	Code description
			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 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 does not present 1 - Wireless LAN adapter disabled 2 - Searching for initial connection

Group name	#1 code	#7 code	#S code	Code description
				4 - Connected 5 - Out of range <rate> - transfer rate [Mb/s] ∈ (1 ÷ 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 ∈ (1 ÷ 13) <snr> - signal to noise ratio Reading connection information: **#7,WI,2,<act>,0x<flags>,<serviceIP>,<subMask>,<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*

Group name	#1 code	#7 code	#S code	Code description
				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>*

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 ∈(1 ÷ 50)
6	TriggerPost	number of the records taken into account after the fulfilment of the triggering condition ∈(1 ÷ 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[23] value
	Result[1][3]	Lxymax[2] value
	Result[1][4]	Lxymin[2] value
	Result[1][5]	Lxy[2] value
	Result[1][6]	Lxyeq[23] 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[23] value
	Result[2][3]	Lxymax[2] value
	Result[2][4]	Lxymin[2] value
	Result[2][5]	Lxy[2] value
	Result[2][6]	Lxyeq[23] 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[23] value
	Result[3][3]	Lxymax[2] value
	Result[3][4]	Lxymin[2] value

Word number	Name	Comment
	Result[3][5]	L_{xv}^{2} value
	Result[3][6]	L_{xveq}^{23} 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)
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

Word number	Name	Comment
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

Word number	Name	Comment
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 + (NofDirDistXY+ NofDirDistZ)	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	
+[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,

Word number	Name	Comment
		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,
+[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

Word number	Name	Comment
		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] 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,

Word number	Name	Comment
		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 ∈(-179° ÷ 180°). 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, 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 the 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 the IEC 61672-1:2013 standard for the Class 1 "**Z**" filter
- **A** meeting requirements of the IEC 651 and IEC 61672-1:2013 standard for the Class 1 "**A**" filter
- **C** meeting requirements of the IEC 651 and IEC 61672-1:2013 standard for the Class 1 "**C**" filter
- **B** meeting requirements of the IEC 651 and IEC 61672-1:2013 standard 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

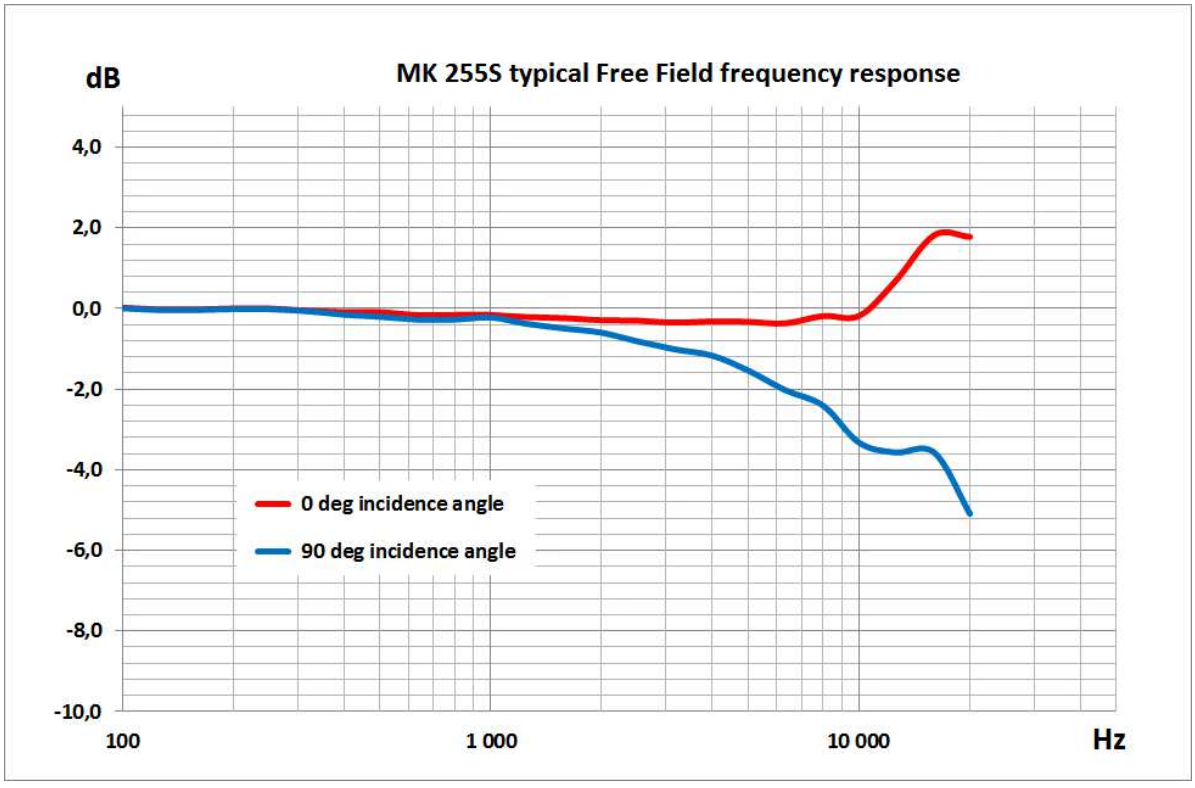
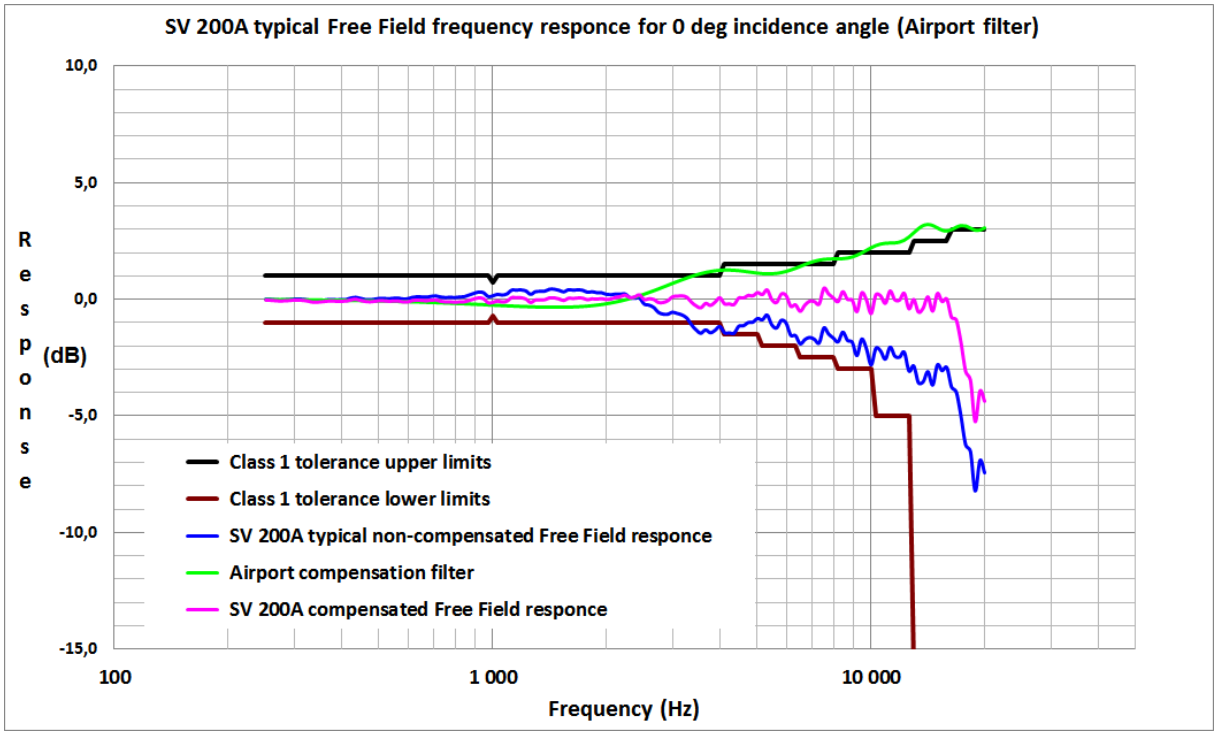


Table C.1.4. MK 255S typical Free Field frequency response and corrections for 0 deg and 90 deg incidence angle

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	--

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]
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



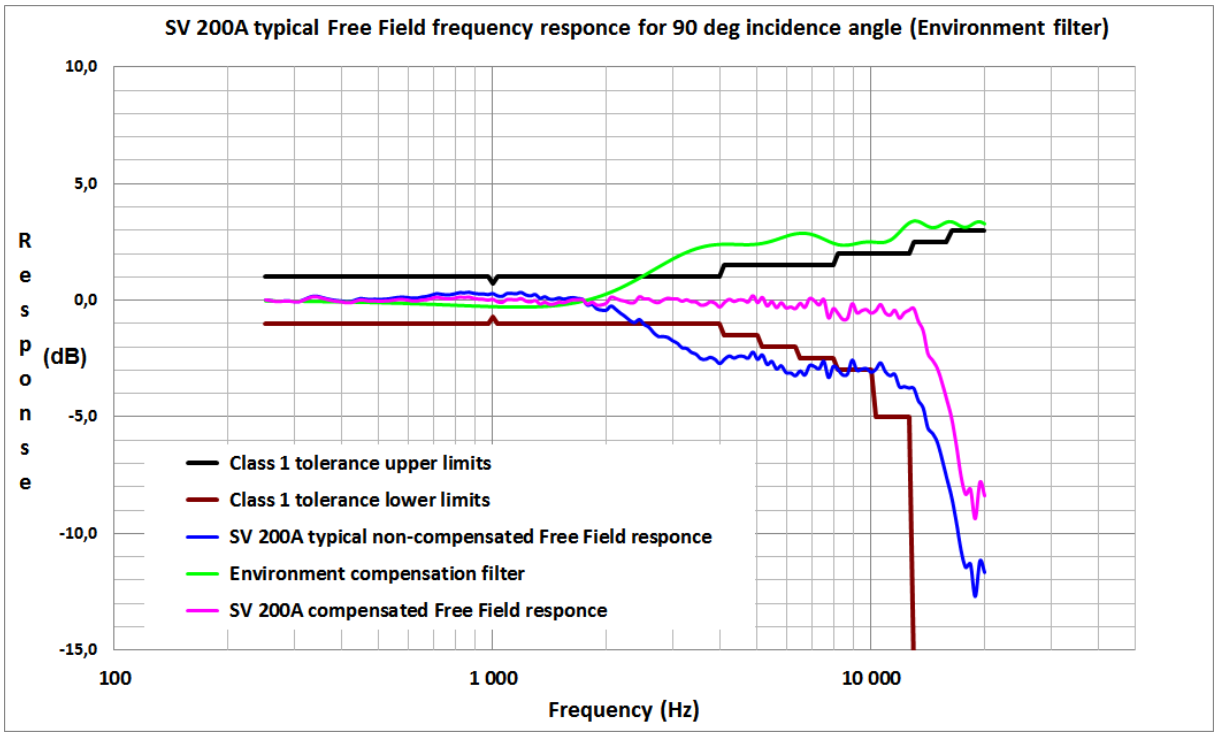


Table C.1.5. SV 200A typical Free Field frequency response [dB]

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

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		
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
750	0.08	-0.17	-0.09	0.24	-0.20	0.05

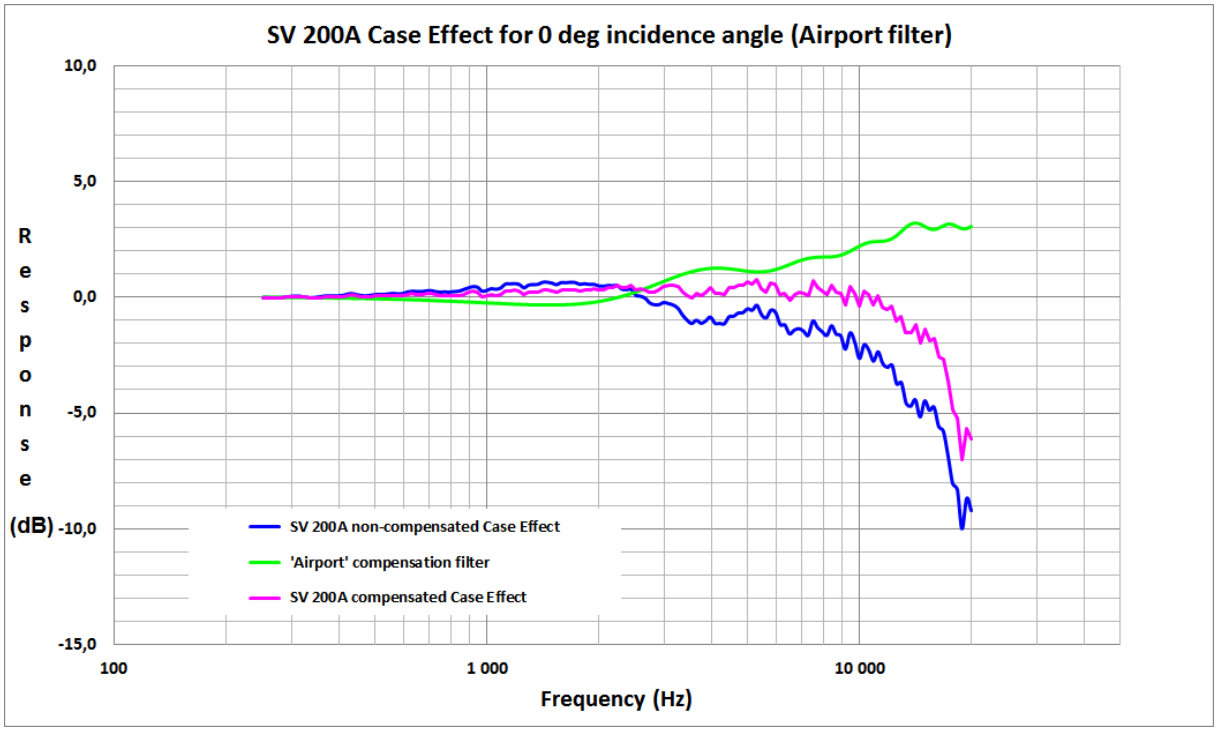
f [Hz]	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environment'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
772	0.09	-0.18	-0.09	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

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		
2 304	0.07	0.02	0.09	-0.86	0.73	-0.12
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

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		
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
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 (according to EN 61672-1:2013 point 5.3.2)

Effect of reflections and diffraction of the acoustic plane wave from the case of SV 200A ("Case Effect")



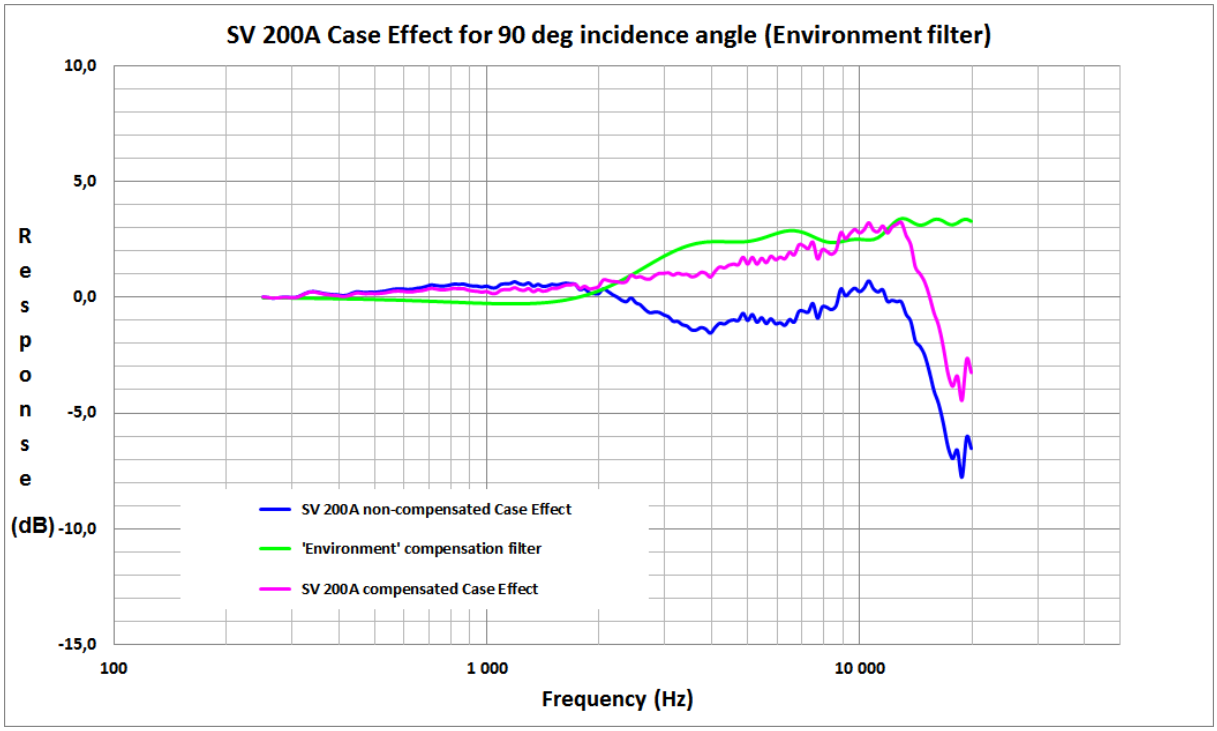


Table C.1.6. SV 200A compensated Case Effect for 0 deg incidence angle (according to EN 61672-1:2013 point 5.3.2)

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

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]
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
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

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]
1 454	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
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

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]
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
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

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]
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 (according to EN 61672-1:2013 point 5.3.2)

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
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

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]
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
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

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]
1 939	-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
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

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]
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
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
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 Case Effect (according to EN 61672-2:2013 point 9.6)

Table C.1.9. SV 200A compensated Case Effect for 0 deg incidence angle (according to EN 61672-1:2013 point 9.6)

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Airport)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
251	0.00	0.00			-0.02		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			-0.03		0.25
290	-0.03	-0.04			-0.03		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			-0.04		0.25
325	-0.06	-0.06			-0.04		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			-0.04		0.25
365	-0.06	-0.08			-0.05		0.25
376	-0.05	-0.08			-0.05		0.25
387	-0.07	-0.09			-0.05		0.25
398	-0.07	-0.09			-0.06		0.25
410	-0.06	-0.09			-0.06		0.25
422	0.00	-0.09			-0.06		0.25
434	0.03	-0.09			-0.07		0.25
447	-0.03	-0.09			-0.07		0.25
460	-0.07	-0.09			-0.07		0.25
473	-0.09	-0.09			-0.08		0.25
487	-0.07	-0.09			-0.08		0.25
501	-0.04	-0.09			-0.09		0.25
516	-0.05	-0.10			-0.09		0.25
531	-0.07	-0.11			-0.10		0.25
546	-0.05	-0.12			-0.10		0.25
562	-0.05	-0.13			-0.11		0.25
579	-0.09	-0.14			-0.11		0.25
596	-0.09	-0.15			-0.12		0.25
613	-0.04	-0.16			-0.12		0.25
631	-0.01	-0.16			-0.13		0.25
649	-0.03	-0.16			-0.14		0.25
668	-0.04	-0.16			-0.14		0.25
688	-0.02	-0.16			-0.15		0.25
708	-0.01	-0.16			-0.16		0.25
729	-0.06	-0.16			-0.17		0.25
750	-0.09	-0.16			-0.17		0.25
772	-0.09	-0.16			-0.18		0.25
794	-0.11	-0.16			-0.19		0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Airport)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
818	-0.09	-0.16			-0.20		0.25
841	-0.09	-0.16			-0.21		0.25
866	-0.03	-0.16			-0.22		0.25
891	0.04	-0.16			-0.23		0.25
917	0.08	-0.16			-0.24		0.25
944	0.05	-0.16			-0.24		0.25
972	-0.13	-0.16			-0.25		0.25
1 000	-0.11	-0.16			-0.26		0.25
1 029	-0.05	-0.17			-0.27		0.25
1 059	-0.09	-0.17			-0.28		0.25
1 090	-0.06	-0.18			-0.29		0.25
1 122	0.10	-0.19			-0.30		0.25
1 155	0.09	-0.20			-0.31		0.25
1 189	0.09	-0.20			-0.32		0.25
1 223	0.03	-0.21			-0.33		0.25
1 259	-0.12	-0.21			-0.34		0.25
1 296	-0.01	-0.21			-0.34		0.25
1 334	0.00	-0.22			-0.35		0.25
1 372	0.00	-0.22			-0.35		0.25
1 413	0.08	-0.23			-0.36		0.25
1 454	0.08	-0.23			-0.36		0.25
1 496	0.04	-0.24			-0.36		0.25
1 540	-0.03	-0.24			-0.35		0.25
1 585	0.06	-0.24			-0.35		0.25
1 631	0.06	-0.25			-0.34		0.25
1 679	0.08	-0.25			-0.33		0.25
1 728	0.07	-0.26			-0.32		0.25
1 778	0.00	-0.27			-0.31		0.25
1 830	0.04	-0.28			-0.29		0.25
1 884	0.03	-0.28			-0.26		0.25
1 939	0.05	-0.29			-0.24		0.25
1 995	0.01	-0.29			-0.21		0.25
2 054	0.03	-0.29			-0.17		0.25
2 113	0.10	-0.29			-0.13		0.25
2 175	0.14	-0.29			-0.08		0.25
2 239	0.20	-0.30			-0.03		0.25
2 304	0.09	-0.30			0.02		0.25
2 371	0.12	-0.30			0.08		0.25
2 441	0.21	-0.30			0.14		0.25
2 512	0.01	-0.30			0.21		0.25
2 585	0.04	-0.31			0.28		0.25

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Airport)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
2 661	0.02	-0.31			0.36		0.25
2 738	-0.12	-0.32			0.44		0.25
2 818	-0.12	-0.33			0.52		0.25
2 901	-0.04	-0.33			0.60		0.25
2 985	0.13	-0.34			0.68		0.25
3 073	0.15	-0.35			0.76		0.25
3 162	0.17	-0.35			0.83		0.25
3 255	0.11	-0.34			0.91		0.25
3 350	-0.10	-0.34			0.98		0.25
3 447	-0.26	-0.34			1.04		0.25
3 548	-0.35	-0.33			1.10		0.25
3 652	-0.15	-0.33			1.15		0.25
3 758	-0.24	-0.32			1.19		0.25
3 868	-0.10	-0.32			1.22		0.25
3 981	0.09	-0.32			1.24		0.25
4 097	-0.18	-0.32			1.25		0.35
4 217	-0.18	-0.32			1.25		0.35
4 340	-0.21	-0.32			1.24		0.35
4 467	0.07	-0.32			1.23		0.35
4 597	0.08	-0.33			1.20		0.35
4 732	0.18	-0.33			1.18		0.35
4 870	0.17	-0.33			1.15		0.35
5 012	0.31	-0.33			1.12		0.35
5 158	0.22	-0.33			1.10		0.35
5 309	0.42	-0.34			1.09		0.35
5 464	0.00	-0.35			1.09		0.35
5 623	-0.11	-0.35			1.11		0.35
5 788	0.24	-0.36			1.14		0.35
5 957	0.19	-0.36			1.19		0.35
6 131	-0.28	-0.37			1.26		0.35
6 310	-0.22	-0.37			1.33		0.35
6 494	-0.50	-0.34			1.41		0.35
6 683	-0.23	-0.31			1.49		0.35
6 879	-0.06	-0.29			1.57		0.35
7 079	-0.08	-0.26			1.63		0.35
7 286	-0.19	-0.24			1.68		0.35
7 499	0.49	-0.21			1.71		0.35
7 718	0.25	-0.19			1.73		0.35
7 943	0.08	-0.19			1.74		0.35
8 175	-0.08	-0.18			1.74		0.35
8 414	0.35	-0.18			1.75		0.35

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Airport)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
8 660	0.01	-0.18			1.77		0.35
8 913	-0.01	-0.18			1.82		0.35
9 173	-0.51	-0.18			1.90		0.35
9 441	0.29	-0.18			1.99		0.35
9 716	-0.01	-0.18			2.11		0.35
10 000	-0.59	-0.18			2.22		0.35
10 292	0.22	-0.06			2.31		0.35
10 593	0.17	0.06			2.38		0.35
10 902	-0.15	0.18			2.41		0.35
11 220	0.38	0.30			2.42		0.35
11 548	0.00	0.42			2.43		0.35
11 885	-0.02	0.54			2.46		0.35
12 232	0.28	0.66			2.54		0.35
12 589	-0.39	0.66			2.68		0.35
12 957	0.01	0.82			2.86		0.35
13 335	-0.53	0.99			3.04		0.35
13 725	-0.36	1.15			3.18		0.35
14 125	0.13	1.32			3.22		0.35
14 538	-0.49	1.49			3.18		0.35
14 962	0.27	1.65			3.08		0.35
15 399	-0.08	1.82			2.98		0.35
15 849	0.03	1.82			2.94		0.35
16 312	-0.76	1.81			3.00		0.35
16 788	-0.86	1.81			3.10		0.35
17 278	-1.85	1.80			3.18		0.35
17 783	-3.08	1.79			3.16		0.35
18 302	-3.45	1.79			3.07		0.35
18 836	-5.23	1.78			2.98		0.35
19 387	-3.92	1.78			2.98		0.35
19 953	-4.35	1.78			3.08		0.35

Table C.1.10. SV 200A compensated Case Effect for 90 deg incidence angle (according to EN 61672-1:2013 point 9.6)

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Environment)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
251	0.00	0.00			-0.03		0.25
259	-0.03	-0.01			-0.03		0.25
266	-0.06	-0.01			-0.03		0.25
274	-0.07	-0.02			-0.03		0.25
282	-0.05	-0.03			-0.04		0.25
290	-0.06	-0.04			-0.04		0.25
299	-0.08	-0.04			-0.04		0.25
307	-0.08	-0.05			-0.04		0.25
316	-0.01	-0.05			-0.04		0.25
325	0.07	-0.06			-0.05		0.25
335	0.13	-0.08			-0.05		0.25
345	0.12	-0.09			-0.05		0.25
355	0.07	-0.10			-0.05		0.25
365	0.01	-0.11			-0.06		0.25
376	-0.03	-0.13			-0.06		0.25
387	-0.07	-0.14			-0.06		0.25
398	-0.08	-0.14			-0.07		0.25
410	-0.12	-0.15			-0.07		0.25
422	-0.12	-0.15			-0.08		0.25
434	-0.05	-0.16			-0.08		0.25
447	0.00	-0.17			-0.08		0.25
460	-0.02	-0.18			-0.09		0.25
473	-0.05	-0.18			-0.09		0.25
487	-0.04	-0.19			-0.10		0.25
501	-0.06	-0.19			-0.10		0.25
516	-0.05	-0.20			-0.11		0.25
531	-0.04	-0.21			-0.11		0.25
546	-0.01	-0.22			-0.12		0.25
562	0.01	-0.23			-0.12		0.25
579	0.01	-0.24			-0.13		0.25
596	-0.01	-0.25			-0.14		0.25
613	-0.04	-0.26			-0.14		0.25
631	-0.04	-0.26			-0.15		0.25
649	-0.01	-0.26			-0.16		0.25
668	0.01	-0.26			-0.16		0.25
688	0.06	-0.26			-0.17		0.25
708	0.11	-0.26			-0.18		0.25
729	0.09	-0.26			-0.19		0.25
750	0.05	-0.26			-0.20		0.25
772	0.05	-0.26			-0.20		0.25
794	0.08	-0.26			-0.21		0.25

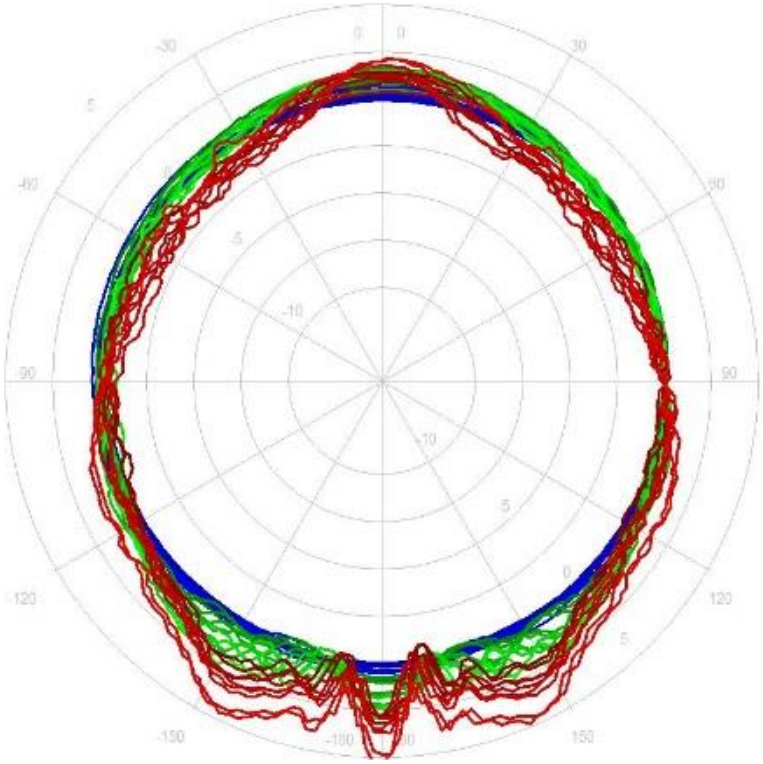
Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Environment)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
818	0.12	-0.25			-0.22		0.25
841	0.11	-0.25			-0.23		0.25
866	0.12	-0.24			-0.24		0.25
891	0.06	-0.23			-0.24		0.25
917	0.03	-0.22			-0.25		0.25
944	0.03	-0.22			-0.26		0.25
972	-0.01	-0.21			-0.26		0.25
1 000	0.03	-0.21			-0.27		0.25
1 029	-0.08	-0.23			-0.28		0.25
1 059	-0.10	-0.25			-0.28		0.25
1 090	0.02	-0.28			-0.29		0.25
1 122	0.02	-0.30			-0.29		0.25
1 155	0.00	-0.32			-0.29		0.25
1 189	0.06	-0.34			-0.29		0.25
1 223	-0.05	-0.36			-0.29		0.25
1 259	-0.08	-0.36			-0.29		0.25
1 296	-0.02	-0.38			-0.28		0.25
1 334	-0.17	-0.40			-0.27		0.25
1 372	-0.10	-0.42			-0.26		0.25
1 413	-0.19	-0.43			-0.25		0.25
1 454	-0.17	-0.45			-0.23		0.25
1 496	-0.10	-0.47			-0.21		0.25
1 540	-0.12	-0.49			-0.18		0.25
1 585	-0.05	-0.49			-0.15		0.25
1 631	0.01	-0.50			-0.12		0.25
1 679	0.00	-0.52			-0.08		0.25
1 728	0.01	-0.53			-0.04		0.25
1 778	-0.18	-0.55			0.01		0.25
1 830	-0.10	-0.56			0.07		0.25
1 884	-0.23	-0.57			0.13		0.25
1 939	-0.21	-0.59			0.20		0.25
1 995	-0.14	-0.59			0.27		0.25
2 054	0.12	-0.62			0.35		0.25
2 113	0.06	-0.65			0.44		0.25
2 175	-0.01	-0.68			0.53		0.25
2 239	-0.05	-0.71			0.63		0.25
2 304	-0.12	-0.74			0.73		0.25
2 371	-0.10	-0.77			0.84		0.25
2 441	0.14	-0.80			0.95		0.25
2 512	0.04	-0.80			1.07		0.25
2 585	0.04	-0.83			1.19		0.25

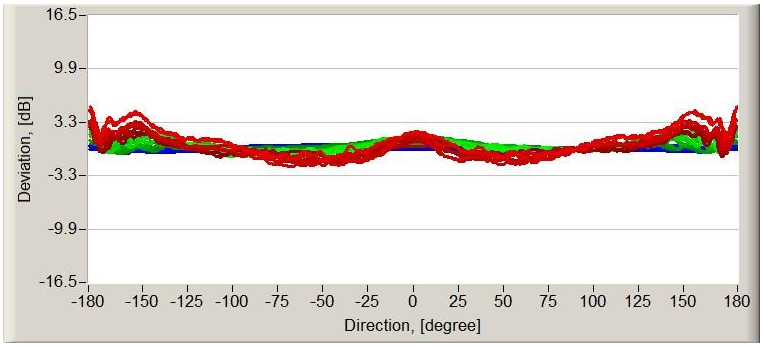
Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Environment)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
2 661	-0.07	-0.86			1.30		0.25
2 738	-0.12	-0.89			1.42		0.25
2 818	0.00	-0.92			1.54		0.25
2 901	0.07	-0.94			1.65		0.25
2 985	0.04	-0.97			1.76		0.25
3 073	0.04	-1.00			1.87		0.25
3 162	-0.05	-1.00			1.97		0.25
3 255	0.00	-1.02			2.06		0.25
3 350	-0.08	-1.05			2.14		0.25
3 447	-0.09	-1.07			2.21		0.25
3 548	-0.23	-1.09			2.27		0.25
3 652	-0.20	-1.12			2.32		0.25
3 758	-0.08	-1.14			2.36		0.25
3 868	-0.14	-1.16			2.38		0.25
3 981	-0.31	-1.16			2.40		0.25
4 097	-0.11	-1.22			2.40		0.35
4 217	0.02	-1.27			2.40		0.35
4 340	-0.07	-1.32			2.40		0.35
4 467	0.00	-1.37			2.39		0.35
4 597	-0.01	-1.43			2.38		0.35
4 732	-0.09	-1.48			2.38		0.35
4 870	0.18	-1.53			2.39		0.35
5 012	-0.11	-1.53			2.41		0.35
5 158	0.11	-1.60			2.44		0.35
5 309	-0.26	-1.67			2.48		0.35
5 464	-0.07	-1.74			2.54		0.35
5 623	-0.33	-1.81			2.60		0.35
5 788	-0.12	-1.88			2.67		0.35
5 957	-0.34	-1.95			2.74		0.35
6 131	-0.30	-2.02			2.80		0.35
6 310	-0.37	-2.02			2.85		0.35
6 494	-0.15	-2.08			2.88		0.35
6 683	-0.32	-2.13			2.88		0.35
6 879	0.06	-2.19			2.85		0.35
7 079	-0.04	-2.24			2.79		0.35
7 286	-0.22	-2.30			2.71		0.35
7 499	0.01	-2.36			2.62		0.35
7 718	-0.77	-2.41			2.53		0.35
7 943	-0.37	-2.41			2.45		0.35
8 175	-0.58	-2.54			2.39		0.35
8 414	-0.83	-2.68			2.36		0.35

Frequency	SV 200A typical compensated Free Field frequency response	MK 255S typical Free Field frequency response	SV 200A electrical frequency response	SV 200A typical non-compensated Free Field frequency response	Compensation filter (Environment)	Compensated Case Effect	Uncertainty (IEC 62585:2012)
	A	B	C	D=A-B-C	E	D+E	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
8 660	-0.79	-2.81			2.36		0.35
8 913	-0.16	-2.94			2.40		0.35
9 173	-0.55	-3.07			2.44		0.35
9 441	-0.46	-3.20			2.48		0.35
9 716	-0.41	-3.33			2.50		0.35
10 000	-0.57	-3.33			2.50		0.35
10 292	-0.46	-3.37			2.49		0.35
10 593	-0.20	-3.40			2.47		0.35
10 902	-0.56	-3.44			2.49		0.35
11 220	-0.65	-3.47			2.57		0.35
11 548	-0.44	-3.51			2.72		0.35
11 885	-0.78	-3.54			2.92		0.35
12 232	-0.55	-3.58			3.14		0.35
12 589	-0.44	-3.58			3.31		0.35
12 957	-0.37	-3.58			3.39		0.35
13 335	-0.92	-3.58			3.38		0.35
13 725	-1.32	-3.58			3.28		0.35
14 125	-2.29	-3.58			3.17		0.35
14 538	-2.58	-3.58			3.11		0.35
14 962	-2.94	-3.58			3.15		0.35
15 399	-3.54	-3.58			3.25		0.35
15 849	-4.27	-3.58			3.35		0.35
16 312	-5.05	-3.80			3.37		0.35
16 788	-6.20	-4.02			3.28		0.35
17 278	-7.54	-4.23			3.17		0.35
17 783	-8.31	-4.45			3.13		0.35
18 302	-8.09	-4.67			3.21		0.35
18 836	-9.36	-4.89			3.33		0.35
19 387	-7.79	-5.11			3.37		0.35
19 953	-8.37	-5.11			3.28		0.35

SV 200A directional characteristics

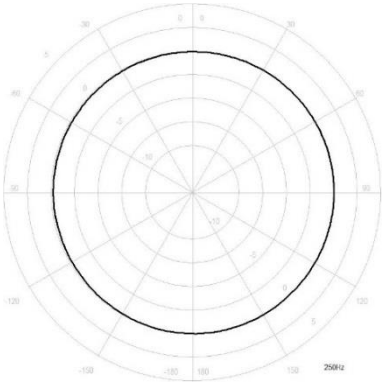
Combined typical directional characteristics



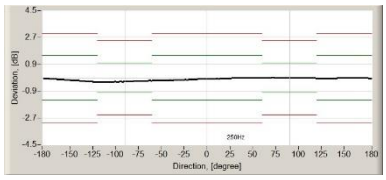


Below the typical directional characteristics and tolerances for 90 degree and 0 degree incidental angles are presented.

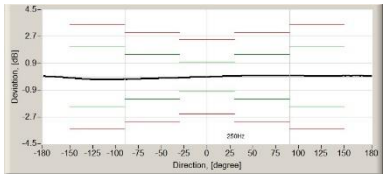
250 Hz



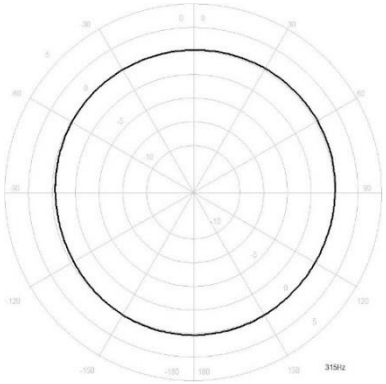
90 deg



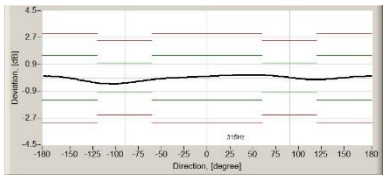
0 deg



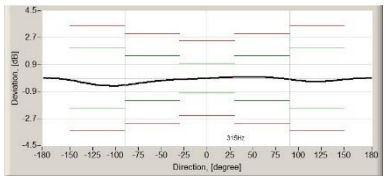
315 Hz



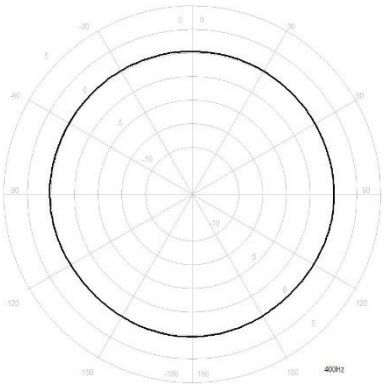
90 deg



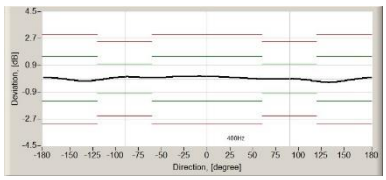
0 deg



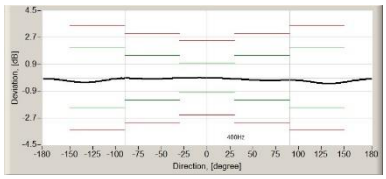
400 Hz



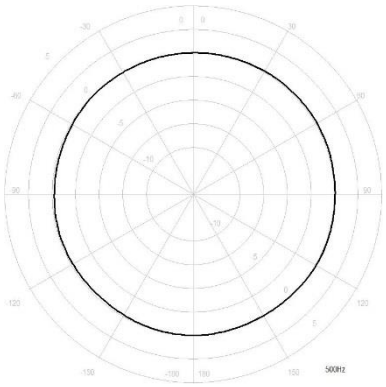
90 deg



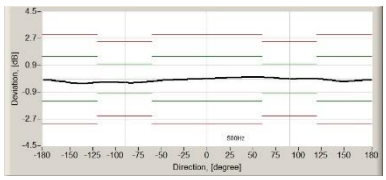
0 deg



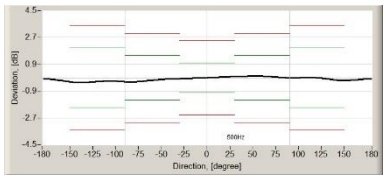
500 Hz



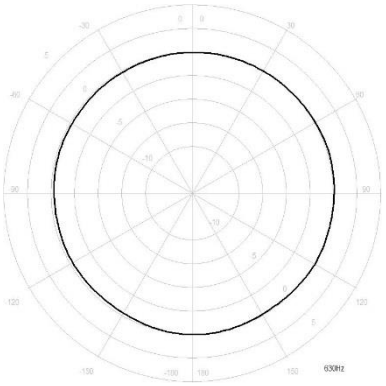
90 deg



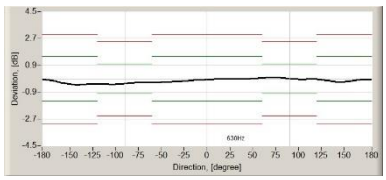
0 deg



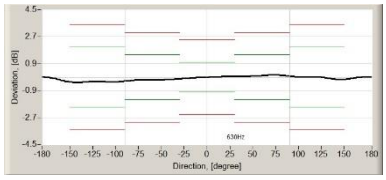
630 Hz



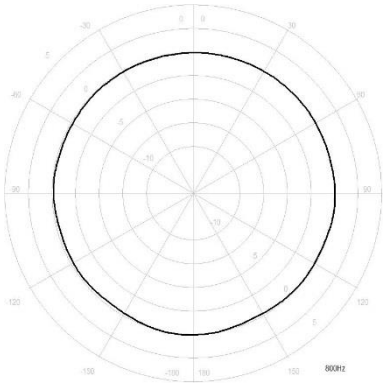
90 deg



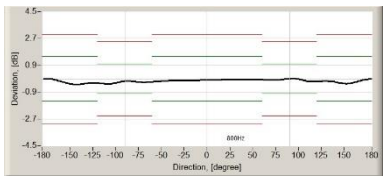
0 deg



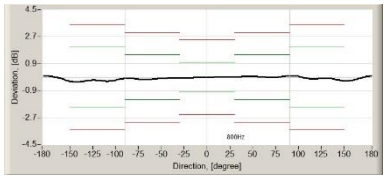
800 Hz



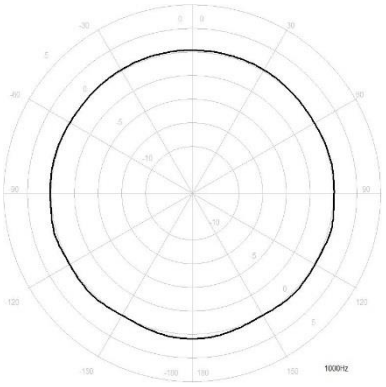
90 deg



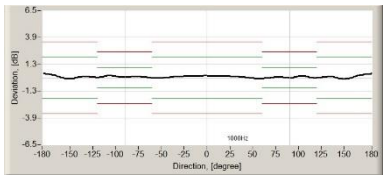
0 deg



1000 Hz



90 deg



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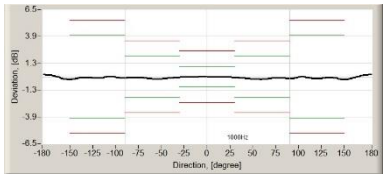
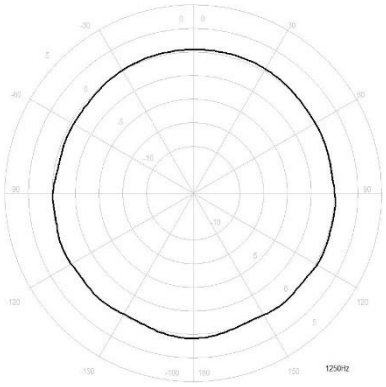
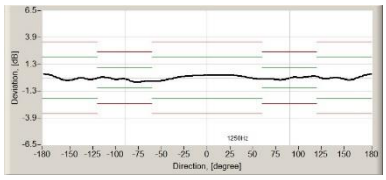


1250 Hz



90 deg



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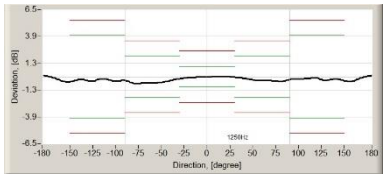
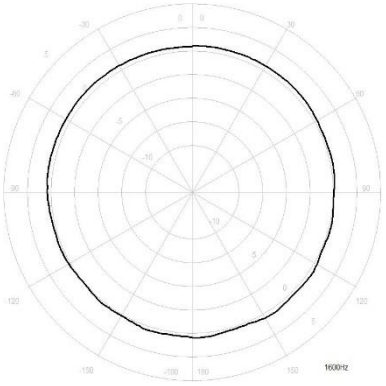
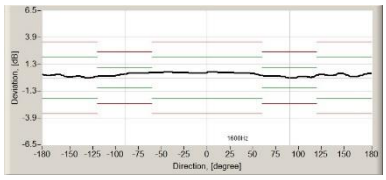
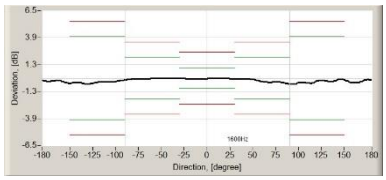


1600 Hz



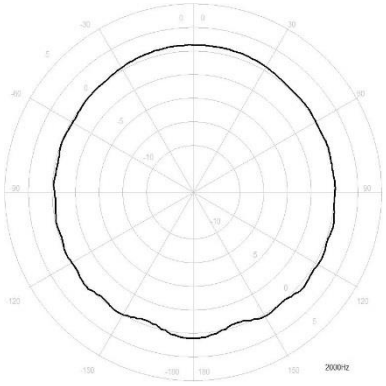


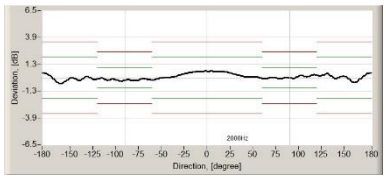
90 deg



0 deg

2000 Hz





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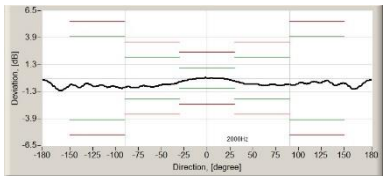
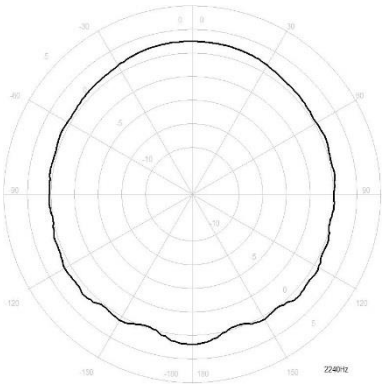
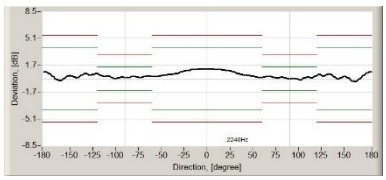


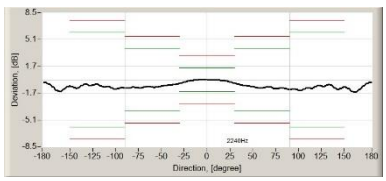
0 deg

2240 Hz



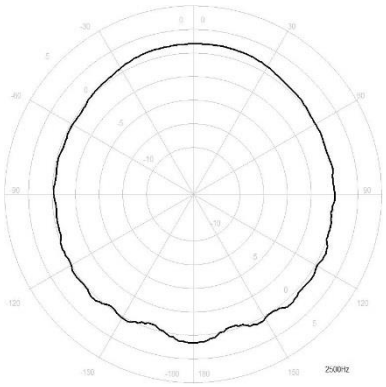


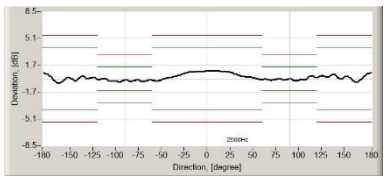
90 deg



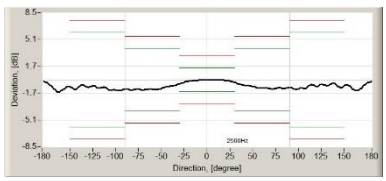
0 deg

2500 Hz



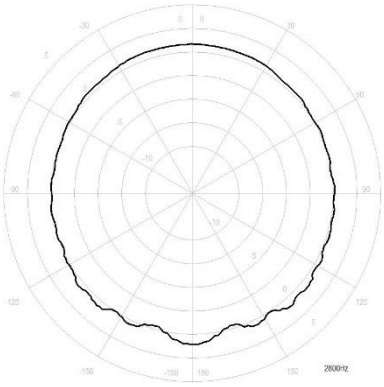


90 deg



0 deg

2800 Hz



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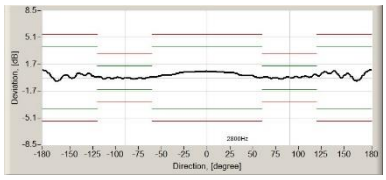

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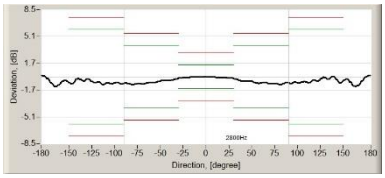
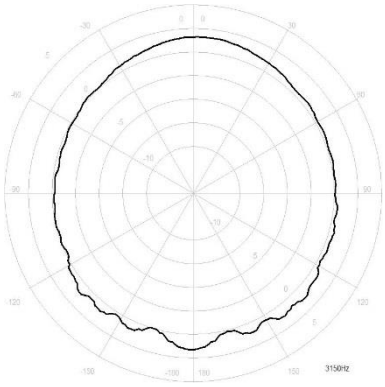
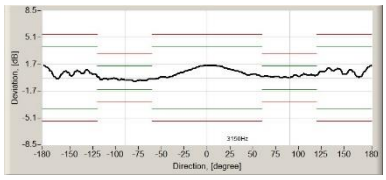


3150 Hz



90 deg



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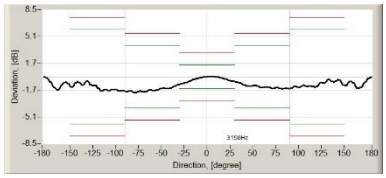
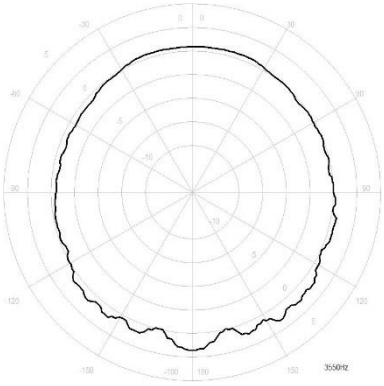


3550 Hz



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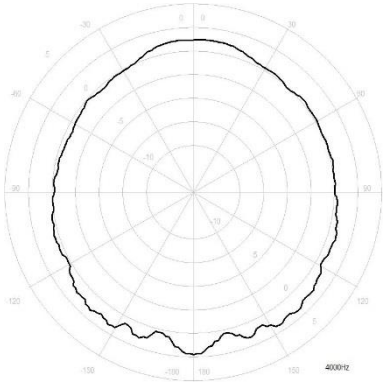
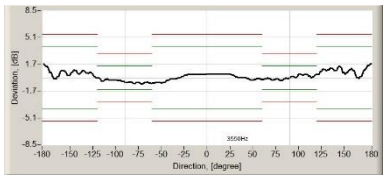
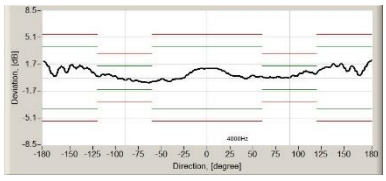
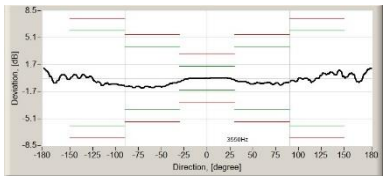
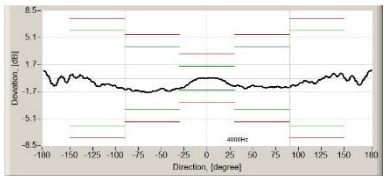
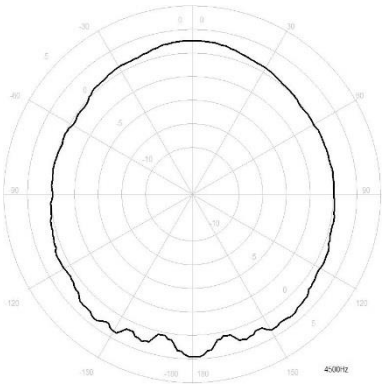
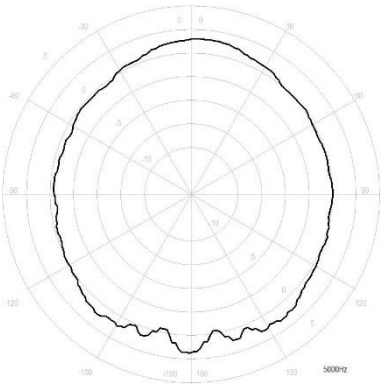
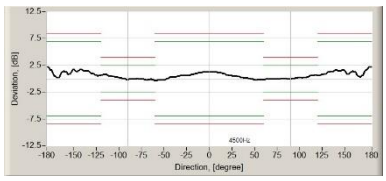
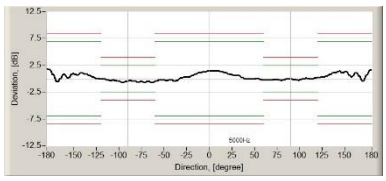
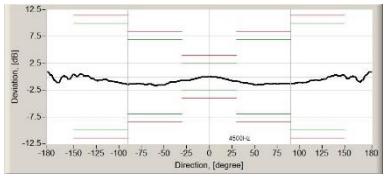
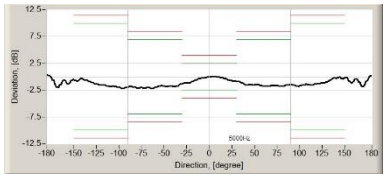
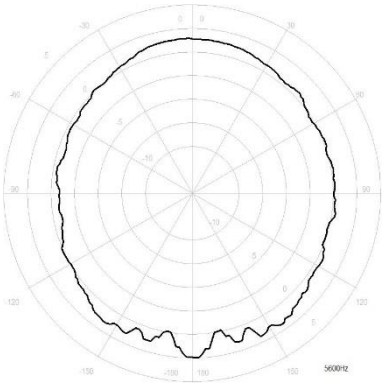


	90 deg		90 deg	
	0 deg		0 deg	
4500 Hz			5000 Hz	
	90 deg		90 deg	
	0 deg		0 deg	

5600 Hz



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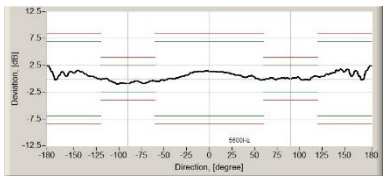
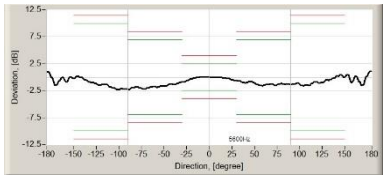
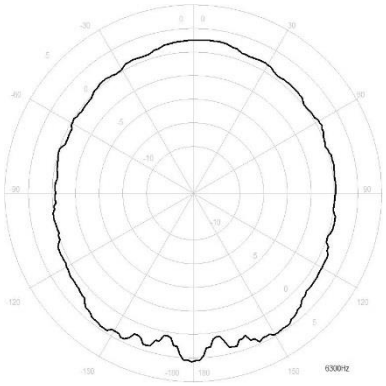


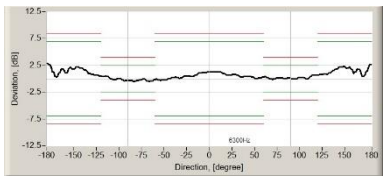
0 deg



6300 Hz



90 deg



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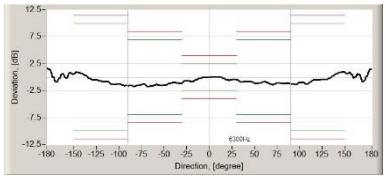
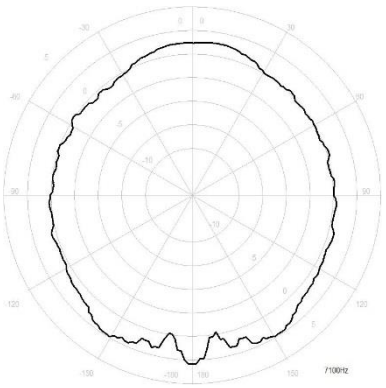


7100 Hz



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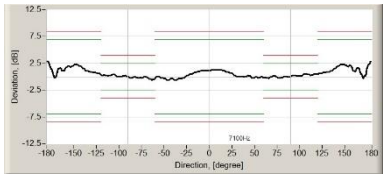

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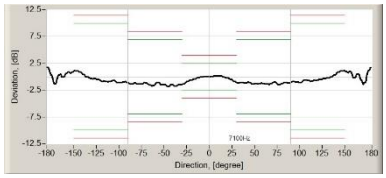
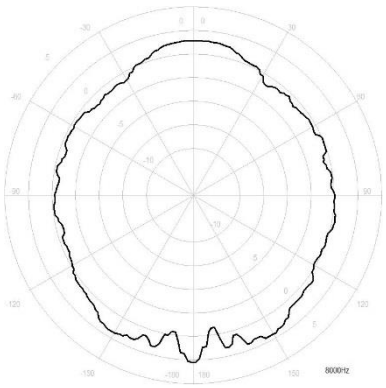
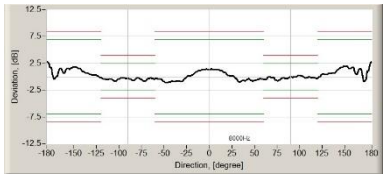


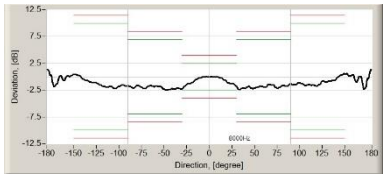
8000 Hz



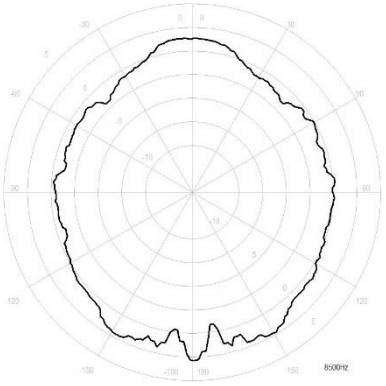
90 deg



0 deg



8500 Hz



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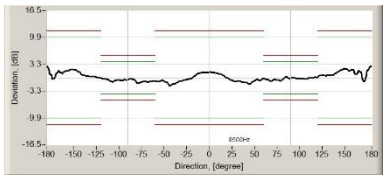
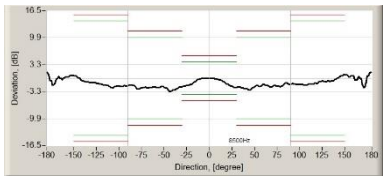
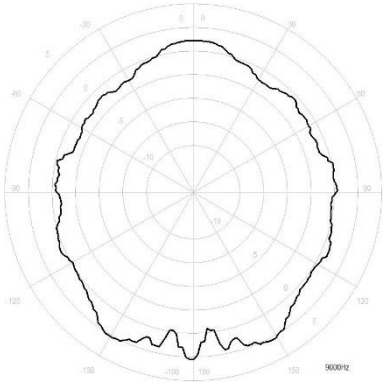


0 deg



9000 Hz



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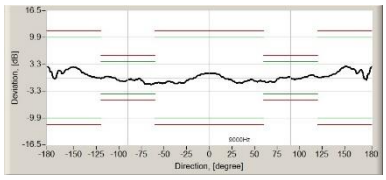
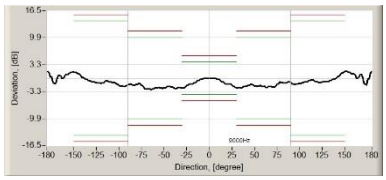
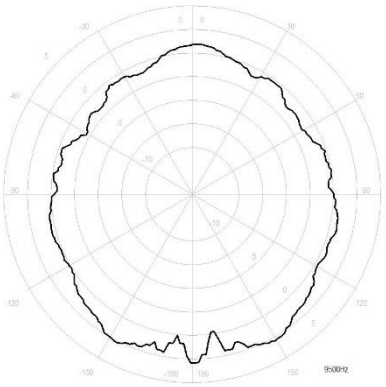


0 deg



9500 Hz



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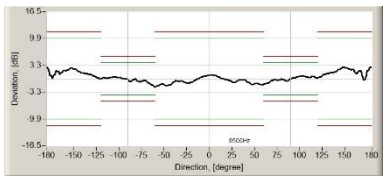
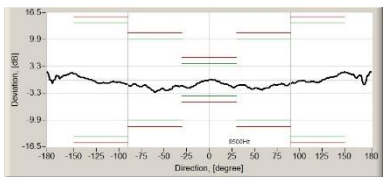
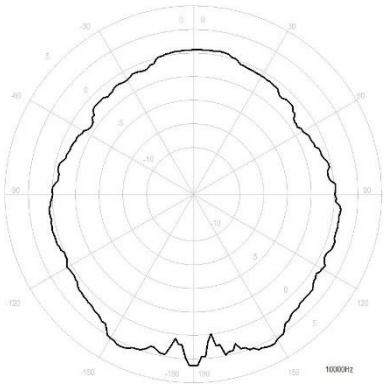


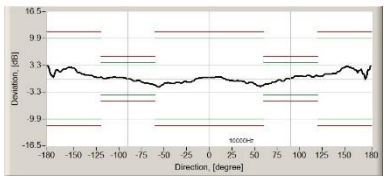
0 deg



10000 Hz



90 deg



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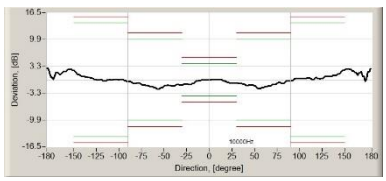
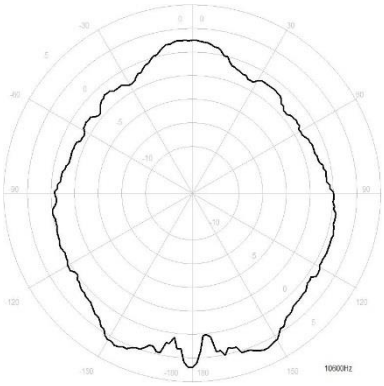


10600 Hz



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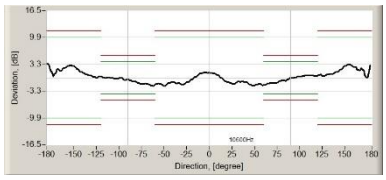
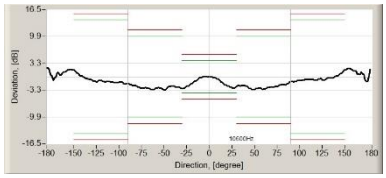
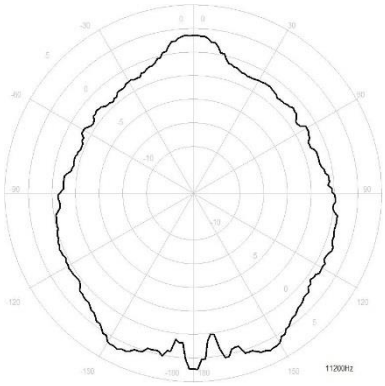


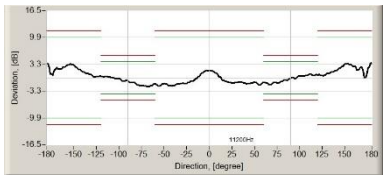
0 deg



11200 Hz



90 deg



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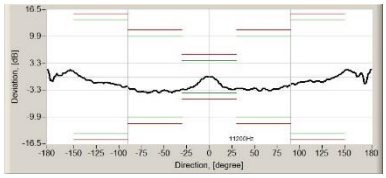
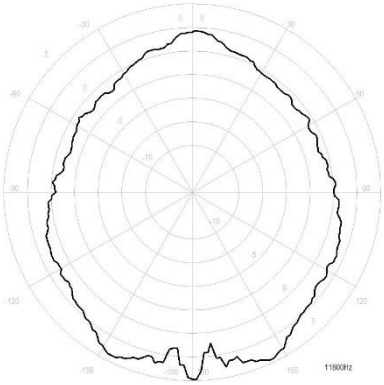
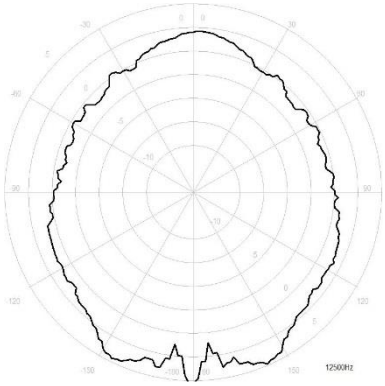


11800 Hz



12500 Hz



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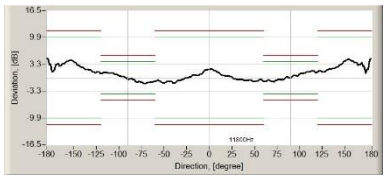
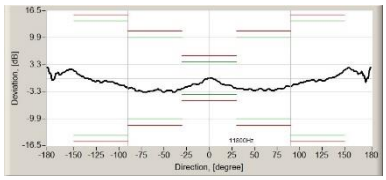


0 deg



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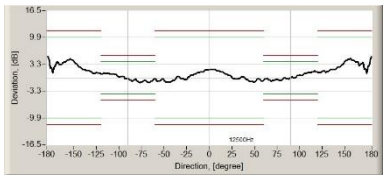


0 deg

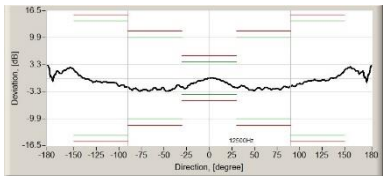


Table C.1.11. SV 200A typical directional response

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 ST02 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).

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"

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).

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

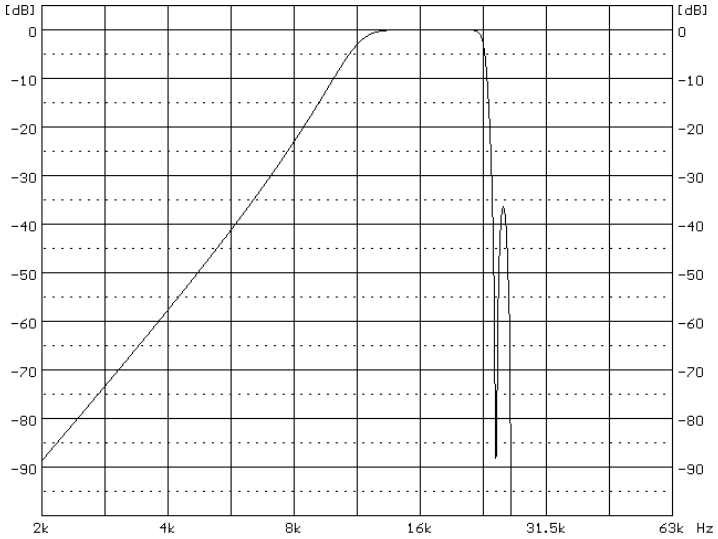
- A meeting requirements of IEC 61672-1:2013 for the Class 1 “A” filters,
- C meeting requirements of IEC 61672-1;2013 for the Class 1 “C” filters,
- Z meeting requirements of IEC 61672-1;2013 for the Class 1 “Z“ filters,
- B meeting IEC 651 for the Class 1 “B” filters

See part C.3 for the A , C, B and Z filters characteristics,

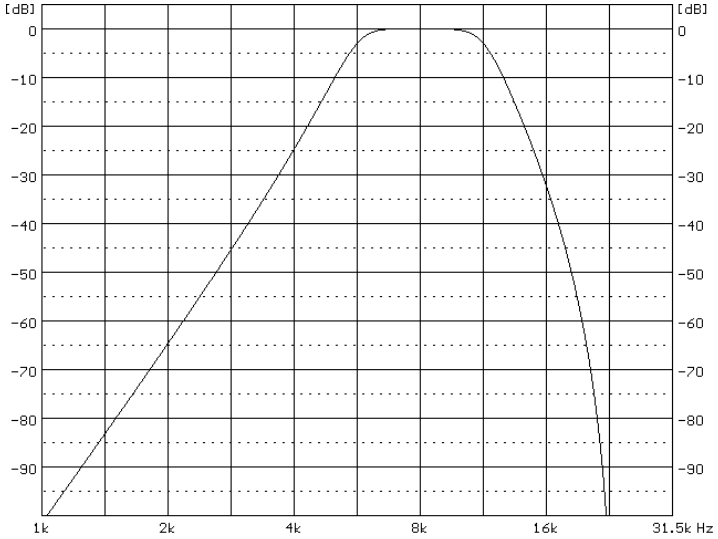
Noise levels measured with the ST 02 adapter and 50 Ω input impedance for 20kHz Bandwidth.

- ”A” weighting < 5.6 μV_{RMS}
- “B” weighting < 5.6 μV_{RMS}
- ”C” weighting < 5.6 μV_{RMS}
- ”Z” weighting < 7.9 μV_{RMS}.

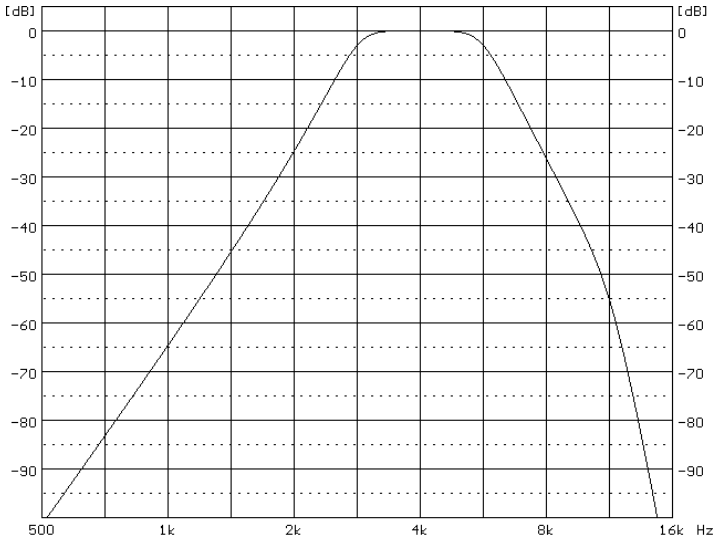
1/1 Octave filters	13 filters with centre frequencies from 4 Hz to 16 kHz (base 10), meeting the IEC 61260-1:2014 standard for Class 1



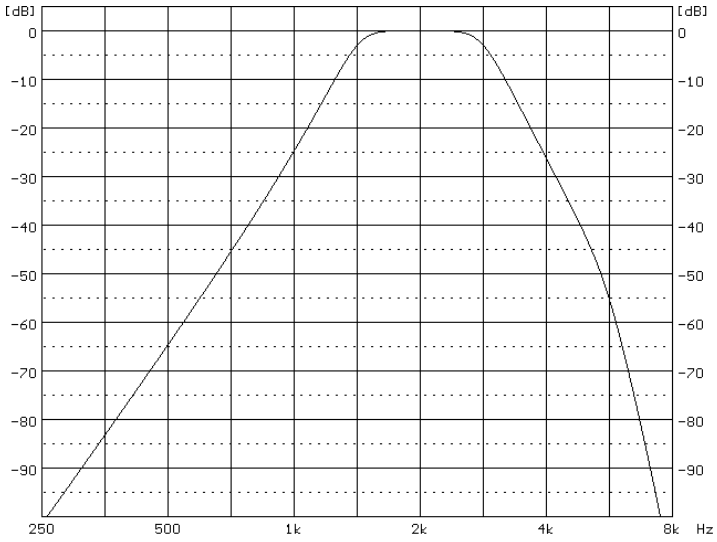
16.0 kHz 1/1 octave filter



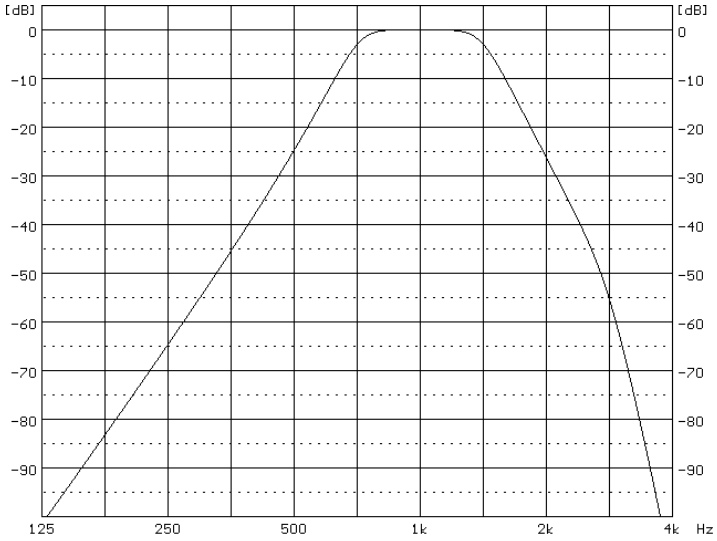
8.0 kHz 1/1 octave filter



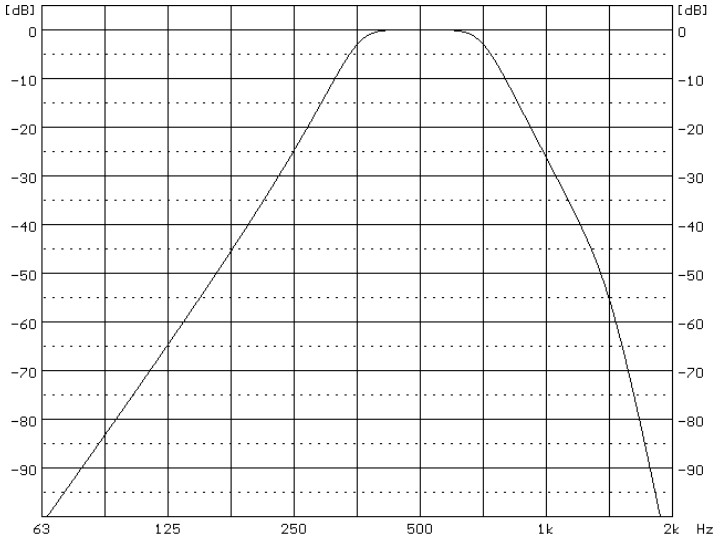
4.0 kHz 1/1 octave filter



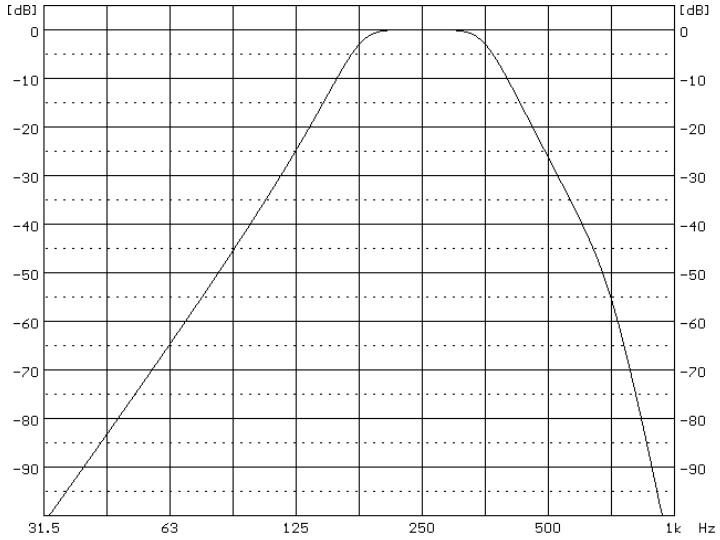
2.0 kHz 1/1 octave filter



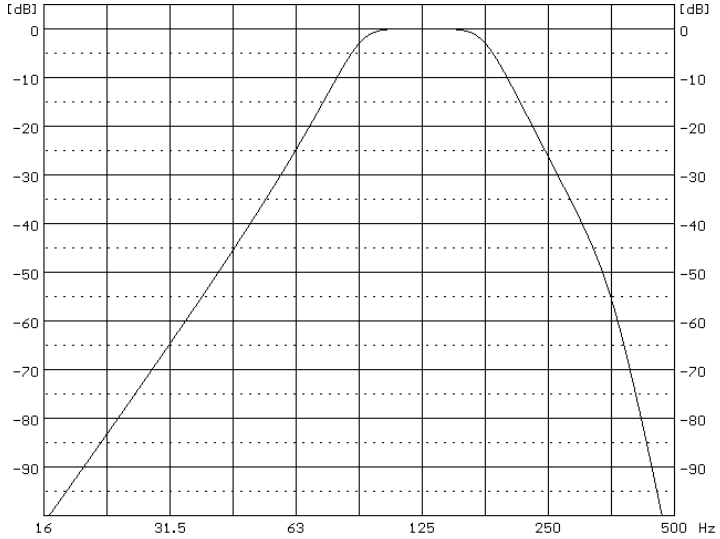
1.0 kHz 1/1 octave filter



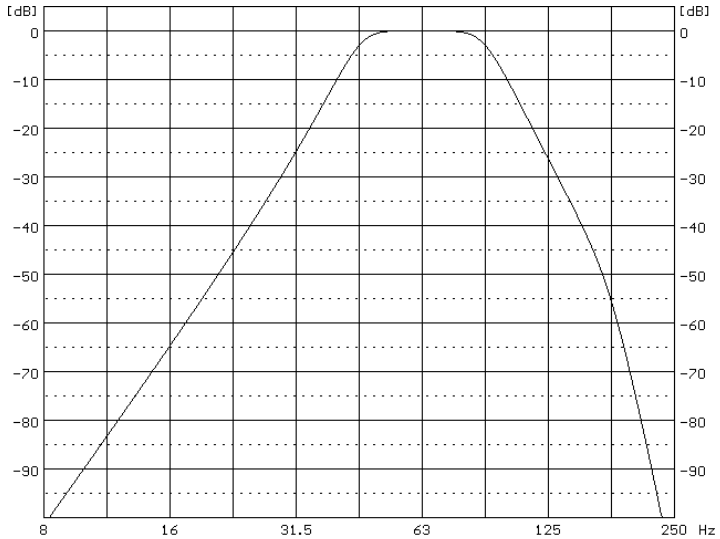
500 Hz 1/1 octave filter



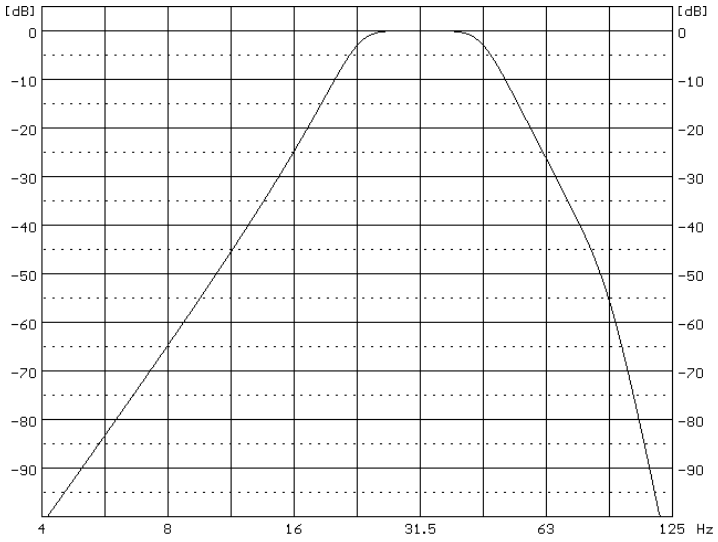
250 Hz 1/1 octave filter



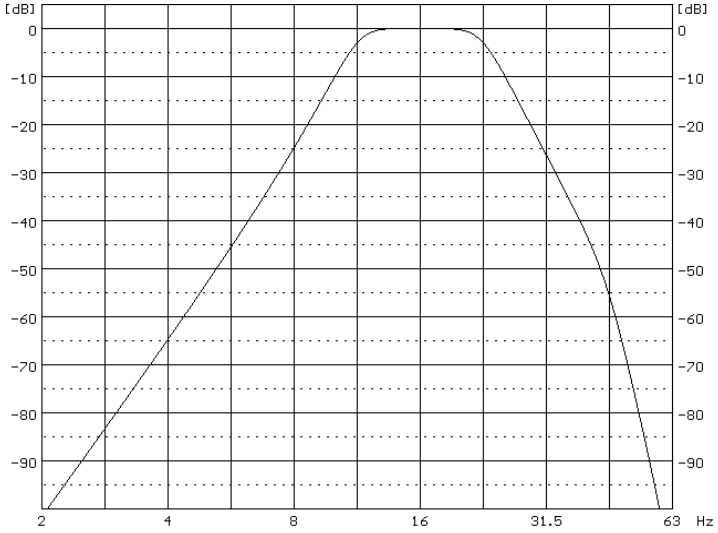
125 Hz 1/1 octave filter



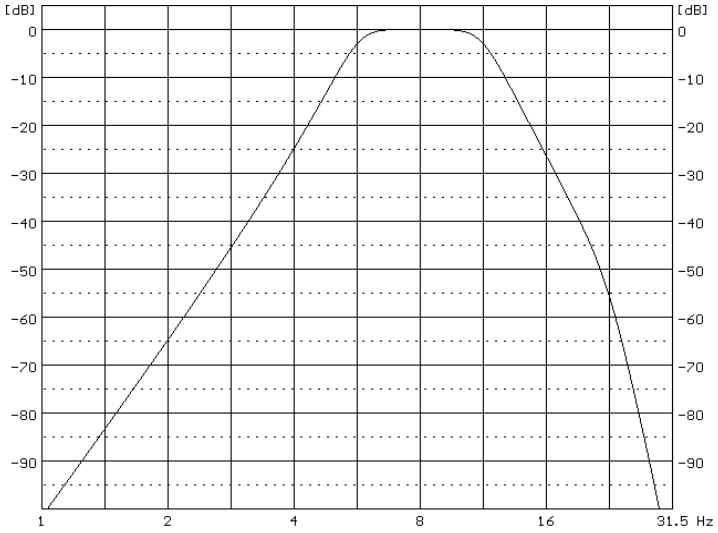
63.0 Hz 1/1 octave filter



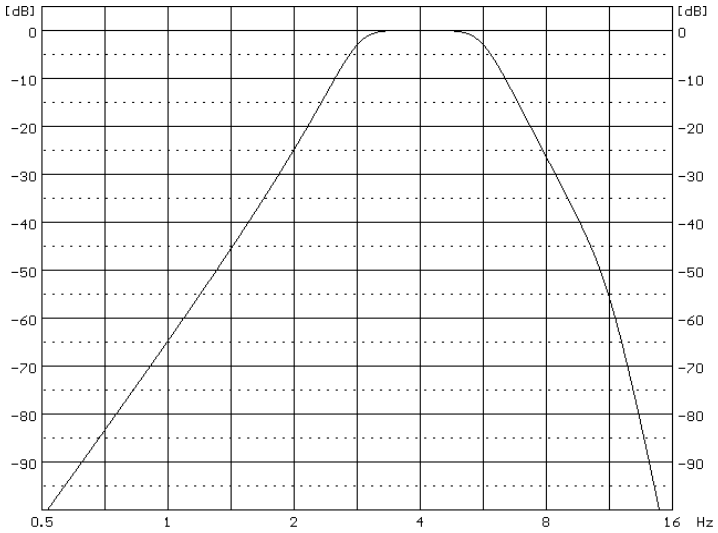
31.5 Hz 1/1 octave filter



16.0 Hz 1/1 octave filter

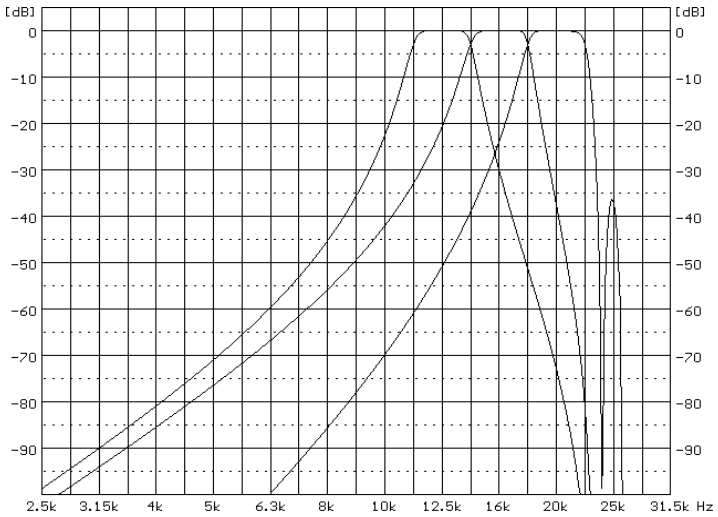


8.00 Hz 1/1 octave filter

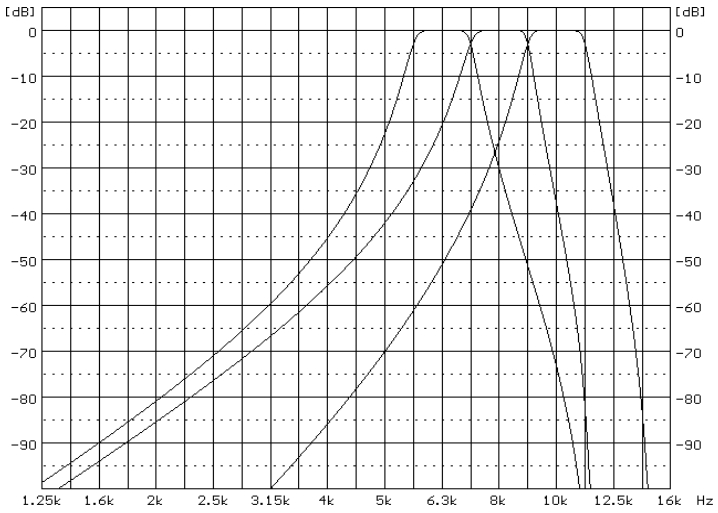


4.00 Hz 1/1 octave filter

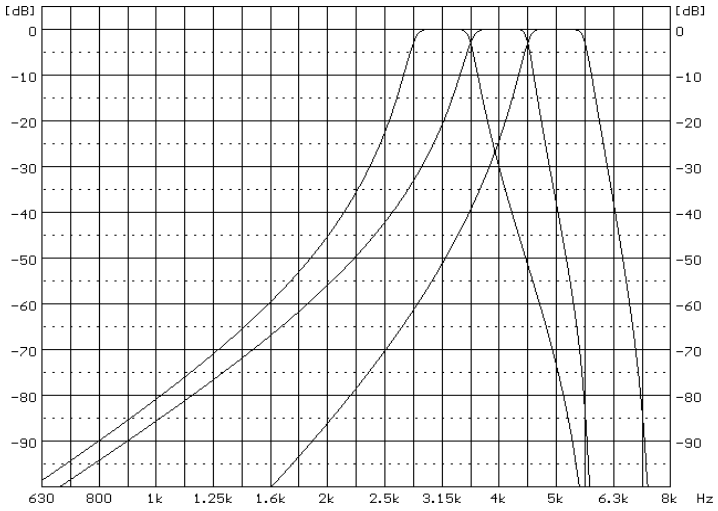
1/3 Octave filters 38 filters with centre frequencies from 4 Hz to 20 kHz (base 10), meeting the IEC 61260-1:2014 standard for Class 1



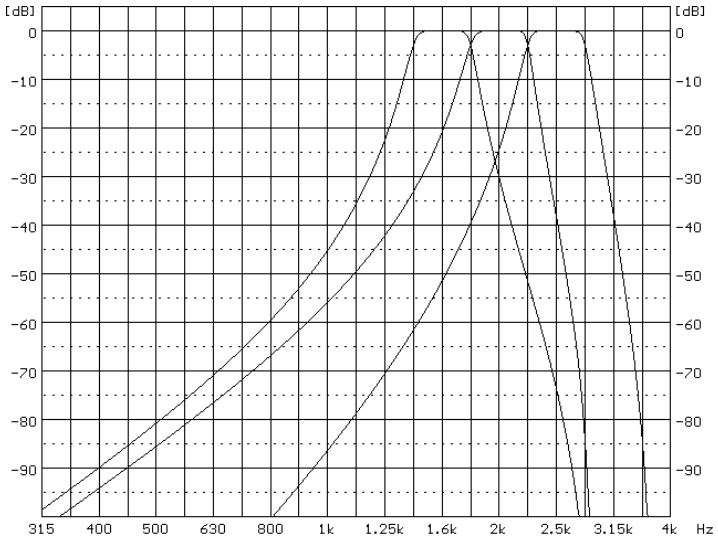
1/3 octave filters for 16.0 kHz 1/1 octave filter



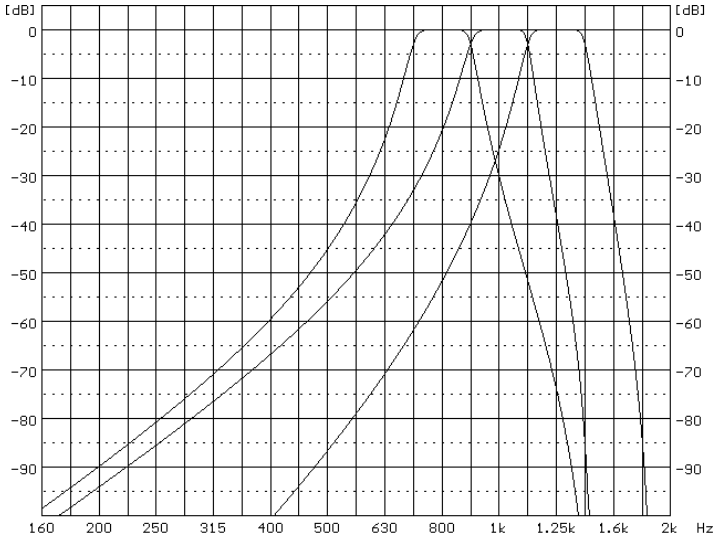
1/3 octave filters for 8.0 kHz 1/1 octave filter



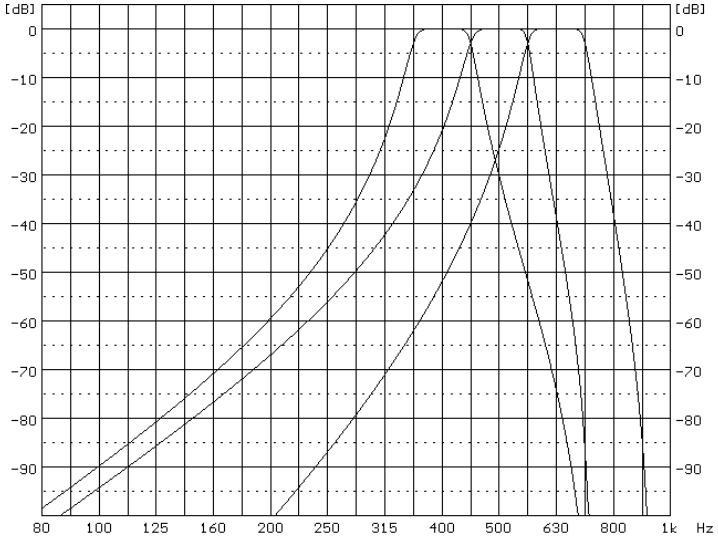
1/3 octave filters for 4.0 kHz 1/1 octave filter



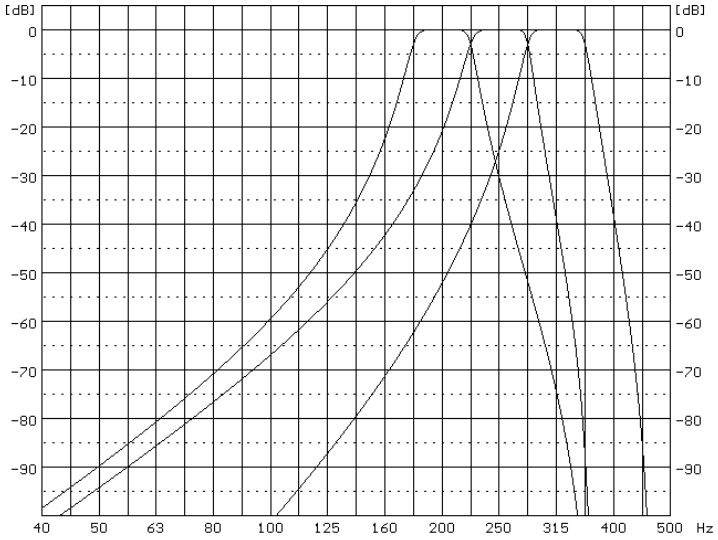
1/3 octave filters for 2.0 kHz 1/1 octave filter



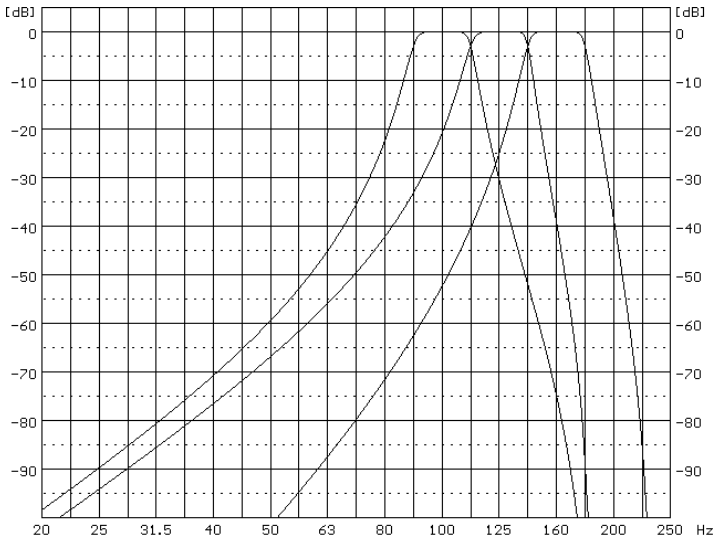
1/3 octave filters for 1.00 kHz 1/1 octave filter



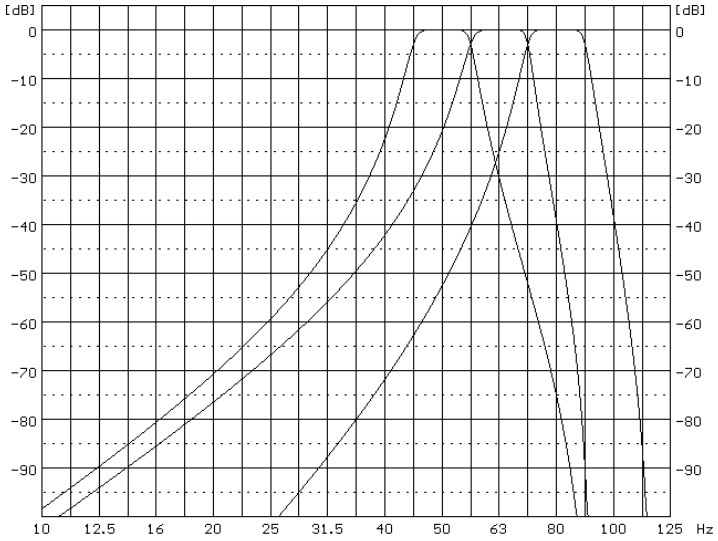
1/3 octave filters for 500 Hz 1/1 octave filter



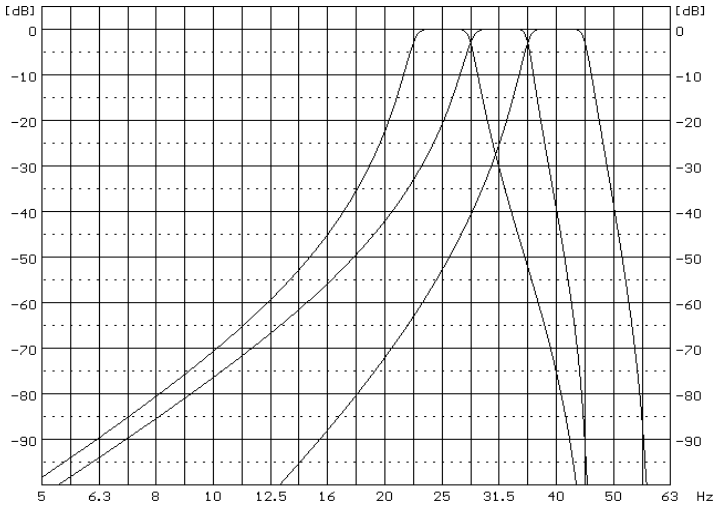
1/3 octave filters for 250 Hz 1/1 octave filter



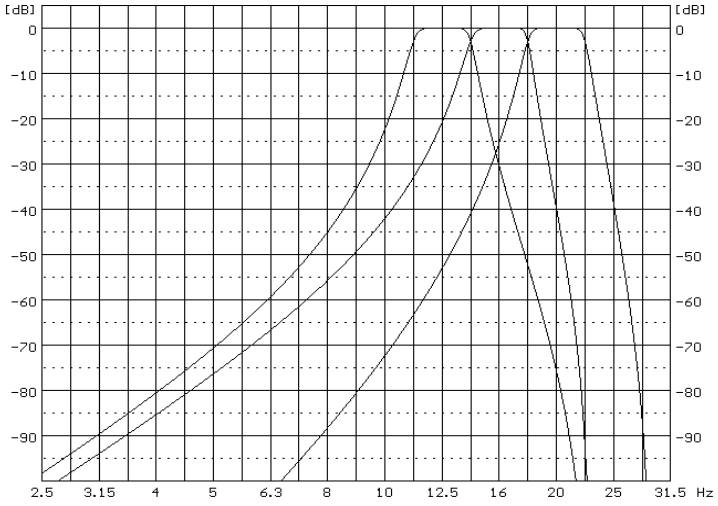
1/3 octave filters for 125 Hz 1/1 octave filter



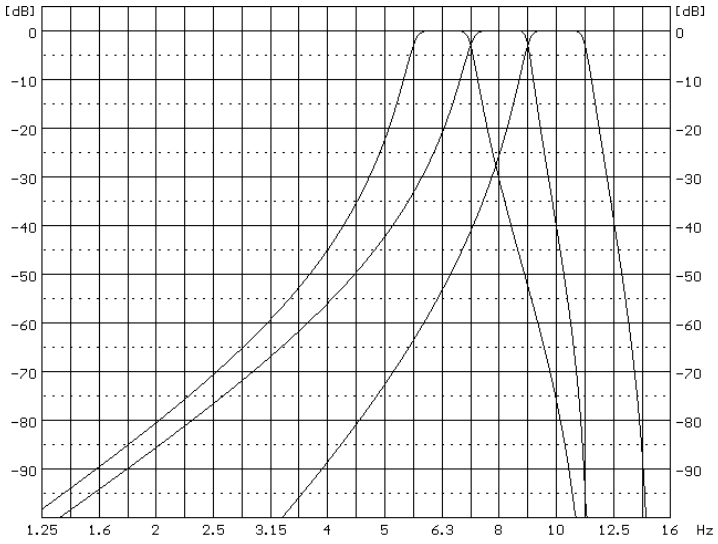
1/3 octave filters for 63.0 Hz 1/1 octave filter



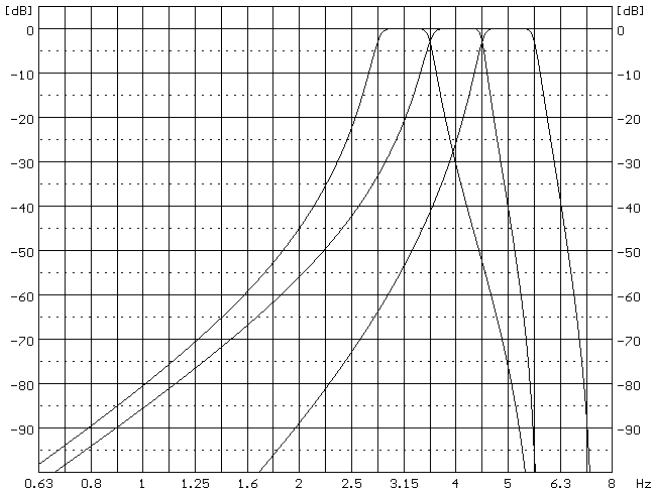
1/3 octave filters for 31.5 Hz 1/1 octave filter



1/3 octave filters for 16.0 Hz 1/1 octave filter



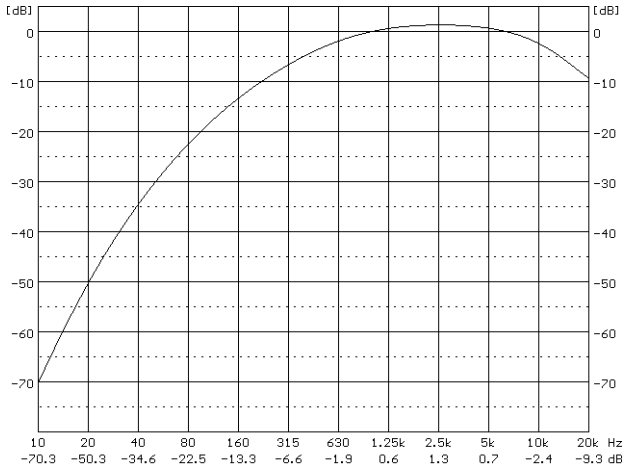
1/3 octave filters for 8.00 Hz 1/1 octave filter



1/3 octave filters for 4.00 Hz 1/1 octave filter

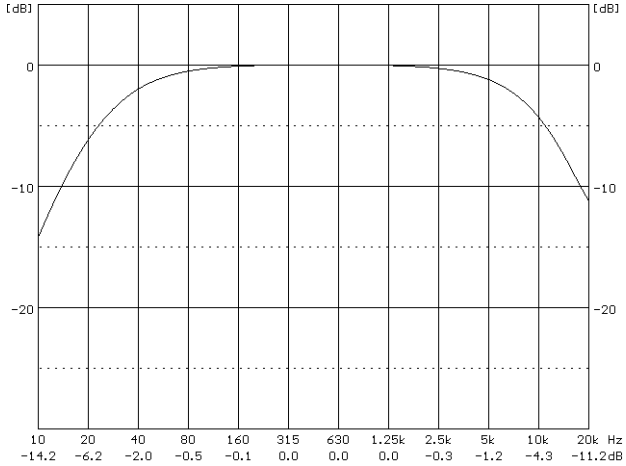
C.3 FREQUENCY CHARACTERISTICS OF THE IMPLEMENTED BROADBAND DIGITAL FILTERS

“A” filter Class 1 according to IEC 651 and IEC 61672-1:2013



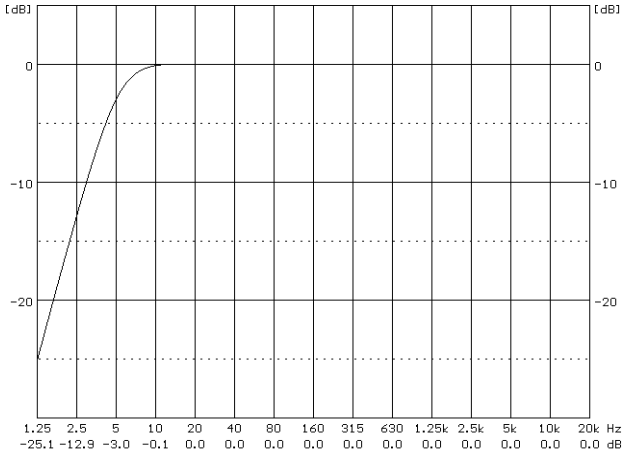
“A” filter characteristic

“C” filter Class 1 according to IEC 651 and IEC 61672-1:2013



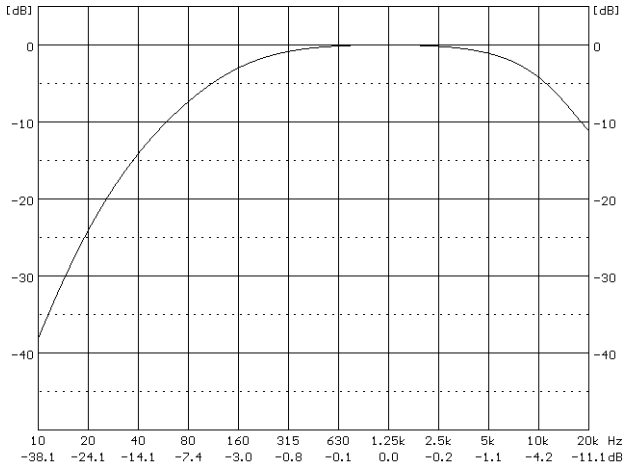
“C” filter characteristic

“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

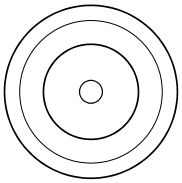
***) Modem/module is normally switched off, and is switched on for an hour in a day

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:



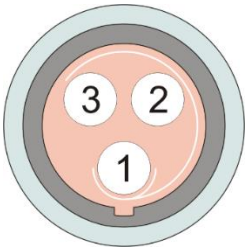
½" microphone connector (external view)

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)

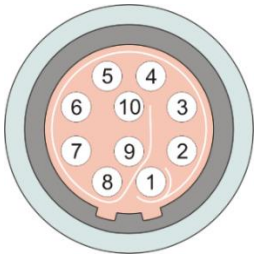
- Solar panel MPPT voltage 15.0V ÷ 20.0V, OCV < 28V

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 accumulator voltage range 10.5V – 24V, e.g. 12V or 24V

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	-	-

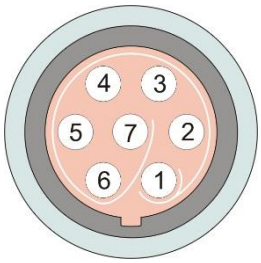
*) do not connect these pins

**) 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)

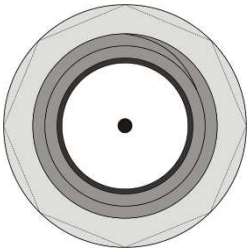
Table C.4.5. Pin-out of the LAN connector

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.



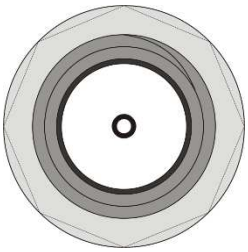
WLAN antenna connector – SMA-RP (front view)

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®[3] 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

[3] "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.

- Sensitivity: standard mode -92 dBm
  high gain mode -98 dBm
- Channels: 40
- Modulation: GFSK
- 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

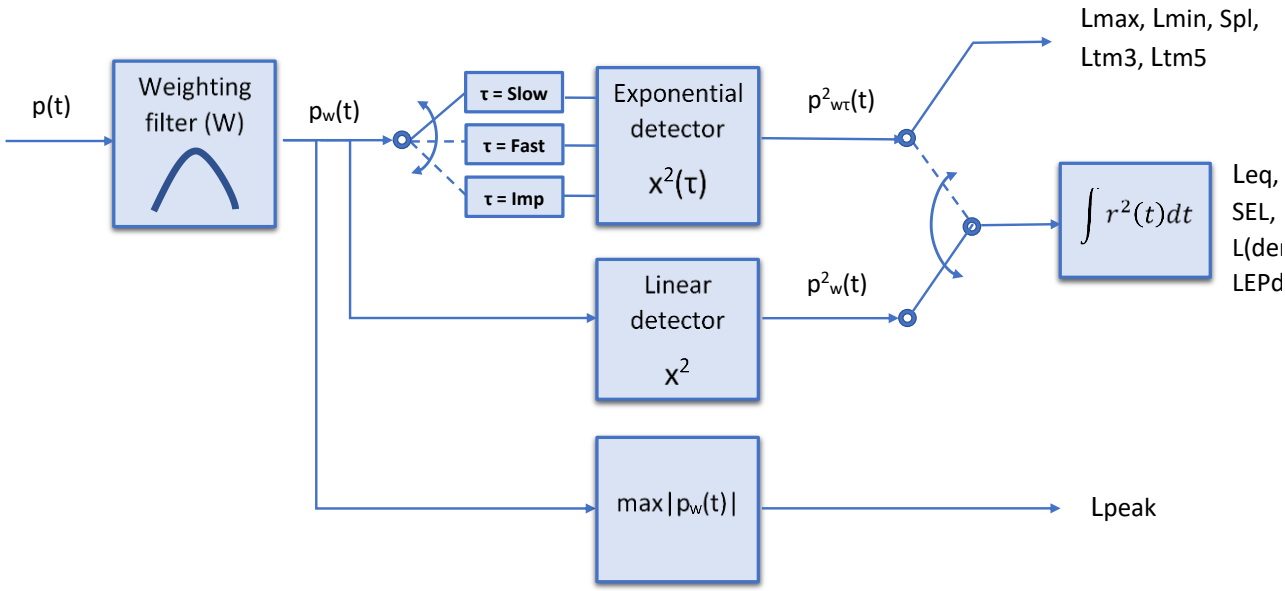
Appendix D. DEFINITIONS AND FORMULAE OF MEASURED VALUES

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: $r(t) = \begin{cases} p_W(t) & \text{RMS Integration = Lin} \\ p_{W\tau}(t) & \text{RMS Integration = Exp} \end{cases}$
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.

$$L = 10 \log \left(\frac{p_{W\tau}^2(t)}{p_0^2} \right)$$

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**).

$$Leq = 10 \log \left(\frac{1}{T} \int_0^T \left(r(t)/p_0 \right)^2 dt \right)$$

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**).

$$SEL = 10 \log \left(\int_0^T \left(r(t)/p_0 \right)^2 dt \right) = Leq + 10 \log \frac{T}{1s}$$

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:

- T_d (day-time) starts from 6 am and ends at 6 pm,
- T_e (evening-time) starts from 6 pm and ends at 10 pm,
- 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:

- T_d (day-time) starts from 7 am and ends at 7 pm,
- T_e (evening-time) starts from 7 pm and ends at 11 pm,
- T_n (night-time) starts at 11 pm and ends at 7 am.

Ld

Ld is calculated for: $T_d \neq 0$, $T_e = 0$, $T_n = 0$.

$$Ld = 10 \log \left(\frac{1}{T_d} \int_{T_d} \left(r_W(t)/p_0 \right)^2 dt \right)$$

Le

Le is calculated for: $T_d = 0$, $T_e \neq 0$, $T_n = 0$.

$$Le = 5\ dB + 10 \log \left(\frac{1}{T_e} \int_{T_e} \left(r_W(t)/p_0 \right)^2 dt \right)$$

Ln

Ln is calculated for: $T_d = 0$, $T_e = 0$, $T_n \neq 0$.

$$Ln = 10\,dB + 10\log\left(\frac{1}{T_n}\int_{T_n}(r_w(t)/p_0)^2\,dt\right)$$

Lde

Lde is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n = 0$.

$$Lde = 10\log\left[\frac{1}{12+4}\left(12\cdot 10^{Ld/10} + 4\cdot 10^{Le/10}\right)\right]$$

Len

Len is calculated for: $T_d = 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Len = 10\log\left[\frac{1}{4+8}\left(4\cdot 10^{Le/10} + 8\cdot 10^{Ln/10}\right)\right]$$

Lnd

Lnd is calculated for: $T_d \neq 0$, $T_e = 0$, $T_n \neq 0$.

$$Lnd = 10\log\left[\frac{1}{8+12}\left(8\cdot 10^{Ln/10} + 12\cdot 10^{Ld/10}\right)\right]$$

Lden

Lden is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Lden = 10\log\left[\frac{1}{12+8+4}\left(12\cdot 10^{Ld/10} + 4\cdot 10^{Le/10} + 8\cdot 10^{Ln/10}\right)\right]$$

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**

$$LEPd = Leq + 10\log\frac{T_e}{T_{8h}}$$

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.

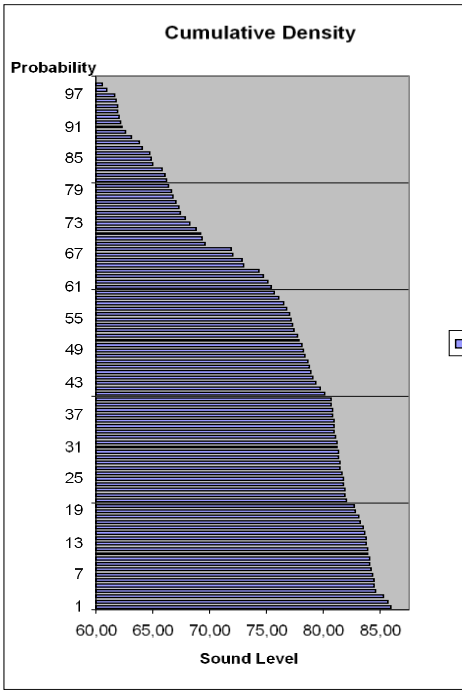
Example:

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