SVANTEK

USER MANUAL

SV 277 PRO

MONITORING STATION

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 web site at www.svantek.com.*

This user's manual presents the controller firmware revision SD270-PRO v6.03 and SD270A-PRO v3.04.

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

WEEE Notice: *Do not throw the device away with the unsorted municipal waste at the end of its life. Instead, hand it in at an official collection point for recycling. By doing this you will help to preserve the environment.*

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Technical Support Contact Information:

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IMPORTANT NOTES BEFORE USE

✓ *Before installing the station at the measurement site, make sure that the protective caps on the four anti-bird spikes of the SA 277 outdoor microphone kit are removed. It is recommended to use the protective caps during transportation, storage and other operations with the instrument like, laboratory calibration, etc. to avoid personal injury.*

✓ *Only SVAN 977 and the controller can be disconnected and removed from the station case by the user. All other disassembling work should be performed strictly by an authorized service team.*

✓ *The producer does not recommend removing the controller without a sound reason. Double check that the controller has a good fixation in the connector after reconnecting.*

✓ *Do not remove the battery from the case! This operation must be done only by the authorised service.*

✓ *SVAN 977 is powered from the external source and doesn't use its internal batteries. Internal instrument's batteries must be removed for correct system operation and safety reasons.*

✓ *The correct connection of the accelerometer or microphone is not signalled by the controller therefore it is recommended to perform a test measurement each time the station is turned on.*

✓ *During station operation it is recommended to charge the internal and external batteries as often as possible; this will extend battery life. It is necessary to charge the battery after any total discharge.*

✓ *Monitoring station and/or SB 272 should not be stored for a long time with discharged batteries. Storing with batteries in discharged condition may damage them.*

✓ *If Monitoring station and/or SB 272 are planned to be stored for a long period of time, it is recommended to charge their batteries to 100% capacity. Batteries should be charged at least once per 6 months.*

✓ *If the storage period is longer than one year, a discharge/charge cycle must be performed. To do this, leave the device turned on until the battery is completely discharged. Then charge the battery to 100% capacity.*

✓ *Monitoring station and SB 272 have their own chargers, which are incompatible: SB 270 is a waterproof power supply for SV 277 PRO, whereas SB 273 is an indoor charger for SB 272.*

✓ *The windscreen influences the free-field characteristics of the SA 277 outdoor microphone kit; 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.*

✓ *If you use desiccator (silica gel) inside the outdoor microphone protection, it should be regenerated after some period of use, when it changes colour to light grey, by drying it for 3 hours in a temperature of 150°C. Desiccator should be inspected at least every two weeks, and more often when used in conditions of high air humidity.*

Table of Contents:

1.   INTRODUCTION

SV 277 PRO is an outdoor monitoring station based on the **SVAN 977** Class 1 sound level meter and **SA 277** outdoor microphone kit. The solution is recommended for short term and semi-permanent noise measurement in the environment.

The IP 67 rated case contains a lead-acid battery the operating time of which can be easily extended by connecting an external battery or a solar panel. The intelligent charging unit enables the use of a solar panel without expensive controllers or heavy batteries. The case is fitted with very robust, waterproof connectors (military standard).

The station allows you to measure results, such as Leq, Max, Min and Peak, with all standard weight filters and with history recording with two registration steps. The results can be obtained for three profiles - virtual sound level meters, allowing parallel measurements with three different filters (for example, A, C, Z), as well as with three different RMS detector time constants (for example, Fast, Slow, Impulse).

The SA 277 outdoor microphone kit protects the SVAN 977 preamplifier and microphone from weather conditions. SA 277 is made of lightweight materials and can be easily installed on a mast with standard mounting threads.

SVAN 977 can be easily removed from the station case and used as a hand-held sound level meter. The monitoring station uses a mobile modem for remote communication with the Internet. **SvanNET**, a relay server, supports the connection between PC and station. Thanks to SvanNET users may use a mobile phone or tablet to check the status of the monitoring station.

1.1. FEATURES

- SV 277 PRO is a portable monitoring station housed in an IP 67 waterproof case dedicated for periodic outdoor measurements.
- The station is based on the SVAN 977 instrument which can be easily removed from the case and used as a hand-held sound and vibration level meter and analyser.
- **Class 1** noise measurements are performed over a very wide dynamic range over 110 dB from 10 Hz up to 20 kHz.
- **Time history** of measurement results is saved in the file.
- The station can perform a real-time frequency analysis in **1/1 Octave** bands and
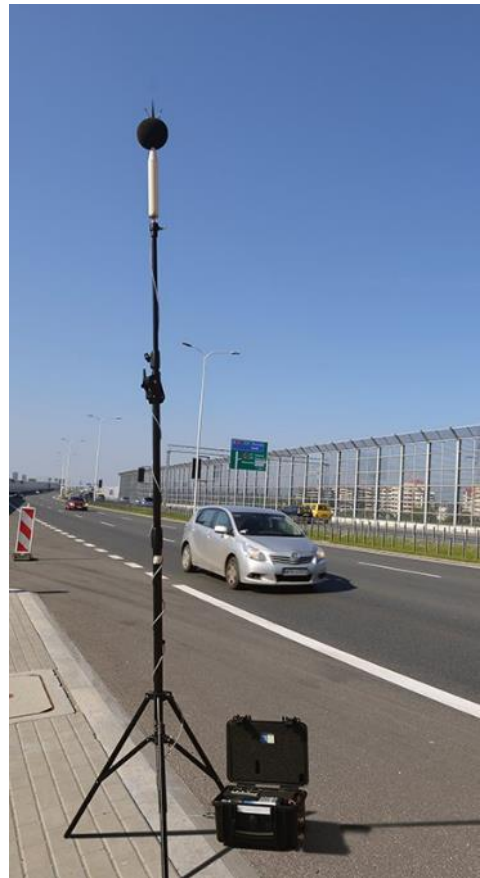
save spectra as Time history.

- The optional **1/3 Octave** real-time frequency analysis allows analysis of the noise frequency contents. The **statistical analysis** in 1/3 octave band can be used for verification of noise sources in the environment.

- The optional time domain signal recording to **Wave** format works during measurement and is logged in parallel to a time history. Once downloaded to a PC it can be played back. Settings such as triggers or recording time are adjustable. In addition to audio play-back, Wave file can be post-processed in the **SvanPC++** software that provides the calculation of overall results such as Leq, Lmax, Lmin, Lpeak as well as 1/3 octave and **FFT** calculations or RT60.

- The **mobile modem** provides fast data transfer over the Internet to a PC with a standard Internet connectivity.

- The remote communication settings are automatically adjusted to connect to the **SvanNET** Internet service.

- The station can be powered from an internal battery, external battery or external DC power supply and is ready for direct connection to a solar panel. The powering is managed by the intelligent charging unit.

- The station uses a waterproof **charger** that is designed for the outdoor use.

- Military standard **connectors** provide reliable, robust and waterproof cable connections.

1.2. ACCESSORIES INCLUDED

SVAN 977	Class 1 Sound & Vibration Analyser with the standard firmware and accessories: prepolarised ½" condenser microphone (**SV 7052E** for the SVAN 977A modification or **MK 255** for the SVAN 977C modification), microphone preamplifier with IEPE power supply (**SV 12L**), foam windscreen (**SA 22**), USB cable (**SC 16**)
SM 277 PRO	Outdoor monitoring station for SVAN 977 including: 17Ah battery, mobile modem (**SP 270**) and external power supply (**SB 270**)
SC 277	Preamplifier cable for SV 12L, 6 meters
SA 270D	Desiccator for outdoor protection kits
SA 277	Outdoor microphone kit for **SV 7052** microphone (microphone, preamplifier, cable and desiccator not included)
SA 250	Carrying case for SA 277, SB 270, cables and accessories

1.3. ACCESSORIES AVAILABLE

SV 36	Class 1 Sound Calibrator: 94/114 dB@1000 Hz
SB 272	External battery for SV 27x monitoring stations series (33 Ah) including indoor charger
SB 271	Solar panel for SV 27x monitoring stations (40 W)
SA 206	Mast with adjustable height from 1.5 meter to 4 meters
SP 275	Vaisala Weather Transmitter WXTxx type meteo module.
SP 276	GILL GMX600 type meteo module (with communication cable SC276).
SP 272	WERMA, LED/Buzzer alarm lamp (12V DC).

1.4. ACCESSORIES AVAILABLE

The standard firmware of SVAN 979 includes 1/1 analysis. Other functions are optional:

SF 277_2   1/3 octave analysis option
SF 277_4   FFT analysis option
SF 277_15   Time domain waveform signal recording option

> ⚠️ ***Note:*** *The software options for the instrument can be purchased at any time as only the introduction of a special unlock code is required for their activation in a specific instrument. Contact your local Svantek distributor for further information and costs for these options.*

2.   MONITORING STATION SET

2.1.   SV 277 PRO STANDARD SET AND OPTIONAL ELEMENTS

The SV 277 PRO station consists of two carrying cases. The main case is waterproof with an internal 17 Ah battery and internal charging block providing power from an external DC power supply or a solar panel. The SVAN 977 Class 1 sound level meter is installed inside the main case.

All accessories fit conveniently into a second carrying case.

The SV 277 PRO station includes:

- outdoor microphone kit (1),
- waterproof case with battery, charging unit and connectors (2),
- controller (3),
- SVAN 977 – Class 1 Sound Level Meter and Analyser (4),
- mobile modem (5),
- power supply unit (6).

The waterproof case is equipped with:

- external power connector (7),
- meteo module connector (8),
- air pressure compensation valve (9),
- input signal connector (10).

The outdoor microphone kit (1) and power supply unit (6) are packed inside the second transportation case together with microphone, windscreen (11) power supply and input cables.
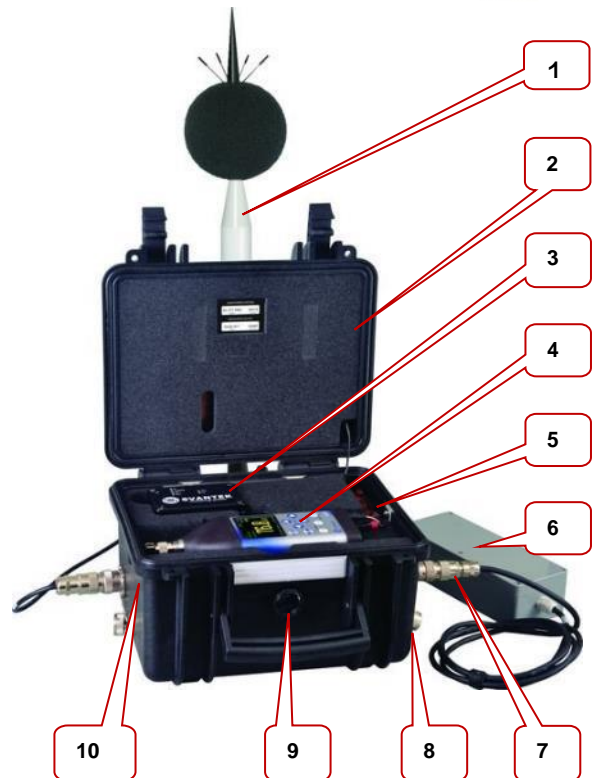
Additional accessories for SV 277 PRO system, not included in the standard set, but in many applications, essential for reliable system operation and task performance are:

6. Mast with adjustable height from 1.5 meter to 4 meters (**SA 206**),   Type: Manfrotto 269BU

2.1.1. *Waterproof case*

The SM 277 PRO waterproof case (IP 67) houses and protects the main elements of the monitoring station:

- controller,
- mobile modem,
- SVAN 977 instrument,
- other internal elements such as: rechargeable battery, connectors, cables, circuit boards.

SVAN 977 can be removed from the case by the user and used as a hand-held sound and vibration meter.

To do this the user should:

1. switch off the instrument by pressing together the **\<Alt\>** and **\<Start/Stop\>** keys,

2. unscrew the input connector and disconnect the input cable from SVAN 977,

3. disconnect the USB and power cables from SVAN 977.
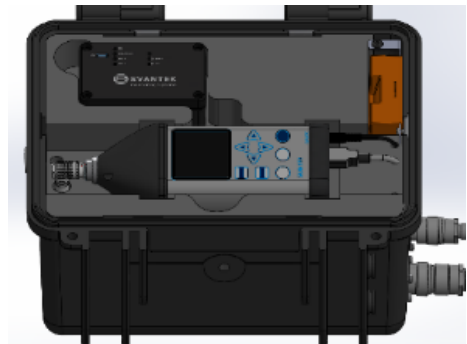
The controller is fixed in the station case by a Signal Power Combo connector and can also be removed from the case. To do this the user should pull the controller up and remove it from the slot.
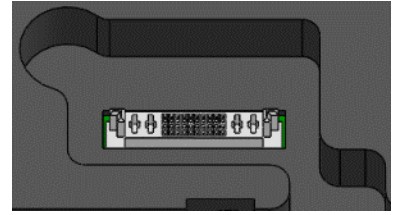

To put it back the user should put the controller in the slot and press on it to achieve a good fixation with the connector.

> **Note**: *Only SVAN 977 and the controller can be disconnected and removed from the station case by the user. All other disassembling work should be performed strictly by an authorized service team.*

> **Note**: *The producer does not recommend removing the controller without a sound reason. Double check that the controller has a good fixation in the connector after reconnecting!*

The monitoring station case is equipped with the air pressure compensation valve that enables the user to open the case easily if the internal pressure is lower than the atmospheric one.

Any remaining moisture after closing the lid will be absorbed by the silica gel bags (optional accessory).

The valve should be released if opening the top lid is problematic.

> **Note**: *The valve must be closed when the station is used outdoors, otherwise the case is not sealed against moisture.*

The station case is equipped with three Souriau UTO type connectors for:

- input signal from the microphone (**INPUT**).

- powering station and charging the internal battery (**DC SUPPLY**).
- external interface for the meteo module or the alarm lamp (**EXTERNAL INTERFACE**).

To connect a cable to a case socket, start by lining up the key on the plug and the socket, then lock the connector by turning the ring clockwise (only the ring close to the socket will rotate).

To disconnect a cable, push the connector towards the station and turn it counter-clockwise. New connectors require more force so using a closed hand is more effective than using only fingers.

The Lead-Acid rechargeable battery is located in the bottom of the case.

The battery can be used in any chosen position without the risk of leakage. The battery has a pressure relief valves that allows safe dispersal of any excess pressure inside the cell (VRLA).

Battery capacity may vary depending on the ambient temperature.

The safety fuse is located on the left side of the controller connector plate.

⚠️ *Note: Do not remove the battery from the case! This operation must be done only by the authorised service.*

⚠️ *Note: Battery is not restricted for air, surface and water transport. Classified as non-hazardous material (IATA/ICAO Special Provision A67, DOT-CFR Title 49 parts 171-189, IMDG amendment 27).*

⚠️ *Note: During station operation it is recommended to charge the internal battery as often as possible; this will extend battery life. It is necessary to charge the battery after any total discharge.*

⚠️ *Note: The station should not be stored for a long time with a discharged battery. Storing with batteries in discharged condition may damage them.*

⚠️ *Note: If the station is planned to be stored for a long period of time, it is recommended to charge its battery to 100% capacity. The battery should be charged at least once per 6 months.*

⚠️ *Note: If the storage period is longer than one year, a discharge/charge cycle must be performed. To do this, leave the device turned on until the battery is completely discharged. Then charge the battery to 100% capacity.*

The case lid is equipped with an antenna for the mobile modem.

2.1.2.   *Controller*

The SV 277 PRO monitoring station is equipped with the SD 270A PRO (or previous modification SD 270 PRO without the TEST button and corresponded LED) controller that integrates and controls all system modules and is responsible for the powering of all elements and communication between the following elements of the monitoring station:

- SVAN 977 instrument,
- mobile modem

and optionally

- meteo module, alarm lamp etc.

Very important task of the controller is power distribution - it provides appropriate DC power to every element of the system (managing external power sources such as the SB 270 power supply or optional solar panel or external battery).

Another key task of the controller is the integration of the entire system – examining the communication, state and condition of every module of the system and the immediate indication of all problems on the control panel by means of several LEDs or remotely using the mobile Internet connection.

The controller also analyses the temperature condition inside the monitoring station case. If the internal temperature is higher than +50°C, the controller will switch off internal battery charging. If the temperature further increases over +65°C, the controller will switch off the monitoring station. The station will be also switched off, if the internal temperature falls below -30°C.

The TEST key in the SD 270A PRO controller allows you to reset the controller settings. To do this, press and hold the TEST key for more than 20 seconds until the corresponding LED lights up. Release the key and the controller will be reset.

The mini USB connector on the front panel of the controller is intended for updating the controller firmware.

> **Note**: *The mini USB connector on the controller panel doesn't provide any measurement or setup data exchange with the PC. Such data exchange is carried out via the USB Device 1.1 interface of the SVAN 977 (**USB** socket).*

> **Note**: *Communication of the controller or SVAN 977 with a PC requires installation of the USB drivers on your PC. USB driver for Svantek devices are available on http://svantek.com/support-drivers-software.html*

> **Note**: *Make sure SvanPC ++ is Off before starting the update! If not, please Exit it before starting any upgrading.*

To upgrade the SD 270 PRO controller firmware, go through the next steps:

1. If you upgrade the firmware without removing the controller switch off SVAN 977 and wait until all LEDs are off.
2. Connect the controller to the PC with the SC 56 cable.
3. Run the "loadfile.bat" file on the connected PC. This operation opens a window which displays the state of downloading the program. After successful loading the "File loaded" is displayed.
4. Press any key on the PC to finish firmware download.
5. Disconnect the SC 56 cable. The **BAT1** LED goes out.

To upgrade the SD 270A PRO controller firmware, go through the next steps:

1. If you upgrade the firmware without removing the controller switch off SVAN 977 and wait until all LEDs are off.
2. Connect the controller to the PC with the SC 56 cable. The **TEST** LED starts blinking red 1 per second.
3. Run the "loadfile.bat" file on the connected PC. This operation opens a window which displays the state of downloading the program. While downloading the **TEST** LED starts blinking faster. After successful loading the "File loaded" is displayed and **TEST** LED starts blinking red 1 per 3 seconds.
4. Press any key on the PC to finish firmware download.
5. Disconnect the SC 56 cable. The **TEST** LED goes out.

Note: If after successful firmware loading you run the "loadfile.bat" file again, the firmware will not start downloading and the byte counter will not be changing. If you still would like to repeat firmware upgrading, disconnect the SC 56 cable and repeat steps from 2 to 5.

Note: In the case of any problems with upgrade, switch off SVAN 977 and wait until all LEDs are off, then extract the controller from the case and repeat steps from 2 to 5.

2.1.3.   *Sound and Vibration Meter*

SVAN 977 is a Class 1 Sound & Vibration level meter as well as a real time 1/1 or 1/3 octave or FFT analyser and is a core of the SV 277 PRO system. Its role is to make measurements and save results in files, as well as to control data transfer via the mobile modem to the SvanNET webserver or directly to a PC. Measurement results can be analysed later with the use of the SvanPC++ software.

Main important features of SVAN 977 as a part of SV 277 PRO system:

- Three user configurable profiles allow parallel measurements with independently defined frequency filters and RMS detector time constants. Each profile provides a significant number of results (for example, Spl, Leq, SEL, Lden, LEPd, Peak, Max and Min).

- Advanced time history logging, time-domain signal recording for each channel provides complete information about the measured signal.

- All required weighting filters: A, B, C, Z are available with this instrument.

- Advanced trigger and alarm functions.

- Analyser options: FFT analysis, 1/1 and 1/3 octave real-time analysis including calculations of statistical levels.

SVAN 977, when it works with the monitoring station, is powered from an external power supply via the **7-16V** socket.

Data transfer to the modem is done via the **Serial** socket, the serial interface.

Other instrument sockets are not used in the SV 277 PRO system.

not used

serial port

external power

⚠️ *Note: As a part of the SV 258 PRO station SVAN 977 is powered from the external source and doesn't use its internal batteries. Internal instrument's batteries must be removed for correct system operation and safety reasons!*

⚠️ *Note: The station is delivered without internal batteries inside the instrument. But if you use SVAN 977 as a hand-held instrument, don't forget to remove batteries from the instrument every time you put it back into the station slot.*

To extract the batteries, switch off the instrument, unscrew the coin-operated screw, take off the black bottom cover of the instrument and slide the battery tubes out. You should then fix the bottom cover back on.

SVAN 977 is delivered with 16 GB micro SD-card. You may exchange it for a 128 GB card, but before insertion the card must be formatted as FAT32.

The micro-SD Memory Card is located in the slot under the bottom cover and can be accessed after removing the bottom cover.

To extract the card from the card-slot, push on the card and then pull it out of the slot.
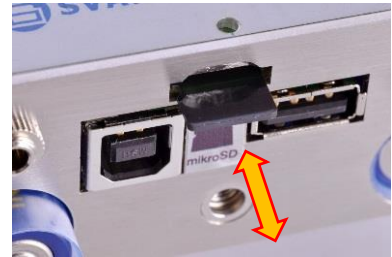
There are two important settings, which should be assured in the instrument when it is a part of the monitoring station:

1. The microphone compensation should be set to **Outdoor Environment** or **Outdoor Airport** (*path: <Menu> / Measurement / Compensation*). Both compensation filters are dedicated to the permanent outdoor monitoring application. The characteristics of the compensation filters depend on the application: environmental (acoustic signal is parallel to the microphone's grid) or airport (acoustic signal is perpendicular to the microphone's grid). The frequency characteristics of the compensation filters are given in Appendix C of the SVAN 977 user manual.

2. **Network** should be set to **GPRS** (*path: <Menu> / Instrument / Wireless Connection / Network*).
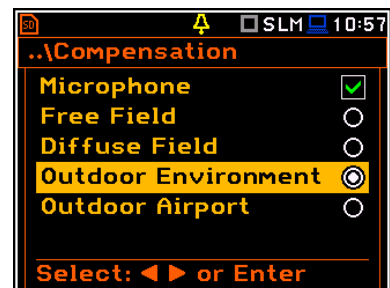
Other settings depend on the measurement and transmission type.
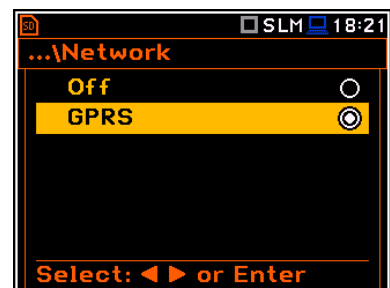
All measurement, instrument and transmission settings can be set up via SVAN 977 user interface, or remotely via the SvanNET webserver or SvanPC++ program.

⚠️   *Note: See also SVAN 977 user manual.*

2.1.4.   *Mobile modem*

The SP 270 mobile modem provides fast data transfer over the Internet to a PC with standard Internet connectivity. The station uses a 3G modem type "Gemalto® EHS6T Terminal" or a 4G modem type "Cinterion® PLS62T-W Gateway".

Both modems use mini-SIM cards 25mm x 15mm with Internet Access. The SIM slot accepts 1.8V and 3V SIM cards in accordance with GSM 11.12 Phase 2.
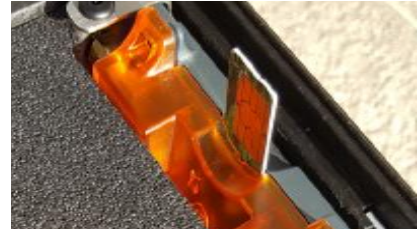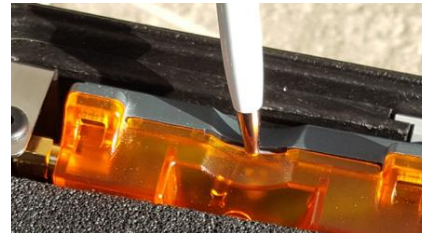
⚠️ **Note**: *See also "Gemalto® EHS6T Terminal" or "Cinterion® PLS62T-W Gateway" user manual.*

The SIM-card should be inserted with the circuit-side facing left in the slot by pushing it until it snaps hold.

The SIM-card can be removed from the card slot by using a pen or other flat object. Press on the card until it snaps out. Use tweezers to remove the SIM-card from the slot.

If settings of SVAN 977 in "Wireless Transfer" menu are correct, then once you insert a SIM card in the modem slot the remote communication settings of the modem are automatically adjusted to connect to the SvanNET server. In some cases, APN should be provided.

⚠️ **Note**: *Be sure that the PIN of the SIM card is off!*

2.1.5.   *Outdoor microphone protection kit*

The **SA 277** outdoor microphone kit protects the SVAN 977 preamplifier and microphone from weather conditions. The use of the outdoor kit requires an extension cable between the instrument and its preamplifier (**SC 277**). The SA 277 is made of lightweight materials and is easy to install on a tripod. This solution is recommended for short term and semi-permanent noise measurements in the environment.

The outdoor microphone kit has ¾" screw on its bottom which enables using of standard tripods or other user specific mountings. Technical data such as direct and frequency characteristics associated with the microphone are included in the SVAN 977 user manual.

Optionally you may use desiccator - Silica gel. Desiccator absorbs moisture normally contained in the air.

⚠️ **Note**: *Desiccator should be regenerated after some period of use, when it changes colour to light grey, by drying it for 3 hours in a temperature of 150°C. Desiccator should be inspected at least every 2 weeks, and more often when used in conditions of high air humidity.*

 Note: See Appendix B to learn how to assemble and disassemble the outdoor microphone kit.

 Note: After assembling the SA 277 or after calibration check that the windscreen foam is properly installed. It should be shifted close to the anti-bird spikes. Otherwise the SA 277 free-field characteristics will be different from declared ones.

For absolute certainty, push the windscreen up to the stop.
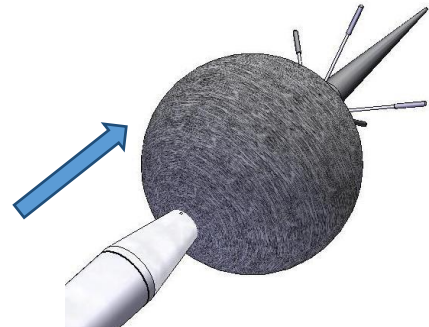
 Note: Before installing the station at the measurement site, make sure that the protective caps on the four antibird spikes are removed.

It is recommended to use the protective caps during transportation, storage and other operations with the instrument like, laboratory calibration, etc. to avoid personal injury.
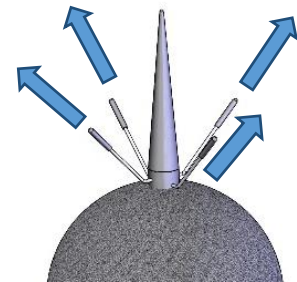
 Note: Correct connection of the microphone is not signalled by the controller therefore it is recommended to perform a test measurement each time the station is turned on.

2.1.6.   *External power supply with AC/DC converter*

The SB 270 external power supply is a waterproof Single Output Switching Power Supply which is characterised by:

- Universal AC input / Full range (90 ~ 264VAC)

- Protections: Short circuit / Overload / Over voltage

- Fully encapsulated with IP65 level

- Fully isolated plastic case

2.2. OPTIONAL ACCESSORIES FOR **SV 277 PRO**

2.2.1. *Sound Calibrator*

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

Sound calibrator is a device which produces sound pressure of defined level and frequency.

The **SV 36** 1 Class Sound calibrator produces sound pressure of declared levels - 94 or 114 dB at a frequency of 1 kHz.

This calibrator is equipped with autorun function. It starts generation of the declared sound pressure automatically after insertion of the microphone into the calibrator hole.

2.2.2. *External rechargeable battery*

The **SB 272** external rechargeable battery supplies the DC power for the monitoring station. It includes a Lead-Acid rechargeable battery (33 Ah, 12 V) and is dedicated for outdoor use because of its waterproof case. The battery capacity enables up to three times longer operating time of the monitoring station in comparison to the station's internal 17 Ah battery.

The SB 272 set includes the SB 273 indoor charger and a cable for connection between SB 272 and the monitoring station.

SB 272 has the same connector for charging and for power supply and therefore cannot be used as a power supply for the monitoring station and at the same time be charged (as the internal station battery with solar panel or external power supply).

⚠ *Note: SB 272 cannot be charged by the monitoring station SB 270 power supply!*

⚠ *Note: SB 272 is not restricted for air, surface and water transport. Classified as non-hazardous material (IATA/ICAO Special Provision A67, DOT-CFR Title 49 parts 171-189, IMDG amendment 27).*

⚠ *Note: It is necessary to charge SB 272 after any total discharge, otherwise the battery may lose its capacity.*

⚠ *Note: SB 272 should not be stored for a long time with a discharged battery. Storing SB 272 with a discharged battery may damage it.*

⚠ *Note: If SB 272 is planned to be stored for a long period of time, it is recommended to charge its battery to 100% capacity. The battery should be charged at least once per 6 months.*

Note: If the storage period is longer than one year, a discharge/charge cycle must be performed. To do this, completely discharge the battery and then charge it to 100% capacity.

2.2.3. Solar panel

The **SB 271** solar panel (40 Watt, 17.5 V) extends the working time of the monitoring station. The size and weight of the panel enables easy transportation in the dedicated carrying bag.

The SB 271 solar panel does not require additional batteries or external controllers.

The mounting system enables mounting of the SB 271 solar panel above the monitoring case which provides a natural shade that protects the station from overheating.

The SB 271 is equipped with a military standard connector cable for direct connection to the monitoring station.

2.2.4. Alarm lamp

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

The alarm lamp is connected to the **EXTERNAL INTERFACE** connector instead of the Meteo module.

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

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

2.2.5. Meteo module

The SV 279 PRO monitoring station can work with two types of meteorological measuring stations - Vaisala Weather Transmitter WXTxx (**SP 275**) or GILL MaxiMet GMX600 (**SP 276**).

The SP 275 meteo module measures 6 most essential weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) and also rain and hail intensity. The module has low power consumption (working also with solar panels), 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 SP 275 to the monitoring station every second.

Precipitation is measured and 3 values for rain and hail (intensity, accumulation and duration) are transferred, every 10 seconds, only when it is raining or hailing These parameters are not averaged but integrated.

Note: Do not forget to align the transmitter so that the arrow on the bottom of the transmitter points North.

Note: See also Vaisala WXT530 User Guide.

The SP 276 meteo module measures 6 most essential weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) and also rain. The module 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 SP 276 to the monitoring station every second.

Note: If your GILL 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.

Note: See also GILL GMX600 User Guide.
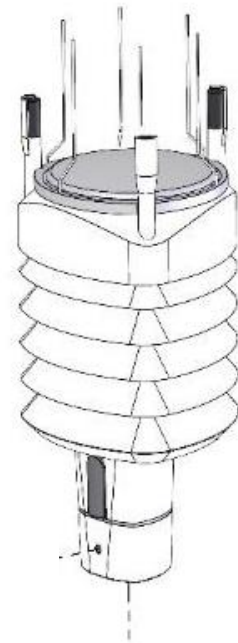
The controller then transfers the weather parameters to SVAN 977, which saves them in a logger file as a history if the **Meteo** position is **On** in the **Logger Results** list (*path: <Menu> / Measurement / Logging / Logger Results*).
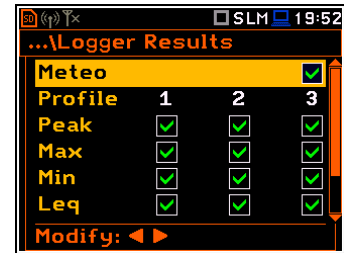
SVAN 977 also integrates weather parameters for the period, defined by the parameter **Integration Period** in SVAN 977 (*path: <Menu> / Measurement / General Settings*) and then saves them as **Summary Results** if the **Meteo** position is **On** in the **Summary Results** list (*path: <Menu> / Measurement / Logging / Summary Results)*.
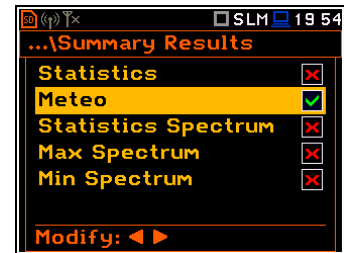
3. OPERATING THE STATION

3.1. POWERING

The SV 277 PRO monitoring station can be powered from:

- internal rechargeable battery,
- mains power source (SB 270);

and optionally from:

- external rechargeable battery (SB 272),
- solar panel (SB 271).

When the power supply is connected, it starts powering the station and charging the internal battery in parallel (as a voltage source).

When the external rechargeable battery is connected to the station the station controller switches the powering from the internal battery to the external one. As soon as the external battery is discharged the controller switches powering back to the internal battery.

When the solar panel is connected to the station it starts charging the internal battery (as a current source). And all the time that the solar panel charges the internal battery, the station continues to be powered from the internal battery.

The status of powering is indicated at the controller's panel by a combination of **DC**, **CHARGING**, **BAT 1** or **BAT 2** LEDs (see Table below).

Note: It is recommended that the batteries of SV 277 PRO and SB 272 are charged before going on site.

Note: Monitoring station and external battery have their own chargers, which are incompatible: SB 270 is a waterproof power supply for SV 277 PRO, whereas SB 273 is an indoor charger for SB 272.

Note: SVAN 977 is powered from the external source and doesn't use its internal batteries. Internal instrument's batteries must be removed for correct system operation and safety reasons!

3.2. CONTROLLER INTERFACE

The controller interface consists of several LEDs, which indicate the state of the station elements or their connection with the controller:

- **DC** – external power supply connection state (AC/DC converter),
- **CHARGING** – charging state of the internal battery,
- **BAT 1** – internal battery state,
- **BAT 2** – additional external battery state,
- **SVAN** – SVAN 977 connection state,
- **3G** – mobile modem connection state,
- **EXT I/O** – meteo module connection state.

Colour of LEDs can be red, orange or green. Colour of the **SVAN**, **3G** and **EXT. I/O** LEDs reflect the communication state with the corresponding unit. Colour of the **DC**,

CHARGING, **BAT 1** or **BAT 2** LEDs depend on the state of the power supply and charging of the internal battery.

The table below shows combinations of LED colours in the specific supply states.

Power from	Internal battery	Power supply	External battery	Solar panel
DC	off	green	off	off
CHARGING	off	• red when charging; • green when charged	off	• red when charging; • green when charged
BAT 1	• green if charged > 50%; • orange if charged 20-50%; • red if charged <20%; • blinking red if charged <8%; • off if 0% charged or disconnected	• when charging, colour is changed: red-orange-green; • green when charged	off	• when charging, colour is changed: red-orange-green; • green when charged
BAT 2	off	off	• green if charged > 50%; • orange if charged 20-50%; • red if charged <20%; • blinking red if charged <8%; • off if 0% charged or disconnected	off

Colour of the **SVAN** LED is green when there is a connection between the controller and the SVAN 977 instrument. If there is no connection the colour is red (for example, when the SVAN 977 instrument is switched off). When there is data transmission between controller and SVAN 977 the green LED will be blinking. During connection initialization or powering down phase it is blinking orange.

Colour of the **3G** LED is green when there is a connection with a modem. When there is data transmission to or from the modem the green LED is blinking. During connection initialization or powering down phase it is blinking orange.

The **EXT. I/O** LED is off if logging of the meteo results (*path: <Menu> / Measurement / Logging / Logger Results*) and meteo results saving with the Summary Results (*path: <Menu> / Measurement / Logging / Summary Results)* in the SVAN 977 settings are off (see Chapter 2.1.3). If one of these parameters or both are on, but the meteo module is not connected to the SV 277 PRO the **EXT. I/O** LED lights red colour. After connection of the meteo module the LED changes colour to green. If logging of meteo results is off and alarms are on in the SVAN 977 instrument settings, then the **EXT I/O** LED reflects the status of an external alarm lamp.

3.3.   MODES OF STATION OPERATION

3.3.1.   *Operational mode*

In the operational mode, the SVAN 977, controller and mobile modem are switched on and communication between all modules is functioning correctly.

Data transmission is presented by the blinking lights of **SVAN** and **3G** LEDs on the controller panel.

In the operational mode, the following modules are powered continuously: SVAN 977 instrument, controller, mobile modem and outdoor microphone (optionally also the meteo module). The power supply for these modules can be switched off only by turning off the SVAN 977 instrument.

When the station case is open all LED diodes of the controller shine, informing about the station condition. The SVAN 977 display is switched on permanently regardless of the instrument's settings.

When the station case is closed all LED diodes of the controller are off and the SVAN 977 display is also off in order to save energy.

3.3.2.   *Battery charging mode*

When the SVAN 977 is switched off but there is a power supply (voltage from SP 270 or current from solar panel) only **DC**, **CHARGING** and **BAT 1** LEDs of the controller will be active if the lid is open and these LEDs show:

- connection of AC/DC converter indicated by green **DC** LED,
- charging of the internal battery indicated by red **CHARGING** LED. When charging is complete **CHARGING** LED turns green and **BAT1** LED stops changing colours and turns green,
- status of the internal battery charging indicated by green-orange-red **BAT 1** LED.

If the case lid is closed all LEDs will be off but charging will continue.

3.3.3. *Bootstrap mode*

The bootstrap allows upgrades of the internal firmware of the controller.

There are two ways to activate "bootstrap mode":

- by removing the controller from the monitoring station and connecting it to the PC through the USB or

- by connecting the controller to the PC via USB while SVAN 977 is off (all LEDs should be turned off).

Activation of bootstrap mode is indicated:
- in the case of SD 270, by the green **BAT 1** LED or
- in the case of SD 270A, by the LED above the **TEST** key.

⚠️ **Note**: *USB connection between controller and PC can be established only if USB driver for SVANTEK instruments had been previously installed on the PC. USB driver can be downloaded from www.svantek.com*

3.4. ESTABLISHING MOBILE CONNECTION

It is strongly advised to configure the remote communication before going on site.

1. Start by opening the SV 277 PRO station and locating the mobile modem on the right-hand side of the case.

2. Insert a mini SIM card into the slot of the modem. The SIM card PIN protection must be disabled.

3. A click sound indicates that the SIM card is in the right position. If necessary, use a tool (e.g. pen) to push the SIM card fully in.

4. Press **<Alt>+<Start>** on SVAN 977 to turn on the system.
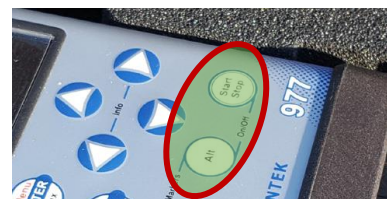
The station is programmed to automatically establish a mobile connection with the SvanNET webservice. It takes up to 5 minutes to connect.

The most important parameter of the connection is the **APN** (Access Point Name).

5. Check the APN setting in SVAN 977.

The default APN setting is "**internet**". It's possible that your Internet provider is using a different APN. In this case the APN must be entered manually, either using the SvanPC++ software or the SVAN 977 user interface (*path: <Menu> / Instrument / Wireless Transfer / Modem Connection*).
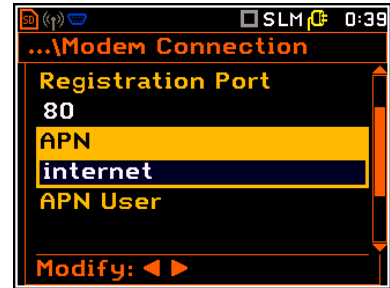
> ⚠️ **Note**: *The station is supplied with SVAN 977 configured for connection with SvanNET. If for some reasons you have changed factory settings, you always may restore them with the use of Factory Settings option.*

> ⚠️ **Note**: *If above steps don't result in connection with SvanNET or you wish to connect to the other server, you have to configure remote communication parameters in your SVAN 977 according to the SVAN 977 User Manual. In the case of further problems consult your local distributer or SVANTEK.*

3.5. ASSEMBLING THE STATION

1. The system consists of 2 carrying cases. Before use check the serial numbers on labels located on the side of both cases and ensure they are a matching set.

2. Open the case with accessories and take out the SA 277 outdoor microphone kit.

3. Mount the SA 277 on a tripod (not included) or other stable support.
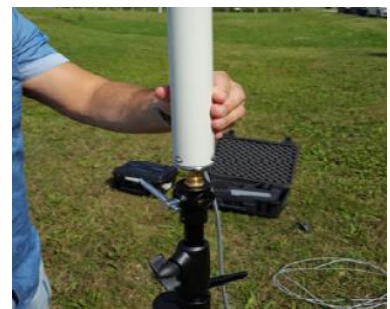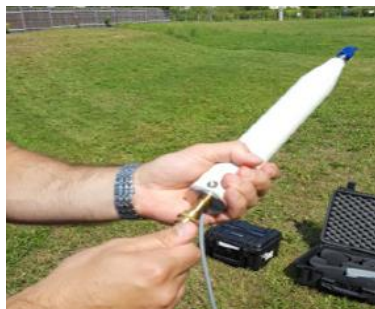
4. Remove the protection cap from the input socket on the case by turning it counter-clockwise.

5. To connect the microphone extension cable, start by lining up the key on the plug and the INPUT socket, then lock the connector by turning the ring clockwise (only the ring close to the socket will rotate).

6. If you wish to power the station, connect the power supply cable to the DC Supply socket in the same way.

7. Press **<Alt>+<Start>** on SVAN 977 to turn on the system.

8. Remove the protection cap from the microphone and perform a calibration check.

9. Take out from the case with accessories the anti-bird spike with the foam from the accessories case, push the foam upwards and mount the tube on the thread. Then slide the foam down so it hides the metal parts of the kit.

![Note icon] **Note**: *Make sure that the protective caps on the four antibird spikes are removed.*

10. The station now is ready for use.

3.6. TURNING ON THE STATION

When the remote communication is installed, and the station is fully assembled turn on the SVAN 977 instrument. The controller will turn on automatically.

System integration is checked directly after turning on the controller. This procedure includes checking the connections with the instrument and mobile modem (optionally also the meteo module). Additionally, system power, internal temperature of the station and the battery state are checked.

During the test procedure, the controller's LEDs light up sequentially orange in the sequence from **DC** to **BAT2** and from **SVAN** to **EXT I/O**. In the case of the SD270A controller, during the test (about 3-5s) the red LED next to the TEST button is still lit. All errors are indicated on the front panel by appropriate LED indicators. If all red indicators are off after above procedure, it means that the station is ready to use.

4.   REMOTE CONTROL VIA MOBILE CONNECTION

The SV 277 PRO station is designed to be operated remotely via a mobile connection.

Planning and deploying the remote-control system of the SV 277 PRO station doesn't require any extensive knowledge in the field of telecommunication. Once all steps described in Chapters 3.4 – 3.6 have been made, you can start working with the station via the remote-control system provided by SVANTEK.

The easiest way to establish remote control is to create a user account in the SvanNET webservice.

4.1.   SᴠᴀɴNET WEBSERVICE

SvanNET is an Internet service that simplifies the remote connection between a PC and Svantek monitoring stations.

SvanNET allows usage of all type of SIM cards with the station mobile 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.
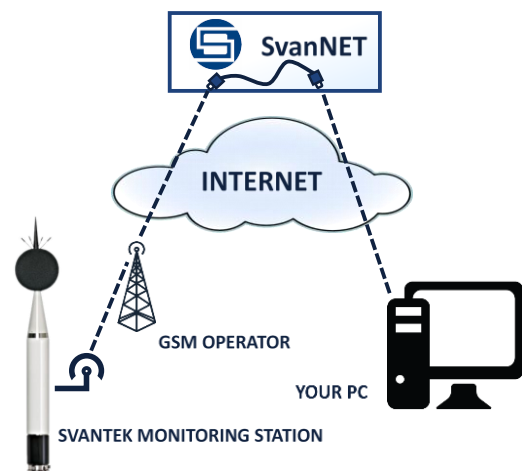
> ⚠ **Note**: *Establishing a mobile connection requires the use of a SIM card without PIN code protection and with activated Internet access. Installation of the SIM card is described in Chapter 3.4.*

SVAN 977 enables defining different types of connection via the mobile modem. To configure connection via SvanNET please follow next steps:

1. Press **<Alt>+<Start>** on SVAN 977 to turn on the system.

2. Reset all settings in SVAN 977 using **Factory Settings** option (*path: <Menu> / Auxiliary Setup*).
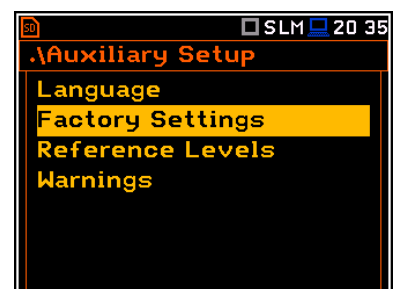
⚠️   *Note: Newly purchased stations have factory settings.*

3. Set **Network** to **GPRS** (*path: <Menu> / Instrument / Wireless Connection / Network*).
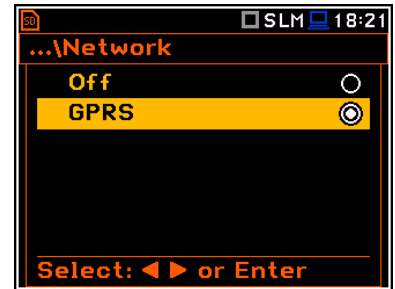
4. Check the Access Point Name (APN).

   The default setting for the APN is "**internet**". It is possible that your Internet provider uses different APN. In this case the APN must be entered manually (*path: <Menu> / Instrument / Wireless Transfer / Modem Connection*).
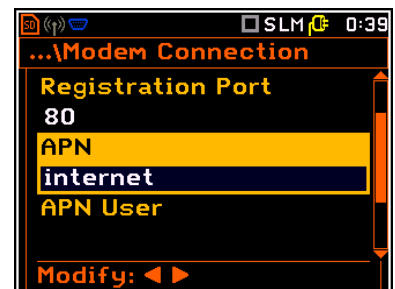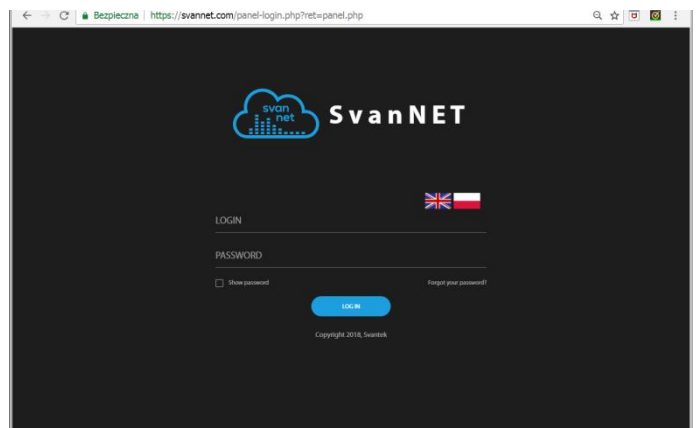
5. Successful connection to SvanNET is indicated by the "S" icon on the SVAN 977 display.

   The "S" icon means that connection with SvanNET is established. Bars and arrows inform about signal quality and data transmission – in and out.

6. 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 work remotely with the monitoring station.

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

4.2. INTERFACE FUNCTIONALITIES OF MOBILE MODEM

The mobile modem enables the user a wide spectrum of interfacing capabilities using Internet.

Internet access, provided by mobile operators, comes with a set of parameters that define the visibility of the SIM card address in the network. This address can be *public* or *private* (accessible from the outside or not) and can be *static* or *dynamic* (same or different each time the card connects to the Internet). The set of parameters define the spectrum of

available functionalities of the station remotely accessed.

The functionalities that a mobile modem offers are:

- Main communication channel

- SMS / E-mail alarms

- SMS command exchange.

4.2.1. *Main communication channel*

Main communication channel is the TCP connection (a lossless data exchange protocol) that can be used to exchange commands as specified by Appendix A to SVAN 977 User Manual. SvanPC++ assures this connection and provides data download, performance validation and measurement start/stop.

Main communication channel of SV 277 PRO can be established by one of two available methods: TCP Client or TCP Server. The SV 277 PRO stations support SSL (Secure Socket Layer) connections.

The **TCP Client** is a mode of main communication channel in which the mobile modem is configured to initiate connection to a designated address (***remote host***). Each time a ***reconnection period*** (default value is 30 seconds) has elapsed, SV 277 PRO attempts to establish a TCP connection to a designated address on a designated port (***Data Port***). Should the connection be established successfully, SV 277 PRO can exchange commands as in TCP Server mode. Should the connection attempt fail or is broken by the ***remote host***, SV 277 PRO will attempt to connect again after another reconnection period has elapsed.

To prevent the connections from going *idle* (a state in which the connection seems active, but no data can be transferred – it may happen due to mobile operator terminating the link, but the TCP protocol not being able to detect it), the station maintains the connection to the server by sending small packages of data at reconnection 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 service.*

SV 277 PRO uses the TCP Client mode for connection with SvanNET (this is the default setting of SVAN 977). The user PC connects to SvanNET via a web browser or SvanPC++, and the service creates a "bridge" between the station and the user PC. In this case, the user does not need to buy more options for SIM card (public dynamic or public static IP addresses are typically optionally payed and often hard to obtain). The essence of SvanNET is to simplify the procedures and requirements necessary for the connection.

TCP Server is a mode in which the mobile modem is configured to act as a server for incoming connections. The modem is waiting for the first connection to be established on a designated port (called ***Data Port***; default 8001). Such connection can come from any application - an initiator of the TCP connection (such as SvanPC++) called ***remote peer***. This mode is recommended as it gives the initiative to the application. This mode requires the SIM with a ***public address*** (also called ***public IP***).

The **TCP Server** mode uses a so-called ***Registration***. This is a method of translation of a

dynamic address to a form of a static credentials. It is essential for effective use of a SIM card with a *dynamic IP*. The dynamic IP means that the IP address is changed each time the modem establishes connection to the Internet. The Registration feature allows to use the current internet address by an external application for the connection.

There are two Registration methods supported by SV 277 PRO:

1. DynDns
2. Address Server

The *DynDns* is a service that allows to translate a static name to the internet address. The special controlling application uses this name to identify SV 277 PRO in the Internet as an internet address. The properly configured station provides means to validate its internet address to be recognized in the Internet. The static name provided by DynDns service is translated by the DNS protocol to a given internet address to which an application can connect to.

⚠️ *Note: To use this method the user should have a DynDns account and to input its credentials (host name, login name and password) into the SVAN 977 configuration. For more details regarding DynDns service consult http://www.dyndns.org.*

The *Address Server* is the Svantek own initiative of providing the instrument's current internet address. In this mode, SV 277 PRO provides its current internet address to Svantek server. SvanPC++ is getting said address to be able to connect to it. This mode doesn't require any payments for the account and obtaining any credentials as it comes preconfigured to the user, but it requires access to **www.svantek.com** domain from the Mobile operator's network.

⚠️ *Note: To use this method contact your local SVANTEK distributor.*

4.2.2. *SMS / E-mail alarming*

SMS/E-mail alarming functionality allows SV 277 PRO to inform the user about exceeded thresholds by SMS and/or E-mail notification. SV 277 PRO can send an SMS to a defined number(s) and/or an E-mail to a defined address(s) with alarm, including the current value of the monitored result against the threshold level.

SVAN 977 has two alarm modes: simple and advanced. Simple alarm mode is based on the configuration of the I/O port in the **Multifunction I/O** window (*path: <menu> / Instrument / Multifunction I/O*) in which the user can set the trigger for alarm output signal with respect to the threshold level and additionally enable sending alarm messages by SMS to one number and/or e-mail also to one address.

Advanced alarm mode enables extended functionality and requires the use of SvanPC++ or SvanNET to set up alarms. In this case, the user can configure far more complex alarms (e.g. send an alarm when the level of source exceeds 75 dB during at least 10 seconds but only on weekdays). Additional extension is that alerts can be send to more than one phone number / e-mail address.

The E-mail alarming requires the credentials of the e-mail server to be used for it, including the SMPT server name, the port number, sender name, login and password. The content of the message is created automatically, and the user can add his own information to it.

Note: SvanNET provides also an e-mail service. The use of SvanNET simplifies the configuration of the station by only switching on the SvanMail position in the SVAN 977 configuration menu (path: <Menu> / Instrument / Wireless Transfer / E-mail Settings).
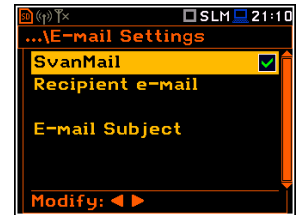
Note: SvanNET e-mail service uses SSL connection.

It should be noted that SMS alarming does not require the modem to establish 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.

4.2.3.   *SMS command exchange*

SMS command exchange allows any command from the *Appendix A. Remote Control* to SVAN 977 User Manual to be exchanged via SMS. By sending a command as specified by the said document, SV277 PRO can provide a response. This feature is particularly useful when retrieving the current state of the station.

Like SMS alarming, this feature does not require an active internet connection.

The functionality is useful tool in some situations. In particular, to send "Reset" or "#7,RM;" (reset communication) command when there is a loss of remote communication.

The functionality does not require any additional configuration as is always active when modem is on and SIM card is inserted.

4.3. REMOTE COMMUNICATION MODULE OF SVANPC++

SvanPC++ is more extended software than SvanNET regarding data view and data process functionality. It can utilize all above described communication channels, also via SvanNET. For this purpose, SvanPC++ should be completed with special **Remote Communication** module, which usually is delivered as an option to SvanPC++.

SvanPC++ and Remote Communication module is described in detail in the SvanPC++ User Manual.

5.   SVANNET USER INTERFACE

The SvanNET interface depends on the package of tools assigned to your account and access level and includes:

— projects tools (**Project list**)

— individual stations tools (**Station list**).

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

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

5.1.   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.
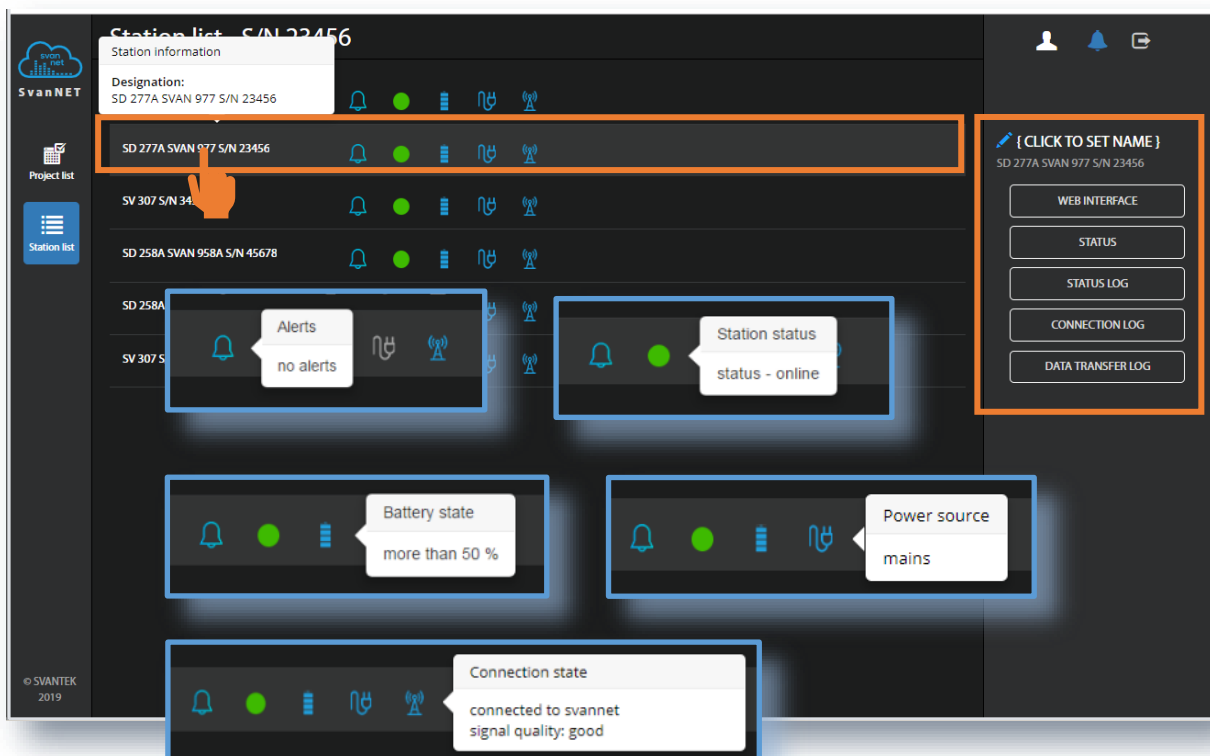
The station bar except station name with serial number includes five icons that indicate station state. When station is disconnected from SvanNET all icons are of grey colour.

If you click the station name, station information will be displayed.

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

 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, information about charging level will be displayed.

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

 Connection status. When you click this icon, information about connection with SvanNET and a signal quality will be displayed.

Three icons in the upper right-hand corner of the window allows you to:

 manage the user account

 display alarms for all stations

 exit 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.
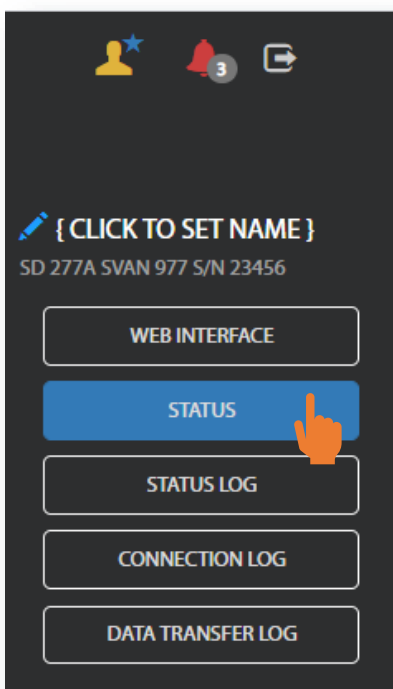
The **WEB INTERFACE** button switches you to the Live data view (see Chapter 5.2) in which you can view measurement results and use additional tools to configure station parameters, download data files and start/stop measurements. This button is available for the stations connected to SvanNET.

The **STATUS** button switches you to the Station status view (see Chapter 5.1.1) in which you can check the station status and configure status alarms.

The **STATUS LOG** button switches you to the Status log view (see Chapter 5.1.2) in which you can check the power source (type and charge level), memory free space and mobile signal quality.

The **CONNECTION LOG** button switches you to the Connection log view (see Chapter 5.1.2) 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 5.1.2 in which you can check the history of data transfers (uploads).

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

5.1.1. *STATUS view*

In the **STATUS** view, you can check the station status and configure status alarms.

- To update instrument's status, click the **UPDATE STATUS** button.
- To configure status alarms Conditions and related Actions for the measurement points, click the **STATIONS ALARMS** button.
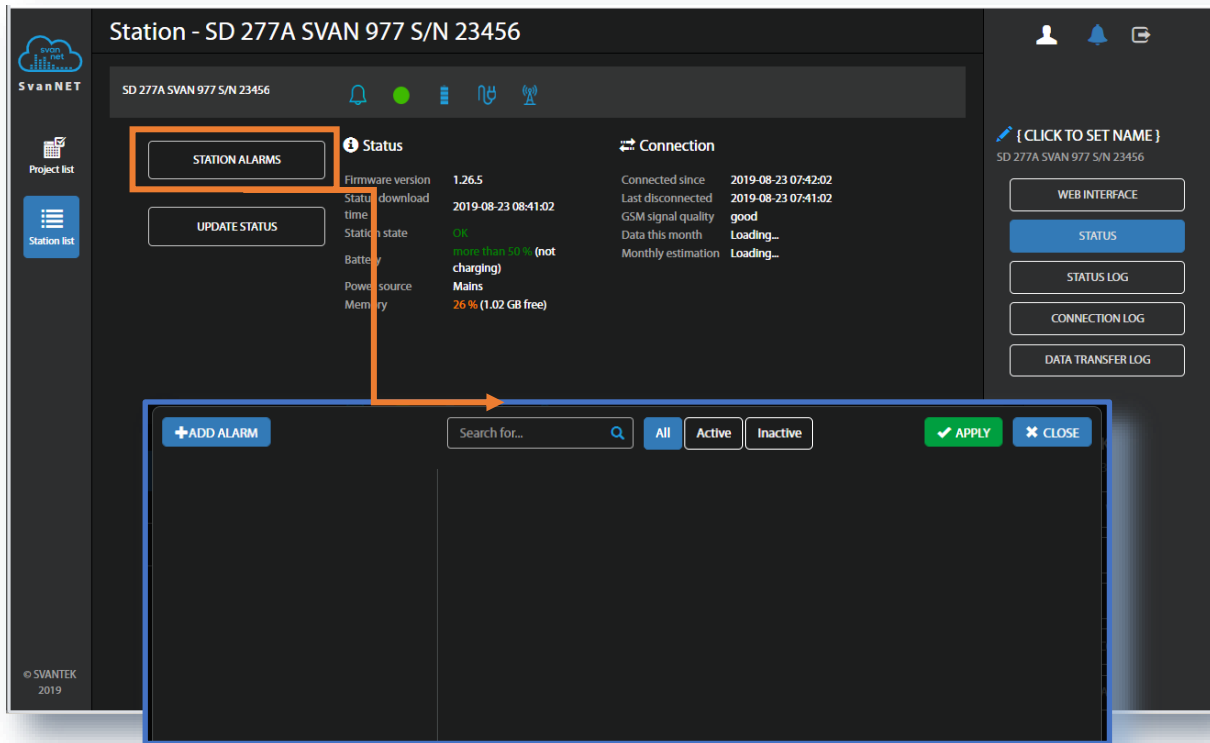
Click **+ADD ALARM** in the pop-up box and a new **Alarm(1)** with CONDITIONS, ACTIONS and MEASUREMENT POINTS areas will appear. Alarms are based on Conditions and relate to Actions, that are default e-mails to the specified recipients, and refer to Measurement points. To configure Alarm:

1. click the **Status** button and in the EDIT CONDITIONS pop-up 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**.
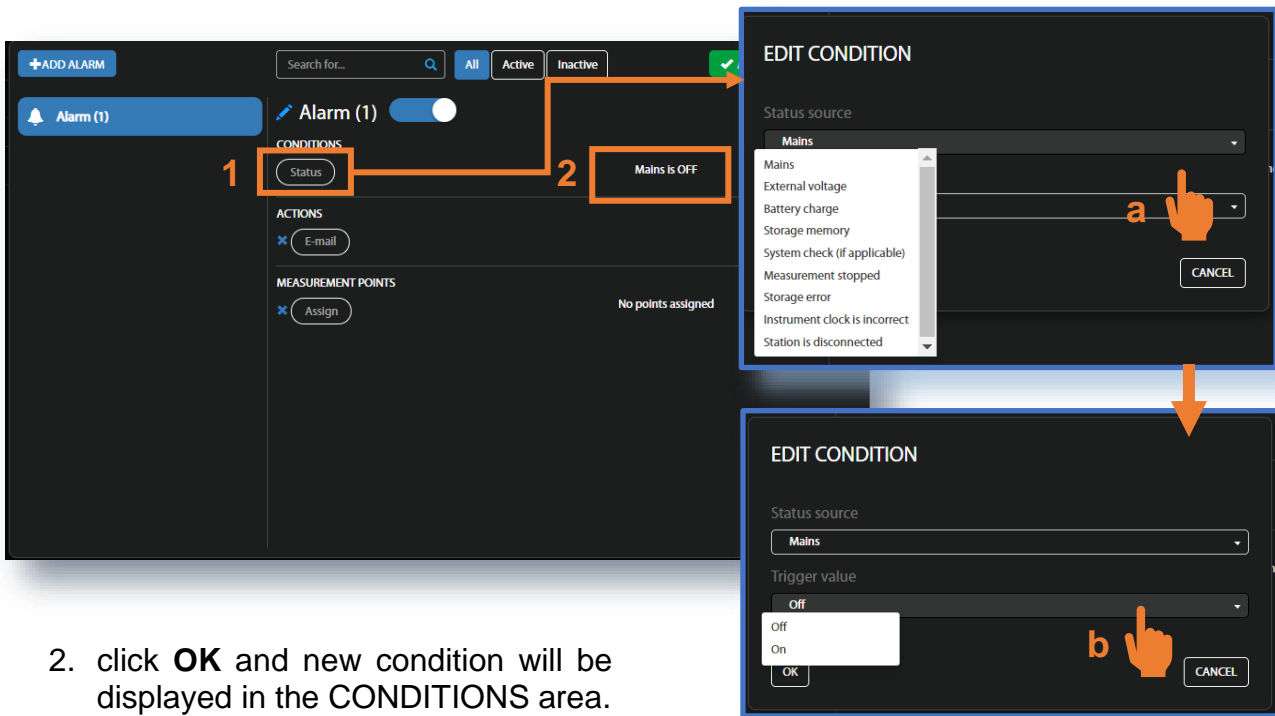
2. click **OK** and new condition will be displayed in the CONDITIONS area.

The SvanNET alarms have next meanings:

- **Mains**
  - o Trigger Value: Off – alarm is generated when the system detects loss of power supply
  - o Trigger Value: On – alarm is generated when the system detects appearance of power supply
- **External voltage**
  - o 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**
  - o Trigger Value: xx % - alarm is generated when the system detects a decrease in the percentage of battery charge below the selected threshold.
- **Storage memory**
  - o 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)**
  - o Alarm is generated when the system detects failure in execution of the system check procedure (not live check).
- **Measurement stopped**
  - o Alarm is generated when the system detects luck of measurement. Applies only to stopped measurements - states such as start delay, waiting for synchronization and pause are treated as a running measurement
  - o Instrument action: Start measurement
- **Storage error**
  - o 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).

- o Instrument action: Restart measurement

- **Instrument clock is incorrect**
  - o 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
  - o 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**
  - o 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).

3. click the **E-mail** button to 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 areas.

5.1.2.   *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 and mobile signal quality,

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

- **Data Connection log** which registers history of station connections.

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

- **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: Monthly, Weekly, Daily or Hourly.

5.2.   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 and measurements start/stop.
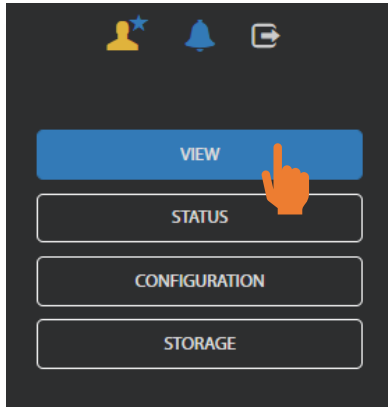
The **VIEW** button switches you to the **Live data** view (see Chapter 5.2.1) in which you can view broadband results, 1/1 or 1/3 octave spectra and a time-history.

The **STATUS** button switches you to the station status view (see Chapter 5.2.3) in which you can check the station status and start/stop measurements.

The **CONFIGURATION** button switches you to the station **Configuration** view (see Chapter 5.2.2) in which you can configure measurement and instrument parameters.

The **STORAGE** button switches you to the **Storage** view (see Chapter 5.2.4) in which you can download files manually.

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

5.2.1.   *Live data view*

The **Live data** view includes three tabs: **OVERVIEW**, **TIME HISTORY RESULTS** and **SPECTRUM RESULTS**.

The **OVERVIEW** tab displays current broadband results:

1. three **Instantaneous Results**, measured/averaged by 1-second period and
2. three **Summary Results**, measured/averaged by the **Integration period**.

Instantaneous and Summary results are updated every second.

The type of the measured result along with filter and detector as well as profile in which this result is measured is presented in the selector field below the result value. To change the displayed result, click the selector button and choose the profile and the result.
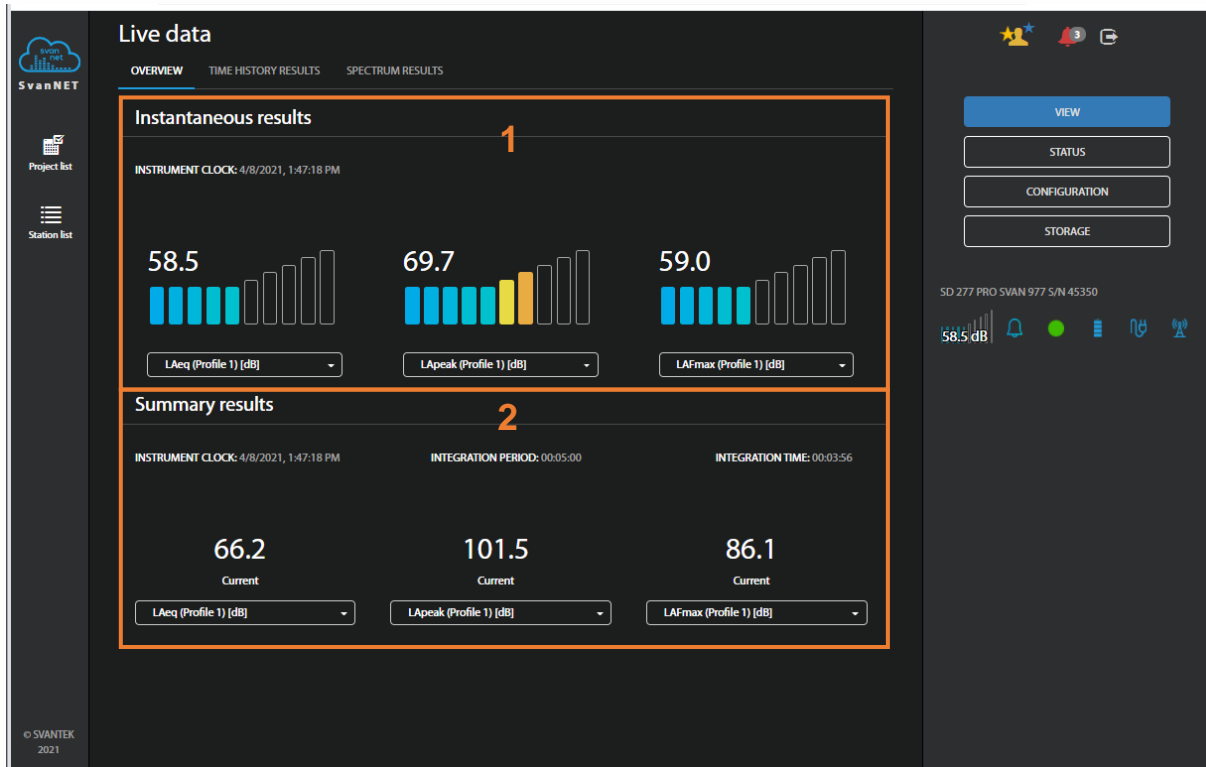
- for **Instantaneous results**, you can select the result out of list: **Lpeak**, **Lmax**, **Lmin** or **Leq**.

- for **Summary results**, you can select the result out of list: **Lpeak**, **Lmax**, **Lmin**, **LA**, **Leq**, **LAE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **OVL** and ten statistical level results (**Ln**).

Such results as **Lpeak**, **Lmax**, **Lmin** or **Leq** have in their names also filter abbreviation (**A**, **B** or **Z**) and **Lmax**, **Lmin** results have also detector type abbreviation (**F**=Fast, **S**=Slow, **I**=Impulse).
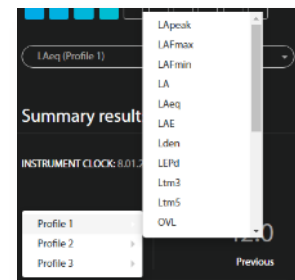
All results and formulas are presented in Appendix D to SVAN 977 User Manual.

  *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 tab of the **Configuration** view.*

The **TIME HISTORY RESULTS** tab displays the time history of the selected measurement results. In this tab you can:

1. Choose results for simultaneous displaying with the use of selector buttons (Leq, Lpeak, Lmax and Lmin) 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.
4. Scroll the time window over the time history.

There are four results (**Leq**, **Lpeak**, **Lmax** and **Lmin**) measured with appropriate weighting filters and detector types and available for each measurement profile from the pop-down list.
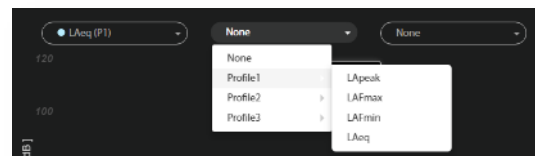
The **SPECTRUM RESULTS** tab displays current 1/1 or 1/3 octave Instant and Averaged results (LZeq) and three Total results.
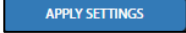
1. Point your mouse cursor on the plot to readout the values of instantaneous and averaged results for each 1/1 or 1/3 octave band.
2. Point your mouse cursor on the last three bars of the plot to readout the values of instantaneous and averaged three Total results.

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

5.2.2.   Configuration views

The **Configuration** view consists of several tabs that enable configuring measurement parameters (**MEASUREMENT SETUP**), saving measurement results (**STORAGE**), audio signal recording (**AUDIO RECORDING**) and triggering alarms based on events (**EVENT TRIGGER**).

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

In the **MEASUREMENT SETUP** tab, you can:

1. Select the **Measurement function**: **Level Meter**, **Octave 1/1**, **Octave 1/3**
2. Update the **Instrument clock**
3. Select the type of **RMS/LEQ Integration**: **Linear** or **Exponential**
4. Set the start synchronisation period (**Start sync**): **Off**, **1 minute**, **15 minutes**, **30 minutes** or **1 hour**
5. Select the measurement **Mode**: **Sound** or **Vibration**
6. Select the measurement **Range**: **Low** or **High**
7. Select **Filter** for profiles: for Sound mode: **Z**, **A**, **C**, **G**, **B** or for Vibration mode: **HP1**, **HP1**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **Wh**) and **Detector** type (for Sound mode: **Impulse**, **Fast**, **Slow** or for Vibration mode: **100ms**, **125ms**, **200ms**, **500ms**, **1s**, **2s**, **5s**, **10s**
8. Select **Microphone correction**: **Off**, **Free field**, **Diffuse**, **Environment** or **Airport**
9. Select time frame for calculating **Rolling Leq**.

Note: *Definitions and formulae for measurement results are presented in Appendix D of the SVAN 977 User Manual.*

In the **STORAGE** tab, you can:

1. Enable data logging

2. Program splitting of the logger file (**Logger splitting**)

3. Configure the **Summary results** parameters: switch on/off saving of the Summary results in a file (**Save summary results**), define measurement time and step of saving (**Integration period**), select number of measurement repetitions (**Repetition cycles**) and define ten **Statistical levels**

4. Configure saving of the **Time history** in a file: define step of saving (**Step**) and select results to be saved as a Time history for three profiles (Lpeak, Lmax, Lmin and Leq for the Sound mode and Peak, P-P, Max and RMS for the Vibration mode), switch on 1/1 or 1/3 octave spectra (**Save spectrum**) and weather station results (**Save meteo**).
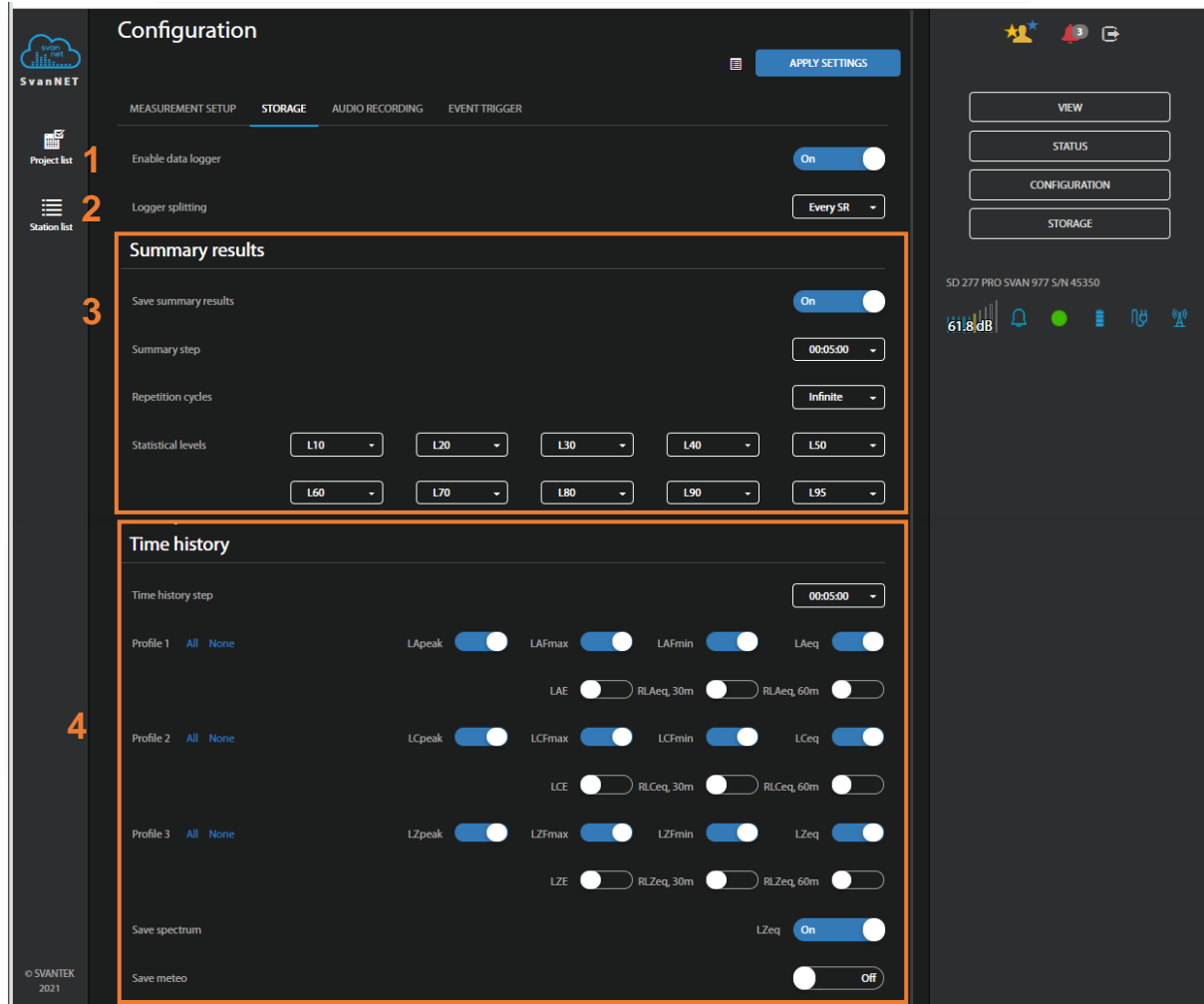
The **Logger splitting** position enables splitting of logger files and selecting the splitting mode: **Disabled**, **Every 15 m**, **Every 30 m**, **Every 1 h** and **Every day**.

If **Every day** is selected, you can define up to six points during a day when splitting will take place.
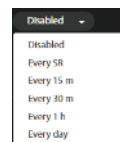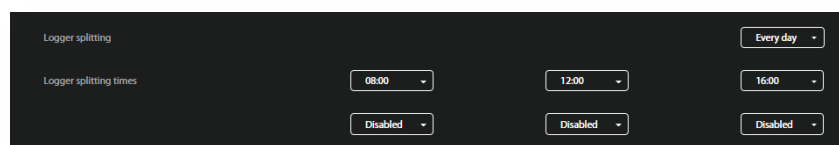
Summary step (Integration period) defines the period during which Summary results are measured (integrated) with filters and time constant defined in the MEASUREMENT SETUP tab and saved in a file as the set of Summary Results.

The Summary step can be selected in the pop-up list in the range from 1s to 24h.
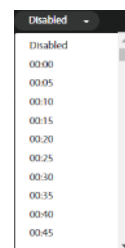
Repetition cycles defines the number of automatic repetition of measurements with the defined integration period. If you select **Infinite**, measurements will be repeated till the manual stop. If the number of cycles is defined, measurement cycles will be stopped after

that number of measurements automatically or earlier manually.

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

You can define ten statistical noise levels, named from **L01** to **L99**, to be calculated, displayed and saved in the file as Summary results.

Statistical noise level **Lnn** is a <u>level</u> in dB which was exceeded during **nn** percent of the Integration period. Statistical noise levels are calculated from histogram, created based on 100ms Leq results (see Appendix D).

⚠️ *Note: To ensure saving of any results you should enable data logging. Summary results are saved in the same file with Time history results.*

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

If the **Octave 1/1** or **Octave 1/3** function is selected, you can also switch on spectrum saving (**Save spectrum** button) as a time history with the logger **Step**.

The audio recording function is optional and if not enabled, the **AUDIO RECORDING** tab will not be visible.

In the **AUDIO RECORDING** tab, you can configure an audio signal recording in a separate *.wav type file.

There are four parameters of audio recording: **Format** (PCM or Extensible), **Bits per sample** (16 or 24), **Recording range** (from 21 dB – 96 dB to 61 dB – 136 dB), **Sampling** frequency (12kHz, 24kHz or 48kHz).
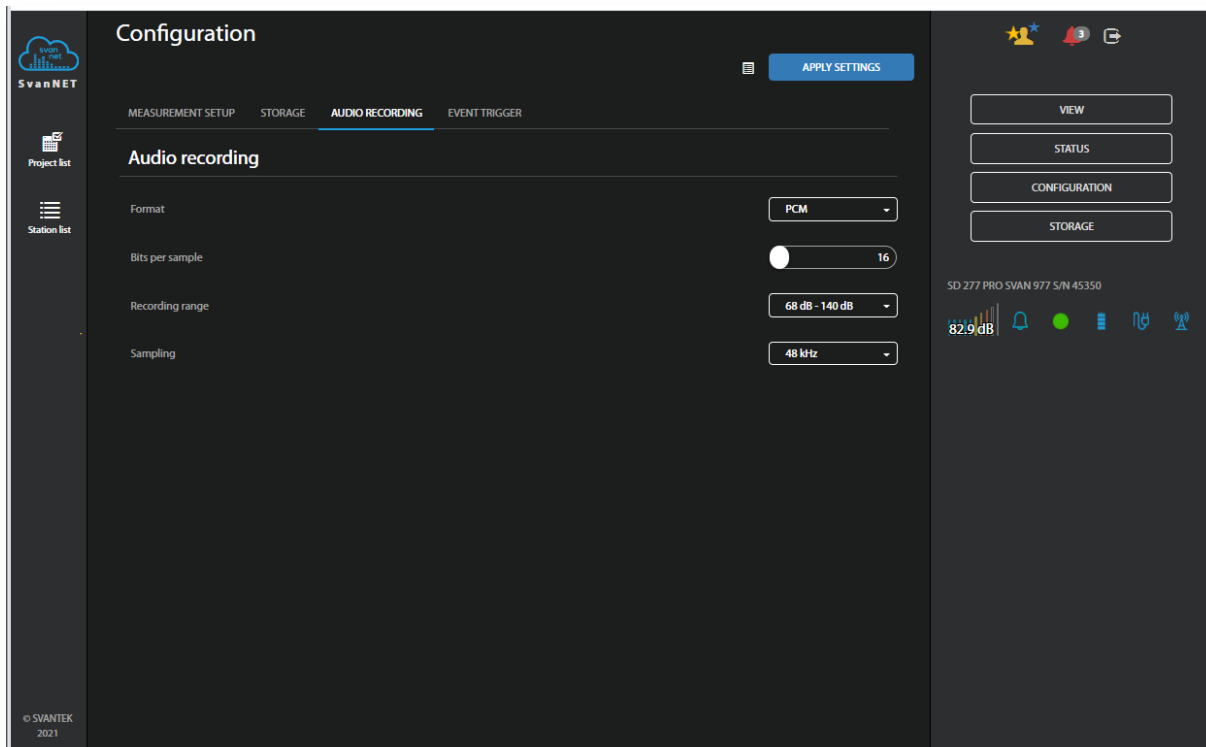
In the **EVENT TRIGGER** tab, you can configure events for triggering markers, audio recording and alarms.

1. Events are specified as a combination of superimposed **CONDITIONS** (logical AND) such as specific time intervals (**Time periods**) in which measurement threshold levels are exceed or system events occur (**Triggers**).
2. Each Event may relate to special triggers (**ACTIONS**) such as: marker recording to the logger file (**Marker**), audio signal recording to the wave file (**Audio**), generation of the alarm signal on the I/O socket (**I/O alarm**), alarm SMS sending (**SMS alarm**) or alarm e-mail sending (**E-mail alarm**).
3. Switch off the Event without deleting it. The Event becomes inactive, but you can switch it on when needed.

When events are not defined the **EVENT TRIGGER** tab is empty.
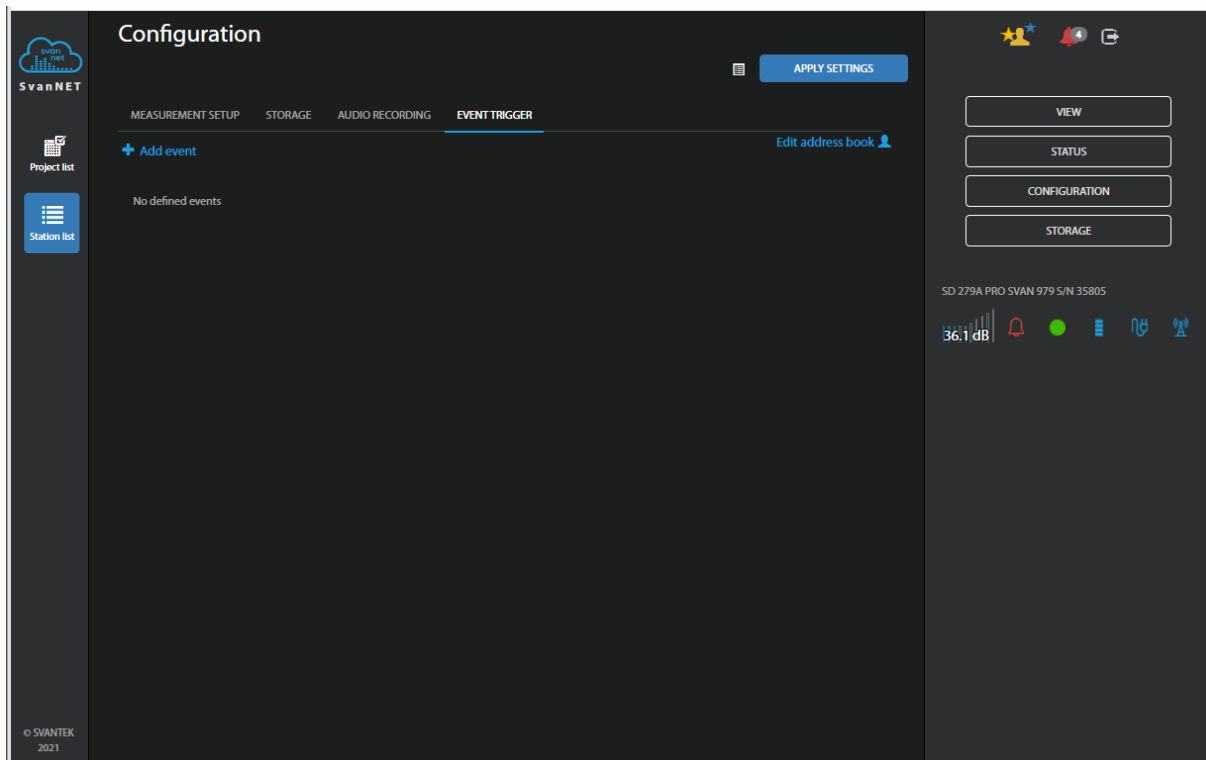
Creating Events

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

1. rename the event, switch it on/off or delete it, clicking on the appropriate field in the area,
2. configure conditions, clicking on the appropriate button.
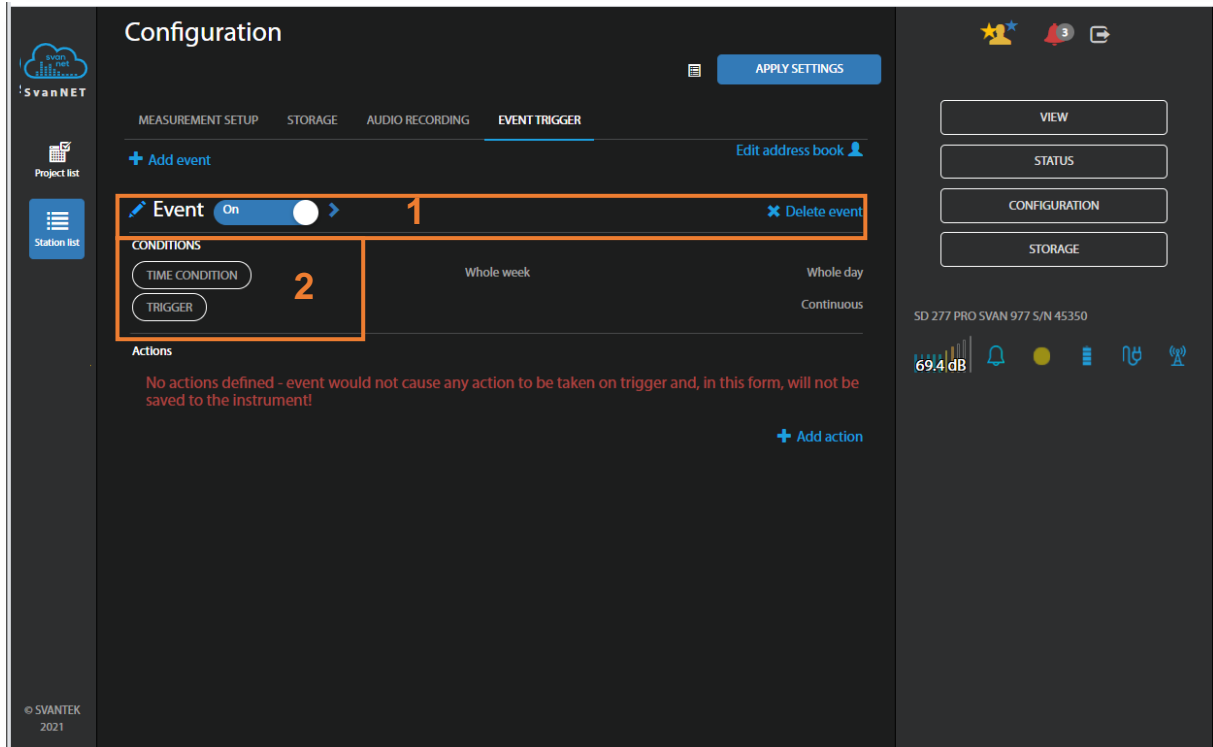
Configuring Conditions

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

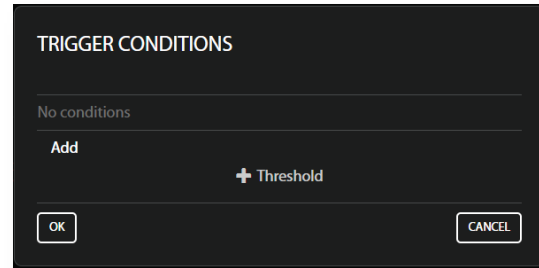In this box, you can select days and periods during which events occurrences will be registered.
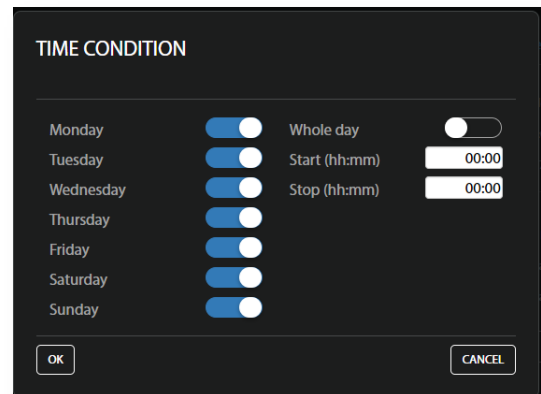
After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TIME PERIODS** button.
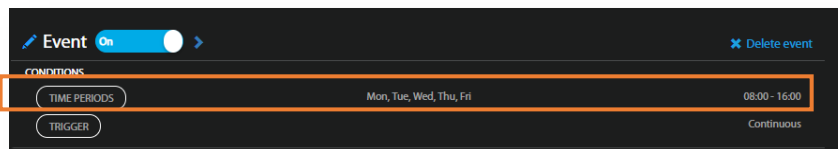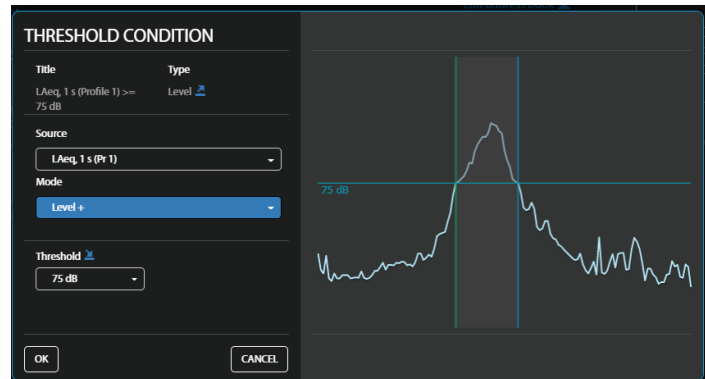
If you click the **TRIGGER** button, the **TRIGGER CONDITIONS** configuration box will pop-up.

In this box, you can add the condition type: **Threshold**.

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.

You can select as a **Source** different results (**Leq**, **Lpeak**, **Lmax**, **Lmin**, etc. in the Sound mode or **PEAK**, **MAX**, **RMS**, etc. in the Vibration mode) 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.
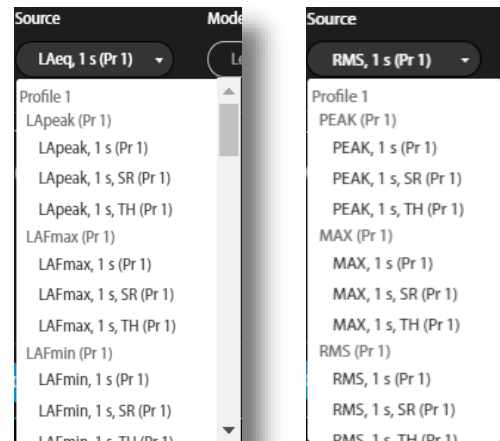
If you expand the **Threshold** by clicking the [Threshold] field, you can define **Start** and **Stop** threshold levels and delays (**Min. duration**) of start and stop.
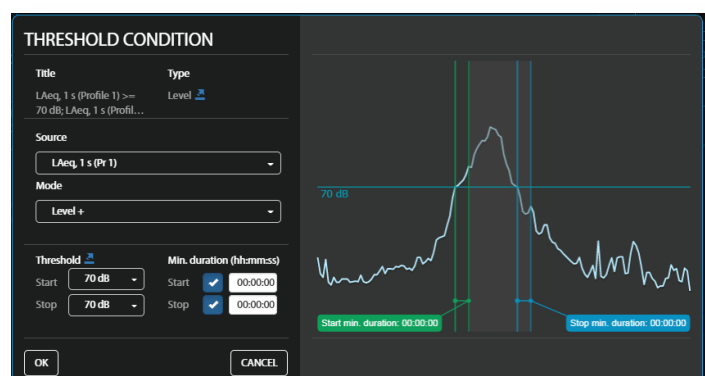
After confirmation (**OK**) the pop-up box closes, and the selection will be presented in the line of the **TRIGGER** button.
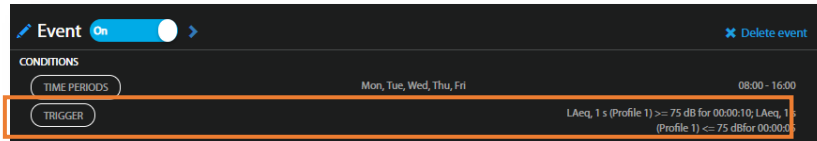
Configuring Actions

To create new action, click the field 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 an audio recording in the WAV file (Wave recording).

**Max. duration** defines maximum time of recording after the event start.
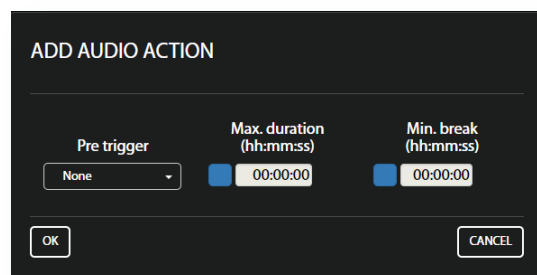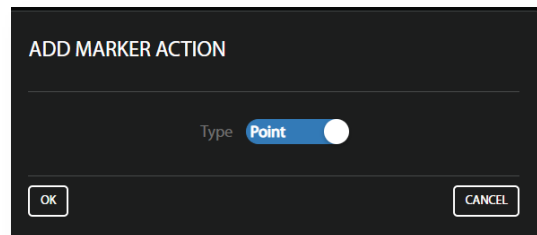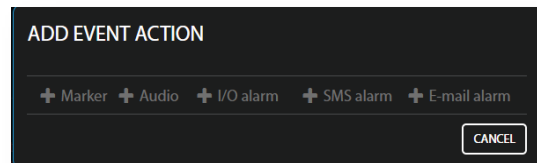
Min. break defines the minimum time break between two consequent records.

Pre trigger enables earlier start of recording with respect to the event start: **None**, **1 s** or **2 s**.

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).

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

Min. break defines the minimum time break between two consequent alarms.
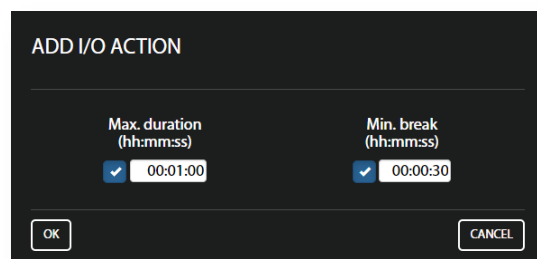
The **SMS Alarm** action sends the SMS note (**Message**) to the defined recipient's phones, which are selected from the **ADDRESS BOOK** after clicking [+Add recipient] field.

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

The **E-mail Alarm** action sends the E-mail note (**Subject** and **Message**) to the defined recipient's addresses, which are selected from the **ADDRESS BOOK** after clicking [+Add recipient] field.

Min. break defines the minimum time break between two consequent E-mails.

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

Address book

The **ADDRESS BOOK** pop-up window appears in the SMS and E-mail alarm actions pop-up windows when you click the [+Add recipient] field.

In this case you should select the required address (**+**) and click **OK**.

You can add the contact by clicking the [+ Add contact] field.

You can **Edit address book** from the **EVENT TRIGGER** tab of the **Configuration** view.

5.2.3. STATUS view

The **STATUS** view is similar to that described in the Chapter [5.1.1]. The difference is that instead of STATUS ALARMS, in this view, you can start/stop measurements.
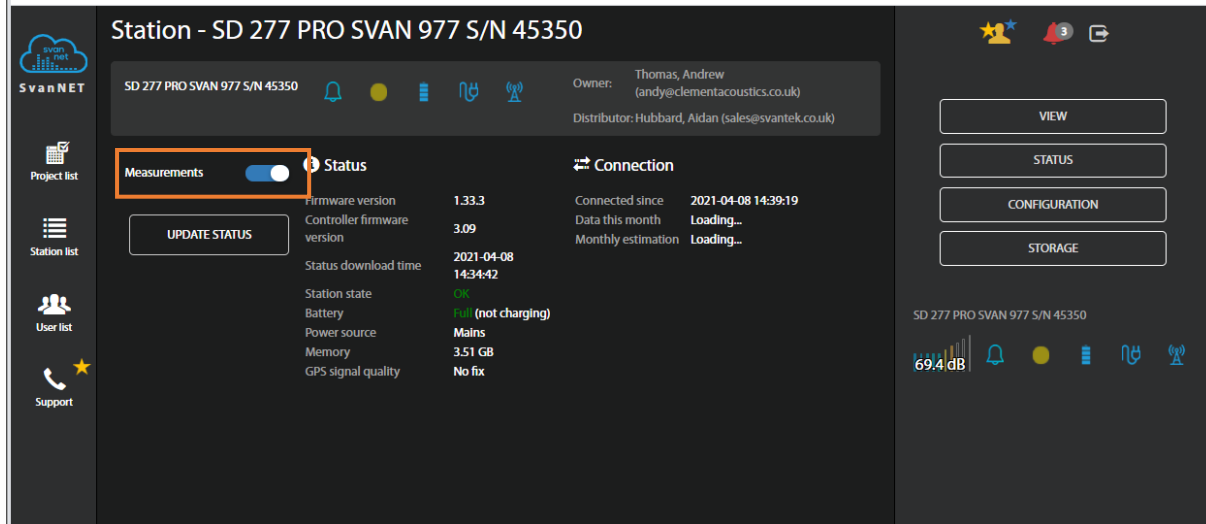
5.2.4. STORAGE view

The file storage view 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.
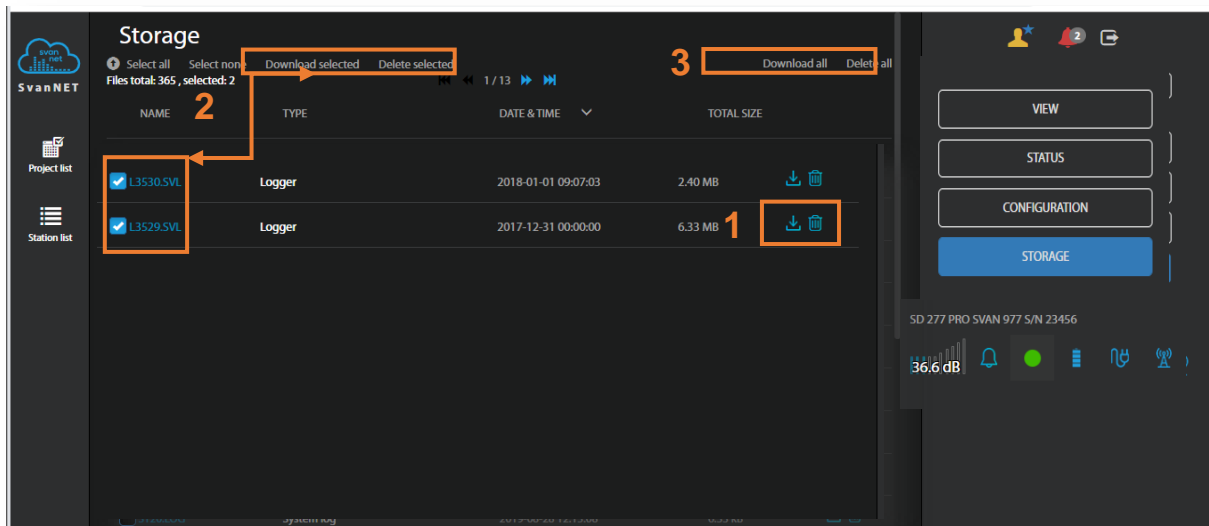
In the **Storage** view, you can:

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

> **Note**: See also "SvanNET User Manual".

APPENDIX A. SV 277 PRO TECHNICAL DATA[1]

No.	Parameter	Value/ Description
	Physical data	
1	Dimensions	SM 277 PRO – 300 x 260 x 190 mm SA 250 – 450 x 400 x 155 mm
2	Weight	SM 277 PRO – ~10 kg SA 250 – ~4 kg
3	Leakproof classification	SM 277 PRO – IP67 according to EN 60529 (1997) + A1 (2000)
4	Working temperature range	-30°C do +60°C (Ambient air temperature, without direct sunlight). *Note: Outside this range the station will automatically switch itself off.* *Note: In charging mode the range of working temperature is: -20°C to +50°C !*
5	Storage temperature range	SM 277 PRO and SA 250: -40°C to +70°C
6	Working relative humidity range	0 – 100 %RH
	Power Supply	
7	Internal battery	Europower EP 17-12 (12 V, 17 Ah)
8	SV 277 PRO power consumption without charging	Modem is switched off: ~1,0W Mean infrequent short transmissions: ~1,5W Continuous transmission: ~2,0W
9	Operating time when powered from the internal battery, (20°C, 17 Ah, fully charged)	Modem is switched off: ~200h (~8,3d) Mean infrequent short transmissions: ~130h (~5,4d) Continuous transmission: ~100h (~4,2d)

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[1] Our Company's policy is based upon continuous product development and innovation. Therefore, we reserve the right to change the specifications without any prior notice whatsoever

No.	Parameter	Value/ Description
10	SV 277 PRO power consumption including charging	up to 30W ±5%
11	External DC input	voltage: 10,5 V to 28 V **Note:** *When external DC input voltage is in the range 11 V to 15 V, the station is powered from the external DC source, but the internal battery is not charged!*
12	External DC power supply SB 270	15 V, 4 A, 60 W
13	External battery SB 272	Europower EP 33-12 (12 V, 33 Ah)
14	Operating time when powered from the internal and external SB272 batteries, (20°C, 17+33 Ah, fully charged)	Modem is switched off: ~620h (~26,0d) Mean infrequent short transmissions: ~380h (~16,0d) Continuous transmission: ~300h (~12,5d)
15	Solar panel (option)	System best fit with solar panel with a MPPV voltage 17,5±0,5V and power in the range of 30W to 120 W (without control system). **Note:** *Size and power of the panel depend on the climate of the area where the station operates.*
	Measurement Line	
16	SVAN 977 Meter/analyser	Datasheets are available at http://www.svantek.com .
17	SA 277 outdoor microphone kit	Set of weather protection for SV 12L preamplifier and ACO 7052E microphone.
18	ACO 7052E microphone	Pre-polarised 1/2" condenser microphone with sensitivity 35 mV/Pa.
	Note: *With the use of **Outdoor Airport** type compensation filter (filter must be defined in SVAN 977, see Chapter 2.1.3) the acoustic characteristics of SA 277 conforms the class 1 sound meters and IEC 61672:2002 standard for the direction 0 degree (normal direction regarding the microphone membrane). With the use of **Outdoor Environmental** type compensation filter the acoustic characteristics of SA 277 is switched to the direction 90 degree (parallel to the microphone membrane).*	

No.	Parameter	Value/ Description
		3G modem
22	modem type and features	Gemalto® EHS6T Terminal Five Bands UMTS (WCDMA/FDD): 800, 850, 900, 1900 and 2100 MHz
23	modem specifications	HSDPA Cat.8 / HSUPA Cat.6 data rates DL: max. 7.2 Mbps, UL: max. 5.76 Mbps EDGE Class 12 data rates DL: max. 237 kbps, UL: max. 237 kbps GPRS Class 12 data rates DL: max. 85.6 kbps, UL: max. 85.6 kbps
24	modem approvals	R&TTE, GCF, CE, FCC*, PTCRB*, IC*, UL AT&T* and other local approvals and provider Certifications *) EHS6-T only
		4G modem
25	modem type and features	Cinterion® PLS62T-W Gateway LTE (1,2,3,4,5,7,8,12(17),18,19,20,28), 3G (1, 2, 4, 5, 8, 9, 19), 2G Quad Band
26	modem specifications	LTE Cat.1 date rates DL: max 10.3Mbps UL: max. 5.2 Mbps HSPA+ Cat.8 (ELS61-US) data rates DL: max. 7.2 Mbps, UL: max. 5.76 Mbps GPRS Class 12 data rates DL: max. 85.6 kbps, UL: max. 85.6 kbps
27	modem approvals	CE, RED, GCF, PTCRB, IC, UL AT&T and other local approvals and provider Certifications WEEE, EuP, RoHS and REACH compliant

APPENDIX B. SA 277 OUTDOOR MICROPHONE KIT ASSEMBLY GUIDE

B.1. PART SET
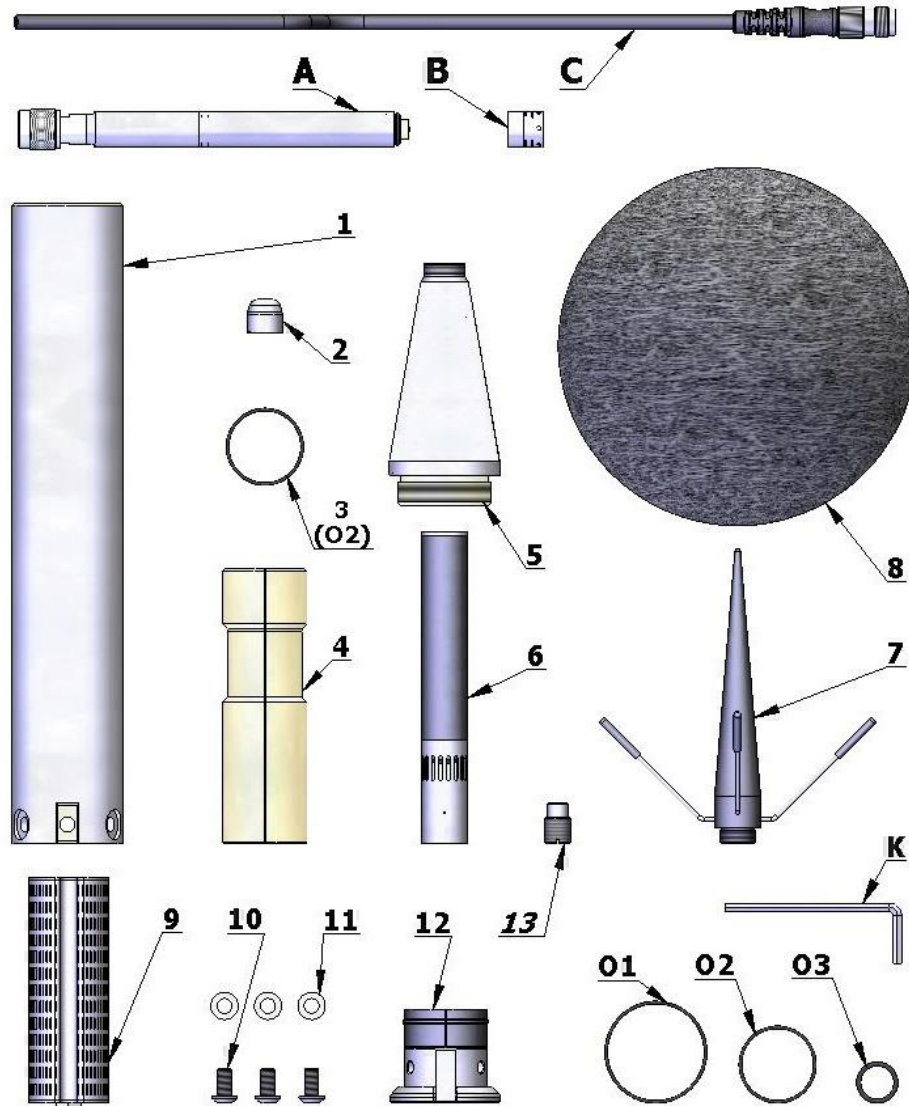
SA 277 kit:
  1 - tube
  2 - dummy microphone
  3 - O-ring type gasket
  4 - clamp (2 halves)
  5 - upper cone
  6 - microphone protecting tube
  7 - anti-bird spikes
  8 - windscreen (SA 209)
  9 - desiccator (not included)
 10 - M5x10 hex socket raised screw
 11 - washer

Tools:
K - 3mm Allen key

Spare parts:
O1 - O-ring type gasket Ø35x1
O2 - O-ring type gasket Ø26x1
O3 - O-ring type gasket Ø12x1.5

Parts not included:
A – SV 12L preamplifier
B – SV 7052 microphone
C – SC 236 / SC 26

12 - bottom
13 - ¼" thread adapter (not included)

O3

O1

O2
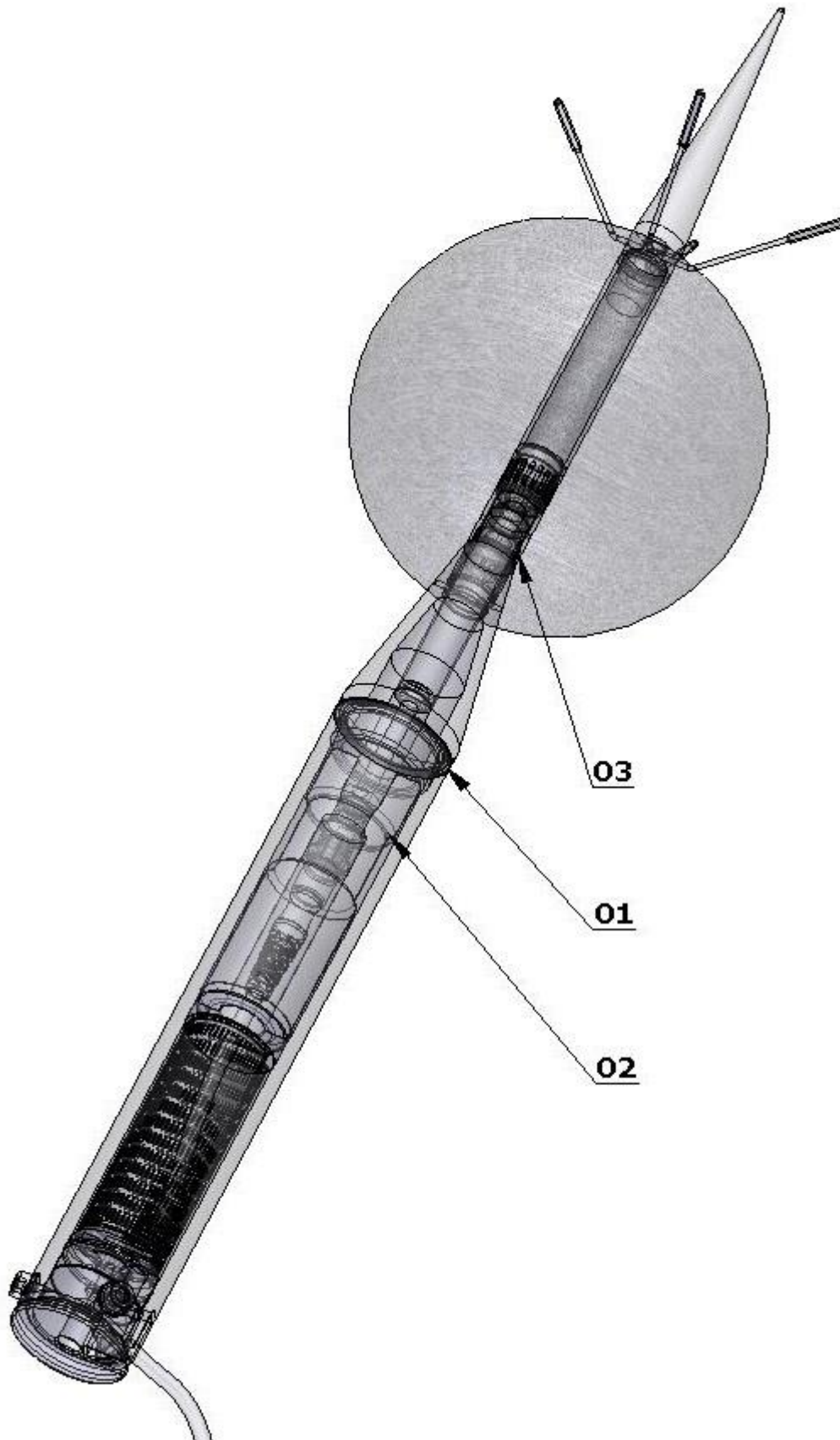
O-ring gasket locations inside

B.2. ASSEMBLY OF SA 277

1. Secure preamplifier (**A**) with the dummy microphone (**2**) and connect the cable (**C**).
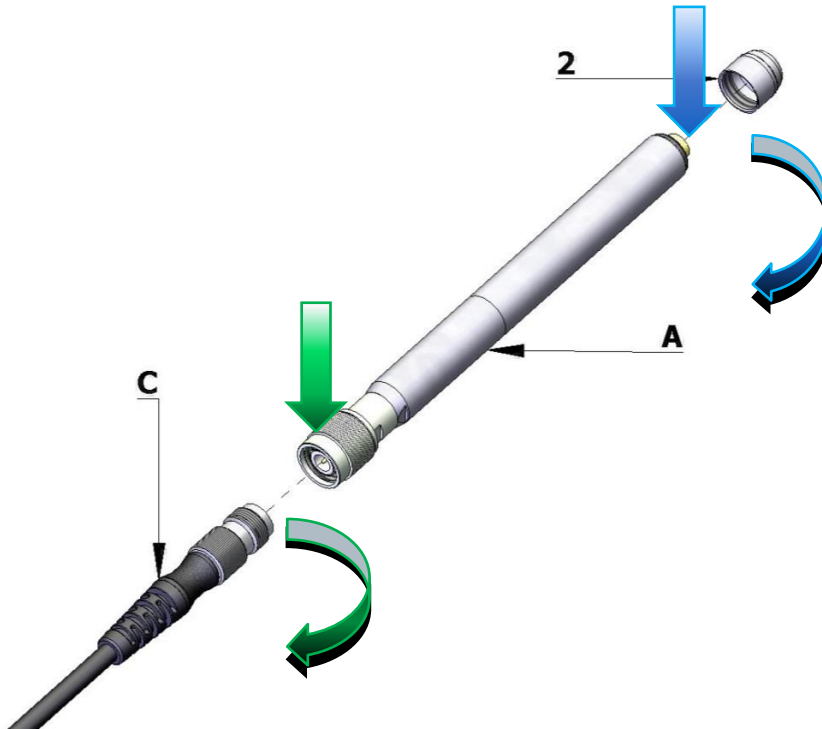
2. Pull tube (**1**) over the cable.

3. Connect the clamp halves (**4**) to the connector and insert O-ring gasket (**3**) on the lightning signed place.
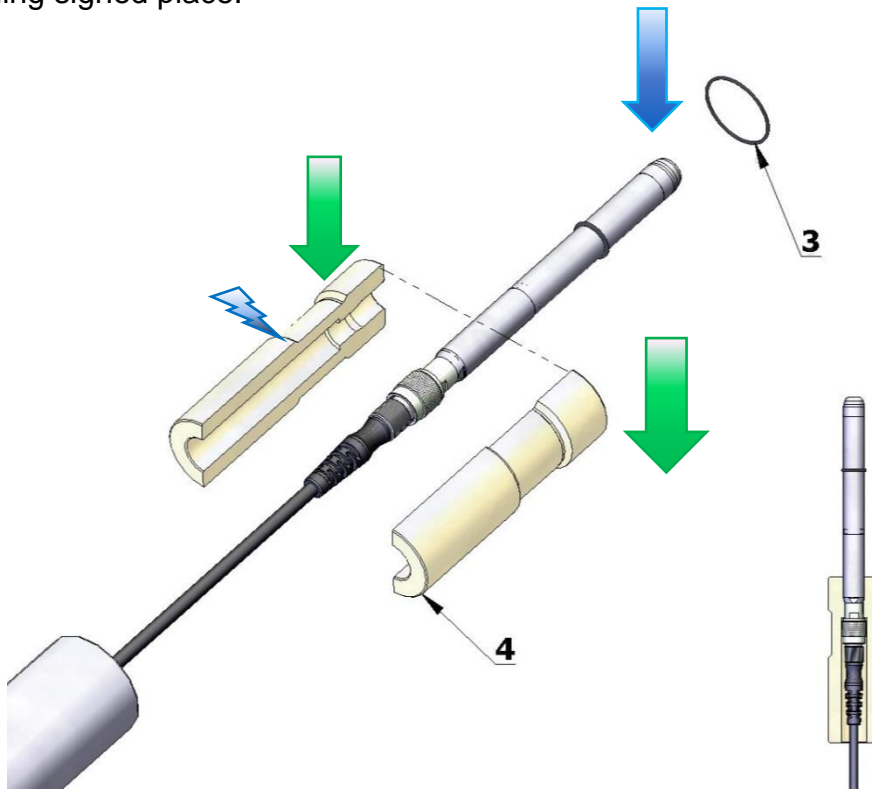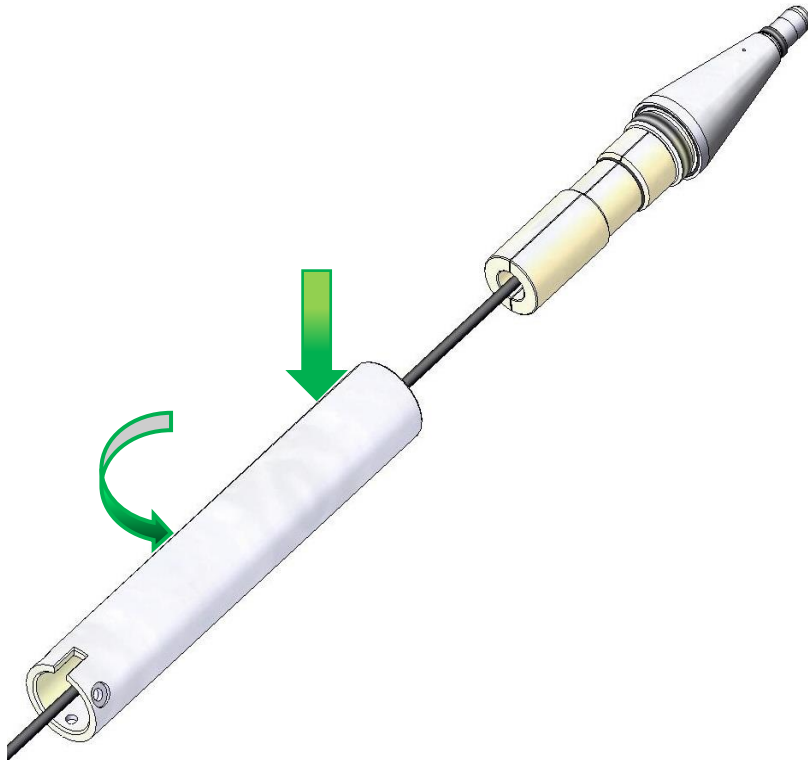

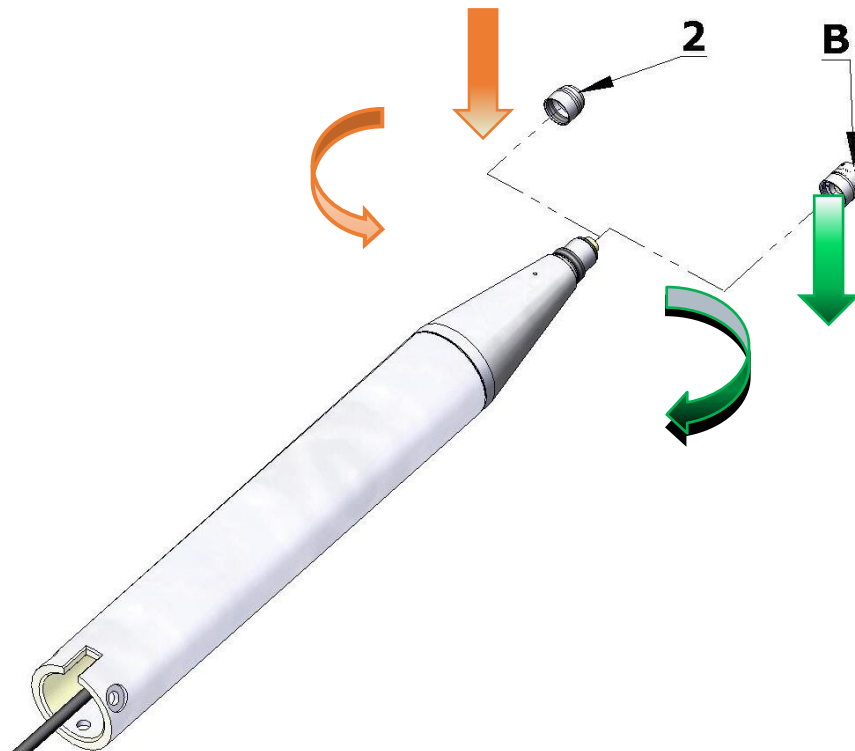4. Apply the upper, conical part (**5**) on the preamplifier.
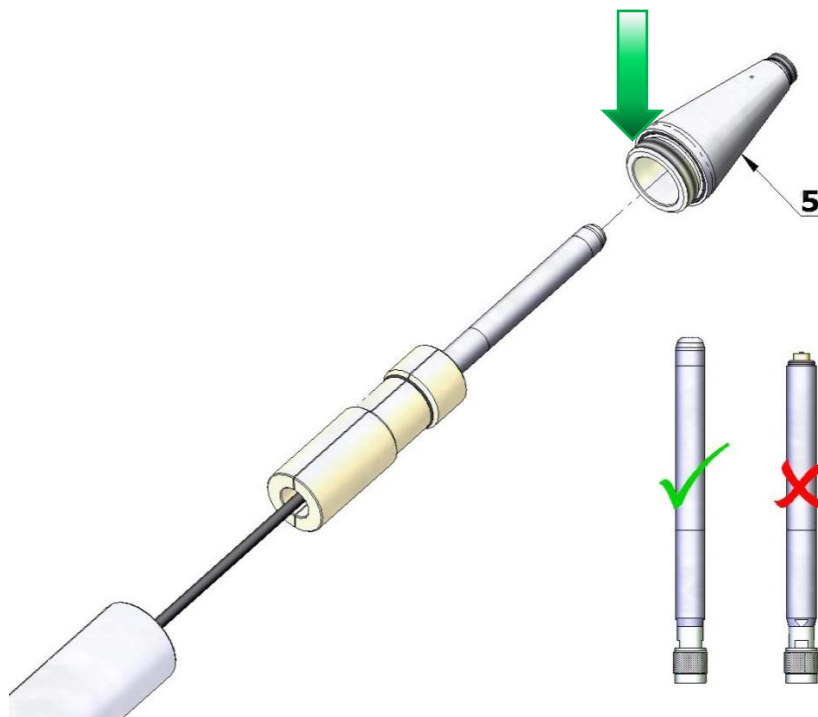
> ⚠️ *Note: Do not use preamplifier without the dummy microphone. It can cause damage of the O-ring gasket inside the cone.*

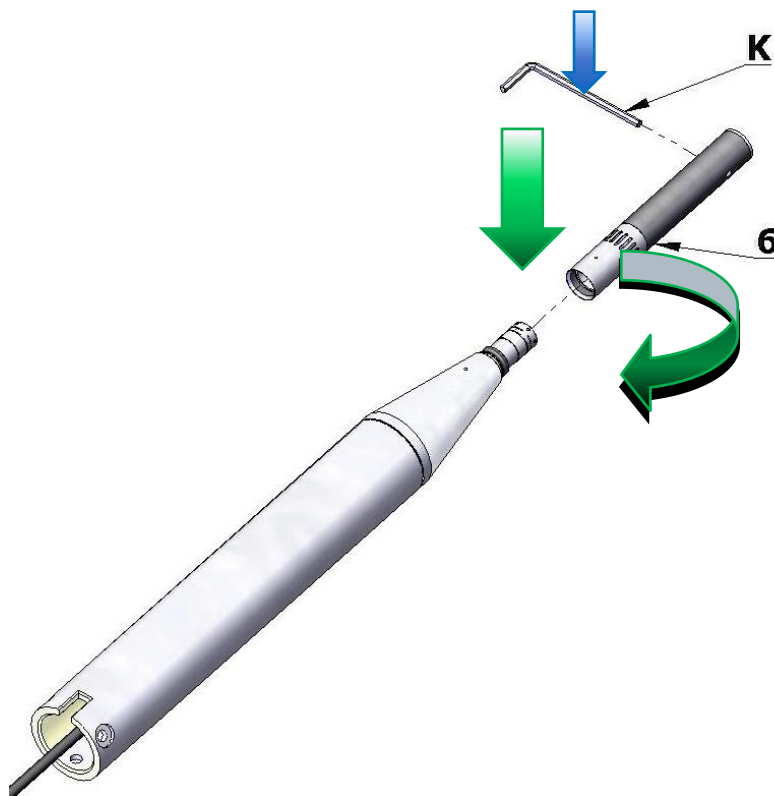5. Screw the tube on the cone by rotating the tube – so as to not twist the cable.

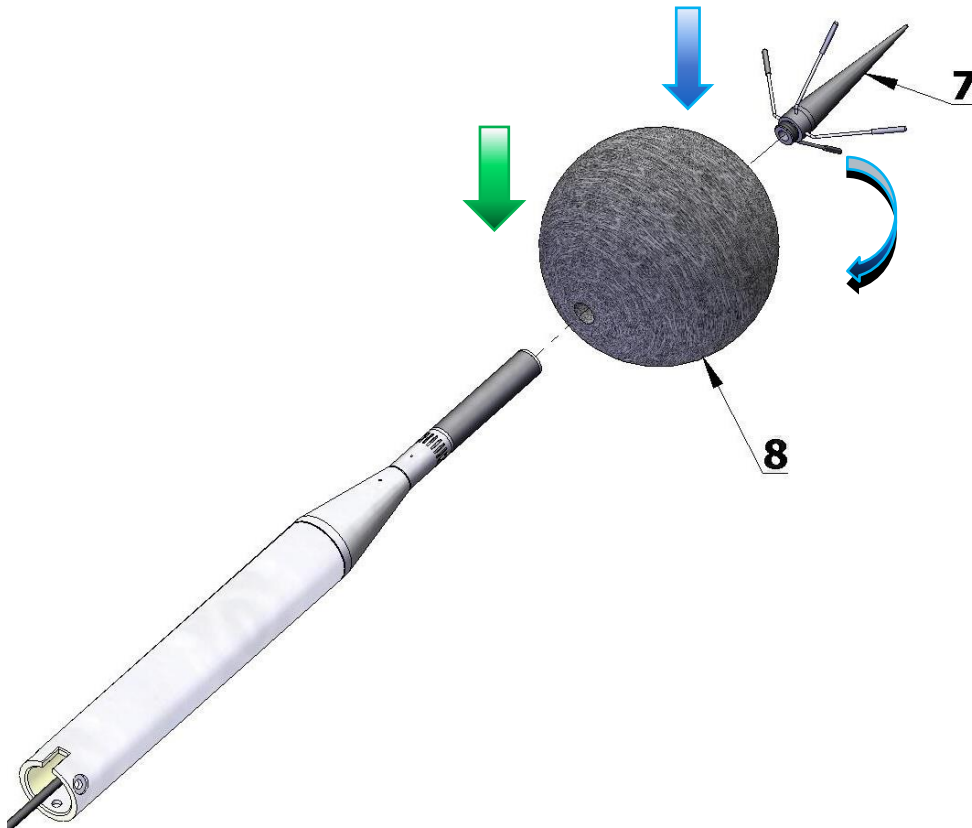6. Replace the dummy microphone (**2**) with the ½" microphone cartridge (**B**).

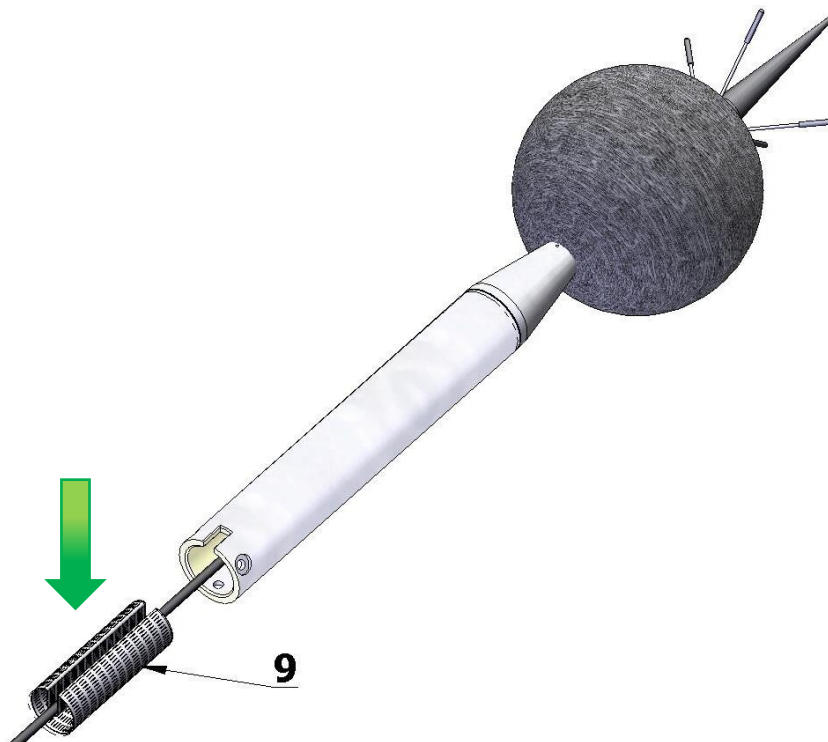7. Calibrate the complete system using SVANTEK acoustic calibrator.
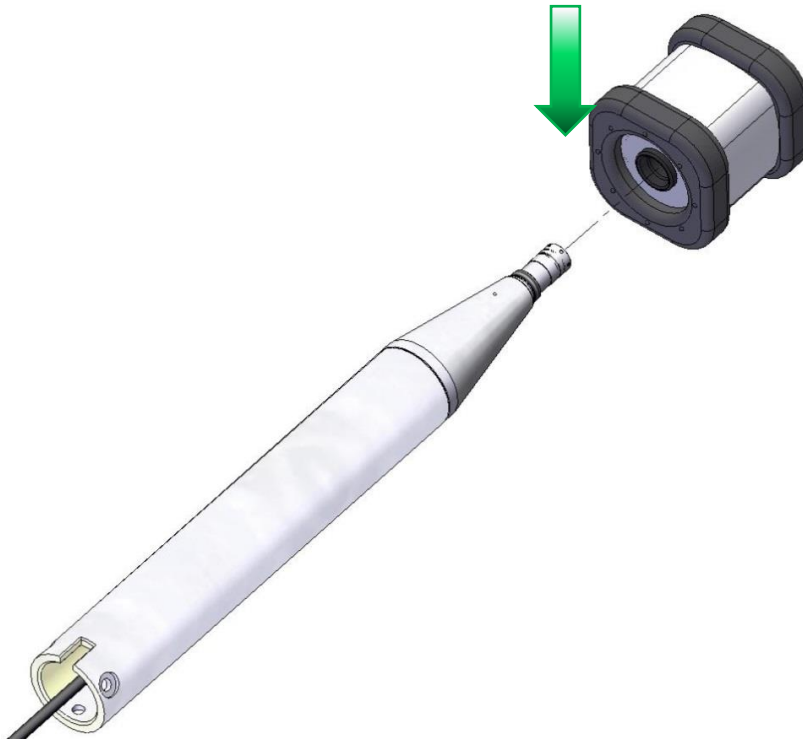
8. Install the microphone protection tube (**6**). Use the Allen key (**K**) as a pin at protecting tube orifice.

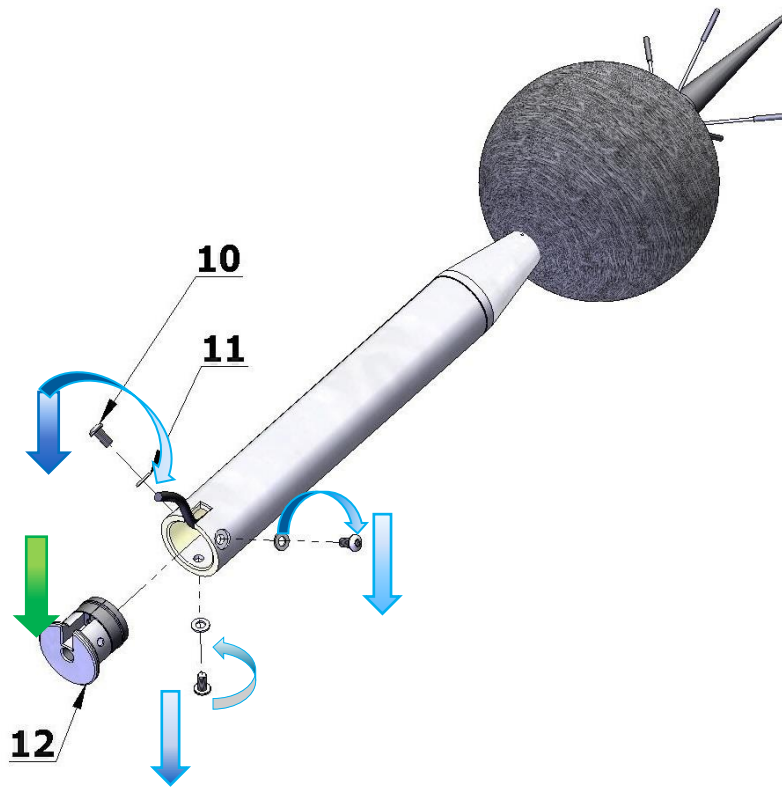9. Mount windscreen (**8**) and the anti-bird spikes (**7**).

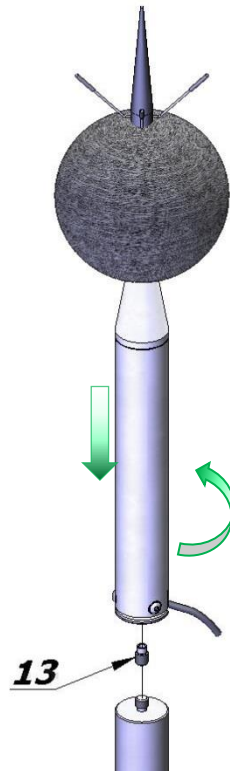10. Slide the desiccator (**9**) inside the tube.

11. Place the cable in the slot and connect the bottom part (**12**) by three screws (**10**)

with washers (**11**). Use the Allen key (**K**).

12. Mount the completed system on the dedicated tripod or pole. Use ¼" thread adapter (**13**) (if necessary) (see last note on next page).


B.3. IMPORTANT NOTES

⚠️ **Note:** *The SA 209 foam windscreen (part **8**) protects the microphone against wind and rain. If the SA 209 windscreen is used continuously for a long period of time it is recommended to replace it at least once a year.*

⚠️ **Note:** *During continuous usage the SA 209 windscreen is exposed to different weather conditions with possibility of causing physical damage to the foam's structure. Therefore, it is recommended, at least once a quarter (3 months), to check the condition of the windscreen by examining the surface for cracks by squeezing the foam. If cracks or holes are observed, the SA 209 windscreen must be replaced. Take care when examining the foam, as squeezing it too aggressively can damage the surface.*

Colour of the silica gel used in the desiccator (part **9**) when it is dry is amber. If colour of the silica gel turns light grey it means that the gel is soaked (wetted) and the desiccator is not able to absorb more moisture. Colour of the silica gel is visible through the window of the desiccator. If colour of the gel becomes light grey, the desiccator should be regenerated by drying it for 3 hours in temperature of 150°C.
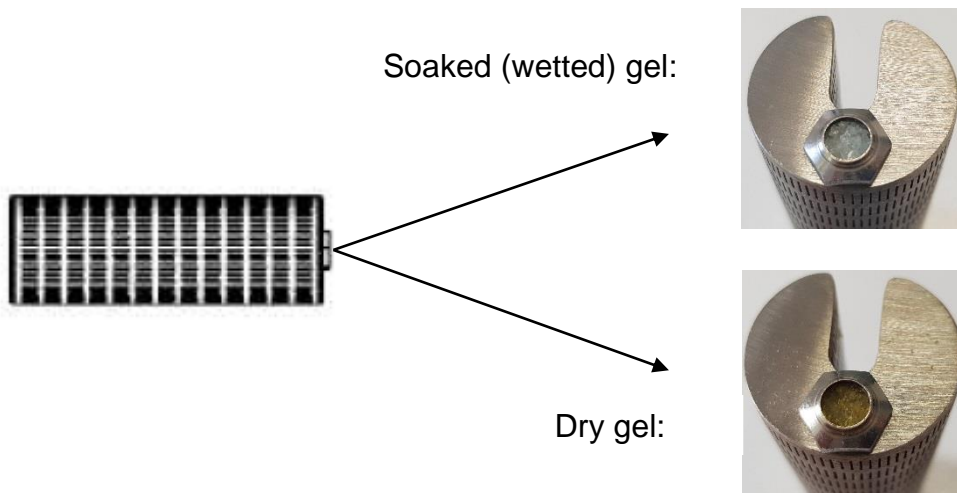
Soaked (wetted) gel:

Dry gel:

⚠️ **Note**: *Desiccator should be inspected at least every 2 weeks, and more often when used in conditions of high air humidity.*

⚠️ **Note:** *Desiccator must be stored in a hermetic container when is not installed in SA 277 to prevent absorbing moisture unnecessarily.*

⚠️ **Note:** *Tripod or pole with ¼" thread is not recommended for stormy weather.*

APPENDIX C. LIST OF RELATED DOCUMENTS

1. SVAN 977 User Manual (www.svantek.com)
2. SvanNET User Manual (www.svantek.com)
3. SvanPC++ User Manual (www.svantek.com)
4. Gemalto® EHS6T Terminal User Manual (www.thalesgroup.com/IoT)
5. Cinterion® PLS62T-W Gateway (www.thalesgroup.com/IoT)
6. WXT530 User Guide (www.vaisala.com)
7. MaxiMet GMX600 User Guide (www.gillinstruments.com)