USER MANUAL

SV 100A
VIBRATION DOSIMETER

Warsaw, March 2017

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Thank you for buying and using this SVANTEK product!

⚠ **Note:** *Battery power indicator - To improve accuracy of remaining battery life indicator, run the instrument until it is fully discharged; then proceed with a full charge via the mini USB port. The procedure is recommended before first use. Repeat this procedure every few months of use to maintain more accurate current battery condition indication.*

⚠ **Note:** *On account of continuous product improvement SVANTEK reserves the right to make changes to product specifications without Note. 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 firmware revision named 1.03.4 (see the **Unit Label** review to check version details).*

This user's manual presents some aspects of SUPERVISOR software revision named 2.1.18 (see the software start-up splash screen).

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

🗑 **WEEE Note:** *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.*

CONTENTS

1 INTRODUCTION

1.1 Vibration risk and its assessment

During human contact with the surface of the vibrating machine, mechanical vibrations are transmitted directly to the human body, affecting the individual tissues or even the whole body. Vibration that affects humans is called human vibration and is divided into whole-body (WBV) and hand-arm (HAV) vibration.

Whole-body vibration is transmitted through the seat or feet of employees who drive mobile machines, or other work vehicles, over rough and uneven surfaces as a main part of their job. Large shocks and jolts may cause health risks including back-pain.

The whole-body vibration measurement is performed in typical working conditions, when the employees perform tasks that are part of their normal routine, with normal exploitation of a tool, machine or device. For each selected activity performed by the employee, the weighted vibration acceleration is measured in three mutually perpendicular directions: a_{wx}; a_{wy}; a_{wz}.

The assessment of the level of exposure to vibration is based on the calculation of daily exposure A(8) expressed as equivalent continuous acceleration over an eight-hour period, calculated as the highest (RMS) value, or the highest vibration dose value (VDV) of the frequency-weighted accelerations, determined on three orthogonal axes ($1.4a_{wx}$, $1.4a_{wy}$, a_{wz} for a seated or standing worker) in accordance with ISO standard 2631-1(1997). The application of 1.4 weighting in x and y axes is associated with the higher risk of negative effects of the horizontal vibrations to the human health.

1.2 SV 100A as a new generation vibration exposure meter

The new SV 100A is a wireless whole-body vibration exposure meter suitable for whole-body measurements in accordance with ISO 2631-1 and Directive 2002/44/EC of the European Parliament. Suitable for taking measurements both on the seat and seat-back, the device uses the very latest technology and is ease of use. The instrument is equipped with 4 push buttons and a small OLED display that allows basic configuration in the field.
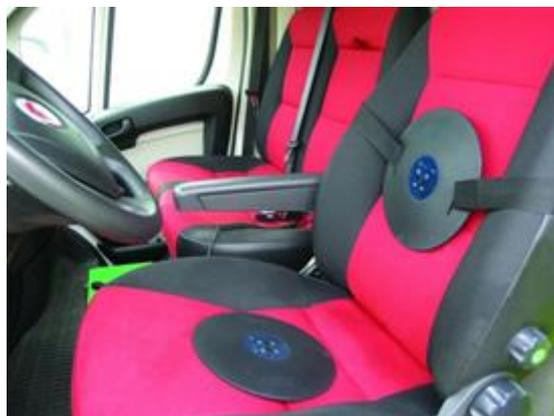
Figure 1-1 SV 100A application

The wireless BT communication interface enables current results to be previewed on a smartphone or tablet using our Assistant application. The smartphone application can also signal an alarm when set vibration limits are exceeded.

The ISO 2631-1 standard implies that it is desirable for the measurement report to include information about any changes in conditions over time. The SV 100A enables correlation of GPS data with the vibration data and plots them on a map, where the colour indicates vibration magnitudes. This simple solution gives a powerful tool for projecting the A(8) vibration exposure with respect to the vehicle speed and road conditions.

The device is equipped with both RMS and RMQ detectors which allow the calculation of Daily Vibration Exposure A(8) based on RMS and VDV simultaneously. Besides A(8) daily exposure the SV 100A provides results such as: a_w **(RMS)**, a_{wmax} **(RMS MAX), VDV, MaxVDV,** a_{wv} **(VECTOR), A(8) Daily Exposure, ELV Time (TIME LEFT TO LIMIT), EAV Time (TIME LEFT TO ACTION), MTVV, Max, Peak, Peak-Peak** (with selectable weighting filters). All measurement results are stored in a large 8 GB internal memory.

For advanced users, the SV 100A offers options for frequency analysis in 1/1 or 1/3 octaves and time signal recording to WAV format in accordance to ISO 2631-5 that is compatible with popular recalculation software.

The SV 100A is fully configurable with our Supervisor software. It can quickly and easily be setup for all the weighting filters required by ISO standards for the estimation of the effects of vibration on health, comfort, perception and motion sickness. The dedicated Whole-Body Vibration Exposure panel within Supervisor software makes reporting extremely easy.

The instrument is powered from internal new generation Ni-MH rechargeable batteries offering circa 30 hours of continuous operation. The powering and charging of the instrument from the USB interface is provided which also enables easy data exchange connection between the **SV 100A** and a PC without the requirement of a special docking station.

2 SV 100A SYSTEM DESCRIPTION

2.1 SV 100A key features

- Whole-body Vibration Exposure Meter complying to ISO 8041
- Wireless instrument with rechargeable battery
- Unattended measurement of seat-pad or seat-back vibration
- Wireless BT communication
- Auto-detection of the operator
- Weighting filters complying to ISO 2631-1
- Calculation of A(8) Daily Exposure
- Results both in ms^{-2} and exposure points
- Large **8 GB** memory
- USB 2.0 interface
- OLED display with super brightness and contrast and push-buttons
- Digital true RMS detector with Peak detection, resolution 0.1 dB
- Frequency Range **0.1 Hz ÷ 180 Hz**
- Measurement range **0.018 ms^{-2} RMS ÷ 157 ms^{-2} PEAK**
- Simultaneous measurement results: **aren**, **VDVR**, **PEAK**, **P-P**, **MAX**, **CExp**, **A(8)**, **EAVTT**, **EAVTL**, **ELVTT**, **ELVTL**, **OVL**, **TIME**, **aw (RMS)**, **VDV**, **CRF**, **MSDV**, **awv (Vector)**, **CDose**, **DDose**, **CExp**,
- **3** user configurable measurement channels
- Easy in use **predefined setups**
- **Time-history** data logging of **PEAK/P-P/MTVV/aw/VDV/awv/spectrum** with variable 0.1 s to 1 h logger step for three channels
- **Time-domain** signal recording (optional)
- **1/1 Octave** or **1/3 Octave** real time analysis (optional)
- Operational time **> 30 hours** *(display off, octave analysis off)*
- **Assistant** - smartphone/tablet application for Android 5.0 or iOS 9.0 or later platforms allows full distant control and additional GPS data logging (speed and location of the vehicle)

2.2 Kit components

- **SV 100A** – vibration dosimeter (with rechargeable batteries)
- **SA 54** – charger/power supply for SV 100A
- **SC 56 -** mini USB 2.0 cable
- **SA 145** - carrying case for SV 100A instrument and accessories (waterproof)
- **Screw** for fixing SV 100A to SV 111
- **Mounting belt** to SV 100A
- **CD** with user manual

- **Supervisor Software** for configuration, viewing and exporting data, USB drivers for 32 and 64 bit operating systems (MS Windows) available as freeware
- **Assistant** – Android 5.0 or iOS 9.0 application

2.3   Related optional equipment & accessories

- **SV 111** – Vibration calibrator for in-situ check per ISO 8041:2005
- **SA 136** – Calibration adapter for SV 100A periodical verification

2.4   Instrument Software (Firmware) options available

- **SF 100A_OCT** – 1/1 Octave real time analysis option
- **SF 100A_3OCT** – 1/1 and 1/3 Octave real time analysis option
- **SF 100A_WAV** - Time domain signal recording option
- **SF 100A_Wf** - Motion sickness measurement option per ISO 2631-1

⚠️   *Note: The software options can be purchased in any time as only the introduction of a special code is required for their activation.*

3 GETTING STARTED

3.1 SV 100A control panel, interface

The following Figure 3-ure shows the **SV 100A** controls and ports:

Figure 3-1 **SV 100A view**
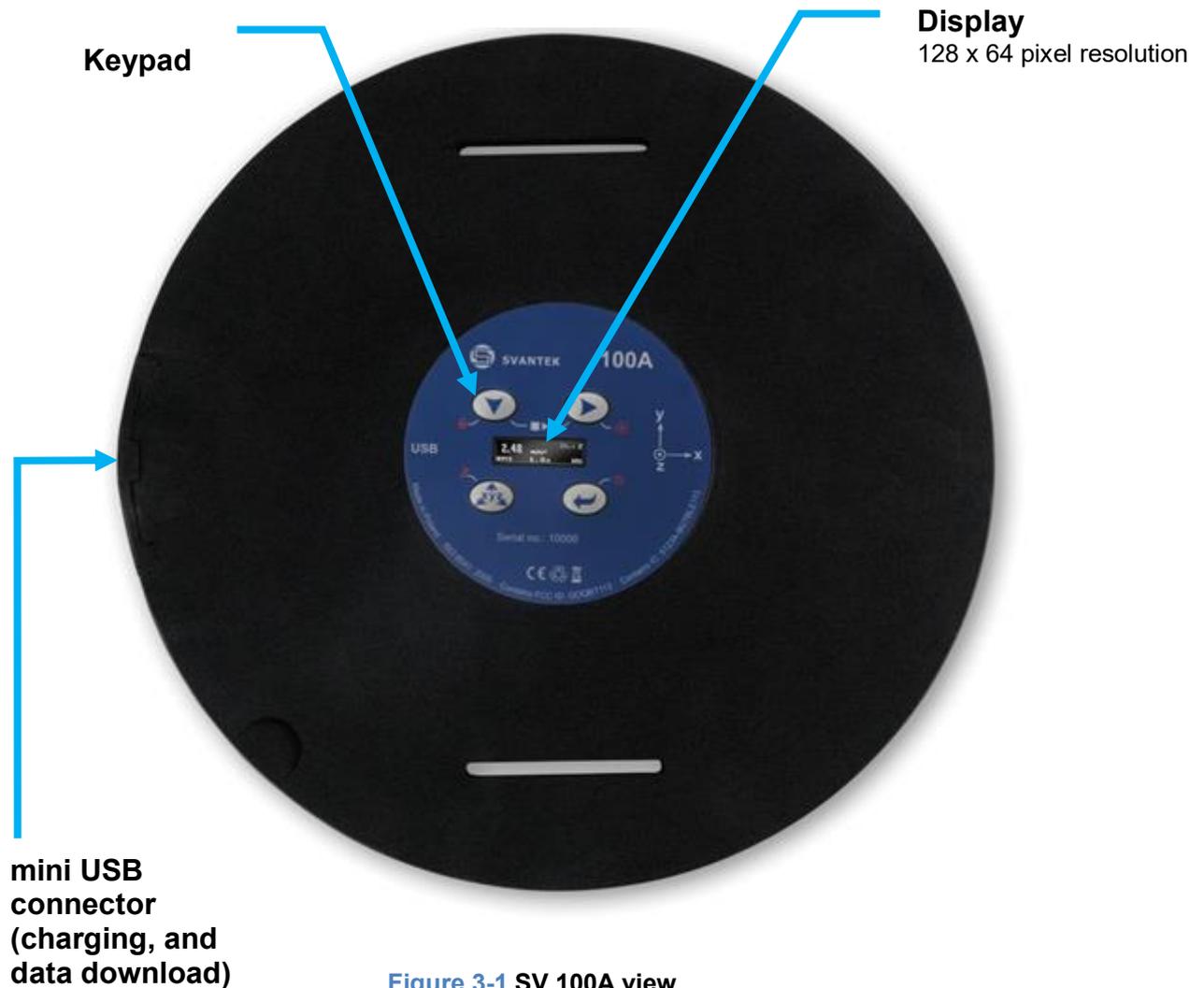
3.2 Measurement with SV 100A vibration exposure level meter

To perform measurements with SV 100A, follow next steps:
- Configure the instrument using SUPERVISOR software or load available setup (see section 4.4)
- Place the instrument on a vehicle seat to be monitored (e.g. truck seat) and start the measurement manually or from smartphone/tablet application
- Download measurement results to a PC by SUPERVISOR software for data processing and visualisation (see section 5.5).

3.3 Manual control of the instrument

The Instrument's keypad is designed to be minimal, but still highly ergonomic and easy to use providing effective operational capabilities. Thanks to that, the number of the control push-buttons of the instrument is reduced to only four.

Generally, the user can operate the instrument by:

- change the **VIEW** mode with the **<ENTER>** ⏎ key
- select the required **VIBRATION AXIS** with the **<AXIS>** ⊕ key
- and **SCROLL** thru the results with the ▼ or ▶ keys

⚠ **Note:** *To save power consumption and extend battery life, **SV 100A** will automatically switch off the display after 30 seconds if no button on the keypad is pressed.*

3.3.1 Primary key functions

On the front panel of the instrument, the following primary (shortly pressed) control keys are located:
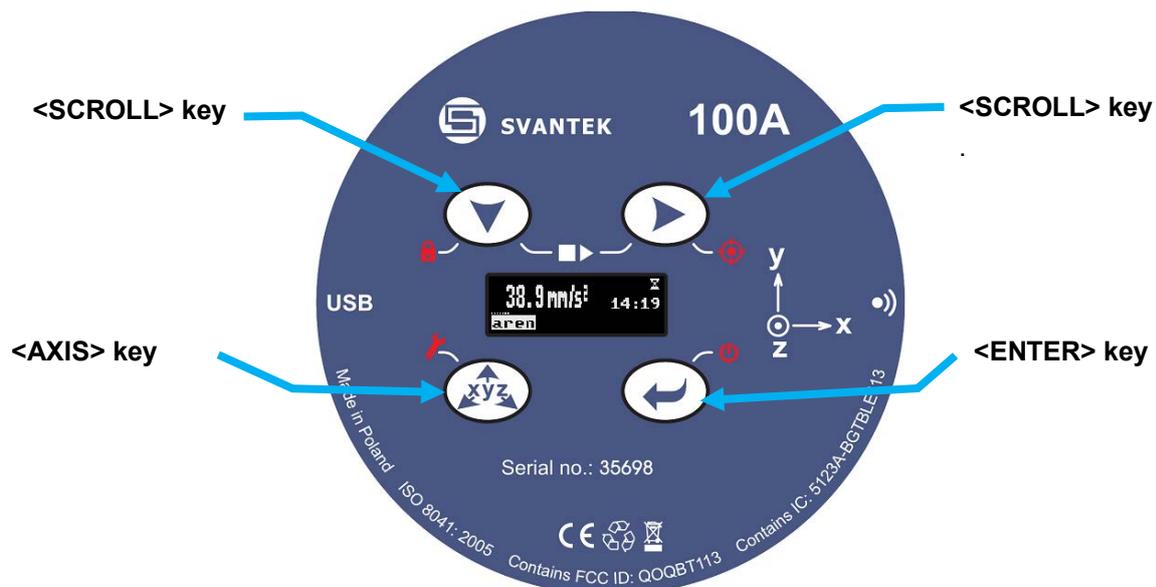
Figure 3-2 Control keypad on the front panel – primary key functions

<SCROLL> ▼ or ▶ keys allow to:

- scroll down thru results in the RESULTS VIEW modes;
- scroll down and up thru menu **Calibration** positions;
- scroll down and up thru setups in the **Load Setup** menu;
- decrease and increase the values of the **Level** parameter in the **Calibration axis** screens;

<ENTER> ⏎ key allows to:

- change VIEW modes;
- enter different positions in the **Calibration** screens ;
- confirm changed parameters (for example, **Level** parameter in the **Calibration axis** screens);
- confirm Warnings or other confirmation messages.

<AXIS> key allows to:

- change presented vibration channels;
- escape from all screens;
- reject Warnings or other confirmation messages.

3.3.2 Alternate key functions

Alternative **long press of single keys** (keypad icons marked with red colour) allow quick access to special functions:

- **Power ON/OFF** the unit by holding down the **<ENTER>** key

X	2.97 mm/s²	07:51
Y	3.12 mm/s²	
Z	14.16 mm/s²	aw

- **Screen activation** when keyboard locked by holding down the **<ENTER>** key

Keyboard Locked

- **Calibration** menu activation by holding down the **<SCROLL>** key

Calibration
By Measurement
System Check

- **Lock** keypad and screen by holding down the **<SCROLL>** key

Keyboard Locked

- **Setup** loading by holding down the **<AXIS>** key

Load Setup
🔧 SETUP1 ⚙
🔧 SETUP2 ⚪
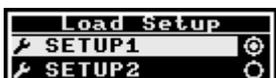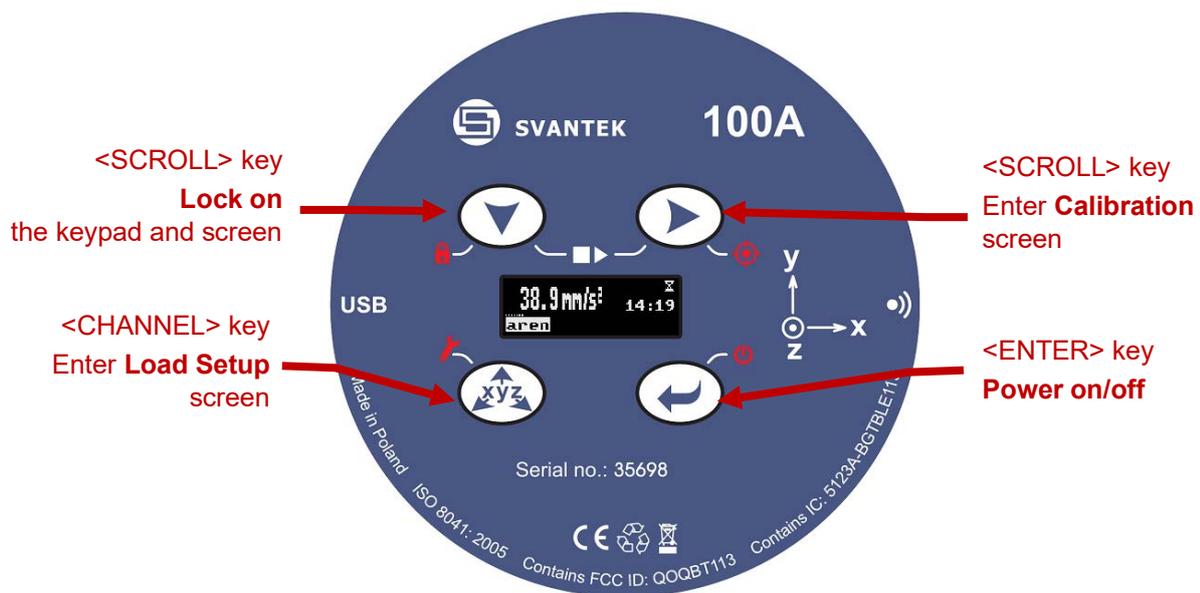
Figure 3-3 Control keypad on the front panel – alternate key functions

When holding down a key for few seconds, a countdown is displayed. If you release the key too early, **SV 100A** returns to the last used **VIEW** mode and the selected control function will not be executed.

3.3.3 Alternate combined keys function

Additionally, **combined short press of two keys simultaneously** allow quick access to even more functionalities:

- **Start/Stop** measurement by pressing the **<SCROLL>** ⌄ and ▶ keys simultaneously

- Enter **Units** screen by pressing the **<SCROLL>** ⌄ and **<AXIS>** ⊕ keys simultaneously

- Enter **Unit Label** screen by pressing the **<AXIS>** ⊕ and **<ENTER>** ↵ keys simultaneously

3.4 Charging

SV 100A instrument is equipped with an internal charger, so that the fixed internal batteries can be charged directly from USB port or **SA 54** charger.

After connection **SV 100A** to a USB port or to USB charger it will automatically switch on during charging and display status of the internal instrument battery. The **SV 100A** will display 'Fully charged' once charging is complete. Full charging from **SA 54** should take approximately 4 hours from a fully discharged state. Charging from PC via USB port is much slower and takes approximately 10 hours for fully discharged battery. A charging time of about 2 hours will be sufficient to perform at least 8 hours of measurements. A fully charged instrument holds enough charge to run for approximately 30 hours. After disconnection from USB power supply, the instrument will automatically switch itself off.

Ensure the **SV 100A** is fully charged prior to use it for dose measurements.

⚠ *Note: To charge a fully discharged battery, it would take approximately 3-5 hours. Note also, that instrument under charging condition is slightly warm. It is normal state for NiMH type cells and does not affect the measurement accuracy.*

⚠ *Note: Use only high quality USB cables. Many poor-quality cables do not ensure low resistance of the cable, thus disabling proper charging of the internal cells.*

3.5 Turning the instrument on/off

TURNING ON: To switch the power on the operator should hold the **<ENTER>** ↵ key for a couple of seconds. The instrument switches on and goes through the self-test routine (during this time the manufacturer's logo, the name of the instrument and firmware version is displayed).

In ready to measure mode the SV 100A displays the running instantaneous RMS view (if enabled):

⚠ **Note:** Warm up time - After power on, the instrument should be warmed up for at least 60 seconds before starting measurement.

⚠ **Note:** If you leave the instrument in stopped (ready to measure) mode, the display will be switched off after 30 seconds, and the unit will turn off after the period of no keypad activity to save the batteries. The switch off period can be programmed and is set up for 1 hour by default.

⚠ **Note:** SV 100A will show a warning screen if the battery capacity is below 2 hours of potential measurement time.

TURNING OFF: To shut down the unit the operator should hold the **<ENTER>** ↵ key for a couple of seconds during which a countdown ("Shutting down" 3… 2… 1…) is displayed. Thus, the **SV 100A** gives you time to decide if you really want to turn off the instrument. If you release the key too early, the **SV 100A** returns to the last presented **VIEW** mode.

If enabled in the configuration setup there may be presented an additional, double-check, warning screen. This is for the operator to be aware and convinced the unit is really to be turned off.

```
Warning !
Power Off ?
No      Yes
```

⚠ **Note:** If **auto-run** (timer) mode is active, **SV 100A** will automatically stop the measurement when the set time is over and then turn off. If no **auto-run** mode is used and specific time has not been pre-set, the unit will continue to measure until the battery is exhausted. Just before switch off, the measurement run will be stopped and all data until that point will be saved securely for later download to the PC.

3.6   Starting and stopping measurement run

START:

Before starting a measurement ensure that:
1. the instrument is turned on,
2. there is sufficient battery operating life and free memory by checking the status screen,
3. the required configuration setup selected,
4. the **SV 100A** is calibrated, because it affects the results.

To start the measurements the user has to press the **<SCROLL>** ▼ and ▶ keys at the same time. The results of the measurement are displayed in the last used result's display view mode. One profile mode is always available for most Functions of the instrument. The results of the measurements can also be presented in other display modes, which can be enabled or disabled and adjusted to the user's needs.
The keyboard is always blocked when measurement starts.

STOP:

The same combination of keys: **<SCROLL>** ▼ and ▶ allows the user to stop the measurement run, but before to stop it the user should unblock the instrument.

If the auto save function is not switched off, all run results are always saved automatically, there is no need to save them manually.

After stopping the measurement run, make sure that:
1. the data to PC for further analysis is downloaded,
2. the instrument is turned off.

4 RUNNING AND OPERATING BASIC PROCEDURES

4.1 The VIEW mode presentation concept

Such an advanced vibration instrument as the **SV 100A** offers many parameters for the operator to inspect. Therefore, all information is divided in neatly organized manner as **VIEW** modes for each channel.

The **VIEW** mode is a way in which the measurement parameters are presented to the operator. In other words, when you change the **VIEW** mode, specific measurement parameters and status information will be presented in different manner as distinct screen content.

SV 100A features the following **VIEW** modes, where most of them can be individually disabled:
- Running RMS for three channels view mode
- Primary "one-result" parameters Basic view mode - *cannot be disabled*
- Additional "one-result" parameters Large View mode
- 3-channel View mode
- Results for 3-channel View mode
- Instrument Status view mode
- File Information view mode

4.1.1 Running RMS view mode

Running RMS presentation mode is used when measurement run is not actually running, e.g. when the instrument is in standby mode before or after a measurement. In this mode, the current RMS results for all channels are calculated and displayed, but not stored in the instrument's memory. The purpose of this is to give the user a first indication of the vibration levels. The instrument behaves as a simple general purpose vibration level meter in this view mode.

Figure 4-1 Running RMS view mode screen

4.1.2 Primary "Basic View" parameters view mode

The **Basic View** mode is a primary measurement mode. It can be switched on or off, as all other measurement modes, but if all modes are switched off the **Basic View** mode will be active. In the **Basic View** mode, any measurement result may be presented and selected with **<SCROLL>** ▼ or ▶ key. The user may change the actual channel view by pressing **<AXIS>** key.

parameter value

parameter units

measured parameter name

elapsed time

weighting filter

channel name

Figure 4-2 Primary parameters view mode screen

In case of some parameters, no filters, units or channels are displayed.

4.1.3 "Large View" parameters view mode

The **Large View** mode can be switched on or off. This mode is similar to the **Basic View** mode. This view mode is useful in low vision conditions or is suitable for operators with some visual impairment.

parameter value

parameter units

measured parameter name

weighting filter

channel name

Figure 4-3 Primary parameters view mode screen

In case of some parameters, no filters, units or channels are displayed.

4.1.4 Results for channels view mode

To get information about a number of results at one time, it is handy to switch to the **3-channel View** mode. Up to three parameters at a time are accessible for the operator.

Measured results for channels:
X, **Y**, **Z**

Measured function for channels

Measured function for channels: **X**, **Y**, **Z**

Weighted filter

Figure 4-4 Results list view mode screens

4.1.5 Instrument Status view mode

Instrument Status view presents:
- estimated working time which is **Left** until the battery is expected to be completely drained,
- the battery **Charge** status,
- current **Setup** information,
- used **Standard** for Exposure Limits,
- **Timer** mode.

Instrument Status screen is moved down and up with **<SCROLL>** ▼ and ▶ keys respectively.

Figure 4-5 Instrument Battery view mode screens

⚠️ *Note: Battery charge state calculation is based on internal charge counter and should be considered only as an overall, not very precise, estimation. Therefore, the time left could be Noteably different. Although the newest technology cells are used, the slight degradation over time is inevitable, thus aging requires occasionally factory based (or authorised service centre) replacement of the rechargeable battery cells.*

⚠️ *Note: To improve accuracy of remaining battery life indicator, run the instrument until it is fully discharged; then proceed with a full charge via the mini USB port. The procedure is recommended before first use. Repeat this procedure every few months of use to maintain more accurate current battery condition indication.*

4.1.6 File information view mode

Instrument **File information** view presents current file name and size.

4.2   ALARM screen review

Apart from simple LED alarm indications (see chapter **Błąd! Nie można o dnaleźć źródła odwołania.**) there are a two alarm conditions (EAV and ELV), when ALARM presentation screens will appear. During a measurement run the **SV 100A** will immediately turn on the display at the time that the programmable alarm condition is exceeded. Press any key, to confirm the information.

⚠️ *Note: At any time when battery power is almost exhausted the "low battery" alarm screen may inform you about immediate recharging requirement.*

4.3   Reviewing unit label

Unit Label screen is accessed by pressing the **<AXIS>** 🔘 and **<ENTER>** 🔙 keys simultaneously and provides information about elementary instrument properties such as:
- Copyrighted manufacturer name: SVANTEK (C)
- Instrument name: SV 100A

- Unit serial number: SN …
- Unit name: *[user programmable name]*
- Firmware version: 1.02.1
- CRC(OK): ED39
- Standards list, that instrument conforms to ISO 8041:2005

```
 Unit Label
Version  1.02.1
CRC(OK)    ED39
```

```
 Unit Label

ISO 8041:2005
```

Unit Label screen is moved down or up with **<SCROLL>** ▼ or ▶ keys.

To exit the **Unit Label** screen just shortly press the **<ENTER>** ↵ or **<AXIS>** (xyz) key. Then **SV 100A** will return to the last presented **VIEW** mode.

⚠ *Note: The personalized **Unit Name** can be set arbitrarily with SUPERVISOR software.*

4.4   Loading Measurement Setups

Press and hold the **<AXIS>** (xyz) key. The **Load Setup** menu will appear with the list of loaded configuration setups.

```
  Load Setup
🔧 SETUP1      ⚙
🔧 SETUP2      ⚙
```

```
  Load Setup

  No Files
```

To cancel setup selection, press the **<AXIS>** (xyz) key. Otherwise select the required configuration setup with the **<ENTER>** ↵ key navigating thru the list with the **<SCROLL>** ▼ or ▶ key.

```
 Load Setup
 SETUP1.SVT
[Cancel][ Load ]
```

The following screen will appear, that will allow you to confirm you really want to load the selected setup or cancel the selection and return to configuration setup list.

Press the **<AXIS>** (xyz) key to cancel the setup loading (**Back**), or the **<ENTER>** ↵ key to confirm loading of selected setup configuration and exit the **Load Setup** menu (**Exit**).

```
 SETUP1.SVT
 Loaded O.K.
[ Back ][ Exit ]
```

Confirmation of configuration setup loading leads to the screen with the status of the loading procedure.

4.5   Calibration and verification of the instrumentBłąd! Nie zdefiniowano zakładki.

Three levels of performance testing are defined in ISO 8041:2005 International Standard, including: pattern evaluation, targeted at manufacturers; periodic verification, targeted at manufacturers and users and in-situ check, targeted at users.

The periodic verification comprises an intermediate set of tests to be performed periodically (e.g. prior to, or at the time of purchase, and every 1 or 2 years thereafter) to verify that the performance remains within the specifications of this International Standard, to demonstrate that one-off instrument systems comply with the

requirements of this International Standard, and following modification or repair that may affect the performance of the instrument.

In-situ check, which mostly targeted at users and comprises a minimum level tests, indicating that the instrument is likely to be functioning within the required performance specification. These tests shall be carried out immediately before and after measurements.

The **SV 100A** instrument is offered with the dedicated tri-axial MEMS based accelerometer. It makes the calibration very easy by direct usage of commonly available vibration calibrators. The instrument is factory calibrated with the supplied accelerometer.

The **SV 100A** instrument is equipped with both periodic verification (**By Measurement** calibration) and in-situ check (**System Check**) functions, which can be run from the **Calibration** menu. The Calibration menu is opened by holding down the **<SCROLL>** ▶ key.

> ⚠ **Note:** *The manufacturer recommends to perform factory calibration every 12 months to assure the instrument its continuing accuracy and compliance with the international specifications. Please contact your local SVANTEK distributor for further details.*

4.5.1 Periodical verification - Calibration

To calibrate the instrument the user has to perform next steps:

1. Select **By Measurement** position in the **Calibration** menu and press the **<ENTER>** ↵ key, select the appropriate channel (axis X, Y or Z) and press the **<ENTER>** ↵ key again.

2. Adjust the actual calibration level of the calibrator to be used with the **<SCROLL>** ▼ or ▶ keys. The **Factor** position demonstrates the current calibration factor.

3. Dismantle the SV100A and remove the tri-axial accelerometer.
4. Mount the calibration adaptor **SA136** on a shaker table.
5. Mount the accelerometer on calibration adaptor and tighten it up with screw

Figure 4-6 Calibration with SV 111 calibrator

6. Switch on the calibrator and wait ca 30 seconds for its stabilisation before starting the calibration measurement

7. Start the calibration measurement by pressing the **<ENTER>** ↵ key. Delay before starting calibration measurement is counted down on the display.

```
  Delay 3s
Please wait
```

The calibration measurement lasts 60 second and stops until the same result is obtained 3 consecutive times. It is possible to stop the calibration measurement by pressing the **<AXIS>** (xyz) key. After the measurement, its result is presented on the display.

```
 Cal. Measure
  944.1 mm/s²
Please wait: 26s
```

It is recommended to repeat the calibration measurement few times. The obtained results should be almost the same (with ±0.1 dB difference). The reasons for the unstable results are as follows:
- the calibrator is not properly attached to the instrument,
- there are external vibration disturbances,
- the calibrator or the measurement channel is damaged.

8. Press the **<ENTER>** ↵ key in order to accept the measurement result.

```
Factor    0.00 dB
New       0.14 dB
[Cancel][Accept]
```
↵
```
Calibr. axis Z
  Saved O.K.
```

⚠ *Note: If a calibration factor does not meet tolerance criteria the unit informs the user and proposes to exit the calibration measurement without saving its results.*

Post calibration. If enabled, the post processing is performed automatically under acceptance of calibration measurement.

⚠ *Note: If it is required to perform so called post-calibration of the instrument (in case the Post Calibration is pre-programmed within configuration setup) the **SV 100A** automatically adds the calibration factor to the header of the result files. This doesn't modify the saved results and gives the user to possibility to compare the possible changes of accelerometer sensitivity before and after the measurements.*

⚠ *Note: The calibration factor is always considered in all instrument's function (like 1/1 Octave or 1/3 Octave analysis).*

4.5.2 In-situ check – System Check

To check (verify) the calibration factor the user should:

1. Select **System Check** position in the **Calibration** menu and press the **<ENTER>** ↵ key, select the appropriate channel (axis **X**, **Y** or **Z**) and press the **<ENTER>** ↵ key again.

```
 Calibration
By Measurement
System Check
```
↵
```
 System Check
Check axis X
Check axis Y
```
▼
```
 System Check
Check axis Y
Check axis Z
```

2. Adjust the actual calibration level of the calibrator to be used with the **<SCROLL>** ▼ or ▶ keys. The **Factor** position demonstrates the current calibration factor.

```
 Check axis Z
Level 1.000  m/s²
Factor    0.14 dB
```

3.   Mount the SV100A instrument on the calibrator as shown on the below Figure.

4.   Switch on the calibrator and wait ca 30 seconds for its stabilisation before starting the calibration measurement

Figure 4-6 **Using the SV 111 calibrator**

5.   Start the measurement by pressing the **<ENTER>** key. Delay before starting measurement is counted down on the display.

The measurement lasts 60 second and stops until the same result is obtained 3 consecutive times. It is possible to stop the measurement by pressing the **<AXIS>** key.

After the measurement, its result is presented on the display. The user can now check if the result of the measurement is close enough to the calibration level.

6.   Press the "**Exit**" to return to the **System Check** screen.

4.5.3 Viewing the instrument's calibration

To view the calibration factor, the user should select **Calibr. View** position in the **Calibration** menu and press the **<ENTER>** key.

4.6   Auto-run mode information

When auto-run mode is configured, there is no need to turn on the instrument manually. The instrument will be switched on and run measurement automatically in time. This can be easily programmed with the use of the **SUPERVISOR** software (see chapter 5.4.7).

On predefined date and time, the instrument is switched on and start to count down the delay time. After warming up time, the instrument starts the measurement being all time locked. The measurement status is signalled by changed measurement run time.

Figure 4-7 Auto-run mode – delay count down and measurement run time screens

4.7   Security lock

Locking the keypad and display during the measurement serves to prevent from tampering with the measurement run. That automatically prevents any tampering, but the unit can be unlocked if necessary with proper sequence of key.

The programming of lock/unlocking function of the instrument can be done via the SUPERVISOR software (see chapter 5.4.6 General settings tab).

Locking **SV 100A** unit:

The **SV 100A** is always locked automatically when it starts.

It is always possible to lock the instrument manually. In this case the user should hold the **<SCROLL>** ▼ key for a couple of seconds during which a countdown ("Keyboard lock" 3… 2… 1) is displayed and the unit gives you time to decide if you really want to activate security lock. If you release the key too early, **SV 100A** returns to the last presented **VIEW** mode.

Unlocking **SV 100A** unit:

SV 100A can be unlocked by providing Unlock keys sequence, which is programmed via Supervisor software. To unlock the unit the user should press the keys in the correct sequence.

Figure 4-8 Unlocking the unit sequence screens

4.8   Measurement procedures

Preferably, when taking vibration measurements, the instrument should be put on the vehicle seat or attached to the seatback at the start of a shift and collected at the end of the whole shift. In case a shorter period is sampled then care should be taken to ensure that the result is representative of the full shift exposure. Shorter sampled periods require that the sampler has a deep and full understanding of the expected working tasks during the shift and the duration cycles of those tasks.

Before performing any vibration measurements, ensure that employees selected for evaluation are operating equipment or performing tasks under normal (representative) conditions, and emphasise the importance of continuing to work in their usual manner (the instrument should not interfere with normal duties). Explain the purpose and procedures of sampling to the employee who will be using the instrument and the importance of not interfering with it. Instruct the employee not to remove the instrument unless absolutely necessary.

The general procedure for taking measurements could be as follows:
1. Check that the indicated instrument battery life is at least twice the time required for the measuring period.
2. Check the instrument setup mode is appropriate and change it if necessary.
3. Check the calibration of the instrument and adjust the settings if required.
4. Secure the instrument onto the employee's arm selected for sampling.
5. Start the recording session manually if it is not programmed for an automatic timed start.

6. At the end of the measurement period, stop the recording session, and remove the instrument from the seat.

7. Follow your organisation's specific procedure for personal vibration exposure recordings analysis.

8. Ensure the report is submitted to the appropriate person.

9. Distribute copies of vibration exposure recordings to test participants and explain the results.

4.9 Reviewing measurements

Most of the results can be inspected in real-time during either measurement run or stopped mode of operation.

If the display screen is turned off just press the **<ENTER>** key to "wake up" the unit and then press the unlocking buttons sequence.

The keys on the keypad of the instrument enable you to navigate thru most of the parameters. For specific information on the VIEW modes.

- Use the **<SCROLL>** or keys to move thru the measurement results
- Use the **<AXIS>** key to change the channel you would like to inspect
- Use the **<ENTER>** key to change the VIEW mode

⚠ **Note:** *In most cases the keypad will be probably locked. To gain access to the results and unlock the keypad see chapter 4.7.*

⚠ **Note:** *After reviewing results remember to lock the keypad again to maintain the integrity of the measurement run by preventing uncontrolled access to the instrument.*

5 BASIC OPERATIONS WITH THE PC SOFTWARE

This chapter explains data storage, the configuration setup of the instrument, and how to customize the parameters via the "Supervisor" PC software.

With use of mini USB cable, software, and **SV 100A**, it is easy to:

- set up required configuration parameters and download these, so called **SETUPS,** straight to the **SV 100A** instrument
- retrieve time history data to view and analyse your vibration recorded charts, graphs, with extended reporting functionality.

> ⚠️   *Note: In case of detailed description of the Supervisor software functions, please refer to the Supervisor user manual.*

5.1 Installing and connecting to PC

Insert the **Supervisor** software CD/DVD into your PC and run the installation program. After installation, we are ready to connect the **SV 100A** instrument.

- Plug the USB cable into the computer
- Plug the opposite end of the cable (mini USB) into the instrument itself
- The **SV 100A** is powered and charged directly through the computer; thus, you do not need separate charger. The instrument screen will be switched on automatically with current charging information only
- Turn on the instrument - long press of the **<ENTER>** ↵ key
- The user should install drivers for Svantek instruments if not previously installed
- Once switched on, run the **Supervisor** software.

Figure 5-1 Supervisor splash screen

5.2 Main software window

The main screen of the SUPERVISOR is divided into few panels. Panels expose areas of interest of professional users and satisfy user's needs to find, configure, download, review and assess stored data in a very simple but still professional way.

- Control panel enables you to select: Instrument control, Data browser or Session you work with
- Instrument filter enables **SV 100A** device selection, or other Health and Safety dedicated instruments
- Inventory panel detects all **SV 100A** connected devices (see chapter 5.3)
- Quick access file manager enables you to copy configuration setup files between computer and instrument internal memory (see chapter   5.4.1)
- Instrument configuration panel enables access to all measurement run configuration settings (see chapter   5.4.1 for details)
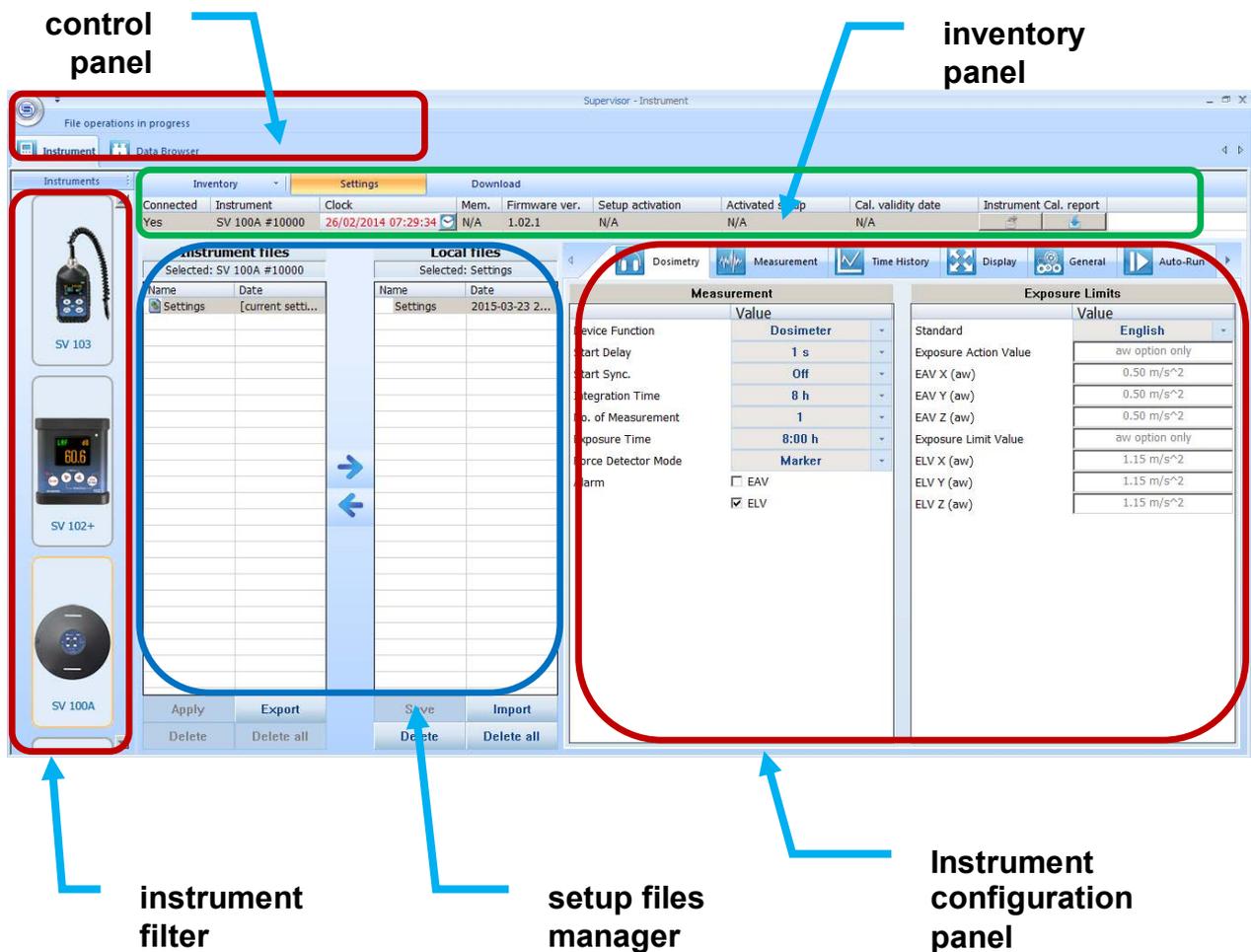

Figure 5-2 Supervisor main window

5.3   Instruments inventory panel

Click the SV 100A big instrument icon in the left "Instrument filter" Panel (see Figure 5 2) to get access to the devices.

Inventory panel (Figure 5-3) enables you to see all currently connected, or previously connected instruments of the same type. There are several columns with information related to each particular instrument related to the correct allocation of instrument and calibrator calibration report details.

"Settings"
configure setup files and the instrument

"Download"
download measurement data from the device

small clock update icon button

configurable
columns
right click
on top menu row

possible context
operations
right click on instrument row

Figure 5-3 Inventory panel and its capabilities

There are two control buttons near the Inventory Panel top menu:
- Settings button enables to configure current local configuration file, that can be later uploaded to the **SV 100A** instrument;
- Download button enables to navigate and download files directly from the instrument.

⚠️ *Note: To download any setup, or data file, first click the row related to the chosen instrument.*

5.3.1 Managing the instrument options

The user may add new purchased options or functions to the instrument. For this purpose, it is necessary to know the activation code. Once the activation code is submitted the customer should follow the next steps to activate the new function:
- right click on the Instrument row and select the **Manage options/functions** position in the list,
- in the **Manage instrument options/functions** window select your option and click on **Unlock** button
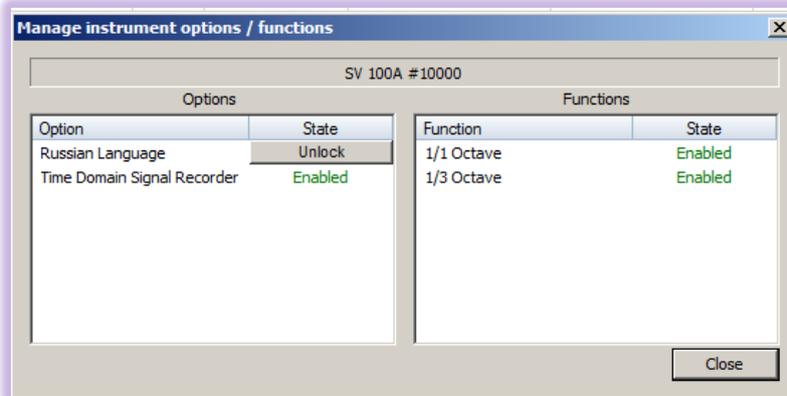
- key in the code in the opened **Enter code:** window and press **Ok**
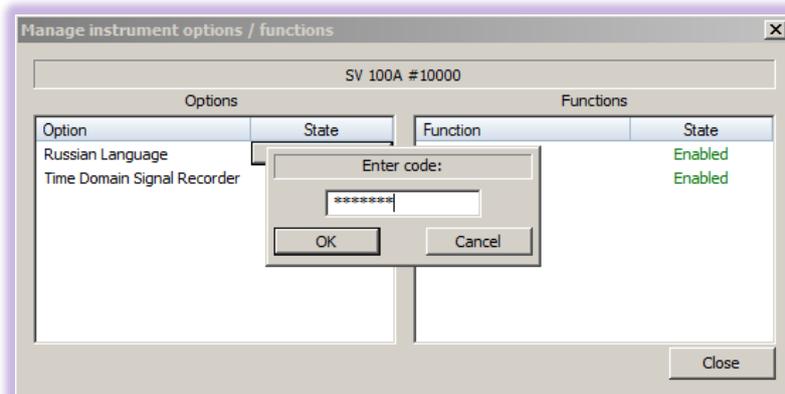
- the unblocked function is now enabled in the instrument current Settings

⚠ **Note:** The above algorithm unblocks the function in the instrument, but not switches it on. To be able to change settings of newly unblocked function the user has to download the current Settings file from the instrument to the computer, select the new function and appropriate settings and upload new Settings file to the instrument.

5.4   Configuration setup

Customizing and saving setups are performed via the Supervisor. The following sections discuss each of the setup screens and explain how to save and send the parameters to the multiple instrument(s).

Settings described here apply to the type **SV 100A** model. If you are also using other instruments and have them connected, they will appear in the Inventory section panel, but no device will appear unless you first select the appropriate model picture on the left side of the application in instrument filter section. The clicked instrument picture denotes that the models are selectable from inventory panel when setup changes are applied and the "send setup to instruments" is selected.

To gain access to settings window click the **Settings** button near the Inventory panel (see chapter 5.3)

5.4.1 Working with configuration setup files

The idea behind the configuration setup is to download the configuration setup file from the instrument to the computer you are working on and referred as **Local files** destination. Then it is possible to modify the settings, and save with a custom name.


Figure 5-4 Setup files manager panel

For example: To download current settings file from the **SV 100A**, modify it, save with custom name, send it back to the device, export the setup to USB flash memory, and make sure the uploaded settings are applied in the instrument follow the presented procedure described below:

Once connected and selected in the inventory panel (Figure 5-3) **SV 100A** instrument is ready for the operation:

1. Select the **Settings** row position in left side panel named **Instrument files** (Figure 5-4)
2. Click the right arrow pictogram to download instrument **"Settings"** configuration setup to **Local files** right side panel (Figure 5-4)
3. Select the just copied Settings with a click: this will display quite a few configuration tabs on the right side so called Instrument configuration panel of the main Supervisor window (Figure 5-2)

4. Go through all the tabs to verify, or change required parameters of the measurement runs. Follow the chapters from **Błąd! Nie można odnaleźć źródła odwołania.** to 0 to understand and configure the i nstrument
5. Once configured, come back to setups file manager (Figure 5-4) and click the just edited **Settings** in the **Local files** panel
6. Next click the "save" button in bottom area of the panel (Figure 5-4)
7. To change the name right click on the selected row, and choose **Rename** command, which enables you to input a custom name for the setup that has just been edited (see the figure below)
8. To export the setup file right click again on the selected row to open context menu and select the **Export** command (see the figure below). This will open standard save file window, where you can choose the USB flash memory disk, and save the configuration file to use on a different PC. Note, it is also possible to import the previously saved settings file to re-use a created setup configuration.
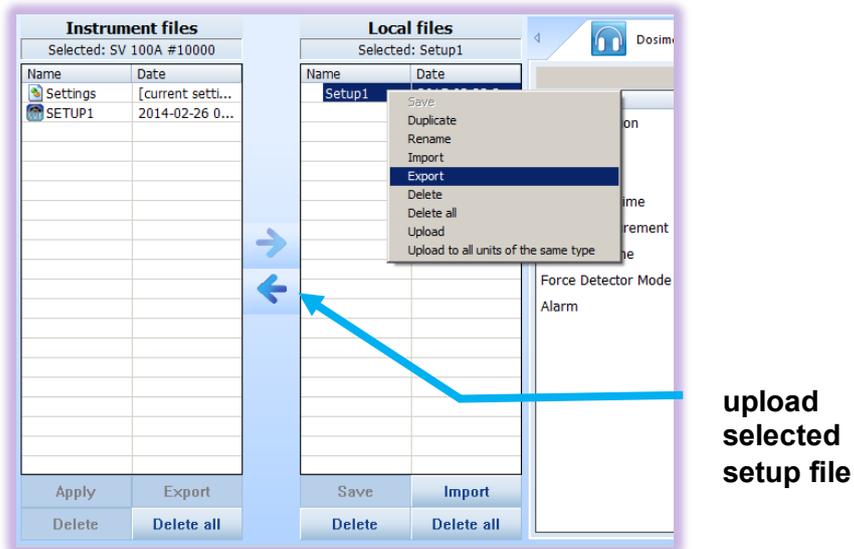
Figure 5-5 Exporting the configuration setup file

9. Now it is time to upload the configuration back to the instrument. Just click the left arrow pictogram.
10. Once copied select the copied file in the Instrument files, and right click onto it to open context menu. Then choose **Apply** command (Figure 5-6). Alternatively, you can enter the **Load Setup** menu directly in the instrument and load it as the current configuration. See chapter 4.4 for details.
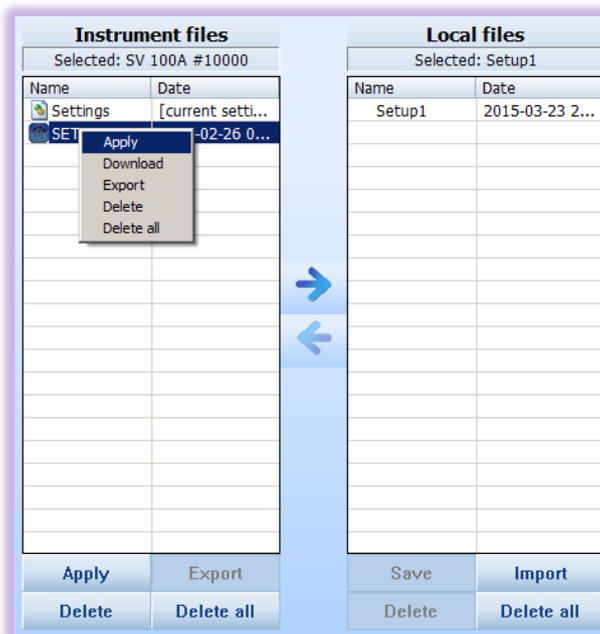
Figure 5-6 "Instrument files" panel and context commands

11. This ends the procedure. Disconnect the instrument and the instrument is now ready for a new measurement run using the settings you have just uploaded.

> ⚠️ **Note:** *During configuration, there are quite a number of parameters to set. To understand detailed meaning of parameters and how the results are calculated refer to Appendix D and check the following by chapters.*

5.4.2 Measurement parameters settings tab

The main settings where specific vibration configuration can be set are located under "Dosimeter" tab, which consists of two panels: **Measurement** and **Exposure Limits**. There are already predefined pre-set fields with grey text. Others fields must be setup by the user.

Within the **Dosimetry** tab you can choose in which mode of operation the **SV 100A** should work: **Dosimeter**, or **Dosimeter** with 1/1 or 1/3 octave analysis.

> ⚠️ **Note:** *Enabling octave analysis shortens battery life, so take it into consideration and double check the battery status before measurement run.*
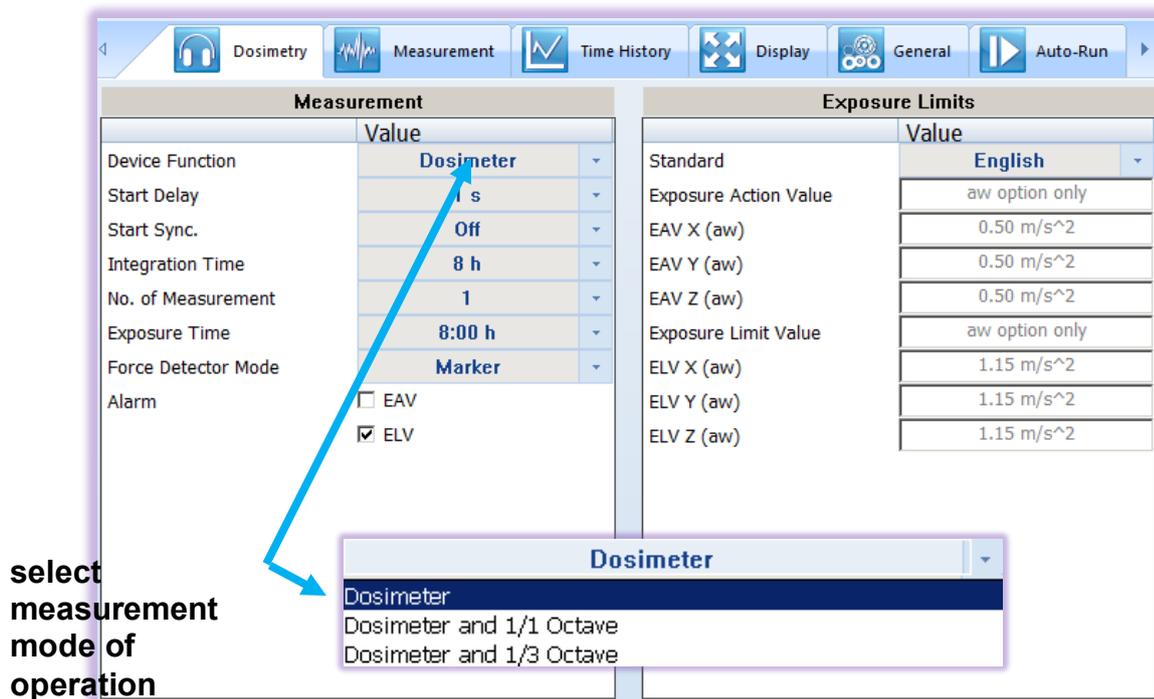

Figure 5-7 "Dosimetry" configuration setttings tab

Other basic parameters configuration for **Measurement** panel:

- The **Start Delay** parameter defines the delay period from the moment the **<Start/Stop>** button is pressed to the start of the actual measurements (the digital filters of the instrument constantly analyse the input signal even when the measurement is stopped). This delay period can be set from **0 second** to **5 minutes**.

- The **Start Sync.** parameter defines maximum delay period from pressing the **<Start/Stop>** button to the start of the measurements to allow synchronisation with the instrument's RTC. The **Start Sync.** parameter can be set as: **Off**, **1m**, **15m**, **30m** and **1h**. For example, if **1h** was selected, then each measurement starts from the first second of next real time hour after pressing **<Start/Stop>** push-button, and then each hour after **Integr. Per**, if **Rep. Cycles** is greater than one.

- The **Integration Time** parameter (integration period) defines the period during which the signal is being measured (integrated) and stored as the set of **Summary Results**.

- The **No. of Measurements** parameter defines the number of cycles (with the measurement period defined by **Integration Time**) to be performed by the instrument. The **No. of Measurements** number values are within the limits [1, 1000] of infinitive (**Inf.**).

- The **Exposure Time** parameter defines the desired value of the workday exposure time that is used for the calculation of the hand-arm Dose results.

- The **Force Detector Mode** parameter – defines mode of automatic start up and shut down the measurement. If **Marker** is selected then when the driver is sitting the marker is recorded, when the driver is standing up, the recording is stopped. If **Pause** is selected then if the driver is sitting the measurement is running, when the driver is standing up, the measurement is paused. When the driver sit down again the measurement starts running again.

- The **Alarm** parameter defines whether to set the alarm for **EAV** or/and **ELV**.

The **Exposure Limits** panel consists of limits, applied for different standards, or limits, defined by user:

- The **Standard** parameter defines the limits of **Exposure Action Value** (**EAV**) and **Exposure Limit Value** (**ELV**) for the measurements of the hand-arm vibration, which are obligatory in: **England**, **German**, **France**, **Italy** and **Poland**. It is possible to define also **User defined** limits.

Exposure Limits	
	Value
Standard	User defined
Exposure Action Value	depending on the crest
EAV X (aw)	0.50 m/s^2
EAV Y (aw)	0.50 m/s^2
EAV Z (aw)	0.50 m/s^2
EAV X (VDV)	9.10 m/s^1.75
EAV Y (VDV)	9.10 m/s^1.75
EAV Z (VDV)	9.10 m/s^1.75
Exposure Limit Value	depending on the crest
ELV X (aw)	1.15 m/s^2
ELV Y (aw)	1.15 m/s^2
ELV Z (aw)	1.15 m/s^2
ELV X (VDV)	21.00 m/s^1.75
ELV Y (VDV)	21.00 m/s^1.75
ELV Z (VDV)	21.00 m/s^1.75

Figure 5-8 Example of user defined limits

5.4.3 Measurement parameters settings tab

The main settings where specific vibration configuration can be set are located under **Measurement** tab, which enables the user to select weighting filter (**Filter**: **Wc**, **Wm**, **Wf**), multiplying factors (**Multiplying Factor**: 0.1-2.0) and vector coefficients (**Coefficient**: 1.0-2.0) for all channels.
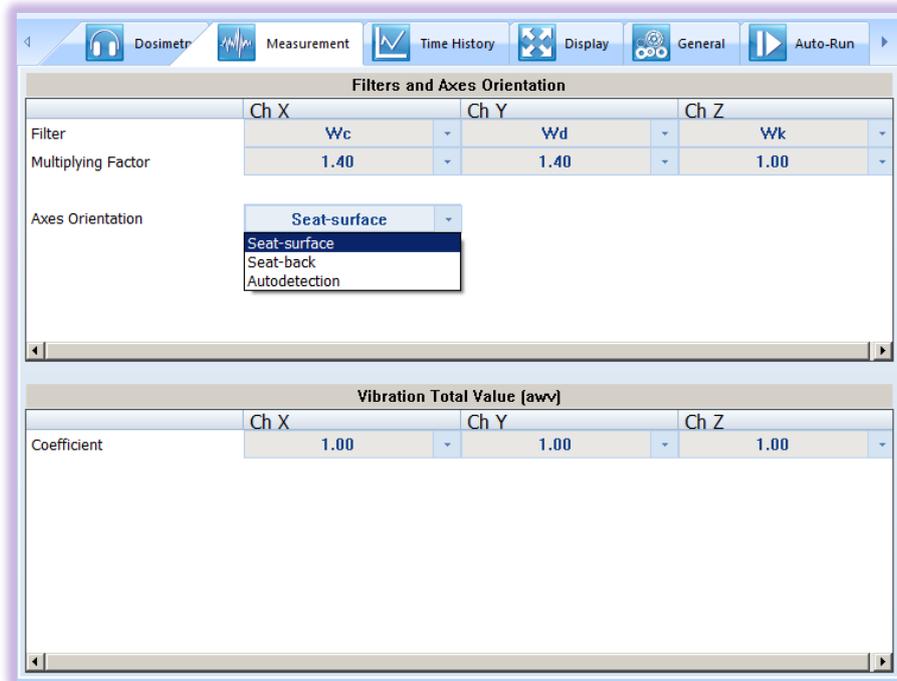

Figure 5-9 Measurement configuration settings tab

Since the axes orientation is fixed (X fore / aft, Y sideways, Z vertical) then when the instrument orientation changes it is necessary to redefine axes. The **Axes Orientation** position allows to adjust the axes orientation to the instrument position:

- **Seat-surface** option is selected when measurement is performed for a sitting position. The device is flat and the direction of the measurement axes is in line with what is drawn on the device front panel.
- **Seat-back** option is selected when the unit is mounted on the seat back. In this case, the X-axis becomes the Z-axis. Z-axis and Y-axis is assigned automatically on the basis of the acceleration measurements.
- **Autodetection** means that the orientations of all axes are defined automatically.

Automatic change of axes position for **Seat-back** and **Autodetection** options is done all the time until the start of the measurement. The device should be placed in a particular orientation for at least 4s. Thus, by measuring with the **Seat-back** and **Autodetection** options the user must first put the device in the measurement position and then after at least 4s start the measurement.

During calibration, the automatic axes orientation is switched off.

5.4.4 Time-history data logging settings tab

To enable logging time-history data go to the **Time History** settings tab and switch the very first switch button on the left panel.
- In the left panel named **Time History Setup** there are basic configuration fields related to: how frequently do you want to log the parameters, what name the logger file should have, and if extended summary results should be saved.

> ⚠️ **Note:** *Summary results are saved on* **Integration Period** *basis (not on* **Logger Step** *time). See* Figure 5-7 *how to set* **Integration Period** *parameter.*

- Right panel named **Display Results** is accessible only if **Logger** switch button is set to **On**. You have the ability to choose, which basic results for each channel should be logged during measurement run and saved in internal storage memory.
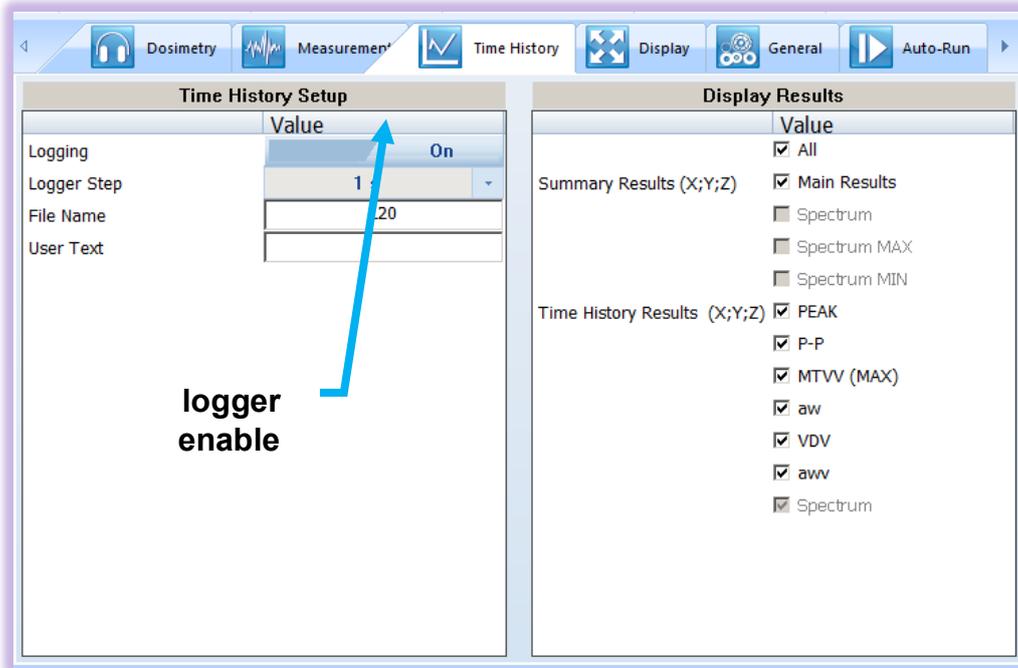

Figure 5-10 **"Time History" (logger) settings tab**

5.4.5 Display VIEW configuration tab

As mentioned in chapter 4.1 there are quite a few VIEW modes accessible on the display, when the instrument is performing a measurement run.

- In the left panel named **Modes & Views** you can select which VIEW mode will be present when you press the **<ENTER>** ⏎ key on the instrument keypad

  In this panel, you can also switch on the automatic screen off function (**Auto off**), which saves the energy of internal power source, the display rotate function, which positions the screen text always horizontally. You can choose the units of the displayed results in the position Units as **Logarithmic**, **Linear Metric** or **Linear Non-Metric**.
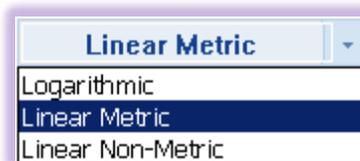
- In the right panel named **Display Results**, you will find a list of twenty measurement parameters, that can be configured to be presented on the **SV 100A** display, when you press **<SCROLL>** ▼ and ▶ key. See Appendix D to review acronyms for each parameter.
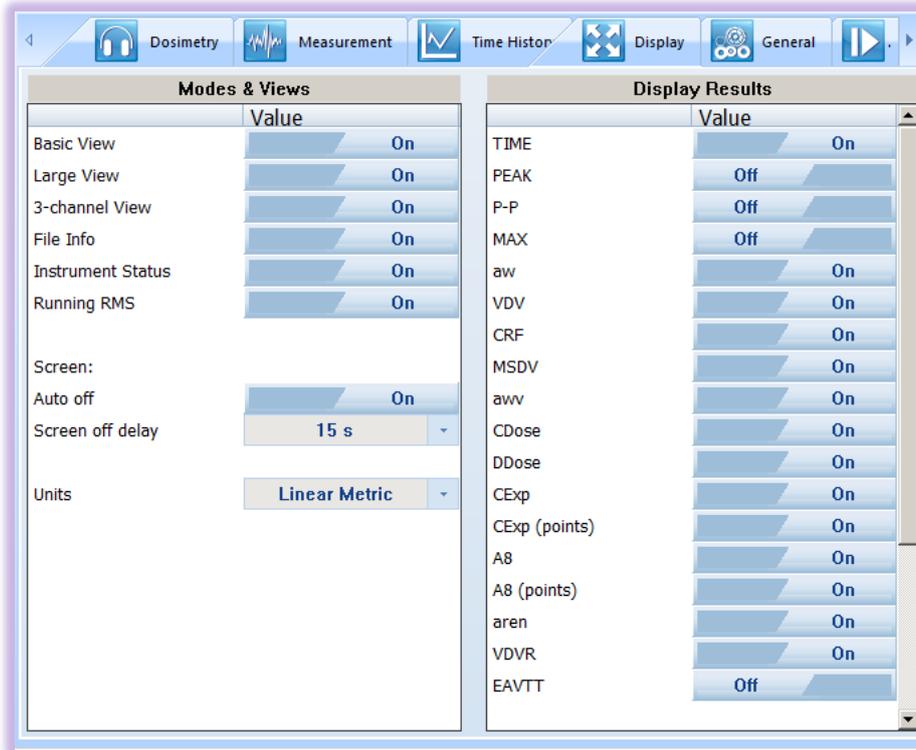
Figure 5-11 Display VIEW configuration tab

5.4.6 General settings tab

General settings tab concerns to many different usability options: See the followed by chapters to understand exactly how to configure these instrument settings.
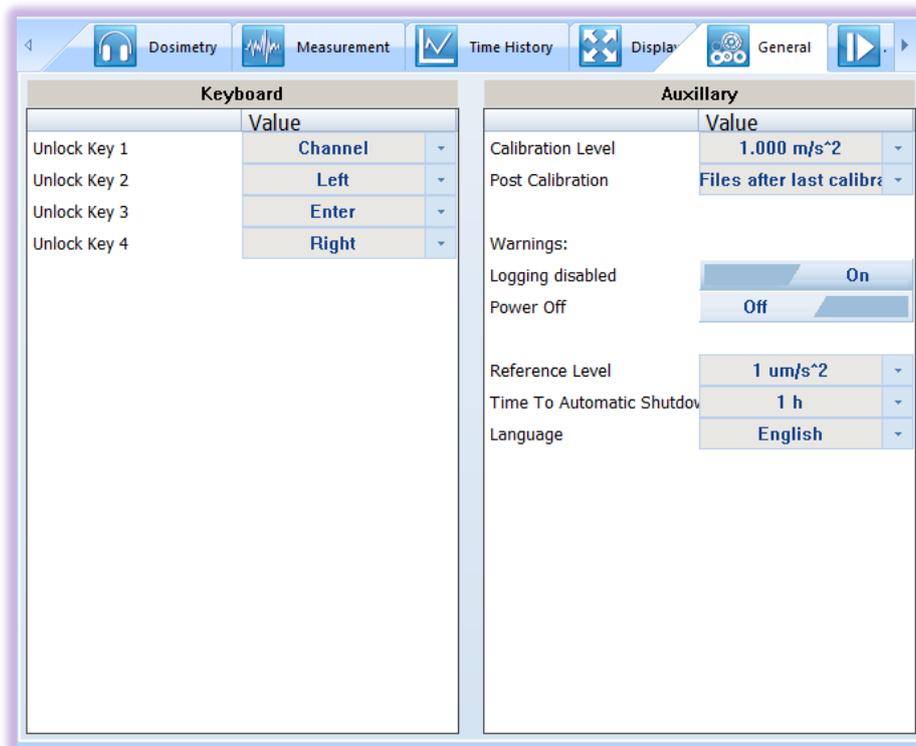

Figure 5-12 "General" settings tab

5.4.6.1 Security settings panel

The security setting enables you to protect access to the instrument when in use with a simple keypad password to prevent users from inadvertently terminating a measurement run. This feature is set through the Supervisor's **General** settings tab.

The **SV 100A** will disable the keyboard every time, the measurement run is started.

See the chapter 4.7 how to lock, and unlock the **SV 100A** instrument.

The **SV 100A** will require special code to be input by pressing four keys defined in this panel in a sequence.

Figure 5-13 "Keyboard" security settings panel

5.4.6.2 Auxiliary settings panel

Under auxiliary settings panel it is possible to:
- Set the calibration level and enable to perform additional calibration after a measurement session and add the results to the file saved in the memory. In the panel below, there are three options for saving results: not to save **Off**, save in the last file **Last File** or save in the files which will be created after last calibration (**Files after last calibration**).
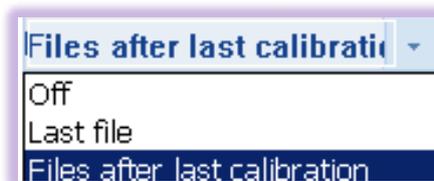
- Enable additional warning screens to be displayed under certain conditions:
    - **Logging disabled** it warns the operator that time history results will not be stored.
    - **Power off** additional confirmation just before switching off (see Turning the instrument on/off3.5)
- Set the **Reference Level** for the results presentation in logarithmic units
- Set **Time To Automatic Shutdown** the instrument
- To change menu **Language**, displayed on the screen of the instrument. The default language is English.

Figure 5-14 "Auxiliary" settings panel

5.4.7 Auto-Run settings (timer, pauses) tab

The **Auto-Run** panel enables the user to program the internal real time clock to act as a delayed start and stop timer. The instrument can be switched on by itself at the pre-selected programmed time and it can then perform the measurement run, which was used before it was last switched off. Auto-run feature is useful if you wish to pre-set the instruments to run and stop for a specific period, such as a week-long study.

Figure 5-15 Auto-run configuration tab

The timer configured in right panel named **Timer** can be:
- switched off – **Off**
- switched on – **On**

In the case the timer function is active (**On**) and the instrument is switched on the Time screen appears until the programmed measurement runs are finished.

Setting hour and day of the measurement's start

The **Start (hh:mm)** and **Stop (hh:mm)** positions determines the time for the measurement to start and to stop automatically. The required hour and minute should be selected.

The **Day of week** determines the days in a week when the measurements should start. The timer can be programmed (**Max. no. of measurements days**) up to 100 days ahead or without limitation (**Infinity**) and during these days' settings of the current state of the **R**eal-**T**ime **C**lock is taken into account. Make sure to check that the real-time clock settings for the measurement location are correct before beginning a delayed timer measurement.

There is also possibility to program five independent **PAUSES** in the form of real time programming. See Figure 5-15 for detailed settings in magnified area.

5.4.8 Signal recording options tab

Signal recording is an optional function, which should be unblocked. Signal recording can be performed as **Time Domain** recording to the same file as main and history results or as a separate **Wave** file. Both modes are mutually exclusive functions and the one option should be turned off in order enable the other one. The difference is that the **Time Domain** signal is recorded to the logger file, while **Wave** signal is recorded as a separate PCM file (or file in extensible format).

Both recordings may be configured in different **"Recording Mode"**. The signal may be recorded during whole measurement time (**Continuous** or **Whole Measurement**) or may be triggered with Slope or Level trigger.

5.4.8.1   Recording on trigger

It is possible to define three sources of triggering condition (**Trigger Source**) from all channels. Four last parameters define: level of signal for triggering (**Trigger Level**), pre-trigger recording (**Pre-Trigger**), time of recording after triggering (**Recording Time**) and step of checking the triggering condition (**Step**).

To be able to switch on Wave recording from smartphone/tablet application (see. Chapter 6) the Recording **Mode** should be switched on: **Whole Measurement**, **Trigger Slope +**, **Trigger Slope -**, **Trigger Level +**, **Trigger Level –** (but not **Continuous**!)
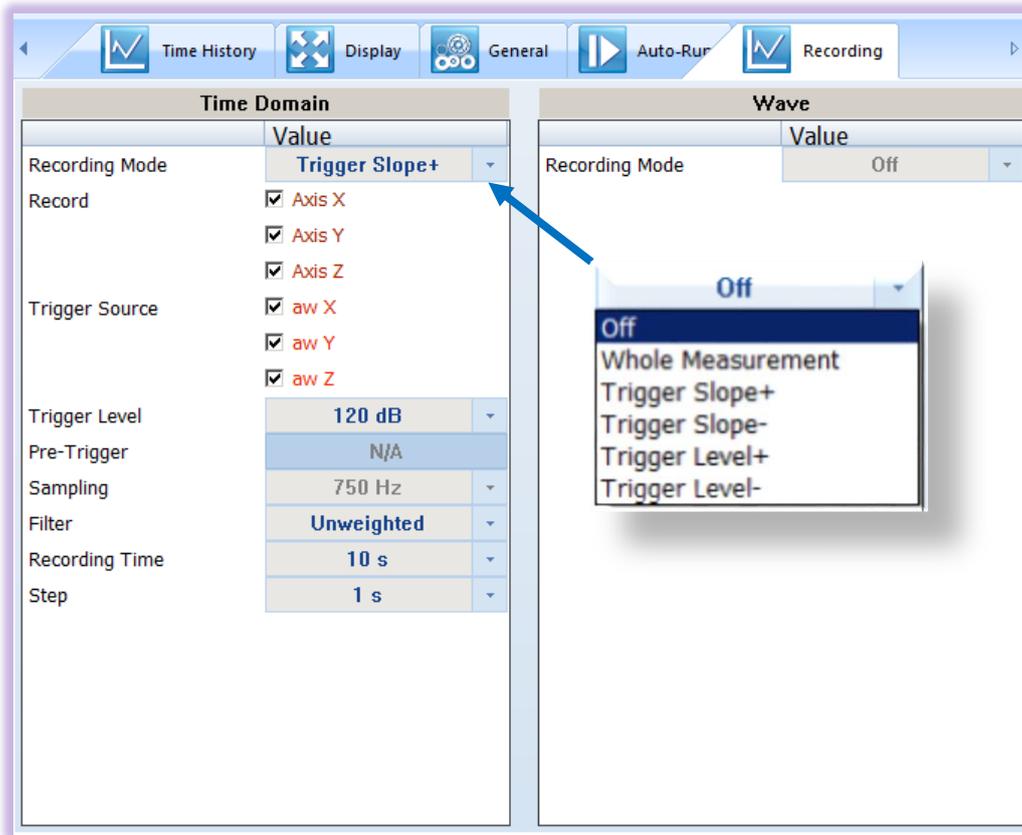
Figure 5-16 Recording on trigger configuration panel

5.4.8.2 Continuous recording

If Whole Measurement is chosen the panel consists only positions, where the user may select three signals for record (**Record**) from tri-axial transducer.
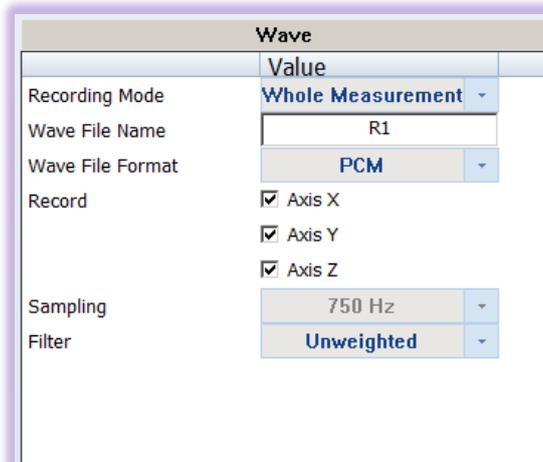

Figure 5-17 Continuous recording configuration panel

5.5   Working with data files

5.5.1 Downloading instrument files

If you want to download any recorded files, whatever it is: logger, wave or time domain files, you should click the **Download** button on the control area.
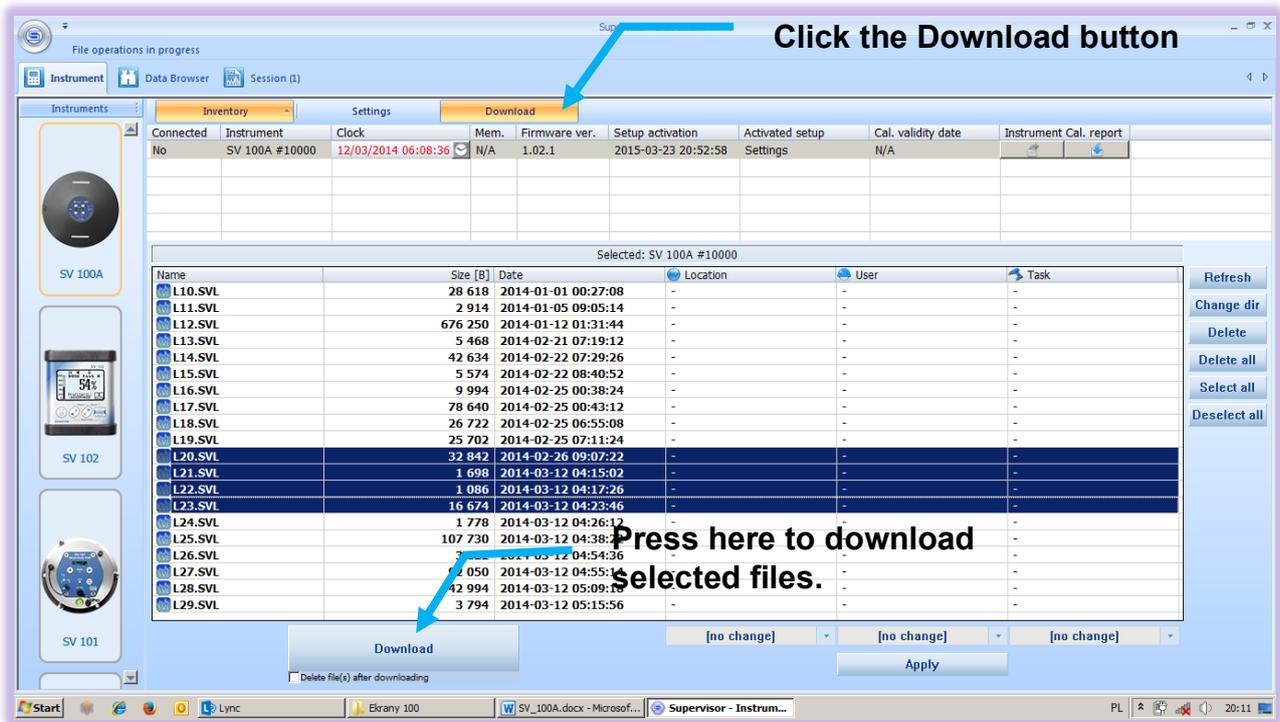

Figure 5-18 SV 100A "Download" window

Press the **Download** button, located in bottom area, and the previously selected run data files will be downloaded to local computer and the **SUPERVISOR** will enter **Data Browser** (see chapter   5.5.2) to further manage downloaded files. Run data files in the instrument can be optionally deleted after download by checking the box under the **Download** button.

To change the working directory or scan other folders, press the **Change dir** button, and appropriate window will appear, see figure below.


Figure 5-19 Change instrument working directory window
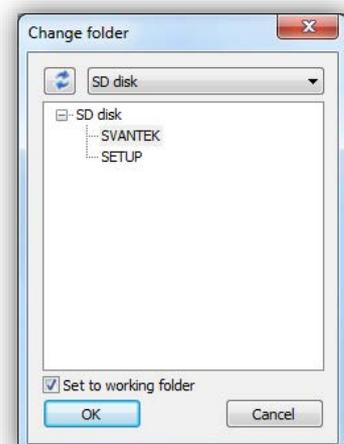
5.5.2 Local files "Data Browser"

Within the **Data Browser** tab you can see the list of previously downloaded files ready for further processing. Note that selected files will generate a short preview in the bottom area giving the operator an initial idea of the time history of the measurement results.

All files are simply divided per specific function: In the case of a instrument: hand-arm dosimetry and Wave are relevant file groups.

To further process the selected file or files, right click on selection, and choose **"New session"** command. This will bring you to the **"Session"** window (see chapter 5.6), where the reporting tool will allow you quickly and professionally review and asses the data.
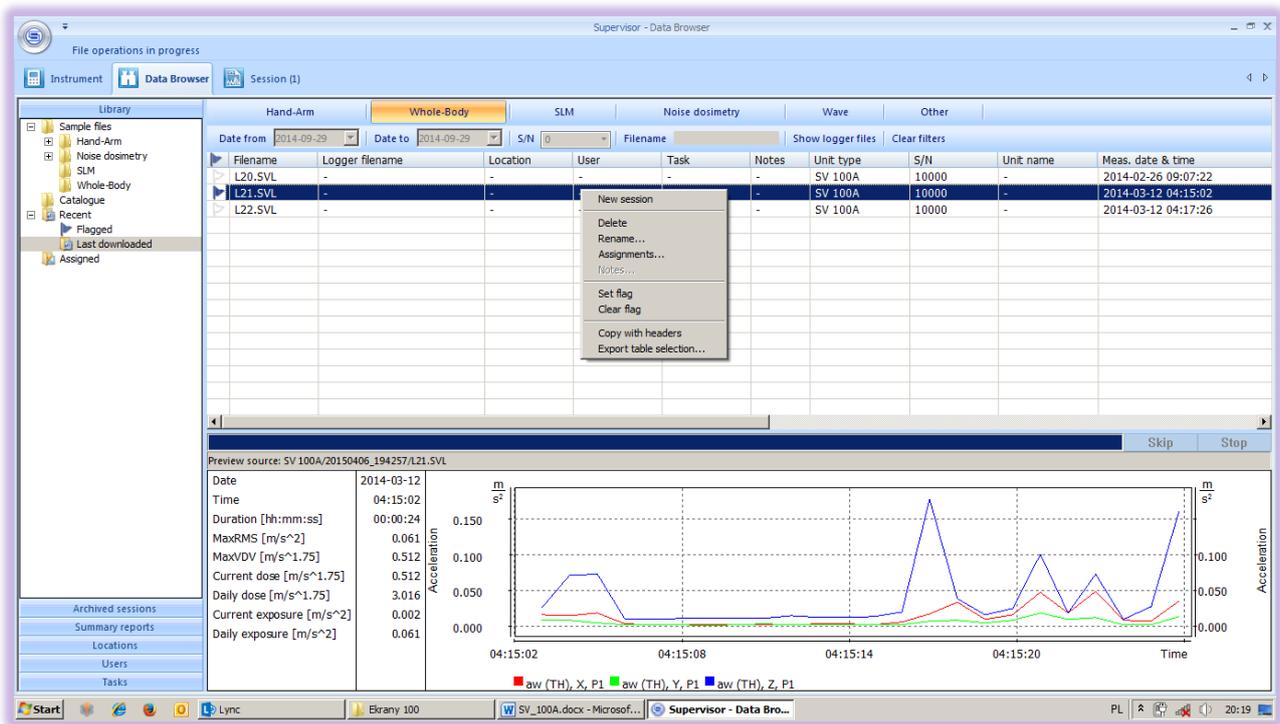

Figure 5-20 Local files "Data Browser" - window layout

5.6   Working with sessions and reporting

One of the main advantages of the SUPERVISOR is its incredibly simple but professional and user customizable report creation. Once you get familiar with the power of document design you will love it and probably never come back to the old-fashioned way of reporting.

When the measurement data is downloaded via the download feature, the data is stored and viewable via the local file **Data Browser** window. Further work with data downloaded from instrument is based on, so called, **SESSIONS** – the most advanced charting, tables, and reporting capability in its class.

Each **SESSION** is highly configurable and the **template** of a document once created (Figure 5-22) can be saved for future use with other measurement data. That gives the operator quick solutions at the fingertip. **The information is divided into panels** and viewable in customizable graphs and/or with selected measurement data/parameters.
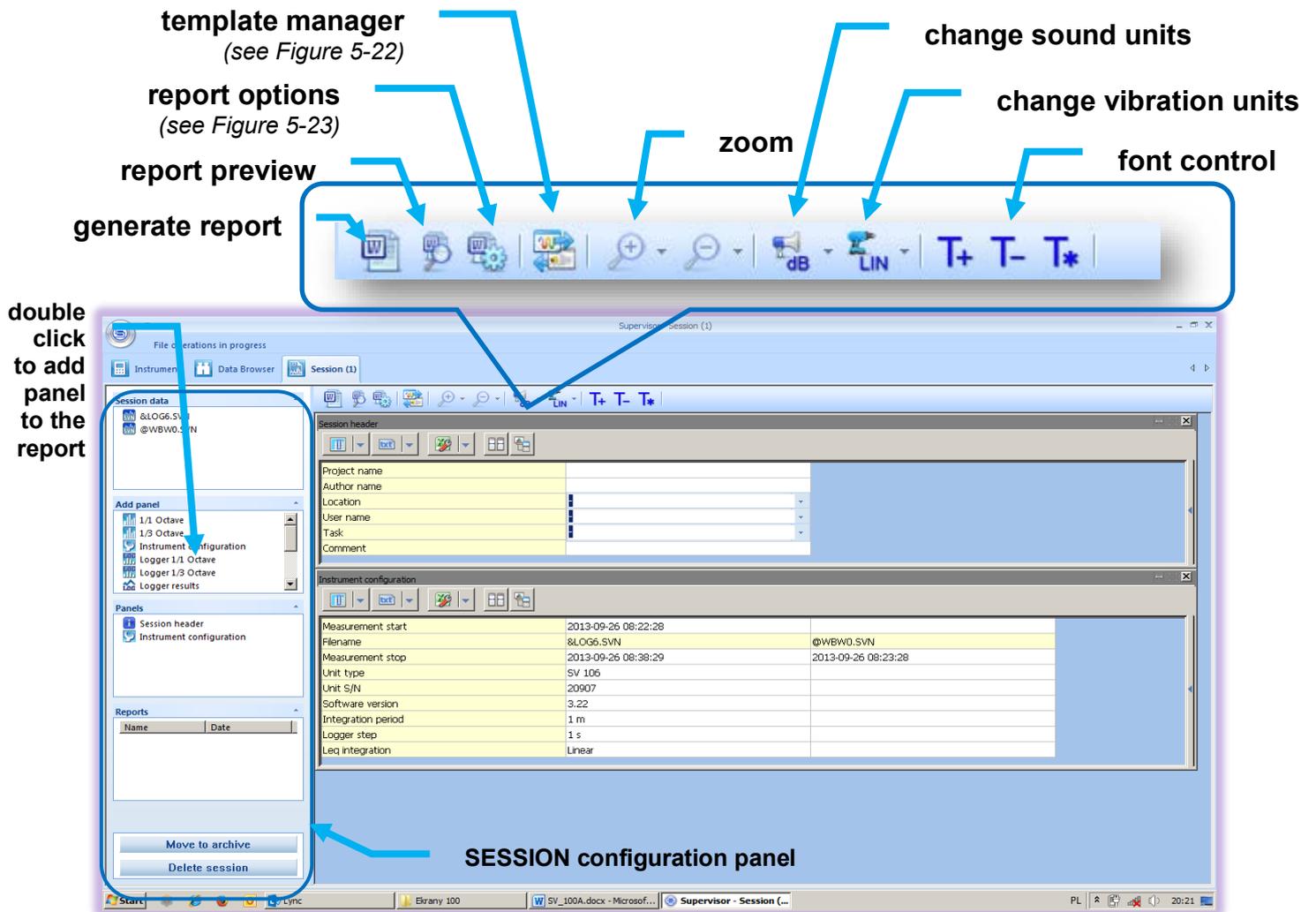
Figure 5-20 SUPERVISOR main SESSION window
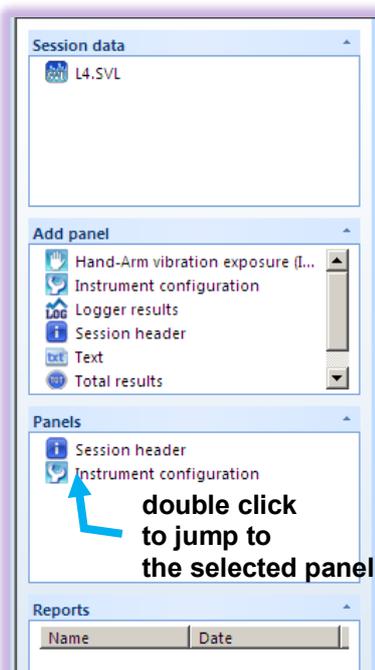
SESSION configuration panel enables you to see the currently selected measurement data in the **Session data** sub-panel.

Add panel contains a list of available information sections or chunks so called panels that are available to place in the report. Just double click to add a new panel section to the report detailed configuration area. Note, that each panel can be added more than once. It is possible to change the information in each panel: for example: one panel with parameters sorted in a table layout, and the other with a graph, or a zoomed graph.

Panels contains the list of currently added information chunks to the report detailed configuration area. Here you can change the names of the individual added panels.

Reports contains information about user generated documents saved by the software.

SESSIONS can be archived, or deleted with single button click.

Figure 5-21 SESSION configuration panel
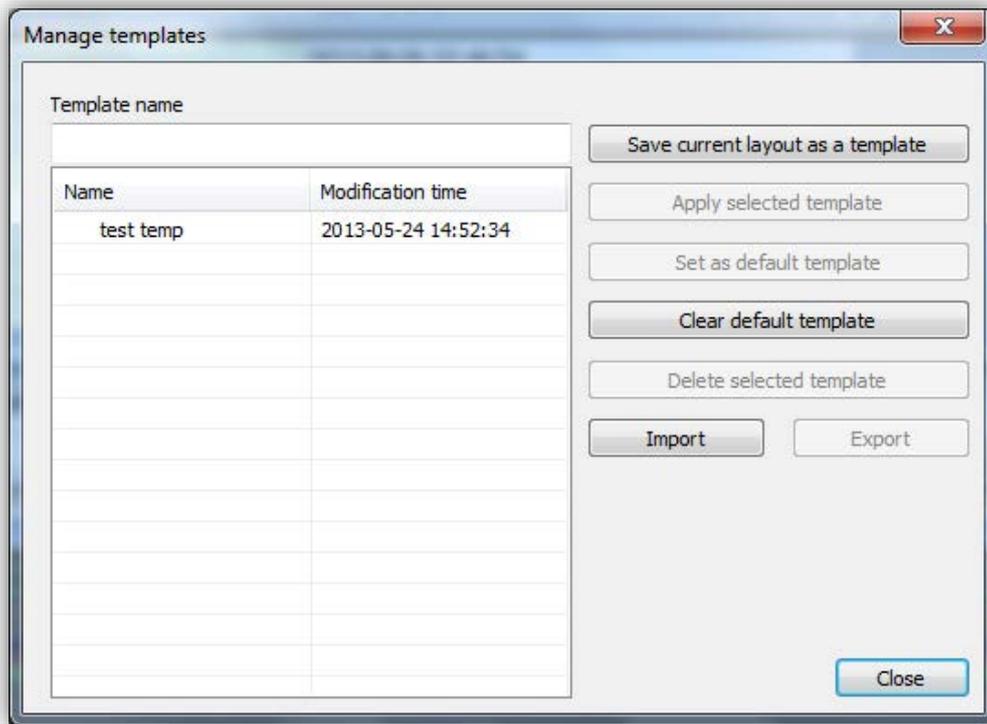
Figure 5-22 Managing templates with SUPERVISOR

5.6.1 Report panels

See the following panels, then configure, and generate report.

Report options: With **Report options** window, it is very straightforward to edit basic report information and predefined graphics, colour and style.
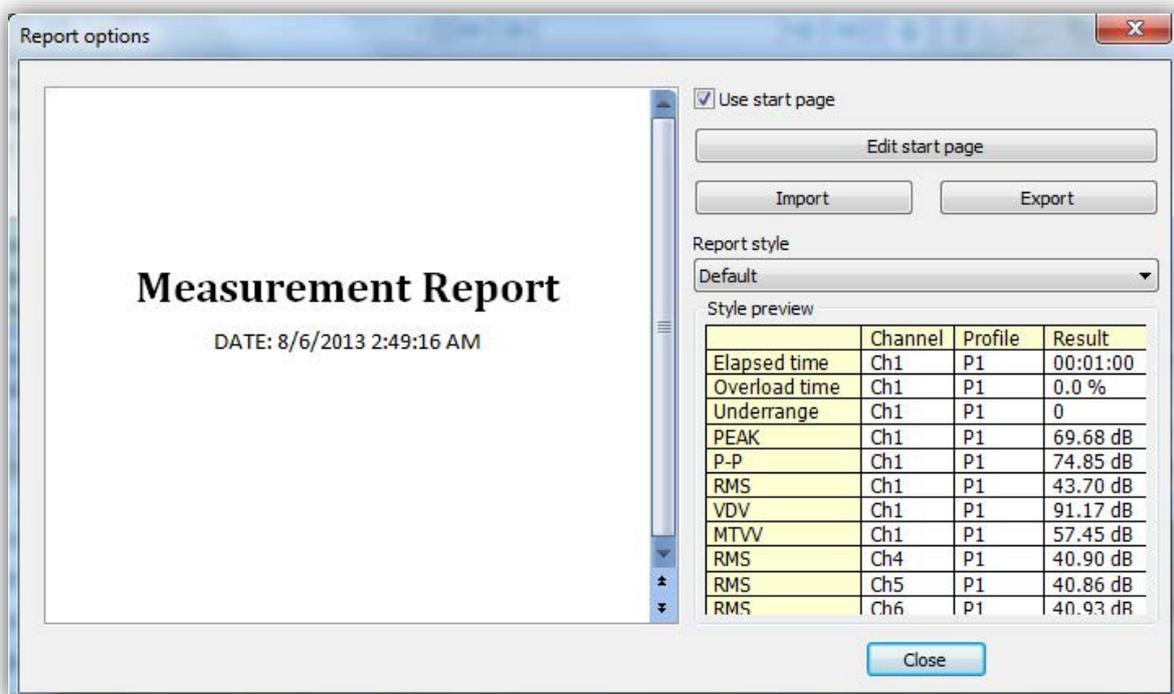
Figure 5-23 SUPERVISOR Report Options

Figure 5-24 Whole-body vibration exposure (ISO 2631-1) panel
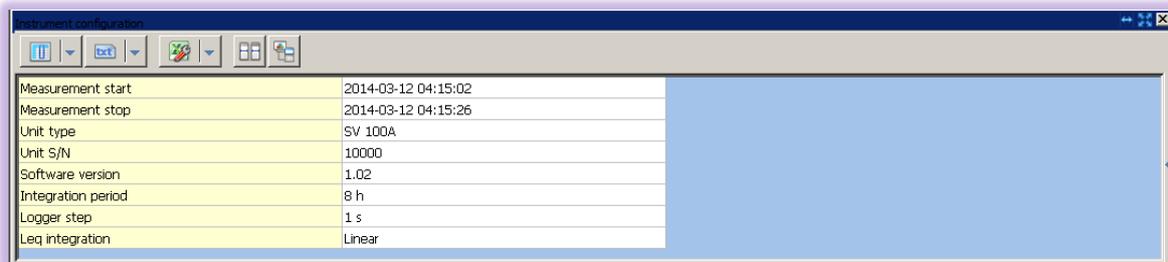
Figure 5-25 Instrument configuration panel
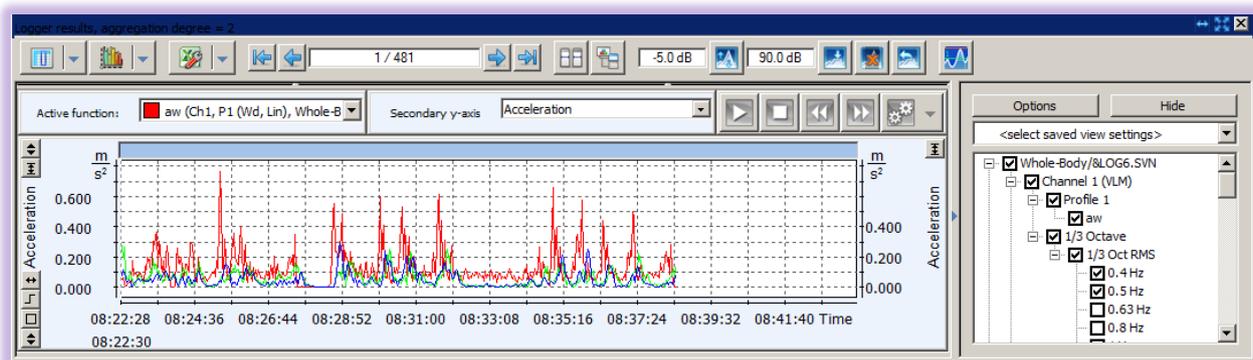
Figure 5-26 Logger results panel

Figure 5-27 Logger results (table) panel

Figure 5-28 Session header panel

Figure 5-29 Configurable Text panel

Figure 5-30 Total results panel

6 SMARTPHONE APPLICATION FOR SV100A REMOTE CONTROL

The **SV100A** can be control via dedicated smartphone/tablet application "**Assistant**" developed for Android (5.0 or higher) and iOS (9.0 or higher) platforms. Assistant supports next functions:

- Alarm on exceeding vibration action and limit value,
- Remote overview of current measurement results,
- Basic setup adjustment, measurement start/stop,
- Remote markers control,
- Provide location data to SV 100A logger.
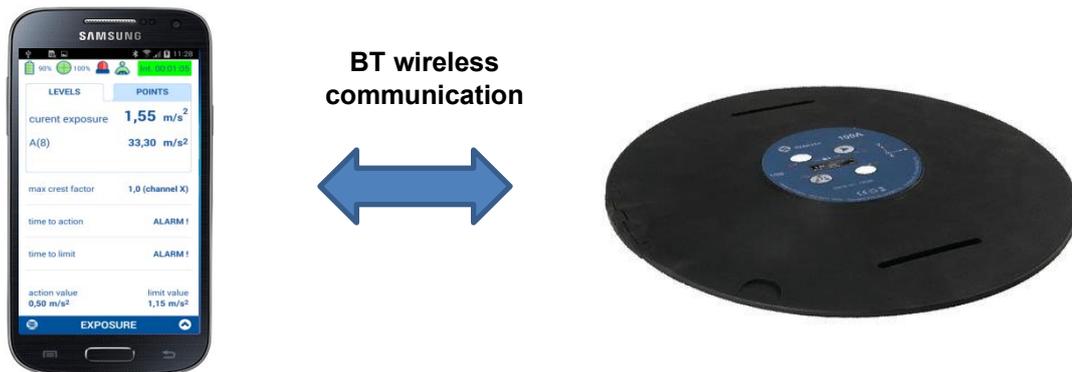
Figure 6-1 SV100A smartphone application via wireless BT communication

Assistant is running at a mobile phone which travels with the driver. It warns the driver on too high exposure. Logged location and speed allows for further analysis and route / velocity optimization.

The Assistant application supports also SV 104A acoustic dosimeter.

6.1 Installing and connecting with SV100A

To install the Assistant application on your smartphone/tablet:

- Connect your smartphone via the USB cable to the PC
- Login to svantek.com website and download **Assistant** from the support page to your smartphone,

- Install Assistant on your smartphone, the icon ![icon] will appear on the smartphone desktop panel.

To start the Assistant application:

- Tap the icon to open the **Assistant** application. The splash window is opened and **Assistant,**
- The Assistant may ask you to enable BT wireless communication and Localization services on your smartphone,
- The Assistant will detect visible instruments automatically.

If some SV 100A are switched off they appear on the instrument list with the comment "Turned off". You may switch them on by clicking on the specific instrument.

If instrument is protected by the PIN code you will be asked to enter this code in a special screen, otherwise Assistant will not be able to download data from SV 100A.
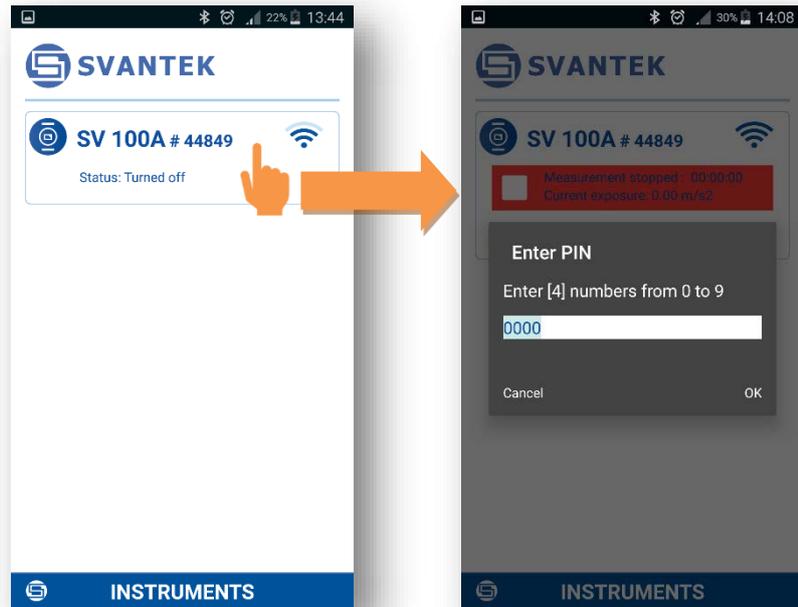
> ⚠️ **Note:** You will not get access to instruments that are under control of other simultaneously running **Assistant** application on other mobile device.

> ⚠️ **Note:** It is recommended that the **SV104A** is in locked mode to discourage the wearer from tampering and is described in chapter 4.7.

6.2   Remote control of SV100A

The Assistant application has two main screens: **scanning/status screen** and **result view/control screen**.

Tapping the fields inside the instrument frame you can go to the instrument's results view and measurement control screen.

If you want to come back to the scanning/status screen just press "Exit" button on your smartphone.
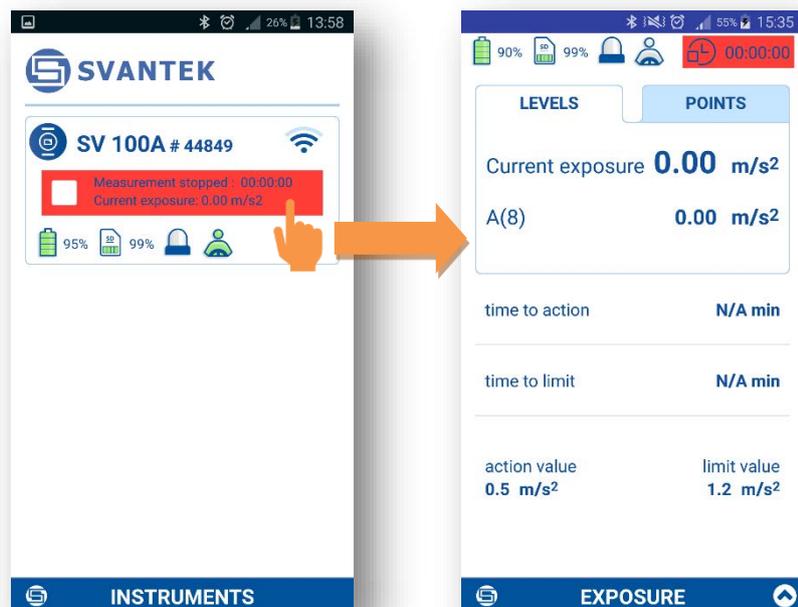
6.2.1 Scanning/status screen

From the scanning/status scree, you may observe status of the set of instruments.

Each instrument status is displayed in the frame that contain up to tree fields. First field displays the instrument name and serial number. Instrument's unique name can be defined by the user via Supervisor software (see chapter 5.3). Second field shows the instrument status (**Turned off**) or if it is turned on – the measurement status. If measurement is stopped the field is red, if in progress it is green, if in pause – yellow.

The third field contains several icons that inform you about:

Internal **battery** status of selected SV 104A. The battery capacity is displayed in percentage. If battery is close to be empty it's colour changes to red.

Internal **memory** status of selected SV 104A. The green area and the percentage display the empty memory capacity.

Dose **alarm**. If dose is above the threshold level the icon is red and the smartphone starts to vibrate.

Presence of the controlled person. If the controlled person is sitting on the instrument, the icon is green, otherwise the icon is white.

Someone is using the instruments **keyboard**.

Blocking status because of other current smartphone control over this instrument.

As an example:

- The instrument SV 100A #44897 is switched on and measurement is stopped. Battery charging is 97%, free memory is 99%, no alarm, the controlled person in not sitting on the instrument.

- The instrument SV 100A #44849 is switched on and measurement is running. Current exposure value is displayed. In addition to the previous instrument it can be seen, that the controlled person is sitting on the instrument.

- The instrument SV 104A # 56400 is switched off.

After pressing the [icon] button, the popup menu appears in which the user can:

- send e-mails with the current measurement information (**Send eMail**),

- send SMS with the current measurement information (**Send SMS**),

- set-up the auto SMS alarm notification (**Set auto SMS**),

- obtain information about recent software version (**About**) and

- exit the Assistant application (**Exit**).
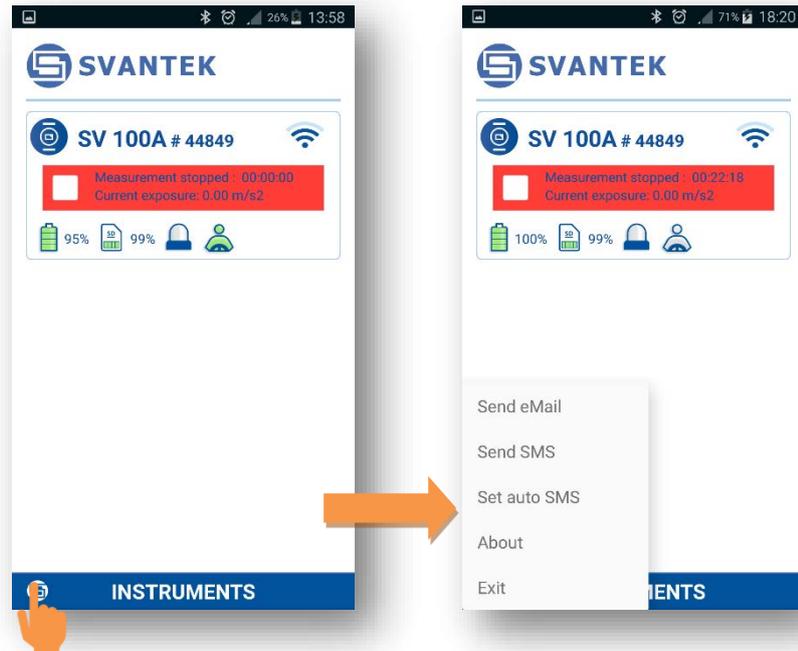
6.2.2 Result view/control screen

Assistant application uses several windows, which allow the user:
- to follow the measurement results,
- to stop, pause the measurements,
- to activate markers,
- to follow current location on the map and log coordinates to the file and
- to change the instrument settings.

By sliding his finger to the right or to the left the user can view next windows: **CONNECTION**, **CHANNEL RESULTS**, **LOCATION**, **EXPOSURE**, **TIME HISTORY** and **SETUP LOADER**.

Assistant application all the time checks alarm levels and informs the user if some levels are exceeded.

From the result view/control screen you may view measured results and control the measurement of the instrument.

From this screen, you can **Pause, Start** or **Stop** a measurement run. Touch the arrow right icon on the bottom bar of the screen. Stopping the measurement run requires confirmation.

As in the scanning/status screen same icons in the upper screen line describe the instrument status. In addition to them integration time is displayed.
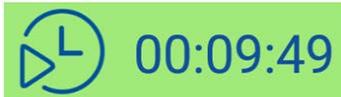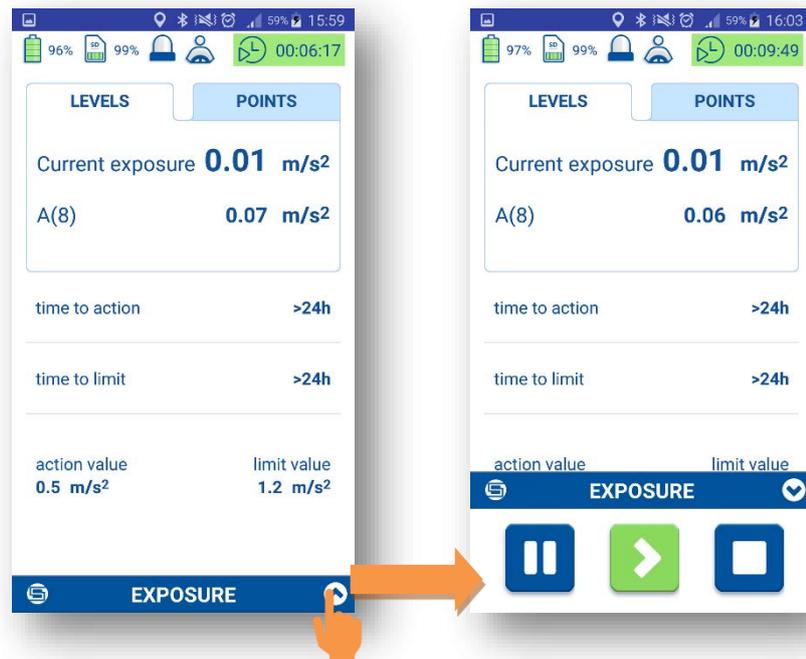
Integration time. If the measurement is running this icon is green and time is counting. If the measurement stopped or paused the icon changes its colour to red or yellow and time counting stops.

After pressing the [icon] button, the popup menu appears in which the user can:

- switch to the scanning/status screen (**Instruments**),
- turn the instrument off (**Turn off instrument**),
- to perform the instrument check (**In-situ check**)
- exit the application (**Exit**).
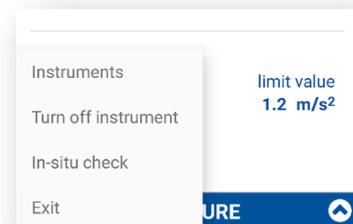
EXPOSURE window

The **EXPOSURE** window presents the current results and the status of the device (top bar displays the battery status, memory usage, an alarm and whether the meter is loaded). In addition, there is a menu that appears when you click on the "S" on the bottom bar - allows you to switch between windows. Exposure can be expressed in metric units or in points.

The user can switch between wo tabs: **LEVEL** and **POINTS**.
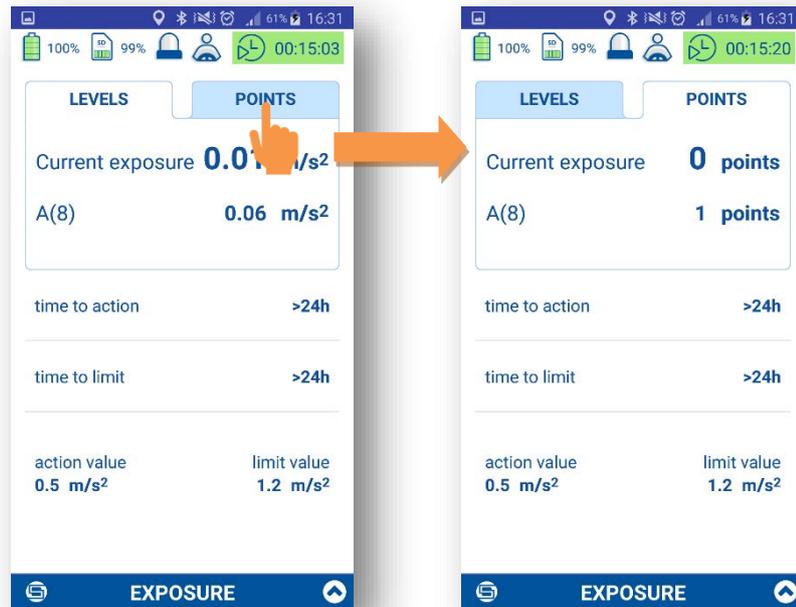
CHANNEL RESULTS window

The **EXPOSURE** window presents instantaneous **RMS** or **VDV** results for three channels.

Two tabs are available for presenting results with the Logger step and with the Integration time step: **TIME HISTORY** and **SUMMARY** results.

The buttons at the bottom of the window serves for activation / deactivation of four markers.

All marker's names except **WAVE REC.** can be defined in the **SETUP LOADER** window.
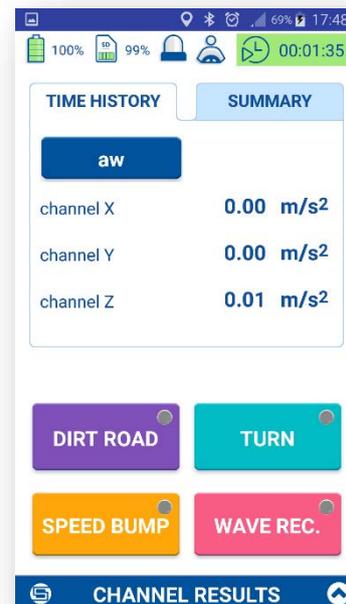
TIME HISTORY window

The **TIME HISTORY** window presents the time history (logger) of the result (**aw**) for the **channel x**, **y** or **z** together with markers.

Pressing the button **aw (channel x)** allows the user to switch between channels: **aw (channel x)** => **aw (channel y)** => **aw (channel z)**.

The buttons at the bottom of the window serves for activation / deactivation of four markers.
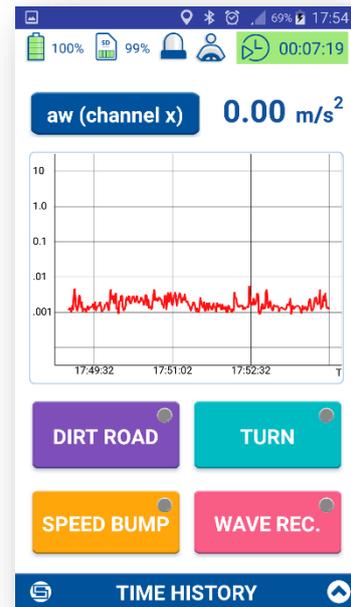
SPECTRUM window

The **SPECTRUM** window presents the 1/1 or 1/3 octave spectrum of the result (**RMS**) for **channel x**.

Pressing the button **RMS (channel x)** allow the user to switch between channels: **RMS (channel x)** => **RMS (channel y)** => **RMS (channel z)**.

The result value refers to the cursor position, which can be selected by clicking the appropriate bar or by dragging the cursor.

The buttons at the bottom of the window serves for activation / deactivation of four markers.
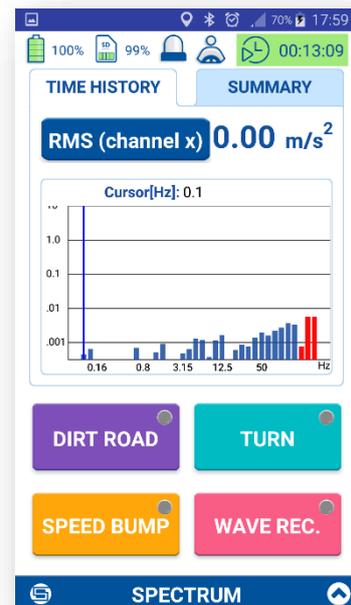
LOCATION window

**Assistant** automatically adds the GPS marker to the logger file of the instrument. The marker contains the current location and speed. The marker is added every 3 seconds or even more often, depending on how Assistant is busy with other processes. Additionally, the program draws a measurement route on the map (automatically retrieved from the Internet) and calculates the route length. The icon in the upper right corner of the map will centre the map on your current location.
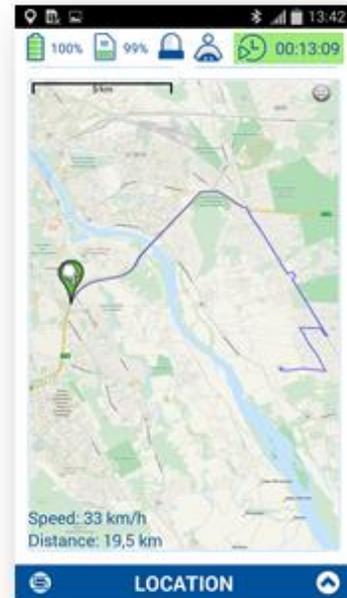
SETUP LOADER window

The **SETUP LOADER** window allows the user to load pre-defined setup files and to change few key parameters. These changes can be made only when the measurement is stopped.

Below few windows with settings are presented.
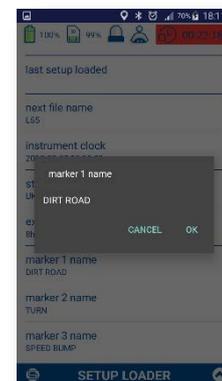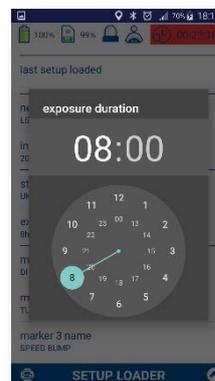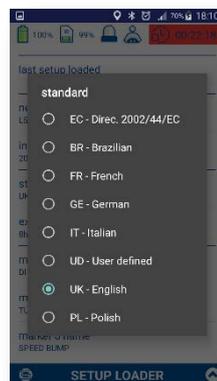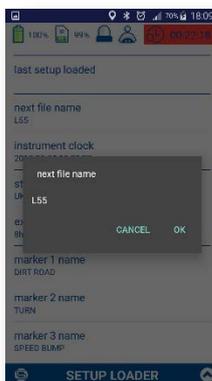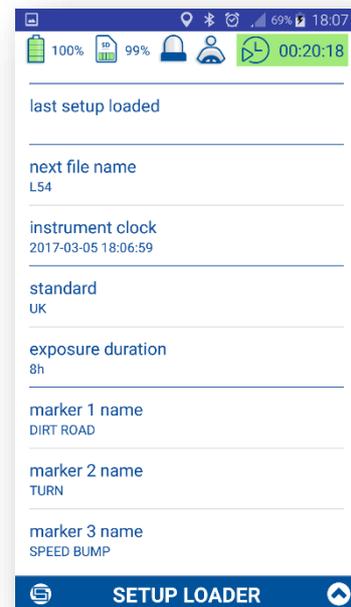
Alarm warning

The system constantly checks the status of the measurement and an alarm. In case of exceeding the allowed dose, alarm occurs with a message on the screen, an information cloud, vibration, voice signals, flashing alarm icon.
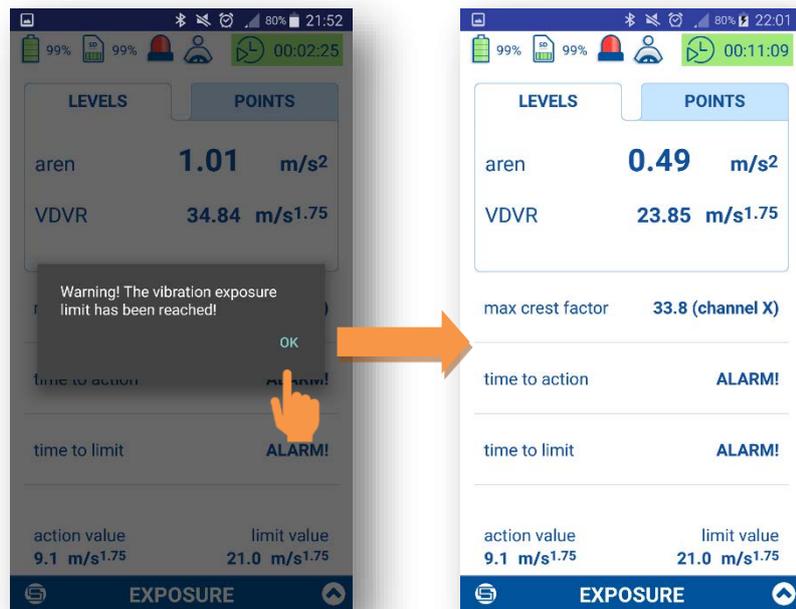
6.3   In-situ check

In-situ check comprises a minimum level tests, indicating that the instrument is likely to be functioning within the required performance specification. These tests shall be carried out immediately before and after measurements.

1. Tap the **In-situ check** position.

2. Attach the instrument to the vibration calibrator.

3. Switch on the calibrator and wait approximately 30 seconds before starting the system check measurement.

4. Start the calibration measurement by pressing the „>" button.
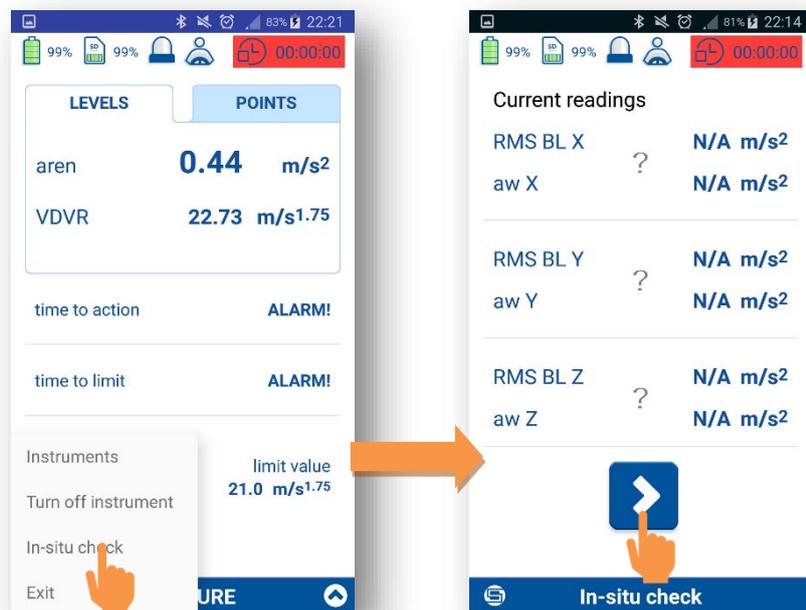
The checking is performed for one channel and it should be repeated for all other channels. The currently checked channel is detected automatically (by highest values).

6.4   SMS and e-mail notification

The **Assistant** can send e-mail/SMS notification about current measurement status and current values of the measured parameters.

E-mail and SMS recipient is defined after pressing the

[button image] button, and then selecting appropriate command from popup menu.
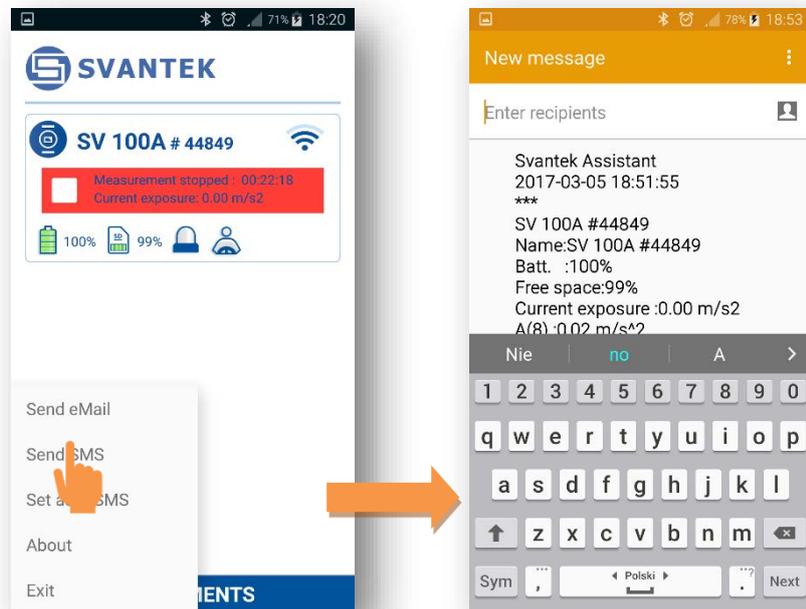
Auto SMS enables the user to define the phone number to which SMS notification will be send in alarm conditions. Alarm conditions should be set-up via **Supervisor** software and uploaded as **setup** configuration files (see chapters: 4.4 and **Błąd! Nie można odnaleźć źródła odwołania.**).

Consecutive notifications will be send when the certain alarm limits are exceeded.
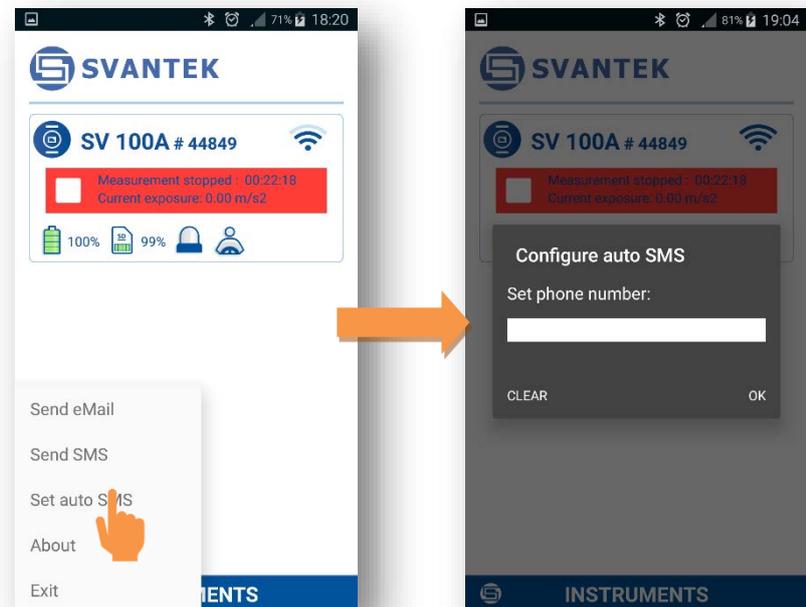
7 SV100A MAINTENANCE

7.1 General recommendations for use

- Use only high quality USB cables, such as **SC 56**. Many poor-quality cables do not ensure low resistance of the cable, thus disabling proper charging of the internal cells
- It is not recommended to leave the instrument in direct sunlight conditions for prolonged periods of time. Extended exposure such as behind the car window may affect the performance.
- To improve accuracy of remaining battery life indicator, run the instrument until it is fully discharged; then proceed with a full charge via the micro USB port. The procedure is recommended before first use. Repeat this procedure every few months of use to maintain more accurate current battery condition indication.

7.2 Cleaning

It is recommended to clean the surface of the SV 100A instrument with a damp soft cloth.

7.3 Firmware upgrade

SVANTEK is committed to continuous innovation path of development, and as such reserves the right to provide firmware enhancements based on user's feedback.

To update the instrument firmware:
- Unpack the provided firmware package (provided as a suitable compressed file).
- Make sure the unit is turned off and disconnected from the USB.
- Hold down the **<SCROLL>** ▶ key and press the **<ENTER>** ↵ key to turn on the unit. This ensures the unit will switch on and enter the special reprogramming **BOOTLOADER** mode.
- Then connect the USB cable. The **<USB>** text will now appear on the instrument display.
- Run the **start.bat** file on connected by USB cable PC.
- Successful firmware update will be indicated by relevant message.
- Turn off the unit.

> ⚠️ **Note:** *With use of SUPERVISOR software it is very easy to check if there are any new firmware releases available for download (see Figure 5-3 commands).*

7.4 Storing the instrument

- To preserve the life of the internal batteries, it is recommended that the **SV 100A** instrument is turned off when it is stored.
- Do not store the instrument permanently connected to the USB port. It shortens battery lifecycle
- When the **SV 100A** is turned off, it still draws a small amount of battery power. Therefore, it is recommended to charge the cell every few months if it is not going to be used regularly.

7.5 Transportation and carrying

For transportation or storage purpose, always use the packaging provided by the manufacturer. In a potentially dirty industrial environment it is advisable to use the carrying case provided by the manufacturer such as the **SA 145** (see chapter 2.3), which ensures excellent mechanical and environmental protection and long term storage conditions.

8 SVANTEK SERVICE

8.1 Troubleshooting

1. Upon connection to the USB port, if automatic charging is not started: check the USB cable and power supply ratings of the source.
2. If the incorrect time or date is displayed when turning on the instrument connect the device to the computer and use Supervisor software to set the time and date (see) ensuring PC clock is set correctly.
3. In case the instrument is not able to turn on ensure the unit is charged by connecting to USB or recommended charger. This ensures the battery is not exhausted. Then proceed with hardware reset (chapter 7.2).
4. In case your instrument does not respond proceed with turn-off/turn-on procedure (chapter 3.83.5), and hardware reset of the instrument (chapter 7.28.2).
5. In case the measurement of the vibration level is frozen or set to a fixed value proceed with turn-off/turn-on procedure (chapter 3.8), then with hardware reset of the instrument (chapter 7.2).
6. In case the reset does not help call Local Authorized Distributor or Svantek Service Office.

8.2 Resetting the instrument

- **SYSTEM RESET:** (internal software reset clears any setup configuration, and brings back the default factory settings).

  See **Appendix A** for remote control commands description.

- **HARDWARE RESET:** (internal hardware reset, no user data is changed)

Make sure the battery is not exhausted, and the unit is turned off. Insert some needle (or paper clip) into the hole on the back panel of the instrument and press it for more than 3 seconds, and then release it. Turn on the instrument as usually.

> ⚠️ **Note:** *Hardware reset is only to be used in extreme situations such as an instrument hang-up. Be aware, that a hardware reset:*
> - *will stop any pre-programmed auto-run modes*
> - *will stop measurement run*
> - *HARDWARE RESET works, even if the keyboard becomes locked out!*

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

Service Office: +48 (22) 51-88-320 or +48 (22) 51-88-322.
Office hours are 8:00 a.m. to 4:00 p.m. Central European Time.
- E-mail at office@svantek.com
- Internet at www.svantek.com
- Address:
  SVANTEK Sp. z o.o.
  Strzygłowska 81, 04-872 Warszawa, Poland

> ⚠️ **Note: *International customers:***
> *Contact your local authorized distributor from whom the product was purchased. You can obtain the name and contact information of your local authorized distributor from SVANTEK by using the e-mail or telephone information listed above or use our website to find nearest distributor office.*

9 SPECIFICATION[1]

Standards	ISO 8041:2005, ISO 2631-1:1997
Meter Mode	a_w (RMS), a_{wmax} (RMS MAX), VDV, MaxVDV, a_{wv} (VECTOR),
	A(8) Daily Exposure, ELV Time (TIME LEFT TO LIMIT), EAV Time (TIME LEFT TO ACTION), MTVV, Max, Peak, Peak-Peak
	Simultaneous measurement in three channels
Filters	Wd, Wk, Wm, Wb (ISO 2631) and corresponding Band Limiting filters
	Wf for motion sickness measurements according to ISO 2631 (option)
RMS & RMQ Detectors	Digital true RMS & RMQ detectors with Peak detection, resolution 0.1 dB
Measurement Range	$0.018\ ms^{-2}$ RMS ÷ $157\ ms^{-2}$ PEAK
Frequency Range	0.1 Hz ÷ 180 Hz
Data Logger	Time-history data including meter mode results and spectra
Time-Domain Recording	Simultaneous 3-channel time-domain signal recording (option)
Analyser	1/1 octave real-time analysis meeting Class 1: IEC 61260 (option)
	1/3 octave real-time analysis meeting Class 1: IEC 61260 (option)
Accelerometer	Tri-axial MEMS based
Display	OLED 128 x 32 pixels
Memory	8 GB
Interfaces	USB 2.0 client, BT wireless communication
Keyboard	4 push buttons
Power Supply	Ni-MH rechargeable cells: operation time > 24 hours1
USB interface:	500 mA HUB
Environmental Conditions	Temperature: from -10 °C to 50 °C
	Humidity: up to 90 % RH, non-condensed
Dimensions	235mm x 12 mm
Weight	0.5 kg

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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