

Appendix C. TECHNICAL SPECIFICATIONS of the SV 100A

C1. Specification of the SV 100A

System configuration

The meter measured simultaneous in three channels with independent set of filters and detector constants.

The **SV 100A** instrument meets requirements of the **ISO 8041:2005**.

Thus SV 100A is a convenient instrument for tests according to the ISO 2631-1,2&5

The configuration of the complete instrument and its normal mode of operation for Whole-Body measurements::

SV 100A vibration meter (see C3, for the built in accelerometers specification)

Accessories included

SA 54	Power supply unit
SC 56	Mini USB 2.0 cable
Assistant	Android application

Accessories available

SA 136 (option)	Calibration adapter for periodical verification.
SA 145 (option)	Carrying case for instrument and accessories.

Measured quantities

The measured quantities in the vibration meter mode are **aw, VDV, CRF, OVL, PEAK, P-P, MTVV, MAX, awv, A(8), CDose, DDose, CExp, ELV, EAV, aren, VDVR**. The definitions for mentioned parameters are given in Appendix D.

Mounting for vibration tests

The accelerometer should be connected with SV 100A using proper cable provided by the manufacturer.

The accelerometer can be mounted on the plate in various ways:

- using threaded stud onto a flat, smooth surface,
- using proper adapter provided by manufacturer.

Linear operating ranges for the acceleration

The linear operating ranges for the distance from noise > 10 dB

Table C.1. Linear operating ranges (RMS values for the sinusoidal signals)

Filter	type SV 100A	
	from	to
Wb, Wd, Wk, Wm Wc, Wf, BL – Wf	85.0 dB (17.8 mm/s ²)	162.4 dB (132 m/s ²)
BL- Wb, BL- Wd, BL- Wk, BL- Wm, BL- Wc	100.0 dB (100 mm/s ²)	165.4 dB peak (186 m/s ² peak)

Frequency range for the acceleration measurement (+/- 10%) **0.02 Hz ÷ 100 Hz**

Basic error for the acceleration measurement: $< \pm 0.5 \text{ dB}$

Calibration

Direct: by the measurement of the standard signal generated by the external vibration calibrator (Svantek SV111).



Notice: Calibration procedure is given in Chapter 4 of the Manual.

RMS detector

- Digital **“True RMS” with Peak detection**
- Resolution **0.1 dB**
- Range **327.7 dB**
- Crest Factor **unlimited** for signals within 200 Hz bandwidth
- Time weighting filters: **100 ms, 125 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s and 10 s**

PEAK and P–P detectors:

Digital with 0.1 dB sampling step

Overload detector

The instrument has the built-in overload detectors. The “overload” indication is when the input signal amplitude is **1.0 dB above** the calibrated “Peak measurement range”.

Underrange detector

The instrument has the built-in underrange detector. The “underrange” indication appears when the minimum value of the RMS detector output goes below the specified lower linear operating range.

Analogue/Digital conversion **3 x 16 bits resolution**

Antialiasing filter

Built-in antialiasing filter. Second-order analogue filter, active type, combined with on-chip FIR digital filter of the analog-to-digital converter, ensuring correct sampling of the measured signal.

Pass band (-1 dB) **280 Hz,**
Pass band (-3 dB) **365 Hz,**
Stop band **5000 Hz,**
Attenuation in the stop band **> 60 dB.**
Sampling frequency **12000 Hz** (internal only).

Reference conditions

- Reference frequency **15.915 Hz ,**
- Reference temperature **+23°C,**
- Reference relative humidity **50 %,**

Pre-heating time **1 minute** (for 0.1 dB accuracy).

Typical stabilization time after change in environmental conditions is 1 minute.



Notice: When the instruments are moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the instruments. In this case, much longer stabilization periods may be necessary.

Digital filters

Frequency weighting filters

All filters include Band Limiting filters.

Band Limited filters are listed and available separately.

(See part C.2 for the filters characteristics).

- **Wk, BL-Wk** from **0.1 Hz to 300 Hz**
- **Wd, BL-Wd** from **0.1 Hz to 300 Hz**
- **Wm, BL-Wm** from **0.1 Hz to 300 Hz**
- **Wb, BL-Wb** from **0.1 Hz to 300 Hz**
- **Wc, BL-Wc** from **0.1 Hz to 300 Hz**
- **Wf, BL-Wf** from **0.02 Hz to 2 Hz**

Instrument Noise Level

Typical noise level from the combination of the vibration transducer and the SV 100A for the frequency-weighted response:

Table C.4 Typical noise level of the SV 100A with accelerometers (for each axes), seat-surface orientation

Filter	Channel X, Y		Channel Z	
	Wk	-	-	5 mm/s ²
BL-Wk	-	-	28 mm/s ²	89 dB
Wd	2.0 mm/s ²	66 dB	-	-
BL-Wd	13 mm/s ²	82 dB	-	-
Wm	1.8 mm/s ²	65 dB	2 mm/s ²	66 dB
BL-Wm	13 mm/s ²	82 dB	28 mm/s ²	89 dB
Wb	-	-	5 mm/s ²	74 dB
BL-Wb	-	-	28 mm/s ²	89 dB
Wf	1.1 mm/s ²	61 dB	3.2 mm/s ²	70 dB
BL-Wf	1.8 mm/s ²	65 dB	4.6 mm/s ²	73 dB

Table C.5 Typical noise level of the SV 100A with accelerometers (for each axes) , seat-back orientation

Filter	Channel X, Y		Channel Z	
	Wc	5.6 mm/s ²	75 dB	-
BL-Wc	25 mm/s ²	88 dB	-	-
Wk	-	-	2.8 mm/s ²	69 dB
BL-Wk	-	-	13 mm/s ²	82 dB
Wd	3.2 mm/s ²	70 dB	-	-
BL-Wd	25 mm/s ²	88 dB	-	-
Wm	2 mm/s ²	66 dB	1.8 mm/s ²	65 dB
BL-Wm	28 mm/s ²	89 dB	13 mm/s ²	82 dB

Wb	-	-	3.2 mm/s ²	70 dB
BL-Wb	-	-	13 mm/s ²	82 dB
Wf	3.2 mm/s ²	70 dB	1.1 mm/s ²	61 dB
BL-Wf	4.6 mm/s ²	73 dB	1.8 mm/s ²	65 dB

Environmental, electrostatic and radio frequency criteria



Notice: *In the measurement conditions with the strong electromagnetic disturbances (e.g. near the high-voltage transmission lines) the lower measurement limit can be drastically shifted as the result of the external field influence on the measurement cables. In such cases, the careful shielding of the measurement cables is strongly recommended. It is worth to underline that the estimation of the external influence can be performed in-site by the observations of the measurement signal spectrum.*

Effect of humidity < 0.5 dB (for 30% < RH < 90% at 40°C and 1000 Hz)

Effect of radio frequency fields (meets requirements of the ISO 8041:2005)

The greatest susceptibility (the least immunity) is achieved when in the SV 100A the band-limiting filter is selected and the RMS measurements are considered.
 The greatest susceptibility is achieved when the SV 100A and accelerometer with cable is placed along field and the cable is coil as solenoid.

Effect of electrostatic discharge (meets requirements of the ISO 8041:2005)

During electrostatic discharge, the influence of the displayed results could be observed.
 No changes in instrument operation state, configuration or stored data corruption were found out.

Operating range from -10°C to + 50°C

Storage and Transportation from -20°C to + 60°C

Effect of temperature < 0.5 dB (from -10°C to + 50°C)

Effect of Acoustic Signal.

The effect for the SV 100A transducers is marginal and can be neglected!

C2. Frequency characteristics of the implemented digital filters

In the SV 100A instrument there are various filters conforming to ISO 8041:2005 standards (**Wk**, **BL-Wk**, **Wd**, **BL-Wd**, **Wm**, **BL-Wm**, **Wb**, **BL-Wb**, **Wf**, **Wc**, **BL-Wc**, and **BL-Wf**).

The **Wk** filter is used for the assessment of the influence of the vibration signal on the human body in the **z** direction and for vertical recumbent direction. It conforms to the ISO 2631-1-97 and ISO 8041:2005 standard.



Characteristics of the BL-Wk and Wk digital filters implemented in the instrument

The **Wd** filter is used for the assessment of the influence of the vibration signal on the human body in the x and y directions and for horizontal recumbent direction. It conforms to the ISO 2631-1-97 and ISO 8041:2005 standards.



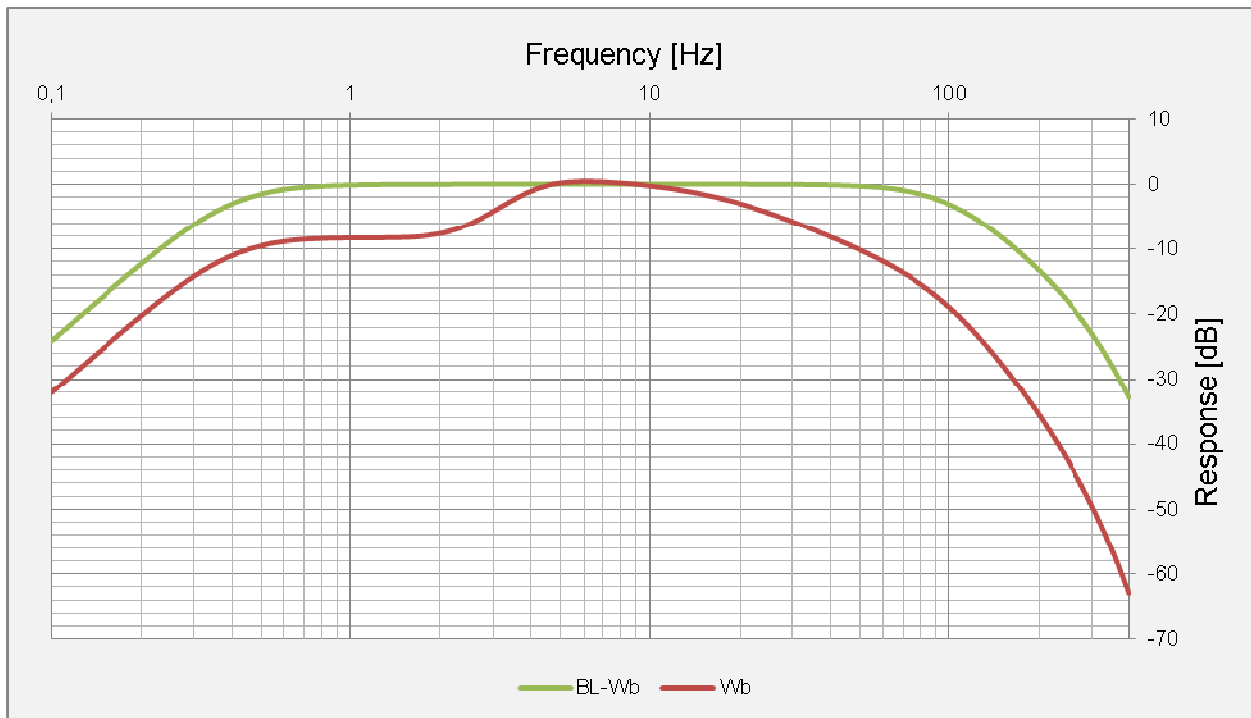
Characteristics of the BL-Wd and Wd digital filters implemented in the instrument

The **Wm** filter is used for the assessment of the influence of the vibration signal on the human body. It conforms to the ISO 2631-1-97 and ISO 8041:2005 standards.



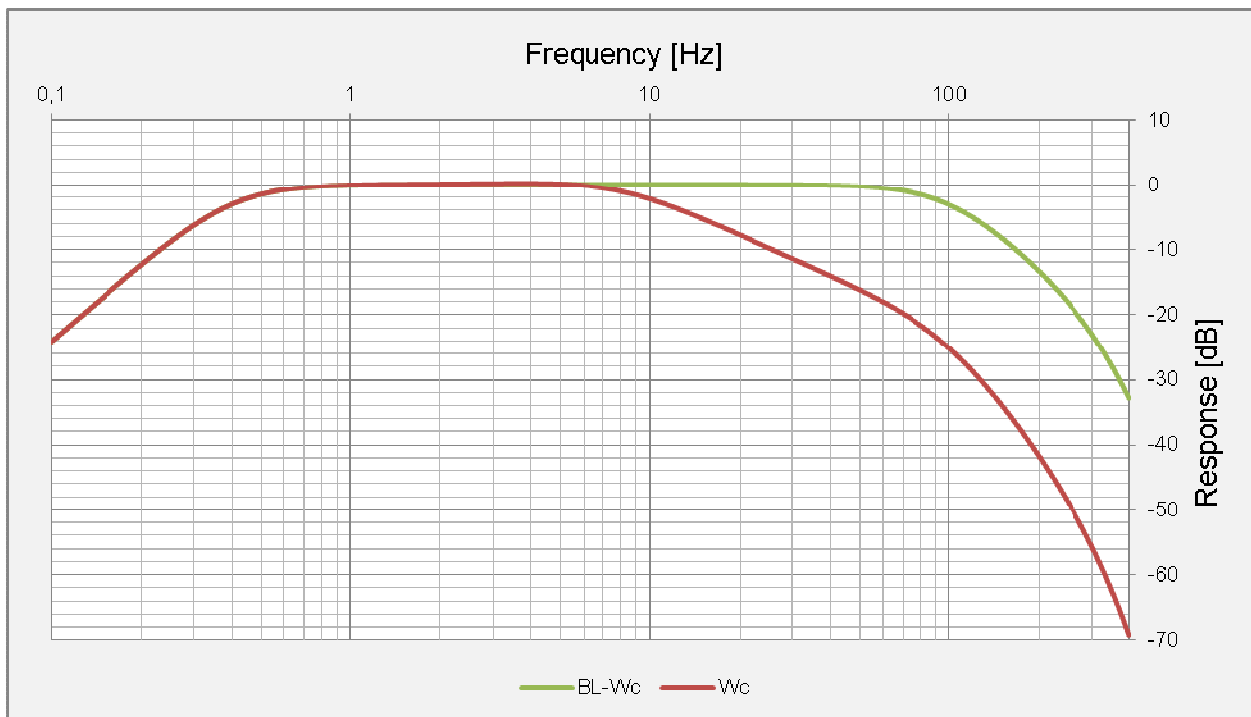
Characteristics of the BL-Wm and Wm digital filter implemented in the instrument

The **Wb** filter is used for the assessment of the influence of the vibration signal on the human body. It conforms to the ISO 8041:2005 standard.



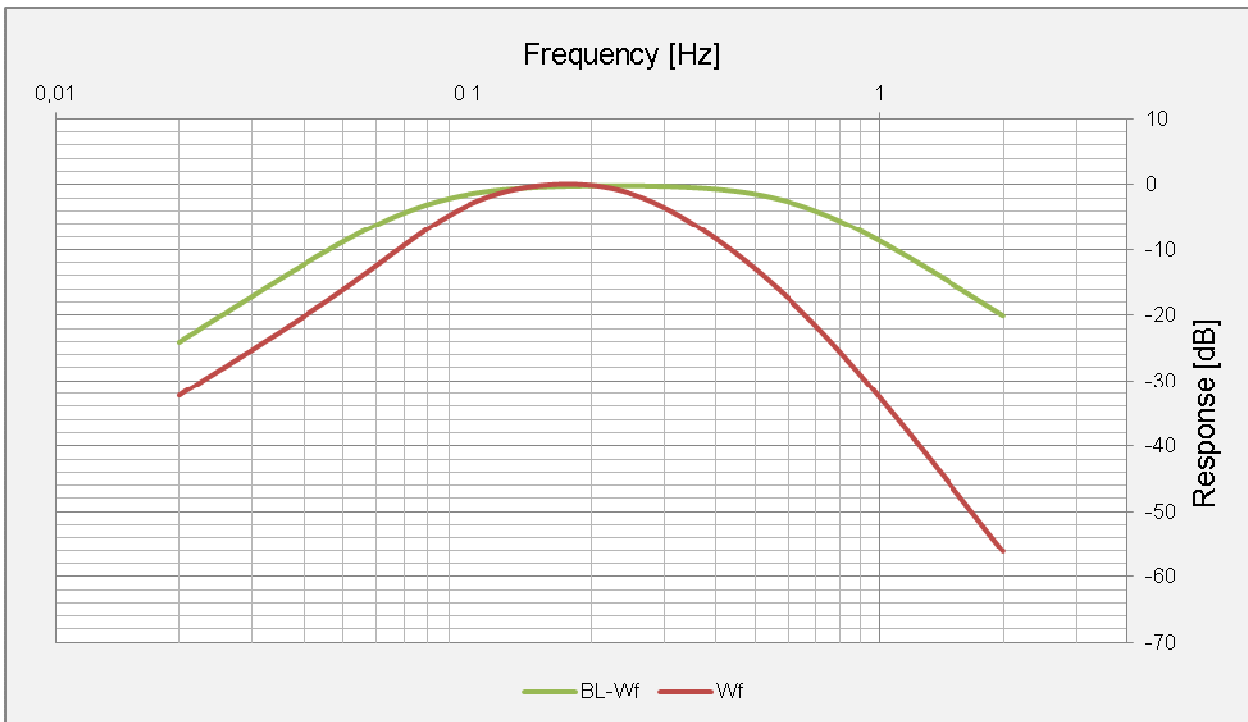
Characteristics of the BL-Wb and Wb digital filter implemented in the instrument

The **Wc** filter is used for the assessment of the influence of the vibration signal on the human body x-axis, seat back, seated person. It conforms to the ISO 8041:2005 standard.



Characteristics of the BL-Wc and Wc digital filter implemented in the instrument

The **Wf** filter is used for the assessment of the influence of the vibration signal on the human body. It conforms to the ISO 8041:2005 standard.



Characteristics of the BL-Wf and Wf digital filter implemented in the instrument

C3. Miscellaneous specification of the SV 100A

Force Detector

The instrument is equipped force sensor to detect the presence of a human sitting on the instrument.

Push Buttons

The instrument is equipped with 4 push buttons.

Display

Monochromatic OLED 128 x 32 pixels, super contrast 2000 : 1



Notice: The manufacturer of the OLED displays specify defective display. In case of defective display the number of dark dots is more than 4.

Definition of dark dots: dots appear dark and unchanged in size in which module is displaying.

Memory

16 MB non-volatile flash memory, 256 kB of the RAM memory and 8GB micro SD flash memory card .

Power supply

- Instrument is dedicated for the operation from the internal rechargeable battery.
- Typical operating time from internal 2 x AAA Ni-MH rechargeable batteries is about 24 hours.
- Power consumption from the 5V source is approx. 400 mA (at + 20°C) (500mA max) under battery charging, Instrument has built-in two AAA NIMH rechargeable batteries.

Typical operating time is ca. **24 hours**.



Notice: For the temperatures below 10°C operating time can decrease !

Interface USB

The **SV 100A** USB 2.0 interface enables remote control of the instrument and data transfer with the speed up to that attainable with 12 MHz/480 MHz clock.

The USB interface can work as external power source of the meter.(during data download)



Notice: To connect USB interface the SC 56 cable must be used!

SC56 USB cable plug (external view)

Table C.9 Pin-out of the USB-Device connector

Pin number	USB
1	Vbus

2	D-
3	D+
4	ID
5	GND
Shield	Ground

Interface Bluetooth

The SV100A contains BLE113 Bluetooth 4.0 communication module. The Bluetooth interface enables current results to be previewed on a smartphone or tablet using our Assistant Android application.

BLE113 FCC and IC Certification Number:

- FCC ID: QQQBLE113
- IC: 5123A-BGTBLE113

Real Time Clock

Accuracy better than **1 minute/month.**

Weight with the battery **630 g**

Dimensions **235 x 12 mm**

Electromagnetic Compatibility (EMC)

The product described above is compliant with the following EMC standards:

1. For the EMC emissions specification:
according to EN ISO8041: 2005 (Chapters 7.5, 12.20.7), applying test methods in accordance with CISPR 22: 2003, Clause 10 and CISPR 16-1-1,
2. For the EMC immunity specification:
according to EN ISO8041: 2005 (Chapters 7.4, 7.6, 12.20.6, 12.20.8), applying test methods in accordance with IEC 61000-4-2:2001, IEC 61000-4-3:2002 and IEC 61000-4-8.



Notice: EMC compatibility is guaranteed only with the original accessories supplied by SVANTEK!

Safety

The product described above is compliant with following standards:
EN 61010-1:2001 and IEC 61010-1:2001

Compliance with EU Directives

CE mark indicates compliance with EMC Directive 89/336/EEC and Low Voltage Directive 2006/95/EC.

Environmental parameters

- Working temperature range -10°C ÷ +50°C
- Storing temperature range -20°C ÷ +50°C
- Humidity up to 90% RH (non-condensed)

C4. Transducers specification

SV 100A Accelerometer specification:

Performance:

Number of axes	3
Sensitivity ($\pm 20\%$)	5.8 mV/(m/s ²) at 15.915 Hz,
Measurement range	0.018 ms ⁻² RMS \div 186 ms ⁻² PEAK (Wb, Wd, Wk, Wm, Wf filters)
Frequency response	0.1 Hz \div 100 Hz
Resonant frequency	5.5 kHz (MEMS transducer)

Electrical:

Supply current	1 mA \div per channel
Supply voltage	3 V
Bias voltage	1.5 V \pm 0.2 V
Charge / discharge time constant (start-up time)	30 sec. typ.

Environmental Conditions:

Maximum vibration	100 000 m/s ² shock survival for MEMS sensor
Temperature coefficient	\pm 0.01 %/°C
Temperature	from -10°C to +50°C
Humidity	up to 90 % RH, non-condensed

Accessories:

SA 136 (option)	Calibration adapter
SA 145 (option)	Carrying case for instrument and accessories