

## APPENDIX C. TECHNICAL DATA OF SVAN 945 INSTRUMENT

### C.1. SPECIFICATION OF SOUND LEVEL METER

The **SVAN 945** instrument conforms to the international standards (IEC 651, IEC 61672-1 and IEC 804) for type 1 sound level meters.

#### Configuration of the system:

- **SVAN 945** - the portable sound level meter,
- **SV 11** - ½" microphone preamplifier,
- AN 40 - ½" microphone from G.R.A.S,
- optionally, the SV 03A, **SV 30** or similar sound calibrator.

#### Measurement ranges:

**Only one** measurement range (RMS) for the **SLM** mode according to the IEC 804 standard:

from 24 dBA to 135 dBA,  
 from 24 dBC to 135 dBC,  
 from 30 dB to 135 dB.



**Notice:** During the measurements of the signals with the peak factor  $n > 1,41$  the upper measurement range for the RMS ( $A_n$ ) value is reduced and can be calculated using the formulae:

$$A_n = 135 - 20 \log(n/\sqrt{2}).$$

For example: for  $n = 10$  one obtains the value  $A_{10} = 118$  dB.

#### Range of the measured sound pressure level:

from 30 dB to 135 dB (RMS related to 20 µPa) with the measurement error < 0.7 dB (the interval from the noise level > 7 dB),

from 52.5 dB to 138 dB (PEAK related to 20 µPa) with the measurement error < 0.7 dB (the interval from the noise level min. 22.5 dB)

and

from 28 dB to 135 dB (RMS related to 20 µPa) with the measurement error < 1.2 dB (the interval from the noise level > 5 dB),

from 35 dB to 138 dB (PEAK related to 20 µPa) with the measurement error < 3.9 dB (the interval from the noise level > 5 dB).

#### Range of the measured sound level:

from 24 dBA (or dBC) to 135 dBA (or dBC) (RMS related to 20 µPa) with the measurement error < 0.7 dB (the interval from the noise level > 7 dB),

from 46.5 dBA (or dBC) to 138 dBA (or dBC) (PEAK related to 20 µPa) with the measurement error < 0.7 dB (the interval from the noise level min. 22.5 dB)

and

from 22 dBA (or dBC) to 135 dBA (or dBC) (RMS related to 20 µPa) with the measurement error < 1.2 dB (the interval from the noise level > 5 dB),

from 29 dBA (or dBC) to 138 dBA (or dBC) (PEAK related to 20 µPa) with the measurement error < 3.9 dB (the interval from the noise level > 5 dB).

**Frequency range of the measured sound pressure level (-3 dB):**

10 Hz ÷ 20 000 Hz.

**Base error of the measured sound pressure level:**

$< \pm 0.7$  dB for the sinusoidal signal of 1000 Hz and 94 dB<sub>RMS</sub> with **A**, **C** or **LIN** input weighting filter measured for the standard environmental conditions (the temperature equal to +20°C, the relative humidity equal to 65 % and the atmospheric pressure equal to 1013 kPa) in the field of the unconstrained acoustic wave falling normally to the microphone's surface.

**Weighting filters:**

Filters for sound measurements (cf. App. D):

- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **LIN** conforms to the requirements for the **Z** filter of type 1 according to the IEC 61672-1 standard.

**RMS detector:**

Digital, with the sampling step equal to 0.1 dB.

**PEAK detector:**

Digital, with the sampling step equal to 0.1 dB.

**Time integral constants:** **SLOW**, **FAST** and **IMPULSE**.

**Warm up time:** 1 minute.

**Calibration of measurement channel:**

Acoustic – by the measurement of the standard reference signal coming from the external calibrator, i.e. SV 30.

**Overload detection:**

The instrument has the built-in overload detectors. The overload of the analogue / digital converter is detected.

## C.2. SPECIFICATION OF 1/1 OCTAVE AND 1/3 OCTAVE ANALYSER

The **SVAN 945** as **1/1 OCTAVE** or **1/3 OCTAVE** analyser conforms to the international standards (IEC 651, IEC 61672-1 and IEC 804) for type 1 sound level meters and the IEC 1260 standard for the pass band filters.

### Configuration of the system:

- **SVAN 945** - the portable sound level meter,
- **SV 11** - ½" microphone preamplifier,
- **AN 40** - ½" microphone from G.R.A.S.,
- optionally, the **SV 03A**, **SV 30** or similar sound calibrator.

### Measurement ranges:

Three measurement ranges are available in **1/1 OCTAVE** and **1/3 OCTAVE** analysis: **95 dB**, **110 dB** and **125 dB**:

Measurement range	The range of the measurement result (RMS for the sinusoidal signal)	
	95 dB	from 24 dBA
95 dB	from 24 dBC	to 105 dBC
95 dB	from 30 dB	to 105 dB
110 dB	from 30 dBA	to 120 dBA
110 dB	from 30 dBC	to 120 dBC
110 dB	from 36 dB	to 120 dB
125 dB	from 40 dBA	to 135 dBA
125 dB	from 40 dBC	to 135 dBC
125 dB	from 46 dB	to 135 dB



**Notice:** During the measurements of the signals with the peak factor  $n > 1,41$  the upper measurement range for the RMS ( $A_n$ ) value is reduced and can be calculated using the formulae:

$A_n = A + 10 - 20 \log(n/\sqrt{2})$ , where  $A$  is the given measurement range.

For example: for  $n = 10$  and  $A = 110$  dB one obtains the value  $A_{10} = 103$  dB.

### Level of the internal noise:

Wideband noise level measured with the voltage input short-circuit:

- with **LIN** filter:  $< 11 \mu V_{RMS}$ ,
- with **A** filter:  $< 5 \mu V_{RMS}$ ,
- with **C** filter:  $< 5 \mu V_{RMS}$ .

### Antialiasing filter:

The build-in antialiasing filter ensures the correct sampling of the measured signal.

**Sampling frequency:** internal equal to 48 kHz.

**Analogue / digital conversion:** 2 × 20 bits.

**Frequency range of the measured sound pressure level with the HP weighting filter:**

1 Hz ÷ 20 000 Hz.



**Notice:** During the measurement of sound pressure level the unsteady of the instrument's frequency characteristic mainly depends on the frequency characteristic of the microphone. The accuracy of the sound level measurements below 10 Hz and above 10 kHz can be lower than 1.5 dB for this reason (for the unconstrained acoustic wave in the normal direction to the microphone's surface).

**Base error of the measured sound pressure level:**

< ± 0.7 dB for the sinusoidal signal of 1000 Hz and 94 dB<sub>RMS</sub> with **A**, **C** or **LIN** input weighting filter measured for the standard environmental conditions (the temperature equal to +20°C, the relative humidity equal to 65 % and the atmospheric pressure equal to 1013 kPa) in the field of the unconstrained acoustic wave falling normally to the microphone's surface.

**Total linearity error:** from 0 dB to 80 dB below the full scale < ± 0.7 dB.

**Reference range:** 110 dB.

**Input divider accuracy (for freq. = 1 kHz and Temp. = +20°C):** ± 0.1 dB.

**Accuracy of the internal frequency indication (for freq. = 1 kHz and Temp. = +20°C):** 0.01 %.

### Digital filters

#### **LIN high-pass filter**

cut-off frequency: 27.0 Hz / -0.1 dB (10.0 Hz / -3.0 dB),  
pass-band ripple < 0.1 dB,  
6 dB / octave slope.

#### **1/1 octave filters:**

15 digital filters (Tszebychew type one, sixth order) with the centre frequencies from 16 kHz to 1 Hz in base two system, conforming to the DIN 45651, IEC 1260 – Annex B (Type 0, ΔB + 0.04) and ANSI S1.11-1986 standards.

#### **1/3 octave filters:**

45 digital filters (Tszebychew type one, sixth order) with the centre frequencies from 20 kHz to 0.8 Hz in base two system, conforming to the DIN 45651, IEC 1260 – Annex B (Type 1, ΔB + 0.17) and ANSI S1.11-1986 standards.

#### **Weighting filters:**

Filters for sound measurements and analysis (cf. App. D):

- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **LIN** conforms to the requirements for the **Z** filter of type 1 according to the IEC 61672-1 standard,
- **HP** high-pass filter for 1/1 OCTAVE and 1/3 OCTAVE analysis.

**RMS detector:**

Digital, with the sampling step equal to 0.1 dB.

**PEAK detector:**

Digital, with the sampling step equal to 0.1 dB.

**Linear detector:**

Digital, ensuring the calculation of the true RMS value.

**Exponential detector:**

Time integral constants: **SLOW, FAST and IMPULSE.**

**Warm up time:** 1 minute.

**Calibration of measurement channel:**

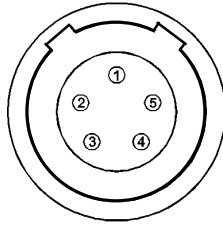
Acoustic – by the measurement of the standard reference signal coming from the external calibrator, i.e. SV 30.

**Overload detection:**

The instrument has the built-in overload detectors. The overload of the analogue / digital converter is detected.

## C.2. REMAINING TECHNICAL DATA

**Input of the measured signal:**

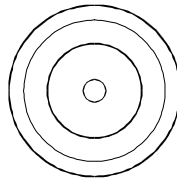


**LEMO type ENB.0B.305 connector (external view)**

LEMO ENB.0B.305 Pin number	Description
1	+28 V
2	mass
3	+200 V
4	mass
5	input
chassis	signal's mass

**Analogue outputs:**

**AC Out -** standard output of the measured signal conforming to the voltage on the input of the analogue / digital converter (without the correction).



**LEMO type ERN.00.250 connector (external view)**

Pin number	ERN.00.250
1	output
shield	mass

Connector: 1-pin LEMO connector type ERN.00.250.

Voltage level:  $1 V_{RMS}$  ( $\pm 5\%$ ) for the input sinusoidal signal conforming to the nominal range value (105 dB for the 95 dB range; 120 dB for the 110 dB range and 135 dB for 125 dB range); the frequency band of the signals on the AC Out (-3 dB) is equal 1.98 Hz – 20 kHz.

Output type: single ended, with  $51 \Omega/1\%$  output impedance.

**Display:**

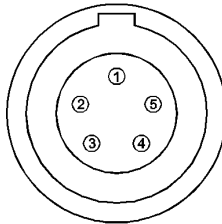
Graphical, the liquid crystals (LCD) type with the icons, the back light and 97x32 pixels.

**Memory:**

3 MB of FLASH type memory and 96 kB of RAM.

**RS 232 interface**

It conforms to the EIA Standard RS 232C. It enables the user to programme remotely all instrument's functions and the transmissions to and from the meter / analyser with the speed up to 115 200 bits / s. Below the pin out is given of the RS232C socket, LEMO connector type ENG.0B.305 mounted in the instrument and DB 09 F connector of the SC 07 cable (for connecting the instrument to the computer). The SC 07 cable has two connectors: LEMO FGG.0B.305 for the instrument and DB 09 F for the computer.



**LEMO connector type ENG.0B.305 (external view)**

PC RS232, 9 -pin connector - Signal name	LEMO ENG.0B.305 Pin number	DB 09 F Pin number
1 – LSD	-	1 (not connected)
2 – RXD	3	3
3 – TXD	4	2
4 – DTR	1	6
5 – GND	5	5
6 – DSR	2	4
7 – RTS	-	8 connected to pin 7
8 – CTS	-	7 connected to pin 8
9 – GND	-	9 (not connected)

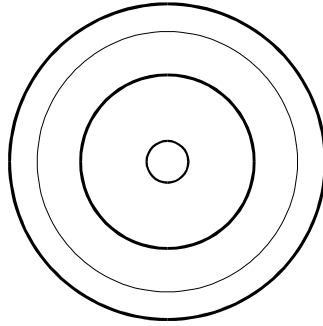
**Powering:**

Instrument can be powered from an external supply (AC adapter or battery), voltage range from 8 V to 15 V DC. Ripple and noise should not exceed  $\pm 5\%$  of the value of the average voltage. Output current capability depends on the supply voltage and is approximately equal to:

- 600 mA DC for 8 V supplier,
- 500 mA DC for 9 V supplier,
- 400 mA DC for 12 V supplier.

**The instrument is powered from the internal battery – it is its base mode of work.**

The internal battery (4.8 V / 1.6 Ah) enables the instrument 10 hours of the continuous operation. The instrument has the built-in battery charging circuit. The fully uncharged battery has to be powered approx. 8 hours to restore its normal capacity (for not damaged battery with the switched off instrument).



**Universal powering socket for the connector type 3.0/1.1 mm (external view)**

Pin number	722A 5.0/2.1 mm
shield	mass
central	+ 12V

**Mass (with the battery, microphone and preamplifier):** 635 g.

**Dimensions:**

- Depth 42 mm,
- Width 82 mm,
- Height 299 mm (with the SV 11 preamplifier and 40 AN microphone).

**Influence of the electromagnetic field:**

The 80 A/m field intensity introduces the increase of the noise level not greater than 10 dB (conforms to the IEC 651 / EN 60651 standards).

**Electromagnetic compatibility:**

EMC emission conforms to EN 50081-2 (1993).  
 EMC imission conforms to EN 50082-2 (1995).

**Safety:**

Conforms to EN 61010-1 (1993) and IEC 1010-1 (1990).

**Environmental parameters:**

- Working temperature range: -10°C ÷ +50°C.
- Storing temperature range: -20°C ÷ +50°C.
- Humidity: < 90% RH in 30°C (uncondensed vapour).