

## Appendix E Noise Monitoring Equipment Calibration Certificate

## FACTORY CALIBRATION DATA OF THE SVAN 971 No. C119577

with preamplifier SVANTEK type SV 18 No. C122487 and

with microphone ACO type 7052E No. 85197

### 1. CALIBRATION\* (acoustical)

LEVEL METER function; Range: Low; Reference frequency: 1000Hz; Sound Pressure Level: 114.03 dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.03	114.05	0.02
A	114.03	114.05	0.02
C	114.03	114.05	0.02

Calibration measured with the microphone ACO type 7052E No. 85197. Calibration factor: 0.74 dB.

### 2. LINEARITY TEST\* (electrical)

LEVEL METER function; Range: Low; Characteristic: A;  $f_{\text{sin}} = 31.5$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	83.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function; Range: Low; Characteristic: A;  $f_{\text{sin}} = 1000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	123.0
Error [dB]	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A;  $f_{\text{sin}} = 8000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	122.0
Error [dB]	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A;  $f_{\text{sin}} = 31.5$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A;  $f_{\text{sin}} = 1000$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	-0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A;  $f_{\text{sin}} = 8000$  Hz

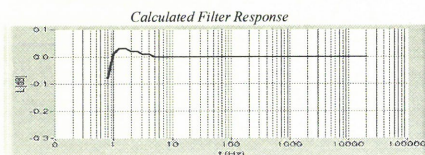
Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.0	0.0

1/3 OCTAVE (1kHz); Range: Low;  $f_{\text{sin}} = 1000$  Hz

Nominal result [dB]	25.0	30.0	40.0	60.0	80.0	100.0	120.0	123.0
Error [dB]	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

### 4. FREQUENCY RESPONSE\* (electrical)

LEVEL METER function; Characteristic: Z; Range: Low; Input signal =120 dB;



Measured Filter Response with Preamplifier SV18  
(f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	0.0	4000	0.0
12.5	-0.0	125	0.0	8000	0.0
16	0.0	250	0.0	16000	0.0
20	0.0	500	0.0	20000	0.0
25	0.0	1000	0.0		
31.5	0.0	2000	0.0		

All frequencies are nominal center values for the 1/3 octave bands

## 5. INTERNAL NOISE LEVEL\* (electrical - compensated)

LEVEL METER function; Range: Low; (Back-light - off); Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	≤20	≤12	≤12

\* measured with preamplifier SVANTEK type SV 18 No. C122487.

## 6. INTERNAL NOISE LEVEL (acoustical - compensated)

LEVEL METER function; Characteristic: A; (Backlight - off)

Range	Low	High
Indication [dB]	≤15	20.5

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

### ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
23 °C	42%	1008 hPa

### TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTEK	SV33B	93171	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)

### CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Cezary Dardziński ..... 

Test date: 2022-10-11

**FACTORY CALIBRATION DATA OF THE SVAN 971 No. C132260**  
 with preamplifier SVANTEK type SV 18 No. C132221 and  
 with microphone ACO type 7052E No. 82767

**1. CALIBRATION\*** (acoustical)

LEVEL METER function; Range: Low; Reference frequency: 1000Hz; Sound Pressure Level: 114.03 dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.03	114.05	0.02
A	114.03	114.05	0.02
C	114.03	114.05	0.02

Calibration measured with the microphone ACO type 7052E No. 82767. Calibration factor: 0.68 dB.

**2. LINEARITY TEST\*** (electrical)

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{in} = 31.5$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	83.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{in} = 1000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	123.0
Error [dB]	0.1	0.1	0.1	0.0	0.1	0.0	-0.0	-0.0	0.0	-0.0

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{in} = 8000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	122.0
Error [dB]	0.1	0.1	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{in} = 31.5$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{in} = 1000$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{in} = 8000$  Hz

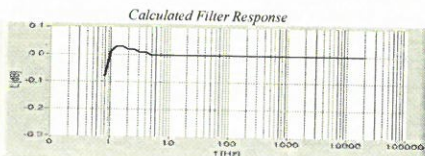
Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.1	0.0	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0

 1/3 OCTAVE (1kHz); Range: Low;  $f_{in} = 1000$  Hz

Nominal result [dB]	25.0	30.0	40.0	60.0	80.0	100.0	120.0	123.0
Error [dB]	0.1	0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0

**4. FREQUENCY RESPONSE\*** (electrical)

LEVEL METER function; Characteristic: Z; Range: Low; Input signal = 120 dB.


 Measured Filter Response with Preamplifier SV18  
 (f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	0.0	4000	0.0
12.5	0.0	125	0.0	8000	0.0
16	0.0	250	0.0	16000	0.0
20	0.0	500	0.0	20000	0.0
25	0.0	1000	0.0		
31.5	0.0	2000	0.0		

All frequencies are nominal center values for the 1/3 octave bands

**5. INTERNAL NOISE LEVEL** (electrical - compensated)

LEVEL METER function; Range: Low; (Back-light - off) ; Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	≤20	≤12	≤12

\* measured with preamplifier SVANTEK type SV 18 No. C132221.

**6. INTERNAL NOISE LEVEL** (acoustical - compensated)

LEVEL METER function; Characteristic: A; (Backlight - off)

Range	Low	High
Indication [dB]	≤15	20.4

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

**ENVIRONMENTAL CONDITIONS**

Temperature	Relative humidity	Ambient pressure
21 °C	43%	1012 hPa

**TEST EQUIPMENT**

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTEK	SV33B	93171	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)

**CONFORMITY & TEST DECLARATION**

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Calibration specialist: Cezary Dardziński

Test date: 2022-10-27

**FACTORY CALIBRATION DATA OF THE SVAN 971 No. C132261**  
 with preamplifier SVANTEK type SV 18 No. C132231 and  
 with microphone ACO type 7052E No. 85231

**1. CALIBRATION\*** (acoustical)

 LEVEL METER function; Range: Low; Reference frequency: 1000Hz; Sound Pressure Level: **114.07 dB**.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.07	114.07	0.00
A	114.07	114.07	0.00
C	114.07	114.07	0.00

Calibration measured with the microphone ACO type 7052E No. 85231. Calibration factor: 0.95 dB.

**2. LINEARITY TEST\*** (electrical)

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{up} = 31.5$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	83.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{up} = 1000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	123.0
Error [dB]	0.1	0.0	0.1	0.0	0.0	0.0	-0.0	0.0	0.0	0.0

 LEVEL METER function; Range: Low; Characteristic: A;  $f_{up} = 8000$  Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	122.0
Error [dB]	0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	-0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{up} = 31.5$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{up} = 1000$  Hz

Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0

 LEVEL METER function; Range: High; Characteristic: A;  $f_{up} = 8000$  Hz

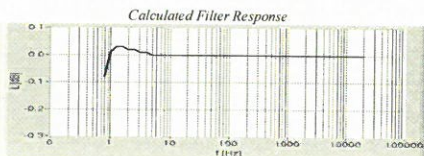
Nominal result LEQ [dB]	34.0	35.0	36.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	-0.0

 1/3 OCTAVE (1kHz); Range: Low;  $f_{up} = 1000$  Hz

Nominal result [dB]	25.0	30.0	40.0	60.0	80.0	100.0	120.0	123.0
Error [dB]	0.1	0.0	0.0	-0.0	0.0	0.0	0.0	0.0

**4. FREQUENCY RESPONSE\*** (electrical)

LEVEL METER function; Characteristic: Z; Range: Low; Input signal = 120 dB;


 Measured Filter Response with Preamplifier SV18  
 (f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	0.0	4000	-0.0
12.5	-0.0	125	0.0	8000	0.0
16	0.0	250	0.0	16000	0.0
20	0.0	500	0.0	20000	0.0
25	0.0	1000	0.0		
31.5	0.0	2000	0.0		

All frequencies are nominal center values for the 1/3 octave bands

**5. INTERNAL NOISE LEVEL\*** (electrical - compensated)

LEVEL METER function, Range: Low; (Back-light - off); Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	≤20	≤12	≤12

\* measured with preamplifier SVANTEK type SV 18 No. C132231.

**6. INTERNAL NOISE LEVEL** (acoustical - compensated)

LEVEL METER function, Characteristic: A; (Backlight - off)

Range	Low	High
Indication [dB]	≤15	20.9

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

**ENVIRONMENTAL CONDITIONS**

Temperature	Relative humidity	Ambient pressure
22 °C	47%	1011 hPa

**TEST EQUIPMENT**

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3.	RIGOL	DM3068	DM30155100773	Digital multimeter
4.	SVANTEK	SV33B	93171	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)

**CONFORMITY & TEST DECLARATION**

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2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Cezary Dardziński



Test date: 2022-10-28



## CALIBRATION CERTIFICATE

Product : SOUND CALIBRATOR  
Type : NC-75  
Serial number : 35124528  
Manufacturer : RION CO., LTD.  
Calibration quantities : Sound pressure level (with reference standard microphone)  
Calibration method : Measured by specified secondary standard microphone  
according to JCSS calibration procedure specified by RION.  
Ambient conditions : Temperature 23.9 °C, Relative humidity 49 %,  
Static pressure 100.6 kPa  
Calibration date : 02/11/2022 (DD/MM/YYYY)  
Calibration location : 3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan  
RION CO., LTD. Calibration Room

We hereby certify that the results of this calibration were as follows.

Issue date : 09/11/2022 (DD/MM/YYYY)

Junichi Kawamura  
Manager  
Quality Assurance Section,  
Quality Assurance Department,  
Environmental Instrument Division,  
RION CO., LTD.  
3-20-41 Higashimotomachi, Kokubunji,  
Tokyo 185-8533, Japan



This certificate is based on article 144 of the Measurement Law and indicates the result of calibration in accordance with measurement standards traceable to Primary Measurement Standards (National Standards) which realizes the physical units of measurement according to the International System of Units (SI).

The accreditation symbol is attestation of which the result of calibration is traceable to Primary Measurement Standards (National Standards).

The certificate shall not be reproduced except in full, without the written approval of the issuing laboratory.

The calibration laboratory who issued this calibration certificate conforms to ISO/IEC 17025:2017.

This calibration certificate was issued by the calibration laboratory accredited by IA Japan who is a signatory to the Mutual Recognition Arrangement (MRA) of International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Accreditation Cooperation (APAC). This (These) calibration result(s) may be accepted internationally through ILAC/APAC MRA.



## CALIBRATION RESULT

### 1. Sound pressure level (with reference standard microphone)

Measured value	Expanded uncertainty *1
93.99 dB	0.09 dB

Specified secondary standard microphone:

Type : 4160

Serial number : 2973341

Reference Sound pressure :  $2 \times 10^{-5}$  Pa

\*1 Defines an interval estimated to have a level of confidence of approximately 95 %.

Coverage factor  $k=2$

Calibration result is the calibration value in ambient conditions during calibration.

## BE OUT OF JCSS CALIBRATION

### 1. Frequency

Measured value	Measurement uncertainty ( $k=2$ )
1000.0 Hz	$2.7 \times 10^{-4}$ Hz

Working measurement standard universal counter:

Type : 53132A

Serial number : MY40005574

(JCSS Calibration Certificate No. 2208001889940)

### 2. Total distortion

Measured value
0.2 %

Working measurement standard distortion meter:

Type : VA-2230A

Serial number : 11076061

(A2LA Calibration Certificate No. 1502-03109)

- closing -