



DLM-101

CLASS I

SOUND LEVEL METER

Instruction manual

This manual describes operation of the DLM-101 meter with firmware version **1.9.0020**. The firmware version number can be viewed on the welcome screen, which is displayed after turning on the meter (the exact description can be found in section 3.1 of this manual).

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1. INSTRUMENT CHARACTERISTICS

DLM-101 is fully digital, single range integrating sound level meter with type 1 accuracy. Easy operation, wide range and small dimensions allow measurements of noise in many areas. This meter is ideal for company health and safety inspector, ventilation installer, or building inspector, controlling building work. The low price enables use of meter, where until now the noise was not evaluated because of high cost of measuring instruments.

Internal Li-ION battery provides long-term measurements on single charging and easy to read, backlit display allows comfort use in tight, dark places.

The large internal memory allows the use of the DLM-101 meter in environmental noise monitoring, and the ability to record the measurement history log with 100ms interval enables its use also in the assessment of aircraft noise.



Fig. 1.1. DLM-101 sound level meter – general view.

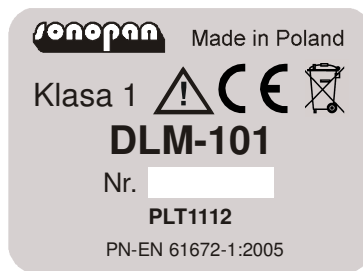


Fig. 1.2. DLM-101 sound level meter – data plate.

1.1. Accessories

Basic accessories:

- Charger 6WZS 12/400 (Tatarek).
- OP60/2 microphone windscreen.
- RS-232 cable (DB9F-RJ10) 1.8m.
- USB cable (USBA-USBB mini) 1.8m.
- Carrying case.
- Instruction manual.
- Declaration of Conformity.
- Warranty Card.

Additional accessories:

- KA-50 type 1 acoustic calibrator.
- Microphone extension cable PD5Lx (x stands for cable length, max 6m).
- Supporting stand for microphone: SM2 (2m height) and SM4 (4m height),
- Supporting stand for the instrument SMR (1,5m height).

1.2. System configuration

Basic configuration:

- DLM-101 sound level meter (Sonopan).
- PW-21L ½" microphone preamplifier (Sonopan).
- WK-21 ½" measurement microphone (Sonopan).
- OP60/2 microphone windscreen.

Other accessories specified in section 1.1 are optional.

1.3. Measured quantities

Sound level meter allows simultaneous measurement:

- with A or C frequency weighting:
 - current RMS sound level (with SLOW or FAST time weighting), e.g. L_{AF} ,
 - minimum RMS sound level (with SLOW or FAST time weighting), e.g. L_{AFmn} ,
 - maximum RMS sound level (with SLOW or FAST time weighting), e.g. L_{AFmx} ,
 - time-average (equivalent continuous) sound level, e.g. L_{Aeq} ,
 - sound exposure level, e.g. L_{AE} .
- with C frequency weighting:
 - current peak sound level L_{CPk} ,
 - maximum peak sound level L_{CMPk} ,
- measurement time.

1.4. Specifications

Instrument meets the requirements of following standards:



EN 61672-1:2003

Electroacoustics. Sound level meters. Part 1:
Specifications.

Meter belongs to the group X, as defined in EN 61672-1:2003.

Specification (for microphone sensitivity 40mV/Pa):

- Accuracy class 1
- Frequency weightings A, C
- Time weightings SLOW, FAST
- Readout resolution:
 - measure 0.1dB
 - calibration 0.01dB
- Maximum value of sound pressure, causing no damage to the meter 150dB (THD <3%)
- Maximum unweighted sound pressure level causing no activating of overload indicator 136.7dB
- Maximum electrical signal value causing no damage to the instrument (applied using electrical input facility) 22V_{p-p}
- Capacitance of electrical input facility 18pF
- Reference conditions:
 - type of sound field free
 - reference frequency 1000Hz
 - reference sound pressure level 94dB
 - reference level range 20 - 135dB
 - sampling frequency 41.7kHz
 - microphone reference direction microphone symmetry axis
 - microphone reference point microphone diaphragm centre
 - reference orientation sound wave arriving from reference direction
 - reference temperature +23°C
 - reference humidity 50% RH
 - reference static pressure 101.325kPa
- Starting point at which to begin tests of level linearity deviation on the reference level range reference sound pressure level
- Permissible error for sinusoidal reference signal (progressive sound wave incident perpendicularly to microphone diaphragm, 94dB, 1000Hz) ≤±0.7dB
- Total range for L_A sound level and L_{Aeq} time-average sound level 20 – 135dBA
- Measuring ranges at specified frequencies for sound level (L) and time-average sound level (L_{eq})

	31,5Hz	1kHz	4kHz	8kHz	12,5kHz
A	20–97.9dBA	20–136.7dBA	20–137.8dBA	20–135.9dBA	20–132.3dBA
C	25–134.1dBC	24–136.7dBC	24–136.0dBC	24–134.0dBC	24–130.4dBC

- Total range for L_{CPk} peak sound level 45 – 137dBC
- Self-generated noise

	with electrical input facility	with WK-21 microphone
A	≤14dB	≤20dB
C	≤19dB	≤25dB

- Measurement duration with 1s resolution 999 hours 59 minutes 59 seconds
- Warm-up time
 - after turn-on 1 minute
 - after environmental conditions change 15 minutes
- Power supply
 - internal battery Li-ION 7.2V 700mAh
 - charger 6WZS 12/400 (Tatarek)
- Minimum operating voltage of internal battery 6.6V
- Operating temperature range -10 ÷ +50°C

- Storage temperature range -10 ÷ +50 °C
- Operating humidity range ≤ 90% RH (without condensation)
- Operating static pressure range 65 ÷ 108kPa
- Electromagnetic emission within the limits specified in EN 61672-1:2002 (maximum emission when operating with charger)
- Dimensions (without microphone) 182 x 81 x 30mm
- Continuous operating time (battery fully charged) 16h
- Weight 480g
- Nominal corrections for effects of reflection from instrument case (free field, 0° incidence) See table below

f [Hz]	250	315	400	500	630	800	1000	1250	1600	2000	2240	
dL [dB]	0.01	0.02	0.22	-0.23	-0.20	0.04	0.02	0.05	0.48	-0.07	0.04	
U [dB]	≤ 0.03								≤ 0.05			
f [Hz]	2500	2800	3150	3550	4000	4500	5000	5600	6300	7100	8000	
dL [dB]	0.18	-0.24	0.49	-0.44	-0.07	-0.31	-0.28	0.36	-0.16	0.16	-0.29	
U [dB]	≤ 0.05											
f [Hz]	8500	9000	9500	10000	10600	11200	11800	12500	13200	14000	15000	
dL [dB]	0.13	-0.29	0.19	-0.64	0.11	0.06	-0.72	0.18	0.27	-0.13	0.05	
U [dB]	≤ 0.05					≤ 0.06						
f [Hz]	16000	17000	18000	19000	20000							
dL [dB]	-0.02	-0.13	0.57	-0.69	-0.67							
U [dB]	≤ 0.06											

- Differences between WK-21 microphone free field frequency response at 0° incidence and electrostatic actuator response; expanded (k=2) uncertainty of the determination of these differences: See table below and Fig. 1.3.

f [Hz]	250	315	400	500	630	800	1000	1250	1600	2000	2240	
dL [dB]	0.00	0.02	0.03	0.04	0.05	0.08	0.11	0.18	0.26	0.36	0.43	
U [dB]	≤ 0.29											
f [Hz]	2500	2800	3150	3550	4000	4500	5000	5600	6300	7100	8000	
dL [dB]	0.52	0.62	0.74	0.93	1.13	1.42	1.70	2.08	2.50	2.89	3.30	
U [dB]	≤ 0.29								≤ 0.39			
f [Hz]	8500	9000	9500	10000	10600	11200	11800	12500	13200	14000	15000	
dL [dB]	3.49	3.69	3.90	4.18	4.49	4.82	5.19	5.72	6.34	6.83	7.31	
U [dB]	≤ 0.39							≤ 0.48				
f [Hz]	16000	17000	18000	19000	20000							
dL [dB]	7.67	8.09	8.47	8.77	9.12							
U [dB]	≤ 0.48											

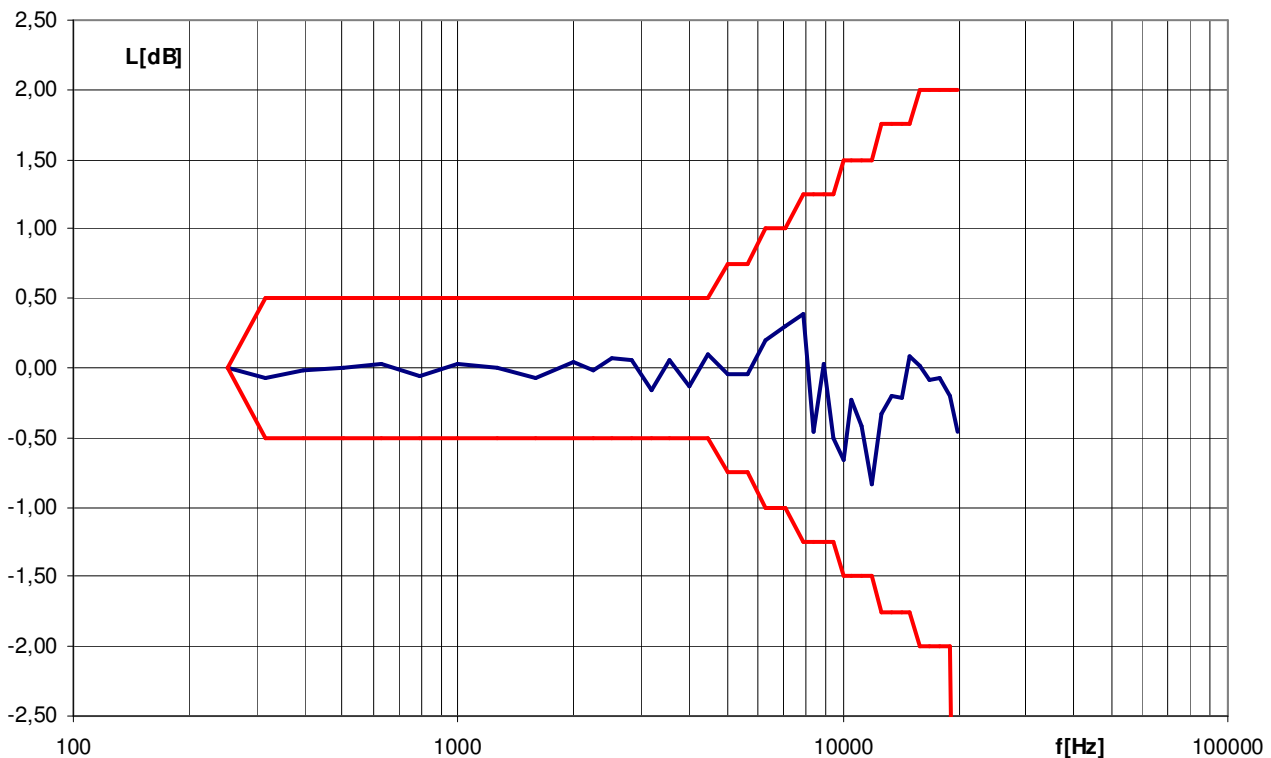


Fig. 1.4. Typical free-field frequency response of WK-21 microphone.

1.5. Influence of operating environment

- Influence of static pressure -0.01dB/kPa (for 1kHz)
- Influence of temperature -0.003 dB/°C (for 1kHz)
- Influence of humidity $\leq \pm 0.1$ dB (without condensation)
- Influence of electromagnetic field conformable to EN 61672-1:2003 specifications (maximum when microphone extension cable is parallel to field direction)
- Influence of electrostatic field conformable to EN 61672-1:2003
- Influence of a.c. power-frequency (reading in 80 A/m field intensity)
 - at A frequency weighting not detectable
 - at C frequency weighting ≤ 30.0 dB

1.6. Influence of instrument accessories

Installation of additional equipment does not deteriorate accuracy class of the instrument, however some influence of this equipment on entire instrument performance can be detected.

- Influence of microphone extension cable its connection to the instrument causes nonlinear distortion increasing with frequency at high input signal levels – see table below.

f [kHz]		1	2	4	5	6,3	8	10	12.5	16	20	25
PD5L6	135dB	0.07%	0.07%	0.08%	0.08%	0.08%	0.09%	0.09%	0.15%	0.98%	1.9%	1.7%
	130dB	0.06%										
	125dB	0.03%										

- Influence of windscreen (at 0° incidence) See table below and Fig. 1.5.

F [Hz]	250	315	400	500	630	800	1000	1250	1600	2000	2240	
dL [dB]	0.06	0.07	0.08	0.16	0.11	0.24	0.22	0.32	0.40	0.64	0.41	
U [dB]	≤ 0.02								≤ 0.05			
F [Hz]	2500	2800	3150	3550	4000	4500	5000	5600	6300	7100	8000	
dL [dB]	0.56	0.58	0.42	0.43	0.10	0.06	-0.23	-0.41	-0.48	-0.52	-0.61	
U [dB]	≤ 0.05											
F [Hz]	8500	9000	9500	10000	10600	11200	11800	12500	13200	14000	15000	
dL [dB]	-0.67	-0.70	-0.82	-1.04	-1.12	-1.21	-1.48	-1.38	-1.44	-1.63	-1.51	
U [dB]	≤ 0.05					≤ 0.07						
F [Hz]	16000	17000	18000	19000	20000							
dL [dB]	-1.86	-1.85	-2.22	-2.54	-2.66							
U [dB]	≤ 0.07											

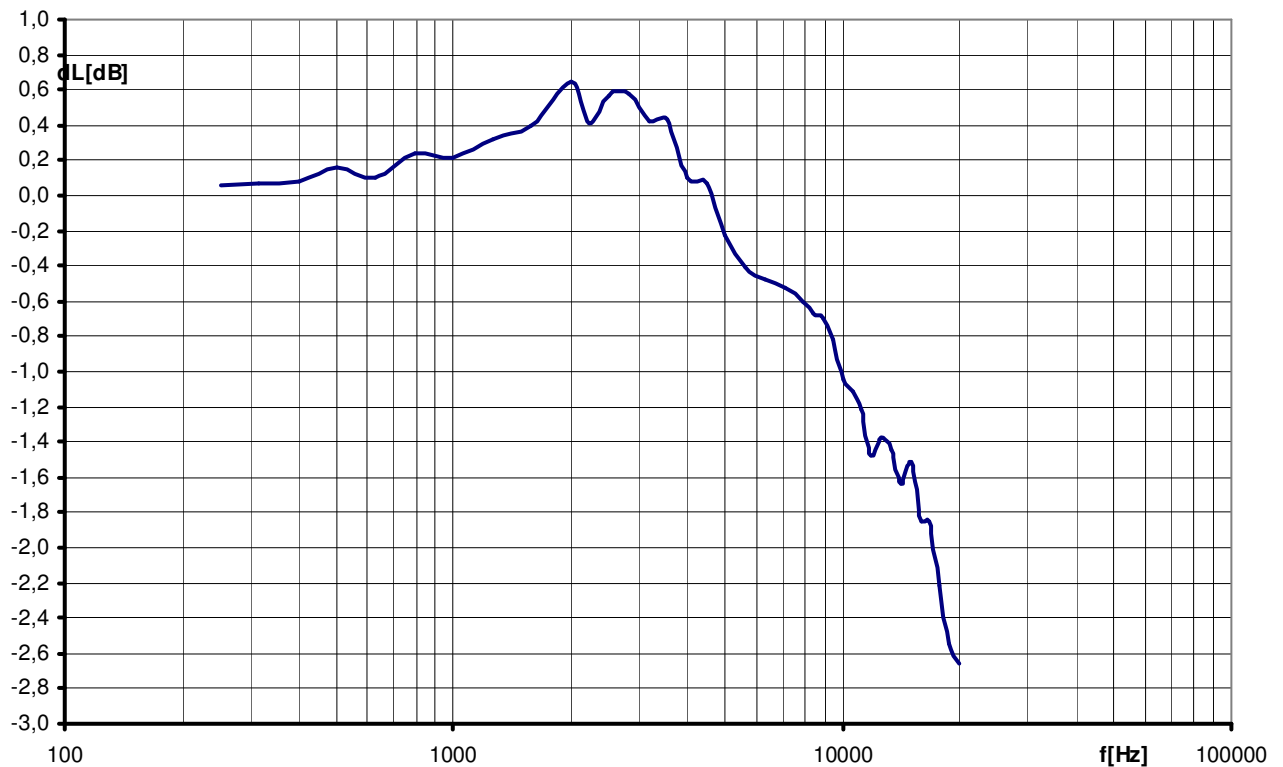


Fig. 1.5. Influence of OP60/2 windscreen.

2. CONTROLLING OF THE INSTRUMENT

DLM-101 sound level meter can be controlled by instrument keyboard.

2.1. Control keys

Instrument keyboard contains following keys:

- power switch:



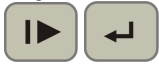
- keys used to select the instrument settings (they also serve as cursors):



- keys used to control memory and calibration:



- keys: START/STOP of measurement and ENTER



2.2. Input and output connectors of the instrument

Instrument is equipped with:

- Microphone connector LEMO EGG.1B.307.CLL.

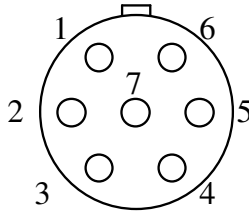


Fig. 2.1. Microphone connector external view.

Pin no.	Signal
1	not connected
2	GND
3	polarization (+200V)
4	signal input
5	not connected
6	+24V
7	GND
screen	case ground

- RS-232 connector Amphenol AMP-215875-1, to data transmission with PC.

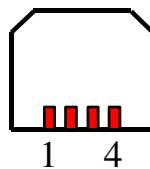


Fig. 2.2. RS-232 connector – external view.

Pin no.	Signal
1	GND
2	TxD
3	GND
4	RxD

- Charger connector RM650/1.3 DC-JACK, with 1.3mm inner pin.

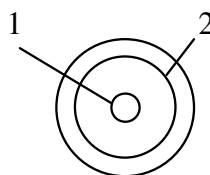


Fig. 2.3. Charger connector – external view.

Pin no.	Signal
1	Positive supply terminal
2	Negative supply terminal

- USB mini B connector, Würth Electronics 65100516121 to data transmission with PC.

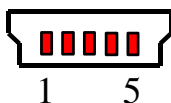


Fig. 2.4. USB mini B connector – external view.

Pin no.	Signal
1	VBUS
2	D-
3	D+
4	not connected
5	GND

2.3. Default instrument settings

Default settings of DLM-101 after instrument turn-on are specified below:

- Frequency weighting A
- Time weighting FAST

2.4. Preparation of the instrument to operation


Screw WK-21 measurement microphone on PW-21L microphone preamplifier. Take off microphone protecting cap. Connect this assembly to LEMO microphone connector. If microphone extension cable is to be used, insert it between microphone preamplifier and microphone connector. Place windscreen on the microphone. Using windscreen is recommended regardless of weather conditions, because it gives the microphone additional protection against dust. Turn the instrument on.

Default instrument setup is specified in chapter 2.3. Now it is recommended to perform acoustic calibration of the instrument as described in chapter 4.3.

After measurements completion, turn the instrument off and place protecting cap on the microphone.

3. OPERATION

All functions of the instrument are invoked using the keyboard, but access to functions critical for measurement is difficult. To activate this function selected key should be hold down for about 1.5 second.

Power of the instrument can be switched on or off by hold down power switch  for about 1.5 second.

The scheme of transitions between menu screens is shown on Fig. 3.1. All menus are described in details in this chapter.

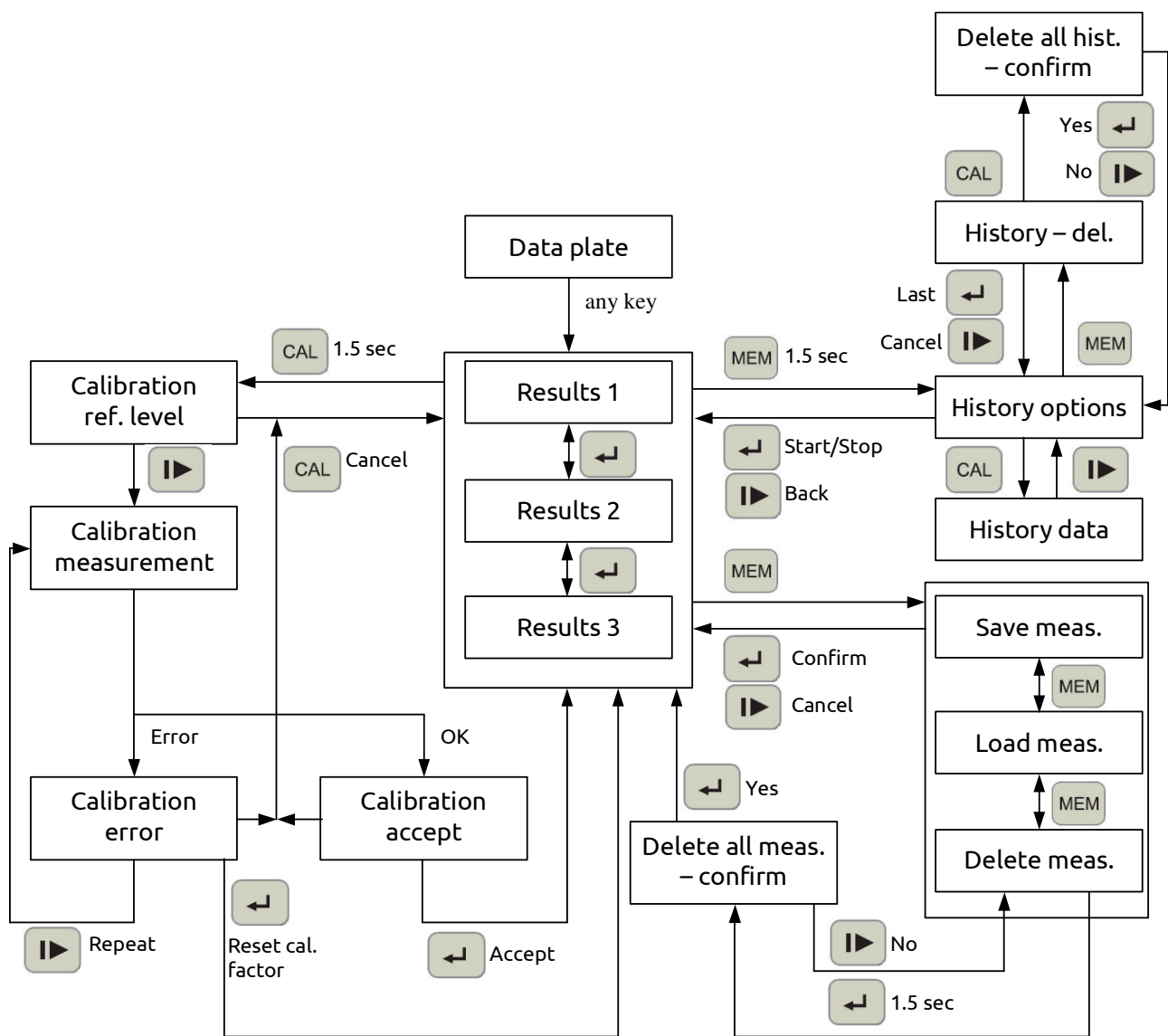


Fig. 3.1. The scheme of transitions between menu screens.

3.1. Instrument data plate

After turning the instrument on, initial information is displayed on the screen. This information contains instrument name, firmware version and manufacturer data (name, website, phone). After pressing any key results screen will be displayed. If no key is pressed, instrument will switch to the result screen automatically after 15 seconds.

If the internal battery of the instrument has been completely discharged, the instrument may not start immediately after the charger is connected - wait a few minutes then. After starting before the data plate, you will be prompted to enter the current date and time.



Fig. 3.2. Instrument data plate.

3.2. Results

Results are updated once per second. When the measurement is stopped using START/STOP key, the measurement results are immediately available.



Fig. 3.3. Results screen 1.



Fig. 3.4. Results screen 2.












Fig. 3.5. Results screen 3.









Fig. 3.6. Results screen 3 – measurement history log registration turned on.

On each results screen you can find:

- measurement time:
 - ⊙ 000:01:57 format hhh:mm:ss,
- analogue level indicator:
 - 20  140
- battery gauge:
 -  battery fully charged,
 -  battery charged in 75%,
 -  battery charged in 50%,
 -  battery charged in 25%,
 -  battery discharged,
 -  battery discharged, automatic shutdown possible,
- indicator of attached charger (if not attached, this indicator is not visible):
 - ⚡ charger is attached,
- measurement status indicator:
 - ▶▶ measurement in progress,
 - ||| measurement stopped,
 - [4] waiting for instrument readiness to operation; the number displayed stands for number of seconds remained to the end of waiting period,
- time history registration indicator (if time history is turned off this indicator is not visible):
 - HIS time history registration turned on,
- overload indicator (if there was no overload this indicator is not visible):
 -  overload has occurred during last second,
 -  overload has occurred after measurement starting but not during last second,
- results:
 - 37.7 dB result correct,

17.7 dB + result below measuring range (under-range),
---- dB no result.

-  frequency weighting change: A / C (only if the measurement is stopped),
hold down 3 seconds – language change: POLISH / ENGLISH,
-  time weighting change: SLOW / FAST (only if the measurement is stopped),
-  START / STOP of measurement,
-  current results screen change,
hold down 1.5 second – clear current results (only if the measurement is stopped),
-  transition to measurement memory menu (only if the measurement is stopped),
hold down 1.5 second – transition to time history memory menu.
-  transition to date and time setup
hold down 1.5 second – transition to calibration menu (only if the measurement is stopped).

WARNING! Changing frequency weighting or time weighting clear current measure results.

WARNING! Changing the language displays instrument data plate. After pressing any key, results screen is shown back.

3.3. Date and time

You can use this menu to check the date and time currently set and change it. When you enter edit mode, set the hour, minute, second, day, month and year respectively, passing to the next item with the ENTER key. Pressing ENTER when the year is edited, causes saving date and time and to leave edit mode.

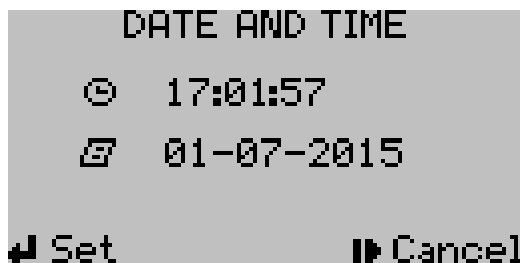


Fig. 3.7. Date and time.



Fig. 3.8. Date and time - edition.

WARNING! It is not possible to set invalid date (e.g. 31-02-2017). In that case, press the Cancel button and set the date again.

3.4. Measures memory

Using measures memory consists of three actions: save measure, load measure and delete measure. It is also possible to delete all measures, but this requires additional confirmation.



Fig. 3.9. Save measure to memory.

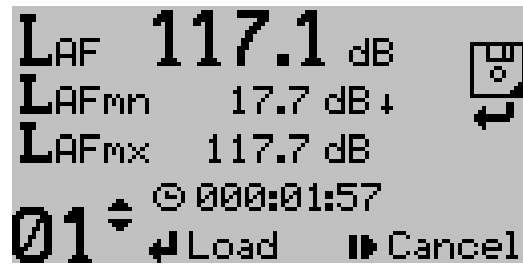


Fig. 3.10. Load measure from memory.



Fig. 3.11. Delete measure in memory.

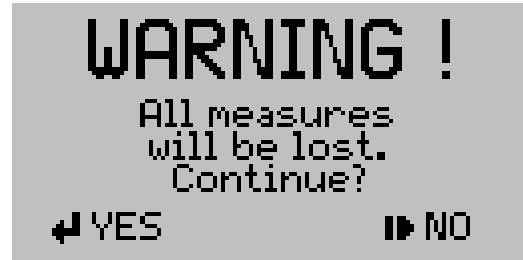


Fig. 3.12. Delete all measures in memory – confirmation.



save / load / delete measure confirmation,
hold down 1.5 second on delete measure screen – delete all measures (with additional confirmation),



cancel,



select cell to save / load / delete – increase by 1,
hold down 1.5 second – automatic repeat,



select cell to save / load / delete – decrease by 1,
hold down 1.5 second – automatic repeat,



change the action: save / load / delete measure.

3.5. Time history memory

Time history registration means cyclic recording selected quantities into memory, measured in registration period. One to four quantities registration is possible: L_{Xeq} , L_{XYmx} , L_{XYmn} , L_{Cpk} , where X stands for selected frequency weighting (A or C), and Y stands for selected time weighting (S - SLOW or F - FAST).

The options screen displays the maximum registration time for selected combination of the registration interval and number of quantities, taking into account available free memory. In addition, you can set the recording interval (period) by selecting one of the predefined values: 100ms, 1s, 5s, 10s, 15s, 30s, 60s, and enable or disable the automatic start option.

History registration starts when the measurement is started and ends when it is stopped or when all available memory is full. If the autostart option is enabled, then starting the next measurement will also start time history recording.

It is possible to delete the last time history or all registered (this requires additional confirmation).

The maximum time for recording history (with empty memory) is shown in the table below.

No of quantities	Time horizon (format: days – hours : minutes : seconds)						
	100ms	1s	5s	10s	15s	30s	60s
1	000-19:27:10	008-02:31:44	040-12:38:40	081-01:17:20	121-13:56:00	243-03:52:00	486-07:44:00
2	000-11:40:18	004-20:43:02	024-07:35:10	048-15:10:20	072-22:45:30	145-21:31:00	291-19:02:00
3	000-08:20:13	003-11:22:10	017-08:50:50	034-17:41:40	052-02:32:30	104-05:05:00	208-10:10:00
4	000-06:29:03	002-16:50:34	013-12:12:50	027-00:25:40	040-12:38:30	081-01:17:00	162-02:34:00



Fig. 3.13. Time history – options.

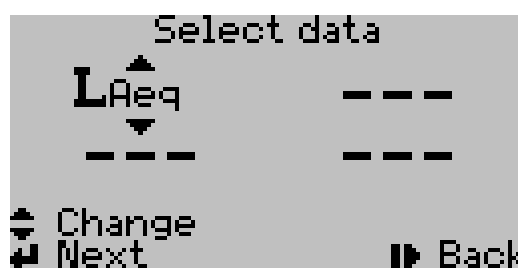


Fig. 3.14. Time history – selecting quantities.



Fig. 3.15. Time history – delete.



Fig. 3.16. Delete all time histories – confirmation.

- Start / Stop time history registration,
- return to the previous screen,
- transition to selecting quantities to register,
- selecting registered quantity,
- selecting registered quantity,
- transition to delete time history menu.

3.6. Calibration

Calibration consists of three phases:

- setting reference level – detailed description of the calibration is in chapter 4.3,
- coupling acoustic calibrator and running the measurement,
- reading the result or error message and accepting it.

Menu screens of each phase are presented below.



Fig. 3.17. Calibration – setting reference level.

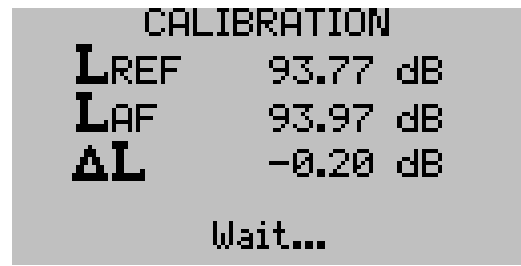


Fig. 3.18. Calibration – measurement in progress.

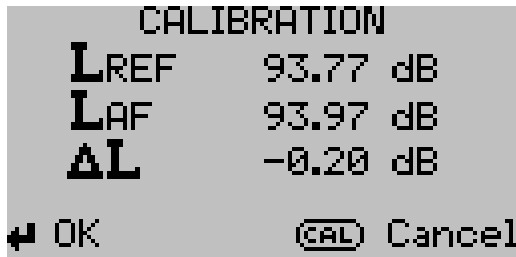


Fig. 3.19. Calibration – accept the result.

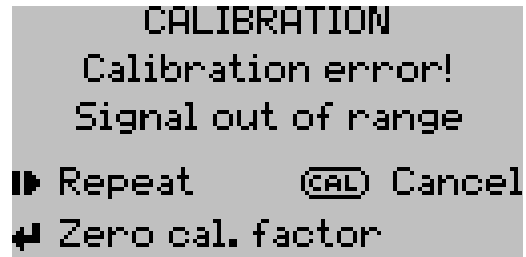







Fig. 3.20. Calibration – error message.

-  accept the result of the calibration / zero calibration factor, if calibration error,
-  start / repeat the measure,
-  set reference level – increase by 0.01dB, hold down 1.5 second – automatic repeat,
-  set reference level – decrease by 0.01dB, hold down 1.5 second – automatic repeat,
-  abort calibration procedure, reject results and back to the results screen.

4. RECOMENDATIONS FOR INSTRUMENT USE

During instrument use following recommendations should be strictly observed:

- do not remove microphone protection grid if not necessary,
- perform all connection changes (connecting or disconnecting of preamplifier, microphone or extension cable) only when the instrument is turned off; making these changes when the instrument is turned on, or turning the instrument on when microphone is not connected to its preamplifier can lead to instrument damage,
- when removing or installing microphone protecting cap use slight rotation right (as during screw driving) to avoid unwanted removing of microphone protecting grid,
- protect the microphone against mechanical shocks, dust, moisture and strong gusts of wind (use windscreen!),
- do not apply excessive force to connect or disconnect LEMO connectors as these are equipped with facilities to avoid improper connection; the way to disconnect microphone preamplifier equipped with LEMO plug is shown on Fig. 4.1.

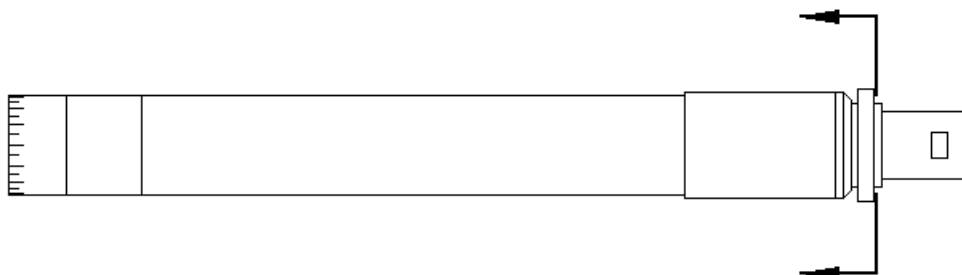


Fig. 4.1. Disconnecting of microphone preamplifier equipped with LEMO connector.

4.1. Recommendations for correct performing of measurements

Fasten the instrument (or its microphone) to its supporting stand and ensure you are located at a distance (from the instrument or its microphone) assuring to avoid sound field disturbance.

The measurement range should be chosen so that the meter does not indicate over-range or under-range condition of the measurement circuit. If the indicated value is less than the lower limit of the meter's linearity range the correction should be subtracted from the measurement result. This correction is calculated on the basis of the self-generated noise level read from calibration certificate using the formula:

$$L = 10 \cdot \log(10^{0.1 \cdot L_w} - 10^{0.1 \cdot L_s})$$

where:

L corrected sound level
L_w sound level read from the meter
L_s self-generated noise level

Do not perform measurements if the ambient temperature and humidity combination can lead to vapor condensation in the microphone

4.2. Internal battery

The instrument is normally operated with internal battery supply. To charge the battery, connect the charger. Attaching the charger is indicated by lighting LED located near charger connector and displaying icon on results screen, also there is a battery gauge displayed on results screen. Battery charging in progress is indicated by pulsing LED. If the LED continuously lit, it means that battery is fully charged.

As far as possible, before charging, the internal battery have to be fully discharged (to automatically switch off the instrument) - avoid the situation when the battery is often recharged a little bit, because it reduces its durability. Continuous operation with connected charger is possible.

WARNING! If the instrument is not used for more than two months, the battery should be recharged. This is necessary because of self-discharge of the battery.

WARNING! The battery is charged regardless of whether the instrument is turned on or off.

4.3. Calibration of the instrument

Correct measurement can be performed only when calibrated instrument is used. Recommended sound calibrator for DLM-101 sound level meter is SONOPAN KA-50 acoustic calibrator. This device produces calibrated sound signal of 94 dB nominal sound pressure level and 1000 Hz nominal frequency. Another sound calibrator of class 1 or better, producing signal of nominal sound pressure level and frequency equivalent to KA-50 sound calibrator, can be also used for calibration.

To perform calibration of the instrument correctly:

- enter calibration mode (see chapter 3),
- calculate and set reference level:

$$L_{\text{ref}} = L_{\text{cal}} + \Delta L_{\text{ff}}$$

L_{cal} acoustic calibrator sound pressure level, read from its calibration certificate,
ΔL_{ff} free field correction, for ½" microphone equal to -0.15dB,

- couple calibrator with the microphone and turn it on,
- start the calibration procedure,
- calibration will be conducted automatically, after a moment you will get the result to accept,

- if an error message appears, remove the cause of an error and repeat the measurement,
- after accepting calibration result, turn off and decouple the calibrator,
- meter is ready to measurement.

WARNING! During calibration the instrument together with the calibrator shall not be exposed to noise higher than nominal sound pressure level of sound calibrator in use or ground vibration.

Calibration error messages description:

Message	Possible cause
Signal out of range	- calibrator turned off, - calibrator poorly coupled, - invalid reference level, - broken microphone.
Unstable reading	- too high background noise level, - strong ground vibrations, - broken calibrator, - broken microphone.
Unknown error	- unknown, contact service.

4.4. Warranty

SONOPAN grants the warranty on following stipulations:

- no remains of changes, corrections, crossing-out etc. are found on Warranty Card,
- the instrument shall be used according to manufacturer Instruction Manual,
- the warranty becomes void if instrument repairs or modifications are undertaken by unauthorized persons.

SONOPAN warrants this instrument:

- to be fulfilling the specifications given in Instruction Manual,
- to be working correctly for 12 months from purchase date in 24 months from date the instrument was produced.

Not covered by this warranty:

- damages resulting from instrument transportation (provided no clear neglects of manufacturer have been stated),
- mechanical damages through the fault of the purchaser,
- internal damages through the fault of the purchaser.

The purchaser is entitled to warranty claim only when instrument dealer does not meet his obligations resulting from this warranty.

4.4.1. Complaint instructions for the purchaser:

- contact SONOPAN and specify the cause of complaint, Warranty Card number, date and place of purchase and date the instrument was produced,
- after complaint receipt is confirmed send the instrument with Warranty Card included to SONOPAN by freight company,
- if SONOPAN service find instrument damage to be not covered by warranty or warranty conditions to be not fulfilled, then the purchaser is obliged to cover service and transport costs as specified in the bill made out by SONOPAN,
- the costs specified above are covered by SONOPAN if the complaint is accepted.

4.5. Maintenance and repair

DLM-101 sound level meter requires no special maintenance treatments.

All repairs of the instrument are performed by the manufacturer.

4.6. Firmware

User has no ability to update, install, delete firmware of the meter. Firmware version is displayed on instrument data plate, detailed description is presented in chapter 3.1.

5. CE MARKING AND CONFORMANCE TO EU COUNCIL DIRECTIVES

The product described in this instruction conforms to following EU Council Directives:
2004/108/EC Electromagnetic compatibility



The conformance to above-mentioned requirements is confirmed by CE mark.



This product cannot be thrown away with household waste. Deposit the product in an authorized electrical and electronic waste collection area for recycling. Contact local Municipal Bureau or nearest waste disposal company to get more detailed information.

Appendix A. Filter characteristics

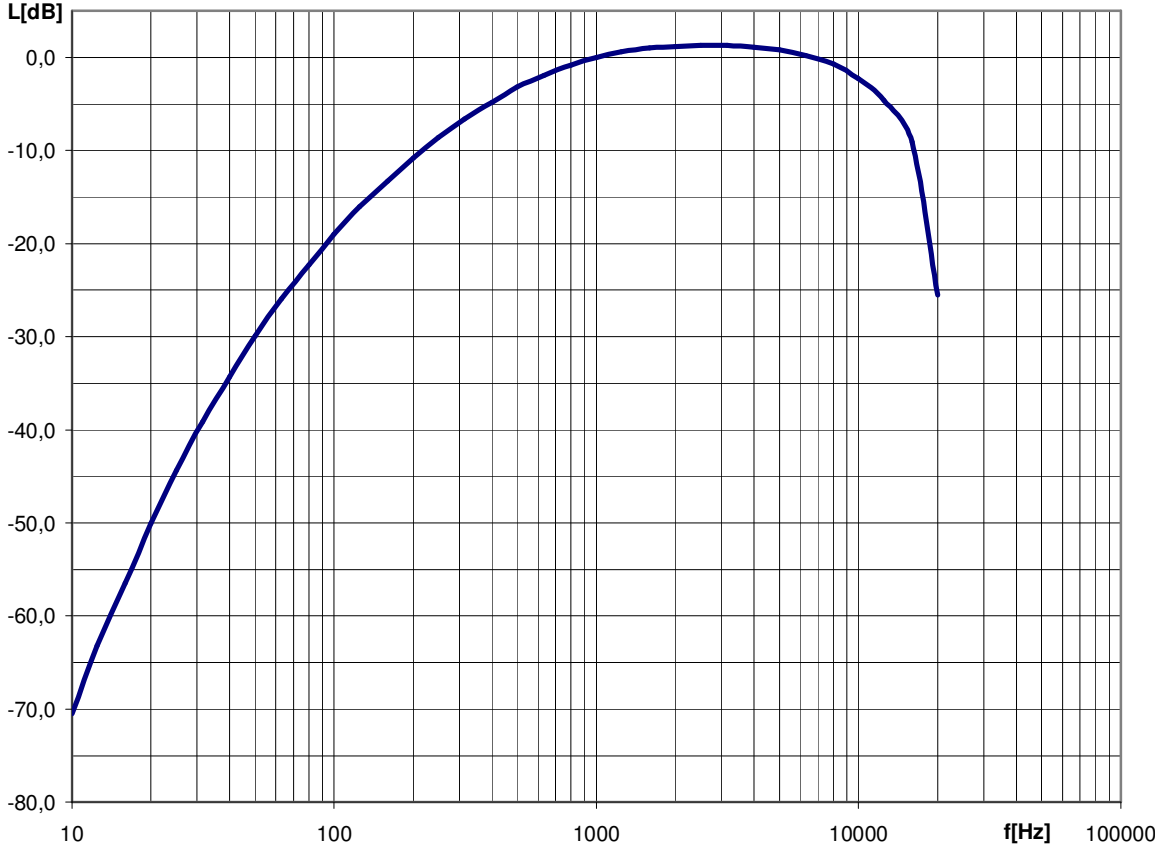


Fig. A.1. The characteristics of A filter, conformable to EN 61672-1:2003 class 1 requirements.

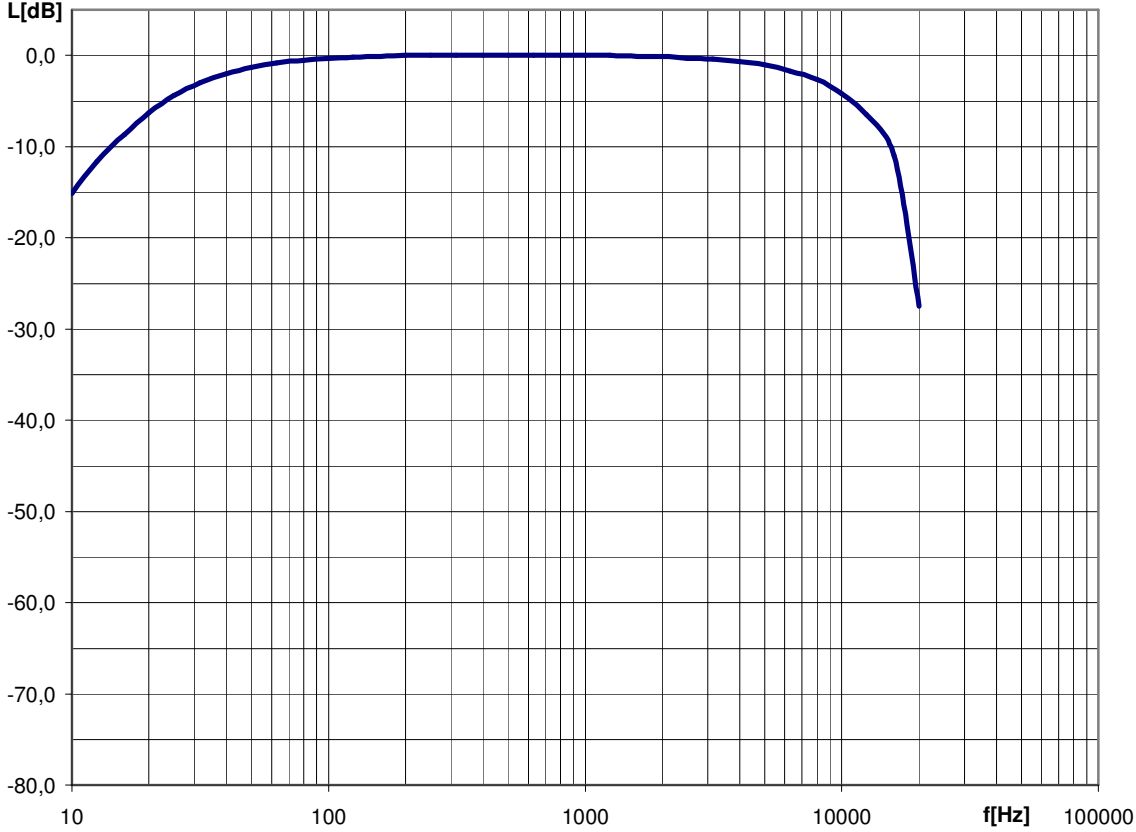


Fig. A.2. The characteristics of C filter, conformable to EN 61672-1:2003 class 1 requirements.

Appendix B. Directional characteristics

Angle	Directional characteristic of the meter – horizontal orientation [dB]							
	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1000Hz	1250Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	0.00	0.01	0.00	0.03	0.01	-0.02	-0.04	-0.04
20°	0.01	0.02	-0.01	0.05	0.02	-0.05	-0.09	-0.08
30°	0.01	0.02	-0.02	0.08	0.05	-0.08	-0.16	-0.13
40°	0.00	0.01	-0.03	0.09	0.08	-0.10	-0.23	-0.18
50°	-0.01	0.00	-0.04	0.10	0.12	-0.09	-0.30	-0.23
60°	-0.02	-0.01	-0.05	0.10	0.15	-0.05	-0.36	-0.32
70°	-0.02	-0.03	-0.07	0.08	0.16	0.00	-0.39	-0.40
80°	-0.04	-0.05	-0.10	0.04	0.16	0.03	-0.35	-0.42
90°	-0.05	-0.08	-0.13	-0.02	0.11	0.00	-0.25	-0.28
100°	-0.06	-0.10	-0.15	-0.08	0.06	-0.07	-0.21	-0.16
110°	-0.08	-0.12	-0.17	-0.14	0.01	-0.17	-0.30	-0.09
120°	-0.09	-0.13	-0.18	-0.18	-0.03	-0.25	-0.46	-0.19
130°	-0.10	-0.14	-0.18	-0.21	-0.04	-0.29	-0.59	-0.43
140°	-0.11	-0.14	-0.17	-0.22	-0.02	-0.27	-0.62	-0.56
150°	-0.11	-0.15	-0.15	-0.23	0.02	-0.22	-0.59	-0.50
160°	-0.11	-0.15	-0.13	-0.23	0.06	-0.16	-0.53	-0.37
170°	-0.12	-0.16	-0.14	-0.25	0.09	-0.12	-0.49	-0.30
180°	x	x	x	x	x	x	x	x
-170°	-0.12	-0.18	-0.15	-0.29	0.09	-0.13	-0.52	-0.36
-160°	-0.13	-0.19	-0.16	-0.33	0.05	-0.19	-0.58	-0.50
-150°	-0.14	-0.21	-0.19	-0.36	0.01	-0.24	-0.64	-0.65
-140°	-0.15	-0.22	-0.20	-0.39	-0.02	-0.28	-0.65	-0.68
-130°	-0.15	-0.23	-0.21	-0.40	-0.03	-0.26	-0.54	-0.49
-120°	-0.14	-0.23	-0.21	-0.39	-0.01	-0.19	-0.37	-0.35
-110°	-0.14	-0.24	-0.19	-0.35	0.03	-0.07	-0.23	-0.36
-100°	-0.13	-0.23	-0.16	-0.31	0.07	0.04	-0.22	-0.44
-90°	-0.12	-0.21	-0.12	-0.26	0.11	0.12	-0.30	-0.56
-80°	-0.11	-0.18	-0.09	-0.21	0.13	0.13	-0.36	-0.60
-70°	-0.09	-0.15	-0.06	-0.18	0.13	0.09	-0.37	-0.44
-60°	-0.08	-0.12	-0.05	-0.15	0.10	0.05	-0.28	-0.24
-50°	-0.06	-0.09	-0.03	-0.12	0.07	0.02	-0.20	-0.11
-40°	-0.05	-0.07	-0.01	-0.10	0.04	0.01	-0.13	-0.04
-30°	-0.03	-0.04	-0.01	-0.08	0.02	0.01	-0.06	0.01
-20°	-0.02	-0.03	0.00	-0.05	0.00	0.01	-0.01	0.02
-10°	0.01	-0.01	0.01	-0.02	-0.01	0.01	0.00	-0.01

Angle	Directional characteristic of the meter – horizontal orientation [dB]							
	1600Hz	2000Hz	2240Hz	2500Hz	2800Hz	3150Hz	3550Hz	4000Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	0.04	-0.05	0.01	-0.05	0.01	0.00	-0.08	0.07
20°	0.09	-0.11	0.03	-0.16	-0.01	0.01	-0.10	0.26
30°	0.14	-0.18	0.02	-0.23	-0.13	-0.03	-0.01	0.31
40°	0.15	-0.20	-0.10	-0.12	-0.49	-0.05	-0.05	-0.59
50°	0.02	-0.07	-0.26	0.00	-0.70	-0.29	-0.10	-0.76
60°	-0.12	-0.05	-0.18	-0.26	-0.40	-0.86	-0.31	-0.23
70°	-0.23	-0.30	-0.02	-0.45	-0.56	-0.53	-0.86	-0.74
80°	-0.33	-0.51	-0.36	-0.32	-0.75	-0.58	-0.89	-1,32
90°	-0.39	-0.40	-0.65	-0.52	-0.69	-0.88	-0.70	-0.77
100°	-0.41	-0.46	-0.41	-0.69	-1,06	-1,16	-0.84	-1,18
110°	-0.19	-0.55	-0.44	-0.70	-0.92	-1,00	-1,32	-1,40
120°	-0.12	-0.22	-0.45	-0.78	-1,09	-1,03	-0.96	-1,57
130°	-0.36	-0.19	-0.14	-0.19	-0.59	-1,14	-0.97	-1,39
140°	-0.55	-0.53	-0.64	-0.48	-0.64	-0.71	-0.75	-0.83
150°	-0.48	-0.58	-0.87	-0.93	-1,27	-1,36	-1,38	-1,64
160°	-0.31	-0.24	-0.41	-0.69	-0.94	-1,05	-1,46	-1,92
170°	-0.19	-0.04	-0.08	-0.33	-0.50	-0.49	-0.43	-0.72
180°	x	x	x	x	x	x	x	x
-170°	-0.24	-0.11	-0.22	-0.55	-0.68	-0.78	-0.80	-1,19
-160°	-0.40	-0.37	-0.67	-1,00	-1,21	-1,32	-1,44	-2,07
-150°	-0.52	-0.50	-0.88	-1,02	-1,25	-1,00	-0.95	-1,10
-140°	-0.41	-0.22	-0.38	-0.22	-0.46	-0.73	-0.76	-1,21
-130°	-0.12	-0.05	-0.32	-0.42	-0.87	-1,11	-0.83	-1,49
-120°	-0.04	-0.32	-0.62	-0.82	-1,08	-0.92	-1,07	-1,82
-110°	-0.24	-0.41	-0.51	-0.65	-1,01	-1,14	-1,26	-1,38
-100°	-0.38	-0.17	-0.53	-0.78	-0.75	-0.93	-0.78	-1,10
-90°	-0.39	-0.20	-0.59	-0.41	-0.76	-0.83	-0.49	-1,09
-80°	-0.29	-0.22	-0.07	-0.37	-0.79	-0.45	-0.92	-1,45
-70°	-0.21	0.11	-0.07	-0.56	-0.19	-0.93	-0.63	-0.61
-60°	-0.16	0.16	-0.33	-0.25	-0.47	-0.59	-0.13	-0.27
-50°	-0.07	0.02	-0.36	-0.07	-0.65	-0.12	-0.07	-0.83
-40°	0.02	-0.05	-0.09	-0.22	-0.26	-0.08	-0.10	-0.20
-30°	0.05	-0.04	0.00	-0.28	0.00	-0.07	-0.16	0.18
-20°	0.04	0.01	-0.01	-0.20	0.06	-0.03	-0.18	0.05
-10°	0.02	0.00	0.01	-0.06	0.03	-0.02	-0.05	-0.05

Angle	Directional characteristic of the meter – horizontal orientation [dB]							
	4500Hz	5000Hz	5600Hz	6300Hz	7100Hz	8000Hz	8500Hz	9000Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	-0.08	0.14	0.10	-0.17	-0.39	0.07	-0.07	-0.01
20°	-0.33	0.44	-0.04	-0.54	-0.68	-0.12	-0.38	-0.23
30°	-0.79	0.30	-1,03	-0.67	-0.63	0.07	-0.69	-0.38
40°	-0.85	-0.08	-1,18	-0.51	-0.83	-0.40	-1,23	-0.97
50°	-0.57	-0.40	-0.84	-1,32	-1,43	-0.96	-1,78	-1,34
60°	-1,43	-0.43	-1,68	-1,37	-1,89	-1,38	-2,11	-2,19
70°	-0.81	-1,01	-1,65	-1,96	-2,14	-1,61	-2,72	-2,72
80°	-1,62	-0.66	-2,17	-2,24	-2,88	-2,19	-3,47	-3,00
90°	-2,11	-1,78	-2,01	-2,39	-3,19	-3,14	-3,88	-3,39
100°	-1,49	-1,13	-3,23	-3,36	-2,86	-2,54	-4,09	-4,56
110°	-2,05	-1,62	-2,46	-2,49	-4,18	-4,15	-4,93	-4,40
120°	-2,22	-2,08	-3,11	-3,38	-3,55	-3,18	-3,56	-4,95
130°	-1,92	-1,66	-2,95	-3,51	-3,98	-4,12	-5,32	-5,11
140°	-1,96	-1,43	-2,68	-2,71	-3,03	-4,06	-5,01	-4,45
150°	-2,10	-1,64	-2,38	-2,79	-2,44	-3,44	-3,94	-3,73
160°	-2,53	-2,35	-3,78	-4,15	-3,64	-4,49	-4,39	-4,34
170°	-1,21	-0.85	-2,01	-2,33	-3,66	-4,84	-4,95	-4,87
180°	x	x	x	x	x	x	x	x
-170°	-1,90	-1,59	-3,11	-3,47	-3,60	-4,90	-5,01	-5,11
-160°	-2,54	-2,32	-3,93	-3,97	-2,50	-3,90	-3,64	-3,97
-150°	-1,64	-1,32	-2,42	-2,85	-2,63	-3,21	-3,68	-4,25
-140°	-2,14	-1,53	-2,89	-3,11	-3,25	-4,57	-4,76	-4,65
-130°	-2,20	-2,06	-3,35	-3,52	-3,38	-5,09	-4,80	-5,27
-120°	-2,48	-2,08	-3,42	-2,88	-2,21	-3,96	-4,52	-5,42
-110°	-2,12	-1,37	-2,47	-3,13	-3,56	-4,85	-4,78	-3,87
-100°	-1,76	-1,58	-3,40	-3,53	-2,08	-3,64	-3,93	-4,32
-90°	-2,46	-1,92	-2,12	-2,73	-2,71	-3,83	-2,87	-3,51
-80°	-1,17	-1,02	-2,52	-2,08	-1,53	-3,03	-3,36	-2,76
-70°	-1,32	-1,25	-1,67	-2,27	-1,69	-2,04	-2,30	-1,95
-60°	-1,72	-0.43	-1,96	-1,56	-0.76	-2,10	-2,02	-2,23
-50°	-0.45	-0.57	-0.98	-1,13	-1,15	-1,42	-0.85	-1,22
-40°	-0.86	0.15	-1,36	-0.54	-0.43	-0.34	-1,16	-0.51
-30°	-0.62	0.40	-0.57	-0.71	-0.32	-0.24	-0.43	-0.45
-20°	-0.22	0.28	0.01	-0.38	-0.57	-0.26	-0.12	-0.03
-10°	-0.06	0.04	0.07	0.05	0.05	-0.09	0.03	-0.05

Angle	Directional characteristic of the meter – horizontal orientation [dB]						
	9500Hz	10000Hz	10600Hz	11200Hz	11800Hz	12500Hz	
0°	0.00	0.00	0.00	0.00	0.00	0.00	
10°	-0.22	0.06	-0.22	-0.37	0.00	-0.07	
20°	-0.34	-0.15	-0.46	-0.39	-0.45	-0.85	
30°	-0.54	-0.78	-0.69	-0.81	-1,10	-0.96	
40°	-1,45	-0.89	-1,57	-1,15	-1,57	-2,04	
50°	-1,92	-1,61	-1,96	-1,89	-2,20	-2,73	
60°	-2,11	-2,14	-2,65	-2,85	-2,94	-3,54	
70°	-3,09	-3,17	-3,29	-3,24	-3,72	-4,55	
80°	-3,58	-3,68	-4,01	-4,19	-4,69	-5,39	
90°	-4,03	-4,64	-4,72	-4,87	-5,40	-5,81	
100°	-5,07	-5,37	-5,24	-5,34	-6,18	-6,77	
110°	-4,65	-4,83	-6,11	-6,68	-6,62	-8,41	
120°	-5,82	-5,47	-6,47	-6,93	-7,35	-8,10	
130°	-5,54	-5,69	-6,38	-5,94	-6,42	-6,78	
140°	-4,93	-5,89	-6,83	-6,87	-7,70	-8,38	
150°	-3,97	-4,20	-5,09	-5,14	-5,82	-7,05	
160°	-4,89	-4,79	-5,94	-5,91	-6,68	-7,06	
170°	-5,74	-5,61	-6,85	-6,72	-7,01	-7,82	
180°	x	x	x	x	x	x	
-170°	-5,96	-5,76	-6,64	-6,77	-6,93	-8,01	
-160°	-4,60	-4,73	-5,83	-5,51	-6,18	-6,37	
-150°	-4,91	-5,56	-6,31	-6,52	-6,72	-7,51	
-140°	-5,70	-5,81	-6,73	-7,09	-8,05	-8,63	
-130°	-4,65	-5,86	-5,64	-5,91	-6,95	-8,48	
-120°	-5,84	-5,67	-7,01	-7,46	-7,37	-6,50	
-110°	-4,18	-4,97	-6,56	-6,83	-6,34	-8,92	
-100°	-5,47	-5,26	-5,38	-5,63	-6,26	-6,34	
-90°	-4,31	-3,90	-4,73	-4,57	-5,32	-5,90	
-80°	-3,62	-3,01	-4,32	-3,99	-4,39	-4,82	
-70°	-3,19	-3,41	-3,30	-2,99	-3,66	-3,97	
-60°	-1,98	-2,05	-2,55	-2,26	-2,86	-3,03	
-50°	-2,11	-1,47	-1,73	-1,86	-2,03	-2,17	
-40°	-1,20	-0,66	-1,81	-1,06	-1,11	-1,69	
-30°	-0,37	-0,76	-0,78	-0,31	-1,25	-1,04	
-20°	-0,32	0,17	-0,43	-0,54	-0,14	-0,51	
-10°	-0,02	0,04	-0,05	-0,19	0,09	0,04	

Angle	Directional characteristic of the meter – vertical orientation [dB]							
	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1000Hz	1250Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	-0.01	-0.01	0.02	-0.01	0.02	-0.01	-0.03	-0.02
20°	-0.01	-0.01	0.04	-0.02	0.05	0.00	-0.07	-0.06
30°	-0.03	-0.03	0.03	-0.02	0.08	0.00	-0.11	-0.10
40°	-0.03	-0.04	0.01	-0.01	0.12	0.03	-0.14	-0.15
50°	-0.05	-0.07	0.00	-0.03	0.15	0.08	-0.19	-0.18
60°	-0.06	-0.09	-0.04	-0.05	0.18	0.17	-0.23	-0.28
70°	-0.07	-0.11	-0.07	-0.09	0.18	0.28	-0.27	-0.43
80°	-0.08	-0.14	-0.11	-0.13	0.16	0.34	-0.20	-0.44
90°	-0.09	-0.17	-0.16	-0.19	0.10	0.31	-0.02	-0.21
100°	-0.10	-0.19	-0.20	-0.25	0.03	0.21	0.04	-0.16
110°	-0.11	-0.20	-0.23	-0.29	-0.03	0.11	-0.11	-0.12
120°	-0.12	-0.20	-0.25	-0.31	-0.06	0.05	-0.30	-0.15
130°	-0.13	-0.21	-0.27	-0.30	-0.07	0.02	-0.40	-0.42
140°	-0.13	-0.20	-0.27	-0.28	-0.05	0.03	-0.42	-0.54
150°	-0.13	-0.19	-0.27	-0.26	-0.03	0.08	-0.36	-0.41
160°	-0.12	-0.19	-0.27	-0.23	-0.01	0.12	-0.28	-0.24
170°	-0.12	-0.18	-0.28	-0.21	-0.01	0.15	-0.22	-0.15
180°	x	x	x	x	x	x	x	x
-170°	-0.12	-0.18	-0.30	-0.20	-0.04	0.14	-0.23	-0.18
-160°	-0.13	-0.18	-0.32	-0.19	-0.09	0.05	-0.29	-0.31
-150°	-0.13	-0.18	-0.35	-0.19	-0.14	-0.03	-0.35	-0.43
-140°	-0.14	-0.18	-0.36	-0.19	-0.17	-0.07	-0.37	-0.35
-130°	-0.13	-0.18	-0.38	-0.18	-0.18	-0.08	-0.31	-0.10
-120°	-0.12	-0.18	-0.37	-0.15	-0.17	-0.02	-0.13	-0.02
-110°	-0.11	-0.16	-0.36	-0.11	-0.13	0.07	0.07	-0.07
-100°	-0.09	-0.15	-0.33	-0.05	-0.07	0.18	0.09	-0.09
-90°	-0.08	-0.12	-0.29	-0.01	-0.02	0.24	-0.11	-0.29
-80°	-0.06	-0.10	-0.26	0.03	0.02	0.21	-0.21	-0.42
-70°	-0.05	-0.07	-0.22	0.05	0.02	0.11	-0.17	-0.27
-60°	-0.04	-0.05	-0.19	0.05	0.00	0.03	-0.11	-0.12
-50°	-0.02	-0.03	-0.17	0.05	-0.02	-0.02	-0.07	-0.05
-40°	-0.01	-0.02	-0.13	0.04	-0.04	-0.03	-0.03	-0.02
-30°	-0.01	-0.01	-0.10	0.03	-0.04	-0.02	0.00	0.01
-20°	0.00	0.00	-0.07	0.02	-0.03	-0.02	0.02	0.00
-10°	0.00	0.00	-0.04	0.00	-0.02	-0.01	0.03	0.01

Angle	Directional characteristic of the meter – vertical orientation [dB]							
	1600Hz	2000Hz	2240Hz	2500Hz	2800Hz	3150Hz	3550Hz	4000Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	0.03	-0.03	0.02	-0.06	0.08	-0.08	-0.08	0.07
20°	0.05	-0.09	0.05	-0.14	0.10	-0.15	-0.16	0.31
30°	0.06	-0.20	0.00	-0.16	-0.07	-0.16	-0.18	0.36
40°	-0.02	-0.22	-0.12	-0.06	-0.46	-0.01	-0.35	-0.48
50°	-0.20	-0.04	-0.29	-0.10	-0.68	-0.25	-0.44	-0.63
60°	-0.34	-0.02	-0.31	-0.50	-0.36	-0.93	-0.11	-0.58
70°	-0.46	-0.32	-0.02	-0.51	-0.66	-0.66	-1,03	-0.43
80°	-0.66	-0.60	-0.31	-0.08	-0.80	-0.79	-1,06	-1,43
90°	-0.53	-0.27	-0.86	-0.84	-0.72	-0.65	-0.92	-0.88
100°	-0.45	-0.67	-0.38	-0.58	-0.97	-1,01	-0.55	-1,34
110°	-0.23	-0.32	-0.67	-0.94	-1,14	-1,27	-1,41	-1,43
120°	0.04	0.00	-0.12	-0.44	-1,27	-1,26	-1,31	-1,77
130°	-0.26	-0.10	-0.05	0.15	-0.18	-0.59	-0.76	-1,85
140°	-0.48	-0.61	-0.80	-0.78	-0.68	-0.65	-0.32	-0.15
150°	-0.43	-0.52	-1,04	-1,17	-1,49	-1,56	-1,62	-2,01
160°	-0.30	-0.21	-0.42	-0.57	-0.80	-0.99	-1,63	-2,12
170°	-0.24	-0.05	-0.13	-0.17	-0.31	-0.45	-0.46	-0.71
180°	x	x	x	x	x	x	x	x
-170°	-0.35	-0.17	-0.33	-0.35	-0.55	-0.87	-0.93	-1,25
-160°	-0.52	-0.43	-0.81	-0.75	-1,21	-1,51	-1,58	-2,24
-150°	-0.61	-0.57	-0.98	-0.81	-1,31	-0.85	-0.54	-0.37
-140°	-0.43	-0.21	-0.07	-0.21	-0.15	-0.35	-0.52	-1,05
-130°	-0.08	0.02	0.08	-0.46	-0.83	-1,35	-1,25	-1,91
-120°	-0.21	-0.27	-0.71	-0.89	-1,16	-1,07	-1,26	-1,79
-110°	-0.51	-0.67	-0.43	-1,01	-1,04	-1,25	-0.74	-0.47
-100°	-0.52	-0.35	-0.91	-0.87	-0.60	-0.64	-0.61	-1,42
-90°	-0.69	-0.46	-0.27	-0.15	-0.27	-1,03	-1,25	-1,17
-80°	-0.57	-0.54	-0.03	-0.33	-0.82	-0.61	-0.92	-0.76
-70°	-0.48	-0.04	-0.19	-0.61	-0.46	-0.72	-0.38	-0.80
-60°	-0.38	-0.10	-0.44	-0.32	-0.38	-0.38	-0.32	-0.23
-50°	-0.18	-0.24	-0.26	-0.18	-0.46	-0.20	-0.21	-0.53
-40°	-0.05	-0.30	-0.09	-0.12	-0.15	-0.22	-0.05	-0.06
-30°	-0.02	-0.18	0.01	-0.03	-0.03	-0.14	-0.19	0.24
-20°	-0.03	-0.07	-0.01	0.01	0.00	-0.03	-0.12	0.15
-10°	-0.03	-0.01	-0.02	0.05	-0.04	-0.03	-0.04	0.04

Angle	Directional characteristic of the meter – vertical orientation [dB]							
	4500Hz	5000Hz	5600Hz	6300Hz	7100Hz	8000Hz	8500Hz	9000Hz
0°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10°	-0.04	0.19	0.14	-0.06	-0.34	0.10	-0.41	0.13
20°	-0.42	0.31	0.22	-0.28	-0.54	0.14	-1,16	0.62
30°	-1,12	0.29	-1,27	-0.79	-0.22	-0.01	-0.68	-0.16
40°	-1,17	0.37	-1,52	-0.25	-0.86	-0.78	-1,66	-0.99
50°	-0.43	-1,20	-0.98	-1,61	-1,22	-0.96	-1,73	-1,38
60°	-1,50	-0.12	-1,84	-1,24	-1,72	-1,39	-2,74	-1,56
70°	-1,41	-1,25	-2,26	-1,89	-2,09	-2,06	-2,87	-2,31
80°	-1,03	-1,32	-2,57	-2,53	-2,70	-2,57	-3,39	-3,05
90°	-2,39	-1,20	-2,05	-2,64	-2,76	-3,63	-3,78	-3,40
100°	-1,99	-2,42	-3,80	-2,71	-2,98	-3,82	-4,42	-3,62
110°	-1,50	-1,26	-2,83	-3,95	-4,32	-3,18	-4,50	-4,24
120°	-2,50	-2,65	-2,54	-2,22	-3,60	-5,10	-5,08	-4,98
130°	-2,83	-1,93	-3,80	-3,52	-4,13	-3,41	-3,62	-3,47
140°	-0.92	-2,33	-2,85	-3,87	-4,03	-4,89	-5,70	-5,32
150°	-2,30	-1,70	-1,88	-1,36	-0.79	-1,60	-2,31	-2,44
160°	-3,02	-3,07	-4,37	-4,64	-4,75	-6,18	-6,12	-5,54
170°	-1,32	-0.82	-2,15	-2,02	-2,41	-3,10	-3,79	-5,90
180°	x	x	x	x	x	x	x	x
-170°	-2,32	-1,81	-3,54	-3,98	-4,39	-5,90	-6,63	-6,56
-160°	-3,06	-2,80	-4,83	-4,24	-1,46	-1,95	-1,87	-1,69
-150°	-0.95	-0.33	-1,60	-2,98	-3,39	-4,38	-4,68	-4,26
-140°	-2,87	-2,33	-3,70	-3,49	-3,89	-5,27	-4,80	-5,02
-130°	-2,31	-2,54	-3,76	-4,16	-2,20	-4,11	-4,16	-3,60
-120°	-2,73	-0.82	-3,06	-2,64	-3,36	-4,08	-5,16	-4,81
-110°	-2,29	-1,80	-3,37	-3,51	-2,88	-3,00	-4,08	-4,06
-100°	-1,90	-1,81	-2,22	-2,59	-2,84	-3,77	-3,83	-3,42
-90°	-2,34	-1,29	-2,82	-2,27	-2,77	-3,21	-3,04	-3,06
-80°	-1,47	-0.98	-2,02	-2,34	-2,00	-3,00	-3,51	-2,19
-70°	-1,22	-1,23	-2,14	-1,41	-1,92	-1,54	-2,41	-1,92
-60°	-1,57	-0.82	-1,41	-1,49	-1,03	-1,66	-2,44	-1,60
-50°	-0.52	-0.13	-0.77	-0.45	-0.78	-0.97	-1,58	-0.23
-40°	-0.95	0.10	-1,42	-0.62	-0.80	-0.40	-0.59	-0.84
-30°	-0.53	0.29	-0.45	-0.32	-0.14	0.20	-1,06	0.59
-20°	-0.16	0.32	0.07	-0.27	-0.52	0.08	-0.52	0.64
-10°	-0.01	0.02	-0.01	-0.10	-0.09	0.03	-0.07	0.10

Angle	Directional characteristic of the meter – vertical orientation [dB]						
	9500Hz	10000Hz	10600Hz	11200Hz	11800Hz	12500Hz	
0°	0.00	0.00	0.00	0.00	0.00	0.00	
10°	-0.31	-0.16	0.04	-0.51	-0.24	-0.11	
20°	-0.84	0.20	-0.09	-0.83	-0.02	-0.32	
30°	-1,23	-0.36	-1,20	-1,05	-0.93	-1,01	
40°	-1,72	-0.72	-1,61	-1,75	-1,33	-1,83	
50°	-2,15	-1,85	-1,96	-2,55	-1,94	-2,39	
60°	-2,87	-1,90	-2,85	-3,13	-3,04	-3,56	
70°	-3,84	-2,68	-3,71	-3,76	-3,83	-4,32	
80°	-4,20	-3,52	-4,65	-4,56	-4,51	-5,05	
90°	-4,28	-4,09	-5,43	-5,29	-5,42	-6,30	
100°	-5,13	-4,37	-5,65	-6,06	-6,05	-6,71	
110°	-5,14	-4,92	-6,41	-6,63	-6,40	-7,08	
120°	-6,23	-5,31	-6,22	-6,82	-7,04	-7,96	
130°	-5,07	-5,20	-6,81	-7,73	-7,25	-8,26	
140°	-5,50	-5,27	-7,31	-7,74	-7,92	-7,24	
150°	-6,04	-4,49	-6,28	-7,39	-8,19	-9,11	
160°	-6,27	-5,18	-6,36	-6,29	-6,01	-5,89	
170°	-7,68	-6,87	-8,66	-8,93	-9,19	-10,74	
180°	x	x	x	x	x	x	
-170°	-8,30	-7,07	-8,64	-8,64	-8,51	-8,98	
-160°	-2,89	-2,68	-3,93	-4,70	-5,35	-7,02	
-150°	-5,79	-5,84	-7,04	-7,28	-7,20	-8,72	
-140°	-7,05	-5,98	-6,01	-6,72	-6,08	-6,35	
-130°	-5,79	-5,77	-7,00	-6,53	-7,60	-8,42	
-120°	-5,10	-4,48	-6,18	-6,70	-6,08	-7,54	
-110°	-5,25	-4,96	-5,83	-6,73	-6,23	-6,34	
-100°	-4,39	-4,04	-5,37	-5,81	-5,70	-6,87	
-90°	-4,19	-3,55	-4,22	-5,19	-4,66	-4,93	
-80°	-3,45	-3,05	-4,50	-4,36	-3,60	-4,64	
-70°	-2,77	-2,42	-2,74	-3,73	-3,89	-3,69	
-60°	-2,12	-1,56	-3,24	-2,46	-2,18	-2,75	
-50°	-2,07	-1,62	-2,14	-2,55	-1,66	-1,61	
-40°	-0,94	-0,86	-0,96	-1,40	-0,85	-1,73	
-30°	-1,08	0,50	-1,20	-0,70	-0,93	-0,54	
-20°	-0,57	0,00	-0,03	-0,81	-0,03	-0,02	
-10°	-0,07	-0,11	-0,07	-0,10	-0,08	0,09	