

PRODUCT DATA

Sound Level Meter Calibration Software Type 7763 for Calibration Platform Type 3630



The calibration of sound level meters is heavily driven by legislative requirements. As the number of instruments requiring calibration increases, so the need for an efficient calibration system becomes more and more obvious.

The Sound Level Meter (SLM) Calibration application for Type 3630 complies with all relevant international standards and recommendations and is equally well suited for use in national calibration laboratories and commercial calibration centres. The system combines state-of-the-art IT with Brüel & Kjær's proven experience in the calibration of instrumentation for sound and vibration measurement.

The Type 7763 SLM calibration application is not just an effective tool. The fact that the system is globally supported, easy to recalibrate and, not least, comes with a comprehensive user manual (that even includes the uncertainty budgets needed for accreditation purposes), means that customers get an impressive package for their investment.

020090

7763, 3630

USES ○ Acoustical and electrical calibration of sound level meters to international standards

- FEATURES*
- Automatic, semi-automatic or manual calibration of sound level meters
 - Runs under Windows® 2000
 - Flexible test-execution manager
 - Integrated Calibration Manager's Workbench with:
 - traceability control
 - customer database
 - Predefined or user-defined calibration sequences
 - Transparent user interface
 - Test signals comply with IEC 60651 and IEC 60804
 - IEC 61672 tests available as an upgrade
 - Default acceptance limits set in accordance with IEC-type Sound Level Meters
 - User-adaptable acceptance limits (OIML requirements)
 - Taktmaximal Tests (DIN 45657)
 - External electrical traceability via system's digital voltmeter
 - External acoustic traceability via Multifunction Acoustic Calibrator Type 4226
 - Built-in system verification of measurement quality
 - Flexible Certificate of Calibration with detailed test report
 - Fully integrated in the MS® Office environment

- OPTIONS*
- On-site installation and training
 - Tool to add new SLM types
 - Maintenance contracts (hardware and software)

System Concept

The new generation of calibration systems from Brüel & Kjær uses the Portable PULSE™ analyzer as the core system element. Portable PULSE is a state-of-the-art, highly flexible multi-analyzer capable of analysing by FFT, 1/n-octave filters and overall levels. PULSE also generates the test signals necessary to fulfill the requirements of international standards.

The Sound Level Meter (SLM) Calibration application for the Type 3630 platform is designed to calibrate Brüel & Kjær as well as other manufacturers' sound level meters, according to IEC 60651, IEC 60804 and relevant ANSI standards. Future upgrades will cover the coming IEC 61672 standard.

Integrated Applications

Previously, different applications would typically run on dedicated, stand-alone systems. However, all applications on the new platform are fully integrated. This means that information entered just once, e.g., customer information, is available to all applications which guarantees data integrity and saves you time. Furthermore, the system's integration with the MS Office environment assures data compatibility facilitating data export for analysis.

Calibration Manager's Workbench

Proof of traceability and control over calibration intervals for the standards and instruments used by the system is facilitated by the Calibration Manager.

Tests Performed by the Type 7763 Application

- DC-output verification
- Absolute sensitivity at reference frequency
- Electrical inherent noise with different frequency weightings (linear, A, B, C, etc.)
- Frequency response with different weighting filters (linear, A, B, C, etc.)
- Level range control
- Level linearity
- Overload indication
- Time-weighting (F, S, I)
- Time-weighted tone-burst response
- Time-averaged tone-burst response, single and repeated bursts
- Time-weighted rectangular pulse response
- Time-averaged rectangular pulse response, single and repeated pulses
- Time-averaging pulse range
- Peak-level detector with rectangular and half-sine pulses
- Sound exposure
- Taktmaximal
- L_n
- Internal reference generator
- Acoustical inherent noise
- Absolute acoustical sensitivity in coupler
- Acoustical frequency response in coupler (linear and weighted)

System Description

Test Modes

Tests are performed either acoustically or electrically. During the electrical tests, the SLM's microphone is replaced by an adaptor with the same capacitance as the microphone. The adaptor is connected to the system output. The PULSE generator produces all the electrical test signals used during the calibration.

Automatic Mode

If the SLM under test has a bus interface, then setup and reading of data from the SLM is performed via the bus. The complete test is controlled by the Windows software.

Semi-automatic Mode

If the SLM has a DC output, then this is connected to the system's digital voltmeter through the multiplexer. The relationship between the SLM's display and the DC output is tested. If a satisfactory relationship is established, the SLM display can be calculated by the reading from the system's digital voltmeter. Hence, the calibration becomes semi-automatic and time saving.

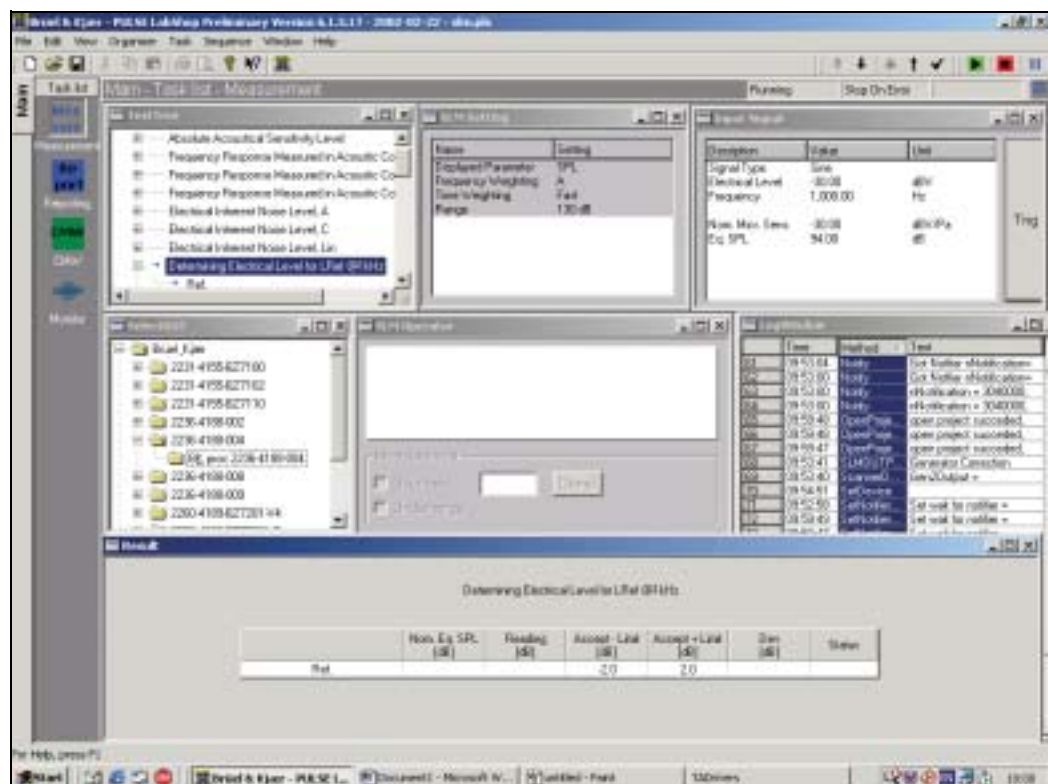
Manual Mode

If the SLM does not have a DC output, or a satisfactory linear DC output, then the calibration can continue but all results must be entered manually via the computer's keyboard.

Acoustic Tests

Acoustic tests are performed using Multifunction Acoustic Calibrator Type 4226. The use of Type 4226 requires knowledge of the "Type 4226 corrections". This information is available for all relevant types of Brüel & Kjær microphones and is contained in the technical documentation that accompanies all microphone packages.

Fig. 1
SLM Calibration
Software Type 7763
user interface



User Interface

An advanced test execution manager controls the calibration sequence and test modes. The user interface has separate windows for operator instructions, test results, system setup and even a log file with the complete calibration history for each session.

The size and position of the windows can be adapted to individual requirements and the settings saved.

System Architecture and Security

All system communication is via a LAN while a sophisticated, multi-level, user-access security system controls user rights and data protection.

Flexibility

By default, the acceptance limits are set to equal the limits given in the IEC standards for the actual type of SLM (0, 1, 2 or 3). However, in order to provide maximum flexibility, you can correct the acceptance level either globally or for each individual test.¹

Reporting

When calibration of the SLM is finished, all data are stored and a “Certificate of Calibration” can be printed out either directly after the calibration or later from another computer on the network. Once a certificate has been generated, the relevant calibration data are locked to protect the data and to ensure that the printed certificates can always be exactly reproduced.

The system supports a number of predefined and user-definable certificates. Accordingly, individual logos and different languages are fully supported by the SLM calibration system.

Watch Out for Other Members of the Family!

Type 7763 is far more than just a single-purpose calibration system – it is part of an entire calibration platform.

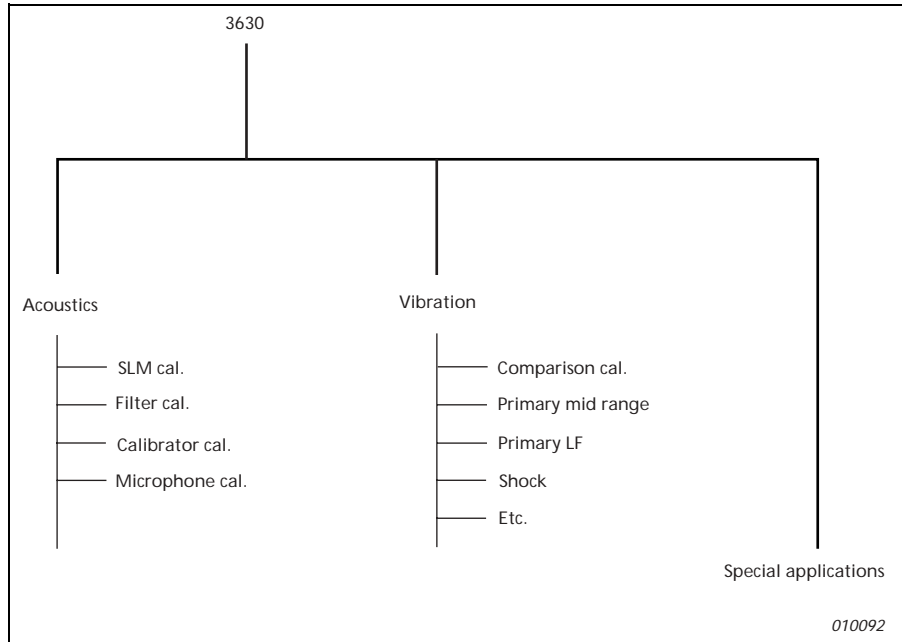
This platform is based upon a highly modular hardware/software concept which, hand in hand with the PULSE multi-analyzer, offers a multitude of different calibration applications. The platform’s modularity gives maximum measurement flexibility because a multifunctional system can be split into separate systems as workload or organisational requirements change.

Even customised applications such as hydrophone phase calibration or microphone high-pressure calibration can be easily implemented with the Type 3630 platform.

Fig. 2 shows the different calibration areas covered by the platform.

¹ For in-field testing, OIML R 58 allows you to add 25% to IEC tolerances. This criterion is easily met by the flexible limits.

Fig. 2
*Type 3630 platform
calibration areas*



Major System Elements – Calibration Platform Type 3630 with SLM Calibration Application Type 7763

Type 3560 C	Portable PULSE Analyzer with input/output and LAN module	Type 4226	Multifunction Acoustic Calibrator
Type 7700 G	2-channel PULSE LabShop license	4226 CAI	Accredited Initial Calibration of Type 4226
UL0210-GB	System controller (Powerful Pentium PIII computer with network card)	<i>plus</i>	Set of cables for system interconnection
UL0109	Colour monitor	<i>plus</i>	Complete System Manual including Uncertainty Budgets
UZ0207-GB	MS Office XP Professional Edition	<hr/>	
BZ5372	Windows 2000	Options	
Type 2978	DMM Agilent 34970 (digital voltmeter)	<hr/>	
ZH0246	Multiplexer Agilent model 37901 (set of 3)	4226 CAF	Accredited Recalibration of Type 4226
KK0055	System Rack	2978 CAI	Accredited Initial Calibration of DMM
Type 3111	Output Module	2978 CAF	Accredited Recalibration of DMM
Type 7763	SLM Calibration Software	3630 SI3	On-site installation and training
WA0302 A	Half-inch Input Adaptor 13 pF	7700 G-MS1	1-year PULSE software upgrade contract
WA0302 B	Half-inch Input Adaptor 15 pF		
WA0302 C	Half-inch Input Adaptor 20 pF		

Technical Specifications for Different Tests Performed

Calibration Uncertainty

DC OUTPUT

Calibration Uncertainty: Better than 0.05%

FREQUENCY WEIGHTING

Calibration Uncertainty: 0.12 dB

LEVEL RANGE CONTROL

Calibration Uncertainty: 0.12 dB

Test Frequency: One or more of 20 Hz, 31.5 Hz, 1 kHz, 4 kHz, 8 kHz, 12.5 kHz

LINEARITY RANGE

Calibration Uncertainty: 0.12 – 0.17 dB

In 1 and/or 10 dB steps plus L_{eq} and SEL as appropriate

Test frequency: One or more of 20 Hz, 31.5 Hz, 1 kHz, 4 kHz, 8 kHz, 12.5 kHz

RMS DETECTOR

Calibration Uncertainty: 0.11 dB

- Level Linearity with Single Tone-bursts
- 4 kHz single bursts of 1 sec duration.
- Test is performed in 10 dB steps
- Steady sine test
- Response in F, S and I tested by means of a 1 kHz sine signal

SINGLE BURST TEST

Calibration Uncertainty: 0.12 – 0.23 dB

Response to single burst tested for various burst durations in F, S and I:

- Burst width: 4, 10, 40, 100, 400, 1000, 4000 periods
- Burst signal: 2 kHz sine
- Signal level: 10 dB steps

Tests can be performed in relevant time weightings Lin, A, B, C or D.

REPEATED TONE BURST TEST

Calibration Uncertainty: 0.1 dB

Test with tone-bursts: 1, 4, 10 or 11 periods of a 2 kHz signal.

Repetition frequency: 2, 20, 40 or 100 Hz

REPEATED TONE BURST TEST (INTEGRATED SOUND LEVEL)

Calibration Uncertainty: 0.12 dB

Test with repeated 4 kHz tone-bursts

Time average level: 20 dB above lower limit in the ref. range

Burst duration: 4 periods.

Repetition period: 10, 100, 1000, 10000 and 100000 multiples of tone-burst duration

PULSE RANGE

Calibration Uncertainty: 0.2 dB

Test of response to a single 4 kHz tone-burst superimposed on a low-level continuous sine signal:

Burst duration: 4, 40, 400 and 4000 periods

Peak level: 53, 63 and 73 dB above the low-level signal

TIME AVERAGING

Calibration Uncertainty: 0.1 dB

Peak Level Detector

Test with rectangular pulses

Reference level 10 msec pulse

Test pulses: 50 and 100 microseconds

Test level: 1 dB below L_{ref}

OVERLOAD TEST

Calibration Uncertainty: 0.31 dB

Test Method: Inverse A-weighted sine input at 1/3-octave frequencies from 1 kHz and downwards until overload occurs.

ACOUSTICAL RESPONSE

Calibration Uncertainty: 0.2 dB to 0.6 dB (Depending on the frequency and the uncertainty of microphone correction values used)

Simulated free-field calibration. Respectively random field calibration

Uses Brüel & Kjær multi-frequency calibrator with software corrections for actual microphone, outdoor gear and body influence

Test frequencies: Octave frequencies from 31 Hz to 12 kHz

Self Calibration: Electrical uncertainty achieved after weekly electrical self-calibration typically better than 0.05 dB

GENERAL

All tests are performed to international standards (IEC 60651 and IEC 60804) with acceptance limits as defined in the standards.

For each single test, the acceptance limit can be modified by a user selected factor (e.g., 125 will add 25% to the IEC tolerance as defined in OIMLR 58 for service verification).

The stated calibration uncertainties 12-month specifications expressed as combined expanded uncertainty with a coverage factor $k = 2$.

The uncertainties are valid at $23^\circ \pm 3^\circ\text{C}$ and $\text{RH } 50\% \pm 25\% \text{ RH}$.

The uncertainties stated include a quantization error for an instrument with 0.1 dB resolution.

Mechanical dimensions (depth × height × width):

500 × 433 × 520 mm

Weight: approx. 50 kg

Mains voltage range: 110 V to 240 V / 50 to 60 Hz

Brüel & Kjær reserves the right to change specifications and accessories without notice.