PULSE™ Sound Power in Reverberation Rooms Type 7884 is software for determining sound power based on the standards ISO 3741, ISO 3743-1 and ISO 3743-2.

Laboratory reverberation rooms as described in ISO 3741 are particularly suitable when performing precision grade tests on comparatively small machines when the sound emitted is predominantly steady in character.

Special reverberation rooms constructed to fulfil the requirements of ISO 3743-2 are less expensive than the laboratory reverberation rooms described in ISO 3741. The methods described in ISO 3743-2 provide measurements of engineering grade, particularly suitable for direct measurement of A-weighted sound power levels of a series of small noise sources.

The hard-walled test rooms as described in ISO 3743-1, are used for engineering grade measurements. Most ordinary, unfurnished rooms without special acoustical treatment comply with the requirements of this standard.

Uses and Features

### Uses
- To declare the sound power emitted under defined conditions
- To verify the declared values (legislation, voluntary awards)
- To compare the noise emitted by machinery and equipment of various types and sizes (for example, when benchmarking, or in engineering work, when developing quieter products)

### Features
- Comprehensive solutions for determining sound power levels according to ISO 3741, ISO 3743-1 and ISO 3743-2
- Interactive measurement setup and information windows to guide you through the measurement process
- Measurement data and results can be conveniently saved to familiar Microsoft® Excel® workbooks for customized reporting and further post-processing
- PULSE platform ensures exceptional measurement accuracy
- Scalable solution

### Dedicated PULSE Template for Ease of Use

A dedicated PULSE template enables the determination, storage and reporting of noise-emission quantities according to the various standards.

### Reverberation Room Template

This solution provides measurement and calculation procedures based on ISO 3741, ISO 3743-1 and ISO 3743-2 for determining the sound power of noise sources operating in reverberant test environments (see Table 1).
The sound power is determined from sound pressure measurements obtained from a distributed set of microphones in the test environment. Depending on the actual situation, sometimes multiple microphone positions as well as multiple source positions have to be measured. To correct for the influence of the test environment, multiple measurements may have to be made with several positions of a reference sound source. Another possibility is that the reverberation time can be measured and stored in the measurement project. Type 7884 provides you with a clear indication of the status of the measurement by means of a colour-coded user interface.

To measure the sound pressure levels, either a set of microphones (Fig. 1) or a single rotating microphone may be used.

![Fig. 1]
Typical setup for determination of sound power in reverberation rooms according to ISO 3741

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ISO 3741 Precision</th>
<th>ISO 3743-1 Engineering</th>
<th>ISO 3743-2 Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test environment</td>
<td>Reverberation room</td>
<td>Hard-walled room</td>
<td>Special reverberation room</td>
</tr>
<tr>
<td>Criterion for suitability of test environment</td>
<td>Room volume and reverberation time to be qualified</td>
<td>Volume &gt; 40 m³ Absorption coeff. &lt; 0.20</td>
<td>Volume &lt; 40 m³ &lt; 300 m³ 0.5s &lt; Tnom &lt; 1 s</td>
</tr>
<tr>
<td>Volume of sound source</td>
<td>Preferably less than 2% of test room volume</td>
<td>Preferably less than 1% of test room volume</td>
<td>Preferably less than 1% of test room volume</td>
</tr>
<tr>
<td>Character of noise from source</td>
<td>Steady, broadband, narrowband or discrete frequency</td>
<td>Any, but no isolated bursts</td>
<td>Any, but no isolated bursts</td>
</tr>
</tbody>
</table>

The similarities between the standards are reflected in the template, which provides an intuitive user interface. To fulfill the requirements of the chosen standard there is a dedicated PULSE template that leads you through all the necessary steps by means of a task list. The main tasks of setup, measure and export are arranged in logical sub-tasks, for example, hardware setup, measurement setup, calibration before measurement, calibration after and results (Fig. 2).
Making a Complex Process Simple

Graphical features, such as pop-up text, colour coding and warnings, allow quick updates on measurement status, determination of pending actions, and validation of specific parameters within the standard. The flexibility of the program allows you to skip repetitive tasks. The results can be exported to Microsoft® Excel® for report generation.

Scalable Solution, Common Platform

Type 7884 software is built on the powerful PULSE platform. It is possible to combine Type 7884 with other PULSE sound and vibration measurement applications for a complete and flexible product testing program aimed at standards compliance and non-conformance problem resolution.
## Specifications – PULSE Sound Power in Reverberation Rooms Type 7884

### SYSTEM REQUIREMENTS
The PC requirements for PULSE must be fulfilled. The following licenses are required:
- PULSE CPB Analysis Type 7771, or PULSE FFT & CPB Analysis Type 7700
- Microsoft® Office 2007 (SP2), 2010 (SP2) or 2013
Screen resolution of 1400 × 1050 pixels (or better) is recommended

### CALIBRATION
Calibration is performed using PULSE’s integrated Calibration Master, which automatically initiates calibration while moving the calibrator from one microphone to the next. The full calibration history for a transducer can be retained in the Transducer Database, which allows monitoring of calibration data variations over a period of time. Global calibration allows you to build up a calibration database that is shared across all PULSE projects

### SPW Reverberation Room (PULSE Template)
Provides measurement and calculation procedures for the determination of the sound power of noise sources using sound pressure, as described in the following international standards

#### STANDARDS
- ISO 3741: 2010 Determination of sound power levels and sound energy levels of noise sources using sound pressure. Precision methods for reverberation test rooms

### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>7884-X*</td>
<td>PULSE Sound Power in Reverberation Rooms</td>
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</tbody>
</table>

**REQUIRED SOFTWARE**

<table>
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<th>Type</th>
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<tr>
<td>7700-X*</td>
<td>PULSE FFT &amp; CPB Analysis, or</td>
</tr>
<tr>
<td>7771-X*</td>
<td>PULSE CPB Analysis</td>
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**RECOMMENDED ACCESSORIES**

<table>
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<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>7767-A-X*</td>
<td>PULSE Data Manager, single user</td>
</tr>
<tr>
<td>7767-B-X*</td>
<td>PULSE Data Manager, up to five users</td>
</tr>
<tr>
<td>7767-C-X*</td>
<td>PULSE Data Manager, up to ten users</td>
</tr>
</tbody>
</table>

**RECOMMENDED HARDWARE**

<table>
<thead>
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<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>4942-A-021</td>
<td>½” Diffuse-field Microphone, incl. Preamplifier. Type 2671</td>
</tr>
<tr>
<td>4231</td>
<td>Sound Calibrator</td>
</tr>
</tbody>
</table>

* ‘X’ indicates the license model, either N: node locked, or F: floating.

### MEASUREMENT

- \( L'_{p(B)\ ij} \): time-averaged sound pressure level produced by the background noise
- \( L'_{p(R)\ ij} \): time-averaged sound pressure level from the reference sound source
- \( L'_{p(S)\ ij} \): time-averaged sound pressure level from the noise source under test

- All quantities are measured in 1/3-octave band for any range with nominal mid-band frequencies from 50 Hz to 20 kHz or in 1/1-octave band for any range with nominal mid-band frequencies from 63 Hz to 16 kHz
- A-weighted values calculated from 1/1-octave or 1/3-octave values as specified in Annex C of ISO 3745: 2012

### CALCULATION

- \( K_1 \): background noise corrections
- \( I'_{p(R)\ j} \): mean corrected time-averaged sound pressure level from the reference sound source over all source positions
- \( I'_{p(S)\ j} \): mean corrected time-averaged sound pressure level from the noise source under test over all source positions
- \( N_M \): number of necessary microphone positions or separate microphone traverses for each source position
- \( N_S \): number of necessary source positions
- \( I_W \): sound power level

### VALIDATION

- Criterion for background noise
- Requirement evaluation for additional microphone positions
- Requirement evaluation for additional source positions

### SERVICE

- M1-7884-X*: Annual Software Maintenance and Support Agreement for Type 7884
- M3-7884-X*: Update of M1-7884-X for PULSE Sound Power in Reverberation Rooms