Vibration Transducer Calibration System Type 3629 is an easy-to-use, automatic calibration system that provides traceable calibration of a wide range of transducers.

The hardware for the basic system with Low Shock Calibration Software Type 5310 consists of a Portable PULSE™ front-end, which provides the necessary inputs, conditioners and a Comparison Shock Calibrator for shock generation.

USES AND FEATURES

USES
• Shock calibration up to 10000 g (100000 m/s²) of transducers according to ISO 16063-22
• Fast and accurate amplitude linearity calibration of transducers
• Generation of complete certificates in Microsoft® Word according to ISO 17025
• Supervision of measuring instrumentation according to ISO 9000 and SAE J211/ISO 6487 (impact tests on road vehicles)

FEATURES
• Comparison shock calibration using a calibrated reference accelerometer
• Choice of one level multi-shock or multi-level linearity calibration with ‘best line’ fitting
• Maximum calculation from multiple samples to avoid effects from irregular pulse shapes or ringing
• Calculation of zero-shift
• Determination of pulse duration
• Low expanded calibration uncertainty (1.0% @ 20 to 2000 g)
• Automated calibration provides ease-of-use, yet fault-proof results
• Customer database for handling of data and inventory following ISO 17025
• Shock range 20 g to 10000 g, depending on exciter and reference transducer
• Calibrates practically all transducer types: charge, DeltaTron® (constant current), piezoresistive, variable capacitance, voltage, and servo
• Automated system calibration and subsequent use of data for correction
• Automated conditioner calibration and subsequent use of data for correction
• User-defined calibration levels depending on exciter and reference transducer
• Based on proven Brüel & Kjær PULSE Multi-analyzer technology
• Brüel & Kjær back-up including staff training and system maintenance (optional)
**System Description**

Vibration Transducer Calibration System Type 3629 with software Type 5310 is an easy-to-use, automatic calibration system that provides comparison shock calibration of a wide range of transducers.

The hardware for the basic system consists of a PULSE front-end, which provides the necessary inputs and a shock exciter. The front-end is connected via Ethernet to a standard PC (desktop or laptop). To accommodate the output of the two transducers, two inputs are used. For typical pulse durations and levels up to 2000 g, PULSE front-ends with 25kHz bandwidth can be used. At higher levels or shorter durations, 200kHz bandwidth inputs are recommended. Two Charge Converters Type 2647-W-003 with 0.1 mV/pC gain are used to accommodate the large signals at high levels for most piezoelectric transducers. Optionally, a two channel NEXUS™ Type 2692-W-001 can be used.

Low Shock Transducer Calibration Software Type 5310 runs on the PC with no external processing, which means that software performance increases in line with general PC development. The operating system used can be Microsoft® Windows® 2000 or Windows® XP, giving familiar user interfaces. Data and status are displayed on the screen. Data and results are stored on the hard disk of the computer, and can be printed out for a hard copy. A Microsoft® Access database, which is accessed transparently by the control software, is used for the storage and organisation of data. Microsoft® Word is used for the generation of certificates using templates that can easily be modified by the user.

You do not need to be proficient in Word, although basic familiarity with it simplifies the creation of customised reports. Nor do you need to be familiar with Windows® to operate Type 3629 – only rudimentary computer proficiency is required. Furthermore, three different user-levels giving access to different menus are included for maximum security.

Due to the extended calibration of the PULSE front-end, an extremely low uncertainty for the measurement of the transducer output voltage can be obtained. To this, the uncertainty of the reference transducer calibration, tilt, etc., and the digital calculations, have to be added. Transverse and rocking motion of the exciter and transverse sensitivity of the reference and the transducer to be calibrated are the other important contributions to uncertainty, typically bringing the total uncertainty to 1.0% in the mid-level range.

Type 3629 calibrates practically all transducer types: charge; DeltaTron (constant current supplied transducers), piezoresistive, variable capacitance, voltage and servo, provided the proper optional conditioners are chosen.

The PULSE analyzer records the time signals from the two transducers. Afterwards the PC calculates the sensitivity and other parameters.

**Flexibility**

Vibration Transducer Calibration System Type 3629, configured with Type 5310 software and corresponding hardware, can calibrate from 20 to 10000 g, although the actual levels are determined by the capabilities of the exciter and reference transducer used. In cases where external signal conditioning is necessary (such as for piezoelectric or piezoresistive transducers), the software is able to measure and store the characteristics of the conditioners, and then compensate for these characteristics during operation. Conditioner calibration certificates can also be printed. The controller is designed to use virtually any shock exciter source. Gain characteristics of amplifier and conditioner are stored in the Microsoft® Access database, minimising calibration uncertainties by correcting for such characteristics.
An easy-to-use procedure editor is used to describe the parameters (and acceptance limits if desired) of the device under test.

A customer database is also available in the system, permitting the calibration laboratory to fulfil the requirements in the ISO 17025 standard without additional administrative systems.

**Maintenance**

Simple menus are used to add/delete and recalibrate the instruments in the system and to maintain calibration and traceability data. These data will normally be listed on the certificates.

Automated electrical calibration of the system is performed using an external high-precision voltmeter, Agilent 3458 A Digital Multimeter, controlled through an IEEE–488.2 interface (optional). Intermediate self-calibrations can be performed to ensure system stability.

Charge and voltage conditioners can be calibrated automatically on the system and the results stored in the database. The data is then used by the system to correct the obtained measurement values reducing the uncertainty.
Specifications – Vibration Transducer Calibration System Type 3629 with Low Shock Transducer Calibration Software Type 5310

Shock calibration according to ISO 16063-22

**Range with Exciter EE-0284 (ENDEVCO Model 2925, POP):**
- 20 to 10000 g

**Optional Range with Pendulum Exciters:** 10 to more than 500 g

**RANGES**
- Maximum Charge Input:
  - Type 2692: 10 nC
  - Type 2692-C: 100 nC
  - Type 2647: 7 nC
  - Type 2647-W-003: 70 nC

**Max Voltage Input (Direct):**
- PULSE Module Type 3109: 7 V; Type 3110: 22 V
- Max Voltage Input (Type 2697): 8 V (gain \(\times 1\))

**Estimated expanded calibration uncertainties at \(k = 2\) (corresponding to approximately 95% confidence level):**

<table>
<thead>
<tr>
<th>Range (g)</th>
<th>Pulse Duration (ms)</th>
<th>Configuration</th>
<th>Magnitude Expanded Uncertainty (with 0.5 – 1% shock calibration of reference to 10000 g)</th>
<th>Magnitude Expanded Uncertainty (with 0.5% vibration plus 2.6% shock calibration of reference to 10000 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 2000</td>
<td>3 – 0.5</td>
<td>POP exciter</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2000 – 10000</td>
<td>0.5 – 0.1</td>
<td>POP exciter</td>
<td>1.8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Ordering Information**

**Standard System Configuration**

**COMPARISON SHOCK CALIBRATION SYSTEM (20 TO 10000 G)**

- Type 3560-C-T00 PULSE
- Type 7202-B-GB Dell® Standard Desktop PC
- UL-0217-GB Dell 19” Standard Monitor
- UL-0207-GB Microsoft® Office XP Professional GB OEM/without manuals
- Type 5310 Low Shock Transducer Calibration Software for Type 3629
- 2 × AO-0038-D-012 Teflon Low-noise cable 10–32 UNF, 1.2 m
- 2 × JP-0145 Input Adaptor, BNC to 10–32 UNF microdot socket
- EE-0210-W-001 ENDEVCO 2270-M8 Standard Reference Accelerometer with Shock Calibration CS110
- EE-0207 ENDEVCO Model 2270 Comparison Standard Piezoelectric Accelerometer
- EE-0284 ENDEVCO Model 2925 Comparison Shock Calibrator, POP
- 3629-CTI Type 3629 system, Traceable Initial Calibration
- 2 × 2647-W-003 Charge to DeltaTron Converter 0.1 mV/pC
- Type 2697 DC Differential Amplifier for Microphone Input

**AVAILABLE OPTIONS AND ACCESSORIES**

- BK-0058 2-channel NEXUS™ Charge Conditioning Amplifier for very high levels (100 nC)
- BK-0060 System Installation per day (excluding travel and accommodation)
- WQ-2349 Agilent 3458A DMM
- WQ-2349-CAF Accredited Calibration of WQ-2349
- EE-0207 ENDEVCO Model 2270 Comparison Standard Piezoelectric Accelerometer
- EE-2692-W-001 Type 2692-W-001 Teflon Low-noise cable 10–32 UNF, 1.2 m
- EE-5426 ENDEVCO CS110 Comparison Shock Calibration

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