

# PRODUCT DATA

## Calibration Exciter — Type 4294 and Type 4294-002

### USES

- Precise field calibration of vibration transducers
- Rapid calibration and checking
- Quick, easy field calibration of vibration measurement and recording systems

### FEATURES

- Small, lightweight, and battery-driven
- Leather case for impact protection
- Designed for everyday use in harsh environments
- Acceleration, velocity and displacement calibration
- High-precision, crystal-controlled servo operating at 159.15 Hz ( $1000 \text{ rad s}^{-1}$ )
- Drop- and environment-tested according to IEC 60068
- Splash-proof according to IP 54 (IEC 60529)

### Description

Type 4294 permits accurate adjustment of measuring instrumentation at a standard acceleration level of  $10 \text{ ms}^{-2}$  (0 – 70 g load). The reference signal may additionally be used for velocity and displacement calibration, at  $10 \text{ mms}^{-1}$  and  $10 \mu\text{m}$  respectively.

Type 4294-002 permits accurate adjustment of measuring instrumentation at a standard acceleration level of  $3.16 \text{ ms}^{-2}$  (0 – 200 g load). The reference signal may additionally be used for velocity and displacement calibration, at  $3.16 \text{ mms}^{-1}$  and  $3.16 \mu\text{m}$  respectively.

The calibrator embodies an electromagnetic exciter driven by a crystal oscillator at a frequency of 159.15 Hz ( $1000 \text{ rad s}^{-1}$ ). Servo feedback via a small accelerometer on the underside of the vibration table is used to maintain a constant and accurate vibration level independent of the mass of the transducer under test (70 g for Type 4294 and 200 g for Type 4294-002).




To prevent overload, power for the calibrator is automatically disconnected if a transducer mass above a certain level is mounted on the table (70 g for Type 4294 and 200 g for Type 4294-002).

Use of the calibrator is very straightforward. The transducer is conveniently attached to the calibrator table using a 10–32 UNF Steel Stud (YQ 2963). Alternatively, the 10 g Mounting Disc (DB 2996) supplied, provides a convenient means of attaching transducers manufactured with 3 mm threads or those fitted with Mounting Magnet UA 0642. The mounting disc also permits the attachment of transducers with either beeswax or cyanoacrylate adhesive.

The calibrator is actuated by pressing the small button on the side of its housing. Following system adjustment, the calibrator is switched off by pressing the button a second time. To prolong the useful life of its built-in battery, Type 4294 automatically switches off after approximately 100 seconds.

## Compliance with Standards

	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
<b>Safety</b>	EN/IEC61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 61010B-1: Standard for Safety – Electrical measuring and test equipment
<b>EMC Emission</b>	EN/IEC61000-6-3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC61000-6-4: Generic emission standard for industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
<b>EMC Immunity</b>	EN/IEC61000-6-1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC61000-6-2: Generic standards – Immunity for industrial environments. EN/IEC61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. <b>Note:</b> The above is only guaranteed using accessories listed in this Product Data sheet.
<b>Temperature</b>	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: +10 to +40°C (50 to 104°F) for 10 ms <sup>-2</sup> reference within ± 3% and 3.16 ms <sup>-2</sup> reference within ± 3% -10 to +55°C (14 to 131°F) for 10 ms <sup>-2</sup> reference within ± 5% and 3.16 ms <sup>-2</sup> reference within ± 5% Storage Temperature: -25 to +70°C (-13 to 158°F) IEC 60068-2-14: Change of temperature: -10 to +55°C (2 cycles, 1°C/min)
<b>Humidity</b>	IEC 60068-2-78: Damp Heat: 90% RH (non-condensing at 30°C (86°F))
<b>Mechanical</b>	Non-operating: IEC 60068-2-6: Vibration: 0.3 mm, 20 m/s <sup>2</sup> , 10-500 Hz IEC 60068-2-27: Shock: 1000 m/s <sup>2</sup> IEC 60068-2-29: Bump: 1000 bumps at 400 m/s <sup>2</sup>
<b>Enclosure</b>	IEC 60529: Protection provided by enclosures: IP 54

## Specifications – Calibration Exciters Types 4294 and 4294-002

	4294	4294-002
<b>Dynamic Characteristics</b>		
Frequency (Hz)	159.15 ± 0.02%	
Acceleration (ms <sup>-2</sup> (RMS))	10 ± 3%	3.16 ± 3%
Velocity (mms <sup>-1</sup> (RMS))	10 ± 3%	3.16 ± 3%
Displacement (µm)	10 ± 3%	3.16 ± 3%
Transverse Amplitude	< 5% of main axis amplitude	
Distortion	4294: < 2% for 10 to 70 g 4294-002: < 2% for 10 to 200 g load 4294 & 4294-002: typical < 7% for 0 to 10 g. Use DB 2699 (10 g) with very light accelerometers to achieve 2% distortion	
<b>Power Requirements</b>		
Built-in Battery	One 9V Alkaline Battery QB 0016 (IEC type 6LR61)	
Battery Life	Approx. 200 calibrations, each lasting 100 s with automatic switching off at the end of each calibration	
Warm-up Time (Seconds)	< 5	
Signal Duration (Seconds)	103 ± 1 s with automatic stop	
Long-term Stability	Better than 1% per year for acceleration, velocity and displacement; better than 10 ppm per year for frequency	
<b>Physical Characteristics</b>		
Length	155 mm (6.1 in)	
Diameter	52 mm ( 2.05 in)	
Weight	500 g (17.6 oz) including battery and leather case	
<b>Transducer Mounting</b>		
Maximum Load (g)	70	200
Mounting Torque (Nm)	max. 0.5	
Mounting Thread	10-32 UNF	

## Ordering Information

Types 4294 and 4294-002 include the following accessories:

- Leather Case
- 9V Battery
- 10-32 UNF Steel Stud
- Mounting Disc Adaptor
- Calibration Chart

### OPTIONAL ACCESSORIES

4294-CAI	Accredited Initial Calibration
4294-CAF	Accredited Calibration
4294-EW1	4294 Calibration Exciter Extended Warranty, one year extension

4294-002-CAI	Accredited Initial Calibration
4294-002-CAF	Accredited Calibration
4294-002-EW1	4294 Calibration Exciter Extended Warranty, one year extension

### RE-CALIBRATION

Periodic re-calibration of Type 4294 is recommended in order to maintain the high accuracy of the vibration unit, and in order to have proof of traceability. Depending on the application, a re-calibration every 1 – 3 years is recommended.

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

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