

DRE-01

Dynamic Rotation Exciter



Applications

- ✓ Calibration of gyro transducers (angular rate/acceleration)
- ✓ MEMS development & qualification
- ✓ Accelerated stress testing
- ✓ Device testing and characterization

Selected Data

- ✓ $\pm 15^\circ$ rotation angle max.
- ✓ up to 5 300 °/s velocity (peak)
- ✓ up to 2 500 000 °/s² acceleration (peak)
- ✓ 1 Hz ... 5 kHz frequency range
- ✓ < 3% THD (frequencies > 6 Hz)

Features

- ✓ Compact design for desktop operation
- ✓ Customizable table for DUT mounting
- ✓ Works with any signal generator or vibration controller
- ✓ Internal reference sensors available
- ✓ Very low distortion of movement (electronic zero position controller option)
- ✓ Integrated overload protection and cooling for improved performance



Specification

The DRE-01 Dynamic Rotation Exciter has been developed as a versatile and precise vibration rotation exciter. It can be used for the calibration of transducers as well as for the characterization of devices requiring a vibration rotation input.

A typical application can be the determination of properties of MEMS sensors and sensor components in the development phase. Designed as an electro-dynamic exciter the DRE-01 can be easily combined with many standard laboratory devices

like signal generators or vibration controllers. The devices under test (DUT) can be attached by glue, wax, screws or clamp adapters and also customized DUT adaptors can be provided on request.

Thanks to the special design of the armature and its special bearing, the DUT's can be excited with very low cross-acceleration. Together with the recommended power amplifier PA14-500 the exciter can deliver a vibration rotation with low harmonic distortion.

Technical Data

Torque, max. (sine peak) ¹⁾	0.95 Nm
Frequency range ²⁾	1 Hz...5 kHz
Angle, max. (peak - peak) ³⁾	30 °
Angular velocity, max. (sine peak) ¹⁾	5 300 °/s
Angular acceleration, max. (sine peak) ¹⁾	2 500 000 °/s ²
Mass moment of inertia of bare table	22 kg·mm ²
Mass moment of inertia of payload, max. ⁴⁾	28 kg·mm ²
Transverse acceleration	1 Hz...600 Hz: < 0.1 m/s ² /(°/s) 600 Hz...5 kHz: < 1.0 m/s ² /(°/s)
Total harmonic distortion (angular velocity)	1 Hz...6 Hz: < 10% 6 Hz...5 kHz: < 3%
Stray magnetic field	0.1 mT on mounting table
Dimensions (H x W x L)	195 mm x 140 mm x 140 mm
Mounting table size	Ø 50 mm (customization on request)
Weight	3.6 kg
Connector to power amplifier	9-pin Sub-D
Temperature range for operation	5 °C...40 °C
Temperature range for storage and transportation	-25 °C...55 °C



Technical Data PA14-500 ⁵⁾ (Recommended power amplifier)

Power output, max.	500 VA at 4 Ohm
Voltage output, max.	45 V RMS
Current output, max.	11 A RMS
Power supply	preset to either 100 V or 120 V or 230 V; 50 / 60 Hz
Dimensions (H x W x L)	88 mm x 440 mm x 450 mm
Weight	21 kg

Accessories (optional)

Internal reference standard BN-43 ⁶⁾	
Sensitivity ($\pm 5\%$)	0.25 mV/(°/s)
Frequency range	0 Hz...2 kHz
Angular velocity, max. (sine peak)	8 000 °/s peak
Full scale signal output	± 2 V nominal
Sensor supply voltage	4.9 VDC...14.0 VDC
Sensor supply current	4 mA nominal
Output bias voltage	2.4 V (± 200 mV)

Internal reference standard BN-42 ⁶⁾	
Sensitivity ($\pm 5\%$)	1.33 mV/(°/s)
Frequency range	0 Hz...2 kHz
Angular velocity, max. (sine peak)	1 500 °/s peak
Full scale signal output	± 2 V nominal
Sensor supply voltage	4.9 V _{DC} ...14.0 V _{DC}
Sensor supply current	4 mA nominal
Output bias voltage	2.4 V (± 200 mV)

All specifications are at room temperature unless otherwise specified.

- 1) Intervals of 5 minutes; other operating modes are displayed in the diagrams
- 2) With internal reference standard the frequency range is 1 Hz ... 2 kHz
- 3) Recommended operation range peak-peak; mechanical stops at 52 ° peak-peak
- 4) Examples for the mass moment of inertia for DUT with a square base area of 30 mm x 30 mm
 - weight 187 g --> 28 kg·mm²
 - weight 133 g --> 20 kg·mm²
 - weight 67 g --> 10 kg·mm²

Assumption: the body's center of gravity is located on the rotary axis.

- 5) The DRE-01 can alternatively be operated with a Power amplifier PA14-180 with a reduced performance (see charts below)
- 6) Other options: BN-41 (max. angular velocity: 300 °/s) and BN-42 (max. angular velocity: 1 500 °/s)



Performance

The possible performance charts for angular velocity measurements with different payloads are exemplified in the following graph. The performance charts are based on operation of the DRE-01 with its recommended power amplifier PA14-500 and the optional internal reference standard. Other charts are referring to interval operation or operation with the power amplifier PA14-180. All displayed measurements with the PA14-500 are operated with the internal cooling system.

