

PRODUCT DATA

Magnetic Transducer — MM-0002

The Magnetic Transducer MM-0002 is a variable reluctance device that can be used as a velocity sensitive vibration pickup or as an electromagnetic vibration exciter. The moving part is either the tested structure itself, if it is ferromagnetic, or one of the high permeability discs supplied, which is glued onto the vibrating structure in front of the electromagnet.

Uses

- Contact-free velocity detection or excitation
- Vibration measurement where absolute values are not necessary
- Counting mechanical events, or time between events with electronic counter
- Triggering stroboscopes, oscilloscopes, tracking filters, etc.

Features

- No physical contact with structure under test
- High sensitivity
- Small mechanical dimensions
- Operating temperature up to 250°C (480°F)
- Unaffected by humidity or pressure

Applications

The Magnetic Transducer is used where changes in vibratory motion must be detected without contact or added mass, and absolute amplitude measurements are not necessary. It has a great variety of applications when used with auxiliary electronic equipment such as counters, time lapse devices, flip-flops and relay circuitry etc. The magnetic transducer is also particularly suitable for charting the nodal patterns of vibrating plates or thin-walled shells. It should be noted that the transducer will also be sensitive to motion of non-ferromagnetic conducting materials (parts made of aluminium, copper, etc.) due to the formation of eddy-currents.

Brüel & Kjær signal generator Types 1054 and 1051 are well suited signal sources for the transducer when it is used as a vibration exciter. The regulation circuit of the generators may be used to give constant current drive to the transducer, providing constant exciting force through an extensive frequency range.



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The Magnetic Transducer may be used as a contact-free rotary speed detector in applications with the Stroboscope Types 4912 and 4913. Adaptor JP-0145 (see accessories) is used for connection to these instruments.

Description

The Magnetic Transducer MM-0002 consists of a cylindrical Ticonal permanent magnet on which a Teflon[®] based coil is wound. The winding, with 8000 turns of polyester insulated wire, combines high sensitivity with low internal impedance. Coil and magnet are electrically isolated from the housing, which is made of nickel plated brass. The coaxial output terminal is gold plated to ensure a good contact.

A 1.2 m (4 ft) long low-noise screened cable is supplied with MM-0002. The cable is Teflon insulated with special treatment against triboelectric noise and can withstand temperatures up to 260 °C (500 °F).

Fig. 1 Typical sensitivity versus mean distance curve

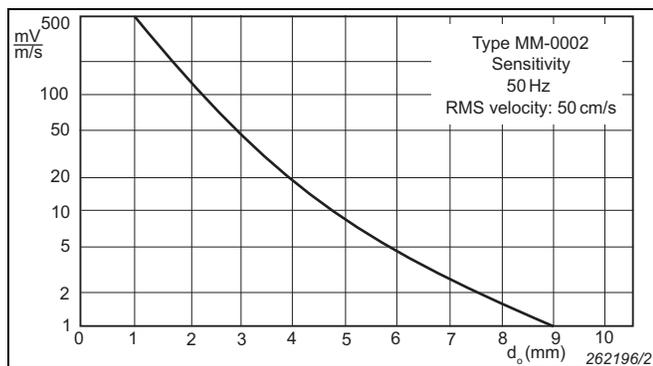


Fig. 2 Variation of static attraction as a function of distance

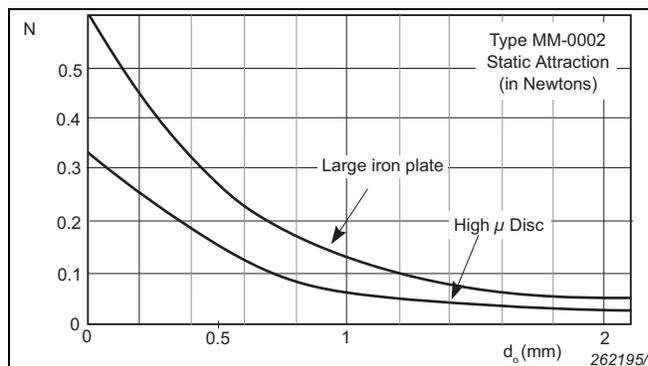
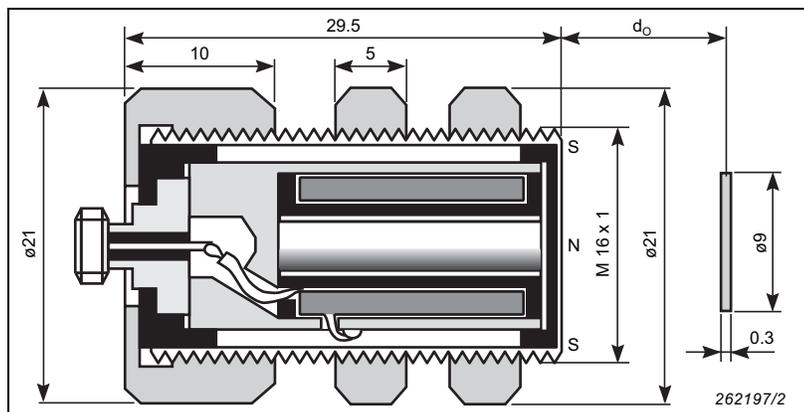


Fig. 3 Cross-section view of the Magnetic Transducer and one high-permeability disk with indication of the main dimensions in mm



Specifications – Magnetic Transducer MM-0002

SENSITIVITY

150 mV per m/s with 2 mm mean distance between electromagnet housing and high- μ disc (see Fig. 1).
The sensitivity in front of a large iron plate is about 2.5 times (8 dB) higher

FREQUENCY RESPONSE

Velocity sensitivity is essentially independent of the frequency (varies less than $\pm 10\%$ up to 2000 Hz)

INTERNAL IMPEDANCE

1800 Ω in series with 400 mH
The resistance may be higher, (especially at high frequencies when operating in front of

massive iron parts) because of eddy-current losses

MAXIMUM INPUT VOLTAGE

100 V at normal ambient temperature
20 V at maximum ambient temperature 250 °C (480 °F)

MAXIMUM CONTINUOUS CURRENT

50 mA at normal ambient temperature
10 mA at maximum ambient temperature 250 °C (480 °F)

STATIC MAGNETIC ATTRACTION

See Fig. 2

DISTORTION

Not more than 5% if the relative peak-to-peak

amplitude ($\Delta d/d_o$) is smaller than 5%.
Distortion is mostly second harmonic (the moving-iron transducer is non-linear because of the square-law relationship between force and distance)

TEMPERATURE RANGE

From approx. -150 °C (-240 °F) up to +250 °C (+480 °F). Ambient pressure and humidity have practically no influence on the transducer's open-circuit sensitivity

DIMENSIONS

See Fig. 3

WEIGHT (WITHOUT CABLE)

52 g (1.8 oz.)

Ordering Information

MM-0002	Magnetic Transducer	JP-0028	14 mm B&K (Male) to 10-32UNF Microdot (Female) Adaptor	JP-0145	BNC (Male) to 10-32 UNF (Female) Adaptor
AO-0038	High-temperature cable			YO-0010	High- μ discs x 10

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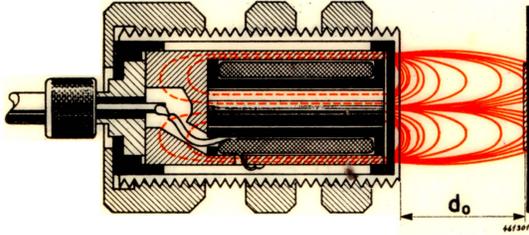
HEADQUARTERS: Brüel & Kjær Sound & Vibration Measurement A/S · DK-2850 Nærum · Denmark
Telephone: +45 4580 0500 · Fax: +45 4580 1405 · www.bksv.com · info@bksv.com

Local representatives and service organisations worldwide



SPECIFICATIONS INCLUDED WITH THE UNIT

Magnetic Transducer Type MM 0002.



Brüel & Kjær
Copenhagen



Principle and Operation. Type MM 0002 is an electromechanical transducer of the variable reluctance type, which can be used as velocity-sensitive vibration pick-up, or as electromagnetic vibration exciter. Type MM 0002 should be fastened carefully in front of the vibrating structure, at less than a few millimeters distance. If the vibrating structure is non-magnetic, one of the High- μ Discs supplied should be cemented on to the structure in front of the axis of the Transducer (see drawing) by means of ordinary good quality glue. The dimensions of the supplied discs may be reduced, if necessary. As pick-up, Type MM 0002 is in normal cases only used for relative measurements.

Open Circuit Sensitivity: About $1.5 \text{ mV/cm sec}^{-1}$ when the transducer is placed at a static distance $d_0 = 2 \text{ mm}$ from the High- μ disc. The sensitivity decreases very rapidly as a function of d_0 . The sensitivity in front of a large iron plate is around 8 db higher (2.5 times higher) than in front of the High- μ disc. The sensitivity remains fairly constant throughout the audio-frequency range (varies less than $\pm 1 \text{ db}$ up to 2000 c/s).

Impedance (with open magnetic circuit): 1800Ω in series with 400 mH.

Distortion: Less than 5 % if the relative peak-to-peak amplitude ($\Delta d/d_0$) is less than around 5 %.

Maximum Input Voltage (exciter): Around 100 V (max. continuous power dissipation is 5 W at 20°C).

Static Magnetic Attraction. The static force acting on the disc decreases rapidly when the distance d_0 increases. For $d_0 = 0.5, 1, 1.5 \text{ mm}$ the force is equal to 15, 6.6 and 3.3 gr. respectively. The attraction on a large iron plate is about twice as high.

Construction:

Permanent Magnet Core: Ticonal.
Coil and magnet are isolated from the housing.
Diameter of the main housing: 16 mm (thread: $M 16 \times 1$).

Temperature Range: From very low temperatures to $+250^\circ\text{C}$.

High- μ Discs YO 0010: Radiometal $\phi = 9 \text{ mm}$.
Weight: 0.17 gr.