

# MBB-02 SERIES

## MINIATURE FORCE SENSORS

### FEATURES

- Nominal capacity: 0.01 N, 0.05 N, 0.1 N, 0.5 N, 1 N and 5 N
- Semiconductor strain gauges
- Built-in high-capacity overload protection
- Minute displacement
- High natural frequency
- High-strength aluminum alloy measuring spring
- Compact dimensions
- Force applicable in two positions
- Humidity compensated version available (Optional)



Fig. 1: MBB-02 Series | Miniature Force Sensor (caliper not included)

### DESCRIPTION

The MBB-02 Miniature Force Sensor is designed for micro-measurement. It is used by many high end watch manufacturers for measuring the friction in the movement of mechanical watches and is also used in various medical applications.

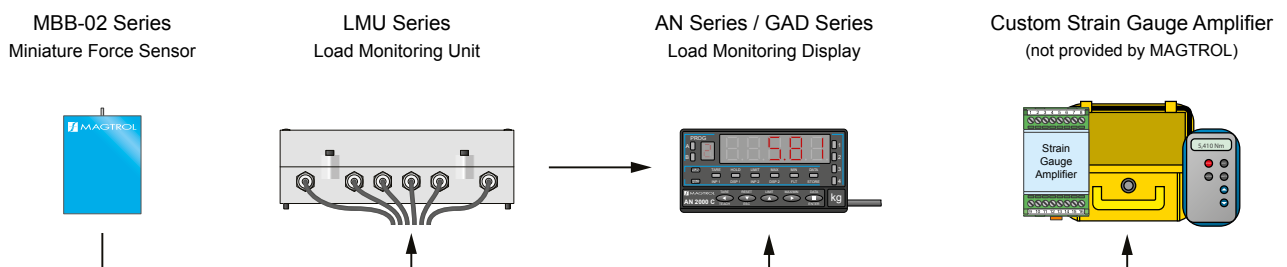
The MBB-02 is entirely made of aluminum to combine lightness and stability of measurement. It has a nominal capacity range 0.01N...5N and uses semi-conductor strain gauges. Having a larger gauge factor than foil types, semiconductor strain gauges allow the measurement of very small strain. The sensor integrates a built-in overload protection offering up to 25 times security. Dedicated to laboratory applications, it is suitable for a temperature range of +15°C...+25°C. It can be easily connected to a PC or display unit through an

external Wheatstone bridge amplifier. A version for Air Humidity compensation in ranges 30 % ... 60 % HR is also available. Applied force radially acts on the sensor pin which can be independently positioned in 2 different locations, thus offering more operating flexibility. Special versions with various cable lengths and connector outputs are also available.

### APPLICATIONS

The compact dimensions of the MBB-02 allows adaptation to a wide range of small and precise applications (watchmaking for example) as well as long term dynamic measurements.

### SYSTEM CONFIGURATION



**SPECIFICATIONS**

MODEL	MBB-02-0.01	MBB-02-0.05	MBB-02-0.1	MBB-02-0.5	MBB-02-1	MBB-02-5
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**MECHANICAL CHARACTERISTICS**

Nominal Load	±0.01N	±0.05N	±0.1N	±0.5N	±1N	±5N
Overload Limit	0.25 N	0.25N	0.3N	2N	2N	15N
Overload at Rupture		> 1.5N		> 150N		>300N
Displacement at Nominal Force	<0.02 mm	<0.04 mm	<0.08 mm	<0.02 mm	<0.04 mm	<0.02 mm

**ELECTRICAL CHARACTERISTICS**

Nominal Sensitivity <sup>a)</sup>	4 mV/V	20 mV/V	40 mV/V	20 mV/V	40 mV/V	
Input Impedance	750 Ω nominal					
Output Impedance	750 Ω nominal					
Insulation Resistance	> 10 <sup>9</sup> Ω					
Supply Voltage	5V DC max.					
Natural Frequency		≈ 170 Hz		≈ 700 Hz		≈ 3000 Hz
Combined Error (nonlinearity + hysteresis)		< ±0.3%				< ±0.2%

**ENVIRONMENTAL CHARACTERISTICS**

Long-term Stability and Error Caused by Changes in Air Humidity <sup>b)</sup>	max. ±2% proportional to nominal sensitivity in relative humidity ranges 30%...60% for a maximum of 72 hours					
Operating Temperature	+15° C...+25° C					
Temperature Influence: On Zero	< ±0.06% /K			< ±0.03% /K		
Temperature Influence: On Sensitivity	< +0.02% /K					
Protection Class	IP42					

**ELECTRICAL CONNECTIONS**

Connection cable	Shielded cable, length 1 m
Output connector (optional)	Axial connector, Lumberg SV 40 <sup>c)</sup>
Wiring diagram <sup>d)</sup>	

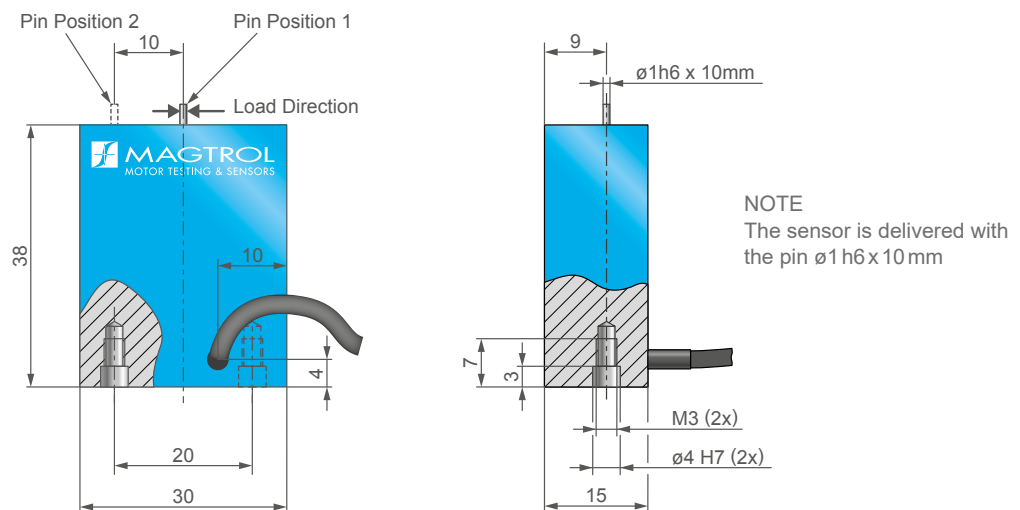
a) Suitable strain gauge amplifier options: LMU Series (special version) Load Monitoring Unit

b) MBB-02 version A transducers only

c) Other connectors available on request

d) The shield is not connected on the sensor side

**DIMENSIONS**



SYSTEMS OPTIONS & ACCESSORIES

LMU SERIES - LOAD MONITORING UNIT



Fig. 2: LMU 217 | Load Monitoring Unit

The Magtrol Load Monitoring Unit is specially designed for strain gauge transducer applications. Specifically developed for use with Magtrol load measuring pins and load-force-weight sensors, the LMU Series provides excitation current and amplifies the output signal of full-bridge strain gauges. Configurable relays and analog outputs are also available.

Its IP65 aluminum housing allows the system to be used in harsh environments.

Further information on accessories are available in their specific data sheets. Please, visit our website: [www.magtrol.com](http://www.magtrol.com)

AN SERIES - LOAD MONITOR & DISPLAY WITH INTEGRATED SIGNAL CONDITIONER



Fig. 3: AN Series | Load Monitor & Display with integrated signal conditioner

The AN Series Load Monitors, Signal Conditioners & Display are designed to process and display signals coming from various types of transducers (weight, load, pressure, torque, etc.) that use standard strain-gauge bridges.

The basic instrument is a soldered assembly composed of a main board, a tri-color programmable display and a power circuit. Standard features include the reading of the input variable as well as remote hold, reading and memorization of max and min values (peak / valley), tare and reset function.

ORDERING INFORMATION

ORDERING NUMBER	MBB - 02 -	----	N -	-
0.01, 0.05, ..., 5 : Nominal force (N)				
blank : No humidity compensation (standard)				
A : Humidity compensation				

Example: MBB-02 Miniature Force Transducer, with nominal load 0.5 N and humidity compensation would be ordered as follows:  
**MBB-02-0.5N-A**