



# DynaLabs DYN-I-9000 Triaxial MEMS Gyroscopes Instruction Manual

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# DynaLabs

**DynaLabs DYN-I-9000 Triaxial MEMS Gyroscopes**



## Product Support

If at any time you have questions or problems with the DYN-I-9000 sensors, please contact a Dynalabs engineer at:

- **Phone:** +90 312 266 33 34 (9 a.m. to 5 p.m., UTC +3)
- **E-mail:** [info@dynalabs.com.tr](mailto:info@dynalabs.com.tr)

## Warranty

Our products are warranted against defective materials and workmanship for one year. Defects arising from user errors are not covered by the warranty.

## Copyright

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## Introduction

Dynalabs Inertial Measurement Units are based on triaxial accelerometers and triaxial gyroscopes that are integrated in a single housing. The inertial measurement unit (IMU) is based on proven microelectromechanical systems (MEMS) accelerometers and gyroscopes for detecting the smallest linear accelerations and angular

rates. Dynalabs IMUs enable separate analog voltage outputs for all 6 degrees of freedom (DOF). IMUs enable power supply voltage from 6 to 20 VDC. Dynalabs IMUs feature a lightweight, reliable aluminum housing with protection class IP68 and have cable with configurable length and connectors.

**DYN-I-9000 sensors offer the following options;**

- Custom Cable Length
- Custom Housing Material
- Custom Connector
- Base plate

**General Information**

**Unpacking and Inspection**

Dynalabs products provide adequate protection for undamaged products to be transported. Document the damages that occur indirectly during the transport and contact the customer representative.

**System Components**

The DYN-I-9000 has the following components:

- MEMS Sensor
- Calibration Certificate
- Product Manual

**Specifications**

Table 1 Gyroscopes Specifications Datasheet

Full scale angular velocity	(°/s)	±75	±150	±300	±900
Frequency range	(Hz)	0-150	0-150	0-150	0-150
Non-linearity (full scale)	(%)	0.06	0.06	0.06	0.06
Noise (in band)	(°/s $\sqrt{\text{Hz}}$ )	0.0075	0.0075	0.0075	0.0075
Scale factor (nominal)	(V/°/s)	0.012	0.006	0.003	0.001
Scale factor var. over. temp.	(%)	0.5	0.5	0.5	0.5
Bias variation with temp.	(°/s)	± 1	± 2	± 3	± 4

Table 2: Accelerometers Specifications Datasheet

<b>Full scale acceleration</b>	(g)	±2	±4	±8	±10	±20	±40	±50	±100	±200	±500
Frequency range (±3dB)	(Hz)	1,500	1,500	1,500	1,500	1,500	1,500	3,000	3,000	3,000	3,000
Non-linearity (full scale)	(%)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Noise (in band)	(µg/√Hz)	20	25	25	75	80	85	70	50	100	260
Scale factor (nominal)	(mV/g)	400	200	100	80	40	20	40	20	10	4

## Environmental

Table 3: Environmental Specifications datasheet

Protection Level	IP 68
Operating Voltage	6 V – 20 V
Operating Temperature	-40 °C to +100 °C
Operating Current Consumption mA	<50 mA
Isolation	Case isolated

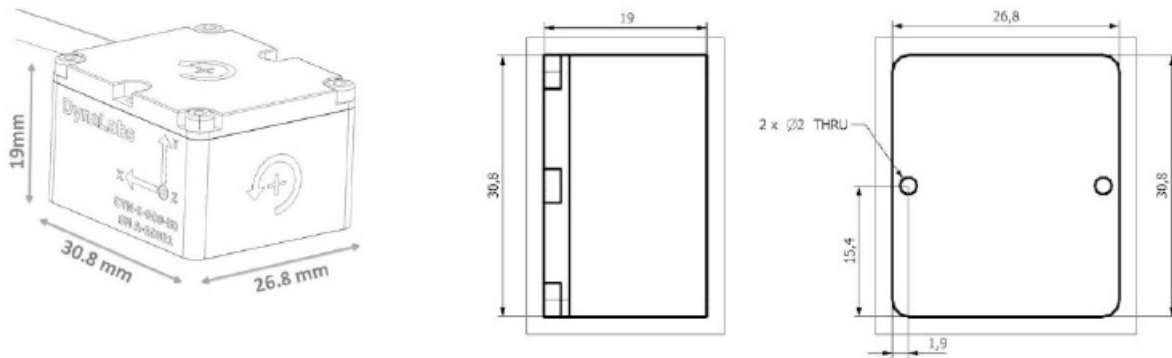
## Physical

Table 4: Physical Specifications datasheet

Sensing Element	MEMS Capacitive – Vibrating ring
Housing Material	Aluminum or Steel
Connector (Optional)	D-Sub 9 or 15 pin, Lemo, Binder
Mounting	Adhesive or screw mount
Base plate (Optional)	Aluminum or Steel
Weight (without cable)	27.5g (aluminum)69.5 g (steel)

## Outline Drawing

The dimensional properties of DYN-I-9000 sensors are given below



## Operation and Installation

### General

The general sensor connector configuration is given below;

### Cable Code/Pin Configuration

- Red: V + Power supply voltage +6 to +20 VDC
- Black: Ground Power GND
- X-Axis: Yellow: Signal(+) Positive, analog output voltage signal for differential mode.
- Purple: Signal(-) Negative, analog output voltage signal for differential mode.
- Y-Axis : Blue: Signal(+) Positive, analog output voltage signal for differential mode.
- Green: Signal(-) Negative, analog output voltage signal for differential mode.
- Z -Axis: White: Signal(+) Positive, analog output voltage signal for differential mode.
- Orange: Signal(-) Negative, analog output voltage signal for differential mode

### Cable Code/Pin Configuration:

- Red: V + Power supply voltage +5 V to +20 VDC.
- Black: Ground Power GND
- RX: Brown: Gyro Signal X-Axis: Analog output voltage signal for single-ended mode.
- RY : Grey: Gyro Signal Y-Axis: Analog output voltage signal for single-ended mode.
- RZ: Pink: Gyro Signal Z-Axis: Analog output voltage signal for single-ended mode.
- White- Brown: NC Not connected.

### WARNING

- Never connect the power supply and/or the power ground to yellow, purple, blue, green, white, orange, brown, grey, and/or pink cables.
- Never connect the power supply to the power ground. Always use a clean power source and check the voltage range.

## Sensor Static Calibration Verification

- Using gravity for the accelerometer of the 9000 series IMU, voltage values are measured in the + and – gravity directions, providing a value of  $\pm 1$  g. The measurement should be made as follows;
- When the acceleration value of 9000 series IMU's accelerometers is entered into the data acquisition system, the sensor shows +1 g with the effect of gravity, which is in the direction of the axis to be calibrated.



- When the sensor is positioned in the opposite direction to the axis to be calibrated, the arrow shows -1g as shown below under the effect of gravity.
- Using gravity, the voltage values that provide 1 g in the + and – directions are measured and compared with the catalog value. The calibration value should be close to the catalog value with 10% tolerance. Sensor catalog sensitivity values are given in Table 2.

## Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer. The product(s) are developed, produced and tested according to following EC- directives:


- 2014/35/EU – Low Voltage Directive (LVD)
- 2006/42/EU – Machinery Safety Directive
- 2015/863/EU – RoHS Directive

## Applied standards:

- EN 61010-1:2010
- EN ISO 12100:2010
- MIL-STD-810-H-2019 (Test Methods: 501.7 – High Temperature, 502.7 – Low Temperature, 514.8 – Vibration, 516.8 – Shock)

DYNALABS MÜHENDİSLİK SANAYİ TİCARET LİMİTED ŞİRKETİ declares that above mentioned products meet all the requirements of the above mentioned standards and regulations.

Documents / Resources

 <small>Product DYN-I-9000</small> <small>DYN-I-9000 Triaxial MEMS Gyroscopes, DYN-I-9000, DYN-I-9000 Gyroscopes, Triaxial MEMS Gyroscopes, MEMS Gyroscopes, Triaxial MEMS, Triaxial Gyroscope, Gyroscope</small> <small>Product DYN-I-9000</small>	<a href="#">DynaLabs DYN-I-9000 Triaxial MEMS Gyroscopes</a> [pdf] Instruction Manual DYN-I-9000 Triaxial MEMS Gyroscopes, DYN-I-9000, DYN-I-9000 Gyroscopes, Triaxial MEMS Gyroscopes, MEMS Gyroscopes, Triaxial MEMS, Triaxial Gyroscope, Gyroscope
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