

# FT-S1000

## Microforce Sensing Probe



### Overview

The FemtoTools FT-S Microforce Sensing Probes are microforce sensors capable of measuring forces from millinewtons ( $10^{-3}$  N) down to several nanonewtons ( $10^{-9}$  N) along the sensors' probe axis. Both compression and tension forces can be measured. The FT-S Microforce Sensing Probes are designed for the integration into one of the FemtoTools Micromechanical Testing Systems, such as the FT-FS1000 Mechanical Probe. The individual calibration in combination with an outstanding long-term stability guarantees significantly higher measurement accuracy than any other force sensing system in this force range. A calibration data sheet is delivered for each individual sensor.

### Application Areas

- Micromechanical testing
  - Compression testing
  - Tensile testing
  - Flexure testing (bending)
  - Shear testing
- MEMS testing
- Quality control
- AFM cantilever calibration
- Micromechanical testing inside a SEM

### Performance Characteristics (typical values)

Sensor force range [ $\mu$ N, mg]	$\pm 1000, 100$
Sensor gain* <sup>1</sup> [ $\mu$ N/V, mg/V]	500, 50
Output signal [V]	0-5
Output voltage at zero load [V]	2.25
Power supply voltage [V]	5
Resolution at 1000Hz* <sup>2</sup> [ $\mu$ N, mg]	0.5, 0.05
Resolution at 10Hz * <sup>2</sup> [ $\mu$ N, mg]	0.05, 0.005

\*<sup>1</sup>) Typical value only! For the exact value of the individual sensor refer to the sensor calibration sheet

\*<sup>2</sup>) Standard deviation of the noise level measured with the FT-SC01

- Sensors are individually calibrated which results in unmatched accuracy
- Repeatable outputs during its entire lifetime (no performance degradation/change in its calibrated sensitivity over more than 150 000 load cycles)
- Optimized technology for microforce sensing (parallel sensor motion/no tip slippage)
- Sensor probe can be set to a separate electric potential
- 300% full-scale overload protection
- Air, liquid (sensor probe) and vacuum compatible (application inside a SEM)

### Recommended Measurement System

- FT-FS1000 Mechanical Probe
- FT-RS1000 Microrobotic System
- FT-FS100-OEM Micromechanical Tester
- FT-FS5000 Compression Tester
- FT-RS5000 Microrobotic Station
- FT-FS8000 Biomechanical Lab

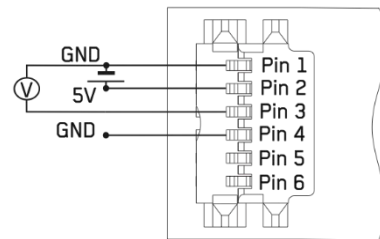
## Electrical Interface

For interfacing the FT-S Microforce Sensing Probes a FemtoTools measurement system or controller is highly recommended. However, OEM applications may require the integration into an existing system. The FT-S Microforce Sensing Probes can be operated by connecting them to a 5V DC power supply (Pin 1 and Pin 2) and measuring the output voltage signal, differentially between Pin3 and Pin1.

The measured force is calculated by the equation  $F = \text{Sensor Gain} * (V_{\text{out}} - V_{\text{out},0})$ , where F is the force axially applied to the sensor probe,  $V_{\text{out},0}$  is the output voltage at zero load and  $V_{\text{out}}$  is the output voltage as the load is applied. A tensile force will result in an increase of the output voltage whereas a compression force will result in a decrease of the output voltage

## Connector Pinout

- Pin1: Sensor supply voltage low (GND)
- Pin2: Sensor supply voltage high (5V)
- Pin3: Sensor output voltage ( $V_{\text{out}}$ )
- Pin4: Sensor Probe Potential (GND)
- Pin5: NC
- Pin6: NC

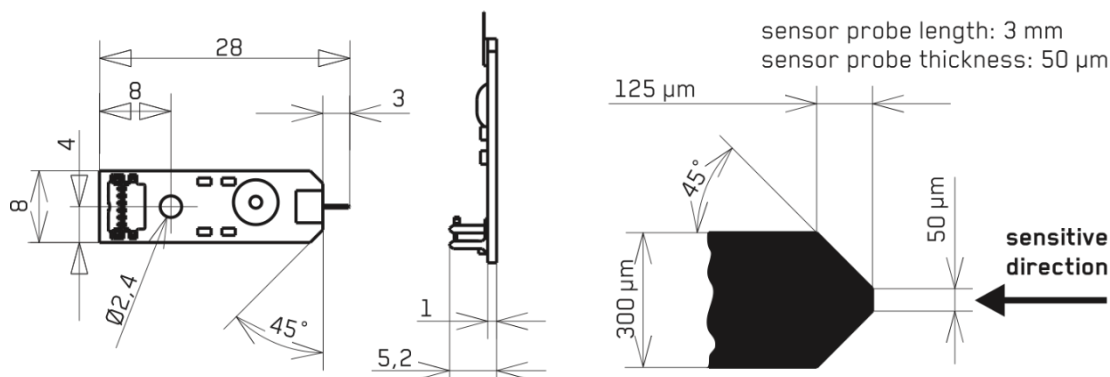


Connector type:

6-pin Erni microstack connector 114711, pitch 0.8mm, hermaphroditic connector mates with itself

## Dimensions

Dimensions in mm unless otherwise specified



## Important Safety Guidelines

Splinter Hazard: If silicon MEMS devices shatter, a large number of small splinters may be generated. Therefore, wear protection goggles when working with force sensors/grippers. Use the equipment at your own risk. If you have questions related to safety, please contact FemtoTools or our distributors for more information.

## Environmental Management and WEEE Recycling Program

FemtoTools is committed to designing and manufacturing products in an environmentally responsible manner. FemtoTools recognizes that eliminating certain hazardous substances from our products is beneficial not only for the environment but also to FemtoTools customers. Please return all FemtoTools products which are at the end of their life cycle, defective or unused back to FemtoTools for recycling. The Waste Electric and Electronic Equipment (WEEE) will be fed to our Recycling Program.