Honeywell

# Basic Force Sensors

TBF Series, Compensated/Unamplified
1 bar to 10 bar | 100 kPa to 1 MPa | 15 psi to 150 psi
Millivolt Analog Output

**32315675**
Issue A

**Datasheet**

## DESCRIPTION

Honeywell's TBF Series Force Sensors are small flush diaphragm pressure sensors designed for customers who require a simple device for applications where media compatibility and low trapped volume are important. The TBF Series has a precisely controlled diaphragm height, making these products useful in applications where force is applied by a flexible membrane to the sensor, such as infusion pumps. The sensor is internally unamplified, providing infinite resolution and allowing customers to do their own amplification in order to make use of the maximum resolution of the bare sensor output, leveraging any algorithm needed for the application. The sensor is internally temperature compensated and calibrated.

## VALUE TO CUSTOMERS

- Smallest package size in its class (7 mm x 7 mm x 3,89 mm) simplifies placement on crowded PCBs
- Widest pressure (1 bar to 10 bar |100 kPa to 1 MPa | 15 psi to 150 psi) enables choice of optimum pressure range to maximize sensitivity
- Many different pressure ranges improve resolution and system accuracy
- Tight accuracy specification of ±0.15 %FSS provides user with enhanced accuracy in the application
- Reliable supply chain
- Fast response for quotes and samples
- Designed to Six Sigma standards
- Manufacturing excellence
- Supports Lean manufacturing

## FEATURES

- Cost-effective sensor with many options
- Compensated/unamplified
- Wide operating temperature range (0 °C to 50 °C [32 °F to 122 °F])
- Low power consumption allows for potential use in battery operated applications
- Stable offset voltage
- Not sensitive to mounting orientation
- Small package size [7 mm x 7 mm x 3,89 mm]
- RoHS2 compliance

## POTENTIAL APPLICATIONS

### Medical

- Drug delivery systems
- Infusion pumps
- Kidney dialysis machines
- Robotics
- Syringe pumps
- Wearables

## PORTFOLIO

The TBF Series joins the 1865 Series, FSG Series, FSS Series, FSS-SMT Series and FSA Series.

**Table 1. Absolute Maximum Ratings[1]**

| Characteristic | Min. | Max. | Unit |
|---|---|---|---|
| Supply voltage (Vsupply)[2] | -12.0 | 12.0 | Vdc |
| Storage temperature | -40 [-40] | 125 [257] | °C [°F] |
| Soldering time peak reflow temperature | 10 s max. at 240 °C [464 °F] | | |

[1]Absolute maximum ratings are the extreme limits the device will withstand without damage.

[2]Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

**Table 2. Operating Specifications**

| Characteristic | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Supply voltage (Vsupply)[1, 2] | 1.5 | 5.0 | 12.0 | Vdc |
| Supply current (at 5.0 Vdc supply) | - | 0.6 | 1 | mA |
| Operating temperature range[3] | 0 [32] | — | 50 [122] | °C [°F] |
| Compensated temperature range[4] | 0 [32] | — | 50 [122] | °C [°F] |
| Output resistance | — | 2.5 | - | kOhm |

[1]Ratiometricity of the sensor (the ability of the device output to scale to the supply voltage) is achieved within the specified operating voltage.

[2]Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

[3]Operating temperature range: The temperature range over which the sensor will produce an output proportional to force.

[4]Compensated temperature range: The temperature range over which the sensor will produce an output proportional to force within the specified performance limits.

**Table 3. Environmental Specifications**

| Characteristic | Parameter |
|---|---|
| Humidity | 0 %RH to 95 %RH, non-condensing |
| Vibration | 15 g, 10 Hz to 2 kHz |
| Shock | 100 g, 6 ms duration |
| Life[1] | 1 million pressure cycles min. |
| Solder reflow | J-STD-020-D, MSL 1 (unlimited shelf life when stored at less than 30 °C and 85 %RH) |

[1]Life may vary depending on specific application in which sensor is utilized.

## CAUTION

### PRODUCT SENSING SURFACE DAMAGE

- The sensing surface of the sensor is composed of a tough silicone gel. Ensure that the sensing surface is not used with media incompatible with silicones.
- Ensure that the sensing surface does not come into contact with sharp or hard objects.

**Failure to comply with these instructions may result in product damage.**

## NOTICE

In order for the TBF Series sensors to provide a linear and repeatable output, ensure the entire top surface of the gel is exposed to a uniform pressure. The silicone gel allows direct contact with many liquids or the gel may be protected with a thin, compliant membrane.