Honeywell

Installation Instructions for the
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

32311567
Issue A

Table 1. 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 2. 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 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.

Table 4. Sensor Pressure Type

Pressure Type	Description
Gage	Output is proportional to the difference between applied pressure and atmheric (ambient) pressure. Reference pressure is atmospheric pressure.

Table 5. Material Composition

Component	Description
Cover	high temperature polyamide
Substrate	not exposed - protected by silicone gel
Sensing surface	silicone gel

Table 6. Pressure Range Specifications for 1 bar to 10 bar

Pressure Range Order Code	Pressure Range		Unit	Overpressure	Pressure Accuracy[1] (%FSS)	Offset[2] (mV/V)	Full Scale Span[3] (mV/V)			Thermal Effect on Offset[4] (%FSS)	Thermal Effect on Span[5] (%FSS)
	Pmin.	Pmax.					Min.	Nom.	Max.	0 °C to 50 °C	0 °C to 50 °C
Gage											
001BG	0	1	bar	4	±0.5	±0.3	4.90	5.10	5.30	±1.0	±1.0
1.6BG	0	1.6	bar	4	±0.5	±0.3	7.84	8.15	8.48	±1.0	±1.0
2.5BG	0	2.5	bar	8	±0.5	±0.15	6.10	6.35	6.59	±1.0	±0.75
004BG	0	4	bar	10	±0.5	±0.075	5.57	5.80	6.04	±1.0	±0.75
006BG	0	6	bar	17	±0.5	±0.075	5.08	5.30	5.54	±0.75	±0.75
010BG	0	10	bar	17	±0.5	±0.075	8.47	8.85	9.22	±0.50	±0.75

[1]Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C [77 °F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.

[2]Offset: The output signal obtained when the reference pressure is applied to all available pressure ports. Also known as “null” or “zero”.

[3]Full Scale Span: The algebraic difference between the output signal measured at the maximum and minimum limits of the pressure range.

[4]Thermal effect on offset: The deviation in offset due to changes in temperature over the compensated temperature range, relative to offset measured at 25 °C.

[5]Thermal effect on span: The deviation in full scale span due to changes in temperature over the compensated temperature range, relative to full scale span measured at 25 °C.

Table 7. Pressure Range Specifications for 100 kPa to 1 MPa

Pressure Range Order Code	Pressure Range		Unit	Overpressure	Pressure Accuracy[1] (%FSS)	Offset[2] (mV/V)	Full Scale Span[3] (mV/V)			Thermal Effect on Offset[4] (%FSS)	Thermal Effect on Span[5] (%FSS)
	Pmin.	Pmax.					Min.	Nom.	Max.	0 °C to 50 °C	0 °C to 50 °C
Gage											
100KG	0	100	kPa	400	±0.5	±0.3	4.90	5.10	5.30	±1.0	±1.0
160KG	0	160	kPa	400	±0.5	±0.3	7.84	8.15	8.48	±1.0	±1.0
250KG	0	250	kPa	800	±0.5	±0.15	6.10	6.35	6.59	±1.0	±0.75
400KG	0	400	kPa	1000	±0.5	±0.075	5.57	5.80	6.04	±1.0	±0.75
600KG	0	600	kPa	1700	±0.5	±0.075	5.08	5.30	5.54	±0.75	±0.75
001GG	0	1	MPa	1.70	±0.5	±0.075	8.47	8.85	9.22	±0.50	±0.75

[1]Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C [77 °F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.

[2]Offset: The output signal obtained when the reference pressure is applied to all available pressure ports. Also known as “null” or “zero”.

[3]Full Scale Span: The algebraic difference between the output signal measured at the maximum and minimum limits of the pressure range.

[4]Thermal effect on offset: The deviation in offset due to changes in temperature over the compensated temperature range, relative to offset measured at 25 °C.

[5]Thermal effect on span: The deviation in full scale span due to changes in temperature over the compensated temperature range, relative to full scale span measured at 25 °C.

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Table 8. Pressure Range Specifications for 15 psi to 150 psi

Pressure Range Order Code	Pressure Range		Unit	Overpressure	Pressure Accuracy[1] (%FSS)	Offset[2] (mV/V)	Full Scale Span[3] (mV/V)			Thermal Effect on Offset[4] (%FSS)	Thermal Effect on Span[5] (%FSS)
	Pmin.	Pmax.					Min.	Nom.	Max.	0 ºC to 50 ºC	0 ºC to 50 ºC
Gage											
015PG	0	15	psi	60	±0.5	±0.3	5.06	5.25	5.49	±1.0	±1.0
030PG	0	30	psi	115	±0.5	±0.15	5.05	5.25	5.45	±1.0	±0.75
060PG	0	60	psi	145	±0.5	±0.075	5.76	6.00	6.24	±1.0	±0.75
100PG	0	100	psi	245	±0.5	±0.075	5.83	6.10	6.36	±0.75	±0.75
150PG	0	150	psi	245	±0.5	±0.075	8.65	9.15	9.55	±0.50	±0.75

[1]Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C [77 °F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.

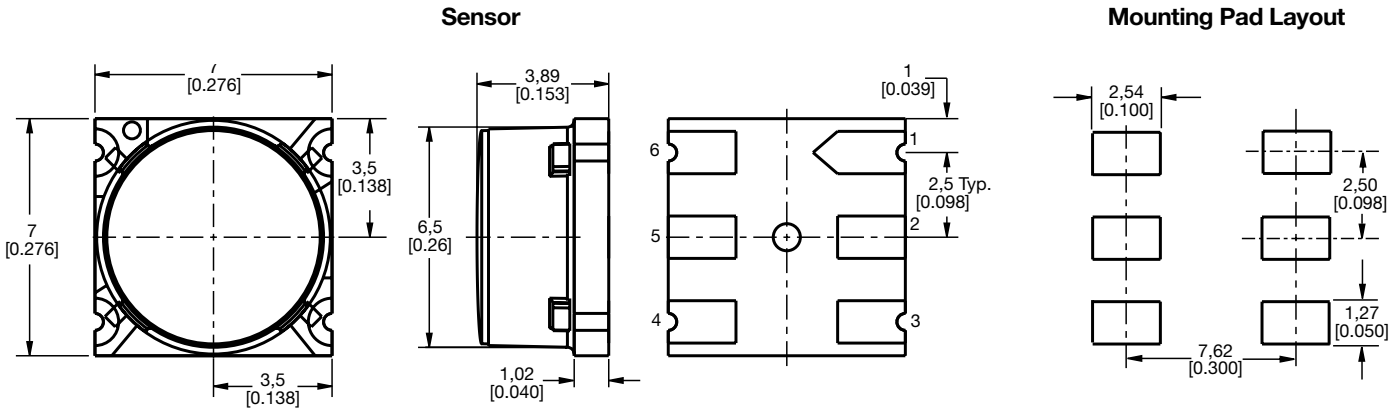
[2]Offset: The output signal obtained when the reference pressure is applied to all available pressure ports. Also known as “null” or “zero”.

[3]Full Scale Span: The algebraic difference between the output signal measured at the maximum and minimum limits of the pressure range.

[4]Thermal effect on offset: The deviation in offset due to changes in temperature over the compensated temperature range, relative to offset measured at 25 ºC.

[5]Thermal effect on span: The deviation in full scale span due to changes in temperature over the compensated temperature range, relative to full scale span measured at 25 ºC.

Figure 1. Leadless SMT Package Dimensional Drawings (For reference only: mm [in].)



Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
analog	Vs	NC	Vo-	GND	NC	Vo+

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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