



Features

- Compact Design
- Easy Mounting in Blind Hole or with Optional Screw-On Enclosure
- 0-15 V Supply Voltage Range
- Differential Analog Output
- Available in Several Force Ranges

Application Examples

- Watchmaking Equipment
- Medical Devices
- Measuring and Testing Equipment
- Robotics



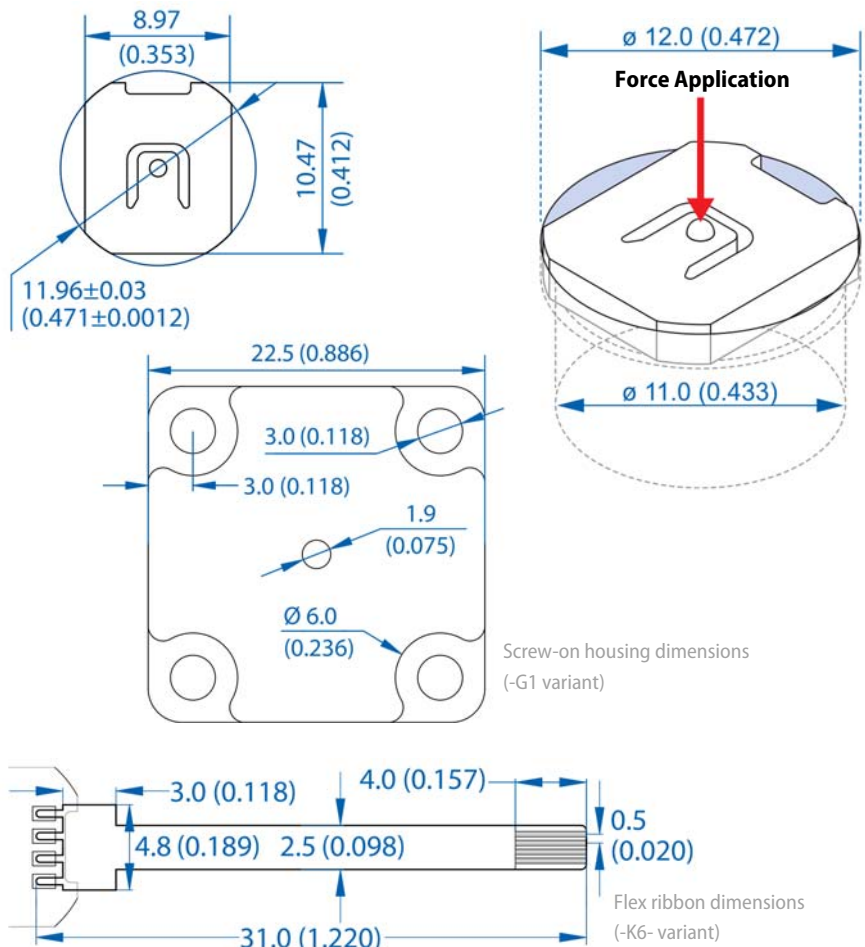
Senstech KZ-011-0400

Centered Force Sensor

With this compact force sensor, the force is applied to a round-head rivet in the center. The sensor can be mounted very easily in a blind hole with a diameter of 12 mm (0.472 in) and a clearance. Flexible contacting and housing options make this sensor suitable for a wide variety of applications.

Dimensions and Mounting Options

All dimensions in millimeters
(in parentheses: inches)



General Specifications

Measuring principle	Thin film strain gauges
Measuring parameter	Force [N] or displacement [μm]
Electrical contacting	Solder points, stranded wires, or flex ribbon
Mounting	Fits into a blind hole of $D = 12 \text{ mm}$, with a clearance of $11 \text{ mm} > d > 6 \text{ mm}$ below sensor to allow for measuring path and protect against overload
Application of force	On round carbide rivet head, positioned in center of blind hole
Direction of force	Perpendicular on thin-film coated side or back side (see ordering information for details)
Shielding	Sensor substrate is connected to supply ground

Environmental Specifications

	Min	Typ	Max	Units	Notes/Conditions
Temperature range					
- Operation	-20		125	°C	
- Storage	-40		125	°C	
Ambient humidity	0		95	%RH	Non-condensing; only guaranteed with continuous power supply at 10 V or more
Ingress protection		IP44			Only valid for variant with housing (-G1)

Operating Specifications

	Min	Typ	Max	Units	Notes/Conditions
Supply voltage	0		15	V	
Supply current	1.5		2.5	mA	at 10 V
Output signal span		0..3.0		mV/V	The output voltage is given by $V_{out} = V_{cc} \cdot F_{sensor} \cdot S$ where V_{out} Output Voltage [μ V] S Sensitivity [μ V/V/N] - see F_{sensor} Force Applied [N] Ordering Information section V_{cc} Supply Voltage [V]
Bridge resistance	4.0		6.0	k Ω	
Zero offset	-0.1		0.1	mV/V	Signal without load, variance between specimens
- Enclosed variants (-G1)	-0.2		0.2	mV/V	
Zero repeatability	-0.02		0.02	%FS	Variance between measurements (FS = Full Scale)
Sensitivity tolerance	-10		10	%	Variance of sensitivity between specimens
Sensitivity repeatability	-0.3		0.3	%	Variance of sensitivity between measurements
Linearity error	-0.2		0.2	%FS	
Thermal shift for zero	-0.02		0.02	%FS/°C	
Thermal shift for sensitivity	0.02	0.025	0.03	%/°C	

Specifications can be customized in case of larger order quantities. The values listed here often do not represent the best achievable performance.

Mechanical & Physical Properties

	Min	Typical
Substrate material		Stainless Steel 1.4542 / X5CrNiCuNb16-4 / 17-4 PH®
Manufacturer		Cleveland-Cliffs (formerly AK Steel)
Heat treatment		H 900 (1 hour at 482°C)
Ultimate Tensile Strength	1310 MPa	1379 MPa
0.2% Yield Strength	1172 MPa	1275 MPa
Elongation in 50.8 mm (2 in)	5%	9%
Rockwell Hardness, C	40	45
Specific Heat		460 J/kg/K @0-100°C (0.11 BTU/lbs/°F @32-212°F)
Thermal Conductivity		17.9 W/m/K @149°C (124 BTU/hr-in/ft²/°F @300°F)
Linear coefficient of thermal expansion		10.8 μ m/m/K @21-93°C (6.0·10 ⁻⁶ in/in/°F @70-200°F)
Modulus of elasticity		197·10 ³ MPa (28.5·10 ⁶ ksi)
Modulus of rigidity in torsion		76·10 ³ MPa (11.0·10 ³ ksi)
Poisson's ratio		0.272

Variants and Ordering Information

KZ-011-0400-xxxN-Ex-Kx-Gx

Application of Force

Code	Force Application Aid
<u>E0</u>	None (hole only)
<u>E1</u>	Rivet on top side
<u>E2</u>	Rivet on bottom side

Contacting

Code	Contacting Variant
<u>K0</u>	Tinned solder pads only
<u>K1</u>	Stranded wires (20 cm) with PicoBlade connector
<u>K6</u>	Flex ribbon «Spirit»

Housing

Code	Housing Variant
<u>G0</u>	None
<u>G1</u>	Screw-on metal housing

Force Range

Code	Full Scale Range	Allowable Overload	Substrate Thickness	Sensitivity
<u>18N</u>	0 N - 18 N	27 N	0.5 mm	158 $\mu\text{V}/\text{V}/\text{N}$
<u>50N</u>	0 N - 50 N	75 N	0.8 mm	61 $\mu\text{V}/\text{V}/\text{N}$
<u>80N</u>	0 N - 80 N	120 N	1.0 mm	37 $\mu\text{V}/\text{V}/\text{N}$
<u>200N</u>	0 N - 200 N	300 N	1.6 mm	15 $\mu\text{V}/\text{V}/\text{N}$
<u>300N</u>	0 N - 300 N	450 N	2.0 mm	10 $\mu\text{V}/\text{V}/\text{N}$

Wire Color Code

Color	Pin Assignment
Red	Supply Voltage
Black	Supply Ground
White	Output Signal +
Blue	Output Signal -

Connector Details

Molex PicoBlade 4P Female connector (1.25 mm pitch).

Mating connectors:

- Right-angle SMT header, Molex Art. No. 532610471
- Wire-to-Wire Male housing, Molex Art. No. 510470400
- [Full list at Digi-Key](#)

Revision History

Rev.	Date	Comments
1	2016-02-02	Initial release
2	2022-01-14	Reviewed all specs, added housing option, updated naming scheme, new layout
3	2022-07-19	Added 18N variant
4	2023-01-12	Added Imperial units, mechanical specs, revision history
5	2023-03-24	Corrected wire color code, added PicoBlade connector
6	2024-04-11	New product photos Spec changes: 50N sensitivity increased from 54 to 61 $\mu\text{V}/\text{V}/\text{N}$ (applies for Batch 01/23 and newer), zero tolerance of -G1 variants increased to ± 0.2 mV/V (all batches)