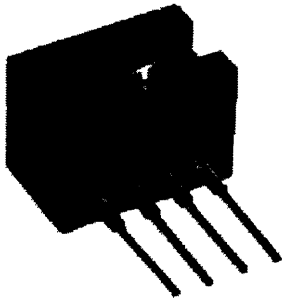


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FSG15N1A

**Force Sensors; Series FS; Non-compensated; Force Range: 1500 g**[e-Catalog Home](#)[Specification Search](#)[Product Family Information](#)

*Representative photograph,
actual product appearance
may vary.*

FEATURES

- Compact commercial grade package
- Robust performance characteristics
- Adaptable product design
- Precision force sensing
- Electrically ratiometric output
- Extremely low deflection (30 microns typ. @ Full Scale)
- High ESD resistance 10 kV
- Available signal conditioning
- Optional terminal configurations

The FS Series Sensors provide precise, reliable force sensing performance in a compact commercial grade package. The sensor features a proven sensing technology that utilizes a specialized piezoresistive micro-machined silicon sensing element. The low power, unamplified, noncompensated Wheatstone bridge circuit design provides inherently stable mV outputs over the force range.

Force sensors operate on the principle that the resistance of silicon implanted piezoresistors will increase when the resistors flex under any applied force. The sensor concentrates force from the application, through the stainless steel plunger, directly to the silicon sensing element. The amount of resistance changes in proportion to the amount of force being applied. This change in circuit resistance results in a corresponding mV output level.

The sensor package design incorporates a patented modular construction. The use of innovative elastomeric technology and engineered molded plastics results in load capacities of 4.5/5.5 kg over-force. The stainless steel plunger provides excellent mechanical stability and is adaptable to a variety of applications. Various electric interconnects can accept prewired connectors, printed circuit board mounting, and surface mounting. The unique sensor design also provides a variety of mounting options including mounting brackets, as well as application specific mounting requirements.

TYPICAL APPLICATIONS

- Medical infusion pumps
- Ambulatory non-invasive pump pressure
- Occlusion detection
- Kidney dialysis machines
- Load and compression sensing
- Variable tension control
- Robotic end-effectors
- Wire bonder equipment

MOUNTING

Sensor output characteristics do not change with respect to mounting orientation. Care should be taken not to obstruct the vent hole in the bottom of the housing. Improper venting may result in unstable output.

APPLYING FORCE

Evaluation of the sensor is to be performed using deadweight or compliance force. Application of a rigid, immobile force will result in output drift (decrease) as elastomeric seals relax. Off-center plunger loading has minimal effect on FSL ball plunger sensor performance and maintains operation within design specifications.

- [Dimensions](#)
- [Circuit Diagrams](#)
- [Constant Current Excitation Schematic](#)
- [Installation Instructions](#)

Engineering Drawings/Documents

<i>Searchable Features</i>	
Sensitivity	0.20 mV/g min., 0.24 mV/g typ., 0.28 mV/g max.
Operating Force (O.F.)	1500 g
Supply Voltage	10 Vdc typ., 12 Vdc max.
<i>Informational Features</i>	
Null Offset	± 30 mV
Linearity	± 22.5 g typ., Best Fit Straight Line
Null Shift over Temperature	± 1.0 mV
Sensitivity Shift over Temperature	+0.012 mV/g / -0.012 mV/g
Input Resistance	4 kOhm min., 5 kOhm typ., 6 kOhm max.
Output Resistance	4 kOhm min., 5 kOhm typ., 6 kOhm max.
Overforce	5,500 g
ESD	10 kV
Operating Temperature Range	-40 °C to 85 °C [-40 °F to 185 °F]

Storage Temperature Range	-55 °C to 105 °C [-67 °F to 221 °F]
Vibration	10 Hz to 2 kHz, 20 g, sine
Shock	150 g, 6 ms, half sine
Solderability	5 s @ 315 °C per lead
Availability	Global
Comment	MCTF 7 million @ 50 °C

Due to regional agency approval requirements, some products may not be available in your area. Please contact your regional Honeywell office regarding your product of choice.

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Please send comments to webmaster@micro.honeywell.com

Installation Instructions for the MICRO SWITCH FS Series Force Sensor

ISSUE 1

PK 88870

PERFORMANCE CHARACTERISTICS @ 10 ± 0.01 VDC, 25°C (Preliminary, based on limited test data)

Parameter	Min.	Typ.	Max.	Units
Excitation*	---	10	12	VDC
Null shift, 25 to 0°, 25 to 50°C	---	±0.5	---	mV
Null offset	-30	0	+30	mV
Linearity (BFSL)**	---	±0.5	---	% Span
Sensitivity shift 25 to 0°, 25 to 50°C	---	±5.0	---	% Span
Sensitivity	---	0.24	---	mV/grf
Repeatability	---	±0.2	---	% Span
Response time	---	---	1.0	msec
Input resistance	---	5.0K	---	ohms
Output resistance	---	5.0K	---	ohms
Plunger deflection	---	30	---	microns
Weight	---	2.0	---	grams
ESD (direct contact - terminals and plunger)	10	---	---	kVolts

* Non-compensated force sensors, excited by constant current (1.5 mA) instead of voltage, exhibit partial temperature compensation of Span.

**BFSL: Best Fit Straight Line.

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	-40 to +85°C (-40 to +185°F)
Storage temperature	-55 to +105°C (-67 to +221°F)
Shock	Qualification tested to 150 g
Vibration	Qualification tested to 0 to 2 kHz, 20 g sine

Note: All force related specifications are established using dead weight or compliant force.

DESCRIPTION

Catalog Listing	Force Range (grams)	Span*, mV			Overforce grams Max.
		Min.	Typ.	Max.	
FSG-15N1A	1,500	290	360	430	5,500

* Span: the algebraic difference between the output end points.

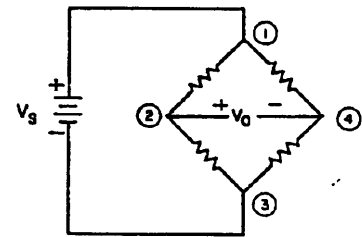
SOLDERING

Soldering temperature should not exceed 315°C. Soldering duration should not exceed 2.5 seconds per lead. When PC board mounting, provide terminal stand-off clearance of at least 0.040" from the soldering surface. Heat sinking is also recommended.

CLEANING

Proper cleaning fluids should be selected, based on the type of contaminants to be removed. MICRO SWITCH recommends alcohols.

EXCITATION SCHEMATIC



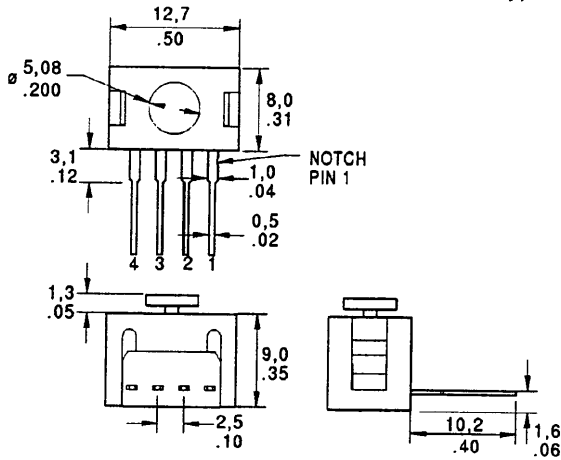
FS SERIES CIRCUIT

- Circled numbers refer to sensor terminals (pins). Pin 1 is designated with a notch.
Pin 1 = Supply V_s (+)
Pin 2 = Output, (+)
Pin 3 = Ground, (-)
Pin 4 = Output, (-)
- The force sensor may be powered by voltage or current. Maximum supply voltage is not to exceed 12 volts. Maximum supply current is not to exceed 1.6 mA. Power is applied across Pin 1 and Pin 3.
- The sensor output should be measured as a differential voltage across Pin 2 and Pin 4 ($V_o = V_2 - V_4$). The output is ratiometric to the supply voltage. Shifts in supply voltage will cause shifts in output. Neither Pin 2 nor Pin 4 should be tied to ground or voltage supply.

FS Series Force Sensor

PK 88870

MOUNTING DIMENSIONS (for reference only)



MOUNTING

Sensor output characteristics do not change with respect to mounting orientation. Care should be taken not to obstruct the vent hole in bottom of housing. Improper venting may result in unstable output.

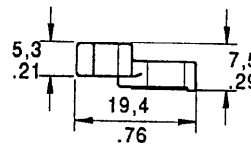
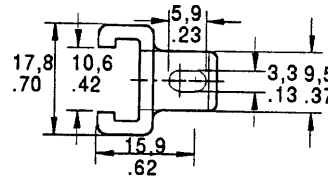
Mounting bracket mounting torque: 2-5 in. lb. (0,21- 0,56 Nm).

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Commencing with date of shipment, Honeywell's warranty runs for 18 months. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace 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.**

ACCESSORY

Catalog Listing	Description
PC15132	Plastic mounting bracket



APPLYING FORCE

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Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA
 1-416-293-8111 Canada
 1-815-235-6847 International

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MOUNTING DIMENSIONS (for reference only)

