

Features

- Compact Design
- mV Output
- High Overload Rating
- High sensitivity
- Surface Mount Device (SMD)
- Low deflection (less 20µm typical at full scale)
- Low voltage supply

Applications

- Medical infusion pumps
- Wearable insulin pumps
- Ambulatory non-invasive pumps
- Occlusion detection
- Kidney dialysis machines
- Enteral feeding pumps
- Robotics
- Surgical & Dental Tools
- Battery Powered Devices
- Manufacturing Equipment

FS10

Surface Mounted Miniature Compression Load Cell

Surface Mounted Miniature Force Sensor

Low Power Consumption

Rugged Microfused Sensing Element

Excellent Cycle Life

High Overload Rating

High Sensitivity

TE Connectivity's (TE) FS10 is a surface mounted miniature compression load cell that offers exceptional price-to-performance in a robust sensor package. Optimized for embedded force sensing applications from wearable medical devices to durable appliances and robotics applications.

The FS10 incorporates TE's high reliability Microfused technology and is offered in ranges from 500 grams to 3000 grams (5N to 30N). Microfused technology provides excellent span and zero stability, outstanding cycle life, superior resolution, high over-range capabilities, and an unamplified span sensitivity of 25mV/V.

The FS10 utilizes a high resistance pin-molded plastic housing to connect with strain gauge signal directly (Inside PCB is eliminated) to guarantee performance stability during high temperature process, which means compatible for both hand soldering and reflow soldering.

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Absolute Maximum Ratings (Analog) ⁽¹⁾

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Supply voltage	V _{dd}			6	V	
Storage temperature	T _S	-40		+125	°C	
Compressive load	L _{max}			3.5X	Rated	2.0X for 3kg range sensor
ESD		-4.0		4.0	kV	Human Body Model
Solderability				280	°C	Less than 10 second

(1) Maximum limits the device will withstand without damage

(2) Caution: Ensure the over-force ratings given in Absolute Maximum Ratings table are not exceeded during any phase of sensor assembly to the board, as well as during the use of the sensor in the application. Failure to comply with these instructions may result in product damage.

Standard Load Ranges

Grams (g)	Newtons (N)
500	5
1500	15
3000	30

Electrical Specifications

(Unless otherwise specified, all parameters are measured at 25°C @ 5.0V applied)

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Supply voltage (V _{supply})	V _{dd}	1.00		6.0	V	
Operating current	I _{dd}			1.5	mA	
Input resistance	R _{in}	3.8	4.6	5.4	kΩ	
Output resistance	R _{out}	3.8	4.6	5.4	kΩ	
Rise time	T _r			1	ms	10% to 90%
Maximum output current	I _o	1.5			mA	
Insulation resistance		50			MΩ	@250VDC

Operating Specifications

(Unless otherwise specified, all parameters are measured at 25°C @ 5.0V applied)

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Zero offset ¹		-5		5	mV/V	
Full scale span ¹		19	25	31	mV/V	
Non-linearity		-0.5		0.5	%Span	Best fit straight line

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Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Hysteresis		-0.8		0.8	%Span	
Zero repeatability		-0.8		0.8	%Span	
Span repeatability		-0.8		0.8	%Span	
Thermal shift for zero		-0.10		0.10	%Span/°C	Reference to 25°C, over compensated temperature
Thermal shift for span		-0.05		0.05	%Span/°C	
Cycle life		1E+6				0 to full scale cycles
Deflection at rated load				0.03	mm	
Weight			2		grams	Without ribbon cable

(1) Span and zero offset are ratiometric to power supply voltage

Environmental Specifications

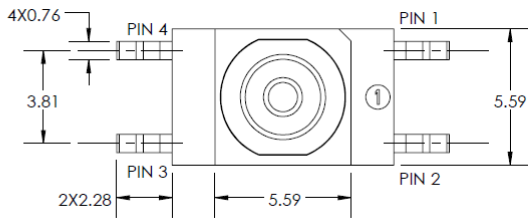
(Unless otherwise specified, all parameters are measured at 25°C @ 5.0V applied)

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Operating temperature range	T _o	-20		60	°C	
Storage temperature	T _s	-40		125	°C	
Ambient humidity		0		95	%RH	Non-condensing
ESD protection		IEC61000-4-2 (8kV _{air} /4kV _{contact}) EN55032 Class A				
Media compatibility		External exposed surfaces: 17-4PH, Nickle Plated Brass, PPS, PI				
Shock		MIL-STD-202G, Method 213B, Condition A (50g)				
Vibration		MIL-STD 202 Method 214A, Condition 1E (16.9g)				
Output ratio metric		Within supply range				

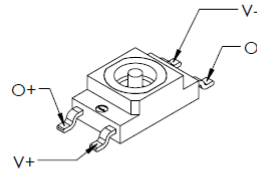
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Dimensions (mm) and Connections



PIN	SIGNAL
1	V+
2	O+
3	V-
4	O-

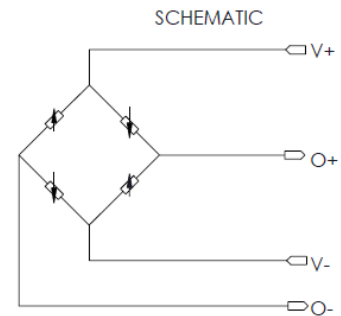
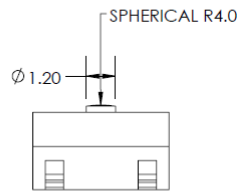
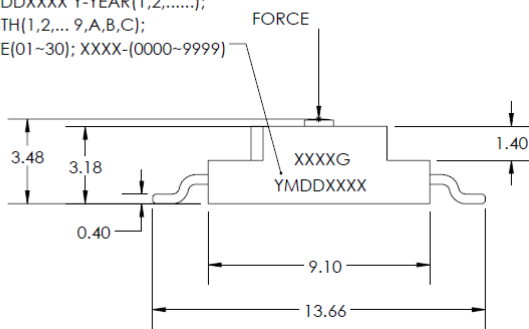


1. The force sensor may be powered by voltage or current. Maximum supply voltage is not to exceed 6 V. Maximum supply current is not to exceed 2 mA. Power is applied across Pin 1 and Pin 3.

2. The sensor output should be measured as a differential voltage across Pin 2 and Pin 4 ($V_o = V_{o(+)} - V_{o(-)}$).

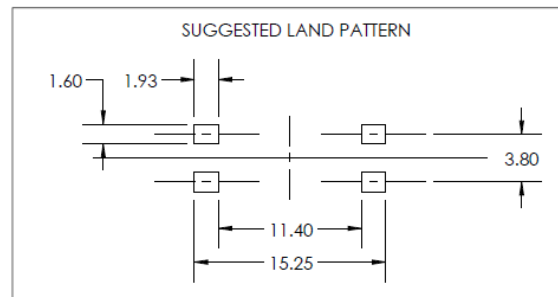
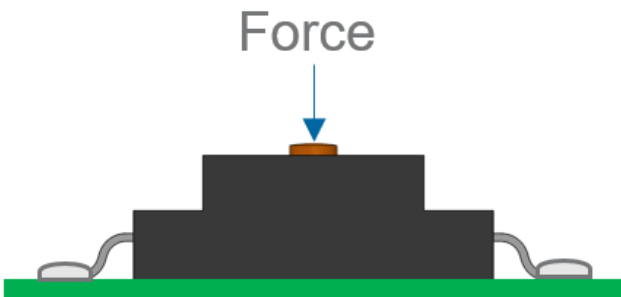
Note: The output is ratio metric to the supply voltage. Shifts in supply voltage will cause shifts in output. Neither Pin 2 nor Pin 4 should be tied to ground or voltage supply.

S/N: YMDDXXXX Y-YEAR(1,2,.....);
M-MONTH(1,2,... 9,A,B,C);
DD-DATE(01~30); XXXX-(0000~9999)



Mounting Recommendation

The sensor is recommended to be soldered on the PCB directly with a land pattern as below. To use the bent pin and bottom surface as support. No additional clamping force is required. The force to be measured should be kept straight to the axis of the pin boss. See below for mounting reference:

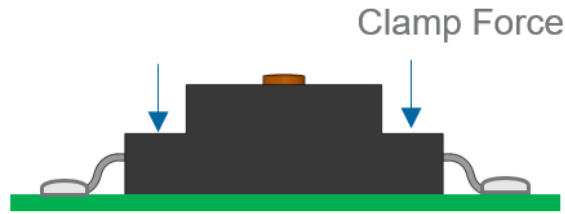


NOTE:

Clamping force to the housing may shift the zero reading slightly. Re-zero if needed.

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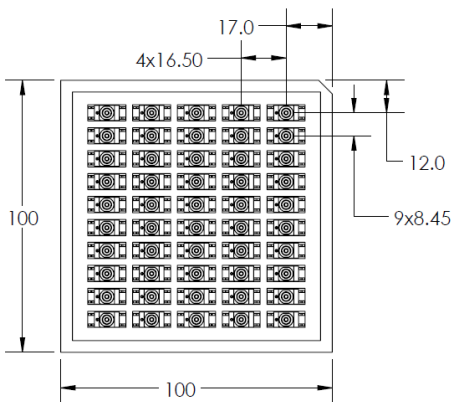
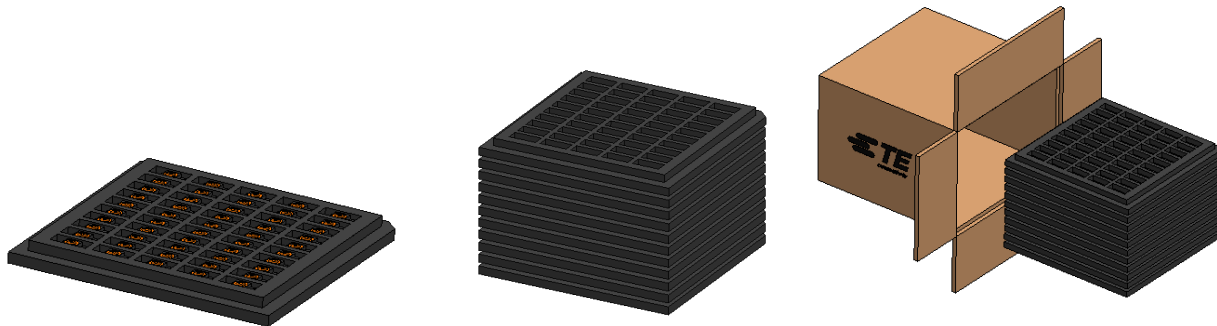
Below table shows the zero-change difference when loaded 5 lbf on the housing step. (For reference only)

Load Range	500g	1500g	3000g
Changing for reference	±1.5%FS	±0.8%FS	±0.5%FS

Reflow soldering:

Package Dimensions (for reference only)

Sensors are packaged with plastic tray, which is compactible for reflow soldering machine. 506 vacuum clamp type is recommended to be used for SMT process. Please refer to the array dimensions for clamping setting. Packed 50 pieces per (1) tray. Standard shipping box contains 10 trays (500 pcs per box) maximum. Order in multiples of 50 pieces is recommended.



No.	500	501	502	503	504	505	506	507	508C	509
Appearance										
	1.0x0.5mm	0.7x0.4mm	φ0.7mm	φ1.0mm	φ1.5mm	φ3.5mm	φ5.0mm	φ8.5mm	φ9.5mm	0.4×0.2mm
Internal thread	2xφ0.4mm	φ0.25mm	φ0.4mm	φ0.6mm	φ1.0mm	φ1.7mm	φ3.2mm	φ5.0mm	φ8.0mm	φ0.1mm

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Ordering Information

FS10 X X - XXXX - XXXX - X

Output Signal		
Code	Output	Output Type
2	25 mV/V*	mV

Measurement Units	
G	Gram (g)*
N	Newtons

Pin Profile	
Code	Profile
A	Bent*
B	Straight

Load Range	
Gram	Newtons
0500*	0005
1500*	0010
3000	0030
Available for customize	

Standard/Customize	
Code	mode
0000	Standard
XXXX	Customize

*Sensor features shown in **bold** are typically stocked by our distribution partners, or available with short lead times from the factory depending on availability. **For customizing load range, require 5000 pcs of MOQ.** Contact customer service for details.

*Standard Products	
Part Number	Description
20023688-01	FS102A-0000-0500-G
20023688-00	FS102A-0000-1500-G

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REVISION HISTORY

Revision Number	Change Description	Date	Approval
1	Draft	11/01/2022	MH

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