

FMA SERIES MICROFORCE SENSORS

For Use in Smart Vending and
Pharmaceutical Dispensing Machines

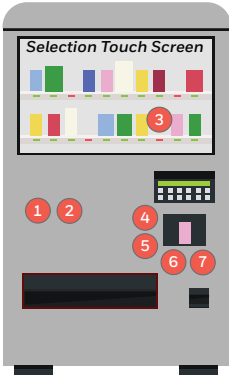
A woman with long dark hair, wearing a white blouse and a tan cardigan, is shown in profile from the chest up. She is pointing her right index finger at a row of green capsules in a tray inside a vending machine. The machine is filled with various colorful products. The background is a blurred pharmacy or store setting.

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FMA SERIES MICROFORCE SENSORS IN SMART VENDING/PHARMACEUTICAL DISPENSING MACHINES

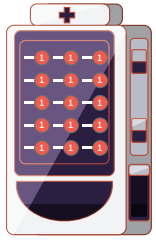
The FMA Series may be used to monitor the amount of product being displaced/dispensed, allowing remote monitoring and enabling improved inventory management.

Smart Vending Machine



- 1 Measures weight of item within each cell to ensure correct item is loaded
- 2 Detects quantity/type of item removed from each cell to prevent over and/or underfilling of order
- 3 Allows system to monitor and react to inventory levels, thus reducing stocking visits, catch inventory errors and reduce mistakes
- 4 Measures weight of coffee bean container to detect when it is nearing empty
- 5 Measures weight of water tank to detect when it is nearing empty
- 6 Detects absence/presence of cup before dispensing beverage
- 7 Measures dispensed beverage amount to provide fault detection feedback mechanism

Pharmaceutical Dispenser



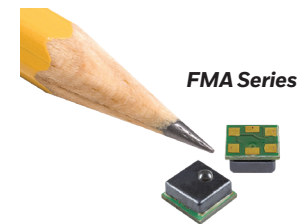
- 1 Measures weight of multiple items within drawer/container to detect number of items removed

The FMA Series piezoresistive-based force sensors offer a digital output for reading force over the specified full scale force span and temperature range. They are fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects, and nonlinearity using an on-board Application Specific Integrated Circuit (ASIC).

The direct mechanical coupling allows for easier interface with the sensor (using tubing, membrane or a plunger), providing repeatable performance and a more reliable mechanical interface to the application. These sensors offer a more stable output which is directly proportional to the force applied to the mechanically-coupled sphere.

The digital I²C interface permits multiple addresses on the same bus, allowing the use of multiple sensors and helping to reduce system complexity. The optional internal diagnostics function enables fault detection.

SPECIFICATIONS	
CHARACTERISTIC	FMA SERIES
Description	compensated/amplified
Force range	5 N, 15 N, 25 N
Output	SPI, I ² C
Supply voltage	3.3 V, 5.0 V
Supply current, typical	2.8 mA (3.3 V), 3.9 mA (5.0 V)
Operating temperature range	-40°C to 85°C [-40°F to 185°F]
Compensated temperature range	5°C to 50°C [41°F to 122°F]
Accuracy	±2% FSS BFUL
Total Error Band	±8% FSS BFUL
Output resolution	12 bits
Long term stability	±1.6 FSS
Humidity	0% to 95% RH, non-condensing
Shock	MIL-STD-202, Method 213, Condition A (50 G)
Vibration	MIL-STD-202, Method 214, Condition 1F (20.71 Gms)
Life	1 million full scale force cycles, minimum
Package size	5 mm x 5 mm [0.20 in x 0.20 in]



Sensor optimized to be as small as possible while still allowing for mechanical coupling.

PRODUCT NOMENCLATURE

FM ¹ MicroForce Sensors	A Type	M Coupling	S Contact Element	D Option Code	XX Option Code 1	025 ² Force Range	W Force Unit	C Force Type	S Output	C ³ Transfer Function	3 Supply Voltage
	A Compensated/amplified	M Mechanical	S Sphere		XX Future placeholder	005 5 (Newtons) 015 15 (Newtons) 025 25 (Newtons)	W Newton (N)	C Compression	S SPI 2 I ² C, Address 0x28 3 I ² C, Address 0x38 4 I ² C, Address 0x48 5 I ² C, Address 0x58 6 I ² C, Address 0x68 7 I ² C, Address 0x78	A 10% to 90% C 20% to 80%	3 3.3 V ±10% 5 5.0 V ±5%

¹ Custom configurations are available upon request. Please contact Honeywell Sales.

² Three characters specify the desired force level; allowable characters are the numbers 0 through 9 for currently configurable force ranges.

³ For other available transfer functions, contact Honeywell Customer Service.

⚠ 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.

⚠ WARNING
MISUSE OF DOCUMENTATION

- The information presented in this document is for reference only.
- Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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

Honeywell Sensing and Internet of Things

830 East Arapaho Road
Richardson, TX 75081
honeywell.com

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FUTURE
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