

# **FMA SERIES** **MICROFORCE** **SENSORS**

For Use in Coffee and Espresso Machines

**Honeywell**

# FMA SERIES MICROFORCE SENSORS FOR USE IN COFFEE AND ESPRESSO MACHINES

The FMA Series may be used in high-end coffee and espresso machines to provide precision ingredient measurement and dispensing information, critical factors that directly affect the quality of the final product.



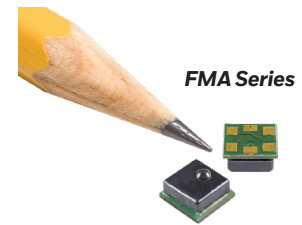
- 1 Measures weight of coffee grounds to ensure correct coffee strength
- 2 Measures weight of beans/fresh grounds container to detect when it is close to empty
- 3 Measures weight of used grounds to detect when container needs to be emptied
- 4 Provides real-time measurement of liquid as pumped into cup to prevent overflows/spills
- 5 Detects cup/carafe presence before dispensing liquid so that liquid goes into cup rather than elsewhere
- 6 Measures amount of liquid dispensed into cup to alert customer if enough liquid is available to fulfill request
- 7 Measures weight of water tank to detect when it is close to empty and needs to be filled.
- 8 Industry-standard digital output simplifies system design, allowing faster design cycles

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 I<sup>2</sup>C 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.

FMA SERIES SPECIFICATIONS	
CHARACTERISTIC	PARAMETER
Description	compensated/amplified
Force range	5 N, 15 N, 25 N
Output	SPI, I <sup>2</sup> C
Supply voltage	3.3 V, 5.0 V
Supply current, typ.	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, typ.	±2% FSS BFSL
Total Error Band, max.	±8% FSS BFSL
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 <sup>1</sup> MicroForce Sensors	A Type	M Coupling	S Contact Element	D Option Code	XX Option Code 1	025 <sup>2</sup> Force Range	W Force Unit	C Force Type	S Output	C <sup>3</sup> 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 <sup>2</sup> C, Address 0x28 3 I <sup>2</sup> C, Address 0x38 4 I <sup>2</sup> C, Address 0x48 5 I <sup>2</sup> C, Address 0x58 6 I <sup>2</sup> C, Address 0x68 7 I <sup>2</sup> C, Address 0x78	A 10% to 90% C 20% to 80%	3 3.3 V ±10% 5 5.0 V ±5%

<sup>1</sup> Custom configurations are available upon request. Please contact Honeywell Sales.

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

<sup>3</sup> 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

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FUTURE  
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