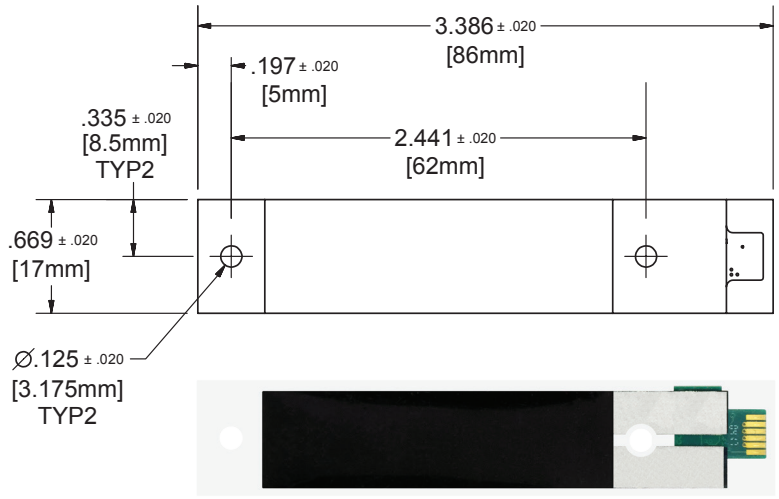
EAP Sensors
Gen3 Spec Sheet

Mateligent's EAP Sensors are soft, thin, conformable devices that can take accurate measurements and readings while being strained up to 100% for millions of cycles. Made of a tough silicone rubber, they can withstand the harshest environments from heat, cold, and shock to dust, vibration and moisture.

The EAP Sensor is a flexible capacitor that acts as a displacement-to-capacitance transducer. The dielectric polymer exists between two stretchable electrodes. As the dielectric film is strained, it thins and expands within the area, increasing its capacitance.



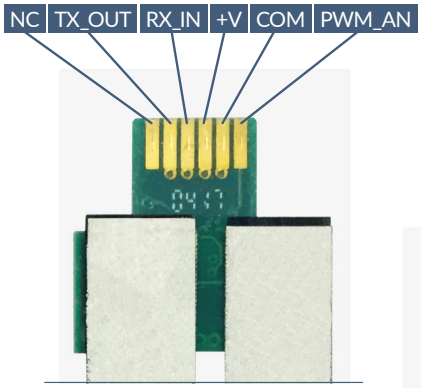
Specifications

	Description	Unit	Digital Output	Analog Output
Output Type			Serial (ASCII) Data Format	Analog Voltage, 0-V Supply (5V typ)
Range	Maximum stretch	%,mm	0-100% (0-50mm)	
Sensitivity	Minimum detectable output change per mm stretch	%/mm or V/mm	2%/mm	83.3mV/mm
Precision	Maximum error when stretching to same known value	%	0.10%	
Resolution	Smallest detectable output within noise	% (um) or V (um)	0.1% (50um)	6mV (72um)
Accuracy	Maximum difference between real stretch and sensor output	% (mm) or V (mm)	0.6% (0.3mm)	
Linearity	Maximum difference between output and ideal linear curve	%	0.60%	
Non-Linearity	Maximum input deviation / FS input X 100	%	0.60%	
Hysteresis	Maximum measured width of hysteresis curve	%	<1%	
Response Time	Maximum time to reach steady state from step input	ms	<10ms	

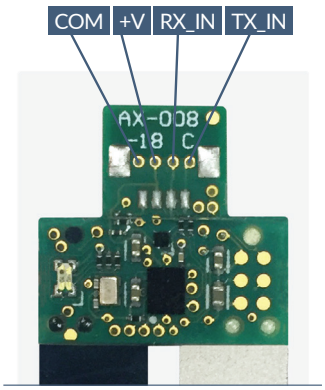
Protocol

1. Binary data format, calibrated sensor. (Uncalibrated sensor defaults to character data format.)
Communication settings: 115,200 baud, 1 start bit, 8 data bits, 1 stop bit.
a. 2 bytes temperature in degrees (K) in tenths. 273.1°K = 0.0 °C
b. 2 bytes primary reading in percentage in hundredths.
i. (0x0000 = 000.00% to 0x7FFF = 327.67%)
ii. Expected maximum value approx. 120.00%
iii. Maximum value saturated to 200.00%
iv. Expected minimum value – saturated to 0.00%
v. Error message for disconnected sensor, overflow, etc (0x8000/-32768)
c. 1 byte status flag – not used at this time
d. 1 byte checksum – not used at this time

2. Character (ASCII) data format, calibrated sensor.
Communication settings: 115,200 baud, 1 start bit, 8 data bits, 1 stop bit.
a. Message string format: "000.00%, 000.0°K"
b. 6 bytes primary reading in percentage in hundredths with decimal point.
i. ("000.00" = 000.00% to "327.67" = 327.67%)
ii. Expected maximum value approx. 120.00%
c. 1 byte "%", indicating calibrated percentage reading.
d. 1 byte comma
e. 5 bytes temperature in Kelvin degrees in tenths with decimal point. ("273.1" = 273.1°K)
f. 1 byte "K", indicating Kelvin temperature units.
g. Message string format if sensor measurement error present (measurement overflow or open circuit): "EAP error"

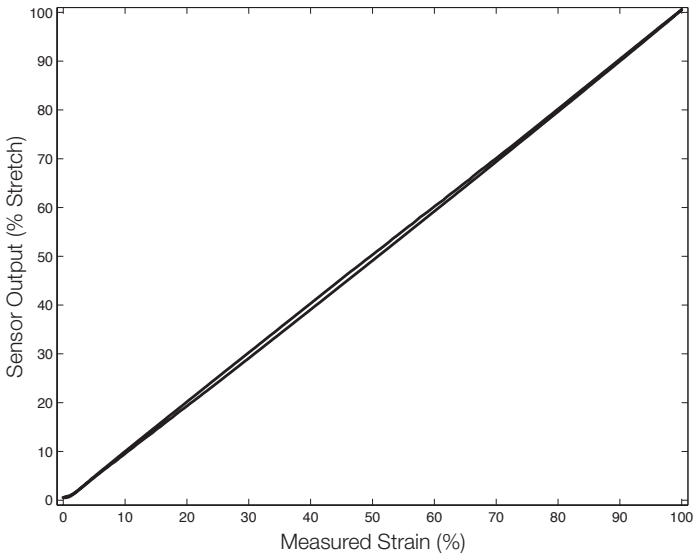


Bottom

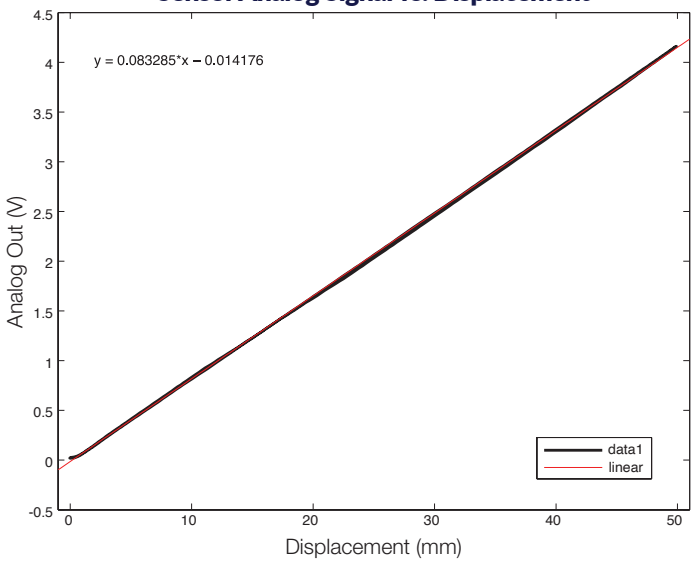


Top

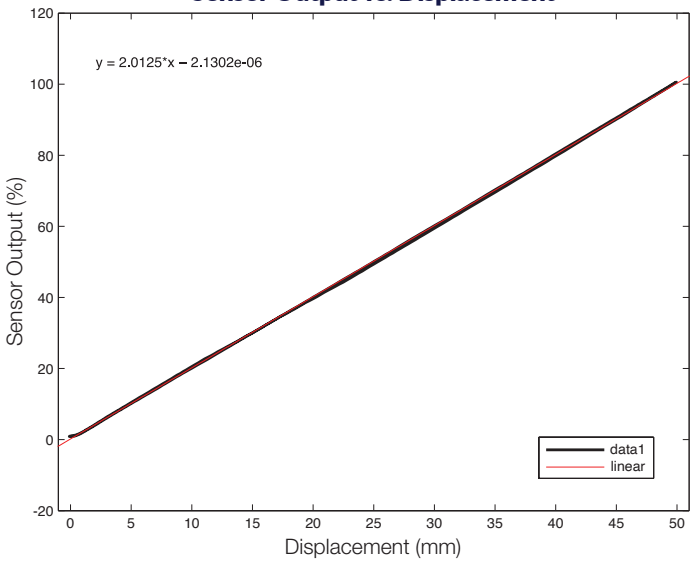
Sensor % Stretch vs. Measured Strain



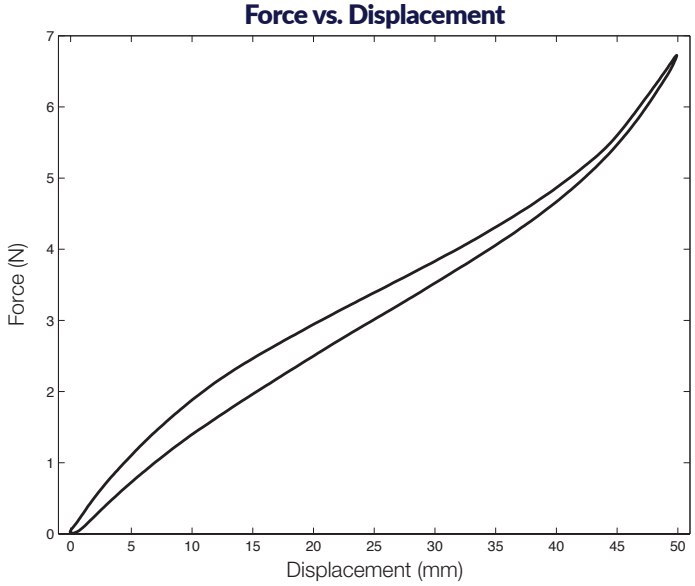
Sensor Analog Signal vs. Displacement



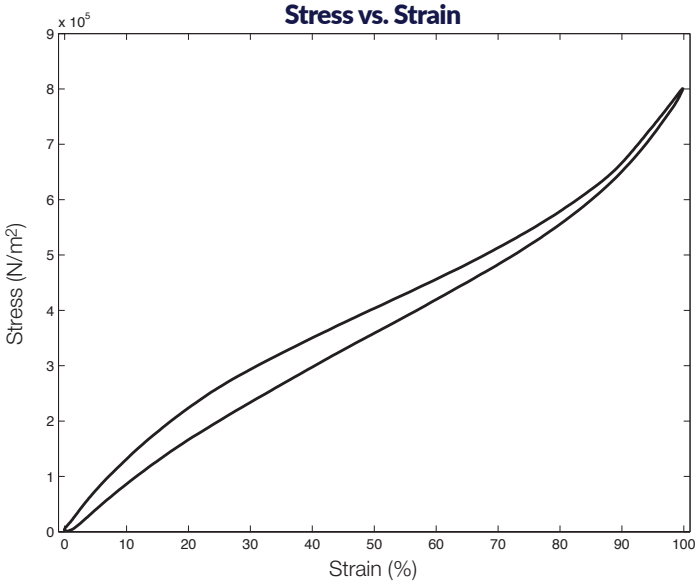
Sensor Output vs. Displacement



Force vs. Displacement



Stress vs. Strain



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