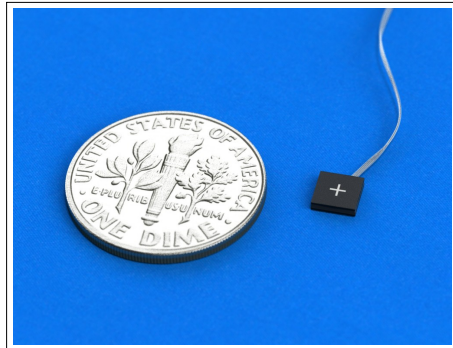


THERMOELECTRIC HEAT FLUX SENSOR ————— HFD02-040-04L04

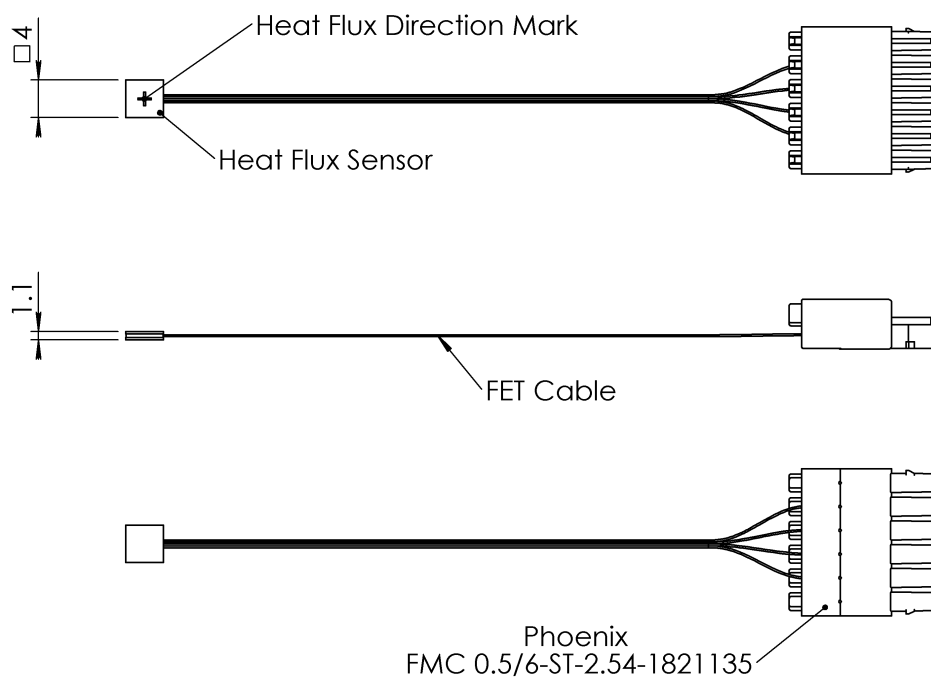


The HFD02-040-04L04 – high sensitive and self-calibrating sensor of conduction, convection and radiation heat fluxes in a wide range of heat flux intensities. Compatible with Datalogger DX8140.

- Ultra-High Sensitivity
- Miniature Dimensions
- Self-calibrating
- FET cable
- Phoenix Connector

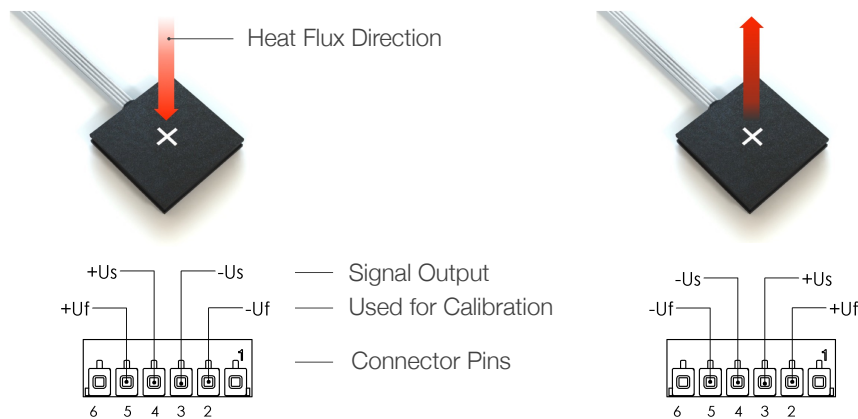
Sensitivity S_e	$\mu\text{V}/(\text{W}/\text{m}^2)$	15.5
Integral sensitivity S_a	V/W	0.97
Heat Flux Range P_e	$\pm\text{W}/\text{m}^2$	8 000
Integral Heat Flux Range P_a	$\pm\text{W}$	0.15
Thermal Time Constant	s	1.4
Thermal Resistance R_T	$\text{K}/(\text{W}/\text{m}^2)$	1.30E-03
Integral Thermal Resistance R_T	K/W	80.1

DIMENSIONS (mm)



Sensor Type		Thermoelectric
Surface material		AlN Ceramics, painted black
Protection class ⁽²⁾		IP67
Surface dimensions AxB	mm ²	4x4
Thickness H	mm	1.1
Pellet pairs		40
Sensitivity Se	$\mu\text{V}/(\text{W}/\text{m}^2)$	15.5
Integral sensitivity Sa	V/W	0.97
Heat Flux Range Pe	$\pm\text{W}/\text{m}^2$	8 000
Integral Heat Flux Range Pa	$\pm\text{W}$	0.15
Thermal Time Constant	s	1.4
Thermal Resistance RT	K/(W/m ²)	1.30E-03
Integral Thermal Resistance RT	K/W	80.1
Electrical Resistance ACR	Ohm	7.95
Temperature Dependence ⁽³⁾ dS/dT	%/°C	0.25
Linearity with Power dS/dP	$\pm\%(\text{W}/\text{m}^2)$	0.03 %
Homogeneity dS/dA	$\pm\%$	1
Calibration Accuracy	$\pm\%$	3
Calibration Temperature Range	°C	-40 ... +85
Operating Temperature Range	°C	-60 ... +150
Max. compressive Force for clamping	kg	3
Cable Length ⁽⁴⁾ L	cm	180
Connector type ⁽⁵⁾		FMC 0,5/6-ST-2,54-18211355
RoHS		Compliant

1. Performance parameters shown in specifications are given for ambient temperature $T_a=300\text{ K}$ (27 °C)
2. Application in water - not more than 1 hour. Maximum temperature 100°C.
3. Average value at $T_a=300\text{ K}$ (27 °C). Detailed temperature dependence is given in table
4. Sensor is equipped with thin FEP Flat Ribbon Cable, 0.025" Pitch, 32 AWG, 1,8 m.
Wire resistance 0.54Ohm/m
5. Cable is ended by miniature connector FMC 0,5/6-ST-2,54-18211355 (Phoenix).
The reciprocal connector p/n is MCV 0,5/6-G-2,54 SMD R44-1821588



Heat Flux Sensor Cable is ended by miniature connector FMC 0,5/6-ST-2,54-18211355 (Phoenix).
The reciprocal connector p/n is MCV 0.5/6-G-2.54 SMD R44-1821588 (not included).

SELF-CALIBRATION METHOD

Sensitivity of thermoelectric heat flux sensor S_a [V/W]

$$S_a = \frac{U}{P} = N \times \alpha \times R_t$$

U – sensor signal at heat flux P_e ;
 N – number of pellet pairs inside a sensor;
 R_t – thermal resistance;
 α – Seebeck coefficient (average value P-N pair)

Figure-of Merit Z of thermoelectric sensor

$$Z = \frac{(N \times \alpha)^2 \times R_t}{ACR}$$

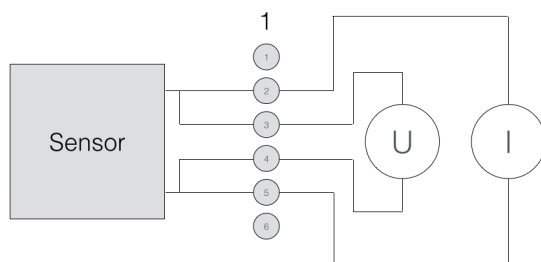
Calibration expression with use of Z , ACR and Seebeck coefficient α

$$S_a = \frac{1}{(\alpha \times N)} \times Z \times ACR$$

$$S_e = S_a \times S \quad \text{where } S - \text{surface area}$$

MEASUREMENT SCHEME

Self-calibration to be made by measurement of Figure-of-Merit and ACR Resistance of thermoelectric heat flux sensor by four-wire method which is provided by four wires of the FET cable connected to the sensor.



Use TEC Microsystems Z-Meters made by for measurement of Figure-of-Merit and ACR resistance of thermoelectric heat flux sensor.

Or Datalogger DX8140 developed for HTx, Hfx series of thermoelectric heat flux sensors.

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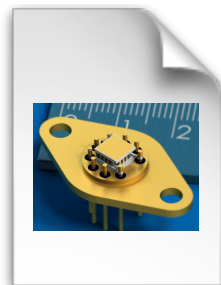
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