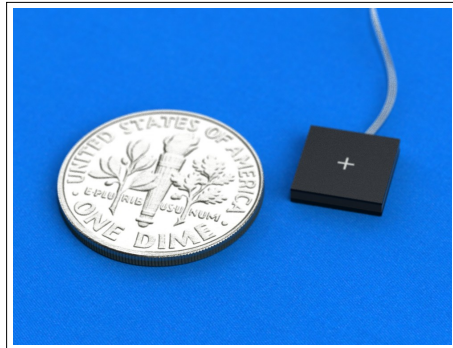


## THERMOELECTRIC HEAT FLUX SENSOR \_\_\_\_\_ HFD04-059-05L08

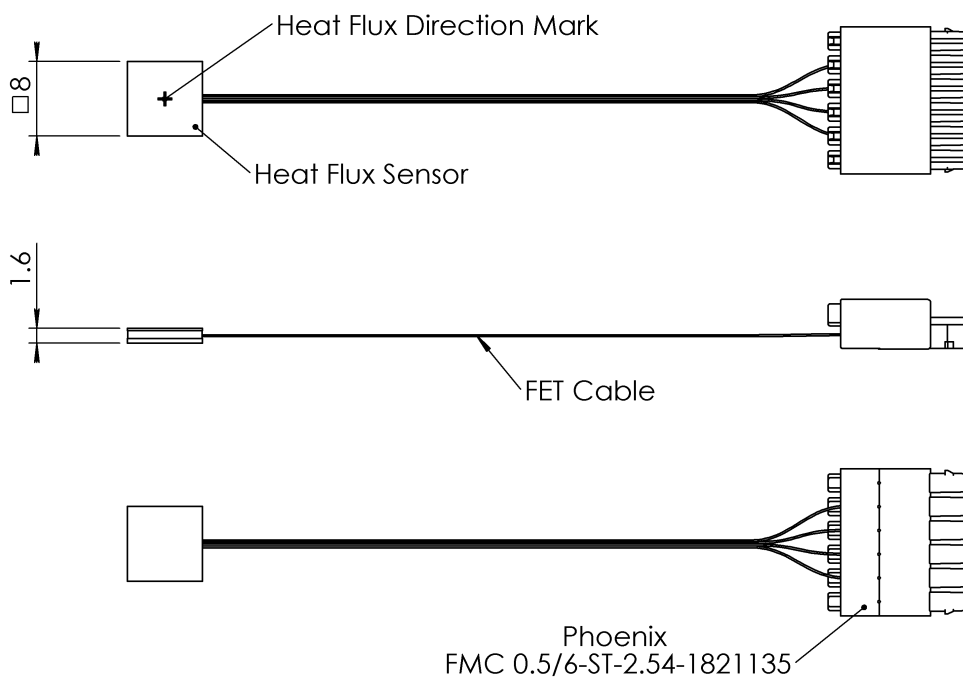


The HFD04-059-05L08 – high sensitive and self-calibrating sensor of conduction, convection and radiation heat fluxes in a wide range of heat flux intensities. Compatible with Datalogger DX8140.

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

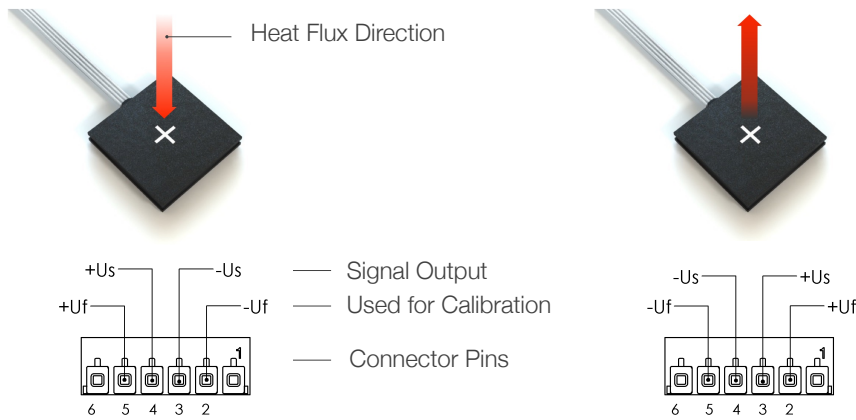
Sensitivity $S_e$	$\mu\text{V}/(\text{W}/\text{m}^2)$	22
Integral sensitivity $S_a$	$\text{V}/\text{W}$	0.34
Heat Flux Range $P_e$	$\pm\text{W}/\text{m}^2$	8 500
Integral Heat Flux Range $P_a$	$\pm\text{W}$	0.55
Thermal Time Constant	s	1.6
Thermal Resistance $R_T$	$\text{K}/(\text{W}/\text{m}^2)$	1.20E-03
Integral Thermal Resistance $R_T$	$\text{K}/\text{W}$	19.3

### DIMENSIONS (mm) \_\_\_\_\_



Sensor Type		Thermoelectric
Surface material		AlN Ceramics, painted black
Protection class <sup>(2)</sup>		IP67
Surface dimensions AxB	mm <sup>2</sup>	8x8
Thickness H	mm	1.6
Pellet pairs		59
Sensitivity Se	μV/(W/m <sup>2</sup> )	22
Integral sensitivity Sa	V/W	0.34
Heat Flux Range Pe	±W/m <sup>2</sup>	8 500
Integral Heat Flux Range Pa	±W	0.55
Thermal Time Constant	s	1.6
Thermal Resistance RT	K/(W/m <sup>2</sup> )	1.20E-03
Integral Thermal Resistance RT	K/W	19.3
Electrical Resistance ACR	Ohm	3.73
Temperature Dependence <sup>(3)</sup> dS/dT	%/°C	0.25
Linearity with Power dS/dP	±%/(W/m <sup>2</sup> )	0.03 %
Homogeneity dS/dA	±%	1
Calibration Accuracy	±%	3
Calibration Temperature Range	°C	-40 ... +85
Operating Temperature Range	°C	-60 ... +150
Max. compressive Force for clamping	kg	19
Cable Length <sup>(4)</sup> L	cm	180
Connector type <sup>(5)</sup>		FMC 0,5/6-ST-2,54-18211355
RoHS		Compliant

1. Performance parameters shown in specifications are given for ambient temperature Ta=300 K (27 °C)
2. Application in water - not more than 1 hour. Maximum temperature 100°C.
3. Average value at Ta=300 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;  
RT – thermal resistance;  
 $\alpha$  – Seebeck coefficient (average value P-N pair)

Figure-of Merit Z of thermoelectric sensor

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

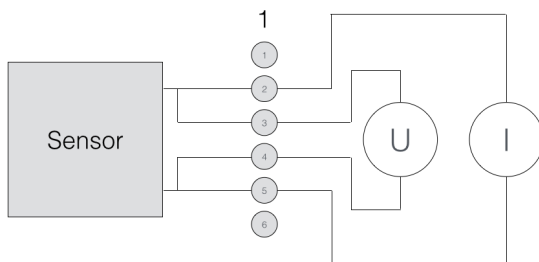
Calibration expression with use of Z, ACR and Seebeck coefficient  $\alpha$

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

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

## 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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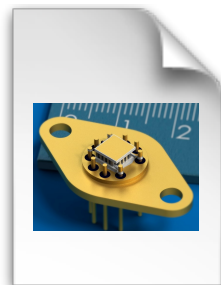
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