



TFX-161

Heat Flux Sensor 161

Flat Heat flux and Temperature Sensor

Maximum operating temperature 150°C / 300°F

Main applications: heat transfer measurements, cure monitoring (calorimetry)

Description

Flat Heat Flux sensors can be used in many systems in order to measure and control local heat exchanges with good sensitivity (better noise / signal ratio than with multiple thermocouples).

The integrated temperature measurement provide a useful temperature reference for thermal calculations.

Flat Heat Flux sensors are useful for measuring conductive and convective heat transfer. Sensors with copper surface have a low sensitivity to radiative heat whereas blacken version provide a full sensitivity to three transfer modes.

Benefits

Shape can be chosen according to the need.
Standard sizes are the following :

Code	Active area mm	Sensitivity $\mu V / (W/m^2)$	A mm	B mm
010	10x10	-0.15	10	
020	20x20	-0.5	20	
D20	$\varnothing 20$	-0.5	20	
D25	$\varnothing 25$	-0.5	25	
030	30x30	-1	30	
050	50x50	-15	50	50
100	100x100	-60	100	100

Mounting

TFX-161 sensors can be mounted dry or with thermal grease according to application. They will introduce a thermal resistance which has to be characterized if precise measurements are required.

Signals


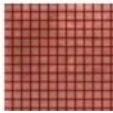


Heat flow signal is converted into positive or negative millivolts depending on the direction of the heat through the sensor.

The temperature is provided by a type T thermocouple.


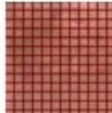
Caution

These sensors are fragile and require care handling. Once mounted, avoid to pull on the wire.

Surface aspect

Code	Description	Aspect
N	Natural rigid	
F	Natural flexible	
K	Kapton	
B	Blacken	

Type

Aspect	Type	Aspect	Type	
			Low T	High T
	N Active		T	A
	K Passive			R
	B Vacuum High pres.			V P
	N Flexible		TBD	F

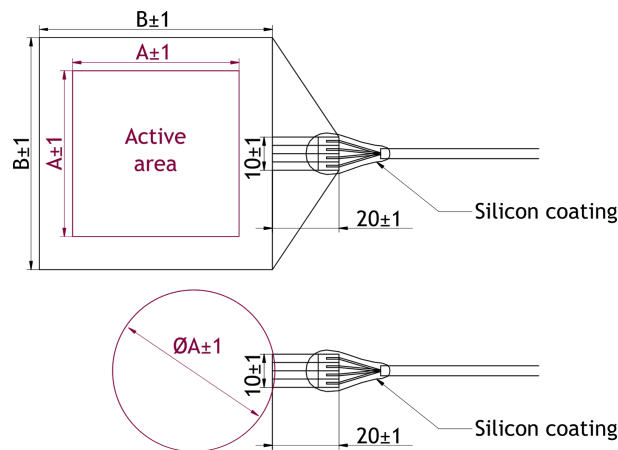
Thermal Specifications

Name	Description	Min	Typ	Max	Unit
T_{nom}	Operating temperature			150	° C
	Low temperature option			100	° C
φ	flux density			$\pm 10k$	W / m ²

Identification label

Product	front	rear		
Sensitivity Model - S / N	<table border="1"> <tr> <td>$\pm xx.x \text{ uV/ W/m}^2$</td> </tr> <tr> <td>161-yyyyyy</td> </tr> </table>	$\pm xx.x \text{ uV/ W/m}^2$	161-yyyyyy	
$\pm xx.x \text{ uV/ W/m}^2$				
161-yyyyyy				

Dimensions



Wiring

It is recommended to use an extension cord to connect the sensors to measuring systems.



Standard cable E (3mm diameter, 10mm maximum advised curvature radius):

- **Red:** Flow -
- **Brown:** Common +
- **White:** Temperature - (Constantan)

Standard cable M (3.6mm diameter, 12mm maximum advised curvature radius):

- **Red:** Flow +
- **Blue:** Flow -
- **Brown:** Temperature +
- **White:** Temperature -

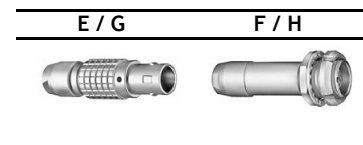
If active Type :

- **Yellow :** heat
- **Green :** heat

Maximum cable length between the sensor and the measurement system can be up to 20m according to the measuring system used.

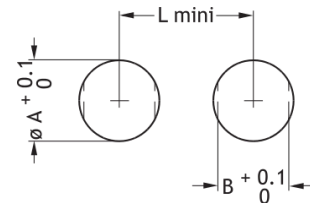
Connector types

Standard proposed connectors are made by LEMO in Switzerland, they have three or seven pins.



F and H type are a female plug designed to be screwed on a flat panel.

Maximal mounting panel thickness : 5mm



Connector	A	B	L	Unit
F	9.1	8.3	14.5	mm
H	12.1	10.6	18.5	mm



Product Number

Product	161.	N	050	R	.	A	010	M		
Aspect	Natural (copper)	N						E	3-wire	Cable Type
	Black paint	K						M	4 or 6 wires	
Size	B (XXX) in mm		XXX				010		1m	Cable length
	Round shape in mm		DXX				xxx		Other on request, in dm	
	If A ≠ B, B-A in mm		XXX-XXX							
	Special shape in mm		XX x XX							
Type	Active Rigid			A		A			Bare wires	Connector
	Passive Rigid			R		B			Ferrules	
	Passive Flexible			F		E			LEMO 3-pin male	
	For Vacuum*			V		F			LEMO 3-pin female with screw	
	High Pressure*			P		G			LEMO 7-pin male	
	Rigid low temperature*			T		H			LEMO 7-pin female with screw	

* Special types may have different sensitivities and shapes

Contents

- 1 sensor with wounded cable conditioned bubble protective bag