



TFX-191

Heat Flux Sensor 191

Heat flux and temperature sensor for massive tools

Maximum operating temperature 250°C / 480°F
(500°C / 930°F optional)

Main applications: control of material transforming processes
For example : Cure monitoring in compression and injection processes.

HDFS® conductive type sensor, contactless with material
Replaces Tfx-144 and Tfx-171 models
Total height 42mm

Reinforced for quick installation

Description

Conductive heat flux sensors are particularly useful for the detection of thermal events occurring in liquids, pastes and solids.

They can be used to control physico-chemical phenomena who leads to a temperature change in the material.

The double measurement of heat flow and temperature make possible to estimate the temperature in the product without direct contact.

Benefits

Sensors developed by TFX SA are designed to be mounted in a housing without opening into molding cavity. This guarantee tightness of the cavity (vacuum or resin infiltration). This allow also sensors to withstand severe conditions of pressure and temperature.

These sensors can be removed cold. No special machining accuracy is required in comparison to other sensors.

Mounting

The sensor must be mounted in a clean housing. The nut can be tightened with a pipe wrench by hand, do not tighten with a key, the nut must simply ensure blocking of the sensor at the bottom of the housing and shall not crush it.

TFX do not recommend the use of thermal grease. Although it improves the thermal contact, grease may change over time and generate a signal drift. Also a



surplus can thermally bypass the sensor making it less sensitive.

Signals

Heat flow signals are 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. High temperature versions have a type N thermocouple.

Electrical Specifications

Name	Description	Typ	Unit
R_{in}	differential input impedance	3	Ω
V_{noise}	Measuring noise	0.1	μV_{RMS}
S	typical sensitivity	-10	nV / (W / m ²)
BW	bandwidth		1Hz
V_{ins}	insulation voltage	500	Vac
V_{nom}	maximum amplitude	± 20	mV

Thermal Specifications

Standard version with type E (PTFE) cable :

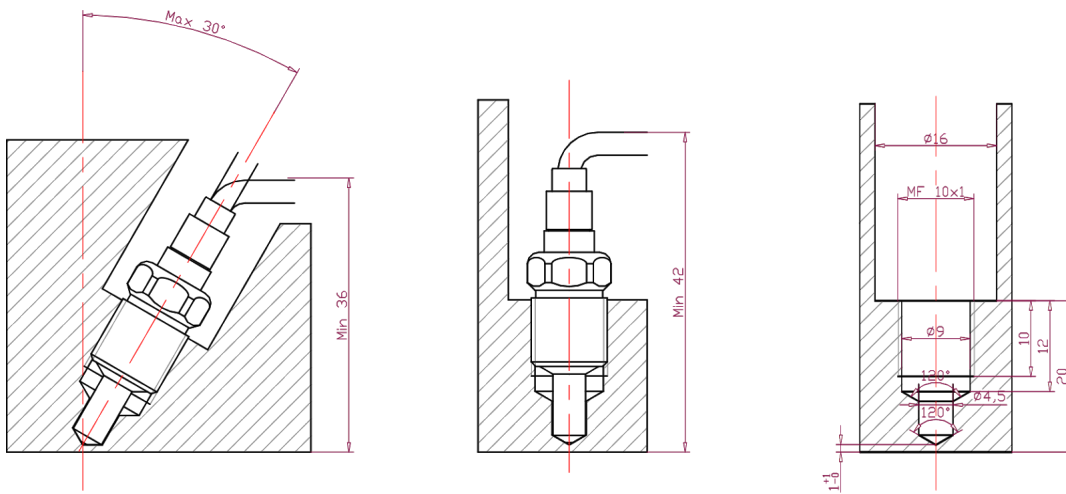
Name	Description	Min	Typ	Max	Unit
T_{nom}	Operating temperature			250	° C
T_{tip}	Tip Temperature			300	° C
ϕ	flux density	± 10		$\pm 100k$	W / m ²

Identification label

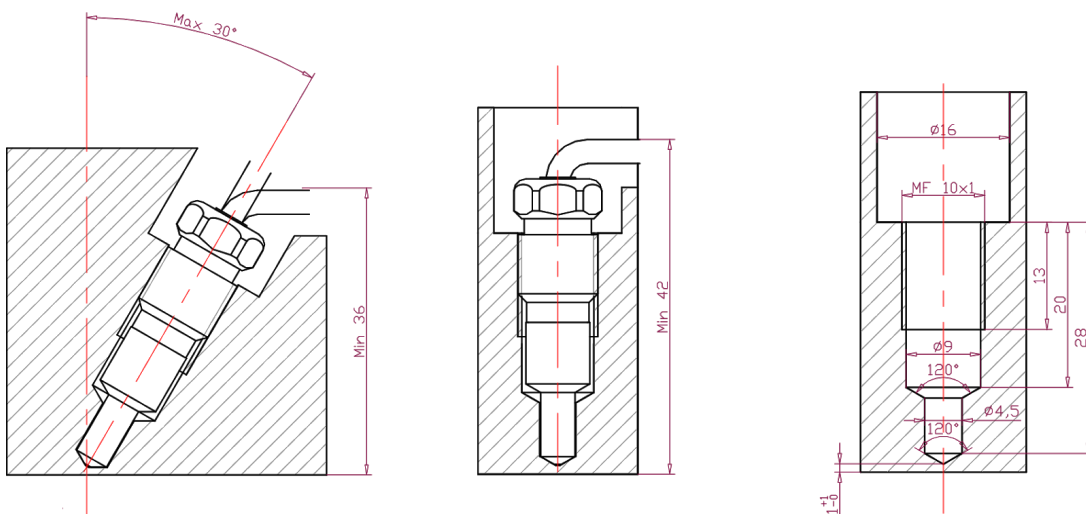
Product	front	rear
Sensitivity	$\pm xx.x \text{ nV/ W/m}^2$	H
Model - S / N	191-yyy-yyyy	T

Dimensions

Short nut



Long nut



Machining tolerances: unnecessary
 Mounting with a 10mm pipe wrench.
 The drilling axis can make an angle up to 30° relative to the normal of surface.



Wiring

It is recommended to use an extension cord to connect the sensors to measuring systems. The sensor cable is supposed to be protected in the tooling.



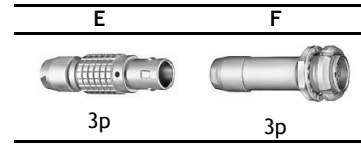
Standard cable E (3mm diameter, 10mm maximum advised curvature radius):

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

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

Connector types

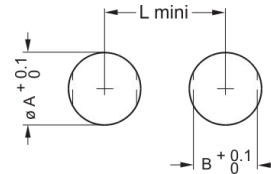
Proposed connectors are made by LEMO in Switzerland, they have three pins.



F-type is a female plug designed to be screwed on a flat panel. Maximal mounting panel thickness : 2mm, drilling diameter : 10mm.

Connector mounting specifications:

A = 9.1mm, B = 8.3mm, L mini=14.5mm.



Product Number

Product	191.	S	.	E		
Material	Stainless Steel Aluminum	R A				No option C Short Nut S Spring and M12 bayonet Options
Connector	Bare wires LEMO 3-pin male LEMO 3-pin female with screw		A E F		E	Sensor Standard Cable Type
			010 xxx		1m Other on request, in dm	Cable length

Standard reference number: 191.RS.F010E, steel sensor with 1m cable and screwable female connector.

High temperature version

Product	191.	R	.	N		
Material	Stainless Steel					No option C Short Nut Options
Type		K J			010	1m, 200°C max
Connecteur	Bare wires LEMO 3-pin male LEMO 3-pin female with screw LEMO 7-pin mâle		A E F G	010 xxx	1m, high temperature Other on request, in dm	Cable lengths

The cable is made in two parts. The one connected to the sensor can withstand high temperatures (500°C) whereas the connector side is limited to 200°C.

Contents

- 1 sensor with wounded cable conditioned bubble protective bag