

# 2Dex™ Hall Sensor Technology

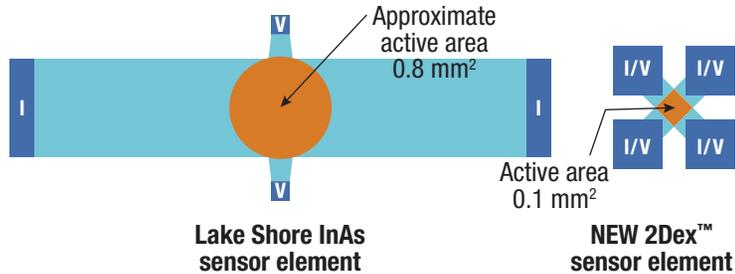
2-dimensional electron gas (2DEG) Hall effect magnetic sensors, providing several feature improvements over previous generation sensors.

## Easily calculate magnetic field values with highly linear Hall voltage

Compared to other sensor technology, 2Dex sensors exhibit significantly less linearity error. This makes the conversions of Hall voltage to field values using simple sensitivity values much more viable.

## Smaller active areas

2Dex Hall sensors have significantly smaller active areas than previous generation products. This results in improved spatial resolution and reduced signal averaging, useful when measuring fields close to a source where field gradients can be extreme.



## Better 3-axis measurements

2Dex 3-axis magnetic sensors have been designed to maximize orthogonality between x, y, and z sensor elements, resulting in more accurate vector magnitude measurements when field direction is unknown or changing.

## Predictable, flexible, and fast

Many magnetic sensors rely on auxiliary measurement conditioning circuitry, resulting in restrictions on the sensor's range, resolution, and accuracy. 2Dex Hall sensors use a very simple Hall structure without the need for auxiliary conditioning circuits. Sensor performance is achieved through meticulous manufacturing and testing of each sensor. This results in the predictability and repeatability of more complex circuits with the flexibility of a simple Hall element.



## Suitable for extreme environments

### Temperature

Materials in 2Dex sensors have been selected to work at both cryogenic and elevated temperatures, resulting in sensors with extremely wide operating temperature ranges. These sensors have also been characterized over their full operating temperature range for variables such as sensitivity, resistance, offset voltages, and quantum oscillations. This provides sensors with predictable behavior for various scenarios, and when they are paired with an F71 or F41 teslameter, automatic compensation for these variables result in highly accurate measurements—even in extreme environments.



### Radiation



The 2DEG material used in these sensors is inherently resilient to radiation—so much so that the same material used in 2Dex sensors has been used in satellite solar panels.

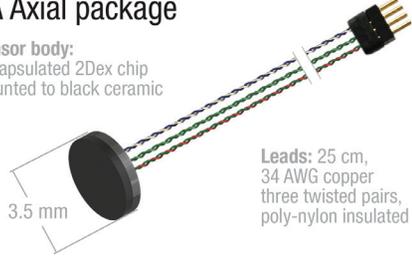
## Simplify setup with plug-and-play sensor options

Interested in using a 2Dex Hall sensor, but not interested in the time, effort, or uncertainty of building your own measurement circuit or apparatus? Plug-and-play sensors connect directly to the F71/F41 teslameters. This offers the installation flexibility of a Hall sensor with the measurement simplicity and performance of a teslameter/probe combination.

## 2Dex plug-and-play packages

### FA Axial package

**Sensor body:**  
Encapsulated 2Dex chip mounted to black ceramic



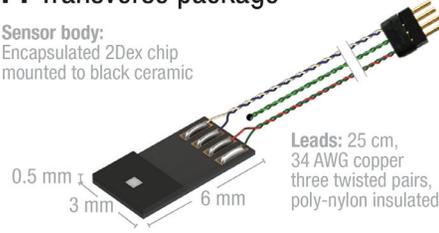
**Leads:** 25 cm, 34 AWG copper three twisted pairs, poly-nylon insulated



Typical active area depth: 0.35 mm

### FT Transverse package

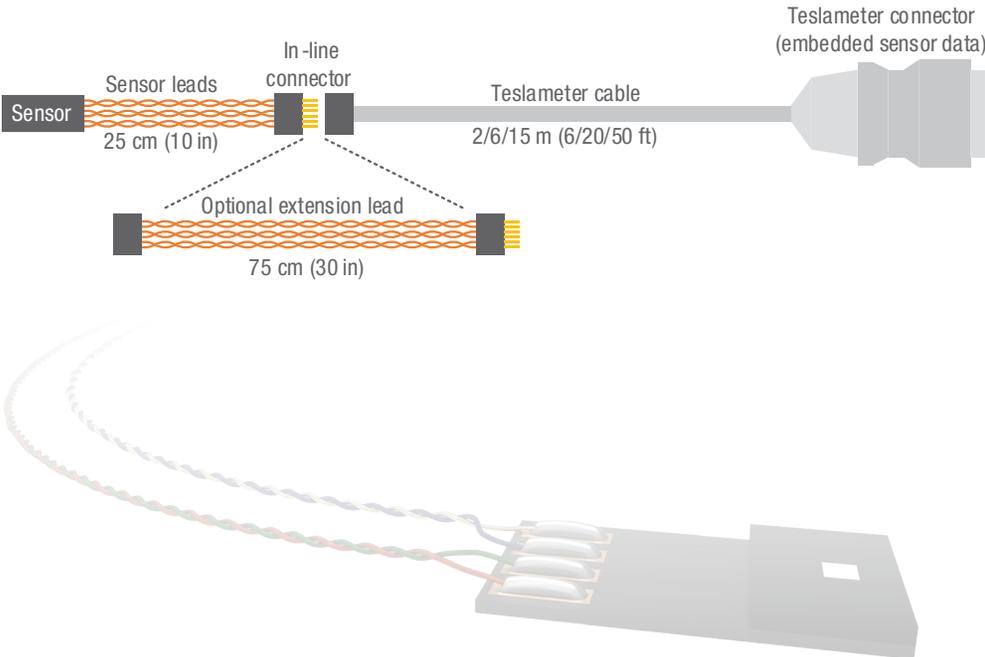
**Sensor body:**  
Encapsulated 2Dex chip mounted to black ceramic



**Leads:** 25 cm, 34 AWG copper three twisted pairs, poly-nylon insulated



Typical active area depth: 0.35 mm



## DC field measurement performance

	Standard resolution	Single-axis accuracy
35 T (350 kG) range	70 $\mu$ T (700 mG)	$\pm 1\%$ of rdg
3.5 T (35 kG) range	1.2 $\mu$ T (12 mG)	$\pm 0.15\%$ of rdg
350 mT (3.5 kG) range	0.16 $\mu$ T (1.6 mG)	$\pm 0.15\%$ of rdg
35 mT (350 G) range	0.12 $\mu$ T (1.2 mG)	$\pm 0.15\%$ of rdg

TruZero™ residual offset ( $23 \pm 5^\circ\text{C}$ ):  $\pm 3.5 \mu\text{T}$

## FP Series Hall probes

### Features

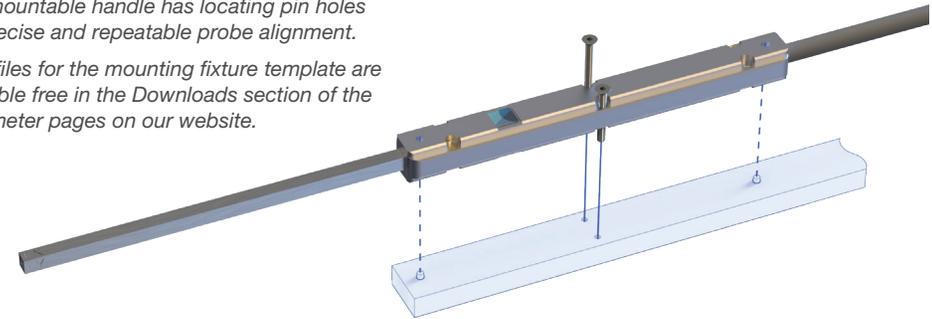
- Wide field range—suited for everything from earth-field to the world's strongest electromagnets
- 2Dex™ sensors with tiny active area of just 0.1 mm<sup>2</sup> for more precise measurements
- Temperature and linearity (field) compensation are built-in
- Versatile handle and stem options to suit numerous applications
- Ease of use features such as active area and polarity indicators
- Application-specific probe customization available

The FP Series probes make it easier than ever to integrate magnetic field measurement into your system. Take advantage of probes and sensors that really fit your application for optimum measurement results.

Lake Shore offers probes for every need, including 3-axis (vector), transverse, and axial models available in both handheld and fixture-mountable versions. Special cryogenic versions are also available.

The mountable handle has locating pin holes for precise and repeatable probe alignment.

CAD files for the mounting fixture template are available free in the Downloads section of the teslameter pages on our website.



With the flexible transverse probe, the standard aluminum stem is removed, exposing the PCB and sensor element. This somewhat flexible stem is also thinner than the standard offering, making it the best probe for measuring in very thin magnet gaps.

This stem also features a helpful ruler printed directly on the PCB.

