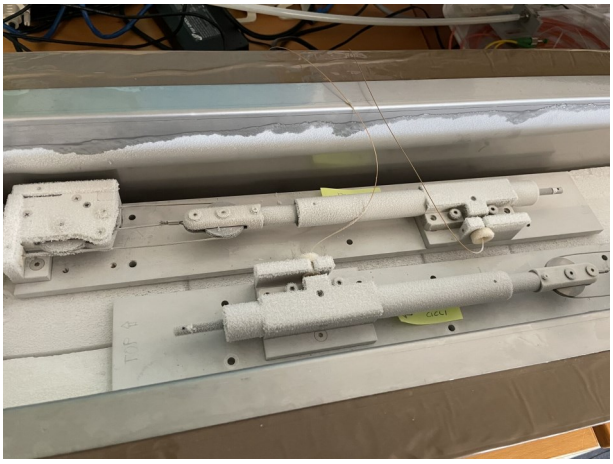
FOD Displacement Sensor

Fiber Optic Displacement Sensor

Extreme Sensing



INDUSTRIAL, LABORATORIES, PROCESS, R&D
HIGH VACUUM, IRRADIATION, MAGNETIC FIELDS,
DOWN TO CRYOGENIC TEMPERATURES

Thermo-Mechanical Instrumentation in the most challenging environments.

Description

The **FOD** optic linear position and displacement transducer is an absolute position transducer. The **FOD** is a completely passive sensor requiring no electrical signal. The **FOD** is completely immune to EMI and RFI and carries no risk of current leakage or ignition. The **FOD** can be located far away from the signal conditioner. These characteristics make the **FOD** well suited for difficult-to-reach locations.

The **FOD Extreme Sensing** is an enhanced design to measure displacement in vacuum, under irradiation, magnetic fields in cryogenic to high temperature environments.

The **FOD** operates either as a base sensor with push-pull configuration for contact measurements or in a non-contact measurement system made of a base sensor mounted on a frame with pulley and wire guide to enable axial or perpendicular exit of the wire.

Our unique design is based on **Fabry Perot interferometer principle**. By connecting this device to a Fabry-Perot fiber optic signal conditioner **EVOLUTION** it becomes an absolute position and displacement transducer.

The use of the **FOD Extreme Sensing** linear position and displacement sensor allows a complete analysis in the most challenging environments.

Key Features

- High resolution
- Intrinsically safe
- Immune to EMI / RFI
- Withstand extreme conditions
  - High Vacuum up to 10^{-8} Torr
  - Irradiation 6 MGy
  - Strong Magnetic fields up to 6 Tesla
  - Operating from 4 K up to +200 °C
- Stroke 0 - 40 mm and up to 0 - 250 mm
- Push-pull and Non-Contact (wire)
- 1-D displacement
- 3-D displacement compact arrangement
- High speed readout 250 Hz

Applications

- Particle Accelerators
- Superconducting Magnets
- Nuclear research facilities
- Tokamak Magnets, Vacuum Vessels and Cryostats
- Telescope, Spatial, Scientific and Medical R&D
- LNG and Chemicals storage, transportation and process infrastructures

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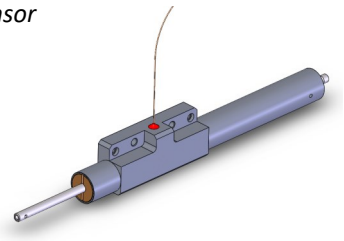
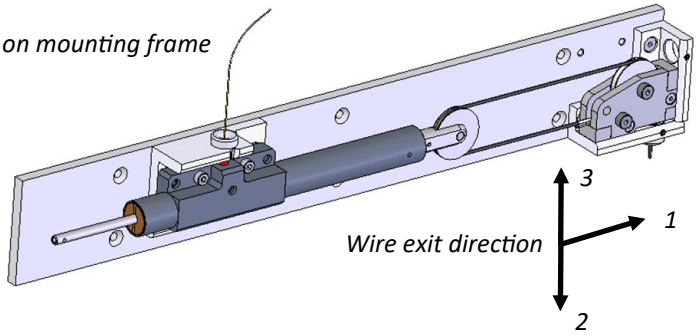
Specifications

Linear stroke:	0 - 40 mm (base push-pull sensor ±20 mm) 0 - 80 mm; 0 - 120 mm with pulley de-multiplicators / OPTIONAL: 0 - 250 mm
Accuracy:	1 % Full Scale over lifetime with EVOLUTION FPI-HR and down to 0.5 % Full Scale
Resolution:	0.1 % F.S. with EVOLUTION FPI-HR at constant Temperature / Irradiation
Irradiation:	Up to 6 MGy
Temperature range A:	-269 °C (4 K) to 80 °C
Temperature range B:	-100 °C to 200 °C
Material:	Aluminum (main body); Stainless Steel (moving piston); Aluminium-Bronze (guiding elements) ; Ceramic (sensor tip and wire output guide); Nickel-Chromium (wire). Non-magnetic
Thermal sensitivity:	Sensor body, piston, guiding elements: similar to aluminium (CTE ~10.10^{-6} / K)
Base sensor:	Cylindrical body: 0 - 40 mm stroke (native stroke) overall length 247 mm, body 184 mm x O.D. 19.05 mm
Base sensor on mounting frame:	Mounting frame with pulley system and wire guide for exit direction 1, 2 or 3: up to 0 - 120 mm stroke; 425 mm x 70 mm x 32 mm (L x W x T) / OPTIONAL: 0 - 250 mm stroke; 517 mm x 70 mm x 32 mm (L x W x T)
Lead fiber:	MM GI 50 µm core; rad hard; polyimide coating 125 µm
Mechanical cycling:	> 100'000 cycles

Base sensor



Base sensor on mounting frame



Certification and compliance

- Contact SMARTEC for additional information

Accessories

- L-Bracket to maintain wire extremity: dimensions 40 x 32 x 32 mm
- PEEK spiral tube O.D. 3 mm on Lead fiber
- Hermetic feedthrough
- Fiber Optic Signal Conditioner EVOLUTION (*): sampling rate FPI-HR-2X dual or single channel up to 125 Hz / 250 Hz per channel analog outputs 0 - 5 V or OPTIONAL 4 - 20 mA (16 bits resolution)
  (*) Contact SMARTEC for compliance to external interferences, including magnetic fields

Ordering information

- Estimated length sensor to feedthrough (if any) and / or to signal conditioner
- Sensor name for ID marking on the body
- Stroke
- Temperature range
- Wire exit direction

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Doc: SMA 15.1042
v. 14.04.23