



# FRI Refractive Index Sensor

Industrial, Laboratories, Process, R&D



FRI-BA



FRI-PK



FRI-NP

## Description

The FRI is a miniature sensor that provides *in-situ* refractive index measurements and allows continuous monitoring of any process, whether chemical or food engineering, thus eliminating manual sampling and repeatability problems. These sensors are designed to withstand variable temperature, EMI, RF, or microwaves as well as high pressure and vibration conditions.

Our unique design is based on the variation of a liquid-filled Fabry-Pérot optical cavity length to precisely determine the bulk refractive index of the liquid. The liquid-filled optical cavity length varies in direct proportion with the refractive index of the liquid sample. The refractive index measurement is achieved by measuring the Fabry-Pérot cavity length using white-light interferometry technology.

The FRI fiber optic refractive index sensors are available in a miniature package (FRI-BA model) or in PTFE tube (FRI-PK model) or in a rugged stainless steel package (FRI-NP model), suitable for industrial applications.

## Specifications

### Performances with CLASSIC conditioners (FTI-10, UMI-4 or 8)

Refractive index range <sup>1</sup>	1.000 to 1.700 RI
Resolution	0.0001 RI
Repeatability <sup>2</sup>	± 0.0005 RI
Operating temperature <sup>3</sup>	0°C to 100°C, No temperature compensation offered
Storage temperature <sup>4</sup>	-30°C to 80°C
Proof pressure of FRI-NP model	1000 psi (max)
Fiber optic cable minimum bend radius	2.5 cm (1")

1. FISO refractive index measurement system will not give  $n_D^{20}$  (where wavelength = 589 nm, and temperature = 20°C) The refractive index measurement is performed with white-light. The light source extends from 650 nm to 1000 nm. As a rule of thumb it is generally acceptable to consider the refractive index is measured for a central wavelength of 800 nm.

2. At 2σ and at constant temperature.

3. Do not freeze the sensor in any solvent to avoid damaging the sensing silicon bridge.

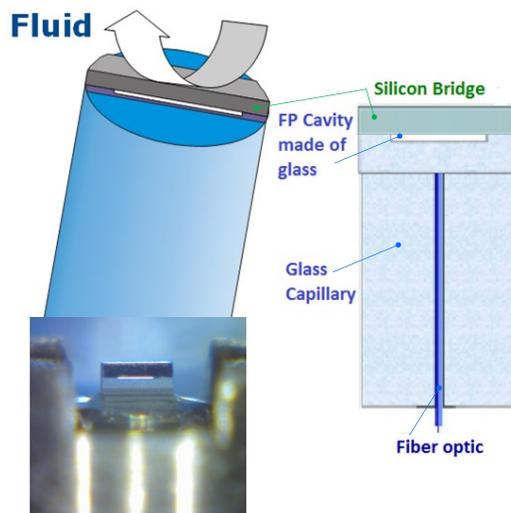
4. Limited by the connector maximum temperature.

## Key Features

- Wide range (1.000 to 1.700 RI)
- Resolution of 0.0001 RI
- Intrinsically safe (explosion proof)
- Immune to EMI / RFI / MW (see options)
- Up to 100°C (212°F)
- Up to 1000 psi
- High Accuracy and Repeatability
- Easy to use

## Applications

- Industrial environments
- Industrial *in-situ* process monitoring
- Sealed environments
- Chemical applications
- Harsh and hazardous environments
- Research and development
- Quality control
- Gas or liquid non-viscous fluids
- Mix fluid ratio evaluation (ex. oil % in refrigerant solution)



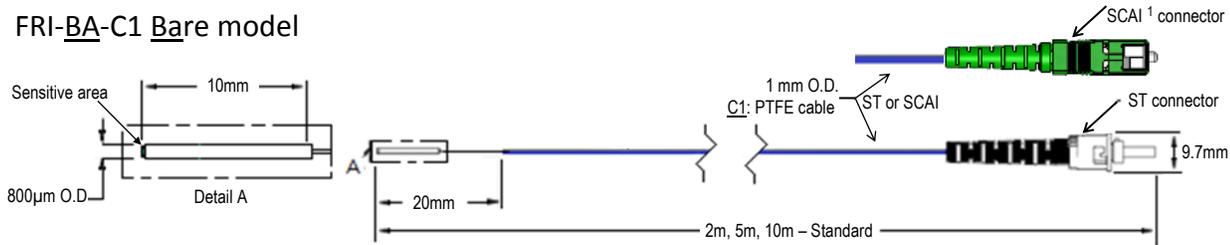


# FRI Refractive Index Sensor

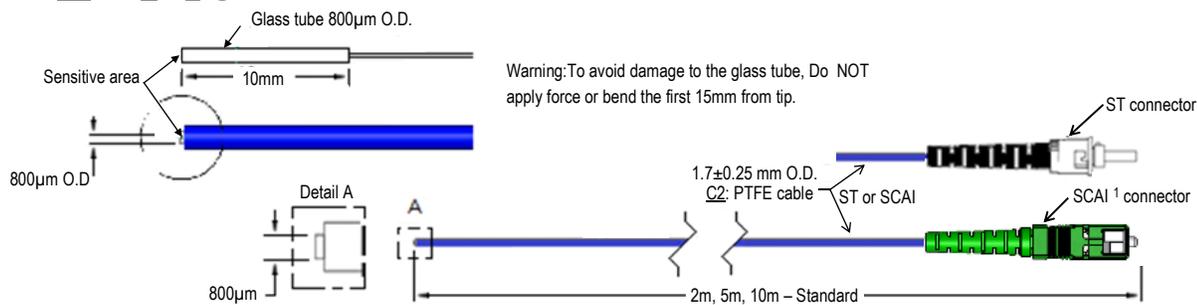
Industrial, Laboratories, Process, R&D

## Dimensions

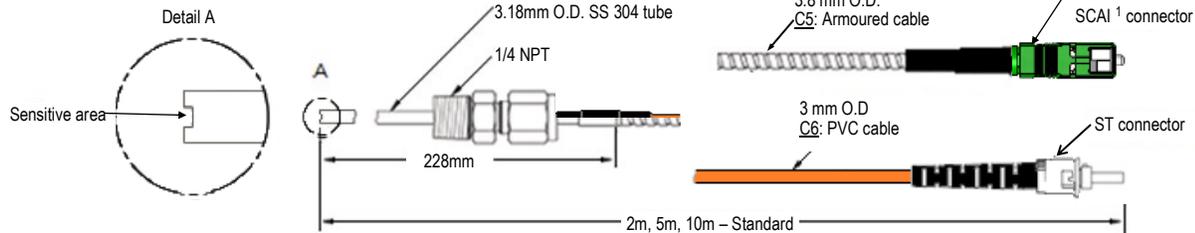
### FRI-BA-C1 Bare model



### FRI-PK-C2 Packaged model



### FRI-NP-C5 or C6 in SS 304 tube model



## Ordering information

Example: FRI- BA - C1 - F1 - M2 - R1 - ST

<p>BA- 20 mm sensor &amp; bare fiber exposed PK- 1.7 mm O.D. PTFE tube NP- 3.18 mm O.D. stainless steel</p>	<p>Distal tip</p>	<p>Cable</p>	<p>Fiber</p>	<p>Sensor length</p>	<p>Range</p>	<p>Connector</p>
<p>C1- 1 mm O.D. PTFE cable for BA model C2- 1.7 mm O.D. PTFE cable for PK model C5- 3.8 mm O.D. armoured cable for NP model C6- 3 mm O.D. Polyurethane cable</p>				<p>R1 1.000 to 1.700 RI</p>	<p>M2- 2 meters total length M5- 5 meters total length M10- 10 meters total length</p>	<p>ST- for CLASSIC (FTI, UMI) SCAI 1- for EVOLUTION (FPI-HR-2X)</p>
				<p>F1- 50µm CLASSIC (FTI, UMI) F2- 62.5µm EVOLUTION (FPI-HR-2X)</p>		

Other configurations may be possible. Call FISO for availability.

Note 1 SCAI is a SCA connector with smart chip communicating calibration data to the signal conditioner module

