



FOT-100™

Fiber Optic Temperature Sensor

User's Manual



Safety Information

The following manual contains information and warnings. They must be followed in order to keep the instrument in a working condition and ensure safe operation.

Safety Symbols

| | |
|--|--|
| | Warning - Danger - Identifies conditions or practices that could cause physical harm or death. |
| | Caution - Identifies conditions or practices that could result in a permanent loss of data or damage the measuring chain and/or other equipment to which it is connected. |
| | Important Information - Identifies important information, hints, and tips that must be read and applied. |
| | GND or earth ground |

Safety Precautions

Warning - Danger Caution

- To use the described product correctly and safely, read and follow all safety instructions or warnings that appear throughout this manual.
- This product is intended to be used by qualified operators and maintenance personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information before using this product.
- Install and use this product only as specified in this manual or the protection provided by this product might be impaired.
- When in doubt that safety protection has been impaired, make this product inoperative and secure it against any unintended operation.
- Exercise caution when working with voltage levels above 30 VAC RMS or 42 VDC. These voltage levels are potential shock hazards.
- Follow all generally accepted safety practices and procedures when working with or around electricity.
- Do not use this product in wet environments.

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This manual is provided solely for guidance. VibrosystM Inc. takes no responsibility or liability for any damage caused by accidents, improper installation or misuse. Liability is limited to the repair and/or replacement of defective products.

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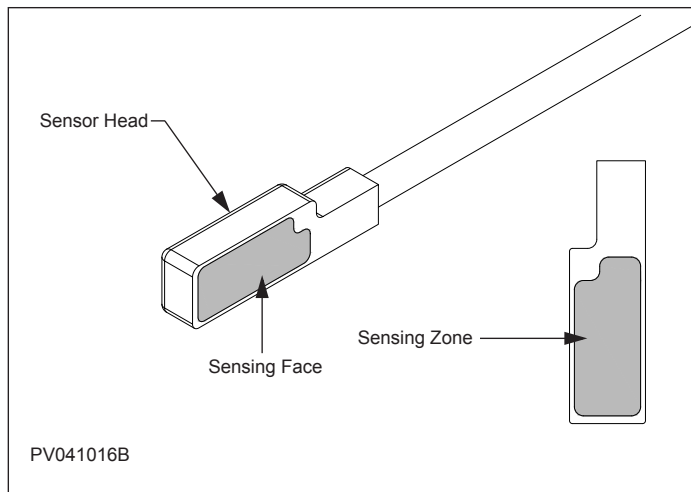
1. FOT-100 FIBER OPTIC TEMPERATURE SENSOR OVERVIEW

1.1 Description

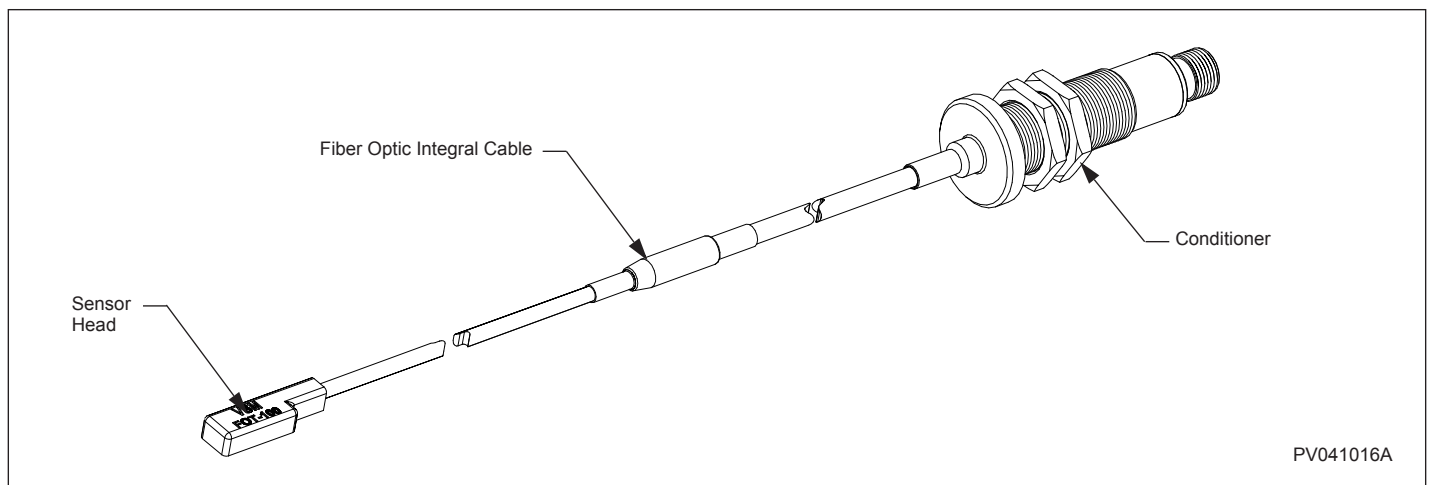
The FOT-100 fiber optic temperature sensor is used to monitor temperature in generator end windings, isophase bus bars, exciter brushes, and knife switches in large motors or generators. These sensors are made of non-conductive materials and are immune to inductive effects and electromagnetic interference. FOT-100 sensors are suited for operation in hostile environments containing high voltage levels.

These sensors detect temperature from their entire surface, front and back. They can be glued to solid objects and can also read ambient air temperature.

FOT-100 Fiber Optic Temperature Sensor



Complete Measuring Chain



1.2 Main Unit Interventions

- Sensors must be glued on the stator bars.
- Fiber optic cables must be routed inside the stator housing.
- Epoxy resins must be applied inside the generator.



2. FOT-100 SENSOR OPERATION

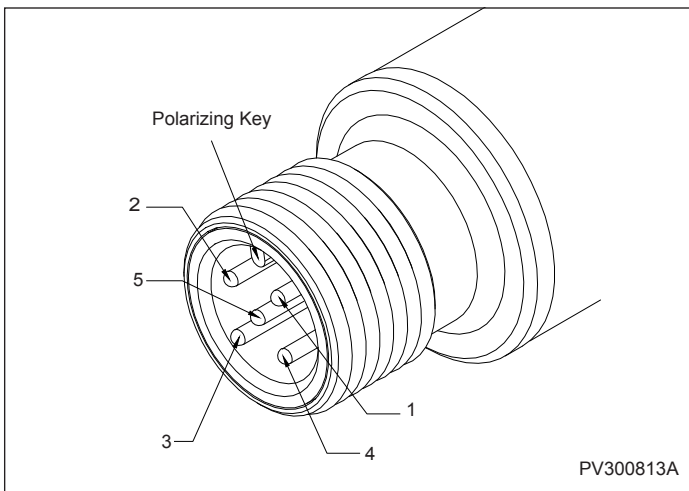
2.1 Connecting the FOT-100 Sensor

The FOT-100 conditioner must first be connected to a 24VDC power supply and a receiving instrument with signal cable and M12 connector. It is important to confirm each component's functionality before proceeding with a permanent installation.

The conditioner's outer shell must always be grounded. This is usually achieved by mounting the conditioner to an already grounded holder with a conductive surface.

The cable shield must also be grounded. It is important to ground the shield on one end only to avoid creating a ground loop. If the M12 connector at the end of the cable is insulated from the shield, the shield must then be grounded on the acquisition unit side. However, if the M12 connector at the end of the cable is connected to the shield, attaching the cable to the already grounded FOT-100 conditioner will automatically ground the shield. In this case, the shield must not be grounded on the acquisition unit side. The illustration below shows the pinout for the M12 connector.

FOT-100 Pinout



The signal cable provided by VibroSystM may be replaced by any cable having similar characteristics. The table below shows the color codes, designations and specifications for VibroSystM's signal cable.

M12 Connector/Cable Pinout

| M12 Connector Pin # | Color | Designation | Specification |
|---------------------|----------|----------------|---|
| 1 | Brown | Power Supply | +24 VDC |
| 2 | White | Current Output | 7.2-20 mA (proportional to sensor's full range) |
| 3 | Blue | Common | 0 V |
| 4 | Black | Not Used | |
| 5 | Not Used | | |



3. SENSOR INSTALLATION OVERVIEW

Caution

- Since this product has a multitude of possible applications, only an installation overview is explained. In order to properly complete the installation, VibroSystM should be present during sensor installation and commissioning. Please contact VibroSystM for more information regarding specific applications.

3.1 Preliminary Considerations

When choosing a location for the sensor head, cable and conditioner, the following considerations must be taken into consideration:

- The conditioner's case must be properly grounded (usually through its holder).
- The electric insulation rating between the sensor head and signal conditioner is up to 3KV/mm.
- The distance between the sensor head and conditioner: the fiber optic cable has a set length of 10 m [32.8 ft].
- The M12 connector/cable's total length must not exceed 300 m [984 ft].

FOT-100 temperature sensors are designed and calibrated to operate strictly according to their respective specifications. The fiber optic cable between the sensor head and conditioner must not be cut or altered.

3.2 Installation Guidelines

3.2.1 FOT-100 Sensor Head Installation

Caution

- Avoid applying mechanical stress (twisting, pressure) on the sensor head. This may damage the sensor and lead to erroneous readings

Sensor performance depends on a proper installation. The closer the sensor head comes into contact with the monitored surface, the more accurate the readings will be. The use of a thermally conductive adhesive is recommended to maximize thermal transfer to the sensor head. It is also possible to encapsulate the sensor head in order to maximise transfer from only one direction.



3.2.2 FOT-100 Fiber Optic Cable Installation

Caution

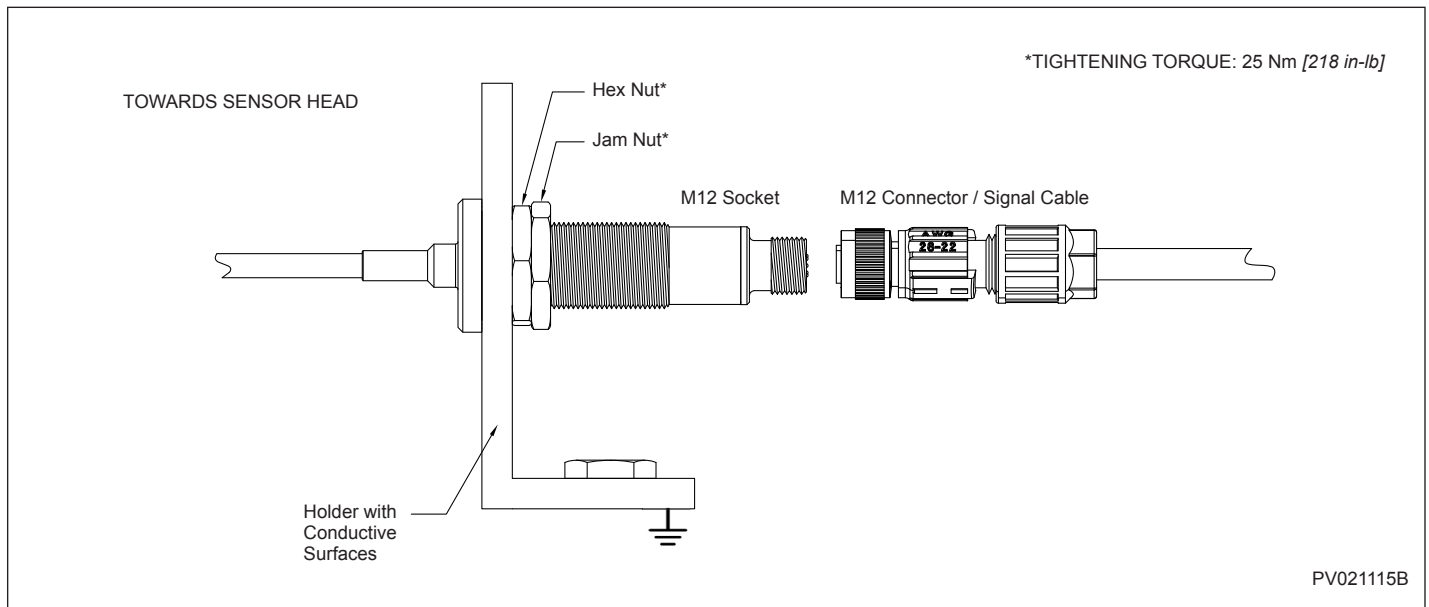
- The fiber optic cable must NEVER be bent below its minimum bending radius of 80 mm [3.15"]. All bends must have smooth curves and follow the cable's natural curvature. While handling the cable, avoid twisting or pulling it against sharp edges. This may break the fiber optic strands inside.
- Mechanical stress on the fiber optic cable (crushing, kinking) can cause damage and cause false readings.

All cables must be secured on their entire length. Ties should be used whenever possible. Excessive vibrations can cause irreversible damage to the sensor.

3.2.3 FOT-100 Signal Conditioner Installation

The FOT-100 signal conditioners are typically mounted on a holder and their housing must be grounded. Proceed with the installation of each conditioner as shown in the following illustration.

Detailed View of an FOT-100 Signal Conditioner Installation



Important Information

- If it is not possible to mount the FOT-100 conditioner on a grounded holder, grounding must be provided by the M12 connector's shield.