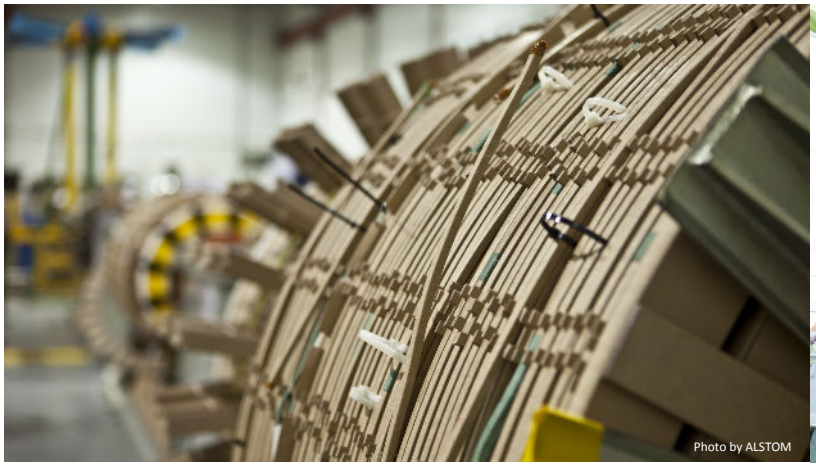
Nortech

Fiber-Optic Sensor

For **Winding Hot-Spot**

The FISO Nortech fiber-optic temperature measurement system provides direct, real-time, and long-term monitoring of power transformers and reactors, allowing smarter dynamic substation and power grid management.

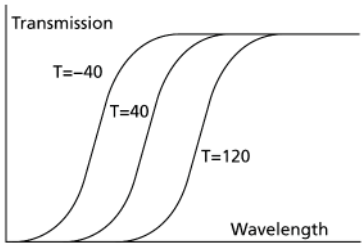
The industry's most reliable solution for direct hot-spot temperature measurement



GaAs

THE PRINCIPLE

The measurement principle is based on white light absorption/ transmission by a GaAs (gallium arsenide) semiconductor. The effects of temperature variations on this semiconductor are well known and predictable. As the temperature of the semiconductor changes, the semiconductor's transmission spectrum (i.e. the light that is not absorbed) shifts also. At any given temperature there will be a wavelength at which the transmission jumps from essentially 0% to 100% . This jump is called the absorption shift,

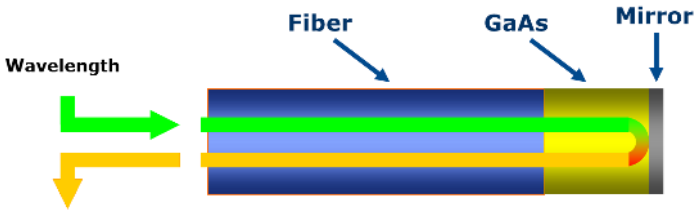


and the relationship between the specific wavelength where the absorption shift takes place and temperature is predictable.

THE TEMPERATURE SENSOR

The sensor consists of a tiny GaAs semiconductor crystal bonded to one end of a well-polished optical fiber.

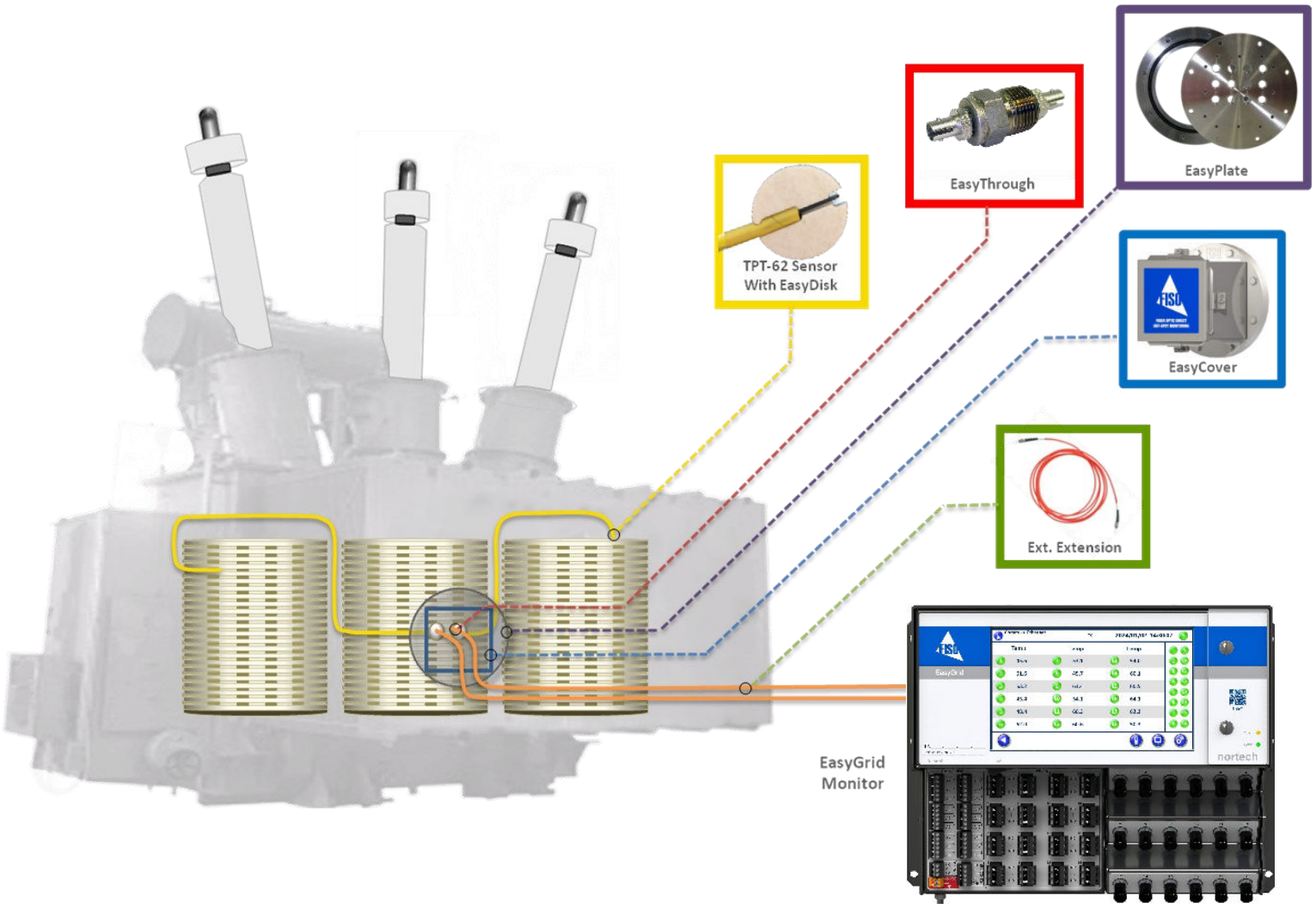
White light launched from the monitor into the optical fiber travels through to the GaAs crystal, passes through it while being partially absorbed, and then is reflected back to the monitor by a mirror at the very tip of the sensor. Light reflected back to the monitor is coupled into an optical spectrum analyzer which then measures the optical power transmission versus wavelength. The position of the absorption shift is determined by the monitor using a proprietary signal analysis algorithm and is then correlated to the temperature of the GaAs crystal.



Furthermore, since the semiconductor will not change over time, all sensors are interchangeable with no need for calibration or entry of factors when swapping sensors. For the same reason monitors never need recalibration after they leave the factory, while used under normal operating conditions.

- **Reliable 62.5µm optical fiber design with tighter bend radius than 200µm alternatives**
- **All dielectric materials & complete immunity to EMI**
- **Thermally, chemically, and mechanically compliant with transformer environments**
- **No sensor or monitor recalibration required**
- **Not an intensity based measurement such as with competing fluorescence decay technology**

TYPICAL NORTECH SYSTEM

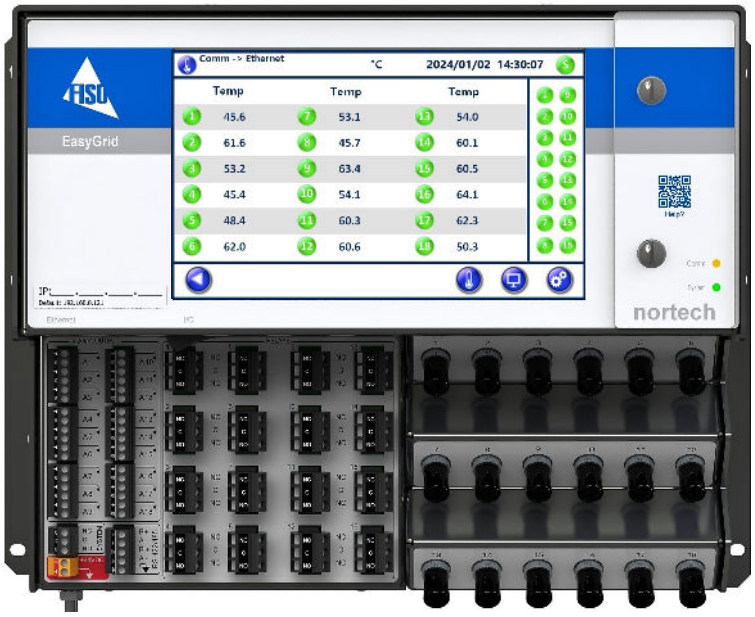


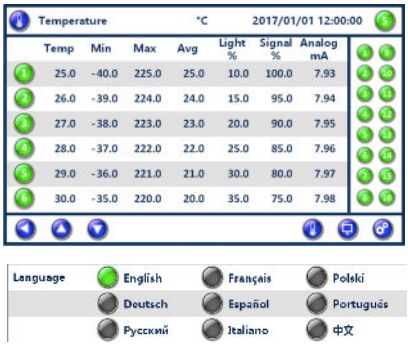
- **Reliable & Cost Effective Hot Spot Solution**
- **IEC Compliant EasyDisk Sensor Installation**
- **Leak-Free Tank Wall Optical Interface**
- **User-Friendly Installation and Operation**
- **Nortech Client PC Software Support**

Nortech

EasyGrid

ENERGY





MULTI-CHANNEL FIBER-OPTIC MONITOR / CONTROLLER FOR ENERGY APPLICATIONS

Accurate, Reliable & Cost Effective Winding Hot Spot Temperature Monitoring Solution for Transformers and Reactors

Description

The Nortech EasyGrid is the perfect complement to your Smart Grid. The fiber optic signal conditioner is designed for direct, accurate and real-time temperature monitoring to manage and maximize your transformer performance. The EasyGrid provides critical information about the level of thermal stress and the management of the life cycle of any transformer or reactor. From an EHV/UHV, HVDC to a distribution transformer the cost-effective EasyGrid will meet the highest requirements. A large 7" (800 x 480) Color Touch Screen LCD Display allows you to monitor and configure up to 18 channels and 16 form-C programmable relays. The new graphical user interface makes it easy to customize to your needs. The Nortech Client software allows full configuration and complete monitoring of your system. View all data logging information live on your PC without stopping the acquisition or downloading of any file.

For over 30 years, FISO has been the leader in the Fiber-Optic White-Light Technology. The EasyGrid is using the temperature dependent band gap shift of the GaAs crystal to provide a fast and accurate measurement. Inherent to the technology, the system will not drift nor require any recalibration and the monitor Auto-Correct feature continuously compensates for internal temperature effects.

Furthermore, internal monitor temperature data logging allows tracking of your control equipment during extreme environmental conditions.

Key Features

- Real-time Temperature Monitoring
- 4 to 18 Channels
- Display up to 18 temperatures simultaneously
- Large 7" Color Touch Screen LCD (800x480)
- New Display Language Selection
- Up to 18, 4-20mA Analog Output (1/Channel)
- Choice of 0, 8 or 16 Form-C Programmable Relays
- Easy Front panel Wiring
- 8 GB, Industrial Data Storage
- Modbus (ASCII / RTU)
- Ethernet: IEC 61850*, DNP3.0*, IEC 60870-5-104*, Modbus TCP-IP*
- Ethernet Over Fiber Optics*
- PRP, Integrated Parallel Redundancy Protocol*
- No Calibration Required
- Light Source Good for the Life of the Transformer
- Auto-Diagnostic & Auto-Correct
- Robust design & 5 Year Warranty

* Optional

Applications

- Power Transformer Winding & Core Hot Spot
- Power Transformer Top & Bottom Oil
- All types of Reactors & Transformers (MV, HV, EHV, UHV, HVDC)
- Busbars & Switchgear
- Generator Stators

Nortech

EasyGrid ENERGY

Specifications

Number of channels	4, 6, 8, 9, 10, 12, 14, 16 or 18
Reading temperature range	-40°C to 225°C
Temperature accuracy	±1 °C
Resolution	0.1 °C
Sampling rate (per channel)	500 ms
Operating temperature	-20°C to 70°C*
Storage temperature	-30°C to 85°C
Light source life	>50 years
Humidity	95% RH Non-Condensing
Display	Large 7" TFT Color display (800x480)
System Configuration	Touch Screen Panel or USB Remote
Security	Password Protection
Internal monitor temperature	CCD, Board & System Temperature Available with data logging

* System Temperature

Communication ports	USB, RS-485, RS-422 & Ethernet (RJ45* or ST optical**)
Communication Protocols	Nortech, Modbus (ASCII / RTU), IEC 61850*, DNP3.0*, Modbus TCP-IP*, IEC 60870-5-104*
Analog Output	Up to 18, 4-20 mA, 1 per channel, User Configurable
Relays	0, 8 or 16 Form-C Relays, User Configurable
System fault relay	1 Dedicated System Fault Relay
System Status Indicator	LED
Memory	8 GB Industrial Memory & User configurable > 50 Years at 1 measurement/minute
Auto-Correct	Continuous Internal Temperature Compensation
Auto-Diagnostic	Light Level, Signal Level
Input Power	24 VDC
Power consumption	40W (maximum)
Surge Protection	4000V (IEEE C37.90.1)

* Optional ** Optional 100BASE-FX IEC61850 protocol, MM (ST) 2km (1310nm)

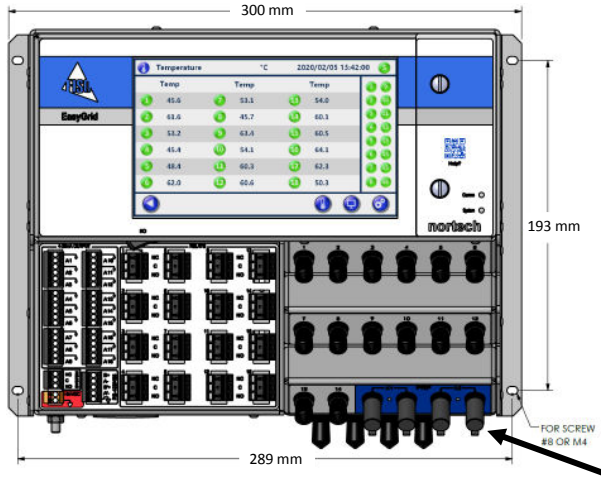
Environmental standards

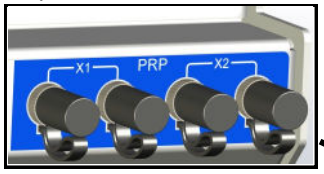
MIL-STD-810G	Transport vibrations
IEC 60255-21-1	Vibration: response , endurance
IEC 60255-21-2	Shock and bump tests
IEC 60255-21-3	Seismic test
IPC-CC-830 / MIL-I-46058C	Environmental protection, conformal coating
EN50581 : 2012	RoHS Directive

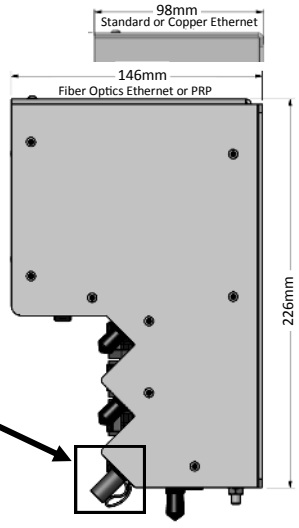
Immunity standards

EN 61326	IEC 61000-4-2 (IEC 60255-22-2)	IEC 61000-4-9
EN 55011 / CISPR 11	IEC 61000-4-3 (IEC 60255-22-3)	IEC 61000-4-11
ICES-003	IEC 61000-4-4 (IEC 60255-22-4)	IEC 61000-4-18
IEC 60255-22-1	IEC 61000-4-5 (IEC 60255-22-5)	IEEE C37.90.1
IEC 60255-26	IEC 61000-4-6 (IEC 60255-22-6)	
IEC 60255-27	IEC 61000-4-8	

This product meets the EMC requirements of the United States (FCC Part 15, subpart B, Class A)







Ordering information

E-GRID - __ - A - Y__ - _____

Number of Sensor Channels
04, 06, 08, 09, 10, 12, 14, 16 or 18

Sensor compatibility
A : Compatible with TPT-62-R1

Number of Relays
00 : 1 System Fault Relay
08 : 1 System Fault Relay + 8 Programmable Relays
16 : 1 System Fault Relay + 16 Programmable Relays

Communication Ports / Protocols
Standard Modbus over RS-485: STND

Optional Ethernet :	Ethernet Over copper	Ethernet Over Fiber Optics
DNP 3.0 :	DNP3	DNP3FO
IEC 61850 :	I850	I850FO
IEC 61850 PRP :	---	I850FOPRP
IEC 60870-5-104 :	I870	I870FO
MODBUS TCP-IP :	MTCP	MTCPFO

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

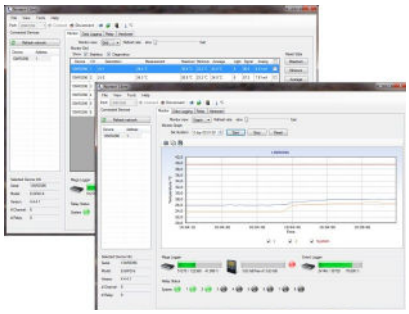
Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

EasyGrid LT

ENERGY



MULTI-CHANNEL FIBER-OPTIC MONITOR / CONTROLLER FOR ENERGY APPLICATIONS

Accurate, Reliable & Cost Effective Winding Hot Spot Temperature Monitoring Solution for Transformers and Reactors

Description

The Nortech EasyGrid LT is a cost effective, flexible, multi-channel fiber optic signal conditioner designed for direct, accurate and real-time temperature monitoring.

The Nortech Client Software allows full configuration and monitoring of your system. It is now possible to consult the data logging information live on your computer without downloading the complete file.

The EasyGrid LT is available as a full-featured monitor to match your requirements and it offers on-board auto-diagnostic for easier system installation.

Select the relay option and use it as a fully configurable controller with complete communication capabilities. For over 30 years, FISO has been the leader in Fiber-Optic White-Light Technology. The EasyGrid LT is using the temperature dependent band gap shift of the GaAs crystal to provide a fast and accurate measurement. Inherent to the technology, the system will not drift nor require any recalibration and the monitor Auto-Correct feature continuously compensates for internal temperature effects.

Furthermore, internal monitor temperature data logging allows tracking of your control equipment during extreme environmental conditions.

Key Features

- Real-time Temperature Monitoring
- 2 to 8 Channels, 1 Analog Output / Channel
- Large LCD Screen
- 0 or 8 Form-C Programmable Relays
- Internal Memory
- Modbus, Modbus TCP-IP*, IEC 61850*, IEC 60870-5-104*, DNP3.0*
- No Calibration Required
- Easy Front Panel Wiring
- Light Source Good for the Life of the Transformer
- Auto-Diagnostic & Auto-Correct
- Robust Design & 5 Year Warranty

* Optional

Applications

- Power Transformer Winding & Core Hot Spot
- Power Transformer Top & Bottom Oil
- All types of Transformers (MV, HV, EHV, UHV, HVDC)
- Reactors, Generators, Switchgear
- Load Tap Changers

Nortech

EasyGrid LT

ENERGY

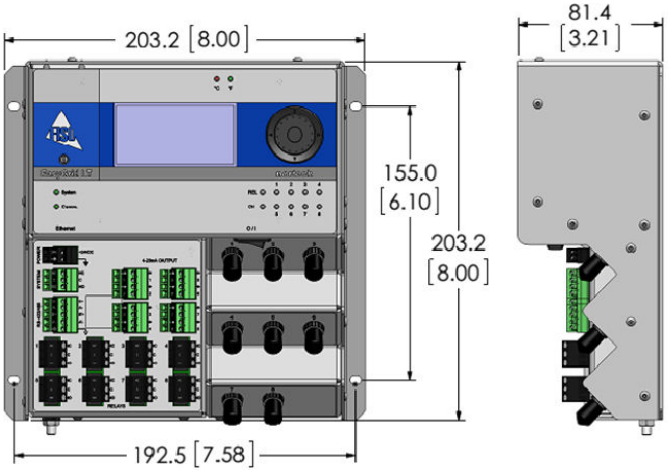
Specifications

Number of channels	2, 4, 6 or 8
Reading temperature range	-40 °C to 225 °C
Temperature accuracy	±1 °C
Resolution	0.1 °C
Sampling rate (per channel)	500 ms
Operating temperature	-20°C to 70°C*
Storage temperature	-30°C to 85°C
Light source life	>50 years
Humidity	95% RH Non-Condensing
Display	Large LCD
Internal monitor temperature	CCD, Board & System Temperature Available with data logging

* System Temperature

Communication ports	USB, RS-485, RS-422 & Ethernet (RJ45)*
Communication Protocols	Nortech, Modbus (ASCII / RTU), Modbus TCP-IP*, IEC 61850*, IEC 60870-5-104*, DNP3.0*.
Analog Output	4 -20 mA, User Configurable
Relays	8 Form-C Relays, User Configurable Also Available without Relays
System fault relay	1 Dedicated System Fault Relay
System Status Indicator	LED
Memory	> 1 .8 Years at 1 Measurement / 1 Min. > 9 Years at 1 Measurement / 5 Min.
Auto-Correct	Continuous Internal Temperature Compensation
Auto-Diagnostic	Light Level, Signal Level
Input Power	24 VDC
Power consumption	15W (maximum)
Surge Protection	4000V (IEEE C37.90.1)

* Optional



Immunity standards

EN 61326	IEC 61000-4-2 (IEC 60255-22-2)	IEC 61000-4-9
EN 55011 / CISPR 11	IEC 61000-4-3 (IEC 60255-22-3)	IEC 61000-4-11
ICES-003	IEC 61000-4-4 (IEC 60255-22-4)	IEC 61000-4-18
IEC 60255-22-1	IEC 61000-4-5 (IEC 60255-22-5)	IEEE C37.90.1
IEC 60255-26	IEC 61000-4-6 (IEC 60255-22-6)	
IEC 60255-27	IEC 61000-4-8	

This product meets the EMC requirements of the United States (FCC Part 15, subpart B, Class A)

Environmental standards

MIL-STD-810G	Transport vibrations
IEC 60255-21-1	Vibration: response , endurance
IEC 60255-21-2	Shock and bump tests
IEC 60255-21-3	Seismic test
IPC-CC-830 / MIL-I-46058C	Environmental protection, conformal coating
EN50581 : 2012	RoHS Directive

Ordering Information

EGD-LT - __ - MIL - A - Y__ - _____

Number of Sensor Channels
02, 04, 06 or 08

Configuration
M : Memory
I : Analog Output
L : LCD Display

Sensor compatibility
A : Compatible with TPT-62-R1

Number of Relays
00 : 1 System Fault Relay
08 : 1 System Fault Relay + 8 Programmable Relays

Communication Ports / Protocols
Standard Modbus over RS-485: STND

Optional Ethernet :	Ethernet Over copper
DNP 3.0 :	DNP3
IEC 61850 :	I850
IEC 60870-5-104 :	I870
MODBUS TCP-IP :	MTCP

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

EasyGrid Base

ENERGY

NEW GENERATION
MULTI-CHANNEL
FIBER-OPTIC RTU/IED

TEMPERATURE MONITOR
FOR ENERGY APPLICATIONS

Accurate, Reliable & Cost Effective Winding Hot Spot Temperature Monitoring Solution for Transformers and Reactors

Description

The Nortech EasyGrid Base is the perfect complement to your Smart Grid remote condition monitoring system.

This fiber optic signal conditioner is designed for easy network integration to provide direct, accurate and real-time temperature monitoring of your electrical grid assets.

Full network connectivity is possible through analog outputs, a serial port or an optional Ethernet port (Copper or Fiber Optic) and if desired, all simultaneously connected and operational.

The EasyGrid Base provides critical information, in real-time, on the level of thermal stress of any transformer or reactor. From your GSU to EHV, UHV, HVDC all the way to distribution transformers, the cost-effective EasyGrid Base will meet the most challenging requirements.

Using the EasyGrid Base software you can configure the EasyGrid Base to operate as a stand-alone device, on its own or as a parallel autonomous device. Store temperature information locally and then view all the logged data information live on your PC without stopping an ongoing acquisition or downloading of any file. Internal logged files can be quickly uploaded to your PC also using the Evolution software for complete off location data analysis.

Key Features

- Real-Time Temperature Monitoring
- 4 to 12 Channels, 1 Analog Output / Channel
- Smart Grid Network Compatible
  - ♦ **Ethernet Port**: Modbus TCP-IP*, IEC 61850*, IEC 60870-5-104*, DNP3.0*
  - ♦ **Serial Port**: Modbus (ASCII / RTU)
  - ♦ **Analog Outputs**: Current equivalent
- Ethernet Over Fiber Optics*
- Industrial grade operating temperature -40 to 85 °C
- Internal Data Logging
- Auto-Diagnostic & Auto-Correct
- No Calibration Required
- Robust design & 5 Year Warranty

* Optional

Applications

- MV, HV, EHV, UHV, HVDC Transformer Winding & Core hot spots
- GSU Transformers and Reactors Winding & Core hot spots
- Tank Top & Bottom Oil, Load Tap Changers
- Current Transformer, Switchgear, Busbars
- Stators & other critical components

Nortech

EasyGrid Base

ENERGY

Specifications

Number of channels	4, 6, 8, 10 or 12
Reading temperature range	-80°C to 300°C
Temperature accuracy	±1 °C
Resolution	0.1 °C
Sampling rate (per channel)	140 ms
Operating temperature	-40°C to 85°C
Storage temperature	-50°C to 85°C
Light source life	>50 years
Humidity	95% RH Non-Condensing
System Configuration	Remote via Software
Configuration Port	Micro USB
Internal monitor temperature	System Temperature Available with data logging

Communication ports	Isolated RS-485, RS-422 Ethernet (RJ45* or ST optical**)
Communication Protocols	NORTECH II, Modbus (ASCII / RTU), Modbus TCP-IP*, IEC 61850*, IEC 60870-5-104*, DNP3.0*.
Analog Output	4-20 mA, User Configurable
System fault relay	1 Dedicated System Fault Relay
System Status Indicator	LED
Internal Memory	> 1 Years at 1 Measurement / 1 Min for 12 channels
Auto-Correct	Continuous Internal Temperature Compensation
Auto-Diagnostic	Light Level, Signal Level
Input Power	24 VDC
Power consumption	< 15W
Surge Protection	4000 V (IEEE C37.90.1)

* Optional ** Optional 100BASE-FX IEC61850 protocol, MM (ST) 2km (1310nm)

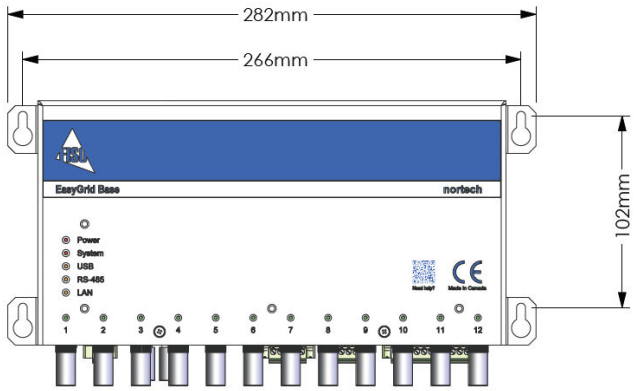
Environmental standards

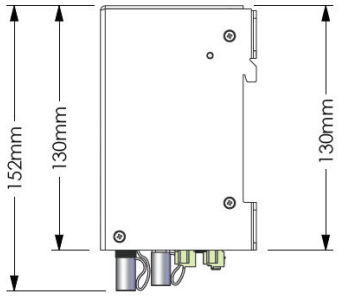
MIL-STD-810G	Transport vibrations
IEC 60255-21-1	Vibration: response , endurance
IEC 60255-21-2	Shock and bump tests
IEC 60255-21-3	Seismic test
IPC-CC-830 / MIL-I-46058C	Environmental protection, conformal coating
EN50581 : 2012	RoHS Directive

Immunity standards

EN 61326	IEC 61000-4-2 (IEC 60255-22-2)	IEC 61000-4-9
EN 55011 / CISPR 11	IEC 61000-4-3 (IEC 60255-22-3)	IEC 61000-4-11
ICES-003	IEC 61000-4-4 (IEC 60255-22-4)	IEC 61000-4-18
IEC 60255-22-1	IEC 61000-4-5 (IEC 60255-22-5)	IEEE C37.90.1
IEC 60255-26	IEC 61000-4-6 (IEC 60255-22-6)	
IEC 60255-27	IEC 61000-4-8	

This product meets the EMC requirements of the United States (FCC Part 15, subpart B, Class A)





Ordering information

EGD-BASE - __ - MI0 - A - Y00 - _____

Number of Sensor Channels
04, 06, 08, 10, or 12

Configuration
M : Memory
I : Analog Output
0 : No Display

Sensor compatibility
A : Compatible with TPT-62-R1

Number of Relays
00 : 1 System Fault Relay

Communication Ports / Protocols
Standard Modbus over RS-485: STND

Optional Ethernet :	Ethernet Over copper	Ethernet Over Fiber Optics
DNP 3.0 :	DNP3	DNP3FO
IEC 61850 :	I850	I850FO
IEC 60870-5-104 :	I870	I870FO
MODBUS TCP-IP :	MTCP	MTCPFO

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

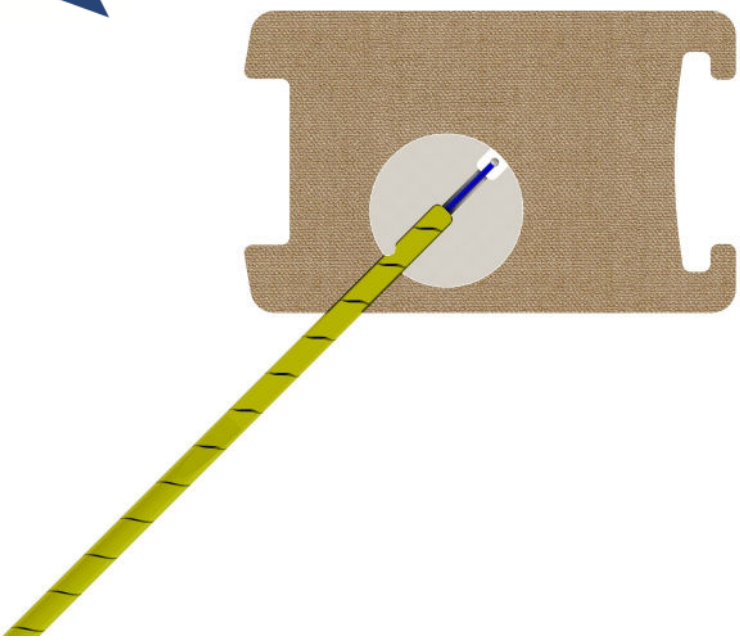
Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

TPT-62

ENERGY



With EasyDisk

Optimal Sensor Location
Increased Protection
Easier Installation

TEMPERATURE SENSOR FOR OIL-FILLED TRANSFORMERS

Robust & Cost effective Fiber Optic Sensor for Energy Temperature Monitoring solutions

Description

The FISO heavy duty TPT-62 fiber optic temperature sensor is specifically designed for permanent installation in oil-filled transformers. It clearly demonstrates FISO's experience and leading edge technology in direct winding temperature measurement.

Offered at no extra cost, the EasyDisk allows quick and secured spacer installation without any adhesive.

It ensures optimal sensor tip positioning on the conductor to allow reliable and accurate temperature measurements. The EasyDisk provides the best protection during all transformer manufacturing steps including winding compression.

The Nomex™ EasyDisk also locks the PTFE Spiral-Wrap sheathing in the spacer to ease optical cable routing. The TPT-62 double PTFE oil permeable sheathing, with transversal slits, is designed to withstand installation stresses, harsh testing conditions such as kerosene vapour, heat runs and induced vibration during the overall lifetime of the transformer. The TPT-62 can be used with all Nortech 62.5µm monitors (EasyGrid, EasyGrid LT, EasyGrid Base and EasyTest-II). Neither the signal conditioner nor the TPT will require any calibration for the life of the transformer.

- Robust Design
- -40°C to 225°C
- Nomex™ EasyDisk
- Direct Contact
- RFI/EMI Immune
- High Dielectric Constant
- No Calibration Required

- Power Transformer Winding & Core Hot Spot
- Power Transformer Top & Bottom Oil
- All types of Transformers (MV, HV, EHV, UHV, HVDC)
- Reactors, Generators, Switchgear
- Load Tap Changers

Nortech

TPT-62

ENERGY

Specifications

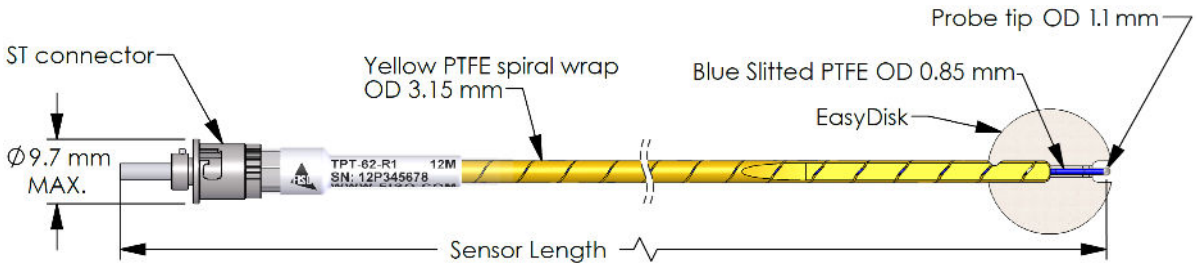
Temperature Range	-40°C to 225°C
Resolution	0.1°C
Accuracy	±1°C
Fiber Type	62.5 µm Silica Fiber (OM1)
Cable Sheathing	Double PTFE Sheathing • 0.85 mm PTFE Cable with Slits for Oil Permeability • 3.15 mm PTFE Spiral Wrap
Minimum bending radius	8mm Short-term, 15mm Long-term
Available Sensor Length	2 to 15 Meters (1m Increment)
Connector Type	ST Connector

Chemical Resistance	Compatible with Hot Kerosene Vapor drying process Compatible with transformer oils: Mineral, Natural Ester, Synthetic Ester
Tip Termination	EasyDisk Ø 18.85 mm (Standard) Bare Tip / No Disk (Optional) Glued Tip / No Disk (Optional)
RF & EMI Susceptibility	Completely Immune

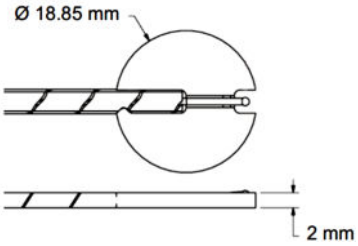
Dielectric certification (sensor, disk & cable)

Tested at HV Lab after being prepared accordingly to ASTM D2413		
Power frequency withstand PD inception	< 2 pC at 6.7kV/mm	ASTM D149
Lightning & Switching Impulse	20kV/mm	ASTM D3426

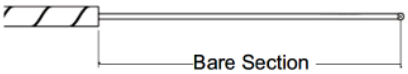
TPT-62



EasyDisk (Standard)



Bare/Glued Tip (Optional)



TPT-62 Ordering Information

TPT - 62 - ____ - C7 - F2 - M _ _ - R1 - ST

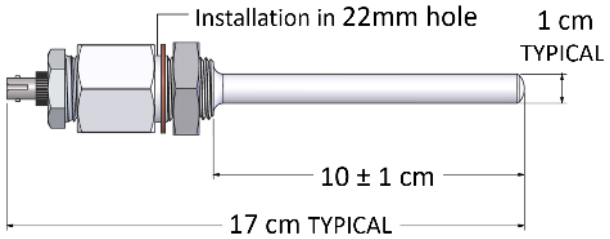
Sensor tip Options	
ED	19mm EasyDisk (Standard)
GL	Spiral wrap Glued at 9 mm from tip
GLXX	Spiral wrap Glued at XX mm from tip
BA	Loose Spiral wrap at about 50 mm from tip
BAXX	Loose Spiral wrap at about XX mm from tip

Sensor length	
XX	Sensor length in meters (From 2 to 15 meters)

Sensor Reading Range	
1	-40°C to 225°C

Ambient Temperature Sensor

Order code: **TPT-62-NS-1195A**



FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

ST-ST 62.5 µm Silica Fiber OPTICAL FEEDTHROUGH MATING for TPT-62

ST-ST Sealed Fiber Optic Mating for Oil Filled Transformer Applications

Description

The FISO EasyThrough is designed to be installed on the oil filled transformer tank wall or any other sealed environment.

Its simple and proven design efficiently conveys optical signals between a Nortech monitor and fiber optic temperature sensors for reliable and accurate measurements.

This ST-ST fiber optic connector will sustain temperature up to 200°C and pressure of 20 BAR / 2000 kPa / 290 PSI.

The EasyThrough, made out of 316L stainless steel, offers long term reliability and excellent chemical resistance to oil, kerosene, humidity, etc. FISO's EasyThrough is manufactured using a glass to metal solder bonding technology which ensures that no oil can possibly leak from the feedthrough over time.

The 3/8 NPT ANSI EasyThrough can easily be mounted on the EasyPlate or directly on the tank wall.

Key Features

- Long Term Reliability, 316L Stainless Steel
- Leakproof
- Support Vacuum or Pressure
- Maximum Pressure 20 BAR / 2000 kPA / 290 PSI
- Glass to Metal Bonding
- No O-Ring
- Chemically Resistant
- Quick and Easy Installation

Applications

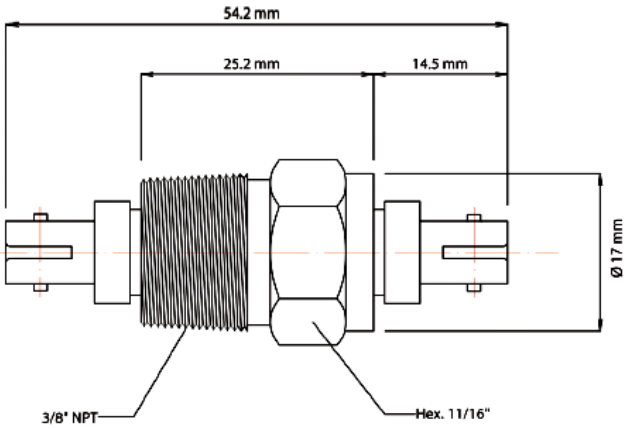
- Oil filled Transformers
- Sealed Environments

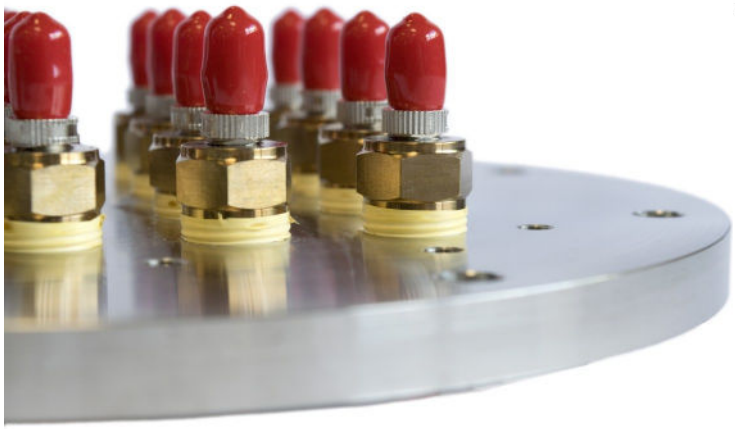
Specifications

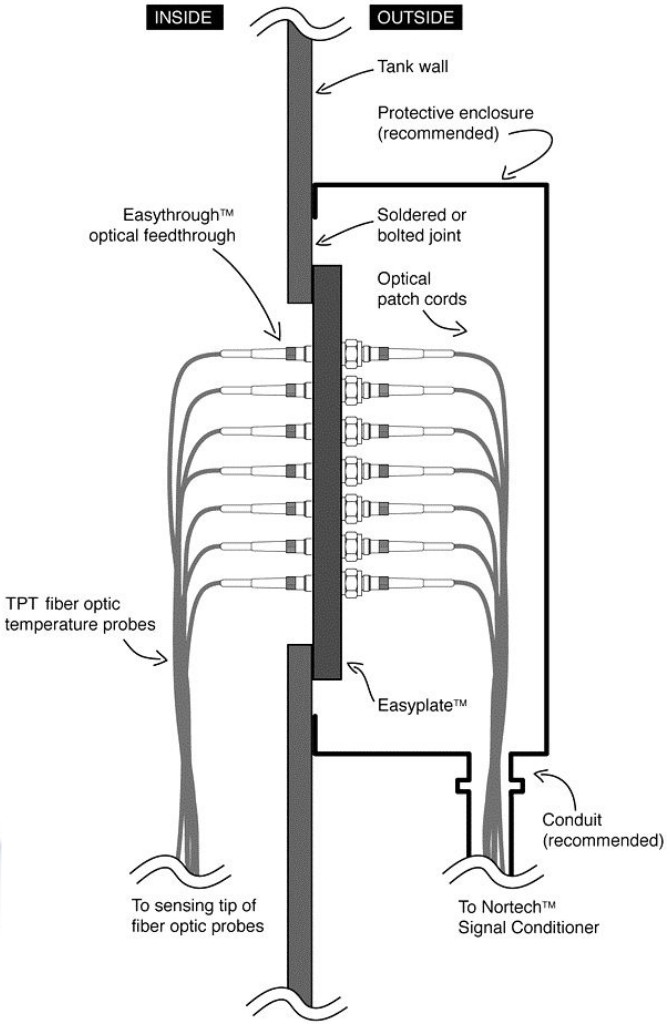
Temperature Range	-40°C to 200°C
Maximum Pressure	20 BAR / 2000 kPA / 290 PSI
Thread	3/8 NPT 60° Thread Angle Taper Angle of 1°47' Truncation of Root and Crest are Flat ANSI / ASME B1.20.1
Material	316L Stainless Steel
Connector Type	ST Connector
Fiber Type compatibility	62.5 µm Silica Fiber (for TPT-62)

Ordering information

SEN-EST







FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

EasyPlate

ENERGY

EASYPLATE DESIGNED

FOR OPTICAL EASYTHROUGHS

Tank Wall Plate Specifically Designed For Oil Filled Transformer Applications

Description

The FISO EasyPlate is designed to be installed on the tank wall of oil filled transformers.

FISO's EasyPlate is a stainless steel customized circular plate that completes the integration of Nortech's fiber optic direct winding temperature measurement and monitoring system.

Specifically designed to mate with FISO's optical EasyThrough, the 316L stainless steel EasyPlate is mounted on the transformer tank wall by bolting or welding it on. An optional EasyRing is offered to ease installation on rough surfaces.

The 3/8'' NPT ANSI EasyThrough can be easily mounted on the EasyPlate, one per hole, allowing the optical signal to pass through the tank wall.

One EasyPlate can fit as many as 25 EasyThroughs. Each NPT hole is numbered on each side of the EasyPlate. The resulting setup is completely leak-proof and provides long term reliability.

Key Features

- Long Term Reliability
- Leak-proof
- 316L Stainless Steel
- Up to 25 EasyThroughs
- Trouble Free Installation

Applications

- Oil filled Transformers
- Sealed Environments

Specifications

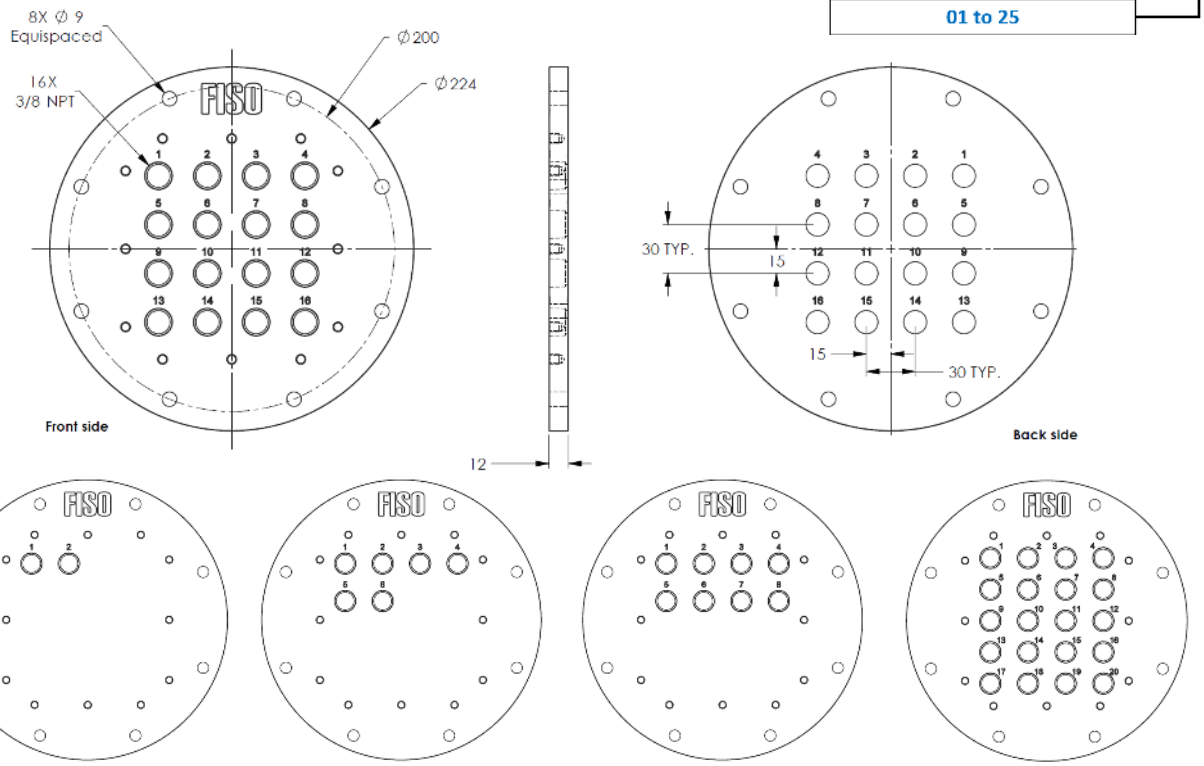
Diameter	224 mm (8.82 in)
Thickness	12 mm (0.47 in)
Material	316L Stainless Steel
Bolts	8 x SS M8 HEX Head (Not Included)

EasyThrough Holes	1 to 25
EasyThrough Thread	3/8'' NPT Pipe Thread

Ordering information

SEN-ESP2-A-SS - **_ _**

Number of FeedThrough Holes
01 to 25

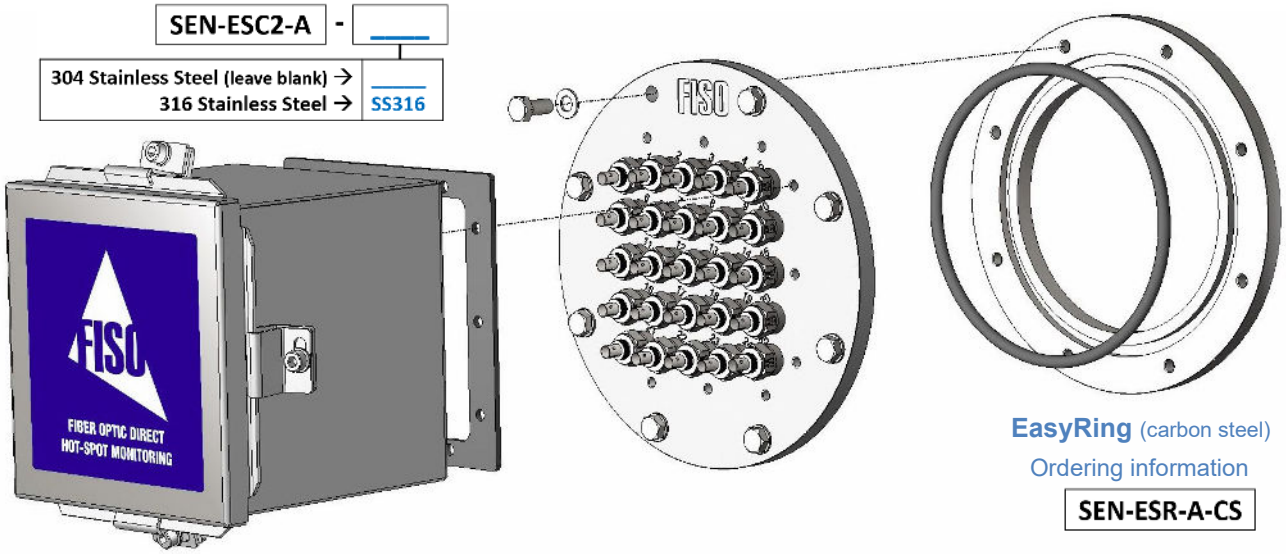


EasyCover (IP67 rated)

Ordering information

SEN-ESC2-A - **____**

304 Stainless Steel (leave blank) →	____
316 Stainless Steel →	SS316



EasyRing (carbon steel)

Ordering information

SEN-ESR-A-CS

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

CFO-C12

ENERGY

62.5µm MULTIMODE

ST-ST EXTERNAL EXTENSION CABLE

Robust & Cost Effective 62.5 micron External Extension for Energy Temperature Monitoring Solutions

Description

The FISO External Extension Cable provides a very robust and cost effective link between the transformer tank wall plate and the Fiber Optic Monitor.

The Extension Cable uses a multimode 62.5 micron pure silica fiber built with a chemically and thermally resistant 3mm O.D. Polyurethane outer jacket. It is designed to support a temperature range of - 55°C to 85°C.

The FISO CFO-C12 is terminated with PC polished ST connectors with strain relief at both ends.

Specifically designed to mate with the Nortech system and its accessories like the EasyThrough, the patch cord can be placed in harsh environments without compromising performance.

Key Features

- Pure silica fiber 62.5 micron
- ST-ST connectors
- PC Polish
- Robust Design
- -55˚C to 85˚C
- Compatible with all Nortech 62.5µm components

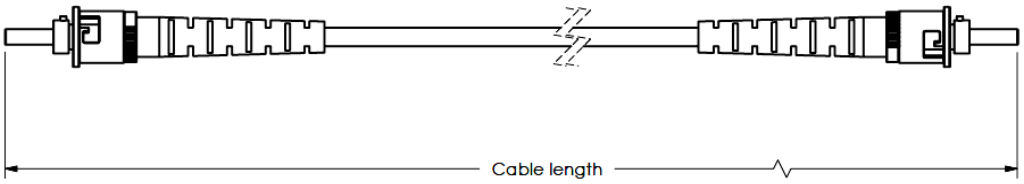
Applications

- Power Transformer Winding & Core Hot Spot
- Power Transformer Top & Bottom oil
- All types of Transformers (MV, HV, EHV, UHV, HVDC)
- Reactors, Generators, Switchgear
- Load Tap Changers

Specifications

Fiber Type	62.5 µm Silica Fiber
Cable diameter	3 mm O.D.
Cable Sheathing	Polyurethane
Reinforcement	Kevlar
Connector Type	ST-ST Connectors, PC Polish
Temperature Range	-55˚C to 85˚C
Standard Lengths	3, 6, 8, 10, 12, 15 meters
Available Extension Length	Up to 1 000 meters (Custom)

CFO-C12



CFO-C12 Ordering Information

CFO - C12 - F2 - M _ _ - ST - ST

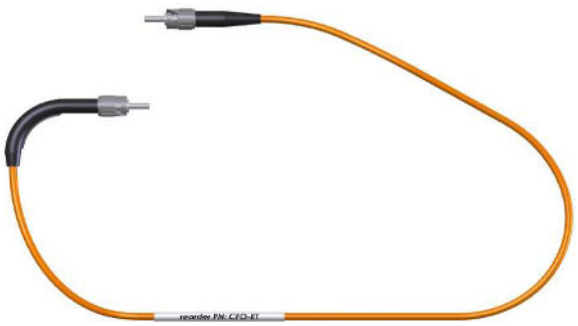
Cable Length	
XX	Cable length in meters 1m increment from 1 to 15m extension 5m increment from 20m and more extension

CFO-ET

A short extension for the EasyTest II that protects its main optical port by absorbing connection wear.

Rated for ~500 connection cycles, it is easily replaceable to maintain optimal performance.

Order code: **CFO-ET**



FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

Nortech

EasyTest II

ENERGY

Single Channel Portable Tester

Used for Fiber-Optic Sensor Factory Installation Process Control, Field Testing and Trouble-Shooting

KEY FEATURES

- Integrated Fiber Optic connector cleaning tool
- Optical port saver, that protect the main optical connector and provide small extension to test the EasyThrough
- Validation test probe included in the tool box
- Powered with 48 W-h Rechargeable Li-ion Battery
- Data download via USB port
- Accuracy of ± 1°C

DESCRIPTION

The EasyTest II portable tester is designed to check more than optical continuity of the fiber optic sensor during installation, it give you the diagnostic values of the sensor reading. So you can measure the sensors health after each critical steps of the transformer manufacturing.

APPLICATIONS

- Quality control for fiber optic sensor installation
- Field testing and trouble-shooting
- R&D testing when only one Temperature needs to be measured

Current temperature and diagnostic parameters are displayed all at once on the main display screen.

```
Diagnostic CH 1
Temp      21.5 oC
Light      3.8 %
Signal    97.1 %
```

For over 30 years, FISO has been the leader in the Fiber-Optic White-Light Technology. The EasyTest II is using the temperature dependent band gap shift of the GaAs crystal to provide a fast and accurate measurement. Inherent to the technology, the system will not drift nor require any recalibration for the life of the device and the monitor Auto-Correct feature continuously compensates for internal temperature interference.

Nortech

EasyTest II

ENERGY

SPECIFICATIONS

Number of channels	1
Reading temperature range	-40 °C to 225°C
Temperature accuracy	±1 °C
Resolution	0.1 °C
Sampling rate	100 ms (typical)
Operating temperature	5°C to 45°C
Storage temperature	5°C to 45C
Humidity	95% RH Non-Condensing
Dimensions	200 x 151 x 81 mm
Instrument overall weight	1.5 kg (inclusive of battery)
Enclosure Type	Aluminium casing with protection holster
Internal Memory	450,000 data points
Data Log Export	Via Standard USB B-Type port
Auto-Correct	Continuous Internal Temperature Compensation
Power source	Rechargeable Li-ion Battery 48 W-h (~16 hours autonomy)

Immunity standards

EN 61326-1(2013)	IEC 61000-4-2	IEC 61000-4-3	IEC 61000-4-4
IEC 61000-4-5	IEC 61000-4-6	IEC 61000-4-8	IEC 61000-4-11
CISPR 11	ICES-003	EN50581 : 2012	

This product meets the EMC requirements of the United States (FCC Part 15, sub-part B, Class A)

All accessories included in the carrying case

Ordering information:

E-TEST-II - 01 - A

Number of Channels
01

Sensor compatibility
A : Compatible with TPT-62-R1

Spare Parts and Tools

EasyClean, cleans male and female ST connectors

Order code: **SEN-CLEANER**

EasyCheck, returns Temperature, Light% & Signal% to validate monitor and CFO installations

Order code: **SEN-CRP**

Knockout Punch Kit, prepares the spacers to receive the TPT with EasyDisk

Order code: **SEN-ESD-KIT**

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

Phone +1.418.688.8065
Fax +1.418.688.8067

Email info@fiso.com
Web www.fiso.com

FISO Technologies, a leading developer and manufacturer of fiber optic sensors and signal conditioners, is worldly recognized for its unparalleled range of fiber optic solutions. Besides being extremely small, thus minimally invasive, the advantages of fiber optic sensors are that they are highly precise, intrinsically safe and immune to radio frequencies, electromagnetic interferences and microwave radiations.

FISO's leadership in fiber-optic sensing is built on advanced technology, deep technical expertise, and a team of experienced engineers and technicians. Its strong product development capabilities, combined with highly controlled and optimized manufacturing processes, are supported by rigorous quality control aligned with industry regulations and best practices. This enables FISO to meet the needs of clients operating in even the most challenging and demanding environments.

Founded in 1994, FISO is part of Resonetics. Its products are sold in more than 75 countries through a network of representatives and distributors. Since 2003, FISO Technologies meets the requirements of the ISO 9001:2015 and ISO 13485:2016 certifications. The company is assessed and certified by the BSI Group and strictly applies its quality policy day after day.

FISO is the largest fiber optic sensor company in the world with hundreds of thousands of sensors shipped annually and continuing to grow year after year.

FISO Technologies
500 St-Jean-Baptiste Ave, Suite 195
Québec (Quebec) Canada G2E 5R9

T : +1-418-688-8065
info@fiso.com
www.fiso.com

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