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User manual

FOTEMP MINI 3
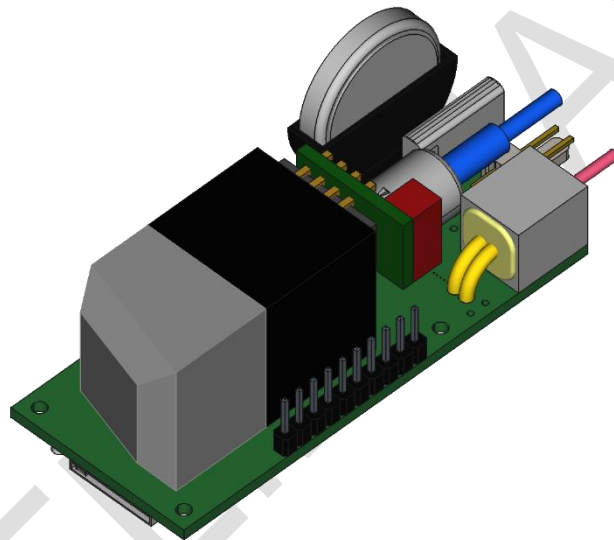
Fiber optic temperature

measurement system

Table of contents

1   General

The fiber optic temperature measurement system described in the operating instructions has been designed and manufactured using state-of-the-art technology.

All components are subject to stringent quality and environmental criteria during production.

These operating instructions contain important information on handling the instrument. Working safely requires that all safety instructions and work instructions are observed.

Observe the relevant local accident prevention regulations and general safety regulations for the instrument 's range of use.

The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.

Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.

The manufacturer 's liability is void in the case of any damage caused by using the product contrary to its intended use, noncompliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorized modifications to the instrument.

The general terms and conditions contained in the sales documentation shall apply.

Subject to technical modifications.

Further information at:

https://weidmann-optocon.com/

2   Safety

This manual contains important information to ensure personal safety and to prevent damage.

Explanation of symbols:

Information: points out useful tips, recommendations, and information for efficient and trouble-free operation.

Caution: indicates a potentially dangerous situation that can result in light injuries or damage to equipment or the environment, if not avoided.

Warning: indicates a potentially dangerous situation that can result in injury or death, if not avoided.

Skilled personnel: personnel who, based on their technical training, knowledge of measurement and control technology and their experience and knowledge of country-specific regulations, current standards, and directives, can carry out the work described and independently recognizing potential hazards.

Intended use

The instrument has been designed and built solely for the intended use described here and may only be used accordingly. The technical specifications contained in these operating instructions must be observed.

3 Unpacking, Inspection, Service

When unpacking and inspecting your system components, you need to do the following:

1. Check all materials against the enclosed packing list.

2. Carefully unpack and inspect all components for visible damage.

3. Save all packing materials, until you have inspected all components and find that there is no obvious or hidden damage.

4. Before shipment, each instrument is assembled, calibrated, and tested. If you note any damage or suspect damage, immediately contact us.

5. In case of a malfunction or service request please use our technical support.

Technical support
Email: info.wtde@weidmann-group.com
TD +49 351 843 599 0

Equipment return address
Weidmann Technologies Deutschland GmbH
Washingtonstrasse 16/16a
01139 Dresden, Germany

Disposal

Inoperable instruments must be disposed of in compliance with local regulations for electronic materials.

4 Introduction

The FOTEMP MINI 3 fiber optic temperature measurement system with its minimalist design is specially intended for use in customer projects. With fiber optic sensors it is ideal for measuring temperatures in microwave, high frequency, high voltage and magnetic field environments or aggressive environments where the use of metallic sensors (RTC, TC, capillary, etc.) is not possible.

FOTEMP MINI 3 is a minimalistic OEM device for many fields of application, e.g.:

- Medical engineering such as nuclear spin tomography

- High Frequency heating processes

- Microwave power heating processes

- Electric motors

- Generators and transformers

- Aeronautical engineering

The probes used for temperature measurement consist of a PTFE-housed glass fiber with a GaAs crystal (gallium arsenide) at the tip The probe is completely non-metallic and therefore completely non-conductive.

Weidmann's fiber optic sensors offer complete immunity to RF and microwave radiation with high temperature operating capability, intrinsic safety, and non-invasive use. The probes are also designed to withstand harsh and corrosive environments.

Starting at a light wavelength of 850nm GaAs becomes optical translucent. Since the position of the band gap is temperature dependent, it shifts about 0.4nm/Kelvin.

The measurement device contains a light source and a device for the spectral detection of the band gap. This guarantees fast, repeatable, and reproducible measurements.

Thanks to its accompanying software FOTEMP ASSISTANT 2, measurement results can be easily controlled and monitored.

Over the entire life of the system re-calibration is not required to remain within the specifications.

5   Product specification

Measurement	
Measurement Range	-200 °C to 300 °C
Measuring Time	< 250 ms per Channel
Accuracy (Standard Deviation)	0.2 K
Resolution	0.1 K
Probes	Compatible with all Weidmann fiber optic temperature probes

Environment	
Communication Protocols	ASCII, Modbus
Interfaces	TTL, RS232, RS485, USB
Operating Temperature	-20 °C to 60 °C
Storage Temperature	-20 °C to 70 °C
Connector Type	ST

Device	
Channel	1
Display	---
Additional Interfaces	---
Data Logging	Continuous or timed temperature logging
Power Supply	USB-Powered (Standard) 9-24VDC / 350 mA (Optional)
Dimension	70 x 30 x 29 mm
Weight	0,2 kg

6   Calibration

Your fiber optic temperature measurement system is calibrated at the factory and ensures accurate temperature measurement in all areas. Weidmann will provide you with a full certificate of the test results for every measuring device calibrated by us. A recalibration is not necessary.

However, should you require a recalibration, we offer a comprehensive calibration service for our fiber optic temperature measurement devices. All calibrations are carried out in our factory and our modern laboratories and qualified staff guarantee a very accurate and fast calibration. You will receive your device back as quickly as possible and can continue with your fiber optic measurement projects.
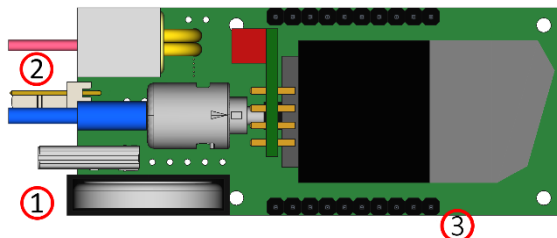
Our customer service will support you.

Please visit our homepage for contact details:

https://weidmann-optocon.com products/service-calibration-solutions/

7   Quick start

This quick reference guide gives you an overview for quick usage. However, it cannot replace extensive literature with important information and safety warnings.

Top View

1) USB interface

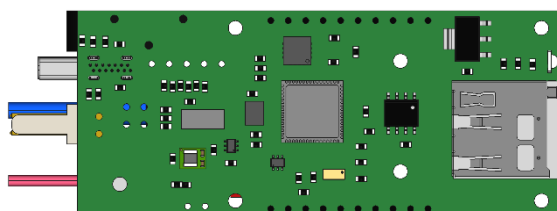USB-C Port for communication and power supply.

2) Power supply (Optional)

Connector for external power supply. Ensure that you only use power supply units that comply with the specifications.

3) Pin header

20 pins for all functions such as communication, LEDs, and power supply.

Bottom View

1) Status LED

The Sensor-LED indicates the status of the channel. In case of damage, sensor either defective or nonexistence, the LED flashes red. In normal operation, sensor is available, measurements are carried out, it flashes green.

2) Micro SD-Card slot

8   Getting started

1. Plug the fiber optic temperature sensors to the ST-socket.

2. Connect the USB for communication and power supply.

3. If you want to supply the device with power externally, please connect it to an appropriate power supply. (Optional)

4. After you have connected the power supply, the device starts and the LED lights up green.

5. Now the device is ready for measurement.

i   If no sensor is connected or the signal quality is too low, the LED will light up red.

⚠   Caution! The fiber optical temperature measurement systems only function with Weidmann fiber optic temperature sensors. Please do not use temperature sensors of other brands.

General installation guidelines

Please read the instructions for installing the fiber optic instrument carefully. Please note especially the order of the instructions exactly.

Sensor connection (=> page 8)

The temperature sensors are connected via the ST-plugs to the ST-socket. Please note to insert the plugs pushing slightly against the spring pressure and to turn with a clockwise rotation. All fiber optical temperature sensors of Weidmann can be connected.

Sensor handling (=> page 8)

The sensor consists of a ST-plug at the end and a gallium arsenide crystal at the tip of the sensor. The crystal is sensitive and should not be exposed to excessive mechanical stress. Please note the information about the bending radius of the sensor. A forcible bending of the sensor leads to breakage of the fiber. In this case the sensor is damaged and needs to be repaired / replaced.

External power (=> page 11)

The device offers the opportunity for an external power supply. (Optional)

Pin header (=> page 11)

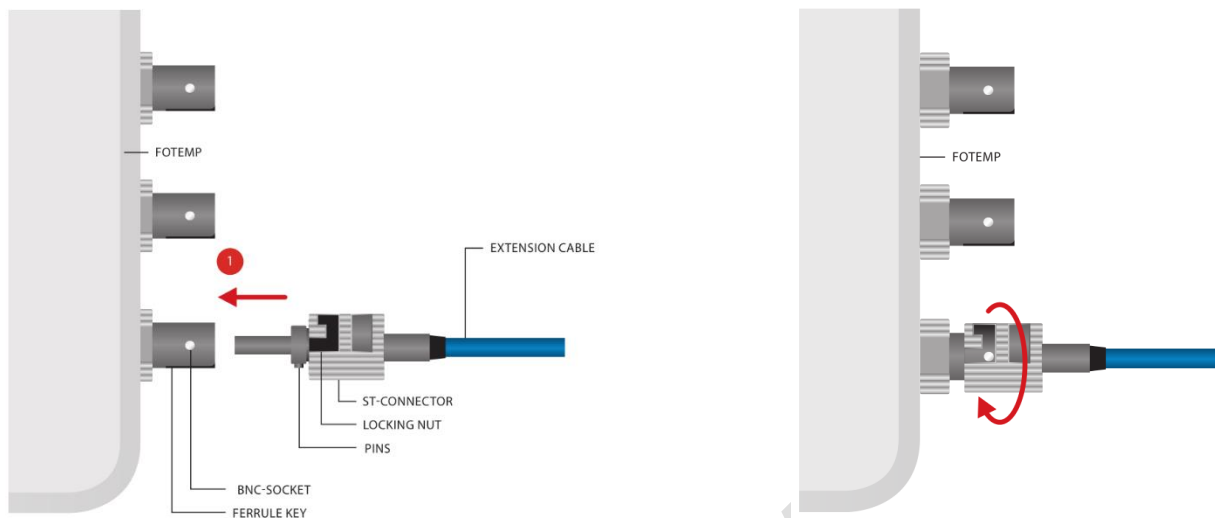The device offers 20 pins for all functions such as communication, LEDs, and power supply.

Logging (=> page 11)

It is possible to write all measured values to an SD card.

Serial communication (=> page 11)

The device can be connected to a PC via RS232 (TTL), RS485 or USB.

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9 Sensor connection

To ensure accurate measurements and long life of the fiber optic sensors and instruments, it is necessary to clean them regularly. More information about cleaning can be found on page 9.

ℹ️ Any unused channels must be protected with supplied dust caps.

Test of sensor functionality

To test the functionality of the sensor, you can place the sensor into a test liquid, of which the temperature is known (e.g. boiling water). The sensor will respond with the given temperature within a few seconds.
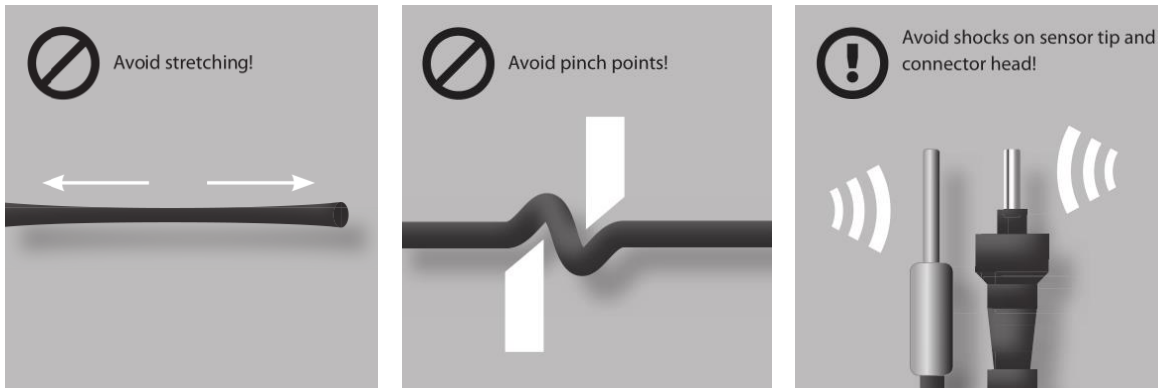
10 Sensor handling

Bending radius

Fibers with a core diameter of 200 μm have a short time (≤10 min) bending radius of 10,0 mm and a long time (>10 min) bending radius of 27,0 mm.
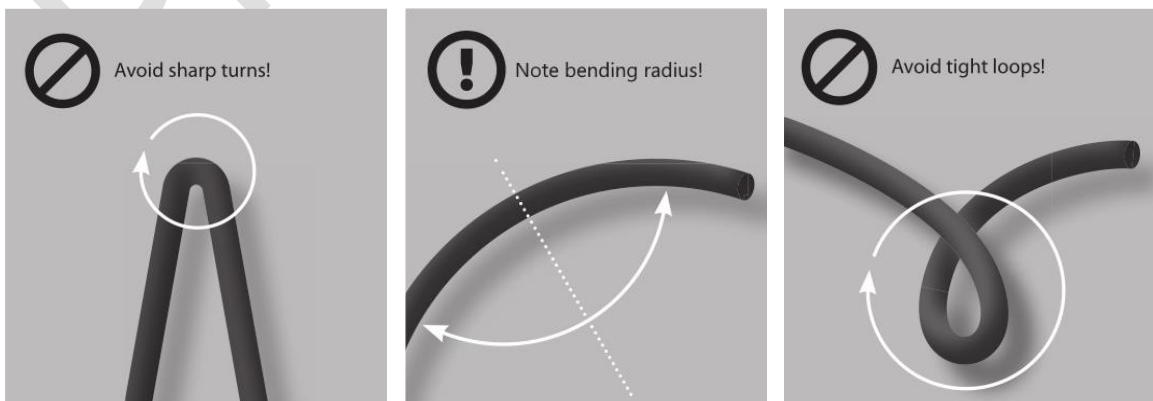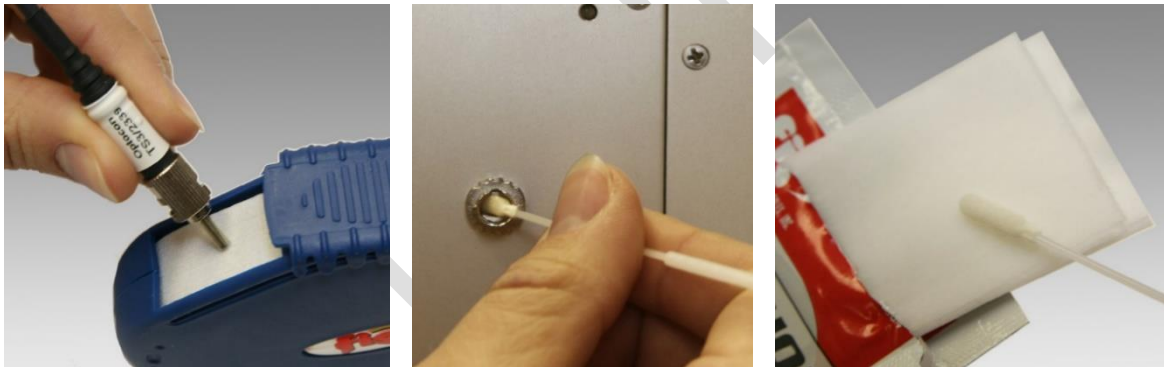
Mechanical load

Storage

When not in use, the sensor should be carefully stored in its delivery box or suitable storage container to prevent bending or crushing. Apply the delivered dust cap to the ST connector.

11   Sensor / connector cleaning

Instructions

Clean the ST connector of the sensor with the connector cleaner. Softly press the connector on the cloth tape and rotate across the tape while rotating the connector.

You can clean up to 6 connectors before advancing the tape. Tear off excess tape as required.

Take a swab and wet it with the isopropanol wipes. In rotating motion smoothly insert swab into the internal connector of the conditioner. Avoid using cotton swabs.

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12   External Power (Optional)

The FTM3 also offers the possibility of supplying the device with voltage (9-24V) via the connector on the front.

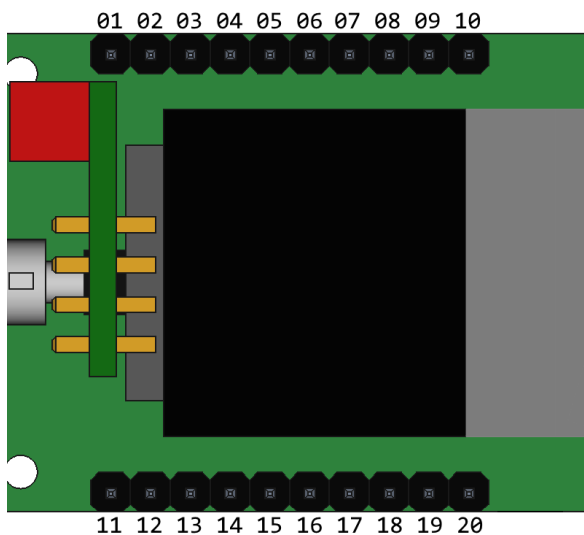Alternatively, the corresponding pins can also be used. (see below)
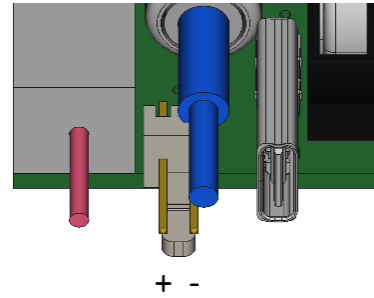
ℹ This feature must be ordered explicitly to use it.

⚠ Caution! A voltage outside the specified range will damage your device. Please note the polarity!

13   Pin header

Nr	Function	Nr	Function
1	9–24V INPUT	11	5V IN/OUT
2	5V IN/OUT	12	3,3V OUTPUT
3	GND	13	GND
4	GND	14	TTL TX
5	GND	15	TTL RX
6	GND	16	GND
7	GND	17	RS485 A
8	3,3V OUTPUT	18	RS485 B
9	LED OK *(Katode)*	19	RS232 TX
10	LED Error *(Katode)*	20	RS232 RX

14   Logging

Temperature logging

The device can store the temperature either at a certain time interval or continuously after each measurement. The values are written to a csv file on the SD card.

The time interval can be set via Modbus, our ASCII protocol or with our accompanying software FOTEMP ASSISTANT 2.

15 Serial communication

The device can be connected to the computer via USB-C cable. Afterwards you have the possibility to use our free software FOTEMP ASSISTANT 2 to display the temperatures on the computer, to make advanced settings, to log the temperatures or to display them in diagrams.

Further information at:

https://weidmann-optocon.com/products/software/

However, you are also free to use our open ASCII protocol or Modbus to communicate with your device.

https://weidmann-optocon.com/downloads/
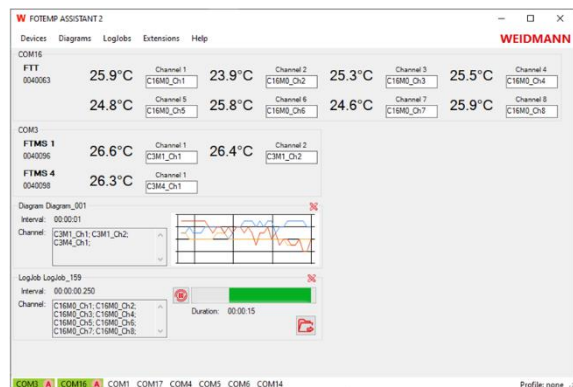
16 Troubleshooting

For more information, see in the AN206: FOTEMP Device Error-Handling at:

https://weidmann-optocon.com/products/downloads/