18457-01
10.2024

METER

TEMPOS Common Troubleshooting Issues and Questions

INTRODUCTION

Use this guide for troubleshooting the TEMPOS. The TEMPOS controller and compatible sensors are factory calibrated to measure thermal properties in materials effectively. Contact METER Customer Support environment@metergroup.com for further assistance.

CALIBRATION

Does the TEMPOS need to be calibrated by METER?

Technically, no. The TEMPOS does not need to come back to METER on a regular schedule for calibration.

However, many customers need to get their equipment calibrated for legal requirements. METER offers a calibration service for those customers to meet their compliance needs. To use this service, contact customer support at support.environment@metergroup.com.

How much environmental variance (room temperature change, drafts, etc.) can TEMPOS tolerate before it impacts TEMPOS readings?

Any amount of thermal change in the environment surrounding the sample will impact readings. Minimizing temperature change and draft in the room is important for all readings but is especially important in low-conductivity materials like insulation.

Samples with a low thermal conductivity will be more impacted than those with a high conductivity because TEMPOS has a 10% margin of error for accuracy. Samples with a high conductivity (e.g., 2.00 W/[m • K]) can still be considered accurate across a wider margin for error (0.80 to 2.20 W/[m • K]) than a sample with a conductivity of only 0.02 (0.018 to 0.022 W/[m • K]).

I lost my calibration certificate. How can I get a new one?

Calibration certificates can be obtained by contacting Customer Support at support.environment@metergroup.com.

Use the sensor(s) serial numbers to get a replacement calibration certificate. The certificates are organized under the serial number of the TEMPOS device and then again under the sensor's serial number. Both numbers will be needed to obtain the correct certificate.

EQUILIBRATION

How long does a sample need to equilibrate after inserting the needle?

Equilibration time varies with the material. A general guideline is that the more insulated the sample is, the longer it will take to reach thermal equilibrium. Soil may only need 2 min before taking a reading, but METER recommends a section of insulation for 15 min as a standard.

GENERAL

Are the TEMPOS and its sensors waterproof?

The TEMPOS handheld device is not waterproof.

The sensor cable and sensor head are waterproof, but METER does not currently have the ability to sell waterproof cable extensions for TEMPOS sensors.

Is there documented proof of TEMPOS specifications?

For data or documented information needed for TEMPOS and sensors used with TEMPOS, visit the TEMPOS resources page on the METER website meter.ly/tempos-resources. METER Customer Support may also provide other requested support.environment@metergroup.com.

How were range and accuracy determined?

Range was determined by extensive testing in materials at different known conductivity levels. The TEMPOS range of 0.02–2.00 W/(m • K) is a relatively large range of conductivity that covers most materials that researchers would be interested in measuring: insulation, soil, fluids, rock, food and drink, and snow and ice.

Accuracy was determined by using the glycerin standard that is shipped with the TEMPOS, which has a known conductivity of 0.285 W/(m • K). The hundreds of sensors built by the METER production team have been tested and all fall within 10% accuracy of that standard.

TAKING MEASUREMENTS

Why am I getting bad or inaccurate data in water or other fluids?

TEMPOS sensors can have a difficult time reading low-viscosity fluids due to the presence of free convection. Free convection is when fluid at the heat source warms up and has a lower density than the colder fluid above, so the warm fluid rises, and the colder fluid is pushed downward. This motion introduces an outside source of heat, which will interfere with the TEMPOS sensor measurement in process, making it incorrect. Free convection is not a problem in high-viscosity fluids such as honey or the glycerin standard, but this effect is exacerbated in water or other liquids of similar or lower viscosity level.

Minimize all outside heat sources and vibrations as much as possible. Take readings with the water inside a styrofoam box in a still and quiet room. It is very difficult to get accurate thermal measurements in water if there is any machinery around, for example.

Can the TEMPOS sensors be used in a drying oven?

Yes, it can. Set the TEMPOS sensor in the drying oven on unattended mode during the drying process. This is much faster and easier than manually taking measurements while drying out a sample to create a thermal dryout curve. The cable and sensors can operate up to 150 degrees C°.

This is a commonly asked question from customers hoping to use TEMPOS for ASTM soil measurements.

Why does the manual recommend using Soil mode over ASTM mode?

ASTM mode is less accurate because of its longer measurement time. Conductivity is temperature dependent, and ASTM mode heats and cools the soil for 10 min, compared with 1 min for Soil mode. Constant heat fluxes over 10 min mean that the soil becomes warmer than its native temperature and, therefore, more thermally conductive. Despite this shortcoming, ASTM mode is included in TEMPOS to fulfill the requirements of ASTM.

Can the TEMPOS take readings in very thin materials?

TEMPOS is designed to have at least 5 mm of material in all directions from the needle to get an accurate reading. With very thin material, the TEMPOS needle will read not only the immediate material surrounding the sensor but also any secondary material beyond it within that 5 mm radius. The best solution to get accurate measurements is to sandwich several layers of the material together to achieve the appropriate measurement thickness.

Can we take a sample from the field back to the lab to measure?

Yes, TEMPOS was designed to work well in the field, but collecting samples and bringing them back to the lab for readings is also an option. However, consider how this may impact the moisture content of the sample. Any field samples need to be air-sealed until they are ready to be measured because a change in moisture content will alter the result. Field conditions also introduce challenges maintaining thermal stability due to wind, sunlight, and other weather conditions.

Can TEMPOS be used in my unique or uncommon application?

The answer depends on three factors:

- Conductivity

  TEMPOS sensors and calbing are rated to make accurate measurements from 0.02 to 2.0 W/(m • K)

  Outside of that range, it is possible for TEMPOS to perform at a level of accuracy that may be accurate enough

- Operating temperature

  TEMPOS is rated to work in environments of −50 to 150°C.

  If the temperature is significantly higher than that, parts on the sensor head can melt.

- Contact resistance

  TEMPOS sensor needles need to be in contact with the material, or at least close to it, to get a good reading. Fluids and very small granular materials allow this to happen easily. More rigid surfaces, like rock or concrete, make it difficult to get good contact between the needle and the material. Poor contact means the needle measures air gaps between the material and the needle, not the material itself.

METER offers thermal lab testing services prior to purchase or rental of TEMPOS units. Please contact the sales team at sales.environment@metergroup.com for pricing and information.

TROUBLESHOOTING

Problem	Possible Solutions
Cannot download data using TEMPOS Utility	Verify the latest version of TEMPOS Utility is being used (meter.ly/tempos-support). If using the most recent version of TEMPOS Utility does not solve the issue, contact support.environment@metergroup.com for additional support
TEMPOS will not turn on or is stuck on black screen	Open the back of the device and remove the batteries to force a power-off state. Replace the batteries and the back panel. Hold down the **POWER** button for 5 s to reboot the device. If that does not work, contact support.environment@metergroup.com for additional support.
SH-3 needles bent or poorly spaced	Slowly and gently push the needles back into their proper place manually. If the needles are bent too quickly or too much, the heating element within the needle will break. A red SH-3 needle spacing tool shipped with the TEMPOS provides a guide for proper spacing (6 mm).
Temperature changes during reading	This is common in Unattended mode if taking many readings over a long period of time. • Ensure the sample and the needle are stationary. Bumping or jostling the sample or the sensor will cause a temperature drift. • Avoid any vibration that can throw off a reading, especially in fluids. • Avoid reading next to computer fans, a room near the HVAC system, or any other situation that would add any extra movement. • Remove or avoid extra sources of heat to ensure the room is the same temperature the whole time. • If taking readings overnight, ensure the heating system does not turn on or off and change the temperature in the room. • Avoid setting the sample in a location where it will be exposed to sunlight.
Obviously wrong or inaccurate data	There is a good chance that something is wrong with either the heating element or the temperature sensor within the needle. • Check the screen during a reading, and verify red bars display on the screen. If no bars appear, then it is likely that the heating element has failed. • Verify the reading returns temperature data. If no temperature data is returned then it is likely that the temperature sensor has failed. If either of these scenarios occurs, contact support.environment@metergroup.com for additional support. If the device does show red bars and returns temperature data but is still giving bad data, contact support.environment@metergroup.com for additional support.

CUSTOMER SUPPORT

NORTH AMERICA

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 7:00 am to 5:00 pm Pacific time.

Email:	support.environment@metergroup.com sales.environment@metergroup.com
Phone:	+1.509.332.5600
Fax:	+1.509.332.5158
Website:	metergroup.com
Mailing Address	2365 NE Hopkins Court, Pullman, WA 99163

EUROPE

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 8:00 to 17:00 Central European time.

Email:	support.europe@metergroup.com sales.europe@metergroup.com
Phone:	+49 89 12 66 52 0
Fax:	+49 89 12 66 52 20
Website:	metergroup.com

If contacting METER by email, please include the following information:

Name	Email address
Address	Instrument serial number
Phone	Description of the problem