

OptoTemp 2000 Starter-kit
User's Manual
Version 1



Table of Contents

Introduction.....	2
Starter-kit components	3
Quick set-up.....	4
Operational overview.....	6
Probe handling instructions.....	7
Controller operating instructions	8
MMI PC Viewer operating instructions.....	9
Installing MMI PC Viewer	9
Configuring for serial communication.....	9
Viewing temperature.....	10
Recording temperature data	10
Calibrating a new probe	11
Specifications.....	12
Warranty	12

Introduction

Welcome to the user’s manual for MicroMaterials’ OptoTemp 2000, the world’s only crystal fiber optic thermometer. This manual will take you through the initial set-up procedure and will serve as a reference guide for future troubleshooting and recalibrating.

The OptoTemp 2000 difference includes:

- immunity to EMI including microwave, plasma and magnetic
- long lifetime in corrosive environments
- stability up to 950 °C
- contact temperature measurement with small thermal mass

This is all achieved with MMI’s patented monolithic crystalline probe (U.S. Patent 6,045,259). It is a single continuous piece of crystal, which can withstand stress and harsh environments better than probes that are mechanically assembled. To learn more about the technology and capabilities at MMI, please visit our website at www.micromaterialsinc.com.

Starter-kit components

1. Probe
2. Fiber optic patch cord
3. Fiber optic mating sleeve
4. OptoTemp 2000 controller
5. Power supply
6. CD with MMI PC Viewer
7. RS-232 cable

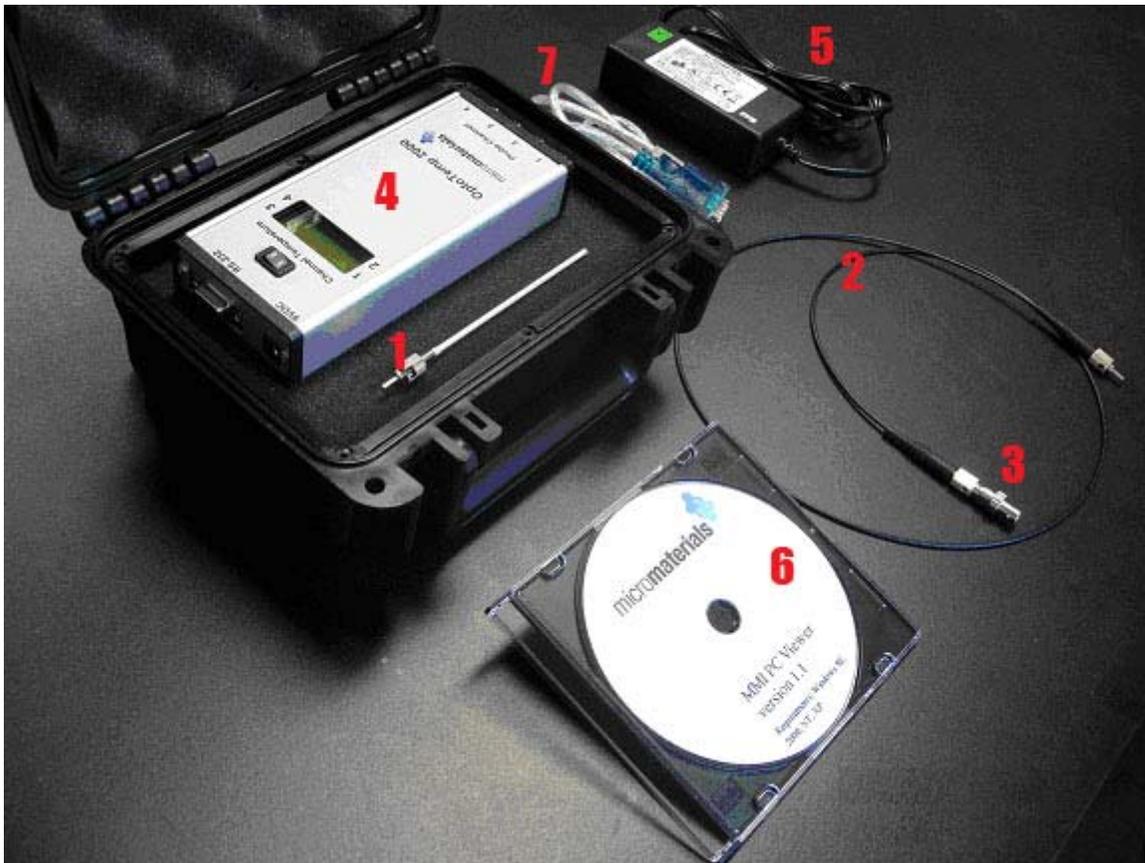


Figure 1 - Starter-kit components

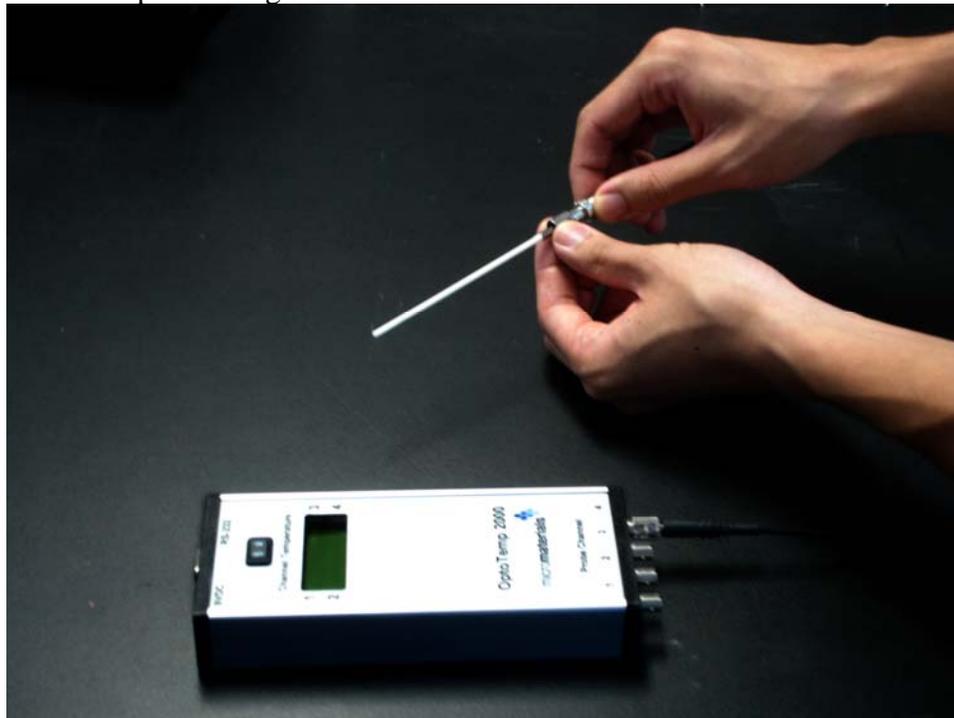
Quick set-up

CAUTION: Read probe handling instructions on P.7 first.

1. Attach patch cord to controller box. Tighten securely.



2. Remove probe from packaging and attach to the other end of the patch cord using the fiber optic mating sleeve.



The resulting setup should resemble the layout shown below.



3. Make sure power switch is in OFF position.
4. Plug power adapter into back of controller and wall outlet.
5. Turn the power switch to the ON position.
6. To view and record data on your computer, connect the OptoTemp 2000 controller box to your computer serial port with the RS-232 cable.
7. To install MMI PC Viewer, insert the CD in your computer's CD drive. In the "MMIPViewer2.0", click on the Setup.exe file. This will walk you through the installation procedure.

Operational overview

The OptoTemp 2000 operates on the fluorescence decay principle. Pulses of light are guided by an optical fiber into a probe which has a phosphor attached to its tip. The phosphor produces a fluorescence in response to the optical excitation. Some of the emitted light, which is at a longer wavelength and decays with a characteristic lifetime, is guided back by the fiber. This return fluorescence is monitored by a detector, and its decay is analyzed by a processor. If the decay time has a strong dependence on temperature, a sensitive thermometer is obtained.

Figure 2 shows a pictorial representation of how OptoTemp 2000 operates. In step 1, an LED produces pulses of light which reflect off a 45° mirror onto a lens. The lens focuses the light into the fiber optic patch cord (step 2). The light reaches the phosphor at the end of the probe (step 3) and causes the phosphor to fluoresce (step 4). The fluorescence light is guided back down the fiber to the controller, where a light sensor monitors the decay of the fluorescence (steps 5 and 6). The decay time is then calculated and translated to a temperature by an electronic processor and outputted to the LCD display and RS-232 port.

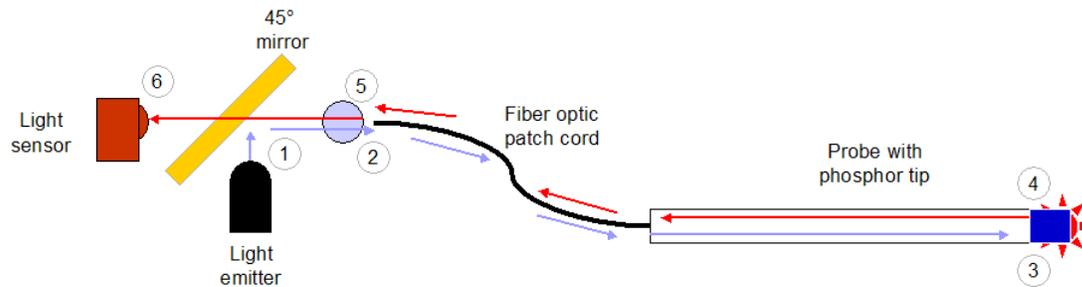


Figure 2 - Conceptual representation of temperature sensing using the fluorescence decay principle

Probe handling instructions

The standard SuperT and UltraT probes are protected by 3mm ceramic sheaths over their entire lengths. Ordinary care should be taken when handling them to avoid breakage. The optional UltraT probe has an exposed 0.2mm tip for fast response. Great care should be taken not to stress either the crystalline tip or the thin ceramic tube. When laying down this optional probe, always prop it up on the thick ceramic tube.

When removing the probe from its acrylic tube housing, hold the acrylic tube vertically with the probe's stainless steel connector pointing up. Hold the stainless steel connector and carefully pull it straight up to avoid knocking its tip on the tube walls.

When not in use the probe should always be placed in its acrylic tube housing with a vinyl cap covering the stainless steel end.



Figure 3 – Standard and optional (top) probes

Controller operating instructions

The controller's operation is straightforward. Upon pushing the switch to the ON position, the unit will begin acquiring temperature data. The LCD display will be updated every 0.25 seconds (alternating among the channels if fitted with more than one), and data will be sent to the RS-232 port at the same rate.

LCD message table

Top line message	Description
xxx.x C (or F)	Temperature reading in Celsius or Fahrenheit
<1>	Below minimum operating range
<2>	Above maximum operating range
<3>	Probe is disconnected

RS-232 – ascii string table and format

Ascii string	Description
,	Comma delimiter for each message
x:	Channel designation
xxxx C (or F)	Temperature measurement (x10)
<1>	Below minimum operating range
<2>	Above maximum operating range
<3>	Probe is disconnected

When not in use, the vinyl cap(s) should always be in place over the fiber input(s).

MMI PC Viewer operating instructions

Installing MMI PC Viewer

Installing the MMI PC Viewer requires your computer to have an available serial port and Windows 98, 2000, NT, or XP operating system.

To install, start by inserting the CD into your computer's CD-ROM drive. Click on the Setup.exe file in the "MMIPCVIEWER2.0" folder on the CD. The installation software will walk you through the rest of the installation process.

When you first use the MMI PC Viewer, you may have to configure your port settings.

Configuring for serial communication

To configure the port settings, use the drop-down list under COM PORT to choose the proper port attached to the OptoTemp 2000 controller.

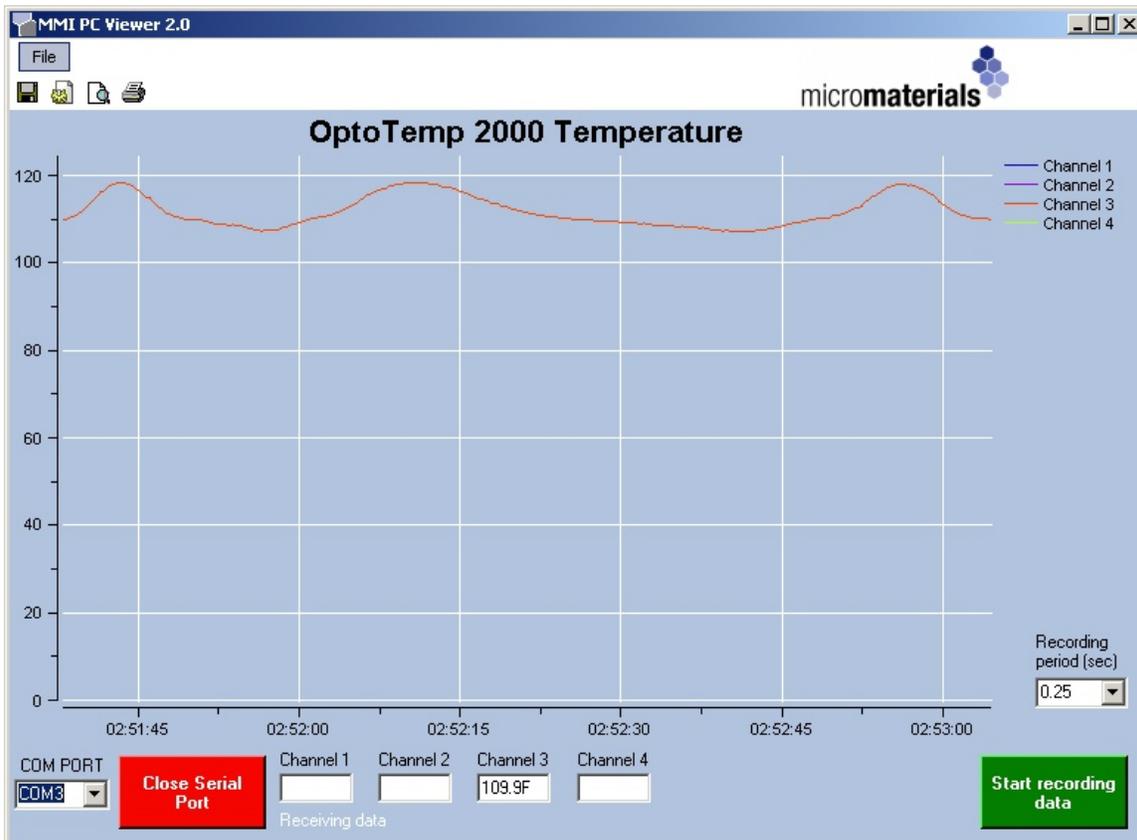


Figure 4 - Changing settings

To open the port manually, click on "Open Serial Port" button. Usually the MMI PC Viewer will automatically open the port if it is available.

Viewing temperature

When the OptoTemp 2000 is connected and the port is open, the temperature readings will automatically begin to appear on the chart as shown in Figure 5. To change the time scale of the chart, choose a different time interval by using the drop-down list under Recording Period (sec).

Recording temperature data

Data can be recorded to a .txt file at a specified frequency. To record data, click the “Start recording data” button as shown in Figure 5. You will be asked to select a .txt file to record to, or simply type in the name of a new file to be created. The recording frequency can be changed by selecting a different time period under Recording Period (sec).

To stop recording, click on the “Stop recording data” button.

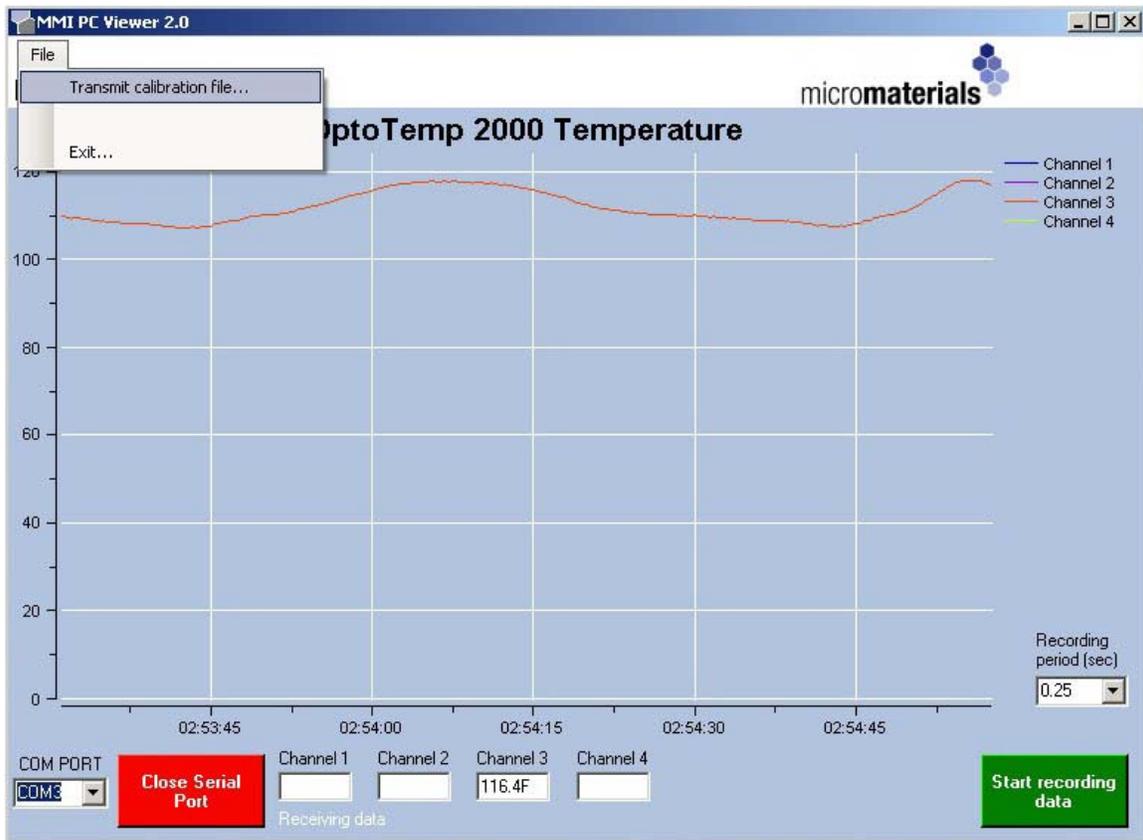


Figure 5 – Recording data and sending a new calibration file

Calibrating a new probe

When you receive a new Starter-kit, the controller will already be calibrated for the probe. This section is only relevant if you have ordered a new probe and need to recalibrate.

Installing a new calibration file requires the MMI PC Viewer 2.0.

1. Save the calibration file to your computer.
2. Click on file on the menu and then “Transmit Calibration File...” as shown in Figure 5.
3. Select the calibration file and click OK.
4. Within a few seconds, a message should appear that “Calibration is successful”.
5. If this message does not appear, try again or contact us at info@micromaterialsinc.com.

Each new probe has a probe code and corresponding calibration file. It is a good idea to check that the probe code on the probe corresponds with the calibration file. For example, the name of the calibration file may appear as “MMICal011001.mmi”. The “011001” after “MMICal” is the probe code information and will appear on the corresponding probe.

Specifications

These specifications are for standard probes. Custom probes can also be manufactured for special applications.

<u>Controller specifications</u>	
Channels	Up to 4
Measurable temperature range	20 °C to 950 °C
Response Time	250msec
Sample Rate	4 samples/sec
Precision	± 1.0 °C RMS over 8 samples
Accuracy	± 2.0 °C
Power	5W 7.5 VDC wall adapter at 90-260VAC, 47 to 63Hz
Output Port	RS-232
Display	LCD
Dimensions	15 cm x 7 cm x 3.5 cm
Housing Material	Anodized aluminum

<u>Probe Specifications</u>	SuperT	UltraT
Temperature range	15 °C to 400 °C	200 °C to 950 °C
Connector type	ST	SMA
Overall diameter of sheath	3 mm	3 mm
Probe length (no patch cord)	15 cm	15 cm
Protective sheath material	ceramic	ceramic

Warranty

1 year limited warranty on the OptoTemp 2000 controller for normal operating conditions. Damage caused by abnormal events or improper use such as opening the controller box or sudden impact will not be covered by the warranty.