INSTRUCTION MANUAL

SI-TCM2 (96110)
Two Channel Temperature Control Module

Serial No._____

CONTENTS

ABOUT THIS MANUAL

The following symbols are used in this guide:

This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.

This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.
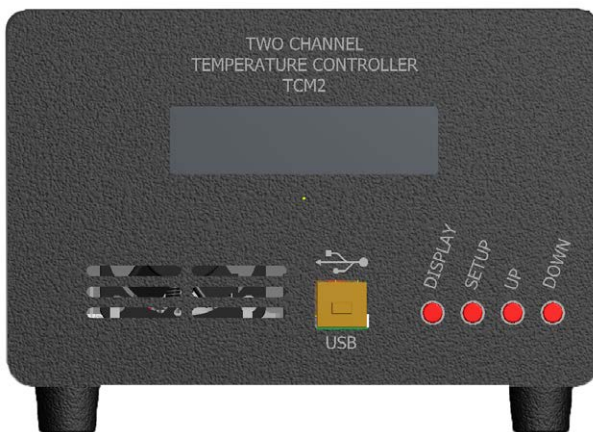
NOTES and TIPS contain helpful information.

Fig. 1—The SI-TCM2 Temperature Controller is designed for SI-H Muscle Tester and SI-MKB system cuvettes.

INTRODUCTION

The SI-H Temperature Control Unit is designed for use with the SI-H line of muscle physiology research platforms. It maintains the temperature of an SI-H cuvette up to 45ºC. This unit is available in a standalone model and as a module for the Signal Conditioning Amplifier System backplane.

Features

The **SI-TCM2** temperature controller:

- Controls two cuvettes simultaneously

- Uses PID control to maintain a constant temperature

- Has both high and low alarm warnings which can be user defined

Parts List

After unpacking, verify that there is no visible damage to the unit. Verify that all items are included:

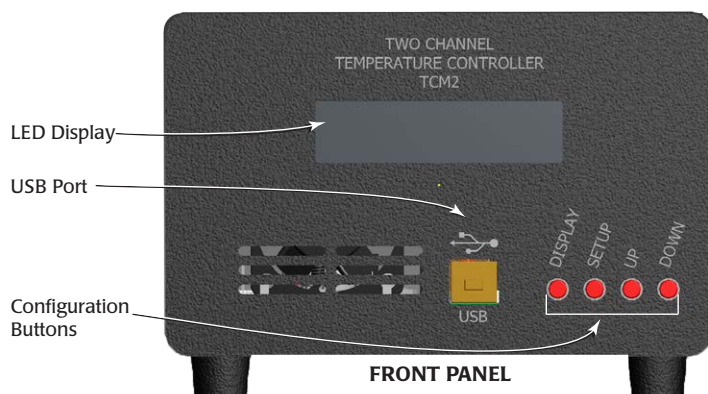(1) **SI-TCM2** Temperature Controller

(1) Instruction Manual

Unpacking

Upon receipt of this instrument, make a thorough inspection of the contents and check for possible damage. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed damage should be reported at once to the carrier and an inspection requested. Please read the section entitled "Claims and Returns" on page 11 of this manual. Please contact WPI Customer Service if any parts are missing at 941.371.1003 or customerservice@wpiinc.com.

Returns: Do not return any goods to WPI without obtaining prior approval (RMA # required) and instructions from WPI's Returns Department. Goods returned (unauthorized) by collect freight may be refused. If a return shipment is necessary, use the original container, if possible. If the original container is not available, use a suitable substitute that is rigid and of adequate size. Wrap the instrument in paper or plastic surrounded with at least 100mm (four inches) of shock absorbing material. For further details, please read the section entitled "Claims and Returns" on page 11 of this manual.

INSTRUMENT DESCRIPTION

LED Display

USB Port

Configuration Buttons

FRONT PANEL

Cuvette Connections

Power Switch

BACK PANEL

LED Display–Upon startup, this display shows the version of the software the **SI-TCM2** is running. During normal operations, this display shows the temperature of the cuvette attached to the channel 1 port, channel 2 port or both. During configuration, this display shows parameters and confirmation messages.

USB Port–This port can be used to connect to a computer to log the temperature history. In order to communicate with the computer, a terminal emulation program is required. Several third party options are available, including: Hyperterminal, Real Term (realterm.sourceforge.net) or Cool Term (freeware.the-meiers.org).

Configuration Buttons–The Display button is used to toggle the display between Channel 1 temperature, Channel 2 temperature and both. The Setup button rotates through the array of configurable parameters. The Up and Down buttons are used to adjust the parameters.

Cuvette Connections–Use these ports (located on the back panel) to connect SI-H cuvettes used with the **SI-MT** and **SI-MKB** platforms.

Understanding the Display

The default display is two lines and shows the temperature of both channels. If you prefer, you may display information from a single channel, either Channel 1 or Channel 2.
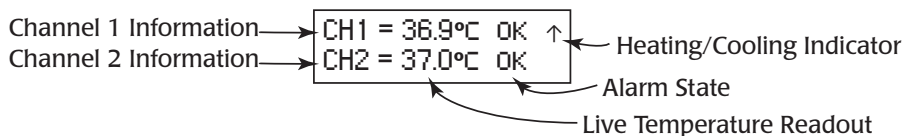
Channel 1 Information⟶ CH1 = 36.9°C OK ↑ ⟵ Heating/Cooling Indicator
Channel 2 Information⟶ CH2 = 37.0°C OK ⟵ Alarm State
⟵ Live Temperature Readout

Fig. 2—Two Channel display mode provides live data on both channels.

Channel 1 Information⟶ CH1 Temp 36.9°C ⟵ Live Temperature Readout
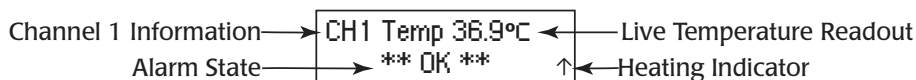Alarm State⟶ ** OK ** ↑ ⟵ Heating Indicator

Fig. 3—One channel display mode provides live data on a single channel.

Live Temperature Readout–The temperature of the cuvette connected to Channel 1 displays in the first line, and the Channel 2 cuvette temperature appears in the second line.

NOTE: The maximum temperature the sensor can monitor is 62.9°C. If a channel has no cuvette plugged in, the display will default to the maximum temperature display.

Alarm State–If the temperature of the cuvette is within the defined range, OK displays on the screen. If the temperature falls below the defined range, a low alarm sounds and LO appears on the display. HI appears on the display and a high alarm sounds if the temperature exceeds the defined range. If the alarm is not enabled, no audible alarm is heard.

Heating Indicator–A flashing arrow pointing up (↑) indicates that the cuvette is heating.

Setup

1. Turn on the system.

2. Line up the cuvette connector with the port on the back of the **SI-TCM2**, press it into place and screw the outer ring of the connector to secure the connector.

3. Press the **Setup** button to toggle through the setup parameters.

4. Press the **Display** button to save the configuration and return to the normal display.

   NOTE: The unit remembers the state of all the parameters, even after it is

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powered off. To reset the factory defaults, turn the unit off, press both the **Up** and **Down** buttons simultaneously while you turn the system back on.

Choosing a Display Mode

To toggle through the display modes, press the **Display** button. Press one time to see the Channel 1 Only display. Press it again to see the Channel 2 Only display. Press it a third time to return to the Two Channel display.

Setup Menu

Press the Setup button to toggle through the Setup menu and cycle through the list of available parameters. Parameters are shown in Fig. 4.
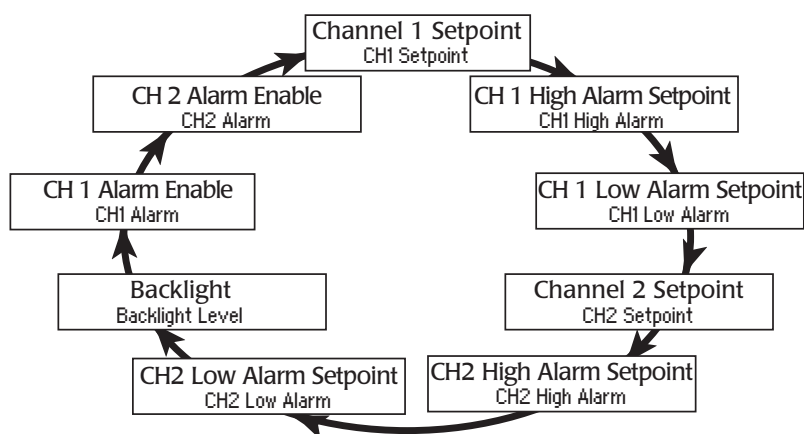

Fig. 4—The Setup button lets you toggle through the list of parameters.

Adjusting the Setpoint

1. Press the **Setup** button. The Channel 1 setpoint displays. To modify the Channel 2 setpoint, press the **Setup** button until "CH2 Setpoint" displays.

Fig. 5—Press the Up and Down buttons to adjust the Channel 1 Setpoint.

2. Press the **Up** or **Down** button to adjust the setpoint. The maximum setpoint allowed is 45°C.

3. Press the **Display** button to save the configuration and return to the normal display.

Setting Alarms

Both Channel 1 and Channel 2 have high and low alarm values. By default, the low alarms are set at 36°F, the high alarms are set at 38°F and the alarms are disabled.

1. Press the **Setup** button:
   - Twice to display the Channel 1 High Alarm
   - Three times to display the Channel 1 Low Alarm
   - Five times to display the Channel 2 High Alarm
   - Six times to display the Channel 2 Low Alarm

   The alarm setting displays.

```
CH1 High Alarm
    38.0°C
```

Fig. 6—Press the Up and Down buttons to adjust the alarm setting.

2. Press the **Up** or **Down** button to adjust the alarm setting.

3. Press the **Display** button to save the configuration and return to the normal display.

Changing the Backlight Level for the Display

By default the backlight level is set at 4. To make the display brighter, increase the level up to a maximum of 8. To dim the display, choose a lower level.

1. Press the **Setup** button until "Backlight Level" appears on the screen.

```
Backlight Level
Min=1 4 Max=8
```

Fig. 7—Press the Up or Down buttons to adjust the backlight level.

2. Press the **Up** or **Down** button to adjust the backlight level.

3. Press the **Display** button to save the configuration and return to the normal display.

Enabling/Disabling the Alarms

By default the alarms are disabled. When enabled, the unit will emit a beep when an alarm state occurs.

1. Press the **Setup** button until "CH1 Alarm" or "CH2 Alarm" appears on the screen.

```
CH1 Alarm
 DISABLED
```

Fig. 8—By default the alarms are disabled.

2.   Press the **Up** or **Down** button to enable or disable the alarm.

3.   Press the **Display** button to save the configuration and return to the normal display.

Using the USB Port Output

The USB port can be used to connect to a computer to log the temperature history. In order to communicate with the computer, a terminal emulation program is required. Several third party options are available, including: Hyperterminal, Real Term (realterm.sourceforge.net) or Cool Term (freeware.the-meiers.org).

1.   When you use a standard USB cable to connect the **SI-TCM2** to your computer, the computer will automatically install the necessary drivers.

2.   Set up your terminal emulation program using the following parameters:
      •   Baud rate: 38400 Bd
      •   Data: 8 bits, (1 start, 1 stop)
      •   Parity: None

3.   The comma delimited, output file logs the temperature 10 times a second.

MAINTENANCE

The **SI-TCM2** is maintenance free. However, to protect your **SI-TCM2**, follow these guidelines:

- Place the **SI-TCM2** in a clean, dry location.

- Use only a 12V DC, 2.5A power supply.

- Keep liquids away from the **SI-TCM2** connections.

ACCESSORIES

Table 1: Accessories

Part Number	Description
801513	Universal Input Power Supply AC Adapter (12V DC at 3.75A 50/60Hz, 2.5mm ID/5.5mm OD with positive center DC barrel (Standalone SI-TCM2 only)
801514	Power Cord for AC Adapter, US plug

SPECIFICATIONS

This unit conforms to the following specifications:

Input Configuration	Current to voltage converter
Power Requirements	12V DC at 2.5A 50/60Hz wall adaptor, 2.5mm ID/5.5mm OD with positive center DC barrel (included–WPI #**801513**)
Operating Temperature Range	Room temperature
Display Precision	0.1ºC
Controller Resolution	0.1ºC
Cuvette Temperature Sensor	1000Ω RTD (1000Ω at 0ºC)

DECLARATION OF CONFORMITY

WORLD PRECISION INSTRUMENTS, LLC.

175 Sarasota Center Boulevard
Sarasota, FL 34240-9258 USA
Telephone: (941) 371-1003 Fax: (941) 377-5428
E-mail: wpi@wpiinc.com

DECLARATION OF CONFORMITY CE

We: World Precision Instruments
                             175 Sarasota Center Boulevard
                             Sarasota, FL 34240-9258 USA

As the **manufacture/distributor** of the apparatus listed, declare under sole responsibility
that the product(s):
WPI PN: SI-TCM2

To which this declaration relates is/are in conformity with the following standards or
other normative documents:

Safety:
    EN 61010-1:2010+A1:2019
EMC:
    EN 61326-2-3:2013, EN 61326-1:2013
    EN 61000-3-2:2014, EN 6100-3-3:2013

And therefore conform(s) with the protection requirements of Council Directive
2014/30/EU relating to electromagnetic compatibility and Council Directive 2014/35/EU
relating to safety requirements and Council Directive 2011/65/EU relating to hazardous
substances:

Issued on:	**March 24, 2020**

President of WPI

WARRANTY

WPI (World Precision Instruments) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of 30 days* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

* Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.