# CONTENTS

ABOUT THIS MANUAL .................................................................................................................... 1

INTRODUCTION .......................................................................................................................... 2
  Parts List .................................................................................................................................. 2
  Unpacking .................................................................................................................................. 3

INSTRUMENT DESCRIPTION ........................................................................................................ 4
  Front Panel ................................................................................................................................ 4
    LED Displays ............................................................................................................................. 4
    Switches and Keys ..................................................................................................................... 4
    Connectors ................................................................................................................................ 5
  Back Panel ................................................................................................................................... 5

OPERATING INSTRUCTIONS ........................................................................................................ 6
  Alarms ........................................................................................................................................ 6
  Turning the ATC1000 On/Off .................................................................................................... 7
  Using the ATC1000 Controls ..................................................................................................... 7
    Setting the Temperature ........................................................................................................... 9
    Setting the Temperature Deviation Limit ................................................................................ 9
    Sensor Calibration ................................................................................................................... 9
    PID Controller Parameters .................................................................................................... 10
    Auto-tuning ............................................................................................................................. 13
    Parameter Values .................................................................................................................... 13

MAINTENANCE ............................................................................................................................ 14
  Cleaning the Heating Plate ......................................................................................................... 14
  Cleaning the Rectal Probe Tip ..................................................................................................... 14

ACCESSORIES .............................................................................................................................. 14

TROUBLESHOOTING ..................................................................................................................... 15

SPECIFICATIONS .......................................................................................................................... 16

APPENDIX A: APPLICATION NOTE .......................................................................................... 16

INDEX ............................................................................................................................................ 17

DECLARATION OF CONFORMITY ................................................................................................. 18

WARRANTY .................................................................................................................................... 19
  Claims and Returns .................................................................................................................... 19
  Repairs ....................................................................................................................................... 19

Copyright © 2012 by World Precision Instruments, Inc. All rights reserved. No part of this publication may be reproduced or translated into any language, in any form, without prior written permission of World Precision Instruments, Inc.
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—Animal Temperature Controller
INTRODUCTION

ATC1000 is a low noise heating system for maintaining animal body temperature during experimental procedures. The DC heater is extremely quiet in terms of electromagnetic radiation. This is essential in electrophysiological recordings which are very sensitive to electromagnetic interference.

The controller uses proportional, integral, and derivative (PID) technology in adjusting the DC voltage output. Compared with switched on/off type controllers, PID controllers provide a much more precise and stable control of temperature. The PID approach is also more immune to the variation of the experimental conditions such as change in animal size and unexpected disturbances.

The controller has dual temperature sensing inputs.

- The Probe input is used to monitor the rectal probe to control the animal temperature.
- The other is input is labeled “Output,” because it connects with the heater. It is used to monitor an internal temperature sensor in the heating plate (available separately) to prevent the localized hot spots under animal.

The ATC features an auto tuning function that utilizes a fuzzy-logic algorithm to optimize settings automatically. Parameters may also be set manually. The temperature resolution of the controller is 0.1°C. The rectal temperature probe has a 6-ft ultra-flexible shield cable and an RTD sensor.

Parts List

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

(1) ATC1000 Animal Temperature Controller
(1) 502197 Rectal Probe, 2mm shaft diameter, 3.5mm ball tip or 503524 Mouse Rectal Probe, 1.8mm shaft diameter, 2.5mm ball tip
(1) Instruction Manual

NOTE: You need a heating plate to use the ATC1000 and three varieties are available. For accessories, see “Accessories” on page 14.

An optional silicone pad (WPI #503573) is available for use with the ATC1000. It is composed of a thermally conductive rubber material that is used to enhance the heat transfer to the animal. Simply place the silicone pad on the ATC1000 warming plate and place the animal on silicone pad.
Fig. 2—The 503573 Silicone Pad, an optional accessory, can be placed under the animal to enhance the heat transfer from the ATC1000 plate to the animal.

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 19 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 19 of this manual.
**INSTRUMENT DESCRIPTION**

**Front Panel**

**LED Displays**

**Probe LED Display**—The Probe LED display shows either the probe temperature in normal working mode or one of the setting modes. Press the Set key to enter the temperature setting mode as described in “Operating Instructions” on page 6. If the Set key is pressed for 5 seconds, the controller enters the PID setting mode, which is described in “Using the ATC1000 Controls” on page 7.

**Preset LED Display**—The Preset LED display shows the temperature setting in the normal working mode. It shows the parameter value when the controller is in setting mode.

**Heat LED Indicator (green)**—The green LED indicates that the unit is heating. It toggles on and off during normal use. The amount of time the LED is illuminated is proportional to the output voltage. Continuous illumination means the heater is on full power.

**Auto Tuning LED Indicator (orange)**—The yellow LED flashes when auto-tuning is on.

**Alarm LED Indicator (red)**—The red LED lights up when the measured temperature of the probe exceeds the user-programmed upper limit (the set temperature plus the deviation limit). An audible alarm is also turned on to indicate overheating.

**Switches and Keys**

**Power Switch**—This turns the temperature controller on and off.

**Set Key**—Press the Set key to set the control parameters.

**Shift Key**—When the controller enters the setting mode, press the Shift key to save the current digit value (flashing digit), move to the next digit and make the new digit ready to change.
**Down Key**—Press the **Down** key to decrease the displayed digit by 1 if it is not 0, otherwise it changes to 9.

**Up Key**—Press the **Up** key to increase the displayed digit by one if it is not 9, otherwise it changes to 0.

## Connectors

![ATC1000 connectors](image)

*Fig. 4—ATC1000 connectors*

- **Probe Connector**—Connect the temperature sensor to the **Probe** connector.
- **Output Connector**—Connect the heating device to the **Output** connector.

## Back Panel

The BNC connector on the rear panel provides the temperature sensor output with a voltage corresponding to temperature — 20 mV/°C.

![BNC connector](image)

*Fig. 5—BNC connector on the rear panel of the ATC1000*

The power input module, also on the rear panel, contains a fuse.
OPERATING INSTRUCTIONS

The temperature controller provides electrically quiet control over the heating plate. Place the animal directly onto the heating plate.

1. Connect the heating device to the Output connector.

2. Connect the rectal temperature probe to the Probe input on the ATC1000.

The controller’s PID algorithm compares the measured temperature to the preset (setpoint) temperature to determine the correct heater power output. When the instrument is turned on, the control parameters last used are loaded. The probe (animal) temperature is shown on the Probe LED display. (Fig. 5)

Fig. 6—Temperature Control display

TIP: It may be useful to allow the heating plate to warm up before placing the animal on it. After the plate reaches the setpoint, position the animal and insert the rectal probe.

Alarms

The ATC1000 has two alarm conditions that trigger the audible alarm:

- DEVIATION LIMIT ALARM—When the animal’s temperature (monitored with the rectal probe) exceeds the upper temperature limit, an audible alarm sounds, the red LED flashes, and the heater shuts off. The upper temperature limit is the target temperature plus the user-defined deviation limit. The deviation limit can be adjusted up or down to change the sensitivity of this alarm.

- SAFETY ALARM—An internal sensor monitors the plate temperature. When the temperature of the plate exceeds 45°C, a safety alarm sounds. The heater, however, remains on. When this alarm sounds, turn the ATC1000 off to avoid injury to the animal. See “Troubleshooting” on page 15 for information on correcting the alarm condition before turning the heating plate back on.

TIP: If this alarm becomes a nuisance, set the deviation limit a little higher. See “Setting the Temperature Deviation Limit” on page 9.
WARNING: WHEN THE SAFETY ALARM SOUNDS (THE PLATE TEMPERATURE EXCEEDS 45°C), TURN THE ATC1000 OFF TO ALLOW THE HEATING PLATE TO COOL FOR A FEW MINUTES BEFORE TURNING IT BACK ON.

Turning the ATC1000 On/Off

When the Power key is set to on (I), it takes several seconds for the controller to initialize and come to a normal working condition. The parameters loaded are the same as those last used. The Probe LED display shows the temperature measured by the sensor. The Preset LED display shows the temperature setting (setpoint). If any connection is loose, the controller alarm sounds.

Set the Power key to off (0) to turn the temperature controller off.

CAUTION: After the power is switched off, wait at least 30 seconds before turning the unit on again or the controller may not initiate the control parameters correctly.

Using the ATC1000 Controls

Using the keys on the front panel of the ATC1000, you can:

- Set the desired temperature (page 9)
- Set the deviation limit, auto tuning preference and other detailed parameters of the PID algorithm (page 9)
- Lock the parameters (page 12)
- Calibrate the sensor (page 9)

The flow chart (Fig. 5) provides a visual overview of ATC1000 operations. After turning the power on, you may enter the Temperature Setting Mode or the Advanced Setting Mode depending on how long you hold down the Set key. Specific instructions for adjusting parameters are detailed on the next few pages.
Fig. 7—Overview of ATC1000 functions available from the front panel

NOTE: A time limit applies when you are working with the functions of the ATC1000. If no key is pressed for 30 seconds, the controller returns to the normal condition without saving the data.
Setting the Temperature
1. Press the Set key to enter the Temperature Setting Mode.
2. When \( T \) displays, use the Shift and the Up or Down key to change the temperature. The controlled temperature range can be adjusted up to 45°C.
3. Press the Set key again to save the temperature and exit to the normal condition.

Setting the Temperature Deviation Limit
The standard deviation limit is 2°C. DO NOT SET THE DEVIATION LIMIT TO ZERO.

**NOTE:** The temperature controller can maintain the temperature within less than ±0.3°C in most situations, so the deviation limit should be larger than 0.3°C. Otherwise, the alarm may be triggered unnecessarily.

To set the deviation limit:
1. Press and hold the Set key for 5 seconds.
2. When \( \text{Shift} \) is shown in the upper LED display, use the Shift, Up and Down keys to change the setting. (For example, 2°C is the standard setting.)
3. Press and hold the Set key for 5 seconds to save the setting and exit to normal working condition.

Sensor Calibration
The instrument is calibrated before shipping. It does not need calibration before use. However, if a new sensor is replaced or the accuracy of the reading needs to be confirmed, the user can calibrate the system with an equilibrated ice and water mixture. The controller provides a calibration function.

1. Set the Preset temperature at 0.0°C to avoid a heating output.
2. Immerse the probe in the ice water. The ratio of ice and water should be 2:1 and be stirred by a magnetic stirrer.
3. After at least 10 minutes, take a reading.
4. Press and hold the Set key for 5 seconds.
5. Press the Set key briefly seven times or until \( \text{T} \) is shown in the Probe LED display.
6. When \( \text{T} \) is shown, use the Shift, Up and Down keys to change the setting. The last digit also changes the calibration temperature above zero or below zero. For example, the probe measures 0.5°C in the ice water, enter -0.5°C in the calibration to correct the reading to zero. The maximum calibration range is ±9.9°C.
7. Again, press and hold the Set key for 5 seconds to save the setting and exit to normal working condition.
PID Controller Parameters

If auto-tuning does not adequately stabilize the system or the ideal settings for a particular heater are already known, you can manually adjust the PID parameters. WPI doesn’t recommend changing these parameters manually unless you are familiar with the functions of each PID parameter. See “Auto-tuning” on page 13.

Proportional Scale

When the plate temperature falls within the range of the proportional band, the proportional control algorithm of the PID controller is invoked.

<table>
<thead>
<tr>
<th>Actual Temperature</th>
<th>Heating Power Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below proportional band range</td>
<td>Maximum output</td>
</tr>
<tr>
<td>Rising in proportional band range</td>
<td>Power diminishing proportionally</td>
</tr>
<tr>
<td>Falling in proportional band range</td>
<td>Power increasing proportionally</td>
</tr>
<tr>
<td>Above the proportional band range</td>
<td>Zero</td>
</tr>
</tbody>
</table>

The proportional control limits the amount of fluctuation of the temperature around the setpoint value as the controller stabilizes. However, if the proportional control is used alone after the temperature has stabilized, then the actual temperature approaches the setpoint, but never quite reach it. Fig. 6 shows a graphically representation of how the temperature rises compared with the heater output over time.

Fig. 6—Shows a graphically representation of how the temperature rises compared with the heater output over time.

Fig. 8—Heater power output is compared with the actual temperature over time. Notice that with proportional control alone, the temperature falls short of the setpoint as it stabilizes.
The proportional algorithm can be expressed mathematically.

Heater Output Power = (Temperature Setpoint – Actual Temperature) * 100 / (Proportional Scale Value)

The power output is inversely proportional to the proportional scale value and directly proportional to the temperature deviation. A smaller scale value means higher gain, faster response and tighter temperature control. However, the system can become unstable if the value is too small. The scale range is between 1-999. The default value is 5.

**NOTE:** NEVER set the proportional scale value to zero.

1. Press and hold the **Set** key for 5 seconds to enter advanced setting mode.
2. Press the **Set** key briefly to change the setting mode. This setting is the second one in the advanced setting mode.
3. When **---** is shown in the upper LED display, use the **Shift** key and the **Up** or **Down** keys to change the setting.
4. Again, press and hold the **Set** key for 5 seconds to save the setting and exit to normal working condition.

**Integral Time**

Adding integral control to the proportional control corrects the temperature shortfall experienced with proportional control alone, bringing the actual temperature closer to the setpoint. The value set for the integral determines the speed of the correction. The integral value is only applied when the actual temperature falls within the range of the proportional band. At startup or when the setpoint is changed, the actual temperature may overshoot the setpoint. The integral value is seconds/repeat. A low integral value causes rapid action, but too much action makes the system unstable.

The integral function eliminates the residual difference between the set temperature and measured temperature.

\[
\text{Controller Output} = \frac{\text{Error Time}}{\text{Integral Time}}
\]

The controller output is proportional to the amount of time the error is present and inversely proportional to the integral time. The integral time range is 0-3600 seconds. The default is 7. The smaller the integral time, the stronger the integral effect. When the integral time is set to zero, the integral function shuts off.

1. Press and hold the **Set** key for 5 seconds to enter advanced setting mode.
2. Press the **Set** key briefly to switch between the different settings. This setting is the third one in the advanced setting mode.
3. When **---** is shown in the **Probe LED** display, use the **Shift** key and the **Up** or **Down** keys to change the setting.
4. Again, press and hold the **Set** key for 5 seconds to save the setting and exit to normal working condition.
Derivative Time

The derivative control minimizes the setpoint overshoot of proportional/integral control. It is the rate control mechanism. The derivative adjusts the temperature output based on the rate of the actual temperature change. If the derivative value is set too high, the system becomes less responsive.

The derivative parameter has two main functions.

- Provides fast action when the system has a large disturbance
- Reduces oscillation in the system

Controller Output = (Derivative Time) x dT / dt

\( T = \) temperature of the animal

The controller output is proportional to both the rate of the error change and the derivative time. The derivation time range is 0-3600 seconds. The default value is 3. The larger the derivative time, the stronger its effect. Zero derivative time has no effect.

1. Press and hold the Set key for 5 seconds to enter advanced setting mode.
2. Press the Set key briefly to switch between the different settings. This setting is the fourth one in the advanced setting mode.
3. When \( \text{Parameter Lock} \) is shown in the Probe LED display, use the Shift key and the Up or Down keys to change the setting.
4. Again, press and hold the Set key for 5 seconds to save the setting and exit to normal working condition.

Parameter Lock

Two parameter lock options are available. If you do not want to leave the parameters adjustable, you may set the ATC1000 so that only the temperature can be modified or so that none of the parameters can be modified.

1. Press and hold the Set key for 5 seconds to enter advanced setting mode.
2. Press the Set key briefly to switch between the different settings. This setting is the seventh one in the advanced setting mode.
3. When \( \text{Parameter Lock} \) is shown in the Probe LED display, use the Shift key and the Up or Down keys to change the setting.
   - 0—All parameters are adjustable
   - 1—Only temperature is adjustable
   - 2—No parameter changes allowed, including auto-tuning
4. Again, press and hold the Set key for 5 seconds to save the setting and exit to normal working condition.
Auto-tuning

The controller is shipped with PID parameters that work in most conditions. However, when changing heating plates or trying to warm a subject that is significantly different from a regular sized animal, the current setting of the controller might not hold the temperature as stable. To solve this problem, use the Auto-tuning feature. This lets the controller find the best parameters for the system. The Auto-tuning program heats the subject and lets it cool several times. Based on the heating and cooling speed, the program optimizes the PID parameters for the system. Auto-tuning is the sixth setting mode in the advanced setting mode.

1. Press and hold the Set key for 5 seconds to enter advanced setting mode.
2. Press the Set key briefly to switch between the different settings.
3. When \(-\text{P-}\) is shown in the Probe LED display, use the Shift key along with the Up and Down keys to change the setting to either 0 or 1.

**NOTE:** When auto-tuning is set to 1, the controller erases all existing parameters, finds the optimal parameters and saves these parameters to memory. When auto-tuning is set to 0, the parameters can be changed manually as described above.

**Parameter Values**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Upper Limit</th>
<th>Lower Limit</th>
<th>Default</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviation Limit</td>
<td>9.9</td>
<td>0.3</td>
<td>2.0</td>
<td>0.5–3.0</td>
</tr>
<tr>
<td>Sensor Calibration</td>
<td>9.9</td>
<td>-9.9</td>
<td>0.0</td>
<td>-1.5–1.5</td>
</tr>
<tr>
<td>Proportional Scale</td>
<td>999</td>
<td>0</td>
<td>5</td>
<td>2–10</td>
</tr>
<tr>
<td>Integral Time</td>
<td>3600</td>
<td>0</td>
<td>7</td>
<td>1–100</td>
</tr>
<tr>
<td>Derivative Time</td>
<td>3600</td>
<td>0</td>
<td>3</td>
<td>1–500</td>
</tr>
<tr>
<td>Auto Tuning</td>
<td></td>
<td></td>
<td>0</td>
<td>0, 1</td>
</tr>
<tr>
<td>Parameter Lock</td>
<td></td>
<td></td>
<td>1</td>
<td>0, 1, 2</td>
</tr>
</tbody>
</table>
MAINTENANCE

Cleaning the Heating Plate

**CAUTION**: Do not immerse in liquids.
Do not autoclave.
Do not use acids or strong bases.

Clean the heating plate with mild soap and water and rinse with water. Be careful to keep water away from the cord, especially where the cord connects with the heating plate. If desired, use enzymatic cleaners to wash the heating plate.

Sterilize with alcohol, if needed.

Cleaning the Rectal Probe Tip

**CAUTION**: Do not immerse in liquids.
Do not autoclave.
Do not use acids or strong bases.

To clean the rectal probe, use an enzymatic detergent like Enzol (WPI #7363-4). Soak the tip of the probe in Cidex Plus (WI #7364) for 20-45 minutes to disinfect it.

ACCESSORIES

**Table 1: Accessories**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7363-4</td>
<td>Enzol enzymatic detergent, gallon</td>
</tr>
<tr>
<td>7364-4</td>
<td>Cidex Plus biocide, gallon</td>
</tr>
<tr>
<td>502195</td>
<td>Small Heating Plate with built-in RTD sensor, 10x15cm</td>
</tr>
<tr>
<td>502196</td>
<td>Medium Heating Plate with built-in RTD sensor, 15x25cm</td>
</tr>
<tr>
<td>502197</td>
<td>Rectal Temperature Probe, 2 mm shaft diameter, 3.5mm ball tip</td>
</tr>
<tr>
<td>503524</td>
<td>Mouse Rectal Temperature Probe, 1.8mm shaft diameter, 2.5mm ball tip</td>
</tr>
<tr>
<td>503567</td>
<td>Mouse Adaptor Heating Plate with built-in RTD sensor, 4x15cm (for use with 502063 Stereotaxic Adaptor)</td>
</tr>
<tr>
<td>503573</td>
<td>Silicone pad for ATC1000 (10x15cm)</td>
</tr>
</tbody>
</table>
### TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No power</td>
<td>Poor connection</td>
<td>Check the power cable connection.</td>
</tr>
<tr>
<td></td>
<td>Fuse is blown</td>
<td>Check the fuse, which is inside the power input module. Change the fuse if it is blown.</td>
</tr>
<tr>
<td>&quot;-LLL&quot; or &quot;-HHH&quot; displays</td>
<td>Poor probe connection</td>
<td>Disconnect and properly re-connect the probe to the ATC1000.</td>
</tr>
<tr>
<td>Animal cannot reach set temperature</td>
<td>Insufficient heating power</td>
<td>The maximum power output on the heating device is 30W. In most situations, the power is sufficient to keep the animal warm up to 40°C. To minimize heating loss, insulate the bottom of heating plate and cover the animal with a small blanket to keep it warm.</td>
</tr>
<tr>
<td>Control of temperature is unstable</td>
<td>Environmental temperature fluctuations</td>
<td>Since the heating output of the ATC1000 is automatically PID-controlled, the temperature can swing back and forth if the environmental temperature varies dramatically. Set the deviation limit to a small value so that the temperature swing is minimized. <strong>NOTE:</strong> The deviation limit alarm may be triggered more frequently (each time the temperature reaches the upper limit).</td>
</tr>
<tr>
<td>Alarm is sounding</td>
<td>Poor transfer of heat from the heating plate to the animal. (The plate is hot, but the animal has not warmed up.) You may use these solutions independently or together to solve this issue.</td>
<td>Improve the thermal coupling from the heating plate to the animal. Place a heat-conductive, conformal material (like cotton wadding) between the animal and the plate. Adjust the PID parameter to slow the plate heating process. To do this, increase the proportional scale (P parameter) incrementally. A value between 3 and 8 is normal. See “Proportional Scale” on page 10.</td>
</tr>
<tr>
<td></td>
<td>Poor connection to heating plate and probe</td>
<td>Disconnect both the heating plate and probe and reinsert them properly. If nothing is plugged into the ATC, an alarm will sound.</td>
</tr>
</tbody>
</table>

**NOTE:** If you have a problem/issue with that falls outside the definitions of this troubleshooting section, contact the WPI Technical Support team at 941.371.1003 or technicalsupport@wpiinc.com.
SPECIFICATIONS

The ATC1000 conforms to the following specifications:

- **Temperature Range**: up to 45°C
- **Resolution**: 0.1°C
- **Accuracy**: ± 0.3°C
- **Rat Sensor**: RTD, OD 2.0mm tube with 3.5mm ball head (Optional mouse sensor is available)
- **Maximum DC Output**: 32V, 1A
- **Proportion Scale (P)**: 1 ~ 999, default setting: 5 (normal: 3-8)
- **Integral Time (I)**: 0 ~ 3600 seconds, default setting: 7
- **Derivative Time (D)**: 0 ~ 3600 seconds, default setting: 3
- **Power**: 90 - 240V, 50 - 60 Hz
- **Dimensions**: 45x30x7 cm (17.7 x 11.8 x 2.76 in.)
- **Weight**: 5 kg (11 lb)
- **Fuse**: For 110V, 2A
  For 220V, 1A

APPENDIX A: APPLICATION NOTE

If desired, the RTD temperature sensor inside the heating plate can be used to control the warming. In this case the rectal probe is not used. Instead the temperature monitored is the plate temperature, not the animal’s temperature. To do this, plug the heating plate into the Probe connector and set the Preset temperature about 5°C higher than normal. When the plate temperature falls below the setpoint to the value defined in the PID algorithm, the plate will begin to heat. This may take several minutes, depending on the sensitivity or your algorithm settings.
# INDEX

## Symbols
- 502195 14
- 502196 14
- 502197 2, 14

## A
- accessories 14
- alarm 6, 15
- Alarm LED Indicator 4
- audible alarm 6
- auto-tuning 13
- Auto Tuning LED 4

## B
- BNC connector 5

## C
- calibrate 9
- cotton wadding 15

## D
- DC heater 2
- derivative time 12
- deviation limit 9
- dual temperature sensing inputs 2

## E
- electromagnetic radiation 2
- electrophysiological 2

## F
- Fuse 15
- fuzzy-logic 2

## H
- Heat LED 4
- hot spots 2

## I
- initialize 7
- integral time 11
- internal sensor 6

## N
- noise 2

## O
- oscillation 12
- output connector 5, 6

## P
- parameter lock 12
- parameters 10
- parts list 2
- PID 2, 4, 6, 10, 13, 15
- power 15
- power input module 5
- Preset LED 4
- probe connector 5
- Probe LED 4
- proportional scale 10

## Q
- quiet 2

## R
- rectal temperature probe 2
- returns 3
- RTD sensor 2

## S
- safety alarm 15
- setpoint 6
- set the temperature 9
- specifications 16

## T
- temperature, setting 9
- thermal coupling 15
- transfer of heat 15
- troubleshooting 15

## U
- unpacking 3
- upper temperature limit 6
DECLARATION OF CONFORMITY

WORLD PRECISION INSTRUMENTS, INC.
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

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

as the distributor of the apparatus listed, declare that the product:

Title: ATC-1000 Temperature Controller

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


EMC:
EN 61326-1: 2006
EN 61000-3-2: 2000
EN 61000-3-3: 2001
EN 61000-6-2: 2001


Issued on: January 18, 2007

Mr. Cliff Bredenberg
General Manager
World Precision Instruments, Inc.
175 Sarasota Center Boulevard
Sarasota, FL 34240-9258 USA

Mr. Glen Carliquist
Vice President of Manufacturing
World-Precision Instruments, Inc.
175 Sarasota Center Boulevard
Sarasota, FL 34240-9258 USA
WARRANTY

WPI (World Precision Instruments, Inc.) 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.