WORLD
PRECISION
INSTRUMENTS

INSTRUCTION MANUAL

ATC2000

Small Animal Temperature Controller

Serial No._____

Version 2.7

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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 shown with heating plate (sold separately) and temperature probe (sold separately)

INTRODUCTION

ATC2000 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 system consists of the controller, the heating plate, the animal subject and the temperature probe. The heat from the plate must travel through the subject to register an effect on the temperature probe inside the subject. The ability of the heater plate to affect the temperature of the probe is limited by the size, contact surface and heat conductivity of the subject. The factory default parameter values

were determined for a set of characteristics designed to emulate a real subject. If the desired results are not achieved, the PID values can be adjusted to compensate for the difference. As an alternative, use the adaptive mode of the controller.

Fig. 2—The conduction of heat depends on the size of the subject, the contact the subject has with the plate and the conductivity of the subject itself.

The controller has three temperature sensing inputs.

- The resistive temperature device (RTD) probe input can be used to monitor an RTD rectal probe to control the animal temperature or to monitor ambient temperature, induction chamber temperature or any other temperature.
- When using a thermocouple probe, the thermocouple (TC) probe input can be used just like the RTD input. (A T type thermocouple must be used.)
- The heater plate also has an internal temperature sensor. The **ATC2000** monitors this sensor to prevent the localized hot spots under animal.

The controller has three modes of operation ("MODE" on page 8):

- Normal mode uses the configured sensor (RTD or TC) to control.
- Adaptive mode uses the temperature of the heated plate and the temperature of the subject to control. This approach is less prone to overshoot, but somewhat slower than normal mode, depending on the sampling rate used.
- Shutdown is a fail safe mode used if the plate temperature ever exceeds your shutdown set point. By default the shutdown set point is 37ºC.

The **ATC2000** is tuned at the factory. However, the PID parameters may also be set manually. (See "Setting PID Parameters" on page 13.) The temperature resolution of the controller is 0.1°C. The rectal temperature probe has a 6' ultra-flexible, shielded cable and an RTD sensor.

NOTE: When using the **ATC2000** with the **61800** Heating Plate (15 x 4 cm) and a stereotaxic frame, a rubber foam pad (included with the **61800** Heating Plate) may be attached to the bottom of the heating plate. The pad acts an insulator to prevent heat transfer into the base of the stereotaxic frame.

Parts List

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

(1) **ATC2000** Animal Temperature Controller

(1) Power adapter

(1) Instruction Manual

NOTE: You need a heating plate (not included) and a probe (not included) to use the **ATC2000**. For accessories, see “Accessories” on page 14.

An optional silicone pad (WPI #**503573**) is available for use with the **ATC2000**. 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 **ATC2000** warming plate and place the animal on silicone pad.

Fig. 3—The 503573 Silicone Pad, an optional accessory, can be placed under the animal to enhance the heat transfer from the ATC2000 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

How it Works

The **ATC2000** uses a digital PID controller to regulate the application of power to the heating plate to achieve the desired temperature at the monitored sensor. PID stands for Proportional, Integral and Differential. The control mechanism is illustrated below.

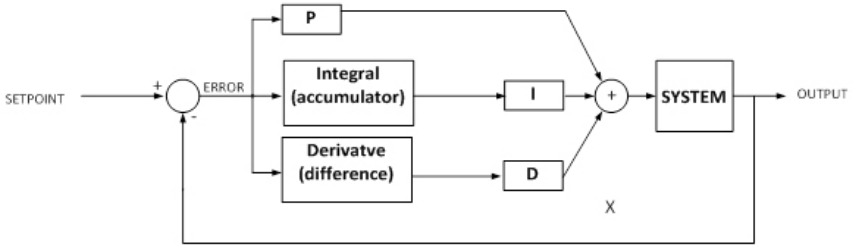

Fig. 4—The monitored temperature is compared with the set point (error), and then the P, I and D algorithms are applied to the error value. The PID values are added together to determine the command sent to the heater. The output changes the monitored temperature, and the cycle repeats.

The default set point is 37°C, but you can configure it as needed. The controller calculates the error, which is the difference between the present temperature and the desired temperature.

Error = Monitored temperature – set point

Three individual components are derived by applying different functions to the error.

- The error is multiplied by the proportional gain factor (P) that is set in the configuration menu. See "Setting PID Parameters" on page 13.
- The error is accumulated to constitute the integral, which is multiplied by the integral gain factor (I) that is set in the configuration menu. See "Setting PID Parameters" on page 13.
- The error is subtracted from the previous value of the error to determine the difference. It is then multiplied by the differential term (D) that is set in the configuration menu. See "Setting PID Parameters" on page 13.

These three components are added together to form the stimulus input applied to the system. The system produces a temperature value which is fed back to be compared with the set point once more. Then, the cycle repeats until the error is zero, meaning that the output is at the desired set point.

Proportional Gain Effect

The proportional gain is fast acting, and it does not change with time when the error is constant. The proportional gain alone brings the system close to the desired value, because the proportional control limits the amount of fluctuation of the temperature around the set point value as the controller stabilizes. However, if the proportional control is used alone after the temperature has stabilized, then the actual temperature approaches the set point, but never quite reaches it. Too much proportional gain causes the system to oscillate, going above and below the set point.

Integral Gain Effect

The integral gain changes with time as the error accumulates. This gain factor changes as need until the system reaches the set point. At this point it remains stationary until the error creeps up or down. The integral gain factor is responsible for long term stability. Too much integral gain also causes oscillation.

Differential Gain Effect

The differential gain factor is seldom used. This term is mainly used to reduce the initial overshoot in a rapidly changing system. The default factory settings for the differential gain is zero. The functionality is still implemented and available, but for systems with a considerable delay in reacting to stimulus, it may be difficult to use effectively.

Default PID parameters:

Type	P (Proportional Gain)	I (Integral Gain)	D (Differential Gain)
Thermocouple	3900	2.5	0
RTD	600	0.4	0
Plate(s)	10230	0.41	0

You can reset PID parameters to the default setting by resetting the unit (see page 13 for Resetting Factory Defaults)

Front Panel

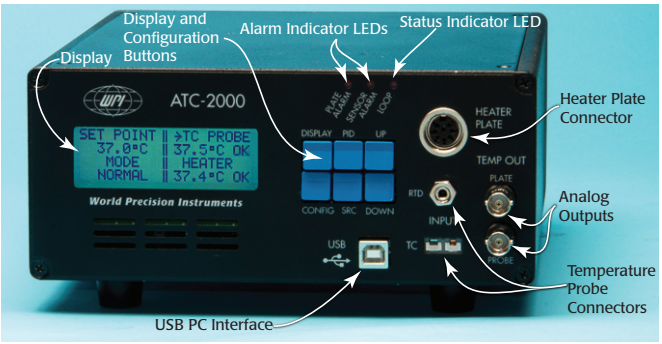

Fig. 5—Front panel of the ATC2000

Display–The main display shows the set point temperature, mode of operation, the temperature reading for the controlled probe (the thermocouple in Fig. 5) and the temperature of the heated plate. Press the **Display** button again to view the temperature of the other temperature probe. In the example above, the RTD probe value will display. If a probe is not connected, the display says, "ERROR." The arrow next to the TC Probe indicates that the TC Probe is the controlled temperature.

Display and Configuration Buttons–

Display: Press this button to toggle between the main display and the display of the alternate temperature probe.

Config: This button toggles through a list of configuration parameters like set point and alarms.

PID: To adjust the PID value of a controlled temperature probe, press this button.

SRC: To change the sensor that is used as the control value, press this button. You can configure the **ATC2000** to control the temperature of the plate, the RTD probe or the thermocouple probe. All three sensors are monitored, but only one temperature is controlled. Typically, the plate temperature is the control value until it reaches the set point. Then, the animal's temperature should become the control value during a procedure.

Up/**Down**: These two buttons are used to adjust configuration parameters.

Alarm Indicator LEDs–The red LEDs illuminate to indicate an alarm state.

Plate Alarm: This red LED illuminates when the plate temperature exceeds 45°C.

Sensor: This red LED illuminates when the controlled temperature falls outside the high and low alarm limits set using the configuration menu.

Status Indicator LED–This heartbeat LED blinks continuously to indicate that the unit is operational and the control loops are running. Like a heartbeat monitor, it indicates the "health" of the **ATC2000** system.

Heater Plate Connector–Align the pins of the Heater Plate connector to this port to connect the plate to the control box.

Analog Outputs–If desired, the analog outputs can be connected to a data acquisition system using BNC cables. For both outputs, 50mV = 1°C.

Plate: The plate temperature can be monitored.

Probe: The controlled probe temperature (either the RTD or TC probe) can be monitored.

Temperature Probe Connectors (RTD and TC)–An RTD probe and a thermocouple probe can be connected to their respective ports. While both temperatures will be monitored, only one can be controlled at a time.

NOTE: The **ATC2000** powers up in normal mode with the heat source set as the default heat source stored in memory from the previous use. See "Setting Controlled Temperature" on page 8 to activate an external probe.

USB PC Interface–This output is for future development.

Back Panel

Fig. 6—The back panel has a power cord connection and a power switch.

Power Cord Socket–Plug the power cord into this socket.

Power Switch–This turns the temperature controller on and off.

OPERATING INSTRUCTIONS

The temperature controller provides electrically quiet control over the heating plate, so that you can place the animal directly onto the heating plate.

1. Connect the heating plate to the **Plate** connector.
2. Connect the rectal temperature probe to one of the Inputs on the **ATC2000**. If it is an RTD temperature sensor, plug it into the **RTD** port; if it is a thermocouple sensor, plug it into the **TC** port.
3. Turn on the **ATC2000** using the power switch on the back of the unit.
4. Adjust the set point, if necessary. See "Setting Temperature Set Point" on page 9.
5. **The unit always powers up in Normal mode with the heat source set as default heat source from the previous use**. Typically, the plate temperature is the control value used until it reaches the set point. Set the source to the heater plate, and allow the unit to run until the plate reaches the set point. (See "Setting Controlled Temperature" on page 8.) The controller's PID algorithm compares the controlled temperature to the preset (set point) temperature to determine the correct heater power output.
6. After the plate reaches the set point, position the animal and insert the rectal probe.
7. If desired, set the temperature source to the sensor monitoring the animal's temperature. See "Setting Controlled Temperature" on page 8.

Display

The main display window shows the set point and the mode of operation on the left side of the screen. On the right side, the control temperature and plate temperature are visible. The arrow next to the TC Probe indicates that the TC Probe is the controlled temperature.

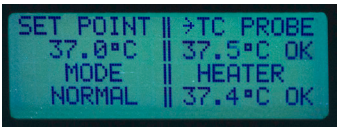

Fig. 7—The home page display shows the set point, mode, control temperature and plate temperature.

TEMPERATURE DISPLAY

In the illustration above, the unit is controlling the thermocouple (TC) probe. In this case, the RTD probe temperature can be viewed by pressing the **Display** button. When the unit controls the RTD probe, that temperature displays on this screen. The OK next to a temperature indicates that the temperature falls within the parameters defined by the low and high alarm limits. If the temperature falls below the low limit, LO displays instead of OK. Likewise, if it exceeds the high limit, HI displays.
If the message "ERROR HI" appears on the Temperature Display, the temperature probe is either disconnected or defective.

ALARMS
When the plate temperature or the control temperature falls outside of the alarm limits, the appropriate alarm LED illuminates. If the audible alarm is enabled, it will also sound.

MODE
The instrument has three modes of operation–normal, adaptive and shutdown.

- The normal mode compares the temperature of the configured sensor (RTD or TC) with the set point to control the heater.
- In the adaptive mode, the sensor in the heated plate is used as the control trigger for the set point. A platinum sensor in the plate monitors the plate temperature very precisely. The temperature of the subject, using the selected probe is sampled at regular intervals. The difference between the temperature of the subject and the desired set point is used to control the heating of the plate. The sampling interval should be set long enough to allow the subject and plate to stabilize before the temperature is sampled and the heating is adjusted. The default sampling interval is three minutes. This approach is less prone to overshoot, but somewhat slower the normal mode, depending on the sampling rate used.

  NOTE: This mode cannot be enabled when the heater plate is selected as the temperature source.
- Shutdown is a fail safe mode. If the plate temperature ever exceeds 45ºC, the unit automatically enters the shutdown mode. In this mode, the controller brings the heater temperature to the Shutdown Mode set point. Once the controller enters shutdown mode, it will remain in that state until you change it. You can press the **Up** and **Down** buttons simultaneously to manually return the unit to the normal mode of operation, however, if the temperature exceeds 45ºC, the unit will return to the shutdown mode.

Setting Controlled Temperature

The **ATC2000** has three temperature sensors. One is located in the heated plate, and the other two can be plugged into the RTD and TC input ports. The **ATC2000** monitors all three temperature readings. You can choose which of the three the unit will control. The **ATC2000** then heats (or stops heating) the plate to keep the controlled temperature within the alarm limits.

1. To set the controlled temperature, press the **SRC** button.

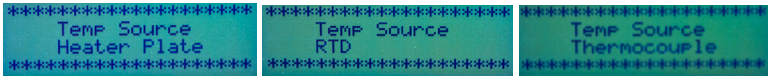

Fig. 8—One of three source temperatures can be used to control the animal's temperature.

2. Press the **Up** or **Down** key to select a temperature source.

NOTE: If the unit is placed in adaptive mode, then the heater plate is not available as a temperature source option here.

3. To make the selected temperature source the default temperature source, press the **SRC** button again. A *D* appears on the display next to your choice to indicate that it is the default temperature source. The unit will retain the default setting even after you power off the **ATC2000**.

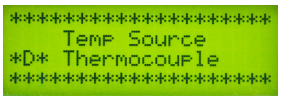

*Fig. 9—The *D* appears next to the Thermocouple temperature source to indicate that the thermocouple is the store default temperature source.*

4. Press the **Display** button to save the new temperature source.

Setting Configuration Parameters

Press the **Config** button on the **ATC2000** to access the Configuration menu. From this menu, you can:

- Adjust the set point temperature
- Set the high and low alarm limits
- Enable/disable the audible alarm
- Adjust the three temperature offsets

Setting Temperature Set Point

1. Press the **Config** button to access the Configuration menu. The temperature set point displays. The default is 37°C.

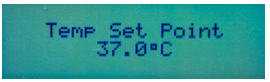

Fig. 10—The set point can be adjusted with the Up/Down buttons.

2. Press the **Up** or **Down** key to change the set point. The controlled temperature range can be adjusted up to 45°C.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

Setting High Alarm Limit

If the controlled temperature climbs above the high alarm temperature limit, the **Sensor Alarm** LED illuminates. If the audible alarms are enabled, the **ATC2000** will also beep continuously until the temperature falls back into the acceptable range. See “Enabling Audible Alarm” on page 10.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until the High Alarm Limit parameter displays.

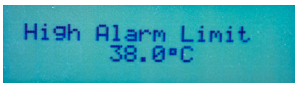

Fig. 11—The high alarm limit parameter can be adjusted with the Up/Down buttons.

2. Press the **Up** or **Down** button to change the set point.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

Setting Low Alarm Limit

If the controlled temperature falls below the low alarm temperature limit, the **Sensor Alarm** LED illuminates. If the audible alarms are enabled, the **ATC2000** will also beep continuously until the temperature returns to the acceptable range. See "Enabling Audible Alarm" on page 10.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until the Low Alarm Limit parameter displays.

Fig. 12—The low alarm parameter can be adjusted with the Up/Down buttons.

2. Press the **Up** or **Down** button to change the parameter.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

Enabling Audible Alarm

By default alarms are disabled on startup, because they would beep continuously until the controlled temperature stabilizes. When the audible alarm is enabled, the controller will beep if the controlled temperature falls outside the range set by the high and low alarms.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until the Audible Alarm parameter displays.

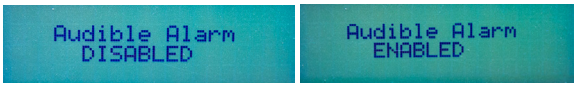

Fig. 13—Enable or disable the alarm using the Up/Down buttons.

2. Press the **Up** or **Down** button to enable or disable the alarms.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

Enabling Adaptive Mode

In the adaptive mode, the sensor in the heated plate is used as the control trigger for the set point. A platinum sensor in the plate monitors the plate temperature very precisely. The temperature of the subject, using the selected probe is sampled at regular intervals. The difference between the temperature of the subject and the desired set point is used to control the heating of the plate.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until the Adaptive Mode Enable displays.

Fig. 14—Enable or disable the adaptive mode using the Up/Down buttons.

NOTE: If the temperature source is set to heater plate, then the adaptive mode cannot be enabled.

2. Press the **Up** or **Down** button to enable or disable adaptive mode.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

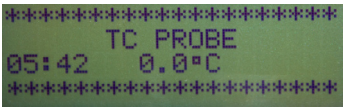

Fig. 15—(Left) The main display shows the selected adaptive mode.
Fig. 16—(Right) A timer displays counting up to the next sample time.

Once the adaptive mode is enabled, Adaptive appears as the mode on the main display window (Fig. 15). If you press the Display button again, the alternate temperature displays along with a timer that counts up from the last sampled time (Fig. 16). In this case, the temperature was sampled 5 minutes and 42 seconds ago. If the interval is set to 10 minutes, the temperature will be sampled again in 4 minutes and 18 seconds.

Setting Adaptive Interval

The sampling interval for the adaptive mode should be set long enough to allow the subject and plate to stabilize before the temperature is sampled. The default sampling rate is 3 minutes.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until the Adaptive Mode Enable displays.

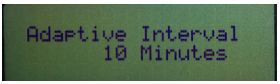

Fig. 17—Using the Up/Down buttons, change the sampling interval time.

2. Press the **Up** or **Down** button to change the sampling interval time.
3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters.

Setting Temperature Offset

If desired, you may set temperature offsets for the RTD probe, the thermocouple probe and the heater plate. The temperature may be offset by ±5°C. For example, if you set the plate offset to 3.0°C, and the actual plate temperature is 34°C, the temperature displayed on the **ATC2000** will be 37°C. This means that if the set point is 37°C, the

ATC2000 will control to the new 37°C, which is actually 34°C plus a 3°C offset.

1. Press the **Config** button on the **ATC2000** to access the Configuration menu. Press the **Config** button again until one of the following displays:
   - Set RTD Offset–Adds temperature offset to the RTD probe reading
   - Set TC Offset –Adds temperature offset to the thermocouple probe reading
   - Set Plate Offset –Adds temperature offset to the heating plate reading

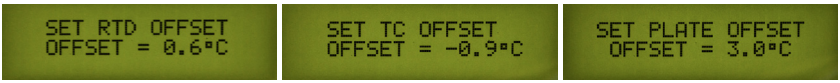

Fig. 18—(Left) Using the Up/Down buttons, change the RTD Offset.
Fig. 19—(Center) Using the Up/Down buttons, change the Thermocouple Offset.
Fig. 20—(Right) Using the Up/Down buttons, change the Heating Plate Offset.

2. Press the **Up** or **Down** button to change the temperature offset.

3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters again.

Changing Shutdown Temperature Set Point

The **ATC2000** automatically goes into shutdown mode if the plate temperature exceeds 45°C. This is designed to prevent overheating the subject.

In shutdown mode, the source temperature defaults to the temperature sensor embedded in the heating plate. The shutdown mode has its own shutdown temperature set point, which is different than the temperature set point in normal mode. By default, the shutdown set point temperature is set to 37ºC. You may set it between 20.0ºC and 45.0ºC.

To clear the shutdown mode, hold down the Up and Down buttons on the front panel simultaneously for 2 seconds. Shutdown mode may also be cleared by momentarily powering down the **ATC2000** for 2-3 seconds. Either procedure causes the **ATC2000** to revert to the normal mode. The control loop continues to reference the sensor embedded in the heating plate, but the temperature set point is set to the set point defined for the normal mode. To change the normal mode temperature source, see "Setting Controlled Temperature" on page 8.

1. To change the shutdown temperature set point, press the **Config** button on the **ATC2000**. The Configuration menu appears. Press the **Config** button again until the Set Shutdown Temp displays.

Fig. 21—Using the Up/Down buttons, change the shutdown temperature.

2. Press the **Up** or **Down** button to change the temperature set point.

3. Press the **Display** button to save the new parameters or press the **Config** button to toggle through the rest of the parameters again.

PID Controller Parameters

If the factory default PID settings do not adequately stabilize the system, 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.

Setting PID Parameters

1. Press the **PID** button to display the PID screen. The two arrows on the screen indicate which digit is being adjusted.

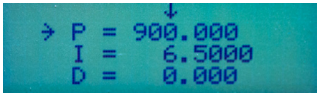

Fig. 22—The PID screen shows you the proportional, integral and derivative values

2. Press the **Config** button to select the P line to modify the proportional value, I line to modify the integral value or the D line to modify the derivative value.
3. Press the **PID** button to select the digit to modify. Each time you press the **PID** button, the top arrow moves one space to the left.
4. Press the **Up** or **Down** button to change the value.
5. When you are finished adjusting the PID values, press the **Display** button to save them and return to the home page screen.

Resetting Factory Defaults

To reset all the configuration parameters to the factory defaults, turn the unit off. Then, hold down both the **Up** and **Down** buttons while you turn the unit on again.

MAINTENANCE

Cleaning 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 Rectal Probe Tip

CAUTION: Do not immerse the entire probe in liquids.
Do not autoclave.
Do not use acids or strong bases.

To clean the tip of 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

Part #	Description
7363-4	Enzol enzymatic detergent, gallon
7364-4	Cidex Plus biocide, gallon
61800	Heating Plate with built-in RTD sensor, 15x25cm
61830	Heating Plate with built-in RTD sensor, 15x10cm
61840	Heating Plate with built-in RTD sensor, 15x4cm
61824	Mouse Rectal Temperature Probe, 1.0mm shaft diameter, 2.5mm ball
503573	Silicone pad for **ATC2000** (10x15cm)

Probes

Probe Type	Size/Lead Diameter	Style	Time Constant	Isolated	Max. Temp	Lead Length	Description
NEEDLE MICROPROBES							
Fast-response needle probes for instant readings in tissue, semisolids, liquids, very small specimens, powders and materials. Needle tip is sealed to ensure only stainless steel contacts specimen.							
MT-29/1	29 ga/1 cm	A	0.125 sec	No	200°c	5 ft.	29g ~ 0.013 in
MT-23/3	23 ga/3 cm	A	0.15 sec	No	200°c	5 ft.	23g ~ 0.125 in
MT-D	—	C	0.025 sec	No	200°c	5 ft.	Fast response surface probe (stainless steel for locating inflammation, arteries, etc. Also for dental use.
FLEXIBLE IMPLANTABLE PROBES							
Designed for high accuracy on extremely small specimens such as insects, seeds, etc. Maximum insertion depth 1/8". Totally sheathed in chemical resistant Teflon.							
IT-18	0.025" dia	D	0.1 sec	Yes	150°c	3 ft	-
IT-23	0.009" dia	E	0.005 sec	Yes	150°c	3 ft	For ultra fast measurements/use on micro-size specimens. Tissue implantable with 23ga. needle. Fragile. Teflon coated.
IT-1E	0.025" dia	F	0.005 sec	Yes	150°c	3 ft	As IT-18 sensor except lead exposed. Combines ultra fast reponse of IT-23 with sheath strength of IT-18
RECTAL PROBES							
RET-2	3.175mm	G	0.8 sec	No	125°c	5 ft	Rectal probe (thermocouple)
61824	2.5mm						Rectal probe (RTD) - 1.25mm shaft
RET-3	0.70mm	G	0.5 sec	No	125°c	5 ft	Rectal probe (thermocouple)

NOTE: When using the **ATC2000** with the **61800** Heating Plate (15 x 4 cm) and a stereotaxic frame, a rubber foam pad (included with the **61800** Heating Plate) may be attached to the bottom of the heating plate. The pad acts an insulator to prevent heat transfer into the base of the stereotaxic frame.

TROUBLESHOOTING

Issue	Possible Cause	Solution
No power	Poor connection	Check the power cable connection.
ERROR displays instead of a temperature	Poor probe connection	Disconnect and properly re-connect the probes to the **ATC2000**.
Animal cannot reach set temperature	Insufficient heating power	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.
Alarm is sounding	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.	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, decrease the integral (I) value.
	Poor connection to heating plate and probe	Disconnect both the heating plate and probe and reinsert them properly.

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 **ATC2000** 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	10V, 3A
Power	Universal AC Adapter 90–264V Input, 12V@4.5A max. output
Dimensions	20.9 x 8.8 x 27.6 cm (8.2 x 3.5 x 10.9 in.)
Weight	5 kg (11 lb.)

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: ATC2000

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 IEC 61326-2-3:2021, EN 61326-1:2021
EN IEC 61000-3-2:2019+A1:2021
EN IEC 61000-3-3: 2013+A1:2019+A2:2021

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: **January 18, 2023**

Stephen Schultz / Quality Manager

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

USA
International Trade Center, 175 Sarasota Center Blvd., Sarasota FL 34240-9258
Tel: 941-371-1003 • Fax: 941-377-5428 • E-mail: sales@wpiinc.com

UK
1 Hunting Gate, Hitchin, Hertfordshire SG4 0TJ
Tel: 44 (0)1462 424700 • Fax: 44 (0)1462 424701 • E-mail: wpiuk@wpi-europe.com

Germany
Saarstraße 23, D-61169 Friedberg (Hesson), Germany
Tel: +49 (0)6031 1602171 • Fax: +49 (0)6031 1602180 • E-mail: wpide@wpi-europe.com

China & Hong Kong
WPI Shanghai Trading Co., Ltd.
Rm 25e, No8 Dongfang Rd., Pudong District, Shanghai, 200120 PR China
Tel: +86 21 6888 5517 • E-mail:chinasales@china.wpiinc.com

Internet
www.wpiinc.com • www.wpi-europe.com • www.wpiinc.cn • www.wpibrasil.com.br