INSTRUCTION MANUAL

Serial No._____________________

021813
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

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 changed to compensate for the difference. As an alternative, use the adaptive mode of the controller.

![Diagram of heat conduction](image)

*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 the normal mode, depending on the sampling rate used.
- Shutdown is a fail safe mode used if the plate temperature ever exceeds 45°C.

The ATC2000 is tuned at the factory. However, the PID parameters may also be set manually. (See "Setting PID Parameters" on page 11.) The temperature resolution of the controller is 0.1°C. The rectal temperature probe has a 6-ft ultra-flexible, shielded 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. **ATC2000** Animal Temperature Controller
2. **61824** Mouse Rectal Probe, 1.0mm shaft diameter, 2.0mm ball tip
3. Power adapter
4. Instruction Manual

**NOTE:** You need a heating plate to use the ATC2000. For accessories, see “Accessories” on page 12.
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 15 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 15 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.
The default setpoint 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.

\[
\text{Error} = \text{Monitored temperature} - \text{Setpoint}
\]

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 11.

- 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 11.

- 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 11.

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 setpoint once more. Then, the cycle repeats until the error is zero, meaning that the output is at the desired setpoint.

**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 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. Too much proportional gain causes the system to oscillate, going above and below the setpoint.
Integral Gain Effect

The integral gain changes with time as the error accumulates. This gain factor changes as need until the system reaches the setpoint. 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.

Front Panel

![Front panel of the ATC2000](image)

**Display**—The main display shows the setpoint 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.”

**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 setpoint 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 setpoint. 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.

**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.

**USB PC Interface**—This output is for future development.

**Back Panel**

![Image of back panel with power cord socket and power switch]

*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 setpoint, if necessary. See “Setting the Temperature Setpoint” on page 9.
5. Set the temperature source to “Heater Plate.” See “Setting the Controlled Temperature” on page 8. Allow the unit to run until the plate reaches the setpoint. The controller’s PID algorithm compares the controlled 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.
6. After the plate reaches the setpoint, position the animal and insert the rectal probe.
7. If desired, set the temperature source to the sensor monitoring the animal’s temperature.

Display

The main display window shows the setpoint and the mode of operation on the left side of the screen. On the right side, the control temperature and plate temperature are visible.

![Fig. 7—The home page display shows the setpoint, mode, control temperature and plate temperature.](image)

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.

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 setpoint to control the heater.

- In the adaptive mode, the sensor in the heated plate is used as the control trigger for the setpoint. 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 setpoint 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 setpoint is re-evaluated. This approach is less prone to overshoot, but somewhat slower the normal mode, depending on the sampling rate used.

- Shutdown is a fail safe mode. If the plate temperature ever exceeds 45°C, the unit automatically enters the shutdown mode. In this mode, the controller brings the heater temperature to 37°C. 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 45°C, the unit will return to the shutdown mode.

Setting the 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.

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

3. Press the Display button to save the new temperature source.

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

- Adjust the setpoint temperature
- Set the high and low alarm limits
- Enable/disable the audible alarm
Setting the Temperature Setpoint

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

![Temp Set Point](image)

Fig. 9—The setpoint can be adjusted with the Up/Down buttons.

2. Press the Up or Down key to change the setpoint. 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 the 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 the 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.

![High Alarm Limit](image)

Fig. 10—The high alarm limit parameter can be adjusted with the Up/Down buttons.

2. Press the Up or Down button to change the setpoint.

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

Setting the 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 the 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.

![Low Alarm Limit](image)

Fig. 11—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 the 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.

![Audible Alarm](DISABLED) ![Audible Alarm](ENABLED)

Fig. 12—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 again.

Enabling the Adaptive Mode

In the adaptive mode, the sensor in the heated plate is used as the control trigger for the setpoint. 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 setpoint 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.

![Adaptive Mode Enable](DISABLED)

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

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 again.

![Set Point](37.0°C) ![RTD Probe](21.8°C Low)
![Mode](Heater) ![Adaptive](28.2°C OK)

Fig. 14—(Left) The main display shows the selected adaptive mode.

Fig. 15—(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. 14). If you press the Display button again, the alternate temperature displays along with a timer that counts up from the last sampled time (Fig. 15). 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 the 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 and the setpoint re-evaluated. The default sampling rate is 10 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.

![Adaptive Interval 10 Minutes](image)

Fig. 16—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 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.

![PID Screen](image)

Fig. 17—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 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>
<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>61800</td>
<td>Heating Plate with built-in RTD sensor, 15x2.5cm</td>
</tr>
<tr>
<td>61830</td>
<td>Heating Plate with built-in RTD sensor, 15x10cm</td>
</tr>
<tr>
<td>61840</td>
<td>Heating Plate with built-in RTD sensor, 15x4cm</td>
</tr>
<tr>
<td>61824</td>
<td>Mouse Rectal Temperature Probe, 1.0mm shaft diameter, 2.0mm ball tip</td>
</tr>
<tr>
<td>503573</td>
<td>Silicone pad for ATC2000 (10x15cm)</td>
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</table>

Probes

<table>
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<tr>
<th>Probe Type</th>
<th>Size</th>
<th>Style</th>
<th>Time Constant</th>
<th>Isolated</th>
<th>Max. Temp.</th>
<th>Lead Length</th>
<th>Price</th>
<th>Description</th>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>NEEDLE MICROPROBES</td>
</tr>
<tr>
<td>MT-29/1</td>
<td>29 ga / 1 cm</td>
<td>A</td>
<td>0.125 sec</td>
<td>No</td>
<td>200°C</td>
<td>5 ft</td>
<td>$152</td>
<td>29g ~ 0.013 in</td>
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<tr>
<td>MT-23/3</td>
<td>23 ga / 3 cm</td>
<td>A</td>
<td>0.15 sec</td>
<td>No</td>
<td>200°C</td>
<td>5 ft</td>
<td>$152</td>
<td>23g ~ 0.125 in</td>
</tr>
<tr>
<td>MT-D</td>
<td>—</td>
<td>C</td>
<td>0.025 sec</td>
<td>No</td>
<td>200°C</td>
<td>5 ft</td>
<td>$179</td>
<td>Fast response surface probe (stainless steel for locating inflammation, arteries, etc. Also for dental use.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Lead Diameter</th>
<th>Diameter</th>
<th>Temp</th>
<th>Max.</th>
<th>Depth</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT-18</td>
<td>0.025&quot; dia</td>
<td>D</td>
<td>0.1  sec</td>
<td>Yes</td>
<td>150°C</td>
<td>3 ft</td>
</tr>
<tr>
<td>IT-23</td>
<td>0.009&quot; dia</td>
<td>E</td>
<td>0.005 sec</td>
<td>Yes</td>
<td>150°C</td>
<td>3 ft</td>
</tr>
<tr>
<td>IT-1E</td>
<td>0.025&quot; dia</td>
<td>F</td>
<td>0.005 sec</td>
<td>Yes</td>
<td>150°C</td>
<td>3 ft</td>
</tr>
</tbody>
</table>


**RECTAL PROBES**

| RET-2  | G    | 0.8 sec | No | 125°C | 5 ft | $108 |

Rectal probe for rats typically for fast intermittent measurements. Smooth ball tip (0.125 in. dia.) with 1” long (0.59 in. dia) stainless steel shaft.

**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>ERROR displays instead of a temperature</td>
<td>Poor probe connection</td>
<td>Disconnect and properly re-connect the probes to the ATC2000.</td>
</tr>
<tr>
<td>Insufficient heating power</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 the heating plate and cover the animal with a small blanket to keep it warm.</td>
</tr>
<tr>
<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>Poor connection to heating plate and probe</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, decrease the integral (I) value.</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**: 10V, 3A
- **Power**: Universal AC Adapter 90–264V Input, 12V@4.5A maximum output
- **Dimensions**: 45x30x7 cm (17.7 x 11.8 x 2.76 in.)
- **Weight**: 5 kg (11 lb)
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.
World Precision Instruments, Inc.

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