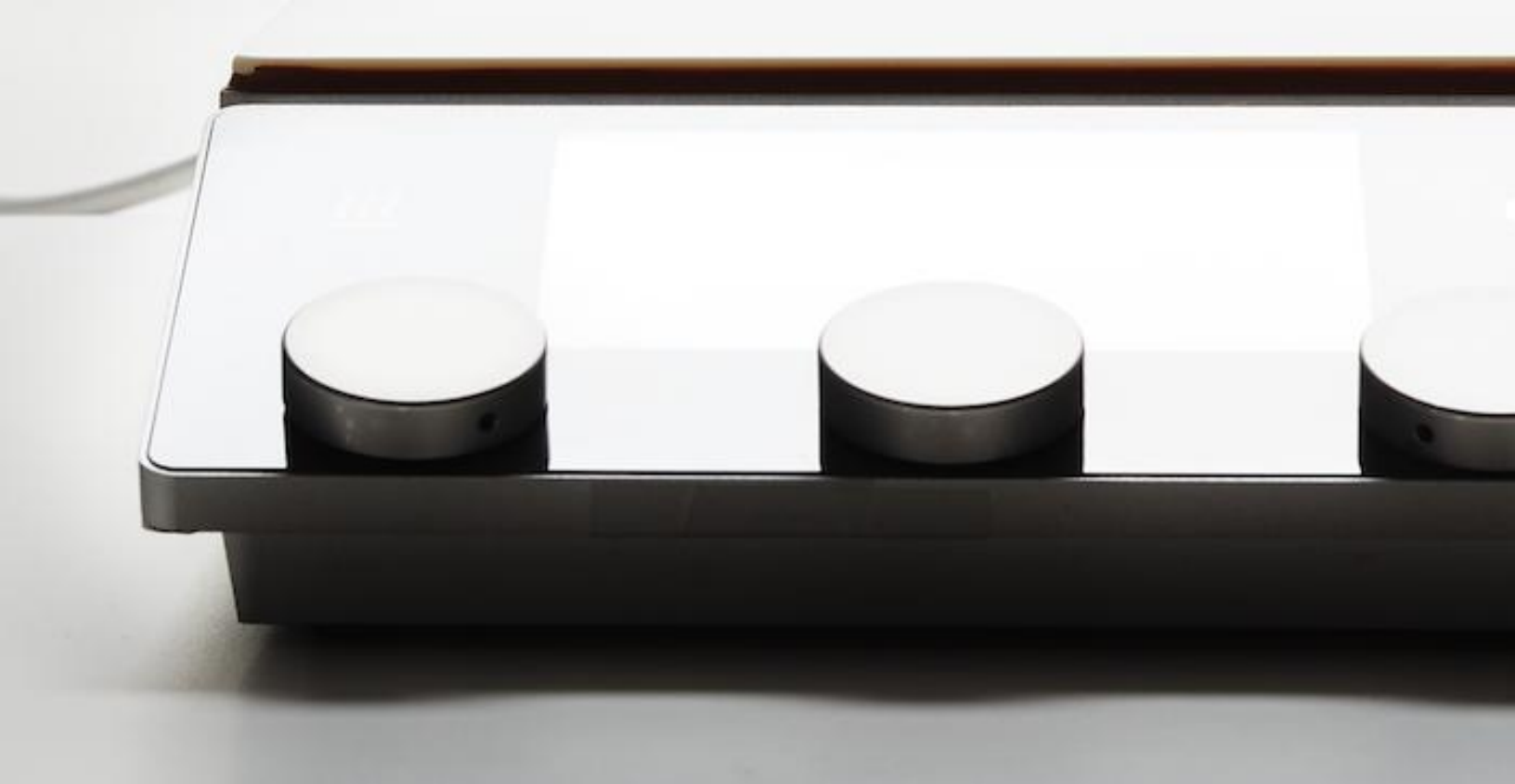
GATE SCIENTIFIC

Operating Manual

Model HPS1 with smartSENSE™



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PACKAGE CONTENTS:

Precision Hotplate ™, smartSENSE™ Stirbar (qty 1), 2-piece metal stand, Detachable power cord, 6" Wi-Fi Extender Cord, Instruction Manual

Please inspect contents to ensure that no damage has occurred during shipping. If any damage is detected, please notify the carrier immediately.

WARRANTY:

Manufacturer warrants this product to be free from defects in material and workmanship when used under normal conditions for two years. Please retain proof of purchase. All warranty claims should be emailed to sales@gatescientific.com.

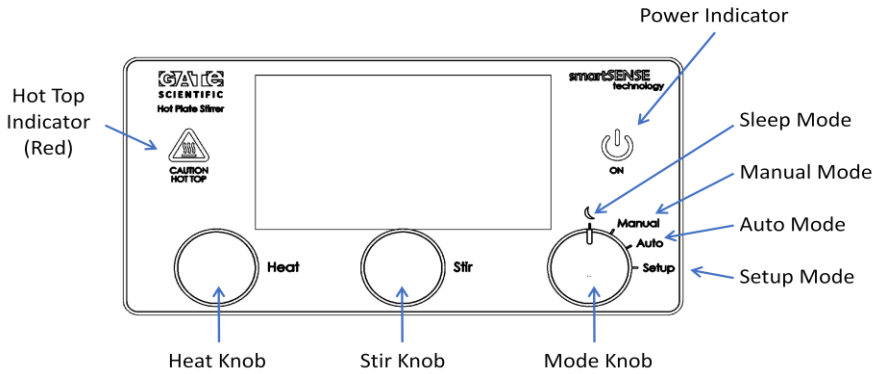
Serial No: _____ Date Purchased: _____

Supplier: _____

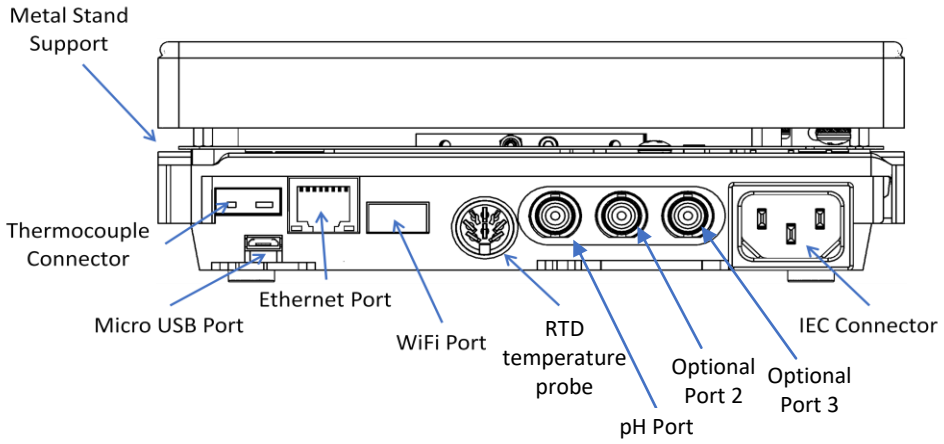
INSTALLATION:

1. After unpacking, place the unit on a level, sturdy surface that can withstand the heat generated by the unit.
2. Keep the unit at least twelve inches from any vertical surfaces.
3. Insert the supplied power cord into the IEC connector on the back of the unit.
4. Screw the metal stand into the metal stand support on the back of the unit.
5. Pull out the Wi-Fi USB adaptor and insert the 6" Wi-Fi extender into the unit. Plug in the Wi-Fi USB adaptor into the other side of extender.
6. **Confirm that the unit is in sleep mode by turning the mode knob to the sleep position**.
7. Plug the power cord into a grounded, 120 volt, 50/60 Hz power outlet.
8. **NOTE: Do not place smartSENSE Stirbar™ on hotplate surface until power-up protocol is complete.**
9. When unit is first plugged in, the Power indicator will flash blue, then off, while unit is powering up.
10. When power indicator remains solid blue, the unit has finished its power-up routine and is ready for use. This can take several minutes.

Control Plate



Back of Unit



MAINTENANCE:

The Precision Hotplate Stirrer needs no user maintenance beyond keeping the surfaces clean. The unit should be given the care normally required for any electrical appliance. Avoid wetting and unnecessary exposure to fumes. Spills should be removed as soon as unit cools down. Do not use a cleaning solvent on top plate or front panel which is abrasive or harmful to glass, nor one which is flammable. Always ensure the power is disconnected from the unit when cleaning. If unit requires service or for general technical information, contact:

Gate Scientific
950 Yosemite Dr
Milpitas, CA 95035
www.gatescientific.com
+1 (650) 223 5509

Cleaning Ceramic Tops: When the top plate has cooled, apply a non-abrasive cleaner with a damp paper towel. Finally, rinse with water and wipe surface dry with a clean paper towel.

INTENDED USE:

The Precision Hotplate™ is intended for general laboratory use.

ENVIRONMENTAL CONDITIONS:

<u>Operating Conditions:</u>
Indoor use only
Temperature: 5 to 40°C (41 to 104°F)
Humidity: Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Altitude: 0 to 6,562 ft (2000 M) above sea level

<u>Non-Operating Storage:</u>
Temperature: -20 to 65°C (-4 to 149°F)
Humidity: 20% to 80% relative humidity, non-condensing
Installation Category II and Pollution Degree 2 in accordance with IEC 664.

SAFETY INSTRUCTIONS:

Read the entire instruction manual before operating the equipment

Always wear safety glasses and other appropriate protection when operating this equipment

WARNING! DO NOT use the Hotplate/Stirrer/Hotplate-Stirrer in a hazardous atmosphere or with hazardous materials for which the unit was not designed. Protection provided by the equipment may be impaired if used with accessories not provided or recommended by the manufacturer or used in a manner not specified by the manufacturer.

CAUTION! To avoid electrical shock, completely cut off power to the unit by disconnecting the power cord form the unit or unplug from the wall outlet. Disconnect unit from power supply prior to maintenance, service, or cleaning.

Unit is NOT explosion or spark proof

Always operate unit on a level surface for best performance and maximum safety.

DO NOT lift unit by the top plate.

Spills should be removed promptly after the unit has cooled down. DO NOT immerse the unit for cleaning. Spills may damage the unit and lead to thermal failure.

CAUTION! The top heater plate assembly can reach 400°C, DO NOT touch the top heater plate assembly. Use caution at all times. Keep the unit away from explosive vapors and clear of papers, drapery and other flammable materials. Keep the power cord away from the top heater plate assembly.

Do not modify or substitute the grounded power plug supplied with the unit. Use only grounded power outlets to avoid shock hazard.

Do not use the equipment in conditions other than those stated in the ENVIRONMENTAL CONDITIONS section.

DO NOT operate the unit if it shows signs of electrical or mechanical damage.

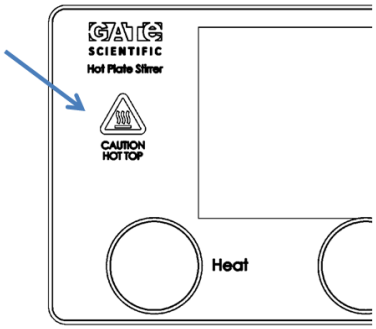
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions: 1.This device may not cause interference. 2. This device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications not expressly approved by Gate Scientific, Inc. could void the user's authority to operate the equipment.

SAFETY SYMBOLS:

Caution Hot Top Indicator

The caution hot top indicator light will be illuminated red while unit is in active operation. If unit is in sleep mode or setup mode ,and top is above 40 °C, the indicator light will flash red.



STANDARDS AND REGULATIONS:

Safety Standards

This unit complies with the following Safety Standards and Regulations:

Canadien ICES-003

FCC Rule 15

The unit has been Field inspected by QPS Evaluation Services, Inc. to the following standards:

SPE1000, CSA C22.2 No 0, 0.4, CE Code, NEC, UL61010-1.

Some jurisdictions require other safety standards, please contact your local jurisdiction for information.

Note:
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

SPECIFICATIONS:

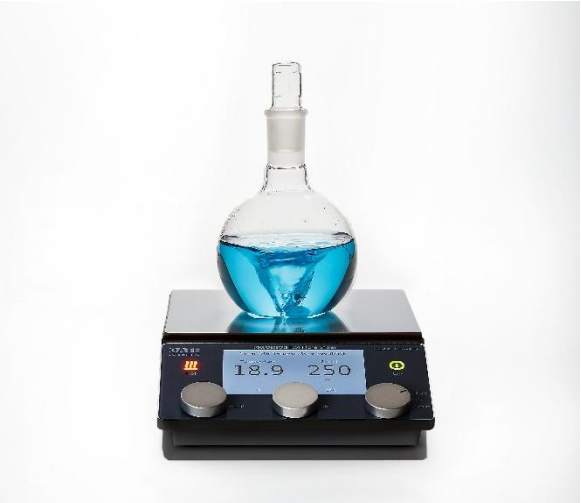
Precision Hotplate Stirrer™:

Dimensions (LxWxH):	11.25 x 7 x 2.25 inches
Plate dimension:	7 x 7 inches
Electrical:	120V, 60Hz : 10 amps/ 1000 watts
Temperature range:	Ambient +5°C to 400°C
Communication:	Wi-Fi, USB and Ethernet
Stirring speed:	60-1000 RPM
Instrument weight:	2.1kg/4.6lbs
Capacity:	2500 mL, gross weight should not exceed 40lbs.
Controls:	See diagrams

smartSENSE Stirbar™:

Temperature range:	20-100degC/68-212degF
Length:	40mm/1.6inch
Magnet:	Neodymium
Material:	Solvent resistant EFEP Fluoropolymer
Power:	Wireless RFID
Temperature:	Dual sensors
Communication:	Wireless RFID

PRODUCT DESCRIPTION:

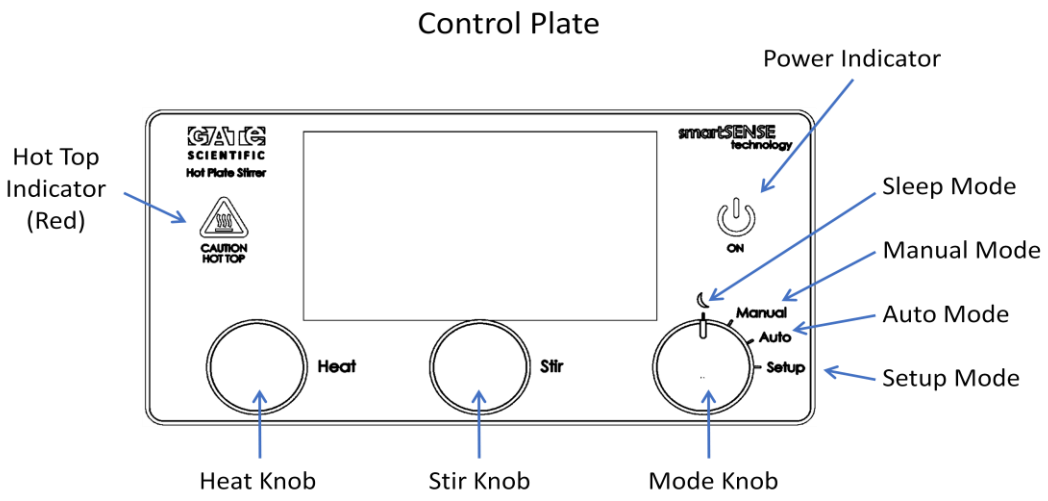


The smartSENSE™ Stirbar and Precision Hotplate™ allow for precise, wireless control of laboratory solutions.
The Precision Hotplate™ is a fully functional hotplate that can communicate wirelessly with the temperature-sensing smartSENSE™ Stirbar.

The programmable hotplate has a ceramic glass heating surface, a DC motor for consistent speed control, neodymium magnets for the strongest stirring control, and a full color digital display.

The smartSENSE™ Stirbar has dual temperature sensing elements, a neodymium magnet, Integrated RFID wireless communication and onboard calibration memory encased in a solvent resistant fluoropolymer.

OPERATION:



1. **Sensor Options** The unit will automatically detect the presence of one of three sensor options:
   1.1. **smartSENSE™ Stirbar.** Place the smartSENSE™ Stirbar in the flask or beaker containing the liquid to be thermally controlled and place the container on the center of the hotplate surface.

   1.2. **RTD Temperature Probe.** Connect the RTD Temperature Probe to the RTD Port on the back of the unit.

   1.3. **Thermocouple Sensor.** Connect the thermocouple sensor to the thermocouple sensor port on the back of the unit.

2. **Operation Modes.** The operation mode can be selected using the "mode" knob. There are four (4) modes:

   2.1. **Sleep Mode.** The instrument should be set to sleep mode during initial system power-up and when not in use.

   2.2. **Manual Mode.** The user can set the desired temperature of the solution or hotplate surface. The unit will maintain that temperature indefinitely until stopped by the user.

   2.3. **Auto Mode.** The user can set the desired temperature of the solution or hotplate surface as well as the time the unit will maintain that temperature for.

   2.4. **Setup Mode.** The user can set network parameters, calibrate the smartSENSE™ Stirbar as well as a thermocouple and RTD.

3. **Sleep Mode**

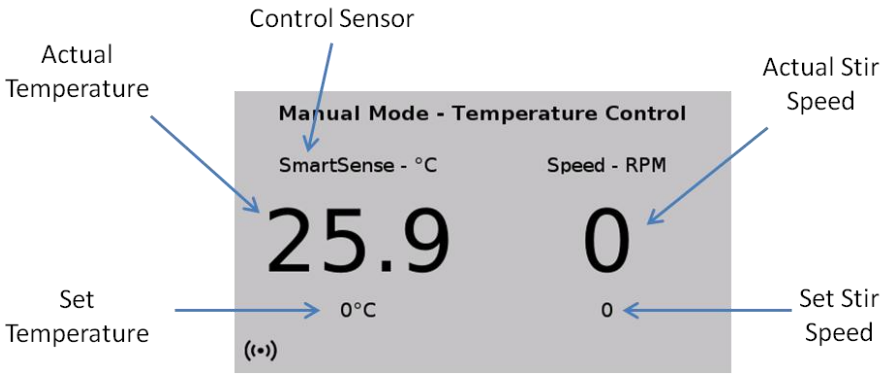
3.1. It is recommended that the unit remain plugged in and set to sleep mode when not in use.

3.2. Set the unit to sleep mode by turning the mode knob to the sleep mode symbol: ☾

4. **Manual Mode**

4.1. Manual mode allows the user to quickly set the desired temperature of the solution being heated or control the temperature of the hotplate surface

4.2. Select manual mode by turning the mode knob to the "manual" setting. The following display will appear.



4.3. The instrument will automatically detect the presence of the following possible sensors:

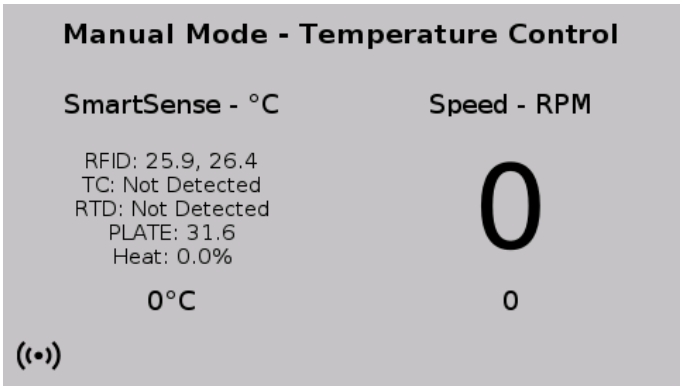
SmartSENSE™ Stirbar
Resistance Temperature Detector (RTD)
K-type Thermocouple

The control sensor that is detected will be displayed as indicated above. If no sensor is detected, the plate surface temperature will be controlled.

4.4. Set the desired temperature of your solution by turning the heat knob - the set temperature is displayed as indicated above. The actual measured temperature is displayed in large font as indicated.

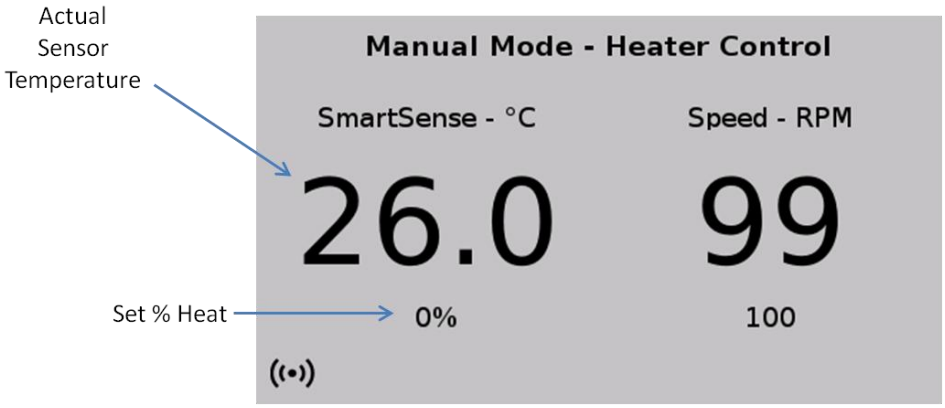
4.5. Set the desired stir speed by turning the Stir knob -the set stir speed is displayed as indicated above. The actual stir speed is displayed in large font as indicated.

4.6. The readings from all connected sensors, as well as the plate temperature and control power can be displayed in real time at any point by pressing and holding the Stir knob. The following display will appear.



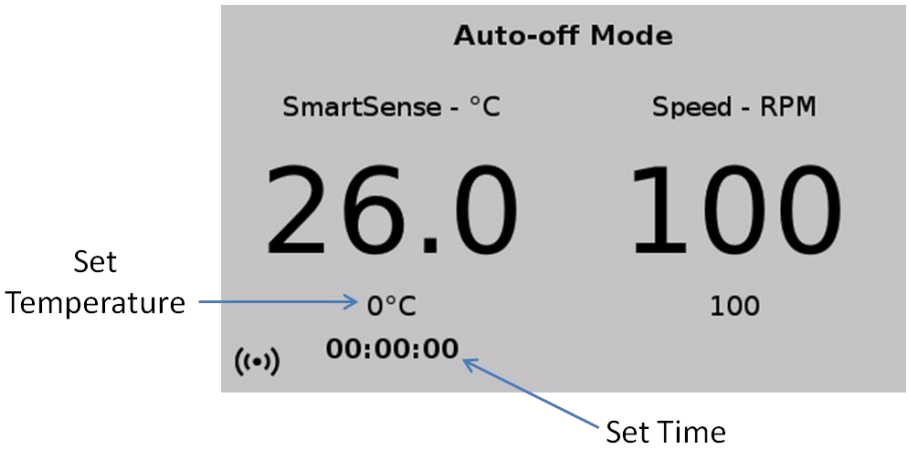
4.7. It is also possible to control the plate temperature independently while monitoring any of the detected sensors. To accomplish this, press and hold the heat knob for 2 seconds. The mode will switch to Manual Heater Control.

4.8. The % power to the heater can now be controlled directly by turning the heat knob. The set value is displayed as indicated below. The detected sensor reading is displayed in large font as indicated.



5. **Auto Mode.** Auto mode allows the user to set the desired temperature of the solution or hotplate surface as well as the time the unit will maintain that temperature for.

5.1. Select auto mode by turning the mode knob to the "auto" setting. The following display will appear.



5.2. The instrument will automatically detect the presence of the following possible sensors:

SmartSENSE™ Stirbar
Resistance Temperature Detector (RTD)
K-type Thermocouple

The control sensor that is detected will be displayed as indicated above. If no sensor is detected, the plate surface temperature will be controlled.

5.3. Select the parameter (Temperature and/or Time) to set by pressing the heat knob. The selection will be displayed in bold on the screen.

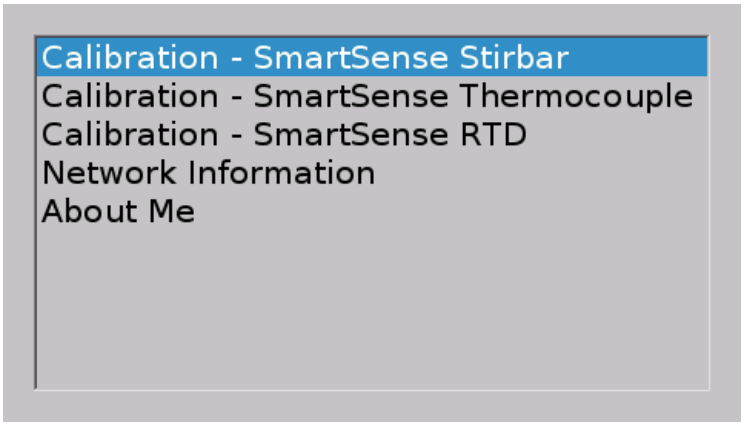
5.4. Set the desired temperature and/or time by turning the heat knob.

5.5. The time countdown will start immediately.

5.6. The readings from all connected sensors, as well as the plate temperature and control power can be displayed in real time at any point by pressing and holding the Stir knob.

6. **Setup Mode**. The setup mode is used for sensor calibration and network configuration.

6.1. Select the setup mode by turning the mode knob to the "setup" position. The following display will appear on the screen.



6.2. Select the desired function by turning the heat knob. The selected function is outlined in blue.

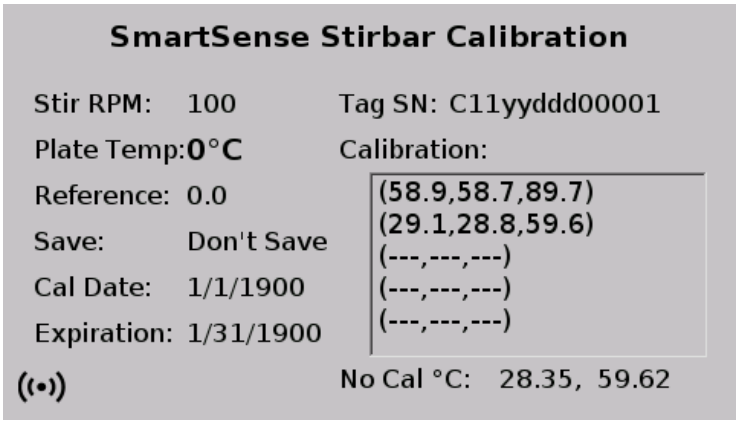
6.3. Push the heat knob to bring up the desired function.

6.4. Press the stir knob to return to this menu.

6.5. **Calibration of the smartSENSE™ Stirbar**.

6.5.1. Each smartSENSE™ Stirbar is provided pre-calibrated from the factory. A three point calibration is performed with a six month expiration. It is recommended that the user re-calibrates the smartSENSE™ Stirbar after this point.

6.5.2. Select "Calibration-SmartSense Stirbar" from the menu and press the heat knob. The following display will appear on the screen.



6.5.3. Place flask with calibration liquid and smartSENSE™ Stirbar onto hotplate surface and insert external reference probe.

6.5.4. Adjust the stir speed by turning the stir knob. The stir bars have been pre-calibrated at 300 rpm.

6.5.5. All other parameters in the calibration menu can be selected by pushing the heat knob. Once selected, the value, function or date will be in bold on the display and can be adjusted by turning the heat knob.

6.5.6. Clear the previous calibration by pushing the heat knob to select the "Save:" function and then turning the heat knob to select "Erase Cal?". Pushing the heat knob will clear the previous calibration values. **This cannot be undone.**

6.5.7. Set the desired calibration temperature of the solution by controlling the plate temperature with the "Plate Temp:" function and turning the heat knob to set the desired value. Up to five calibration temperatures can be used.

6.5.8. Allow the temperature of the solution to stabilize as determined by the reference probe.

6.5.9. Select "Reference:" and turn the heat knob to enter the reference temperature.

6.5.10. Select "Save:" and turn the heat knob to "Save Ref1"

6.5.11. Press the heat knob to record the calibration point. The values will appear under the calibration table.

6.5.12. Repeat this process for each calibration point and record the values under the appropriate reference point using the "Save:" function.

6.5.13. Enter the calibration date by selecting "Cal Date:" and turning the heat knob to select the date.

6.5.14. Enter the calibration expiration date by selecting "Expiration:" and turning the heat knob to select the date.

6.5.15. Exit smartSENSE Stirbar calibration page by pushing the Stir Knob.

6.6. **Calibration of accessory RTD and/or thermocouple sensors**.

6.6.1. Select the desired function from the setup menu.

6.6.2. Follow the same procedure as with the smartSENSE™ Stirbar but place the sensor to be calibrated in the calibration solution rather than the smartSENSE™ Stirbar.

TECHNICAL SERVICE

For technical questions or service contact:

Gate Scientific
950 Yosemite Dr
Milpitas, CA 95035
www.gatescientific.com
+1 (650) 223 5509
sales@gatescientific.com