Operation Manual For ACE Temperature Controllers

IMPORTANT!

Heater voltage rating must be equal to or greater than the Temperature Controller output outlet used.

The sensor circuit on all ACE Temperature Controllers has been isolated from the power input lines in order to protect the operator from electrical shock due to earth ground return when handling the sensor assembly. This also protects the sensitive amplifier circuit from burnout due to the same possible short circuit to ground.

Unfortunately, shock hazard still exists while handling the output leads when connecting the heater circuits. It is advisable, therefore, that the power cord be disconnected from the 120v source, or at the very least, the MAIN POWER SELECTOR SWITCH be in the "OFF" position during setup of the controller system.

Due to high overall wattage capabilities of the controller, the only way to obtain total isolation is to incorporate a line voltage isolation transformer. This would, however, prove to be extremely bulky and **expensive**.

ACE GLASS INCORPORATED

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SAFETY
and ACE Temperature Controllers

We at ACE take pride in producing a reliable, rugged and precise line of temperature control instruments. These controllers are designed and constructed utilizing state-of-the-art components that are sized for long-term reliability and safety.

The standard laboratory controller, such as ACE Models 12102, 12103, 12105, 12106, 12108, 12110, 12125, 12126, 12127 and several of other manufacturers, has one component — a Solid State Relay, a Triac or a Mechanical Relay — that controls the output to the heated medium. If any of these or one of many auxiliary components were to fail and short-out, which is usually the case, thermal runaway will occur, creating, at the very least, a dangerous situation such as a fire hazard. Therefore, no matter how reliable a controller might be, it should never be left running unattended for long periods of time; e.g., 1/2 hour to continuous.

If it is necessary to operate for extended periods of time, then for SAFETY, a second controller having ON-OFF output should be utilized. This secondary controller's limiting output should be adjusted by the setpoint to a temperature above the primary controller's setpoint (+10°) and the secondary's output used as a power source of 120 volts for the primary controller. Thus, using two controllers with two sensors and two Solid State Relay components greatly reduces the chance of thermal runaway since both would have to fail.

ACE Controllers can be set to ON-OFF output by adjusting the proportional band to zero as described in the operating instructions furnished with the controllers.

Controllers with one temperature probe sensor that will protect your heated medium from thermal runaway are available from ACE. Models 12107, 12111 and 12113 have Alarm HI and Alarm LO setpoints providing an alarm tracking band of ±15°C (user adjustable) around the setpoint. These alarm setpoints shut off the output to the heater by an additional relay in series with the main control relay. These alarm setpoints, when properly adjusted, provide over-temperature protection for a thermal runaway problem. This includes sensor-out-of-medium protection only after system does reach setpoint.

In addition, these controllers have a rear AL2 output that offers a 120 volt source for powering a sound device, motors, solenoid valve, etc., all of which may be utilized to react to a runaway temperature situation.

We can customize controllers for your needs.

Knowing the potential hazards of thermal runaway, we at ACE have designed the safest and most reliable temperature controllers available.

WARNING: In any critical application where failure could cause product loss or endanger personnel, a second redundant limit controller is recommended

All ACE Temperature Control outputs are rated for resistive loads ONLY.

No transformers or autotransformers can be plugged into these outputs. Damage to the controller could result.

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HELPFUL HINTS
For Better General Laboratory Temperature Control Operation

1. Temperature medium must be stirred or agitated well for close control of temperatures.
2. Immersion temperature probe must be at least 1" into medium for proper control.
3. Keep probe plug connectors clean by using fine emery paper and/or electrical cleaning fluid. Make sure plugs are fully inserted, especially phone jacks.
4. The selected voltage output of the temperature controller must **NOT** exceed the maximum voltage rating of the heating element.
5. The average temperature rise-time from starting temperature to setpoint temperature should be in the 2° to 3°C per minute range. Methods to achieve reduced overshoot:
   a) Use controllers with multiple selection output voltages.
   b) In some situations you can use a line voltage autotransformer to power the input to your temperature controller to 100 volts and even lower without affecting controller performance, thereby reducing the voltage to your heater.

      WARNING! DO NOT plug autotransformer into the output of your temperature controller to reduce voltage output. Repeated proportional switching of the autotransformer can and will cause damage to your controller circuitry in most cases.

   c) Commercially available solid state line voltage controls such as ACE Cat. No. 13530-10 can be plugged into the output of a proportional temperature controller to reduce power to your heater.
   d) Generally, properly sized heaters for the vessel being heated will normally achieve proper temperature rise time, such as ACE Instatherm®.
   e) In some instances, trying to heat large vessels at low temperatures, above yet near room ambient, will necessitate using some of the previously mentioned voltage- or power-reducing methods. Controller Models 12107, 12108, 12110, 12111, 12125, 12126, and 12127 have an automatic rate circuit which helps regulate rise-time, and the ramp and soak feature on these controllers can also help. The factory setting for SP1 output high limit is 68% for *normal* heating conditions. If you encounter a problem of overshooting the SP1 setpoint or if cycling around the SP1 setpoint becomes a problem, it is usually due to over-powered heaters or low setpoint temperatures. To adjust for this limited problem, reduce the SP1 output high limit setting (S1OH). See page 31 of the O.E.M. Manual. Adjust between 68% (factory setting) to 30% for better overall controller performance if this problem has been encountered.

      A good guideline is to keep the maximum % output to no more than four times the power % needed to maintain the setpoint. Estimate % output by the Demand Light **ON** time out of the factory-set ten-second cycle time, or see page 25 of the O.E.M. Manual (PCTO).

      Please note: Adjustment of (S1OH) could need increasing above 68% for high-temperature use. Contact Ace Glass Electronics Dept. if difficulty arises in making these changes. Remember, regulating the rise-time helps limit overshoot and reduces temperature differentials across glass vessel walls, which is good safety practice.
   f) A good practice, especially on initial start-ups, is to set the setpoint lower than the temperature needed (5° to 25°C less), then increase the setpoint after the lower set temperature is reached. This helps lessen overshoot, yet you still get good heat-up rate which is sometimes a necessity. This practice of an initial lower setpoint is almost a *must* with standard proportional controllers, especially NON-PID units (e.g. 12102, 12103, 12105 and 12106).
6. Use of line filters and surge suppressors to power your temperature controller is recommended.
7. Keep controller case in a clean, vented, room-ambient temperature area, if possible.
8. Properly sized fuses for heater and temperature controller protection are a must. Very fast acting fuses are supplied with ACE Controllers and replacements are available from ACE to protect your equipment investment; see ACE Temperature Controller Bulletin or contact your ACE Salesperson. These fuses are higher cost than the regular blow fuse but they are worth it! Also, when constantly heating small vessels with less than 10 amperes drain, a 10 ampere very fast acting fuse would be appropriate. On most ACE Temperature Controllers[1] the bottom rear panel fuse would be the one to change from 15 amperes to 10 ampere value. The 15 ampere is standard since the majority of heaters used are rated so near 10 amperes that false blows would occur. The top rear 15 ampere primary should not be changed.

   [1]On the ACE Nos. 12107-20, 12111-15 and 12113-17 Controllers, the top fuse is the one to change. The bottom fuse is a three ampere regular blow alarm output fuse. Check your controller instructions for the proper replacement of the output or secondary fuse and use proper fuse for the size of the heater amperes.

   Since supplying these very fast acting fuses, we have seen a reduction of approximately 90% in Instatherm heater burnout normally due to “over-voltaging.” This is a big savings in time, money and product loss.
9. Temperature control units with alarm bands must be set properly. The 12107, 12111 and 12113 ACE Controllers automatically make the adjustment of the Alarm setpoints. Factory set at ±15°C; can be changed when necessary.
10. Allow sufficient time for Auto Tune type Controllers to tune themselves by doing a trial run or by having a Setpoint Temperature 25°C or more above the starting temperature.
11. Refer to ACE Quick Reference menu sheets to follow OEM Manual.
12. Always read instructions first and call ACE GLASS INC. (Electronics Dept.) if any questions arise.

Operating Instructions for

12102-12 Temperature Controllers

(RTD INPUT SENSOR)

CONTROLS 120 VOLT HEATERS ONLY!

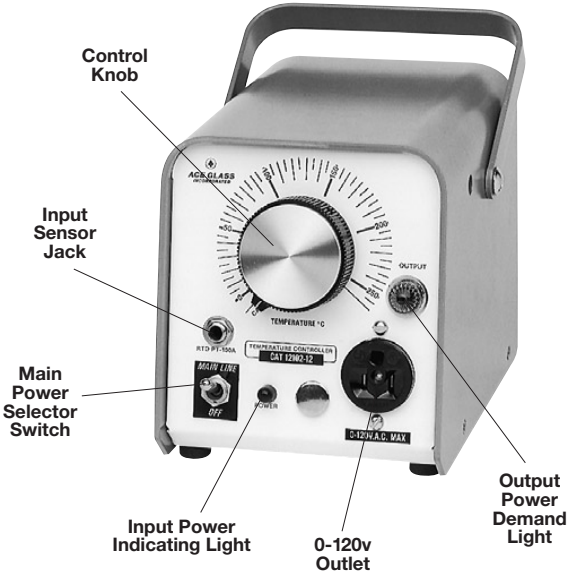
Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:

Locate large *CONTROL KNOB* in upper center of panel. In lower left corner is *MAIN POWER SELECTOR, ON (A.C. Power)/OFF SWITCH.* Above power switch is the *DETECTOR CONNECTION* for connecting RTD Sensor. To the immediate right of the power switch is a red *INPUT POWER INDICATING LIGHT* indicating line power to controller. In lower right corner see the front *0-120V OUTLET* for connecting heater. Above outlet is the *OUTPUT POWER DEMAND LIGHT* that indicates power output to heater.

REAR PANEL:

Lower left, locate two fuse holders: both are fast acting 15 amp fuses for input (top) and output (bottom) circuits. **Note!** Output can be changed to 10 amp for lower current heaters. Bottom center is a second output outlet for 120 volts, 15 amps maximum loads such as oil baths, mantles, etc. To the right bottom is the power cord for 120 volts, 15 amps maximum power input.



OPERATION

CONTROLS 120 VOLT HEATERS ONLY!

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect 120v heater to front or rear outlet, i.e., oil bath, mantle, etc. ***Watch heater voltage rating!***
4. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip.
5. Plug POWER CORD into line source.
6. Switch MAIN POWER SELECTOR SWITCH to A.C. Power. INPUT POWER INDICATING LIGHT should light.
7. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating.

Operating Instructions for

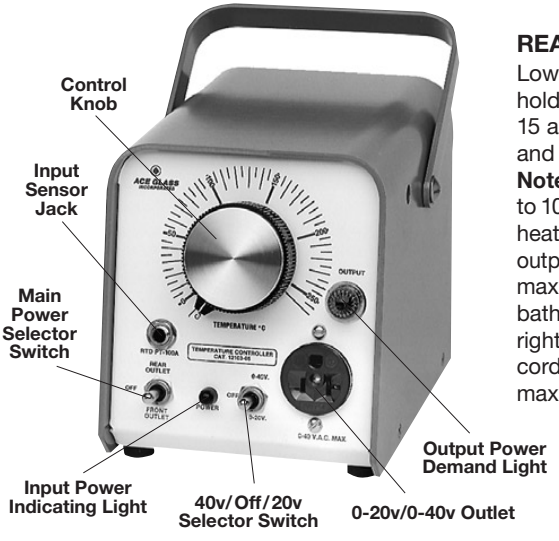
12103-05 Temperature Controllers

(RTD INPUT SENSOR)

CONTROLS 20, 40 & 120 VOLT HEATERS

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:
Locate large *CONTROL KNOB* in upper center of panel. In lower left corner is *MAIN POWER SELECTOR, ON (A.C. Power)/OFF SWITCH.* Above power switch is the *DETECTOR CONNECTION* for connecting RTD Sensor. To the immediate right of the power switch is a red *INPUT POWER INDICATING LIGHT* indicating line power to controller. In lower right corner see the front *0-20V or 0-40V OUTLET* for connecting heater. To the left of outlet is output voltage selector switch. Above outlet is the *OUTPUT POWER DEMAND LIGHT* that indicates power output to heater.



REAR PANEL:
Lower left, locate two fuse holders: both are fast acting 15 amp fuses for input (top) and output (bottom) circuits. **Note!** Output can be changed to 10 amp for lower current heaters. Bottom center is an output outlet for 120v, 15 amps maximum loads such as oil baths, mantles, etc. To the right bottom is the power cord for 120 volts, 15 amps maximum power input.

OPERATION

FOR 0-20 OR 0-40 VOLTAGE LIMITS

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect FRONT OUTLET to heater, i.e., oil bath, mantle, etc.
4. Select desired voltage limit and switch front toggle, located to left of front outlet, to proper position. ***Watch heater voltage rating!***
5. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip.
6. Plug POWER CORD into 120v line source.
7. Switch MAIN POWER SELECTOR SWITCH to “Front Outlet.” INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to “Rear Outlet,” the front outlet will not be activated.)
8. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating, blinks within proportional band, and goes out when set temperature is exceeded.

FOR 0-120 VOLTAGE LIMITS

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect REAR OUTLET to heater, i.e., oil bath, mantle, etc. 120v type heaters, only.
4. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip.
   (**IMPORTANT!** To avoid damage, never disconnect sensor while MAIN POWER SELECTOR SWITCH is energized.)
5. Plug POWER CORD into 120v line source.
6. Switch MAIN POWER SELECTOR SWITCH to “Rear Outlet.” INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to “Front Outlet,” the rear outlet will not be activated.)
7. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating.

Operating Instructions for

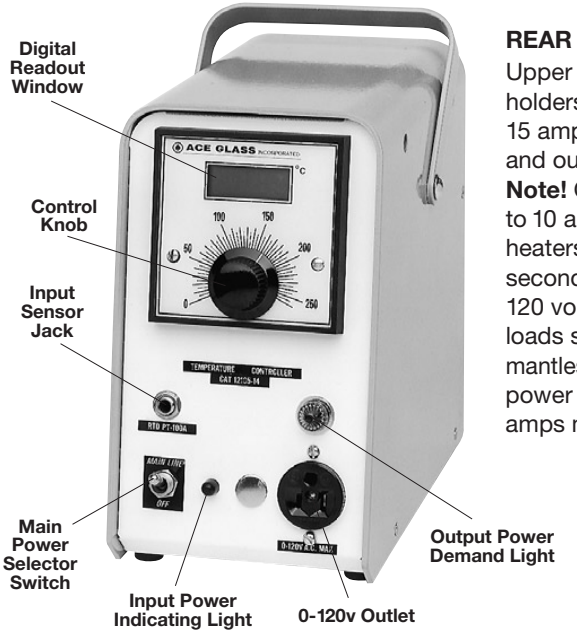
12105-14
Temperature Controllers

(RTD INPUT SENSOR)

CONTROLS 120 VOLT HEATERS ONLY!

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:
Locate *DIGITAL READOUT* window in upper center. Immediately below window is *CONTROL KNOB*. In lower left corner is *MAIN POWER SELECTOR, ON (Power)/OFF SWITCH.* Above power switch is the *DETECTOR CONNECTION* for connecting RTD Sensor. To the immediate right of the power switch is a red *INPUT POWER INDICATING LIGHT* indicating line power to controller. In lower right corner see the front *0-120V OUTLET* for connecting heater. Above outlet is the *OUTPUT POWER DEMAND LIGHT* that indicates power output to heater.



REAR PANEL:
Upper left, locate two fuse holders: both are fast acting 15 amp fuses for input (top) and output (bottom) circuits. **Note!** Output can be changed to 10 amp for lower current heaters. Upper center is a secondary output outlet for 120 volts, 15 amps maximum loads such as oil baths, mantles, etc. To the right is the power cord for 120 volts, 15 amps maximum power input.

OPERATION

CONTROLS 120 VOLT HEATERS ONLY!

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect 120v heater to front or rear outlet, i.e., oil bath, mantle, etc. 120 volt type heaters, only.
4. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip.
5. Plug POWER CORD into line source.
6. Switch MAIN POWER SELECTOR SWITCH to A.C. Power. INPUT POWER INDICATING LIGHT should light.
7. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating, blinks within proportional band, and goes out when set temperature is exceeded.

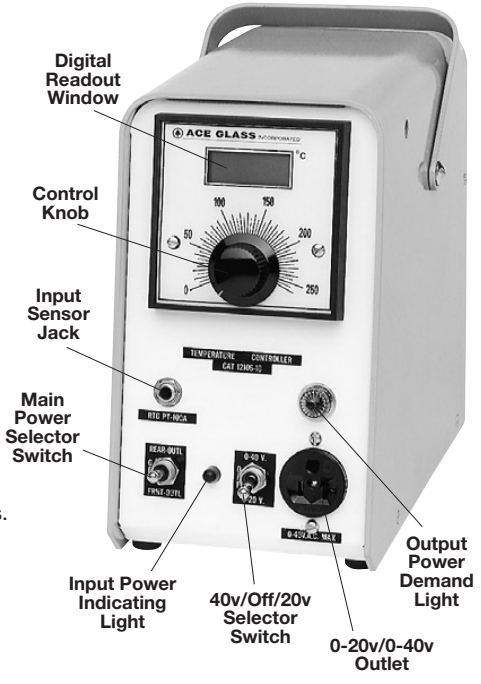
Operating Instructions for

12106-10
Temperature Controllers

(RTD INPUT SENSOR)

CONTROLS 20, 40 & 120 VOLT HEATERS

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.



FRONT PANEL:

Locate *DIGITAL READOUT WINDOW* in upper center. Immediately below window is *CONTROL KNOB* in upper center of panel. In lower left corner is *MAIN POWER SELECTOR, ON (A.C. Power)/OFF SWITCH.* Above power switch is the *INPUT SENSOR JACK* for connecting RTD Sensor. To the immediate right of the power switch is a red *INPUT POWER INDICATING LIGHT* indicating line power to controller. In lower right corner see the front *0-20V/0-40V OUTLET* for connecting heater. To the left of outlet is *40V/OFF/20V SELECTOR SWITCH.* Above outlet is the *OUTPUT POWER DEMAND LIGHT* that indicates power output to heater.

REAR PANEL:

Lower left, locate two fuse holders: both are fast acting 15 amp fuses for input (top) and output (bottom) circuits. **Note!** Output can be changed to 10 amp for lower current heaters. Bottom center is an output outlet for 120 volts, 15 amps maximum loads such as oil baths, mantles, etc. To the right bottom is the power cord for 120 volts, 15 amps maximum power input.

OPERATION

FOR 0-20 OR 0-40 VOLTAGE LIMITS

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect FRONT OUTLET to heater, i.e., oil bath, mantle, etc.
4. Select desired voltage limit and switch front toggle, located to left of front outlet, to proper position.
5. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip.
6. Plug POWER CORD into 120v line source.
7. Switch MAIN POWER SELECTOR SWITCH to “Front Outlet.” INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to “Rear Outlet,” the front outlet will not be activated.)
8. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating, blinks within proportional band, and goes out when set temperature is exceeded.

FOR 0-120 VOLTAGE LIMITS

1. Turn MAIN POWER SELECTOR SWITCH to “Off” position.
2. Turn the CONTROL KNOB to position “0.”
3. Connect REAR OUTLET to heater, i.e., oil bath, mantle, etc. 120v type heaters, only.
4. Connect sensor to DETECTOR CONNECTION and immerse probe into liquid to be heated. A convenient method of holding sensor in oil baths is via 9601-30 Holder Clip. (**IMPORTANT!** To avoid damage, never disconnect sensor while MAIN POWER SELECTOR SWITCH is energized.)
5. Plug POWER CORD into 120v line source.
6. Switch MAIN POWER SELECTOR SWITCH to “Rear Outlet.” INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to “Front Outlet,” the rear outlet will not be activated.)
7. Turn CONTROL KNOB to desired temperature. OUTPUT POWER DEMAND LIGHT will indicate heating, blinks within proportional band, and goes out when set temperature is exceeded.

Operating Instructions for

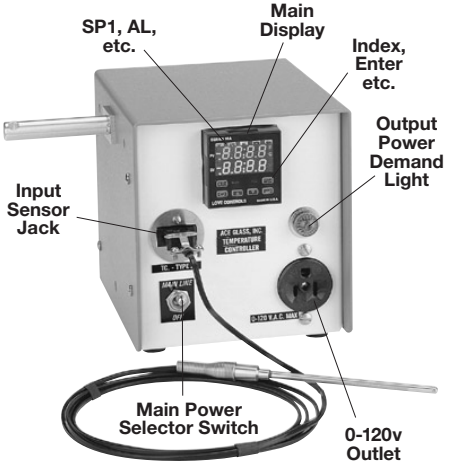
12107-20, 12111-15, 12113-17 Temperature Controllers

(RTD SENSOR *or* TYPE "J" OR "K" THERMOCOUPLE)

CONTROLS 120 VOLT HEATERS ONLY!

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:
Locate the square module at top with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the top of the Display, locate small square lights labeled SP1, SP2, AL, °F., °C. These lights will be on or blinking when their functions are active. Below the display are four keypads labeled (INDEX$_{AL}$), ▲, ▼$_{AL}$, and (ENTER). Above these, find two buttons labeled MAN and HLD . Below and to the left of the module is the *INPUT SENSOR JACK* and below the Jack is the



MAIN POWER SWITCH. To the far right of the Switch is the *120V OUTPUT OUTLET* (15 amps max.) Above the Output Outlet is a large orange *DEMAND LIGHT* which will blink around setpoint, is off above setpoint and full on below setpoint.

REAR PANEL:
Top left fuse holder is a main fast acting 15 amp fuse for heater; below is a three amp regular blow fuse for the alarm output and control circuits. Bottom center is the alarm outlet for 120 volts, three amps maximum loads such as buzzers, valves, motors, etc. To the right is the power cord for 120 volts, 15 amps maximum power input.

OPERATION

1. Plug appropriate sensor plug into the Controller Jack labeled for Types RTD, "J" or "K," and insert probe into medium to be heated.
2. Plug controller power cord into 120v source.
3. Flip main power switch up to ON position. Controller Module will light up on main display.
4. Main display shows PROCESS TEMPERATURE (top); bottom shows SETPOINT TEMPERATURE (SP1). *(Wait for self test to complete*.)
5. Press INDEX key once and using up (▲) and down (▼) arrows, adjust SP1 value in top display to desired setpoint temperature. Then push ENTER key to enter value. *(Note that lower display identifies SP1 value.)*
6. Press INDEX key again and appearing is the SP2 factory-set value of 5°C and identified in display. This value is the tracking band for over-temperature cutoff back-up with an additional series S.S.R. Push INDEX once again for main display. When there is output, the larger orange demand light will light. SP2 of 5.0° should not be changed.
7. If Diagnostic Error Message appears, see OEM Manual (pages 38 and 39). Correct condition: reset by cycling main power switch or pressing Index and Enter keys simultaneously for 5.0 seconds.
8. Plug heater into front outlet only. **Note!** The top display PV value should be increasing.
9. Plug buzzer, valve, motor, etc. into rear outlet. This outlet will energize only when an alarm condition happens, such as a bad sensor, fuse, heater, S.S.R., or if any parameters are out of factory-set limits. Alarm band is automatically set for ±15°C track of SP1 setpoint and when exceeded will cut off both SP1 and SP2 solid state relay outputs.
10. Sixteen segment ramp and soak feature, see manual. Fuzzy logic feature is factory set.

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

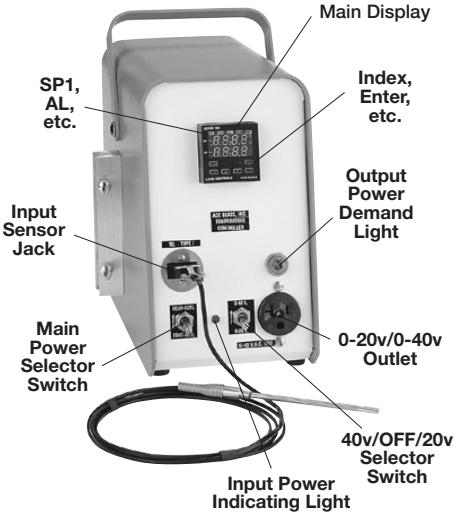
Operating Instructions for

12107-46, 12111-47, 12113-50 Temperature Controllers

(RTD SENSOR *or* TYPE "J" OR "K" THERMOCOUPLE)

CONTROLS 20, 40 & 120 VOLT HEATERS

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.



FRONT PANEL:
Locate the square module at top with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the top of the Display, locate small square lights labeled SP1, SP2, AL, °F., °C. These lights will be on or blinking when their functions are active. Below the display are four keypads labeled (INDEX$_{AL}$), ▲, ▼$_{AL}$, and (ENTER). Above these, find two buttons labeled MAN and HLD. Below and to the left of the module is the *INPUT SENSOR JACK* and below the Jack is the *MAIN POWER SWITCH.* To the right of the Switch is a *40V/OFF/20V SWITCH* that controls Front Output Outlet (15 amps max.) only, located to the far right. Between the two switches is a red pilot *MAIN ON LIGHT.* Above the Output Outlet is a large orange OUTPUT POWER DEMAND LIGHT which will blink around setpoint, is off above setpoint and full on below setpoint.

REAR PANEL:
Top left fuse holder is a three amp regular blow fuse for the alarm control circuits and alarm 120v output. Bottom left, find two fuse holders. Top fuse is primary (15 amp fast acting), bottom fuse is secondary (fast acting 10A or 15A). To the right is a 120v output outlet. To the far right is the power cord for 120 volts, 50/60 Hz., 15 amps maximum power input.

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

OPERATION

1. Plug appropriate sensor plug into the Controller Jack labeled for Types RTD, "J" or "K," and insert probe into medium to be heated.
2. Plug controller power cord into 120v source.
3. **FOR 0-20 and 0-40 VOLTAGE LIMIT:** Switch MAIN POWER SELECTOR SWITCH to "Front Outlet." INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to "Rear Outlet," the front outlet will not be activated.)
   FOR 0-120 VOLTAGE LIMIT: Switch MAIN POWER SELECTOR SWITCH to "Rear Outlet." INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to "Front Outlet," the bottom rear heater outlet will not be activated.)
4. Main display shows PROCESS TEMPERATURE (top); bottom shows SETPOINT TEMPERATURE (SP1). *(Wait for self test to complete.)*
5. Press INDEX key once and using up (▲) and down (▼) arrows, adjust SP1 value in top display to desired setpoint temperature. Then push ENTER key to enter value. *(Note that lower display identifies SP1 value.)*
6. Press INDEX key again and appearing is the SP2 factory-set value of 5°C and identified in display. This value is the tracking band for over-temperature cutoff back-up with an additional series S.S.R. Push INDEX once again for main display. When there is output, the larger orange demand light will light. SP2 of 5.0°C should not be changed.
7. If Diagnostic Error Message appears, see OEM Manual (pages 38 and 39). Correct condition: reset by cycling main power switch or pressing Index and Enter keys simultaneously for 5.0 seconds.
8. Plug heater into appropriate outlet.
   Note! The top display PV value should be increasing.
9. Plug buzzer, valve, motor, etc., into top rear alarm outlet. This outlet will energize only when an alarm condition happens, such as a bad sensor, fuse, heater, S.S.R., or if any parameters are out of factory-set limits. Alarm band is automatically set for ±15°C track of SP1 setpoint and when exceeded will cut off both SP1 and SP2 solid state relay outputs.
10. Sixteen segment ramp and soak feature, see O.E.M. Manual, pages 25-26. Fuzzy logic feature is factory set.

Operating Instructions for

12108-13
Temperature Controllers

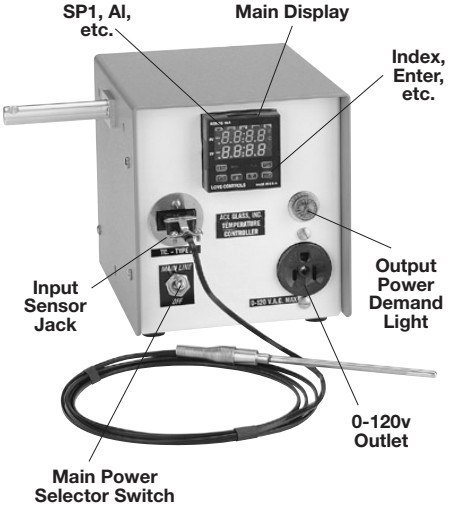
(TYPE "J" THERMOCOUPLE)

CONTROLS 120 VOLT HEATERS ONLY!

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:

Locate the square module at top with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the left of the Display, locate small square lights labeled SP1, AL, SP2, °F., °C. These lights will be on or blinking when their functions are active. Below the display are keypads labeled (INDEX$_{AL}$), ▲, ▼$_{AL}$, and (ENTER). Below and to the left of the module is the *INPUT SENSOR JACK* and below the Jack is the *MAIN POWER SWITCH.*



To the far right is the *0-120V OUTLET.* Above the Output Outlet is a large orange *OUTPUT POWER DEMAND LIGHT* that is full on indicating heating, blinks within proportional band, and goes out when set temperature is exceeded.

REAR PANEL:

Top left, find two fuse holders. Top fuse is primary (15 amp fast acting); bottom fuse is secondary (fast acting 10A or 15A).

To the right is a 120v output outlet. To the far right is the power cord for 120 volts, 50/60 Hz., 15 amps maximum power input.

OPERATION

CONTROLS 120 VOLT HEATERS ONLY!

1. Plug sensor plug into the Controller Jack labeled for Type "J" and insert probe into medium to be heated.
2. Plug controller power cord into 120v source.
3. Switch MAIN POWER SELECTOR SWITCH to AC Power. Control module should light. *(Wait for self test to complete.)*
4. Main display shows PROCESS TEMPERATURE (top); bottom shows SETPOINT TEMPERATURE (SP1).
5. Press INDEX key once and using up (▲) and down (▼) arrows, adjust SP1 value in top display to desired setpoint temperature. Then push ENTER key to enter value. *(Note that lower display identifies SP1 value.)*
6. Press INDEX key again and appearing is the SP2. This function is not used. Push again. You are back to main display.
7. If Diagnostic Error Message appears, see OEM Manual (pages 38 and 39). Correct condition: reset by cycling main power switch or pressing Index and Enter keys simultaneously for 5.0 seconds.
8. Plug heater into a convenient front or rear outlet. The top display PV value should be increasing. ***Watch heater voltage rating!***

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

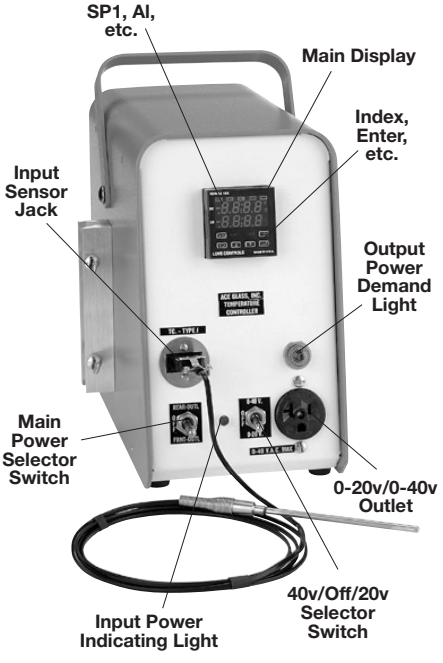
Operating Instructions for

12110-06
Temperature Controller

(TYPE "J" THERMOCOUPLE)

CONTROLS 20, 40 & 120 VOLT HEATERS

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.



FRONT PANEL:
Locate the square module at top with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the left of the Display, locate small square lights labeled SP1, AL, SP2, °F, °C. These lights will be on or blinking when their functions are active. Below the display are keypads labeled (INDEX$_{AL}$), ▲, ▼$_{AL}$, and (ENTER). Below and to the left of the module is the *INPUT SENSOR JACK* and below the Jack is the *MAIN POWER SWITCH.* To the right of the Switch is a *40V/OFF/20V SELECTOR SWITCH* that controls front *0-20V/0-40V OUTLET* (15 amps max.) only, located to the far right. Between the two switches is a red pilot *MAIN ON LIGHT*. Above the Output Outlet is a large orange *OUTPUT POWER DEMAND LIGHT* which will blink around setpoint, is off above setpoint and full on below setpoint.

REAR PANEL:
Bottom left, find two fuse holders. Top fuse is primary (15 amp fast acting): bottom fuse is secondary (fast acting 10A or 15A). To the right is a 120v output outlet. To the far right is the power cord for 120 volts, 50/60 Hz., 15 amps maximum power input.

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

OPERATION

1. Plug sensor plug into the Controller Jack labeled for Type "J" and insert probe into medium to be heated.
2. Plug controller power cord into 120v source.
3. **FOR 0-20 and 0-40 VOLTAGE LIMIT:**
   Switch MAIN POWER SELECTOR SWITCH to "Front Outlet." INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to "Rear Outlet," the front outlet will not be activated.)

   FOR 0-120 VOLTAGE LIMIT:
   Switch MAIN POWER SELECTOR SWITCH to "Rear Outlet." INPUT POWER INDICATING LIGHT should light. (**Note!** If switch is accidentally turned to "Front Outlet," the rear outlet will not be activated.)
4. Main display shows PROCESS TEMPERATURE (top); bottom display shows SETPOINT TEMPERATURE (SP1). *(Wait for self test to complete.)*
5. Press INDEX key once and using up (▲) and down (▼) arrows, adjust SP1 value in top display to desired setpoint temperature. Then push ENTER key to enter value. *(Note that lower display identifies SP1 value.)*
6. Press INDEX key again and appearing is the SP2. This function is not used. Push again. You are back to main display.
7. If Diagnostic Error Message appears, see OEM Manual (pages 38 and 39). Correct condition: reset by cycling main power switch or pressing Index and Enter keys simultaneously for 5.0 seconds.
8. Plug heater into appropriate outlet.
   Note! The top display PV value should be increasing. *Watch heater voltage rating!*

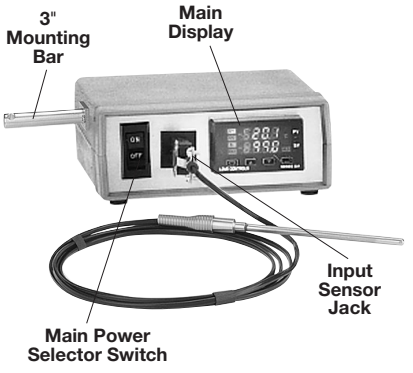
Operating Instructions for

12125-14 Temperature Controllers

(TYPE "J" THERMOCOUPLE)

CONTROLS 120 VOLT HEATERS ONLY!

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.



FRONT PANEL:
Locate the control module at right with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the left of the digits, locate four prompt lights labeled SP1 (lights when there is an output), SP2 and AL *(not used)*, and MAN (lights when in manual % of output mode; **CAUTION! Controls output without using sensor**). Below the digits are four keypads labeled ⟲ for INDEX, ▲ Increase, ▼ Decrease, and ↵ for ENTER. Left of module locate *"J" TC INPUT JACK* (for "Mini" type plug). This input is polarized (do not force in reversed polarity). To the far left of the module locate *MAIN POWER ROCKER SWITCH* labeled ON and OFF. Left side of case, locate metal plate for screwing 3" mounting bar supplied.

REAR PANEL:
Locate fuse holder, far left, for 15A fuse (fast acting type). **Note:** A 10-amp or lower fuse can be used for added protection if using lower ampere heaters. To right of fuse holder locate 6-foot power cord for 15A 120v power source, NEMA USA standard plug. To far right, locate square black 120v output outlet, 15 amp max. See label on top of controller for convenient operating instructions.

OPERATION

CONTROLS 120 VOLT HEATERS ONLY!

1. Plug sensor plug into the Controller Jack labeled for Type "J" TC.
2. Plug controller power cord into 120v source.
3. Insert sensor sheath into heated medium.
4. Plug 120v heater system into rear outlet.
5. Turn front POWER SWITCH "ON."
6. Main display appears:
   PROCESS TEMPERATURE (PV), top value;
   SETPOINT TEMPERATURE (SV), bottom value.
7. To change Setpoint Temperature **(SP1 in °C)**:
   a. Press INDEX ⟲ Button momentarily.
   b. Press UP (▲) or (▼) DOWN Button to adjust **SP1** Temperature.
   c. Press ENTER ↵ Button momentarily.
   d. Press INDEX ⟲ Button momentarily.
      Auto ON for normal control
      Auto OFF for manual % control
   e. Press INDEX ⟲ Button again for main display.

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

Operating Instructions for

12126-24 Temperature Controllers

(TYPE "J" THERMOCOUPLE)

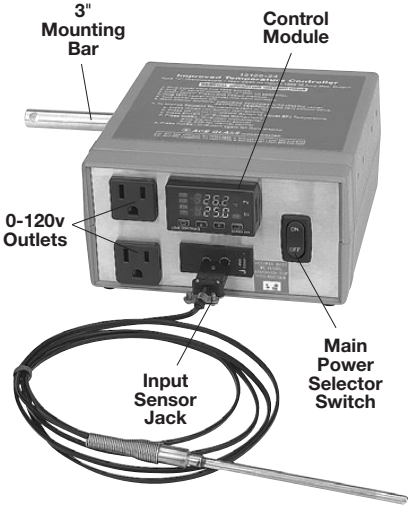
CONTROLS 120 VOLT HEATERS ONLY!

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.

FRONT PANEL:
Locate the control module at top center with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY.* To the left of the digits, locate four prompt lights labeled SP1 (lights when there is an output), SP2 and AL *(not used)*, and MAN (lights when in manual % of output mode; **CAUTION! Controls output without using sensor**). Below the digits are four keypads labeled ⟲ for INDEX, ▲ Increase, ▼ Decrease, and ↵ for ENTER. To the left of the module are two square black 120v output outlets. Both outlets are available for heating one and two heat zone mantles, etc.

Below the module locate *"J" TC INPUT UNIVERSAL JACK:* on top for "Standard" type plug, bottom for "Mini" type plug. These inputs are polarized (do not force in reversed polarity). To the right of the module locate *MAIN POWER ROCKER SWITCH* labeled ON and OFF. Left side of case, locate metal plate for screwing 3" mounting bar supplied.

REAR PANEL:
Locate fuse holder for 15A fuse (fast acting type). **Note:** A 10-amp or lower fuse can be used for added protection if using lower ampere heaters. Below fuse holder locate 6-foot power cord for 15A 120v power source, NEMA USA standard plug. See label on top of controller for convenient operating instructions.



OPERATION

CONTROLS 120 VOLT HEATERS ONLY!

1. Plug sensor plug into the Controller Jack labeled for Type "J" TC.
2. Plug controller power cord into 120v source.
3. Insert sensor sheath into heated medium.
4. Plug 120v heater circuit(s) into front outlet(s).
5. Turn front POWER SWITCH "ON."
6. Main display appears:
   PROCESS TEMPERATURE (PV), top value;
   SETPOINT TEMPERATURE (SV), bottom value.
7. To change Setpoint Temperature **(SP1 in °C)**:
   a. Press INDEX ⟲ Button momentarily.
   b. Press UP (▲) or (▼) DOWN Button to adjust **SP1** Temperature.
   c. Press ENTER ↵ Button momentarily.
   d. Press INDEX ⟲ Button momentarily.
      Auto ON for normal control
      Auto OFF for manual % control
   e. Press INDEX ⟲ Button again for main display.

Note: Controller is factory programmed for normal heating situations for controlling resistive type heaters and should not need any further programming. See OEM Manual for any additional options which are available to you to make the controller match your needs. Contact ACE GLASS Electronics Dept. for consultation in programming changes for your situation. The OEM Manual is a valuable guide and lists all menu choices used by ACE in programming. Refer to ACE Quick Reference sheets to follow OEM Manual.

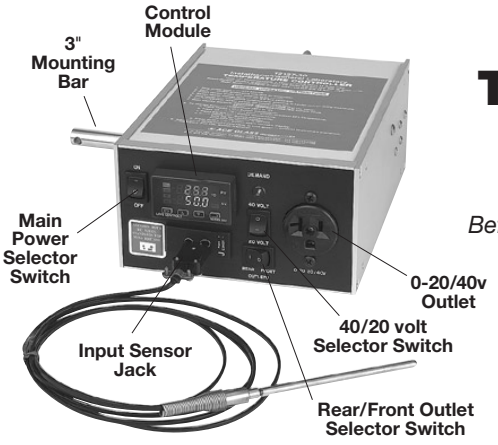
Operating Instructions for

12127-30
Temperature Controllers

(TYPE "J" THERMOCOUPLE)

CONTROLS 20, 40 & 120 VOLT HEATERS

Before beginning, take some time to familiarize yourself with the features of your new ACE Temperature Controller.



FRONT PANEL:
Locate the control module at top left with digital display (lighted only when power is on) that has two sets of four digits: the Process Temperature (PV) value above and the Setpoint Temperature (SV) value below; this is the *MAIN DISPLAY*. To the left of the digits, locate four prompt lights labeled SP1, (lights when there is an output), SP2 and AL *(not used)*, and MAN (lights when in manual % of output mode; **CAUTION! Controls output without using sensor**). Below the digits are four keypad buttons labeled (↻) for INDEX, ▲ Increase, ▼ Decrease, and (↵) for ENTER. To the left of the module is the MAIN POWER ROCKER SWITCH labeled ON and OFF. Below the module locate "J" TC INPUT UNIVERSAL JACK: on top for "Standard" type plug, bottom for "Mini" type plug. These inputs are polarized (do not force in reversed polarity). To the right of the module locate *OUTPUT DEMAND LED LIGHT*. Below the demand light locate *40 VOLT/20 VOLT* rocker switch for selecting maximum output of the front output outlet to its right, labeled *0 TO 20/40V*. The *OUTLET SELECTOR ROCKER SWITCH* below these selects which outlets are energized, labeled REAR, FRONT OUTLETS. Left side of case, locate metal plate for screwing 3" mounting bar supplied.

REAR PANEL:
Locate two 120 volt controlled outlets for one- or two-zone heating mantles, etc. **Note:** "D" nine pin connector, far left (non-functioning), for communications is a special option. To the right of the outlets is a SENSITIVITY adjustment, factory set at 2/3 CW. This finger- or small-screwdriver-adjustable potentiometer "tunes" speed to setpoint to eliminate over- or undershoot, full CW fastest response to setpoint. This adjusts all outputs' sensitivity: 20, 40 or 120v. Locate 15 amp fuse holder to the far right top. **Note:** Fuse is 15 amp fast acting type. A lower current fuse, 10 amp or even lower, is recommended for added protection if using lower power or ampere heaters. Below fuse holder locate 6-foot power cord for 15 amp, 120 volt, 50/60 Hz power source, NEMA USA standard plug. See label on top of controller for convenient operating instructions.

OPERATION

1. Plug sensor plug into the Controller Jack labeled for Type "J" TC.
2. Plug controller power cord into 120v source.
3. Insert sensor sheath into heated medium.
4. Select heater voltage limit via SW and 20/40 SW.
5. Plug heater into appropriate outlet/outlets; be attentive to heater voltage rating maximums.
6. Flip MAIN POWER SWITCH "ON" (upper front left).
7. Main display appears:
   PROCESS TEMPERATURE (PV), top value;
   SETPOINT TEMPERATURE (SV), bottom value.
8. To change Setpoint Temperature **(SP1 in °C)**:
   a. Press INDEX (↻) Button momentarily.
   b. Press UP (▲) or (▼) DOWN Button to adjust **SP1** Temperature.
   c. Press ENTER (↵) Button momentarily.
   d. Press INDEX (↻) Button momentarily.
      Auto ON for normal control
      Auto OFF for manual % control
   e. Press INDEX (↻) Button again for main display.
9. Adjust REAR SENSITIVITY CONTROL to tune speed to Setpoint to eliminate overshoot, if necessary. Full CW, fastest response.
10. **IMPORTANT!** *Read statement in box at bottom of page 13.*

IMPORTANT

For replacement fuses, use only ACE No. 12117 VERY FAST ACTING (VFA) or FAST ACTING (FA) RECTIFIER FUSE.

This fuse protects sensitive equipment, like ACE Temperature Controllers, that utilize silicon solid state devices. Fits Type 3AG standard fuse holder found on most ACE instruments.

Blow time at 100% current rating, four hours minimum; at 250% current rating, less than one second.

Fuses measure 1¼" x ¼" and are offered in two current ratings. Supplied five per package.

Temperature Controller Fuses

FOR 12107-20, 12111-15, 12113-17

	Rating	Type	Use	Ordering Code
	3 amp	FA 3AG-312	Control & Alarm (Bottom Fuse)	**12117-23**
	15 amp	FA ABC or 3AB-314	Primary Heater (Top Fuse)	**12117-31**
or	15 amp	VFA GBB	Primary Heater (Top Fuse)	**12117-15**
	10 amp	VFA GBB or 3AG-322	Primary Heater (Top Fuse)	**12117-10**
	10 amp	FA ABC or 3AB-314	Primary Heater (Top Fuse)	**12117-29**

FOR 12107-46, 12111-47, 12113-50

	Rating	Type	Use	Ordering Code
	3 amp	FA 3AG-312	Control & Alarm (Top Fuse, only)	**12117-23**
or	15 amp	VFA GBB	Secondary (Bottom Fuse, only)	**12117-15**
	10 amp	VFA GBB or 3AG-322	Secondary (Bottom Fuse, only)	**12117-10**
	15 amp	FA ABC or 3AB-314	Primary (Middle Fuse)	**12117-31**

FOR 12102-12, 12103-05, 12105-14, 12106-10, 12108-13, 12110-06

	Rating	Type	Use	Ordering Code
or	10 amp	VFA GBB or 3AG-322	Secondary (Bottom Fuse, only)	**12117-10**
	15 amp	VFA GBB	Secondary (Bottom Fuse, only)	**12117-15**
	15 amp	FA ABC or 3AB-314	Primary (Top Fuse)	**12117-31**

FOR 12125-14, 12126-24, 12127-30

	Rating	Type	Use	Ordering Code
or	10 amp	FA ABC or 3AB-314	Primary Fuse	**12117-29**
	10 amp	VFA GBB or 3AG-322	Primary Fuse	**12117-10**
	15 amp	FA ABC or 3AB-314	Primary Fuse	**12117-31**
	15 amp	VFA GBB	Primary Fuse	**12117-15**

WARRANTY

For Catalog Nos. 12102, 12103, 12105, 12106, 12107, 12108, 12110, 12111, 12113, 12125, 12126, 12127

ACE Proportional Temperature Controllers carry a conditional two-year warranty against defects in material and workmanship from date of shipment. ACE's obligation under this warranty is expressly limited to the repair or replacing of returned equipment provided that (a) ACE is promptly notified by phone or in writing by the Purchaser of a defect; (b) upon receipt of authorization, verbal or written, from ACE, said defective equipment is returned as directed, with transportation charges prepaid by the Purchaser; and, (c) ACE's examination of such equipment discloses, to our satisfaction, that the defect exists and was not the result of negligence (operated in corrosive atmosphere or from chemical or water damage), misuse, physical damage (dropping), or unauthorized repair or alteration by the customer.

If repair is required, phone ACE for a Return Authorization Number (RA). The complete instrument should be adequately packed. Do not send the electronic assembly without its case. Include a brief note describing the observed problem, include the end user's name and phone number, and ship prepaid to:

ACE GLASS INCORPORATED
1430 N.W. Boulevard
Vineland, NJ 08360
Attn.: Electronics Dept.

ACE Catalog Nos. 12102, 12103, 12105, 12106, 12107, 12108, 12110, 12111, 12113, 12125, 12126, and 12127 are covered under a conditional two-year warranty from date of shipment; see above. Beyond this warranty period, ACE can make any and all repairs, including refurbishing. (Repairs carry a one-year conditional warranty.)

To arrange for repairs, call ACE Customer Service at 800/223-4524 for shipping instructions before returning. You will receive a quotation before repairs are made.

P.S. You may save the expense of our repair by contacting the Electronics Dept. at ACE for consultation in making your own repairs.

ACE GLASS INCORPORATED

P.O. Box 688 • Vineland, NJ 08362-0688 • 856-692-3333 • Fax: 1-800-543-6752
TOLL-FREE: 1-800-223-4524

aceglass.com *e-mail:* ***sales@aceglass.com***