Patents Pending

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CERTIFIED TO

CSA 1010 .1
UL 3101-1
IEC 1010-1

$C\,\epsilon$ ⓢⒶ Ⓤ

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1. Introduction

This manual is to be used by **distributors** and **employees** of **SCP SCIENCE** only. The *DigiPREP* KeyPad Controller is used to control the *DigiPREP* Digestion Systems (Jr, MS, HP, HT). Operation details of the KeyPad can be found in the *DigiPREP* Digestion System operation manuals or older KeyPad instruction manuals (see references page). Those details are also included into this document.

WARRANTY
Warranty and service for *DigiPREP* digestion systems

SCP SCIENCE warrants this product free from defect in workmanship and materials for one (1) year from date of purchase.

SCP SCIENCE agrees to make every effort to supply products in merchantable condition and free from defects.

1. The warranty period for *DigiPREP* digestion systems is 12 months from the date of shipment from **SCP SCIENCE**.
2. *DigiPROBE* and *DigiSET* Probe are consumable products and carry a warranty only to the extent that they are functional on receipt.
3. As part of the Agreement between **SCP SCIENCE** and the Distributor, the (distributor) agrees to assume the responsibility to provide service for any *DigiPREP* digestion system sold by the distributor in the territory;
    a. **Warranty Period:** Service parts required during the warranty period shall be provided to (distributor) at no charge. Freight costs for the service parts shipped to the distributor will be borne by **SCP SCIENCE**. Transportation costs for returned instruments and parts are the responsibility of the distributor. Labour for repairs during the warranty period or post warranty period are the responsibility of the Distributor
    b. **Alternative Service:** In the event that the distributor wishes **SCP SCIENCE** to perform repair service on their behalf, the distributor shall return the instrument prepaid to the designated **SCP SCIENCE** Service Center. Charges for labour required to complete the repairs will be chargeable to the distributor at **SCP SCIENCE**'s current rates. Parts required in the post warranty period will be charged according to the prevailing Service Parts Price List less distributor's discount. Transport charges for the instrument to be returned are the responsibility of the distributor.
    c. **Post Warranty Period: SCP SCIENCE** agrees to supply required service parts at prices according to the prevailing Service Parts Price List less distributor's discount. The distributor agrees to pay

freight charges for service parts purchased after the warranty period.

4. **SCP SCIENCE** reserves the right to request that failed parts be returned to a location specified by **SCP SCIENCE**, in which case freight charges shall be borne by (distributor). This clause shall apply irrespective of whether the unit is under warranty or not.

5. A *Digi***PREP** digestion system that does not operate upon receipt ('out-of-box failure') may be returned to **SCP SCIENCE** with transport charges to the account of **SCP SCIENCE**. Note that the distributor must obtain a Return Authorization number from **SCP SCIENCE** before shipping the instrument. **SCP SCIENCE** reserves the right to select the method of transport.

6. (Distributor) agrees to cooperate in all respects with **SCP SCIENCE** and will provide **SCP SCIENCE** with service failure information, serial numbers of the digestion block and/or controller, and any other service related information determined by **SCP SCIENCE** as being relevant to the repair of an instrument and to the improvement of the product.

7. An RMA # is required prior to returning any item to **SCP SCIENCE**.

8. **SCP SCIENCE** shall not be responsible for any damage or losses however caused, which may be experienced as a result of the installation or use of this product.

1.1 ERROR MESSAGES

Some of these error messages will not appear on older equipment.

1. *Digi***PROBE** ERROR - ensure the *Digi***PROBE** or the *Digi***PROBE** Dongle is installed correctly.

2. Over Temperature Protection - the block is over heating the set point temperature check the SSR section 3

3. Temperature Dropping - *Digi***PROBE** is no longer in the solution and could be measuring vapor temperature.

4. Check *Digi***PROBE** and *Digi***SET** Dongle - The set point temperature has not been reached. But steady state has been reached.

5. Steady State Error. The system is detecting a constant temperature but has not reached set point temperature.

6. Temperature Unsteady – the *Digi***PROBE** appears to be sensing a variation in temperature typical caused when the *Digi***PROBE** is or is about to become out of the solution due to evaporation.

7. Set point Exceed Sample Boiling Point – Verify the set point entered.

Note: Any of these error messages will be eliminated upon the pressing of any key. Elapsed time is not interrupted in this sequence.

1.2 Basic verification list

1. Visual and physical inspection

    - All parts are included (see section 1.5)   ☐

    - Voltage selector is at the right position (both block and controller) ☐

    - Power cord is fully inserted   ☐

    - All connectors and cables are inserted accordingly   ☐

    - The system powers up correctly   ☐

    - Cable connector look fine (not bent)   ☐

Comments and observations:

_____
_____
_____
_____
_____
_____
_____

2. Display

    - Touch Screen or LCD Backlight is working   ☐

    - Banner Screen is appearing   ☐

    - Main menu screen is appearing   ☐

    - Fonts and video color is correct   ☐

    - Keypad display has clear black letters   ☐
                                                                           ☐

Comments and observations:

_____
_____
_____
_____

3. Power Supply

- The Fuse is fine ☐

- Power cables are correctly inserted (see section 3) ☐

Comments and observations:

_____
_____
_____
_____
_____
_____
_____
_____

4. Heater and Monostable Circuit

- *Digi*PREP block is connected into the controller ☐

- *Digi*PREP block is heating accordingly ☐

- COM2 dongle is correctly inserted ☐

- *Digi*PROBE is correctly inserted into its socket ☐

Comments and observations:
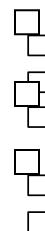
_____
_____
_____
_____
_____

5. CPU and general component verification

- The CPU daughter card is fully inserted ☐

- The backup battery is functional ☐

- Software runs accordingly ☐

- Controller serial number _____

- Software version _____

1.3 Symptoms

The following symptoms must be verified before going into more detail (see figure 1).

1. The block is over shooting the set point temperature, and the temperature keeps climbing.
   - Check the SSR Relay section 3.1.5

2. The block is not heating
   - Ensure the *Digi***SET** Dongle is installed.
   - The power cable is connected correctly.
   - Ensure the Voltage Selector Switch is at the appropriate voltage.
   - Verify that the 180°C NC Thermal Switch is closed (see block service manual)
   - Check resistance of heater (115 v – 65 ohms or 230v – 32 ohms)

3. The block is heating very slowly
   - Ensure that the voltage selector switch is at the correct position (see section 8).
   - Ensure the correct system is chosen on the utilities menu

4. No display but back light is lit
   - Ensure the Voltage Selector Switch is at the appropriate voltage.

5. No display and no back light
   - Check fuse F1.

Symptoms	Reference
Operation LED not illuminated (blue) when power is on	Section 2.1 Section 7.2
Digital Screen Backlight is not working	Section 2.2 Section 7.3
Digital Screen (LCD) is malfunctioning	Section 2.3 Section 7.3
LCD shows "DigiPROBE error"	Section 6.1 Section 8.5.1
Keypad buttons are not functioning correctly	Section 3
The controller is not functioning when power switch is on	Section 4.1
The DigiPREP block is not heating up	Section 5
The heating block is not reaching its temperature or vary	Section 6
A long and clear sound is heard when controller is powered up	Section 7.1

Figure 1: Symptoms vs. document references

1.4 *Digi*PREP *KeyPad Automatic Diagnostics Test Procedure*

The CPU is able to perform an automatic diagnostic test. Follow the 7 simple steps below.

1   Shut off power to the *Digi*PREP KeyPad.

2   Ensure voltage selector is switched to the correct position. NOTE: The selector switch shows the voltage selected in white text.

3   Ensure that the *Digi*PROBE is installed, and inserted into either the block, or the sample. If you are not using a *Digi*PROBE, ensure that the dongle is connected.

4   Ensure that the block is connected, and that the connector is twisted and locked into the receptacle.

5   Wait for 30 seconds.

6   Press and hold the ↵ key while turning the power back on

7   The *Digi*PREP KeyPad controller will emit up to 5 diagnostic beeps. The beeps can be short (__) or long (_____) in duration. Listen and record the length on the following chart.

Record Beep Pattern	1st	2nd	3rd	4th	5th

Compare the beep pattern recorded above to the chart below.

BEEP Pattern	1st	2nd	3rd	4th	5th	Description
A	_	_	_	_	_	Normal boot
B	_	_	_____	_	_	Low battery / Memory Failure
C	_	_____				KeyPad Failure
D	_	_	_			A/D failure
E	_	_	_	_		LCD failure
F	(Continuous)					CPU error #1
G	(No beeps)					CPU error #2

1.5 Controller Physical Description

Figure 2: *Digi***PREP** KeyPad controller physical diagram
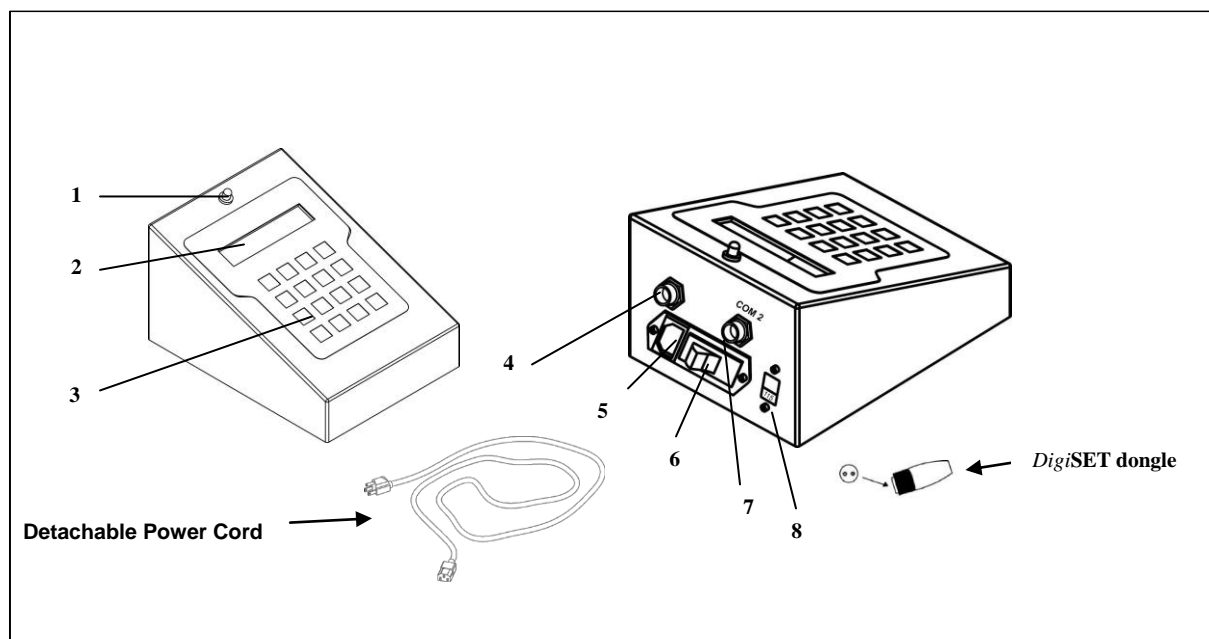
1. **LED** – Visible indication that *Digi***PREP** KeyPad Controller is powered-up.
2. **Digital Display Screen** (LCD)
3. **KeyPad** – Input all data into controller.
4. **Cable Connection** – Connection port for the blocks umbilical cable.
5. **Power Cord Receptacle** – Receives the female end of the power cord.
6. **Power switch** – On/Off switch with circuit breaker.
7. *Digi***SET Connector (COM2) –** connection port for *Digi***SET**. *Digi***SET** will automatically shut off the digestion block when a pre-set sample volume is reached. ***Digi*SET dongle must be installed to run any *Digi*PREP block without the *Digi*SET option.**
8. **Voltage selector switch –** Selects appropriate voltage (115V or 230V). I.E.: If 115 V is visible then 115 V has been selected.
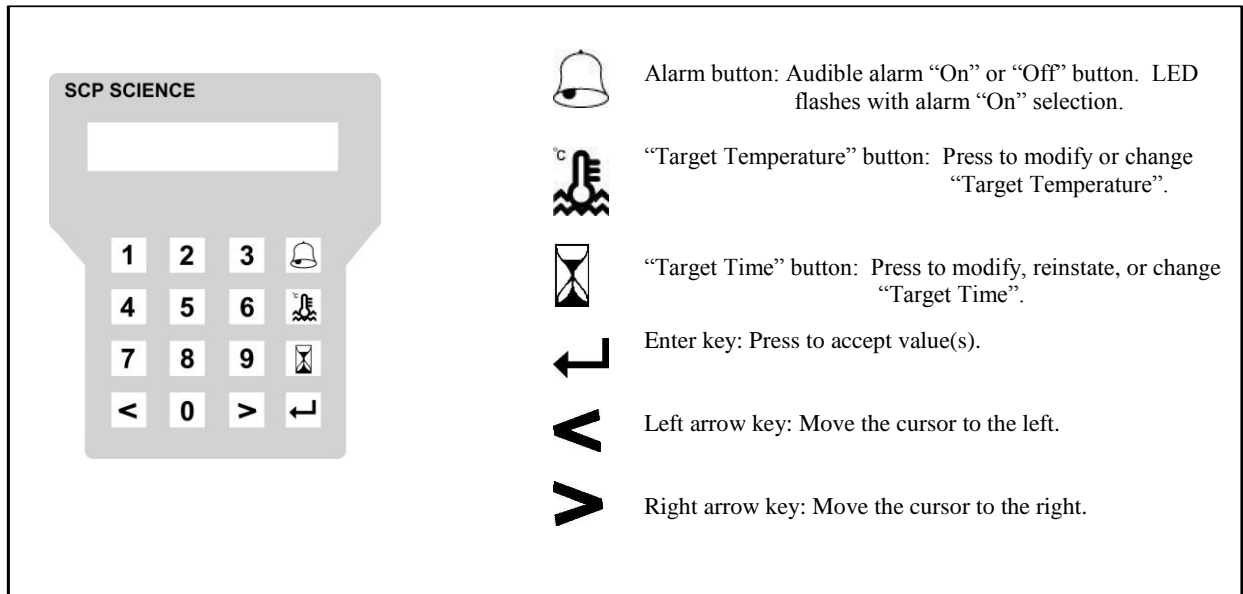
Figure 3: KeyPad Layout

1.6 Instrument Operation

With the power switch in the off position on the controller, connect *Digi***PROBE** to the back of the heating block unit. (see figure 2) Connect the block umbilical cable to the controller. Connect the power cord to the back of the controller. You are now ready to plug the system into the appropriate wall receptacle.

This banner screen will change to the Menu screen after a 5 second delay.

> **SCP SCIENCE**
>
> *Digi***PREP Jr.**
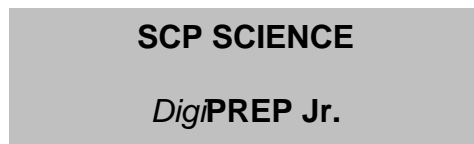
1.6.1 Set-Up Menu

The Menu screen allows for operating the system or changing the menu language.

> **MENU**
>
> **OPERATION   UTILITIES**

Using the ＜ or ＞ keys move the blinking curser to the 'Operation' mode or the 'Utilities' mode Press ↵   ☐to select the category. Select Utilities.
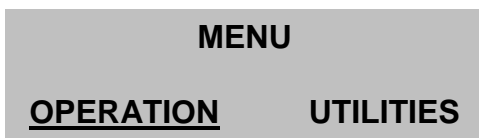
1.6.2 Language Selection

```
    UTILITIES    VER X.X


   EN   FR   DE   IT   ES
```

Using the ＜ or ＞ keys move the blinking curser to the language of choice. The menu commands will then appear in the selected language. Press ↵

1.6.3 Set-Up Menu

Return to Main Menu to set operation parameters.

```
          MENU

OPERATION        UTILITIES
```

Using the ＜ or ＞ keys move the blinking curser to the 'Operation' mode. Press ↵   ☐to select the category. Select Operation.

1.6.4 Setting Operating Temperature

```
 TARGET TEMPERATURE?


   25 TO 180 XXX.X C
```

Enter the required 'Target Temperature'. Target Temperature is the required operating temperature. To change the Target Temperature, use the numeric keypad and over write with the desired value.
Press ↵

Caution: The maximum digestion temperature for polypropylene tubes is 130° C. If higher digestion temperatures are required, use the appropriate glass or Teflon replacement tubes. A full listing of available tubes is located on Page 17.

1.6.5 Setting the Timer

```
       TARGET TIME?

       0 TO 999 XXX
```

Enter the required 'Target Time' (minutes). The Target Time is the required time at the designated Target Temperature. To change the Target Time, use the numeric keypad and over write with the desired value.
Press ↵

1.6.6 Programming Heater Shut Down

```
       END OF TIME?

   HEATER    OFF    ON
```

Select 'OFF' to turn the heater off at the end of the Target Time. Select 'ON' if you wish to maintain the block at the previously set Target Temperature at the end of the Target Time.
Press ↵

1.6.7 Alarm Mode

```
   TEMPERATURE 95.0 C

   TIME    120:23   AL
```

Press the 'Alarm Button' to turn on the alarm. 'AL' will be displayed to indicate the alarm is on. A second press of the button will toggle the Alarm off. The timer will sound an audible alarm if the alarm is selected.
To reset the timer/alarm, press the 'Target Time' button to return to the Timer screen and enter a new Target Time. Continue to follow the previous instructions mentioned above.
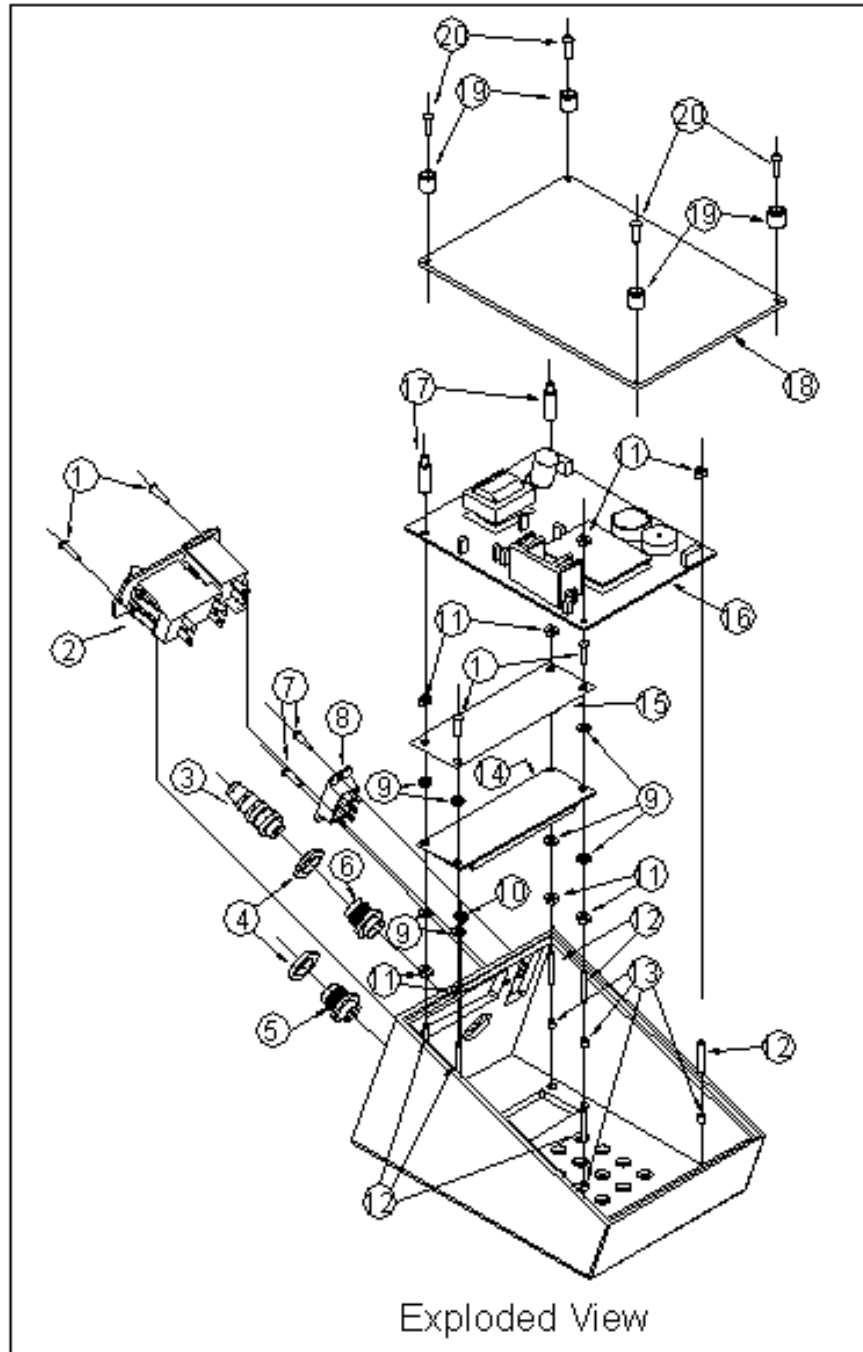
Figure 4: KeyPad display mounting view.

Legend:
1. Rounded-Head Nylon Screw #6-32 x 1"
2. On/Off Switch
3. Dongle 2-Pin Female
4. Panel Lock Nut
5. Panel Mount Connector 7-Pin Male
6. Panel Mount Connector 2-Pin Male

7. Flat Head Nylon Screw #6-32 X 1 "
8. Voltage Selector Switch
9. Flat Washer, Nylon #6 Screw
10. LED
11. Nylon Nut #6-32
12. Stud #6-32
13. Brass Insert #6 Screw
14. LCD
15. Fish Paper
16. Nylon Stand-off #6-32 x ¼"
17. Bottom Kydex ¼"
18. Feet
19. Pan Phillips Head Tapping Screw #8 x ¾"

1.7 Controller General Description

The following figure shows a general block diagram of the KeyPad controller and all the interaction between components. Each part will be explained in detail in a different section of the document.
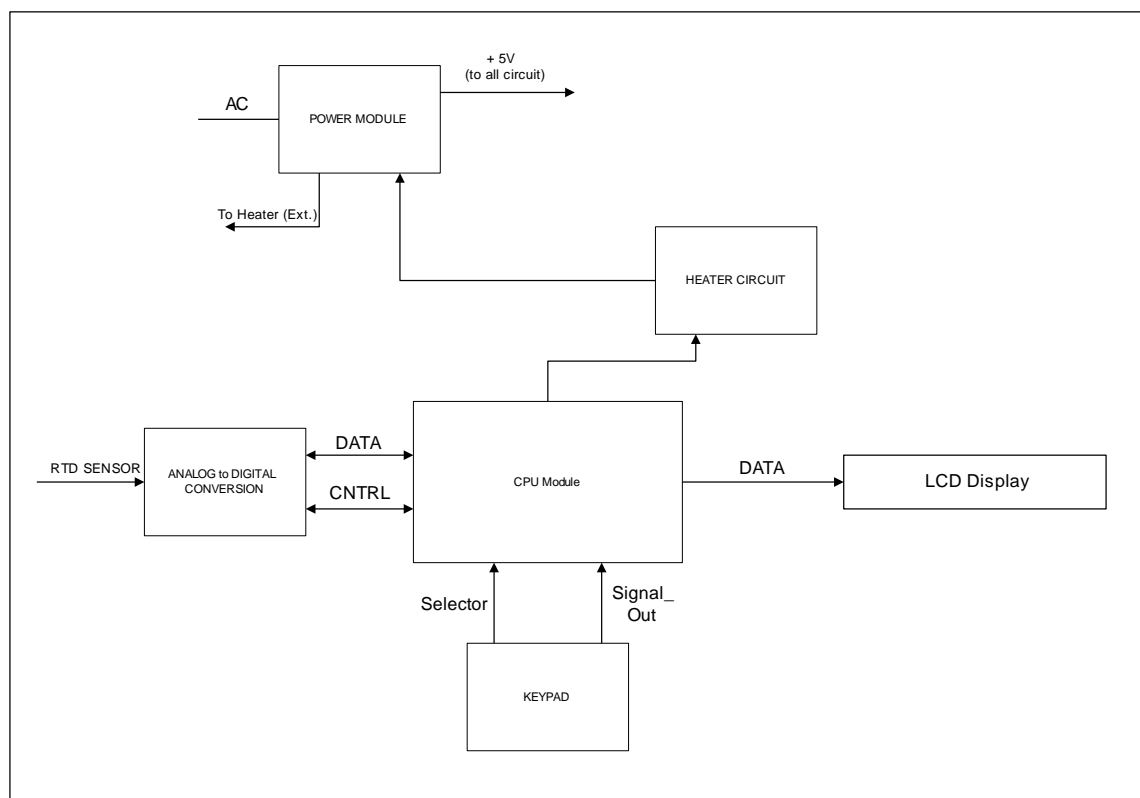
Figure 5: General KeyPad block diagram

The KeyPad controller system is composed of a keypad to enter information regarding set point temperature and controlling time to a CPU, which controls the *Digi***PREP** block (Jr, MS, HP or HT). A diagnostic test procedure is available and will be discussed in CPU diagnostic section.

2. Light Emitting Diode (LED) & LCD

Ensure the voltage selector switch is set at the proper voltage for your location before powering the controller (see Figure 2). It is typical set at 230 volts when it leaves the factory.

2.1 Operation LED not illuminated (blue) when power is on

- Ensure the power cord is fully inserted into its socket (see Figure 1)
- Verify that the power switch is in position ON
- Remove the bottom plate by removing the four feet and verify that the front LED is connected to connector "SP" (see figure 6 for detail)
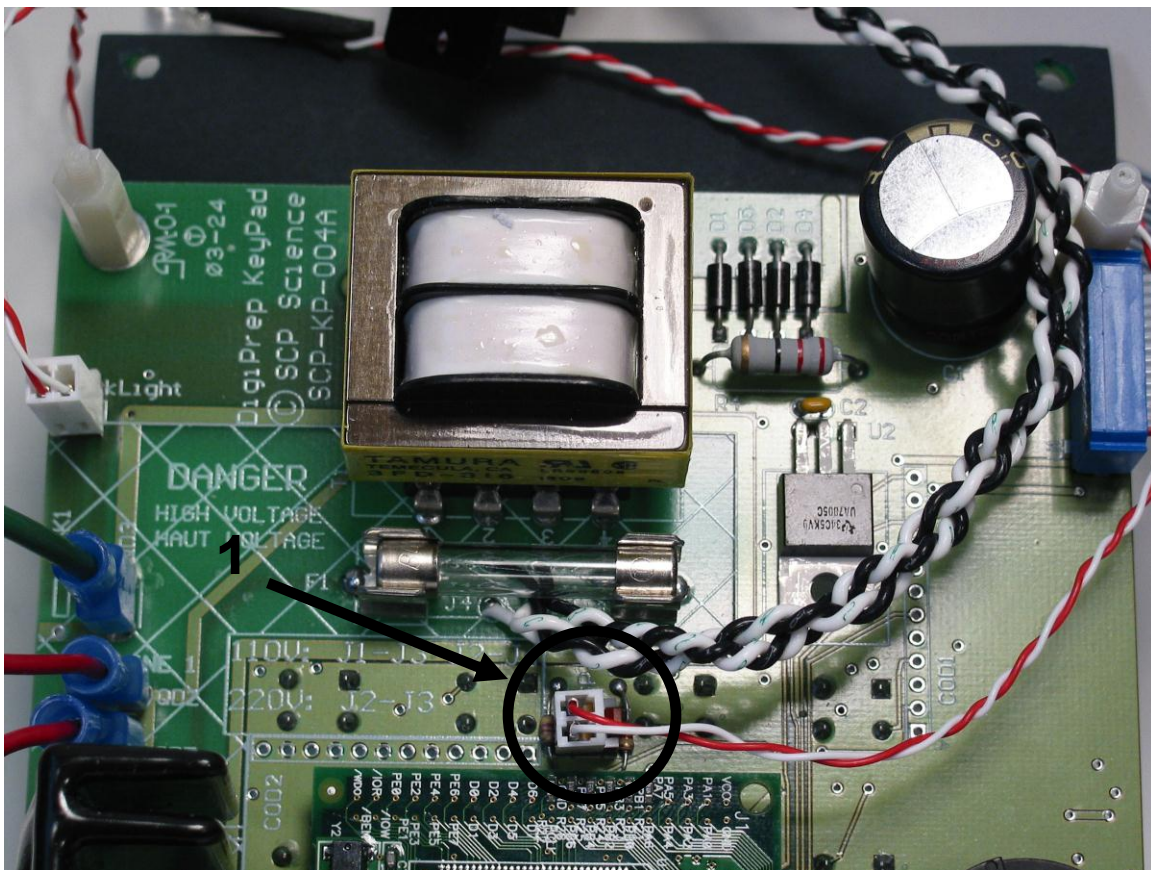
Figure 6: LED cable position

Legend:
1. Connector SP

If the LED is not lit, please refer the Power Circuit section and the CPU section before changing the LED.
NOTE: Ensure that the LED has not been connected in reverse, positive to negative.

2.2 Digital Screen Backlight is not working

- Remove the bottom plate by removing the screws holding the feet. Verify that the backlight cable is fully inserted or connected to the "Backlight" connector (see figure 7 for detail)
- Use a multimeter to measure R4 and see if it is 22 ohms.
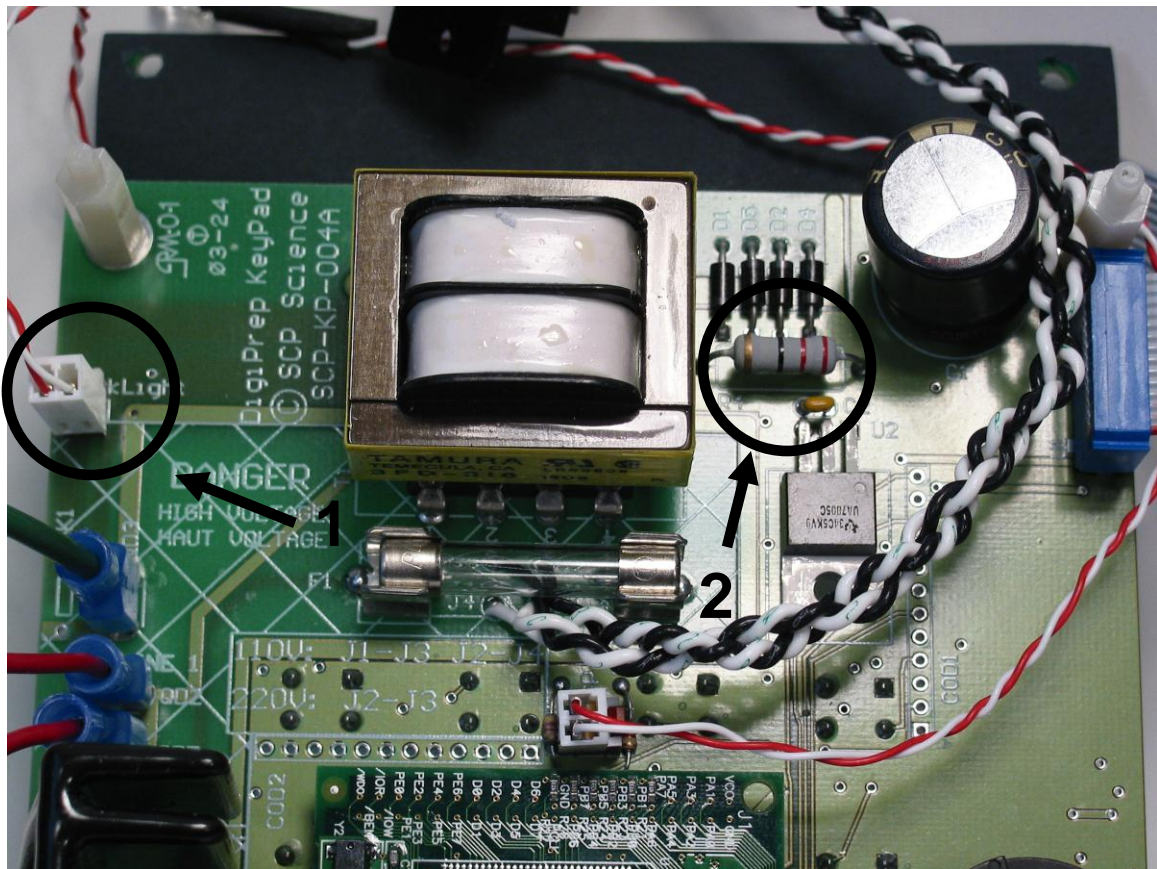
Figure 7: Backlight and R4 location

Legend:
20. Backlight
21. R4 (22 ohms)

Please refer to the following section before changing the LCD display.

2.3 Digital Screen (LCD) is malfunctioning

- Make sure that the voltage selector switch is set to the right position (see figure 2)
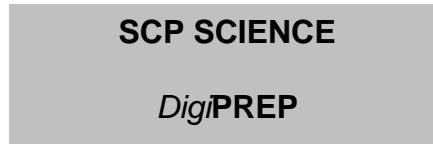- With the system powered up, verify that the following message is appearing for 5 seconds on the LCD screen:

<div style="text-align:center">

SCP SCIENCE

*Digi***PREP**

</div>

- If the startup message is not appearing or strange character are displayed
  - o Replace the LCD monitor
- After 5 second, the user should see the following:

<div style="text-align:center">

MENU

OPERATION   **UTILITIES**

</div>

- If not, remove the bottom plate by removing the 4 screws holding the feet in place and verify that the LCD ribbon cable is fully inserted into the U1 connector (see figure 8 for detail)
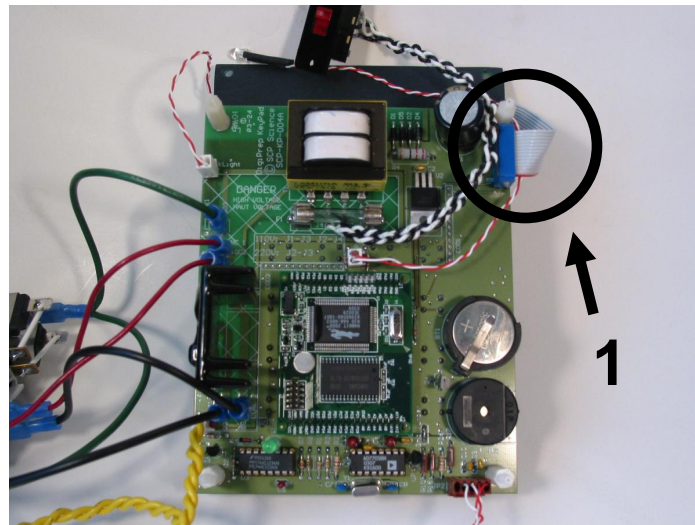
Figure 8: LCD display ribbon cable position

Legend:
1. U1, LCD ribbon Cable

If the LCD display is still not working, please refer to the CPU section before changing the digital screen.

3. KeyPad Malfunction

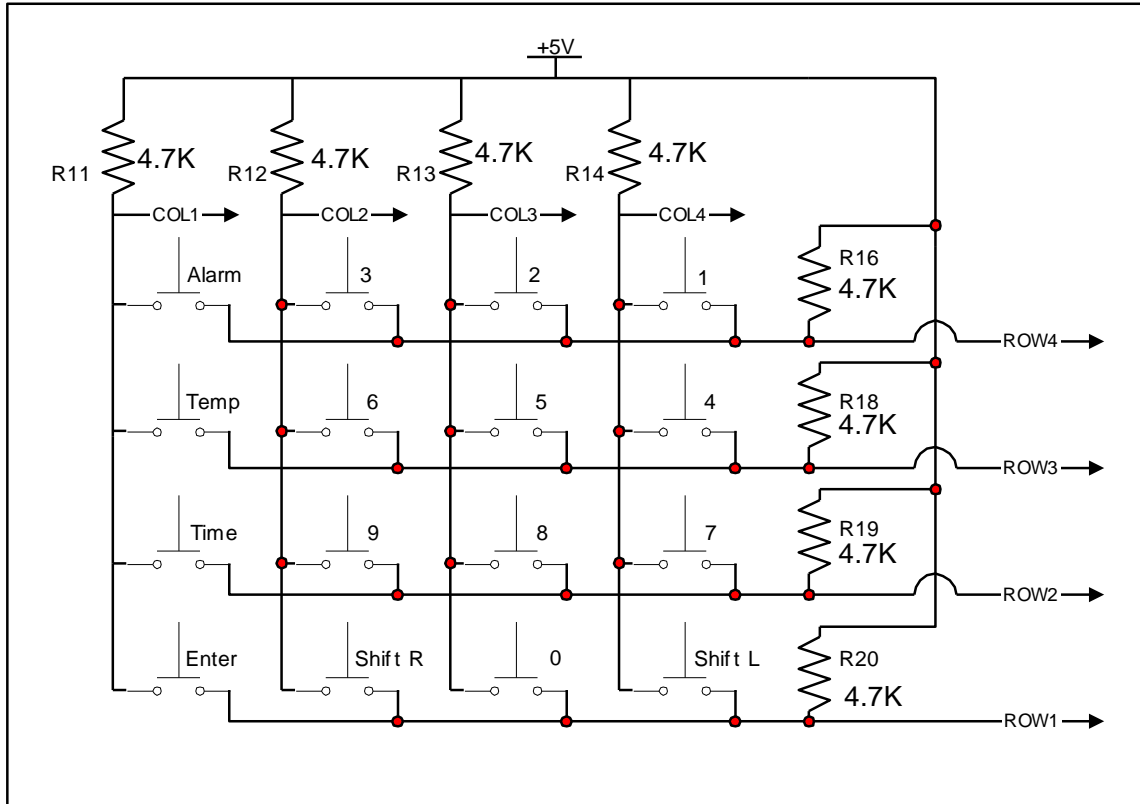The KeyPad is made of 16 independent switches. The information of a pressed button is sent to the CPU with help of a row and column detector. One should feel a 'click' upon pressing a button. If there is no click then the PCB board adjustment should be checked.

Figure 9: KeyPad electronic diagram

3.1 Failed KeyPad Buttons

NOTE: Please write down each failed button number in order to see if the problem is for a complete row or column.

- In order to verify the buttons, please reset the KeyPad controller (ON/OFF) and select the Operation section in the main MENU.
- A target temperature is now asked.
- First, verify all digits. Every time you press a button, you should see the corresponding number under the cursor.
- When it is done and all digits are fine, enter 25.0 and press the ENTER key.
- Enter "1" in the "Target Time" menu and press ENTER key.
- Now its time to verify the ARROW keys.

- o Press the LEFT ARROW key a couple of time and see if the cursor switched from ON to OFF and so on.
- o Press the RIGHT ARROW key a couple of time and see if the cursor switched from ON to OFF and so on.

- Select HEATER OFF and press ENTER (Make sure that a *Digi***PREP** is connected

- Enter a time scale of 1 minute and press enter

- Press the ALARM, TARGET TEMPERATURE and TARGET TIME button one at a time and verify if they are correctly doing what they are supposed to do:
  - o ALARM: A small "AL" should appear on the LCD display.
  - o TARGET TEMPERATURE: The target temperature menu should appear.
  - o TARGET TIME: The target time menu should appear.

3.2 KeyPad Diagnostic Section

3.2.1 Entire row or column problem

- If all buttons in a row or column are failing, with the helps of figure 9, identify the corresponding pull-up resistor.
  - o Remove the CPU board from the main PCB
  - o Measure with a multimeter the value of the corresponding resistor.
  - o If it is 4.7K, try to verify the connection (soldering) between the VCC and the resistor.
  - o Then check if the resistor is also connected to each button corresponding to its row or column (see figure 10 for resistors location)
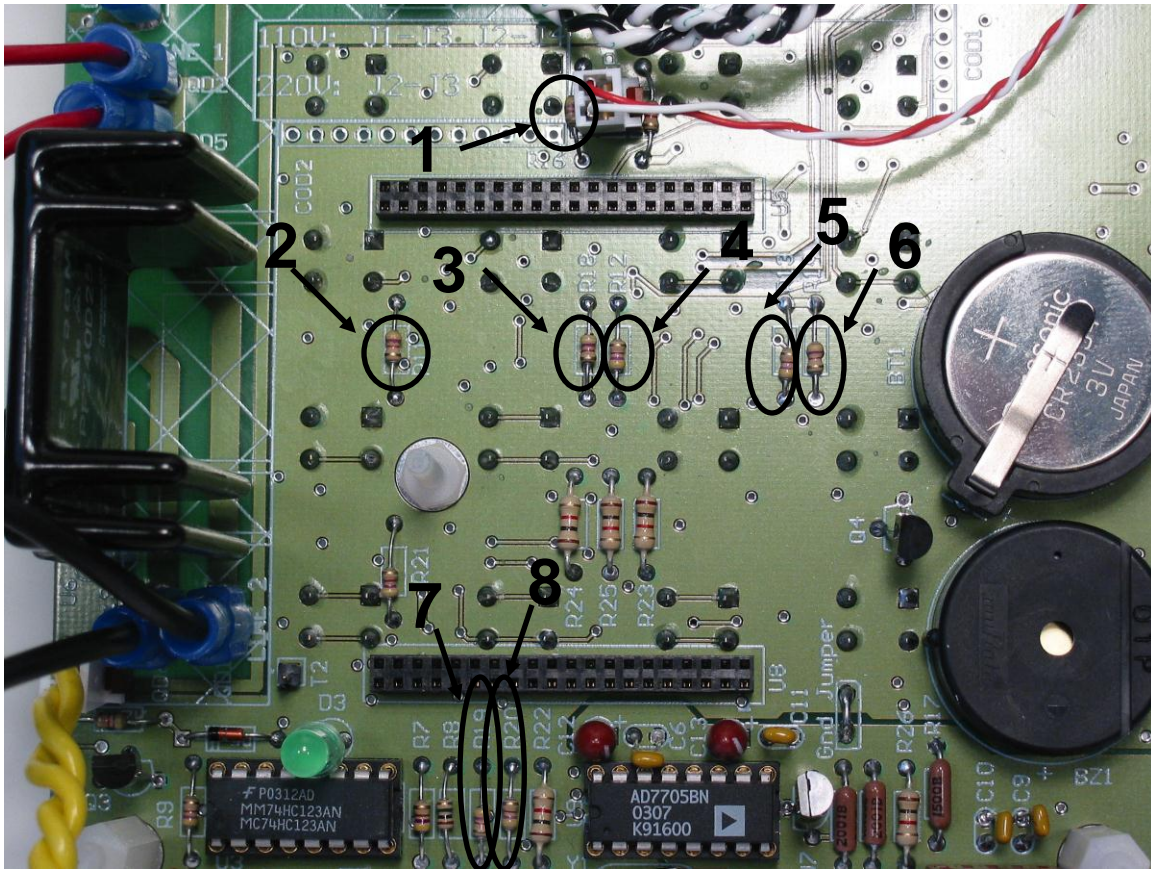
Figure 10: Keypad resistors location

Legend:
1. R16
2. R11
3. R18
4. R12
5. R13
6. R14
7. R19
8. R20

3.2.2 Specific Button Problem

- If only different row or column buttons are in trouble:
  - ○ First, verify the impedance of the button (see figure 11) by measuring between 1 and 2 of each faulty buttons:
    - ▪ Pushed: almost 0 0hms
    - ▪ Not pushed: more than 9.2k
  - ○ Unscrew the whole PCB from the box
  - ○ Verify the soldering of this particular button on the bottom side of the PCB.
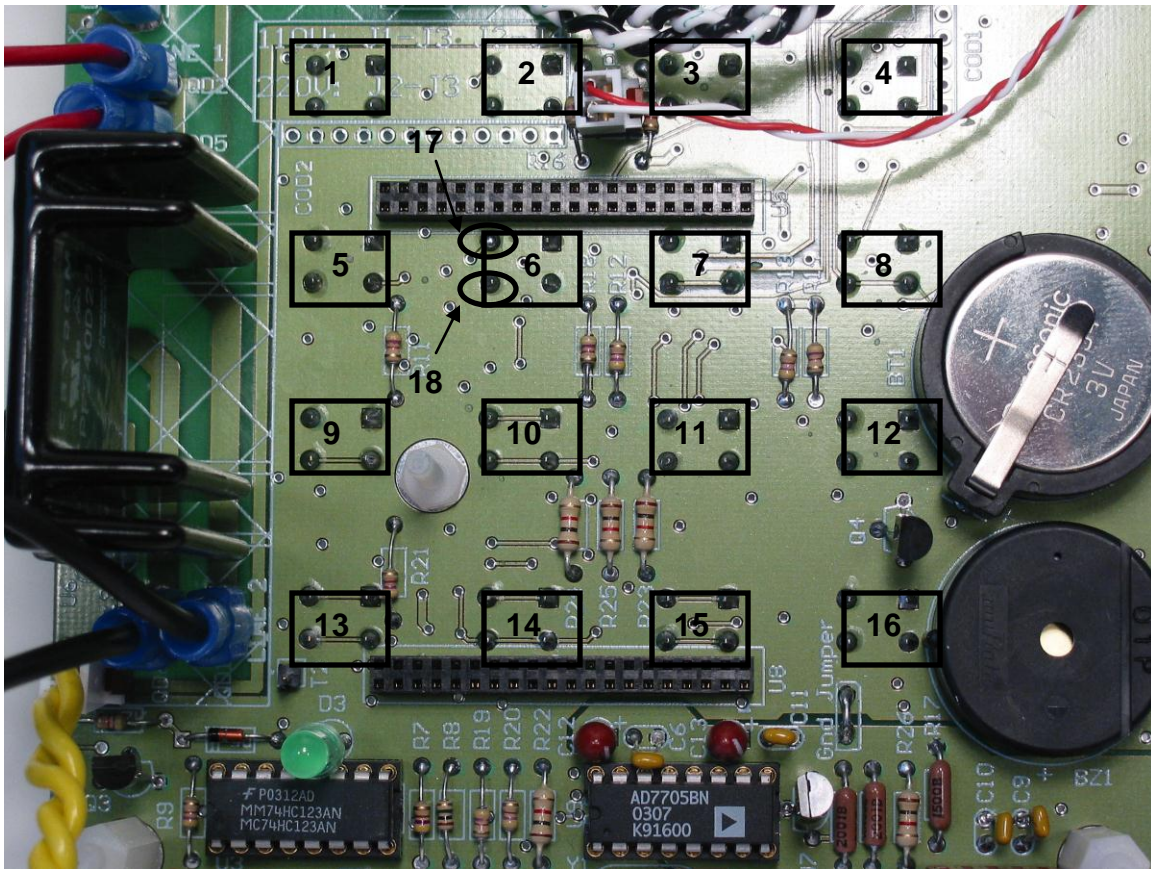
Figure 11: Push button measuring location

Legend:
1. Alarm button
2. Button #3
3. Button #2
4. Button #1
5. Temperature setting button
6. Button #6
7. Button #5
8. Button #4
9. Time setting button
10. Button #9
11. Button #8
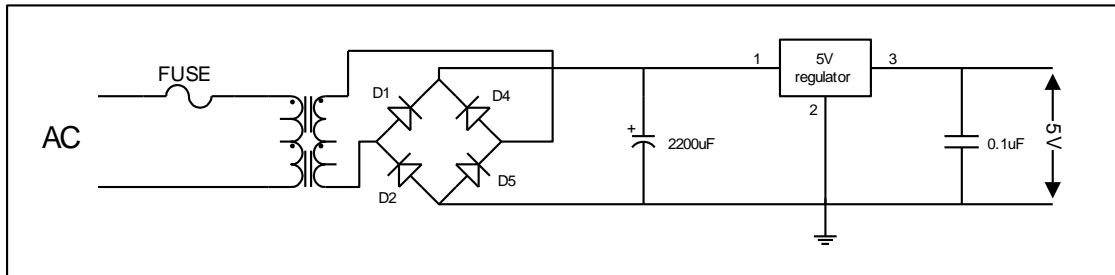12. Button #7
13. ENTER button
14. Right shift button (<)
15. Button #0
16. Left Shift button (>)
17. Positive probe position
18. Negative probe position

4. Power Section

The power section is rectifying and regulating power for all different parts of the KeyPad Controller. It is mainly composed of a transformer, a bridge diode and a DC regulator.

Figure 12: AC/DC converter

Ensure the voltage selector switch is at the correct position before powering the controller (see Figure 2)

4.1 The controller is not functioning when power switch is on

- o Ensure the power cord is fully inserted into its socket (see Figure 2)
- o Unscrew the bottom plate and verify the fuse F1 (see figure 13 for parts location)
  - Replace by a 0.5A if necessary AWG 1 fuse (1/4x1¼)
- o Verify all the power cables connections (see figure 12 for detail):
  - Green wire connected with QD3
  - Pin 3 of the power switch is connected to QD1
  - Pin 4 of the power switch is connected to QD2
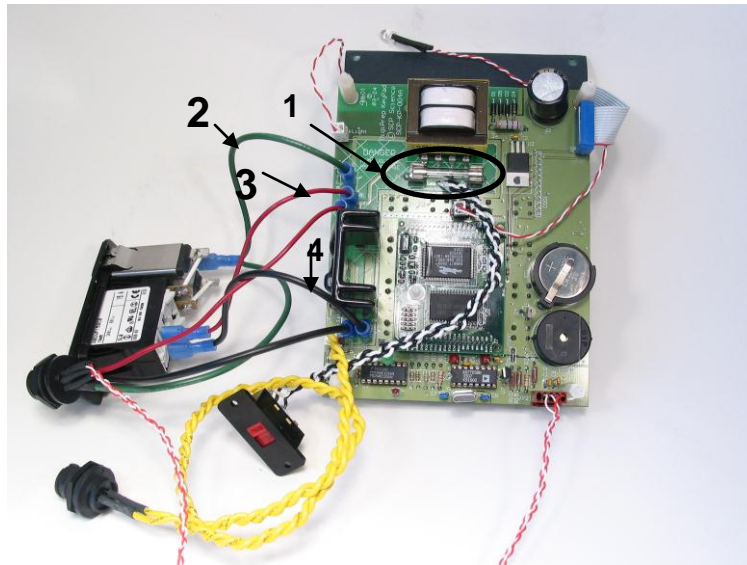
Figure 13: Power connections

Legend:
1. FUSE, 05A AWG
2. QD3
3. QD2
4. QD1

- o Use a multimeter to measure the following voltages (see 14 for parts location):
    - Locate diode D4 and D1 cathodes and measure the transformer output power between D4 cathode and D1 anode (should be between 8V and 9.5V AC). Please see the schematic for detail.
        - If there is no power then make sure that the fuse is fine and change the transformer.
    - Measure the DC level at the regulator input U2 (should be between 9.5V and 10.5V between pin 1 and 2).
        - If no power comes out of the bridge of diode, then verify the diodes integrity and change the faulty one.
    - Measure the DC level at the regulator output U2 (should be between 5V and 5.5V between pin 2 and 3).
        - If no power is at the regulator output, then change the regulator U2.
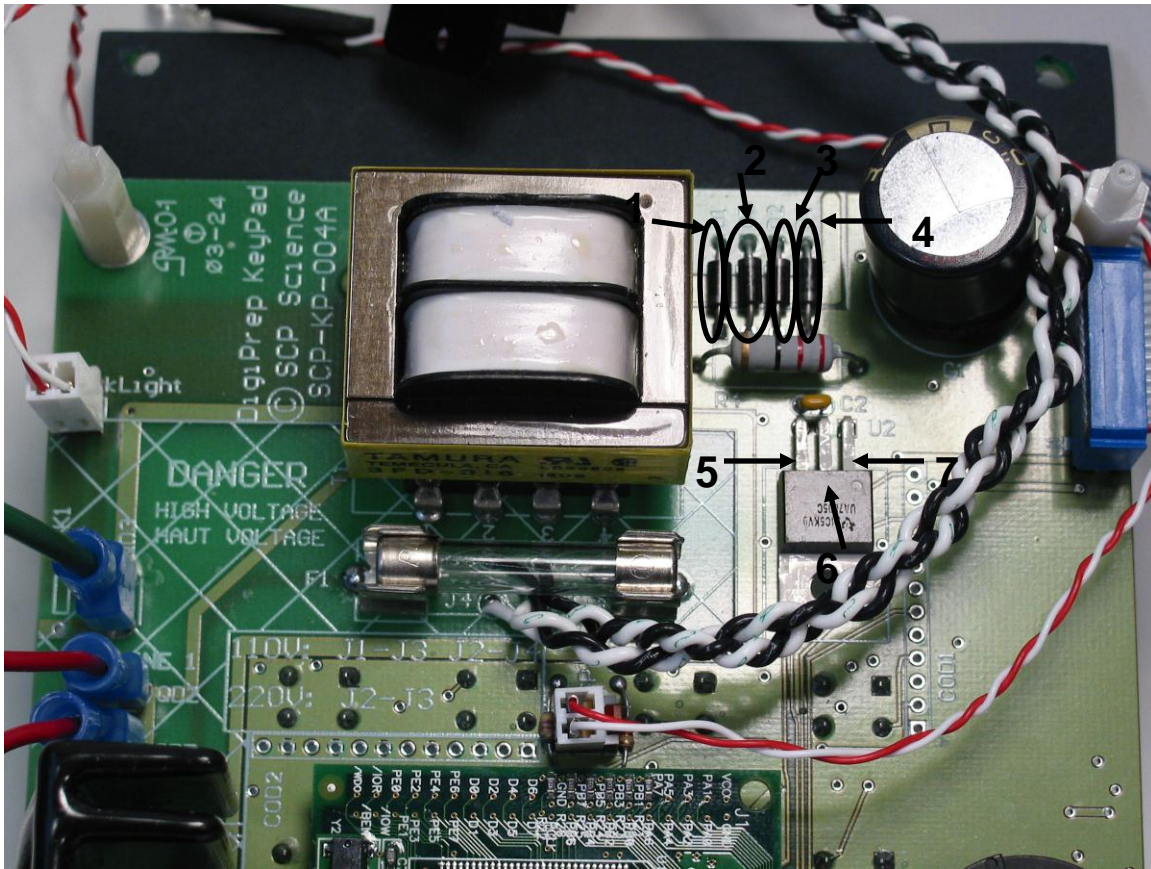
Figure 14: Diodes and regulator location

Legend:
1. Diode 1
2. Diode 5
3. Diode 2
4. Diode 4
5. U2 pin 3
6. U2 pin 2
7. U2 pin 1

5. Heater and Monostable Section

This circuit controls the heater inside all types of *Digi*PREP Blocks. It consists of a Solid State Relay, a Monostable Multivibrator and protection circuit.
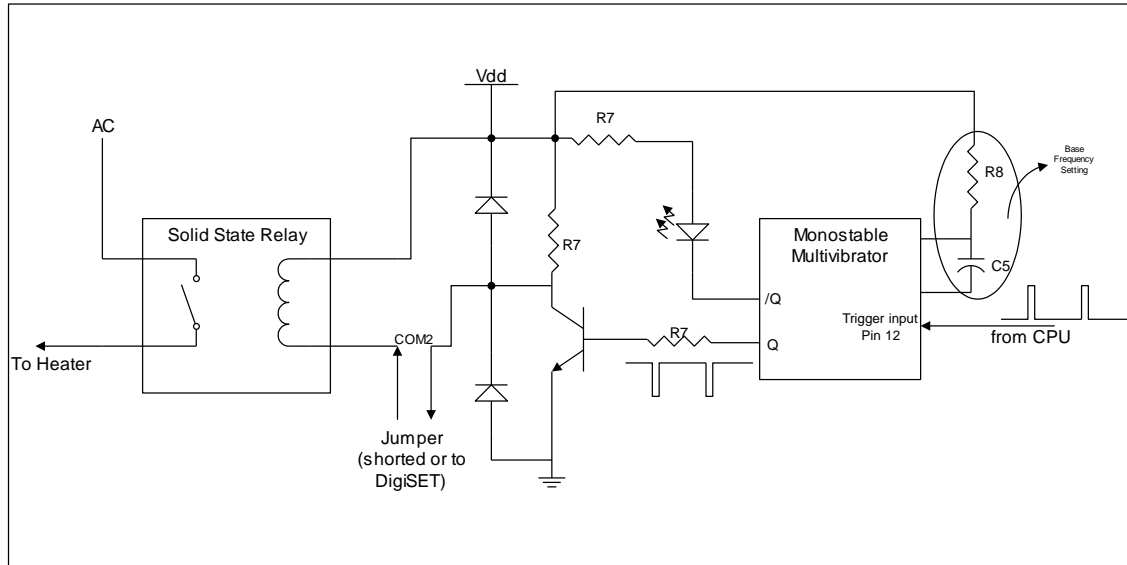

Figure 15: Monostable and solid-state relay circuit

*5.1 The Digi*PREP *Block is not heating up*

5.1.1 *Digi*PREP connection verification

- Ensure that the cable between the KeyPad controller and the heating block is correctly inserted on both sides.
- Verify that the voltage selector of the heating block is properly set.

5.1.2 COM2 dongle verification (only if available)

NOTE: When the COM2 of the KeyPad controller is not connected to a *Digi*SET system, the port must be shorted with supplied *Digi*SET Dongle.

  ○ Make sure that section 1 and 2 have been verified before continuing.
  ○ Ensure that the *Digi*SET dongle is fully inserted into COM2 port (see Figure 2).
  ○ If so, before removing the bottom plate, verify with a multimeter that the COM2 dongle is shorted. If not, please replace the part with a new one.
  ○ If the dongle is ok, remove the bottom plate by removing the four screws holding the feet in place and check if the *Digi*SET cable (see figure 16 for location) is fully inserted.

Figure 16: *Digi***SET** connector location

Legend:
1. *Digi***SET** connector

5.1.3 Internal wiring connection verification

- After removing the bottom plate, verify the connectivity between the heating block external connector and the PCB.

5.1.4 *Digi*SET verification (only if available)

Make sure that the *Digi***SET** is fully functional and that the voltage selector is properly set (see *Digi***SET** operation and service manual).

5.1.5 SSR and Monostable circuit verification

- Fan verification
    - If the SSR case temperature is going too high (more than 85°C) then the fan is not working well. The SSR is probably also defective. Verify if the fan is running correctly, if not, then replace the SSR and the fan.

- Monostable verification (74HC123AN – U3)
NOTE: This will also confirm that the CPU is also up and running
  - Unscrew the bottom plate by removing the four screws holding the feet in place.
  - First verify that U3 part number is 74HC123AN. If not, please replace accordingly (see figure 18).
  NOTE: 74HC123N is on older unit only (green display), it must be replaced with the same part
  - Set the target temperature to 25 °C and target time to 1 min.
  - After starting the system, turn the module upside down and see if the LED D3 (see figure 17 for position) had a 1 sec. lighting time.
NOTE: The heating block temperature must be lower than the target temperature in order for the LED to flash.
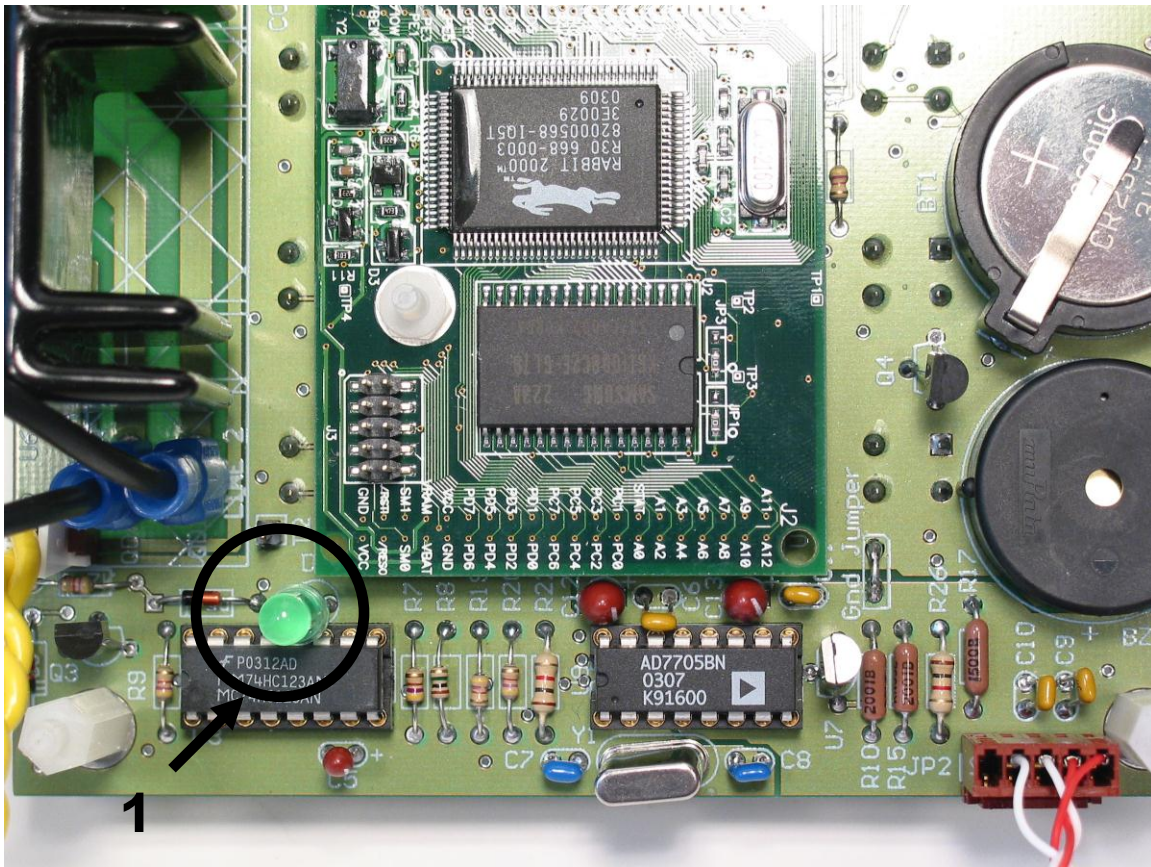

Figure 17: Heating system LED indicator location

Legend:
1. Monostable LED (green)

If the LED is not ON, if possible, use an oscilloscope and see if there is a pulsing signal on the trigger input, coming from the CPU. The pulse width should always be 1 second regardless of the frequency (please refer to the figure 15 and figure 18 for pin location). Take a couple of second to verify the integrity of the LED. If nothing is coming on pin 9 of the U3 chip, the CPU section is in trouble. Please refer to the CPU section for more detail.

  o If there is a signal on pin 9 of U3 and the block temperature is below set point temperature and the LED is not blown, then change the Multivibrator.
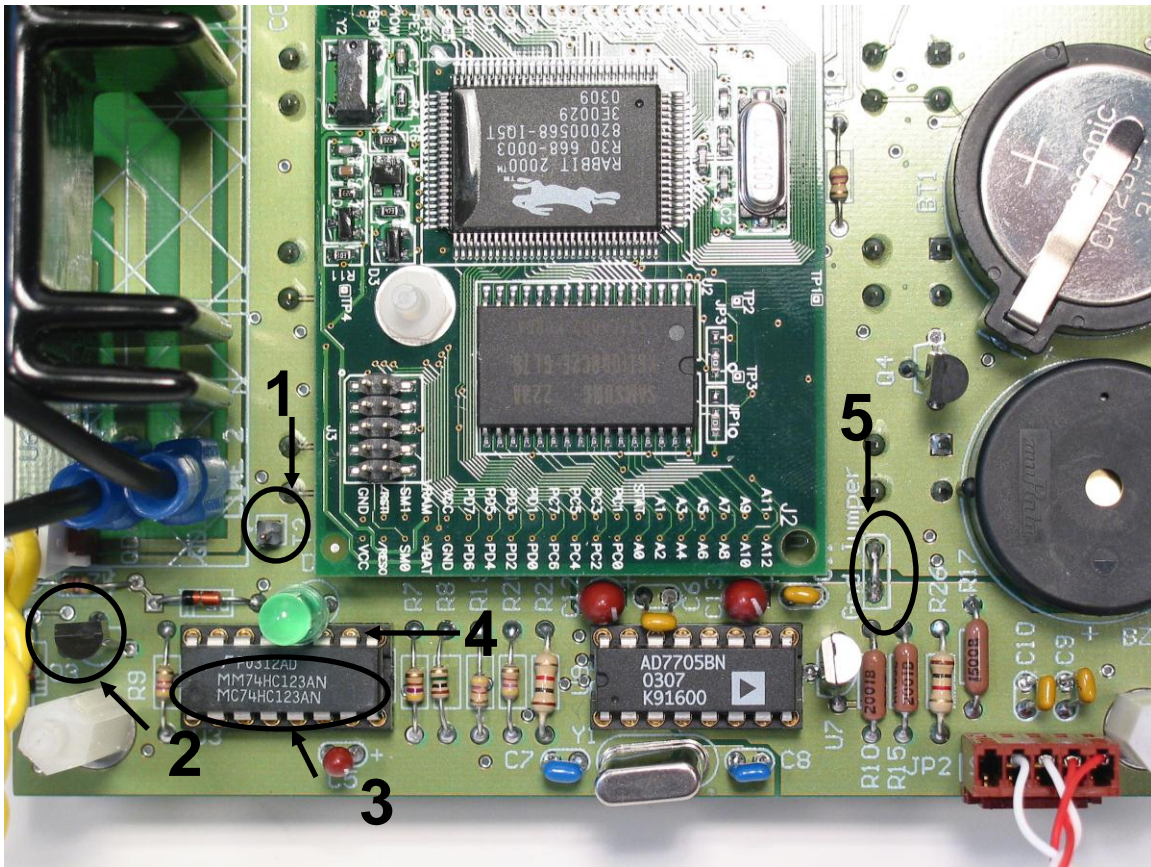
**Figure 18:** Monostable pin location (U3)

Legend:
1. T2 (SSR testing point)
2. Q3
3. U3 pin 12
4. U3 pin 9
5. Analog Ground

- Q3 switch (bipolar transistor) verification
  o If there is a signal at the output of the monostable chip (U3), then the problem can be the bipolar transistor Q3.

- o Measure with a multimeter the voltage between T2 test point and GND Jumper (analog ground).
- o If there is a pulse or a steady 5V then the Q3 switch is fine. The problem is probably the solid-state relay.
- o If there is always 0V and the LED is ON or toggles, then replace Q3.

- Solid State Relay verification
  - o The only way to see if the SSR is behaving accordingly is by measuring between QD6 and QD5 (see figure 19 for location). Make sure that there is 120V/230V AC (Toggling or not).   Also refer to figure 19 for an example of what can be seen on a scope if the control is toggling.
  - o Make sure that the heating block temperature is lower than the target temperature if you want the SSR to toggle.

  NOTE: If you're using a scope, it must be isolated from the wall outlet.
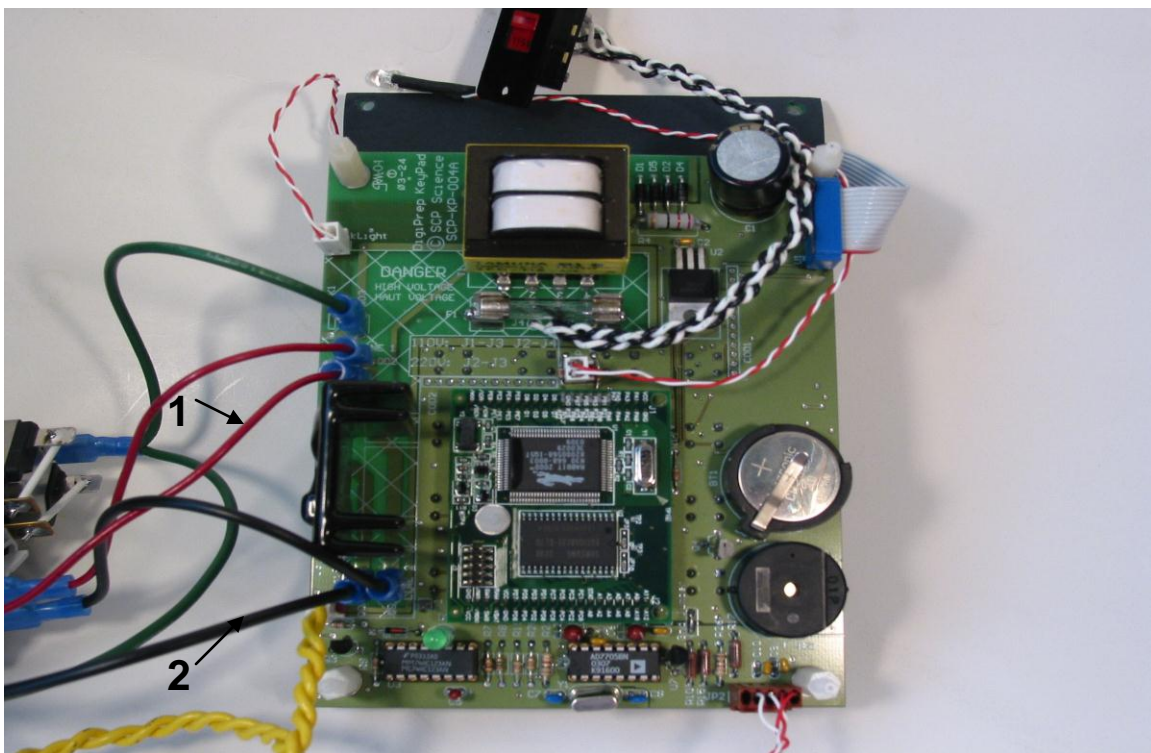
Figure 19: SSR test pins location

Legend:
1. QD5
2. QD6
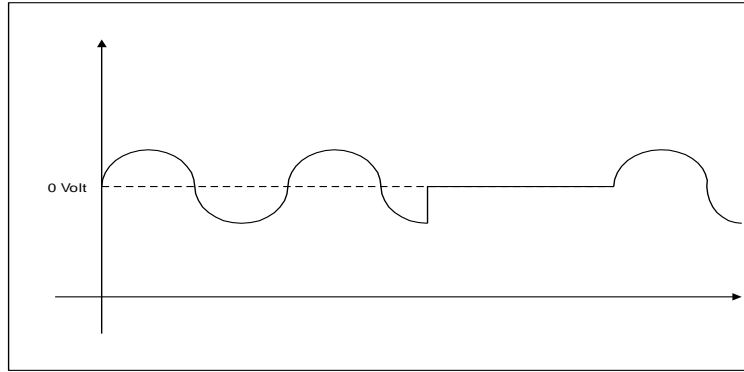
Figure 20: SSR output when heating section is firing

NOTE: if all of those tests are correct, please refer to the *DigiPREP* heating Block section for more detail (see section 8).

6. A/D Converter

The analog to digital conversion is the feedback information coming from the heater block temperature sensors or from a *Digi*PROBE. The CPU section handles this information in order to control the temperature of the heating block.

6.1 Possible A/D problem

- If the *Digi*PROBE is reading wrong temperature, make sure that the *Digi*PROBE itself is functional before looking at the converter circuit. This can be accomplished by measuring the resistance across pin 1 and 2 of connector of the *Digi*PROBE.
  - Typical 25 °C = 108 ohms
- If the display is printing "*Digi*PROBE error", then the A/D can be faulty but make sure that the section 8 has been verified before changing the A/D.

6.1.1 RTD input connection

- Visually inspect the external connection of the *Digi*PROBE.
- Unscrew the bottom plate and make sure that the JP2 connector is fully connected with the jumper (see figure 21 for location)
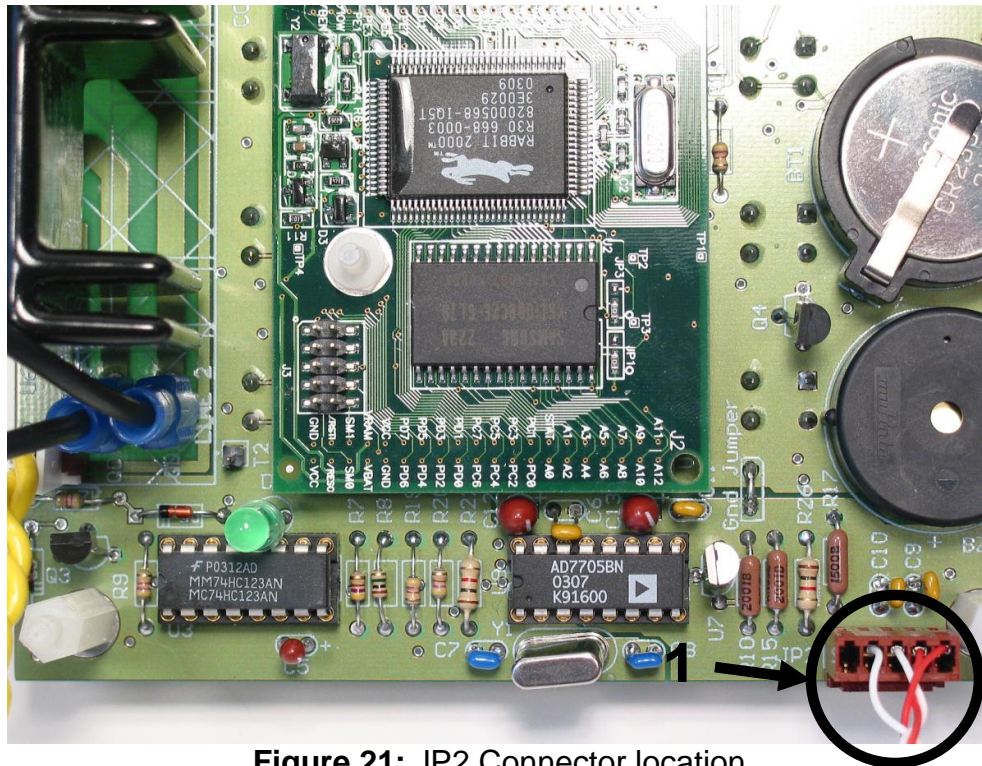

Figure 21: JP2 Connector location

Legend:
1. JP2 header

6.1.2 A/D power and connections

- With the help of a multimeter, make sure that the A/D (U9) is powered (see figure 22 for pin 15 and 16 location). If it is not powered up, then the 5V regulator (U7) part is not functioning correctly.
- If available, with help of a scope, verify that the Y1 component is oscillating at the correct frequency, which is 4.9152MHz (see figure 22 for part location).
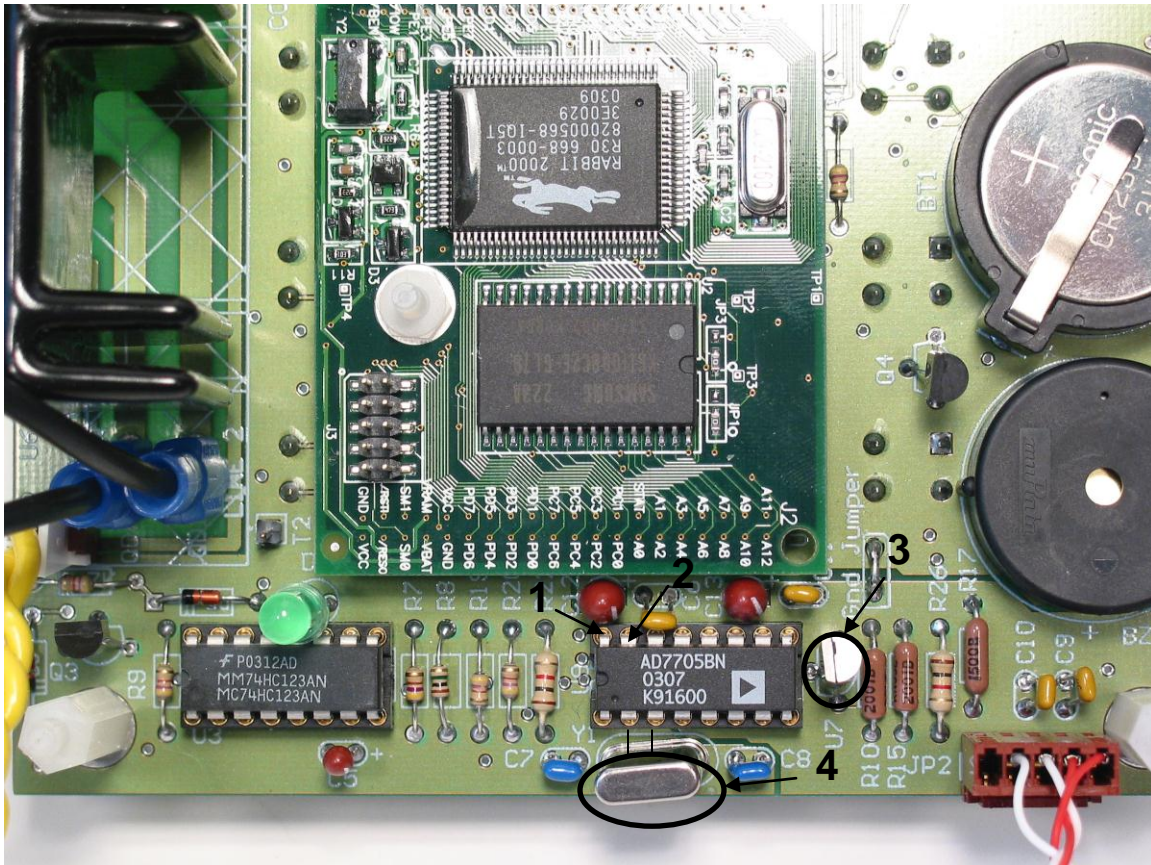
Figure 22: A/D, Oscillator and regulator location

Legend:
1. U9 pin 16
2. U9 pin 15
3. U7 (5V regulator)
4. Y1 (4.9152 MHz oscillator)

6.1.3 A/D conversion behavior

- Before changing the A/D, make sure that all the external instruments (sensors, probe, etc.) and interconnection cables are not broken.
- Replace the A/D and verify if the system is heating up accordingly and that the temperature feedback is correct.

7. CPU Section

The CPU section is in fact the daughter card that fits directly on the KeyPad controller PCB (see figure 23 for location).
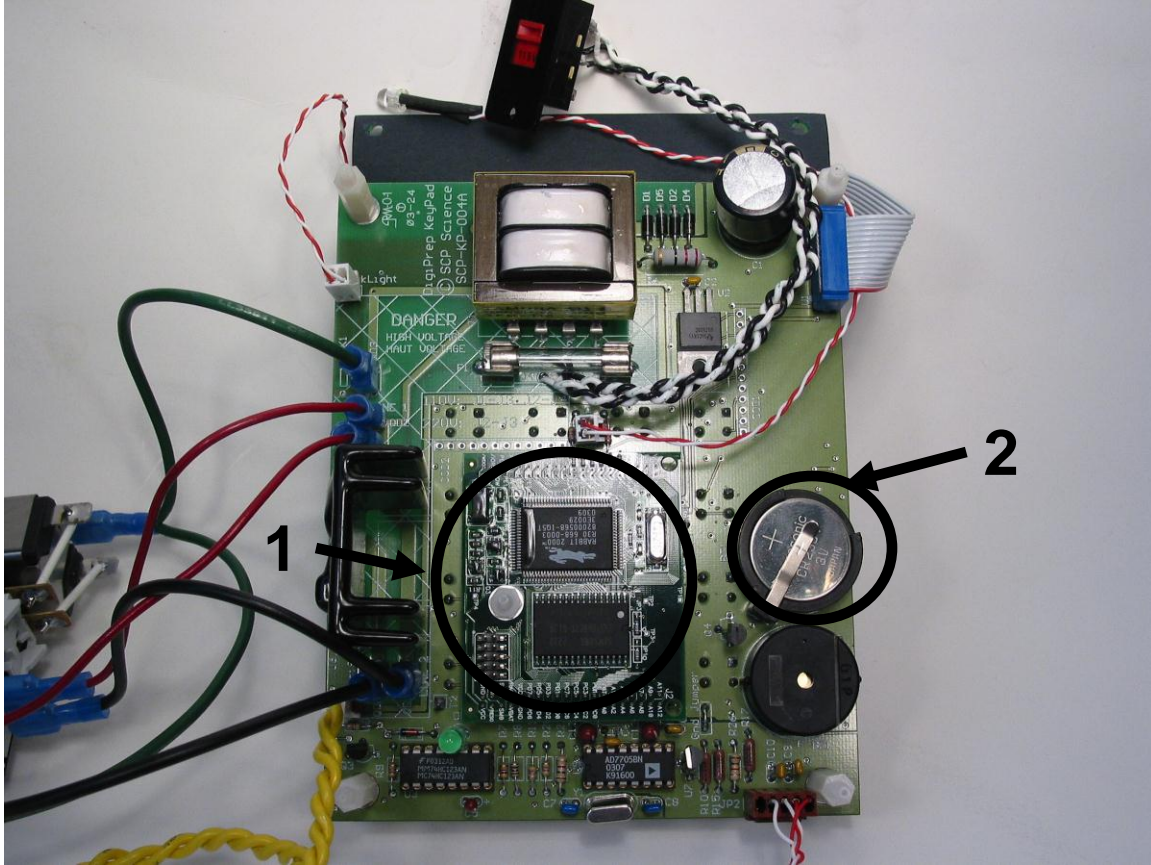
Figure 23: CPU daughter card location

Legend:
1. CPU daughter card
2. Battery backup

If any of the sections 1 to 4 has been verified and a CPU problem is suspected then try the following sections.

7.1 CPU board insertion

If a long and clear sound is heard when powering up the KeyPad System
- Make sure that the power switch is OFF before doing the following item.
- Fully insert the CPU daughter card on the mother board
- See section 1.4 for more detail on CPU diagnostic.

7.2 Power LED malfunction

If the power LED is not correctly functioning and the section 1 has been fully verified:

- Verify the battery and the socket integrity (see figure 23 for location): Part must be replaced and the preprogrammed setup must be reentered if the battery is bad.

7.3 LCD Display problem

If the section 1 has been fully investigated and the system is always returning to the default setup (EN language, default heating block type etc.), then replace the on board battery. You can check the battery by turning off the instrument off for about 5 min. Turn it ON and see if the info set is still unchanged (system language, block temp set and time). The default values are: Jr, English, 25°C and 999min.

8. *Digi*PREP Blocks

8.1 *Digi*PREP Jr. *Block description*

*Digi*PREP Jr. 24 position
Digestion Block

*Digi*SET dongle

*Digi*PROBE dongle

One (1) - 24 Position
*Digi*TUBE Racks

1. *Digi*PROBE Connector – Connection port for *Digi*PROBE. *Digi*PROBE will allow direct monitoring and control based on *actual* sample temperature. **DigiPROBE Dongle must be installed to run the *Digi*PREP Jr. without the *Digi*PROBE option**.

2. **Cable Connector –** Connection port for the *Digi*PREP Jr. umbilical cable to the controller.

3. **Power Switch/ Power Cord Receptacle –** On/Off switch – contains circuit breaker and receives the female end of the power cord.

4. *Digi*SET Connector **–** Connection port for *Digi*SET. *Digi*SET will automatically shut off the digestion block when a pre-set sample volume is reached. *Digi*SET dongle must be installed to run *Digi*PREP Jr. without the *Digi*SET option.

5. *Digi*PREP Controller – *Digi*PREP Jr. is designed to be used with *Digi*PREP KeyPad* or Touch Screen* controller (*Sold separately)

6. *Digi*PROBE (Option) **–** To monitor and control sample or block temperature.

7. *Digi*PROBE Storage Well **–** Use with replaceable glass liner.

8. **Voltage Selector Switch** - Select appropriate voltage. If 115 V is showing, system is
   running at 115 volts.

8.2 *Digi*PREP MS *Block Description*
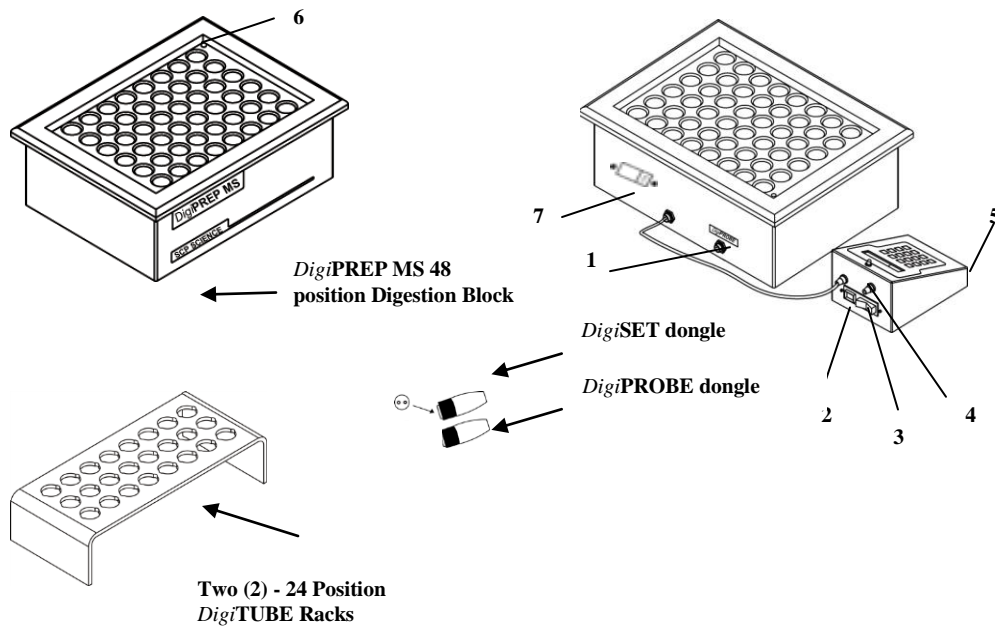
*Digi*PREP MS 48
position Digestion Block

*Digi*SET dongle

*Digi*PROBE dongle

Two (2) - 24 Position
*Digi*TUBE Racks

1. *Digi*PROBE Connector – Connection port for *Digi*PROBE. *Digi*PROBE will allow direct monitoring and control based on *actual* sample temperature. **_DigiPROBE Dongle must be installed to run the Digi_PROBE MS without the Digi_PROBE option.**

2. **Cable Connector –** Connection port for the *Digi*PREP MS umbilical cable to controller.

3. **Power Switch/ Power Cord Receptacle –** On/Off switch – contains circuit breaker and receives the female end of the power cord.

4. *Digi*SET Connector **–** Connection port for *Digi*SET. *Digi*SET will automatically shut off the digestion block when a pre-set sample volume is reached. **_DigiSET dongle must be installed to run Digi_PREP MS without the Digi_SET option.**

5. *Digi*PREP Controller – *Digi*PREP MS is designed to be used with *Digi*PREP KeyPad* or Touch Screen* controller (*Sold separately).

6. *Digi*PROBE well – Use with replaceable glass liner.

7. **Voltage Selector Switch** - Select appropriate voltage. If 115 V is showing, system is running at 115 volts.

8.3 *Digi*PREP HP *Block Description*
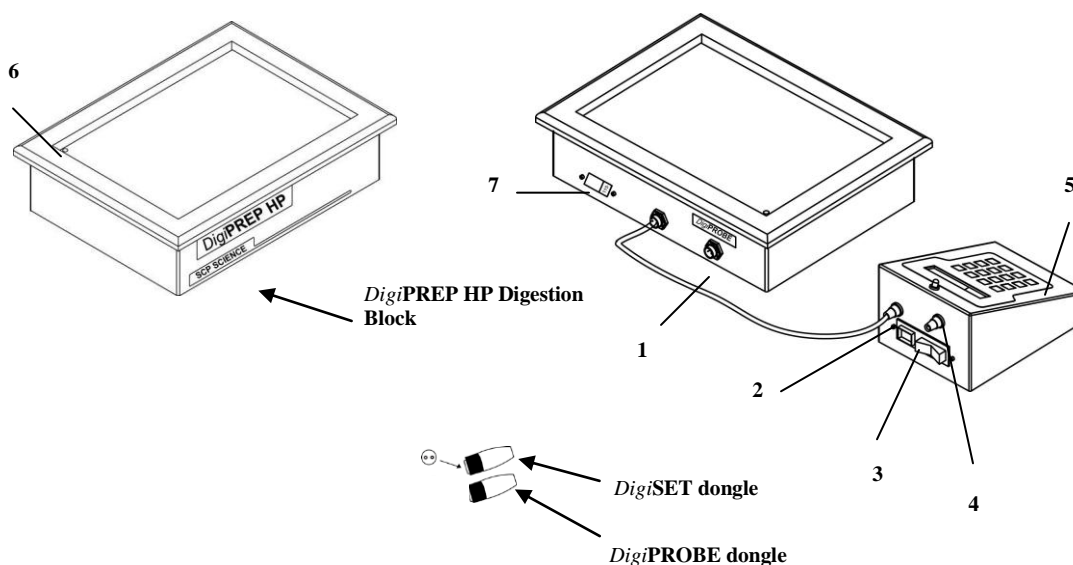
*Digi*PREP HP Digestion Block

*Digi*SET dongle

*Digi*PROBE dongle

1. *Digi*PROBE Connector – Connection port for *Digi*PROBE. *Digi*PROBE will allow direct monitoring and control based on *actual* sample temperature. **_Digi_PROBE Dongle must be installed to run the _Digi_PREP HP without the _Digi_PROBE option.**

2. **Cable Connector –** Connection port for the *Digi*PREP HP umbilical cable to the controller.

3. **Power Switch/ Power Cord Receptacle –** On/Off switch – contains circuit breaker and receives the female end of the power cord.

4. *Digi*SET Connector – Connection port for *Digi*SET. *Digi*SET will automatically shut off the digestion block when a pre-set sample volume is reached. **_Digi_SET dongle must be installed to run _Digi_PREP HP without the _Digi_SET option.**

5. *Digi*PREP Controller – *Digi*PREP HP is designed to be used with *Digi*PREP KeyPad* or Touch Screen* controller (*Sold separately).

6. *Digi*PROBE well – Use with replaceable glass liner.

7. **Voltage Selector Switch** - Select appropriate voltage. If 115 V is showing, system is running at 115 volts.


8.4 *Digi*PREP HT *Block Description*

*Digi*PREP HT Digestion Block
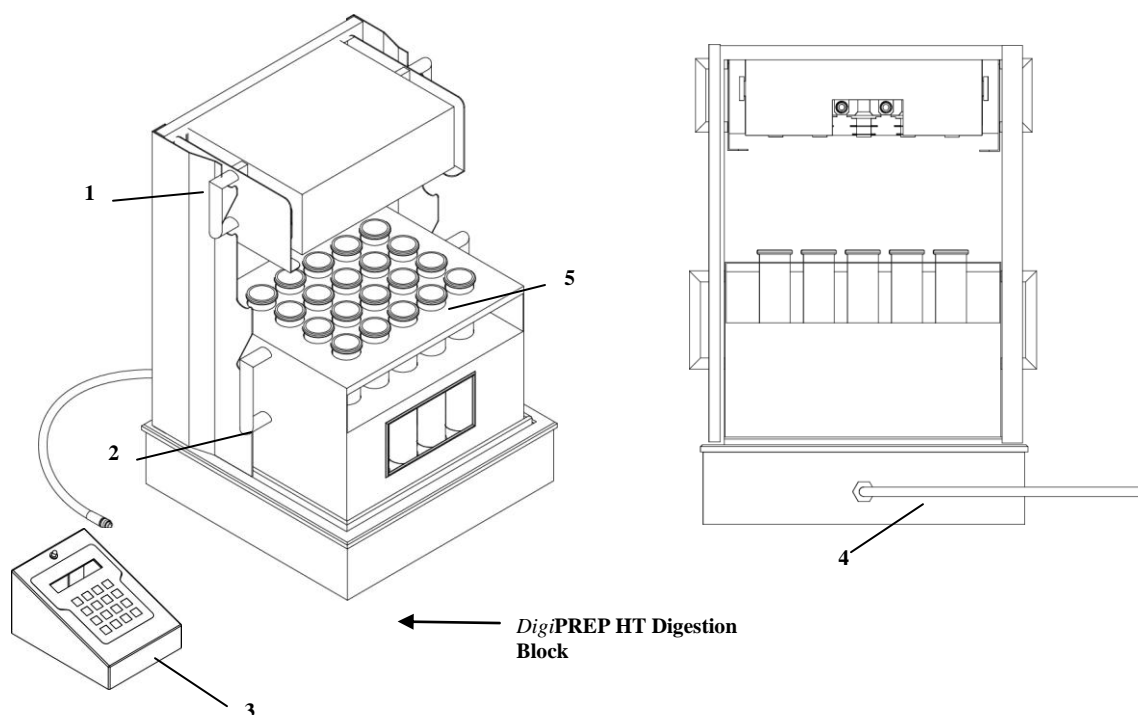
1. **Exhaust Manifold Module.**

2. **Dual Zone Tube Rack**

3. *Digi*PREP **Controller** – *Digi*PREP **HT** is designed to be used with *Digi*PREP Touch Screen* or KeyPad* controller (*Sold separately)

4. **Umbilical Cable –** to connect to controller.

5. **Glass Digestion Tubes –** 40 / 100 ml glass tubes or 20 / 250 ml glass tubes are included with the *Digi*PREP **HT**.

8.5 Heater verification

The following figure shows the heater general diagram.
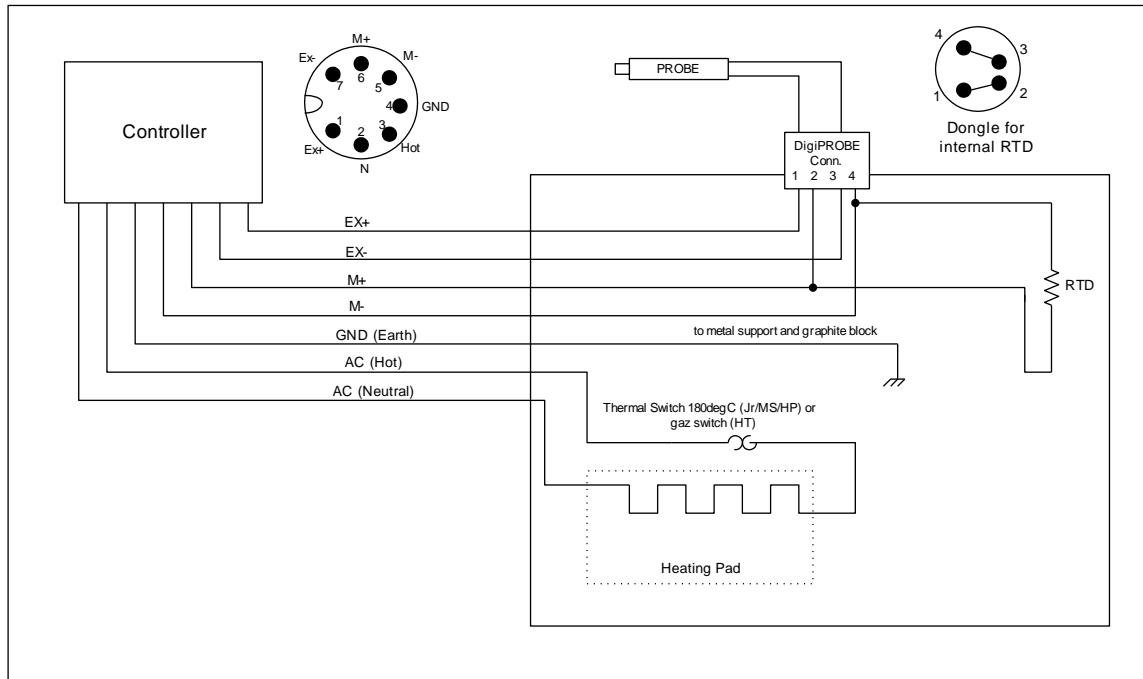
Figure 24: Heater general diagram
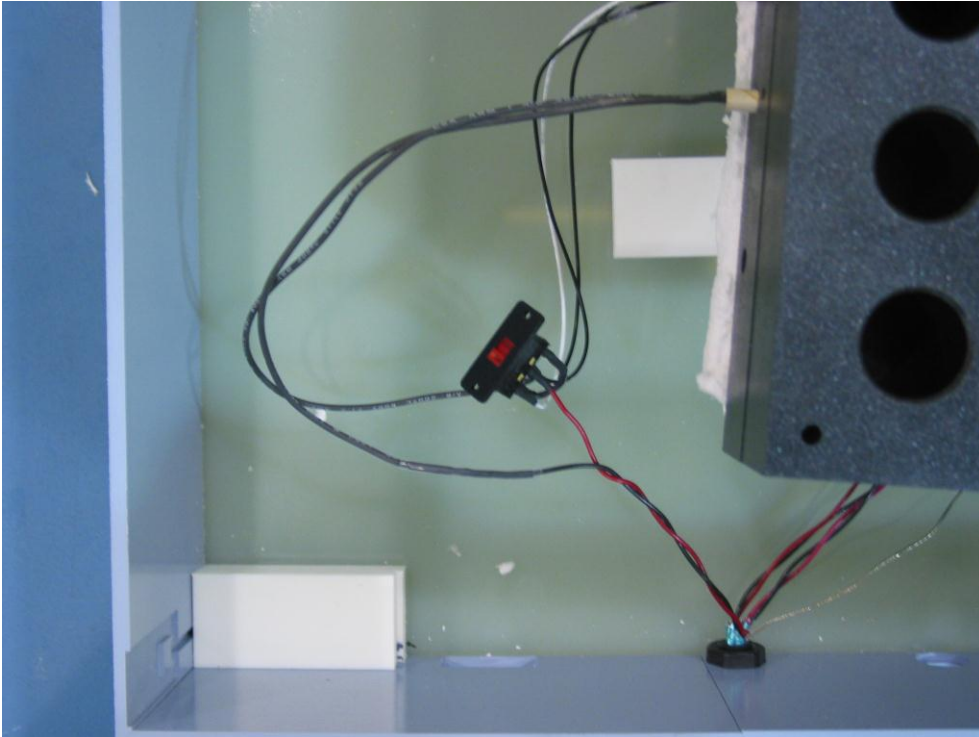
**Figure 25:** Heating Block internal connection

8.5.1 *Digi*PROBE error

If the dongle is put into its socket (COM2), the RTD (temperature sensor) is faulty. Please open the block and make sure that the impedance of the RTD is 108 ohms.

- There are two *Digi*PROBEs, an old and a new version. Make sure you use the right one according to the heater version you have.
  - S/N < 057 -> Probe 010-505-015
  - S/N > 057 -> Probe 010-505-115 (yellow stripe)

  The new probe won't work with an old heating block, but an old probe will work with new block.

8.5.2 Heater is not heating up

- Ensure that the umbilical cord is fully inserted into the controller
- Verify that the thermal switch inside the block is close and functional
- Make sure that the voltage selector switch is at the correct position for your location.
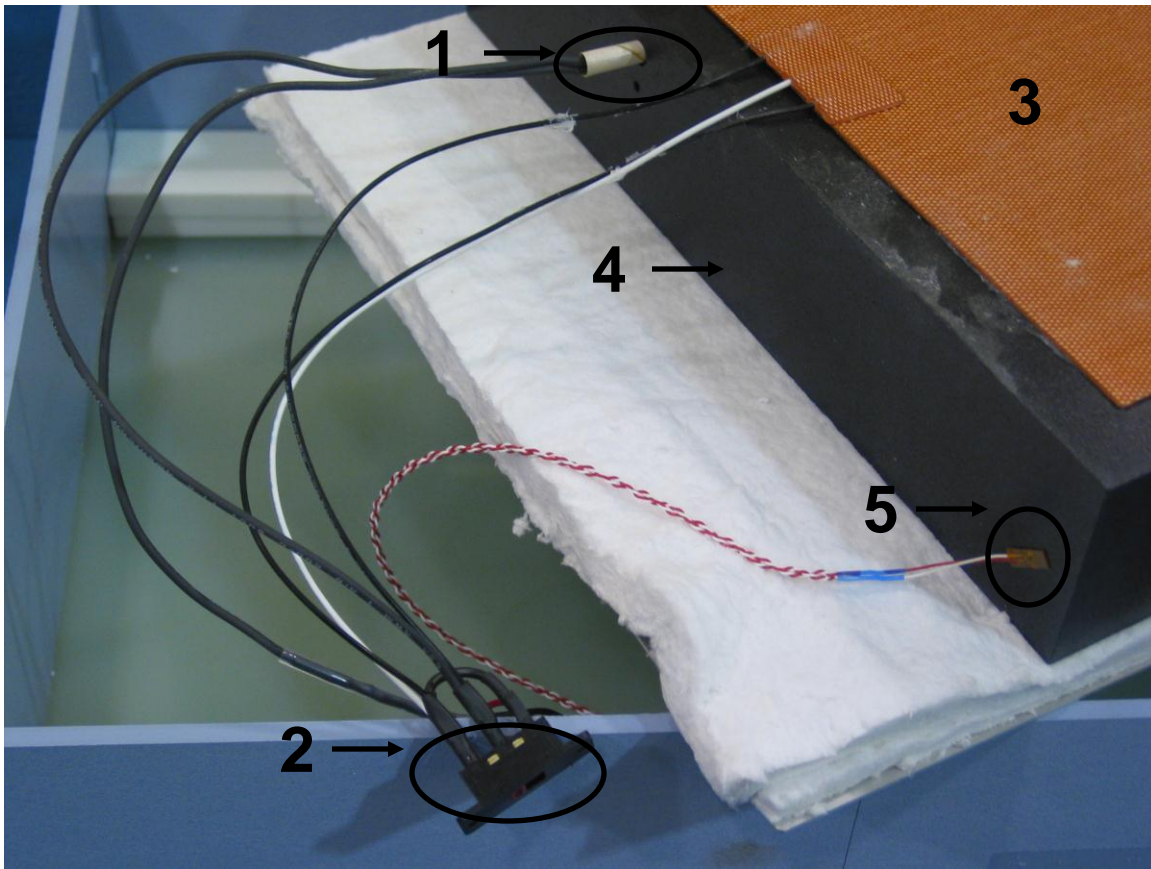
Figure 26: Heating Block Parts
Legend:
1. Thermal Switch 180 °C
2. Voltage selector (115V-230V)
3. Heater pad
4. Graphite block
5. RTD (thermal sensor)

Models	Voltage	Resistance
*Digi*PREPHP	230 V 115 V	30Ω 60Ω
*Digi*PREP Jr.	230 V 115 V	50Ω 100Ω
*Digi*PREP HT	230 V	20Ω

Figure 27: Heating pad resistance

9. Part lists

9.1 Controller major part list

SCP number	Part Description	Manufacturer Number
E296	Fuse, 0.5A, 250V, Fast blow, 1/4x1 1/4	AGC-1/2
E239	Voltage selector	83710030
E225	Switchcraft Panel Mt. 2 Pin Male	EN3P2M
E226	Switchcraft Cord, 2 Pin Female	EN3C2F
E287	Buzzer, Piezo	PKB24SPC-3601
E293	Diode, Rectifier, 1N400X	1N4002
E295	LED, Green	LN31GPHL
E305	Transistor,'NPN, 2N3904	2N3904
E310	Resistor, 22 ohm, 1Watt	RSF100JB-22R
E311	Resistor, 4.7k,c ohm, 1/8 w	CFR-12JB-4K7
E318	Switch, Tack,c Switch	TL1105LF160Q
E321	Transformer Dual 8vac 30a	3FD-316
E324	LCD Character Display	C-51505NFJ-SLW-AC
E325	Voltage 'Regulator, 5Volt	UA7805KC
E326	Monostable multivibrator	MM74HC123AN
E329	CPU module	101-0383
E330	Solid State Relay, 240VAC, 25 amp	PF240D25
E331	Voltage regulator 5V 0.1A	LM78L05ACZ
E332	A/D Converter, 16 pin, dip	AD7705BN
E333	Crystal ,4.91520MHZ	MP042
E364	Battery,'3V, lithium battery	CR2354
E499	LED Blue	LNG901CFBW
E550	Power Cord Switch 15a	ABDWF150C0-831

9.2 Heating Block major part list

SCP number	Part Description	Manufacturer Number
W137	Thermo Fuse with 12" Black Si Leads	75M180NC
C176	RTD	S17624PDXT40B
E239	Voltage selector switch	83710030
E767	Jr., MS, HP, HT Umbilical cord with connector and strain relief	
E391	MS – HP Heater Dual Voltage	M20612RG04
E667	Heater HT, for 100 and 250	TF-100-93-1
E353	Jr. Heater 115/230 48" Lead UL	075109500

10.Service Department

Please phone your local service representative and report this information before returning the product. This will help our technicians determine the cause of the malfunction more quickly.

SCP SCIENCE

Within North America:	**Outside North America:**
Tel: (800) 361-6820	Tel: (514) 457-0701
Fax: (800) 253-5549	Fax : (514) 457-4499

Europe:
(SPIN DIVISION)
Tel: 33 (01) 69 18 71 17
Fax: 33 (01) 60 92 05 67

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