CRYOSTAT SERIAL NUMBER: 11917

10 PIN FEEDTHROUGH

LOCATION: **VACUUM SHROUD**

PIN A -   POS. CURRENT (I+)

PIN B -   POS. VOLTAGE (V+)

PIN C -   NEG. CURRENT (I-)   ON THE HEATER RING (CONTROL SENSOR)

PIN D -   NEG. VOLTAGE (V-)

PIN E -

PIN F -

PIN G -

PIN H -

PIN J -

    | 50 OHM CARTRIDGE HEATER ON THE HEATER RING

PIN K -

CHAPTER 5

SENSOR INPUT AND
TEMPERATURE MEASUREMENT OPERATION

5.0   GENERAL

This chapter describes front panel operation for sensor input configuration and temperature measurement. The user must setup temperature sensor input before a valid sensor reading can be made, and select a temperature response curve to convert readings to temperature. This chapter covers sensor input setup in Paragraph 5.1, selecting a temperature response curve in Paragraph 5.2, filter and math functions in Paragraph 5.3, and scanner support in Paragraph 5.4.

5.1   SENSOR INPUT SETUP

This section covers sensor type in Paragraph 5.1.1, voltage excitation in Paragraph 5.1.2, thermal EMF compensation with voltage excitation in Paragraph 5.1.3, special sensor type configuration in Paragraph 5.1.4, and turning an input off in Paragraph 5.1.5.

5.1.1   Sensor Type

The first step in sensor input configuration is setting the sensor type parameter. The Model 340 works with a variety of different sensors, each with special requirements for excitation and input range. Selections for several different types of sensors are pre-programmed into the Model 340. If using one of these sensor types, select that type to automatically change the associated parameters listed in Table 5-1.

Table 5-1. Sensor Types Recognized by the Model 340

Type	Units	Excitation	Range	Temp. Coefficient	Update
Silicon Diode	volts	10 µA	0-2.5 V	Negative	20 Hz
GaAlAs Diode	volts	10 µA	0-7.5 V	Negative	20 Hz
Platinum 100/250	ohms	1 mA	0-250 Ω	Positive	20 Hz
Platinum 100/500	ohms	1 mA	0-500 Ω	Positive	20 Hz
Platinum 1000	ohms	100 µA	0-2500 Ω	Positive	20 Hz
Rhodium-Iron	ohms	1 mA	0-250 Ω	Positive	20 Hz
*Carbon-Glass	ohms	10 mV	0-300 kΩ	Negative	10 Hz
*Cernox	ohms	10 mV	0-300 kΩ	Negative	10 Hz
*Ruthenium Oxide	ohms	10 mV	0-300 kΩ	Negative	10 Hz
*Germanium	ohms	1 mV	0-30 kΩ	Negative	10 Hz

*   Refer to Paragraph 5.1.2 for voltage excitation for these sensors. Approximate temperature ranges are given with specifications. Other sensor types are available with input option cards.

To select a pre-programmed sensor type, press Input Setup. The input setup setting screen appears with the input letter in the top left hand corner. Use the s or t key to select an input. Press Enter or Next Setting to display the input parameters. Press Next Setting until the type field highlights and then use the s or t key to select one of the sensor types in the table above. Press Enter or Next Setting to show the input parameters for that sensor type. To proceed to temperature response curve selection (Paragraph 5.2), press Previous Setting or press Save Screen to store the changes in the Model 340. The default setting is Silicon Diode.

NOTE: If the user changes any of the parameters listed for a standard sensor type, the instrument assumes a special sensor type is required (Paragraph 5.1.4).

NOTE: Use the display setup screen (Paragraph 4.5) to show configured readings from an input on the display.

To select a temperature response curve, press the Input Setup key. The input setup setting screen will appear with the input letter in the top left hand corner. Use the s or t key to select an input. Press the Enter key or the Next Setting key to display the input parameters for that input. Press the Next Setting key until the curve field is highlighted and then use s or t key to select a curve from the list. Press the Enter key or the Next Setting key and to advance to the next parameter. (If curve selection was not successful, press the Next Setting key and verify the appropriate type selection). Press the Save Screen key to store the changes in the Model 340.

Table 5-3. Standard Curve Table

Curve Setting	No.	Sensor Type	Model Number	Curve Name	Temp. Range	Table
DT-470	1	Silicon Diode	DT-470	Curve 10	1.4 – 475 K	A-1
DT-500-D	2	Silicon Diode	*DT-500-DRC-D	Curve D	1.4 – 365 K	A-2
DT-500-E1	3	Silicon Diode	*DT-500/DRC-E1	Curve E1	1.4 – 330 K	A-2
PT-100	4	Platinum RTD 100	PT-100	DIN 43760	30 – 800 K	A-3
PT-1000	5	Platinum RTD 1000	*PT-1000	DIN 43760	30 – 800 K	A-3
Type K	6	Thermocouple	Type K	Type K	$3.15 - 864$ K (1500 K[†])	A-4
Type E	7	Thermocouple	Type E	Type E	$3.15 - 622$ K (930 K[†])	A-5
Type T	8	Thermocouple	Type T	Type T	3.15 – 670 K	A-6
AuFe .03%	9	Thermocouple	Chromel-AuFe 0.03%	Chromel-AuFe 0.03%	3.50 – 500 K	A-7
AuFe .07%	10	Thermocouple	Chromel-AuFe 0.07%	Chromel-AuFe 0.07%	3.15 – 610 K	A-8
DT-670	11	Silicon Diode	DT-670	DT-670	1.4 – 500 K	A-9

* Curves supported but sensors no longer available through Lake Shore.
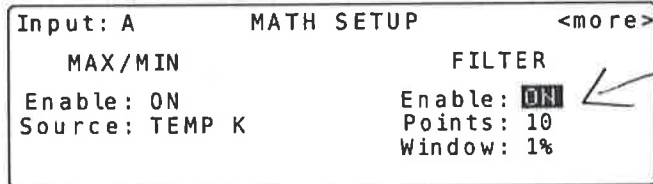
† Temperature range extended when using ±50 mV Range.

5.3   FILTER AND MATH

Some simple arithmetic features have been included in the Model 340 as a convenience to the user. Filter, Max, Min and linear equation can be applied to an input reading. As shown in Figure 5-1, the filter can be applied to all readings for an input. The results of Max, Min, and linear equation can be shown on the display in combination with the actual input reading. The display format screen is used to configure the display.

5.3.1   Filter

The Model 340 can apply an averaging filter to any sensor input. The filter is designed to prevent electronic noise that is picked up on the sensor lead wires from showing on the display. It is enabled or disabled for all of the reading formats of an input at the same time. A number of readings filtered and filter reset window can be changed by the user to meet their application. The control equation has a filter that is enabled independently from the input filter.

To turn on the filter for an input, press the Math Setup key. The MATH COMPUTATIONS screen appears with the Input field highlighted. Use the s or t key to select an input. Use the Enter or Next Setting key to move the cursor to FILTER Enable. Use the s or t key to select ON. The default setting is On.

```
Input: A          MATH SETUP         <more>
    MAX/MIN                    FILTER
 Enable: ON               Enable: ON
 Source: TEMP K           Points: 10
                          Window: 1%
```

currently set as default and enabled.

The user may change filter behavior by changing the number filter readings. Although more filter readings settle the display reading more, it is not always appropriate to select many filter readings. More filter readings also slow display reading response to real temperature changes in the load.

To change on the filter readings (points) for an input, press the Math Setup key. You see the MATH COMPUTATIONS screen. The Input field is highlighted. Use the s or t key to select an input. Use the Enter or Next Setting key to move the cursor to FILTER Points. Use the s or t key to select the desired number. The minimum number of points is 2, the maximum is 64. The default setting is 10.

Some users do not want the filter to slow the response of the display reading when large deliberate changes in temperature are made. The filter window parameter allows the user to set the limit for a large temperature change. If an unfiltered reading differs from the filtered reading by more than the filter window limit, the filter will be restarted. The filter window limit is set in percent of full scale range for the selected input type.

To change the filter window for an input, press the Math Setup key. You will see the MATH COMPUTATIONS screen. The Input field will be highlighted. Use the s or t key to select an input. Use the Enter or Next Setting key to move the cursor to FILTER Window. Use the s or t key to select the desired percentage. The minimum is 1%, the maximum is 10%. The default setting is 1%.