Model K57

Ice Point Reference Dry Well
Operation and Maintenance Manual

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Model K57 - Ice Point Reference Dry Well

1. Background

This report documents the installation, operating and maintenance procedures for the Ice Point Reference Dry Well, Pond Engineering Model Number K57. Information contained in this manual is considered by Pond Engineering Laboratories to be proprietary and is provided for use exclusively by the purchaser for instructional and maintenance purposes relative to the system, any other use is prohibited.

2. General Information and Operating Procedures

2.1 System Specifications

System Setpoint:	0°C, overall uncertainty +/- 0.050°C
Control Stability:	+/-0.005°C over 30 minutes
Thermowells:	4 ea. Aluminum with Type 304 Stainless Steel extensions 0.276" (7.0 mm) I.D. 5.9" (150 mm) Deep
Power Requirements:	90-264 Volts A.C. 47-63 Hz.
Cabinet Dimensions: (Horizontal Orientation)	8.5" (22 cm) Wide 9.75" (25 cm) Deep 5.25" (13 cm) High
User Interface:	Power Switch 2x green status LED's
Additional Features:	Dual Orientation – can be operated horizontally or vertically Audible input confirmation tones

2.2 General Overview

As shown in **Figure 1** on the next page, the controller front panel consists of four 7 mm wells and two status-indicating LED's. The lower LED indicates that the system has power, while the upper LED illuminates when the system is stable and ready to be used for calibration. The Ice Point Reference Dry Well is designed to provide a stable and uniform temperature environment for the preparation and maintenance of ice point conditions inside each of the four wells located on the front panel. It accommodates four thermometers or reference probes in an arrangement of four wells on the front panel. The wells are 7.0 mm. (0.276") inside diameter and approximately 150 mm (5.9") deep. The wells are also 2.2 degrees off-axis to allow for close proximity of the sensing ends of the thermometers, minimizing well-to-well uncertainty.

Figure 1 – K57 System Layout

3. System Controller

3.1 Positioning the Unit

The K57 Ice Point Reference Dry Well is equipped with a cooling fan located in the center of the back panel, as well as ventilation openings on both sides. The unit is designed to operate in both the vertical and horizontal positions with no degradation of performance. The direction of air flow is as illustrated in **Figure 2**. The unit should be positioned in such a manner that the air flow through the unit is not restricted in any way. Restricted air flow may cause a decrease in the cooling effectiveness of the unit. Periodically clean the fan, fan guard, and side vents to maintain good air flow.

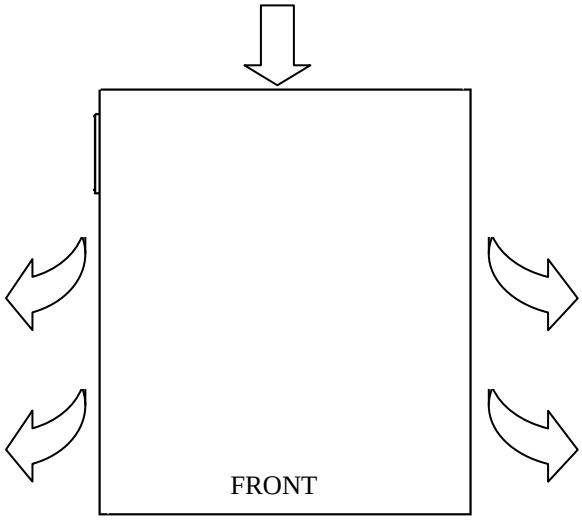

Figure 2 – Direction of Air Flow

3.2 Normal Operating Mode

The K57 Ice Point Reference Dry Well is configured to run on any AC line voltage between 90 and 264 volts at 47-63Hz. Connect the unit to a power source meeting these specifications using the supplied power cable (or another power cable with an appropriate connector for the available power outlet and an IEC connector suitable to mate with the power entry module on the left side panel) and turn the power switch located on the left side panel as shown in **Figure 3** to the ON position. Once power is supplied to the unit and the power switch is turned on, the LED on the front panel marked "POWER" will illuminate, indicating that the system has power and is starting the cool-down process. The system should cool from normal room temperature to zero C in about 10 minutes and should reach stability within 30 minutes from power on. The LED marked READY indicates that the system has maintained stability to within the stability specification of the setpoint for a period of 3 minutes. It will flash briefly every 5 seconds to indicate that the controller is active during the cool-down process and will remain ON with a flash OFF every 5 seconds once the system has achieved stable operation and is ready for use in calibration.

Variables and offsets have been factory initialized based on calibration performed at the factory. If these settings need adjustment, please refer to the section of this manual titled "**System Calibration**".

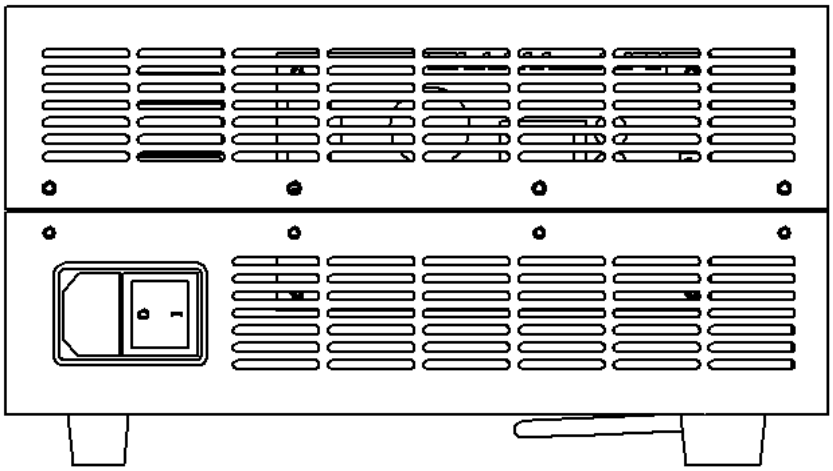

Figure 3 – Left Side Panel Layout

3.3 System Calibration

If necessary, the system calibration can be adjusted to maintain system accuracy. This is done by inserting a calibrated standards thermometer into one of the wells and allowing the unit to stabilize. Three switches are provided to accomplish calibration of the unit using a digital approach, eliminating the drift associated with potentiometer adjustment schemes. The switches are accessed through small holes on the right side cover near the front of unit as shown in **Figure 4** below. The functions of the switches are defined as shown in **Figure 4**.

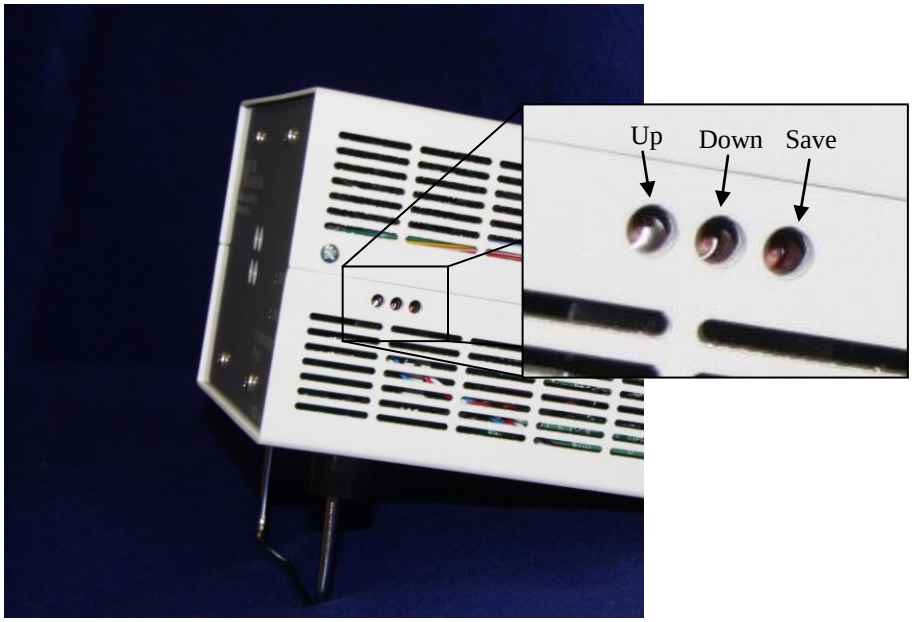

Figure 4 - Calibration Switches

3.3.1 Adjusting the System Calibration

To adjust the system setpoint, use a small screwdriver or blunt probe to press and release the appropriate switch. The UP switch will increase the temperature while the DOWN switch decreases the temperature. Each time a switch is pressed and released, a tone will sound and the core temperature will change in increments of 0.01°C. Be sure to allow an appropriate stabilization time before confirming adjustments or making additional adjustment

3.3.2 Saving Changes to Calibration

The changes made to the setpoint are effective immediately and the core temperature will begin to change, however the changes are not permanent unless those changes are saved. To do this, press and hold the SAVE switch in for more than 2 seconds (the unit will begin to beep). Wait until the unit stops beeping then release the switch; the changes to system calibration are then saved to non-volatile memory. At the conclusion of the save process, the unit will beep 3 times, indicating that the save is complete. NOTE: Only one SAVE is allowed per power cycle - if the unit does not allow changes or generate the tone described above; turn the power off and then back on after a few seconds, the system will then accept a change to the calibration setpoint.

IMPORTANT: Before saving make sure the unit is in the “ready” state. Saving while the unit is stabilizing will cause the unit to be unstable.

4. Typical Thermocouple Reference Junction Application

Thermocouple reference junction probes suitable for use with the Model K57 are available for various thermocouple types including type J, K, T, E, R, S, B and C thermocouples. With the thermocouple reference junction probe inserted into the Model K57 in the READY state, the thermocouple millivolt output may be measured and directly converted to temperature. A bushing sized for use with the thermocouple reference junction probes is also available and should be used with the probes to improve thermal contact with the core block of the Model K57.

4.1 Reference Junction Connections

Connection to the thermocouple reference junction probes is made using standard miniature size thermocouple plugs with compensating alloy contacts appropriate for the type of thermocouple being used. The probes are color coded using standard ANSI MC 96.1 color coding for convenience in connecting user thermocouple probes. Connection to the reference junction voltage output terminals is accomplished using uncompensated (copper contacts on both terminals) connectors matching the size of the thermocouple connectors. When connected to a user thermocouple and a voltage measurement system, the reference junction probe connections will appear as shown in **Figure 5** below (Type K pictured).

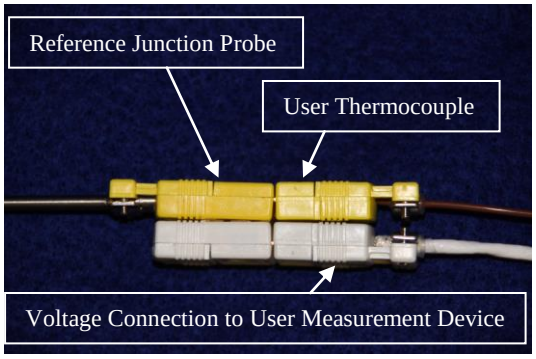

Figure 5 - Thermocouple Connections

A complete measurement system is pictured below in **Figure 6**. This system includes a voltage measurement instrument (set to external or FIXED cold junction compensation and configured to output a temperature for type K thermocouple), a Type K user thermocouple measuring room ambient temperature and a Type K thermocouple reference junction inserted into the Model K57 Ice Point Reference Dry Well using a thermal contact bushing.

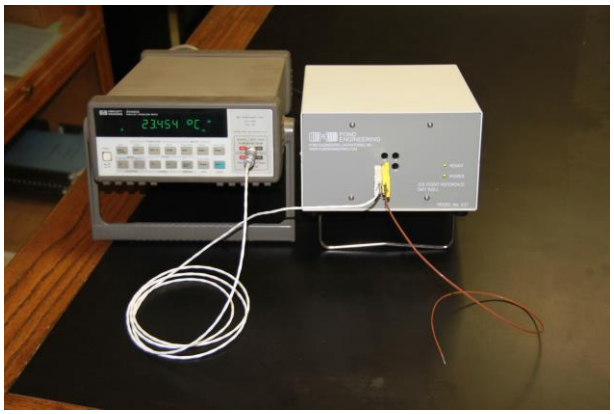

Figure 6 - Complete Measurement System

5. Thermocouples-Connectors and Accessories

Thermocouple use requires an uncompensated connector and a specific type connector. The units current connector setups were purchased through omega.com. Part # SMPW-CC-U-M for the uncompensated connector, for any other connector type the part number starts with SMPW-CC and has a type specified at the end of the number. The following links can be used to brows connectors and accessories through omega.com.

http://www.omega.com/ppt/pptsc.asp?ref=SMPW-CC&Nav=temg03

http://www.omega.com/toc_asp/subsectionSC.asp?subsection=G03&book=Temperature