COMPONENT MAINTENANCE MANUAL
FOR
FCI PN 015838
WATER LEVEL & TEMP MONITORING SYSTEM
FOR
CANADAIR

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REVISION PAGE

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-	Initial Release	05/15/95
A	Revised Part Numbers in Figures 1, 3, and 5	02/12/97
B	Introduction – Changed company name; Figure 3 – Changed Control Unit label; Sect 2.B. Control Unit – Added para. 5 describing differences between -02 and -03; All - Combined sections into single file.	10/04/05

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COMPONENT MAINTENANCE MANUAL

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WATER LEVEL AND TEMPERATURE MONITORING SYSTEM

PART NUMBER: 015838

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Service Bulletin information is placed in this list when the Service Bulletin is incorporated into this manual.

S.B. NUMBER	DESCRIPTION	PARTS ADDED OR CHANGED	INCORPORATED IN REVISION	EFFECTIVITY

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INTRODUCTION

1. General

   A. This manual provides maintenance instructions for the Model 015838 Water Level and Temperature Monitoring System.

   B. The information in this abbreviated manual covers the description, operation, testing, cleaning, and inspection of this equipment.

   C. The instrument is manufactured by Fluid Components International LLC, San Marcos, California (CAGE CODE 64818), for Bombardier Inc. Canadair Group.

2. Ordering of Parts

   Order of parts are to be directed as follows:

   Fluid Components Intl
   1755 La Costa Meadows Drive
   San Marcos, California 92069-5187
   Attention: Customer Sales
   Phone: (800) 854-1993 or (760) 744-6950 or FAX: (760) 736-6250

3. Manual Requests

   Requests for copies of publications should be directed to the address shown in Paragraph 2.

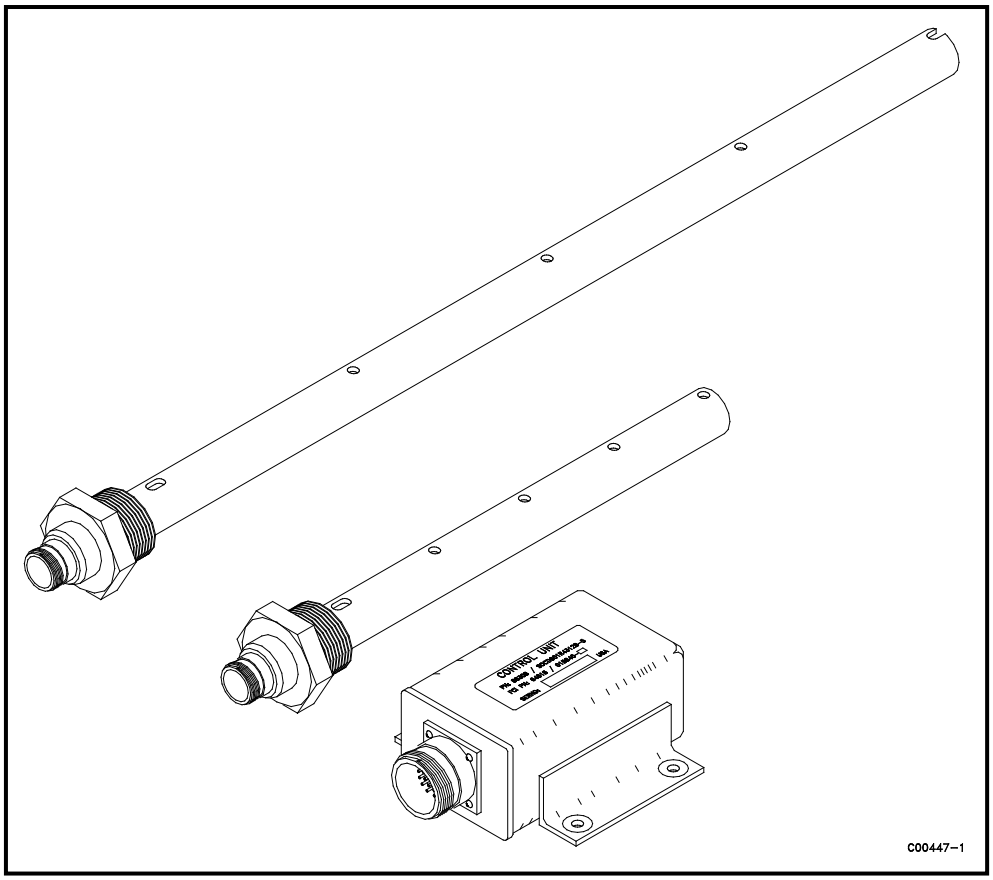
4. Manual Revisions

   This manual will be revised as necessary to reflect current information.

DESCRIPTION AND OPERATION

1. Description

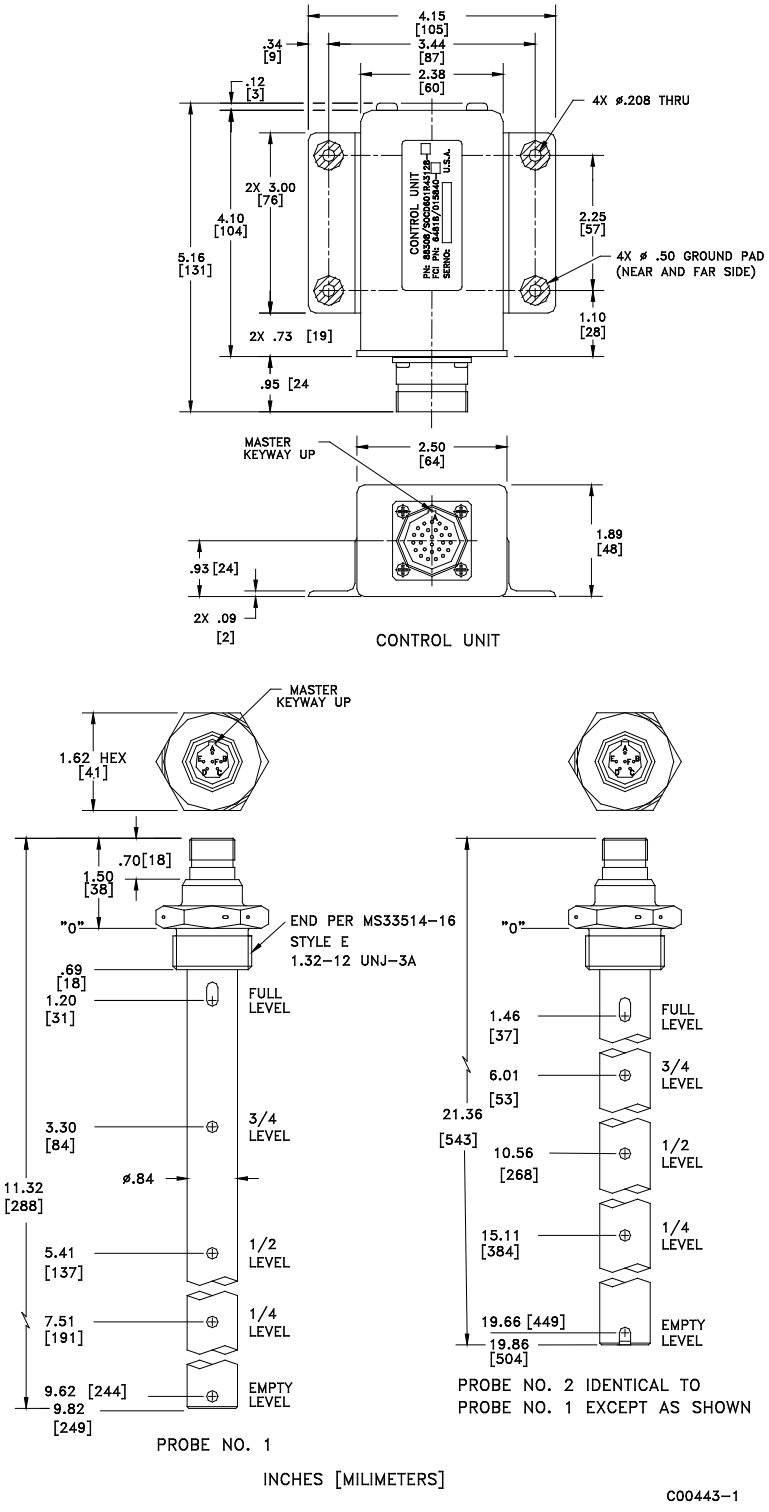
The Model 015838 Water Level and Temperature Monitoring System monitors the potable water in aircraft potable water tanks. Figure 1 shows the Water Level and Temperature Monitoring System. The system consists of 2 probes that are in physical contact with the potable water, and control circuitry that produces output signals that indicate water level, turn on water heaters, and inhibit pump operations. The system has no moving parts, is lightweight, compact, and reliable. The typical application for the system is to monitor aircraft galley and lavatory potable water tanks. The physical and operational characteristics of the system are listed in Figure 2. Figure 3 shows the outline dimensions of the system for purposes of proper mounting.



Water Level and Temperature Monitoring System
Figure 1

Item	Characteristic
Process Connection	End fitting per MS33514-16 Style 3 (1.312-12 UNJ-3A)
Insertion Lengths	
Probe -01	9.82 inches (249 mm)
Probe -02	19.86 inches (504mm)
Material	
Enclosure	Aluminum alloy
Probes	Stainless steel/plastics
Fluid Level Indications	Full, 3/4 level, 1/2 level, 1/4 level, empty level
Repeatability	± .25 inch (6 mm)
Time Response	
dry to wet	20 seconds maximum
wet to dry	2 minutes maximum
Power Input	22 to 30VDC
Signal Output	Discrete ground/open signals
Power Consumption	7.5 Watts maximum
Connectors mate with	
Enclosure	D38999/26WE26SN per MIL-C-38999, series III
Probes -01, -02	D38999/26KB98SC per MIL-C-38999, series III
Operating Temperature	
Probes -01, -02	32 to 158°F (0 to 70° C)
Control Circuitry	-40 to 131°F (-40 to 55° C)
Weight	
Enclosure	1.0 pound (454 G)
Probe -01	1.0 pound (454 G)
Probe -02	1.3 pounds (590 G)

Leading Particulars
Figure 2



Outline Dimensions
Figure 3

2. Operation

A. Probe

One probe is screwed into each potable water tank. (A customer supplied O-Ring packing is suggested for use with each probe.) Each probe consists of two polymer strips that contain Resistance Temperature Detectors (RTD)'s. The strips are placed parallel to each other in a sectioned tube. One strip, known as the reference strip, contains two RTD's. The other strip, known as the active strip, contains five RTD's

The reference strip contains one RTD for level measurement and one RTD for water temperature measurement. The active strip contains five RTD's. All five RTD's in the active strip are used for level detection. See the probe configuration in Figure 4.

When the probe is put in water, the submerged portion of the reference strip is at the water temperature. The active strip is heated by an electric current and loses some heat to the water. A Temperature Differential (ΔT) exists between the active and reference RTD strips and a proportional Resistance Differential (ΔR) exists that the control unit measures.

B. Control Unit

The input to the control unit circuitry is the ΔR. The output of the control unit circuitry is ground (enable) or open (disable) signals.

The control unit has a two minute warm up period from power up to operation. During this time the empty level signals, the 1/4 level signals, the 1/2 level signals, the 3/4 level signals and the full level signals will be enabled one at a time. Then all signals will be disabled. This sequence will repeat every six seconds for the two minute warm up time.

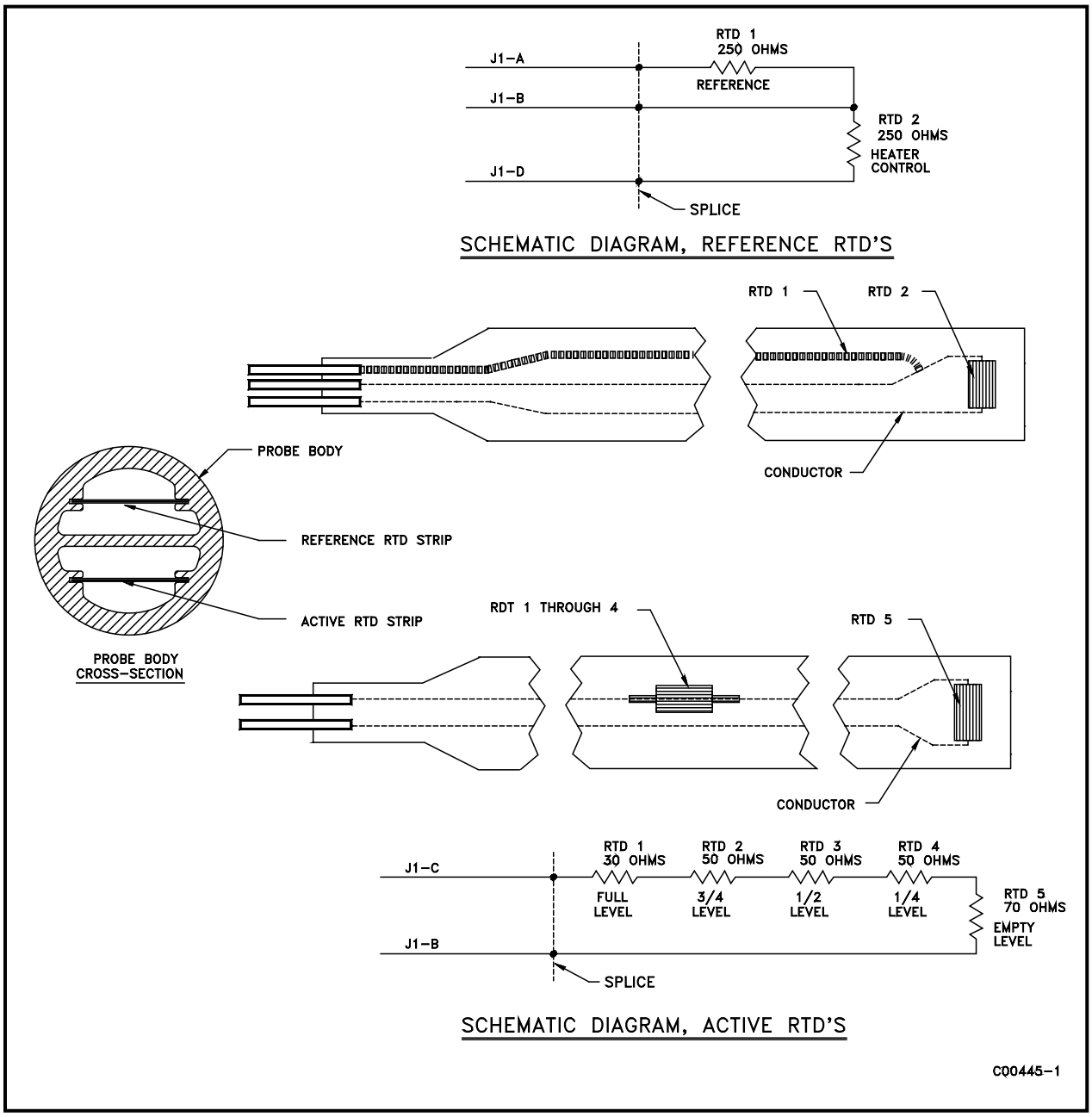
The control unit P/N 015840-01 circuitry enables or disables a pump inhibit signal. If the power has been off for more than 20 ±5 minutes the circuitry will enable the pump inhibit signal at power up. The pump inhibit signal will be enabled for 15 minutes after power up. If power has been removed and then powered on again within 20 ±5 minutes there will be a pump inhibit signal enabled for only the 2 minute warm up period. The pump inhibit signal is also enabled whenever the potable water level is below the empty level on the probe.

The control unit P/N 015840-02 is different from the -01 control unit as follows: When a momentary power interrupt occurs, the -02 control unit will bypass the 2 minute warm-up period and go directly into displaying the level.

The control unit P/N 015480-03 is different from the -02 control unit as follows: The unit has short circuit protection on the signal outputs and reset circuitry to prevent control box software lock-up.

The second RTD in the reference RTD strip along with the control unit circuitry measures the water temperature. For probe #1 (short probe); when the water temperature decreases below 50°F (10°C) the temperature signal is enabled. When the water temperature increases above 68°F (20°C) the temperature signal is disabled. For probe #2 (long probe); when the water temperature decreases below 59°F (15°C) the temperature signal is enabled. When the water temperature increases above 95°F (35°C) the temperature signal is disabled.

The control unit detects if there is a probe failure (short or open). If a failure is detected all of the probe level signals are enabled simultaneously for one second, then disabled simultaneously for 5 seconds. The pump inhibit signal is enabled (disabling the pump) and the temperature signal is disabled (removing power to the heater).



Probe Configuration
Figure 4

TESTING

1. General

The system is easy to troubleshoot due to the simplicity of design. System failures can be as simple to correct as unscrewing a probe and screwing in a new one.

2. Test Equipment

Precision Digital Multi-Meter (DMM)

3. Test Procedure

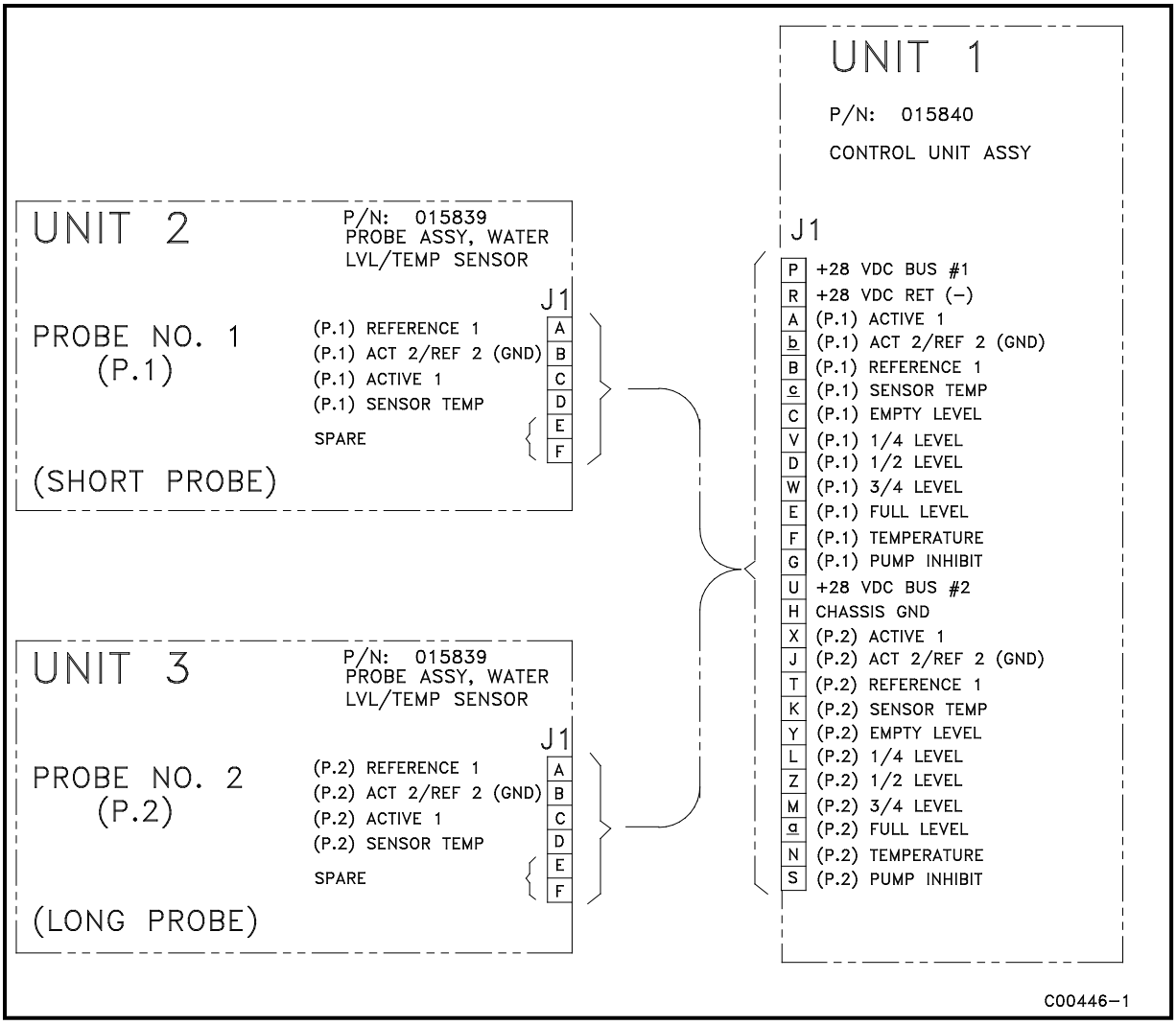
WARNING: ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO TEST THIS SYSTEM. THE OPERATOR ASSUMES ALL RESPONSIBILITIES FOR SAFE PRACTICES WHILE TROUBLESHOOTING.

A. Verify error: All lights in the aircraft's potable water monitoring device for probe 1 flash for 1 second every 5 seconds. The control unit is not receiving correct signals from probe 1.
   (1) Check for bent connector pins in control unit enclosure and probe 1 connector (short probe for galley potable water tank).
   (2) Check probe 1 resistances as found on the schematics in Figure 4. The resistance values shown are taken at 32°F (0°C). At 68°F (20°C) the resistance is 272±8 ohms.
   (3) Check the aircraft components that mate with the system for problems. See Figure 5 for a wiring diagram of the system.

B. Verify error: All lights in the aircraft's potable water monitoring device for probe 2 flash for 1 second every 5 seconds. The control unit is not receiving correct signals from probe 2.
   (1) Check for bent connector pins in control unit enclosure and probe 2 connector (long probe for lavatory potable water tank).
   (2) Check probe 2 resistances as found on the schematics in Figure 4. The resistance values shown are taken at 32°F (0°C). At 68°F (20°C) the resistance is 272±8 ohms.
   (3) Check the aircraft components that mate with the system for problems. See Figure 5 for a wiring diagram of the system.

C. Verify error: No lights lit in the aircraft's potable water monitoring device during warm up sequence.
   (1) Check for power to the control unit. See Figure 5. (No lights lit after warm up indicate that the water level is below the empty level of the probe.)

D. Verify error: Lights in the aircraft's potable water monitoring device indicate incorrect level.
   (1) Verify the correct probe is in the correct tank. The long 19.86 inch (504 mm) probe is used in the lavatory potable water tank. The short 9.82 inch (248 mm) probe is used in the galley potable water tank. (The water tanks may not be entirely empty, however if the water is below the probe the system will register empty.)
   (2) Remove the probe with the incorrect indication. Remove any ice from the probe. Reinstall the probe.



Wiring Diagram
Figure 5

4. Conclusion

If the above conditions have been verified and problems are still being experienced contact the FCI Customer Service Department as shown in paragraph 2 of the introduction.

If any units are defective contact FCI Customer Service Department and arrange to have the system unit sent back for repair or replacement.

CLEANING

1. Cleaning Solutions

   A. Isopropyl Alcohol
   B. Aqueous cleaning / disinfectant solution compatible with potable water containers

2. Cleaning

   A. Remove foreign material from the external surfaces of the control unit enclosure with a cloth moist with an aqueous cleaning / disinfectant solution.
   B. Clean the connectors and pins with isopropyl alcohol and a cotton swab.
   C. Clean the probe body by dipping it into an aqueous cleaning / disinfectant solution. Do not use organic solvents on the plastic materials. Dry with a clean cloth.

INSPECTION/CHECK

1. Control Circuit Enclosure Condition

   Visually inspect the control unit enclosure periodically for physical damage. The enclosure should be free of corrosion and cracks.

2. Probe Condition

   Visually inspect the probe portion of the system for physical damage. The probe should be free of corrosion and cracks.

REPAIR

The system is not field repairable other than the removal and replacement of the probes or the control unit enclosure. If the system fails to operate properly return the system unit(s) to FCI at the address in paragraph 2 of the Introduction. There is no need to return all of the system units if just one unit is faulty.

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