



Automatic Controls for Electrically Heated Stills

Operation Manual
and Parts List
Series 495

Model Numbers:
G2100, G2110, G2120, G2125

Table of Contents

This manual contains important operating and safety information. The user must carefully read and understand the contents of this manual prior to the use of this equipment.

Water purification technology employs one or more of the following: chemicals, electrical devices, mercury vapor lamps, steam and heated vessels. Care should be taken when installing, operating or servicing Thermo Scientific products. The specific safety notes pertinent to Thermo Scientific Barnstead Electrically Heated Stills Automatic Controls are in the Safety Information section of this manual.

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Safety Information

Alert Signals



Warning
Warnings alert you to a possibility of personal injury.



Caution
Cautions alert you to a possibility of damage to the equipment.



Note
Notes alert you to pertinent facts and conditions.

Your Thermo Scientific Barnstead Electrically Heated Still Controls have been designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.

Warnings

To avoid electrical shock, always:

1. Ensure that the equipment is connected to electrical service according to local and national standards. Failure to properly connect may create a fire or shock hazard.
2. Replace fuses only with the same type and rating of fuse for continued protection against electric shock.
3. Do not mount Electrically Heated Still Controls directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.
4. Disconnect from the power supply prior to maintenance and servicing.

To avoid personal injury:

1. Avoid splashing disinfecting solutions on clothing or skin.
2. Ensure all piping connections are tight to avoid leakage of chemicals.
3. This device is to be used with water feeds only. Sanitizing/cleaning agents must be used in compliance with instructions in this manual. Failure to comply with the above could result in explosion and personal injury.
4. Always depressurize chemical lines before disassembly.
5. Wear eye and hand protection when using acid for cleaning, as acid spattering may occur.

SAFETY INFORMATION

6. Do not mount Electrically Heated Still Controls directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.
7. Ensure adequate ventilation.
8. Follow carefully the manufacturers' safety instructions on labels of chemical containers and Material Safety Data Sheets (M.S.D.S.).
9. Refer servicing to qualified personnel.

Introduction

This publication comprises installation, operation, theory of operation, maintenance, and parts lists with appropriate illustrations for Barnstead Automatic Start, Stop, and Drain Controls for Barnstead Electrically Heated Stills. The automatic controls start the still when the stored distilled water drops to a predetermined level, shut off the still when the stored distilled water returns to the full level, drain the still periodically, shut off the current to the heating elements when the water in the still drops to an unsafe operating level, and turn on the current to the heating elements when the water returns to a safe operating level. The controls are designed to be used with 1, 2, 5, and 10 gallon-per-hour stills (Electrically Heated Stills Catalog No. A1011, A1013, A1015 and A1016, respectively). The automatic controls (see Figure 1) consist of: an automatic water shut-off valve, an automatic drain valve, a level monitor, a probe assembly for installation in the still evaporator and associated piping and wiring.

Automatic Water Shut-off Valve

This solenoid valve is located in the water inlet piping as shown in Figure 1 and is wired to the low water cutoff control cabinet. The valve automatically controls the water supply to the still in response to the level monitor and the interval drain timer.

The 1, 2, and 5 gph stills use 1/4-inch valves, and the 10 gph stills use 1/2-inch valves. These valves are packless, two-way, normally closed, solenoid valves that open when their solenoids are energized and close when they are de-energized. The valves have brass bodies and resilient seats.

In addition to the automatic shut-off valve, the water inlet piping is provided with a strainer, a manual throttling valve, and a pressure gauge.

Automatic Drain Valve

This solenoid valve is located in the drain piping as shown in Figure 1 and is wired to the low water cutoff control cabinet. The valve automatically drains the still in response to the interval drain timer.

INTRODUCTION

The 1, 2, and 5 gph stills use 1/2-inch valves, and the 10 gph stills use 3/4-inch valves. These valves are packless, two-way, normally open, solenoid valves that close when their solenoids are energized and open when they are de-energized. The valves have brass bodies and resilient seats.

In addition to the automatic drain valve, the drain piping is provided with a manual shut-off valve.

Level Monitor

The level monitor is mounted on the distilled water storage tank and is wired to the low water cutoff control cabinet. This device monitors the level of distilled water and turns the still off when the storage tank is full, and on when the water level drops.

The level monitor consists of a dustproof switch that is actuated by a stainless steel diaphragm to make or break the circuit to the interval drain timer, and thus to the automatic water drain valves. All adjustments are made externally (see MAINTENANCE section). Switch action, as well as main scale and differential pressure settings, can be seen through a clear plastic cover. A permanent level indicator inside the case is provided for levelling during installation.

Automatic Controls Catalog No.	Still Cat. No.	Still Capacity		Heating Service Phase	Contractor
		SI	English		
G2100	A1011	3.79 l/hr	1 gph	1	27 amp, 2 pole
	A1013	7.57 l/hr	2 gph	1	27 amp, 2 pole
G2101	A1013	7.57 l/hr	2 gph	3	27 amp, 2 pole
G2110	A1015	18.9 l/hr	5 gph	1 or 3	60 amp, 3 pole
G2120	A1016	37.9 l/hr	10 gph	1	60 amp, 4 pole
G2125	A1016	37.9 l/hr	10 gph	3	100 amp, 3 pole

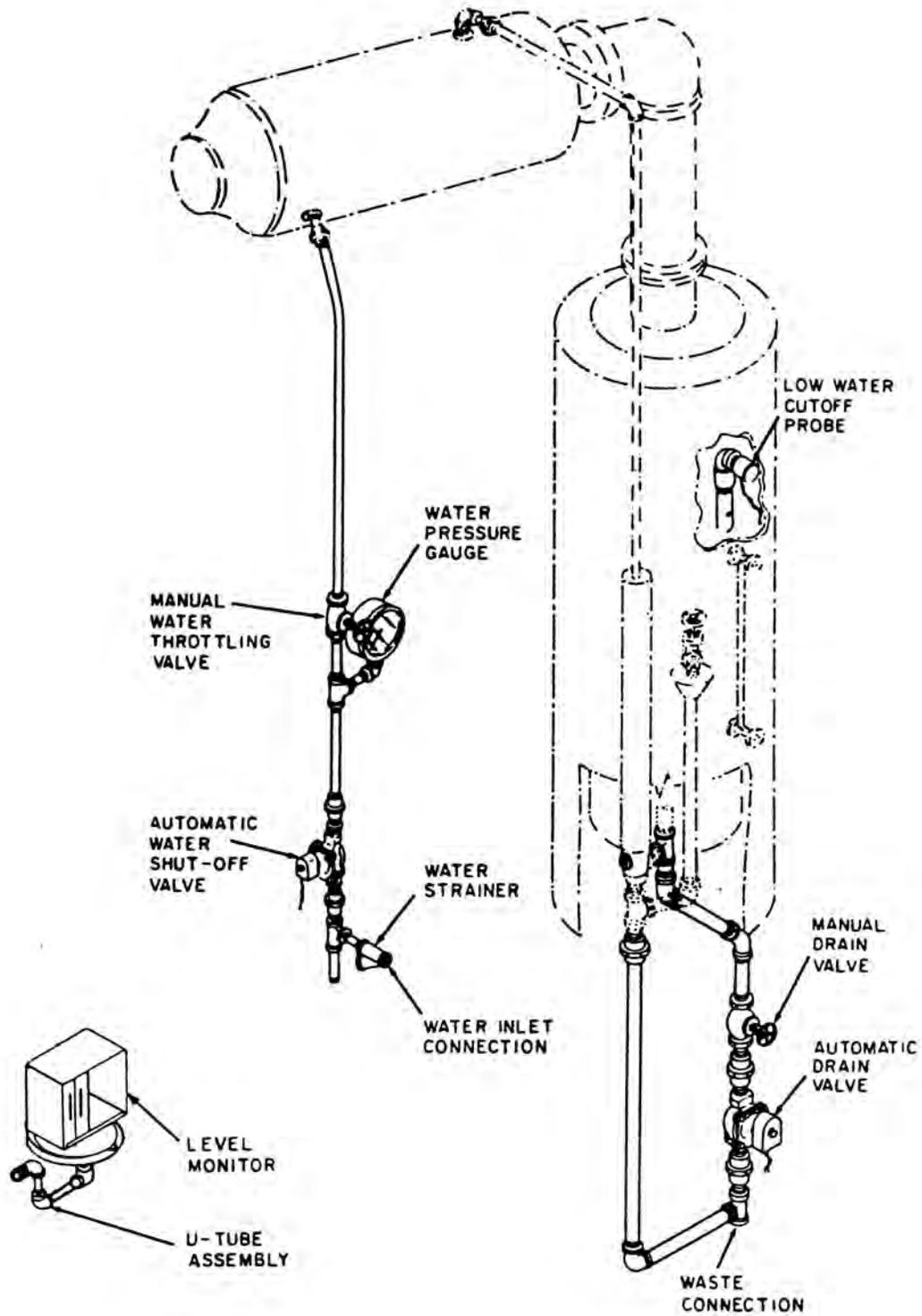


Figure 1: Automatic Controls



Note
Automatic controls include equipment shown solid.

Unpacking & Installation

Unpacking

Unpack the automatic controls carefully so that none of the parts will be damaged. Ensure that all parts are removed from the containers before discarding the packing material.

Installation

Siting

The locations of the automatic water and drain valves are determined by the location of the still, and the location of the level monitor is determined by the location of the distilled water storage tank. The length of wire runs required should be a main consideration when connecting the electrical service and the automatic controls. Make sure that adequate room is provided for operation of the control switch and replacement of the fuse. Also, room should be provided for the electrical conduits that enter the low water cutoff cabinet.

Assembly

The automatic controls can be installed at the factory or at the customer's facility.

Factory Installation

When the still and storage tank have been ordered from the factory with automatic controls, make the necessary plumbing and electrical connections as follows:

- A. The level monitor may be installed on an existing distilled water storage tank or a new tank from the factory as follows:
 1. Install a 3/8-inch NPT tin-lined spud 610 mm (24 inches) from the top of the tank as shown in Figure 2. If the spud cannot be located 610 mm (24 inches) from the top of the tank because the tank is too shallow, or for some other reason, locate the spud as close to 610 mm (24 inches) as possible.

- 2. Install the U-tube assembly in the spud and the level monitor in the U-Tube using Teflon® ribbon tape on the pipe connections. Teflon tape may be purchased by calling customer services and specifying Part No. 06078.
- 3. Adjust the level monitor as described in the MAINTENANCE section of this manual.

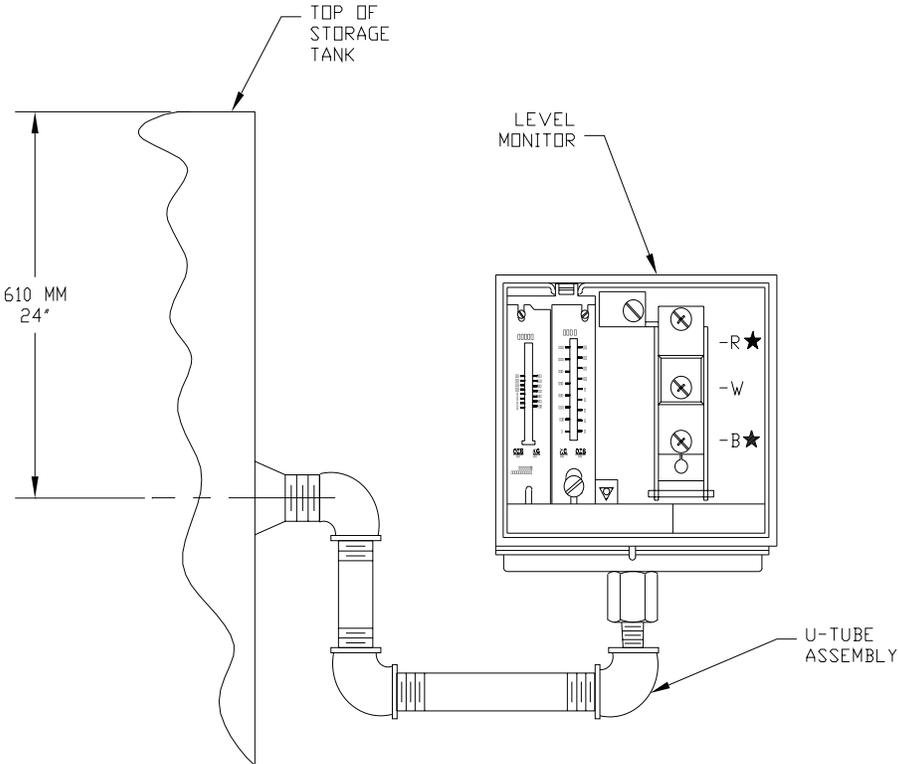


Figure 2: Level Monitor Installation

UNPACKING & INSTALLATION

- B. Connect the water inlet piping and the drain piping to the service lines. The location of these connections is shown in Figure 1, and the sizes of the connections are listed in the following Table:

Still Cat. No.	Still Capacity		Water Inlet NPT	Drain NPT
	SI	English		
A1011	3.79 l/hr	1 gph	1/4	1/2
A1013	7.57 l/hr	2 gph	1/4	1/2
A1015	18.9 l/hr	5 gph	1/4	3/4
A1016	37.9 l/hr	10 gph	3/8	3/4



Note

Ensure that the service lines are supported independently and not by the still piping.

Install a manual shut-off valve in the water supply line.

Ensure that the waste line to which the drain is connected is atmospherically vented and gravity flow.



Caution

The panel fits tightly in the cabinet - do not attempt to pry the panel from the cabinet.

- C. Make the electrical connections to the terminal board in the low water cutoff control cabinet as shown in the wiring diagram on page 27 of this instruction and in accordance with the following instructions:
1. Remove the low water cutoff cabinet front panel. To remove the panel remove the two lower screws in the front of the cabinet, and press firmly down at the bottom center of the panel to free the panel from the cabinet.
 2. Connect the solenoids of the automatic water shut-off valve and the automatic drain valve to terminals 5 and 12.
 3. Remove the jumper between terminals 8 and 10, and connect the level monitor to these two terminals.
 4. Connect the low water cutoff probe wires to terminals 1 and 2 with #18 AWG stranded wire (observe lead number on probe and attach to corresponding number on terminal). Connect the outer shield wire of the probe to terminal #1 and the center wire of the probe to terminal #2. Solder and tape the connections. At the evaporator both wires should protrude through the grommet in the probe shield which clips in place over the cutoff access hole in the evaporator casing.

5. Connect the still heat control contactor coil to terminals 6 and 11.
6. Connect a 3-wire, 120vac, 60-hz electrical service to terminals 9 (AC high), 7 (AC low), and the ground screw just below the terminal board. This electrical service will provide control voltage for the low water cutoff controls and the contactor coil (see wiring diagram on page 27 of these instructions). (120V only, not for use on 208V or 240V.)
7. Connect the heater electrical service to the contactor (see the wiring diagram on page 28 of these instructions). See the still wiring diagram when connecting the still heating elements to the contactor the heater electrical service requirements will be indicated on the nameplate decal at the base of the still evaporator.
8. Install the front panel on the low water cutoff cabinet and install the cover on the contactor cabinet.



Warning

All installation described below should be done by a qualified electrician.

Field Installation

The still is installed at the customer's facility. The automatic controls and accessory piping are installed on the still at the customer's facility as follows:

- A. Shut off the water and electrical service, and drain the still and storage tank.
- B. Disconnect the still heating elements from the electrical service.
- C. Disconnect all service piping from the still.
- D. Replace the drain valve at the constant level device with the plug provided.
- E. Remove the low water cutoff cabinet front panel. To remove the panel remove the two lower screws in the front of the cabinet, and press firmly down at the bottom center of the panel to

UNPACKING & INSTALLATION

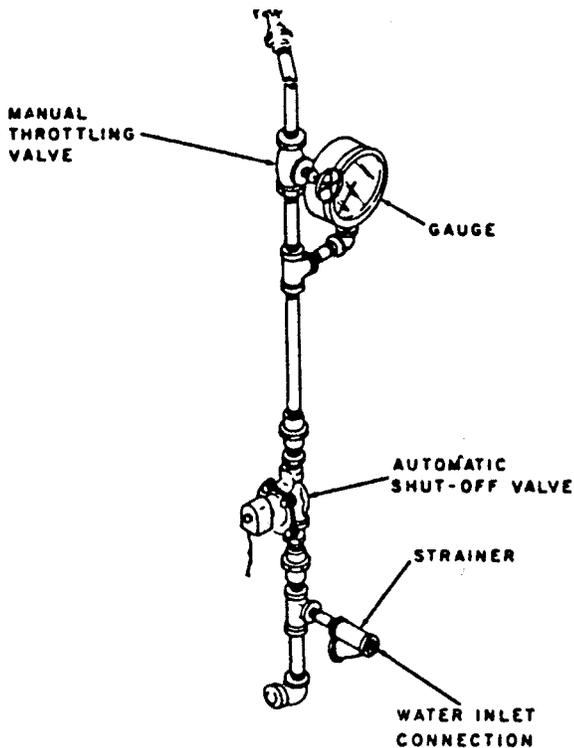


Figure 3: Water Inlet Piping

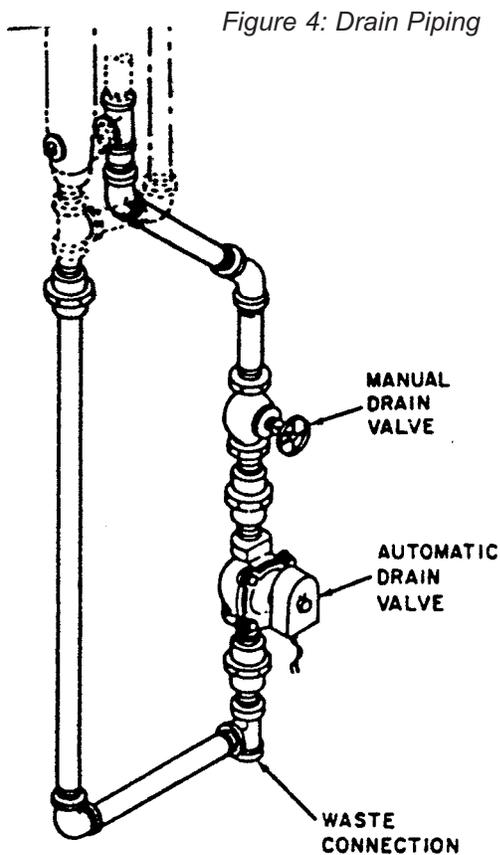


Figure 4: Drain Piping

free the panel from the cabinet. The panel fits tightly in the cabinet - do not attempt to pry the panel from the cabinet.

- F. Install the level monitor on the distilled water storage tank in accordance with the instructions in step A of "Factory Installation" (page 8).
- G. Install the water inlet piping as shown in Figure 3. Note that unions are provided to facilitate assembly.
- H. Install the drain piping as shown in Figure 4. Note that unions are provided in the piping to facilitate assembly.
- I. Connect the water inlet piping and drain piping to the service lines in accordance with the instructions in step B of "Factory Installation."
- J. Make all electrical connections between the still and tank control devices and the low water cut-off controls, between the contactor and the low water cutoff controls, and between the heater electrical service and still and the contactor in accordance with the instructions in step C of "Factory Installation."
- K. Re-install the lower front panel to the Low Water Cut-off Control.

Operation

Theory of Operation

Automatic Water Shut-off Valve

Water flow to the still is controlled by the automatic water shut-off valve, which is a solenoid valve that is closed when its coil is de-energized. When both the control switch contacts on the low water cutoff cabinet and the mercury switch contacts in the level monitor are closed, the interval timer relay closes, and the coil of the solenoid valve is energized. Energizing the coil opens the valve and allows water to flow to the still. When either the control switch or the level monitor switch contacts are opened or the interval timer relay opens, the coil is de-energized and the valve is closed by spring action, shutting off the water flow to the still.

Automatic Drain Valve

Draining of the still is controlled by the automatic drain valve, which is a solenoid valve that is open when its coil is de-energized. This coil is connected in parallel with the coil of the automatic water shut-off valve so the automatic drain valve opens when the water valve closes. Hence, the still drains at the same time that the water flow to the still is shut off.

Level Monitor

As discussed above, water flows to the still when the switch contacts R-B in the level monitor are closed, and it is shut off when the switch contacts are open. The switch is actuated by the movement of a diaphragm that reacts to the varying pressure caused by the changing level of the distillate in the storage tank. As the level of the distillate lowers, the pressure on the diaphragm decreases until at a predetermined setting, the switch contacts close and start the still. As the tank fills, the level rises increasing the pressure on the diaphragm until at another predetermined (see LEVEL MONITOR in the MAINTENANCE section) setting the switch opens and shuts off the still.

Initial Operation

The first time the still is operated, or after cleaning, set the low water cutoff control "ON/OFF" switch to the ON position, open the manual drain valve and operate the still according to the basic still operating instruction. The "ON/OFF" switch will remain lighted as long as the "ON/OFF" switch is in the ON position. The "Still On" lamp will light when the water in the evaporator makes contact with the probe. The still is started and stopped with the "ON/OFF" switch.



Note

When the still is first operated, check all piping connections for leaks, and tighten as necessary.

Normal Operation

As long as the low water cutoff control "ON/OFF" switch is in the ON position, the still will start and stop automatically, depending on the stored distilled water distribution requirements and the operating cycle of the interval drain timer. To stop the still, set the low water cutoff control "ON/OFF" switch to the OFF position. When this is done, the still will drain automatically.

Maintenance

Automatic Water and Drain Valves

These valves are similar in operation and construction, so their maintenance is discussed jointly

Solenoid Temperature

When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched by hand for only an instant. This is a safe operating temperature. Any excessive heating will be indicated by smoke and odor of burning coil insulation.

Solenoid Cleaning

A periodic cleaning of the solenoid valves is desirable. The time between cleanings will vary, depending on service conditions. In general, if the voltage to the coil is correct, sluggish valve operation or excessive leakage will indicate that cleaning is required. Also, a noisy, inoperative solenoid valve is usually caused by foreign matter preventing the valve from seating properly. In order to clean the valve, disassemble it in accordance with the instructions given below.



Warning

Disconnect from power supply prior to maintenance and servicing.

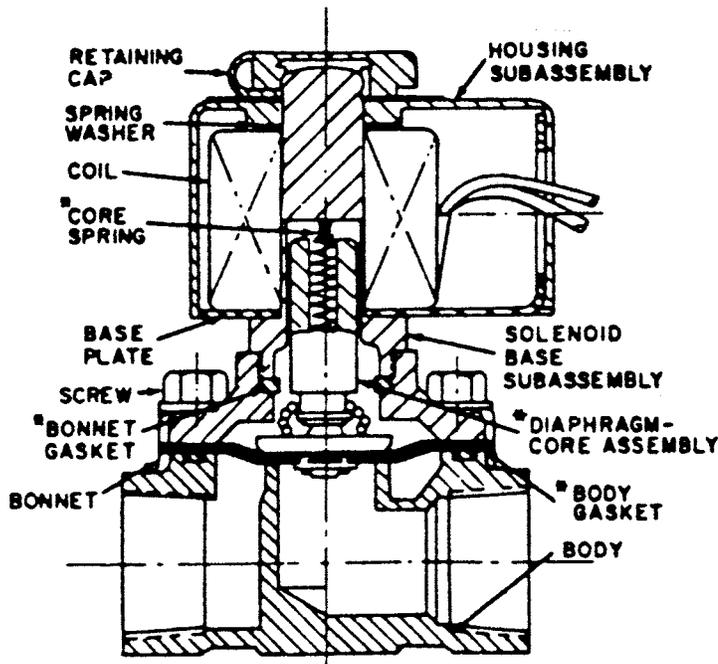
Solenoid Coil Replacement

New coils are available from the manufacturer; order by the part numbers listed in the PARTS LIST section.

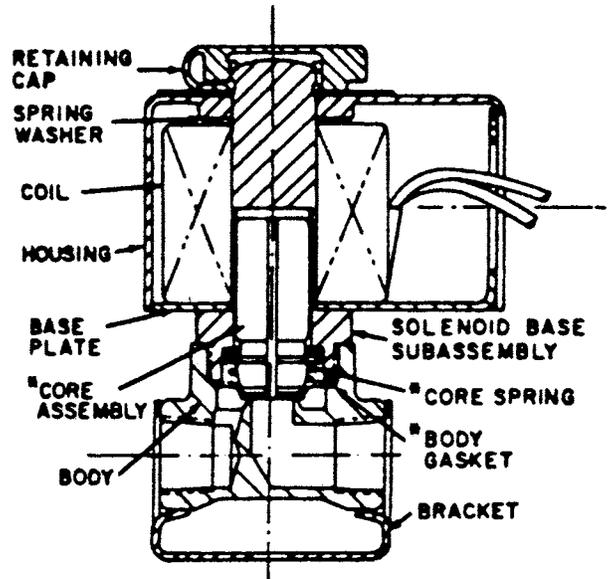
Before disassembling the solenoid, set the control switch to the OFF position and disconnect the coil lead wires. Then proceed in accordance with the following instructions:

For the water valves (see Figure 5):

- A. Remove the retaining cap and slide the housing off the solenoid base subassembly.
- B. Slide the spring washer and the coil off the solenoid base subassembly, and replace the coil with a new one.
- C. Assemble the spring washer, housing, and retaining cap.



1/2-INCH VALVE



1/4-INCH VALVE

Figure 5: Automatic Water Shut-off Valves

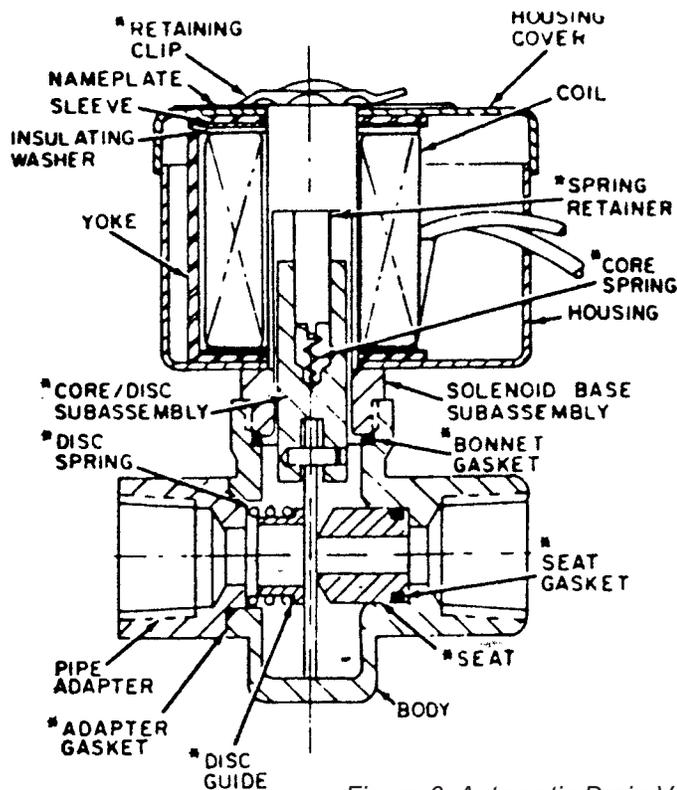


Figure 6: Automatic Drain Valves

For the drain valves (see Figure 6):

- A. Remove the retaining clip, nameplate, and housing cover.
- B. Slide the housing with coil, yoke, sleeves (one top and one bottom), and insulating washers (one top and one bottom), off the solenoid base subassembly.
- C. Remove the coil from the yoke and replace with a new coil.
- D. Reassemble in reverse order

**Note**

For the 3/4-inch valve for Cat. No. G2120 and G2125, servicing information is packaged with each valve replacement.

Valve Disassembly and Reassembly

A spare parts kit is available for each size of valve. These kits contain the parts identified by asterisks (*) in Figures 5 and 6. Order kits by the part numbers listed in the PARTS LIST section.

Before disassembling the valve, set the control switch to the OFF position, disconnect the coil leads, turn off the water supply (do not change the manual water throttling valve setting), and remove the valve from the piping. Remove the coil as described above and proceed in accordance with the following instructions.

For the 1/2-inch water valves used on the 10 gph stills (see Figure 5):

- A. Remove the solenoid base subassembly from the bonnet with an end wrench. Be careful not to lose the core spring, which fits into the end of the core assembly. The bonnet gasket can now be removed if it is to be replaced.
- B. Remove the four screws that hold the bonnet and the diaphragm core assembly to the body and separate these three parts. The body gasket can now be removed if it is to be replaced.
- C. After cleaning thoroughly and replacing any damaged or worn parts, reassemble in reverse order.

For the 1/4-inch water valves used on the 1, 2, and 5 gph stills (see Figure 5):

- A. Remove the solenoid base assembly from the body with an end wrench. The body gasket can now be removed if it is to be replaced.
- B. Remove the core assembly and the core spring from the solenoid base subassembly and separate them.
- C. Remove the mounting bracket by removing the pipes in each end of the body.
- D. After cleaning thoroughly and replacing any damaged or worn parts, reassemble in reverse order.

For the drain valves (see Figure 6):

- A. Remove the solenoid base subassembly from the body with an end wrench. Be careful not to lose the spring retainer and core spring, which fit into the end of the core/disc subassembly. The bonnet gasket can now be removed if it is to be replaced.
- B. Remove the spring retainer and core spring.
- C. Remove the two screws that hold the pipe adapter to the body and separate these parts. The adapter gasket can now be removed if it is to be replaced.
- D. Remove the disc spring and the disc guide.
- E. Remove the core/disc subassembly and push out the seat and seat gasket.
- F. After cleaning thoroughly and replacing any damaged or worn parts, reassemble in reverse order.

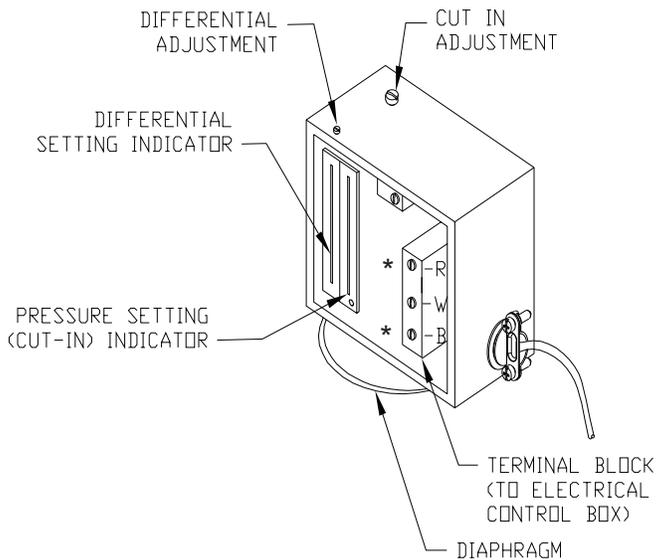


Figure 7: Level Monitor

Level Monitor

The level monitor, Figure 7, has two adjustments: the cut-in adjustment and the differential adjustment. The cut-in adjustment determines how far the water level in the tank will drop before the still will start to replenish the supply. The differential adjustment determines the point at which the still will shut off to prevent the tank from overflowing.

Set the cut-in point as follows:

- A. Determine the point at which the level monitor should turn on the still. This is the cut-in point. Ensure that the cut-in point is above the level monitor connection on the tank.
- B. Measure the distance from the monitor connection to the cut-in point. This is the cut-in head.
- C. Refer to the table below and convert the cut-in head to OZS/IN2. The MAIN (cut-in) scale is calibrated in OZS/IN2 and in kPa .
- D. Rotate the cut-in adjustment screw until the pointer on the MAIN scale indicates the required setting. For example: if the still should start when the water level drops to 7 inches above

the level monitor connection, set the MAIN scale to 4 OZS/IN².

Set the differential as follows:

- A. Determine the point at which the still should shut off. This is the cut-off point. Ensure that the cut-off point is below the tank overflow.
- B. Measure the distance between the cut-in point and the cut-off point. This is the differential head.
- C. Refer to the table below and convert the differential head to OZS/IN². The DIFF.(differential)scale is calibrated in OZS/IN² and in kPa.
- D. Rotate the differential adjustment screw until the pointer on the DIFF. scale indicates the proper setting. For example: if the cut-off point is 14 inches above the cut-in point, set the DIFF.scale to 8 OZS/IN².

<u>HEAD IN OZS/IN²</u>	<u>HEAD IN INCHES OF H₂O</u>
2	3.5
4	7.0
6.1	10.5
8.1	14.0
10.1	17.5
12.2	21.0
14.2	24.5
16.2	28.0



Note

The cut-in and cut-off point can be raised or lowered without changing the differential by raising or lowering the cut-in adjustment.

Low Water Cut-off Control Cabinet

Except for the interval timer, maintenance of the control cabinet consists of replacing a lamp, a blown fuse, or a faulty control switch and checking the terminal connections to make sure that they are tight. These procedures are easily performed and do not require further instructions. See Troubleshooting Chart.

Interval Timer

The interval timer is installed in the low water cutoff control cabinet. Periodic automatic draining of the still is accomplished by the interval timer. For most applications, a four-hour time is satisfactory. With a four-hour time, the still operates for four hours minus the time required for draining. Hard Water or excessive scale formation may indicate that a shorter timing cycle is required. On the other hand, if the still is being fed deionized or low solid content water, a longer timing cycle may be advisable. If a different timing cycle is desired, follow the chart below for the desired drain cycle.

Timer Set-up

Set the dip switch corresponding to the desired drain cycle time as follows:

If the cycle time needs to be changed, the Low Water

<u>Cycle Time</u>	<u>Switch Position</u>
Continuous on	All switches up
2 hrs on, 10 min off	Switch 1 down, Switch 2, 3, 4 up
4 hrs on, 10 min off	Switch 2 down, switch 1, 3, 4 up
8 hrs on, 10 min off	Switch 3 down, Switch 1, 2, 4 up
16 hrs on, 10 min off	Switch 4 down, switch 1, 2, 3 up



Note

The "off" time is fixed at ten minutes.

NOTE: UP = "OFF". DOWN = "ON" (Fig. 8)

Cut-off Control must be turned off. Changing the dip switch while the unit is turned on will have no immediate effect. If the switches are changed while the unit is on, the new cycle time will take effect after the unit is turned off and then back on again.

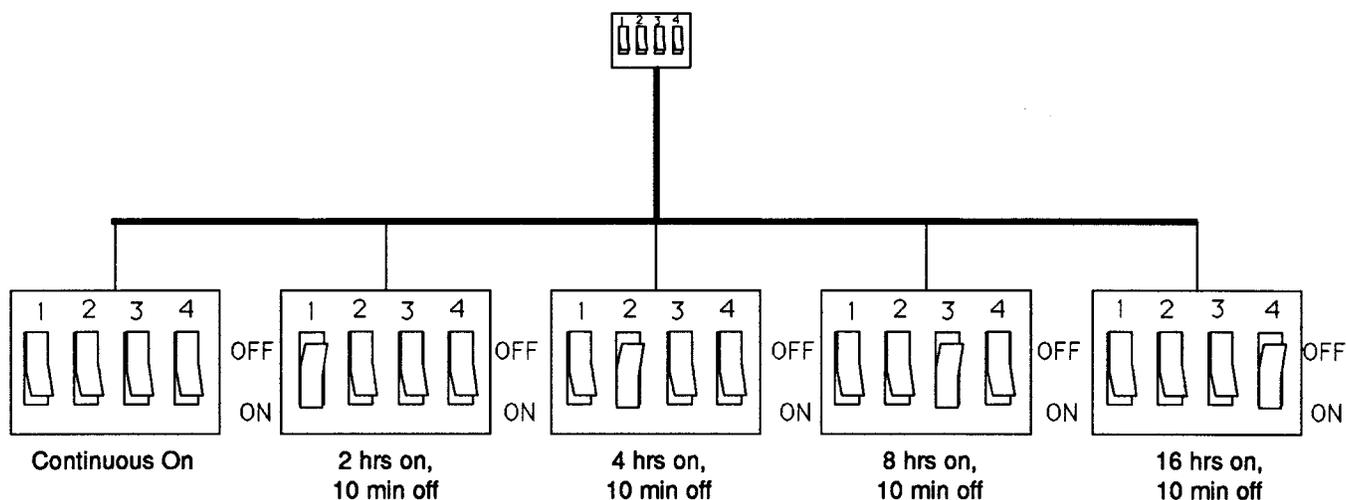


Figure 8: DIP Switch Settings

Probe Cleaning

Periodic cleaning of the low water cutoff probe is required for proper operation of the low water cutoff controls. When scale buildup occurs on the probe, the "Still On" lamp will remain lighted when the water level in the evaporator no longer makes contact with the probe. It is strongly recommended that the probe be cleaned to prevent damage to the still. Cleaning intervals are determined by the condition of the feedwater to the still evaporator. Proceed as follows to clean the probe:

- A. Set the control "ON/OFF" switch to the OFF position.
- B. Shut off all water supplies to the still.
- C. Drain the still evaporator.
- D. Remove the evaporator cover, gasket, and condenser from the still by removing the wing nuts on the evaporator cover and lifting the condenser and evaporator cover straight up. If a "Q" baffle is installed in the still evaporator, remove the "Q" baffle to gain access to the inside of the evaporator.
- E. Disconnect the Probe wires from the terminal board in the control box.
- F. Remove the shield that clips in place over the cutoff access hole in the evaporator casing. Feed the probe wires completely through the

grommet on the shield, and remove the ground wire clip from the probe.

- G. Remove the nut and ferrule securing the probe to the connector in the side of the evaporator.
- H. Remove the probe.
- I. Remove the probe baffle from the probe by removing the screw that holds it in place.
- J. Inspect for dirt, rust, and traces of scale, and clean the inside and outside of the probe baffle as required. Ensure that all holes in the baffle are clear. Refer to CLEANING METHODS in the still instruction for proper cleaning methods.
- K. Reassemble the probe and probe baffle.
- L. Install the probe in the evaporator, and connect the probe wires to the terminal board in the control cabinet. Refer to the instructions in substep 4, step C of "Factory Installation" in the INSTALLATION section (page 8) when reinstalling the probe.
- M. Install the evaporator cover and condenser on the still. If a "Q" baffle is provided, install it in the evaporator before installing the evaporator cover. Ensure that the gasket is installed properly before securing the evaporator cover to the evaporator.

Water Strainer

Maintenance of the strainer consists of cleaning the wire mesh strainer periodically as follows:

- A. Set the control switch to the OFF position.
- B. Shut off the water supply (do not change the manual water throttling valve setting).
- C. Remove the bushing that holds the strainer in the body and remove the strainer.
- D. Thoroughly flush the strainer with water and reassemble.

Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the Thermo Scientific dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed we ask that you check first with your dealer. If the dealer cannot handle your request, then contact our Customer Service Department at 563-556-2241 or 800-553-0039.

Prior to returning any materials to the manufacturer, please contact our Customer Service Department for a "Return Goods Authorization" number (RGA). Material returned without a RGA number will be refused.

Parts List

This section contains parts list information for the Automatic Controls, Cat. No. G2100, G2110, G2120 and G2125 for Electrically Heated Stills, Cat. No. A1011, A1013, A1015 and A1016. When ordering parts, ensure that the proper catalog number and quantity are specified. Also, provide the full description of the part, the catalog number of the automatic controls and the serial number of the still. The serial number of the still can be obtained from the nameplate decal at the base of the still evaporator. When ordering parts for the low water cutoff controller, also provide the model number and electrical data from the nameplate decal on the controller cabinet.

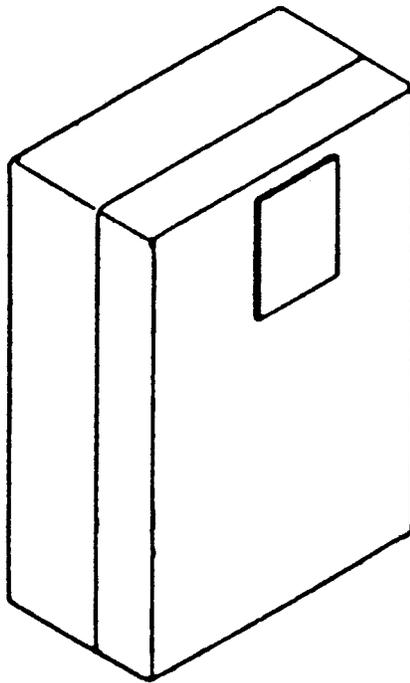


Figure 9: Still Heat Control Contractor

Description	Thermo Scientific Catalog #	Still Distillate Capacity	Heating Service-Phase
Contactors - 27 amp, 2 pole	01107	1 & 2 gph	1
Contactors - 17 amp, 3 pole	01437BI	2 gph	3
Contactors - 60 amp, 3 pole	01437BI	5 gph	1 & 3
Contactors - 95 amp, 3 pole	01435	10 gph	3

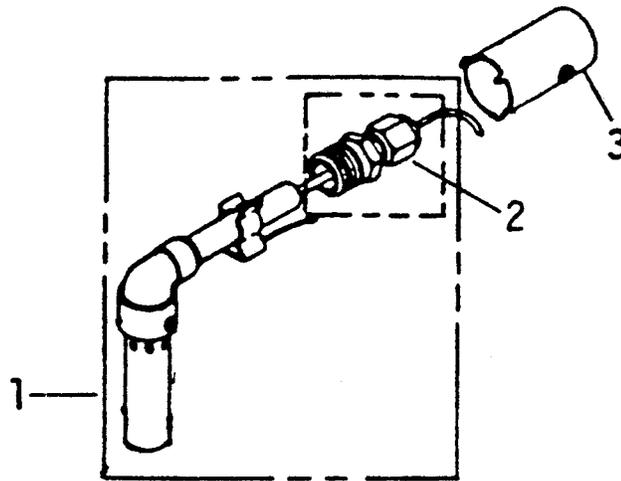


Figure 10: Probe Assembly

Index No.	Description	Thermo Scientific Catalog #
1	Probe Assembly	01113
2	Connector Assembly	03173
3	Shield Assembly	21395

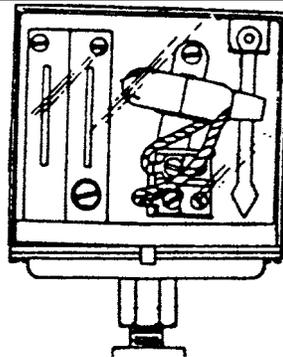


Figure 11: Level Monitor used on units before 2009

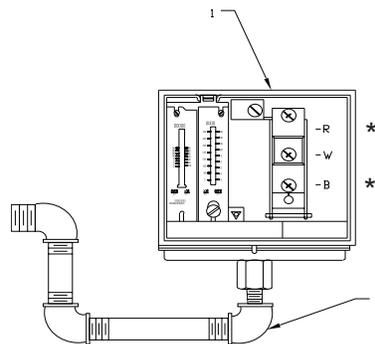


Figure 11: Level Monitor and U-Tube Assembly (Contacts R-B)

Index No.	Description	Thermo Scientific Catalog #
1	Level Monitor	01048
2	U-Tube Assembly	21314

Recommended Spare Parts List

Key	Description	Thermo Scientific Catalog #	Qty.
1	SWITCH, Power ON/OFF		
2	FUSE, Buss, 2 amp	SWX137	1
3	LAMP, Neon	PLX98	1
4	CIRCUIT BOARD	PC665X1A	1
5	CIRCUIT BOARD TIMER	PC665X2A	1
	*WATER INLET SOLENOID VALVE KIT, 1/4 NPT (Parts included are identified by asterisks in Fig. 5)	01125	1
	*WATER INLET SOLENOID VALVE KIT, 1/2 NPT (Parts included are identified by asterisks in Fig. 5)	01126	1
	**DRAIN SOLENOID VALVE KIT, 1/2 NPT (Parts included are identified by asterisks in Fig. 5)	01130	1
	**DRAIN SOLENOID VALVE KIT, 3/4 NPT (Parts included are identified by asterisks in Fig. 5)	01345	1
	PROBE ASSEMBLY	01113	1

* Choose one. A coil can be ordered separately - use Coil Part No. 01121 for both size valves.

** Choose one. A coil can be ordered separately - use Coil Part No. 01124 for both size valves.

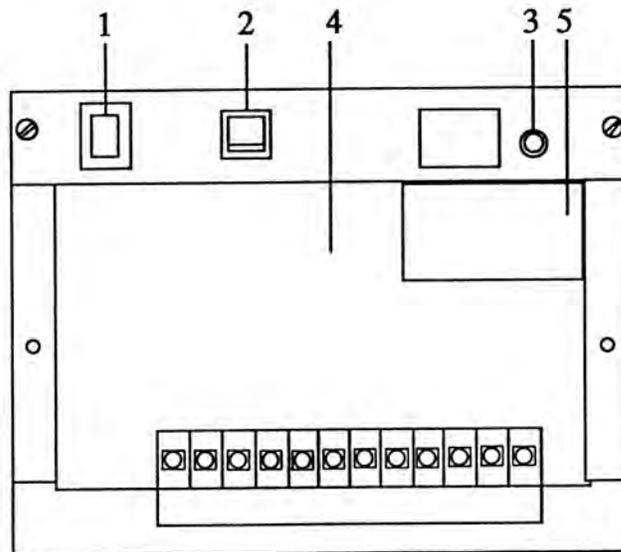
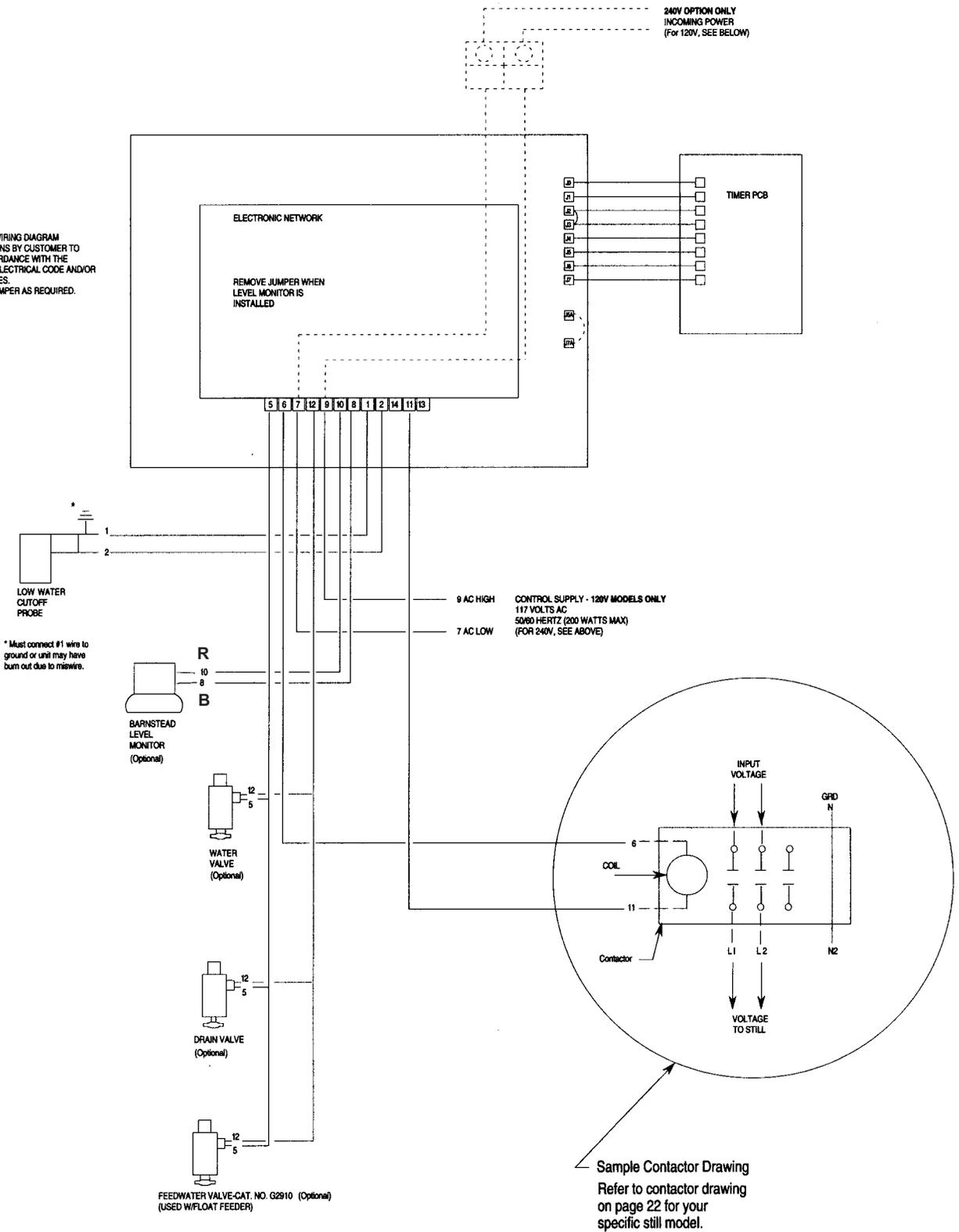


Figure 12: Solid State Low Water Cut-Off Controller

Wiring Diagram

NOTES

1. SEE STILL WIRING DIAGRAM
2. CONNECTIONS BY CUSTOMER TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND/OR LOCAL CODES.
3. REMOVE JUMPER AS REQUIRED.



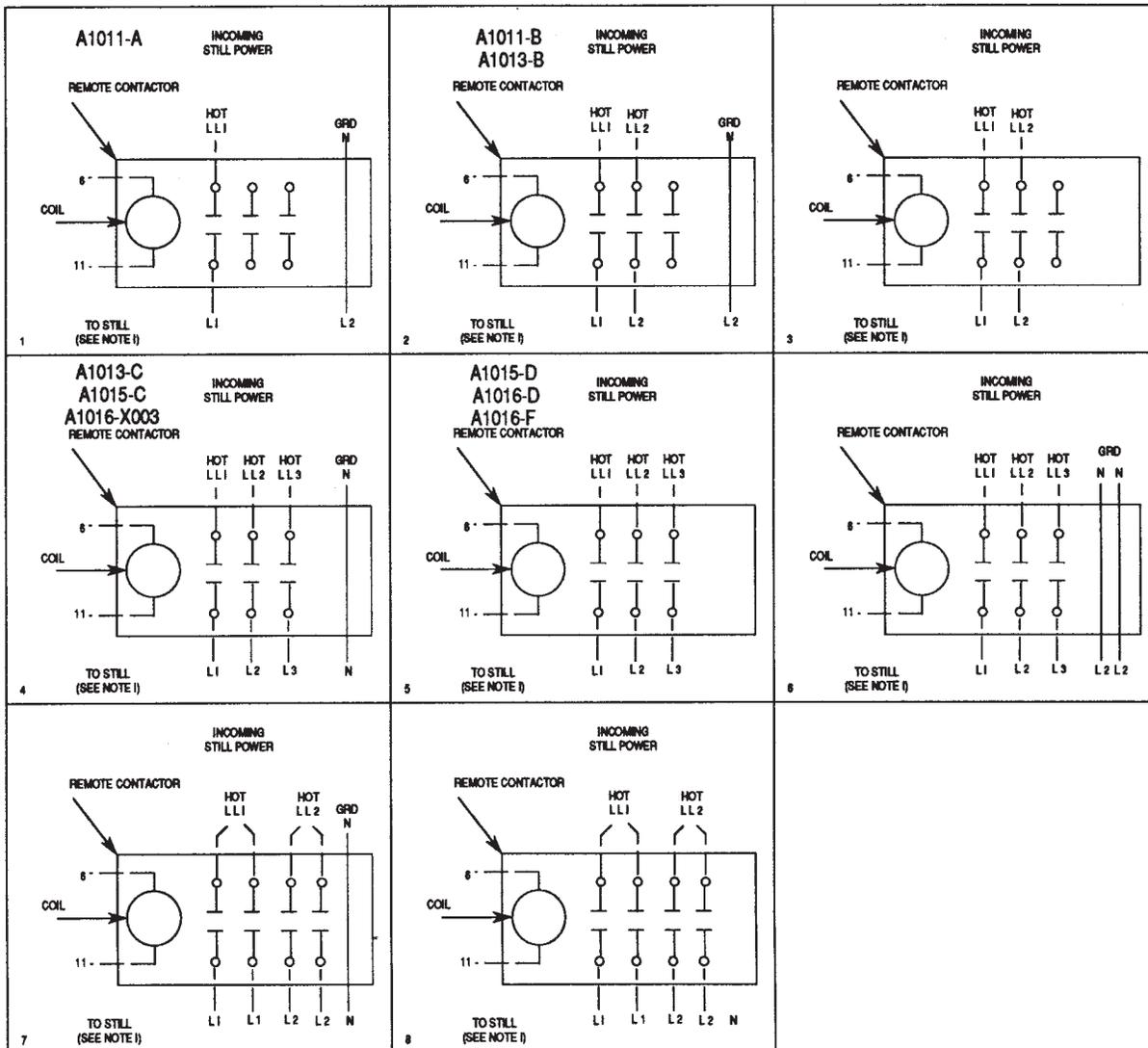
Still Wiring Diagram Showing Connections for Optional Equipment

WIRING DIAGRAM

Heating Element Contactor Diagrams

		CONTACTOR DIAGRAMS (REFER TO APPLICABLE HEATING SERVICE COLUMN)				
STILL CAP	TOTAL WATTS	120V 2 WIRE 1 PHASE	120/230V 3 WIRE 1 PHASE	240V 3 WIRE 3 PHASE	120/208V 4 WIRE 3 PHASE	480V 3 WIRE 3 PHASE
1 GPH	2600	1	2	---	---	---
2 GPH	6000	---	2	---	4	---
5 GPH	13000	---	2	5	4	---
10 GPH	26000	---	---	5	4	5

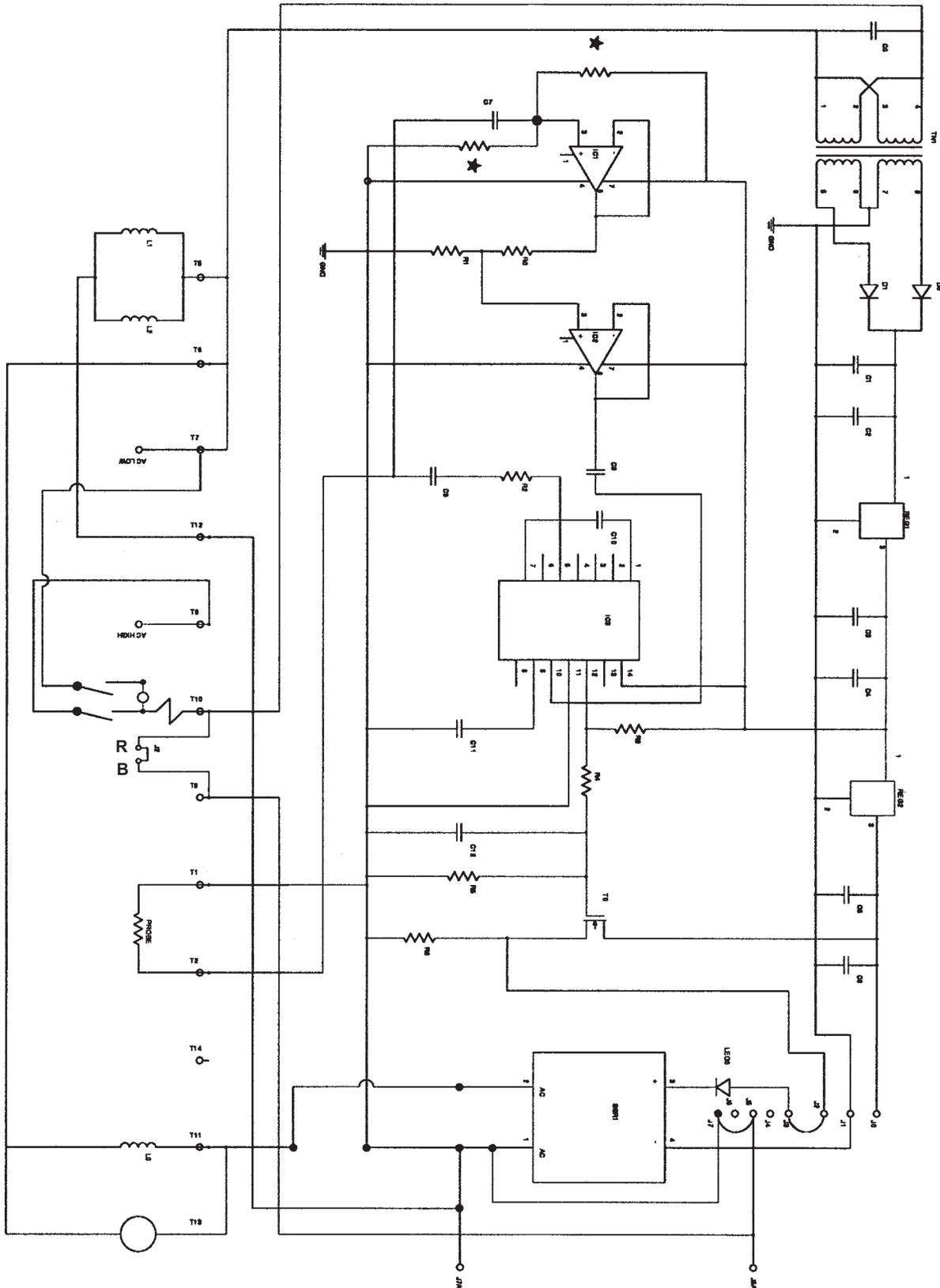
NOTE: REFER TO ABOVE CHART FOR REFERENCE OF WIRING



Contactor to Still
Wiring Diagram

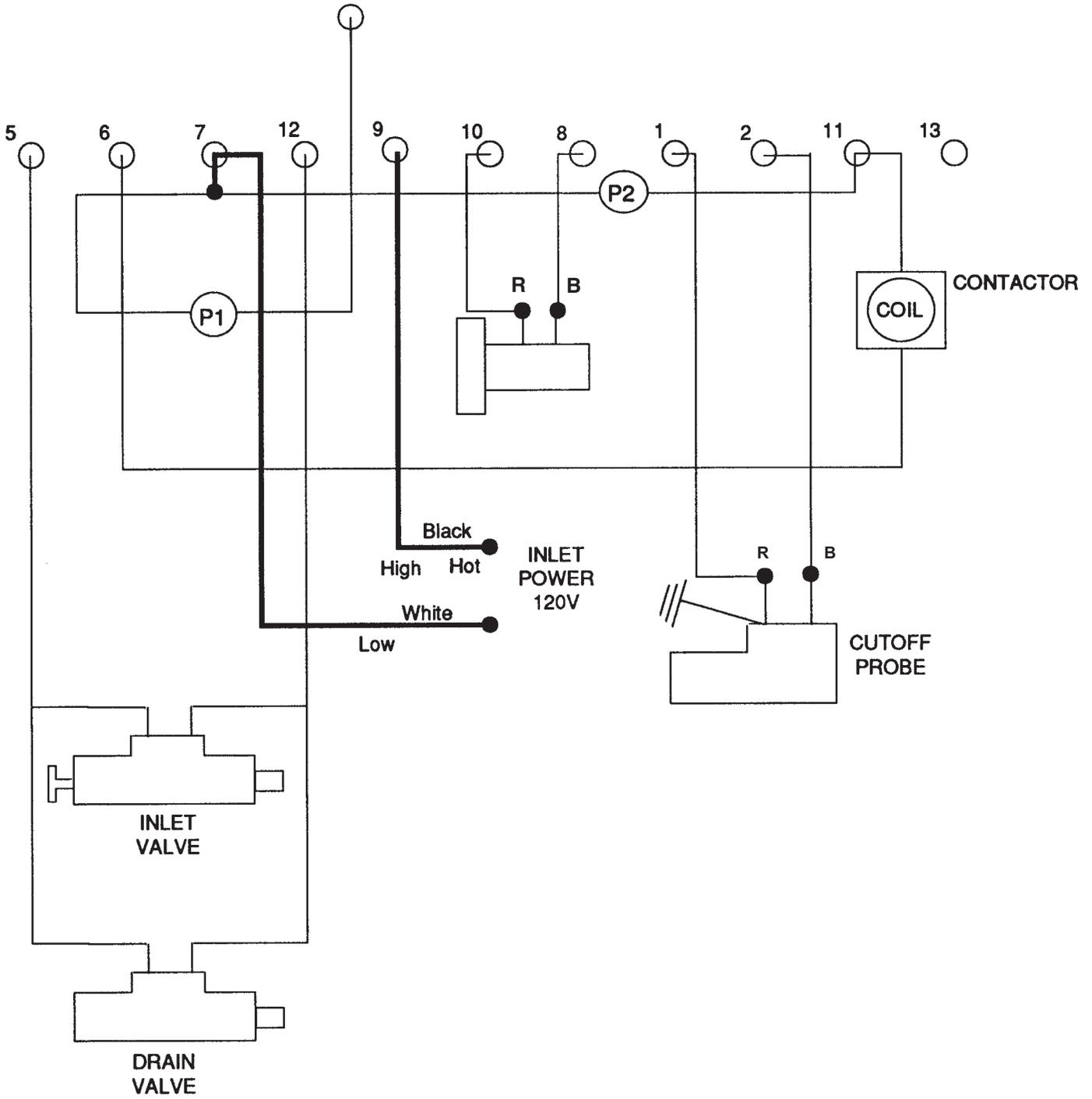
NOTE:

★ 2 RESISTOR ARE MOUNTED TO
UNDERSIDE OF BOARD.

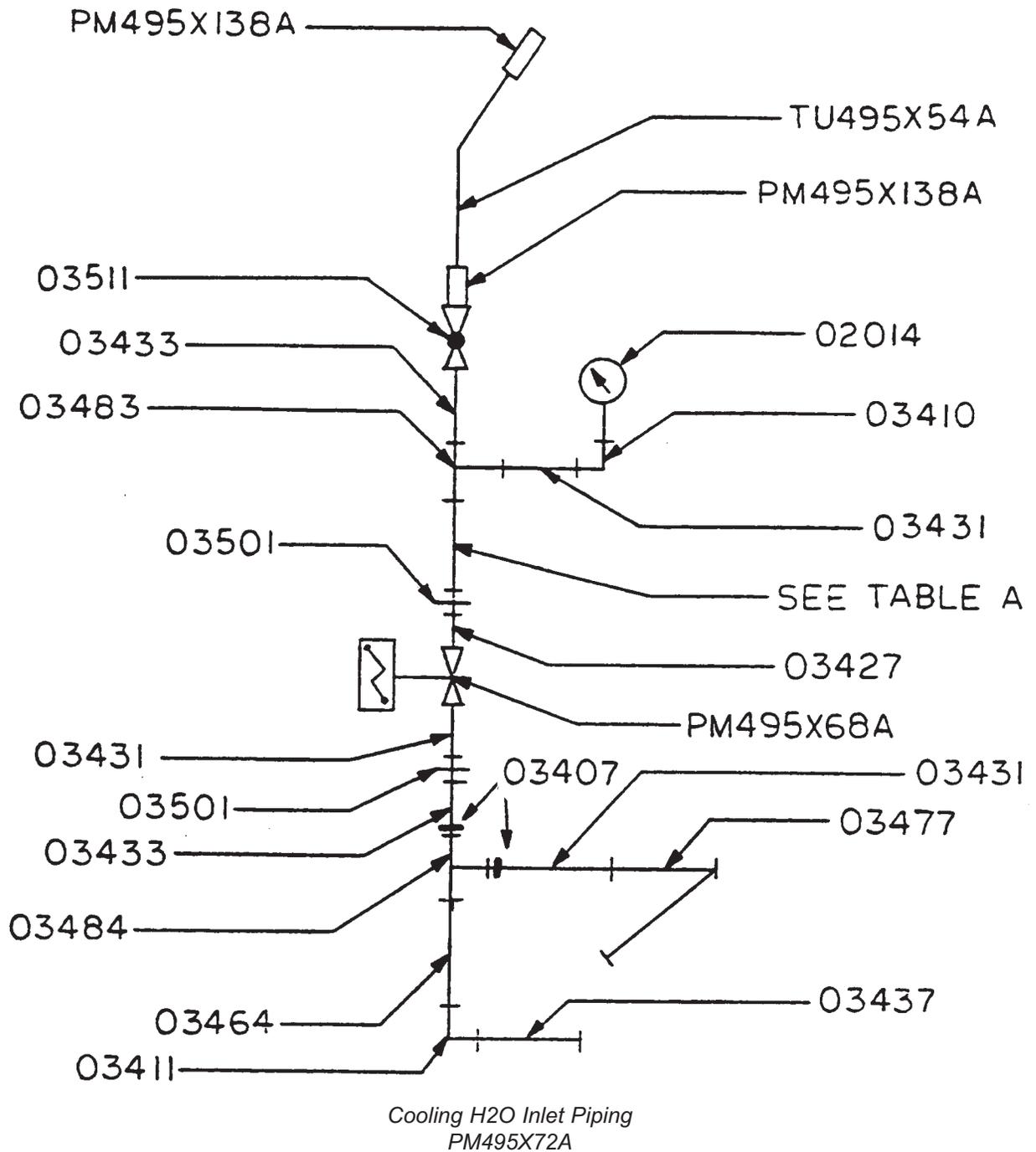


Schematic Wiring
Solid State Low Water Cutoff

WIRING DIAGRAM



Low Water Cutoff
Wiring Connections

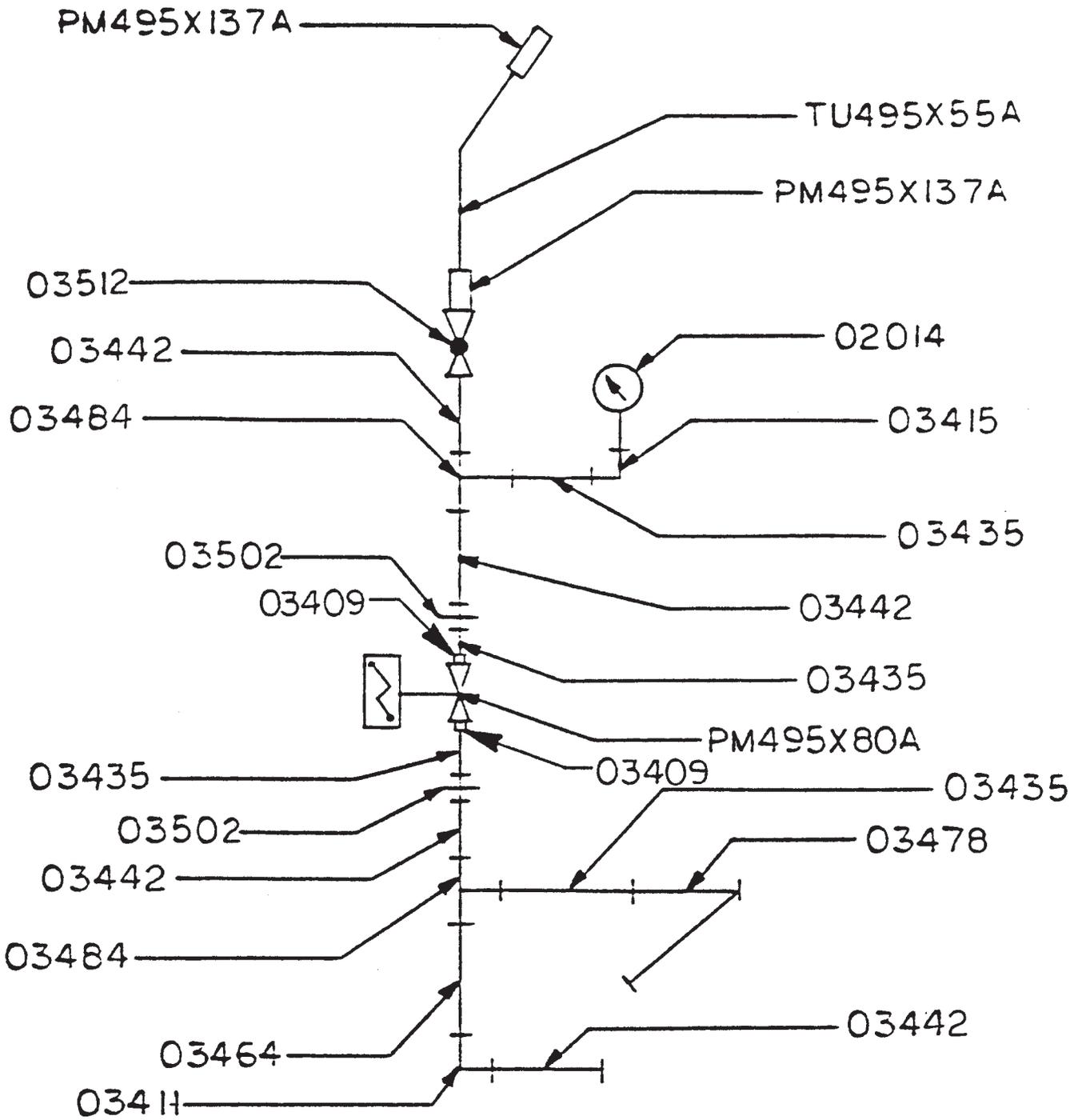


Note

Use 03410 in place of 03484 when wall bracket is used and delete 03464, 03411 and 03437

Table A

1 Gal.	03433
2 Gal.	03433
5 Gal.	03434



Cooling H₂O Inlet Piping
 (10 gal.)
 PM495X75A



Note

Use 03411 in place of 03484 when all bracket is used and delete 03464, 03411 and 03437.
 Use 03422 in place of 03440 and 03437 when using floorstand.

Troubleshooting

PROBLEM	PROBABLE CAUSE	TEST AND REMEDY
Still will not stop.	Storage tank empty. Malfunction in level monitor. Malfunction in Solenoid Valve	Check tank for leaks and repair. Check level monitor differential adjustment in accordance with instructions in this section. Replace monitor if condition cannot be corrected. Check solenoid valves and clean or repair in accordance with instructions in this section.
Still will not drain.	Manual drain valve closed. Drain valve or drain line clogged. Interval timer not operating.	Open valve. Inspect both manual and automatic drain valves and line for dirt and clean as necessary. Check cable to timer; if okay, replace timer.
Drop in distillate-capacity.	Leak in drain valve.	Make sure automatic drain valve is closed and not leaking.
Improper operation of water or solenoid valve.	Faulty control circuit. Burned-out coil. Low voltage.	Check electrical system by drain energizing solenoid. A metallic click indicates solenoid is operating. Absence of click indicates loss of power supply. Check for loose or open fuses, open-circuited or grounded coil, broken lead wires or splice connections. Check for open-circuited coil if necessary in accordance with instructions in this section. Check voltage across coil leads. Voltage must be at least 85 percent of nameplate rating. If voltage is too low, notify plant electrician.

TROUBLESHOOTING

PROBLEM (cont.)	PROBABLE CAUSE (cont.)	TEST AND REMEDY (cont.)
Still will not start	Storage tank full.	Drain storage tank to level monitor cut-in point. Check level monitor in accordance with adjustment instructions in this section. Replace monitor if condition cannot be corrected.
	No electrical power to control circuit.	Make sure main circuit breakers in supply are on. If they are on and trouble still exists, notify plant electrician.
	Low voltage to control circuit.	Check voltage. If appreciably lower than 115 volts, notify plant electrician.
	No electrical power in control circuit.	<p>Check level monitor adjustment and circuit connections at monitor and control cabinet. Replace monitor if condition cannot be corrected.</p> <p>Check main fuse inside control cabinet and replace if open.</p> <p>Check control switch and replace if faulty.</p>
	No electrical power in control circuit.	<p>Check interlock switch and replace if faulty.</p> <p>Check that interval timer or jumper plug is plugged in properly.</p> <p>Check connections in control cabinet and tighten as necessary.</p> <p>Check solenoid valves and clean or repair in accordance with instructions in this section.</p>

PROBLEM (cont.)	PROBABLE CAUSE (cont.)	TEST AND REMEDY (cont.)
	Interval timer in drain cycle.	Wait a sufficient amount of time for complete draining. See INTERVAL TIMER in this section.
Still starts but will not produce distillate.	<p>Inadequate water supply to still.</p> <p>Malfunction in automatic drain valve.</p> <p>Low voltage to heater circuit.</p> <p>No electrical power to heater circuit.</p>	<p>Check that shut-off valve in supply line and throttling valve in inlet piping are open.</p> <p>Check solenoid valves and clean or repair in accordance with instructions in this section.</p> <p>Check that the drain valve is closed and not leaking. Clean or repair in accordance with instructions in this section.</p> <p>Check voltage. If less than specified in wiring diagram, notify plant electrician.</p> <p>Check all wiring and connections in the control cabinet and still heat control (contactor).</p> <p>Check contactor coil and replace if burned out.</p> <p>Check contactor points and replace if badly burned.</p> <p>Check that low water cutoff probe is properly installed in accordance with instructions in this section.</p>

One Year Limited Warranty

This Thermo Scientific product is warranted to be free of defects in materials and workmanship for one (1) year from the first to occur of (i) the date the product is sold by the manufacturer or (ii) the date the product is purchased by the original retail customer (the "Commencement Date"). Except as expressly stated above, the MANUFACTURER MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS AND EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF DESIGN, MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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The warranty provided hereunder shall be null and void and without further force or effect if there is any (i) repair made to the product by a party other than the manufacturer or its duly authorized service representative, (ii) misuse (including use inconsistent with written operating instructions for the product), mishandling, contamination, overheating, modification or alteration of the product by any customer or third party or (iii) use of replacement parts that are obtained from a party who is not an authorized dealer of Thermo Scientific products.

Heating elements, because of their susceptibility to overheating and contamination, must be returned to the factory and if, upon inspection, it is concluded that failure is due to factors other than excessive high temperature or contamination, the manufacturer will provide warranty replacement. As a condition to the return of any product, or any constituent part thereof, to the factory, it shall be sent prepaid and a prior written authorization from the manufacturer assigning a Return Materials Number to the product or part shall be obtained.

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