American Metal Ware®

Installation, Operation & Service Manual

For

High Speed Brewing Urn (Top Line)

TABLE OF CONTENTS

Model 87710

Dual Wall Insulated

[X] Electric [ ] Steam

Special Features

After completing installation and set-up, the equipment owner should keep this manual for future reference.

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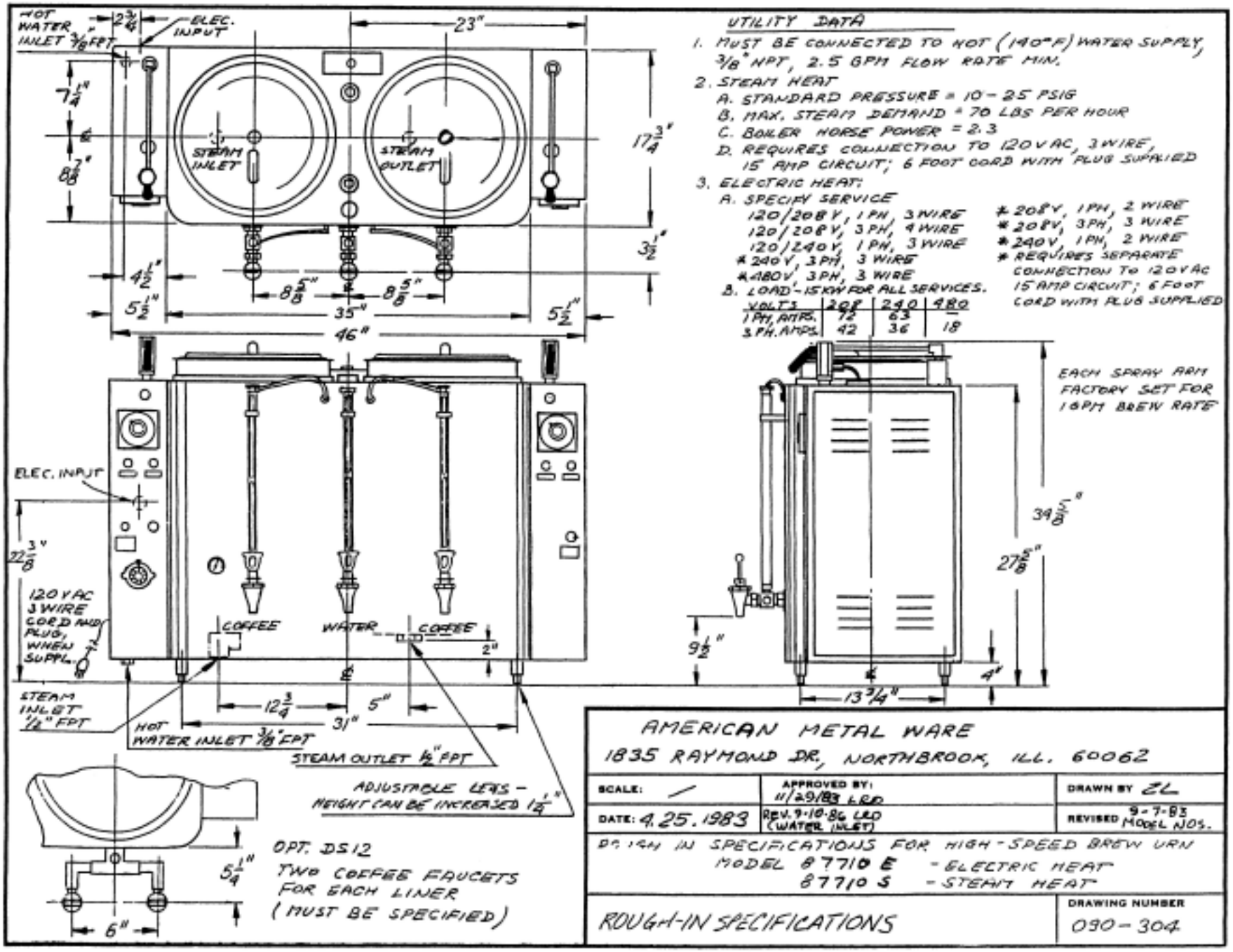
1104 Form # AM-307-02

General Description

This urn is an automatic, push button operated, volume brewing unit. It consists of a non-pressure vented water compartment of large capacity into which two stainless steel coffee liners are inserted. Also installed within this water compartment are electric immersion heaters thermostatically controlled through a contactor relay, to keep the water always at the desired temperature. Measurement of water quantity sprayed over coffee is by push button start, electric reset timer, timing a constant water flow rate to the spray nozzle.

Hot water from the water compartment is pumped to the spray nozzle, controlled by the reset timer. Automatic refill maintains water level in water compartment. Control system components are enclosed in stainless steel housings on both ends of the urn for the 87710 urn.

Air agitation of coffee mixes the brew with compressed air automatically at the end of the brew cycle or, if desired, manually at any time with a push button.



UTILITY DATA

1. MUST BE CONNECTED TO HOT (140°F) WATER SUPPLY, 3/8" NPT, 2.5 GPM FLOW RATE MIN.
2. STEAM HEAT
   - A. STANDARD PRESSURE = 10 – 25 PSIG
   - B. MAX. STEAM DEMAND = 70 LBS PER HOUR
   - C. BOILER HORSE POWER = 2.3
   - D. REQUIRES CONNECTION TO 120 V AC, 3 WIRE, 15 AMP CIRCUIT; 6 FOOT CORD WITH PLUG SUPPLIED
3. ELECTRIC HEAT:
   - A. SPECIFY SERVICE
     - 120/208 V, 1 PH, 3 WIRE
     - 120/208 V, 3 PH, 4 WIRE
     - 120/240 V, 1 PH, 3 WIRE
     - * 240 V, 3 PH, 3 WIRE
     - * 480 V, 3 PH, 3 WIRE
     - * 208 V, 1 PH, 2 WIRE
     - * 208 V, 3 PH, 3 WIRE
     - * 240 V, 1 PH, 2 WIRE
     - * REQUIRES SEPARATE CONNECTION TO 120 V AC 15 AMP CIRCUIT; 6 FOOT CORD WITH PLUG SUPPLIED
   - B. LOAD - 15 KW FOR ALL SERVICES.

VOLTS	208	240	480
1 PH. AMPS.	72	63	—
3 PH. AMPS.	42	36	18

AMERICAN METAL WARE
1835 RAYMOND DR., NORTHBROOK, ILL. 60062

SCALE: /	APPROVED BY: 11/29/83 LED	DRAWN BY EL
DATE: 4.25.1983	REV. 9-10-86 LED (WATER INLET)	REVISED 9-7-83 MODEL NOS.

PG. 14A IN SPECIFICATIONS FOR HIGH-SPEED BREW URN
MODEL 87710 E - ELECTRIC HEAT
87710 S - STEAM HEAT

ROUGH-IN SPECIFICATIONS

DRAWING NUMBER 090-304

Installation

1. IMPORTANT TO ALLOW 6” CLEAR SPACE FOR ACCESS TO CONTROL BOX. Urn should be level, both front to back and left to right.

2. CONNECT WATER LINE. 3/8” NPT water inlet located at left end and provide shutoff valve and union in supply line near urn. 140°F. hot water must be used, 30PSI minimum - 70PSI maximum. We strongly recommend the use of copper or aluminum tubing to provide flexibility and avoid strain on the urn. 3/8” O.D. minimum tubing is recommended.

Model No.	87710
Actual Coffee Capacity Each Liner	10 Gal.
Water Compartment Capacity	24 Gal.
Brew Capacity, Gals. per Hour	80
Electric Supply Voltage	240V/208V
1 Phase Heater Size	15KW / 15KW
1 Phase Amperes	63 / 72
3 Phase Heater Size	15KW / 15KW
3 Phase Amperes	36 / 42

3. CONNECT URN TO ELECTRIC POWER. Check to be sure that the nameplate marking of voltage, phase and the number of wires matches supply lines. Remove cover on control housing. The terminal block for the line connections is located in the housing on the left end. See drawing, as required. It is recommended that a fused disconnect switch be installed near urn. The urn body must be grounded either through metallic conduit or else by means of ground wire. An experienced electrician should be responsible for the installation of the urn, and its associated supply line. NOTE: Neutral wire required on all single phase and on 208 volt 3 phase power supplies to operate 120 volt AC control circuit.

   On single phase, 2 wire service (no neutral) or 3 phase 3 wire service (no neutral) 120 volt AC power to operate control circuit must be supplied as circuit. Do not replace cover until completing installation start-up.

4. FILL WATER COMPARTMENT. Turn on water supply and electric service to urn. Water compartment should fill to stop-full level in approximately 10 minutes.

   Turn thermostat knob to BREW position. Pilot light over knob should light showing heater power on. Water compartment should reach operating temperature approximately 45 minutes later. When the pointer on thermometer approaches the “W” in the blue BREW zone, urn is ready for automatic operation.

Spray-Over Time - Volume - Rate

Timer and spray-over rate are factory set as per information below. If other volumes of water or a faster or slower spray-over rate is desired, see following instructions:

Timer Adjustment

Turn adjustment knob clockwise to decrease time, counterclockwise to increase time.

Operation Start-Up Checks/Brew Cycle Adjustments

1. Turn thermostat dial to BREW position. Pilot light at top of thermostat bezel should light up when thermometer pointer is at "W" in BREW zone, this pilot light should go out. Water in urn tank is now at brew temperature. NOW and ONLY at initial start-up, we advise checking time of flow of hot water to spray nozzle.

2. CHECKING SPRAYOVER VOLUME AND RATE (REPEAT FOR EACH SPRAYARM)
   Remove cover from brew basket over one liner. Position spray nozzle over this brew basket. Liner should be empty and faucet shut off. Push in timer start button and brew pilot should light up. Hot water should start to spray into brew basket. Allow to spray until brew pilot light goes out and sprayover stops.

   Measure amount sprayed over by drawing off into a calibrated one gallon measure. If amount is more or less than desired, reset timer. Longer time, more sprayover, shorter time - less sprayover. Each 1/4 minute increase or decrease adds or subtracts about 1/4 gallon to sprayover total. Note that setting of sprayover bypass valve (on sprayarm) affects amount of sprayover.

   Further adjustment of sprayover volume can be made using the internal bypass valve located in the side pump housing. Screwdriver adjustment is under the hole plug closest to the urn body. Open the valve for less sprayover, close for more. Valve is wide open when screwdriver slot is horizontal. It is closed when slot is vertical; i.e., pointing towards sprayarm for maximum sprayover. The purpose of the internal bypass valve is to direct excess discharge from the sprayover pump back into the urn water compartment.

   Factory setting is 10 gallons sprayover water in 10 minutes (1 gallon/60 seconds) and sprayover bypass valve wide open. Bypass volume is about 30% of the total sprayover, or 3 gallons.

   Before actual use of urn, it should be thoroughly cleaned and washed. It is also recommended that a batch of coffee be brewed in each liner based on a final brewing cycle timer setting and actual muslin bag or filter be used. We recommend that these first batches be thrown out and not used. Strength of brew may be checked by hydrometer or evaporation tests but flavor test might be poor on the first batch.

How To Brew In An Automatic Urn

1. Place filter in brew basket with designated amount of ground coffee (automatic urns are designed to use 1, 2, 3 or 4 lbs. of coffee). Make certain you have a level bed of coffee. Consult your coffee supplier for exact brewing specifications. (C.B.C. recommendation is 1 lb. of coffee to each 2 1/2 gallons water).

2. Replace cover and move spray head over center of coffee grounds.

3. Check thermometer to make certain urn is at brewing temperature. Press timer button.

4. When brew cycle is completed (brew light shuts off), remove brew basket and dispose of spent grounds.

5. Mixing of finished brew is accomplished automatically at the end of the brew cycle if the urn has an air agitation option. Additional mixing can be performed at later time by pressing manual air agitation push button.

   Where urn is not equipped with air agitation, draw one gallon for each three gallons of finished brew from coffee faucet, and pour over top into coffee liner.

   The coffee is ready to serve.

6. Hold coffee at 185° - 190° F. or HOLD setting on thermostat knob. Brewed coffee can be held at this temperature for up to one hour with minimal deterioration of flavor and body.

Explanation Of Brewing Cycle

1. When timer button is pushed, the timer is activated.

2. The timer completes the circuit to the sprayover pump which delivers hot water through the spray arm to the spray nozzle.

3. The hot water from the spray nozzle is sprayed over the coffee grounds. The finished brew collects in the coffee liner.

4. As the pump delivers hot water from the water compartment through spray nozzle into brew basket, the water level in the water compartment lowers.

5. Drop in water level in water compartment below sensing probes activates liquid level control which opens the refill solenoid valve, refilling the water compartment with cold water.

6. The entry of the cold water activates the thermostat, which allows power to go to the heating element to maintain the brewing temperature

NOTE: Some urns may be equipped with an optional adjustable bypass valve on the spray arm. Adjustment of this valve will allow some spray water to bypass the brewing basket for additional control of the water/coffee brewing formula and the extraction percentage from the coffee.

Thermostat

The thermostat is factory set so that the knob on the BREW setting holds the urn at brewing temperature toward the HI end of brew zone on the thermometer dial. Then, if turned back to HOLD position, the thermostat should cycle on and off and hold at the LO end of the BREW zone on the thermometer.

Thermostat Adjustment

1. If the water temperature is below the HI end of the BREW zone on the thermometer dial with the knob on BREW setting, remove the knob by pulling it straight outward. Using a small screwdriver, insert in the hole in the center of the shaft, turn slotted screw counter-clockwise until the red pilot light goes on. Check to see that water in the urn holds at the HI end of the BREW zone on the thermometer and does not boil.

2. If the water boils with the thermostat knob set at the BREW position, remove the knob by pulling it straight outward. Using a small screwdriver, insert into the hole in the center of the shaft, turn slotted screw clockwise until the red pilot light goes out. Hold shaft so it does not turn while adjusting screw. Add cold water and check that the heat comes back on (pilot light glows), and that the thermostat cycles at temperature at HI end of the BREW zone on thermometer dial.

   If the thermostat will not cycle, replace the entire control.

Push Button Timer For Spray Over Control

The function of the timer is to start the pump and run it for a preset period of time and upon lapse of this time, to stop the pump, thereby completing the spray over cycle.

This urn is equipped with an electric reset timer. Pushing in the START button will start the flow of water. The timer will complete the time cycle for which it has been programmed and on completion, the flow will be stopped and the timer will reset itself, ready for the next brewing cycle.

If electric power is cut off anywhere in the service coming to the urn during the timer operating cycle, the timer will reset. When the power is restored, the timer must be restarted by pushing the START button.

Spray Rinse Of Liner

To rinse the liner after brewing coffee, swing the spray arm over the desired liner and push START button. Allow hot water to spray from the spray arm for approximately 30 to 60 seconds and then push STOP button and drain the liner.

Care and Cleaning of Coffee Urn

1. Always rinse the urn immediately after each use.
2. Add small quantity of hot water, brush sides and rinse with hot water until it runs clean. Urn is now ready for next batch.
3. At end of each day clean and brush urn several times, then rinse thoroughly with hot water.
4. Remove clean-out cap at the end of the coffee faucet (or take apart faucets which have no caps) and scrub pipe leading to center of urn. Clean urn gauge glass with brush and urn cleaner. Rinse!
5. Scrub the faucet, then rinse it thoroughly with hot water.
6. Place a gallon or more of fresh water in the urn until next use.
7. Remove cover and clean. Replace cover, and leave partly open.
8. ALWAYS REMEMBER TO EMPTY, AND RINSE THE URN WITH HOT WATER BEFORE USING AGAIN.

NOTE: On automatic urns, use brew start and stop switches, or the rinse switch, to spray scalding hot water into liner for cleaning and rinsing. On pourover urns, draw hot water directly from urn. Make sure urn water tank is kept near full, and heat is on.

Semi-Weekly Cleaning Procedure

1. Be sure that the outer jacket is full of water.
2. Turn on the heat and fill the urn liner 3/4 full of water; use only urn cleaning compounds, following manufacturer's directions; mix thoroughly and let stand about 30 minutes.
3. Clean the gauge glass, faucet pipe, plugs, etc. using long thin brush. Use urn cleaning solution for scrubbing. Take faucet valve apart and clean thoroughly. Clean all tubes well.
4. Scrub inside of urn and inside of cover with long handled brush. Be sure to clean the "lug nut" in the base of urn liner.
5. Rinse the inside of the urn three or four times with hot water - scrubbing each time. Also rinse parts well. Repeat until all traces of foreign odor and cleaning solution are removed.
6. Leave a gallon or more of fresh water in the urn with the cover partly open until the next use. If cold water is used, allow urn to cool to prevent cracking liner.
7. The urn baskets may be cleaned by immersing them in urn cleaner solution and scrubbing with a stiff brush. Rinse thoroughly and let dry. Sprayheads should be checked to see that all holes are open. If any are clogged, remove sprayhead and use stiff wire to open.
8. Don't use soap, scouring powders, or abrasives to clean coffee brewing equipment.

WARNING: Cleaner used can affect taste of coffee if not thoroughly flushed out as covered above.

NOTE: Coffee system cleaners that have been used successfully:

DIP-IT manufactured by Economics Laboratories, Inc., 4 Corporate Park Drive, White Plains, NY 10604
OXYLITE manufactured by Avril, Inc., Syndet Division, 601 N. Third Street, Reading, PA 19601
TEMP-KLEEN manufactured by Caddy Corp. of America, Pitman, NJ 08071

Solid State Coffee Agitation System

Coffee agitation is accomplished with low pressure air, bubbling up through the coffee in liner. Air enters at the top coffee gauge elbow fittings and forces coffee down out of sight in gauge glasses during the agitation period. Air continues through into the liner connection elbow, and bubbles up from this center fitting. The rich, heavy portion of brew is carried up to the top and thoroughly mixed with weaker top level coffee.

Automatic Program - End of Brew and Delayed Types

At the end of the spray cycle, the air pump turns itself on for about 30 seconds automatically. This automatic agitation program is either built into the solid state spray cycle (brew) timer or is provided by a separate solid state agitation relay on equipment with mechanical timers. Urns with delayed air agitation (Option 43D) have a two minute delay after the end of the brew cycle before the 30 second agitation cycle starts for improved mixing. This delayed program is provided by a separate delay solid state relay. Whenever power to the urn has been off, such as upon installation, the automatic agitation program will begin as soon as the power is turned on. Otherwise, it operates only after the end of spray.

Manual Agitation

At any desired time, holding in the “manual agitation” black push button switch will blend stored coffee.

Note: The plug in the cleanout cap at the top of the coffee gauges must be pushed in completely to avoid air leaks. Gauge glasses are cleaned with a gauge brush by first lifting out the top cap. (A slight twist will release a tightly sealed cap). Be sure to replace the cap properly so that the agitation system can operate.

WARNING: Overfilling coffee liners may damage air pumps. Never overfill liners at any time.

Operation Malfunction and Service

Problem - Thermostat dial turned to brew and water in tank remains cold.

Possible Cause	Service Checks and Cures
1. No power at urn.	Check main switch. Check main fuses. (Three on 3 phase power, two on single phase power). Check that pilot light at top of thermostat bezel is ON.
2. Power at urn, but no power at heater terminals.	Check urn control circuit breaker or fuse, reset or replace if needed. Check that water level is at STOP mark on gauge. Check that power contractor has power at coil, and clicks open and closed at thermostat dial is turned off and to BREW position. Check control transformer, if supplied. It may be burned out. Lastly, check for voltage at heater terminals. If voltage at heater is O.K., check for broken or loose wire. Water must be showing in center gauge glass 2" if Opt. 39 equipped.
3. Power at heater terminals, but no heat.	Check heater for an open circuit with ohmmeter or continuity tester. If necessary, replace heater. (It is necessary to remove coffee liner to replace electric heater).

PROBLEM: Water boils continuously with thermostat dial on position "BREW" or "HOLD."

Possible Cause	Service Checks and Cures
1. Thermostat out of calibration.	Set knob on "BREW" and remove knob by pulling outward. Using small screwdriver in center of shaft, turn slotted screw clockwise until pilot light goes out. Check holding temperature by adding cold water. Light should come on and water heat up to high end of "BREW" zone on thermometer dial and then shut off. NO BOILING.
2. Thermostat is inoperative. Fluid has leaked out of diastat assembly of thermostat.	If impossible to get control to cycle on and off and control temperature, replace entire control. Be sure to drain water in urn below level at which bulb enters urn. Also, shut off all power before service is attempted.
3. Contractor sticking in closed position.	Contactor must click on and off. If it sticks, replace.

Dual Level Control Auto Refill And Low Water Cutoff System

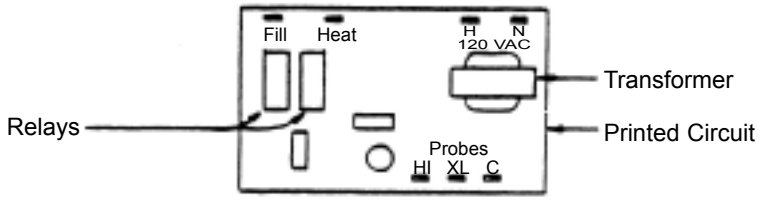
1. Dual Level Control: What it does:
   A. AUTO REFILL of the water compartment to keep the tank filled with water. When water is used, the fill valve opens automatically to let more in. The fill valve closes when the water level reaches full.

   B. LOW WATER CUTOFF to prevent burn out of the electric immersion heater when there is not enough water to cover it. When low water occurs, the heat automatically switches off. The heat stays off until more water is added.

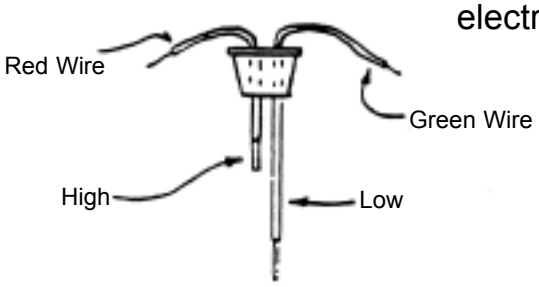
   C. A device called a DUAL LEVEL CONTROL keeps the tank filled with water and turns off the heat when water is low by simultaneously monitoring two different water levels.

2. Description and Operation of the Dual Level Control System:

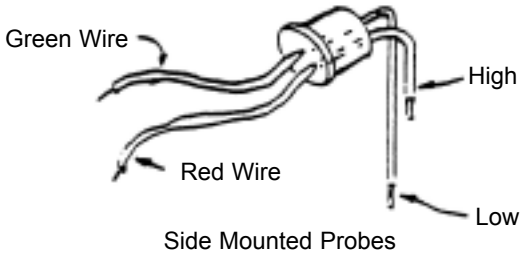
   A. Components
      1. Dual Level Control - switches power to both the thermostat and water inlet solenoid valve by sensing changes in water level.



      2. Electrode Assembly - consists of a high (short) and a low (extra long) sensing electrode, or probe, molded in an epoxy body.



Top Mounted Probes

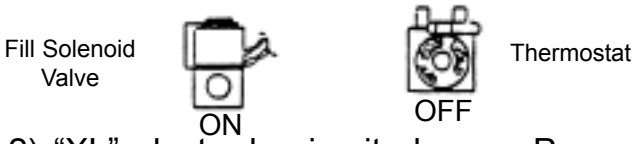


Side Mounted Probes

      3. Metal Enclosure (tank body)- provides a common (ground) connection for the electrode circuit.

2. Description and Operation of Dual Level Control System (continued):

B. Operation

Water Level	Action
1) Below both electrodes 	1) Both “HI” and “XL” electrode circuits open. Dual Level Control turns power on to fill valve and keeps power off to thermostat. 
2) Rises to low electrode above above heater coils 	2) “XL” electrode circuit closes. Power to thermostat turned on. Power to fill valve remains on. 
3) Rises to high electrode 	3) “HI” electrode circuit closes. Dual Level Control turns power off to fill valve and continues power to thermostat. 
4) Falls below high electrode only 	4) “HI” electrode circuit opens. “XL” circuit stays closed. After a few seconds delay, power to fill valve is turned on. 
5) Falls below low electrode. (Same as condition no. 1)	5) “XL” electrode circuit now opens. Power to thermostat is turned off. Power to fill valve remains on.

3. Quick Service Check of Dual Level Control System:

1) All wire secure and properly connected.

2) Clean the electrodes. Lime (mineral scale) build-up can interfere with the operation of any liquid level control system.

3) Check the common (ground) connection. A little looseness or dirt can cause erratic operation.

Problem	Possible Cause	Service Check	Remedy
A) Overfilling of water tank when power is off.	1) Fill solenoid valve leaking due to dirt or scale holding valve open, or worn plunger seat.	Visual. Water entering tank continuously, and usually slowly.	Disassemble and clean out. May require new plunger assembly. Caution is advised to avoid damage to valve. See valve instruction sheet.
	2) Fill solenoid valve installed backwards.	Visual.	On valves without integral strainer: Install so that port marked "IN" is connected to outside fresh water supply. On valves with integral strainer: Install so that arrow points in direction of tank, away from fresh water supply.
B) Overfilling of water tank only when power to unit is on.	1) High electrode coated with scale, or faulty.	Jumper from "HI" terminal to metal enclosure stops fill.	Remove electrode assembly. Clean both electrodes. If still no remedy and connections are good, replace assembly.
	2) Missing or faulty common connection for electrode circuit ("C" terminal to metal enclosure).	Jumper for "C" terminal (next to XL) to metal enclosure stops fill.	Make good secure connection. May require cleaning or replacement.
	3) Fill valve connected to "HEAT" terminal.	Visual.	Connect "BLACK" wire lead to "FILL" terminal.
	4) Dual Level printed circuit board faulty.	Jumper from "HI" to "C" does not stop fill.	Replace Dual Level Control.
C) Auto refill fails to fill water tank.	1) No power at equipment.	Nothing operates on machine.	Make sure main switch(es), fuse(s), circuit breaker(s), provide power to unit, that machine's circuit breaker is OK and power switch, if provided, is on.
	2) No water at equipment	"Crack" fitting at water inlet for pressure check.	Make sure all water supply line valves are open.

Problem	Possible Cause	Service Check	Remedy
C) Auto refill fails to fill water tank (continued).	3) Water strainer clogged.	Water pressure before strainer and not after.	Remove and clean micromesh screen filter located in water strainer.
	4) No power on Dual Level Control.	Check for 120V AC across “H” and “N” terminals.	If voltage missing or incorrect, check wiring for looseness, breaks, and proper connections.
	5) Fill solenoid valve clogged with scale or frozen closed.	Disassemble.	Clean out and/or replace plunger assembly or entire valve. May require new coil. Caution is advised to avoid damage to valve. See valve instruction sheet.
	6) Fill solenoid valve coil inoperative.	Jumper from “FILL” terminal to “H” terminal does not start fill.	Replace coil. Also check for frozen plunger. See valve instruction sheet.
	7) Electrodes shorting to ground.	Tank fills with electrode wire disconnected from “HI” terminal.	Replace electrode assembly. If no remedy, check for improper wiring (cut insulation) or electrode tips touching metal.
	8) Dual Level Control faulty.	Tank does not fill with electrode wire disconnected from “HI” terminal.	Replace Dual Level Control.
D) Auto Refill is erratic.	1) Electrode shorting to ground completely or intermittently.	Tank fills with electrode wire disconnected from “HI” terminal.	Replace electrode assembly.
	2) Loose connection.	Visual. Check “C” and “HI” probe terminals as well as “FILL”. Also check neutral (white) wire at valve.	Push wire lead connector securely onto terminal(s). Replace connector if wire is frayed or broken.
	3) Dual Level Control faulty.	Tank does not fill with electrode wires disconnected from “XL” and “H” terminals.	Replace Dual Level Control.

Problem	Possible Cause	Service Check	Remedy
E) Tank fills with water, but heat does not come on.	1) Thermostat off.	Visual.	Make sure knob is turned fully clockwise.
	2) Thermostat inoperative or out of calibration.	Jumper across thermostat terminals causes heat to come on.	Recalibrate thermostat. If no remedy, or thermostat does not cycle, replace.
	3) Power relay or contactor inoperative.	Check for voltage (120V AC) across coil terminals.	If correct voltage, replace coil or entire device. If not correct voltage, check for loose wires, improper wiring or other cause.
	4) Low electrode faulty or covered with lime scale.	Jumper from "XL" terminal to metal enclosure allows unit to heat.	Clean electrodes. Check wiring. If still no remedy, replace electrode assembly.
	5) Dual Level Control faulty.	Jumper from "XL" terminal to "C" does not cause unit to heat	Replace Dual Level Control.
F) No water in tank, but heat comes on (heater damage likely).	1) Thermostat and fill valve connected to wrong terminals on Dual Level Control.	Visual	Thermostat (brown wire) must be connected to "HEAT" and fill valve (black wire) to "FILL".
	2) Electrode(s) shorting to ground.	Disconnecting wire (white) from "C" probe terminal provides low water heat cutoff and tank fill.	Replace electrode assembly. If no remedy, check for improper wiring (cut insulation for instance), or electrode tips touching metal inside tank.
	3) Dual Level Control faulty.	Heat comes on with no probe wires (HI, XL, C) connected	Replace Dual Level Control.

NOTE: The level control board works on the principle that water is conductive and with some pure water installations an increased sensitivity may be required in the level control system. Consult factory if this be the case.

If you still need help, call our service department at (800) 568-5715, Ext. 3 or (502) 425-4776 (Monday through Friday, 8 am - 6 pm EST) or an authorized service center in your area. Please have the model and serial number ready so that accurate information may be given.

Prior authorization must be obtained from Grindmaster Corporation's Technical Service Department for all warranty claims.

Service/Troubleshooting Solid State Air Agitation

A vibrator air pump is located in the control box. This pump supplies the air to the coffee liners. It is turned on directly by pushing the manual agitation switch, and automatically by the brew timer or solid state relay in series with the brew timer.

The manual agitation switch is a momentary contact, normally open single pole black push button switch. Depressing the button closes the switch contacts completing the circuit to the air pump. It is wired parallel to the automatic agitation circuit.

The automatic 30-second (approx.) operation of the air pump is provided by the output of the solid state brew timer or a separate solid state agitation relay in series with the brew timer. The delayed automatic agitation program (2 minute off time between end of spray and start of 30 second agitation) uses a delay solid state relay in series with the brew timer.

The following trouble shooting guide assumes that internal wiring is correct and 120V AC power is provided.

1. IF COFFEE LEVEL DOES NOT RISE BACK IN GAUGE GLASS, or is unusually slow to come back up, the very small vent hole in the clean out cap is clogged. Clear vent using a straight pin or similar object.

2. IF AGITATION DOES NOT STOP, check for sticking manual agitation switch. Where automatic agitation is built into timer, and manual switch checks okay, timer is defective and should be replaced. Where automatic agitation is a separate solid state agitation relay and manual switch checks okay, the relay is defective and should be replaced. If there is a constant “low” air pump output, the solid state timer or relay is defective and should be replaced.

3. IF NO AIR ENTERS LINER, check output of pump through outlet fittings on urn front. If okay, then make sure all connections are tight. Check for leaks at gauge glass, at top, bottom and at cleanout cap. May require new o-ring or silicone grease on top cap; upper or lower gauge glass washer; or, if chipped or cracked, new gauge glass. Also, make sure passageways through top cap and gauge base are clear.

4. IF LITTLE OR NO AIR COMES THROUGH FITTINGS ON URN FRONT, open control box and check pump operation. If pump operates, but has weak output, replace it. If air pump is okay, air lines between control box and front fittings are blocked or leak. Blockage usually is caused by overfilling liners. Use stiff thin wire to clear. If air lines leak, coffee liners are removed first, then tighten compression fittings at each end of lines.

5. IF NEITHER AUTOMATIC NOR MANUAL AGITATION OPERATES PUMP, pump is most likely defective and should be replaced.

6. IF AUTOMATIC AGITATION IS OKAY, BUT MANUAL DOES NOT WORK, replace manual agitation switch.

7. IF MANUAL AGITATION WORKS, BUT AUTOMATIC DOES NOT, replace the solid state brew timer or separate solid state agitation relay.

Installation and Service Instructions

53.20.10

For

202CB and 204CD Series

General Purpose Solenoid Valve

May 1983
Supd's 3-80

Safety Instructions

Attention: Read carefully before attempting to install, operate or service your Alco solenoid valve. Retain for future reference.

1. Read installation instructions - thoroughly. Failure to comply can result in valve failure or system damage or personal injury.
2. Do not use solenoid valves on applications or fluid media not specifically cataloged without prior approval of Alco Engineering Department.

   WARNING: DO NOT USE WITH FLAMMABLE OR EXPLOSIVE FLUIDS OR GASES. DO NOT USE IN EXPLOSIVE ATMOSPHERES.

   Use on these elements can result in product damage or personal injury.
3. Use of solenoid valves on applications not specifically cataloged can result in valve failure and/or system damage or personal injury. Do not utilize a solenoid valve on any system where the system pressure can exceed the safe working pressure of the valve.
4. CAUTION: Do not utilize a solenoid valve as a safety shut off.
5. Do not exceed MOPD (Maximum Operating Pressure Differential) or valve may fail to open when energized.
6. CAUTION: Always disconnect power source and depressurize the system before working on solenoid valve or system. If the power disconnect is out-of-sight, lock it in the open position and tag to prevent unexpected applications of power.
7. Direction of flow must correspond to Flow Direction Schematics.
8. Before energizing valve, be sure source voltage and frequency matches that on coil. Do not energize coil unless coil is securely attached to valve. See Coil Installation Instructions.
9. Prolonged use in excessive ambient temperature or humidity may damage coils.
10. Do not dent or bend or use enclosing tube as lever. A damaged enclosing tube may result in coil burnout or inoperative valve.
11. Foreign matter in the valve may result in seal leakage, sticking open or closed, or coil burnout. To prolong valve life and ensure system cleanliness use a strainer

Installation

Valve and Solenoid Position

1. For ease of installation, an Alco solenoid valve can be installed in any position. Gravity does not affect its operation.

   NOTE: Although all valves can be operated in any position, by mounting the valve upright there is less chance of malfunction caused by the collection of foreign material
2. The solenoid coil can be rotated 360° for ease of wiring. If possible do not reduce the length of the solenoid coil wire leads, so that if it becomes necessary to remove coil at a later date (for valve cleanout, etc.) wire leads will not have to be disconnected.
3. To allow for removal of the solenoid coil without removing the valve from its piping, allow at least 2 inches of clearance above the solenoid.
4. Be sure valve is installed so that its flow arrow on valve body corresponds to direction of flow thru piping.

FLUID TEMPERATURE RATING F°

Elastomer Code	Coil Code	
	AMG, AMC	AHG, AHC
B	180	
P	250	
N	180	
F	180	
T		365
V	250	

Identify valve elastomer code and coil code from valve model number and reference rating from table.

Valves are rated for use on air or other non-hazardous, non-toxic fluids, water and other aqueous, non-hazardous fluids, and steam.

Coil Installation Instructions

1. Before removing coil from valve, disconnect electrical power source. Failure to do so will cause coil to burn out.
2. Verify coil type, voltage and frequency. This information appears on the coil nameplate.
3. Place coil over the enclosing tube. Coil may be rotated 360° for easy wiring. It is recommended that coil lead connections be soldered on D.C. and 24V -50/60 Hz. applications.
4. Install valve nameplate. Pull tab on valve nameplate and peel off paper backing to expose adhesive. Stick nameplate on top of coil housing and press nameplate down firmly. If installing replacement coil, use valve nameplate supplied with valve. Press nameplate down firmly.
5. Install voltage nameplate and coil retainer. Press coil retainer down firmly to secure coil.

Wiring

1. Be sure your wiring conforms to all local and national electric codes.
2. For dual voltage coils, refer to the wiring schematic label on side of coil.
3. The coil circuit of each solenoid valve should be protected by adequate fuses.

WARNING

If not properly grounded, a hazard of electrical shock may exist. Install and ground unit in compliance with National, state, and local electrical codes.

Disassembly
Disassemble in the same general order as indicated in exploded - view illustrations except as noted in the following steps:

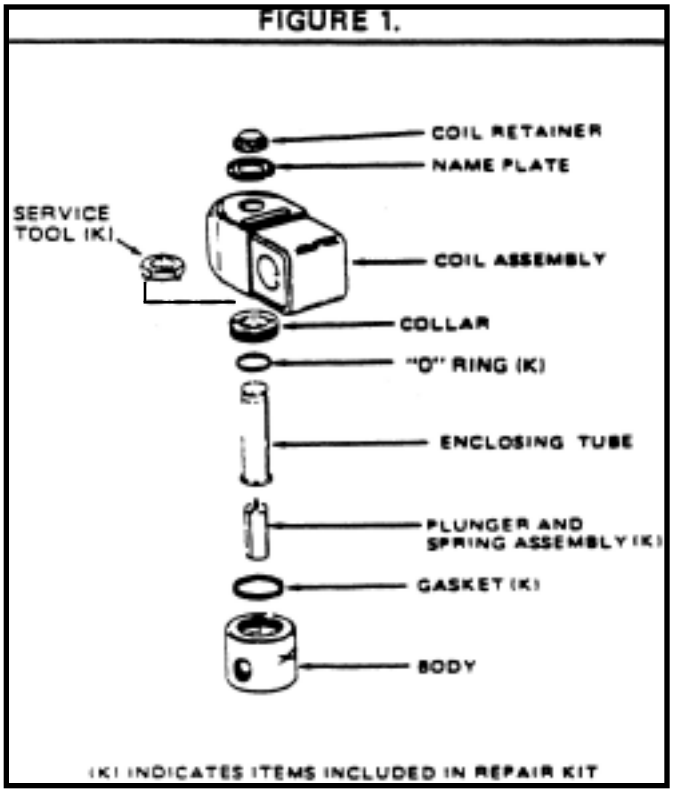
1. De-pressurize valve and disconnect electrical power source.
2. To remove solenoid coil:
   Insert small screwdriver into gap in voltage nameplate. Slide screwdriver tip under coil retainer and snap off. If replacing coil, use knife to separate adhesive-backed valve nameplate from coil. Keep valve nameplate.
3. To remove collar, use service tool X11981-1 shown in Figure 1

   Note: Do NOT lose nameplate, as it is extremely important if it becomes necessary to order a parts kit, coil or duplicate valve.

Assembly
1. Assemble in the reverse general order of disassembly.
2. Lubricate gasket and "O" ring *sparingly* with a compatible lubricant such as a Silicon base lubricant.
3. All moving parts must move freely over the full length of its intended travel.

Troubleshooting
1. Check system fuses, electrical wiring and system source voltage as specified.
2. Is flow direction arrow on valve the same as system flow direction?

FIGURE 1.



Cleaning
As with all valves, it may become necessary to clean them periodically to keep them in peak operating condition. Any cleaning methods or fluids used should be compatible with valve materials.

Inspection
1. All moving parts and elastomers should be clean in appearance without permanent set; springs should be free of corrosion. If any appear damaged, replace them with a parts kit which contains all moving parts necessary to rebuild valve to an "as new" condition.

2. Inspect enclosing tube assembly for wear, exterior dents or other conditions which would impair free movement of the poppet and/or plunger assembly. Its interior should be clean and free from any obstructions. Be especially critical of its valve seat.

Testing
1. Apply correct voltage to valve solenoid and cycle solenoid several times. A distinct click should be heard each time the solenoid is energized.

2. Pressurize valve and check for leaks.

   Note: Alco solenoid valves are equipped with a continuous-duty solenoid coil, which when energized for an extended period of time becomes hot to the touch. This is a safe operating temperature. Any excessive heating will be indicated by smoke and odor of burning coil insulation.

3. Are all system relays operating?

4. Is system source pressure as specified?

5. Are all system components free from obstruction?

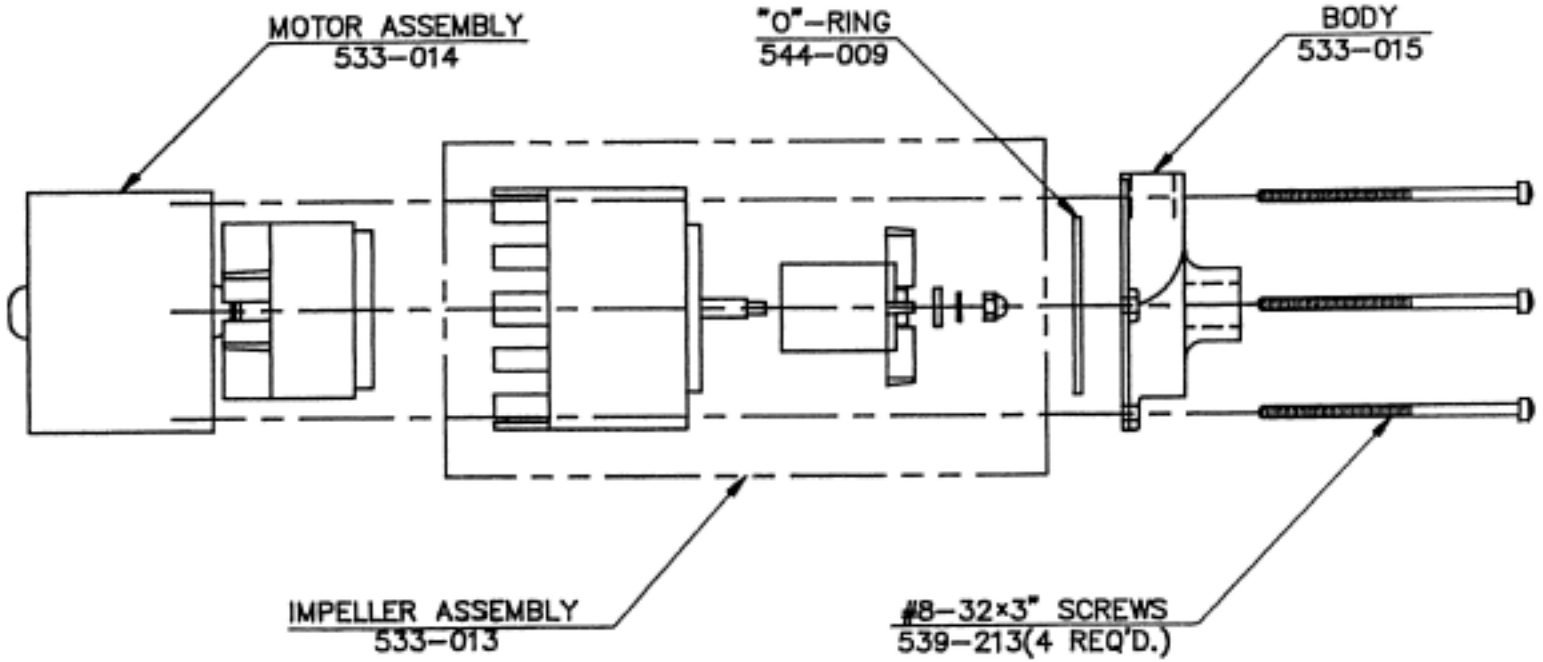
Repair Kits - The following Repair Kits are available.

Valve Series	Kit Part No.	Valve Series	Kit Part No.
202CB -B	K-1063	204CD -B	K-1072
202CB -F	K-1066	204CD -F	K-1075
202CB -N	K-1067	204CD -N	K-1073
202CB -P	K-1064	204CD -P	K-1076
202CB -T	K-1068	204CD -T	K-1077
202CB -V	K-1065	204CD -V	K-1074

Valve Series	Kit Part No.
For 1/4" Orifice Only	
204CD -B	K-1162
204CD -V	K-1164
204CD -T	K-1167
204CD -P	K-1166

Coils
1. Junction box (AMG) is supplied as standard on all valves.
2. The following coil housings are available:
   a. Conduit Connection (AMC) c. Open Frame (AMF)
   b. GROMMET 18" Leads (AML) d. Spade Connection (AMS)
3. Use only Alco coils on Alco valves.

Alco Controls Division • Emerson Electric Co.
P.O. Box 12700 • St. Louis, Missouri 63141 • 314-569-4500
Customer Service • 314-569-4666



COMPLETE PUMP = PART NO. 533–012

REVISIONS		
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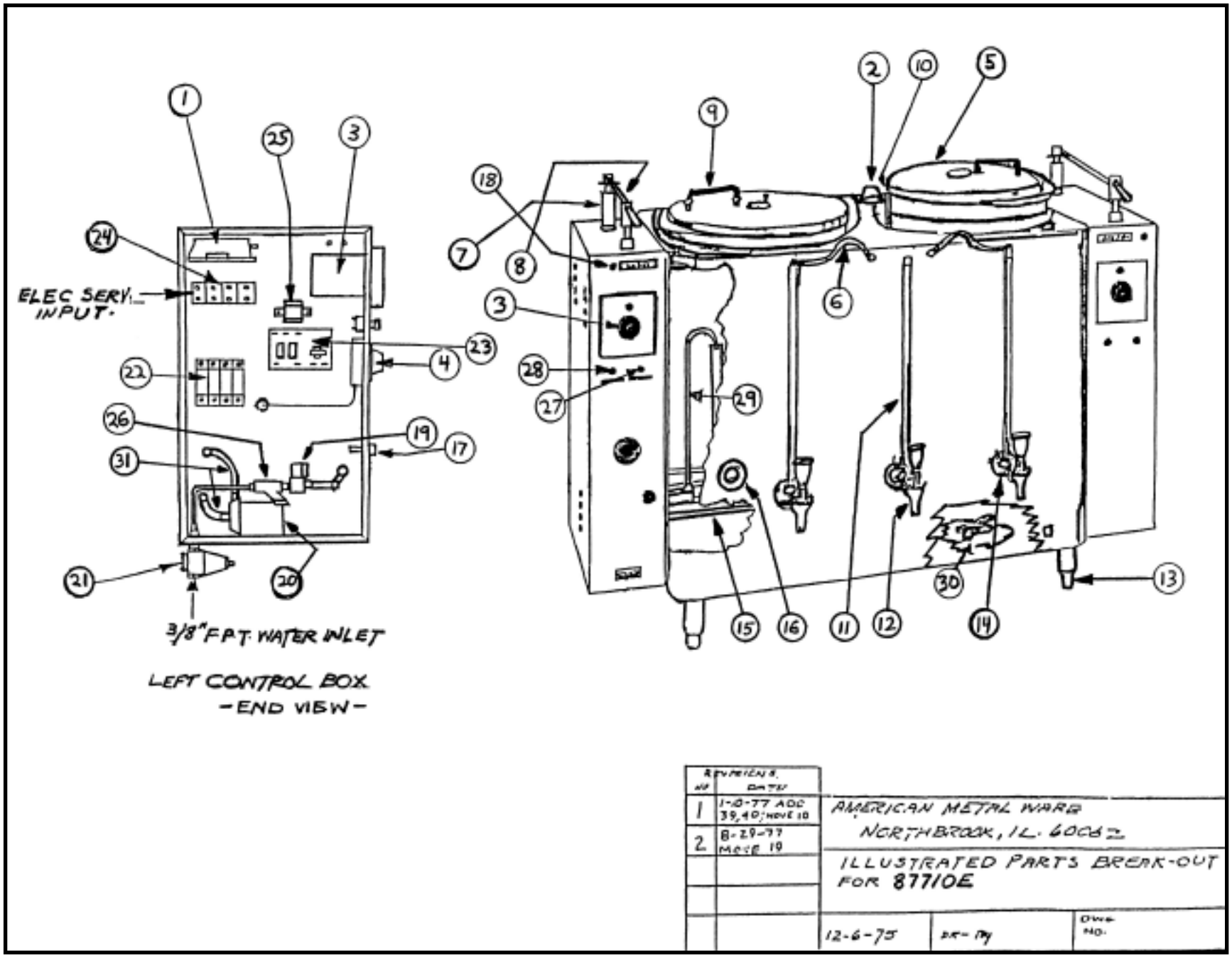
AMERICAN METAL WARE
1835 Raymond Drive, Northbrook, Illinois 60062-6778

SCALE: NONE	MAT'L		
DRAWN: MKG	CHK'D	APP'D	
DATE: 9–3–87	DATE	DATE	
TITLE: HARTELL SPRAYOVER PUMP PARTS BREAKDOWN		DRWG NO.: 093-011	



REVISIONS NO	DATE	
1	1-10-77 ADD 39,40; MOVE 18	AMERICAN METAL WARE NORTHBROOK, IL. 60062
2	8-29-77 MOVE 19	ILLUSTRATED PARTS BREAK-OUT FOR 87710E
		12-6-75 DR- TM DWG NO.

List of Illustrated Parts

(see page 21)

1. Dual Air Pump
2. Electrode Assembly
3. Timer
4. Thermostat
5. Cover
6. Air Agitation Tubing
7. Vent Tube
8. Spray Arm Assembly
9. Cover Handle
10. Brew Basket
11. Gauge Glass Assembly
12. Faucet
13. Leg
14. Shank with Wing Coupling Nut
15. Electric Immersion Water Heater
16. Thermometer
17. Circuit Breaker
18. Manual Agitation Switch
19. Fill Solenoid Valve
20. Sprayover Pump
21. Water Pressure Regulator
22. Heater Contactor
23. Liquid Level Control - Dual
24. Power Input Terminal Block
25. Solid State Relay - Automatic Air Agitation
26. Water Strainer
27. Start Push Button
28. Stop Push Button
29. Refill Water Inlet Standpipe
30. Boiler Drain Valve
31. Pump Silicone Tubing

87710E Parts

522005	Gauge Shield, Coffee, 15”
522046	Gauge Shield, Water, 14”
522035	Gauge Glass, Coffee, 15”
522048	Gauge Glass, Water, 14”
522026	Upper Gauge Glass Washer
522027	Lower Gauge Glass Washer
522030	Gauge Shield Aluminum Bracket
522094	Coffee/Water Faucet
522102	Silicone Seat Cup for Faucet
522120	Stainless Steel Spring for Faucet
A-682	Gauge Shield Cap for Plug-In cleanout cap
A-689	Plug-in Cleanout Cap with “O” Ring for Agitation
A-1132	Plug Cleanout Cap with vent hole for Water
532064	1/4” FPT Water Strainer
506001	Dial Thermometer
531011	Spray Nozzle w/Body
1214031	10 Gallon Spray Arm Assembly
521014	“O” Ring & Teflon Seal Kit Spray Arm
513001	Cover Handle Kit
507003	ATC Timer, Standard
507011	ATC Timer w/Lock & 2 Keys
530-007	Half Batch Timer
531-012	Half Batch Selector Switch
549-000	Dual Liquid Level Control
515001	Black Start Push Button
515002	Red Stop Push Button
504019	KR48 Thermostat - Opt 47
504001	Thermostat, Heater Circuit
533-012	Sprayover Pump
533-004	Sprayover Pump Complete Assembly
533-013	Pump Repair Kit
512012	Sprayover Pump Silicone Tubing 5/8” O.D. x 3/8” I.D.
524006	Pinch Clamp for 5/8” O.D. Tubing
712-017	Electrode Assembly - 6 & 10 Gallon Pump Urn
508004	Dual Air Pump
512011	Silicone Tubing 1/4” O.D. x 1/8” I.D. for Air Agitation
515001	Manual Agitation Push Button
712-050	Solid State Delayed Air Agitation Relay Assembly - Complete
531-024	Solid State Delayed Air Agitation Relay - Only
5220001	Urn Liner Washer
537-060	Alco Tank Refill Solenoid Valve
537-061	Alco Valve Repair Kit
537-062	Alco Valve Replacement Coil
532068	Boiler Drain Valve
BB810	10 Gallon Brew Basket
BB810-6	1/2 Batch Brew Basket
BB810WP	10 Gallon Filter Paper
BB6WP	6 Gallon Filter Paper

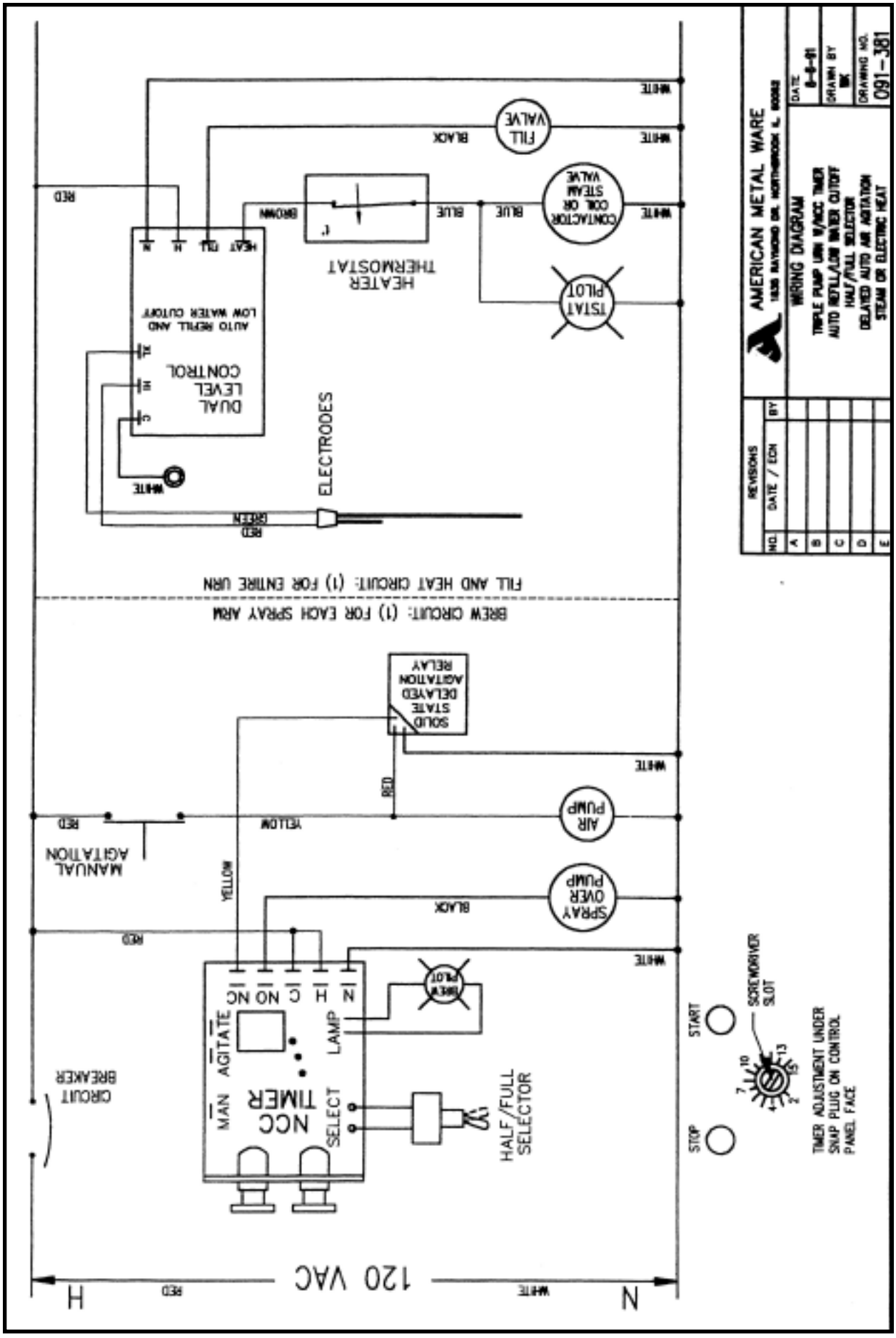
Electric Heat Only

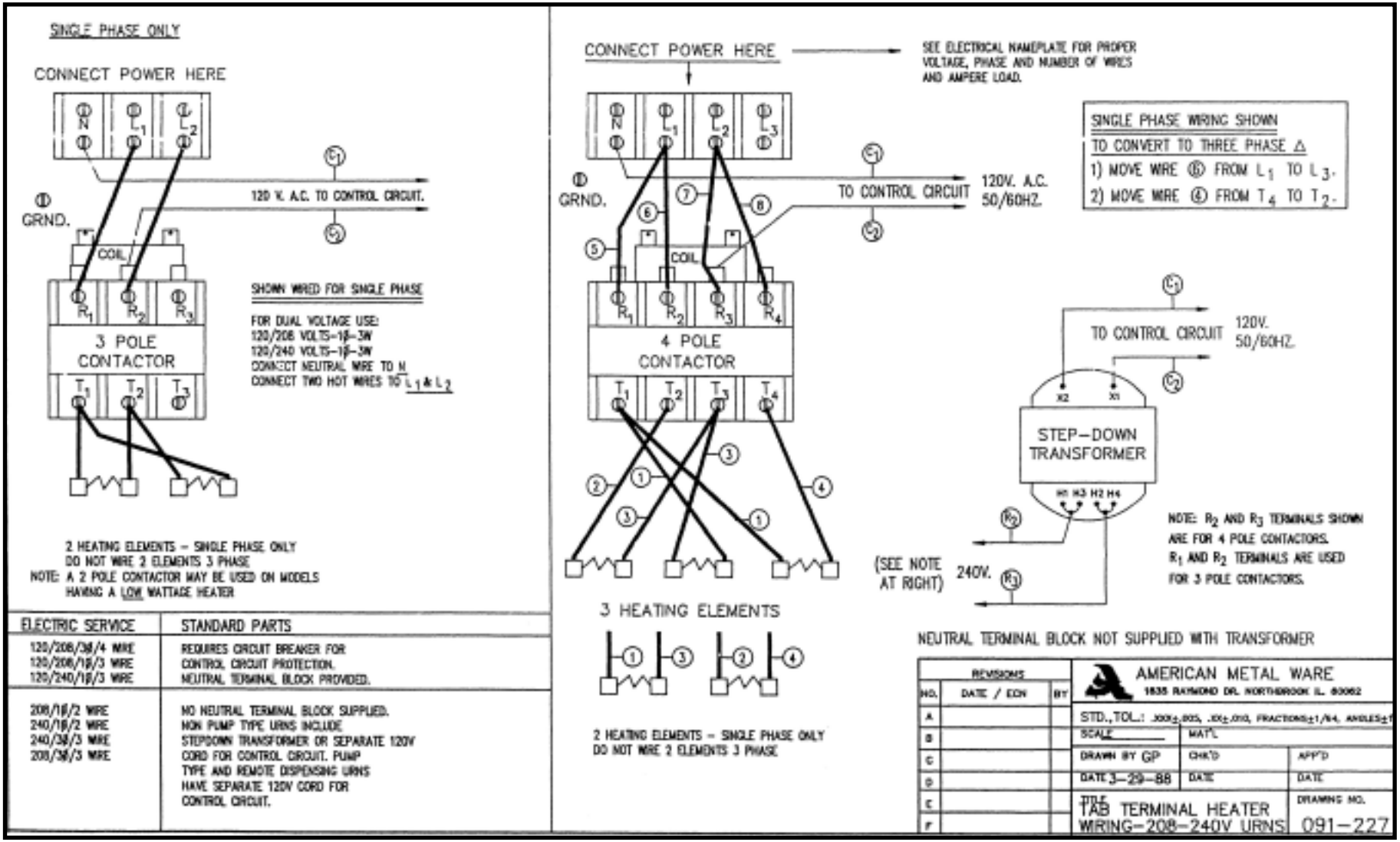
514005	4 Pole Heater Contactor
514009	3 Pole Heater Contactor
515072	Circuit Breaker

Heating Elements - Specify Volts, Watts & Phase or Urn’s Serial Number

Steam Heat Only

506009	Steam Solenoid Valve - 0-50 PSI
506014	Repair Kit for Steam Solenoid Valve 506009
506016	Replacement Coil for Steam Solenoid Valve 506009
532027A	Steam Strainer 1/2” FPT


AMERICAN METAL WARE
WIRING DIAGRAM
TRIPLE PUMP URN W/ACCC TIMER
AUTO REFILL/LOW WATER CUTOFF
HALF/FULL SELECTOR
DELAYED AUTO AIR AGITATION
STEAM OR ELECTRIC HEAT
091-381
REVISIONS
DATE / ECN
BREW CIRCUIT: (1) FOR EACH SPRAY ARM
FILL AND HEAT CIRCUIT: (1) FOR ENTIRE URN
DUAL LEVEL CONTROL
AUTO REFILL AND LOW WATER CUTOFF
HEATER THERMOSTAT
ELECTRODES
FILL VALVE
CONTACTOR COIL OR STEAM VALVE
TSTAT PILOT
SOLID STATE DELAYED AGITATION RELAY
AIR PUMP
SPRAY OVER PUMP
MANUAL AGITATION
CIRCUIT BREAKER
ACCC TIMER
MAN AGITATE
SELECT
LAMP
BREW PILOT
HALF/FULL SELECTOR
START
STOP
SCREWDRIVER SLOT
TIMER ADJUSTMENT UNDER SNAP PLUG ON CONTROL PANEL FACE
120 VAC
H
N



ELECTRIC SERVICE	STANDARD PARTS
120/208/3ϕ/4 WIRE 120/208/1ϕ/3 WIRE 120/240/1ϕ/3 WIRE	REQUIRES CIRCUIT BREAKER FOR CONTROL CIRCUIT PROTECTION. NEUTRAL TERMINAL BLOCK PROVIDED.
208/1ϕ/2 WIRE 240/1ϕ/2 WIRE 240/3ϕ/3 WIRE 208/3ϕ/3 WIRE	NO NEUTRAL TERMINAL BLOCK SUPPLIED. NON PUMP TYPE URNS INCLUDE STEPDOWN TRANSFORMER OR SEPARATE 120V CORD FOR CONTROL CIRCUIT. PUMP TYPE AND REMOTE DISPENSING URNS HAVE SEPARATE 120V CORD FOR CONTROL CIRCUIT.

REVISIONS		
NO.	DATE / ECN	BY
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B		
C		
D		
E		
F		

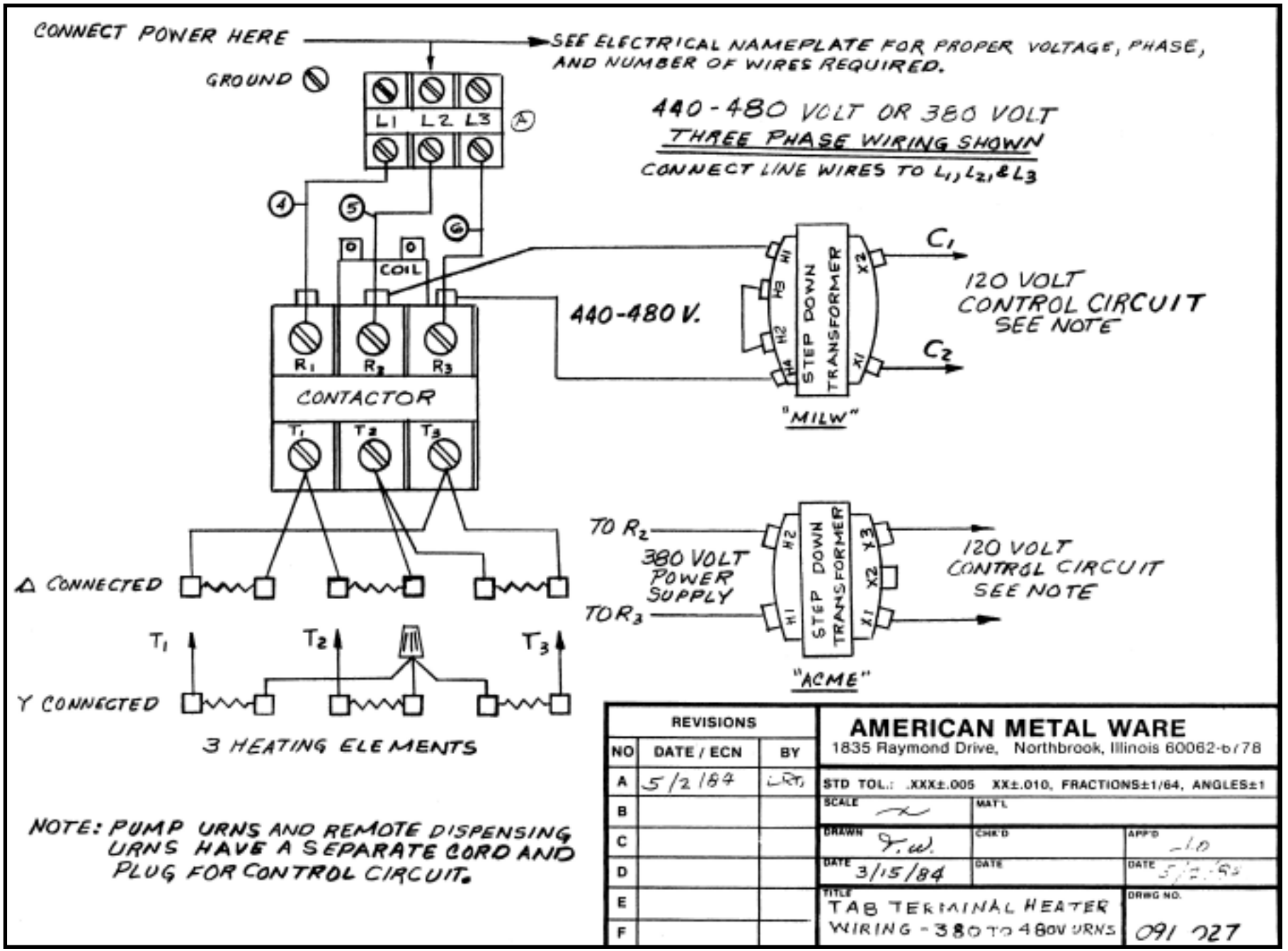
AMERICAN METAL WARE
1835 RAYMOND DR. NORTHBROOK IL. 60062

STD., TOL.: .XXX±.005, .XX±.010, FRACTIONS±1/64, ANGLES±1°

SCALE	MAT'L	
DRAWN BY GP	CHK'D	APP'D
DATE 3-29-88	DATE	DATE

TITLE: TAB TERMINAL HEATER WIRING-208-240V URNS

DRAWING NO. 091-227


CONNECT POWER HERE
SEE ELECTRICAL NAMEPLATE FOR PROPER VOLTAGE, PHASE, AND NUMBER OF WIRES REQUIRED.
GROUND
L1 L2 L3
440-480 VOLT OR 380 VOLT
THREE PHASE WIRING SHOWN
CONNECT LINE WIRES TO L1, L2, & L3
COIL
R1 R2 R3
CONTACTOR
T1 T2 T3
440-480 V.
STEP DOWN TRANSFORMER
H1 H3 H2 H4 X2 X1
C1
C2
120 VOLT CONTROL CIRCUIT SEE NOTE
"MILW"
Δ CONNECTED
Y CONNECTED
T1 T2 T3
3 HEATING ELEMENTS
TO R2
380 VOLT POWER SUPPLY
TO R3
H2 H1 X3 X2 X1
120 VOLT CONTROL CIRCUIT SEE NOTE
"ACME"
NOTE: PUMP URNS AND REMOTE DISPENSING URNS HAVE A SEPARATE CORD AND PLUG FOR CONTROL CIRCUIT.
REVISIONS
NO DATE / ECN BY
A 5/2/84
B
C
D
E
F
AMERICAN METAL WARE
1835 Raymond Drive, Northbrook, Illinois 60062-6178
STD TOL.: .XXX±.005 XX±.010, FRACTIONS±1/64, ANGLES±1
SCALE
MAT'L
DRAWN F.W.
CHK'D
APP'D
DATE 3/15/84
DATE
DATE 5/2/84
TITLE
TAB TERMINAL HEATER WIRING - 380 TO 480V URNS
DRWG NO.
091 027

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