

SMOKE-MASTER

250R-FS

THE LITTLE RED

SMOKEHOUSE

250FS & 250 FSE



OPERATIONS AND SERVICE MANUAL

READ AND UNDERSTAND THIS OPERATIONS AND SERVICE MANUAL BEFORE USING THIS MACHINE. FAILURE TO FOLLOW OPERATING INSTRUCTIONS COULD RESULT IN PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT.

KEEP THIS MANUAL IN A SAFE LOCATION FOR FUTURE REFERENCE

J&R MANUFACTURING

820 W. Kearney, Suite B
P. O. Box 850522
Mesquite, TX 75185-0522

(972) 285-4855 (Texas)

(800) 527-4831 (All 50 States & Canada)

(972) 289-0801 (Parts & Service)

(972) 288-9488 (Fax)

ADVERTENCIA

Leer y comprender el Manual de operaciones y servicio antes de usar esta máquina.

El incumplimiento de las instrucciones de operación podría causar lesiones graves o daño al equipo.



WARNING

Read and understand operations and service manual before using this machine.

Failure to follow operating instructions could result in personal injury or damage to equipment.

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Reorder No. 8980-02WHPS

ADVERTENCIA

Riesgo de explosión

1. Nunca utilizar químicos volátiles como líquido para encender carbón, gasolina, grasa, etc., para encender o ayudar a prender un fuego. Nunca utilizar gas (natural o propano). Utilizar únicamente leña o ayudas que sean sólidas (poco volátiles) para encender el fuego.
2. Siempre deberá "RETIRARSE" por lo menos un minuto antes de abrir cualquier puerta para evitar retrocesos de la llama.



WARNING

Explosion hazard

1. Never use volatile chemicals such as charcoal lighter fluid, gasoline, grease, etc. to start or aid fire. Never use gas (natural or propane). Use only kindling or safe (low volatility) solid fire starting aids.
2. Always "EVAC" for at least one minute before opening any door to avoid flashbacks.

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WARNINGS!

Disposal of Ashes

Ashes should be placed in a metal container with a tight-fitting lid. J&R offers ash carts suitable for this purpose. The closed container of ashes should be placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

Creosote – Formation and Need for Removal –

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire. The chimney connector and chimney should be inspected at least twice monthly to determine if a creosote buildup has occurred. If creosote has accumulated it should be removed to reduce the risk of a chimney fire.

Dedicated flue

If this unit is to be directly vented (no exhaust hood) do not connect to a flue serving another appliance.

DANGER-Risk of Fire or Explosion

Do not burn garbage, gasoline, drain oil or other flammable liquids

WARNING-Risk of Fire

Do not operate with flue draft exceeding 0.03 in. water column.

Do not operate fuel loading or ash removal doors open.

Do not store fuel or other combustible material within marked installation clearances.

Inspect and clean flues and chimney regularly

If the oven temperature reaches 450 degrees F, a high limit thermostat will temporarily interrupt the temperature control function (it will automatically resume when it cools down). If this occurs (or if the indicating thermostat shows an abnormally high temperature) and the front doors feel excessively hot, **DO NOT OPEN THE DOORS**, as there may be a grease fire inside. Open the doors only after it cools down. Contact your supervisor (if applicable) while continuing to observe the pit. If you observe any flames, or perceive any fire threat, immediately contact the local fire department.

CAUTION-Hot Surfaces

Keep children away.

Do not touch during operation.

SMOKE-MASTER
Model 250R-FS
THE LITTLE RED
SMOKEHOUSE
Models 250FS and 250FSE

OPERATIONS AND
SERVICE MANUAL

MANUFACTURED BY:

J & R MANUFACTURING

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MODELS 250 R-FS, 250 FS, and 250 FSE

The operation of these units is very similar.

The 250 R-FS is physically larger, has fixed meat shelves, and an electrical heating element as standard equipment.

The 250 FS and 250 FSE also utilize fixed meat shelves. The 250 FSE has an electrical heating element as well.

The electrical heating elements are always mounted in the convection fan air stream at the top of the units. The heater elements are controlled by either the primary or secondary thermostat but will only operate if the Heater Element Switch on the control panel is energized.

INSTALLATION INSTRUCTIONS

1. Your unit will be shipped fully assembled. It can be handled with a 4000 pound capacity forklift. Uncrate and inspect for concealed shipping damage. Install the casters (packed inside the unit).
2. Move unit into position.
3. Vent according to venting instructions on the following pages.
4. Clearances: (in inches) From Any Combustibles:

Above Top Of Casing	From Front	From Back	From Sides	From Chimney Connector
12	48	6	1	18

Floor: Unit to be installed on a non-combustible floor

5. Electrical
 - a. Units without an electrical heater element. The electrical requirement is 115 volts, single phase, 13A. Have your electrician directly wire the unit, making field connections inside the junction box provided. There should be a “designated circuit” for safe servicing of these units.
 - b. Unit equipped with an electric heating element. The electrical requirement is different. It will require either 208 volt or 230-volt single-phase service (the heater element has decreased wattage at the lower voltage). Directly wire the unit, making the field connections inside the junction box provided. **Supply circuit requires three conductors plus ground (L1, L2, N, G).** A two pole, 30-amp breaker is required. Turn the circuit breaker off and tag it whenever servicing as this is the only way to completely de-energize all components of the machine.

Venting Requirements

Our barbecue ovens are listed under multiple standards, including U.L. 737 (Fireplace Stoves), U.L. 2162 (Commercial Wood-Fired Baking Ovens), and U.L. 391 (Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces). These listing provide two alternatives for exhausting our units: direct venting and exhaust hood venting.

In all cases, it is imperative to obtain the approval of the AHJ (Authority Having Jurisdiction). This will typically be the mechanical inspection department of the local municipality's building inspection division and/or the local fire marshal.

Option One: Direct Venting

Our listings under U.L. 737 and U.L. 391 permit direct venting and the ventilation standard cited in each is NFPA 211 (Standard for Chimneys, Fireplaces, Vents, and Solid-Fuel Burning Appliances). All of our enclosed ovens are designed to be vented via a smokestack (chimney) with natural draft. All models incorporate smoke-control (bypass) mechanisms to contain smoke spillage when the oven doors or firebox doors are opened.

In all cases in which combustible construction is present, a factory-built Type HT chimney is required (refer to NFPA 211 6.3.1.2 and U.L. 103). Examples of such chimneys would be Selkirk "Ultra-Temp" and DuraVent "DuraTech".

If no combustible construction is present (examples: exterior installations or installations in which the oven is faced into a non-combustible exterior wall and the chimney is either uncovered or covered with a non-combustible weather covering), then a single wall metal chimney (Figure 5B) is acceptable if approved by the AHJ.

Air Balance

The building air balance is very important to the proper operation of your pit. The design requires an unimpeded flow of combustion air into the firebox and an unimpeded exhaust flow from the chimney connector to the the building exterior, whether the unit is directly vented or vented via an exhaust hood.

Combustion Air

Make sure adequate combustion air is available. Excerpt from NFPA 211 12.3:

"Solid-fuel burning devices shall be installed in a location and manner so as to provide ventilation and combustion air supply to allow proper combustion of fuel, chimney draft, and maintenance of safe temperatures... where buildings are so tight that normal infiltration does not provide the necessary air, outside air shall be introduced."

Option Two: Exhaust Hood Venting

U.L. 2162 cites NFPA 96 (Standard for Ventilation Control and Fire Protection for Commercial Cooking Operations) as its ventilation standard. While NFPA 96 allows direct ventilation with factory-built grease ducts or properly constructed welded ducts (with fire-rated enclosures), it also permits the exhaust hood ventilation option for our units.

It is very important that the filter bank be located toward the rear of the unit (near the chimney connector).

Refer to the specifications from the 2009 (or later) International Mechanical Code Section 507.13.1 (Extra Heavy Duty Cooking Appliances, Single Canopy, 700 CFM per linear foot of hood). Wall- mounted hoods will require less volume (550 CFM per linear foot).

Notes :

- 1. Exhaust volume should be determined by the exhaust hood manufacturer based on their products listing and local code requirements. States such as California, Oregon, Washington, and Connecticut all have code driven maximum exhaust volumes for specific equipment. For example: California mandates that solid fuel exhaust hoods for a wall mounted application can use NO MORE than 385 cfm/lf for solid fuel.**
- 2. Spark arrestor type filters are required.**
- 3. Hoods serving solid fuel equipment must be dedicated to solid fuel only (no gas or electric) with their own dedicated fire protection system.**

DESIGN

TEMPERATURE CONTROL:

A thermostat activates and controls the combustion air supply to the firebox and the exhaust from the pit through the flue damper. If the unit is equipped with an electrical heating element, the thermostat also controls it.

HEAT FLOW:

Heat and smoke flow through refractory lined flues into the cooking chamber and are circulated by a convection fan system.

EVACUATION SYSTEM:

Turning the EVAC switch on opens a damper to directly vent the firebox, opens exit dampers from the oven, and opens a fresh air supply damper at the top of the oven as the smoke is evacuated from the cooking chamber into the stack. Evacuation should be in 45 seconds to 2 minutes, depending on the net draft at the chimney connector (this depends on the air balance in the building).

EVAC OR STACK FAN:

A jet blower fan maintains a draft in the stack and pulls fresh ambient air into the stack to mix with the exhaust from the pit.

HIGH-LIMIT PROTECTION:

All dampers are closed and fans (except the cabinet cooling fans) are shut off if the temperature in the cooking chamber reaches 450° (reset is automatic upon cool down).

POWER INTERRUPTION PROTECTION:

Upon loss of power, all dampers close and the temperature will begin to drop.

GREASE HANDLING:

Grease is held in the sump in the bottom (coolest) part of the oven and is drained by opening a valve located behind an access door adjacent to the firebox.

OPERATIONAL SEQUENCING

COOK MODE:

Convection fan and EVAC fan are on. The primary (operator adjustable) thermostat energizes and is in control. When this thermostat requires additional temperature (sensed inside oven) to satisfy the set point, its contacts close thereby energizing the flue damper motor* (item 16) and the combustion air delay timer (item 13A). This causes the flue damper (item 18) the EVAC dampers (item 17), the firebox bypass damper (item 19), and the fresh air damper (item 20) to open. After a 90 second delay, the combustion air damper motor (item 13) is energized (thus opening the combustion air damper (item 14)) and the combustion air fan (item 12) is energized, while the firebox bypass damper, the EVAC dampers and the fresh air damper close. This 90-second delay occurs on every cycle of the thermostat. When the thermostat set point is satisfied, the thermostat contacts open resulting in the flue damper closing*, the combustion air damper closing, and the combustion air motor (fan) de-energizing.

*** Note: On units mfg. after 02/19 (250FS SN 7433 and higher; 250RFS SN 8379 and higher) the flue damper motor is energized at all times unless the unit is in the Hi-Temp mode.**

EVAC MODE:

The convection fan is off. The EVAC fan is on. The flue damper motor is energized and the flue damper opens. The EVAC damper motor is energized thus opening four dampers: two EVAC dampers (item 17), the fresh air damper (item 20), and the firebox bypass damper (item 19). The thermostats remain energized in this mode so that this mode can be used in starting the fire (see the operating procedures section of this manual). This mode is also used to vent the smoke from the unit prior to opening the door.

COOK AND HOLD MODE:

The only difference between this mode and the “cook” mode is that temperature control is shifted away from the primary thermostat to a preset secondary (or “hold”) thermostat after the operator set timer on the instrument panel counts down to zero. Then the temperature control reverts to the secondary thermostat and all other aspects of the “cook” mode are in operation.

HI-TEMP MODE:

If the oven temperature reaches 450 degrees all fans (except the cabinet cooling fans) de-energize and all dampers close. When the temperature falls below 450 degrees normal operations resume.

ELECTRICAL ELEMENTS:

The pit incorporates an electrical heating element in the oven which is energized whenever the control thermostat calls for a temperature rise as long as the “Element” switch is on. Turning the “Element” switch off only deactivates the element, leaving the wood burning temperature controls operational.

OPERATING PROCEDURES

1. STARTING THE FIRE.

(Caution: Use only *small* quantities of **green wood** *except for fire starting*. **NEVER USE CHARCOAL LIGHTING FLUID, GASOLINE, OR OTHER VOLATILE FUELS TO START THE FIRE.** In order to prevent gasket damage, never leave the firebox door partially open (either fully close and latch it or open it fully).

- a. Manual Fire Starting WITH COLD PIT – no coals in firebox.
 1. Use solid (safe) fire-starting blocks along with two small dry pieces of wood and a couple of logs (use 6” diameter x 24” long green hardwood in the firebox. As an alternative to the starter blocks, use kindling.
 2. Set Cooking Thermostat at desired temperature.
 3. Select the “EVAC” position on the selector switch.
 4. Light starter block or paper with match and close firebox door.
 5. After about 10 minutes turn the “EVAC” switch off and the “Cook” switch on (on “EVAC”, the oven will not begin warming because the heat will be bypassed up the stack).
- b. Manual Fire Starting – Coals Remaining in Firebox.
 1. Shovel out dead ashes as required.
 2. Set cooking thermostat at desired temperature.
 3. Select the EVAC position on the selector switch.
 4. Stir up live coals and place one or more small logs on the coals. Close the firebox door.
 5. Add more wood as needed to establish a good fire.
 6. See above, Starting The Fire, a. 5.

2. LOADING THE MEAT.

- a. Model 250FS Little Red Smokehouse.
 1. Turn thermostat all the way down.
 2. Turn on EVAC switch and wait at least 60 seconds before opening door. This will allow most of the smoke to be cleared from oven interior.
 3. The unit is equipped with 10 pull out racks (shelves). Place meat on racks – it may be necessary to remove some of the racks to fit the product height – being careful to leave space at sides, front and between the meat to allow good heat and smoke circulation.
 4. Close door and latch. Turn off EVAC switch and turn on Cook switch. Be sure to set the temperature indicator (red arrow) at your desired cooking temperature (see 3 Cook Operation and 4 Cook and Hold Operation).
- b. Model 250R-FS Smoke-Master. Same procedure as 1 through 4 above, except this unit has seven racks instead of ten.

3. “COOK” OPERATION.

- a. Set the Selector switch in the “Cook” position and set the thermostat to the desired cooking temperature. If the unit is equipped with an electric heating element turn HTR ELEM on as desired.

4. “COOK AND HOLD” OPERATION.

- a. Set the timer to the desired cooking time (see detailed instructions about timer).
- b. Turn the Selector switch to the “Cook and Hold” position.
- c. After the cooking time has elapsed, temperature control switches to an internal, preset, “hold” thermostat until the Selector switch is changed. The “hold” temperature is approximately 145 degrees. **NOTE:** The timer dial does not move as it counts down. When the timer indicator light is flashing, it is counting down. When this light stops flashing, it has completed its countdown.

5. INSPECTION OF MEAT.

- a. It is best not to open the doors interrupting the cooking process any more often than necessary. However, during the “get acquainted” process of learning your pit, you will probably inspect the meat more often. Remember you lose heat and moisture each time the door is opened.
- b. Evacuate – turn the thermostat all the way down, turn the EVAC switch on and wait at least 60 seconds before opening doors. Remember to turn off EVAC switch and reset thermostat to resume normal cooking. **Always EVAC** & Wait before opening doors.

6. INSPECTION OF FIREBOX DURING COOKING

(using the following procedure will minimize the smoke that can billow out of the fire box when opening the firebox door to check the condition of the fire or to add new logs to the existing fire).

- a) Turn the thermostat UP, above set point. Do this always.
- b) Wait approx. 2 mins before opening firebox door. Do this always.
(allows time for the combustion air system to activate, regenerating the fire; this reduces the potential for smoke spillage and/or flash-backs, as the hot fuel seeks fresh oxygen).
- c) Open the firebox door slowly. To avoid gasket damage, make sure the door is open fully.
- d) Add wood as required. Remove any embers that may have rolled out on to door frame bottom lip to avoid gasket damage.
- e) Close the door, return the thermostat to the cooking temperature (set point).

7. REMOVAL OF MEAT.

Racks can be pulled out to access and remove the meat.

8. HANDLING OF RENDERED GREASE.

Grease that collects in the bottom of the cooking chamber should be drained by threading the grease drain extension nipple onto the drain valve fitting and draining the grease into a suitable receptacle.

This grease should be stored in a closed barrel. Usually a company that buys and sells used grease will furnish a barrel.

9. CLEANING OF PIT.

a. Daily.

1. Drain grease as often as needed. Drain after every cooking to prevent a fire hazard.
2. Clean racks.
3. Wipe down exterior of pit (including firebox door) using a mild soap or detergent on wet cloth.
4. Clean any carbon build-up around the firebox door.
5. Place excess ashes in a fire-safe, closed container such as a J&R Mfg. ash cart. Ashes can start fires (example: dumpster fires) several days after removing them from the firebox.

b. Weekly or Bi-Weekly.

1. Remove oven racks and apply oven cleaner to the interior surfaces of the unit and wipe off. Be sure that all the oven cleaner has been removed with clear water after cleaning.
2. We recommend that foil or plastic be placed on the floor in front of pit when cleaning oven door and firebox door.
3. Clean the build-up on inside of firebox door.
4. Be very careful not to damage the electrical element in the top of the pit (if your pit is equipped with this option).

c. Monthly:

Remove the convection fan cowling from the ceiling of the oven and thoroughly clean ceiling, cowling, and fan impeller.

CAUTION: Turn off and tag breaker to prevent the convection fan or elements from being energized.

d. Annually:

Remove all rear inspection panels and clean the rear damper areas and stack plenum. Inspect and clean smokestack as required. Remove all interior baffles (at inside rear of oven) and clean.

10. HIGH TEMPERATURE PROTECTION.

- a. This pit is equipped with a safety thermostat control that will close dampers, deactivate fans, etc. if the interior oven temperature reaches 450 degrees.
- b. If the pit stops (lights go off, etc.) and the front door feels excessively hot to the touch, **DO NOT OPEN THE PIT** as there may be a grease fire inside. The pit will automatically resume operation when it cools down. Open the doors **after** it cools down.

11. TROUBLESHOOTING.

Refer first to the Service Manual and then call our Service Department at (972)-289-0801 if further assistance is required.

12. COOKING TIMES AND TEMPERATURE.

- a. The Barbecue Recipe Book gives times and temperatures for non-convection ovens.
- b. This unit is a Convection Oven and consequently cooks faster than ordinary ovens.
- c. We recommend that you cook as follows:

PRODUCT	TEMPERATURE	TIME
1. Spareribs	250°	1 ½ hours
2. Loin (Baby-back) Ribs	250°	1 hour
3. Chicken Halves	250°	1 ½ hours
4. Beef Brisket	185°	11 hours
5. Prime Rib	250°	4 hours

CAUTIONS.

- a. **Keep pit clean.**
- b. **Keep grease drained.**
- c. **Never allow exterior of pit near the top or the top itself to get wet. This will void all warranties and could severely damage the pit.**
- d. **Always disconnect the pit electrically before servicing or cleaning.**
- e. **Refer to Cleaning (above) and DO IT!**
- f. **A DIRTY PIT IS A HAZARD. DRY WOOD CAN BE A HAZARD, ESPECIALLY IF TOO MUCH IS USED (IT BURNS TOO RAPIDLY TO CONTROL PROPERLY). NEVER OPEN A PIT DOOR UNTIL IT HAS BEEN SWITCHED TO EVAC FOR AT LEAST 60 SECONDS. FLASHBACKS CAN OCCUR OTHERWISE. THE USE OF DRY WOOD CAN BUILD UP VOLATILE GASES IN THE PIT AND CAN ACTUALLY CAUSE SUDDEN PRESSURE INCREASES, WHICH CAN FORCE MEAT DOORS OR FIREBOX DOORS OPEN.**

PREVENTIVE MAINTENANCE – CLEANING

MONTHLY:

The interior fan cowling area should be cleaned. Remove the convection cowling (25), clean, and reinstall. Clean the convection fan impeller (26) at the same time.

ANNUALLY:

Remove the rear upper exterior skin panel. Remove the bolts that secure the hinged access cover (22) over the rear dampers and open the cover. For older models remove the rear EVAC and Flue access plate and the rear firebox damper access plate. Clean all the exposed cavities. Inspect and clean, as needed, the flue beneath the firebox bypass damper (19). To inspect this flue the damper will have to be in the open position. Either turn the unit to the EVAC setting or disconnect the firebox damper linkage and reconnect after inspection. Inspect and repair/replace as needed the damper gaskets associated with the EVAC dampers (17), the flue damper (18), and the firebox damper.

Inside the oven, remove the convection cowling (25) by removing the two “T” bolts (25A) and lifting the cowling off the rear clips. Then remove the EVAC outlet baffles (28), the oven heat outlet baffle (29), and the oven heat inlet baffle (30). Inspect and clean all areas behind these parts. Reinstall the parts.

Remove the roof cover. Clean carbon from top components. Remove the cover (20A) over the fresh air damper (20). Inspect, clean and repair/replace as needed the fresh air inlet damper (20) and gasket.

Inspect and lubricate the combustion air linkages. Clean the combustion air damper (14), and the combustion air inlet elbow (13B). Inspect the combustion air damper gasket (13C).

Inspect and lubricate as needed the damper linkages.

Inspect the interior of the firebox. Repair as required any damaged refractory.

GENERAL MAINTENANCE

Door Gaskets

The firebox door gasket and the oven door gasket should be smoke-tight. To stop smoke leaks, you may need to shim the hinge side, the latch side, or both. You may also need to “thicken” the gasketing by using additional (allow 4 hours to cure before closing the door) RTV silicone between the gasket and the body of the unit. Paper check the gasket seal by placing a long strip of paper between the gasket and the unit body so that the paper extends outside the door. Close and latch the door. Pull the paper toward you. It should be very resistant to your effort. If it seems loose, further adjust the door or the gasket thickness.

USING YOUR “COOK & HOLD” FEATURE

- I. The Cook & Hold timer will reset the oven temperature to 145 degrees F at the end of the time set on timer. However, it will take about 2 hours for the oven to cool down from 250 degrees to 145 degrees. So, cut about 2 hours off the time you want it to cook.
- II. Make sure your timer is set correctly for your purposes. It is set properly at the factory. See the detailed instructions in this manual for the timers.
- III. Procedures to follow:
 1. Load oven with meat.
 2. Set thermostat at desired cooking temp.
 3. Stoke firebox.
 4. Set hours to cook on timer (remember to reduce the cooking time setting due to the long cool down time of the oven). It will gradually cool from your thermostat setting to the preset 145° F hold setting. Use trial and error to arrive at optimum timer settings.
 5. Turn control from “COOK” to “COOK & HOLD”

IMPORTANT NOTE: In addition to the maintenance procedures described elsewhere in this manual, the electric heating elements and the convection fan impeller should be inspected regularly, daily if possible, and cleaned if necessary. If there is a heavy build up of soot or creosote, these surfaces should be cleaned with a stiff brush. This is especially important if the heater elements are not frequently employed. Heavy buildup on the elements can create a fire hazard.

Newer units with Idec "RTE" Timers:

Green "PWR" light will remain on, red "Out" light will illuminate when timer has timed out. For these timers the factory settings are mode: A, scale: 0-10, range: h.

Older units with Omron Timers:

Red light will illuminate, and green light will begin flashing, then the red and green lights will remain illuminated (steady, not flashing) when the timer times out. For these timers the factory settings are mode: A, time range: 12, time units: hours.

TROUBLESHOOTING

NOTE: Always de-energize the unit or the component in the unit before servicing and tag switches to warn others that service is in progress.

1. NO POWER (NOTHING WILL ENERGIZE)

Check the power supply to the unit. If no supply voltage or improper voltage, then check the breaker box. If power supply is OK then check for proper voltage at the contact block on the unit. If the voltage there is improper then repair the supply wiring from the junction box or from the plug (or repair the plug). If there is the proper voltage at the contact block then check the control fuse block and the high limit thermostat for continuity. Replace if no continuity.

2. CONVECTION FAN INOPERATIVE

Check the fuse and the high limit thermostat. Note that the unit must be in the “COOK” or “COOK and HOLD” mode with EVAC off for this fan to operate. Check the Convection Blower Contactor and Overload (CBO) (36 and 36A) and reset if needed (see enclosed sheet on the reset procedures). If overload has not tripped then check for proper voltage between terminals 4 & 6 of the CBO. If OK, check the Convection Blower Motor (10) itself. It has internal thermal protection. Replace the motor if defective. If the voltage between terminals 4 & 6 is not correct then trace the circuit rearward to find the problem.

3. EVAC FAN INOPERATIVE

Check the fuse and high limit thermostat. This fan will be operative in the “EVAC”, “COOK”, and “COOK and HOLD” modes. Duplicate the steps for the convection fan described in #2 above except check the overload and terminals on the EVAC Blower Contactor and Overload (35 and 35A) rather than the Convection Blower Overload.

4. CABINET COOLING FAN(S) INOPERATIVE

These fans should run at all times when the unit is plugged in or wired into a power supply. Check the power supply and verify the proper voltage to the contact block on the unit. If they are OK then check the wiring to each motor. If the wiring is OK the fans should be replaced.

5. COMBUSTION AIR MOTOR (FAN) AND/OR COMBUSTION AIR DAMPER MOTOR INOPERATIVE

Check the fuse and high limit thermostat. The combustion air fan (12) and the Combustion Air Damper Motor (13) are energized when the unit is in either the “COOK”, “COOK and HOLD”, or “EVAC” modes and the appropriate thermostat is calling for a temperature increase (recall the 60 second delay for this fan after the thermostat contacts close). If the combustion air damper actuator is energized (i.e. the damper is open) and the wiring to the combustion air fan is OK, then replace the fan. If the reverse is true, then check the Combustion Air Damper Motor and replace if defective.

If both are inoperative check for proper voltage at terminal 3 of the Combustion Air Delay Timer (13A). If voltage is proper and neutral continuity is verified at the Combustion Air Fan and the Combustion Air Damper Motor then replace both components. If the voltage is not OK then check for proper voltage between terminals 2 and 7 of the Combustion Air Delay Timer. If the voltage there is OK then replace it. If not OK then check the thermostat for proper voltage and replace/repair as needed.

6. HEATER ELEMENT INOPERATIVE

First verify that a thermostat is calling for a temperature rise and that the heater element switch is on. Next check the fuse and high limit thermostat. Check the voltage between terminals 4 and 8 of the Heater Element Relay (27A). If OK and if the wiring between the Heater Element Relay and the Heater Element (27) is OK then replace the heater element. If the voltage between terminals 4 and 8 is not OK, then trace the circuit rearward to find the problem.

7. EVAC DAMPER MOTOR INOPERATIVE

Check the fuse and high limit thermostat. Check for proper voltage at terminal 4 of contact block A on the EVAC Switch (3). If voltage is OK and the wiring is OK between the switch and the EVAC Damper Motor (15) then the damper motor may need to be replaced. First, however, verify that the damper motor has not just overheated. This damper motor has an internal limit switch – it must be allowed to complete its power stroke and close its limit switch contacts. Otherwise, it will overheat, trip out internally and then eventually fail completely. When adjusting linkages always let the motor complete its power stroke (amperage then drops to about 0.2) before connecting any load to the pivoting arm. If voltage at terminal 4 is not OK then trace the circuit rearward to find the problem.

8. FLUE DAMPER MOTOR INOPERATIVE

Use the same procedure as for the EVAC Damper motor except verify the voltage at terminal 4 of contact block B of the EVAC switch.

9. SMOKE LEAKS

Check for proper EVAC fan function. Has the unit been cleaned as per the schedule in the cleaning maintenance section? Check the gaskets for proper seal (see the cleaning maintenance section for adjustment details). If gaskets are to be replaced it is important to remove all old gasket material and mastic material and clean with solvent to degrease before installing a new gasket. Use RTV silicone as mastic.

10. SOOTING ON MEAT.

The wood being used is either too dry, too much wood is being used, or the unit is not venting properly. Check the flues and baffles for obstructions. Check the stack for buildup. Check the EVAC fan function and verify the operation of the flue damper.

11. COOKING FAST OR SLOW.

If the temperature is holding at the set point, then check the thermostat calibration. If over-riding, then check all the gaskets, the Flue Damper Motor, and the Combustion Air Damper Motor. If the temperature is under-riding or is sluggish to respond, then check for flue or baffle obstructions, stack buildup, EVAC fan function, Combustion Air Damper Motor function, and check the Flue Damper Motor function.

12. UNEVEN COOKING.

Check the Convection Fan operation. Clean the convection fan cowling and the convection fan impeller.

13. “POOFING” – PRESSURIZATION DURING OPERATION.

Unburned combustible gases can be driven off a wood fire when the fire is oxygen deprived. When oxygen is reintroduced, these gases ignite and result in a pressure increase. For this reason there is a 60 second delay in every combustion air cycle. The flue damper and EVAC dampers open immediately and after the delay of 60 seconds combustion air flows into the firebox. If pressurization is observed check the Combustion Air Delay Timer. If the delay time is correct, then check for proper drafting of the unit.

Pressurization usually results from improper firing of the unit. Green wood is required. Dry wood can cause the pressurization problem. Too much wood in the firebox can also be the culprit. The problem is directly related to the rate of combustion (dry wood burns faster) and surface area (quantity of fuel). Charcoal should not be used as a fire-starting aid due to its large surface area.

MODEL 250 SERIES NOMENCLATURE

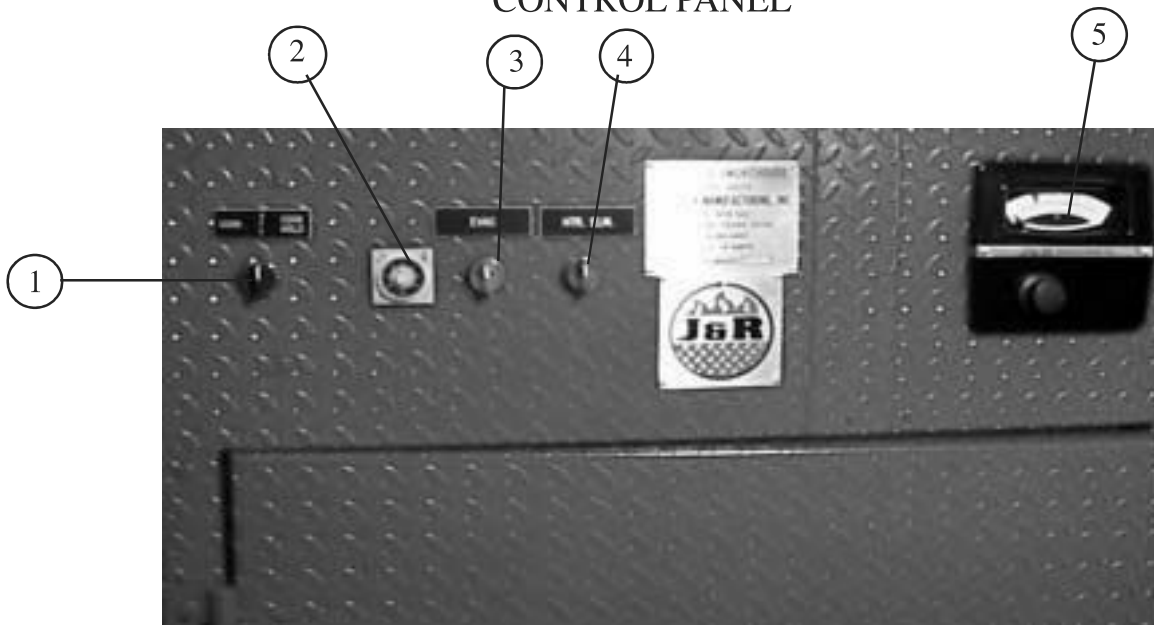
1. COOK – OFF -- COOK and HOLD Switch
2. Timer
3. EVAC Switch
4. Heater Element Switch
5. Oven Control Primary Thermostat
- 5A. J Box for Secondary and High Limit Thermostats.
6. Secondary (or Hold) Thermostat
7. High Limit Thermostat
8. 6 Amp Slow Blow Fuse
9. Cabinet Cooling Fan
10. Convection Blower Motor
11. EVAC (or Stack) Blower Motor
- 11A. EVAC Blower
12. Combustion Air Fan
13. Combustion Air Damper Motor
- 13A. Combustion Air Delay Timer
- 13B. Combustion Air Inlet Elbow
- 13C. Combustion Air Damper Gasket
14. Combustion Air Damper
15. EVAC Damper Motor
16. Flue Damper Motor
17. EVAC Damper (1 of 2)
18. Flue Damper
19. Firebox Bypass Damper
- 19A. Firebox Flue
20. Fresh Air Inlet Damper
- 20A. Fresh Air Inlet Damper Cover
21. Fresh Air Inlet

MODEL 250 SERIES NOMENCLATURE

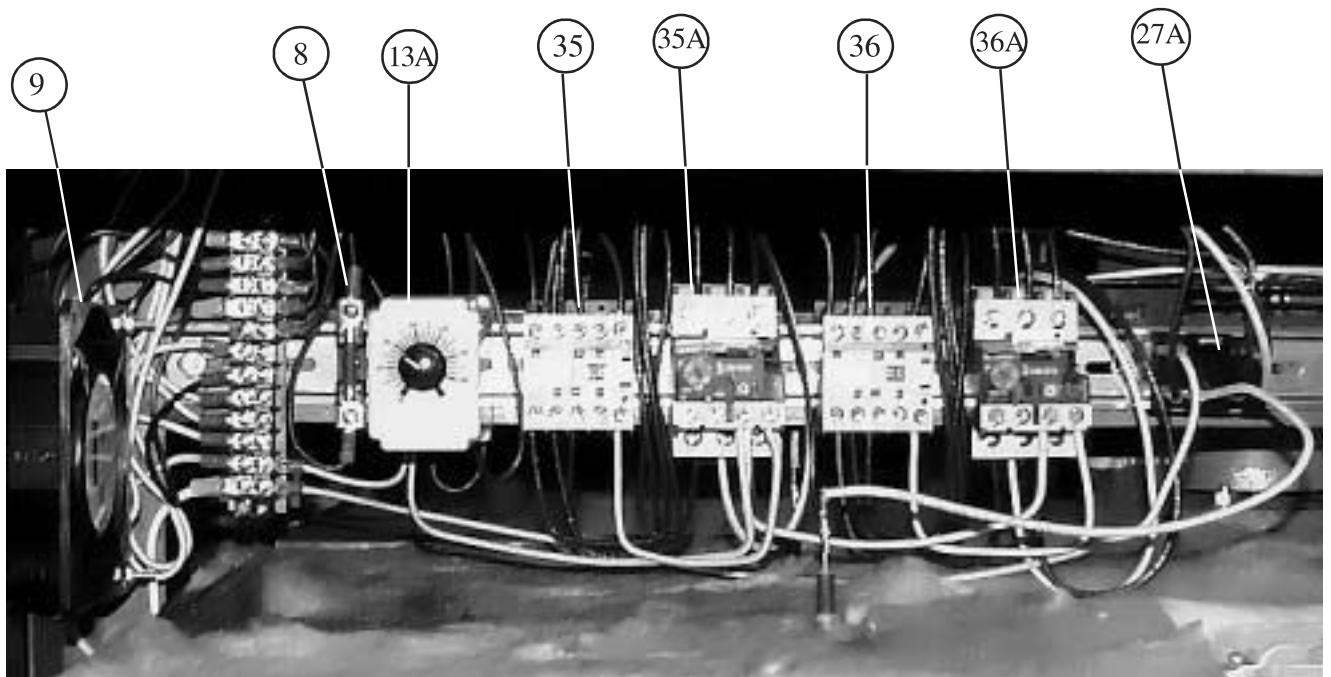
Continued

- 22. Hinged Damper Access Cover
- 22A. Hinged Stack Plenum Access Cover
- 23. Oven Heat Outlet (1 of 2)
- 24. Oven Heat Inlet
- 25. Convection Cowling
- 25A. Convection Cowling "T" Bolts (1 of 2)
- 25B. Convection Cowling Retainer Clips (1 of 2)
- 26. Convection Blower Impeller
- 27. Electric Heater Element
- 27A. Heater Element Relay
- 28. EVAC Outlet Baffle (1 of 2)
- 28A. EVAC Outlet (1 of 2)
- 29. Oven Heat Outlet Baffle
- 30. Oven Heat Inlet Baffle
- 31. Stack Connector
- 32. Stack Jet Nozzle
- 33. Grease Drain Valve
- 34. Grease Drain Pan
- 35. EVAC Blower Contactor
- 35A. EVAC Blower Overload
- 36. Convection Fan Contactor
- 36A. Convection Fan Overload
- 37. Firebox Door
- 38. Firebox Door Silicone Rubber Gasket
- 39. Firebox Door Fiberglass Gasket

CONTROL PANEL



INSIDE CONTROL PANEL

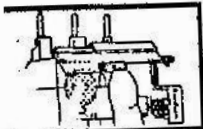
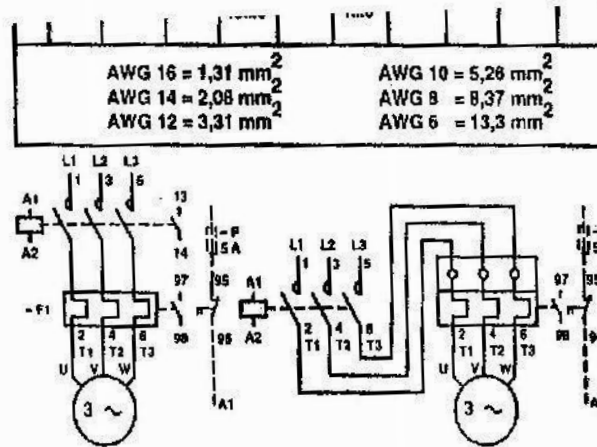


HIGH LIMIT AND HOLD THERMOSTATS

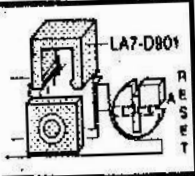


RESETTING OVERLOADS

	c	100	110	111
	b	81	86	86
	e	50	55	55
	i	44	54,7	52,1
	s	16,7	27,4	24,8
1	LP	D09	D25	D32
2		D12		
		D18		
	c	135	154	155
	b	81	86	86
	e	50	55	55
	i	44	54,7	52,1
	s	16,7	27,4	24,8



Réglage du relais
 OVERLOAD ADJUSTMENT
 EINSTELLUNG DES RELAIS
 REGOLAZIONE DEL RELE
 REGULATION DEL RELE
 REGULAÇÃO DO RELÉ

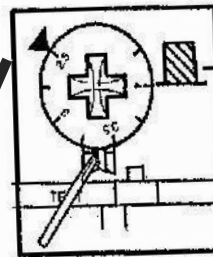


Verrouillage Arrêt
 SEALED STOP
 /ERRIEGELUNG STOP
 BLOCCO DELLA FUNZIONE ARRESTO
 PRECINTADO PARADA
 ENCRAVAMENTO PARAGEM



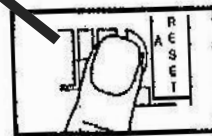
ferrouillage du réglage (capot plombable)
 SEALED ADJUSTMENT (SEALING COVER)
 EINSTELLUNG ABDECKBAR
 PLOMBIERBARER DECKEL
 BLOCCO DELLA REGOLAZIONE
 SPORTELLLO PIOMBABILE
 PRECINTADO DE LA REGULACION
 CAPÓ DE PRECINTADO
 ENCRAVAMENTO DA REGULAÇÃO
 TAMPA SELÁVEL

RE- SET HERE

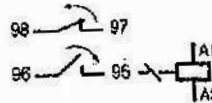


Témoin de déclenchement
 TRIP INDICATOR
 AUSLÖSEANZEIGE
 TESTIMONE DI SGANCIO
 TESTIGO DE DISPARO
 TESTEMUNHO DE DISPARO

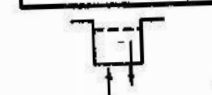
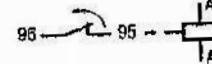
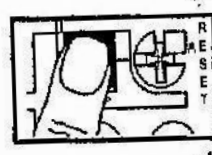
Simulation de déclenchement
 TRIP TEST
 AUSLÖSESIMULATION
 SIMULAZIONE DI SGANCIO
 SIMULACION DE DISPARO
 SIMULAÇÃO DE DISPARO



Fonction Réarmement
 RESET FUNCTION
 FUNKTION RÜCKSTELLUNG
 FUNZIONE RIARMO
 FUNCION REARME
 FUNÇÃO REARME



Fonction Arrêt
 STOP FUNCTION
 FUNKTION STOP
 FUNZIONE ARRESTO
 FUNCION PARADA
 FUNÇÃO PARAGEM

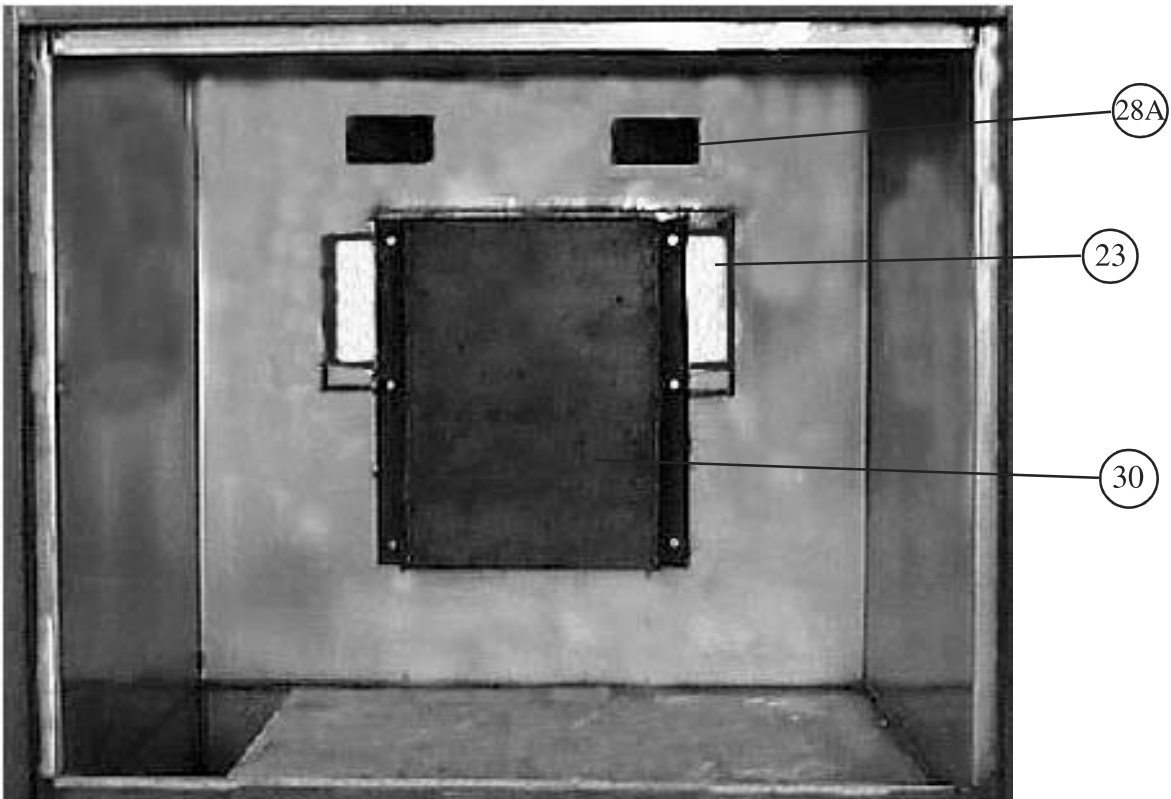


Réarmement manuel (H) et auto (A)
 MANUAL (H) - AUTO (A) RESET
 POSITION RÜCKSTELLUNG
 HAND (H) - AUTO (A)
 RIARMO MANUALE (H) ED
 AUTOMATICO (A)
 REARME MANUAL (H) Y AUTO (A)
 REARME MANUAL (H) E AUTOMÁTICO (A)

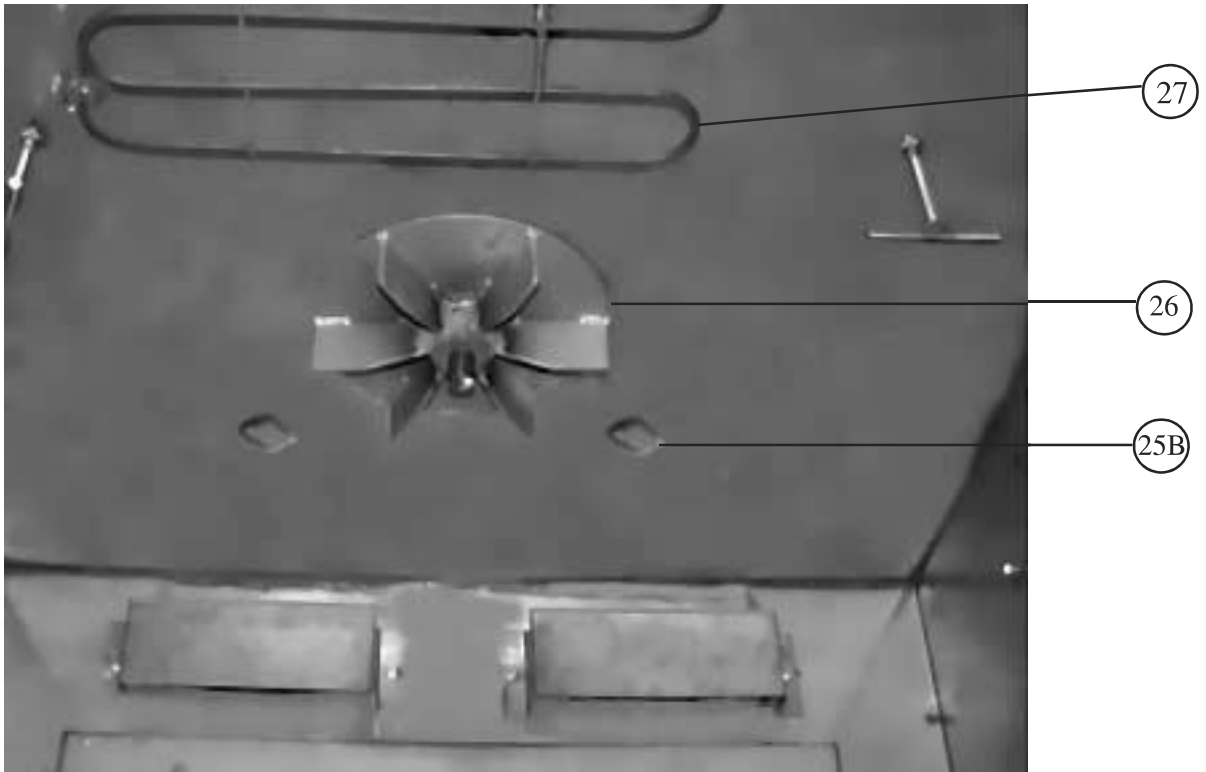
INTERIOR VIEW WITH ALL BAFFLES IN PLACE



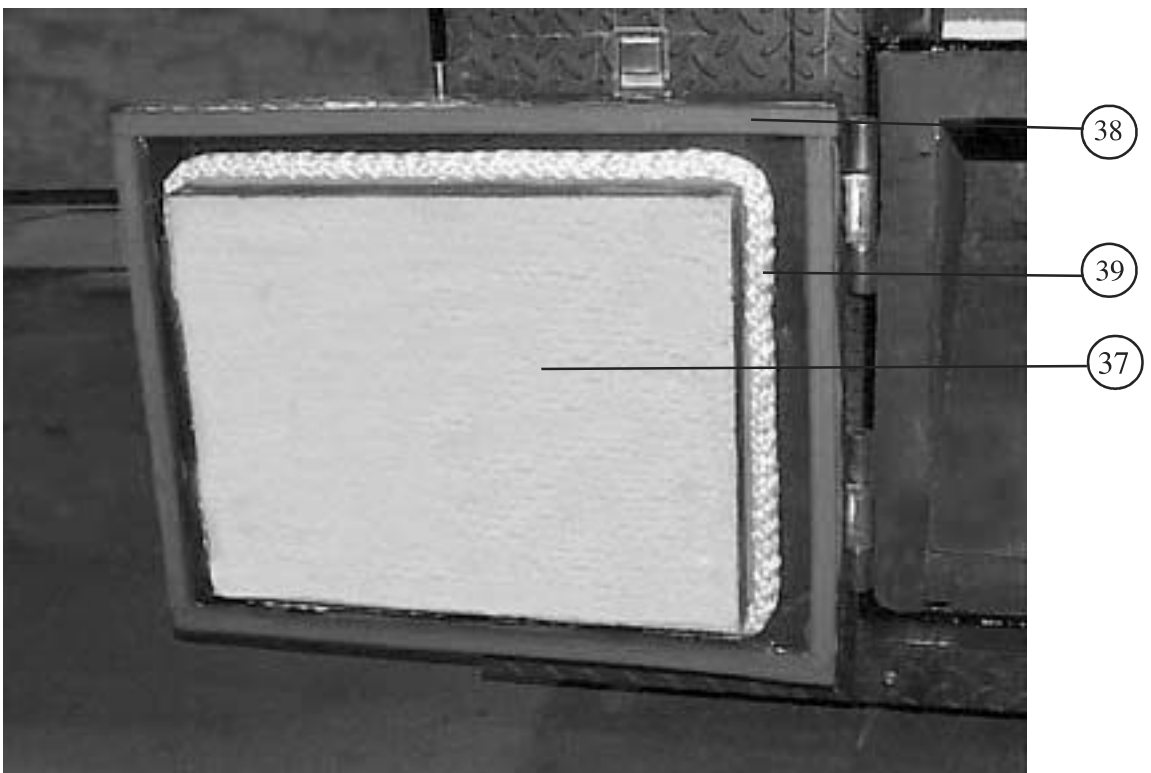
INTERIOR VIEW WITH MOST BAFFLES REMOVED



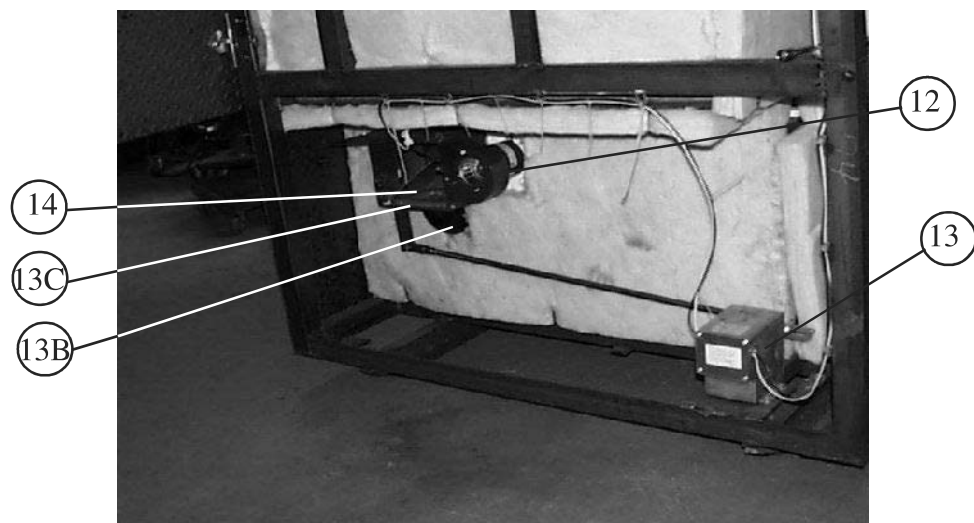
INTERIOR VIEW COWLING REMOVED



FIREBOX DOOR



SIDE VIEW SHOWING COMBUSTION AIR ASSEMBLY



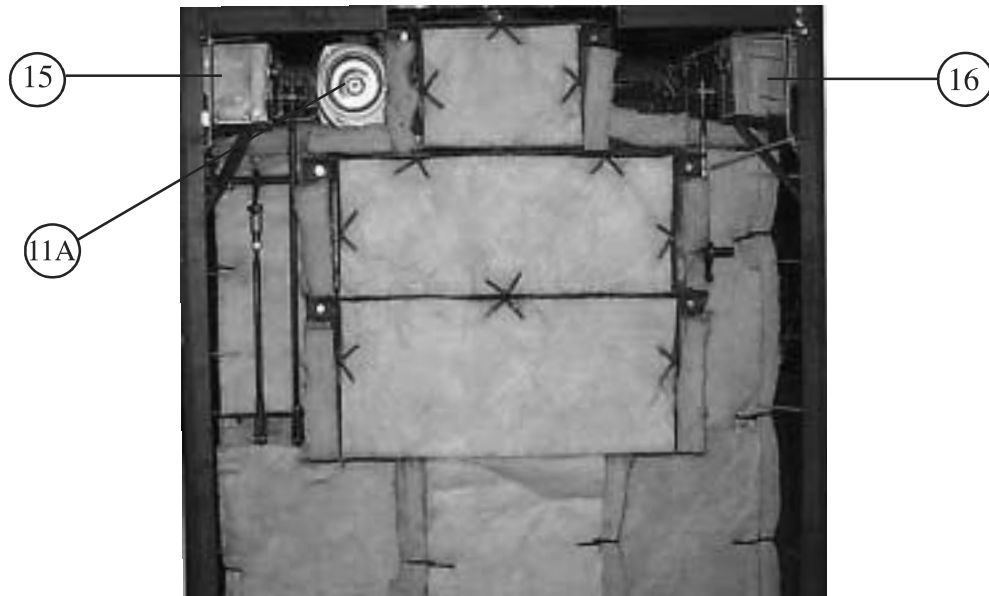
FRESH AIR INLET SHOWN WITH DAMPER OPEN



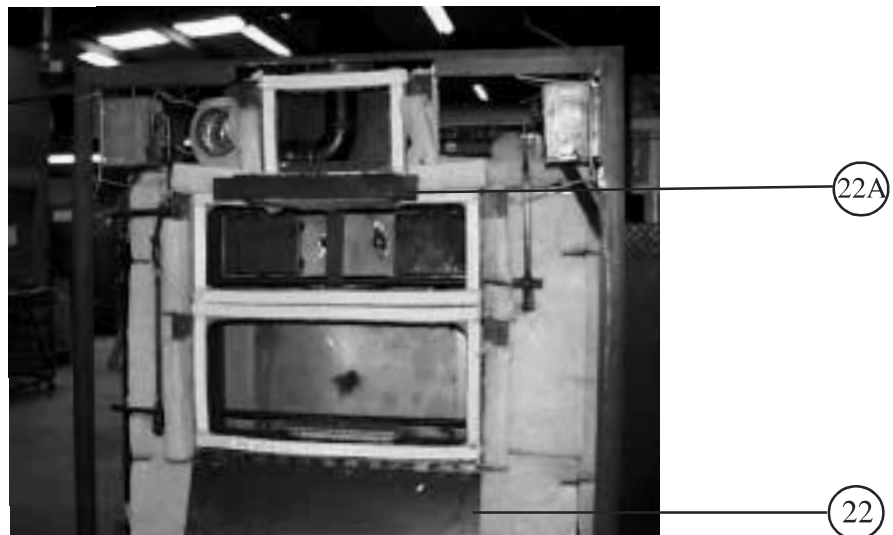
TOP VIEW



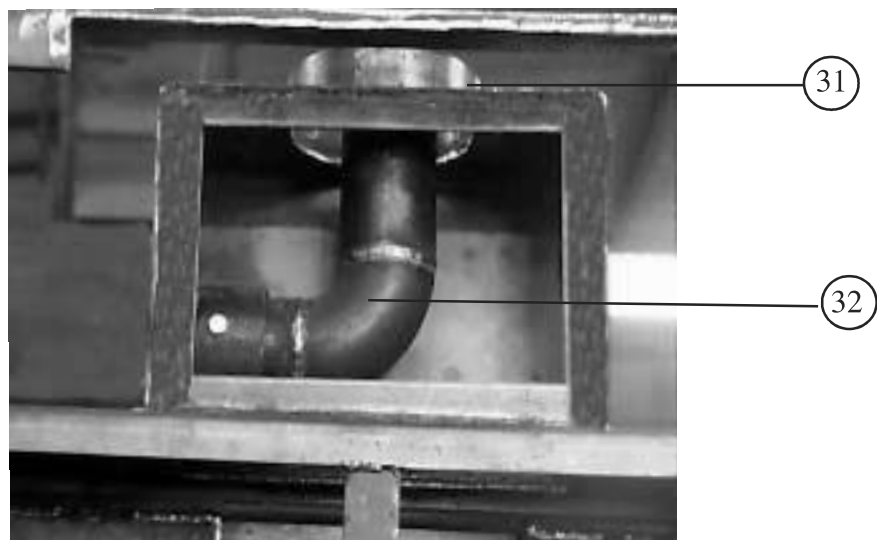
REAR VIEW WITH EXTERIOR PANELS REMOVED



REAR VIEW WITH ACCESS PANELS OPEN



STACK JET NOZZLE AND STACK CONNECTOR



ALL DAMPERS OPEN (EVAC POSITION)



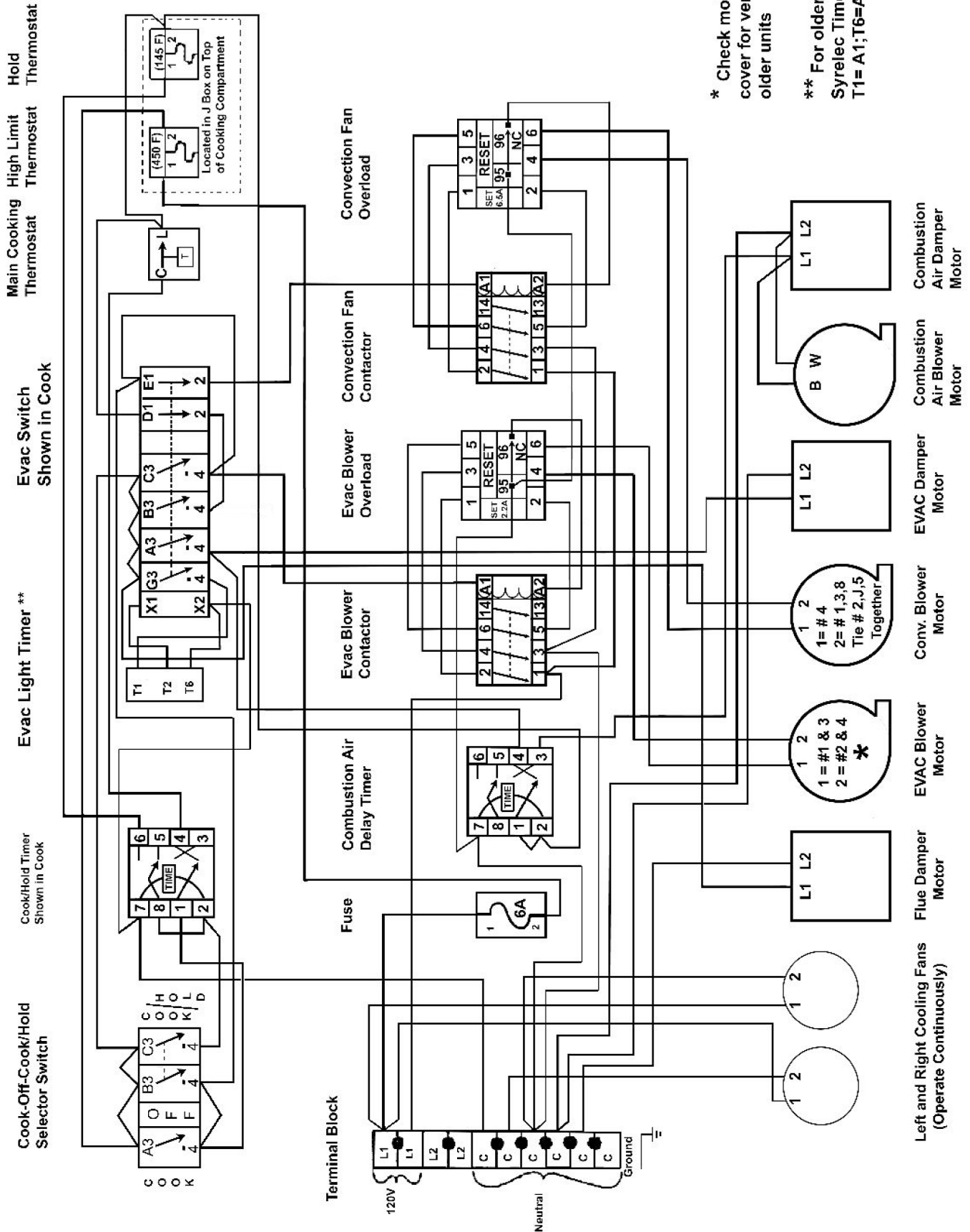
* NOTE: DAMPERS ARE HIGHLIGHTED FOR ILLUSTRATION PURPOSES

FLUE DAMPER OPEN



MODEL 250FS (120 VOLTS)

Rev. 2/19
For Units Mfg. 02/19
and later
S.N.7433 and higher

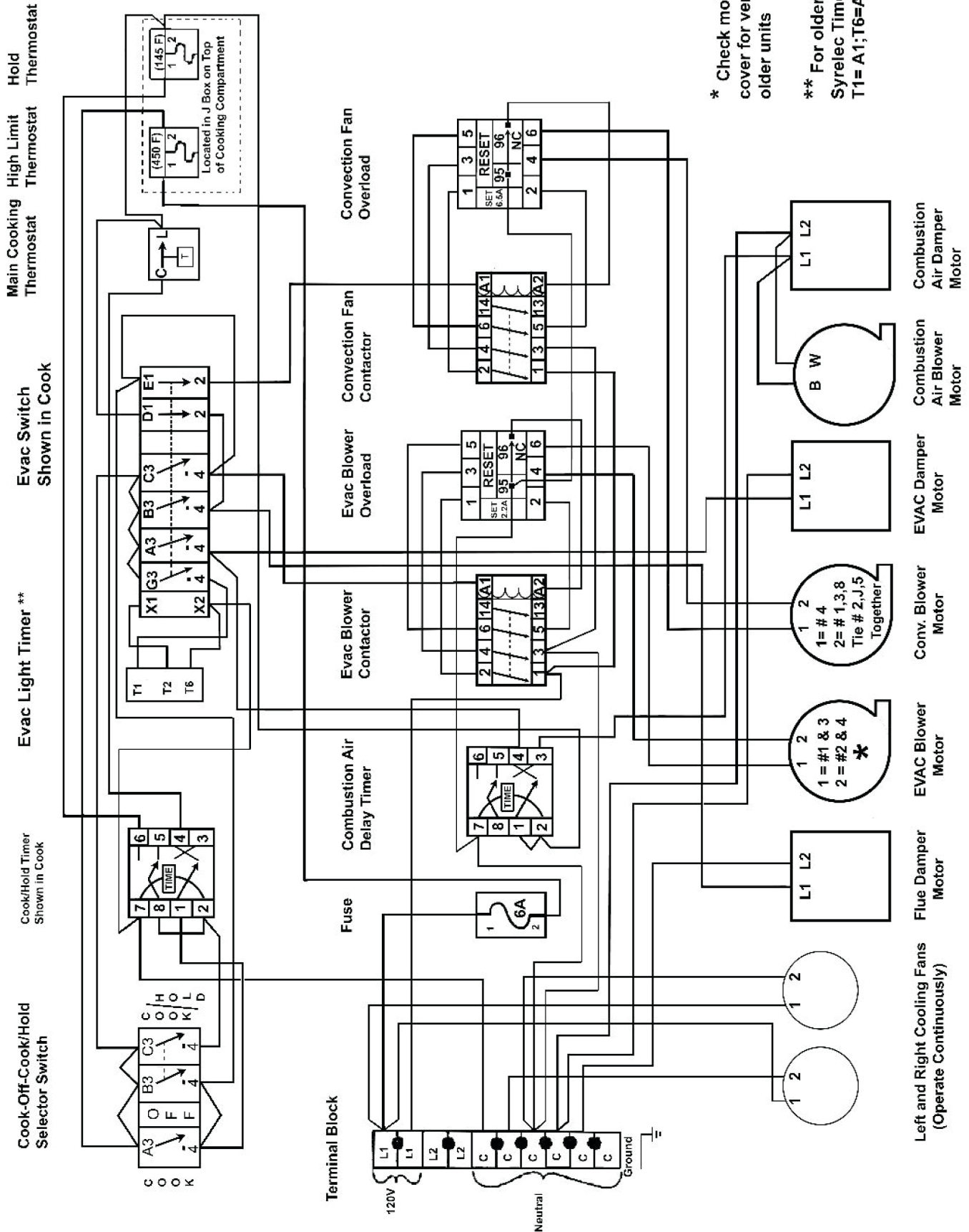


* Check motor junction box cover for verification on older units

** For older units with Syrelec Timers:
T1= A1; T6=A2; T2=1B

MODEL 250FS (120 VOLTS)

Rev. 03/19
For Units Mfg.
04/98-01/19
SN's up to 7432

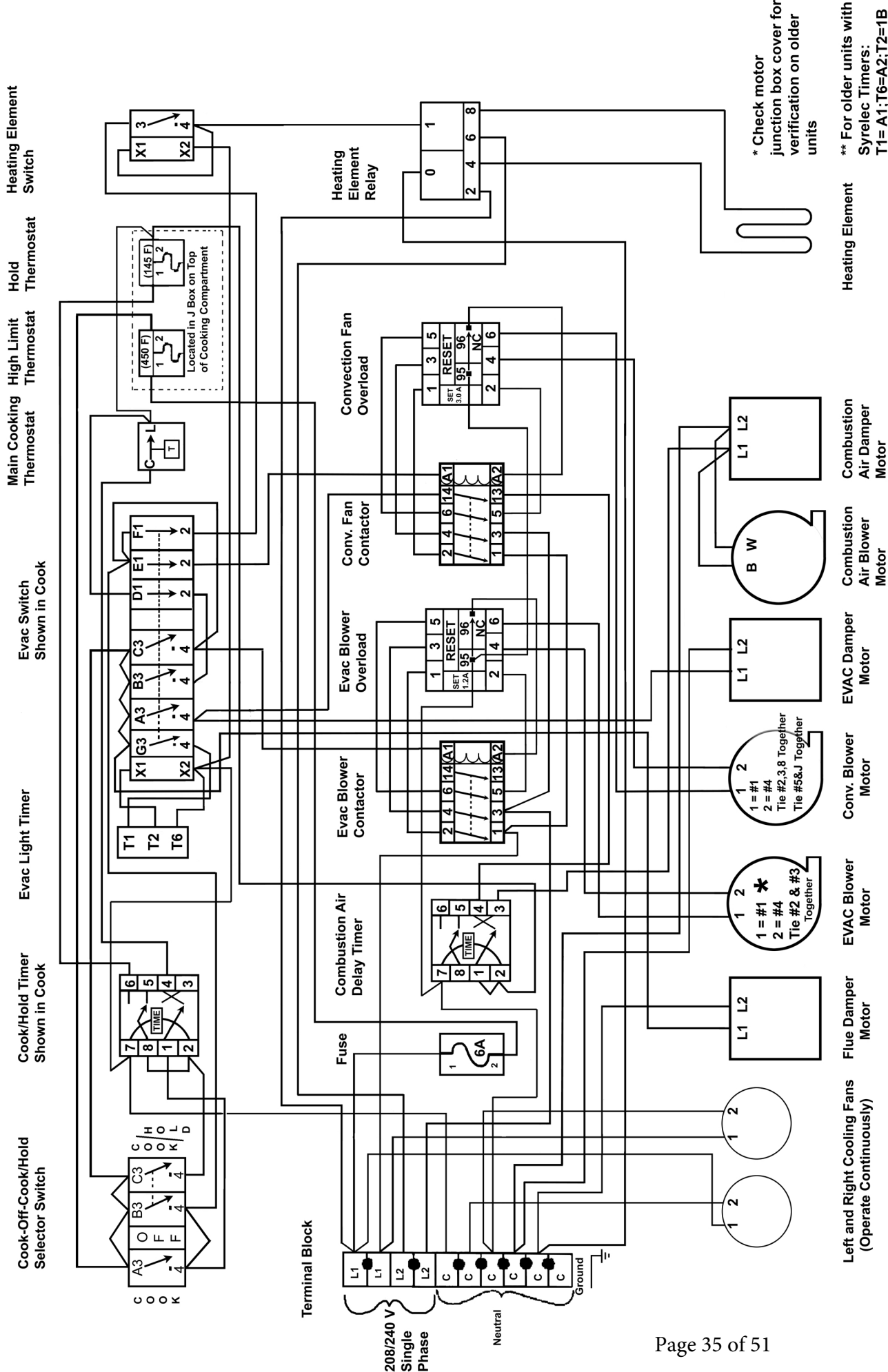


* Check motor junction box cover for verification on older units

** For older units with Syrelec Timers:
T1= A1;T6=A2;T2=1B

MODEL 250 RFS & 250 FSE (208/240 V-1ph)

Rev. 2/19
For Units Mfg 02/19
and later
250RFS S.N. 8379 and up
250FS(E) S.N. 7433 and up



Types 800, T800, 802

Installation and Maintenance Instructions

Practices, Liabilities and Warranties.

Temperature variations are sensed by a liquid filled sensing bulb which hydraulically transmits motion through a mechanism which rotates the indicating pointer and actuates precision snap-acting switch(es). Control set point(s) are varied by turning the external adjustment knob(s), according to procedures outlined (See Part II - Adjustments). Thermometer type T800 provides temperature indication only with no snap-acting switch.

Please refer to product bulletins for product specifications. Product bulletins may be found at www.ueonline.com.

Tools Needed



When mounting 800 or 802 type controls, it may be necessary to remove adjustment knob and front cover. The knob is secured with a 5/64" Allen Setscrew. The cover is secured by four phillips screws at the corners.

The controller may be mounted in any position to either a surface or panel

To Flush Mount

PANEL MOUNT CUT-OUT
(FLUSH MOUNT)

23/32 (59.1)

13/32 (162.7)

5 31/32 (151.6)

7/32 (5.6)

5 7/16 (138.1)

Clearance for #8 screw - (2) places

**Figure 1A -
Flush Mounting**

To Surface Mount

Diagram showing the clearance for #10 screw - (2) places, with a dimension of 6-1/8 inches.

Clearance for #10
screw - (2) places

Mounting Bulb and Capillary

Try to place any remaining capillary adjacent to the control head so it will sense the same ambient temperatures (control is ambient temperature compensated).

Unless otherwise specified, factory calibration, allows for 6" of capillary tube in the control zone. If longer lengths are required recalibration may be necessary. Follow the procedure outlined in PART II - Adjustments.

Avoid bending or coiling the capillary tube tighter than 1/2" radius. Exercise caution when making bends near the capillary ends.

If a separable well or union connector is used follow separate instructions included with them.

WIRING



DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING. ELECTRICAL RATINGS STATED IN LITERATURE AND ON NAMEPLATE SHOULD NEVER BE EXCEEDED. OVERLOAD ON A SWITCH CAN CAUSE FAILURE ON THE FIRST CYCLE. WIRE UNITS ACCORDING TO LOCAL AND NATIONAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE IS 14 AWG.

Types 800, 802

Connect the electrical conduit to the case securing it with the grounding locknut supplied.

Note: Unless control is connected to a metallic conduit, grounding bushing should be removed from grounding wire. A separate conductor should be provided from grounding system directly to the non-current carrying metal parts of control (splice the grounding wire).

Conduit opening is available on the left side as standard. It can be supplied on the right side on request. Wire through the 7/8" conduit hole directly to the lead-wire(s) provided, color coded as follows, or to the optional terminal block.

	Switch 1	Switch 2
Common	Violet	Yellow
Normally Open	Blue	Orange
Normally Closed	Black	Red

See wiring Diagrams Figure 2A and 2B.

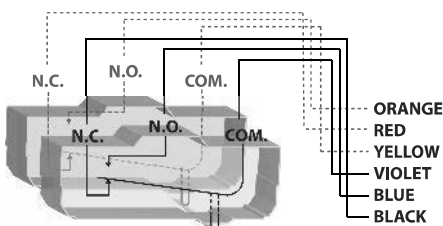


Figure 2A - Dual Switch

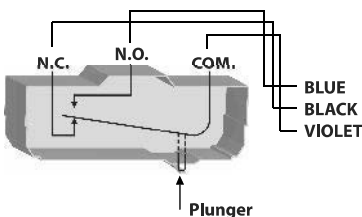


Figure 2B - Single Switch

Optional terminal block wiring is available for single or dual switch controls (option M100). See Figure 2C

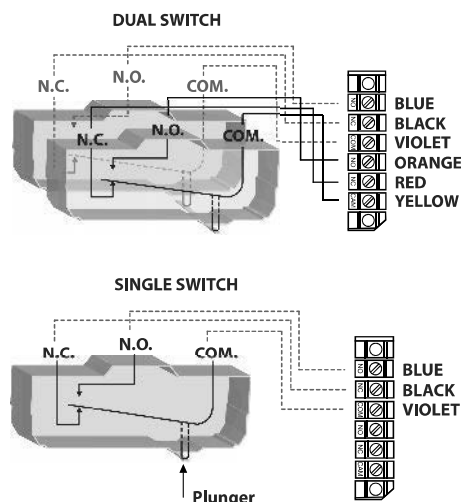


Figure 2C - Terminal Block Option

Part II - Adjustments

(Refer to Figure 3)

Tools Needed

5/64" Allen Wrench
5/16" Open End Wrench (2 required)
Phillips and slotted tip screwdriver

Single Switch Type 800

Move the set point Adjustment Pointer (red) up scale beyond the black Indicating Pointer. This permits checking the set point by moving the lever arm upward with a finger or tool simulating thermal assembly movement. Connect test lights to indicate switch operation or listen for the switch to click. Loosen adjustment "A" and move the Adjustment Pointer until it agrees with the Indicating Pointer. When the switch clicks re-tighten the screw.

Dual Switch Type 802

Type 802 has a separate knob and pointer for each switch. Turn black knob for switch #2 and turn green inserted knob for switch #1. Set points are shown by individual pointers and may be separated up to 100% of dial range apart, so long as the red pointer is set higher than the green pointer.

To align either switch to the Adjustment Pointer the corresponding adjustment "A" must be loosened and the Adjustment Pointer set to the Indicating Pointer, then tighten adjustment "A".

Note: Switch #1, green pointer, cannot be set to operate at a higher setting than switch #2, red pointer.

Connect test lights to indicate switch operation or listen for the individual switch clicks. The separation between switches is the difference between the high and low set points. The set points are determined by setting individual adjustment pointers and may be separated up to 100% of scale range apart.

Replace cover and adjustment knob if removed during installation. Controller is ready for operation. Turn setting pointer to desired control temperature and start up the process. To suit particular process conditions or for greater controller accuracy it may be desirable to make slight alterations to the set point or indicator reading. Procedures for making these adjustments are described below.

In-Process Adjustments

Use an accurate test thermometer such as a thermocouple with its probe mounted directly to the center of the sensing bulb. Before making any adjustments, allow process temperature to stabilize; i.e., successive on-off cycles repeated.

Note: Prior to making any controller adjustments, the cover and adjustment knobs should be removed. The adjustment knob slides off adjustment shaft for all controls except the 802. The 802 requires a 5/64" allen wrench. When adjustments are completed, all applicable parts should be replaced.

Correct any difference between the Indicating Pointer and the test thermometer by holding the compensator with a 5/16" wrench while turning the zero adjustment "C" on the thermal assembly with a second 5/16" wrench, per Figure 3 until the brown Indicating Pointer reads the same as the test thermometer. Turning clockwise lowers indicated reading. Compare the process temperature with the set point Adjustment Pointer. Loosen adjustment screw "A" to align set point Adjustment Pointer with the Indicating Pointer. Re-tighten screw "A".

Adjusting Thermometer Type T800

Use the in-process adjustment to check the control. Differences between the test instrument and the thermometer can be corrected by turning the zero adjustment “C” per Figure 3 on the thermal assembly. Turning in lowers indicated reading.

Note: Indicating Pointer Deflection:

The indicating pointers will read slightly low when the bulb temperature is 15° above the controller setting. This deflection is normal and repeatable (approximately 0.5% of scale range on single switch models) and is due to the transference of the switching mechanism load to the thermal system. It can be measured by moving the setting pointer from the high to the low end of the scale and observing the resultant indicating pointer deflection.

Correction of Capillary

If the length of capillary immersed in the process differs from the amount immersed at the factory calibration bath, a calibration shift will occur. The error may be corrected as follows:

Move set pointer to the highest temperature setting. Note indicating scale reading with the head and sensor at room temperature. Loosen the two thermal assembly mounting screws. Re-position the housing index against the calibration on the instrument case (or skeleton casting) at a rate of 1 division line per capillary length listed in the following column. Move to the left if capillary is to be added to the process, or to the right if capillary is to be removed from process.

Model Number	Range	Cap Length/Division*
1	-180 to 120°F	2 ft
2	-125 to 350°F	1 1/2 ft
3	-125 to 500°F	1 ft
4	-40 to 120°F	4 ft
5	-40 to 180°F	3 ft
6	0 to 250°F	2 1/2 ft
7	0 to 400°F	2 ft
8	50 to 650°F	2 ft

* Added to or taken away from the process.

Tighten the two thermal assembly mounting screws. Note change indicated scale reading (if any).

Turn zero adjustment “C” to bring indicating pointer reading back to the original reading noted before. Turning in lowers indicated reading.

Note: The thermal assembly can be returned to its original position by aligning its flange with the line scribed on the instrument case.

General Layout

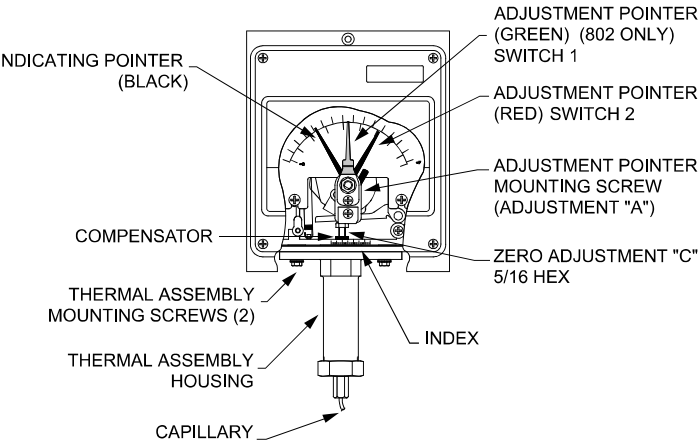


Figure 3

Dimensions

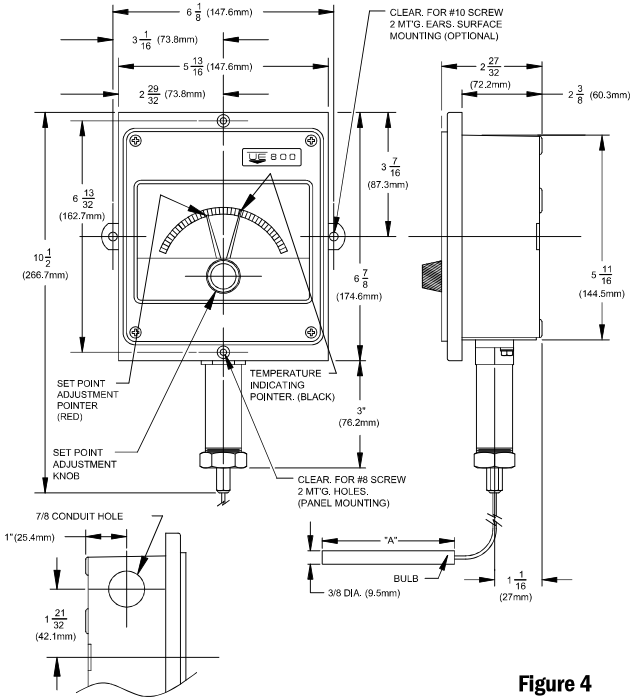


Figure 4

Dimension A		
Model	Inches	mm
1BS	3-3/4	95.3
2BS	2-5/8	66.7
3BS	2-1/8	54.0
4BS	6-3/4	171.5
5BS	5	127.0
6BS	4-1/2	114.3
7BS	3	76.2
8BS	3-1/4	82.6

RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. Orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- For all applications, a factory set unit should be tested before use.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts, INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.



UNITED ELECTRIC
CONTROLS

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Watertown, MA 02471-9143 USA
Telephone: 617 926-1000 Fax: 617 926-2568
<http://www.ueonline.com>

SINGLE SWITCH INDICATING MECHANICAL TEMPERATURE CONTROLLER

This single switch indicating temperature controller operates fuel valves or relays which start and stop heating or cooling systems in a wide variety of applications. It is the smallest and most compact of the indicating mechanical instruments. It derives its simplicity and efficiency from the Piston-Pak filled systems sensing element.



Form Number 3000
Published Jan. 1992
Third Edition

ISO 9002 REGISTERED

**SPECIFICATIONS
INSTALLATION
OPERATION**

6770

Partlow

The Partlow Corporation • Two Campion Rd. • New Hartford, NY 13413 USA • 315-797-2222 • FAX 315-797-0403

QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA

Dynapar, Veeder Root, and Eagle Signal Brands:

Sales, Repair, and Application Support:
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847-782-5277 Applications Support Fax
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800-866-6659 Applications Support

Please disregard all phone numbers and addresses in this manual. The phone numbers and address on this page are the correct phone number and addresses to use for sales, repair, and application support.

MAINTAINING YOUR MF79

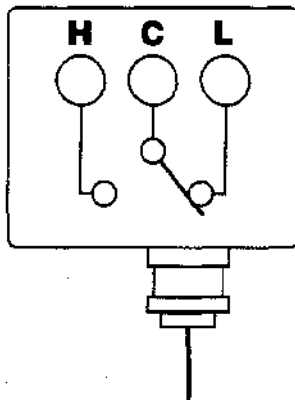
CHECKING TEMPERATURE

When checking and verifying your temperature be sure to use a test thermometer of known accuracy. Position the test thermometer sensing bulb or probe adjacent to the thermal sensing bulb from the MF79. Turn the red set pointer on the MF79 to the desired process temperature or above. Wait for the temperature to stabilize, then compare the test thermometer reading with that of the MF79 (Black indicating pointer). If the two readings do not agree, the MF79 should be re-zeroed.

RE-ZEROING YOUR MFS

Be sure that the process temperature is stable. Move the red set pointer to the temperature indicated by the test thermometer. Remove the setting knob on the instrument cover (See exploded view illustration, page 6). Loosen the set screw S (Figure 3, below) and using the 3/16 inch wrench provided with the MF79 turn shaft J until the black indicating pointer reading matches the test thermometer reading. Tighten the set screw S. Check the adjustment by allowing the temperature to stabilize and compare the readings. Repeat these steps if necessary.

Figure 2 - 3 Wire Switch



NOTE: Illustration shows switch condition below set point C to H will be continuous above set point.

SWITCH REPLACEMENT & #73 SWITCH INSTALLATION

Turn the power to the MF79 off. Remove the setting knob and cover (See exploded view illustration, page 6) and remove the two screws holding the switch to the switch arm. Take out the existing switch and remove the wires. Re-connect the wires to the replacement switch one wire at a time to avoid confusion. (When installing a #73 switch re-connect the wires to the same respective terminals as on the #79 switch). Then re-assemble the switch in the mechanism, replace the MF79 front cover and knob. Then turn on the power. **Note: After replacing the switch it may be necessary to make an adjustment to the switch actuation screw E (Figure 4, below). If, during normal process temperature cycling, the black indicating pointer registers a constant differential over or under the red set pointer adjust the actuation screw E to correct. Lengthening the screw lowers the temperature while shortening it raises the temperature.**

BRAKE TIGHTENING

Periodically the setting shaft brake may require tightening. If the brake is too loose, the overtravel movement of the black indicating pointer will tend to drag the red set pointer upscale from its set position. To tighten the brake, turn the adjustment screw U clockwise (Figure 5, below). **Do not over-tighten.**

Figure 3 - Re-Zeroing

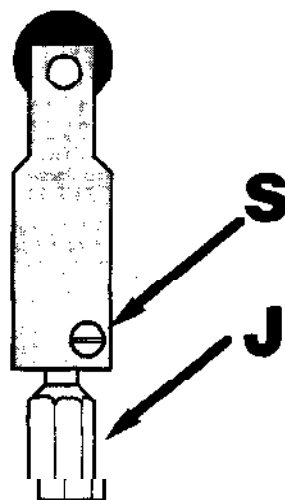


Figure 4 Switch Replacement

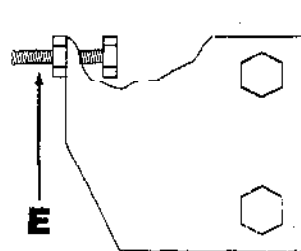
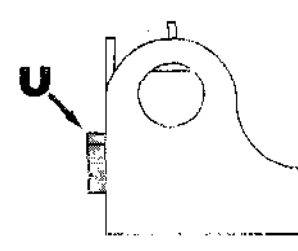


Figure 5 - Brake Tightening



PISTON-PAK THERMAL SENSING ELEMENT IDENTIFICATION

An element designation number is stamped on the bottom of the element head. This is a coded description of the element specifications and should be used whenever a replacement element is ordered. The number appearing on the side of the element head (Figure 6, below) is the element age code, which may be required in establishing warranty.

ORDERING/SPECIFYING THE PISTON-PAK SENSING ELEMENT

The sensing element is ordered separately from the MF79 and requires its own matrix number. To determine the correct sensing element configuration for your instrument(s) and application see Partlow Form 3028 "Mechanical Products Cross Reference and Pricing Guide."

ELEMENT REPLACEMENT

To change a thermal sensing element start by removing screws D (Figure 7, below) and withdrawing the element from the instrument body. Then remove the element bulb from the medium. Install the new element and replace screws D. Insert the new element bulb into the medium being measured.

Note: After the element has been replaced, check the temperature setting, re-zeroing may be necessary. If so, see the CHECKING TEMPERATURE section.

Caution: The inside mechanism(s), particularly the inside of the element housing, should never be oiled. However, if the instrument is subject to corrosion or gunking conditions, the mechanical linkage should be sprayed periodically with corrosion inhibiting CRC 2-26, 3-36, or 5-56. Use only CRC 2-26, 3-36, or 5-56 as other lubricants may cause build up and sticking of internal parts. CRC 2-26 may be purchased from Partlow in a 15 oz. container (part #63600401). CRC 5-56 may be purchased locally from any hardware or automotive store.

Figure 6 - Element ID

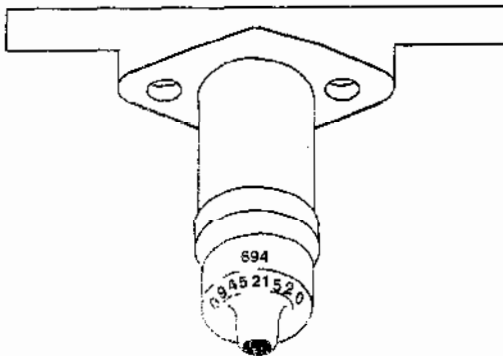
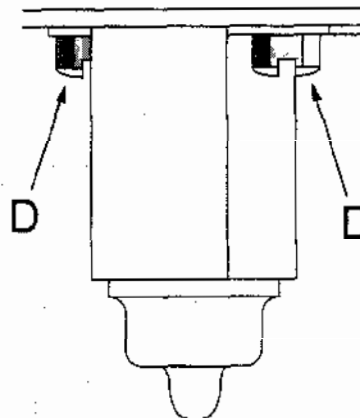


Figure 7 - Replacing Element





RTE-P1, -P2, -B1, -B2 ALL MULTI-TIMERS INSTRUCTION SHEET

Read this instruction sheet to make sure of correct operation before starting installation, operation, maintenance, and inspection of the RTE series timers. The end user should keep this instruction sheet for future reference.

TIME RANGE Determined by Time Range Selector and Dial Selector

Dial Range	0-1	0-3	0-10	0-30	0-60
s	0.1sec - 1sec	0.1sec - 3sec	0.2sec - 10sec	0.6sec - 30sec	1.2sec - 60sec
min	1.2sec - 1min	3.6sec - 30min	12sec - 10min	36sec - 30min	1.2min - 60min
h	1.2min - 1hr	3.6min - 3hr	12min - 10hr	36min - 30hr	1.2hr - 60hr
10h	12min - 10hr	36min - 30hr	2hr - 100hr	6hr - 300hr	12hr - 600hr

GENERAL SPECIFICATIONS

Operation System		Solid-state CMOS circuit	
Operation Type		Multi-Mode	
Time Range		0.1sec to 600hours	
Pollution Degree		2 (IE60664-1)	
Over voltage category		Ⅲ (IE60664-1)	
Rated Operational Voltage	AF20	100-240V AC(50/60Hz)	
	AD24	24V AC(50/60Hz)/24V DC	
	D12	12V DC	
Voltage Tolerance	AF20	85-264V AC(50/60Hz)	
	AD24	20.4-26.4V AC(50/60Hz)/21.6-26.4V DC	
	D12	10.8-13.2V DC	
Input off Voltage		Rated Voltage × 10% minimum	
Ambient Operating Temperature		-20 to +65°C (without freezing)	
Ambient Storage and Transport Temperature		-30 to +75°C (without freezing)	
Relative Humidity		35 to 85%RH (without condensation)	
Atmospheric Pressure		80kPa to 110kPa (Operating)	
		70kPa to 110kPa (Transport)	
Reset Time		100msec maximum	
Repeat Error		±0.2%, ±20msec*	
Voltage Error		±0.2%, ±20msec*	
Temperature Error		±0.5%, ±20msec*	
Setting Error		±10% maximum	
Insulation Resistance		100MΩ minimum (500V DC)	
Dielectric Strength		Between power and output terminals: 2000V AC, 1 minute Between contacts of different poles: 2000V AC, 1 minute Between contacts of the same pole: 1000V AC, 1 minute	
Vibration Resistance		10 to 55Hz amplitude 0.5mm 2 hours in each of 3 axes	
Shock Resistance		Operating extremes: 98m/sec ² (10G) Damage limits: 490m/sec ² (50G) 3 times in each of 3 axes	
Degree of Protection		IP40 (enclosure), IP20 (socket) (IEC60529)	
Power Consumption (Approx.)	TYPE	RTE-P1, -B1 RTE-P2, -B2	
	AF20	120V AC/60Hz	6.5VA 6.6VA
		240V AC/60Hz	11.6VA 12.1VA
	AD24(AC/DC)	3.4VA/1.7W 3.5VA/1.7W	
		D12	1.6W 1.6W
Mounting Position		Free	
Dimensions	RTE-P1, P2	40H × 36W × 77.9D mm	
	RTE-B1, B2	40H × 36W × 74.9D mm	
Weight (Approx.)	RTE-P1	RTE-P2	RTE-B1, -B2
	87g	89g	85g

* For the value of the error against a preset time, whichever the largest applies.

APPLICABLE STANDARDS

UL508, CSA C22.2 No.14, IEC61812-1, EN61812-1
EMC

Electrostatic Discharge		level 3 Contact±6.0kV, Air±8.0kV	IEC61000-4-2 EN61000-4-2
Electromagnetic Field		level 3 10V/m, AM 80%, 80M-1000MHz	IEC61000-4-3 EN61000-4-3
Fast Transient/Burst		level 3 Power Supply: ±2.0kV	IEC61000-4-4 EN61000-4-4
Surge	AF20	level 3 Power Supply: Line to Line ±1.0kV Line to Ground ±2.0kV	IEC61000-4-5 EN61000-4-5
	AD24 D12	level 2 Power Supply: Line to Line ±0.5kV Line to Ground ±1.0kV	
Radiated Emission		Group 1 Class A	CISPR 11 EN55011

TYPES

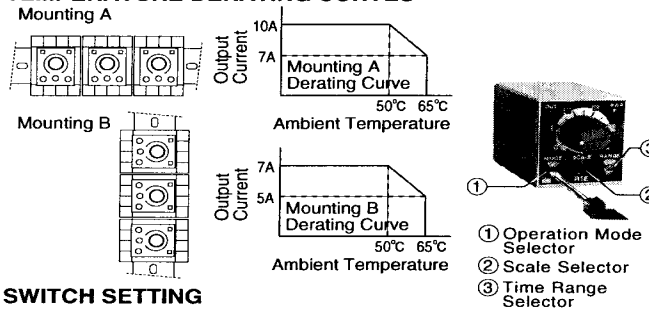
RTE-P1AF20

Connection type	Operation Mode	Power Voltage
P: Pin	1: No Control Signal	AF20: 100 to 240V AC(50/60Hz)
B: Blade	A: ON-Delay 1	AD24: 24V AC(50/60Hz)/24V DC
	B: Interval	D12: 12V DC
	C: Cycle 1	
	D: Cycle 3	
	2: Control Signal	
	A: ON-Delay 2	
	B: Cycle 2	
	C: Cycle 4	
	D: Signal ON/OFF-Delay	
	E: Signal OFF-Delay	
	F: One-Shot	

CONTACT RATINGS

Contact Configuration		2 Form C, DPDT (Delay output)
Allowable Voltage / Allowable Current		240V AC, 30V DC / 10A
Maximum Permissible Operating Frequency		1800 cycles per hour
Rated Load	Resistive	10A 240V AC, 30V DC
	Inductive	7A 240V AC, 30V DC
	Horse Power Rating	1/6 HP 120V AC, 1/3 HP 240V AC
Conditional Short Circuit		Fuse 10A, 240V
Life	Electrical	500,000 op. minimum (Resistive)
	Mechanical	50,000,000 op. minimum

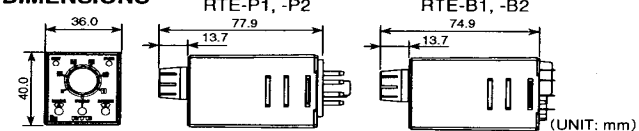
TEMPERATURE DERATING CURVES



SWITCH SETTING

- Turn the selectors securely using a flat screwdriver 4mm wide maximum. Note that incomplete setting may cause malfunction. Do not turn the selectors beyond the limits.
- Since changing the setting during timer operation may cause malfunction, turn power off before changing the setting.

DIMENSIONS



Safety Precautions

- Special expertise is required to use the Electronic Timer.
- All Electronic Timers are manufactured under IDEC's rigorous quality control system, but users must add a backup or fail safe provision to the control system using the Electronic Timer in applications where heavy damage or personal injury may be caused in case the Electronic Timer should fail.
 - Install the Electronic Timer according to instructions described in this instruction sheet and the catalog.
 - Make sure that the operating conditions are as described in the catalog. If you are uncertain about the specifications, contact IDEC in advance.
 - In this instruction sheet, safety precautions are categorized in order of importance to Warning and Caution.



Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

- Turn power off to the Electronic timer before starting installation, removal, wiring, maintenance, and inspection on the Electronic Timer. Failure to turn power off may cause electrical shocks or fire hazard.
- Do not use the Electronic Timer for an emergency stop circuit or interlocking circuit. If the Electronic Timer should fail, a machine disorder, breakdown, or accident may occur.



Caution notices are used where inattention might cause personal injury or damage to equipment.

- The Electronic Timer is designed for installation in equipment. Do not install the Electronic Timer outside equipment.
- Install the Electronic Timer in environments described in this instruction sheet and the catalog. If the Electronic Timer is used in places where the Electronic Timer is subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, and excessive shocks, then electrical shocks, fire hazard, or malfunction will result.
- Use an IEC60127-approved fuse and circuit breaker on the power and output line outside the Electronic Timer.
- Do not disassemble, repair, or modify the Electronic Timer.
- When disposing of the Electronic Timer, do so as an industrial waste.

IDEC IZUMI CORPORATION <http://www.idec.com>
Instruction Sheet B-766-0 June 2003

OPERATION CHART

RTE-P1, -B1

A: ON-Delay 1 (power start)

Set timer for desired delay, apply power to coil. Contacts transfer after preset time has elapsed, and remain in transferred position until timer is reset. Reset occurs with removal of power.

Item	Terminal No.	Operation
Power	(1)2-7 (2)A-B	
Delayed Contact	(1)1-4,5-8 (NC) (2)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

B: Interval (power start)

Set timer for desired delay, apply power to coil. Contacts transfer immediately, and return to original position after preset time has elapsed. Reset occurs with removal of power.

Item	Terminal No.	Operation
Power	(1)2-7 (2)A-B	
Delayed Contact	(1)1-4,5-8 (NC) (2)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

C: Cycle 1 (power start, OFF first)

Set timer for desired delay, apply power to coil. First transfer of contacts occurs after preset delay has elapsed, after the next elapse of preset delay contacts return to original position. The timer now cycles between on and off as long as power is applied (duty ratio 1:1).

Item	Terminal No.	Operation
Power	(1)2-7 (2)A-B	
Delayed Contact	(1)1-4,5-8 (NC) (2)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

D: Cycle 3 (power start, ON first)

Functions in same manner as Mode C, with the exception that first transfer of contacts occurs as soon as power is applied. The ratio is 1:1. Time On = Time Off

Item	Terminal No.	Operation
Power	(1)2-7 (2)A-B	
Delayed Contact	(1)1-4,5-8 (NC) (2)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

RTE-P2, -B2

A: ON-Delay 2 (signal start)

When a preset time has elapsed after the start input turned on while power is on, the NO output contact goes on.

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

B: Cycle 2 (signal start, OFF first)

When the start input turns on while power is on, the output oscillates at a preset cycle (duty ratio 1:1), starting while the NO contact off.

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

C: Cycle 4 (signal start, ON first)

When the start input turns on while power is on, the NO contact goes on. The output oscillates at a preset cycle (duty ratio 1:1).

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

D: Signal ON/OFF-Delay

When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed while the start input remains on, the output contact goes off. When the start input turns off, the NO contact goes on again. When a preset time has elapsed after the start input turned off, the NO contact goes off.

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

E: Signal OFF-Delay

When power is turned on while the start input is on, the NO output contact goes on. When a preset time has elapsed after the start input turned off, the NO output contact goes off.

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

F: One-Shot (signal start)

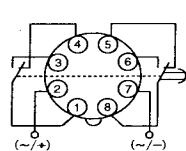
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed, the NO output contact goes off.

Item	Terminal No.	Operation
Power	(A)2-10 (B)A-B	
Start	(A)5-6 (B)2-5	
Delayed Contact	(A)1-4,8-11 (NC) (B)1-7,3-9 (NO)	
Indicator	PWR OUT	
Set Time		T

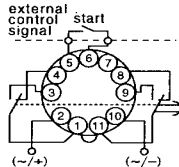
Note: T=Set Time, Ta=Shorter than set time, (1): RTE-P1, (2): RTE-B1, (A): RTE-P2, (B): RTE-B2

INTERNAL CONNECTIONS

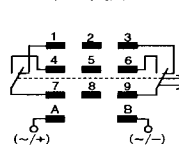
RTE-P1



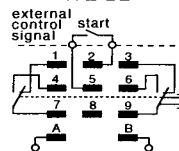
RTE-P2



RTE-B1



RTE-B2



CAUTION:

RTE-P2: Do not apply voltage to terminals #5, #6 and #7.
RTE-B1, -B2: Do not apply voltage to terminals #2, #5 and #8.

NOTE: RTE series are UL Listed when used in combination with following IDEC's sockets:

RTE-P1: SR2P-06* pin type socket.

RTE-P2: SR3P-05* pin type socket.

RTE-B1, -B2: SR3B-05* blade type socket.

(* May be followed by A,B,C or U)

The socket to be used with these timers are rated:

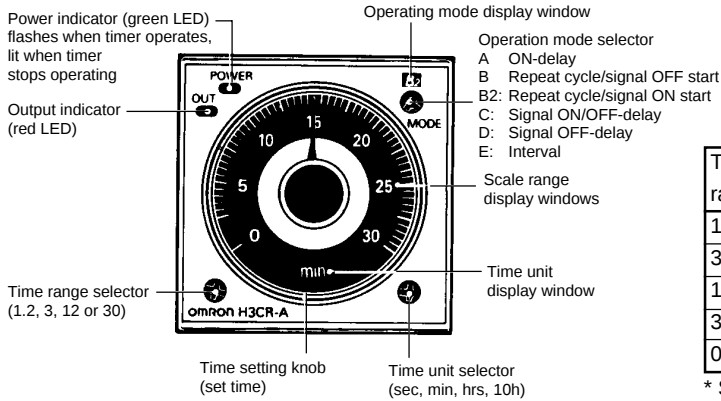
-Conductor Temperature Rating 60°Cmin.,

-Use 14AWG max.(2mm² max.) Copper conductors only,

-Terminal Torque 9 to 12lb.·in (1.0 to 1.3 N·m)



RANGE SELECTION



Time range	Time units			
	sec(onds)	min(utes)	hrs (hours)	10h (10 hours)
1.2	0.05 to 1.2	0.12 to 1.2	0.12 to 1.2	1.2 to 12
3	0.3 to 3	0.3 to 3	0.3 to 3	3 to 30
12	1.2 to 12	1.2 to 12	1.2 to 12	12 to 120
30	3 to 30	3 to 30	3 to 30	30 to 300
0	Instantaneous output*			

* Set to time setting knob below zero.

Specifications

Part number		H3CR-A	H3CR-AS	H3CR-A8	H3CR-A8S	H3CR-A8EL/H3CR-A8E
Supply voltage	AC	24 V or 100 to 240 VAC, 50/60 Hz				
	DC	12 V or 24 V				
Operating voltage	AC	85% to 110% of rated supply voltage				
	DC	90% to 110% of rated supply voltage at 12 VDC				
Power consumption	AC	10 VA				
	AC/DC	1.5 VA (AC), 0.8 W (DC)				
	DC	1.3 W				

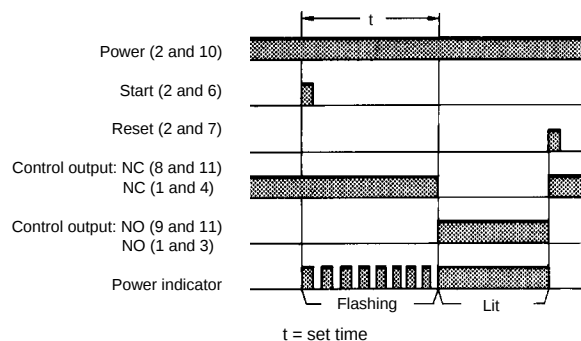
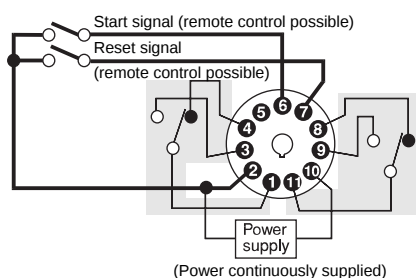
Timing functions	ON-delay, Repeat cycle signal OFF start, Repeat cycle signal ON start, Signal ON/OFF delay, Signal OFF-delay, Interval
------------------	--

H3CR-A, H3CR-AS (SIX-FUNCTION TIMERS)

Mode A ON-Delay

Signal Start/Signal Reset

Power is applied continuously. Timing starts at the leading edge of the start input. The output relay is energized when the accumulated time equals the set time. Subsequent start signals during or after timing will not be accepted. The output relay or transistor will remain energized until a reset input is applied or power is interrupted. The minimum signal input is 0.05 second.



WARRANTY

J & R MANUFACTURING warrants its equipment against defective parts and workmanship under normal use and when installed in accordance with manufacturer's recommendations for a period (after date of shipment*) of twelve (12) months on parts and ninety (90) days on labor with the following provisions:

1. This warranty does not apply if problems or claims are the result of: (a) damage in transit (equipment becomes owner's property upon shipment from factory and owner must file claim with transport company); (b) misuse, neglect, improper maintenance, and or unauthorized alterations to equipment; (c) improper installation of exhaust stacks, air supply, and extraneous exhaust systems; (d) improper voltage hook-up; (e) wind, rain, hail, fire and acts of God.
2. In-warranty replacement parts will be credited only upon receipt and inspection of defective parts at the factory. All shipping charges are the responsibility of the owner, but, at the discretion of J&R Manufacturing, ground shipping charges may be waived or credited.
3. Labor to remove, replace, or repair defects under this warranty must be authorized by factory. Premium time (overtime) and travel time are not included in the warranty.
4. Sales, excise, and other taxes, food loss, and down-time are not covered under this warranty.
5. The removal of manufacturer's nameplate(s) voids the warranty.

It is the aim of J & R Manufacturing to build the finest equipment possible and to facilitate quick solutions to all problems that might arise with the lowest expense possible to the user(s). To help us achieve this goal, please follow these procedures:

1. Telephone our service department at 972-289-0801 at the first sign of a problem. Have ready the Model and Serial Number of your equipment.
2. Cooperate with our Service Department by making certain visual checks as requested. Most problems are quick and easy to pinpoint and resolve.
3. In the event it is necessary to use a service company, the factory will contact its authorized service agency. If no authorized service agency is available, please recommend a service company. The use of a service company not specifically authorized by our Service Department at factory headquarters may invalidate this warranty.

* or provable start up date, whichever is later (start up must be within 12 months of ship date)

Remember to contact J&R for any additional information you need or to order replacement parts or accessories.

Accessories include:

Ash Carts

Wood Carts

Ash Rakes

Contact J&R:

972-285-4855 (Main)

972-289-0801 (Parts and Service)

800-527-4831 (Toll Free-U.S and Canada)

sales@jrmanufacturing.com

www. jrmanufacturing.com

