Automated Canning Process Control Appliance
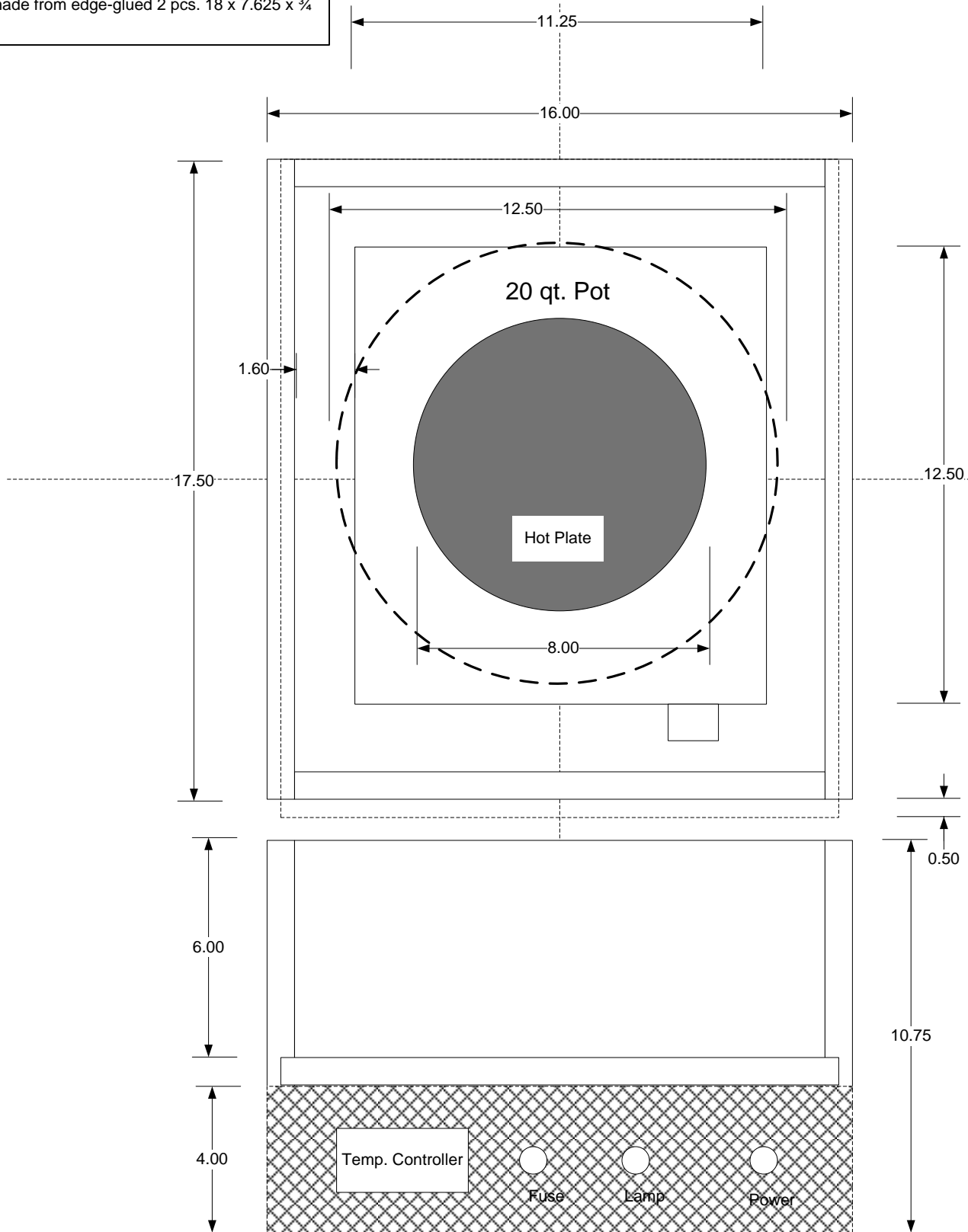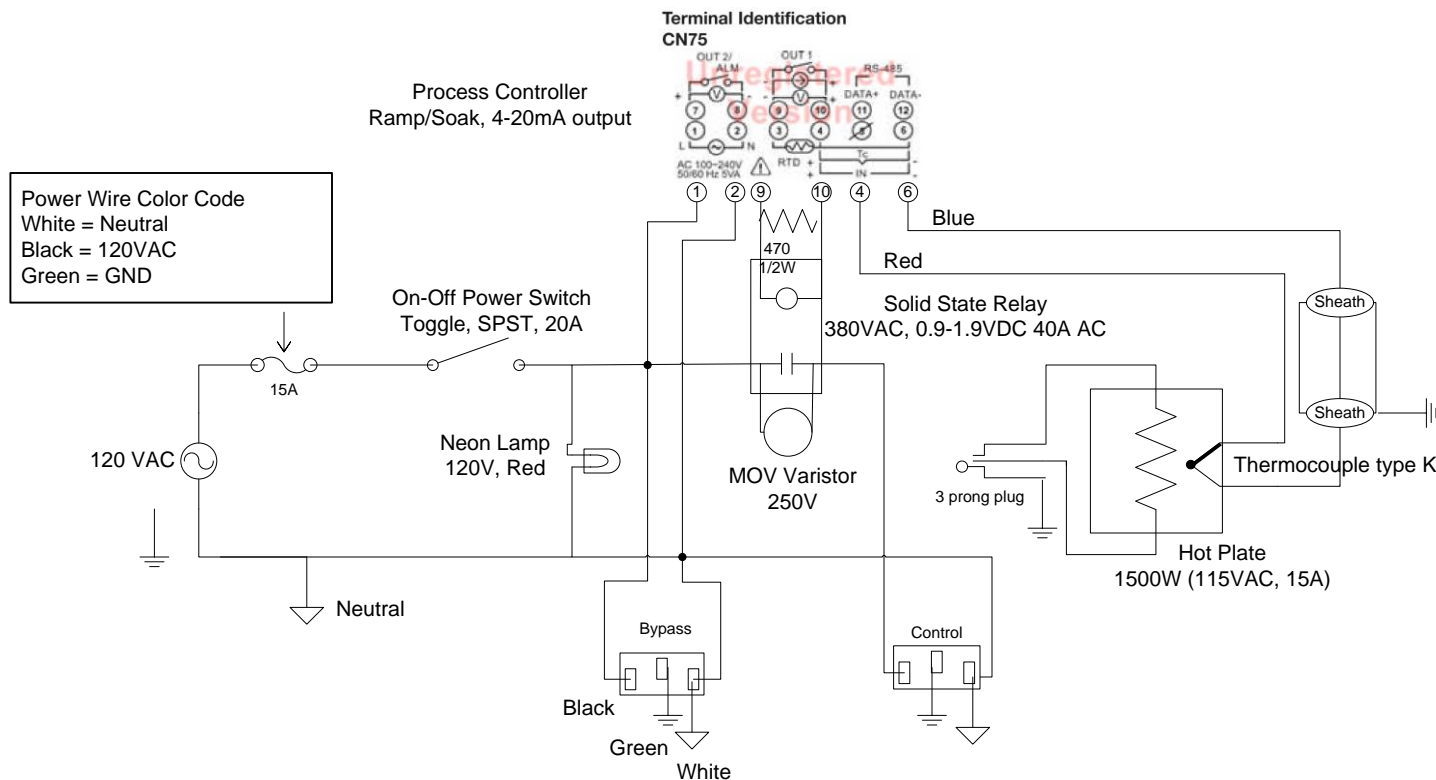## (using ramp/soak temperature controller)

Cut List: White Pine 12 x 6ft x ¾ (2 pcs.)
1. Sides:10¾ x 17½ x ¾ (2 pcs.)
2. Back: 14½ x 6 x ¾ (2pcs.)
3. Bottom: 18 x 15¼ x ¾
4. Blocks: 1.¾ x 2 x ¾ (4 pcs.)

Bottom is made from edge-glued 2 pcs. 18 x 7.625 x ¾

11.25

16.00

12.50

20 qt. Pot

Hot Plate

1.60

17.50

8.00

12.50

0.50

6.00

10.75

4.00

Temp. Controller

Fuse   Lamp   Power

Terminal Identification
CN75

OUT 2/
ALM   OUT 1   RS-485

+ V -   + V -   DATA+ DATA-
7   8   9   10   11   12
1   2   3   4   6

L ~ N   RTD +   T C
AC 100-240V   IN
50/60 Hz 5VA   +   -

Process Controller
Ramp/Soak, 4-20mA output

Power Wire Color Code
White = Neutral
Black = 120VAC
Green = GND

Blue

Red

On-Off Power Switch
Toggle, SPST, 20A

Solid State Relay
380VAC, 0.9-1.9VDC 40A AC

15A

470
1/2W

Sheath

Neon Lamp
120V, Red

Sheath

120 VAC

Thermocouple type K

MOV Varistor
250V

3 prong plug

Hot Plate
1500W (115VAC, 15A)

Neutral

Bypass

Control

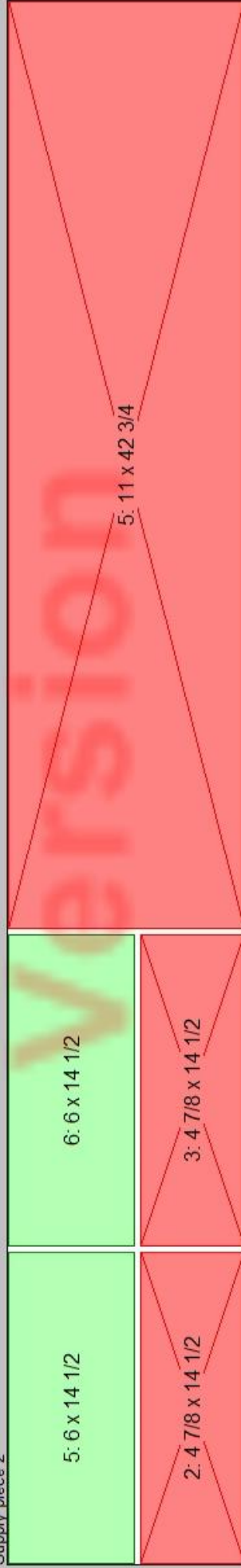Black

Green

White

Electrical Parts List

1. Omega CN7453 Process Controller
2. Cadco 1500W Hot Plate
3. SSR 380V
4. Neon Lamp 120V Red
5. Thermocouple Type K
6. MOV Varistor 240V
7. Dual 120v, 20A outlet, Leviton model CB20A
8. Capacitor 47uF, 35V
9. Resistor 470 ohm, 1/2W (1/4W OK)
10.

	Food Canning Automated Processing Appliance			
SIZE	FSCM NO	DWG NO		REV
		IPG-0000-ABC-001.9		0.9
SCALE	1/4 : 1	IPGENERAL	SHEET	2 OF 9

Supply piece 1

1: 10 3/4 x 17 1/2

2: 10 3/4 x 17 1/2

3: 7 5/8 x 18

4: 7 5/8 x 18

1: 7 5/8 x 12

4: 3 1/4 x 36 3/4

Supply piece 2

5: 6 x 14 1/2

6: 6 x 14 1/2

2: 4 7/8 x 14 1/2

3: 4 7/8 x 14 1/2

5: 11 x 42 3/4

Regulation | Operation

Pidn=4 (Auto Reg.)

HhS = 1F
ChS = 1F

SP = 0 decimal point

AL-1H = 200F
AL-1L = N/A in
Heat only mode

dEAd = 2F
(only available in PID control)

Initial

K

F

210F

40F

ON/OFF or ProG

HEAT

6 = Absolute Temp.
Upper Limit

ALA2 Doesn't Exist

ALA3 Doesn't Exist

SALA = 0 (off)

Regulation Mode

- **At** Auto-tuning (Set in PID control & RUN mode) — Press ▽
- **Ptdn** 4 groups PID modes (n=0~3). When n=4, PID control is auto regulated. See PID Control section. — Press ▽
- **PdoF** PD control offset (when PID control is ON and Ti=0, set the value of PdoF) — Press ▽
- **HtS** Heating hysteresis (in ON/OFF control) — Press ▽
- **CLS** Cooling hysteresis (in ON/OFF control) — Press ▽
- **HtPd** or **CLPd** Heating/cooling control cycle setting (Set in PID control mode) — Press ▽
- **HCPd** Control cycle setting of 2nd output group (Set in PID control and dual loop output control mode) — Press ▽
- **CoEF** Ratio of output 1 & output 2 when in dual output control. P value of 2nd output group = (P value of 1st output group) × CoEF (Set it up when in PID/programmable PID + dual output) — Press ▽
- **dEAd** Dead Band (set in dual loop output control mode) — Press ▽
- **tPoF** Regulate temperature deviation value — Press ▽
- **CrHi** Regulate upper-limit of analog output value (The setting is displayed when in analog output) — Press ▽
- **CrLo** Regulate lower-limit of analog output value (The setting is displayed when in analog output) Press to return to "auto-tuning"

Operation Mode

- **1234** Use ▲▼ to set temperature set point — Press ▽
- **r-S** Control setting RUN or STOP See "Execution" in Section 6 — Press ▽
- **Ptn** Start pattern setting. Appears only when r-S is set to PStP — Press ▽
- **SP** Set the position of decimal point (Not for thermocouple R, S, B type) — Press ▽
- **AL-1H** Upper-limit alarm 1 (This parameter is available only when ALA1 function is enabled.) — Press ▽
- **AL-1L** Lower-limit alarm 1 (This parameter is available only when ALA1 function is enabled.) — Press ▽
- **AL-2H** Upper-limit alarm 2 (This parameter is available only when ALA2 function is enabled.) — Press ▽
- **AL-2L** Lower-limit alarm 2 (This parameter is available only when ALA2 function is enabled.) — Press ▽
- **AL-3H** Upper-limit alarm 2 (This parameter is available only when ALA3 function is enabled.) — Press ▽
- **AL-3L** Lower-limit alarm 3 (This parameter is available only when ALA3 function is enabled.) — Press ▽
- **LoC** Set lock mode — Press ▽
- **out-1** Display and adjust output value of 1st output group (Displayed when in PID control mode and manual RUN mode) — Press ▽
- **out-2** Display and adjust output value of 2nd output group (Displayed when in dual loop PID control mode and manual RUN mode) — Press ▽

Initial Setting Mode

- **InPt** Set input type — Press ▽
- **tPUn** Set temperature unit (Not displayed when in analog input) — Press ▽
- **tP-H** Set upper-limit of temperature range — Press ▽
- **tP-L** Set lower-limit of temperature range — Press ▽
- **CtrL** Set Control method: ON/OFF, Prog, or manual. (Set to ProG for ramp/soak patterns) See 6. Pattern and Set editing. — Press ▽
- **PAtn** Ramp/soak pattern. Only displayed when CtrL is set to ProG. — Press ▽
- **S-HC** Select heating, cooling control or dual output loop output control. — Press ▽
- **ALA1** Alarm 1 mode setting — Press ▽
- **ALA2** Alarm 2 mode setting — Press ▽
- **ALA3** Alarm 3 mode setting — Press ▽
- **SALA** Set system alarm — Press ▽
- **CoSH** Communication write function enabled/disabled — Press ▽
- **C-SL** Select ASCII/RTU communication format — Press ▽

Operational Programming

6 Pattern and Set Editing (Ramp and Soak Programming)

Description of Function and Parameters Setting:

To set-up or edit the ramp/soak function, **CtrL** in the initial setting mode must be set to **ProG**. **PAtn** Will immediately follow in the menu list.

The Ramp and Soak function is supported by 8 different patterns (Pattern No. 0 ~ 7). Each pattern contains 8 steps (step No. 0 ~ 7) for set point and execution time, one Link Pattern parameter, one Cycle parameter and one Actual Step parameter.

The set point (SV) should reach temperature X after the execution time T. The default of step No. 0 is soak control. The unit will control the temperature (PV) to reach the set point X and then keep the temperature at set point X. The execution time T is determined by step No, 0.

The following display is an example of operation of pattern No. 0. PAtn PAtn where n = 0-7.

- **PAtn** Select desired editing pattern number Select OFF Press ▽▷ select number
- **SP00** Edit temperature of step No.0 of pattern No.0 — Press ▽
- **PSV0** Select actual step No. when program control is executing — Press ▽
- Exit pattern and step editing selection Switch to **S-HC** and continue setting
- **tc00** Edit time of step No.0 of pattern No.0. Unit: hh.mm — Press ▽
- **CYC0** Set additional execution cycle number (0~99) — Press ▽
- Set step No.1-7 in order
- **SP07** Edit temperature of step No.7 of pattern No.0 — Press ▽
- **tLn0** Set link pattern. OFF indicates the program end Press to return to pattern No. editing mode
- **tc07** Edit time of step No.7 of pattern No.0. Unit: hh.mm Press to set actual step No.

Actual Step Parameter PSV7 : Offered for each pattern (0-7), the user can select to execute only certain steps in the pattern. For example, when PSV7 is set to 2, pattern No 7 will only execute steps 0 through 2.

Cycle Parameter CYC7 : Offered for each pattern (0-7), the cycle parameter will execute the selected pattern X amount of times. For example, when CYC7 is set to 2, pattern No. 4 will cycle through the steps and then cycle through the steps 2 more times.

Link Pattern Parameter tLn0 : Offered for each pattern (0-7), the link parameter designates the next pattern to execute. For example, when tLn0 is set to 2, pattern No. 2 will execute next after the execution of pattern No. 0. If tLn0 is set to off, the program will stop after executing the current pattern and the temperature will be maintained at the set point of the last step.

Execution:

The execution of the ramp and soak function is initiated through r-S in the operation mode.

When r-S is set to rUn, the program will start to execute in order from the step 0 of the start pattern.

When r-S is set to StoP, the program will stop and the control output is disabled.

When r-S is set to PStP, the program will stop and the temperature will be maintained at the set point before program was stopped. Select rUn again, then the program will restart and execute from step 0 of start pattern. The start pattern setting Ptrn is accessed when r-S is set to PStP and the INDEX key is pressed. (The start pattern setting only appears in PStP mode).
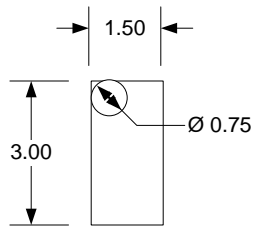
When r-S is set to PHod, the program will hold and the temperature at that time will be controlled at the set point before program hold. Select rUn again, then the program will follow the step before hold and start to execute through the rest of the time.

Display : During ramp and soak program control, the SV default display is P-XX, P indicates the current execution pattern and XX indicates the current execution step. Press ▲▼ to change the SV display item to set point value SP or residual time r-tc.

After selecting SP, press ⏎ key, and then the temperature set point of the current execution step will display on SV display.

After selecting r-tc, press ⏎ key, and then the residual time of the current execution step will display on SV display.

Dual Outlet Cutout

1.50

3.00

Ø 0.75

Leviton 20A #CBR20

Danger: If feedback temperature sensor (thermocouple) malfunctions or becomes separated from process contents, temperature control may enter an unregulated state including CONTINUOS FULL POWER HEATING.

To mitigate these circumstances, set Hot Plate temperature control to a minimum (safe) power level.

Operating Instructions:
Appliance operates in 3 modes
1. Bypass: Use *Bypass* electrical outlet, process temperature is controlled by Hot Plate power setting only.
2. Constant Temp: Use *Control* electrical outlet, process is controlled at a constant temperature for as long as power is applied.
3. Ramp/Soak: Use *Control* electrical outlet, process temperature is controlled by a programmed time sequence.

To start Constant Temp process:
1. Turn Power Switch On
2. Hold Enter button for 3 seconds
3. Index to Ctrl, Set Ctrl to ON/OFF. Press Enter
4. Set process temperature (SV) using Up/Down controls. Press Enter

To start Ramp/Soak program:
1. Turn Power Switch On
2. Hold Enter button for 3 seconds
3. Index to Ctrl, Set Ctrl to ProG. Press Enter
4. Press Index button once
5. Use Up/Down controls to set r-S = rUn. Press Enter
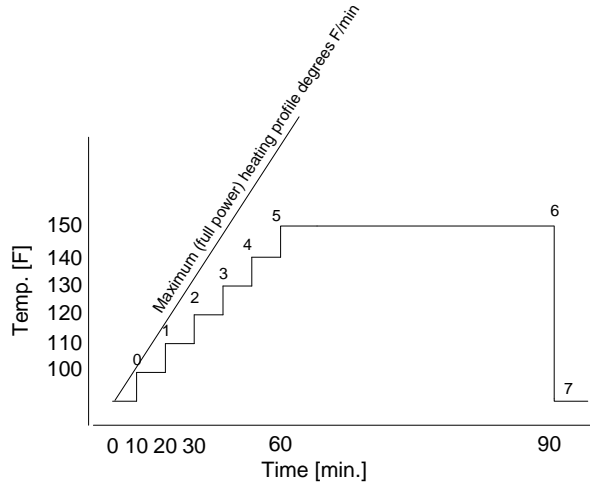(Display shows Process Value (PV) temperature and pattern# step#)

| Control | Bypass | FUSE: 15A | MAIN POWER |

Ramp/Soak Test Example Process & Program

Pattern 0: (example)
SP00 = 100F, ht00 = 00.10
SP01 = 110F, ht02 = 00:10
SP02 = 120F, ht03 = 00.10
SP03 = 130F, ht04 = 00:10
SP04 = 140F, ht05 = 00:10
SP05 = 150F, ht06 = 00:10
SP06 = 150F, ht03 = 00:30 (soak)
SP07 = 40F, lt07 = OFF (end program)

1. Enter Initial Mode – press Enter for 3 seconds
2. Index to Ctrl
3. Use Up/Down Control, set Ctrl = ProG, press Enter
4. Index to Patn
5. use Up/Down controls to select pattern# (0-7), press Enter
6. Index to SPxy (where x is pattern# (0-7), y is step# (0-7)
7. Use Up/Down controls to enter Temperature (SV), press Enter
8. Index to htxy (where x is pattern# (0-7), y is step# (0-7)
9. Use Up/Down controls to set step time (HH:mm), press Enter
10. Continue entering Temperature and Time values for all 8 steps
11. Index to lt07
12. Use Up/Down controls to set lt07 = oFF to (maintain step 7 temp.), press Enter

Misc. Ramp/Soak parameters:
PsY0 = 7 (0-7) (Pattern n 0-7, set Last pattern step#)
CyC0 = 0 (0-99) (repeat Pattern)

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