

customer manual

ORIGINAL INSTRUCTIONS

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SAFETY PRECAUTIONS — AVOID INJURY — READ THIS FIRST!

Safeguards are designed into this application equipment to protect operators and maintenance personnel from most hazards during equipment operation. However, certain safety precautions must be taken by the operator and repair personnel to avoid personal injury, as well as damage to the equipment. For best results, application equipment must be operated in a dry, dust-free environment. Do not operate equipment in a gaseous or hazardous environment.

Carefully observe the following safety precautions before and during operation of the equipment:



Always wear approved eye protection while operating equipment.



Always wear appropriate ear protection while using equipment.



Moving parts can crush and cut. Always keep guard(s) in place during normal operation.



Electrical shock hazard.



Always turn off the main power switch and disconnect the electrical cord from the power source when performing repair or maintenance on the equipment.



Never insert hands into installed equipment. Never wear loose clothing or jewelry that may catch in moving parts of the equipment.



Never alter, modify, or misuse the equipment.

SUPPORT CENTER

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The **Support Center** offers a means of providing technical assistance when required. In addition, Field Service Specialists are available to provide assistance in the adjustment or repair of the application equipment when problems arise which your maintenance personnel are unable to correct.

INFORMATION REQUIRED WHEN CONTACTING THE SUPPORT CENTER

When calling the Support Center regarding service to equipment, it is suggested that a person familiar with the device be present with a copy of the manual (and drawings) to receive instructions. Many difficulties can be avoided in this manner.

When calling the Support Center, be ready with the following information:

1. Customer name
2. Customer address
3. Person to contact (name, title, telephone number, and extension)
4. Person calling
5. Equipment number (and serial number if applicable)
6. Product part number (and serial number if applicable)
7. Urgency of request
8. Nature of problem
9. Description of inoperative component(s)
10. Additional information/comments that may be helpful



Figure 1

1. INTRODUCTION

1.1. General

When reading this manual, pay particular attention to DANGER, CAUTION, and NOTE statements.



DANGER

Denotes an imminent hazard that may result in moderate or severe injury.



CAUTION

Denotes a condition that may result in product or equipment damage.



NOTE

Highlights special or important information.



NOTE

Dimensions in this customer manual are in metric units [with U.S. customary units in brackets]. Figures are not drawn to scale.

1.2. Intended Use

The Model W350 Waffle Iron Infrared Heater (shown in Figure 1) controls system utilizes an integrated HMI touch screen and PLC to control all functions of the process sequence as well as diagnostics for any faults that may occur during the process cycle.

Standard product applications include: CTM splice modules for flat conductor cable, CTM transitions for splicing flat conductor cable to round wire, MTC50 and MTC100 connector wafers for flat conductor cable.

The part to be terminated is fixed between two platens that hold the part in place and apply heat and pressure during a termination cycle.

Each platen is heated by a quartz halogen lamp. To accommodate different interconnection components, different platens are used, which snap in and out of their mounting fixtures. The upper platen and lamp are mounted in a hinged heat sink that opens for loading and unloading.

Technical Assistance may be obtained from:
TE Connectivity
Attn. MTC Products, AD&M
1225 East Main St.
Mount Joy, PA 17552

A. Labels and Warning Symbols

This tool carries the general safety warning labels as shown in Figure 2.



Figure 2

- As with all electrical equipment, the Waffle Iron must be operated properly. Carefully read and observe all of the instruction and warnings in this manual.
- Incorrect use of the Waffle Iron can cause serious injury. This equipment must be operated and maintained only by fully trained and qualified personnel.
- Failure to follow the manufacturer's instructions may void the warranty of this equipment
- The Waffle Iron must be operated in accordance with safe working practices and local safety codes and regulations.
- Do not use the Waffle Iron for any purpose other than its intended function.
- The Waffle Iron carries an International Protection, or Ingress Protection (IP) Code of IP20.
- Never expose the Waffle Iron to rain or moisture.
- Disposal and Decommissioning - Electronic components are to be recycled in accordance with the End-Users National regulatory requirements.



CAUTION

The Waffle Iron must be isolated before any maintenance, cleaning and/or repair work is carried out. A 'cooling period' should be observed before removing/replacing the Halogen Lamps and/or Platens. Do not touch the Halogen lamps without the use of latex, nitrile, or similar gloves that ensure non-contamination of the bulb surface.

B. Care of Platens

Cleaning Platens

Keep the platens clean and free from residues such as melted sealing material. Remove and clean the platens daily or as often as necessary, using a clean tissue moistened with trichloroethane.

Do not immerse platens; pour solvent on platens, or clean platens without removing them from the Waffle Iron infrared heater.

Carefully remove any debris that might fall into the reflector areas when platens are removed.

Clean reflectors and lamps if they become dirty, using a soft cloth or tissue moistened with trichloroethane or isopropyl alcohol. Do not touch lamps directly with fingers.

Preventing Components from Sticking to Platens

Before installation or after cleaning platens, spray or wipe platens with a light coat of release agent as specified. Coat only the side of the platens that comes into contact with the part being terminated. Install the platens and run the Waffle Iron infrared heater through one operating cycle before making any terminations.



Platen Installation

1. Select the correct platen set as called out in the product installation instructions.
2. Before installation or after cleaning, spray or wipe platens with a light coat of release agent. The recommended release agent is Miller-Stephenson MS-122. Only coat the side of the platens that come in contact with the parts being terminated (TFE Release Agent/Dry Lubricant).
3. Turn on the controller unit by the main breaker switch on the rear of the unit.
4. Depress the push button on the waffle iron while pushing down on the latch to the upper heat sink and releasing it.
5. Remove and install platens as required noting the following items:
 - a. Platens are locked into heat sinks by a spring loaded retainer.
 - b. Identification markings face the operator.
 - c. Top platen has one keying slot.
 - d. Bottom platen has two keying slots.



DANGER

Do not touch the heating lamps

6. Close and latch the upper heat sink.

1.3. Termination Procedure

In keeping with good industrial hygienic practice, adequate ventilation must be maintained whenever plastic materials are heated.

Reference the applicable specification shown in Figure 3 per your application for critical handling instructions:

DOCUMENT NO.	TITLE
ES-61190	Termination Procedure-MTC100 Connector Wafers to Flat Conductor Flat Cable using Waffle Iron II Heating Tool
ES-61191	Termination Procedure-MTC50 Connector Wafers to Flat Conductor Flat Cable using Waffle Iron II Heating Tool
ES-61192	Termination Procedure-MTC50 Connector Wafers to Flat Conductor Flat Cable using Waffle Iron II Heating Tool

Figure 3

A. Initiating Termination

1. Make sure that the set-up is complete, the tool is turned “ON” and warmed up, and the TEMP and TIME controls are set.
2. Open the upper heat sink and cable clamps.
3. Load the assembly to be terminated onto the lower platen of the heating tool.
 - a. Position CTMs so that the top surface faces upward and the CTM is centered in the platen.
 - b. Position MTC connector wafers against the stop in the platen, with the contact numbers facing upward. The cable or wires should extend to the operators right.

- c. Position round wires through the platen comb and close the clamp.
4. Line up the edges of the cable (FCC) with the cable guidelines in the top surface of the heating tool, close the clamps on the cable.
5. Inspect to make sure that the cable or wires are fully inserted and properly positioned on top of the solder terminals. Reposition cable or wires if necessary.
6. Close and latch the upper heat sink.



NOTE

The unit is designed to operate on either 115 or 230 VAC mains power supply by **INSTALLING THE CORRECT VOLTAGE RATED LAMPS IN THE HEATING CHAMBER.**

The controls system voltage as well as the cooling fans operate on 24VDC.

B. Fault Diagnostics Include:

1. Lid open during cycle.
2. Processor over temperature.
3. Upper heater fault.
4. Lower heater fault.
5. Over temperature upper heater head.
6. Over temperature lower heater head.



NOTE

It is the user's responsibility to independently verify all process parameters and settings immediately after equipment is installed. The user must also maintain and adjust the equipment, monitor the process, and inspect the installed product to ensure that process requirements are met on an ongoing basis.

1.4. Process Cycle Sequence

To initiate a cycle start the main screen must indicate "SYSTEM OK", the upper lid must be closed, the temperature of the upper heating head must be lower than the cooling cycle complete temperature and the "READY" light on continuously. See Figure 4.

A. The cooling cycle complete is internally set at 52°C. This is the actual temperature monitored by the thermocouple. Any change to the "CALIBRATION OFFSET" will cause the displayed temperature on the touch screen to reflect the actual temperature plus offset temperature. (IE): If a +28°C offset is applied, the temp on the display will show 70°C (52°C + 28°C).

B. The "READY" light will pulse at a 1 second interval if the lid is open, or the monitored temperature is greater that cycle complete temperature.

Cycle Ready Sequence of Operation

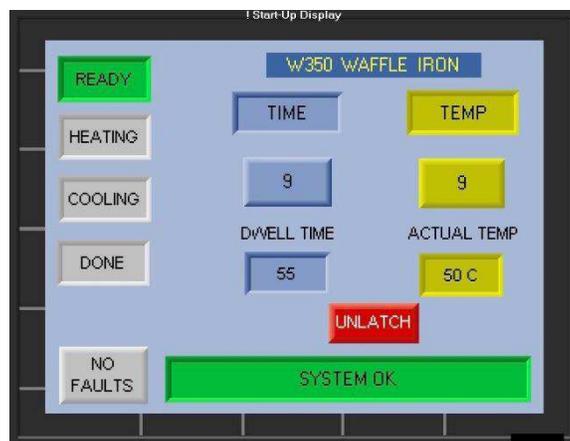


Figure 4

1. Depress the cycle “START” push button located on the Waffle Iron processor.



The “READY” light will turn off and the “HEATING” light will turn on.

Warning: Do not attempt to open the upper heat sink during the heating cycle. The platens may be hot enough to cause burns, and the termination may have to be rejected.

2. At completion of the heating cycle, the “HEATING” light will turn off and the “COOLING” light will turn on. See Figure 5.
3. At completion of the cooling cycle the “COOLING” light will turn off and the “DONE” light will turn on. The upper lid of the Waffle Iron will be able to be opened at this time. See Figure 5.
4. Once the upper lid is opened, the “DONE” light will turn off and the “READY” light will turn on and pulse at a 1 second interval until the upper lid is reclosed for the next cycle.
5. Open the upper heat sink and cable clamps, and remove the completed termination. Do not touch the platens. They are hot and could cause burns. The upper heat sink must be opened and closed before another cycle can be initiated. No damage will occur to the terminated part if it is left in the Waffle Iron infrared heater after the termination cycle is completed. Inspect the completed termination in accordance with the appropriate product application document.

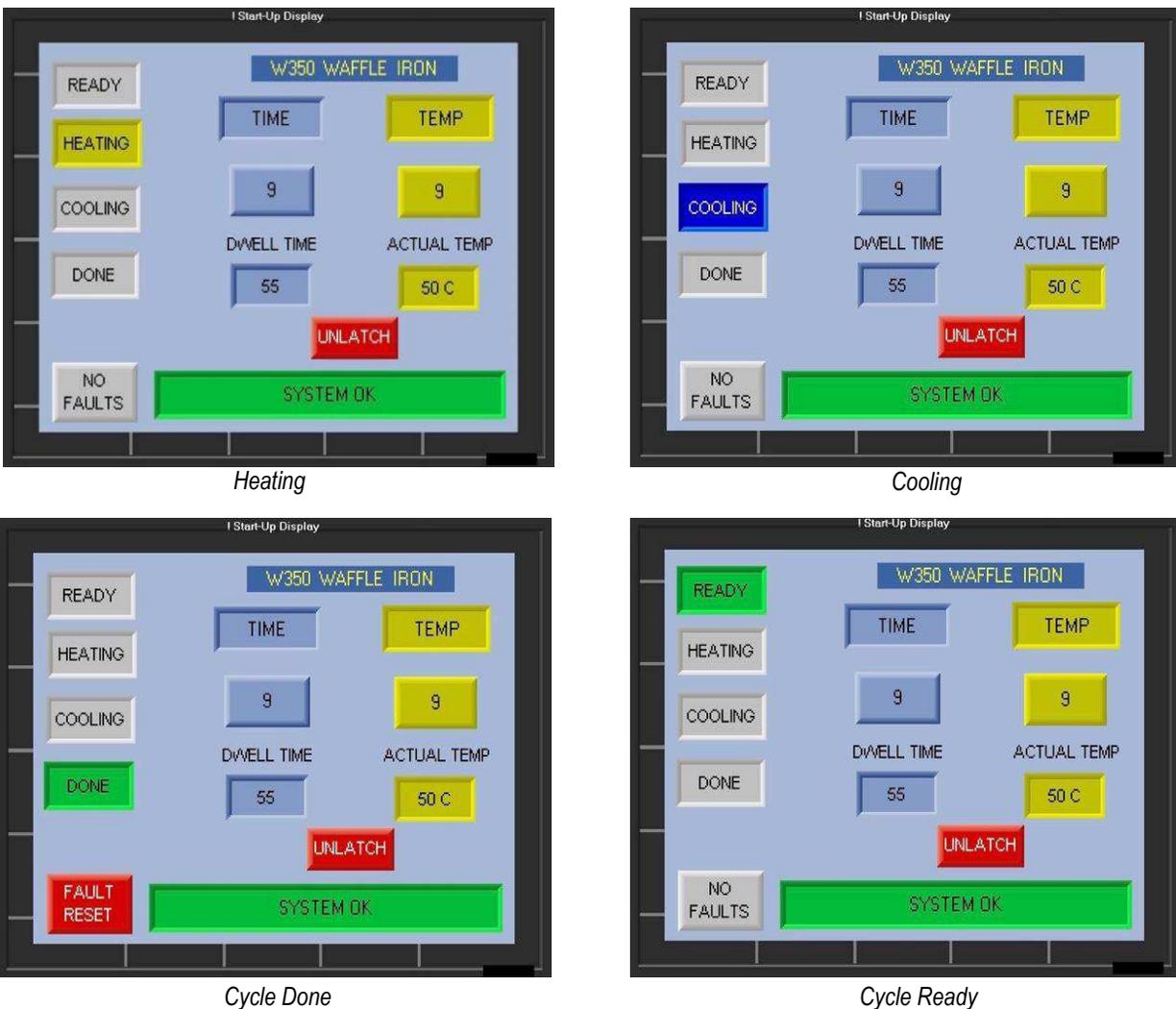


Figure 5

1.5. Main Menu Screen Time and Temp Pushbutton Descriptions

i NOTE

The display screen illustrates status lights as recessed indicators and touch pushbuttons as raised indicators. See Figure 6.



Figure 6

A. "Time"

The "TIME" pushbutton when touched opens the "TIMER" set point parameters screen for viewing. To change the linear 0 to 9 timer values the "PASSWORD" must be entered and the cycle must be complete.

B. Time Preset Value

The TIME PRESETVALUE pushbutton, located below the "TIME" pushbutton displays the time value of 0 to 9. When touched a pop up keypad is displayed, to change the value, select the require dwell time for 0 to 9 and touch the enter/return button to enter the new preset.

C. Actual Time

The actual time indicator for the selected preset 0-9 is displayed below the TIME PRESET pushbutton. The value displayed is the dwell time in seconds corresponding the selected preset value. The timer is initiated when the temperature is within the "dead band limits" set in the temperature parameters screen. Once the temperature is within limits the time value will increment down from set point to 0 and initiate the cooling cycle.

D. "Temp"

The "TEMP" pushbutton when touched opens the temperature set point parameters screen for viewing. To change the linear 0 to 9 timer values the "PASSWORD" must be entered and the cycle must be complete.

E. Temp Preset Value

The TEMP PRESETVALUE pushbutton, located below the “TEMP” pushbutton displays the temperature value of 0 to 9. When touched a pop up keypad is displayed, to change the value, select the require dwell time for 0 to 9 and touch the enter/return button to enter the new preset.

F. Actual Temp

The actual temp indicator for the selected preset 0-9 is displayed below the TEMP PRESET pushbutton. The value displayed is the actual “CALIBRATION OFFSET” temperature as measured by the upper heater thermocouple. During the heating cycle the value will rise to the selected temperature.

G. “UNLATCH” PUSHBUTTON

The UNLATCH pushbutton can be used if the lid latch solenoid should not release when the cycle is completed.

This pushbutton will **only** release the latch if a fault has occurred and the latch did not release. During normal operation the UNLATCH pushbutton is disabled and will not operate without a fault.

1.6. Faults Pushbutton

A. Fault Occurrences:

1. In the event of any fault during a cycle the “FAULT” light will turn on and the type of fault will be displayed on the main menu screen.
2. At a “FAULT” occurrence, the processor will immediately revert to the cooling cycle and the “COOLING” light will turn on.
3. To clear the fault, touch the “FAULT” light pushbutton on the screen.

B. Lid Open

If for any reason the upper heater lid is opened during a cycle the display will indicate a fault and display “LID OPEN” in the fault notification box. The fault will automatically reset with the lid open at completion of the cooling cycle. See Figure 7.



Figure 7

C. Over Temperature Upper or Lower Heater:

If either the upper or lower bimetal thermal switch opens due to an over temperature condition during the heating cycle, the display will indicate a fault and display either “OVER TEMP UPPER HEATER” or “OVER TEMP LOWER HEATER”. The cycle will immediately switch to “COOLING”. To reset the fault touch the fault reset button once the thermal switch has once again closed. See Figure 8.

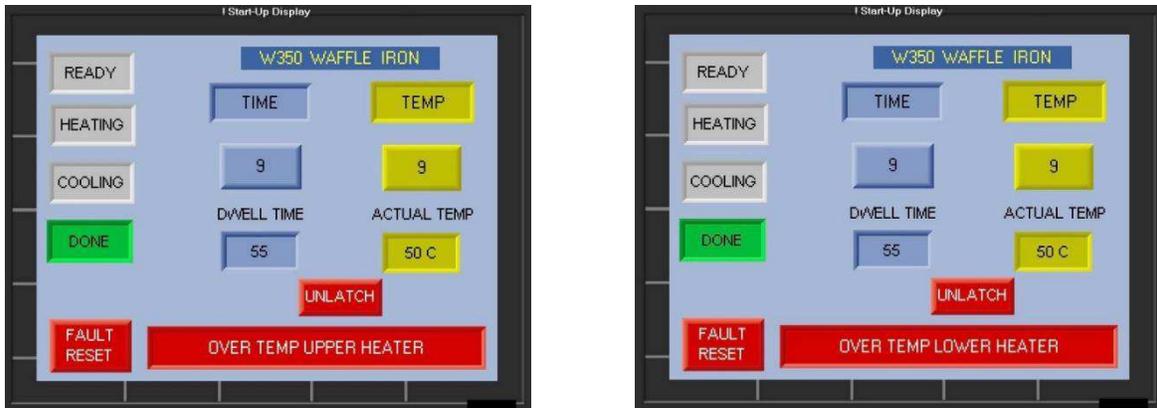


Figure 8

D. Heater Fault Upper or Lower Heater:

If either the upper or lower HEATER fails during a cycle the display will indicate a fault and display either “UPPER HEATER FAULT” or “LOWER HEATER FAULT”. See Figure 9. The cycle will immediately switch to “COOLING”. The heater fault is determined by comparing the rising temperatures of the upper and lower elements. If the temperature differential is > the 50C the fault is reported To reset the fault touch the fault reset button.



NOTE

This fault will occur if either the heating lamp has failed or the solid state relay has failed. To verify a lamp failure, reset the fault, replace the lamp, and initiate a cycle start, if the fault occurs again, the solid state relay has failed.

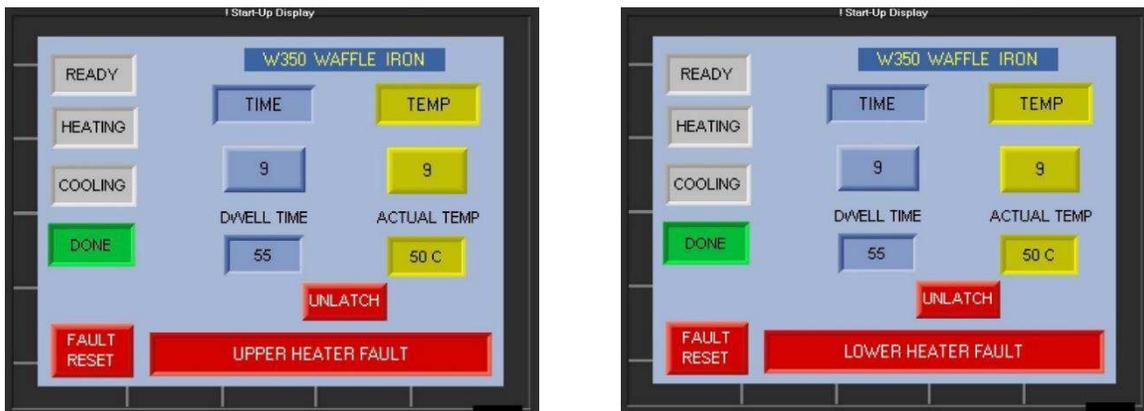


Figure 9

E. Processor Over Temperature:

The maximum allowable temperature for the processor is set by a “PASSWORD” protected value located on the TEMP Screen. If the processing temperature exceeds the preset maximum value, the display will indicate a fault and display “PROCESSOR OVER TEMP”. See Figure 10. The cycle will immediately switch to “COOLING”. To reset the fault touch the fault reset button.



NOTE

This fault will normally occur if maximum processing temperature is set too close to the maximum allowable temperature.

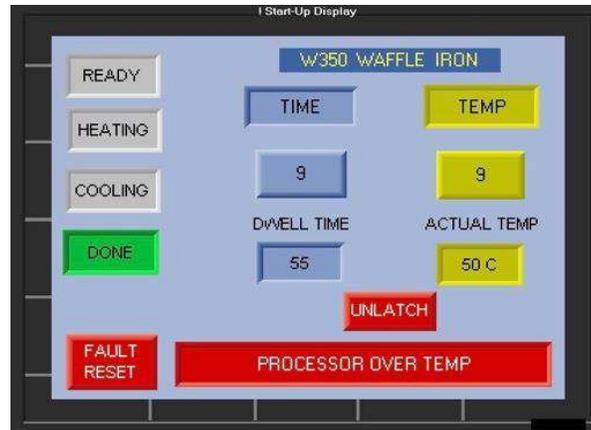


Figure 10

F. Timer Preset Screen

The Timer preset screen is accessed by touching the “TIME” pushbutton on the main menu. The programmed presets for TIME values 0 to 9 are displayed for review, but PASSWORD protected to prevent unauthorized changes. See Figure 11.

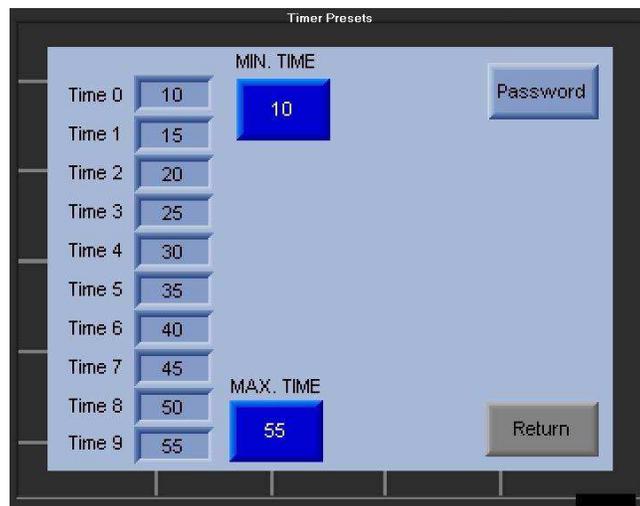


Figure 11

G. Changing Time Presets

The timer presets are a linear calculation with a 10 step range from the min time to the max time. By changing either the min or the max time the linearization will change all intermediate values.

To change the value range the Waffle Iron must be in the “READY” condition.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Touch either the “MIN TIME” or “MAX TIME” button to pop up a key pad that will display the current value.
4. Enter the new desired value and touch the enter/return button.
5. All preset values will be adjusted to the new linear range.
6. Touch the return button to return to the main menu.
7. The new values for each of the 0 – 9 presets will be displayed in the actual time window.

1.7. Temperature Control Screen

The temperature control preset screen is accessed by touching the “TEMP” pushbutton on the main menu. The programmed preset values from TEMP 0 to 9 are displayed, for review, but PASSWORD protected to prevent unauthorized changes. See Figure 12.

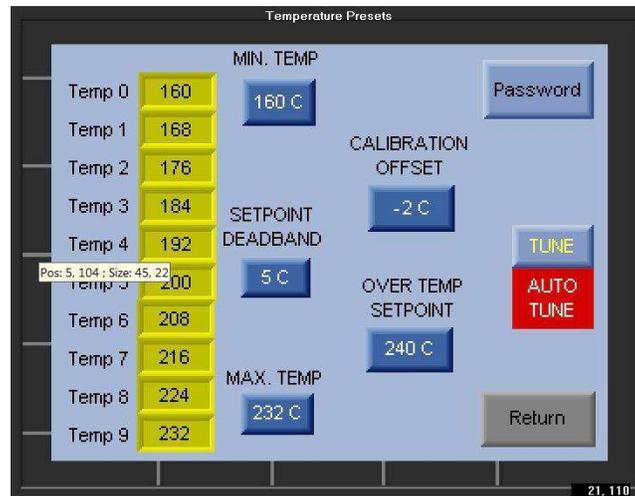


Figure 12

A. Changing Temp Presets

The temperature presets are a linear calculation with a 10 step range from the min temp to the max temp. By changing either the min or the max temp the linearization will change all intermediate values.

To change the value range the Waffle Iron must be in the “READY” condition.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Touch either the “MIN TEMP” or “MAX TEMP” button to pop up a key pad that will display the current value.
4. Enter the new desired value and touch the enter/return button.
5. All preset values will be adjusted to the new linear range.
6. Touch the return button to return to the main menu.
7. The new calibrated temp for each of the 0 – 9 presets will be displayed in the actual temp window during the next cycle.

B. Changing Over Temp Setpoint

The “OVER TEMP SETPOINT” is the maximum allowable temperature that the processor may reach. If the displayed temperature on the Main Menu screen exceeds this value a “FAULT” will be displayed.



NOTE

The “OVER TEMP SETPOINT” should be set at 8°C higher than the “MAX TEMP” preset value.

To change the “OVER TEMP SETPOINT” value the Waffle Iron must be in the “READY” condition.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Touch “OVER TEMP SETPOINT” button to pop up a key pad that will display the current value.
4. Enter the new desired value and touch the enter/return button. (NOTE: The value entered MUST be greater than the MAX TEMP value.)

5. Touch the return button to return to the main menu.

C. Changing Set point Dead Band

The “SETPOINT DEAD BAND” is the number of number of degrees C below the selected TEMP set point that initiates the dwell TIME function.

To change the “SETPOINT DEAD BAND” value the Waffle Iron must be in the “READY” condition.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Touch “SETPOINT DEAD BAND” button to pop up a key pad that will display the current value.
4. Enter the new desired value and touch the enter/return button
5. Touch the return button to return to the main menu.

D. Changing Calibration Offset

The “CALIBRATION OFFSET” is the number of degrees C required to calibrate the actual Main menu displayed thermocouple temperature reading with the CALIBRATION PLATEN temperature reading.

If the actual temperature displayed in the Main menu window during a cycle is “less” than the CALIBRATION PLATEN temperature reading, adjust the “CALIBRATION OFFSET” by entering a (+xx) offset value.

If the actual temperature displayed in the Main menu window during a cycle is “greater” than the CALIBRATION PLATEN temperature reading, adjust the “CALIBRATION OFFSET” by entering a (-xx) offset value.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Touch “SETPOINT DEAD BAND” button to pop up a key pad that will display the current value.
4. Enter the new desired value and touch the enter/return button
5. Touch the return button to return to the main menu.

E. Auto Tune Procedure

The “Tune” pushbutton located in the upper left hand corner of the temperature screen display and provides the ability to re-tune the PID heating control parameters; if the “ACTUAL TEMP” display value on the main screen is fluctuating by more than a few degrees from the selected “TEMP PRESET VALUE”.

To run the “AUTO TUNE” the Waffle Iron must be in the “READY” condition prior to entering the Temperature Control Screen. See Figure 13.



DANGER

While the Auto Tune Procedure is running, the heating lamps will be activated and the lid surfaces will be HOT.

1. Touch the “PASSWORD” button to pop up the password key pad.
2. Enter the password. (NOTE: the password is 4 digits, the 3 digit model number of the unit plus 0.)
3. Close the upper LID of the processor.
4. Touch and HOLD the “Tune” pushbutton for 5 seconds. When the button is touched the background color of the button will turn RED and must remain RED for the full 5 seconds to prevent a reset.
5. After activating the Auto Tune, the “AUTO TUNE” indicator will turn on indicating the tuning process has been initiated.
6. The heating lamps will cycle to establish the PID Loop values for temperature stability.
7. Once the tuning portion of the procedure is complete the cooling fan will turn ON to cool the heating chambers.

8. When the chamber has cooled to a Process Ready temperature, the “AUTO TUNE” Indicator will turn OFF.
9. Touch the return button to return to the main menu.
10. TURN THE POWER OFF TO THE PROCESSOR.
11. TURN THE MAINS BREAKER OFF TO RESET THE PLC.
12. Turn the main breaker ON to return to product processing.



NOTE

Failure to power cycle the PLC controller after Auto Tune will not reset the PID parameters!



Figure 13

1.8. Auxiliary Thermocouple Port

The rear of the controls enclosure has an auxiliary thermocouple receptacle port connected directly to the upper heater head thermocouple. When a temperature meter is connected to this port, the temperature displayed will be the actual reading WITHOUT the programmed “CALIBRATION OFFSET”. See Figure 14.



Figure 14

2. SPECIFICATIONS

Figure 17 provides specifications for the Model W350 Waffle Iron & Touch Screen PLC 2221641-[-].

Input Power	115VAC / 230VAC, 20A, 50/60Hz 1 PH	
Heating	T-3 Halogen Lamps	1000 Watts @115VAC \ 800 Watts @230VAC, one top & bottom
Fuses	1FU 2FU	5x20 mm, 1FU, 1.6A Time Delay Low Breaking 5x20 mm, 1FU, 3.15A Time Delay Low Breaking
Control	Unitronics V350 HMI + PLC	
Operating Temperature	Ambient to 232°C	
Processing Time	1 to 99 Seconds	
Unit Weight	Controller	6 kgs
	Waffle Iron	5.38 kgs

Figure 15

3. SPARE PARTS LIST

Figure 18 provides spare parts for these machines.

PART NO.	DESCRIPTION	RECOMMENDED SPARES
39000090	Circuit Breaker, 2 Pole, 20A, 250VAC, 50/60 Hz, UL, CSA, VDE Approved	---
47000105	Dual Push Button w/ 24VDC Pilot Light, Red "O" Button, Green "I" Button, 1NO Contact on "I" Button, 1NC Contact on "O" Button	---
19000002	Cycle Start Pushbutton Assembly	---
38000073	Relay, 2PDT, 25A, 24 VDC Coil, VDE Approved	Yes
45000058	Phase Fired SCR, 24-330VAC, 25A Output, 4-20mv Input	Yes
45000057	24VDC Unitronics HMI + PLC, (2) T/C inputs, (2) 4-20mv outputs, (8) 24vdc digital inputs, (8) relay outputs	---
54000065	Power Supply 100-240 VAC IN, 24 VDC OUT – 60W	Yes
39000078	Fuse, IEC 5x20mm, Low Breaking, Time Delay, 250V, 1.6A	Yes
39000081	Fuse, IEC 5x20mm, Low Breaking, Time Delay, 250V, 3.15A	Yes
47000123	Halogen Lamps 1000 Watts, 115VAC, one top & bottom	Yes
47000124	Halogen Lamps 800 Watts, 230VAC, one top & bottom	Yes
38000075	Cooling Fan 24VDC, 4.7 x 4.7 x 1.5, 105CFM	Yes
44000030	Line Filter 3 Amp 240vac	---

Figure 16

Unitronics is a trademark.

4. SCHEMATIC DIAGRAMS

Figures 19, 20, and 21 provides schematic diagrams for Model W350 Waffle Iron & Touch Screen PLC 2221641-[].

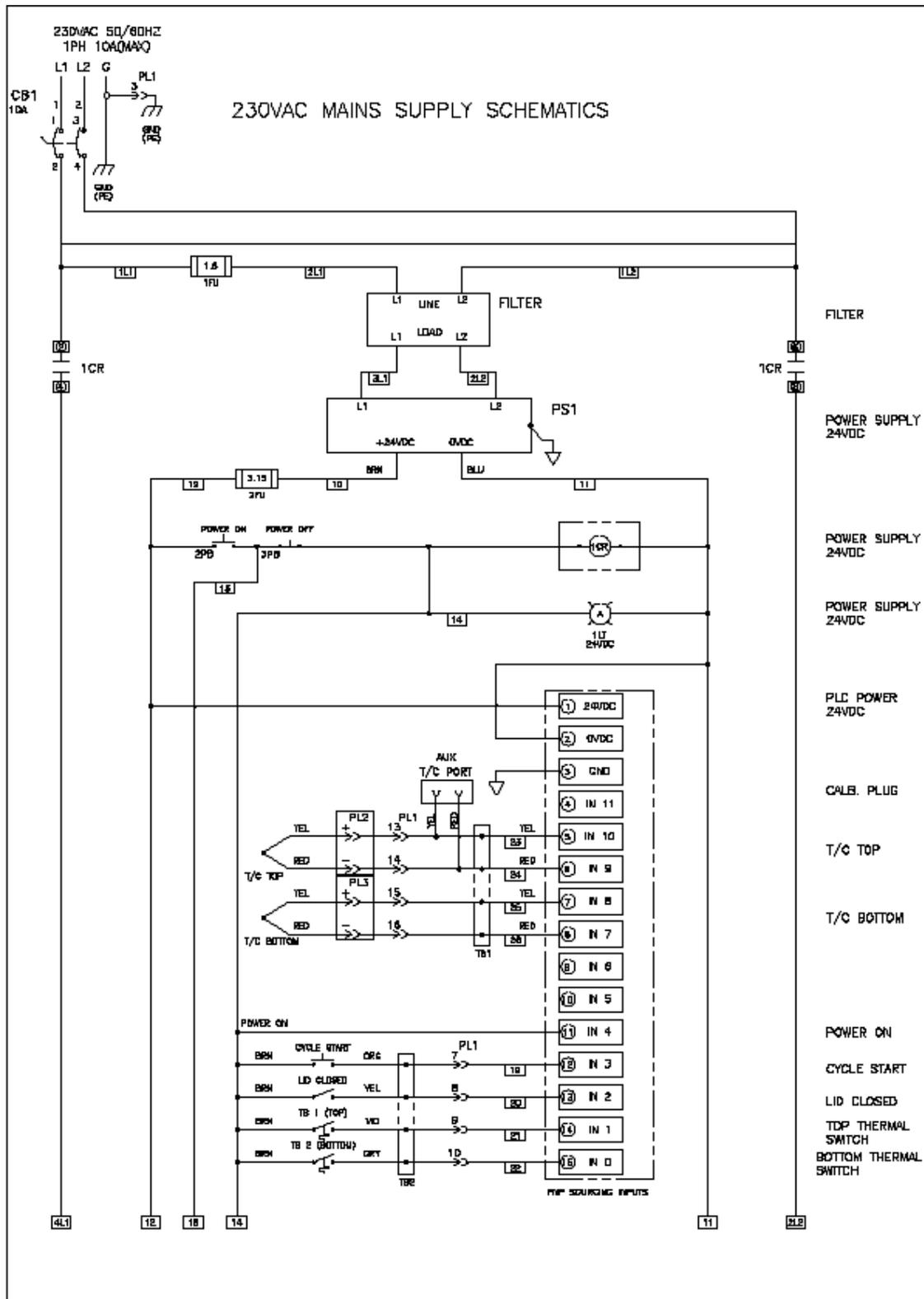


Figure 19

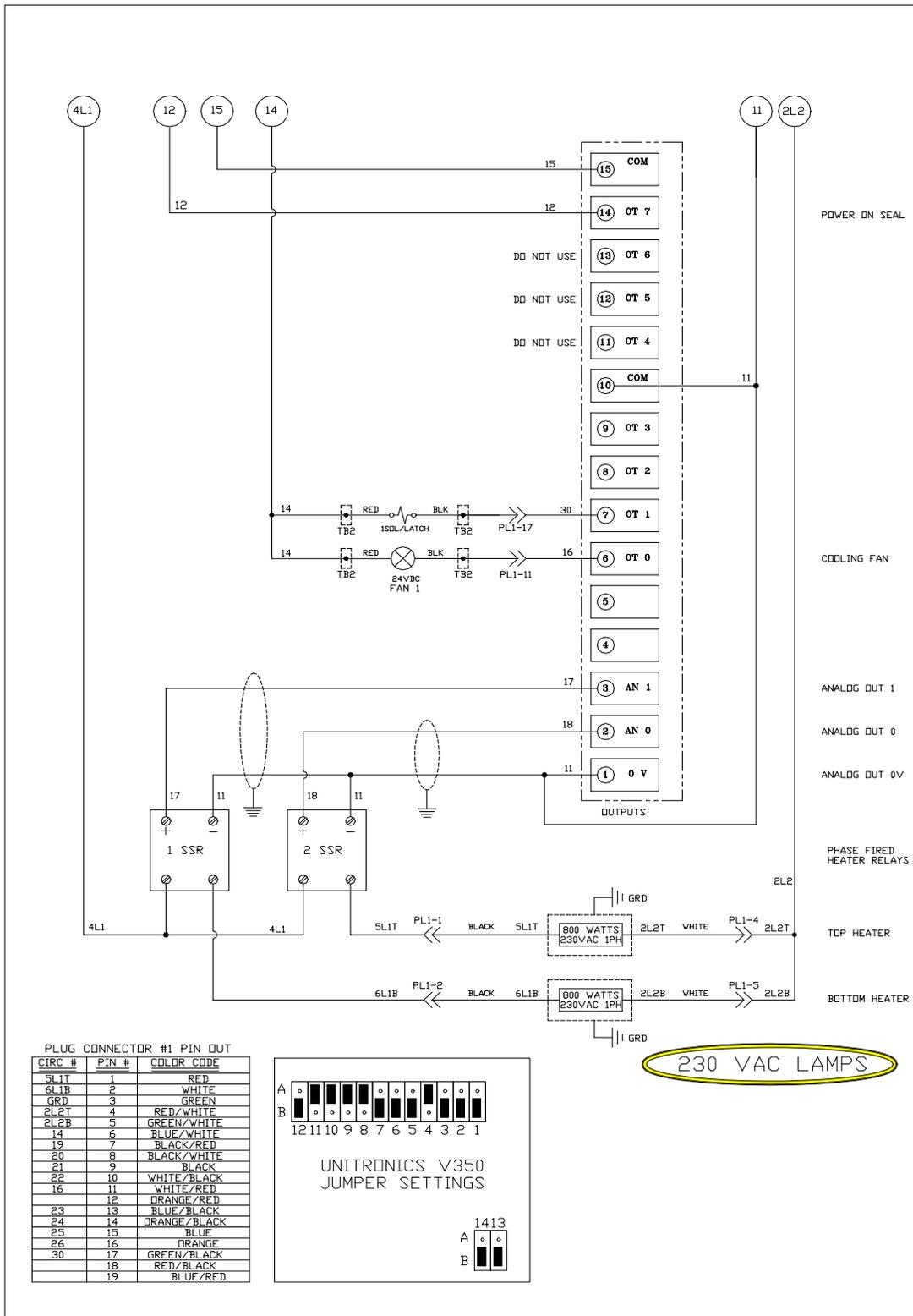


Figure 20

Figure 21

