

# MINICHEF™ 2000

Applications 27 & 28

# Rotisserie Ovens Applications Guide

Programming & Operating Steps



## Watlow Controls

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# Application 27

## Manual and Automatic Rotisserie Oven

*One Heat Channel, 30 Pre-programmed Menus, One Manual Menu*

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Application 27 allows you to program as many as thirty menus to control one temperature channel and cooking time for an automatic cook-&-hold oven. The oven may also be programmed manually by the operator. The oven includes a probe function for temperature sensing, a spit output and a fan output.

### Overview of Key Steps

1. Install the MINICHEF 2000.
2. Wire the controller.
3. Configure the controller.
4. Program the menus.
5. Set the controller security.
6. Set the Real-time Clock.

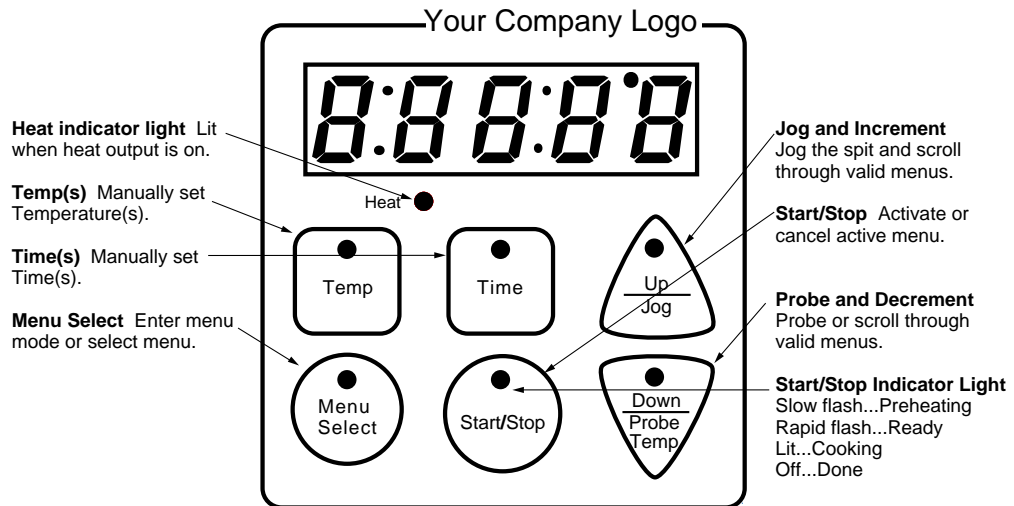
For instructions on Steps 1, 2, 3, 4, 5 and 6, see the *Hardware & Software Setup Guide*.

7. Design, manufacture and apply faceplate overlay for end-users. (For a suggested design to suit this application, see this section. For overlay dimensions and guidelines, see the *Hardware & Software Setup Guide*.)
8. Operate the controller. (See this application guide.)

## Key Functions in Configuration Mode

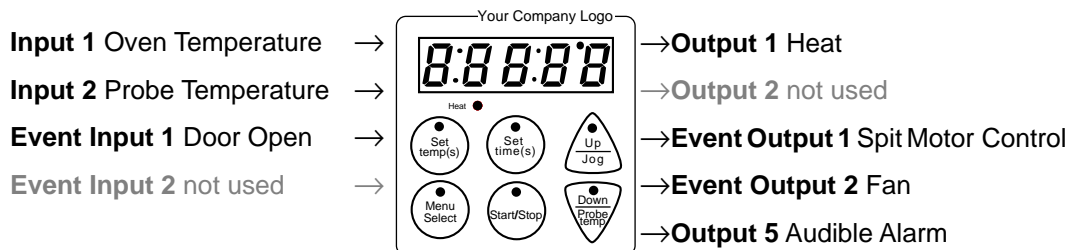


## Key Functions in Operation Mode



**WARNING:** The Jog and Increment keys cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## Summary of Input/Output Functions



**Note:** For details, see wiring instructions in the *Hardware & Software Setup Guide*.

# Configuration Mode Quick Reference

These are the functions, parameters and values included in the Configuration Mode for this application. You must select Application 27 to access them. For directions, see the *Hardware & Software Setup Guide*. The Appendix of that guide includes an explanation of all parameters and values.

Function	Parameter	Value	Your Settings
<b>EETYPE</b> Equipment-Type	<b>APPL</b> Application	1 - 28	27
	<b>R_Loc</b> Application Number Security Lock	Yes, No	
	<b>STEPS</b> Number of cooking steps	1, 2	
	<b>Probe</b> Probe	Yes, No	
<b>SETUP</b> Setup	<b>C_F</b> Temperature Display Units	°C or °F	
	<b>TIME</b> Time Display Units	MMM:SS, HH:MM, H:MM:SS	
	<b>Chirp</b> Key Chirp	On, Off	
	<b>Loc</b> Menu Security Lock	Yes, No	
	<b>tc</b> Thermocouple Type	J, K (shown as <b>H</b> ), E	
	<b>rtd</b> RTD Curve	DIN, JIS	
	<b>WatCurve™</b> WatCurve™	On, Off	
	Temperature Compensation		
	<b>OFFST1</b> Temp Offset, Channel 1	-99 to 99°F (-55 to 55°C)	
	<b>OFFST2</b> Temp Offset, Channel 2	-99 to 99°F (-55 to 55°C)	
	<b>Er Lo</b> Temperature Range Low	0°F (-18°C) for RTD inputs 32°F (0°C) for tc inputs to <b>Er Hi</b>	
	<b>Er Hi</b> Temperature Range High	<b>Er Lo</b> to 1200°F (649°C)	
	<b>rREADY</b> Preheat Ready Feature	Yes, No	
	<b>rbAND</b> Ready Band	1 to 1200°F (1 to 649°C)	
	<b>CLoc</b> Real Time Clock Display	Yes, No	
	<b>PLoss</b> Power Loss Menu Resume	Yes, No	
	<b>AL 1</b> Alarm 1	None, Dev, Proc, Both	
	<b>AL P1</b> Absolute Process Alarm 1	100 to 1200°F (38 to 649°C)	
	<b>ALdL1</b> Low Deviation Alarm 1	-999 to 0°F (-555 to 0°C)	
	<b>ALdH1</b> High Deviation Alarm 1	0 to 999°F (0 to 555°C)	
	<b>AL 2</b> Alarm 2	None, Dev, Proc, Both	
	<b>AL P2</b> Absolute Process Alarm 2	100 to 1200°F (38 to 649°C)	
	<b>ALdL2</b> Low Deviation Alarm 2	-999 to 0°F (-555 to 0°C)	
<b>ALdH2</b> High Deviation Alarm 2	0 to 999°F (0 to 555°C)		
<b>THERM</b> Thermal	<b>TYPE</b> Temperature Control Type	Pid, On-Off	
	<b>HYS1</b> Hysteresis 1	1 to 99°F (1 to 55°C)	
	<b>Pid U</b> PID Units	SI, US	
	<b>tune1</b> Auto-tuning 1	on, OFF	
	<b>PROP1</b> Proportional Band 1	1 to 999°F (1 to 555°C)	
	<b>RSET1</b> Reset (integral) Gain 1	0.00 to 9.99 repeats/minute	
	<b>Int 1</b> Integral Gain 1	0.00 to 99.99 minutes/repeat	
	<b>RATE1</b> Rate (derivative) Gain 1	0.00 to 9.99 minutes	
	<b>dEr 1</b> Derivative Gain 1	0.00 to 9.99 minutes	
	<b>CYCL1</b> PID Cycle Time 1	1 to 60 seconds	
<b>diag</b> WatHelp Diagnostics	Used for equipment troubleshooting and testing. Not used when programming. See the <i>Hardware &amp; Software Setup Guide</i> .		

# Program Mode Quick Reference

These are the functions, parameters and values included in the Program Mode for this application. You must select Application 27 to access them.. For menu programming directions, see the *Hardware & Software Setup Guide*. The Appendix of that guide includes a detailed explanation of all parameters and values.

Function	Parameter	Value/Description	Your Settings
P7 Menu Numbers 1 - 30	<b>SEPT1</b> Set point 1 Temperature of set point 1	Temp range low to temp range high.	
	<b>TUNE1</b> Time 1 Run time of set point 1.	Setting both Time 1 and Time 2 to 0 invalidates selected menu.  Format varies based on configuration.	
	<b>SEPT2</b> Set point 2 Temperature of set point 2.	Temp range low to temp range high.	
	<b>TUNE2</b> Time 2 Run time of set point 2.	Setting both Time 1 and Time 2 to 0 invalidates selected menu.  Format varies based on configuration.	
	<b>HSEPT</b> Hold Set point Temperature at which the oven will operate during hold sequence.	Temp range low to temp range high.	

## Auto-tuning Note:

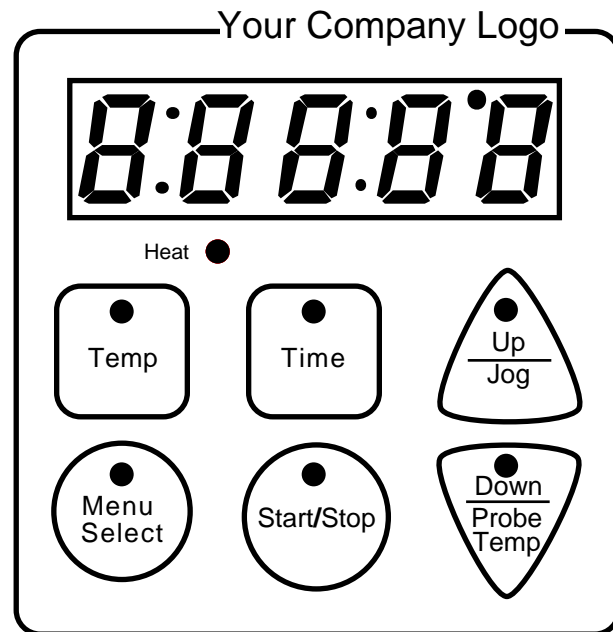
Before auto-tuning Application 27, the Set Point 1 of Menu 1 must first be set to a value that is typical of your application (See the *Hardware & Software Setup Guide* for information on programming menus.). Then set **THERL** / **tunE1** to **on**. After you accept **on**, by pressing “Enter,” the controller will display **tunE** while auto-tuning is taking place.

The controller will cancel the auto-tuning process if it cannot be completed in 80 minutes. You can cancel the auto-tuning process at any time by pressing either key C or key D and accepting **OFF**, by pressing “Enter,” when it appears.

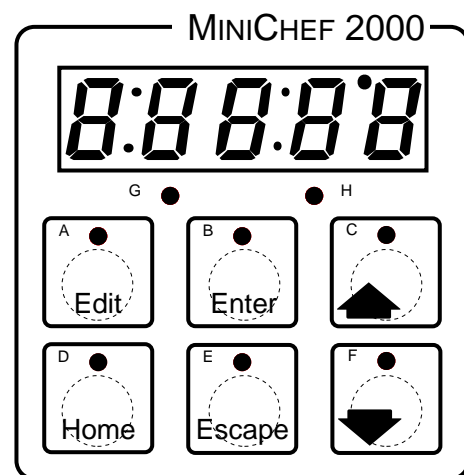
# Step 7 Design a Faceplate Overlay

To complete the installation, you must apply a graphic membrane to the front panel of the controller. The following artwork will help you design and create a membrane for this application. For more dimensions and guidelines, see the *Hardware & Software Setup Guide*.

## Suggested End-user Overlay:



**This Prototyping and Training Membrane Overlay will help you with the configuration and programming steps. To order it, see the Ordering Information at the back of this guide.**



# Step 8 Operate the Controller

## Summary of Key Functions in Operation Mode

Key	Function
A	Temp
B	Time
C	Jog & Increment
D	Menu Select
E	Start/Stop
F	Probe & Decrement

## Startup

Apply power to the oven.

**idLE** will appear on the display.

If the Real-time Clock option is installed and **SETUP / 6.17E** is programmed, the time of day will appear on the display.

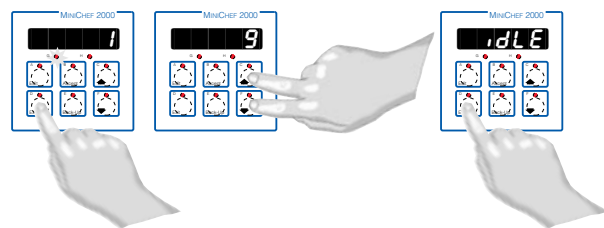
At this time you can either select a pre-programmed menu or set a manual menu.



**WARNING:** Starting or initiating a menu can cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## Select a Pre-Programmed Menu

1. Press the Menu Select key.



The controller will display the currently selected menu. If no menus have been programmed the word **nonE** will appear on the display.

2. Press the Up-arrow or Down-arrow key until the menu you want appears on the display.

**Note:** The controller will not respond if you select an invalid menu (one for which the total of Time 1 and Time 2 for the menu is set to greater than 0).



3. Press the Menu Select key again.

The menu you have chosen becomes the current menu for controller operation.

## Set a Manual Menu

Depending on the way the controller was programmed at **TYPE** / **STEPS** you can set the menu to run in one step or two.

**TYPE** / **STEPS** = **1**: Single Step Menu

**TYPE** / **STEPS** = **2**: Two Step Menu

## Single Step Menu

The single step menu consists of one cooking temperature, one hold temperature and one cooking time.

### Set the cooking and hold temperatures:

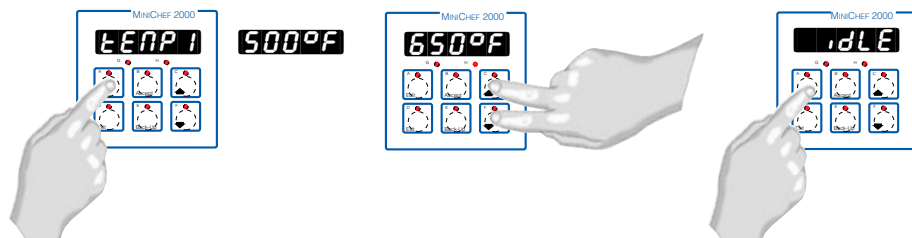
1. Press the Temp key **TEMP** and then the cooking temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Temp key again.

The cooking temperature has been set.

**HTEMP** and then the hold temperature value will appear on the display.

4. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
5. Press the Temp key again.

**idle** will appear on the display.



### Set the cooking time:

1. Press the Time key.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Time key again.

The Cooking Time has been set.

**idle** will appear on the display.

The menu you have set becomes the current menu for controller operation.

### Five Second Timeout

When using the Up-arrow or Down-arrow keys to change a value, if you do not press any key for 5 seconds, the controller will automatically be set to the last value on the display and return to **idLE**.

## Two Step Menu

The two step menu consists of two cooking temperatures, one hold temperature and two cooking times.

### Set the two cooking temperatures and the hold temperature.

1. Press the Temp key **TEMP 1** and then the first cooking temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Temp key again.

The first cooking temperature has been set.

**TEMP 2** and then the second cooking temperature value will appear on the display.

4. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
5. Press the Temp key again.

The second cooking temperature has been set.

**HTEMP** and then the hold temperature value will appear on the display.

6. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
7. Press the Temp key again.

The Hold temperature has been set.

**idLE** will appear on the display.

### Set the two cooking times.

1. Press the Time key **TIME 1** and then the first cooking time value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Time key again.

The first cooking time has been set

**TIME 2** and then the second cooking time value will appear on the display.

4. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
5. Press the Time key again.

The second cooking time has been set

**idLE** will appear on the display.

The menu you have set becomes the current menu for controller operation.

### Five Second Timeout

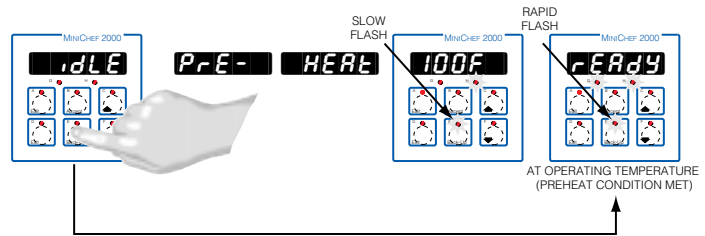
When using the Up-arrow or Down-arrow keys to change a value, if you do not press

any key for 5 seconds, the controller will automatically be set to the last value on the display and return to **idLE**.

## Preheat

If the **rEAdy** parameter under the **SEtUP** function in the Configuration Mode is set to yes, the controller will detect temperatures and preheat to operating temperature (above the relative set point minus the ready band) as required.

- Activate the menu by pressing the Start/Stop key.



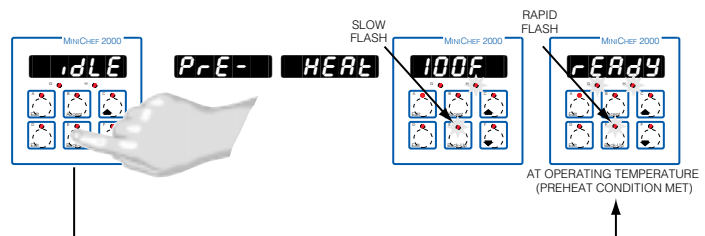
- If the oven is not at operating temperature, it will preheat. Meanwhile:  
The word **PrE- HEAt** will appear on the display for a few moments. The Start/Stop key indicator light will flash slowly. The temperature of Channel 1 will be displayed until the operating temperature is reached.  
The heat output indicator light - G, just below the display- will light up whenever the controller is calling for heat.  
When the oven is at operating temperature (above the relative set point minus the ready band) ready will appear on the display and the Start/Stop key indicator light will flash rapidly. You are now ready to cook with the active menu.
- If the oven is at operating temperature, the display goes directly to **rEAdy** without indicating preheat or temperature.

**Note:** You can skip preheat and go directly to the cooking sequence by pressing the Start/Stop key a second time.

## Run a Menu (with preheat feature)

This procedure describes how to run an active menu when the preheat feature is active – that is, when the **rEAdy** parameter in the **SEtUP** function of the Configuration mode is set to **YES**.

1. Select or Set a menu as shown earlier.
2. With **idLE** or time of day on the display, press the Start/Stop key.



If the preheat condition has not been met, the oven will preheat until **rEAdy** appears on the display.

**Note:** You can skip preheat and go directly to the cooking sequence by pressing the Start/Stop key a second time.

If the oven is already at operating temperature **rEAdY** will appear on the display.

3. With **rEAdY** on the display, place the food on the spit. Then press the Start/Stop key (indicated by the rapidly flashing indicator light).

The Start/Stop key indicator will light up. Time will count down on the display.

Depending on the way the controller was programmed at Etype/Steps the unit will run either a one or a two step cooking sequence:

**One Step Cooking Sequence** **EtYPE** / **StEPS** = **■■■■■1**:

Countdown time is displayed. It is the programmed Time 1.

Temp 1 will run until Time 1 expires.

**Two Step Cooking Sequence** **EtYPE** / **StEPS** = **■■■■■2**:

Countdown time is displayed. It is the total of the programmed Time 1 plus Time 2.

Temp 1 will run until Time 1 expires.

Temp 2 will run until Time 2 expires. You will not see the switch-over from Time 1 to Time 2.

4. When the cooking sequence is complete, the unit will switch to the Hold sequence.

An audible tone will sound for two seconds.

The display will alternate slowly between **HoId** and count up time.

The unit will count up time indefinitely. The hold sequence will end and the controller will go into idle when you cancel the current menu by pressing the Start/Stop key.

5. Once the controller goes into idle, the Start/Stop key indicator light and heat output will switch off. The controller will not regulate to any temperature.

6. To repeat cooking, repeat steps 1 through 4.

## Run a Menu (without preheat feature)

This procedure describes how to run an active menu when the preheat feature is inactive -- in other words, when the **rEAdY** parameter in the **SEtUP** function of the Configuration mode is set to **■■■■no**.

1. Select or set a menu as shown earlier.
2. With idle on the display, place the food on the spit.
3. Press the Start/Stop key.

The Start/Stop key indicator will light up. Time will count down on the display.

Depending on the way the controller was programmed at Etype/Steps the unit will run either a one or a two step cooking sequence:

**One Step Cooking Sequence** **EtYPE** / **StEPS** = **■■■■■1**:

Countdown time is displayed. It is the programmed Time 1.

Temp 1 will run until Time 1 expires.

**Two Step Cooking Sequence** **EtYPE** / **StEPS** = **■■■■■2**:

Countdown time is displayed. It is the total of the programmed Time 1 plus Time 2.

Temp 1 will run until Time 1 expires.

Temp 2 will run until Time 2 expires. You will not see the switch-over from Time 1 to Time 2.

4. When the cooking sequence is complete, the unit will switch to the Hold sequence. An audible tone will sound for two seconds. The display will alternate slowly between **Hold** and count up time. The unit will count up time indefinitely. The hold sequence will end and the controller will go into idle when you cancel the current menu by pressing the Start/Stop key.
5. Once the controller goes into idle, the Start/Stop key indicator light and heat output will switch off. The controller will not regulate to any temperature.
6. To repeat cooking, repeat steps 1 through 4.

## Jog the Spit

When the menu is paused, the unit is in idle or the oven door is open, you can jog the spit by pressing the Jog & Increment key. Event Output 1 is on while key is pressed.



**WARNING:** The Jog and Increment keys cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## View Probe Temperature

When the **Probe** parameter in the **ETYPE** function of the Configuration mode is set to **YES** you can view actual probe temperature.

- Insert the probe into the food and press the Probe & Decrement key. While the probe is heating, **Probe** will appear on the display. When the probe reaches the food temperature, the temperature reading will appear.

## View Actual Oven Temperature

While cooking you can view the actual oven temperature by pressing and holding the Temp key for three seconds.

## Adjust a Menu While Cooking

You can adjust the temperature and time settings during the cooking and hold sequences by performing the actions shown under "Set a Manual Menu" earlier in this section.

Changes can be made to temperature and time only during the portion of the cooking sequence in which they are active. For example, a change to the first cooking temperature **TEMP1** can be made only when the first cooking temperature is being run during the cooking sequence.

Time and temperature changes are not saved and do not become part of the permanent menu.

## Pause a Menu

While cooking, you can pause cooking time by pressing the Start/Stop key once. The Start/Stop key indicator light will flash rapidly. **PAUSE** will appear on the display. Countdown time will resume when you press the active menu key again.

## Cancel a Menu

Canceling a menu stops the controller completely. The controller does not maintain set point temperatures or run time. You cancel a menu to run another menu, stop menu operation for any reason, or are preparing to shut off the oven.

- Press the Start/Stop key for 2 seconds (in hold, momentarily press the Start/Stop key). Heat outputs will switch off. Heat output indicator lights will switch off. **idle** or time of day will be on the display.

## Change Pre-programmed Menus or Restart

With the controller in idle:

1. Select a menu as shown earlier.
2. Press the Start/Stop key.

## Modify a Menu

You can modify a pre-programmed or manual menu while the controller is in idle, by using the procedure shown under "Set a Manual Menu" elsewhere in this section.

Time and temperature changes are not saved and do not become part of the permanent menu.

## Door Opening

When you open the oven door (uses Event Input 1 for switch closure. Switch closure indicates the door is open) the unit will act as described below.

During the cooking sequence: time is paused: **door** will appear on the display. The spit and fan output signals will shut off.

During the preheat or hold sequence: **door** will appear on the display. The spit and fan output signals will be shut off. When you close the door the unit will operate normally.

## Event Outputs

While running a menu, Event Output 1 is on. This output is used to run the spit motor.

When a menu is running and door is shut, Event Output 2 is on. This is the fan output.



**WARNING:** Starting or initiating a menu can cause or initiate fan motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected fan motion.

## Temperature Alarms

The controller will alert you to temperature alarm conditions if they occur. If an alarm occurs, take action as determined by your supervisor. See the Appendix in the *Hardware & Software Setup Guide* for a Troubleshooting Chart and a summary of temperature alarms.

## Errors

The controller will alert you to errors if they occur. Errors are critical problems that shut down the unit. If an error occurs, an error message will appear on the display. You should switch off the power and call for service.

See the Appendix in the *Hardware & Software Setup Guide* for a Troubleshooting Chart and a summary of errors.

# Application 28

## Manual Rotisserie Oven

### *One Heat Channel, One Manual Menu*

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Application 28 allows you to program one manual menu to control one temperature channel and one cooking time for a cook-&-hold oven. The oven includes a probe function for temperature sensing, a spit output and a fan output.

### Overview of Key Steps

1. Install the MINICHEF 2000.
2. Wire the controller.
3. Configure the controller.
4. Program the menu.
5. Set the controller security.
6. Set the Real-time Clock.

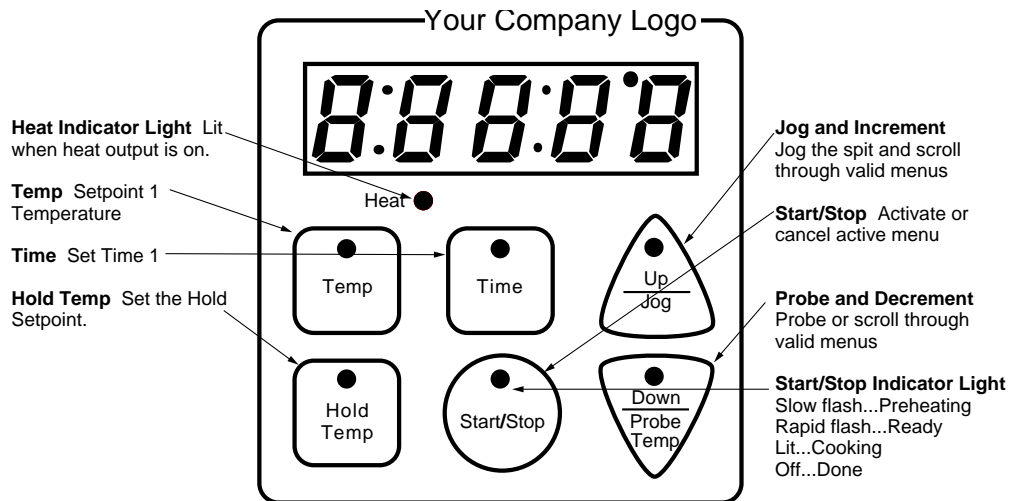
For instructions on Steps 1, 2, 3, 4, 5 and 6, see the *Hardware & Software Setup Guide*.

7. Design, manufacture and apply faceplate overlay for end-users. (For a suggested design to suit this application, see this section. For overlay dimensions and guidelines, see the *Hardware & Software Setup Guide*.)
8. Operate the controller. (See this application guide.)

## Key Functions in Configuration Mode

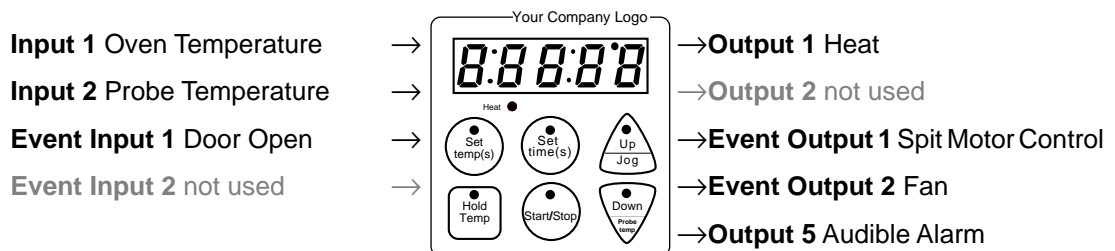


## Key Functions in Operation Mode



**WARNING:** The Jog and Increment keys cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## Summary of Input/Output Functions



**Note:** For details, see wiring instructions in the *Hardware & Software Setup Guide*.



# Configuration Mode Quick Reference

These are the functions, parameters and values included in the Configuration Mode for this application. You must select Application 28 to access them. For directions, see the *Hardware & Software Setup Guide*. The Appendix of that guide includes an explanation of all parameters and values.

Function	Parameter	Value	Your Settings
<b>E t Y P E</b> Equipment-Type	<b>A P P L</b> Application Number	1 - 28	28
	<b>A _ L o c</b> Application Number Security Lock	Yes, No	
	<b>S T E P S</b> Number of Cooking Steps	1, 2	
	<b>P r o b e</b> Probe	Yes, No	
<b>S E T U P</b> Setup	<b>C _ F</b> Temperature Display Format	°C or °F	
	<b>T i m e</b> Time Display Format	MMM:SS, HH:MM, H:MM:SS	
	<b>C h i r p</b> Key Chirp	On, Off	
	<b>T c</b> Thermocouple Type	J, K (shown as <b>H</b> ), E	
	<b>r t d</b> RTD Curve	DIN, JIS	
	<b>t c o n P</b> WatCurve™	On, Off	
	<b>O F S E T 1</b> Temperature Offset, Channel 1	-99 to 99°F (-55 to 55°C)	
	<b>O F S E T 2</b> Temperature Offset, Channel 2	-99 to 99°F (-55 to 55°C)	
	<b>T e r L o</b> Temperature Range Low	0°F (-18°C) for RTD inputs, 32°F (0°C) for tc inputs to <b>T e r H i</b>	
	<b>T e r H i</b> Temperature Range High	<b>T e r L o</b> to 1200°F (649°C)	
	<b>r e A d y</b> Preheat Ready Feature	Yes, No	
	<b>r b A n d</b> Ready Band	1 to 1200°F (1 to 649°C)	
	<b>C L o c</b> Real Time Clock Display	Yes, No	
	<b>P L O S S</b> Power Loss Menu Resume	Yes, No	
	<b>A L 1</b> Alarm 1	None, Dev, Proc, Both	
	<b>A L P 1</b> Absolute Process Alarm 1	100 to 1200°F (38 to 649°C)	
	<b>A L d L 1</b> Low Deviation Alarm 1	-999 to 0°F (-555 to 0°C)	
	<b>A L d H 1</b> High Deviation Alarm 1	0 to 999°F (0 to 555°C)	
	<b>A L 2</b> Alarm 2	None, Dev, Proc, Both	
	<b>A L P 2</b> Absolute Process Alarm 2	100 to 1200°F (38 to 649°C)	
	<b>A L d L 2</b> Low Deviation Alarm 2	-999 to 0°F (-555 to 0°C)	
	<b>A L d H 2</b> High Deviation Alarm 2	0 to 999°F (0 to 555°C)	
<b>T H E R M</b> Thermal	<b>T Y P E</b> Temperature Control Type	Pid, On-Off	
	<b>H Y S T 1</b> Hysteresis 1	1 to 99°F (1 to 55°C)	
	<b>P i d U</b> PID Units	SI, US	
	<b>A u t o</b> Auto-tuning 1	on, OFF	
	<b>P r o P 1</b> Proportional Band 1	1 to 999°F (1 to 555°C)	
	<b>r S E E 1</b> Reset (integral) Gain 1	0.00 to 9.99 repeats/minute	
	<b>i n t 1</b> Integral Gain 1	0.00 to 99.99 minutes/repeat	
	<b>r A T E 1</b> Rate (derivative) Gain 1	0.00 to 9.99 minutes	
	<b>d e r 1</b> Derivative Gain 1	0.00 to 9.99 minutes	
	<b>C y c l 1</b> PID Cycle Time 1	1 to 60 seconds	
	<b>d i A G</b> WatHelp Diagnostics	Used for equipment troubleshooting and testing. Not used when programming. See the <i>Hardware &amp; Software Setup Guide</i>	

**Auto-tuning Note:**

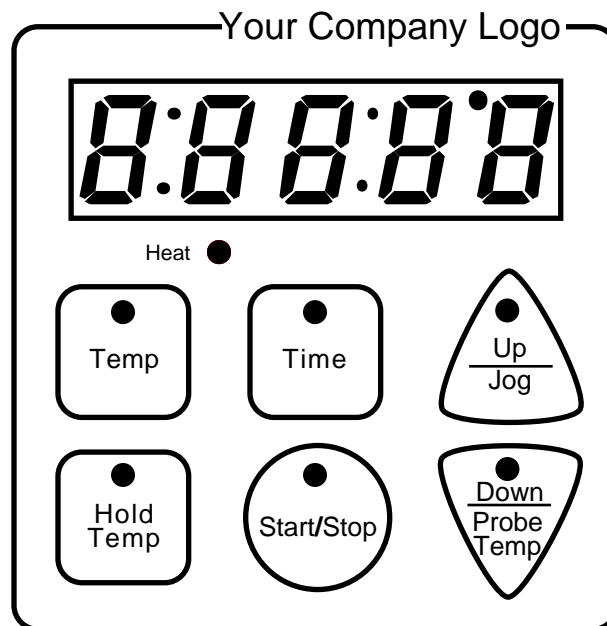
Before auto-tuning Application 28, **tENP 1** in the operations menu must first be set to a value that is typical of your application. (See the *Hardware & Software Setup Guide* for information on programming menus.) Then set **tHERL / tUnE 1** to **on**. After you accept **on**, by pressing “Enter”, the controller will display **tUnE** while auto-tuning is taking place.

The controller will cancel the auto-tuning process if it cannot be completed in 80 minutes. You can cancel the auto-tuning process at any time by pressing either key C or key D and accepting **OFF**, by pressing “Enter,” when it appears.

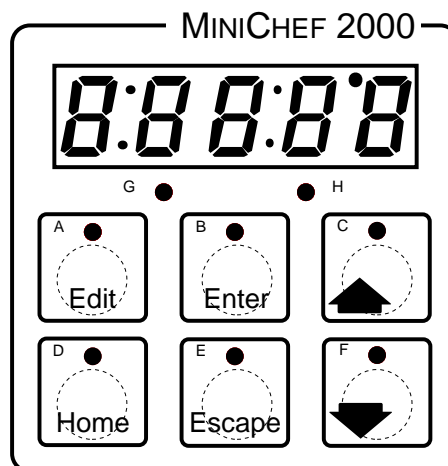
# Step 7 Design a Faceplate Overlay

To complete the installation, you must apply a graphic membrane to the front panel of the controller. The following artwork will help you design and create a membrane for this application. For more dimensions and guidelines, see the *Hardware & Software Setup Guide*.

**Suggested End-user Overlay:**



**This Prototyping and Training Membrane Overlay will help you with the configuration and programming steps. To order it, see the Ordering Information at the back of this guide.**



# Step 8 Operate the Controller

## Summary of Key Functions in Operation Mode

Key	Function
A	Temp
B	Time
C	Jog & Increment
D	Hold Temp
E	Start/Stop
F	Probe & Decrement

## Startup

Apply power to the oven.

**.IDLE** will appear on the display.

If the Real Time Clock option is installed and **SETUP** / **TIME** is programmed, the time of day will appear on the display.



**WARNING:** Starting or initiating a menu can cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## Set a Menu

Depending on the way the controller was programmed at **TYPE** / **STEPS** you can set the menu to run in one step or two.

**TYPE** / **STEPS** = **1**: Single Step Menu

**TYPE** / **STEPS** = **2**: Two Step Menu

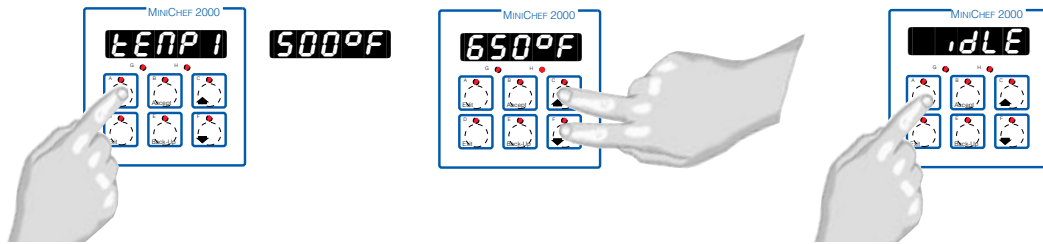
## Single Step Menu

The single step menu consists of one cooking temperature, one hold temperature and one cooking time.

### Set the cooking temperature.

1. Press the Temp key **TEMP** and then the cooking temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Temp key again. The cooking temperature has been set.

**.IDLE** will appear on the display.



### Set the cooking time

1. Press the Time key **TEMP 1** and then the cooking time value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Time key again.

The cooking time has been set.

**idle** will appear on the display.

### Set the hold temperature.

1. Press the Hold Temp key **HEMP** and then the hold temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Hold Temp key again.

**idle** will appear on the display.

The hold temperature has been set.

### Five Second Timeout

When using the Up-arrow or Down-arrow keys to change a value, if you do not press any key for 5 seconds, the controller will automatically be set to the last value on the display and return to **idle**.

## Two Step Menu

The two step menu consists of two cooking temperatures, one hold temperature and two cooking times.

### Set the two cooking temperatures.

1. Press the Temp key **TEMP 1** and then the first cooking temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Temp key again.

The first cooking temperature has been set.

**TEMP 2** and then the second cooking temperature value will appear on the display.

4. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
5. Press the Temp key again.

The second cooking temperature has been set.

**.iDL E** will appear on the display.

#### Set the two cooking times.

1. Press the Time key **E TIME 1** and then the first cooking time value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Time key again.

The first cooking time has been set.

**E TIME 2** and then the second cooking time value will appear on the display.

4. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
5. Press the Time key again.

The second cooking time has been set.

**.iDL E** will appear on the display.

The menu you have set becomes the current menu for controller operation.

#### Set the Hold Temperature.

1. Press the Hold Temp key **HTEMP** and then the hold temperature value will appear on the display.
2. Press the Up-arrow or Down-arrow key until the value you want appears on the display.
3. Press the Hold Temp key again.

The hold temperature has been set.

**.iDL E** will appear on the display.

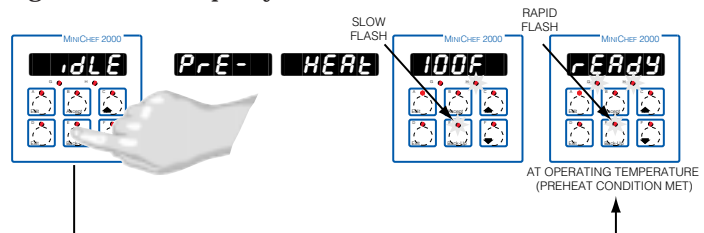
#### Five Second Timeout

When using the Up-arrow or Down-arrow keys to change a value, if you do not press any key for 5 seconds, the controller will automatically be set to the last value on the display and return to **.iDL E**.

## Preheat

If the **rREADY** parameter under the **SETUP** function in the Configuration Mode is set to yes, the controller will detect temperatures and preheat to operating temperature (above the relative set point minus the ready band) as required.

- Activate the menu by pressing the Start/Stop key.



- If the oven is not at operating temperature, it will preheat. Meanwhile:

The word **P-r-E-** **H-E-A-T** will appear on the display for a few moments. The Start/Stop key indicator light will flash slowly. The temperature of Channel 1 will be displayed until the operating temperature is reached.

The heat output indicator light - G, just below the display- will light up whenever the controller is calling for heat.

When the oven is at operating temperature (above the relative set point minus the ready band) **r-E-A-D-Y** will appear on the display and the Start/Stop key indicator light will flash rapidly. You are now ready to cook with the active menu.

- If the oven is at operating temperature, the display goes directly to **r-E-A-D-Y** without indicating preheat or temperature.

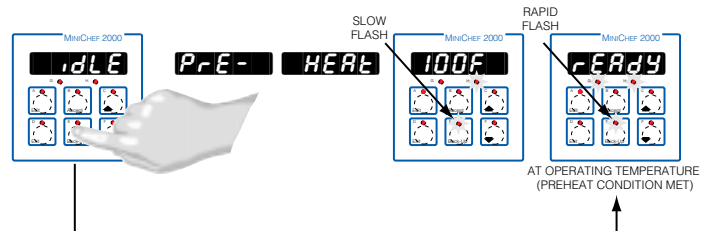
**Note:** You can skip preheat and go directly to the cooking sequence by pressing the Start/Stop key a second time.

## Run a Menu (with preheat feature)

This procedure describes how to run an active menu when the preheat feature is active - that is, when the **r-E-A-D-Y** parameter in the **S-E-T-U-P** function of the Configuration mode is set to **Y-E-S**.

1. Set a menu as shown earlier.
2. With **i-d-L-E** or time of day on the display, press the Start/Stop key.

If the preheat condition has not been met, the oven will preheat until ready appears on the display.



**Note:** You can skip preheat and go directly to the cooking sequence by pressing the Start/Stop key a second time.

If the oven is already at operating temperature **r-E-A-D-Y** will appear on the display.

3. With **r-E-A-D-Y** on the display, place the food on the spit. Then press the Start/Stop key (indicated by the rapidly flashing indicator light).

The Start/Stop key indicator will light up. Time will count down on the display.

Depending on the way the controller was programmed at **E-E-T-Y-P-E** / **S-T-E-P-S** the unit will run either a one or a two step cooking sequence:

**E-E-T-Y-P-E** / **S-T-E-P-S** = **1**: One Step Cooking Sequence

**E-E-T-Y-P-E** / **S-T-E-P-S** = **2**: Two Step Cooking Sequence

### One step cooking sequence:

Countdown time is displayed. It is the programmed Time 1.

Temp 1 will run until Time 1 expires.

### Two step cooking sequence:

Countdown time is displayed. It is the total of the programmed Time 1 plus Time 2.

Temp 1 will run until Time 1 expires.

Temp 2 will run until Time 2 expires. You will not see the switch-over from Time 1 to Time 2.

4. When the cooking sequence is complete, the unit will switch to the Hold sequence.  
An audible tone will sound for two seconds  
The display will alternate slowly between **Hold** and count up time.  
The unit will count up time indefinitely. The hold sequence will end and the controller will go into idle when you cancel the current menu by pressing the Start/Stop key.
5. Once the controller goes into idle, the Start/Stop key indicator light and heat output will switch off. The controller will not regulate to any temperature.
6. To repeat cooking, repeat steps 1 through 4.

## Run a Menu (without preheat feature)

This procedure describes how to run an active menu when the preheat feature is inactive - in other words, when the **rEAdY** parameter in the **SEtUP** function of the Configuration mode is set to **no**.

1. Set a menu as shown earlier.
2. With idle on the display, place the food on the spit.
3. Press the Start/Stop key.

The Start/Stop key indicator will light up. Time will count down on the display.

Depending on the way the controller was programmed at **ETYPE** / **STEPS** the unit will run either a one or a two step cooking sequence:

**ETYPE** / **STEPS** = **1**: One Step Cooking Sequence

**ETYPE** / **STEPS** = **2**: Two Step Cooking Sequence

### One step cooking sequence:

Countdown time is displayed. It is the programmed Time 1.

Temp 1 will run until Time 1 expires.

### Two step cooking sequence:

Countdown time is displayed. It is the total of the programmed Time 1 plus Time 2.

Temp 1 will run until Time 1 expires.

Temp 2 will run until Time 2 expires. You will not see the switch-over from Time 1 to Time 2.

4. When the cooking sequence is complete, the unit will switch to the Hold sequence.  
An audible tone will sound for two seconds.  
The display will alternate slowly between **Hold** and count up time.  
The unit will count up time indefinitely. The hold sequence will end and the controller will go into idle when you cancel the current menu by pressing the Start/Stop key.
5. Once the controller goes into idle, the Start/Stop key indicator light and heat output will switch off. The controller will not regulate to any temperature.
6. To repeat cooking, repeat steps 1 through 4.



## Jog the Spit

When the menu is paused, the unit is in idle or the oven door is open, you can jog the spit by pressing the Jog & Increment key. Event Output 1 is on while key is pressed.



**WARNING:** The Jog and Increment keys cause or initiate machine motion. Appropriate reasonable care should be taken to prevent personal injury or machine damage as a result of operator initiated or unexpected machine motion.

## View Probe Temperature

When the **Probe** parameter in the **ETYPE** function of the Configuration mode is set to **YES** you can view the actual probe temperature.

- Insert the probe into the food and press the Probe & Decrement key. While the probe is heating, **UJA** will appear on the display. When the probe reaches the food temperature, the temperature reading will appear.

## View Actual Oven Temperature

While cooking you can view the actual oven temperature by pressing and holding the Temp key for three seconds.

## Adjust a Menu While Cooking

You can adjust temperature and time settings during the cooking and hold sequences by performing the actions shown under "Set a Manual Menu" earlier in this section.

Changes can be made to temperature and time only during the portion of the cooking sequence in which they are active. For example: a change to the first cooking temperature **TEMP1** can be made only when the first cooking temperature is being run during the cooking sequence.

Time changes are not saved and do not become part of the permanent menu. Temperature changes are saved and become part of the permanent menu.

## Pause a Menu

While cooking, you can pause cooking time by pressing the Start/Stop key once. The Start/Stop key indicator light will flash rapidly. **PAUSE** will appear on the display. Countdown time will resume when you press the active menu key again.

## Cancel a menu

Canceling a menu stops the controller completely. The controller does not maintain set point temperatures or run time. Cancel a menu to run another menu, stop the menu operation for any reason, or prepare to shut off the oven.

- Press the Start/Stop key for 2 seconds (in Hold, momentarily press the Start/Stop key). Heat outputs will switch off. Heat output indicator lights will switch off. **idle** or time of day will be on the display.

## Change Menus or Restart

With the controller in idle:

1. Set a menu as shown earlier.
2. Press the Start/Stop key.

## Specifications (1032)

### Control Mode

- Single and dual heat channels, PID or on/off.<sup>1</sup>
- Microprocessor-based, programmable, reverse-acting control outputs.
- User-selectable embedded application software defines operation of display, keys, inputs, outputs, timing action.
- One-step auto-tuning, WatHelp diagnostics, WatCurve temperature compensation.

### Agency

- CE approved:
  - 89/336/EEC Electromagnetic Compatibility Directive
  - EN 50081-1: Emissions
  - EN 50082-1: Immunity
  - 73/23/EEC Low-Voltage Directive
  - EN 60730-1 and EN 60730-2-9: Safety
- NSF Listed, Criteria 2.<sup>5</sup>
- AGA: UL tested to AGA standard Z21.23, UL File #E43684.
- UL and C-UL recognized, UL 197, 873, 991 and CSA standard C22.2-24, File # E43684.

### Operator Interface

- Membrane overlay, contamination and water resistant, (supplied by customer).
- LED display, 5-digit, 0.56 in high, red.
- Displays times, temperatures, user prompts and diagnostic codes.
- User-selectable time and temperature display formats.
- Temperature display formats—°F or °C.
- Time display formats—H:MM:SS, HH:MM, or MMM:SS.
- 8 discrete indicator LEDs, red.
- 6 tactile feedback keys.
- Menu-driven operation and manual modes available.
- WatHelp diagnostics.
- Real-time clock option displays time of day.

### Accuracy

- Calibration accuracy and sensor conformity<sup>2</sup>:  $\pm 2.0^{\circ}\text{F}$  for Type J thermocouple and RTD,  $\pm 0.35\%$  of span for Type K and E thermocouples,  $\pm 1$  LSD,  $77^{\circ}\text{F} \pm 5^{\circ}\text{F}$  ambient and rated line voltage of  $\pm 10\%$ .
- Accuracy span: 1000°F (540°C) minimum.
- Temperature stability:  $\pm 0.15^{\circ}\text{F}/^{\circ}\text{F}$  ( $0.15^{\circ}\text{C}/^{\circ}\text{C}$ ) change in ambient typical.

### Sensors/Inputs

- Contact inputs, TTL compatible with internal pull-up resistor, two available.
- Thermocouple,<sup>3</sup> software selectable Type J, K or E, 32 to 1200°F. (Dual-channel applications require at least one ungrounded thermocouple).
- RTD,<sup>3</sup> 2- or 3-wire, platinum, 100, 500, 1000Ω, at 0°C, software selectable DIN or JIS curves, 0 to 1200°F (3-wire will function as 2-wire).
- Input A/D resolution: 15 bit.

### Output Options

- Solid-state relay, 0.4A, with or without contact suppression.
- Switched dc signal, 4.5V to 5.25V, 30mA maximum output, minimum load resistance > 150Ω, non-isolated.

### Audible Output Options

- Switched dc signal, 4.5V to 5.25V, 30mA maximum output, minimum load resistance > 150Ω, non-isolated.
- Internal audible alarm, 75dB at 10 cm.

### Connectors

- Sensor Input Terminal Strip<sup>4</sup>: RIACON, 6-position, quick-connect.
- Power Supply & Input/Output Terminal<sup>4</sup>: AMP, 15-position, quick-connect.

### Power/Line Voltage

- 20.4 to 26.4V~ (ac), 47 to 63Hz.
- 15VA maximum.
- For CE applications, input power must be limited to 15W external to the control.
- Program retention upon power failure via non-volatile memory.
- Battery/real-time clock option: 6-year lithium battery, provides power backup upon power failure, operation resumption after power recovery, ability to display time of day.

### Operating Environment

- 32 to 176°F (0 to 80°C), 0 to 90% RH, non-condensing.

### Storage Temperature

- -40 to 176°F (-40 to 80°C).

### Mechanical

- Case: polycarbonate Lexan with adjustable mounting collar (vertical or horizontal orientation), designed for mounting on 16-, 18-, 20- and 22-gauge panels.
- Internal panel mounting requires a specified panel cutout and four #6-32 studs or equivalent.
- Overall width x height x depth: horizontal - 4.13 in x 3.25 in x 2.00 in; vertical - 3.25 in x 4.13 in x 2.00 in (Assumes mating connectors are attached. Does not include wire bundle space requirements.)
- Vibration: 2g, 10 to 150Hz, applied in any one of three axes.
- Weight: 6.50oz maximum.

### Program Storage

- All non-embedded user and factory programs are stored in non-volatile memory. Can be changed by reprogramming.

### Sample/Update Rates

- 1 input: 4Hz.
- 2 inputs: 4Hz.
- PID: 1Hz.
- Control outputs: 100Hz.
- Display: 10Hz.

<sup>1</sup> The MINICHEF 2000 controller is to be used in systems with an external high temperature limiting device.

<sup>2</sup> Thermocouple lead resistance of 200Ω causes < 1°C error. RTD, 22 gauge wire will not contribute more than 0.086°F error/ft.

<sup>3</sup> Dual channel applications require either two thermocouple sensors or two identical RTD sensor types.

<sup>4</sup> For mating connector information, see Ordering Information Accessory section.

<sup>5</sup> Certified for thermometer accuracy (oven and hot food holding applications from 32°F to 60°F) when used with RTD or type J thermocouple probes.

# Ordering Information

(1033)

**MINICHEF 2000™**  
Cooking controller with numerous food equipment application software sets, single and dual channel on/off or PID temperature regulation, timer and machine-function control, microprocessor-based, programmable, auto-tuning, WatCurve, WatHelp diagnostics, 24V~ (ac) power input, agency approved, flush mounted (membrane faceplate supplied by customer).

**Inputs** \_\_\_\_\_

- 1 = Dual thermocouple, Type J, K or E
- 2 = Dual RTD, platinum, 100Ω, curve selectable
- 3 = Dual RTD, platinum, 500Ω, curve selectable
- 4 = Dual RTD, platinum, 1000Ω, curve selectable

**Note: All models include two event inputs, switched dc logic signal, non-isolated.**

**Output Number 1** \_\_\_\_\_

- 1 = Switched dc, 5V nominal, 30mA, non-isolated
- 2 = Solid-state relay, Form A, 0.4A, without RC suppression
- 3 = Solid-state relay, Form A, 0.4A, with RC suppression

**Output Number 2** \_\_\_\_\_

- 1 = Switched dc, 5V nominal, 30mA, non-isolated
- 2 = Solid-state relay, Form A, 0.4A, without RC suppression
- 3 = Solid-state relay, Form A, 0.4A, with RC suppression

**Event Outputs 1 and 2** \_\_\_\_\_

- 1 = 2 event outputs, switched dc, 5V nominal, 30mA, non-isolated

**Battery and Real-time Clock** \_\_\_\_\_

- 0 = None
- 1 = Includes battery and real-time clock

**Audible Alarm** \_\_\_\_\_

- 0 = Alarm signal available at connector, switched dc, 5V nominal, 30mA, non-isolated
- 1 = Internal alarm included

**Software** \_\_\_\_\_

- AA = Standard Food Equipment Application Software Set
- XX = Custom Set-up parameters or Made-To-Order custom software. Consult your local Watlow Sales Engineer. Code number assigned by factory.

F 2 H A - 1 - A A

# Ordering Information: Part Numbers & Accessories

## MINICHEF 2000 Accessories

<b>0836-0442-0000</b>	Sensor Input Mating Connector, (RIACON #31007106), 6-position, quick-connect terminal, screw connection for 28-14 AWG wires, tighten to 7 in/lb
<b>A001-0298-0000</b>	Power Supply and I/O Mating Connector Kit. Includes: – 1 AMP #1-640523-0, 15-position, quick-connect terminal – 15 AMP #641300-1 crimp pins
<b>0238-0679-0000</b>	Prototyping & Training Membrane Overlay, adhesive-backed, 4.75 in x 4.75 in
<b>0830-0479-0000</b>	Prototyping EPROM Extraction Tool, AMP #821980-1
<b>A001-0249-0001</b>	120V~ to 24V~ (ac), stepdown transformer, class 2, quick-connect terminals included
<b>A001-0249-0002</b>	208/240V~ to 24V~ (ac), step-down transformer, class 2, quick-connect terminals included

## MINICHEF 2000 Documentation

<b>WMC2-XUGN-0000</b>	The Complete MINICHEF 2000 User Guide
<b>WMC2-XADN-0000</b>	The Complete MINICHEF 2000 User Guide on CD
<b>WMC2-XTDN-0000</b>	MINICHEF 2000 Tutorial Disk
<b>WMC2-XSGN-0000</b>	Hardware & Software Setup Guide
<b>WMC2-XAGN-0001</b>	Cook-&-Hold Oven Application Guide
<b>WMC2-XAGN-0002</b>	Convection Oven Application Guide
<b>WMC2-XAGN-0003</b>	Deepfat Fryer Application Guide
<b>WMC2-XAGN-0004</b>	Griddle Application Guide
<b>WMC2-XAGN-0005</b>	Timer Application Guide
<b>WMC2-XAGN-0006</b>	Shelf-Timer Application Guide
<b>WMC2-XAGN-0007</b>	Rotisserie Oven Application Guide

## Recommended Sources of Supply for Miscellaneous Items

<b>DURA-TECH, Inc.</b> LaCrosse, WI (608) 781-2570	• <i>Custom Membrane Faceplates</i>
<b>AMP, Inc.</b> Harrisburg, PA 1-800-522-6752	• <i>Prototyping EPROM Extraction Tool</i> Part No. 821980-1 • <i>Pin Crimping Hand Tools</i> Part No. 90325-1 or 58514-1 • <i>Pin Extraction Hand Tool</i> Part No. 455822-2
<b>RIA Electronic, Inc.</b> Eatontown, NJ (908) 389-1300	• <i>RIACON Connectors</i>

## Watlow Controls

Watlow Controls is a division of Watlow Electric Mfg. Co., St. Louis, Missouri, a manufacturer of industrial electric heating products since 1922. Watlow begins with a full set of specifications and completes an industrial product that is manufactured totally in-house, in the U.S.A. Watlow products include electric heaters, sensors, controls and switching devices. The Winona operation has been designing solid state electronic control devices since 1962, and has earned the reputation as an excellent supplier to original equipment manufacturers. These OEMs depend upon Watlow Controls to provide compatibly engineered controls that they can incorporate into their products with confidence. Watlow Controls resides in a 100,000-square-foot marketing, engineering and manufacturing facility in Winona, Minnesota.

### Technical Assistance

If you encounter a problem with your Watlow controller, refer to the Troubleshooting Chart in this guide. Also review all of your configuration information for each step of the setup to verify that your selections are consistent with your applications.

If the problem persists after checking all the steps, you can get technical assistance by calling Watlow Controls at (507) 454-5300, between 7 a.m. and 5 p.m. CST, and asking for an applications engineer. When you call have the following information on hand: the controller's part number, date code, serial number, software revision number, and application number. Much of this information is available on the controller case. All of this information is also available via the MINICHEF 2000 main display by accessing the WatHelp Diagnostics Function under **d.1.19** in the Configuration Mode.

### We Value Your Feedback

Your comments and suggestions on this manual are welcome. Please send them to, Technical Writer, Watlow Controls, 1241 Bundy Blvd., P.O. Box 5580, Winona, MN 55987-5580 or call (507) 454-5300 or fax (507) 452-4507.

### Contact

- Phone: (507) 454-5300.
- Fax: (507) 452-4507.
- For technical support, ask for an Applications Engineer.
- To place an order, ask for Customer Service.
- To discuss a custom option, ask for the MINICHEF 2000 Product Manager.

### Warranty

The MINICHEF 2000 is warranted to be free of defects in material and workmanship for 36 months after delivery to the first purchaser for use, providing that the unit has not been misapplied. Since Watlow has no control over its use, or misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement or refund of purchase price of a unit which upon examination proves to be defective within the warranty period. This warranty does not apply to damage resulting from transportation, alteration, misuse, or abuse.

### Returns

- Call or fax Customer Service for a Return Material Authorization (RMA) number before returning a control.
- Put the RMA number on the shipping label, and also on a description of the problem.
- 20% of net price restocking charge applies to all standard units returned to stock.

**Note: All documentation of the MINICHEF 2000 is subject to change without notice.**



Watlow MINICHEF™ 2000 Rotisserie Ovens Application Guide

Watlow Controls, 1241 Bundy Blvd., P.O. Box 5580, Winona, MN U.S.A. 55987-5580 Phone: (507) 454-5300, Fax: (507) 452-4507