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**OPERATION MANUAL**

**TZP2004-3 THREE ZONE CONTROLLER**



# *INDEX*

## **TZP2004-3 THREE ZONE CONTROLLER**

**TZP2004-3 Three Zone Controller Description, Page 3 & 4**

**Specifications – TZP2004-3 Three Zone Controller, Page 4**

**Maintenance Requirements, Page 5**

**TZP2004-3 Three Zone Controller Operating Instructions, Page 6 & 7**

**P256 Programmer Calibration Instructions, Page 8 & 9**

**TZP2004-3 Three Zone Controller Connections, Page 10**

***The portable three-zone controller is designed to automatically control heat cycles for post weld heat treatment and preheating applications***

- The **TZP2004-3** takes the output from a transformer or welding machine (AC/DC).
- Also requires 110 volt power supply.
- Stainless steel cabinet (16" L x 13" W x 14"H, 35.5 lbs).
- Automatic programmer FGHP256 (°C or °F) controls temperature rate of rise, length of hold time and rate of cool. **User friendly and simple operation**
- Three 200 amp contactors (100% duty cycle).
- Three 110 volt neon's.
- 3 x two way on off switches.
- 1 x 5 amp fuse.
- Maximum output per circuit 4 x 80 volt ceramic pad heaters = 180 amps
- TZP2004-3 requires 32 kilowatts power source to operate 9 x 80 volt ceramic pad heaters or the TZP2004-3 requires 43 kilowatts power source to operate 12 x 80 volt ceramic pad heaters.
- 3 x #1 copper cable (c/w 1 x 300 amp male twistlock on one end and 300 amp female twistlock on the other end)

**Note 1:** One three-zone controller is capable of heating an area up to 7.5 sq. ft. approximately using 9 x 80 volt heaters



Front View



Back View

## **TZP2004-3 THREE ZONE CONTROLLER**

### **DESCRIPTION:**

The TZP2004-3 three zone controller via welding machine/transformer is designed to control various heat treatment processes by closely monitoring and adjusting the temperature rate of rise and fall, the soak temperature, set point and duration, on up to 3 zones. Each zone can be used either in the fully automatic or manual mode. It incorporates the latest microprocessor based technology and is simple to set up and operate. Control setting is by means of push switches and an LCD screen provides visual indication of program position and output status at any time.

### **SPECIFICATIONS – TZP2004-3 THREE ZONE CONTROLLER:**

**Length:** 16”  
**Width:** 13”  
**Height:** 14”  
**Weight:** 35.5 lbs  
**Material:** 12 gauge stainless steel enclosure

### **Output Per Zone:**

- **Zones:** 3
- **Voltage:** 65 or 85 Volts AC/DC, single phase via welding machine/transformer
- **Current:** 180 amps @ 65 V or 135 amps @ 85V
- **Power:** 14.4 kW maximum via welding machine/transformer
- **Activation:** 200 amp contactor
- **Control per zone:** Digital temperature controller

### **Control Circuit:**

- **Voltage:** 110 – 130 VAC, single phase
- **Current:** 5 amp fuse
- **Frequency:** 50/60 Hz

### **Temperature Programmer/Controller (P256):**

- **Temperature Range:** 0-2000°F or 0-1200°C
- **Thermocouple:** Type “K”
- **Resolution:** Measurement 0.1 degrees / Display 1.0 degree

**Maintenance Requirements:**

**Inspection and Cleaning:**

<b><u>ITEM</u></b>	<b><u>INSPECTION</u></b>	<b><u>FREQUENCY</u></b>	<b><u>ACTION</u></b>
Contactors	Burned or Pitted	Every 6 months	Clean or replace contacts
300 amp male/female panel mounts	Check for corrosion and damage	On a daily bases	Clean or replace
P256 Programmer	Calibration	Every 12 months	Check accuracy and adjust if required
System Cleanliness		Every 6 months	Vacuum with power disconnected
System Electrical	Loose connections	Every 6 months	Tighten all terminal connections
Air Vents	Dust or dirt build up	Every 3 months	Clean with vacuum with power disconnected
Check bolts and screws	Loose	Every 6 months	Tighten

### **TZP2004-2 Three Zone Controller Operating Instructions:**

1. Hook up input cables to the welding machine/transformer (see page 10 for hook up diagram).
2. Plug in TZP2004-3 into a 110 volt supply.
3. Turn on welding machine/transformer.
4. Make sure zones used are indicating the actual temperature on the controllers prior to start and then turn rocker switches to the “ON” position.

Decide on the heat treatment specification and set as follows:

5. Decide on the heat treatment specification program and set as follows:
  - a.) On start up. The display shows “Logo 256” and version number. It then reverts to the “Controller Overview”. The large number on the left hand side of each box shows the zone number. The small letter “a” or “m” on the right hand side indicates if the zone is in AUTO or MANUAL mode. The larger number below shows the temperature of the thermocouple in that zone.
  - b.) By pushing the zone button once that display shows the manual set point for that zone. (It is recommended that this is set at about 10°C if no manual operation is required). The value is altered by use of the up - down buttons.
  - c.) Push the zone button a second time, the display will show if the zone is in AUTO or MANUAL mode, this again can be altered by use of the up-down button. Set the zone in the “AUTO” mode.
  - d.) Pushing the button a third time reverts the screen back to “Controller overview” (if no button is pushed for 20 seconds the screen automatically reverts to “Controller overview”). Set each zone to be used in the Automatic mode.
  - e.) While in the “Controller Display” mode – push the “down” button once and the display will change to show the “Profile overview”.

**Note:** The six numbered buttons have now changed their function

6. Push No. 1 button to display heating rate, adjust to requirements with up – down buttons. Push No. 1 again to revert to “Profile”.
7. Push No. 2 button to display “Soak Temperature”, adjust to requirements with up – down buttons. Push No. 2 again to revert to “Profile”.
8. Push No. 3 button to display “Soak Time”, adjust to requirements with up – down buttons. Note this display indicates dwell time in hours i.e.: 1.1 = 1 hour 6 minutes, 1.5 = 1 hour 30 minutes. Etc. Push No. 3 again to revert to “Profile”.
9. Push No. 4 button to display “Cooling Rate”, adjust to requirements with up – down buttons. Push No. 4 again to revert to “Profile”.

10. Push No. 5 button to display program “End Temperature”, adjust to requirements with up – down buttons. Push No. 6 button to display “Ready” and then press the “up” button to start the program.

**Note:** P256 Programmer has a reverse thermocouple alarm feature which will turn off the zone if a thermocouple is accidentally reversed (this is a safety feature built-in to the P256 programmer/controller).

**Note:** Any zone in “manual” mode will control to its set point regardless of the program profile.

Starting the program will cause any zone set in “automatic” to follow the profile. The start temperature will be from the highest actual temperature of any zone in automatic. Any zone heating too slowly for the set heating profile will cause the program to go into a hold mode until that zone has caught up with the profile setting.

On delivery, the hold band is set to 20°C so any zone running a profile that lags the set point by 20°C will start the hold. Once the program has started, the ‘down’ button can be used to alternate between program “Profile Overview” or the “Controller Overview”. If a hold situation arises it will be displayed on either screen.

*For more detailed instructions refer to User Manual for 256 Programmer.*

## **P256 PROGRAMMER CALIBRATION INSTRUCTIONS:**

The P256 programmer has one common measuring circuit, which is used by all six of its thermocouple inputs. The measuring circuit is factory calibrated by the adjustment of two numbers that are held in the 256s non-volatile memory. One of the numbers, the zero constant, adjusts the measuring and cold-junction circuits zero offset. The other number, the span constant, adjusts the measuring circuits gain.

The measuring circuit uses high-stability components and so should not need any further adjustment for many months. From time to time, however, it will be necessary to perform routine calibration checks and make adjustments to the instruments calibration. The following procedure should be used to make these adjustments.

To calibrate the instrument on the bench you should connect a calibrator to thermocouple input 1 using type K compensating or extension wire. To calibrate the instrument in-situ you should disconnect thermocouple 1 and output 1 from the installation and connect the calibrator in its stead, again using type K wire.

In both cases, switch the instrument on and leave it energised for about fifteen minutes to reach its operating temperature. Then briefly switch the instrument off for a few seconds and then switch back on. It will then show the opening logo on the screen for twenty seconds. During these twenty seconds you must enter the password using the front-panel buttons. The password is a fixed, five digit number that cannot be changed by the user. It would be wise to keep this password secret from all unauthorised persons. The password at this time is 1 1 1 7 2 (using the up arrow button for 7). If you have entered this correctly the logo will immediately disappear and be replaced with the calibration mode-opening screen. If you enter the wrong password there will be no effect and you will have to start over by switching the instrument off briefly again. The calibration mode-opening screen shows the following prompt:

### CALIBRATION MODE

Connect calibrator to I/P1  
Use comp cable. Repeat zero  
And span cal till both are OK

Use V to exit cal mode.  
Use 1 for more....

To exit calibration mode press the down arrow button and normal instrument operation will resume. To continue with the calibration procedure press button 1 whereupon the screen changes to:

### **ZERO CALIBRATION**

Value	Zk
00.7	05918

Set calibrator to 0 deg and  
Use ^v unit value = 0000.0  
Use 1 for more...

This shows the zero calibration screen for an instrument with a zero constant of 5918, which reads a temperature of +0.7 degrees for a calibrator input of 0.0 degrees. If this error is unacceptable it may be corrected by using the up or down buttons to change the zero constant until the value is shown as 0000.0. Note that the zero constant can only be set within the range 5700 to 6100. When you are sure that the zero calibration is correct then press button 1 and the screen will change to:

***SPAN CALIBRATION***

Value	Sk
999.1	33862

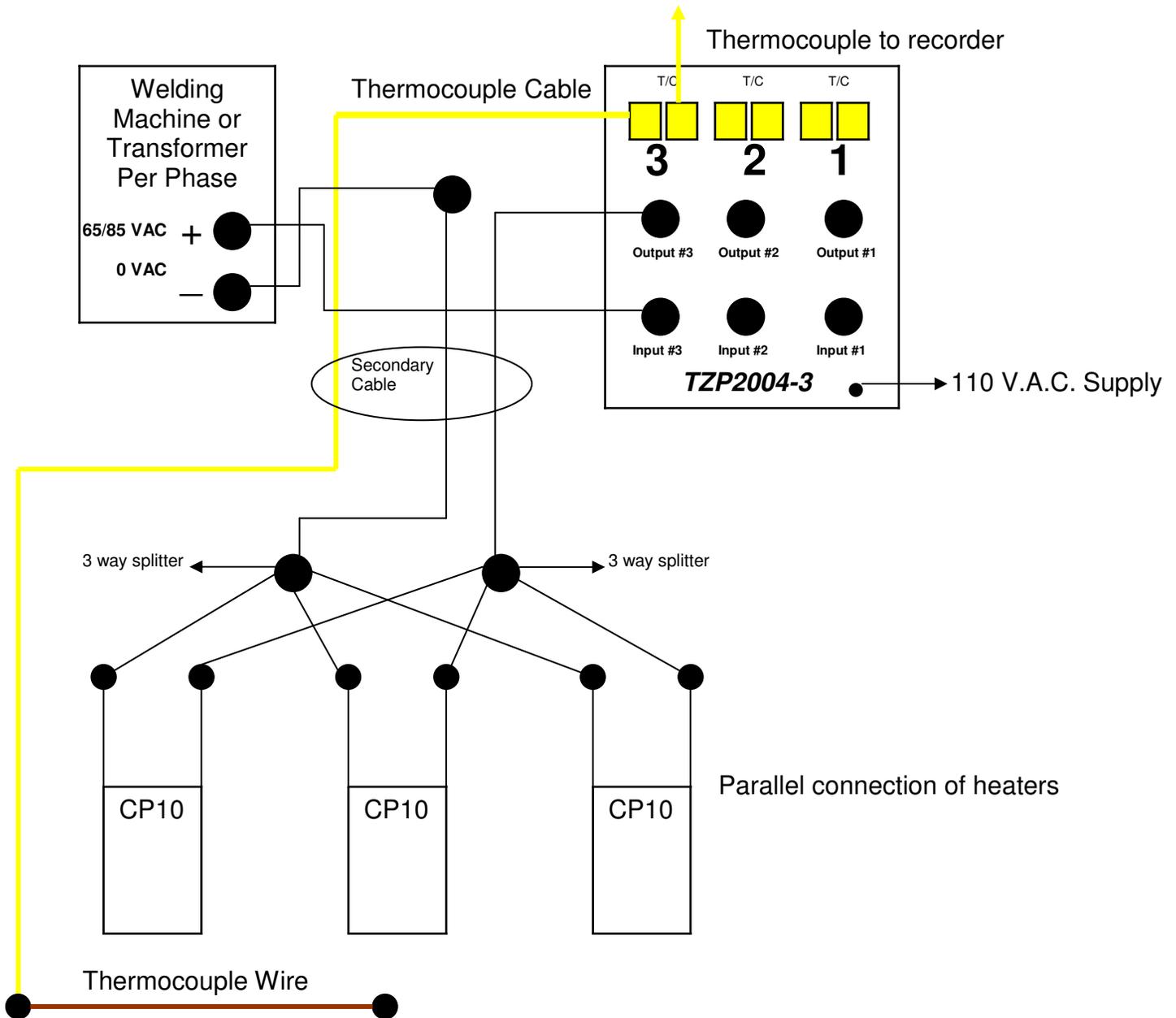
Set calibrator to 1000 deg and  
 Use ^v until value = 1000.0  
 Use 1 for more...

This shows the span calibration screen for an instrument with a span constant of 33862, which reads a temperature of 999.1 degrees for a calibrator input of 1000 degrees. If this error is unacceptable it may be corrected by using the up or down buttons to change the span constant until the value is shown as 1000.0. Note that the span constant can only be set within a range 32250 to 35650. When you are sure that the zero calibration is correct then press button 1 and the screen will change back to the operating screen.

You should repeat the above sequence at least once since any changes that you make to the zero constant will alter the value displayed at span. Similarly any changes made to the span constant may have a small effect on the value displayed at zero. Before you make any changes to the constants you must leave sufficient time for the value to settle after you have set the calibrator. The 256 takes several seconds to achieve a steady reading after a step change to its input. Note that the above values of 0 and 1000 are for instruments set for degrees C, instruments set for degrees F use the corresponding values of 32 and 1800.

When you are sure that the calibration is correct it is wise to make a note of both constants; a record is kept of the original constants at FGH. You may then leave calibration mode by going to the opening screen and then pressing the down button whereupon normal operation will resume. Note that there is no time-out in calibration mode so the instrument will remain in this mode indefinitely until you deliberately exit from it.

# Three-Zone Controller (TZP2004-3) System Connections



**Note:**

TZP2004-3 connections for circuit number 3 shown. Circuit numbers 1 & 2 are connected in the same manner, but you would have to have three welding machines to operate controller box or 32 KW – 3 phase transformer with 65/85 volt secondary