

SAFETY INSTRUCTIONS

Always wear protective clothing, including safety glasses and steel toe boots.

Keep work site neat and clean.

Run the secondary cables overhead or clearly mark the area for trip hazards.

Ensure adequate clearance around the area to be heat treated, is free of any material that could be a fire hazard.

Check to be sure the work piece is adequately supported before starting the heat cycle.

Clearly mark the work area to inform others of ongoing heating.

Inform other workers of the heated area and of the heating element tails on the work piece.

Do not operate or use the heat treating equipment, unless you have read and understand the operating manuals that came with your equipment.

STRESSTECH
HEAT TREATING

A Division of Mactech

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Electrical Specifications:

Input Requirements	150 amps @ 480/575v 3ph 100% 122 KVA
Current Capacity (per zone)	300 AMPS DC 80 VOLTS DC
Output Available	1500 amps @ 80 VDC 100% duty cycle

Physical Dimensions:

Height:	40"
Width:	27"
Length:	40"
Weight:	1050 lbs.

General Information:

The STRESSTECH QZ 1500-8 is an eight zone temperature controller which can be operated semi-automatically (auto-ramping up and down, hold at temperature), or manually (manual ramping, no hold temperature). It consists of eight 300 amp contactors, 0-2000 deg. F. temperature controllers, percentage timers for controlling the rate of heating and cooling, if desired. The QZ 1500-8 also has a 0-500 and a 0-1500 DC ammeter, to aid in monitoring the current supplied to the heating elements being used. (Each element will use approximately 50 amps @ 80 DC volts.)

The top temperature controller will maintain any selected temperature between ambient and 2000 deg. for as long a period of time required. The controller will control the heating and cooling rate by opening or closing the contactor as needed.

The contactor, normally open, will close providing current to the heating elements up to a maximum of 300 amps, at 80 DC volts.

Post Weld Heat Treatment Set-up:

1. Prepare thermocouple wire for attachment to work piece:
 - a) Cut two thermocouple wires 24" or longer (thermocouple wires should extend beyond insulation).
 - b) Strip insulation back approximately 1/4" - 3/8" on both ends of each wire.
 - c) On one end of each wire, trim lead ends to a fine point and bend the last 1/8" at a 90 degree angle.
 - d) On the opposite end of one wire, install a male thermocouple plug. Yellow wire (+), Red wire (K).
 - e) Lightly twist the two wires together. The wire without the plug will be a spare.
2. Attach the prepared thermocouple wires onto the work piece using the capacitor-discharge spot welder (ZAP GUN). Operating instructions, for attachment of thermocouple wires, are on the inside of the Zapgun lid.
3. Thermocouples shall be attached in the following minimum location(s):

ON A HORIZONTAL WORK PIECE:

 - a) Always at the bottom-dead-center.
 - b) For component diameters 12 inches or more, add a second thermocouple at the top-dead-center.
 - c) For component diameters over 24 inches, place thermocouples at each 90 degree intermediate location.

ON A VERTICAL WORK PIECE:

 - a) The same number of thermocouples as above shall be attached, spaced evenly.
4. Thermocouples shall be attached in each zone where heaters are separately controlled.
5. Thermocouples should be placed so that the anticipated coolest and hottest areas within the heating band are monitored.

Post Weld Heat Treatment Set-up Cont:

6. When the component wall thickness adjacent to the wall vary significantly (such as by the thicker side being more than about 25% or 1/2" greater than the thinner) then:

- a) Additional thermocouples shall be attached so that each of the above required locations have thermocouples close to the weld, but both on the thin and thick materials that will be under the heating band (e.g., for a pipe welded to a heavy valve) and,
- b) for even larger thickness differences (such as for a pipe to a very heavy vessel nozzle), even more thermocouples should be attached on the thicker material, at a distance from the weld equal to about 3 times the wall thickness at the weld. If such thermocouples are beyond the heating band, the gradient should be controlled if and as required by the Specific Project Instructions.

7. A system shall be established for positive identification of each thermocouple with the location on the work piece. A sketch or written description of thermocouple locations should be made, identifying each thermocouple.

8. Select the heating element(s) that best cover the area to be heat treated.

9. Tape the heating element(s) onto the work piece using fiberglass strapping tape, and then use stainless steel banding to fasten them securely.

10. Insulation shall completely cover the heating elements, and extend beyond their edges somewhat. If possible, the insulation should be at least twice as wide as the heating band.

11. Fasten the insulation securely to the work piece by using tie wire or banding.

12. Heating element tails should be brought directly out of the insulation, so as not to overheat the connectors.

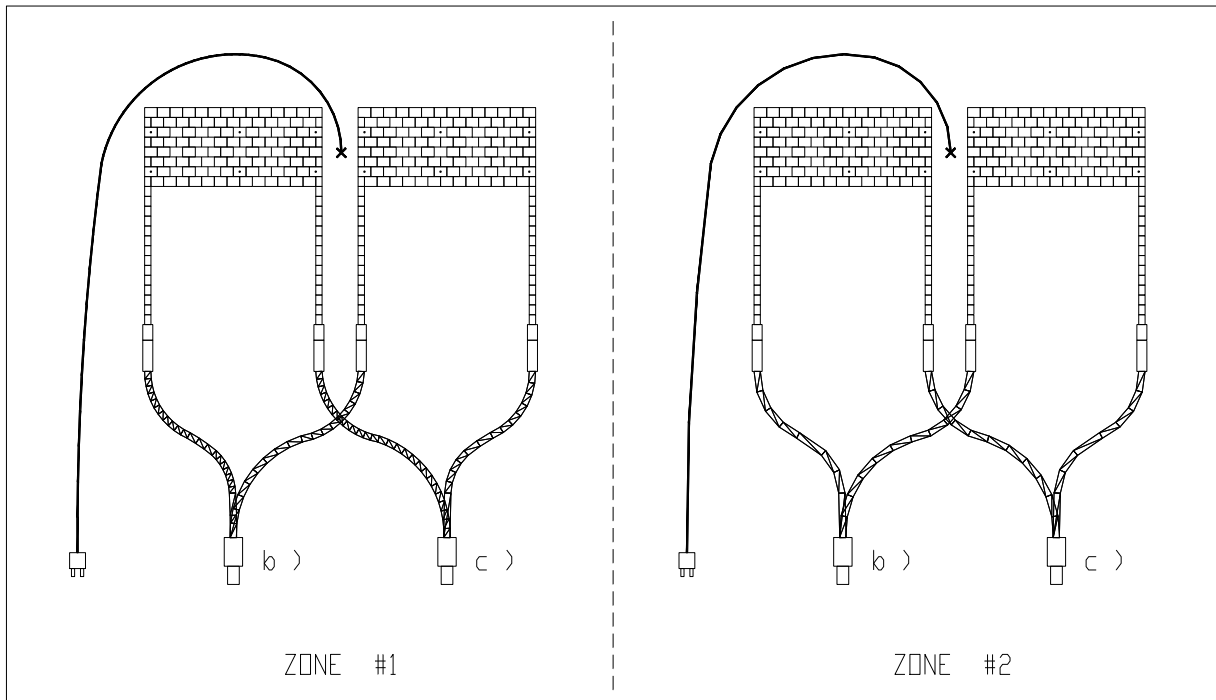
13. Connect thermocouple(s), using thermocouple extension leads, to the thermocouple jack strip on control unit. MAKE SURE thermocouples are plugged into proper jacks; i.e., thermocouple #1 on work piece must be connected to thermocouple jack #1, etc.

Post Weld Heat Treatment Set-up Cont:

14. Connect heating elements to splitter cables: (figure 1)

- a) Heating elements associated with thermocouple zone #1, must be connected to circuit #1. This sequence follows through for each zone of control.
- b) Connect a tail from each heating element in circuit #1, to a splitter cable.
- c) Connect the other tail from each heating element in circuit #1, to a different splitter cable.
- d) Using 2/0 power cable extension leads, connect the two splitter cables from circuit #1 to the two corresponding jacks on the control unit.
- e) Repeat steps b-d, if connecting more than one zone of control.

15. Using 6 ft. male to male thermocouple jumper wires, you can connect a temperature recorder to the thermocouple jack strip on the control unit.

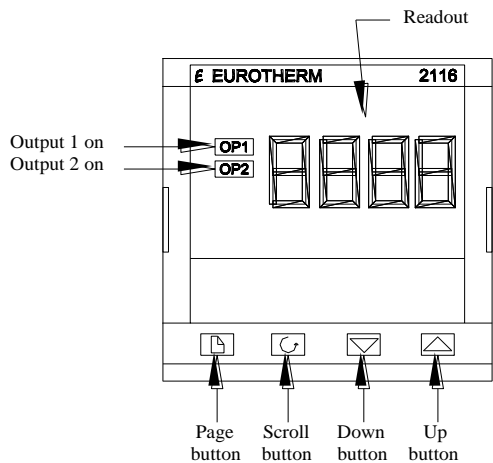






(figure 1)

TOP TEMPERATURE CONTROLLER

KEY FUNCTIONS AND DISPLAYS:

FRONT PANEL LAYOUT

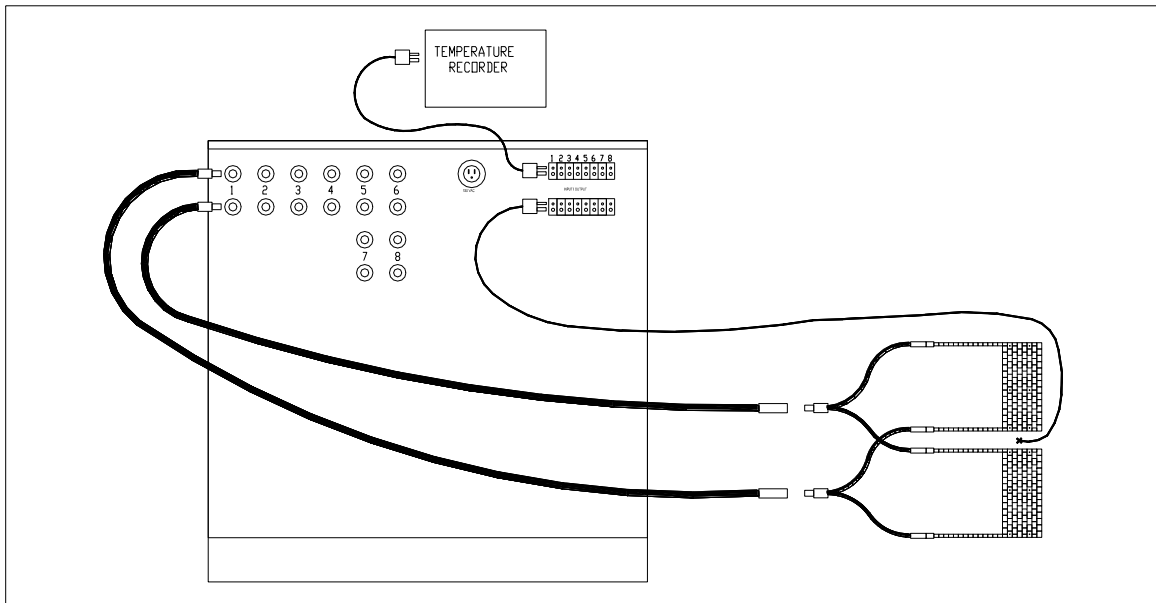


INDICATOR OR BUTTON	NAME	FUNCTION
OP1	OUTPUT 1	When lit, this indicates that the logic output is on.
OP2	OUTPUT 2	When lit, this indicates that the relay output is on.
	PAGE BUTTON	Press to select a new list of parameters.
	SCROLL BUTTON	Press to select a new parameter in a list.
	DOWN BUTTON	Press and release to view the setpoint or a selected parameter. Keep pressed to decrease the value.
	UP BUTTON	Press and release to view the setpoint or a selected parameter. Keep pressed to increase the value.

Operating Instructions:

1. Be sure the main power and control power switches on the QZ 1500-8 are in the OFF position.
2. Position the unit in desired location and connect a 480 volt, three phase, 150 amp service to the line cord. Service line should have a fused safety disconnect switch on the feeder side. Wire in accordance with all applicable local and national electrical codes. Make sure unit is properly grounded before placing into service.
3. Connection of 80 vdc power leads: (figure 2)

ZONE #1
 - a) Connect a lead from the heating elements to the female cam-lock on the side of the unit marked "1".
 - b) To complete the circuit, connect the remaining lead from the heating elements to the other female cam-lock marked "1".
4. Insert the thermocouple lead, from the work piece, into one of the (#1) thermocouple jacks on the side of the QZ. The second (#1) jack is used for connecting a temperature recorder.(figure 2)
5. Repeat steps 3 and 4 using Zone #2, 3, 4, 5 or 6 for heating more than one controlled area.



(figure #2)

Operating Instructions Cont:

MANUAL OPERATION

6. Make sure all the individual heating circuits are off. Turn on the main power switch and then the control power switch. Set the percentage timers at 50%. (Heating circuits work on a full on or off principal. 50% power is obtained by turning contactors on for half a minute then off for half a minute.)

7. Push the auto/manual switch to the manual position. In the manual position only the percentage timers are used, the top temperature controller does not affect the output.

8. Check the ammeters on front panel. Each circuit is capable of switching 300 amps, but do not exceed 1500 amps total for all eight zones. Overloading will cause a fuse to blow inside the unit, which could mean losing a heating cycle.

9. Check the slope of the temperature chart to determine the rate of rise of the temperature and increase or decrease the setting on the percentage timers as needed to maintain proper heating or cooling rate.

Operating Instructions Cont:

AUTO OPERATION

10. Make sure all the individual heating circuits are off. Turn on the main power switch and then the control power switch. Set the percentage timers at 0% (while setting the top temperature controllers).

11. Push the auto/manual switch to the auto position and set the top temperature controller to the desired holding temperature (set value):

- a) The controller runs through a self test for about three seconds and then displays the measured value. This is called the HOME display.
- b) To view the set value, press and release the UP or DOWN key. The set value will be shown for approximately 2 seconds.
- c) To change the set value, press the UP or DOWN key until the desired soak temperature is displayed. After two seconds the new value will be accepted and the controller will return to the HOME display.

12. Set the top temperature controller to the desired heating ramp rate:

- a) Press the SCROLL key twice and an indication of "SPrr" (set point ramp rate) appears.
- b) To view the ramp rate value, press the UP or DOWN key. The value shown is in degrees per minute. After two seconds the display will return to "SPrr".

For example,

If you wish to enter a ramp rate of 300 degrees/hour,
you perform the following calculation:
300 degrees/hour divided by 60 minutes = 5 degrees/minute.

- c) Change the data indication to the desired ramp rate, using the up and down-keys.
- d) The display will return to "SPrr" after two seconds.
- e) After 45 seconds the controller will return to the HOME display. Or you can press the PAGE or SCROLL key once to return to the HOME display.

Operating Instructions Cont:

13. Once you have the desired set value, and ramp rate entered into the controller, push the auto/manual switch to the off position.

14. Turn the percentage timer to 100%.

15. Push the auto/manual switch to the auto position. This enables the unit to use both the top temperature controller and the percentage timer. In the manual position only the percentage timer is used, the top temperature controller does not effect the output.

16. The controller will ramp from the present temperature, at the rate you entered into the "SPrr" parameter, to the soak temperature you entered for the set value.

17. While the controller is ramping, the display may flash "1dLo".

Which is a low deviation alarm, to let you know the workpiece is not keeping up with the controller.

18. The display may also flash "2dHi". Which is a high deviation alarm to let you know the workpiece is not keeping up.

19. The controller will hold the workpiece temperature at the set value until you change it to a new value.

20. At the end of the soak time you will need to change the set point ramp rate "SPrr", if the cooling rate is different than the heating rate. If the rates are the same you won't have to change it.

21. Once the correct cooling rate is entered into the "SPrr", you will need to change the set value to 0 degrees.

22. The controller will now ramp from the soak temperature down to 0 degrees.

Operating Instructions Cont:

23. The weldment area shall be first brought up to about 200 degrees. The temperature recorder shall be checked then for temperature readings of each thermocouple, and for correct chart speed.

24. During the PWHT cycle, the current should be occasionally checked, especially if any abnormal temperature readings are obtained. A significant drop, such as by the rating of one heater (about 50 amps), would indicate that a heater may be burned out.

25. At no time shall any two thermocouples, within the heating band, be allowed to differ by more than 150 degrees. If this temperature difference is approached during heating, the heating rate should be slowed.

26. Heating shall continue until reaching the holding temperature required by the applicable Welding Procedure.

27. At the completion of the holding time, begin the cooling.

28. The power shall not be completely shut off until the temperature cools down to below 600 degrees, unless it is determined by continuous monitoring that the maximum cooling rate will not be exceeded, or that the temperature difference between any two thermocouples will not differ by more than 150 degrees.

29. Insulation coverings shall not be removed until the temperature drops below 200 degrees, although any stuffed in the ends to fill gaps may be removed if the work piece is in still air and will not exceed the maximum allowable cooling rate.

30. Check all equipment for damage or wear. Any damaged equipment should be repaired immediately or replaced.

Trouble Shooting:

1. Temperature does not increase on controller:
 - a) Check voltmeter on front panel to be sure it is reading 80 vdc.
 - b) Percentage timer is turned up to 100%.
 - c) Check for correct connections of the cables.
 - d) Check ammeters on front panel. (each heating element draws approximately 50 amps)
 - d) Check the set value and set point ramp rate "SPrr" settings on the controller.
2. Temperature does not increase on recorder:
 - a) Check male to male thermocouple wire for a bad connection at one of the plugs.
3. Temperature decreases on recorder or controller:
 - a) The thermocouple wires have been reversed in one of the plugs. The yellow wire should be in the positive (+) slot and the red wire in the negative (-) slot.
4. Contactor chatters:
 - a) Check the thermocouple connections first. If all the connections are ok, the contactor may be worn out.
5. Temperature swings when holding at a set point with the top temperature controller:
 - a) Thermocouples are located too far from heating elements. The swing can be reduced by turning the percentage timer down, if the full power is not needed to maintain the temperature.
6. Temperature does not stop rising after reaching the set value:
 - a) Be sure the auto/manual switch is in the auto position.

Trouble Shooting Cont:

7. Fault indication on top temperature controller:

- a) The controller has a fault indicating function so that the cause of fault can be removed quickly. These warn that a fault exists in either the controller or the connected devices.

INDICATION	:	WHAT IT MEANS
1dLo	:	Deviation low alarm
2dHi	:	Deviation high alarm
S.br	:	Thermocouple sensor break
LLLL	:	Out of range low reading
HHHH	:	Out of range high reading
EE.Er	:	
Err1	:	
Err2	:	Return for repair
Err3	:	
Err4	:	

REPAIR AND CALIBRATION

Due to the nature of its design, if a controller fails to operate correctly consult STRESSTECH. Special equipment is required for calibration and unit MAY have to be returned for repair.

Service And Maintenance:

NEVER work on a unit unless primary power has been disconnected or locked out.

1. Keep control unit clean and dry.
2. Periodically check all thermocouple wires and power cables for loose connections or damage. Any damage should be repaired immediately or replaced.
3. Every six months remove the cover from the unit and, using clean dry air, blow out all dust and dirt from the inside. Do not exceed 25 psi.
4. Keep cam-lok connectors clean using scotchbrite pads.
5. Contactor maintenance:
 - a) The main contacts should be given regular attention, especially where heavy loads are involved or a high number of operations per hour.
 - b) These contacts are plated with silver cadmium oxide giving it the same corrosion protection as pure silver, but greater resistance against contact welding.
 - c) Contact surfaces should not be polished or greased.
 - d) Worn-off contact dust should be carefully brushed off the insulating parts at each inspection. The de-ionizing laminations of the arc shield are made of steel plate to which beads of fused metal may stick so that the laminations become electrically connected. If this has occurred, the beads must be removed by means of a smooth file or suchlike. If there are layers of sintered contact dust on the inside of the arc shield, these should also be scraped off.
 - e) Change all three contact points if any one becomes badly worn or pitted.

For further information or parts contact STRESSTECH,
4079 Pepin Avenue, Unit 4, Red Wing, Minnesota 55066;
or call toll free 1-800-328-1488.

STRESSTECH QZ1500-8
AS A POWER SOURCE FOR WELDING

To use:

1. Turn main power switch on.
2. Turn control power switch on.
3. Push auto/manual switch to manual.
4. Turn percentage timer to 100%.
5. Plug in cable from welding grid to unit.
(If more than 300 amps is required per welding station use a "Y" cable between two zones.)

To weld straight polarity:

1. Connect the male cam-lok from the welding grid to the negative cam-lok receptacle on the side of the QZ.
2. Connect the ground clamp to the work piece and to the positive cam-lok receptacle of the same zone on the side of the QZ.

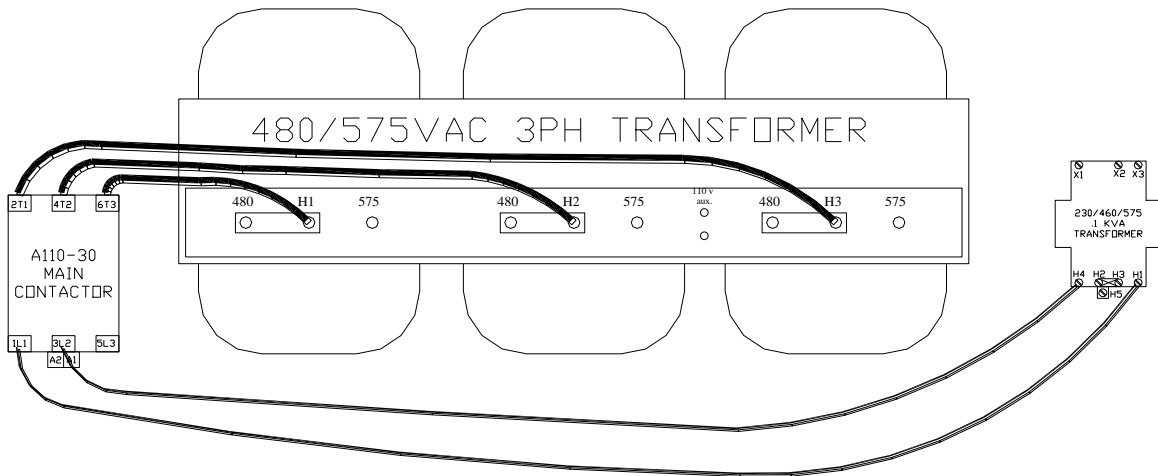
To weld reverse polarity:

1. Connect the male cam-lok from the welding grid to the positive cam-lok receptacle on the side of the QZ.
2. Connect the ground clamp to the work piece and to the negative cam-lok receptacle of the same zone on the side of the QZ.

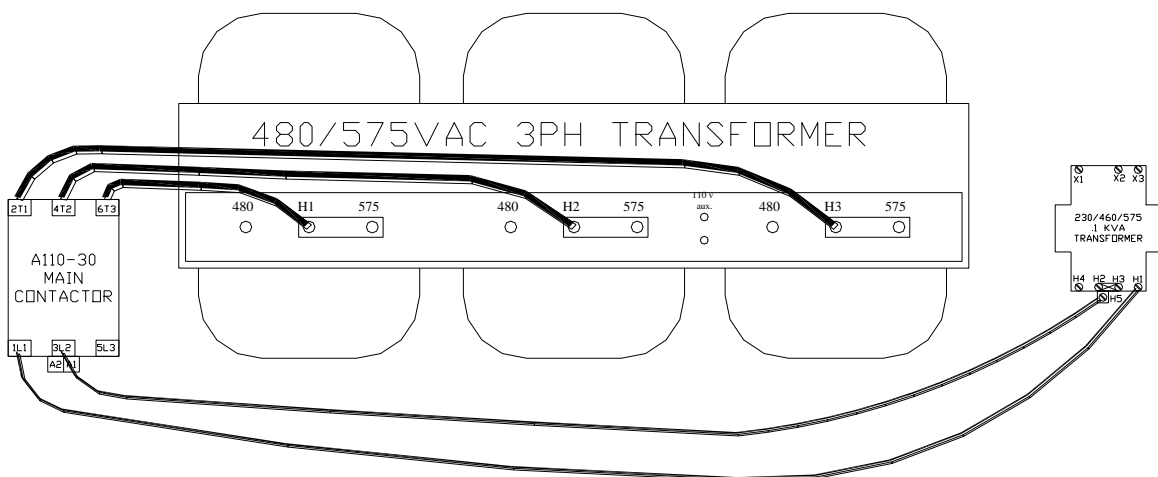
A second welding grid can be used simultaneously by connecting it to different zone, providing the same polarity is used for both welding units.

INPUT VOLTAGE CHANGE-OVER DIAGRAM

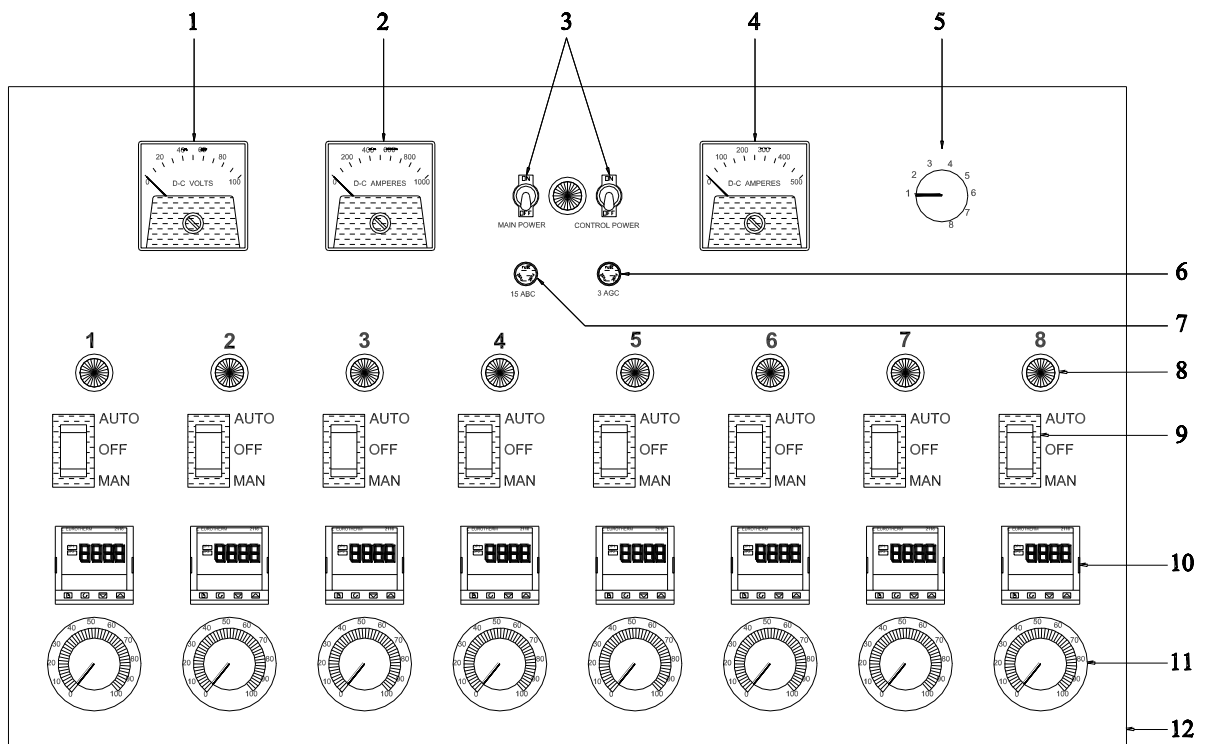
480 VAC INPUT



575 VAC INPUT



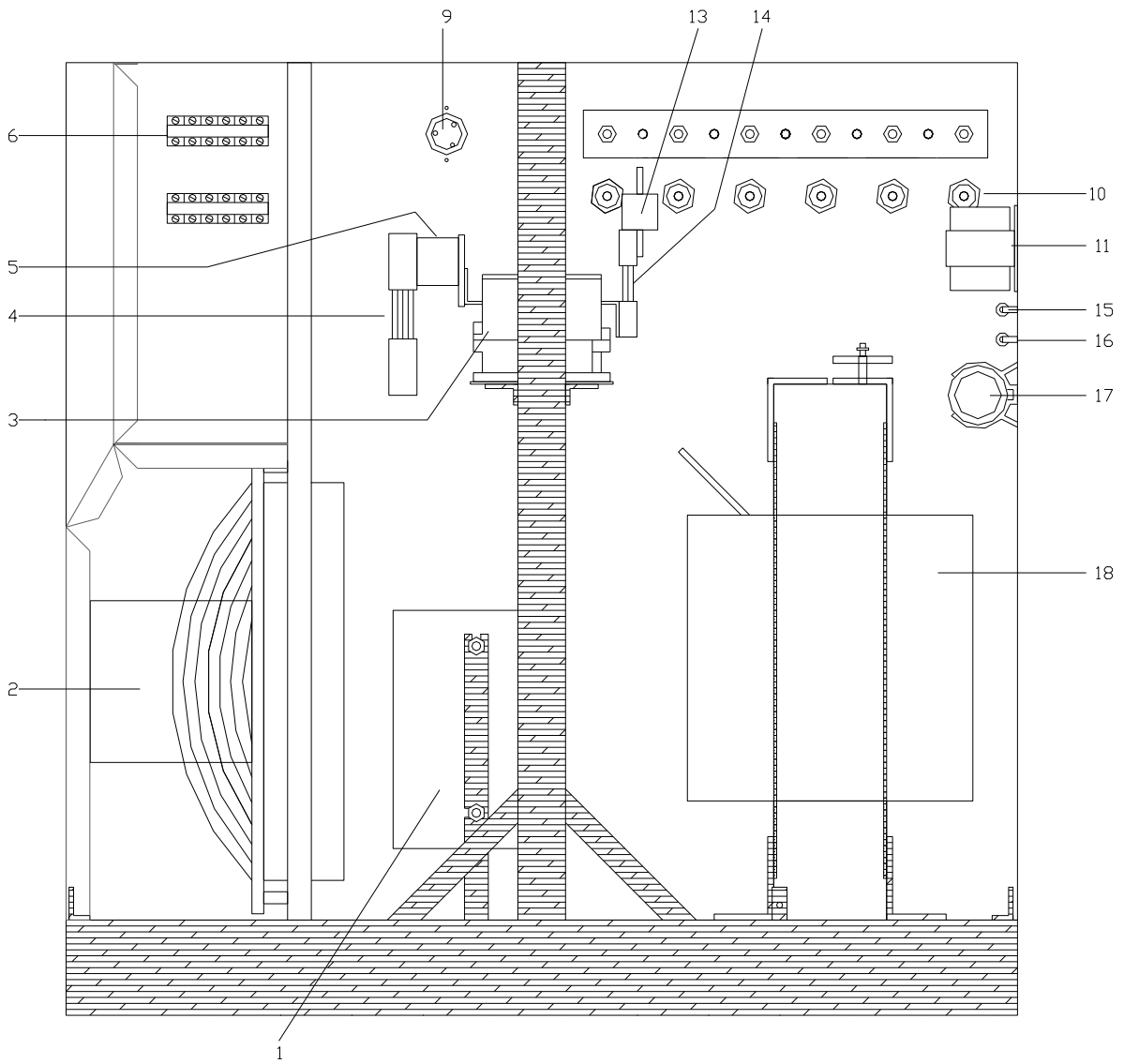
(figure 1)



Parts List (figure 1):

1.	Voltmeter (0-100vdc)	12005736
2.	Ammeter (0-1500amp)	12005727
3.	Main Power Switch & Control Power Switch ON/OFF Plate	12008441 12008460
4.	Ammeter (0-500amp)	12005721
5.	Selector Switch Assy. Rotary Switch Aluminum Knob	12008415 12009959
6.	110v. Outlet Fuse Assy. Fuse Holder AGC 3 Amp Fuse	12003930 12003940
7.	110v. Transformer Fuse Assy. Fuse Holder ABC 15 Amp Fuse	12003930 12003947
8.	Main Power Light Assy. (1) Contactor Light Assy. (8) Pilot Lamp Housing Pilot Lamp Red Lens	12005231 12005220 12005232
9.	Auto/Manual Switch (8)	12008410
10.	Top Temperature Controller (8) Eurotherm 2116 Controller	12008645
11.	Percentage Timer Assy. (8) Aluminum Knob Adjusting Pot. Solid State Timer Dial Plate	12009959 12009984 12006702 12009995
12.	Front panel	12002070I

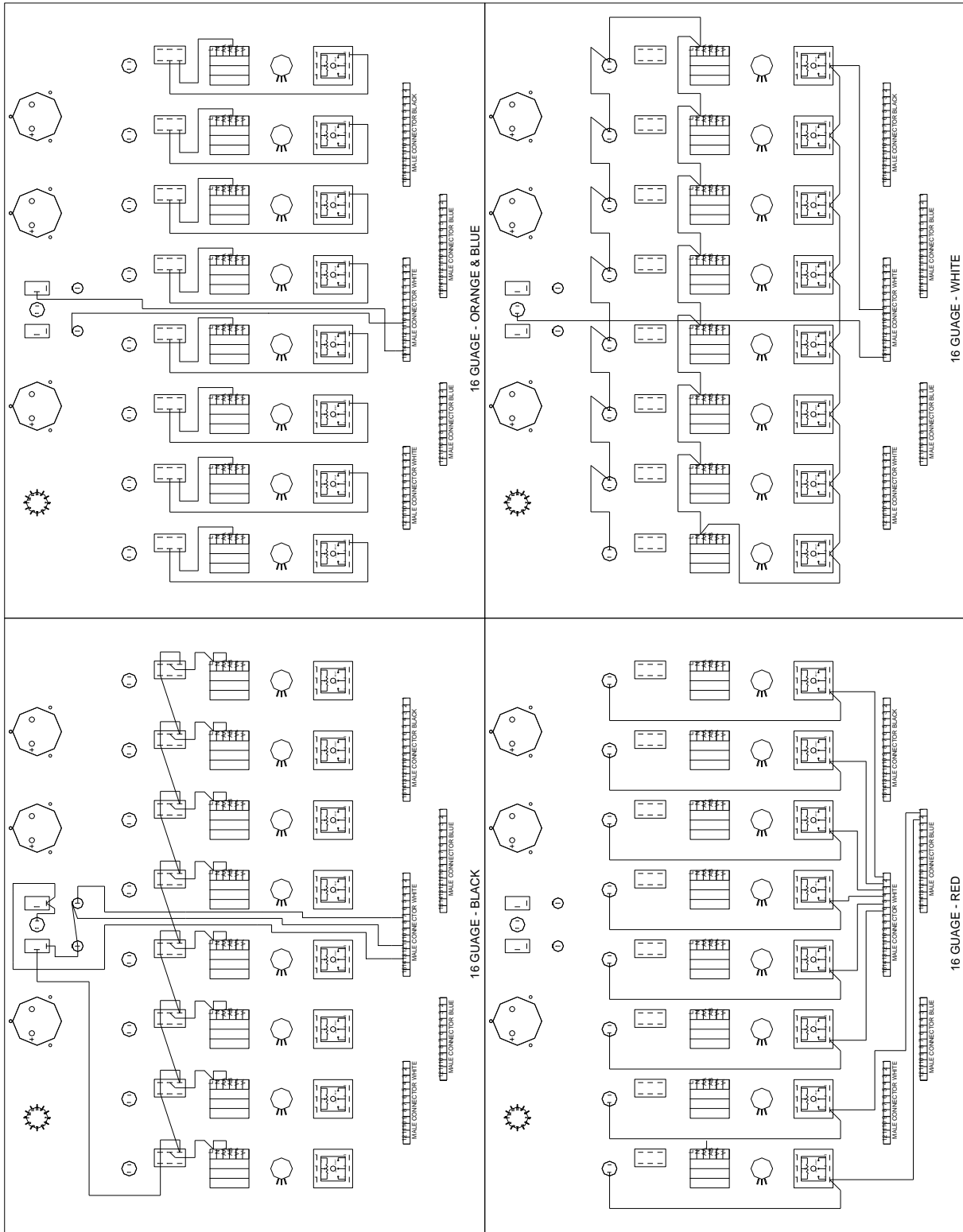
(figure 2)



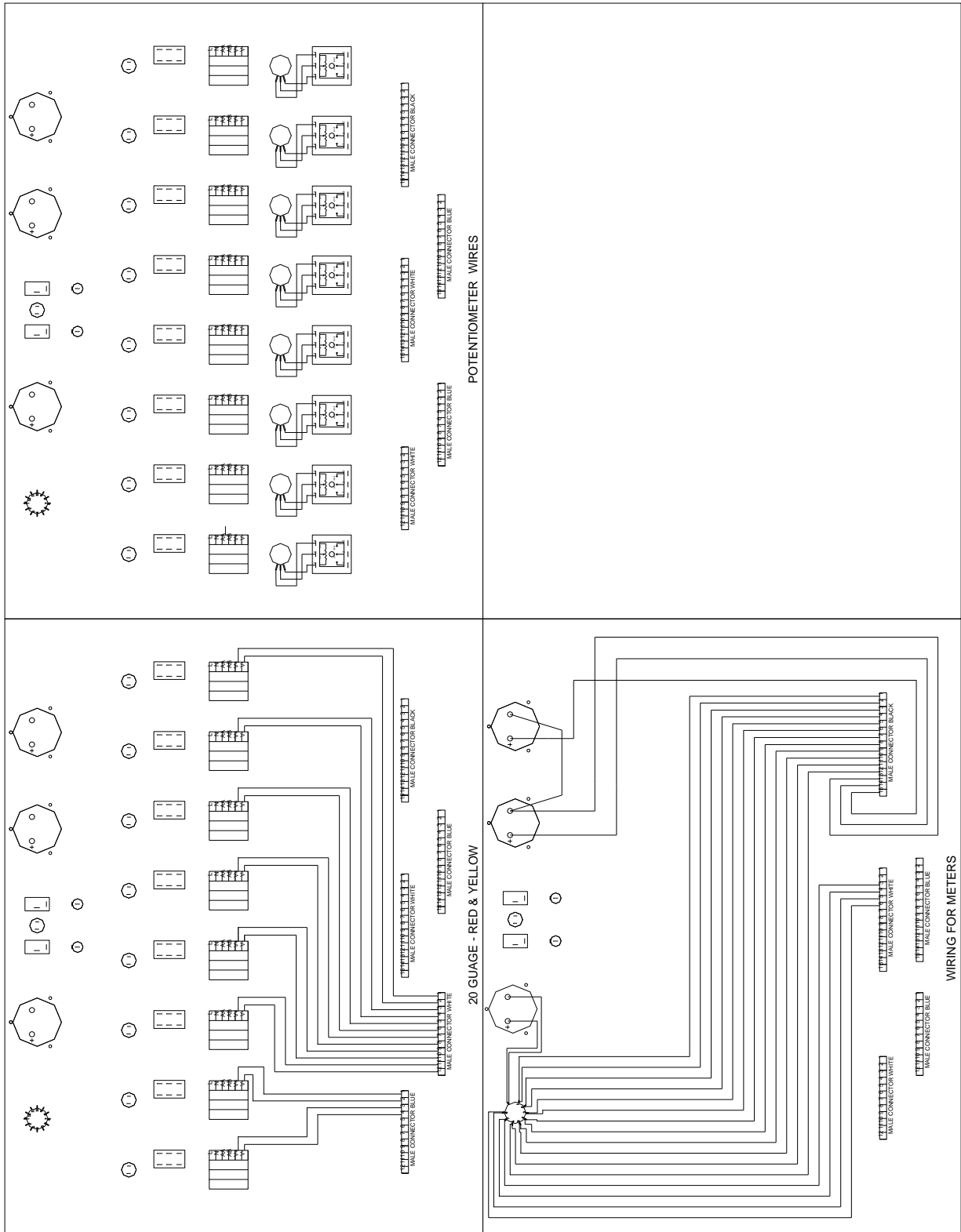
Parts List (figure 2):

1.	Rectifier Assy. Rectifier Diode (6) Diode Clamp-Cross Bar (6) Diode Clamp-Spring Assy. (6)	12009890 12009891 12009892
2.	16" Exhaust Fan	12002227
3.	Zone Contactor (6) Contactor Bussbar	12002760 12001928
4.	1500 Amp DC Shunt	12007850
5.	1600 Amp Fuse	12003925
6.	Thermocouple Terminal Strip (2)	12008910
7.	Female Connector 12 Position	12008471
8.	Female Connector 15 Position	12008473
9.	110v. Panel Mount Outlet	12007045
10.	Panel Mount Cam-lok (16)	12002160
11.	480/110v. Transformer	12009331
12.	Main Contactor	12002765
13.	300 Amp Fuse (8)	12003910
14.	500 Amp DC Shunt (8)	12007820
15.	50W 1 Ohm Resistor	12009955
16.	50W 150 Ohm Resistor	12009956
17.	9800UF 100v. Capacitor	12009929
18.	Main Transformer	12009361

CONTROL DRAWER WIRING DIAGRAM



CONTROL DRAWER WIRING DIAGRAM



BASE UNIT WIRING DIAGRAM

