Vitronics Soltec

Troubleshooting IAS Alarms

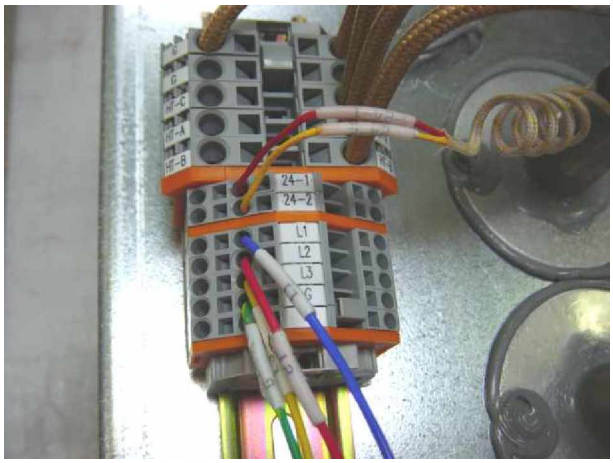
IAS alarms are usually generated by:

- Cell temperature exceeding over temperature switch threshold (over 400° C).
- Failure of an over temperature switch.
- A loose, broken or corroded connection on an over temperature switch.
- Temperature exceeding the maximum threshold on the ROSCO (option) scanner board.
- Loose or broken connection on a thermocouple probe connected to the ROSCO scanner board.
- Loose or broken connection on the wire harness from the thermocouple probe to the scanner board.

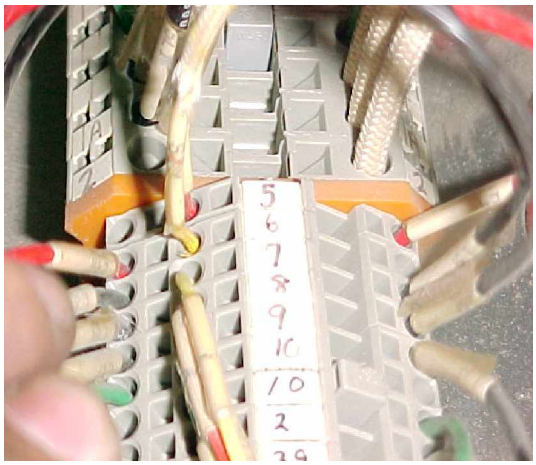
Other possible causes for IAS alarms include:

- Loose connection on a cell sensing circuit board.
- Loose connection on a cell sensing microcontroller.
- Failure of a cell sensing circuit board.
- Failure of a cell sensing microcontroller.
- Loss of voltage to the IAS circuit.

- The over temperature switches are bi-metallic, and a failure is categorized as the inability to pass voltage through the switch.
- Over temperature switches are located on the back side of heater panels and on Controlled Cooling backplate heaters.
- The terminal block assemblies for the top heater cells are located under the skins of the top bonnet. Some oven models have covers that utilize gas springs and can be lifted up and propped open. Some oven models require that the top skins be manually removed to access the terminal block assemblies for the top heater cells.
- The terminal block assemblies for the bottom heater cells are located underneath the machine. Access to the terminal block assemblies is gained by removing the lower sheet metal panels on the back (rear) of the machine.
- The over temperature switches on the heaters, the Controlled Cooling heaters, and the ROSCO scanner board are wired in series. Normally the circuit goes through the heaters first, through the ROSCO scanner board, through the Controlled Cooling heaters, to the over temperature alarm relay.
- On XPM3 / XPM2+ machines, the over temperature circuit goes through the ROSCO board first, then through the heater cell over temperature switches.
- The ROSCO option utilizes a second thermocouple probe on each heater that is wired to the scanner board.
- The wiring from the last top heater cell over temperature switch is always labeled 24R except on Isotherm ovens, where this wire is always labeled 24AH (because there are no bottom heaters).
- The wiring from the last bottom heater cell over temperature switch is always labeled 24AH on all models except the XPM3 and XPM2+ ovens. On the XPM3 and XPM2+ ovens the wiring from the last bottom heater cell over temperature switch is always labeled 24AM.
- On XPM3 and XPM2+ ovens wire #24AM from the last bottom heater cell is routed back to the first bottom heater cell terminal block assembly and voltage can be checked here.
- Machines exist with heater panels in bottom cooling zones. These switches are wired in as normal heater over temperature switches in series with the standard heat zone over temperature switches.



XPM series ovens
(terminals 24-1 / 24-2)



Isotherm, Unitherm, Magnatherm ovens.
(terminials 5 / 6)

In every case, the voltage to the heater cell or controlled cooling heater over temperature switch will be supplied to the terminal with the lower designation (5 / 24-1 / 24AJ). The voltage goes through the switch and comes out to the higher designated terminal (6 / 24-2 / 24AK). The voltage is then taken from this terminal and supplied to the next heater cell in line. The last top heat zone over temperature switch output feeds the first bottom heater zone over temperature cell input. In some cases this is done by returning the voltage supply to the electrical enclosure (as previously noted). In other cases the output of the last top heat cell over temperature switch is run back to the first top heat cell terminal block assembly(XPM series ovens). This wire is always labeled 24R. This circuit is then run to the first heat zone on the bottom to power the bottom heater cell over temperature switches.

- All circuits excluding XPM3 and XPM2+ utilize the K4 relay. On these two model machines, the circuit powers a relay on the A1 interface board labeled A1-K3. On older machines the over temperature alarm relay is labeled 4CR.
- If the machine does not have ROSCO or Controlled Cooling, the circuit only goes through the heaters to power relay K4 / 4CR /A1-K3. Both the ROSCO and Controlled Cooling options are jumpered out.
- If the machine has Controlled Cooling, the circuit goes through the heaters then the Controlled Cooling heaters to power K4. The ROSCO part of the circuit is jumpered out.
- If the machine has ROSCO but not Controlled Cooling, the circuit goes through the cell heater switches then through the ROSCO board to power K4 / 4CR / A1-K3. The Controlled Cooling option switches are jumpered out.
- On some model machines, the over temperature switch wiring went through the top heater cell switches then back to the electrical enclosure to terminal block assembly 2TB. This is a 24VAC circuit and the voltage can be checked at this point using the electrical backplate as ground (or an empty ground terminal block on 2TB). This is a quick way to determine if the fault is with a top cell heater over temperature switch or a bottom cell heater over temperature switch. If there is no voltage at terminal 24R at 2TB, then the failure is in an over temperature switch on a top heater cell.

Troubleshooting IAS Alarms – Over Temperature Switches

First verify that the IAS circuit is correctly powered. Machine models and vintage determine the actual circuitry associated with the IAS alarms. Voltages applied to the IAS circuit include 24 VAC, 120 VAC, 15 VDC, and 24 VDC. To determine the voltage used for the over temperature switch circuit on a machine, reference the electrical schematics for the particular machine.

On machines where the over temperature switch circuit utilizes AC voltage, that voltage is tapped off the control transformer, 1T and the voltage supply wire to the first upper heat zone will be labeled 24. On machines where the over temperature circuit utilizes DC voltage, that voltage is supplied by a DC power supply. On machines where 24 VDC is used, the supply wire will be labeled either 2400, 24Z1, or 1020.

The the best way to begin troubleshooting the IAS alarm circuit is to verify the voltage output of the last top heater cell. If you have voltage at this point, the failure is not in a top heat cell switch. Go to the last heat cell on the bottom and check for voltage out of the last heat cell. If you do not have voltage out any cell, do not forget to verify you have voltage into that cell. If there is no voltage input to the last heater cell (top or bottom), split the oven in half and check the middle cell for voltage into and out of the over temperature switch. Continue splitting the oven in half to find the problem cell.

On Magnatherm, and Unitherm ovens you can go to the main electrical enclosure to terminal block assembly 2TB and work from there. Check for 24 VAC at terminal #24R. If you have voltage at this point, the failure is not in a top heat cell switch. Go to the last heat cell on the bottom and check for voltage on terminal 6 and then on terminal 5. Continue the troubleshooting process as noted in the previous paragraph.

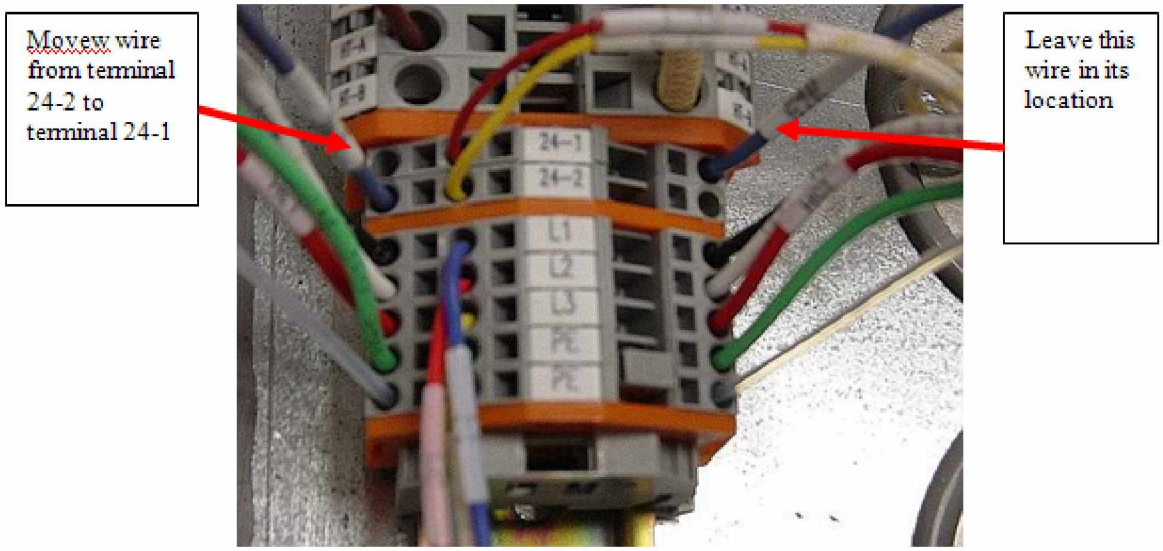
On XPM series oven you can check both the input voltage to the circuit and the output voltage of the last heater at the first top heater cell terminal block assembly.

If the voltage anywhere in the circuit is considerably less than the supply voltage, perform the previous voltage troubleshooting steps to find the first zone where the voltage drops off. The problem zone will need to be bypassed in order to continue troubleshooting the over temperature switch circuit. To bypass the problem zone, voltage to the over temperature switch circuit must be removed. Removing facilities power to the machine is always the safest method. Alternate methods include removing voltage from the main control transformer (turning off the F50 / 50CB circuit breaker), or removing input voltage from the DC power supply (turning off the F52 / 52CB circuit breaker). On machines where the over temperature switches use AC voltage, removing input voltage from the DC power supply does not apply. Removing facilities power or removing voltage from the main control transformer are the only available methods for removing power from the over temperature switch circuit.

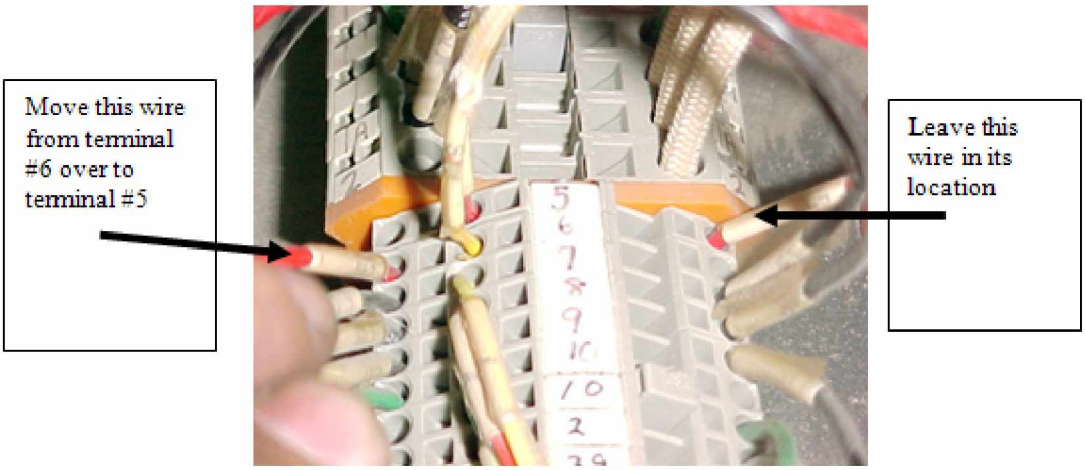
To bypass an over temperature switch after voltage has been removed from the circuit, move the output voltage wire to the same terminal as the input voltage wire. Reference the pictures on the following page. Do not move the over temperature switch wires (red / yellow wires with fiberglass jacket). Move the output wire from terminal 24-2 to terminal 24-1, or terminal 5 to terminal 6.

When the problem over temperature switch has been bypassed, energize the machine / over temperature switch circuit and continue troubleshooting. If the circuit returns to full voltage, only the bypassed switch was the problem. If the circuit voltage still remains low, return to the troubleshooting and bypassing instructions until all problem switches are identified and bypassed. Any switches that are bypassed should be replaced as soon as possible. Switches are #1367403 and terminals for the switches are #1377101. It is strongly recommended that terminals are purchased with replacement switches.

For information on replacing the faulty switches, refer to the Service / Technical Reference manuals for the oven. Follow the steps for replacing a heater panel, as this will provide access to the over temperature switch also.

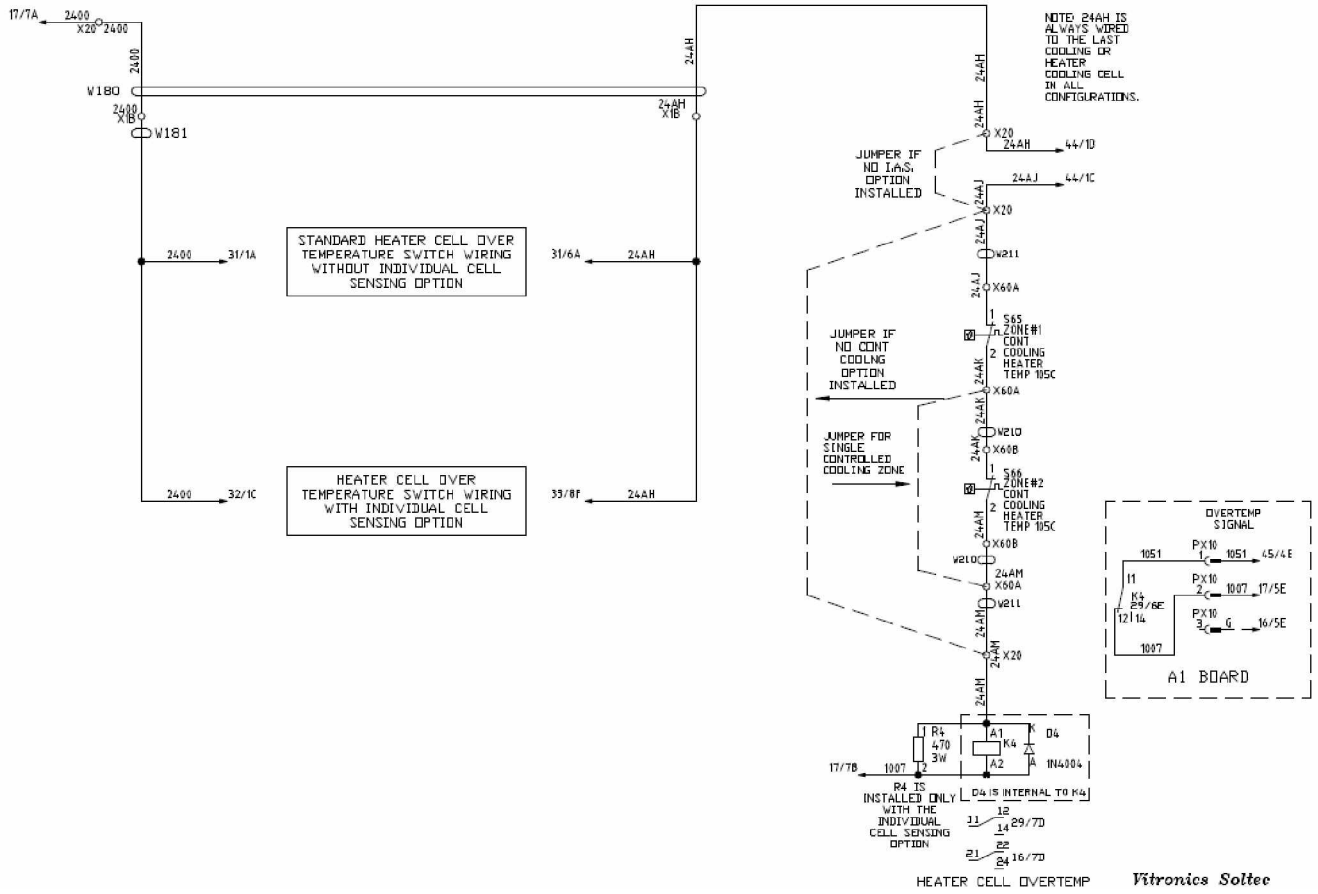


XPM ovens



Isotherm, Unitherm, and Magnatherm ovens

Typical Over Temperature Circuit Wiring.



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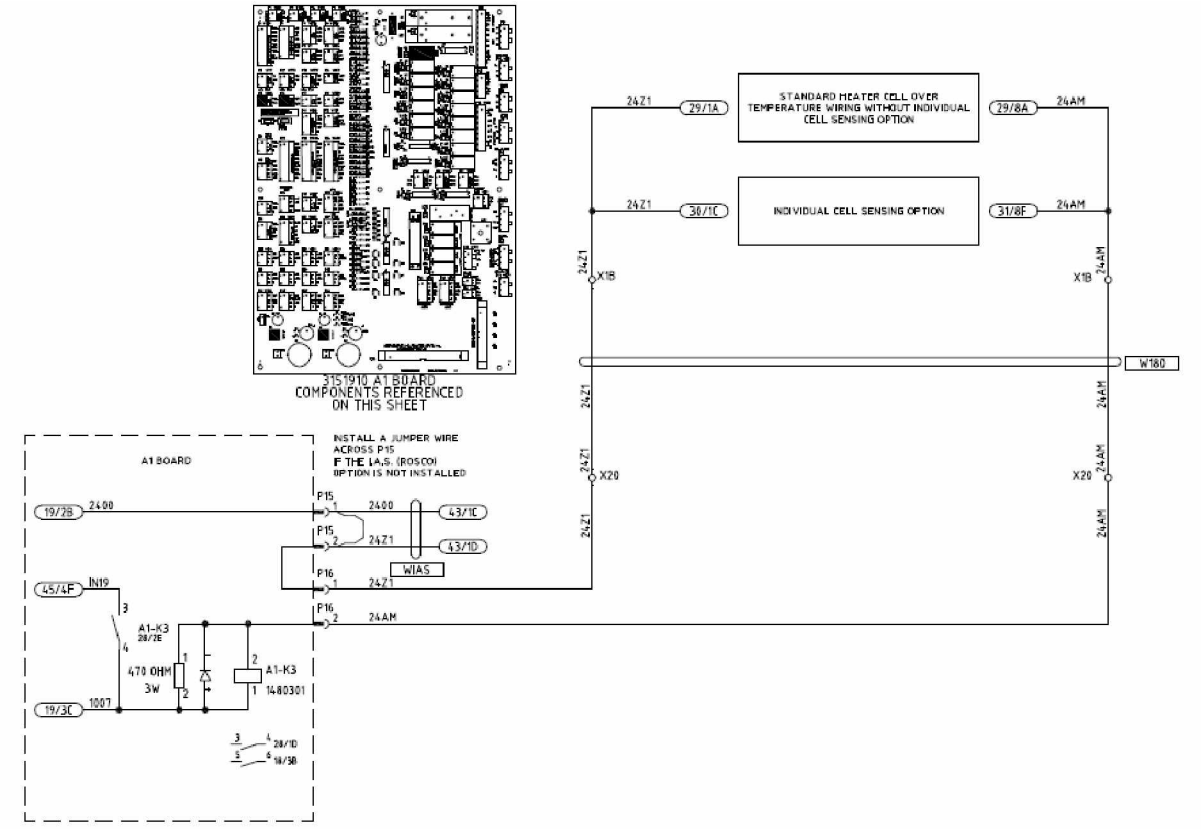
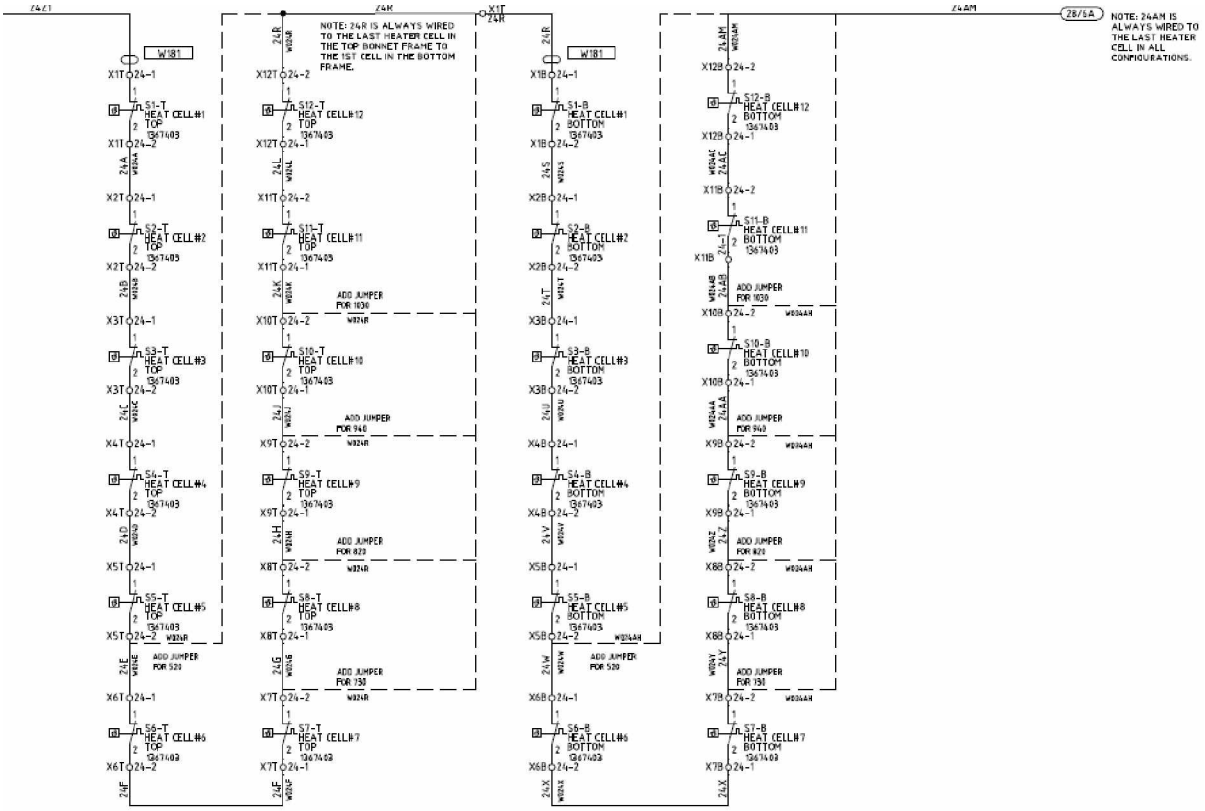
XPM3 / XPM2+ Over Temperature Switch Wiring.





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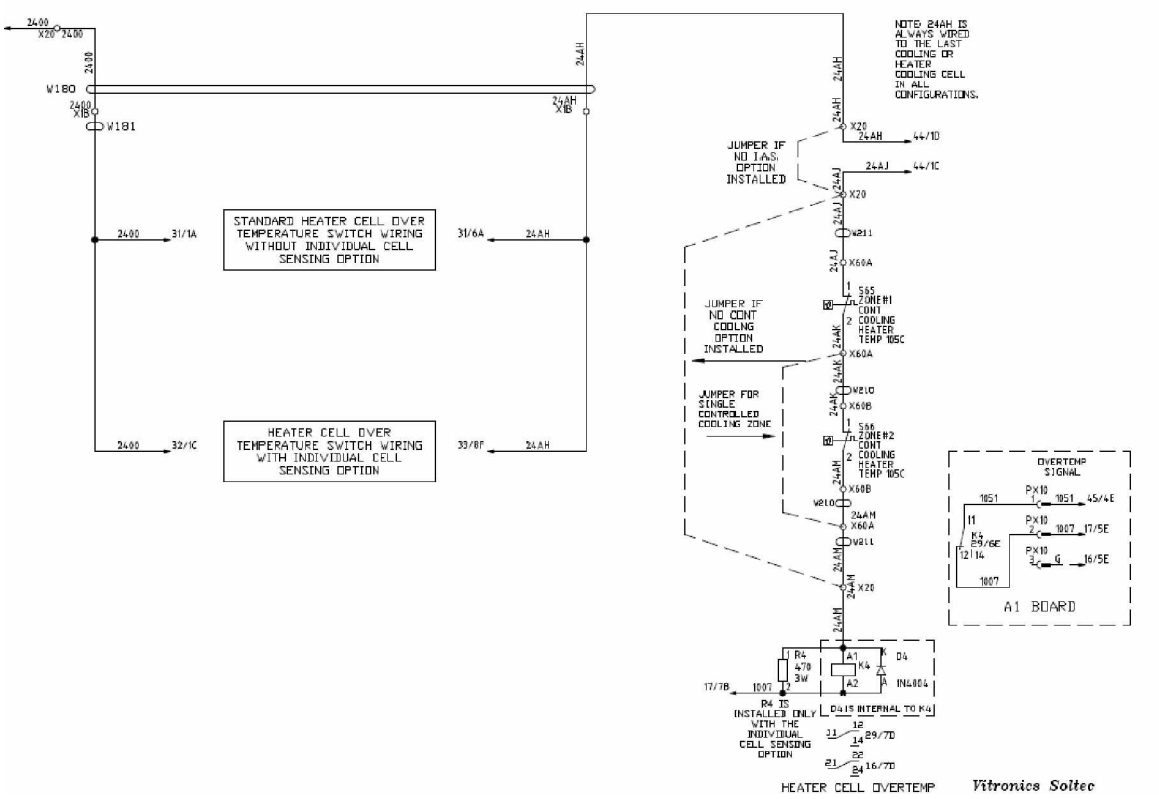
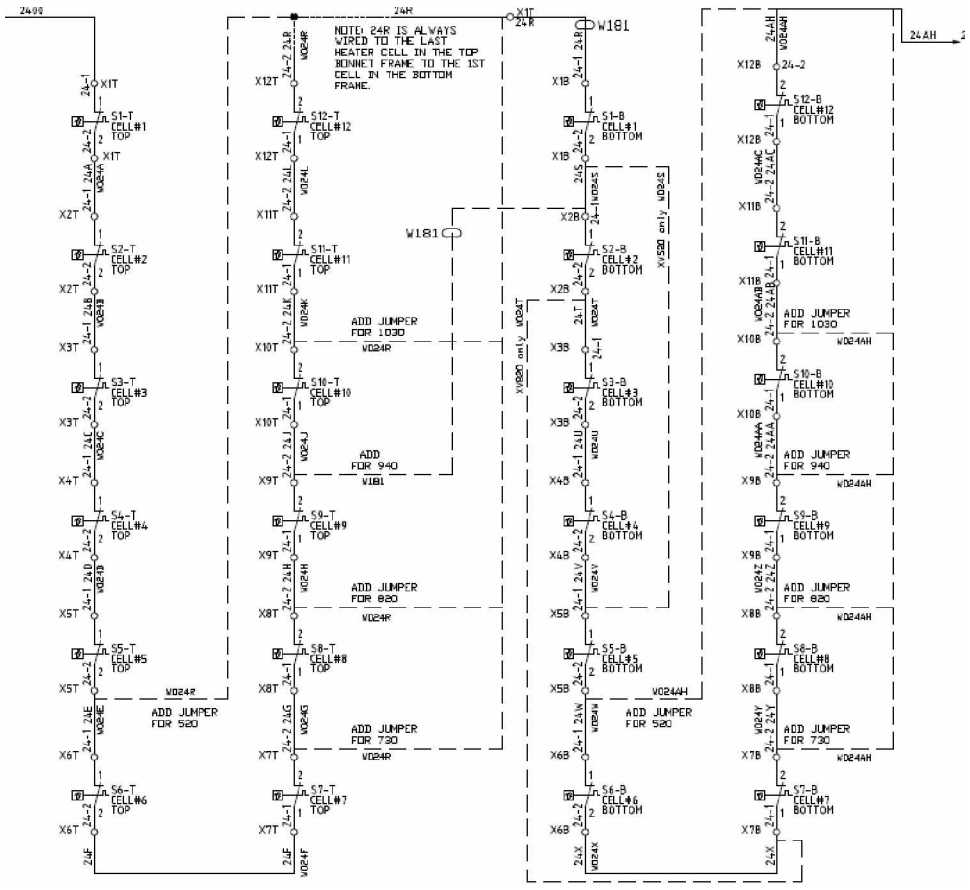
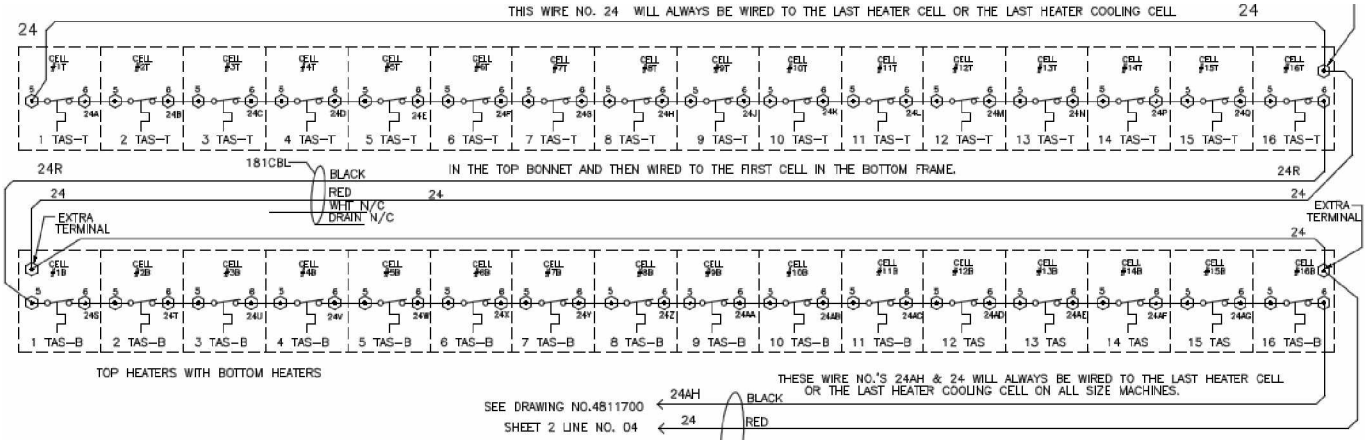
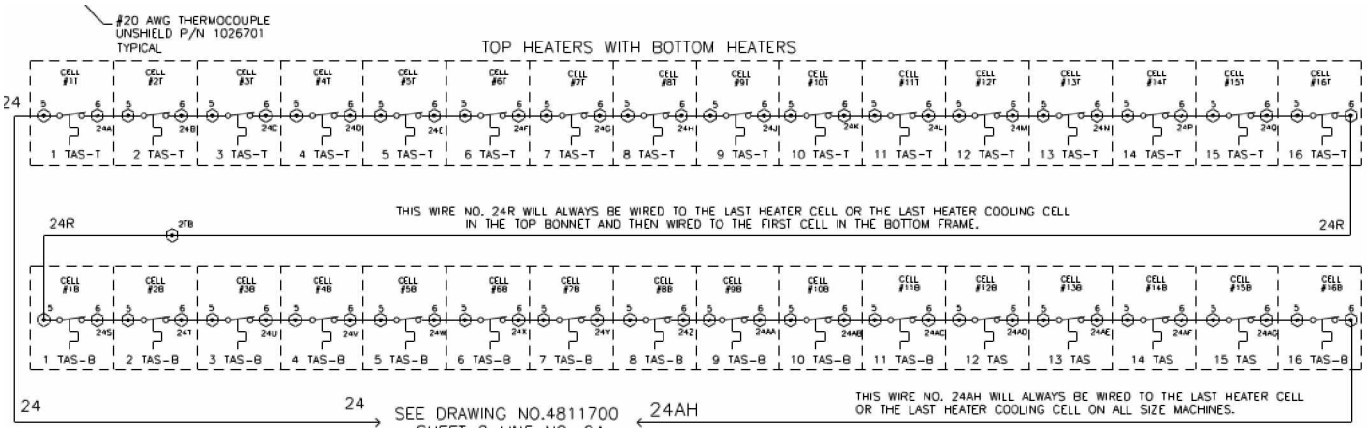
XPM / XPM2 Over Temperature Switch Wiring.





Magnatherm, Isotherm, Unitherm Over Temperature Switch Wiring.



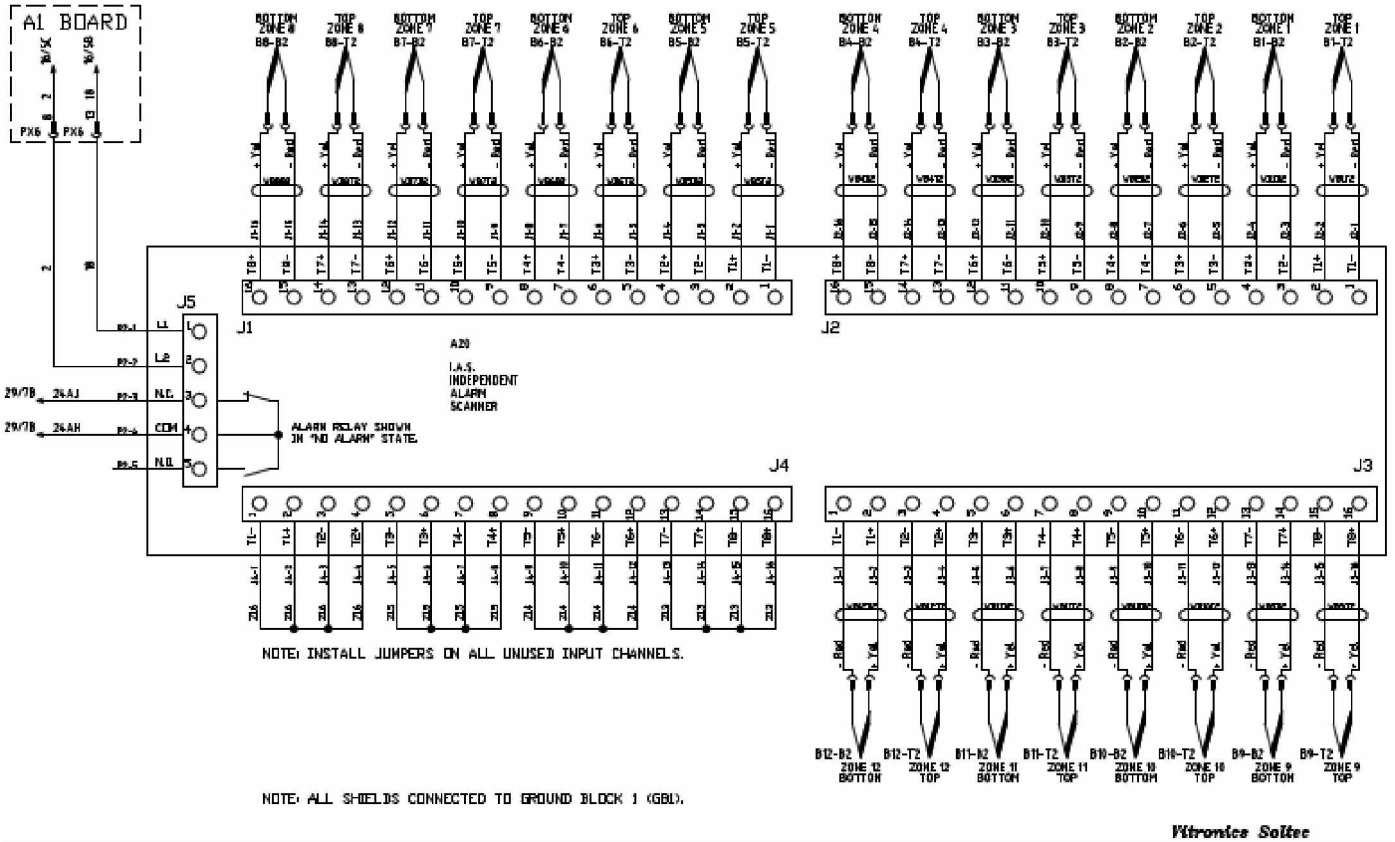


Redundant Over Temperature Scanning Option (ROSCO)

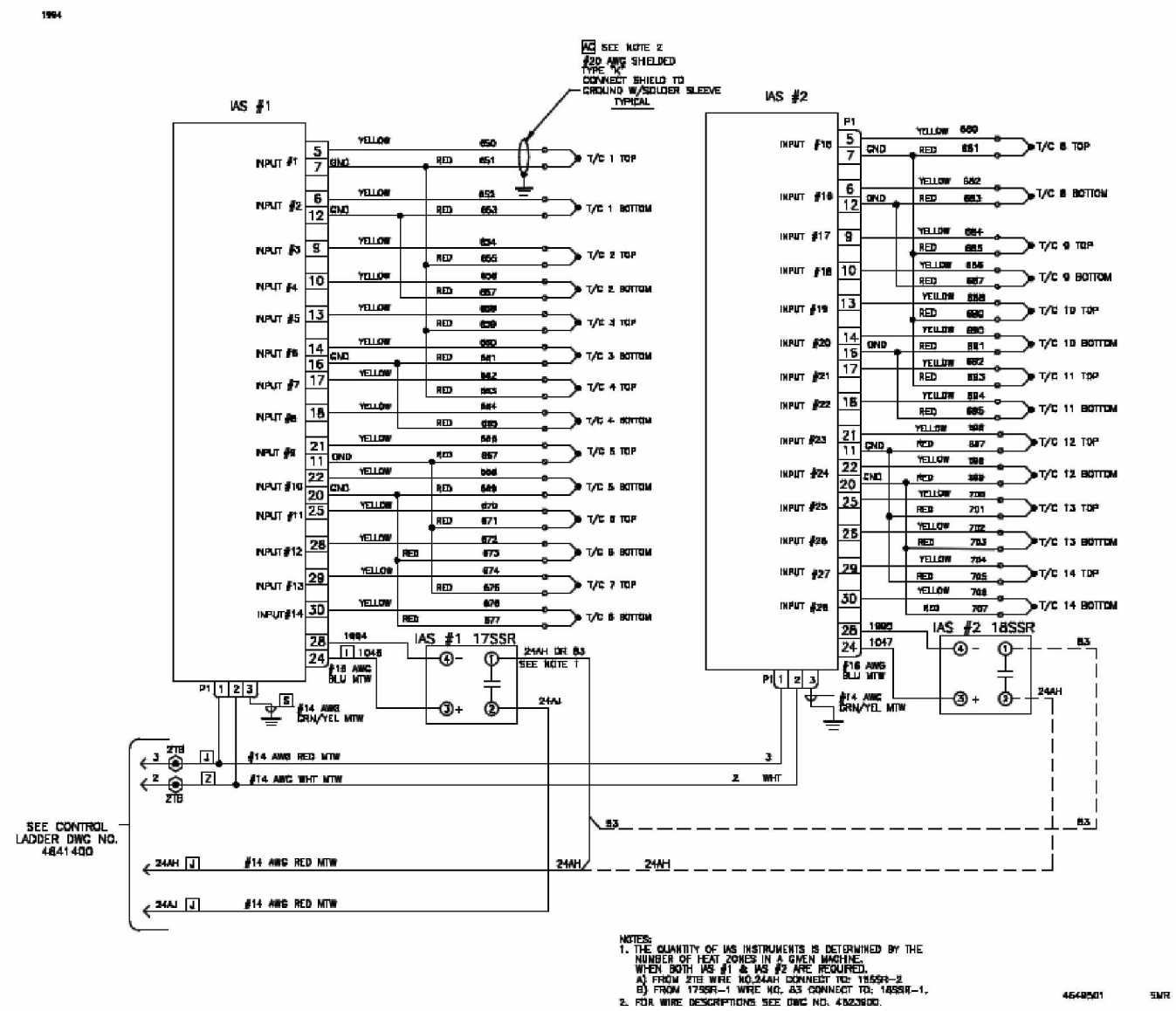
The ROSCO option consists of a second thermocouple probe per heater cell that is wired to a scanning unit. This option can only be wired to heater panels, therefore Controlled Cooling heaters can not be wired as part of the ROSCO circuit. Two versions of the scanning unit were used, the Anafaze IAS unit with digital readout and the NuWave Technologies board that did not have any display.
The Anafaze IAS unit provides identification of the problem input (cell). When the Anfaze IAS unit goes into an alarm state, the alarm LED is lit, and the problem input is frozen on the display. Unit one has 14 inputs (0-9, A-D) which correlates to zones 1 – 7 top and bottom. Unit 2 has the remaining thermocouple inputs. The thermocouple probes are wired into the ROSCO units in the order of zone 1 top, zone 1 bottom, zone 2 top, zone 2 bottom, etc.
Wiring order for the NuWave board is the same as the Anafazer IAS unit. When the NuWave board experiences an alarm condition, the Output LED on the unit will turn off. No information is given regarding which input is in alarm. To troubleshoot this unit, make a wire jumper and individually short out the inputs for each thermocouple. When the problem input is found, the output light will turn on. The manually adjusted potentiometer is used to determine the alarm setpoint.

XPM, XPM2 ROSCO alarm scanner board alarm circuit wiring.
Wire #24AH comes from the last bottom heating cell. Wire #24AJ returns to the X20 terminal block assembly in the electrical enclosure.

NuWave Technologies IAS Scanner Wiring



Anafaze IAS Alarm Scanner Wiring



Preliminary Testing

Verify continuity of the heater over temperature switch circuit from wire number 2400 on zone 1 top to the coil of K4 on the back panel.
Verify that the harness wiring is correct on connector P3 (1479508 8 position connector) of each 3152701 cell interface board by unplugging the heater over temperature switch connector P1 (1479502 2 position connector) on each cell interface board.
The red led on each cell interface board will light when the heater over temperature switch connector is unplugged to the board. If the red led fails to light and continuity is OK in the heater over temperature switch circuit then the wires are reversed in position 1 and 2 of connector P3.

Alarm Testing

Disconnect the following heater over temperature switches one at time by unplugging connector P1 (1479502 2 position connector) on the corresponding 3152701 cell interface board.
Verify that each alarm message is displayed on the PC and that the alarm message text corresponds to the cell location that has the alarm. It takes up to 68 seconds for an alarm condition to be detected and reported on the PC.
Verify that an IAS alert alarm message is present, which indicates that K4 on the back panel is shutting off when a heater over temperature switch is opened.

This test verifies that each 3152202 board is configured correctly and is also communicating correctly with the DI board and that relay K4 on the back panel shuts off when a heater over temperature switch is opened.

3152202 Board#	Model 520	Model 730/820	Model 940/1030	Model 1240
Master	Zone 1 Top	Zone 1 Top	Zone 1 Top	Zone 1 Top
Board 2	Zone 1 Bottom	Zone 1 Bottom	Zone 1 Bottom	Zone 1 Bottom
Board 3		Zone 7 Top	Zone 9 Top	Zone 12 Top
Board 4		Zone 7 Bottom	Zone 9 Bottom	Zone 12 Bottom

3152202 Assembly 16 Channel Input Board Theory of Operation

The Atmel Atmega8 micro-controller is the main component on the board. The Atmega8 has one built in UART. The UART is used to communicate to an RS485 connection on a multi-drop network through MODBUS protocol.

The RS485 port is not used directly with the existing controller since the existing controller does not have additional serial ports available. Instead a frequency generator output from the micro-controller is used on the controller that is set as the Master through switch 4 of dip switch S1 to communicate digital input status data to the existing controller through using a counter input on the existing controller. The frequency generator output is derived by using the timer/counter compare output of timer 1 of the Atmega8 micro-controller.

The DI board initiates MODBUS commands to up to four 3152202 boards connected on a RS485 network to gather digital input status information from each board. It takes 68 seconds to transfer all of the digital input status information for four 3152202 boards.
The IAS alarm level setting must be set to the “Alarm” level for in order to generate an alarm message that contains the location of the faulty over temperature switch. The IAS alarm with the cell sensing option can not be set to the “Critical” level. This is because a critical alarm level setting will cause the cell fans to shut off immediately when an alarm occurs with a critical alarm level setting.