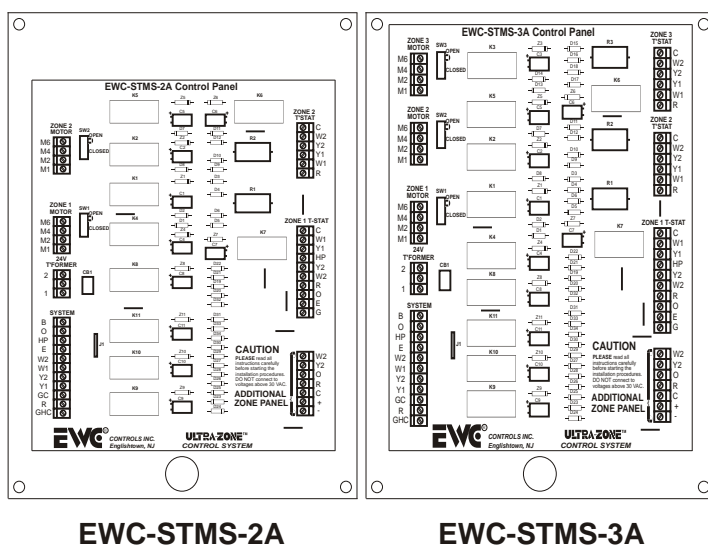


The STMS control panel will interface with single stage or two stage gas or oil fired furnaces and boilers, with electric air conditioning systems, or two stage heat, single stage cool heat pumps.

This technical bulletin contains information and wiring diagrams for the ULTRA ZONE, STMS-2A and 3A control panels. Please read and familiarize yourself with the proper wiring diagrams before you start the installation. We have compiled these diagrams based on the most frequently asked questions regarding the wiring of these panels. The STMS panel will interface with many HVAC systems. If your particular application does not match any of the supplied diagrams, call the technical support hot line. If the system does not operate properly or you experience trouble during the installation, check this bulletin against the field wiring for shorts or mis-wiring. If the problem cannot be resolved, then call the technical support hot line.

The heating and cooling system changeover, emergency heat, and fan operations are controlled by the subbase on the zone 1 thermostat. When using thermostats with manual changeover switches (HEAT-OFF-COOL) on zones other than zone 1, make sure all zones are in the same mode at all times. If zone 1 system mode is changed, then the other zones should be changed as well, for proper operation. Auto changeover thermostats on other zones will eliminate the need for manual changeover. Most battery powered or AC powered thermostats can be used and wired directly to the panel. For even greater comfort and energy savings, setback thermostats can be wired to any or all zones.



EWC-STMS-2A

EWC-STMS-3A

Warning: Control panel does not have any built in time delays. The HVAC system must have its own or, installer provided time delay relays to prevent system short cycling.

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2	Two stage systems
3	Heat pump systems
4	Two stage wiring diagrams
5 & 6	Heat pump wiring diagrams
7	Expansion panel wiring
8 & 9	Transformer and damper wiring
10 & 11	Service notes
12	Diagram overview

SPECIFICATIONS

Power Requirements: 24volt 60 Hz 40VA

Wiring Connections: Screw terminal blocks for thermostat gauge wire.

Mounting: Mounts with 4 screws and mollies (included).

Panel Dimensions: Length: 11 5/8" (295mm); Width: 9" (229mm); Depth: 1 1/4" (32mm).

Warning: These panels are designed for use with 24 volts AC power. Do not use any other voltage! Use caution to avoid electric shock or equipment damage. All wiring should be done in accordance with local and national codes.

OPERATION

CONVENTIONAL TWO STAGE SYSTEM

The mode of operation is determined by the position of the system selector switch on the subbase of the zone 1 thermostat. Switching subbases are not required on the other zones.

HEAT MODE

The panel will be in the heat mode when the zone 1 thermostat subbase is in either the "HEAT" position or the "OFF" position. This allows any zone to call for heat, except zone 1 when its subbase is in the off position. When a zone calls for heat, the panel closes the circuit from the system "R" terminal to the system "W1" terminal, energizing the first stage heat relay. Also in the heat mode, system terminal "R" is in constant make to system "B" terminal. If any zone is equipped with a 2 stage thermostat, when the thermostat makes on the second stage, the panel will also make the system terminal "R" to system "W2" to energize the second stage heat relay.

COOL MODE

The panel is in the cool mode when the zone 1 thermostat subbase is switched to the cool position. In this mode any zone can call for cooling. When a zone calls for cooling, the panel closes the circuit from the system "R" terminal to the system "Y1" and "G" terminals, energizing the first stage cool relay, and the fan relay. Also in the cool mode, the system "R" terminal is in constant make to the system "O" terminal. If any zone is equipped with a 2 stage thermostat, when the thermostat makes on the second stage, the panel will also make system "R" terminal to the system "Y2" terminal, to energize the second stage compressor relay.

OFF MODE

There is no true off mode. When the zone 1 thermostat is in the off position, the remaining zones can still call for heat. Each zone thermostat must have its own switching subbase, with "OFF" position, in order to turn off each individual zone.

FAN

Manual control or continuous operation of the fan is controlled by the position of the fan switch on the zone 1 thermostat subbase only. The remaining zones are not capable of individual fan control. The STMS system terminal block provides two fan control connections, "GC" and "GHC". The "GC" terminal will energize the fan relay in the cool mode only. The "GHC" terminal will energize the fan relay in both heating and cooling modes. Used for electric heat and some hydronic heat applications.

WIRING

SYSTEM

Wiring a 2 stage HVAC system to the EWC STMS control panel is similar to wiring directly to a thermostat subbase.

The following terminals are on the system terminal block.

R - To hot side of system transformer.

B - Unused.

O - Unused.

Y1/Y2 - To compressor relays first and second stage.

W1/W2 - To heat relays first and second stage.

E - Unused.

GC - To fan relay if cycled in cool mode only.

GHC - To fan relay if cycled in cool and heat mode.

HP - Unused.

ZONE DAMPER MOTORS

Use 3 conductor wire from each zone damper motor terminal to the corresponding terminals on the STMS or STEX control panels. Consult wiring diagrams for damper types.

NOTE: When operating more than one damper motor per zone, consult specific wiring diagrams.

When any zone is calling, that damper will be in the open position. Any zone not calling will be in the closed position.

When all zones are satisfied, the position of the damper is controlled by the "OPEN/CLOSED" switches on the panel.

OPEN POSITION - The damper will drive open when all zones are satisfied.

CLOSED POSITION - The damper will drive closed when all zones are satisfied except with SMD,

BMD, IMD dampers, the last zone to satisfy will always remain open regardless of switch position.

THERMOSTATS

ZONE 1

Thermostat wiring depends on the type of thermostats used.

The following is a description and the requirements of the terminals on the zone 1 thermostat terminal block.

R - Hot side of 24 volts to thermostat.

C - Common side of 24 volts to thermostat. If needed.

Y1 - Must be made to "R" on a call for 1st stage cooling.

Y2 - Must be made to "R" on a call for 2nd stage cooling.

HP - Unused in two stage operation.

O - Must be made to "R" continuously when system switch is in the cool position.

E - Unused in two stage operation.

W1 - Must be made to "R" on a call for 1st stage heating.

W2 - Must be made to "R" on a call for 2nd stage heating.

G - Must be made continuously when fan switch is in the "ON" position.

ZONE 2/3

Zone 2/3 thermostat is a simple single stage heat-cool thermostat or a 2 stage heat and 2 stage cool depending on requirements of a particular zone. The following is a description and the requirements of the terminals on the zone 2/3 thermostat

R - High side of 24 Volts to thermostat.

C - Low side of 24 Volts to thermostat. If needed

Y1 - Must be made to "R" on a call for cooling.

Y2 - Must be made to Y1 on a call for second stage cooling.

W1 - Must be made to "R" on a call for heat.

W2 - Must be made to "W1" on a call for second stage heat.

OPERATION

HEAT PUMP SYSTEM

The mode of operation of the heat pump is determined by the position of the system selector switch on the subbase of the zone 1 thermostat. Switching subbases are not required on the other zones.

HEAT MODE

The panel will be in the heat mode when the zone 1 thermostat subbase is in either the "HEAT" position or the "OFF" position. This allows any zone to call for heat, except zone 1 when its subbase is in off position. When a zone calls for heat, the panel closes the circuit from the system "R" terminal to the system "HP", and "G" terminals, turning on the compressor and fan. Also in the heat mode, system terminal "R" is in constant make to system "B" terminal. Terminal "B" is used to operate a reversing valve that is energized in the heat mode. If any zone is equipped with a 2 stage thermostat, when the thermostat makes on the second stage, the panel will also make system "HP" to system "W2" to energize the second stage or auxiliary heat relay.

EMERGENCY HEAT MODE

This mode is activated by putting the zone 1 thermostat subbase in the emergency heat position. In this mode the compressor is disabled. When a zone calls for heat, the circuit is closed from the system "R" terminal to the system "E" and "G" terminals. The "E" terminal is used to energize a separate emergency or backup heat relay. If any zone is equipped with a 2 stage thermostat, when the thermostat makes on the second stage, the panel will also make system "E" terminal to system "W2" terminal. It may be the same heat source as the emergency heat.

COOL MODE

The panel is in the cool mode when the zone 1 thermostat subbase is switched to the cool position. In this mode any zone can call for cooling. When a zone calls for cooling, the panel closes the circuit from the system "R" terminal to the system "HP", and "G" terminals, turning on the compressor and the fan. Also in the cool mode, the system "R" terminal is in constant make to the system "O" terminal. Terminal "O" is used to operate a reversing valve that is energized in the cool mode.

OFF MODE

There is no true off mode. When the zone 1 thermostat is in the off position, the remaining zones can still call for heat. Each zone thermostat must have its own switching subbase, with "OFF" position, in order to turn off each individual zone.

FAN

The operation of the fan is controlled by the position of the fan switch on the zone 1 thermostat subbase only. The remaining zones are not capable of individual fan control. The STMS system terminal block provides two fan control connections, "GC" and "GHC". The "GC" terminal will energize the fan relay in the cool mode only. The "GHC" terminal will energize the fan relay in both heating and cooling modes. The Heat Pump fan relay should be connected to GHC terminal.

WIRING

HEAT PUMP

Wiring the heat pump to the EWC STMS control panel is similar to wiring the heat pump to a thermostat subbase. The following terminals are on the system terminal block.

R - To hot side of heat pump system transformer.

B - To reversing valve if energized in heat mode.

O - To reversing valve if energized in cool mode.

Y1/Y2 - Unused.

W2 - 2 second stage heat relay.

E - To emergency heat or backup heat relay.

GC - Unused.

GHC - To fan relay, cycled in cool and heat mode.

HP - To compressor relay in heat pump mode.

W1 - Unused.

ZONE DAMPER MOTORS

Use 3 conductor wire from each zone damper motor terminal to the corresponding terminals on the STMS or STEX control panels. Consult wiring diagrams for damper types.

NOTE: When operating more than one damper motor per zone, consult specific wiring diagrams.

When any zone is calling, that damper will be in the open position. Any zone not calling will be in the closed position. When all zones are satisfied, the position of the damper is controlled by the "OPEN/CLOSED" switches.

OPEN POSITION - The damper will drive open when all zones are satisfied.

CLOSED POSITION - The damper will drive closed when all zones are satisfied except with SMD, BMD, IMD dampers, the last zone to satisfy will always remain open regardless of switch position.

THERMOSTATS

ZONE 1

Thermostat wiring depends on the type of thermostats used.

The following is a description and the requirements of the terminals on the zone 1 thermostat terminal block.

R - Hot side of 24 volts to thermostat.

C - Common side of 24 volts to thermostat. If needed.

HP - Must be made to "R" on a call for heat or cool.

O - Must be made to "R" continuously when system switch is in the cool position.

E - Must be made to "R" continuously when system switch is in emergency heat position.

W2 - Must be made to "R" on a call for second stage heat when system switch is in either heat or emergency heat.

G - Must be made continuously when fan switch is in the "ON" position.

ZONE 2/3

Zone 2/3 thermostat is a simple single stage heat-cool thermostat or a 2 stage heat and 1 stage cool depending on requirements of a particular zone. The following is a description and the requirements of the terminals on the zone 2/3 thermostat

R - High side of 24 Volts to thermostat.

C - Low side of 24 Volts to thermostat. If needed

Y1 - Must be made to "R" on a call for cooling.

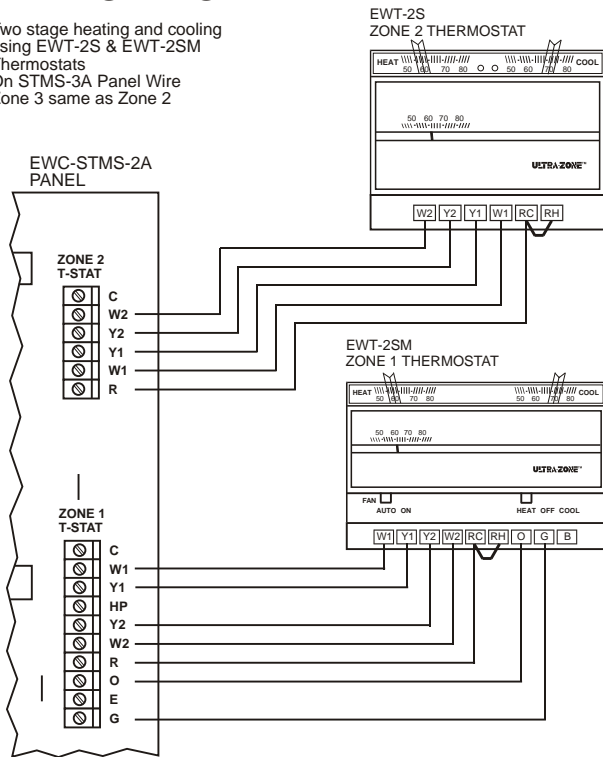
W1 - Must be made to "R" on a call for heat.

W2 - Must be made to "W1" on a call for second stage heat.

2 Stage Heat/Cool Thermostat and System Wiring

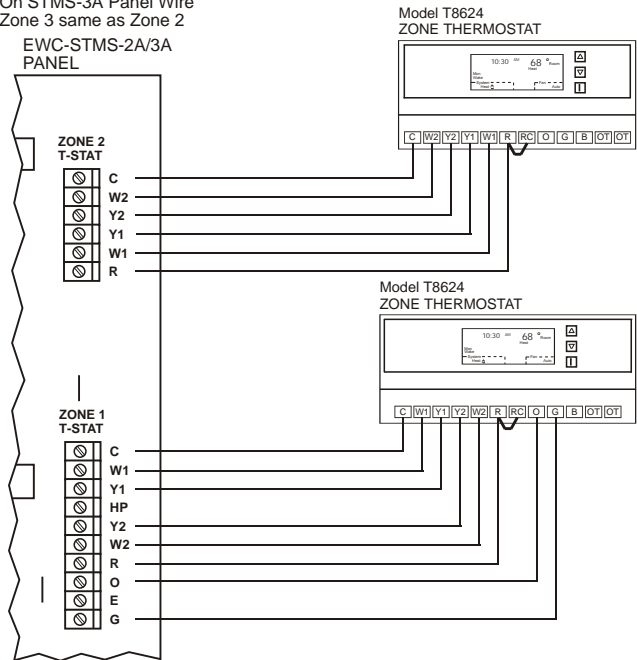
WIRING DIAGRAM #1

Two stage heating and cooling using EWT-2S & EWT-2SM Thermostats
On STMS-3A Panel Wire
Zone 3 same as Zone 2



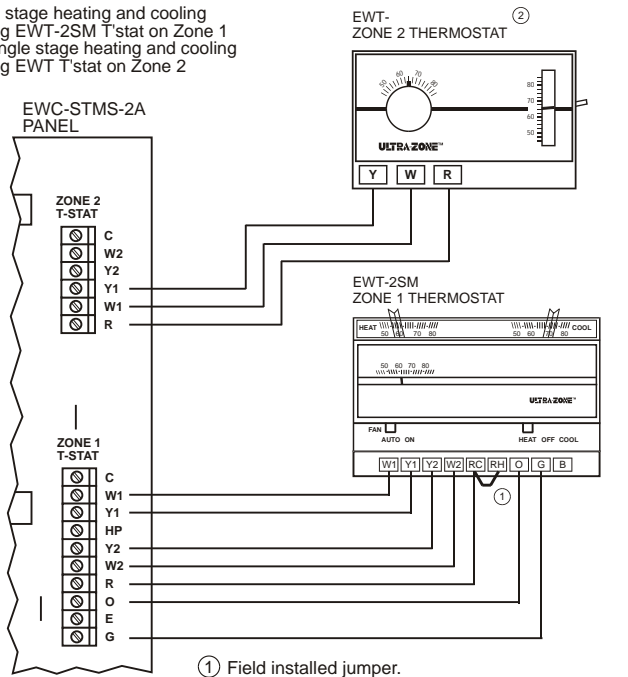
WIRING DIAGRAM #2

Two stage heating and cooling using T8624 programmable digital thermostats
On STMS-3A Panel Wire
Zone 3 same as Zone 2



WIRING DIAGRAM #3

Two stage heating and cooling using EWT-2SM T-stat on Zone 1 & single stage heating and cooling using EWT T-stat on Zone 2

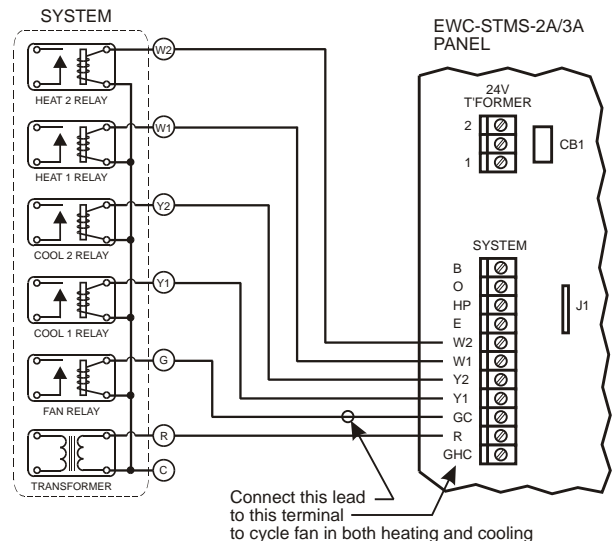


① Field installed jumper.

② Some Zones may not require 2 stage thermostats. Small Zones should NOT be able to bring on second stage heat (W2) or cooling (Y2).

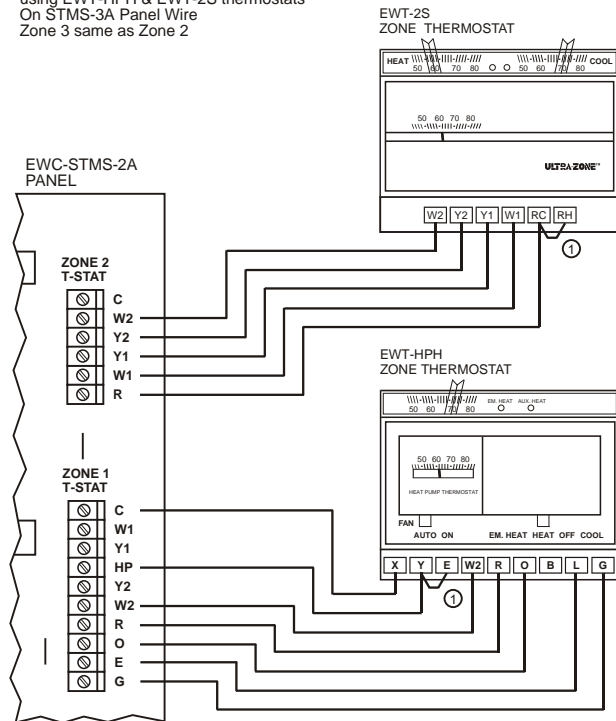
WIRING DIAGRAM #4

EWC-STMS-2A/3A controlling a conventional 2 stage heat and 2 stage cool system



WIRING DIAGRAM #5

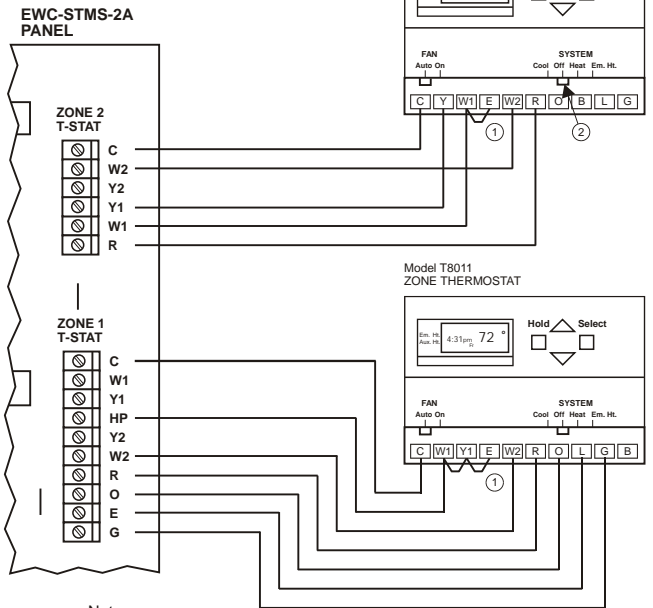
EWC-STMS-2A/3A Heat Pump System
2 stage heat single stage cool
using EWT-HPH & EWT-2S thermostats
On STMS-3A Panel Wire
Zone 3 same as Zone 2



1. Field installed jumper

WIRING DIAGRAM #6

Heat Pump
Two stage heating and single stage cooling
using T8011 Digital Thermostats
On STMS-3A Panel Wire
Zone 3 Same as Zone 2

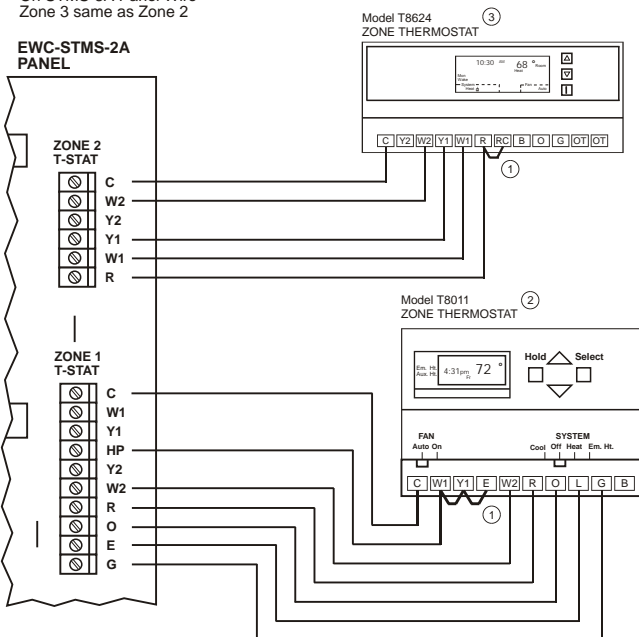


Notes:

1. Field installed jumper.
2. When using T8011 T'STAT on Zones 2/3 switch should be in same position as Zone 1 T'STAT. If not panel will ignore its call.

WIRING DIAGRAM #7

Heat Pump
Two stage heating and single stage cooling
using T8011 & T8624 Digital Thermostats
On STMS-3A Panel Wire
Zone 3 same as Zone 2



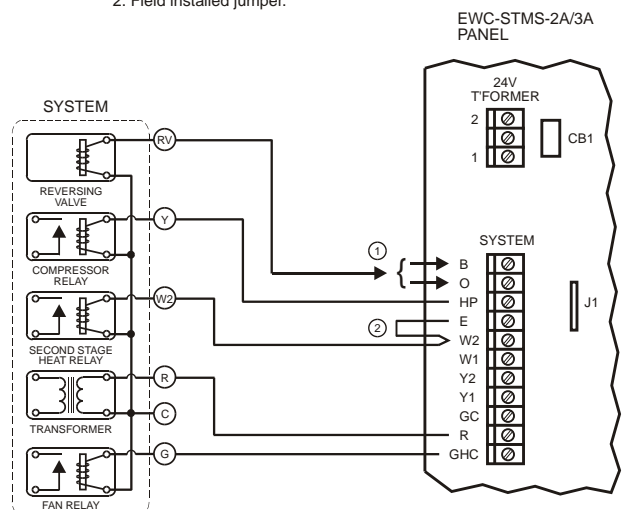
Notes:

1. Field installed jumper.
2. DO NOT use auto change over mode on Zone 1.
3. Use Zone 2 Thermostat in autochange over mode.

WIRING DIAGRAM #8

EWC-STMS-2A/3A
controlling a heat pump
2 stage heat and single stage cool
with a single source of backup heat

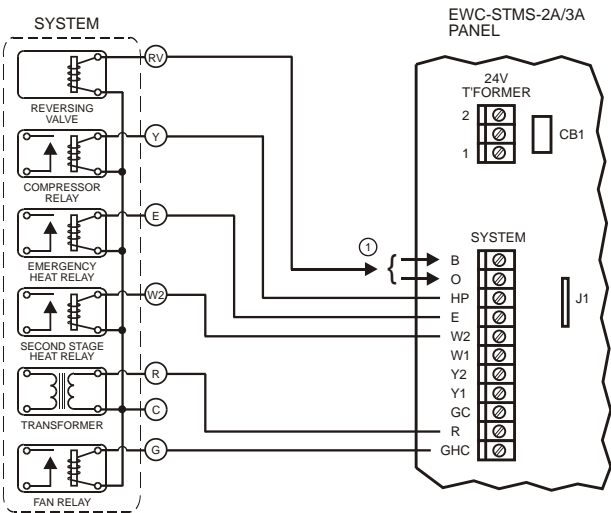
1. Connect reversing valve wire to terminal "B" for heat pumps that energize the reversing valve on heat cycle. "O" for heat pumps that energize the reversing valve in cool cycle.
2. Field installed jumper.



WIRING DIAGRAM #9

EWC-STMS-2A/3A
controlling a heat pump
2 stage heat and single stage cool
with emergency heat.

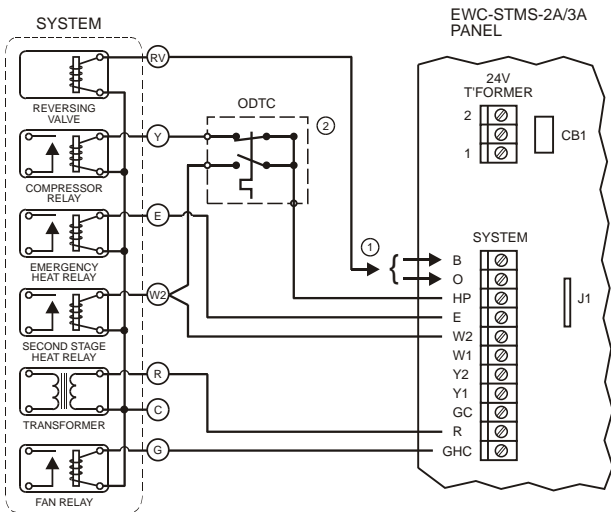
- 1. Connect reversing valve wire to terminal "B" for heat pumps that energize the reversing valve on heat cycle.
"O" for heat pumps that energize the reversing valve in cool cycle.



WIRING DIAGRAM #10

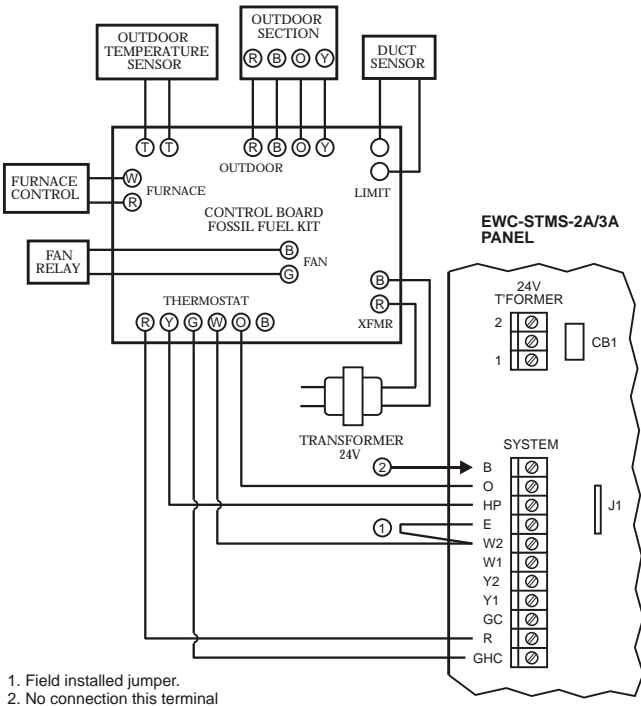
EWC-STMS-2A/3A
controlling a heat pump
2 stage heat and single stage cool
with outdoor low temperature
compressor lockout.

- 1. Connect reversing valve wire to terminal "B" for heat pumps that energize the reversing valve on heat cycle.
"O" for heat pumps that energize the reversing valve in cool cycle.
- 2. Outdoor temperature control [ODT] -
Field installed.



WIRING DIAGRAM #11

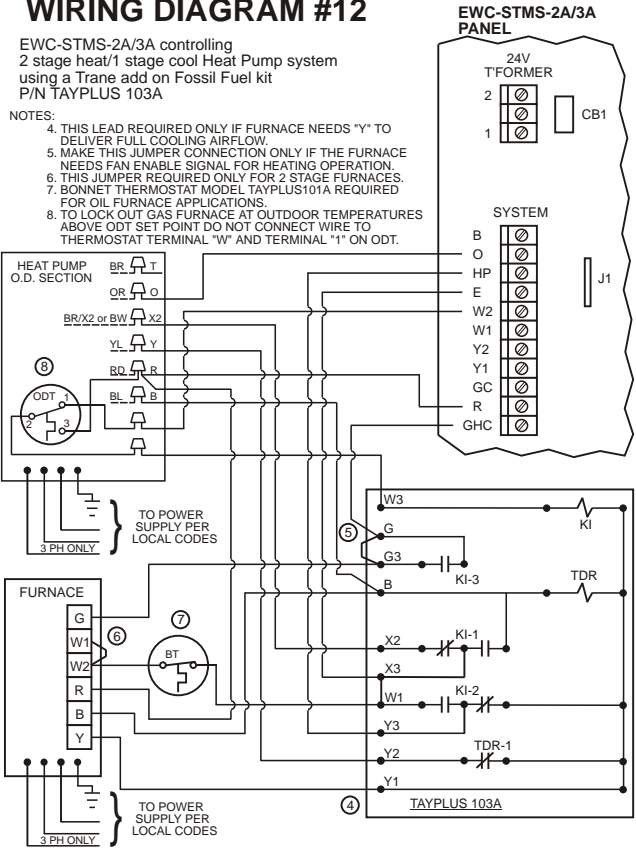
EWC-STMS-2A/3A controlling
Heat Pump system with a
Intercity Products Fossil Fuel kit
P/N AXA 001 RKA1

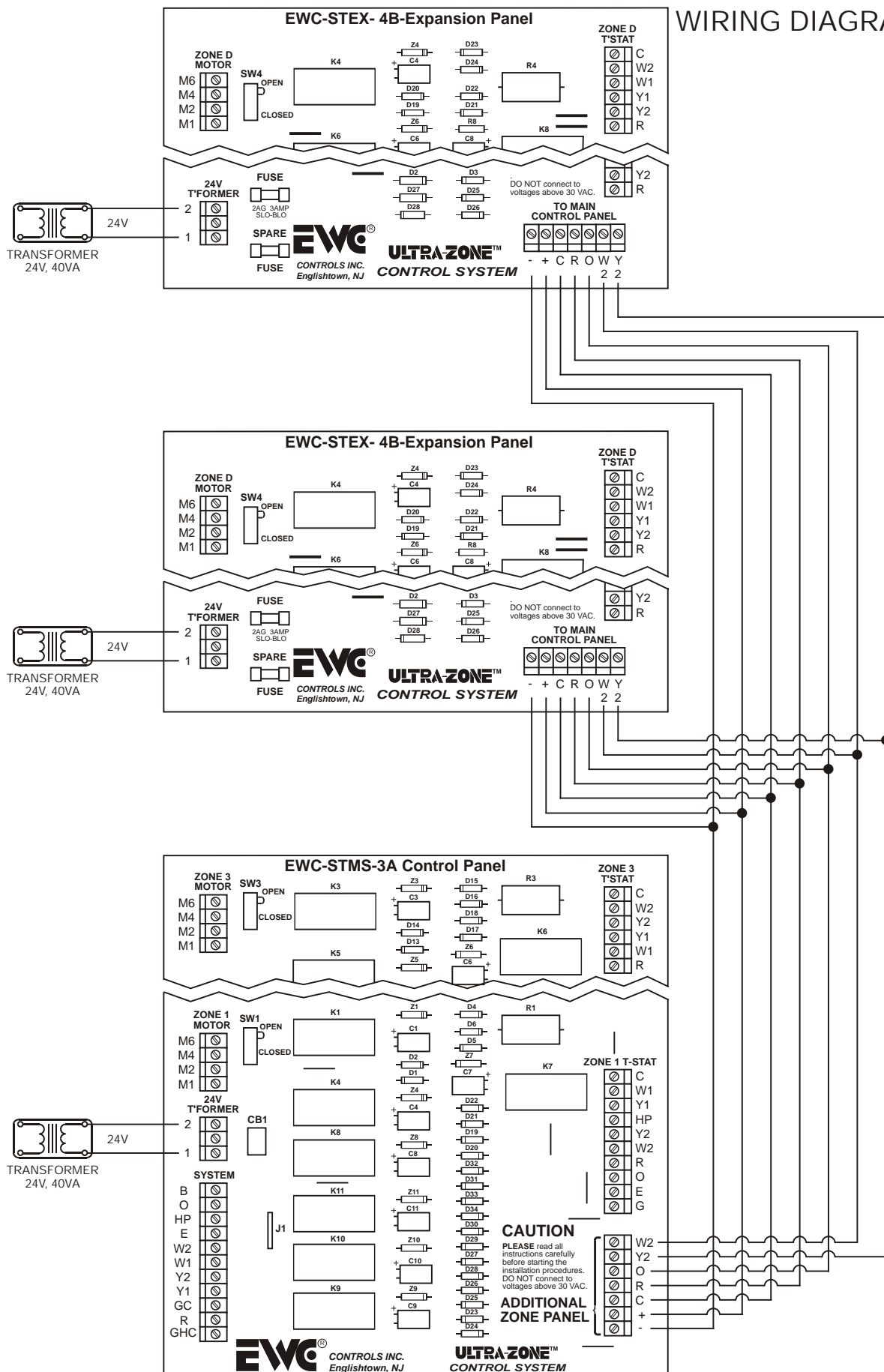


WIRING DIAGRAM #12

EWC-STMS-2A/3A controlling
2 stage heat/1 stage cool Heat Pump system
using a Trane add on Fossil Fuel kit
P/N TAYPLUS 103A

- NOTES:
- 4. THIS LEAD REQUIRED ONLY IF FURNACE NEEDS "Y" TO DELIVER FULL COOLING AIRFLOW.
 - 5. MAKE THIS JUMPER CONNECTION ONLY IF THE FURNACE NEEDS FAN ENABLE SIGNAL FOR HEATING OPERATION.
 - 6. THIS JUMPER REQUIRED ONLY FOR 2 STAGE FURNACES.
 - 7. BONNET THERMOSTAT MODEL TAYPLUS101A REQUIRED FOR OIL FURNACE APPLICATIONS.
 - 8. TO LOCK OUT GAS FURNACE AT OUTDOOR TEMPERATURES ABOVE ODT SET POINT DO NOT CONNECT WIRE TO THERMOSTAT TERMINAL "W" AND TERMINAL "1" ON ODT.





DAMPER WIRING

TRANSFORMER

A separate 24 volt 40 VA transformer is required and must be connected to terminals 1 and 2 of the terminal block labeled "T-Former". This transformer powers the control panel, thermostats, and damper motors. It does not power the system control circuit. The board is protected by a polyfuse circuit breaker at the transformer input. The polyfuse overheats and opens the circuit to protect the panel. Removing power from the board allows the polyfuse to cool and automatically reset. If polyfuse overheats, check field wiring for shorts or miswires, especially damper motor wiring.

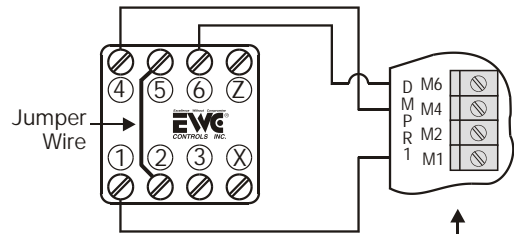
DAMPER WIRING

Description of damper motor terminals on control panel

- Terminal M1 Common.
- Terminal M2 Constant 24VAC.
- Terminal M4 24VAC to open damper.
- Terminal M6 24VAC to close damper.

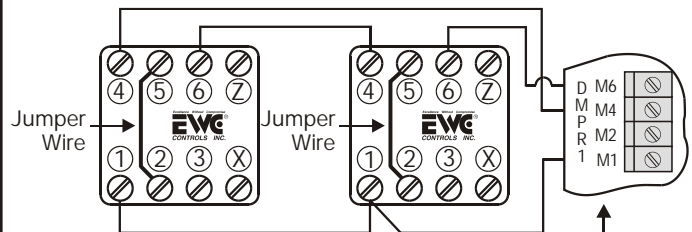
WIRING DIAGRAM #14

Rectangular Damper wiring



A single rectangular damper motor is wired to the M1, M4 and M6 terminals as shown.

ULTRA-ZONE™
Control Panel

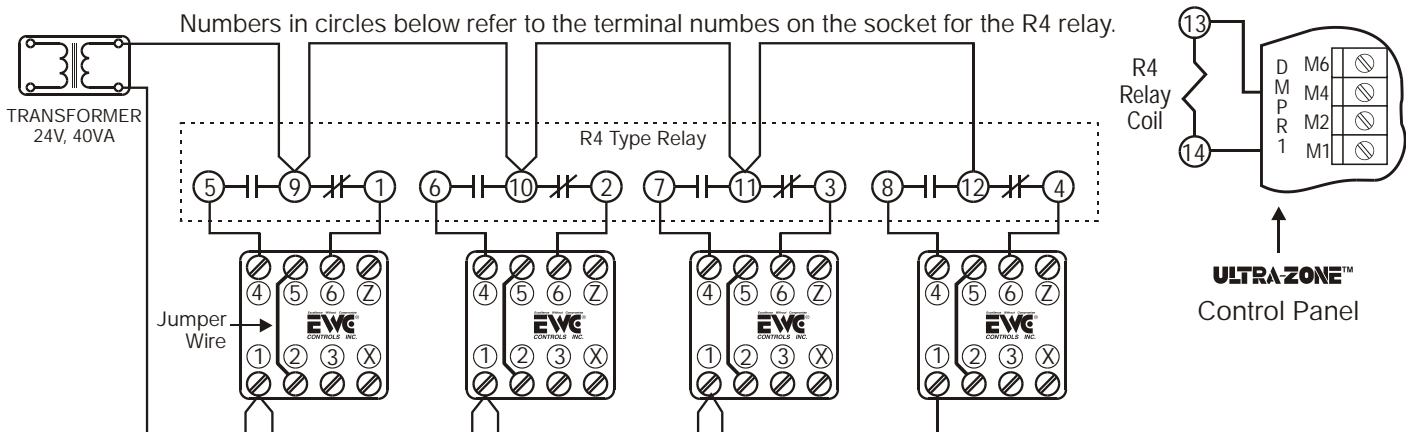


Wiring two rectangular damper motors controlled by one zone as

ULTRA-ZONE™
Control Panel

WIRING DIAGRAM #15

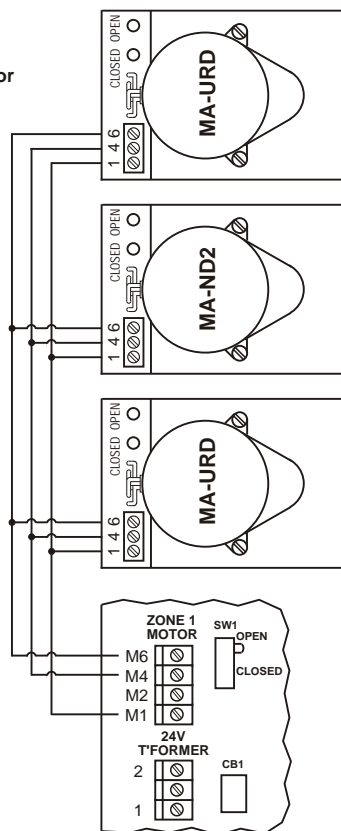
Controlling 3 or more rectangular dampers from One Zone



A relay can be added to the system to control more than two dampers per zone. The diagram shows a relay used to control four dampers using the "R4" relay which has four sets of contacts (4-pole) with both normally open and normally closed contacts. If more than four dampers are required on a single zone, a second R4 relay can be added and the coils wired in parallel.

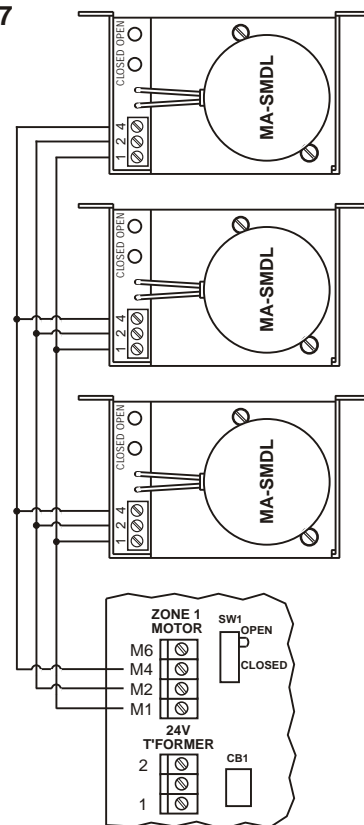
WIRING DIAGRAM #16

Wiring MA-ND and MA-URD Motor Actuators to ULTRA-ZONE Control Panels



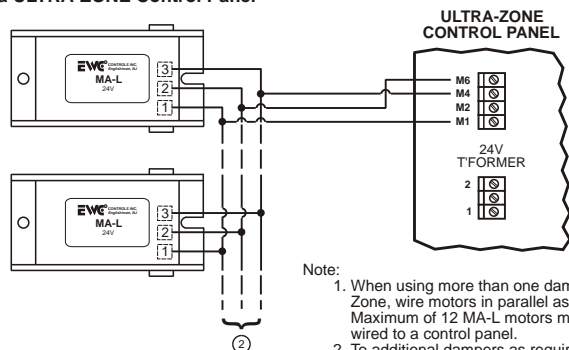
WIRING DIAGRAM #17

Wiring MA-SMDL Motor Actuators to ULTRA-ZONE Control Panels



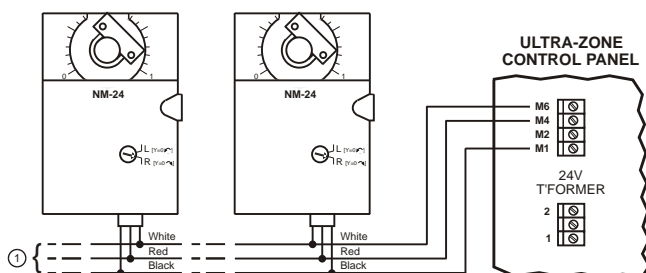
WIRING DIAGRAM #18

Wiring Model MA-L Motor Actuators [Belimo KM 24] to a ULTRA-ZONE Control Panel



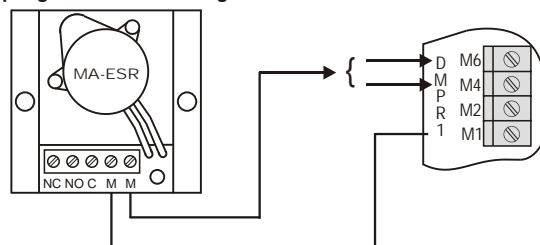
WIRING DIAGRAM #19

Wiring Model PAOB-F [Belimo NM-24] to a ULTRA-ZONE Control Panel



WIRING DIAGRAM #20

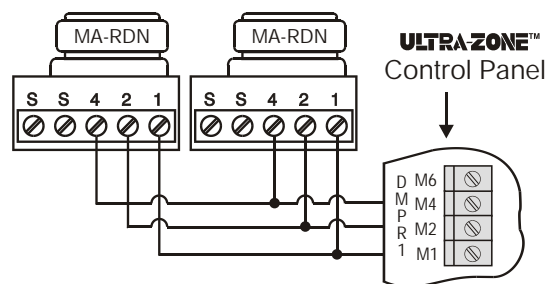
Spring Return Motor wiring



This diagram shows how to wire a spring return damper. A power close style damper is wired M1 & M6. Power open style damper is wired to M1 & M4.

WIRING DIAGRAM #21

Round Damper wiring



The EWC-STMS-2A/3A is a multiuse control panel. The panel can be wired to a conventional single stage or 2 stage heating/cooling system or to a heat pump system. Therefore verify that the installation is wired for the intended application.

To check out the installation, first check that the Heating/Cooling system is operational. Do this by using a jumper wire on the control panel "system" terminal block.

Conventional Heat/Cool System

Jump from "R" to "Y1" - Compressor and fan should turn on.

"R" to "G" - Compressor and fan should turn on. (due to STMS internal circuitry)

"R" to "W1" - Heat should turn on.

With 1st stage running, see that the 2nd stage is working by shorting "Y1" to "Y2" on cooling cycle and by shorting "W1" to "W2" on heating cycle.

Heat Pump System

Determine if reversing valve is to be energized in the cooling or heating mode.

Jump from "R" to "Y1" - Compressor and fan should turn on in heating or cooling mode depending on system.

"R" to "G" - same as above.

"R" to "Y1" + [O or B] - Compressor and fan should turn on in the opposite mode to step 1.

Assuming the heating/cooling equipment checks out fine, shut off the power at the furnace or heat pump. If it does not check out - correct the problems before proceeding with testing of the zoning system.

When testing the zone control system, the power at the furnace should be off, to prevent compressor short cycling and other controls being cycled needlessly.

Zone Control System Power

1. Check that there is 24VAC on terminals 1 and 2 from the transformer.
2. Check that there is 24VAC on terminals M1 and M2 for each zone damper. If voltage measured is less than 5 volt, check "Polyfuse" for overheating. If Polyfuse is hot, it is usually caused by a shorted cable, a miswired damper motor or thermostat.
To find the problem, start with damper wiring. Disconnect one cable at a time, remove power from panel and wait 30 seconds. Restore power and recheck voltage at terminals M1 and M2. If voltage is restored, that is the cable with the short or miswire. To be sure that there is not more than one shorted cable, reconnect removed cables one at a time, monitoring the 24V power to make sure there are no more shorts.
3. Check each zone thermostat terminal block "C" to "R" to make sure that there is power to each thermostat.
4. Make sure that the proper thermostat is wired to each zone. "On Heat Pump Systems" the Zone 1 thermostat MUST be a "Heat Pump Thermostat", Zones 2 and 3 and all expansion zones require conventional thermostats [see diagrams #5 to #8].

5. If panel will not go into "Cool" mode, make sure Zone 1 thermostat is in "Cool" mode and that there is 24VAC present between "C" and "O" terminals on Zone 1 thermostat terminal block. If the thermostat is in the "Cool" mode and there is no 24VAC between terminals "C" and "O" on the panel, check out the wiring, subbase and thermostat to determine where the problem is.

If panel will not work in "Heat" mode, make sure Zone 1 thermostat is in "Heat" mode, and that there is NO voltage between terminals "C" and "O" and "C" and "E". If voltage [24VAC] is present, check wiring, subbase and thermostat. If voltage is present on terminal "O" the panel is in the "cooling mode". Voltage on terminal "E" puts the panel into "Emergency Heat" mode and will not permit the compressor to run in the Heating or Cooling mode.

After review of service notes, the problem cannot be resolved, then call the Technical Support hot-line (1-800-526-4048).

Damper Operation

Before starting to check dampers for proper operating sequence, put all "Open-Closed" switches on panel in "Open" position.

Determine how many and what model of damper is connected to each zone. Verify that they are wired per the correct schematic for the number and model of damper used.

[see schematics [#14](#) to [#21](#)]

Start test with all zone thermostats satisfied - all dampers should be open. Make Zone 1 thermostat call - Zone 1 damper should stay open, all others should close.

Repeat this test with all other zones - have that zone thermostat call with all others satisfied - that damper remains open, all others should close. The control panel damper terminal block outputs are as follows

M1 = 24V common

M2 = 24V constant

M4 = 24V signal to open

M6 = 24V signal to close

Damper Models

On Models SMD, BMD and IMD dampers, also wall registers, ceiling diffusers and floor registers using Model MAN motor actuators - make sure that there is a "Jumper" from terminal "2" to "5". Power on terminal 1 and 4 drives the damper open and power on terminals 1 and 6 drives it closed.

Model ND same as above but no "Jumper" is needed.

Model RDN and SMDLED - apply power [24V] between terminals 1 and 2 damper should drive closed and stop. With power (24V) applied to terminals 1 and 2 plus 4, damper should drive open and stop.

WIRING DIAGRAM

Model STMS **ULTRAZONE™** Control Panel

HEAT PUMP AND 2 STAGE WIRING

