508005-01
9/2019

ZONING SYSTEM

LZP-2 TWO ZONE CONTROL PANEL

INSTALLATION INSTRUCTIONS FOR ZONE CONTROL PANELS USED WITH LENNOX HEATING AND COOLING EQUIPMENT (Y7766)

NOTE – NOT APPLICABLE TO HEAT PUMP SYSTEMS!

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

Shipping & Packing List

(1) Model LZP-2 Zone Control Panel

(2) 88K38 Temperature Sensor

(3) Installation Instructions and Warranty Card

Required Components (ordered separately):

24VAC Transformer - The size of the transformer is determined by the total power requirements for the zone panel (4VA), the thermostats and the maximum number of dampers that could be energized at any given time. The dampers require 10VA each.

Table 1. Transformers

Part Number	Size	Voltage Description
10P17	40VA	120/208/240V-24V
10P87	50VA	120/208/240V-24V
12P61	75VA	120/208/240V-24V

The transformers listed in this chart include a plate mount for a 4" square electrical box, Lennox catalog number 83P74.

Thermostats - single-stage, electronic, 24VAC heat/cool thermostats which include a C (24VAC common) terminal. **Do not use mechanical or power robbing thermostats** (see *Table 3. Recommended Thermostats on page 3).*

Dampers - two- or three-wire, 24VAC dampers required. Two-wire and power closed/spring open preferred.

Specifications

INPUT RATINGS

Voltage: 18-30VAC, 50/60Hz

MAXIMUM CURRENT

Zone panel damper output per zone (fused): 18VA at 158°F, 30VA at 90°F.

Zone panel and thermostats (fused): 18VA at 158°F, 30VA at 90°F.

Zone panel consumption: 4VA maximum.

NOTE – *Use 18 or 20 AWG solid (**non-stranded**) wire with a maximum length of 300 feet.*

ENVIRONMENT

Temperature (operating): -40°F – 158°F

Temperature (shipping): -40°F – 180°F

DIMENSIONS

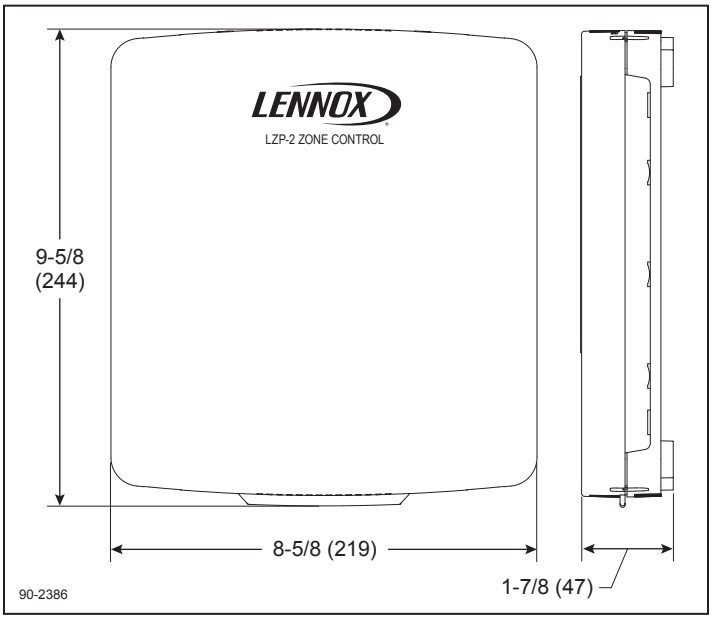


Figure 1. Zone Panel Dimensions – inches (mm)

Application

- Two zones
- Single-stage electric or gas furnace
- Single-stage air conditioner
- Multi-stage equipment can be used provided that it stages on its own internal controls
- **Not applicable to heat pump systems**

Features

- LED indicators for outputs
- Time delay override
- Two- or three-wire damper compatibility

Specifications

WIRING TERMINALS

1 - **HVAC** - HVAC connection

2 - **ZONE 1 THERMOSTAT** - Thermostat connection

3 - **ZONE 2 THERMOSTAT** - Thermostat connection

4 - **DAMPER 1** - Zone 1 damper connection

5 - **DAMPER 2** - Zone 2 damper connection

6 - **SENSOR DAT** - Discharge air temperature sensor

7 - **POWER** - Zone panel, thermostat and damper power

LEDs (under cover)

8 - **POWER** - Green: 24VAC is present. Flashing: TDO (Time Delay Override) button is pressed.

9 - **HEATING** - Green: Heating is active. Flashing: Discharge air temperature high limit reached. Flashing simultaneously with Cooling LED: Discharge air temperature sensor error.

10 - **COOLING** - Green: Cooling is active. Flashing: Discharge air temperature low limit reached. Flashing simultaneously with Heating LED: Discharge air temperature sensor error.

11 - **FAN** - Green: Fan output is active.

12 - **ZONE 1** - Green: Damper is open. Red: Damper is closed.

13 - **ZONE 2** - Green: Damper is open. Red: Damper is closed.

14 - **VACATION** - Green: Vacation mode is enabled.

BUTTONS (under cover)

15 - **VACATION** - Used to enable/disable vacation mode. In vacation mode, all zones will be controlled by the thermostat in Zone 1.

16 - **TDO (Time Delay Override)** - Accelerates timing (six seconds = one minute) used to speed up equipment protection minimum on and off timers for system checkout.

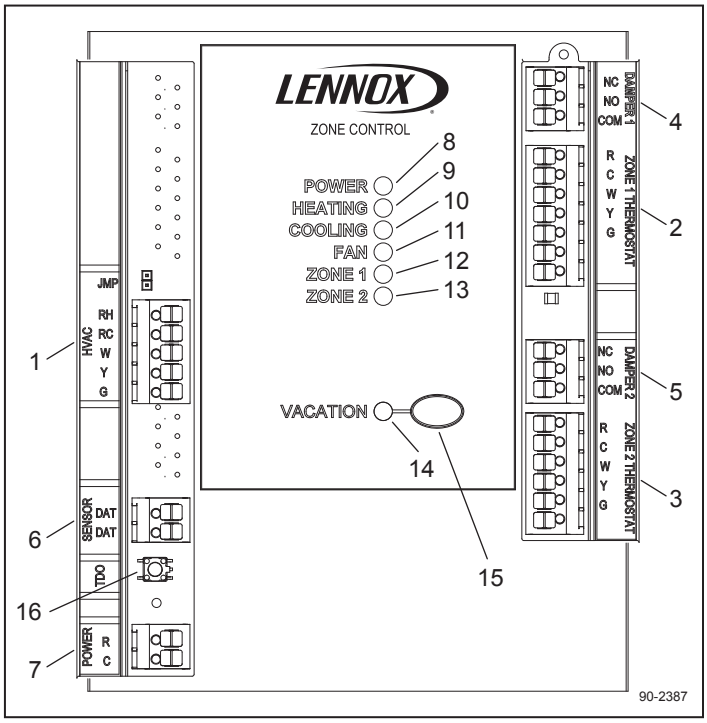


Figure 2. Zone Panel Layout

Installation

MOUNTING ENCLOSURE

- Install the control panel indoors only.
- Do not install the control panel where the temperature will exceed 158°F or will drop below -40°F.
- Do not install the control panel on foundation walls, HVAC equipment, or duct systems, where moisture may condense on the enclosure.
- Do not install the control panel in a room where it will be exposed to elevated humidity levels, such as in a laundry room.

To begin the installation follow these steps:

1 - Remove the cover (replace the cover when installation is complete).

2 - There are a total of six mounting holes. Use the four outside corners when attaching to drywall/plaster. Use the two middle holes when mounting to a wall stud.

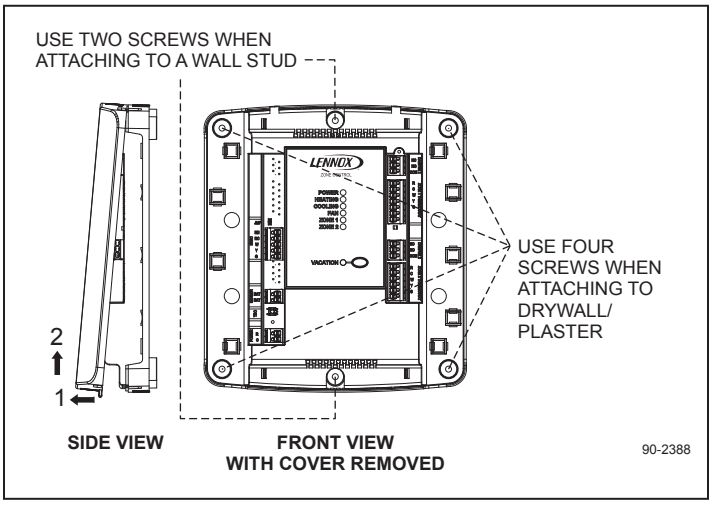


Figure 3. Mounting Panel

3 - Use field-provided #8 screws to install the base.

DISCHARGE AIR TEMPERATURE SENSOR

We recommend traversing the supply plenum to find the best mixed air location. Use the following instructions as a reference.

1 - Before wiring the sensor to the control panel, measure the resistance across the sensor. The resistance corresponds (approximately) to the sensed temperature according to *Table 2. Discharge Air Temperature Sensor - Temperature / Resistance Chart on page 3*. If the reading does not correspond, verify that the wiring is not shorted or open and correct if necessary. If the wiring does not correct the problem, replace the sensor.

⚠ CAUTION

Electrostatic discharge can damage the control. Touch a grounded metal object before touching the circuit board.

2 - Install and wire the discharge air temperature sensor. The tip of the sensor must be located before the take-offs in a region with a fully mixed supply of air (not in a dead air space) in order for the system to work correctly.

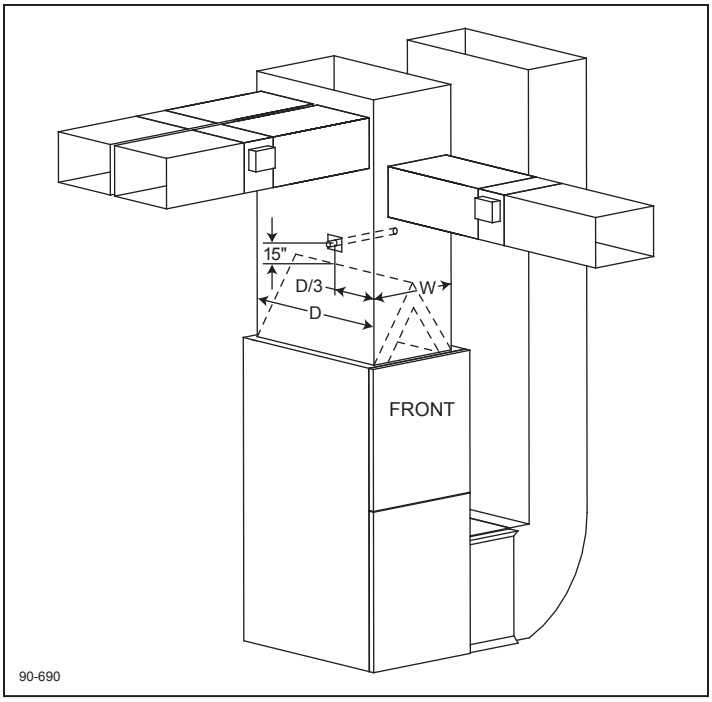


Figure 4. Discharge Air Temperature Sensor Location

Table 2. Discharge Air Temperature Sensor - Temperature / Resistance Chart

°C	°F	Sensor (ohm)	°C	°F	Sensor (ohm)
-6.6	20	46,134	46.2	115	4,169
-3.9	25	39,869	49	120	3,749
-1.1	30	34,520	51.8	125	3,368
1.7	35	29,936	54.5	130	3,037
4.4	40	26,104	57.3	135	2,750
7.2	45	22,764	60	140	2,489
10.1	50	19,842	62.8	145	2,250
12.8	55	17,406	65.7	150	2,033
15.6	60	15,294	68.5	155	1,847
18.4	65	13,442	71.3	160	1,678
21.2	70	11,849	73.9	165	1,536
23.9	75	10,501	76.8	170	1,397
26.7	80	9,282	79.7	175	1,272
29.5	85	8,233	82.2	180	1,170
32.3	90	7,322	85.1	185	1,070
35	95	6,523	87.8	190	982
37.8	100	5,819	90.8	195	895
40.6	105	5,193	93.4	200	829
43.4	110	4,654			

DISCHARGE AIR TEMPERATURE SENSOR (continued)

a. Wire the discharge air temperature probe to the control panel using thermostat wire. Note that the temperature sensor is not polarity sensitive.

b. Be sure that the tip of the sensor is located at least 15 inches downstream from the leaving air side of the evaporator, in the discharge plenum, and 1/3 of the depth (D/3) of the plenum (D) from the wall of the plenum, and centered side-to-side. Move the adjustable bracket along the length of the discharge air sensor to achieve proper sensor tip location (tip of sensor to be located at W ÷ 2). The sensor can be inserted from any side of the plenum, as long as the tip of the sensor is in the correct position (see *Figure 4. Discharge Air Temperature Sensor Location*). Also refer to *Table 2. Discharge Air Temperature Sensor - Temperature / Resistance Chart* for troubleshooting.

⚠ IMPORTANT

The discharge air sensor is required. If a short or open circuit is detected between the DAT (Discharge Air Temperature) sensor terminals, the control panel will only respond to Zone 1 and the dampers will stay in the open position.

SIZING THE TRANSFORMER

1 - Install the required transformer selected from *Table 1. Transformers on page 1.* DO NOT USE the HVAC equipment transformer to power the control panel. Refer to the instructions provided with the transformer.

The system requires approximately 10VA for the control panel and thermostats and 10VA for each damper. The size of the transformer will depend on the greatest number of dampers that could be energized at any given time. Based on the current capacity of the damper fuses, the maximum dampers per zone is three dampers for applications where the maximum ambient temperature of the zone panel is under 90°F and two dampers per zone for applications over 90°F. If a powered bypass damper is used and powered from the same transformer, it should be accounted for in the total transformer VA requirement. The size of the transformer must not exceed 75VA. If the value is greater than 75VA, some dampers will need to be powered by a separate transformer - see *Table 1. Transformers on page 1.*

For instance, if you have a maximum of three dampers that can be energized at one time, then you would require 10VA for the system, and an additional 30VA (3x10VA) for the dampers for a total of 40VA, so catalog number 10P17 would be an adequate transformer size at 40VA.

2 - Install the thermostats. Refer to the instructions provided with the thermostats. Any 24VAC electronic thermostat with a (24VAC) common terminal can be used. Power robbing thermostats can cause unintended operation - DO NOT use mechanical or power robbing thermostats. Use 18 - 20 AWG thermostat non-stranded wire.

Table 3. Recommended Thermostats

Model	Stages	Catalog No.
ComfortSense® 7500 Programmable Touchscreen	4 htg. / 2 clg.	13H14
ComfortSense® 5500 Programmable Touchscreen	1 htg. / 1 clg.	13H13
ComfortSense® 3000 Programmable	1 htg. / 1 clg.	51M34
ComfortSense® 3000 Programmable	2 htg. / 2 clg.	51M35
ComfortSense® 3000 Non-Programmable	1 htg. / 1 clg.	51M32
M30 iComfort Programmable Wi-Fi Thermostat	Multistage	15Z69
E30 iComfort Smart Thermostat	Multistage	15S63

3 - Install the dampers. Refer to the instructions provided with the dampers.

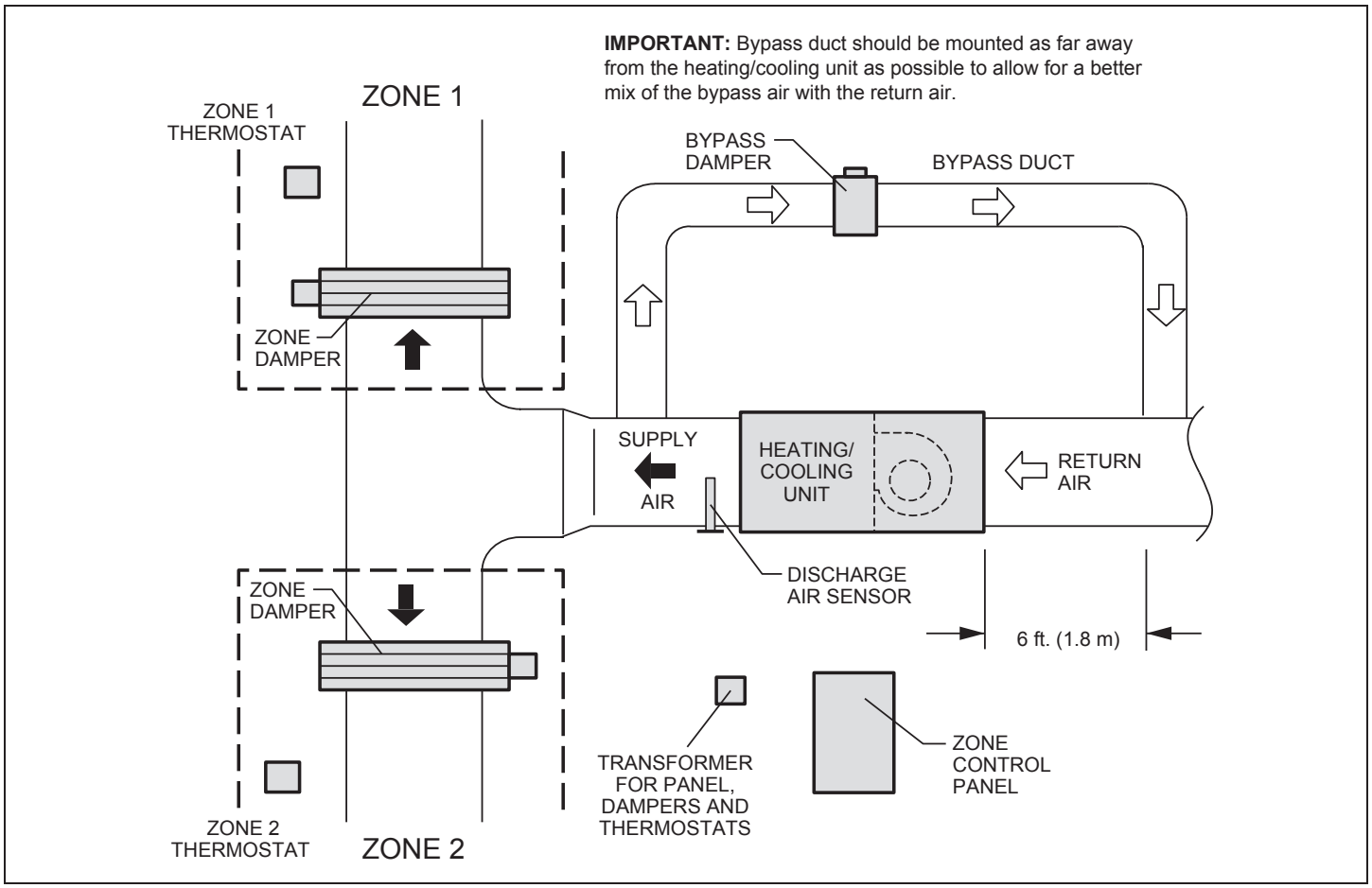


Figure 5. Bypass Damper Installation

Bypass Damper Sizing

When fewer than the maximum number of zones are calling for heating or cooling, an excess volume of air is delivered, and because of the excess air, an excess amount of static pressure is produced as well. Zone systems often require a bypass duct, to relieve this pressure. A properly sized barometric bypass damper must be installed in the bypass duct, which is run between the supply and return air duct systems (see *Table 4. Bypass Damper Air Volume Capacities*). The barometric damper and the bypass duct must be sized to accommodate the excess static pressure from the supply duct.

The bypass tap in the return air duct must be at least six feet from the furnace/air handler to ensure that the hot or cold air coming off of the plenum has time to mix with the return air before it passes through the air handler again. The provided discharge air sensor will prevent any damage to the equipment from overheating or coil freeze-up by interrupting the HVAC equipment.

The bypass damper and duct should be sized to handle the excess pressure created when the smallest zone is operating alone (worst case). To size the bypass damper, subtract the total air volume capacity of the smallest zone from the total air volume of the system.

Example:

- Total System air volume: 2000 cfm
- Air volume of smallest zone: 600 cfm
- Bypass requirement: 2000 - 600 = 1400 cfm

In this example, the bypass duct should be sized to handle the 1400 cfm excess pressure created when only the smallest zone has a demand. For bypass damper air volume capacities see the following table.

Table 4. Bypass Damper Air Volume Capacities

Round	Catalog No.
8 inch diameter - 400 CFM	X4142
10 inch diameter - 750 CFM	X4203
12 inch diameter - 1200 CFM	X4204
14 inch diameter - 1800 CFM	X4205
16 inch diameter - 2400 CFM	X4206

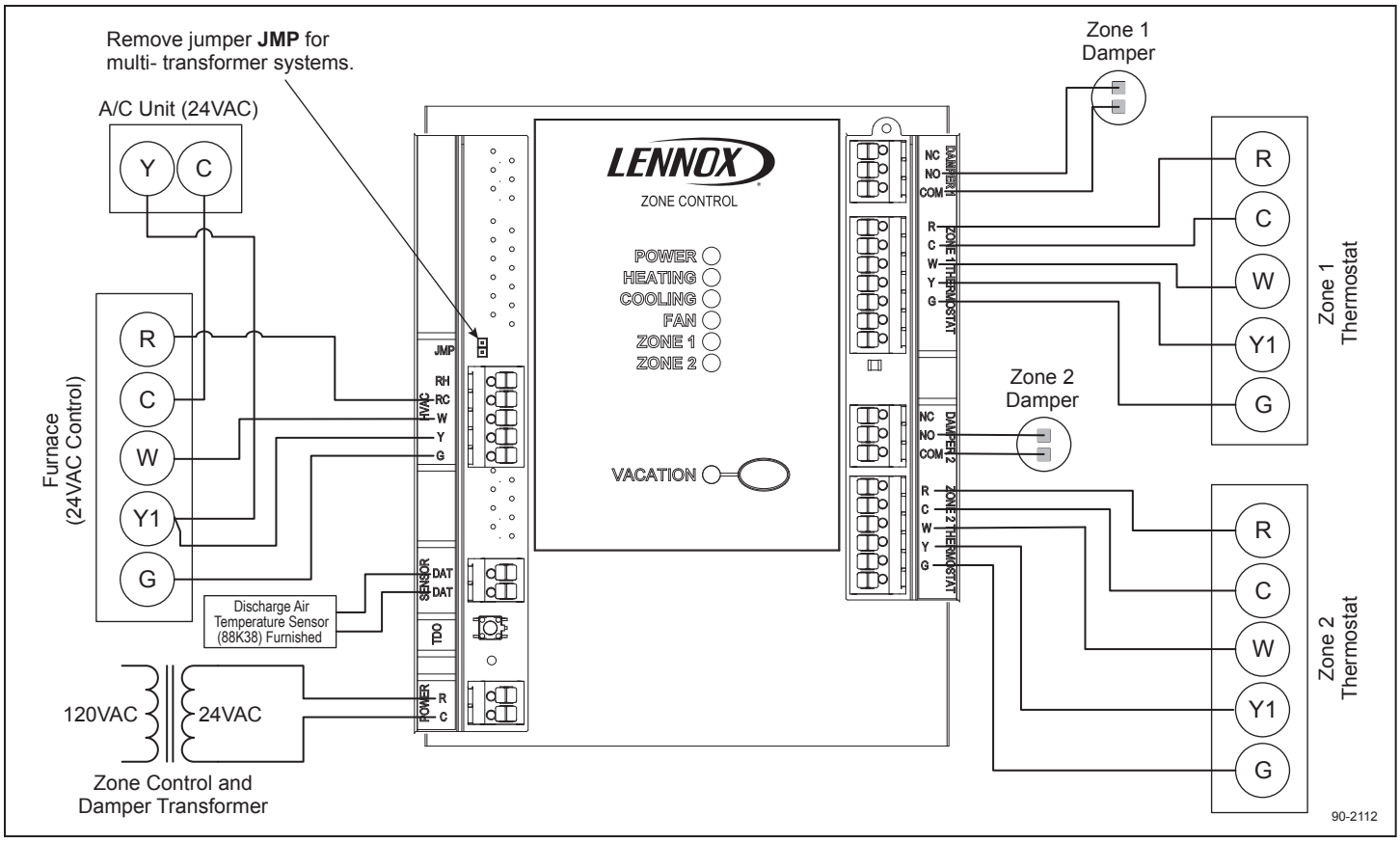


Figure 6. Field Wiring

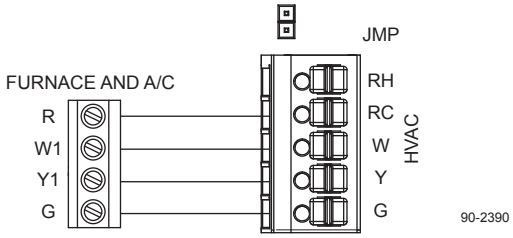
Furnace and Air Conditioner

HVAC Terminal Definitions:

Y1 - First stage cooling

W1 - First stage heating

G - Fan



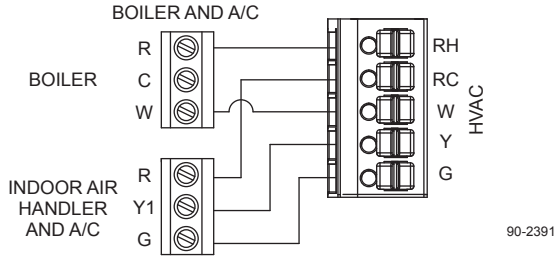
Boiler and Air Conditioner

HVAC Terminal Definitions:

Y1 - First stage cooling

W1 - First stage boiler heat

G - Fan



NOTE – *Remove jumper* **JMP** *to isolate the Boiler and Indoor Air Handler transformers.*

Sequence of Operation

The Zone Panel is for single-stage conventional heat/cool applications. The zone panel is a heat call priority system with automatic heating/cooling changeover after 20 minutes of operation. If two opposing (heating/cooling) thermostat calls exist while the system is idle, the heating call will be satisfied first. A heat/cool thermostat is required in each zone.

Note that immediately after the board is powered, there is a four minute minimum off delay where only the fan output will respond.

Heat/Cool Changeover

When a call for heating/cooling exists and an opposing call is made from another zone, a changeover time limit of 20 minutes begins at the time that the opposing call is made. If the original call is not satisfied within that 20-minute time period, the call will be interrupted, and the zone panel will turn the equipment off and complete the normal fan purge cycle and minimum equipment off time. The opposing call will then be answered. After 20 minutes, if the original call still exists, the opposing call will be interrupted and the original call can once again be recognized.

Discharge Air Temperature Sensor High/Low Temperature Limit

The high/low temperature limits are designed to prevent the heat exchanger from overheating or the cooling coil from freezing. A Discharge Air Temperature Sensor mounted in the supply duct senses the discharge air temperature and will interrupt the heating/cooling equipment before overheating/ freezing occurs.

When the discharge air temperature reaches 160°F (high) or 40°F (low) the zone panel will interrupt the heating/ cooling call. When the interrupt occurs, the zone panel ends the heating/cooling call and energizes the fan terminal (if not already energized). The Heating/Cooling LED on the zone panel will flash during a high/low limit temperature interrupt. Once the temperature drops/rises 10°F, the high/ low temperature interrupt will end and the heating/cooling call to the equipment can resume.

Vacation Mode

The Vacation mode button allows the homeowner to switch from normal operation to Vacation mode. When Vacation mode is enabled, the thermostat in Zone 1 becomes the only zone from which a call for heating or cooling is recognized. Additionally, when in Vacation mode, all dampers remain in the open position. This feature allows the homeowner to create a setback at a single thermostat and control the whole home based on that thermostat. The Vacation LED will illuminate when Vacation mode is enabled.

Fan Operation

A call for Fan from any zone will initiate the G equipment output terminal. The dampers for all zones not calling for a continuous fan will be closed during the fan call.

Heating Operation

When a thermostat makes a call to the zone panel for heating, the zone panel will initiate a heating call to the equipment and close the damper for all zones that are not calling for heat. Following a 2-minute minimum on time, the heating call will end when all zones stop calling for heating, the call has exceeded the 20-minute heat/cool changeover time limit while a cooling call exists or the call is interrupted because the discharge air temperature sensor reaches 160°F. When the heating call ends, the dampers will hold their position for 3-1/2 minutes before completing the purge. During the purge, the zone panel will control the fan call to the equipment based on the thermostat inputs. When a heating call ends, a minimum off time delay of 4 minutes must elapse before another heating/cooling call can begin.

Cooling Operation

When a thermostat makes a call to the zone panel for cooling, the zone panel will initiate a cooling call to the equipment and close the damper for all zones that are not calling for cooling. Following a 4-minute minimum on time, the cooling call will end when all zones stop calling for cooling, the call has exceeded the 20-minute heating/cooling changeover time limit while a heat call exists or the call is interrupted because the discharge air temperature sensor reaches 40°F. When the cooling call ends, the dampers will hold their position for 3-1/2 minutes before completing the purge. During the purge, the zone panel will control the fan call to the equipment based on the thermostat inputs. When a cooling call ends, a minimum off time delay of 4 minutes must elapse before another heating/cooling call can begin.

Time Delay Override

A Time Delay Override (TDO) button is available on the zone panel to speed up the internal timer for system checkout.

Troubleshooting

Table 5. Detecting HVAC System Problems	
Symptom	**Possible Solution**
Air conditioner receiving signal but will not turn on.	Pressure switch open. Consult condensing unit manual for possible cause.
	Compressor is off due to internal overload protector. Consult air conditioner manual for possible cause.
	Condenser control board anti short cycle timer is not yet expired. Most anti-short cycle timers are 5 minutes or less; if the unit does not start after 5 minutes, consult the air conditioner manual for possible causes.
Furnace tripped the primary limit, but the zone panel does not indicate that the discharge air limit has been exceeded.	A high static condition exists. Move the sensor farther down stream to sense air that has mixed more thoroughly. Be sure not to place the senor past the take offs. High static pressure must be corrected.
	Bypass tap is too close to inlet of air handler. Adjust bypass tap in the return air duct so that is farther away from the furnace. This will give the air more of a chance to be tempered with room return air before entering the air handler again.
Air handler receiving signal but will not turn on.	Limit on air handler open. Check position of discharge air temperature sensor in the plenum and move farther down stream if possible. High static condition must be corrected.
	Troubleshoot air handler – see air handler documentation.

Table 6. Detecting Heating, Cooling and Fan Problems	
Symptom	**Possible Solution**
Nothing comes on.	No power to control panel. Green Power LED should be on, and if not, apply power to 24VAC inputs of control panel.
Heat will not come on.	Single transformer system. Confirm jumper JMP for RH and RC is placed.
	Interlock switch on furnace is open – close access doors.
	Thermostat is not calling for heat. Check voltage at the thermostat W input on the control panel.
	Zone 2 calling while open or short at DAT (Discharge Air Temperature) sensor inputs is causing control panel to respond only to Zone 1.
	Thermostat is power robbing or mechanical. Only use line powered electronic thermostat with a C terminal.
Cooling will not come on.	Single transformer system. Confirm jumper JMP for RH and RC is placed.
	Thermostat is not calling for cooling. Check voltage at the thermostat Y input on the control panel.
	Thermostat could be invoking a timed off delay.
	Zone 2 calling while open or short at DAT (Discharge Air Temperature) sensor inputs is causing control panel to respond only to Zone 1.
	Zone panel could be invoking a timed off delay.
	Thermostat is power robbing or mechanical. Only use line powered electronic thermostat with a C terminal.
Fan will not come on.	Check if G is energized at the zone panel.
	Check if G is energized at the thermostat.
	Check if G is energized at the air handler.
Dampers do not position on a call for heating, cooling or fan. Heat, cooling or fan will not come on when the Zone 2 thermostat is calling.	System requires the Discharge Air Temperature sensor. If a discharge air temperature sensor is not installed, only Zone 1 calls will be recognized and dampers will not operate. Disconnect power to the control panel, install the discharge air temperature sensor and restore power to the control panel.
Fan immediately comes on with heat call.	Check the electric/gas setting on the thermostats.
Fan is running but no heat, and Heating LED is blinking.	Discharge air temperature exceeds set limit. Allow discharge air to cool 10° below limit and allow timed off delay to expire.
Fan is running but no cooling, and Cooling LED is blinking.	Discharge air temperature dropped below set limit. Allow discharge air to warm 10° above limit and allow timed off delay to expire.
Both the Heating and Cooling LEDs are blinking.	An open or short in the discharge air temperature sensor has been detected. Install or repair the sensor.

Table 7. Detecting Damper Problems	
Symptom	**Possible Solution**
Damper opens when it should be closed.	Discharge air temperature sensor is shorted or open causing the panel to only respond to Zone 1 inputs while not closing any dampers.
	Damper wired incorrectly. Spring open power close dampers should be connected between NO and C terminals.
Damper will not close.	Discharge air temperature sensor is shorted or open causing the panel to only respond to Zone 1 inputs while not closing any dampers.
	Damper motor faulty.
CHECKING THERMOSTAT VOLTAGES	
Using a digital voltmeter (DVM), measure the AC voltage supplied at the R and C terminals of the thermostat inputs on the control panel for the zone in question. This voltage should be same as the voltage supplied to the control panel 24VAC terminals. Make a call for heat, cooling or fan. Measure the voltage across the terminal that should be energized (i.e. W for heat, Y for cooling, etc.) and the C terminal; this should be the same as the voltage between the R and C terminals. Measure the voltage across a terminal that should NOT be energized and the C terminal; this voltage should be zero.	
DISCHARGE AIR SENSOR CHECKOUT	
The discharge air sensor is a temperature dependent resistor; the higher the temperature, the lower the resistance. In order to confirm the sensor is working, both sensor leads must be disconnected from the zone panel. Using a digital voltmeter (DVM) set to read resistance, touch the leads from the sensor to the probes of the DVM. Take care not to create a parallel resistance path through your body by touching both probes with your fingers or a faulty reading will be obtained. At 77°F, the resistance of the sensor will be 10k ohm. If the sensor is cooler than 77°F, the resistance will be higher, if it is warmer, the resistance will be lower. After reading the resistance at room temperature, warm the tip of the sensor by holding it in the palm of your hand, and take another resistance reading. This reading should be noticeable lower than the room temperature reading. The zone panel is well equipped to monitor the operation of the probe and determine if a failure has occurred. The probe should be considered an integral (but replaceable) part of the zone panel. The zone panel will indicate if the probe is operating improperly and needs to be replaced.	