

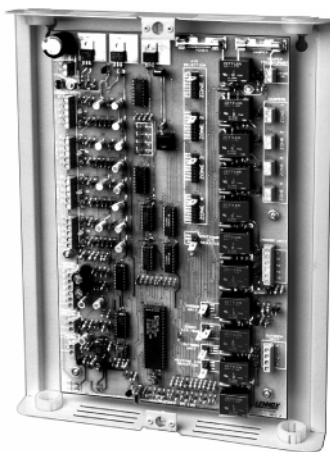
# HARMONY II

## Zone Control for Variable Air Volume Heating/Cooling Systems

Bulletin No. 210099

July 1999

Supersedes April 1997



ZONE SYSTEM  
CONTROL CENTER  
(cover removed)



ZONE SYSTEM  
CONTROL CENTER  
(cover in place)



ZONE SYSTEM  
CONTROL PANEL

### FEATURES

#### Harmony II Zone Control System

- Up to four separate heating/cooling zones utilizing a single indoor unit (G32V, GHR32V or CB31MV) and a single outdoor unit. A single speed outdoor unit may be used for up to two zone applications, a two-speed outdoor unit may be used for two, three or four zone applications.
- System consists of the Harmony control center, discharge air sensor, Harmony control panel, master thermostat and duct mounted zone dampers with a thermostat in each zone.
- Zone dampers automatically controlled to supply air flow only to zones with thermostat demand.
- Variable speed motor (VSM) in the G32V or GHR32V furnace or CB31MV blower coil unit automatically adjusts the air volume to the zones as required. Because of the VSM motors' ability to vary system air volume as required, no bypass damper is required.
- Individual air volumes for heating or cooling are available to each zone.
- Dampers are available in either round or rectangular configuration.
- Each zone is sized for the heating/cooling load.
- Damper operation and blower air volume controlled by the control center.
- Saves energy by allowing temperature setback in unoccupied areas while maintaining comfort in occupied areas.
- Results in lower equipment costs by eliminating the need for two separate heating/cooling systems.
- May be used in conjunction with the FM21 Heat Pump Control System and also in Smarthouse™ applications.

#### Equipment Warranty

- All covered components — one year.
- Refer to Lennox Equipment Limited Warranty certificate included with unit for specific details.

#### Control Center (16J95)

- Contains all necessary relays and controls to operate the system.
- Cabinet constructed of heavy gauge steel with a enamel paint finish and removeable latching cover.
- Board features:

Low voltage output terminals:  
up to four zones  
indoor/outdoor unit connections

Low voltage input terminals:  
up to four zone thermostats  
zone damper transformer  
pressure switch  
discharge air sensor

Jumper selectors:  
Zone Air Volume Selection:  
25-95%

Heating Air Reduction:  
0%, 20% or 40%

Continuous Air Reduction:  
0%, 50% or 75%

Discharge Air Temperature:  
+/- 5°F heat or cool

LED's:

Heating - Red for each zone  
Cooling - Green for each zone  
Reversing Valve - Amber

Additional Red LED's indicate:

Zone Damper Operation  
Indoor Unit Operation  
Blower Operation  
Outdoor Unit Operation

- Four diagnostic LED's are furnished as an aid in servicing system. Board stores last two diagnostic codes.
- Built-in time delay function prevents short cycling of system.
- Holes for mounting are furnished and electrical inlets are provided in top, bottom and rear of panel.
- Dimensions: 13-1/4 x 10 x 1-3/4 in. (337 x 254 x 44 mm).
- Shipping weight: 6 lbs. (3 kg).
- Power requirements: 24VAC (powered by indoor unit transformer).

#### Control Panel (16J96)

- Constructed of high impact Cyclac.
- Features: "Zone", "Central" or "System Off" control mode selection, "Cool", "Auto" or "Heat" mode selection and "Auto" or "On" fan control for continuous or intermittent blower operation.
- LED indicators show selected features at a glance.
- Dimensions: 3-1/2 x 4-3/4 x 1-5/16 in. (89 x 121 x 33 mm).

## FEATURES - CONTINUED

### Discharge Air Sensor Probe (16J98)

- Required for field installation.
- Contains three sensors that monitor air temperature in the supply air stream.
- Sensors send a temperature average to the control center to control blower motor speed.

### System Equipment Data

- See flow charts on page 5 (gas heat), page 5 (heat pump) and page 6 (gas heat/heat pump with FM21 Heat Pump Control) for system equipment selection.
- For G32V and GHR32V furnace data, see section Gas Units.
- For CB31MV blower-coil unit data, see section, Coils-Blower Coil Units.
- For HS21 series two-speed or other single speed condensing units data, see Condensing Units section.
- For HP21 series two-speed or other single speed heat pump outdoor units, see Heat Pump Outdoor Units section.
- For add-on evaporator coil unit data, see section, Coils-Blower Coil Units.
- For FM21 Heat Pump Control data, see section, Thermostats and Controls.
- For EMD14-65 or EMD14M-65 Economizer dampers, see Accessories section.

### Sequence of Operation

- Two modes of operation are available at the control panel:

#### "Central" mode:

- Heating or cooling selection and temperature demand are controlled by the zone 1 (master) thermostat.
- All dampers remain open at mechanically preset openings.
- Blower is controlled by the central control board (total zone air volume), delivering air to all zones.

#### "Zone" mode:

- Heating/cooling selection controlled by control panel or by individual zone thermostats if system is set for auto-changeover.
  - Temperature demand is controlled by the individual zone thermostats.
  - Zone dampers route air to appropriate zones.
  - Blower air volume is adjusted according to central control jumper setting and number of zones operating.
  - Individual air volume for each zone is preset at the control center, adjustable from 25% to 95% actual air volume.
  - During heating mode, Heating Air Reduction jumpers allow a lower heating air volume to be selected (0%, 20% or 40% reduction of cooling air volume).
  - During continuous ("On") blower operation, Continuous Air Reduction jumpers allow 0%, 50% or 75% air volume reduction.
  - All dampers remain open if there is no demand from thermostats.
- NOTE - Because G32V, GHR32V and CB31MV (VSM) blower motor cannot supply air volume lower than lowest speed tap setting, careful zone planning is required to meet individual zone air volume requirements.

## OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA

### Master (Zone 1) Thermostat

- Programmable thermostat for zone 1 master thermostat is recommended.
- See page 3 for recommended thermostats.
- Also see Thermostats bulletin in section, Thermostats and Controls.

### Zone Thermostats

- See page 3 for recommended zone thermostats.
- Also see Thermostats bulletin in section, Thermostats and Controls.

### Zone Dampers

- Nylon blade bearings and steel gearing.
- Adjustable blade stop for system balancing.
- Heavy duty, synchronous, 24VAC motor with spring return open (opens in case of power failure).
- See damper specifications table for sizes, air resistance and shipping weights.

#### Round Zone Damper

- Constructed of heavy gauge galvanized steel.
- One straight end and one crimped end for duct connections.

#### Rectangular Zone Damper

- Constructed of heavy gauge aluminum and stainless steel.
- Slip-in, opposed blade type with duct mounting plate on one end.



### Pressure Switch (Required for Heat Pump Operation)

- Pressure Switch (21J18) required for proper system operation in heat pump applications.
- Protects the outdoor unit/compressor from abnormally high operating pressures during mild weather heating days.
- Field installs with 3/8 or 1/2 in. (9.5 or 12.7 mm) saddle valve in the discharge line between the compressor and the reversing valve.
- Factory set to open at 375 psig (2585 kPa) and close when the pressure drops below 300 psig (2070 kPa).

### Temperature Modulation Switch (Required for G32V and GHR32V Applications)

- Switch (72H45) required for proper system operation for G32V and GHR32V applications.
- Senses supply air temperature to modulate gas valve between high and low fire.
- Field installed in supply air plenum and wired to terminal strip on G32V and GHR32V furnaces.

### Transformer

- 45VAC (87344), required for operation of zone dampers.
- See flowcharts on pages 5 and 6.

# THERMOSTATS

## RECOMMENDED MASTER THERMOSTATS - CONVENTIONAL HEAT/COOL APPLICATIONS

(For a complete selection of alternate thermostats, see Thermostats Bulletin in section, Thermostats and Controls)

L211407CC	① 1 Htg.-1 Clg. 7 Day Programmable	90J38
1F90	1 Htg.-1 Clg. 5-2 Day Programmable	18H10
1F97	1 Htg.-1 Clg. 7 Day Programmable	18H11
T8600D	1 Htg.-1 Clg. 5-1-1 Day Programmable	27H31
L211201CC	1 Htg.-1 Clg. 24 hour Programmable	90J34



L21

## RECOMMENDED ZONE THERMOSTATS - CONVENTIONAL HEAT/COOL APPLICATIONS

(For a complete selection of alternate thermostats, see Thermostats Bulletin in section, Thermostats and Controls)

3AAT8838A1	② 1 Htg.-1 Clg. Electro-Mech. w/ subbase (Off-Auto)	86H23
T87F2048 with Q539A1006	1 Htg.-1 Clg. Electro-Mechanical w/ subbase	38234
1F56420	1 Htg.-1 Clg. Electro-Mechanical w/ subbase	17G17
T834C1475	1 Htg.-1 Clg. Electro-Mechanical w/ subbase	17G18
3AAT89A38A1	1 Htg.-1 Clg. Electro-Mechanical w/ subbase	78H22
T874A1051	1 Htg.-1 Clg. Electro-Mechanical	12F99
Q674E1262	Subbase for 12F99	13F17



T87F



3AA

## RECOMMENDED THERMOSTATS - HEAT PUMP APPLICATIONS

(For a complete selection of alternate thermostats, see Thermostats Bulletin in section, Thermostats and Controls)

L221407HP	③ 2 Htg.-1 Clg. 7 Day Programmable	91H72
1F94	3 Htg.-2 Clg. 7 Day Programmable	18H13
DSL-600LX	3 Htg.-2 Clg. Digital Setpoint	13K97
T8611G	2 Htg.-1 Clg. 5-1-1 Day Programmable	27H30
3AAT88D38B1	④ 2 Htg.-1 Clg. Electro-Mechanical w/ Subbase	51H40



L22



3AA

- ① Recommended master thermostat.
- ② Recommended zone thermostat.
- ③ Recommended programmable master thermostat or zone thermostat.
- ④ Recommended electro-mechanical zone thermostat.

# DAMPER SPECIFICATIONS

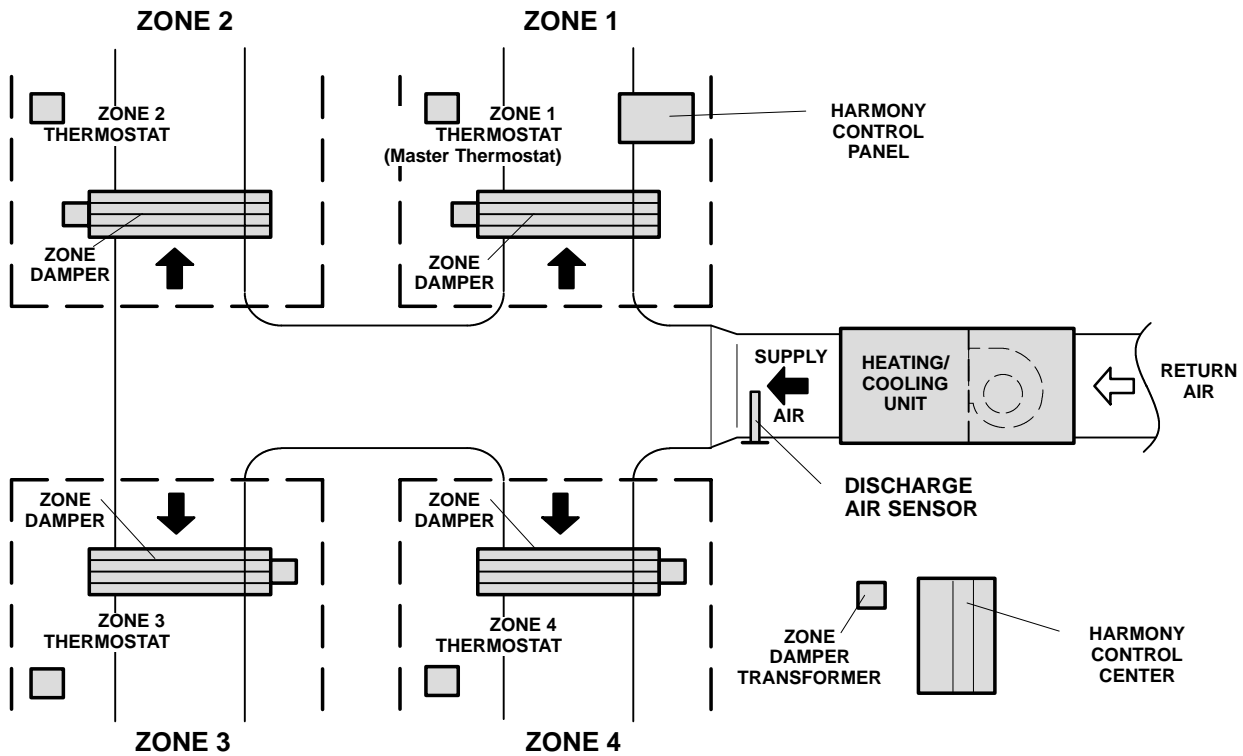
## ROUND ZONE DAMPERS

Catalog No.	Dimensions Diameter		Air Volume		Total Resistance		Shipping Weight	
	in.	mm	cfm	L/s	in. wg.	Pa	lbs.	kg
77G99	6	152	50	25	.01	2	2	1
			100	45	.04	10		
			110	52	.05	12		
78G00	8	203	100	47	.02	5	4	2
			150	70	.03	7		
			210	100	.05	12		
78G01	10	254	100	45	.01	2	6	3
			200	95	.02	5		
			325	155	.05	12		
78G02	12	305	200	95	.02	5	8	4
			350	465	.03	7		
			460	215	.05	12		
78G03	14	356	200	95	.01	2	10	5
			400	190	.02	5		
			640	300	.06	15		

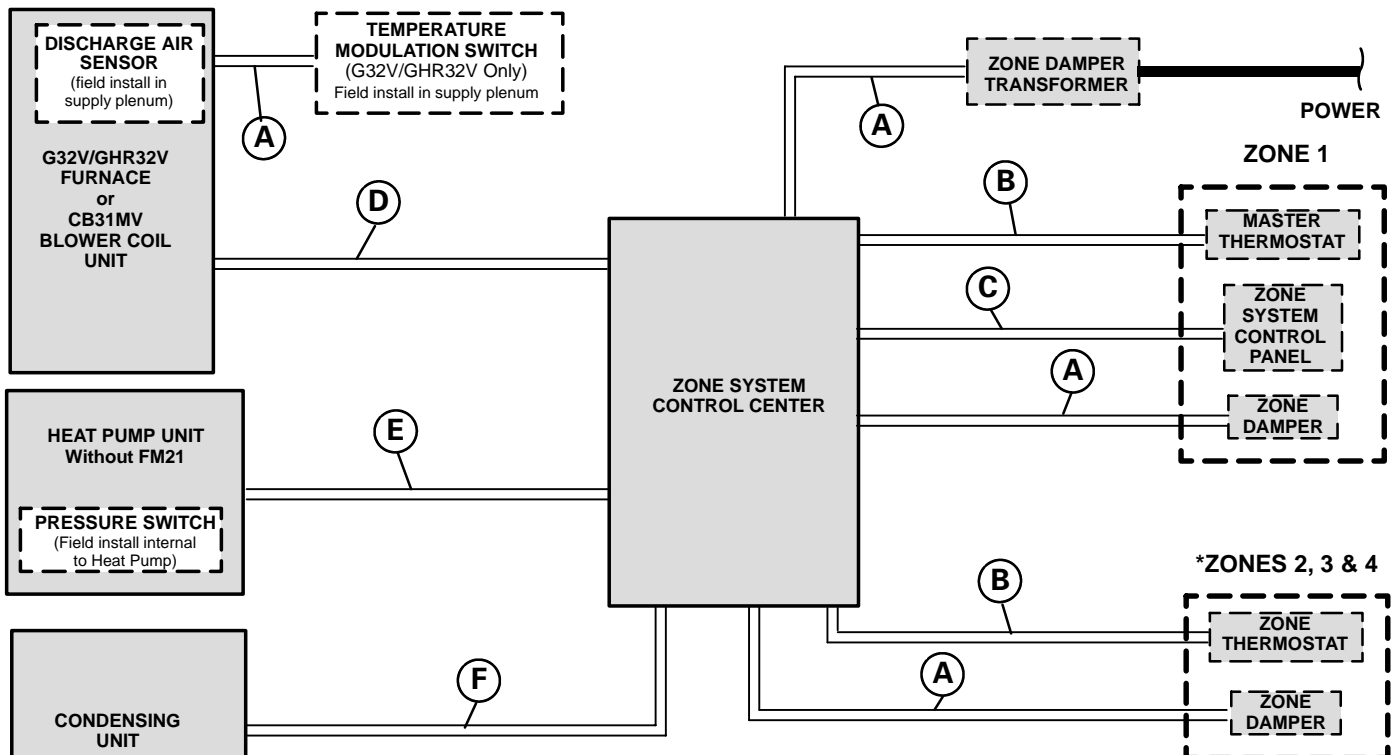
## RECTANGULAR ZONE DAMPERS

Catalog No.	Dimensions W x H		Air Volume		Total Resistance		Shipping Weight	
	in.	mm	cfm	L/s	in. wg.	Pa	lbs.	kg
78G04	10x8	254x203	100	47	.01	2	4	2
			200	95	.02	5		
			325	155	.05	12		
78G05	12x8	305x203	120	565	.01	2	3	1
			240	115	.02	5		
			395	185	.05	12		
78G06	14x8	356x203	200	95	.02	5	3	1
			350	165	.03	7		
			460	215	.05	12		
78G07	16x8	406x203	225	105	.02	5	4	2
			395	185	.03	7		
			520	245	.05	12		
78G08	18x8	457x203	185	85	.01	2	4	2
			375	175	.02	5		
			600	285	.06	15		
78G09	20x8	508x203	210	100	.01	2	4	2
			415	195	.02	5		
			665	315	.06	15		

# TYPICAL SYSTEM LAYOUT

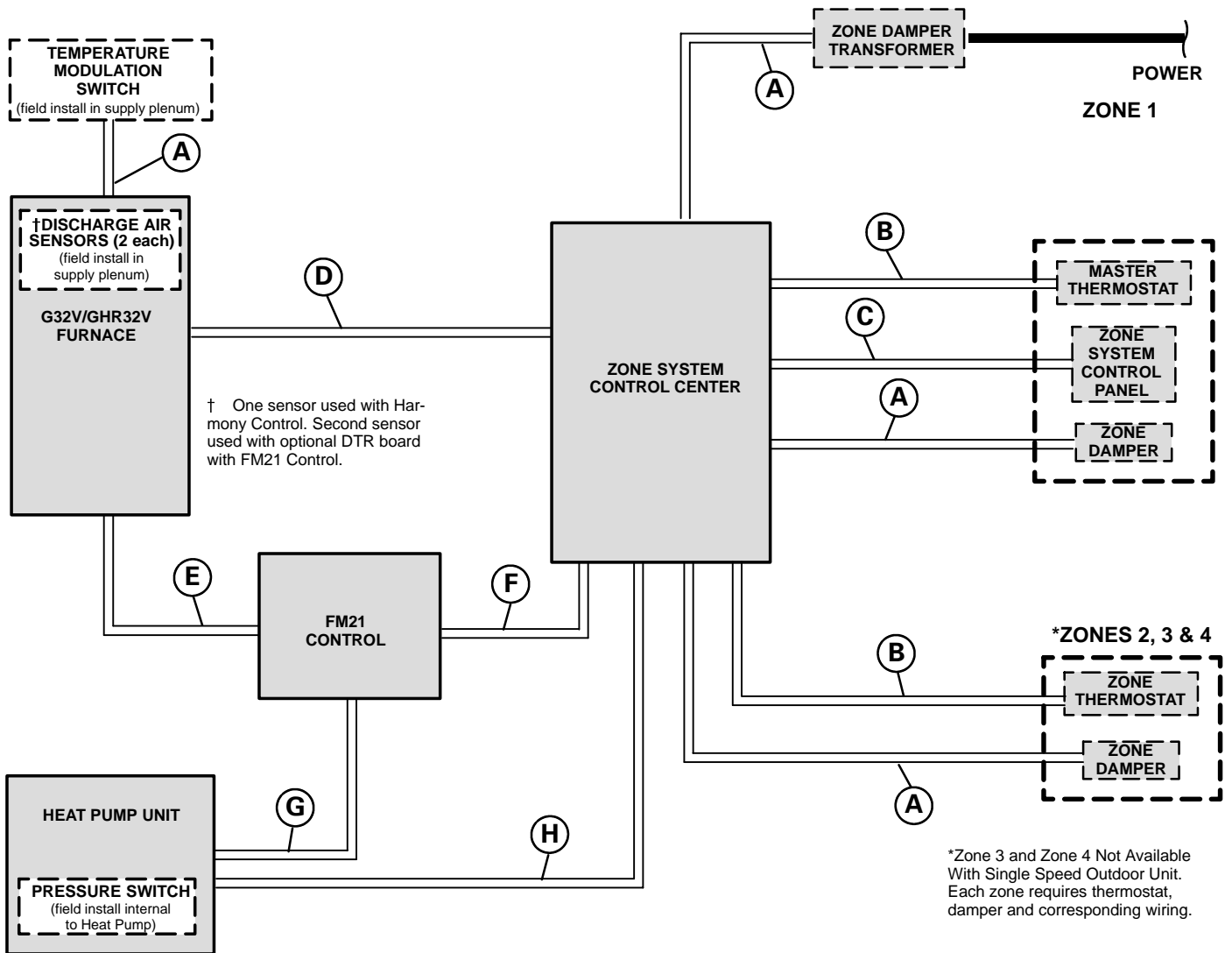


# FIELD WIRING – GAS HEAT/CONDENSING UNIT AND HEAT PUMP SYSTEMS



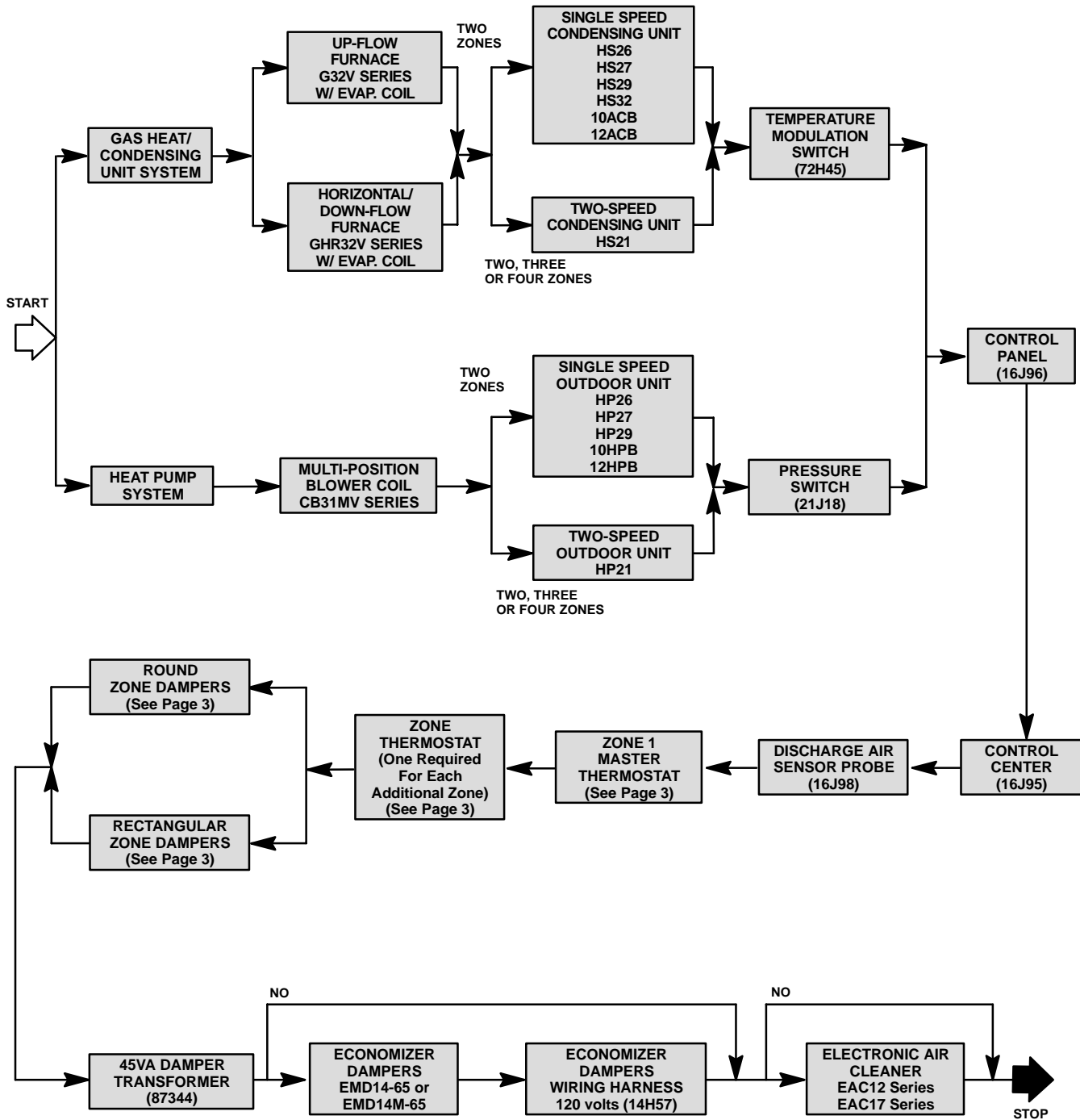
- A - Two wire low voltage — 18 ga. minimum
  - B - Four wire low voltage (gas heat systems) — 18 ga. minimum  
Five wire low voltage (heat pump systems) — 18 ga. minimum
  - C - Six wire low voltage — 18 ga. minimum
  - D - Seven wire low voltage (G32V/GHR32V systems) includes two wires for discharge air sensor — 18 ga., minimum  
Nine wire low voltage (CB31MV systems) includes two wires for discharge air sensor — 18 ga. minimum
  - E - Eight wire low voltage (single speed heat pump outdoor unit) includes two wires for pressure switch — 18 ga. minimum  
Nine wire low voltage (two speed heat pump outdoor unit) includes two wires for pressure switch — 18 ga. minimum
  - F - Two wire low voltage (single speed condensing unit) 18 ga. minimum  
Three wire low voltage (two speed condensing unit) 18 ga. minimum
- \*Zone 3 and Zone 4 Not Available With Single Speed Outdoor Unit. Each zone requires thermostat, damper and corresponding wiring.

# FIELD WIRING – GAS HEAT/HEAT PUMP SYSTEMS WITH FM21



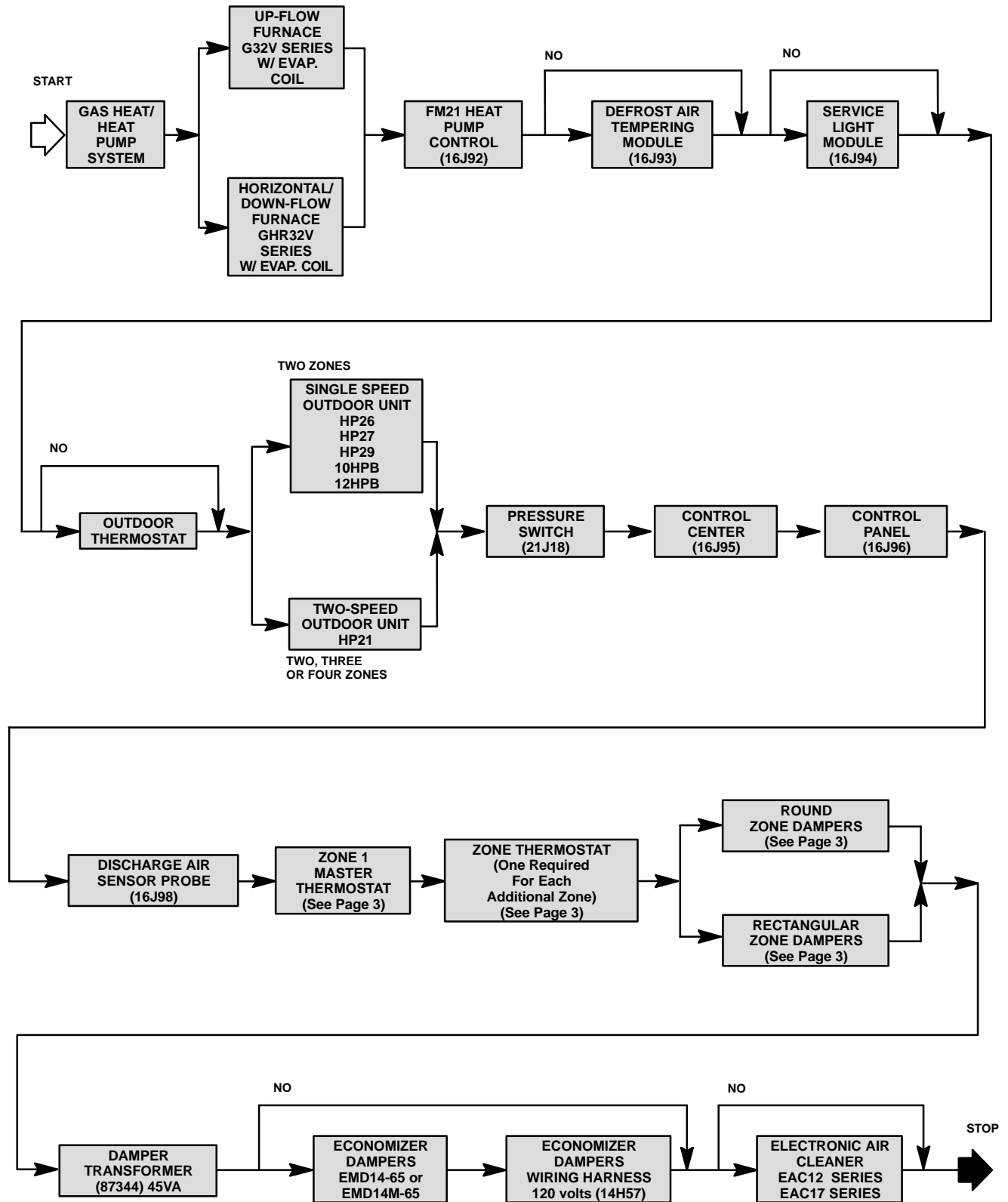
- A - Two wire low voltage — 18 ga. minimum
- B - Five wire low voltage — 18 ga. minimum
- C - Six wire low voltage — 18 ga. minimum
- D - Four wire low voltage, includes two wires for discharge sensor — 18 ga. minimum
- E - Five wire low voltage, includes two wires for DTR1 board (optional for FM21) discharge sensor — 18 ga. minimum
- F - Seven wire low voltage, includes one wire for SLC1 board (optional for FM21) — 18 ga. minimum
- G - Eleven wire low voltage, includes one wire for SLC1 board (optional for FM21) and three wires for outdoor thermostat — 18 ga. minimum
- H - Three wire low voltage, includes two wires for pressure switch — 18 ga. minimum

# SYSTEM COMPONENT SELECTION (GAS HEAT/CONDENSING UNIT SYSTEMS AND HEAT PUMP SYSTEMS)



NOTE — For G32V/GHR32V Gas Furnace data - see Gas Furnaces Tab Section.  
 For Condensing Units data - see Condensing Units Tab Section.  
 For Evaporator Coil and CB31MV data - see Coils-Blower Coil Units Tab Section.  
 For Heat Pump Outdoor Unit data - see Heat Pumps Outdoor Units Section.  
 For EMD14 Economizer Damper data - see Accessories Tab Section.  
 For EAC12/EAC17 Electronic Air Cleaner data - see Accessories Tab Section.  
 For complete Thermostat descriptions - see Thermostats bulletin, Thermostats and Controls Section

# SYSTEM COMPONENT SELECTION (GAS HEAT/HEAT PUMP SYSTEMS WITH FM21 HEAT PUMP CONTROL)



NOTE — For G32V/GHR32V Gas Furnace data - see Gas Furnaces Tab Section.  
 For Heat Pump Outdoor Unit data - see Heat Pumps Outdoor Units Section.  
 For Indoor Coil data - see Coils-Blower Coil Units Tab Section.  
 For EMD14 Economizer Damper data - see Accessories Tab Section.  
 For EAC12/EAC17 Electronic Air Cleaner data - see Accessories Tab Section.  
 For complete Thermostat descriptions - see Thermostats bulletin, Thermostats and Controls Tab Section.  
 For FM21 data - see FM21 bulletin, Thermostats and Controls Tab Section.