Installation and Maintenance Manual	IM 972-1

Maverick™ I
Commercial Packaged Rooftop Systems

Group: **Applied Air Systems**
Part Number: **IM 972-1**
Date: **July 2010**

Heating & Cooling
Models MPS015B - MPS025B
15 to 25 Tons
R-410A Refrigerant

ARI PERFORMANCE CERTIFIED ™
ARI Standard 210/240
Unitary Small AC
Certification applies only when the complete system is listed with ARI.
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Contents

General

This manual contains the installation and operating instructions for your packaged rooftop system. There are some precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions.

Read this manual and any instructions packaged with separate equipment prior to installation. Give this manual to the owner and explain its provisions. The owner should retain this manual for future reference.

Checking Product Received

Upon receiving the unit, inspect it for any damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. **IMPORTANT:** Check the unit model number, heating size, electrical characteristics, and accessories to determine if they are correct.

This product line does have an optional DDC controller. For operation and information on using and programming the MicroTech II unit controller, refer to the appropriate operation manual (see Table 1).

For a description of operation and information on using the keypad to view data and set parameters, refer to the appropriate program-specific operation manual (see Table 1).

Table 1: Operation, Installation and Maintenance Resources

Unit	Manual
Rooftop unit control configuration	Operation manual bulletin number
DDC Unit Controller	OM 1077
BACnet Communication Module	IM 1000
LonWorks Communication Module	IM 999

Safety Information

⚠ DANGER

The manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the air conditioner. you should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

⚠ WARNING

Provide adequate combustion and ventilation air to the unit space as specified in the combustion and ventilation air section of these instructions.

⚠ WARNING

Install this unit only in a location and position as specified in the Mechanical Installation section of these instructions. Provide adequate combustion and ventilation air to the unit space as specified in the venting section of these instructions.

⚠ WARNING

Combustion products must be discharged outdoors. Connect this unit to an approved vent system only, as specified in Mechanical Installation section of these instructions.

⚠ WARNING

Use only with type of gas approved for this unit. Refer to the unit rating plate.

⚠ DANGER

Never test for gas leaks with an open flame. It can cause an explosion or fire resulting in property damage, personal injury or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in the Mechanical Installation section of these instructions.

⚠ WARNING

Always install unit to operate within the unit's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in the Mechanical Installation section of these instructions. See also unit rating plate.

⚠ DANGER

Units are not design certified to be installed inside the structure. Doing so can cause inadequate unit performance as well as property damage and carbon monoxide poisoning resulting in personal injury or death.

Major Components

The unit includes a hermetically-sealed refrigerating system consisting of a scroll compressor, condenser coil, evaporator coil with capillary tube assembly, a supply air fan, a condenser fan, a heat exchanger assembly, gas burner and control assembly, combustion air motors and fan, and all necessary internal electrical wiring. The cooling system of these units is factory-evacuated, charged and performance tested. Refrigerant amount and type are indicated on rating plate.

The unit is available in 250,000 AND 350,000 BTUH heating input with nominal cooling capacity of 15 tons. 300,000 and 400,000 BTUH heating inputs are available in nominal cooling capacity of 20 and 25 tons. Units are convertible from bottom supply and return to side supply and return by relocation of supply and return air cover panels. The units are weatherized for mounting outside of the building.

General

⚠ WARNING

When a unit is installed so that supply ducts carry air circulated by the unit to areas outside the space containing the unit, the return air shall also be handled by duct(s) sealed to the unit casing and terminating outside the space containing the unit.

Install this unit in accordance with The American National Standard Z223.1-latest edition manual entitled "National Fuel Gas Code," and the requirements or codes of the local utility or other authority having jurisdiction.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA-90A - Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B - Warm Air Heating and Air Conditioning Systems 1984.

These publications are available from:

National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

Pre-Installation Check-Points

1. Before attempting any installation, carefully consider the following points:
   - **a** Structural strength of supporting members (rooftop installation)
   - **b** Clearances and provision for servicing power supply and wiring
   - **c** Gas supply and piping
   - **d** Air duct connections and sizing
   - **e** Drain facilities and connections
   - **f** Location for minimum noise and vibration - away from bedroom windows

IMPORTANT: Before operating unit, remove compressor shipping supports from the compressor base. Failure to remove supports will cause noise and vibration.

Location Considerations

The metal parts of this unit may be subject to rust or deterioration in adverse environmental conditions. This oxidation could shorten the equipment's useful life. Salt spray, fog or mist in seacoast areas, sulphur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

If the unit is to be installed in an area where contaminants are likely to be a problem, give special attention to the equipment location and exposure.

1. Avoid having lawn sprinkler heads spray directly on the unit cabinet.
2. In coastal areas, locate the unit on the side of the building away from the waterfront.
3. Shielding by a fence or shrubs may give some protection.
4. Frequent washing of the cabinet, fan blade and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.
5. Regular cleaning and waxing of the cabinet with a good automobile polish will provide some protection.
6. A good liquid cleaner may be used several times a year to remove matter that will not wash off with water.

Several different types of protective coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer.

The best protection is frequent cleaning, maintenance, and minimal exposure to contaminants.

⚠ WARNING

This unit may be used to heat the building or structure during construction if the following installation requirements are met. Installation must comply with all installation instructions including:

- Proper vent installation
- Furnace operating under thermostatic control
- Return air duct sealed to the furnace
- Air filters in place
- Set furnace input rate and temperature rise per rating plate marking
- Means of providing outdoor air required for combustion
- Return air temperature maintained between 55°F (13°C) and 80°F (27°C)
- Installation of exhaust and combustion air inlet hoods completed
- Clean furnace, duct work and components upon substantial completion of the construction process, and verify furnace operating conditions including ignition, input rate, temperature rise and venting, according to the instructions.

Outside Slab Installation

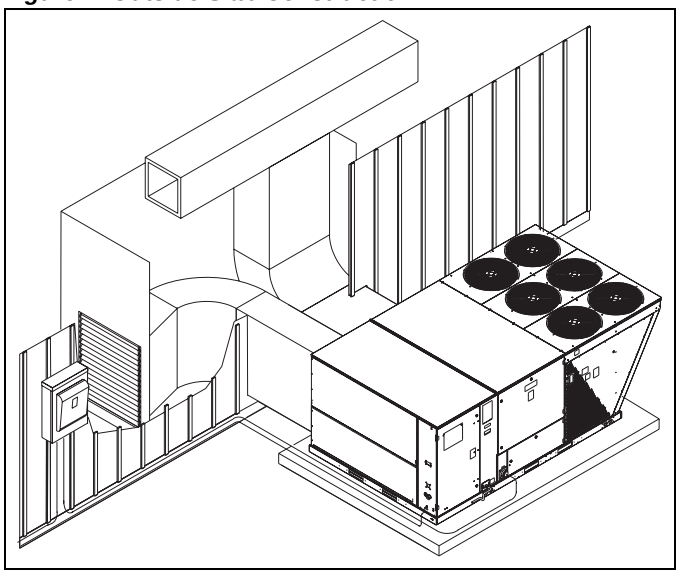
⚠ DANGER

These units are designed certified for outdoor installation only. Installation inside any part of a structure can result in inadequate unit performance as well as property damage. Installation inside can also cause recirculation of flue products into the conditioned space resulting in personal injury or death.

Typical outdoor slab installation is shown in Figure 1.

1. Select a location where external water drainage cannot collect around unit.
2. Provide a level slab sufficiently high enough above grade to prevent surface water from entering the unit
3. Locate the unit to provide proper access for inspection and servicing as shown in Figure 3, page 6.
4. Locate unit where operating sounds will not disturb owner or neighbors.
5. Locate unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level.Do not locate unit in an area where excessive snow drifting may occur or accumulate.
6. Where snowfall is anticipated, the height of the unit above the ground level must be considered. Mount unit high enough to be above anticipated maximum area snowfall and to allow combustion air to enter the combustion air inlet.
7. Select an area which will keep the areas of the vent, air intake, and A/C condenser fins free and clear of obstructions such as weeds, shrubs, vines, snow, etc. Inform the user accordingly.

Figure 1: Outside Slab Construction



Attaching Exhaust and Combustion Air Inlet Hoods

IMPORTANT: Do not operate this unit without the exhaust/combustion air inlet hood properly installed. The hood ships in a carton in the blower compartment inside the unit and must be attached when the unit is installed. See Figure 4, page 6.

To attach exhaust/combustion air inlet hood:

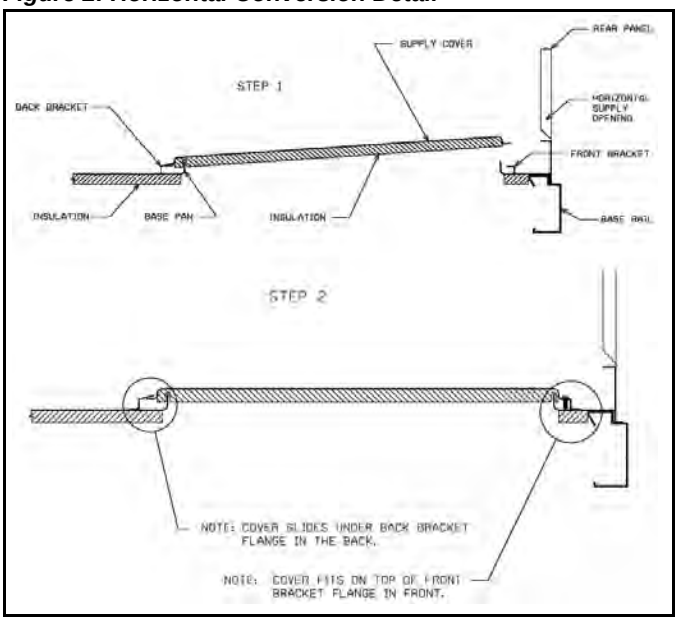
1. Remove screws securing blower access panel and remove access panel. For location of blower access panel, see Figure 3, page 6.
2. Remove exhaust/combustion air inlet hood from the carton, located inside the blower compartment.
3. Attach blower access panel.
4. Attach the combustion air inlet/exhaust hood with screws. Reference Figure 4, page 6 for proper location. Screws are in carton with the hood.
5. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration or addition. The only exception is with factory approved additions.

Horizontal Conversion Procedure

Downflow To Horizontal

1. Remove the screws and covers from the outside of the supply and return sections. Also remove and discard the cover plate.
2. Install the covers over the bottom supply and return openings, painted side up, inserting the leading flange under the bracket provided. Place the back flange to top of the front bracket provided. See Figure 2 and Figure 6, page 7.
3. Secure the return and supply cover to front bracket with two (2) screws.

Figure 2: Horizontal Conversion Detail



Filter Replacement

This unit is provided with 3 - 18" × 18" × 2" and 3 - 18" × 24" × 2" disposable filters. When replacing filters, ensure they are inserted fully to the back to prevent bypass.

Recommended supplier of this filter is AAF International:

- Part #: 54-42541-01 (18" × 18" × 2")
- Part #: 54-42541-03 (18" × 24" × 2")

Clearances

The minimum clearances shown in Figure 3 must be observed for proper unit performance and serviceability.

Figure 3: Clearances

RECOMMENDED CLEARANCE	LOCATION
80″	A – FRONT
18″	B – CONDENSER COIL
18/42″	+C – DUCT SIDE
18/48″	*D – EVAPORATOR END
60″	E – ABOVE
* WITHOUT ECONOMIZER/48″ WITH ECONOMIZER	

+ WITHOUT HORIZONTAL ECONOMIZER/ 42″ WITH HORIZONTAL ECONOMIZER

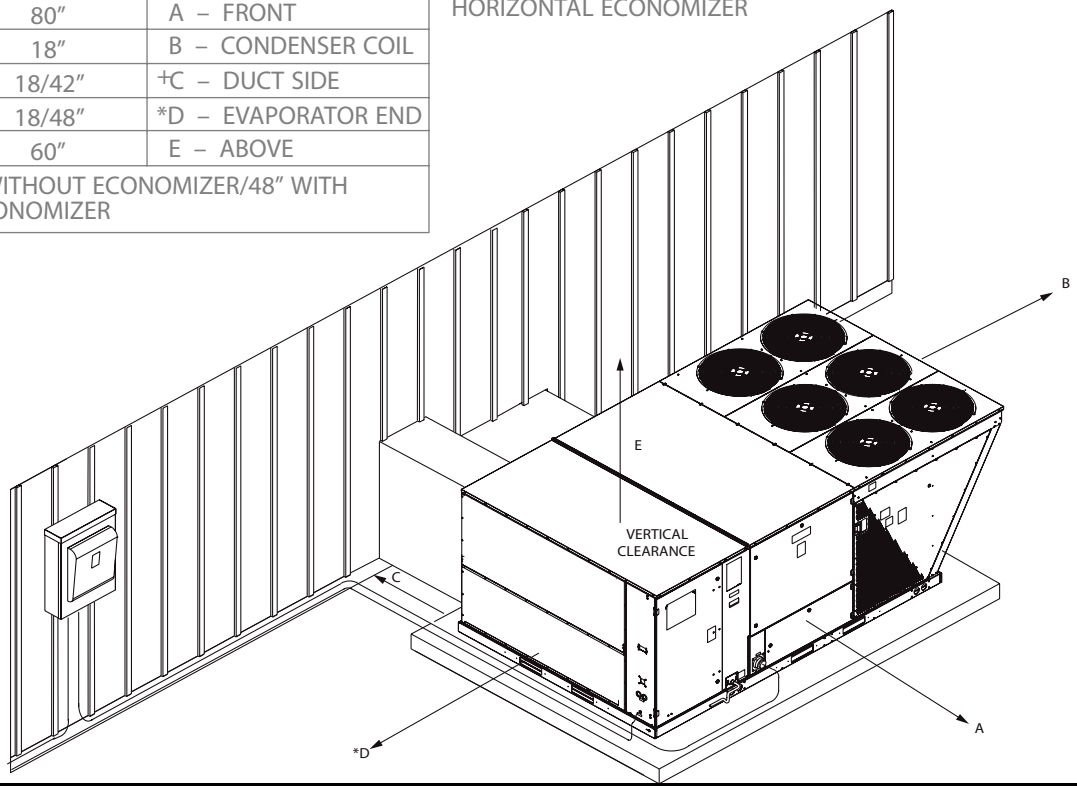
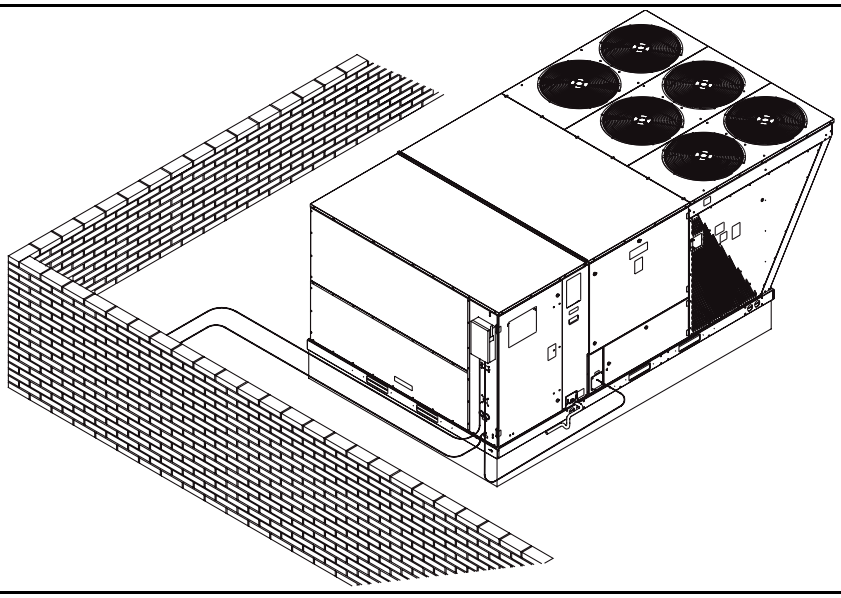


Figure 4: Unit Mounted on Roofcurb



Rooftop Installation

1. Before locating the unit on the roof, make sure that the roof structure is adequate to support the weight involved. (See Electrical & Physical Tables in this manual.) **THIS IS VERY IMPORTANT AND THE INSTALLER'S RESPONSIBILITY.**
2. Remove shipping boards.
3. For rigging and roofcurb details, see Figure 5 and Figure 6.
4. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

IMPORTANT: If unit will not be put into service immediately, block off supply and return air openings to prevent excessive condensation.

Figure 5: Lifting Detail

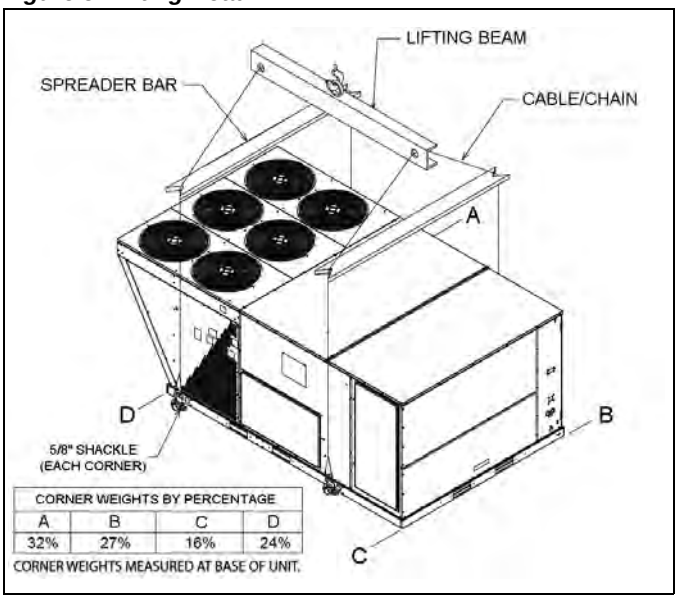
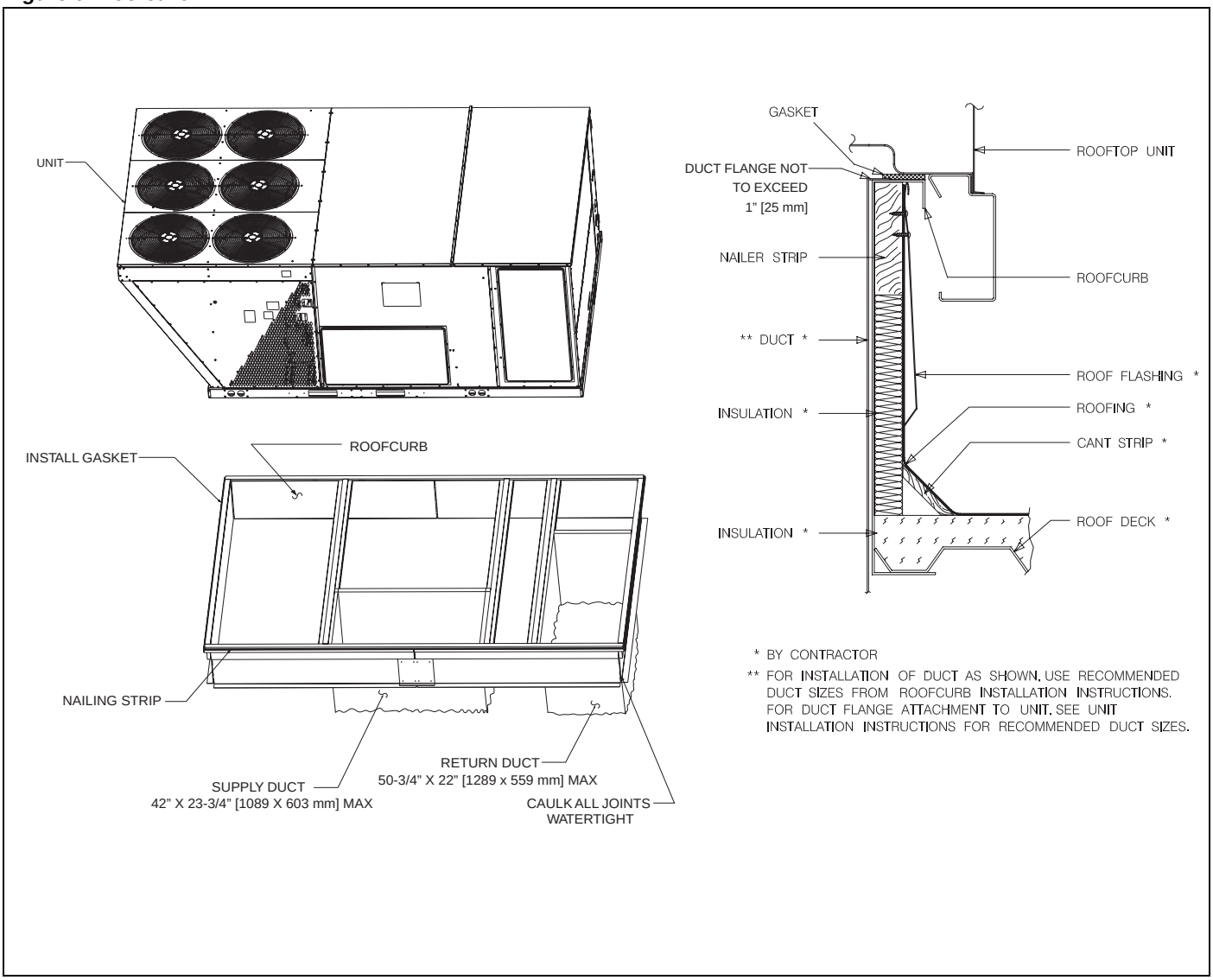


Figure 6: Roofcurb



Ducting

The installing contractor should fabricate ductwork in accordance with local codes. Use industry manuals as a guide when sizing and designing the duct system. Contact Air Conditioning Contractors of America, 1513 16th St. N.W., Washington, D.C. 20036.

⚠ DANGER

Never connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury, property damage or death.

Place the unit as close to the conditioned space as possible allowing clearances as indicated. Run ducts as directly as possible to supply and return outlets. Use of non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission is recommended.

On ductwork exposed to outside temperature and humidity, use a minimum of 2" of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2" of insulation. Half-inch to 1" thick insulation is usually sufficient for ductwork inside the air conditioned space.

Provide balancing dampers for each branch duct in the supply system. Properly support ductwork from the structure.

IMPORTANT: In the event that the return air ducts must be run through an “unconfined” space containing other fuel burning equipment, it is imperative that the user be informed against future changes in construction which might change this to a “confined space.” Also, caution the user against any future installation of additional equipment (such as power ventilators), within the existing unconfined and/or confined space which might create a negative pressure within the vicinity of other solid, liquid, or gas fueled units.

Return Air

⚠ DANGER

Never allow products of combustion or the flue products to enter the return air ductwork, or the circulating air supply. All return ductwork must be adequately sealed and secured to the furnace with sheet metal screws and joints must be taped. All other duct joints must be secured with approved connections and sealed airtight.
Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions, including carbon monoxide poisoning that could result in personal injury or death.

Gas Supply, Condensate Drain

Gas Connection

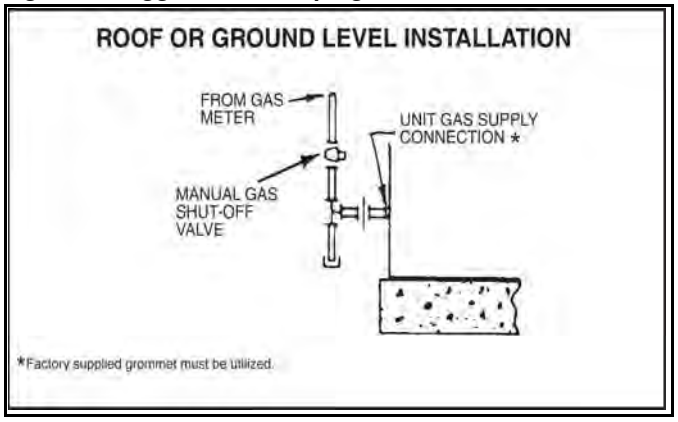
IMPORTANT: Connect this unit only to gas supplied by a commercial utility.

1. Install gas piping in accordance with local codes and regulations of the local utility company. In the absence of local codes, the installation must conform to the specifications of the National Fuel Gas Code, ANSI Z223.1 - latest edition.

Note: The use of flexible gas connectors is not permitted.

2. Connect the gas line to the gas valve supplied with unit. Routing can be through the gas pipe opening shown in Figure 7 or through the base as shown in Figure 13.
3. Size the gas line to the furnace adequate enough to prevent undue pressure drop and never less than 1/2".
4. Install a drip leg or sediment trap in the gas supply line as close to the unit as possible.
5. Install an outside ground joint union to connect the gas supply to the control assembly at the burner tray.
6. Gas valves have been factory installed. Install a manual gas valve where local codes specify a shut-off valve outside the unit casing (see Figure 7).

Figure 7: Suggested Gas Piping



7. Make sure piping is tight. **A pipe compound resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.**
8. **IMPORTANT:** Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

IMPORTANT: Disconnect the furnace and its individual shutoff valve from the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 pound per square inch gauge or isolate the system from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of this gas supply system at pressures equal to or less than 1/2 PSIG.

⚠ DANGER

Never test for gas leaks with an open flame. It can cause an explosion or fire resulting in property damage, personal injury or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections as specified in the “Mechanical Installation” section of these instructions.

IMPORTANT: Check the rating plate to make certain the unit is equipped to burn the type of gas supplied. Care should be taken after installation of this equipment that the gas control valve not be subjected to high gas supply line pressure.In making gas connections, avoid strains as they may cause noise and damage the controls. A backup wrench is required to be used on the valve to avoid damage.

The capacities of gas pipe of different diameters and lengths in cu.ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas) are shown in Table 2.

Table 2: Gas Pipe Capacity Table (Cu. Ft./Hr.)

Nominal Iron Pipe Size	Equivalent Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
1/2”	132	92	73	63	56	50	46	43
3/4”	278	190	152	130	115	105	96	90
1”	520	350	285	245	215	195	180	170
1-1/4”	1,050	730	590	500	440	400	370	350
1-1/2”	1,600	1,100	890	760	670	610	560	530

After determining the pipe length, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/Hr)}}{\text{Heating Value of Gas (BTU/Ft}^3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/Ft^3) may be determined by consulting the local natural gas utility or the LP gas supplier.

LP Conversion

⚠ DANGER

This unit is equipped at the factory for use with natural gas only. Conversion to LP gas requires a special kit supplied by the distributor or manufacturer. Mailing addresses are listed on the furnace rating plate, parts list and warranty. Failure to use the proper conversion kit can cause fire, carbon monoxide poisoning, explosion, personal injury, property damage, or death.

Convert the unit to use liquefied petroleum (LP) gas by replacing with the gas valve supplied in the conversion kit. The LP gas valve maintains the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit. See Figure 8 for component locations.

IMPORTANT: To remove the natural gas valve, remove the four screws securing the manifold pipe to the burner tray. Remove the manifold pipe with gas valve attached.

Note: Order the correct LP conversion kit from the furnace manufacturer. See Conversion Kit Index shipped with unit for proper LP kit number. Furnace conversion to LP gas must be performed by a qualified technician.

Figure 8: Heat Exchanger Component Identification

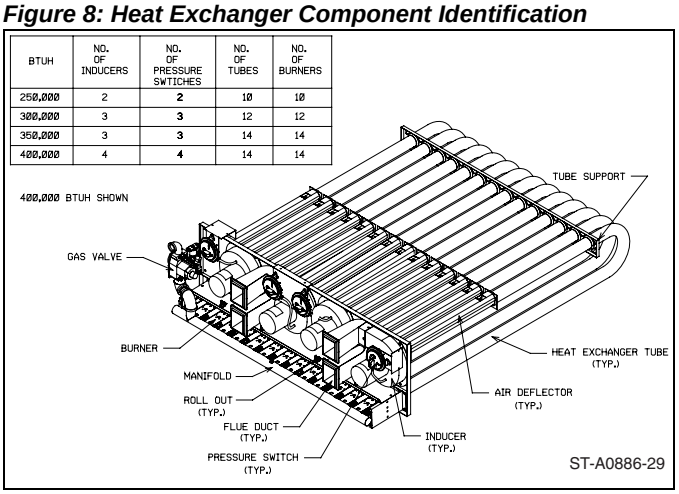
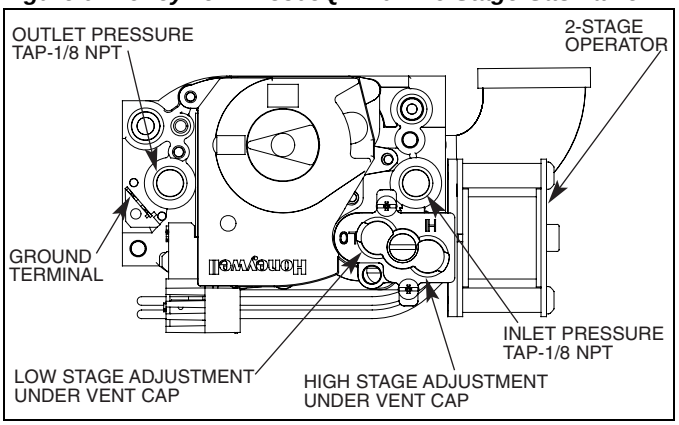


Figure 9: Honeywell VR8305Q4120 Two Stage Gas Valve



Adjusting or Checking Furnace Input

Gas Type	Line pressure (in wc)	Manifold Pressure
Natural Gas	5 - 10.5	3.5
LP Gas	11-13	10

Supply and manifold pressure taps are located on the gas valve body 1/8" N.P.T. and on the manifold (see Figure 9).

Use a properly calibrated manometer gauge for accurate gas pressure readings.

Only small variations in the gas flow should be made by means of the pressure regulator adjustment. Furnaces functioning on LP gas must be set by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the gas control valve.

To adjust the pressure regulator, remove the regulator vent cover and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure (see Figure 9). **Then replace the regulator vent cover securely.**

Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off the manual main gas valve and remove the gas manifold.

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), contact Daikin Parts.

Check of input is important to prevent over-firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following table or formula to determine input rate.

$$\text{Cu. Ft./Hr. Required} = \frac{\text{Heating Value of Gas (BTU/CuFt) x 3600}}{\text{Time in Seconds for 1 Cu. Ft. of Gas}}$$

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas units are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.

IMPORTANT NOTE FOR ALTITUDES ABOVE 2,000 FEET (610 METERS): The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2,000 feet in the USA or Canada, or for elevations of 2,000 - 4,500 feet (610 - 1,373 meters) in Canada if the unit has been derated at the factory. For elevations above 2,000 feet (610 meters) **IN THE USA ONLY** (see ANSIZ223.1), the burner orifices must be sized to reduce the input 4% for each 1,000 feet (305 meters) above sea level.

NOTICE: Derating of the heating input for high altitude in the field is unlawful in Canada (refer to CAN/CGA 2.17). Units installed in altitudes greater than 2,000 feet (610 meters) must be shipped from the factory or from a factory authorized conversion station with the heating input derated by 10% so as to operate properly in altitudes from 2,000 - 4,500 feet (610 1,373 meters).

Table 3: Meter Time In Minutes And Seconds For Normal Input Rating Of Furnaces Using Natural Or Lp Gas

Input Btu/hr	Meter Size Cu. Ft.	Heating Value Of Gas Btu Per Cu. Ft.									
		900		1000		1040		1100		2500	
		Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.
40,000	One	1	21	1	30	1	34	1	39	3	45
	Ten	13	30	15	0	15	36	16	30	37	30
60,000	One	0	54	1	0		3	1	6	2	30
	Ten	9	0	10	0	10	24	11	0	25	0
80,000	One	0	41	0	45	0	47	0	50	1	53
	Ten	6	45	7	30	7	48	8	15	18	45
100,000	One	0	33	0	36	0	38	0	40	1	30
	Ten	5	24	6	0	6	15	6	36	15	0

Table 4: LP Gas Pipe Capacity (Cubic feet per hour)

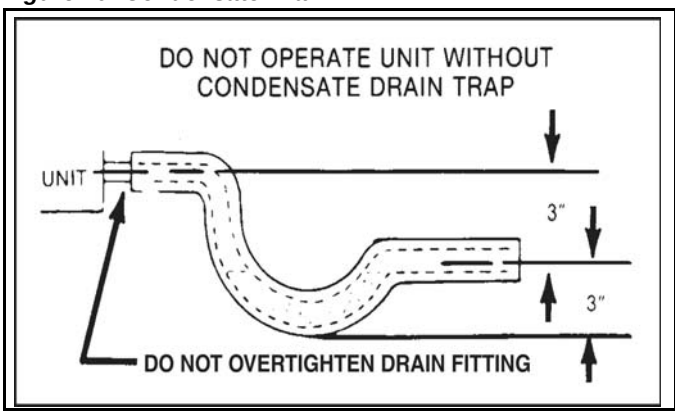
Nominal Iron Pipe Size, Inches	Length of Pipe, Feet									
	10	20	30	40	50	60	70	80	90	100
1/2	275	189	152	129	114	103	96	89	83	78
3/4	567	393	315	267	237	217	196	182	173	162
1	1,071	732	590	504	448	409	378	346	322	307
1-1/4	2,205	1,496	1,212	1039	913	834	771	724	677	630
1-1/2	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976
2	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811

Condensate Drain

The condensate drain connection of the evaporator is threaded 1" nominal iron pipe.

IMPORTANT: Install a condensate trap to ensure proper condensate drainage (see Figure 10).

Figure 10: Condensate Drain



Wiring

Power Supply

⚠ DANGER

Power supply to the unit must be disconnected before making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

1. **All wiring should be made in accordance with the National Electrical Code.** Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to the unit's RATED VOLTAGE REQUIREMENT. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C., C.E.C. or local codes.
2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On three phase units, phases must be balanced within 3%.
3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 5 using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable from the unit disconnect to the unit. Wire size based on 75°C rated wire insulation for 1% voltage drop.
4. For more than 3 conductors in a raceway or cable, see the N.E.C. (C.E.C. in Canada) for derating the ampacity of each conductor.
5. For through-the-base wiring entry, reference Figure 13. All fittings and conduit are field-supplied for this application. Reference Table 6 for proper hole and conduit size.

IMPORTANT: This unit is approved for use with copper conductors only connected to unit contactor. Warranty will be voided if aluminum wire is connected to unit contactor.

Figure 11: Recommended Branch Circuit Disconnect Location

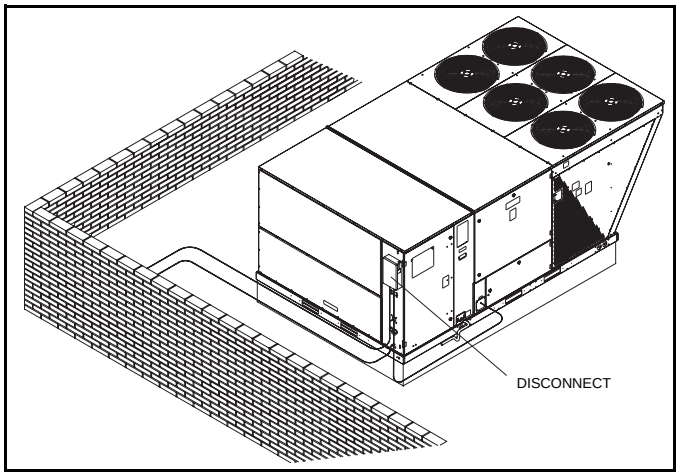


Figure 12: Base Entry Locations (Cooling Only)

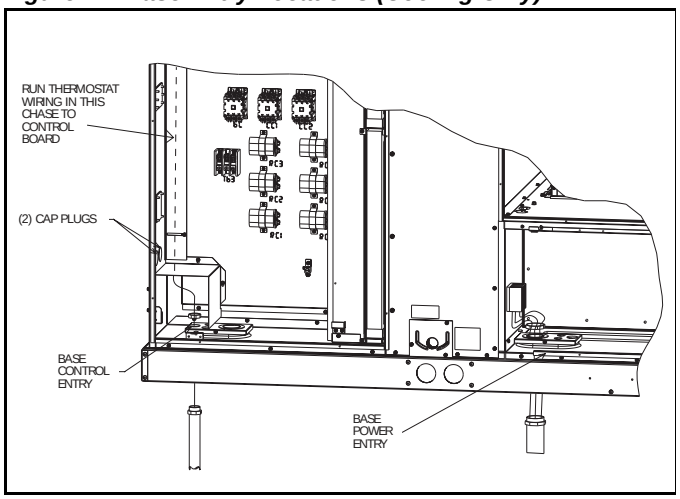


Figure 13: Base Entry Locations (Gas Heat)

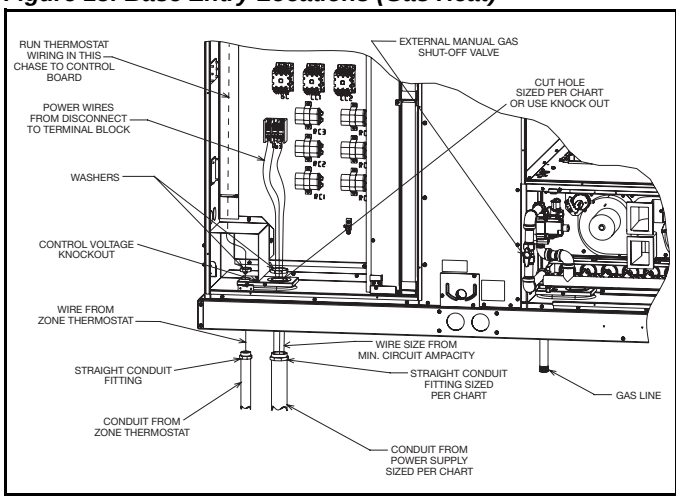


Table 5: Minimum Wire Sizes For Given Wire Length

Unit MCA	Supply Wire Length in Feet					
	50 10	0	150	200	250	300
20	10	8	6	4	4	4
25	10	8	6	4	4	3
30	8	6	4	4	3	2
35	8	6	4	3	2	1
40	8	6	4	3	2	1
45	8	4	3	2	1	1/0
50	6	4	3	2	1	1/0
60	6	4	2	1	1/0	2/0
70	4	3	2	1/0	2/0	3/0
80	4	3	1	1/0	2/0	3/0
90	3	2	1/0	2/0	3/0	4/0
100	3	2	1/0	2/0	3/0	4/0
110	2	1	2/0	3/0	4/0	250
125	1	1	2/0	3/0	4/0	25

Table 6: Recommended Wire Sizes For Given Conduit and Hole Size

Wire Size, AWG	14	12	10	8 6 4			3 2 1			0	00	000
Conduit Size	1/2”	1/2”	1/2”	3/4”	1”	1”	1-1/4”	1-1/4”	1-1/2”	1-1/2”	2”	2”
Hole Size	7/8”	7/8”	7/8”	1-31/32”	1-23/64”	1-23/64”	1-23/32”	1-23/32”	1-31/32”	1-31/32”	2-15/32”	2-15/32”

Hook-Up

To wire unit, refer to Figure 24, page 28 for location of wiring entrances. Wiring to be done in the field between the unit and devices not attached to the unit, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise (35°C)] when installed in accordance with the manufacturer's instructions.

Internal Wiring

A diagram of the internal wiring of this unit is located on the inside of control access panel and in this manual. If any of the original wire as supplied with the unit must be replaced, the wire gauge and insulation must be same as original wiring.

208 Volt Applications

Transformer is factory wired for 230 volts on 208/230 volt models and must be changed for 208 volt applications. See unit wiring diagram for 208 volt wiring.

Customer Supplied Thermostat

The customer supplied room thermostat must be compatible with the spark ignition control on the unit. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated furnace control. The low voltage wiring should be sized as shown in Table 7.

Table 7: Field Wire Size for 24 Volt Thermostat

Thermostat Load Amps		Solid Copper Wire, AWG					
	3.0	16	14	12	10	10	10
	2.5	16	14	12	12	10	10
	2.0	18	16	14	12	12	10
		50	100	150	200	250	300
		Length of Run -Feet (1)					

Note: (1) The total wire length is the distance from the furnace to the thermostat and back to the furnace. DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

Note: DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat.

See Figure 15, page 15 for an example of a typical customer supplied wiring diagram.

Optional Factory Supplied Thermostat

Figure 14: Optional Thermostat

The optional factory supplied, touch screen, commercial setback digital thermostat (Figure 14) uses microcomputer technology to provide precise time and temperature control. This thermostat offers the flexibility to design heating and cooling programs that fit building needs (Table 8). This thermostat is adaptable to most residential 24 volt forced air multi-stage systems with electric or fossil fuel auxiliary and is the ultimate for comfort, convenience, and performance.

See Figure 16, page 15 for an optional factory supplied thermostat wiring diagram.

Table 8: Optional Factory Supplied Thermostat Specifications

Electrical Rating Single Stage:	mV to 30 V (ac), NEC Class II, 50/60 Hz or DC
Electrical Rating Staging:	20 to 30 V (ac), NEC Class II
Terminal Load:	1.5 A per terminal, 2.5 A max. combined
Setpoint Range:	45° to 99°F (7° to 37°C)
Anticipation, Heating:	Adjustable
Anticipation, Cooling:	Adjustable
Rated Differential Single Stage:	Heat 0.6°F, Cool 1.2°F
Rated Differential Staging:	Heat 0.6°F, Cool 1.2°F
Operating Ambient:	32° to +105°F (0° to +41°C)
Operating Humidity	90% non-condensing max.
Shipping Temperature Range:	-4° to 150°F (-20° to 65°C)
Dimensions (H x W x D):	4.6” x 5.9” x 1.2”

Table 9: Thermostat Terminal Functions

Y2	2nd Stage Compressor
Y	Compressor Relay
G	Fan Relay
RC	Power for Cooling
RH	Power for Heating
C	Common wire from secondary side of cooling (Optional). Required for fault indication, continuous backlight operation or remote temperature sensor operation
L	Malfunction indicator for systems with malfunction connection
W/E	Heat Relay/Emergency Heat Relay (Stage 1)
W2	2nd Stage Heat (3rd Stage Heat in HP2)
Blank	Blank
-	Common (DC) for wired remote temperature sensor
S	Frequency signal from remote temperature sensor
+	Power (DC) to remote temperature sensor

Wiring Diagrams

Figure 15: Typical Customer Supplied Thermostat Wiring Diagram

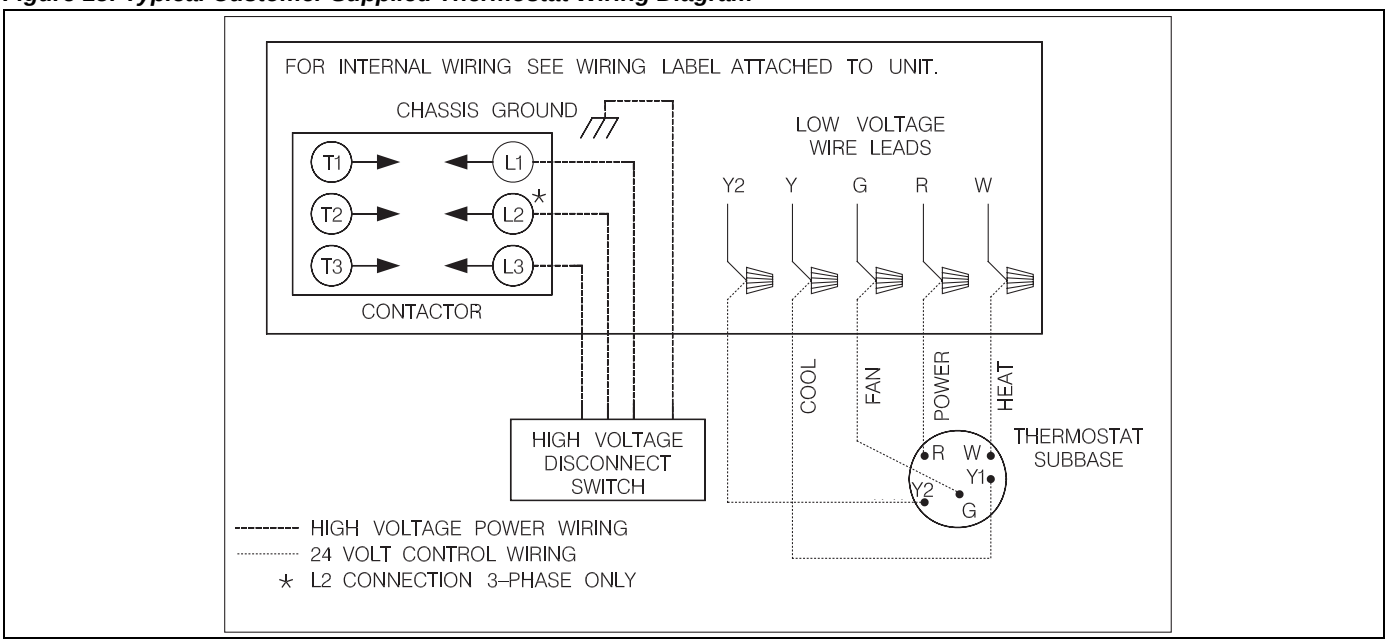
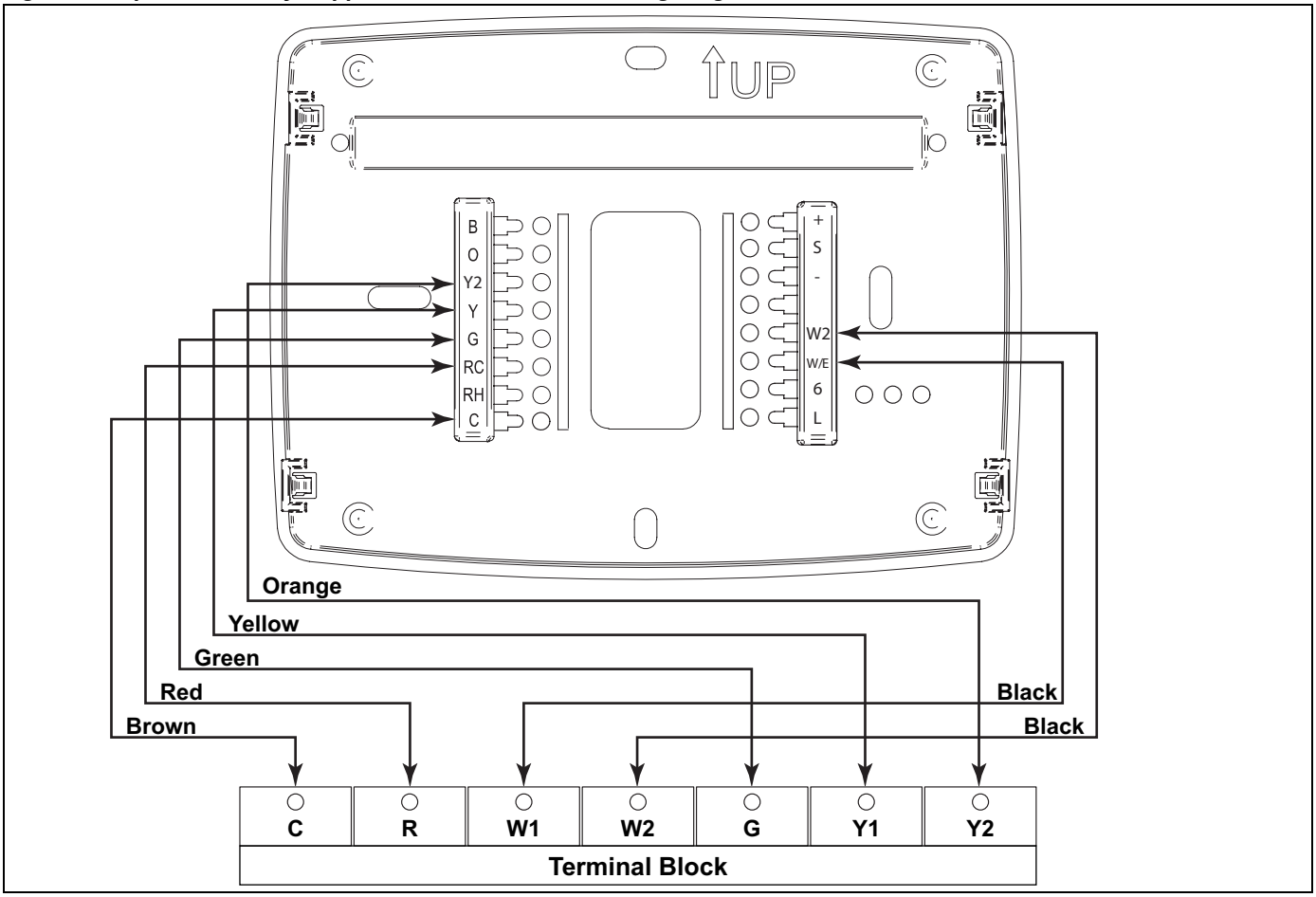


Figure 16: Optional Factory Supplied 7-170 Thermostat Wiring Diagram



1) On 3 to 5 ton units, a terminal block is not supplied. Use a wirenut to extend from the leads provided in the unit to the thermostat. W1, W2, and Y2 are optional depending upon the size and selected options of the unit. Colors shown above are typical for the MPS I.

2) For wiring with DDC control option, see OM 1077 for wiring instructions.

Figure 17: Wiring Diagram: MPS 015B – 025B, 208-230/460 V (Gas Heat)

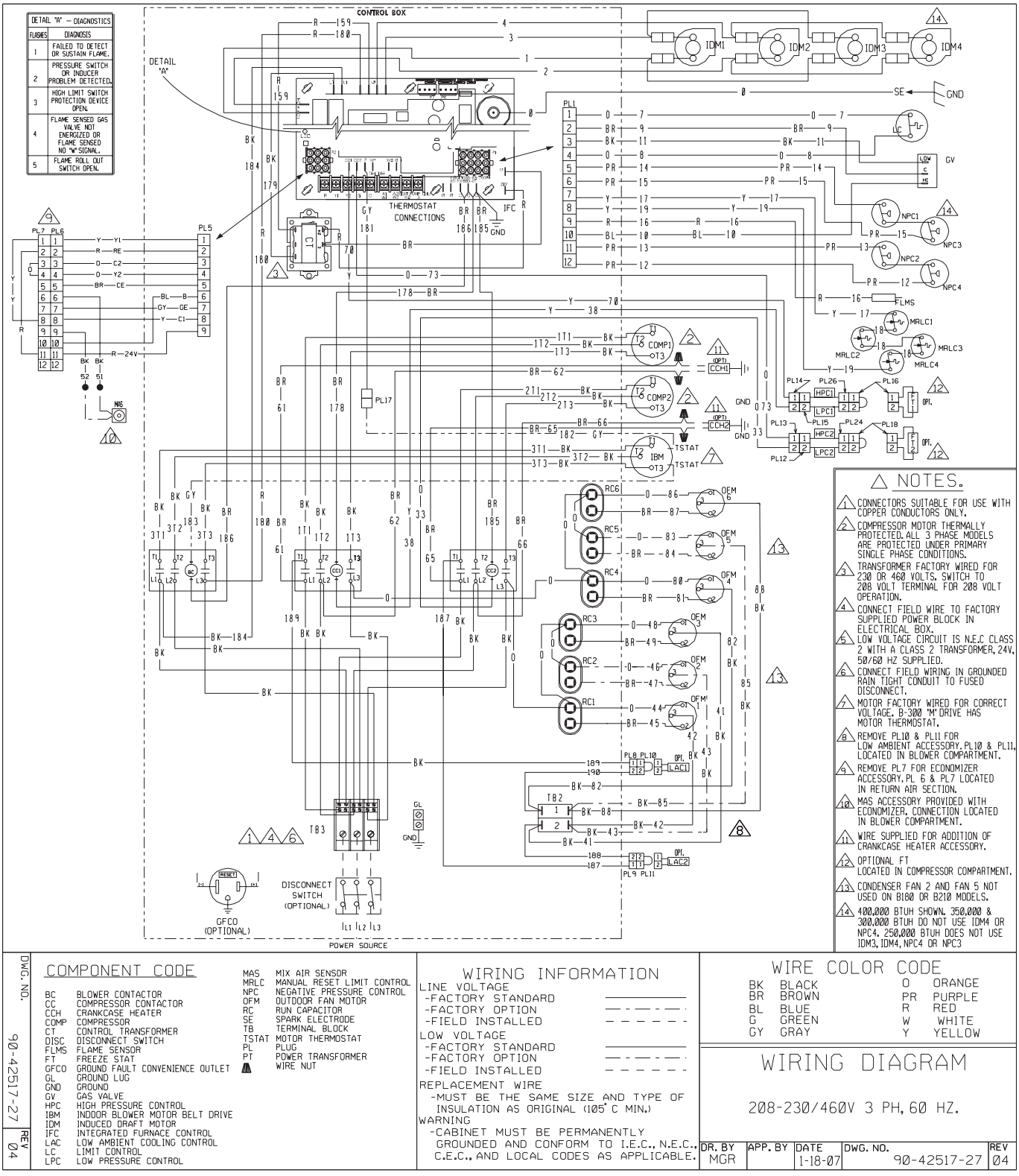
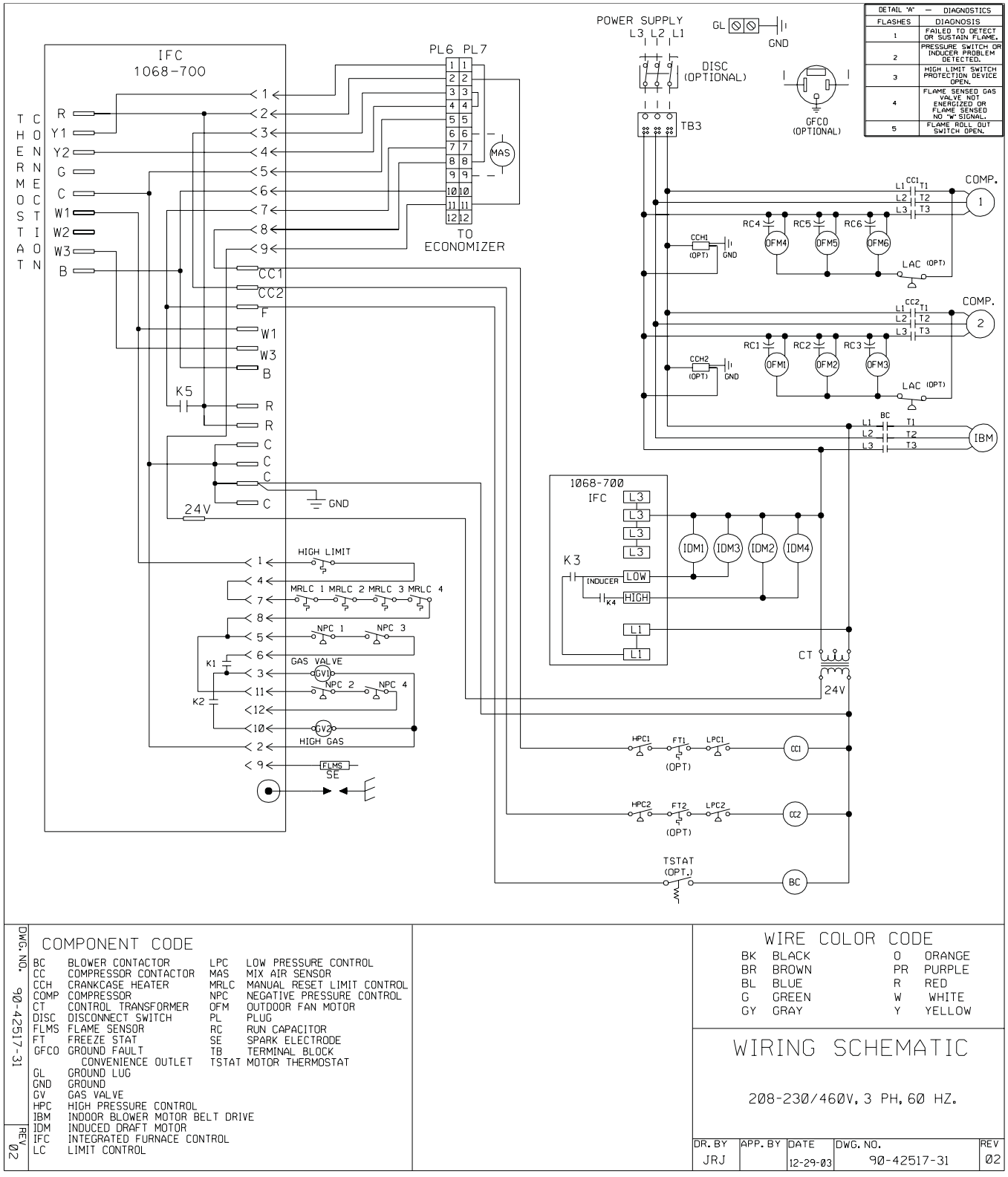


Figure 18: Wiring Diagram: MPS 015B – 025B, 208-230/460 V (Cooling Only)



DWG. NO. 90-42517-31
REV 02

COMPONENT CODE

BC	BLOWER CONTACTOR	LPC	LOW PRESSURE CONTROL
CC	COMPRESSOR CONTACTOR	MAS	MIX AIR SENSOR
CCH	CRANKCASE HEATER	MRLC	MANUAL RESET LIMIT CONTROL
COMP	COMPRESSOR	NPC	NEGATIVE PRESSURE CONTROL
CT	CONTROL TRANSFORMER	OFM	OUTDOOR FAN MOTOR
DISC	DISCONNECT SWITCH	PL	PLUG
FLMS	FLAME SENSOR	RC	RUN CAPACITOR
FT	FREEZE STAT	SE	SPARK ELECTRODE
GFCO	GROUND FAULT CONVENIENCE OUTLET	TB	TERMINAL BLOCK
		TSTAT	MOTOR THERMOSTAT
GL	GROUND LUG		
GND	GROUND		
GV	GAS VALVE		
HPC	HIGH PRESSURE CONTROL		
IBM	INDOOR BLOWER MOTOR BELT DRIVE		
IDM	INDUCED DRAFT MOTOR		
IFC	INTEGRATED FURNACE CONTROL		
LC	LIMIT CONTROL		

WIRE COLOR CODE

BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
GY	GRAY	Y	YELLOW

WIRING SCHEMATIC

208-230/460V, 3 PH, 60 HZ.

DR. BY	APP. BY	DATE	DWG. NO.	REV
JRJ		12-29-03	90-42517-31	02

Figure 19: Wiring Diagram: MPS 015B – 025B, 575V (Gas Heat)

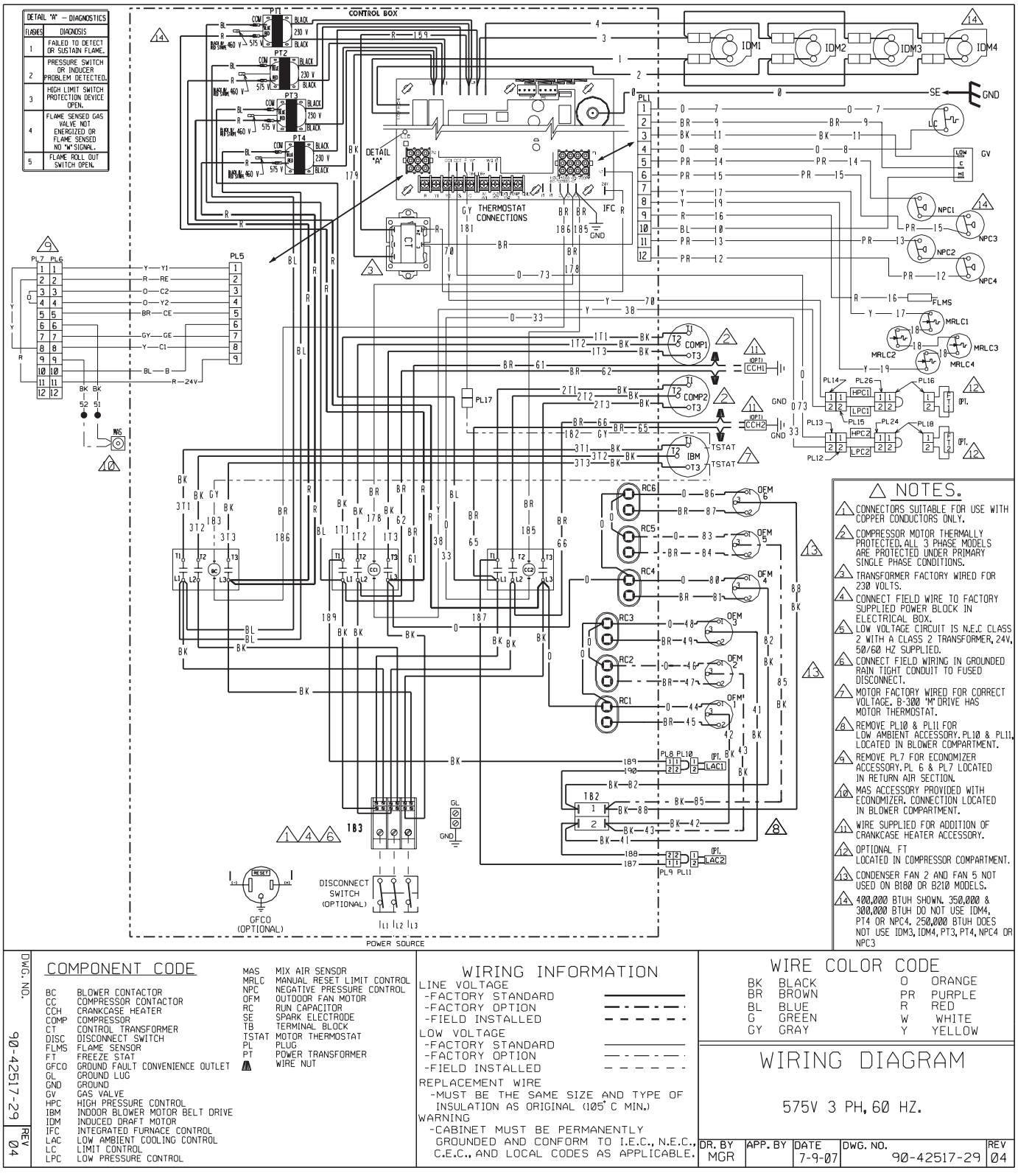
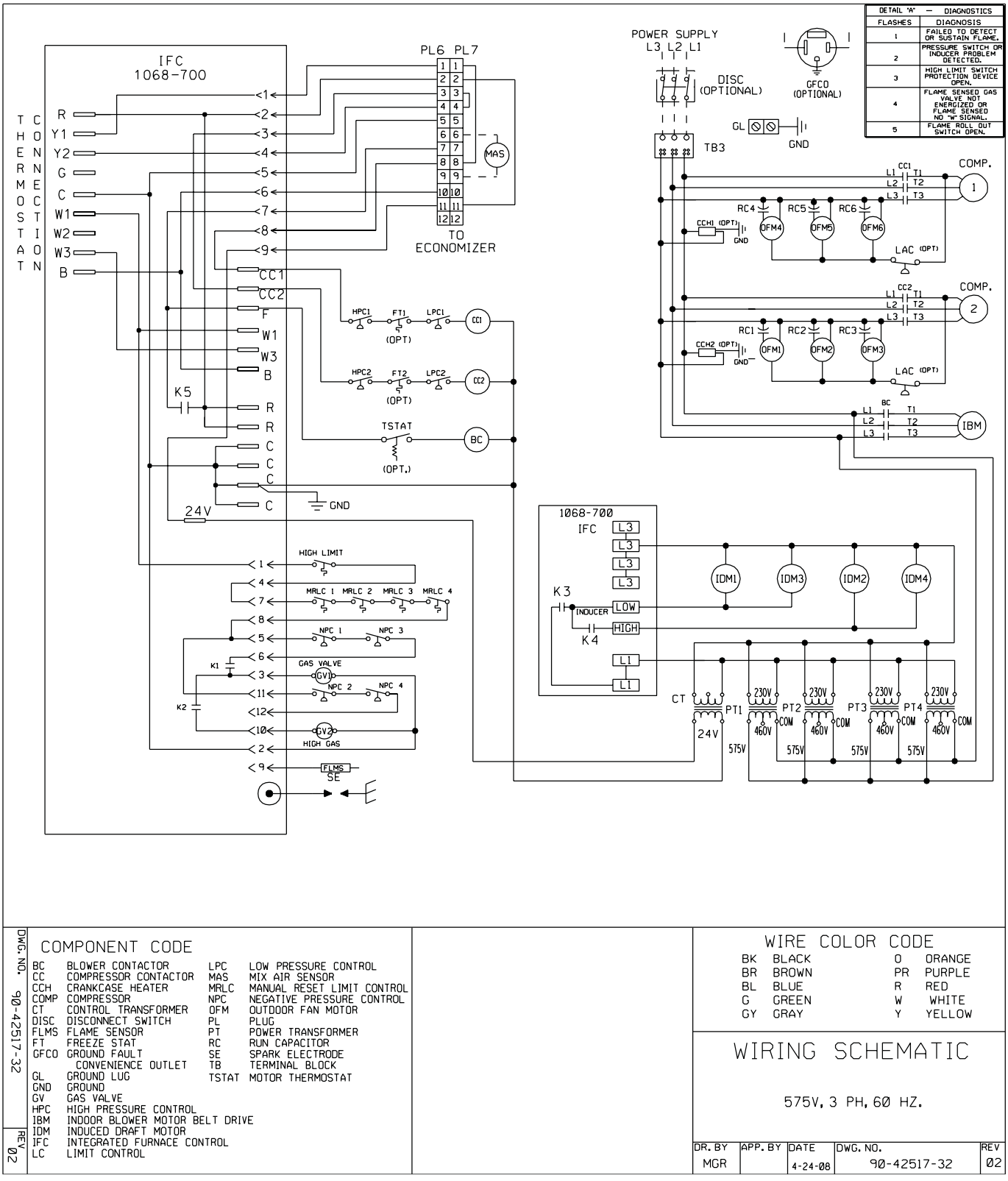


Figure 20: Wiring Diagram: MPS 015B – 025B, 575V (Cooling Only)



DWG. NO. 90-42517-32

REV 02

COMPONENT CODE

BC	BLOWER CONTACTOR	LPC	LOW PRESSURE CONTROL
CC	COMPRESSOR CONTACTOR	MAS	MIX AIR SENSOR
CCH	CRANKCASE HEATER	MRLC	MANUAL RESET LIMIT CONTROL
COMP	COMPRESSOR	NPC	NEGATIVE PRESSURE CONTROL
CT	CONTROL TRANSFORMER	OFM	OUTDOOR FAN MOTOR
DISC	DISCONNECT SWITCH	PL	PLUG
FLMS	FLAME SENSOR	PT	POWER TRANSFORMER
FT	FREEZE STAT	RC	RUN CAPACITOR
GFCO	GROUND FAULT CONVENIENCE OUTLET	SE	SPARK ELECTRODE
		TB	TERMINAL BLOCK
GL	GROUND LUG	TSTAT	MOTOR THERMOSTAT
GND	GROUND		
GV	GAS VALVE		
HPC	HIGH PRESSURE CONTROL		
IBM	INDOOR BLOWER MOTOR BELT DRIVE		
IDM	INDUCED DRAFT MOTOR		
IFC	INTEGRATED FURNACE CONTROL		
LC	LIMIT CONTROL		

WIRE COLOR CODE

BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
GY	GRAY	Y	YELLOW

WIRING SCHEMATIC

575V, 3 PH, 60 HZ.

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		4-24-08	90-42517-32	02

Figure 21: MPS 015F - 025F 208-230/460/575 V DDC Controls w/ Gas Heat

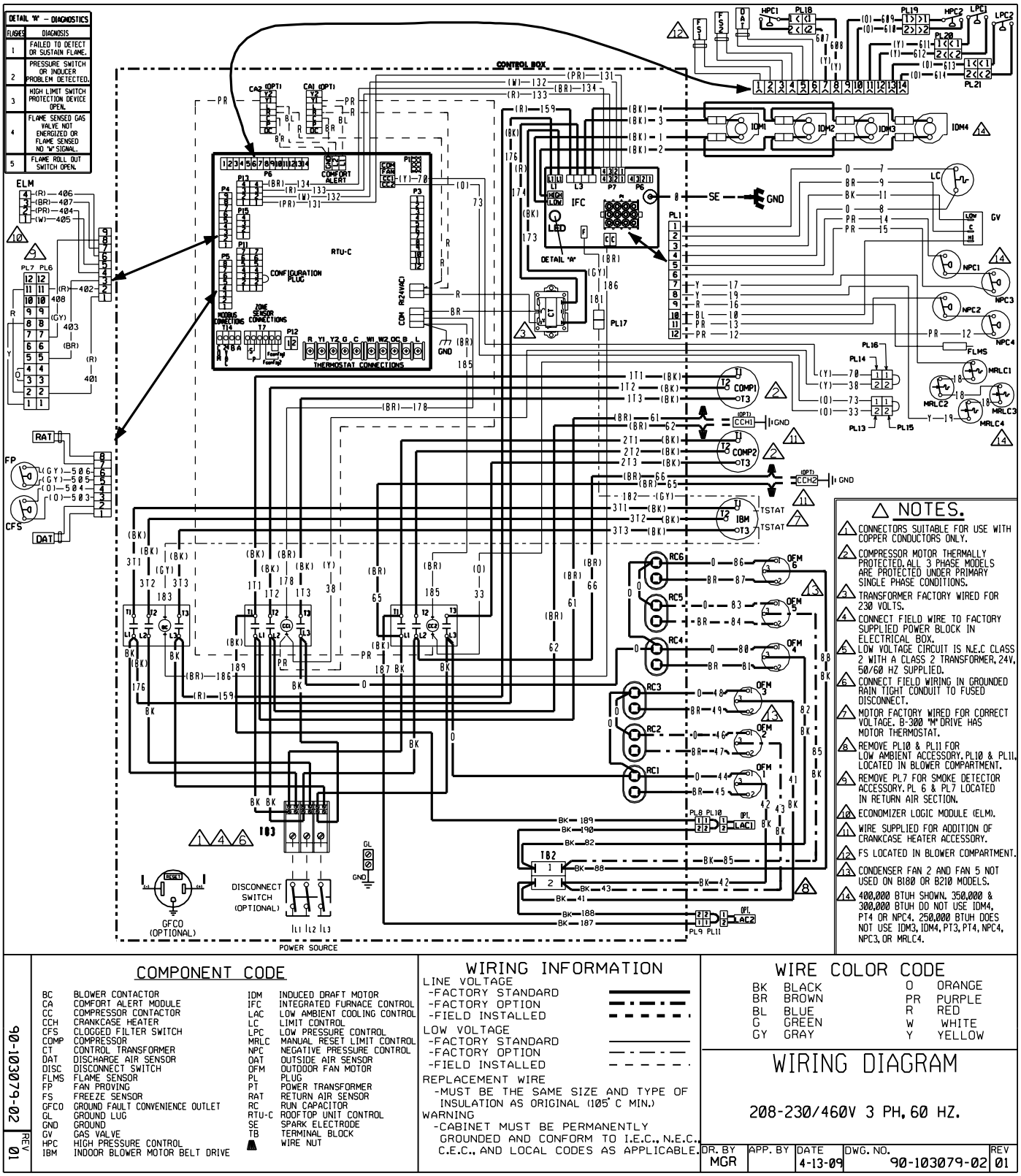


Figure 22: Wiring Diagram: MPS 015B - 025B, 575 Volt (Gas Heat)

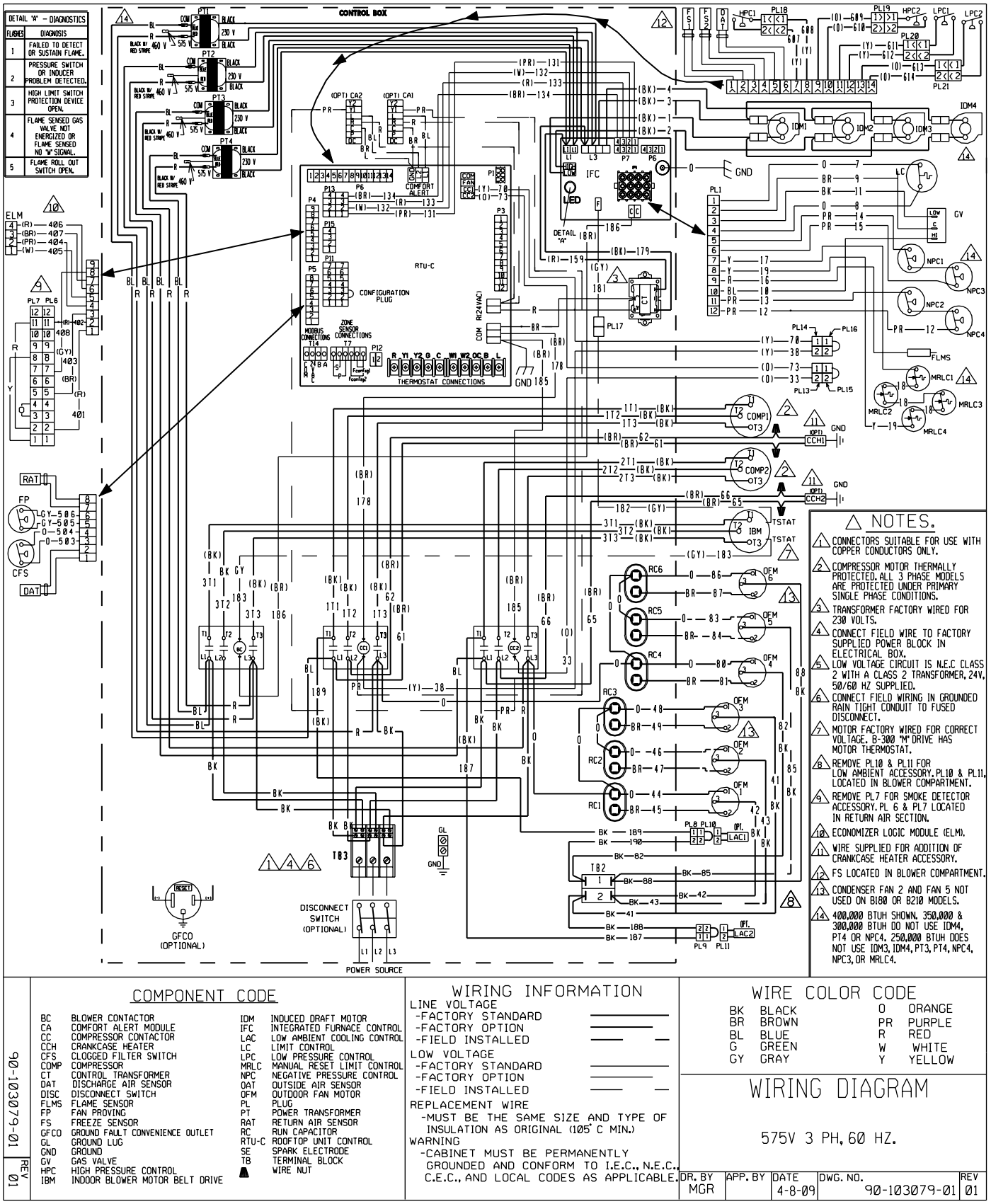
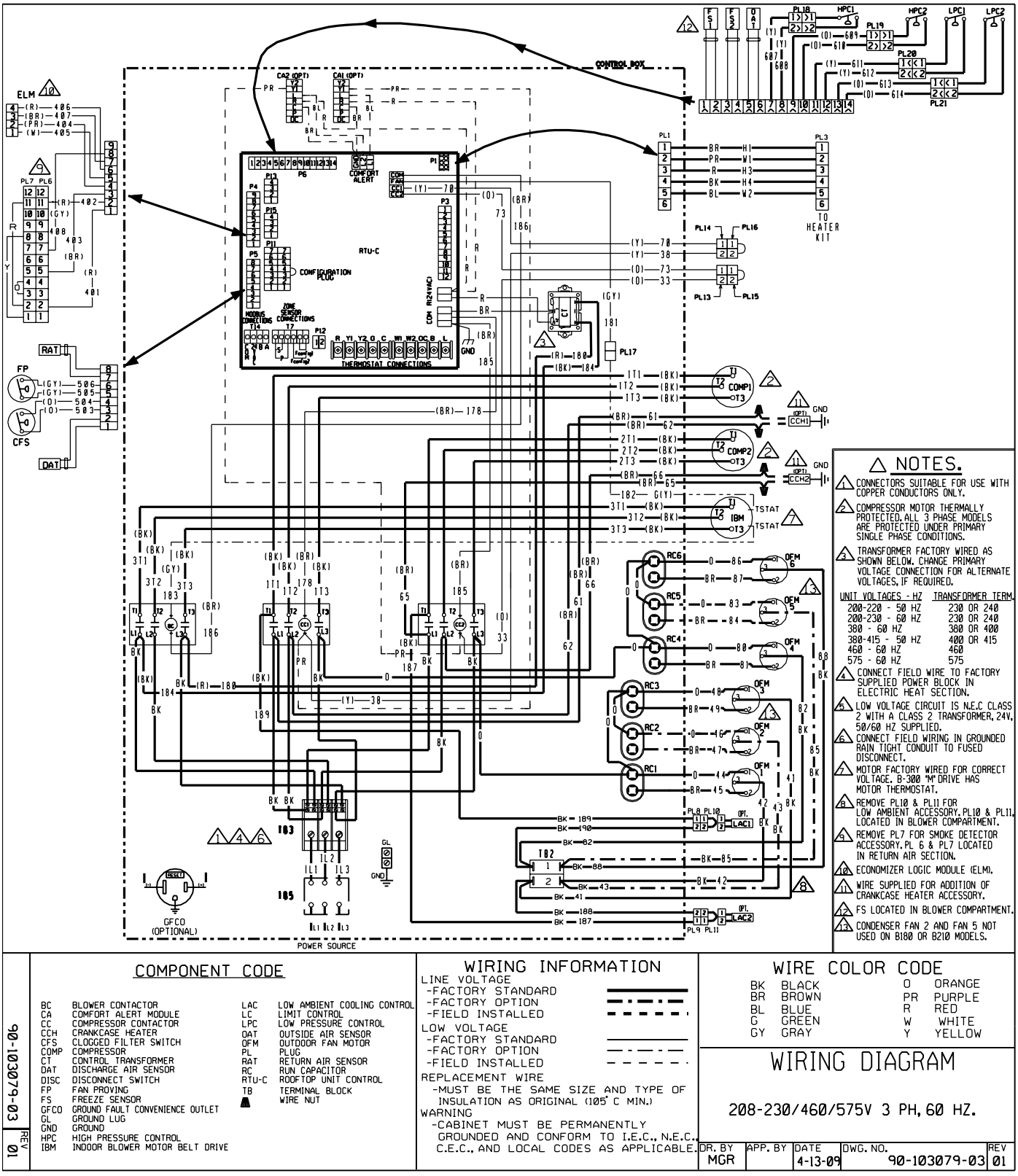


Figure 23: MPS 015F - 025F 208-230/460/575 V DDC Controls w/ Cooling Only



Unit Capacity and Physical Data

Table 10: MPS 015B – 025B

Model	MPS		
	015B	020B	025B
Cooling Performance[1]			
Gross cooling BTU [kW]	188,000 [55.08]	244,000 [71.49]	312,000 [91.42]
EER/SEER[2]	11.1/NA	11.1/NA	10/NA
Nominal airflow/ARI airflow (cfm) [L/s]	6000/5900 [2831/2784]	8000/7725 [3775/3645]	10000/9475 [4719/4471]
Net cooling BTU [kw]	182,000 [53.33]	234,000 [68.56]	294,000 [86.14]
Net sensible BTU [kW]	135,700 [39.76]	171,600 [50.28]	214,100 [62.73]
Net latent BTU [kW]	46,300 [13.57]	62,400 [18.28]	79,900 [23.41]
Net system power kW	16.35	21.04	29.39
Compressor(s)			
Type/number	Scroll/2	Scroll/2	Scroll/2
Gas Heating Performance[3]			
AFUE %	80	80	80
Steady stage efficiency %	81	81	81
No. stages	2	2	2
Gas connection size	1/2" - 3/4"	3/4"	3/4"
Heating input (BtuH)	250,000 / 350,000	300,000 / 400,000	300,000 / 400,000
Heating output (BtuH)	203,000 / 284,000	243,000 / 324,000	243,000 / 324,000
Temperature rise °F	15 - 60	15 - 55	10 - 45
Sound[4]			
Outdoor rating (dB)	91	91	92
Outdoor Coil			
Fin type	Louvered	Louvered	Louvered
Tube type	Rifled	Rifled	Rifled
Tube size OD (in.) [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face area (sq. ft) [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows (fpi) [fpcm]	1/22 [9]	2/22 [9]	2/22 [9]
Indoor Coil			
Fin type	Louvered	Louvered	Louvered
Tube type	Rifled	Rifled	Rifled
Tube size OD (in.) [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face area (sq. ft) [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows (fpi) [fpcm]	2/18 [7]	3/13 [5]	4/15 [6]
Refrigerant control	TX valves	TX valves	TX valves
Drain connection (in.) [mm]	1" [25.4]	1" [25.4]	1" [25.4]
Condenser Fan			
Type	Propeller	Propeller	Propeller
No. used/diameter (in.) [mm]	4/24 [609.6]	6/24 [609.6]	6/24 [609.6]
Drive type/No. of speeds	Direct/1	Direct/1	Direct/1
CFM [L/s]	16000 [7550]	19800 [9344]	19800 [9344]
Motor hp	4 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP
Motor rpm	1075	1075	1075
Indoor Fan			
Type	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. used/diameter (in.) [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
No. motors	1	1	1
Motor hp (low static, high static)	3, 5	5, 7-1/2	7-1/2, 10
Motor rpm	1725	1725	1725
Filter			
Fin type	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes
No. size (in.) [mm]	(8) 2x25x20 [51x635x508]	(8) 2x25x20 [51x635x508]	(8) 2x25x20 [51x635x508]
Refrigerant			
Charge oz. [g]	205/211 [5812/5982]	402/331 [11397/9384]	339/357 [9611/10121]
Weight			
Net weight lbs. [kg]	2000 [907]	2341 [1062]	2433 [1104]
Shipping weight lbs. [kg]	2100 [953]	2441 [1107]	2533 [1149]

Electrical Data

Compressor and Condenser Motor

Table 11: Compressor and Condenser Motor Data – 208/230 Volt

Data	Electrical Data (208/230 V)*		
	MPS 015B	**MPS 020B**	**MPS 025B**
Compressor Motor			
No.	2		
Phase	3		
RPM	3450		
HP, Compressor 1	7-1/2	10	11-1/2
Amps (RLA), Comp. 1	25	33.3	48.1
Amps (LRA), Comp. 1	164	239	245
HP, Compressor 2	7-1/2	7-1/2	11-1/2
Amps (RLA), Comp. 2	25	33.3	48.1
Amps (LRA), Comp. 2	164	239	245
Condenser Motor			
No.	4	6	
Phase	1		
HP	1/3		
Amps (FLA, each)	1.2		
Amps (LRA, each)	4.7		

Note: *Unit operating voltage range is 187 - 253

Table 12: Compressor and Condenser Motor Data – 460 Volt

Data	Electrical Data (460 V)*		
	MPS 015B	**MPS 020B**	**MPS 025B**
Compressor Motor			
No.	2		
Phase	3		
RPM	3450		
HP, Compressor 1	7-1/2	10	11-1/2
Amps (RLA), Comp. 1	12.2	17.9	18.6
Amps (LRA), Comp. 1	100	125	125
HP, Compressor 2	7-1/2	7-1/2	11-1/2
Amps (RLA), Comp. 2	12.2	14.7	18.6
Amps (LRA), Comp. 2	100	95	125
Condenser Motor			
No.	4	6	
Phase	1		
HP	1/3		
Amps (FLA, each)	0.7		
Amps (LRA, each)	2.4		

Note: *Unit operating voltage range is 414 - 506

Table 13: Compressor and Condenser Motor Data – 575 Volt

Data	Electrical Data (575 V)*		
	MPS 015B	MPS 020B	MPS 025B
Compressor Motor			
No.	2		
Phase	3		
RPM	3450		
HP, Compressor 1	7-1/2	10	11-1/2
Amps (RLA), Comp. 1	9.0	12.8	14.7
Amps (LRA), Comp. 1	78	80	100
HP, Compressor 2	7-1/2	7-1/2	11-1/2
Amps (RLA), Comp. 2	9.0	12.2	14.7
Amps (LRA), Comp. 2	78	80	100
Condenser Motor			
No.	4	6	
Phase	1		
HP	1/3		
Amps (FLA, each)	0.5		
Amps (LRA, each)	1.5		

Note: *Unit operating voltage range is 518 - 632

MCA and MCOP

Table 14: Unit MCA and MCOP Data

MPS Model		Voltage					
		208/230		460		575	
		Low Static Fan Drive	High Static Fan Drive	Low Static Fan Drive	High Static Fan Drive	Low Static Fan Drive	High Static Fan Drive
015	MCA	78.0	81.0	38.0	40.0	28.0	30.0
	MCOP	100.0	100.0	45.0	50.0	35.0	35.0
020	MCA	101.0	109.0	52.0	56.0	40.0	42.0
	MCOP	125.0	125.0	60.0	70.0	50.0	50.0
025	MCA	147.0	149.0	60.0	63.0	47.0	50.0
	MCOP	175.0	175.0	70.0	80.0	60.0	60.0

Electrical Data

Auxiliary Heater Kit Performance

Table 15: Auxiliary Heater Kits Characteristics and Application: 208/240V - 3 Phase

Unit Model Number MPS-	Heater Kit Model No. RXJJ-	Heater Kw @ 208/240 V/ 3 Phase	Heater Kit Fla	Unit Min. Ckt. Ampacity	Max. Fuse Or Ckt. Bkr. Size (Ckt. Bkr. Must Be HACR Type For USA)
015 Low Static Drive	NONE	—	—	78/78	100/100
	CE20C	14.4/19.2	40.0/46.2	78/78	100/100
	CE40C	28.8/38.3	79.9/92.2	115/130	125/150
	CE60C	43.2/57.5	119.9/138.3	165/188	175/200
	CE75C	54/71.9	149.8/172.8	202/231	225/250
015 High Static Drive	NONE	—	—	81/81	100/100
	CE20C	14.4/19.2	40.0/46.2	81/81	100/100
	CE40C	28.8/38.3	79.9/92.2	119/134	125/150
	CE60C	43.2/57.5	119.9/138.3	169/192	175/200
	CE75C	54/71.9	149.8/172.8	206/235	225/250
020 Low Static Drive	NONE	—	—	101/101	125/125
	CE20C	14.4/19.2	40.0/46.2	101/101	125/125
	CE40C	28.8/38.3	79.9/92.2	119/134	125/150
	CE60C	43.2/57.5	119.9/138.3	169/192	175/200
	CE75C	54/71.9	149.8/172.8	206/235	225/250
020 High Static Drive	NONE	—	—	109/109	125/125
	CE20C	14.4/19.2	40.0/46.2	109/109	125/125
	CE40C	28.8/38.3	79.9/92.2	129/145	150/150
	CE60C	43.2/57.5	119.9/138.3	179/202	200/225
	CE75C	54/71.9	149.8/172.8	217/245	225/250
025 Low Static Drive	NONE	—	—	147/147	175/175
	CE20C	14.4/19.2	40.0/46.2	147/147	175/175
	CE40C	28.8/38.3	79.9/92.2	147/147	175/175
	CE60C	43.2/57.5	119.9/138.3	181/204	200/225
	CE75C	54/71.9	149.8/172.8	218/247	225/250
025 High Static Drive	NONE	—	—	149/149	175/175
	CE20C	14.4/19.2	40.0/46.2	149/149	175/175
	CE40C	28.8/38.3	79.9/92.2	149/151	175/175
	CE60C	43.2/57.5	119.9/138.3	186/209	200/225
	CE75C	54/71.9	149.8/172.8	223/252	225/300

Table 16: Auxiliary Heater Kits Characteristics and Application: 480V - 3 Phase

Unit Model Number MPS-	Heater Kit Model No. RXJJ-	Heater Kw @ 480V	Heater Kit Fla	Unit Min. Ckt. Ampacity	Max. Fuse Or Ckt. Bkr. Size (Ckt. Bkr. Must Be HACR Type For USA)
015 Low Static Drive	NONE	—	—	38	45
	CE20D	19.2	23.1	38	45
	CE40D	38.4	46.2	64	70
	CE60D	57.6	69.3	93	100
	CE75D	72	86.6	114	125
015 High Static Drive	NONE	—	—	40	50
	CE20D	19.2	23.1	40	50
	CE40D	38.4	46.2	67	70
	CE60D	57.6	69.3	95	100
	CE75D	72	86.6	117	125
020 Low Static Drive	NONE	—	—	52	60
	CE20D	19.2	23.1	52	60
	CE40D	38.4	46.2	67	70
	CE60D	57.6	69.3	95	100
	CE75D	72	86.6	117	125

Table 16: Auxiliary Heater Kits Characteristics and Application: 480V - 3 Phase

Unit Model Number MPS-	Heater Kit Model No. RXJJ-	Heater Kw @ 480V	Heater Kit Fla	Unit Min. Ckt. Ampacity	Max. Fuse Or Ckt. Bkr. Size (Ckt. Bkr. Must Be HACR Type For USA)
020 High Static Drive	NONE	—	—	56	70
	CE20D	19.2	23.1	56	70
	CE40D	38.4	46.2	70	70
	CE60D	57.6	69.3	99	100
	CE75D	72	86.6	121	125
025 Low Static Drive	NONE	—	—	60	70
	CE20D	19.2	23.1	60	70
	CE40D	38.4	46.2	70	70
	CE60D	57.6	69.3	99	100
	CE75D	72	86.6	121	125
025 High Static Drive	NONE	—	—	63	80
	CE20D	19.2	23.1	63	80
	CE40D	38.4	46.2	74	80
	CE60D	57.6	69.3	103	110
	CE75D	72	86.6	124	125

Table 17: Auxiliary Heater Kits Characteristics and Application: 600V - 3 Phase

Unit Model Number MPS-	Heater Kit Model No. RXJJ-	Heater Kw @ 600V	Heater Kit Fla	Unit Min. Ckt. Ampacity	Max. Fuse Or Ckt. Bkr. Size (Ckt. Bkr. Must Be HACR Type For USA)
015 Low Static Drive	NONE	—	—	28	35
	CE20Y	19.2	18.5	28	35
	CE40Y	38.4	37	51	60
	CE60Y	57.6	55.4	74	80
	CE75Y	72	69.3	92	100
015 High Static Drive	NONE	—	—	30	35
	CE20Y	19.2	18.5	30	35
	CE40Y	38.4	37	53	60
	CE60Y	57.6	55.4	76	80
	CE75Y	72	69.3	94	100
020 Low Static Drive	NONE	—	—	40	50
	CE20Y	19.2	18.5	40	50
	CE40Y	38.4	37	53	60
	CE60Y	57.6	55.4	76	80
	CE75Y	72	69.3	94	100
020 High Static Drive	NONE	—	—	42	50
	CE20Y	19.2	18.5	42	50
	CE40Y	38.4	37	56	60
	CE60Y	57.6	55.4	80	80
	CE75Y	72	69.3	97	100
025 Low Static Drive	NONE	—	—	47	60
	CE20Y	19.2	18.5	47	60
	CE40Y	38.4	37	53	60
	CE60Y	57.6	55.4	76	80
	CE75Y	72	69.3	94	100
025 High Static Drive	NONE	—	—	50	60
	CE20Y	19.2	18.5	50	60
	CE40Y	38.4	37	59	60
	CE60Y	57.6	55.4	82	90
	CE75Y	72	69.3	100	100

Dimensional Data

Unit Dimensions MPS 015B – 025B

Figure 24: MPS 015B – 025B Dimensions (Cooling Only)

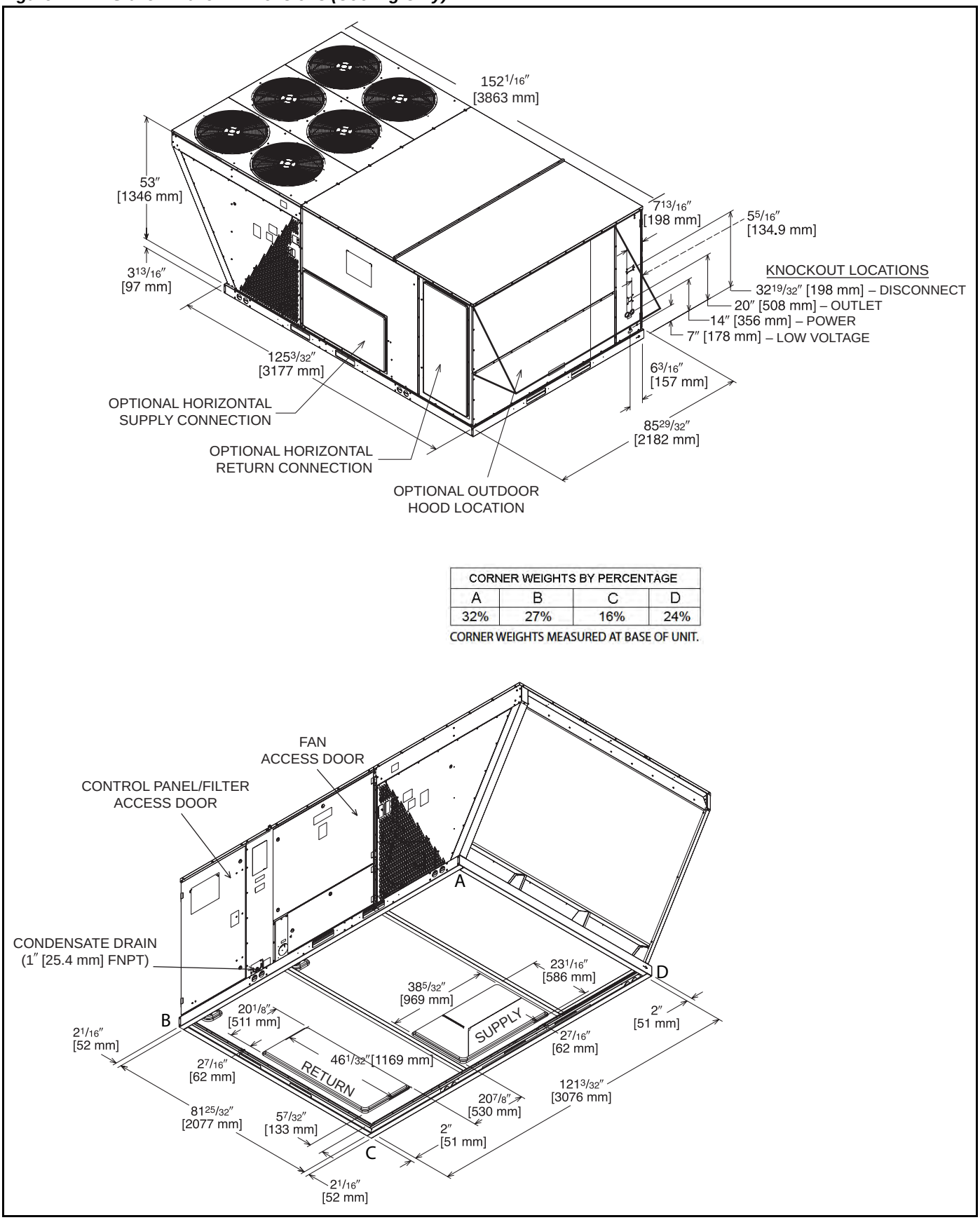
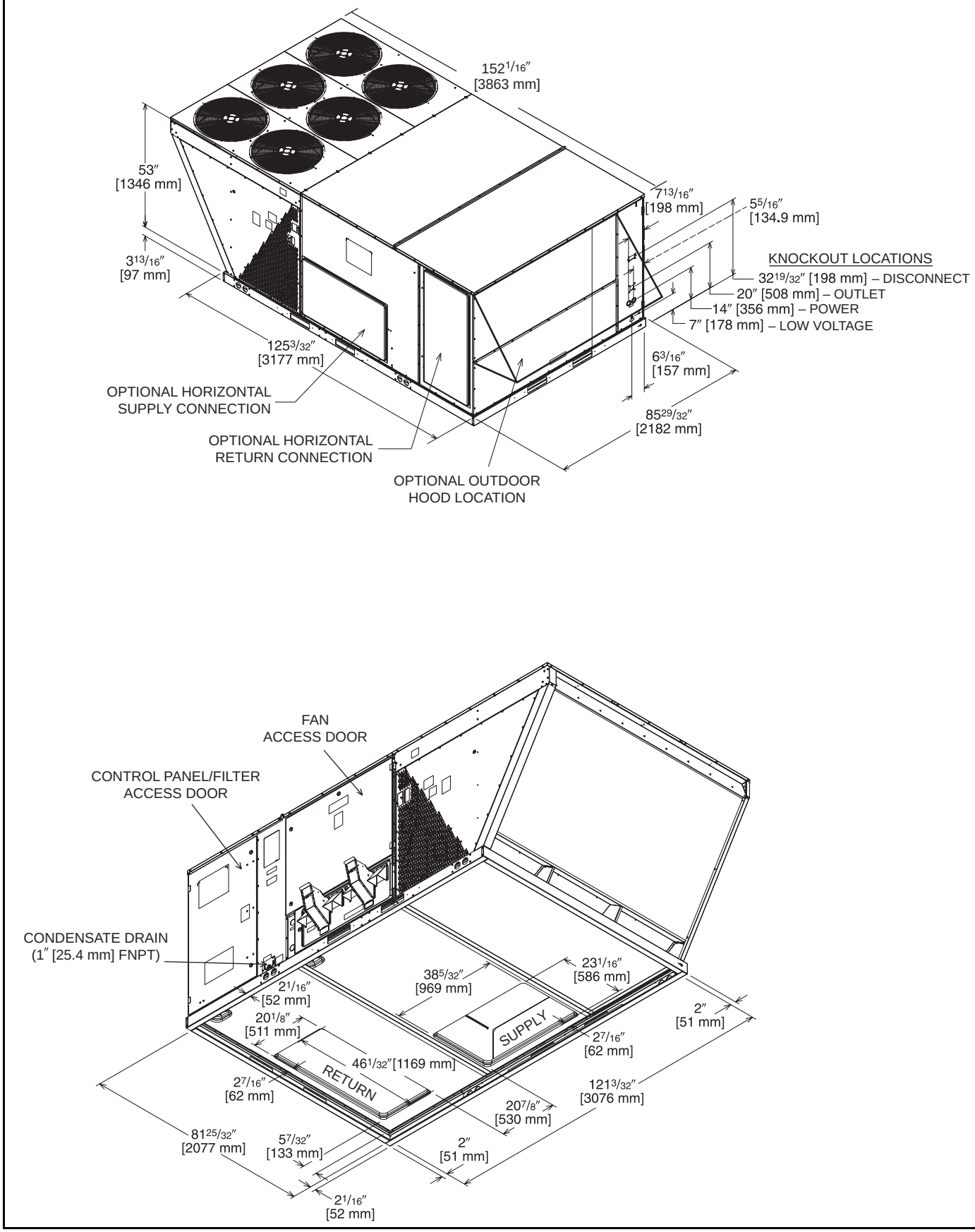


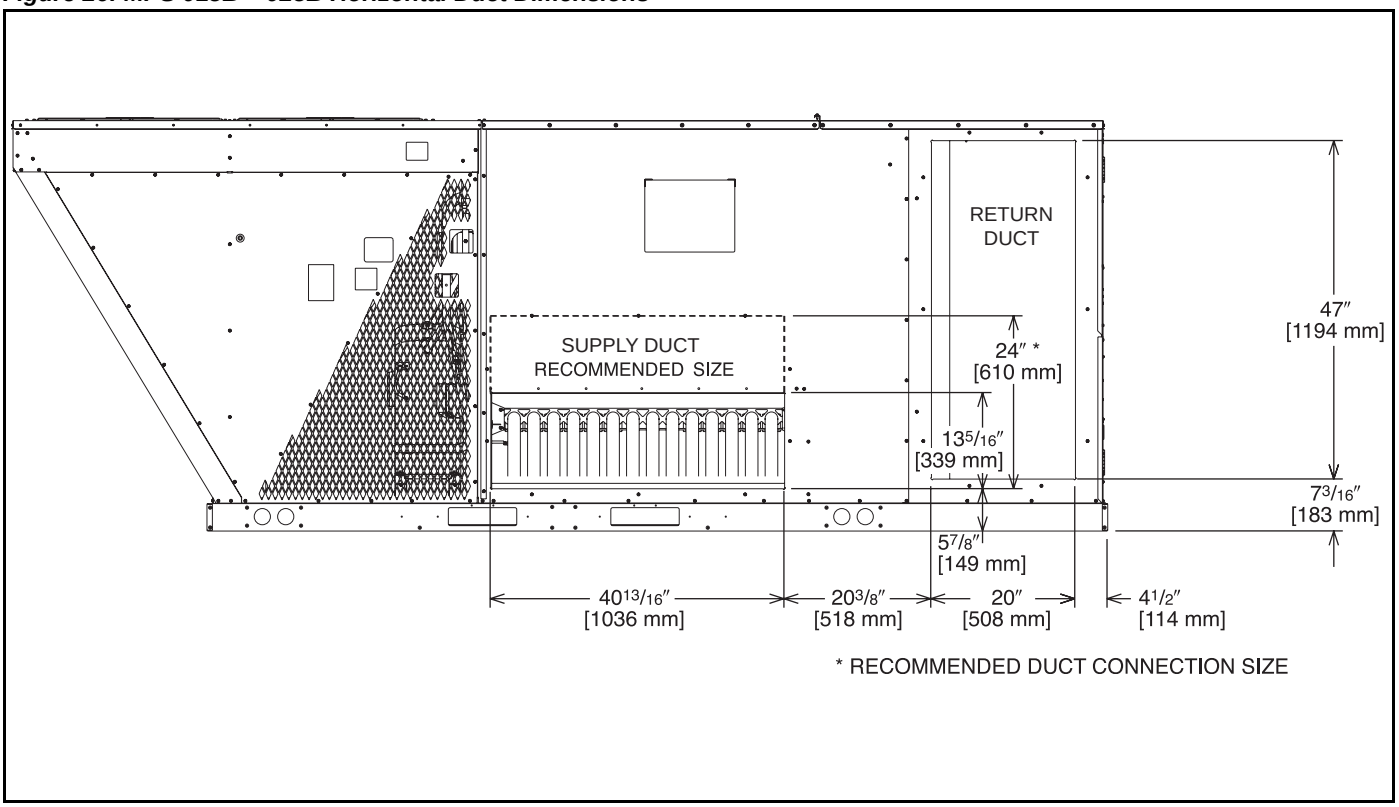
Figure 25: MPS 0015B – 025B Dimensions (Gas Heat)



Dimensional Data

Horizontal Duct Dimensions

Figure 26: MPS 015B – 025B Horizontal Duct Dimensions



Curb Dimensions

Figure 27: MPS 015B – 025 Curb Dimensions

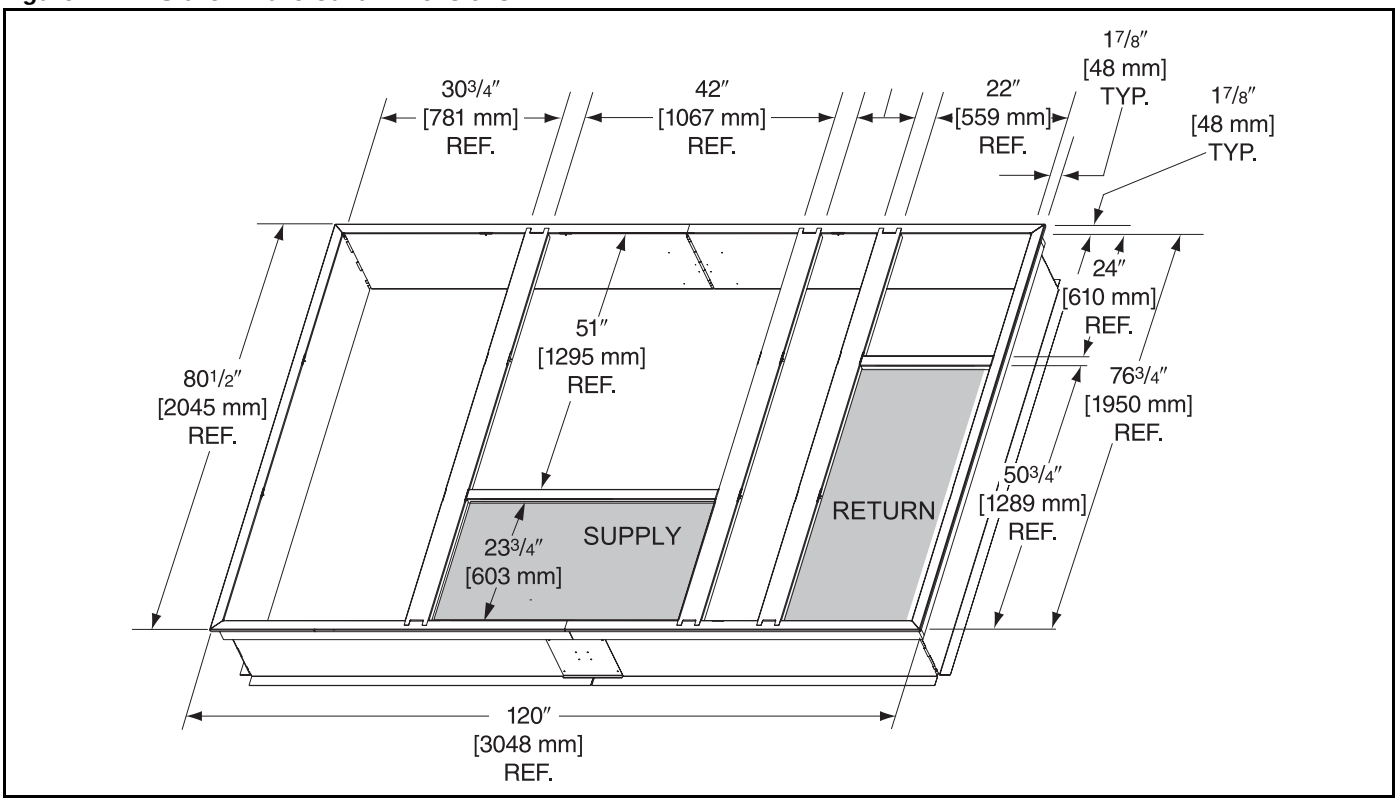


Figure 28: Airflow Performance—MPS 015B

Air Flow CF M [L/s]	Model MPS 015 Voltage 208/230, 460, 575 — 3 phase External Static Pressure — Inches of Water [kPa]																																			
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
4800 [2265]	—	—	—	—	—	—	—	—	—	—	583	1393	608	1508	632	1621	656	1732	679	1841	701	1947	723	2052	744	2154	764	2254	785	2326	805	2430	825	2537	844	2647	863	2761	881	2878
5000 [2359]	—	—	—	—	—	—	—	—	—	—	591	1476	616	1593	640	1707	663	1820	686	1930	708	2038	729	2145	750	2248	771	2350	791	2420	811	2528	830	2640	850	2755	868	2873	887	2995
5200 [2454]	—	—	—	—	—	—	—	—	575	1442	600	1562	624	1681	648	1797	671	1911	693	2023	715	2133	736	2241	757	2346	777	2410	797	2520	817	2633	836	2749	855	2869	874	2992	892	3118
5400 [2548]	—	—	—	—	—	—	—	—	583	1530	608	1652	632	1772	655	1890	678	2005	701	2119	722	2231	743	2340	764	2447	784	2512	804	2626	823	2744	842	2865	861	2989	879	3117	897	3248
5600 [2643]	—	—	—	—	—	—	—	—	592	1621	616	1745	640	1866	663	1986	686	2103	708	2218	729	2331	750	2442	770	2551	791	2620	810	2739	830	2861	849	2987	867	3116	885	3248	903	3384
5800 [2737]	—	—	—	—	—	—	576	1588	601	1715	625	1840	649	1964	672	2085	694	2204	716	2321	737	2436	757	2548	778	2614	798	2735	817	2858	836	2985	855	3116	873	3249	891	3386	909	3527
6000 [2831]	—	—	—	—	—	—	585	1683	610	1813	634	1940	657	2065	680	2187	702	2308	724	2426	744	2543	765	2657	785	2731	805	2856	824	2984	843	3116	861	3251	879	3389	897	3531	914	3676
6200 [2926]	—	—	—	—	570	1650	595	1783	619	1913	643	2042	666	2169	688	2293	710	2415	731	2535	752	2653	773	2728	792	2854	812	2984	831	3116	850	3253	868	3392	886	3535	903	3682	920	3832
6400 [3020]	—	—	—	—	579	1750	604	1885	628	2017	652	2148	674	2276	697	2402	718	2526	739	2648	760	2767	780	2852	800	2983	819	3118	838	3255	856	3396	875	3541	892	3688	909	3839	926	3994
6600 [3114]	—	—	—	—	589	1854	614	1991	637	2125	661	2257	683	2386	705	2514	727	2640	748	2763	768	2884	788	2984	808	3119	827	3258	845	3400	863	3546	881	3695	899	3847	916	4003	—	—
6800 [3209]	—	—	574	1822	599	1961	623	2099	647	2235	670	2369	692	2500	714	2629	735	2756	756	2882	776	2984	796	3121	815	3262	834	3405	853	3552	871	3702	888	3856	905	4013	922	4173	—	—
7000 [3303]	—	—	584	1930	609	2072	633	2211	656	2349	679	2484	701	2617	723	2748	744	2877	764	3003	785	3124	804	3265	823	3410	842	3559	860	3710	878	3865	895	4024	912	4185	929	4350	—	—
7200 [3398]	570	1897	595	2042	619	2185	643	2327	666	2466	689	2602	711	2737	732	2870	753	3000	773	3127	793	3270	812	3416	831	3566	849	3719	868	3875	885	4035	902	4198	919	4364	—	—	—	—

NOTE: L-Drive left of bold line, M-Drive right of bold line.

Drive Package	L						M					
Motor H.P. [W]	3 [2237.1]						5 [3728.5]					
Blower Sheave	BK105H						BK105 H					
Motor Sheave	1VL-44						1VP-56					
Turns Open	**1**	2	3	4	5	6	1	2	3	**4**	5	6
RPM	**733**	701	669	640	605	572	927	903	873	**840**	808	775

NOTES:
1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 15 TON [52.7kW]

CFM [L/s]	4800 [2265]	5000 [2359]	5200 [2454]	5400 [2548]	5600 [2643]	5800 [2737]	6000 [2831]	6200 [2926]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]
	Resistance — Inches of Water [kPa]												
Wet Coil	0.03 [.01]	0.04 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]
Downflow	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.08 [.02]
Downflow Economizer RA Damper Open	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]
Horizontal Economizer RA Damper Open	0.00 [.00]	0.01 [.00]	0.01 [.00]	0.02 [.00]	0.02 [.00]	0.03 [.01]	0.03 [.01]	0.04 [.01]	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]

AIRFLOW CORRECTION FACTORS — 15 TON [52.7kW]

	CFM [L/s]	4800 [2265]	5000 [2359]	5200 [2454]	5400 [2548]	5600 [2643]	5800 [2737]	6000 [2831]	6200 [2926]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]
	Total MBH	0.97	0.97	0.98	0.98	0.99	1.00	1.00	1.01	1.02	1.02	1.03	1.03	1.04
	Sensible MBH	0.87	0.90	0.92	0.94	0.97	0.99	1.02	1.04	1.06	1.09	1.11	1.14	1.16
	Power kW	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02

NOTE: Multiply correction factor times gross performance data — resulting sensible capacity cannot exceed total capacity.

Figure 29: Airflow Performance—MPS 020B

Air Flow CFM [L/s]	Model MPS 020 Voltage 208/230, 460, 575 — 3 phase External Static Pressure — Inches of Water [kPa]																																					
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
6400 [3020]	—	—	—	—	—	—	—	—	632	2007	654	2111	676	2218	698	2328	719	2439	741	2553	763	2670	785	2789	810	3065	830	3203	850	3342	869	3481	888	3621	906	3761	923	3902	937	4121
6600 [3114]	—	—	—	—	—	—	—	—	642	2106	664	2217	686	2330	707	2446	729	2564	751	2685	773	2808	798	3060	819	3201	838	3342	857	3484	876	3626	894	3769	912	3912	930	4056	944	4271
6800 [3209]	—	—	—	—	—	—	630	2100	652	2215	674	2332	696	2452	718	2574	739	2699	761	2826	783	2955	807	3202	827	3346	846	3490	865	3634	884	3780	901	3926	919	4072	933	4283	950	4432
7000 [3303]	—	—	—	—	—	—	641	2213	663	2334	684	2458	706	2585	728	2713	750	2844	772	2977	796	3207	816	3352	835	3499	854	3646	873	3794	891	3942	909	4091	926	4240	940	4448	957	4603
7200 [3398]	—	—	—	—	630	2211	651	2336	673	2464	695	2594	717	2727	739	2862	761	2999	783	3139	805	3362	825	3511	844	3661	863	3811	881	3961	898	4112	916	4264	932	4417	947	4624	964	4784
7400 [3492]	—	—	—	—	641	2338	663	2470	684	2604	706	2741	728	2880	750	3021	772	3165	795	3375	815	3526	834	3678	853	3831	871	3984	889	4137	906	4292	923	4447	938	4650	954	4810	971	4976
7600 [3586]	—	—	630	2339	652	2475	674	2613	696	2754	718	2897	740	3043	761	3190	783	3341	805	3545	824	3699	843	3854	862	4009	879	4165	897	4322	914	4479	930	4637	945	4841	962	5007	978	5179
7800 [3681]	—	—	642	2480	664	2622	686	2767	707	2914	729	3064	751	3216	773	3370	795	3567	815	3723	834	3880	852	4038	870	4197	888	4356	905	4515	922	4675	936	4878	953	5043	969	5214	986	5392
8000 [3775]	632	2485	654	2631	676	2780	698	2931	719	3085	741	3241	763	3399	785	3559	806	3750	825	3910	844	4070	862	4231	880	4392	897	4554	914	4717	930	4880	944	5084	961	5255	977	5432	993	5616
8200 [3869]	644	2640	666	2793	688	2948	710	3105	732	3265	754	3427	776	3592	797	3780	816	3942	835	4105	854	4268	871	4432	889	4596	906	4761	922	4927	936	5130	952	5300	969	5477	985	5660	1001	5850
8400 [3964]	657	2805	679	2964	701	3126	723	3290	745	3456	767	3625	789	3796	808	3978	827	4143	846	4309	864	4475	881	4642	898	4809	915	4977	931	5146	944	5352	961	5528	977	5710	993	5899	1008	6094
8600 [4058]	670	2980	692	3146	714	3314	736	3484	758	3657	780	3832	800	4017	819	4184	838	4352	856	4521	874	4690	891	4860	907	5030	924	5201	937	5408	953	5584	969	5765	985	5954	1001	6148	—	—
8800 [4153]	683	3166	705	3338	727	3512	749	3689	771	3868	793	4059	812	4229	831	4399	849	4570	867	4742	884	4914	901	5087	917	5260	933	5434	946	5645	962	5826	978	6013	993	6208	1009	6408	—	—
9000 [4247]	697	3361	719	3540	741	3721	763	3904	785	4089	805	4276	824	4449	842	4622	860	4796	877	4971	894	5146	911	5322	927	5498	939	5712	955	5892	971	6079	986	6272	1002	6472	—	—	—	—
9200 [4341]	711	3567	733	3752	755	3939	777	4129	798	4327	817	4502	835	4678	853	4854	871	5031	888	5209	905	5387	921	5565	933	5784	949	5963	964	6149	980	6342	995	6541	1010	6747	—	—	—	—
9400 [4436]	725	3783	747	3975	769	4168	792	4381	811	4558	829	4736	847	4915	865	5094	882	5274	899	5455	915	5636	931	5818	942	6040	958	6225	973	6418	989	6616	1004	6821	—	—	—	—	—	—
9600 [4530]	739	4010	762	4207	784	4407	805	4617	823	4798	842	4979	859	5161	877	5343	894	5526	910	5709	926	5894	937	6122	952	6307	968	6498	983	6696	998	6901	—	—	—	—	—	—	—	—

NOTE: L-Drive left of bold line, M-Drive middle of bold lines.

Drive Package	L						M					
Motor H.P. [W]	5 [3728.5]						7.5 [5592.7]					
Blower Sheave	BK130H						BK130H					
Motor Sheave	1VP-56						1VP-71					
Turns Open	**1**	2	3	4	5	6	1	2	**3**	4	5	6
RPM	**756**	734	709	683	658	631	928	902	**874**	847	820	793

NOTES:
1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 20 TON [70.3kW]

CFM [L/s]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]	7400 [3492]	7600 [3586]	7800 [3681]	8000 [3775]	8200 [3869]	8400 [3964]	8600 [4058]	8800 [4153]	9000 [4247]	9200 [4341]	9400 [4436]	9600 [4530]
	Resistance — Inches of Water [kPa]																
Wet Coil	0.00 [.00]	0.00 [.00]	0.00 [.00]	0.01 [.00]	0.01 [.00]	0.02 [.00]	0.02 [.00]	0.03 [.01]	0.03 [.01]	0.04 [.01]	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.07 [.02]
Downflow	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.08 [.02]	0.09 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.18 [.04]	0.19 [.05]	0.20 .05]	0.22 [.05]
Downflow Economizer RA Damper Open	0.15 [.04]	0.16 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]	0.19 [.05]	0.20 [.05]	0.21 [.05]	0.22 [.05]	0.23 [.06]	0.24 [.06]	0.25 [.06]	0.26 [.06]	0.27 [.07]	0.28 [.07]	0.29 [.07]	0.30 [.07]
Horizontal Economizer RA Damper Open	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.07 [.02]	0.08 [.02]	0.09 [.02]	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.11 [.03]	0.12 [.03]	0.12 [.03]	0.13 [.03]

AIRFLOW CORRECTION FACTORS — 20 TON [70.3kW]

	CFM [L/s]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]	7400 [3492]	7600 [3586]	7800 [3681]	8000 [3775]	8200 [3869]	8400 [3964]	8600 [4058]	8800 [4153]	9000 [4247]	9200 [4341]	9400 [4436]	9600 [4530]
	Total MBH	0.97	0.97	0.98	0.98	0.99	0.99	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.03	1.04	1.04
	Sensible MBH	0.88	0.90	0.92	0.94	0.96	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.10	1.12	1.14	1.16	1.18
	Power kW	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.02	1.02	1.02

NOTE: Multiply correction factor times gross performance data — resulting sensible capacity cannot exceed total capacity.

[ ] Designates Metric Conversions

Figure 30: Airflow Performance—MPS 025B

Air Flow CFM [L/s]	Model MPS 025 Voltage 208/230, 460, 575 — 3 phase External Static Pressure — Inches of Water [kPa]																																							
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
8000 [3775]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	794	3720	814	3870	833	4024	851	4182	869	4344	886	4510	903	4680	920	4854	948	5256	963	5410	979	5565	994	5720	1009	5877
8200 [3869]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	807	3908	826	4065	845	4226	863	4392	880	4561	897	4735	914	4912	943	5296	958	5455	973	5614	988	5774	1003	5935	1018	6097
8400 [3964]	—	—	—	—	—	—	—	—	—	—	—	—	801	3947	820	4108	838	4273	856	4442	874	4614	891	4791	908	4972	924	5157	952	5503	967	5667	982	5832	997	5997	1012	6164	1028	6331
8600 [4058]	—	—	—	—	—	—	—	—	—	—	794	3989	813	4153	832	4321	850	4493	868	4670	886	4850	902	5034	919	5223	947	5557	962	5725	977	5894	992	6064	1007	6235	1022	6407	1037	6579
8800 [4153]	—	—	—	—	—	—	—	—	—	—	807	4200	826	4371	845	4547	862	4727	880	4910	897	5098	913	5290	942	5614	957	5787	972	5960	987	6134	1002	6310	1017	6486	1032	6663	1047	6841
9000 [4247]	—	—	—	—	—	—	—	—	801	4249	820	4424	839	4603	857	4786	874	4973	892	5164	908	5359	924	5558	952	5853	967	6031	982	6209	997	6389	1012	6570	1027	6752	1042	6934	1057	7118
9200 [4341]	—	—	—	—	—	—	795	4300	815	4478	833	4660	851	4847	869	5037	886	5232	903	5430	919	5633	947	5923	962	6105	977	6289	992	6473	1007	6658	1022	6844	1037	7031	1052	7219	1068	7408
9400 [4436]	—	—	—	—	790	4352	809	4534	828	4720	846	4910	864	5104	881	5302	898	5504	915	5710	943	5997	958	6184	972	6372	987	6561	1002	6750	1017	6941	1032	7132	1048	7325	1063	7518	—	—
9600 [4530]	—	—	—	—	804	4592	823	4781	841	4975	859	5172	876	5373	893	5579	910	5788	926	6002	953	6267	968	6460	983	6653	998	6847	1013	7042	1028	7238	1043	7434	1058	7632	—	—	—	—
9800 [4624]	—	—	798	4652	817	4845	836	5042	854	5242	872	5447	889	5656	905	5869	922	6085	949	6355	964	6551	979	6749	994	6947	1009	7147	1024	7347	1039	7548	1054	7751	1069	7954	—	—	—	—
10000 [4719]	793	4714	813	4910	831	5110	849	5315	867	5523	884	5735	901	5951	917	6171	945	6446	960	6647	975	6849	990	7052	1005	7256	1019	7461	1034	7667	1050	7873	1065	8081	—	—	—	—	—	—
10200 [4813]	808	4978	827	5181	845	5389	863	5600	880	5816	897	6035	913	6259	941	6542	956	6748	971	6954	986	7162	1001	7370	1016	7579	1031	7789	1046	8000	1061	8212	—	—	—	—	—	—	—	—
10400 [4908]	822	5254	840	5465	858	5680	876	5899	893	6122	909	6349	926	6580	953	6852	967	7063	982	7275	997	7488	1012	7701	1027	7916	1042	8131	1057	8348	1072	8565	—	—	—	—	—	—	—	—
10600 [5002]	836	5543	854	5761	872	5984	889	6210	906	6441	922	6675	949	6961	964	7176	979	7393	993	7610	1008	7828	1023	8047	1038	8267	1053	8488	1068	8710	—	—	—	—	—	—	—	—	—	—
10800 [5096]	850	5845	868	6071	885	6301	902	6534	918	6772	946	7074	961	7294	975	7514	990	7736	1005	7959	1020	8182	1035	8407	1050	8632	1065	8858	—	—	—	—	—	—	—	—	—	—	—	—
11000 [5191]	864	6160	882	6393	899	6630	915	6871	943	7191	958	7415	972	7640	987	7867	1002	8094	1017	8321	1032	8550	1046	8780	1061	9011	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11200 [5285]	878	6487	895	6728	912	6972	940	7313	955	7541	969	7771	984	8001	999	8233	1014	8465	1029	8698	1043	8933	1058	9168	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11400 [5379]	892	6827	909	7075	925	7328	952	7671	967	7905	981	8140	996	8376	1011	8613	1026	8851	1041	9089	1055	9329	1070	9570	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11600 [5474]	906	7180	922	7436	950	7806	964	8044	979	8283	994	8524	1008	8765	1023	9007	1038	9250	1053	9494	1068	9739	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11800 [5568]	920	7546	948	7944	962	8187	977	8431	991	8676	1006	8921	1021	9168	1035	9416	1050	9664	1065	9913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12000 [5663]	946	8087	960	8334	975	8583	989	8832	1004	9082	1019	9333	1033	9585	1048	9838	1063	10092	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE : L-Drive left of bold line, M-Drive right of bold line.

Drive Package	L						M					
Motor H.P. [W]	7.5 [5592.7]						10 [7457.0]					
Blower Sheave	BK130H						BK120H					
Motor Sheave	1VP-71						1VP-75					
Turns Open	**1**	2	3	4	5	6	1	2	3	**4**	5	6
RPM	**919**	894	869	844	817	790	1067	1039	1012	**982**	953	925

NOTES:
1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 25 TON [87.9kW]

CFM [L/s]	8000 [3775]	8400 [3964]	8800 [4153]	9200 [4341]	9600 [4530]	10000 [4719]	10400 [4908]	10800 [5096]	11200 [5285]	11600 [5474]	12000 [5663]
	Resistance — Inches of Water [kPa]										
Wet Coil	0.07 [.02]	0.09 [.02]	0.10 [.02]	0.12 [.03]	0.13 [.03]	0.15 [.04]	0.16 [.04]	0.18 [.04]	0.19 [.05]	0.21 [.05]	0.22 [.05]
Downflow	0.12 [.03]	0.14 [.03]	0.16 [.04]	0.19 [.05]	0.22 [.05]	0.25 [.06]	0.29 [.07]	0.33 [.08]	0.37 [.09]	0.42 [.10]	0.46 [.11]
Downflow Economizer RA Damper Open	0.22 [.05]	0.24 [.06]	0.26 [.06]	0.28 [.07]	0.30 [.07]	0.32 [.08]	0.34 [.08]	0.37 [.09]	0.39 [.10]	0.41 [.10]	0.44 [.11]
Horizontal Economizer RA Damper Open	0.09 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]	0.19 [.05]

AIRFLOW CORRECTION FACTORS — 25 TON [87.9kW]

	CFM [L/s]	8000 [3775]	8400 [3964]	8800 [4153]	9200 [4341]	9600 [4530]	10000 [4719]	10400 [4908]	10800 [5096]	11200 [5285]	11600 [5474]	12000 [5663]
	Total MBH	0.97	0.98	0.99	0.99	1.00	1.01	1.02	1.03	1.03	1.04	1.05
	Sensible MBH	0.89	0.92	0.95	0.98	1.01	1.04	1.08	1.11	1.14	1.17	1.20
	Power kW	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02

NOTE : Multiply correction factor times gross performance data — resulting sensible capacity cannot exceed total capacity.

[ ] Designates Metric Conversions

Accessories

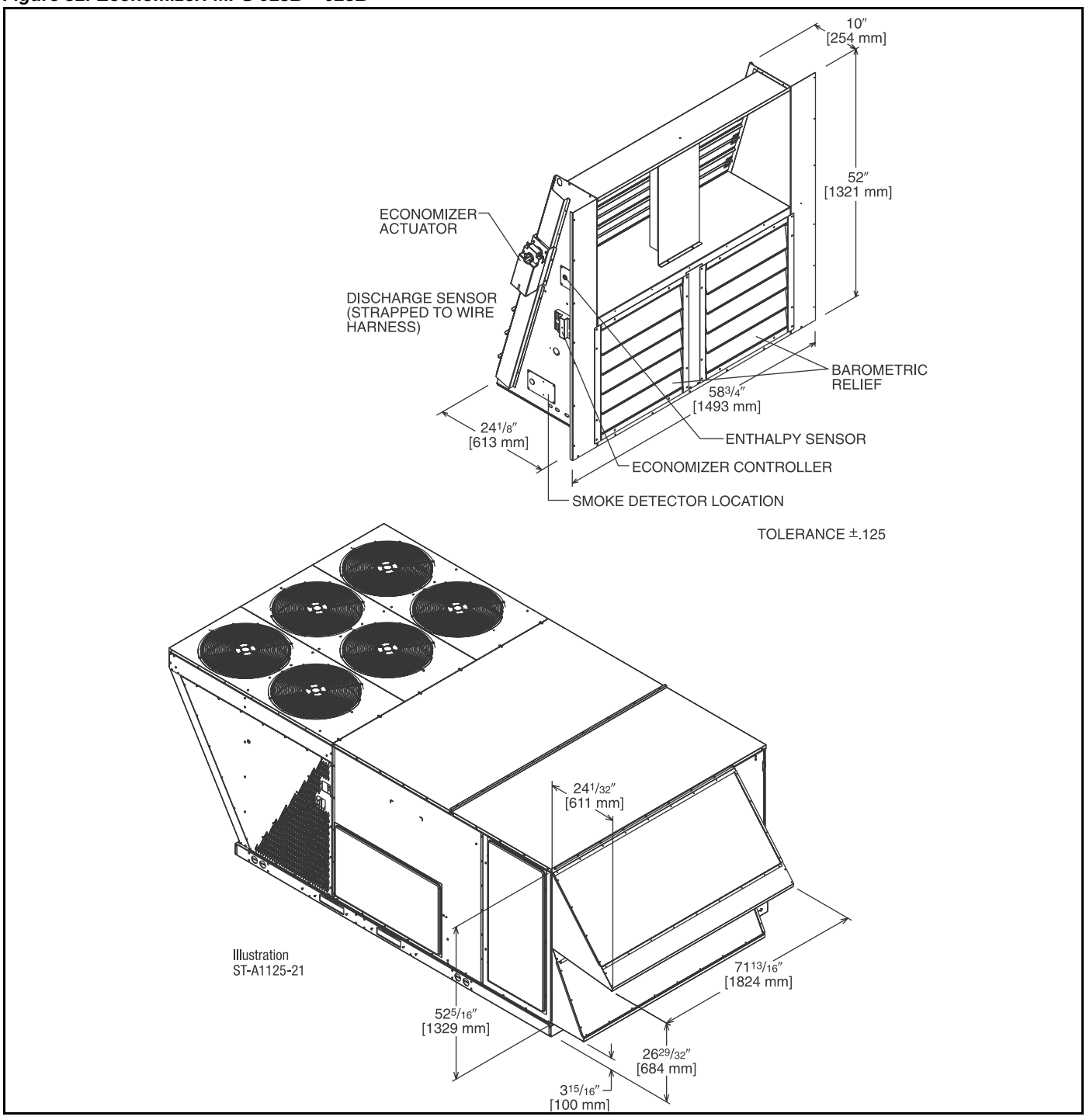
Table 18: Accessory Weights

Accessory	Daikin Part Number	Shipping Weight	Operating Weight
Economizer, 3-5 ton, Vert/Horiz	MXRD-TECM3	70 [32]	60 [27]
Economizer, 6-12 ton, Vertical	MXRD-PDCM3	90 [41]	81 [32]
Economizer, 6-12 ton, Horizontal	MXRD-RDCM3	90 [41]	81 [32]
Economizer, 15-25 ton, Vertical	MXRD-PGCM3	155 [70]	146 [66]
Economizer, 15-25 ton, Horizontal	MXRD-RGCM3	155 [70]	146 [66]
OA damper, 3-5 ton, Manual	MXRF-FGA1	11 [5]	9 [4]
OA damper, 3-5 ton, Motorized	MXRF-FGB1	13 [6]	11 [5]
OA damper, 6-12 ton, Manual	MXRF-KDA1	26 [12]	21 [10]
OA damper, 6-12 ton, Motorized	MXRF-JDB1	43 [19]	38 [17]
OA damper, 15-25 ton, Manual	MXRF-KFA1	46 [21]	35 [16]
OA damper, 15-25 ton, Motorized		51 [23]	40 [18]
Power Exhaust Kit, 3 - 5 Ton 208/230 V	MXRX-BGF06C	70 [32]	60 [27]
Power Exhaust Kit, 3 - 5 Ton 460 V	MXRX-BGF06D	70 [32]	60 [27]
Power Exhaust Kit, 6 - 12 Ton 208/230 V	RXRX-BFF02C	44 [20]	42 [19]
Power Exhaust Kit, 6 - 12 Ton 460V	RXRX-BFF02D	44 [20]	42 [19]
Power Exhaust Kit, 6 - 12 Ton 575 V	RXRX-BFF02Y	44 [20]	42 [19]
Power Exhaust Kit, 15-25 Ton 208/230 V	RXRX-BGF05C	44 [20]	42 [19]
Power Exhaust Kit, 15-25 Ton 460V	RXRX-BGF05D	44 [20]	42 [19]
Power Exhaust Kit, 15-25 Ton 575V	RXRX-BGF05Y	44 [20]	42 [19]
14" Roof Curb, 3-5 Ton	RXKG-CBH14	92 [42]	88 [40]
14" Roof Curb, 6-12 Ton	RXKG-CAD14	90 [41]	85 [39]
14" Roof Curb, 15-25 Ton	RXKG-CAE14	170 [77]	164 [74]
Receptacle Outlet	RXRX-AN01	N/A	N/A
Thermostat Guard	113130101	N/A	N/A
7-Day Programmable Stat	113129901	N/A	N/A
Ionization Smoke Detector	113126601	N/A	N/A
CO_2 Sensor	RXRX-AR02	N/A	N/A
Dual Enthalpy Kit	RXRX-AV02	N/A	N/A

Economizers

- Features economizer controller
- Available factory installed or field accessory
- Gear driven direct drive actuator
- Fully modulating (0-100%)
- Low leakage dampers
- Slip-in design for easy installation
- Plug-in polarized electrical connections
- Pre-configured—no field adjustments necessary
- Standard barometric relief damper
- Single enthalpy with dual enthalpy upgrade kit available
- CO_2 input sensor available
- Field assembled hood ships with economizer
- Economizer ships complete for downflow duct application
- Field installed power exhaust available

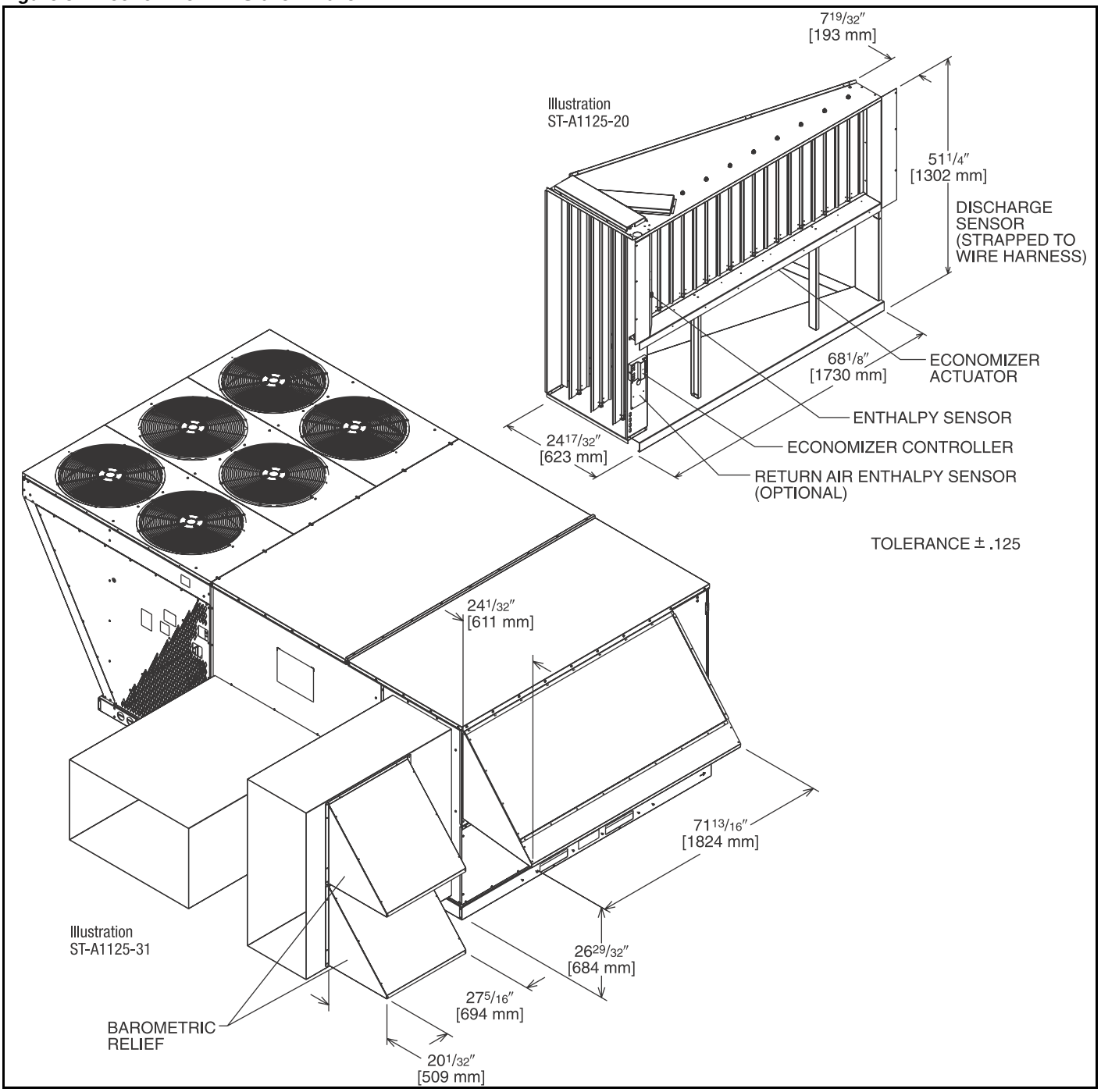
Figure 31: Economizer: MPS 015B – 025B



Economizers: 15–25 Tons [52.8–87.9 kW] Horizontal Duct Installation

- Features economizer controller
- Available factory installed or field accessory
- Gear driven direct drive actuator
- Fully modulating (0-100%)
- Low leakage dampers
- Slip-in design for easy installation
- Plug-in polarized 12 pin electrical connections
- Pre-configured—no field adjustments necessary
- Standard barometric relief damper
- Single enthalpy with dual enthalpy upgrade kit available
- CO_2 input sensor available
- Field assembled hood ships with economizer
- Economizer ships complete for downflow duct application
- Field installed power exhaust available

Figure 32: Economizer: MPS 015B – 025B



Fresh Air Dampers and Power Exhaust

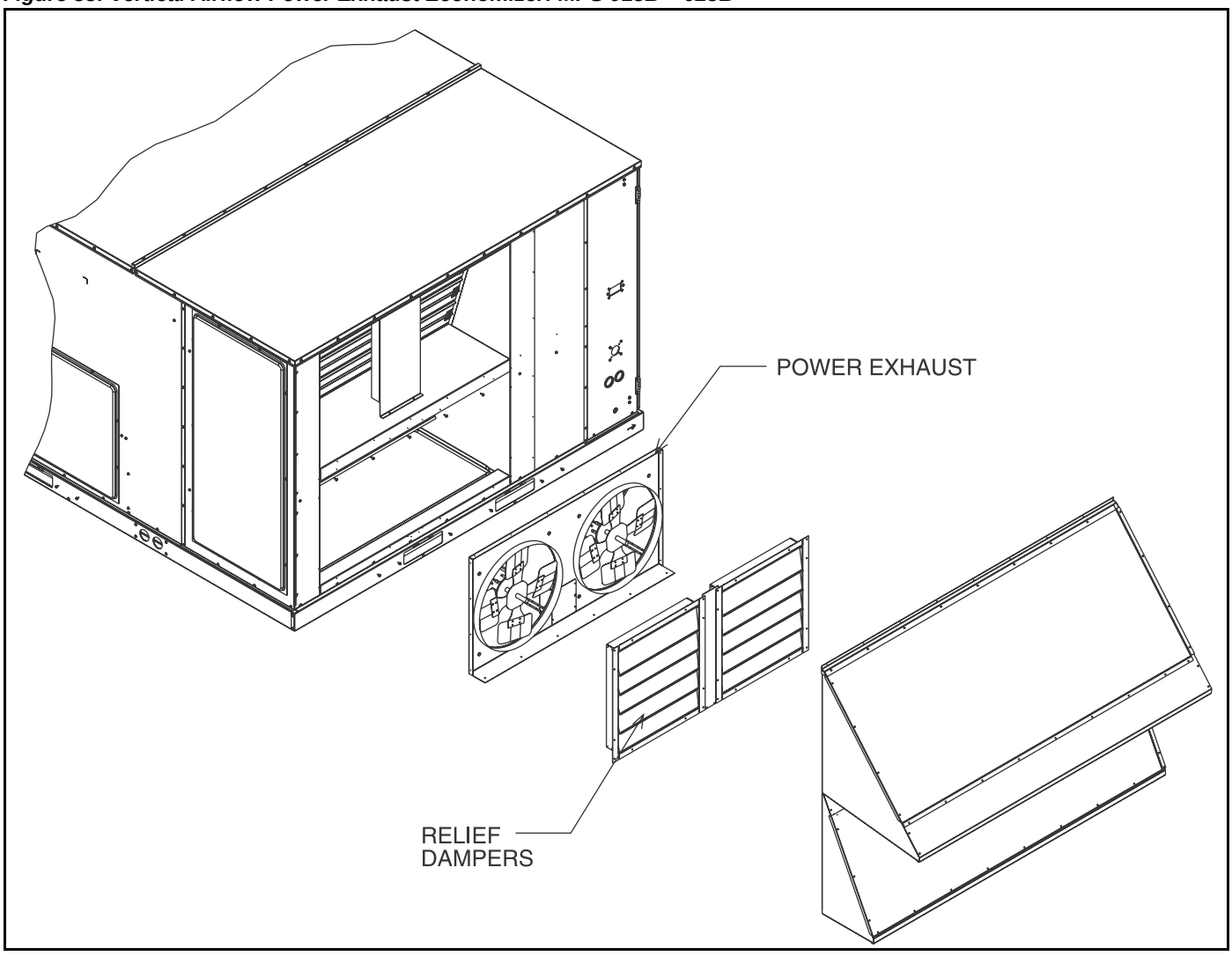
Table 19: Air Damper and Exhaust Accessories

Daikin Model No.	Description
RXRX-CFF02C	Power exhaust, 208/230 volt for MPS-006B through -025B
RXRX-CFF02D	Power exhaust, 460 volt for MPS-006B through -025B
RXRX-CFF02Y	Power exhaust, 575 volt for MPS-006B through -025B

Power Exhaust Kit For Economizers: 15–25 Tons [52.8–87.9 kW]

- For economizer controller
- Requires separate power supply with disconnect
- Adjustable switch on economizer, factory preset to energize power exhaust at 95% outside air position
- Polarized plug connects power exhaust relay to economizer

Figure 33: Vertical Airflow Power Exhaust Economizer: MPS 015B – 025B

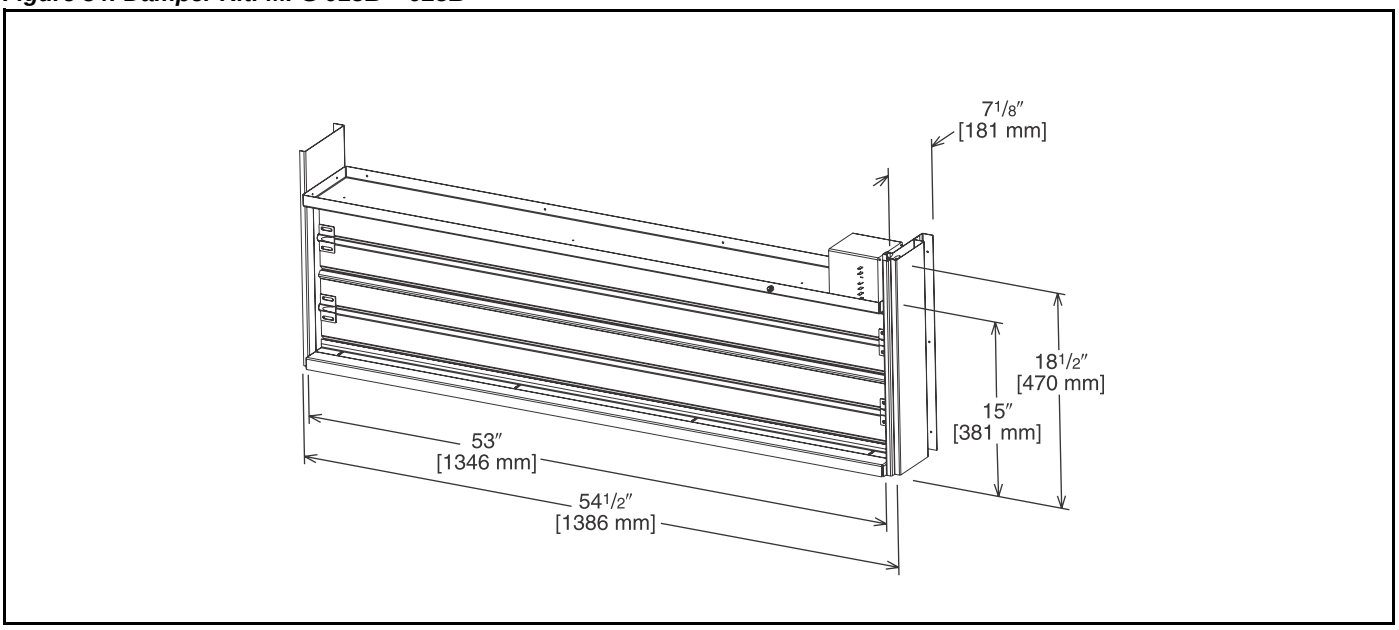


Accessories

Fresh Air Damper Kit for 15–25 Ton [52.8–87.9 Kw] Units

Motorized Damper Kit

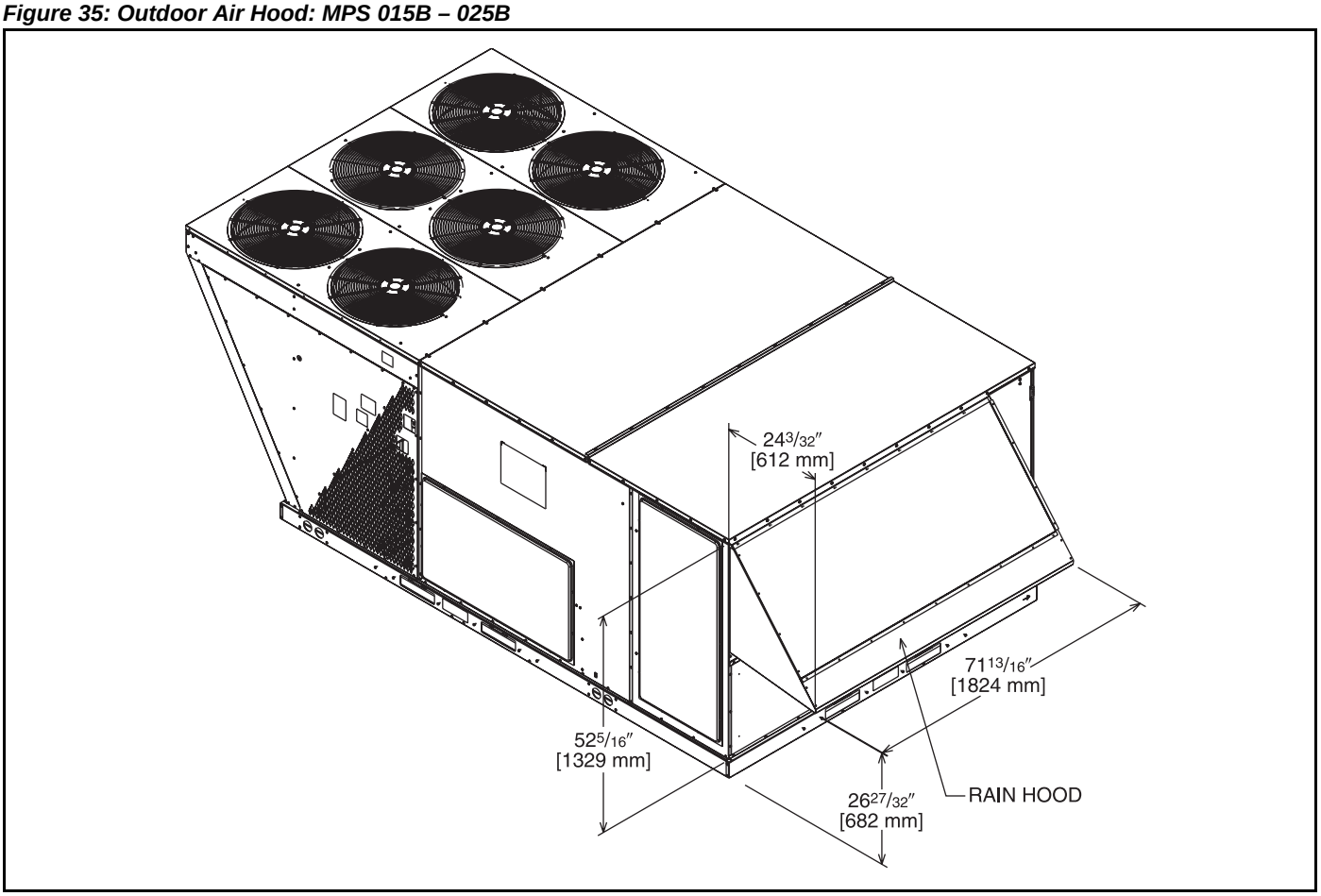
Figure 34: Damper Kit: MPS 015B – 025B



Note: Outdoor air hood must also be ordered with this kit

Outdoor Air Hood

Figure 35: Outdoor Air Hood: MPS 015B – 025B

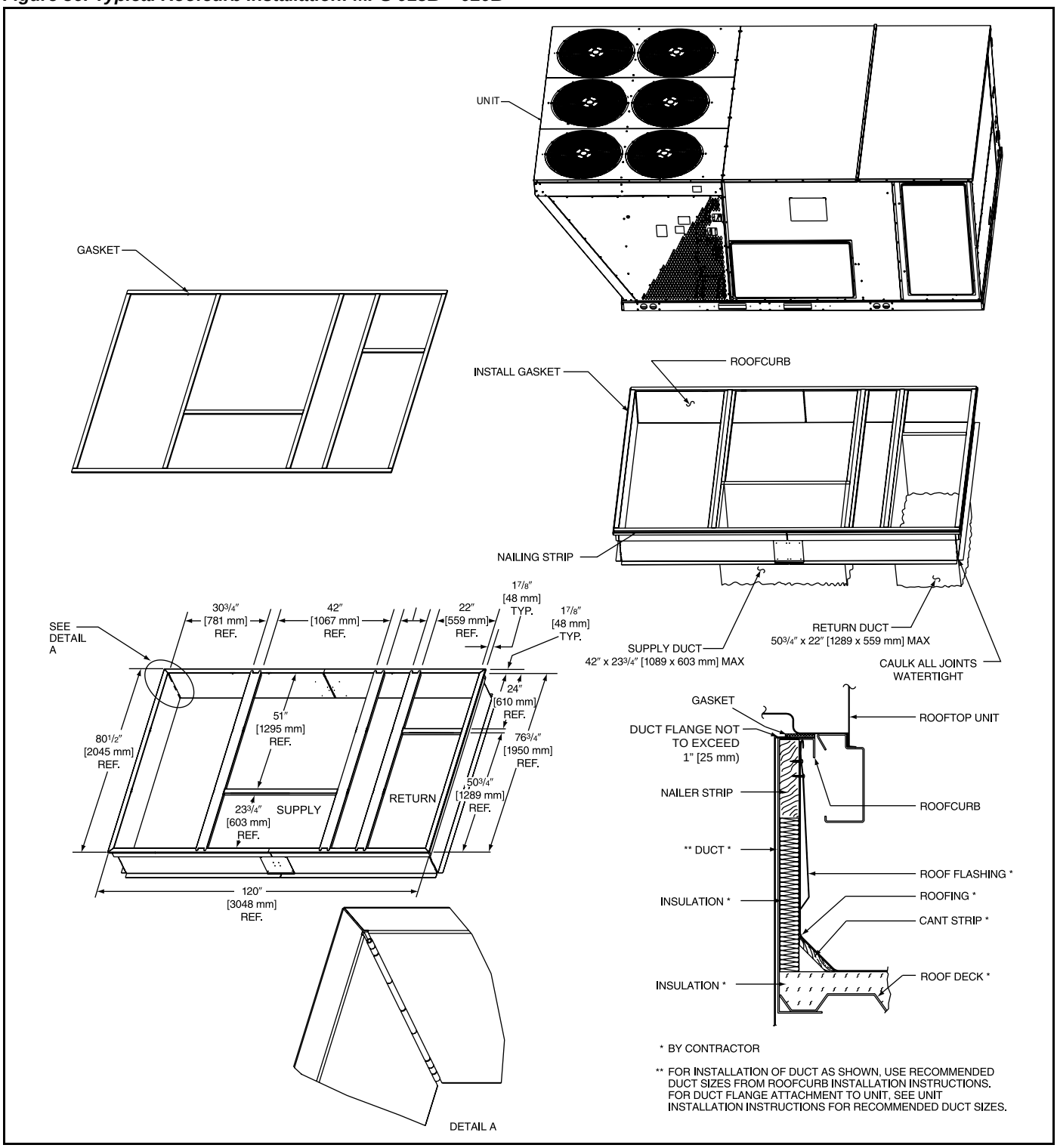


Roofcurbs

Roofcurbs (Full Perimeter): 15–25 Tons [52.8–70.3 kW]

- One available height (14") [356 mm] for all models.
- Quick assembly corners for easy installation.
- 1" [25 mm] x 4" [102 mm] nailer provided.
- Insulating panels not required because of insulated outdoor base pan.
- Sealing gasket (28" [711 mm]) provided with roofcurb.
- 18 gauge galvanized steel.

Figure 36: Typical Roofcurb Installation: MPS 015B – 020B

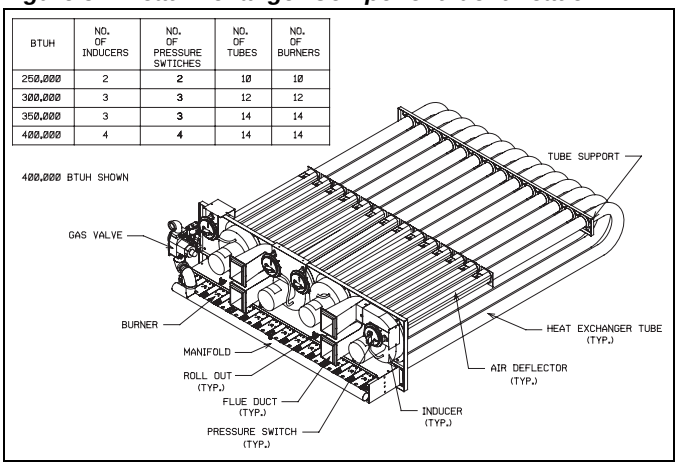


Furnace Section Controls and Ignition System

Normal Furnace Operating Sequence

This unit has a two stage gas furnace which employs an integrated furnace control with self diagnostics located in the control box. The furnace is composed of induced draft blowers, negative pressures switches, two stage gas valve, manifold orifices, in-shot burners, direct spark ignitor, remote flame sense, tubular heat exchanger, high limit switch and rollout switches. See Figure 37.

Figure 37: Heat Exchanger Component Identification



Normal Heat Mode

Call For First Stage (low fire) Only:

1. Zone thermostat contacts close, a call for first stage (low fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.
5. Control checks each low-fire pressure switch for closure.
6. If each pressure switch is closed, the control starts a 30 second prepurge and energizes W2. If any pressure switch is still open, the inducers will continue to be energized until closure.
7. After prepurge timeout, control energizes W1 and continues to energize W2, initiates spark for two seconds minimum (seven second maximum) ignition trial, and initiates a 120 second - second stage (high fire) warm up timing.
8. Control detects flame, de-energizes spark and initiates 45 second delay on blower timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After a fixed 120 seconds second stage warm-up period control checks thermostat input. If only W1 is called for, W2 is de-energized and the control starts a 30 second off delay on the W2 inducer(s).
11. After fixed 30 seconds the W2 inducer is de-energized.
12. Control enters normal operating loop where all inputs are continuously checked.
13. Zone thermostat is satisfied.
14. Control de-energizes gas valve.
15. Control senses loss of flame.
16. Control initiates five second inducer post-purge and 90 second indoor blower delay off.
17. Control de-energizes inducer blower(s).
18. Control de-energizes indoor blower.
19. Control in the stand by mode with solid red LED.

Call For Second Stage, After First Stage Established; Starting from A.11:

1. If a call for second stage (high fire) is initiated after a call for first stage heat is established, the control energizes the W2 inducers and energizes the second stage of the gas valve.
2. Control enters normal operating loop where all inputs are continuously checked.

Second Stage Satisfied; First Stage Still Called For; Starting From B.3:

1. Once the call for second stage is satisfied, the control starts a 30 second off delay on W2 inducers and reduces the gas valve to first stage.
2. Control enters normal operating loop where all inputs are continuously checked.

First Stage Satisfied:

1. Zone thermostat is satisfied.
2. Control de-energizes gas valve.
3. Control senses loss of flame.
4. Control initiates five second inducer post-purge and 90 second indoor blower delay off.
5. Control de-energizes inducer blower.
6. Control de-energizes indoor blower.
7. Control in the standby mode with solid red LED.

First Stage and Second Stage Called Simultaneously:

1. Zone thermostat contacts close. A call for first stage (low fire) and second stage (high fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.

5. Control checks each pressure switch for closure.
6. If each pressure switch is closed, the control starts a 30 second prepurge and energizes W2. If either switch is still open, the inducers will continue to be energized until closure.
7. After prepurge time-out, control energizes W1 and continues to energize W2, initiates spark for 2 seconds minimum, 7 second maximum ignition trial, and initiates 120 second stage warm up timing.
8. Control detects flame, de-energizes spark and starts a 45 second indoor blower delay on timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After a fixed 120 seconds second stage warm-up period control checks the thermostat input. If W1 and W2 are present, control enters normal operating loop where all inputs are continuously checked.

First Stage and Second Stage Removed Simultaneously:

1. Upon a loss of W1 and W2 the gas valve is de-energized.
2. 2 Upon a loss of flame, each inducer will complete a 5 second post-purge and the indoor blower will complete a 90 second delay off.
3. Control in the stand by mode with solid red LED.

The integrated control is a three ignition system.

After a total of three cycles without sensing main burner flame, the system goes into a 100% lockout mode. After one hour, the ignition control repeats the prepurge and ignition cycles for 3 tries and then goes into 100% lockout mode again. It continues this sequence of cycles and lockout each hour until ignition is successful or power is interrupted. During the lockout mode, neither the ignitor or gas valve will be energized until the system is reset by turning the thermostat to the “OFF” position or interrupting the electrical power to the unit for 3 seconds or longer.

The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the “ON” position.

The integrated furnace control is equipped with diagnostic LED. The LED is lit continuously when there is power to the control, with or without a call for heat. If the LED is not lit, there is either no power to the control or there is an internal component failure within the control, and the control should be replaced.

If the control detects the following failures, the LED will flash on for approximately 1/4 second, then off for 3/4 second for designated failure detections.

1. Flash: Failed to detect flame within the four tries for ignition.
2. Flash: Pressure switch or induced draft blower problem detected.
3. Flash: High limit or auxiliary limit open.
4. Flash: Flame sensed and gas valve not energized or flame sensed with no “W” signal.
5. Flash: Overtemperature switch open.

Operating Instructions

This unit is equipped with integrated furnace control. This device lights the main burners each time the room thermostat (closes) calls for heat. See operating instructions on the back of the furnace/controls access panel.

⚠ DANGER

Never test for gas leaks with an open flame. It can cause an explosion or fire resulting in property damage, personal injury or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections as specified in the Mechanical Installation section of these instructions.

⚠ DANGER

The spark ignitor and ignition lead from the ignition control are high voltage. Keep hands or tools away to prevent electrical shock. Shut off electrical power before servicing any of the controls. Failure to adhere to this warning can result in personal injury or death.

⚠ DANGER

Should overheating occur or the gas supply fail to shut off, shut off the manual gas valve to the unit before shutting off the electrical supply. Failure to do so can result in an explosion or fire causing property damage, severe personal injury or death!

To Start The Furnace

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the unit.
3. This unit does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Remove control door.
5. Move control knob to the “OFF” position. Turn the knob by hand only, do not use any kind of tool.
6. Wait five minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow B in the safety information on the Operating Instructions located on the back of the controls/access panel. If you don't smell gas, go to the next step.
7. Move the gas control knob from “OFF” position to “ON” position. Operate this unit with the gas control knob in the “ON” position only. Do not use the gas control knob as a means for throttling the burner input rate.
8. Replace the control door.
9. Turn on all electric power to the unit.
10. Set the thermostat to the desired setting.
11. If the unit will not operate, follow the instructions below on how to shut down the furnace.

The initial start-up on a new installation may require the control system to be energized for some time until air has bled through the system and fuel gas is available at the burners.

To Shut Down Furnace

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the unit if service is to be performed.
3. Remove control door.
4. Move control knob to the “OFF” position.
5. Replace control door.

Burners

Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

Manual Reset Over-Temperature Control

Four manual reset overtemperature controls are located on the burner shield. These devices senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

⚠ DANGER

DO NOT JUMPER THIS DEVICE! Doing so can cause a fire or explosion resulting in property damage, personal injury or death. DO NOT reset the over-temperature control without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Failure to do so can result in carbon monoxide poisoning or death. Replace this control only with the identical replacement part.

Pressure Switch

This furnace has four pressure switches for sensing a blocked exhaust or a failed induced draft blower. They are normally open and close when the induced draft blower starts, indicating air flow through the combustion chamber.

Limit Control

The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature.

Cooling Section Operation

Cooling Mode

Call for first stage cooling

1. Zone thermostat contacts close and a call for cooling is initiated.
2. Inputs Y1 and G to the control are energized.
3. Control senses Y1 and G. After 1 sec. delay, control energizes indoor blower and first stage compressor.
4. Control enters normal operating loop where all inputs are continuously checked.
5. Zone thermostat is satisfied.
6. Control de-energizes indoor blower relay after 80 second indoor blower delay off.
7. Control in the stand by mode with solid red LED.

Call for second stage cooling. After first stage cooling established: starting from A4.

1. If a call for second stage cooling is initiated after a call for first stage cooling is established, the control energizes Y2 and energizes the second stage compressor.
2. Control enters normal operating loop where all inputs are continuously checked.

Second stage satisfied: first stage still called for: starting from B2.

1. Y2 is de-energized and second stage compressor is de-energized.

First stage and second stage called simultaneously.

1. Zone thermostat contacts close, a call for first and second stage cooling is initiated.
2. Inputs Y1, Y2 and G to the control are energized.
3. Control senses Y1, Y2 and G, after 1 second delay, control energizes indoor blower, first and second stage compressor are energized.

First stage and second stage removed simultaneously.

1. Upon a loss of Y1 and Y2 each compressor is de-energized. Control either de-energizes indoor blower relay after 80 second indoor blower delay off.
2. Control in the stand by mode with solid red LED.

Continuous Fan Mode

G input only indicates a zone thermostat call for continuous indoor blower operation.

General

Advise The Customer

1. Change the air filters regularly. The heating system operates better, more efficiently and more economically.
2. Except for the mounting platform, keep all combustible articles three feet from the unit and exhaust system.
3. **IMPORTANT:** Replace all blower doors and compartment cover after servicing the unit. Do not operate the unit without all panels and doors securely in place.
4. Do not allow snow or other debris to accumulate in the vicinity of the unit.

Unit Maintenance

Furnace Section

The unit's furnace should operate for many years without excessive scale build-up in flue passageways. However, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the exhaust system and the burners for continued safe operation, paying particular attention to deterioration from corrosion or other sources.

If during inspection the flue passageways and exhaust system are determined to require cleaning, the following procedures should be followed (by a qualified installer, service agency, or gas supplier):

⚠ DANGER

Power supply to unit must be disconnected before making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

1. Turn off the electrical power to the unit and set the thermostat to the lowest temperature.
2. Shut off the gas supply to the unit either at the meter or at manual valve in the supply piping.
3. Remove the furnace controls access panel and the control box cover.
4. Disconnect the gas supply piping from the gas valve.
5. Disconnect the wiring to the induced draft blower motor, gas valve, flame sensor, and flame roll-out control, and ignitor cable. **Mark all wires disconnected for proper reconnection.**

⚠ DANGER

Label all wires prior to disconnection when servicing controls. wiring errors can cause improper and dangerous operation resulting in fire, electrical shock, property damage, personal injury or death.

6. Remove the screws (4) connecting the burner tray to the heat exchanger mounting panel.
7. Remove the burner tray and the manifold assembly from the unit.
8. Remove the screws (10) connecting the two induced draft blowers to the collector box and screws (12) connecting the inducer mounting plate to the heat exchanger center panel. Remove the induced draft blower and the collector box from the unit.
9. Remove the turbulators from inside the heat exchangers by inserting the blade of a screwdriver under the locking tabs. Pop the tabs out of the expanded grooves of the heat exchanger. Slide the turbulators out of the heat exchangers.
10. Direct a water hose into the outlet of the heat exchanger top. Flush the inside of each heat exchanger tube with water. Blow out each tube with air to remove excessive moisture.
11. Reassemble (steps 1 through 9 in reverse order). **Be careful not to strip out the screw holes used to mount the collector box and inducer blower. Replace inducer blower gasket and collector box gasket with factory replacements if damaged.**

⚠ DANGER

Holes in the exhaust transition or heat exchanger can cause toxic fumes to enter the home. The exhaust transition or heat exchanger must be replaced if they have holes or cracks in them. Failure to do so can cause carbon monoxide poisoning resulting in personal injury or death.

The manufacturer recommends that a qualified installer, service agency or the gas supplier visually inspect the burner flames for the desired flame appearance at the beginning of the heating season and approximately midway in heating season.

The manufacturer also recommends that a qualified installer, service agency or the gas supplier clean the flame sensor with steel wool at the beginning of the heating season.

Lubrication

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are pre-lubricated by the manufacturer and do not require further attention.

A qualified installer, service agency or the gas supplier must periodically clean the motors to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict air flow and the motor depends upon sufficient air flowing across and through it to prevent overheating.

Cooling Section

⚠ DANGER

Power supply to unit must be disconnected before making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

⚠ DANGER

Label all wires prior to disconnection when servicing the unit. Wiring errors can cause improper and dangerous operation resulting in fire, electrical shock, property damage, severe personal injury or death.

It is recommended that at the beginning of each cooling season a qualified installer or service agency inspect and clean the cooling section of this unit. The following areas should be addressed: evaporator coil. condenser coil, condenser fan motor and venturi area.

To Inspect the Evaporator Coil

1. Open the control/filter access panel and remove filters. Also, remove blower access panel. In downflow applications remove the horizontal return to gain access.
2. Shine a flashlight on the evaporator coil (both sides) and inspect for accumulation of lint, insulation, etc.
3. If coil requires cleaning, follow the steps shown below.

Cleaning Evaporator Coil

1. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
2. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
3. Inspect the drain pan and condensate drain at the same time the evaporator coil is checked. Clean the drain pan by flushing with water and removing any matters of obstructions which may be present.
4. Go to next section for cleaning the condenser coil.

Cleaning Condenser Coil, Condenser Fan, Circulation Air Blower and Venturi

1. Remove the compressor access panel and/or compressor access louver panel. Disconnect the wires to the condenser fan motor in the control box (see wiring diagram).
2. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
3. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT:** Do not use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
4. The venturi should also be inspected for items of obstruction such as collections of grass, dirt or spider webs. Remove any that are present.
5. Inspect the circulating air blower wheel and motor for accumulation of lint, dirt or other obstruction and clean it necessary. Inspect the blower motor mounts and the blower housing for loose mounts or other damage. Repair or replace if necessary.

Re-Assembly

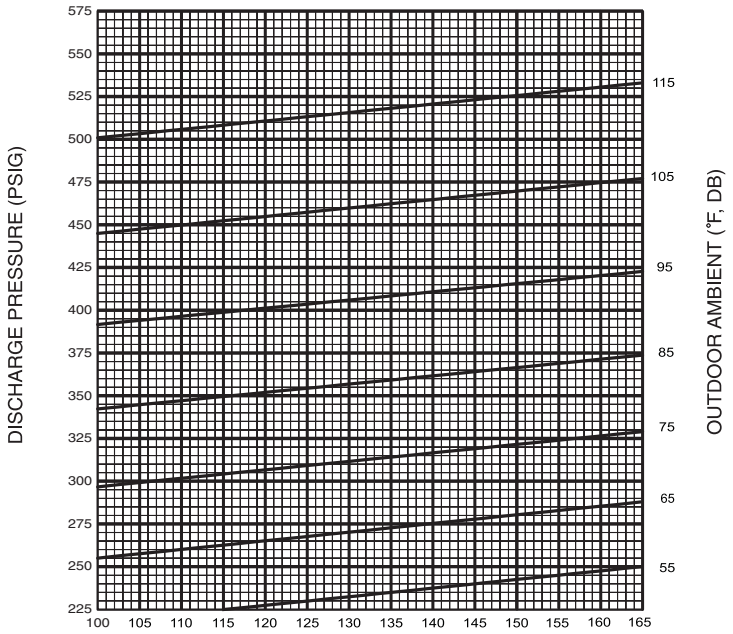
1. Reconnect fan motor wires per the wiring diagram attached to the back of the cover.
2. Replace the control box cover.
3. Close the filter/control access panel and replace the blower/evaporator coil access panels.
4. Restore electrical power to the unit and check for proper operation, especially the condenser fan motor.

System Charge Charts

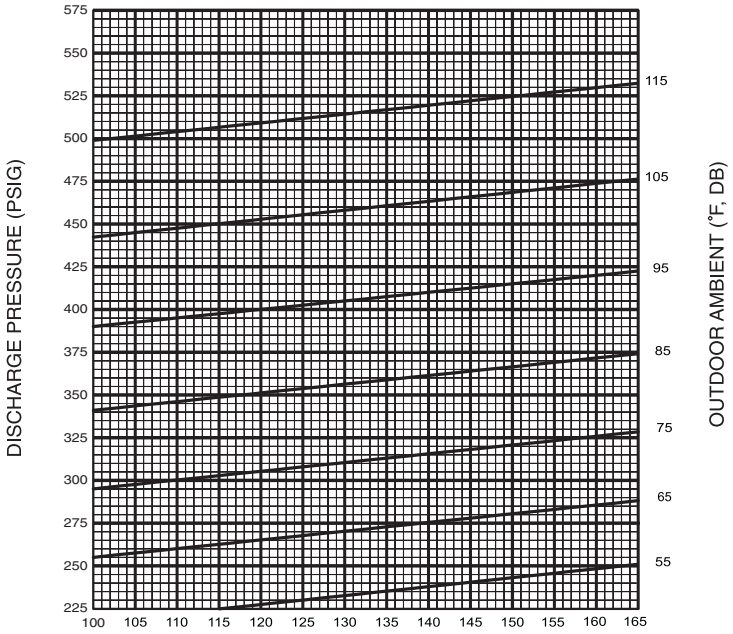
Figure 38: System Charging Chart: MPS 015B

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



15 TON, CIRCUIT 1



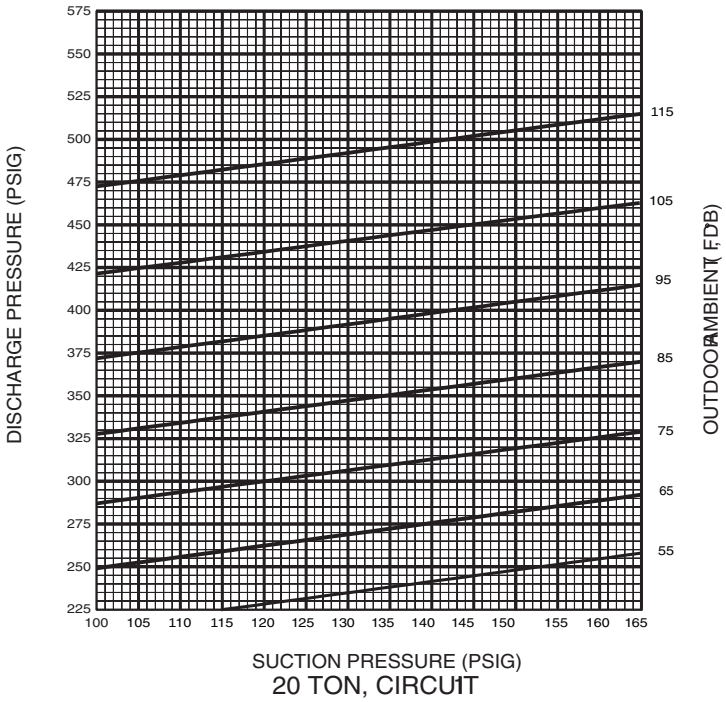
15 TON, CIRCUIT 2

Figure 39: System Charging Chart: MPS 020B

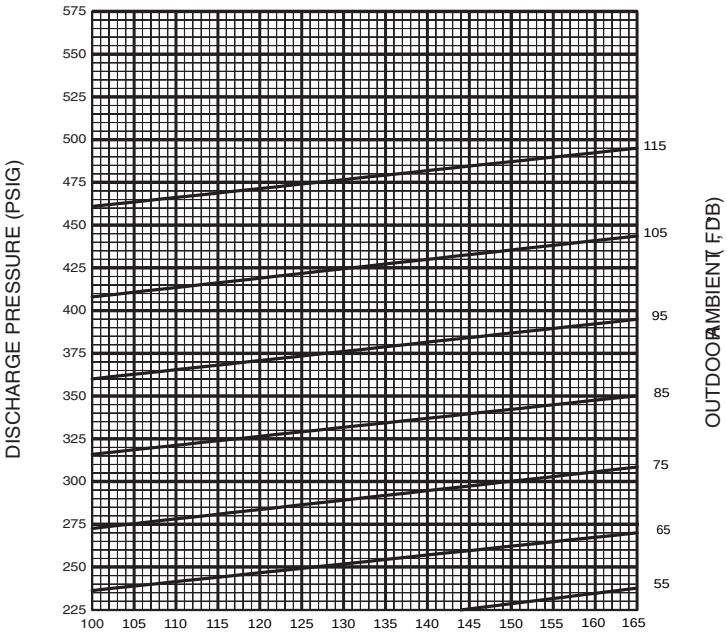
SYSTEM CHARGE CHART FOR REFRIGERANT 410A
20 TON, CIRCUITS 1 & 2

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



20 TON, CIRCUIT 1



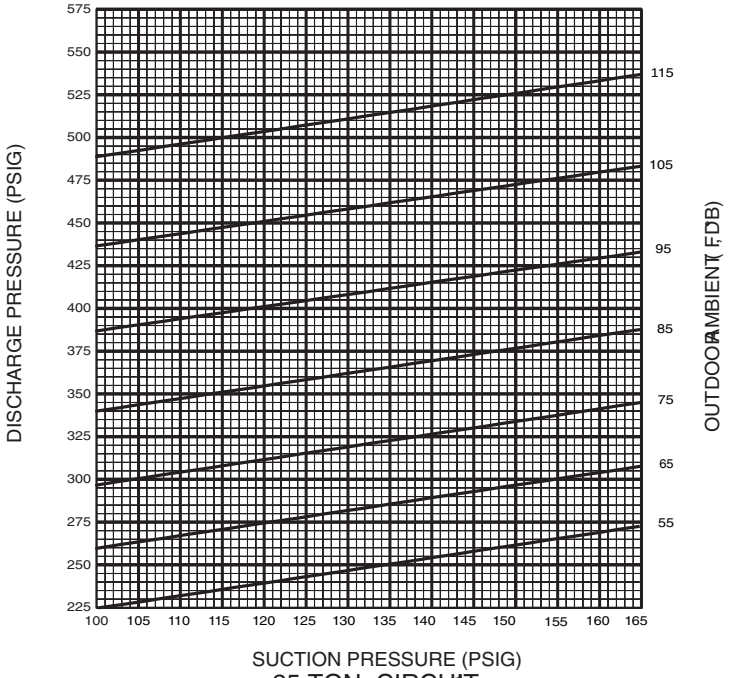
20 TON, CIRCUIT 2

Figure 40: System Charging Chart: MPS 025B

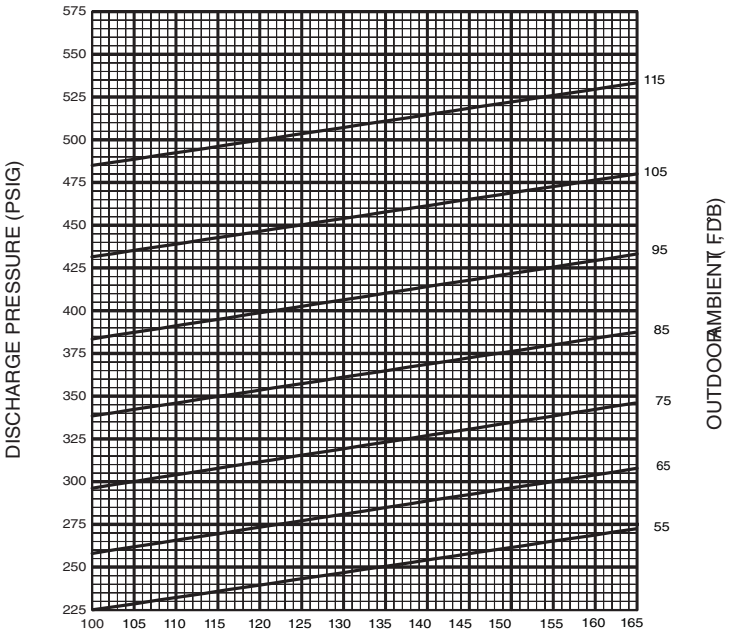
SYSTEM CHARGE CHART FOR REFRIGERANT 410A
25 TON, CIRCUITS 1 & 2

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



25 TON, CIRCUIT 1



25 TON, CIRCUIT 2

Cooling Troubleshooting Chart

⚠ DANGER

Disconnect all power to unit before servicing. Contactor may break only one side. Failure to shut off power can cause electrical shock resulting in personal injury or death.

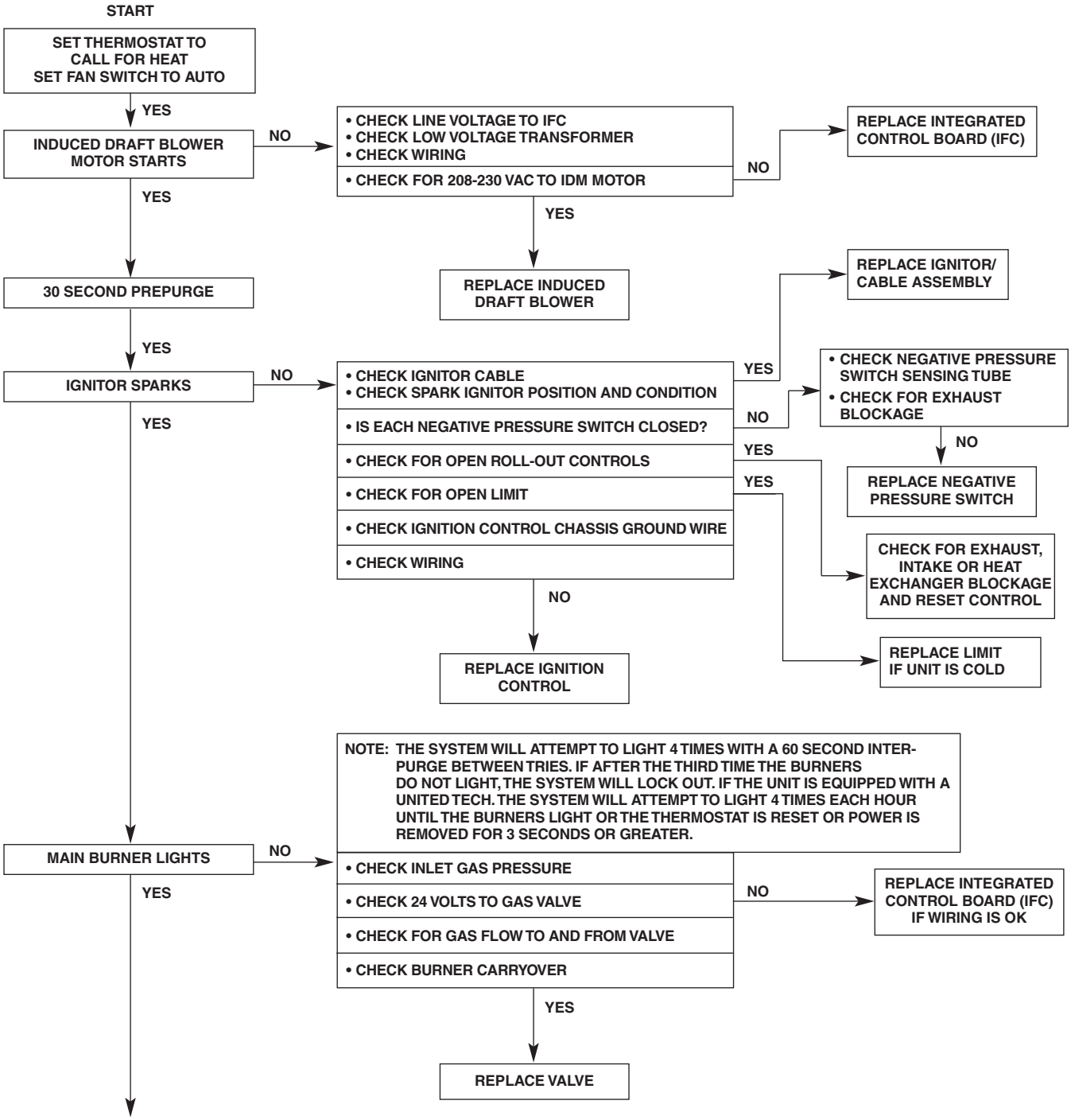
SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	Power off or loose electrical connection	Check for correct voltage at compressor contactor in control box
	Thermostat out of calibration-set too high	Reset
	Failed contactor	Check for 24 volts at contactor coil replace if contacts are open
	Blown fuses	Replace fuses
	Transformer defective	Check wiring-replace transformer
	High pressure control open (if provided)	Reset-also see high head pressure remedy-The high pressure control opens at 450 PSIG
	Interconnecting low voltage wiring damaged	Replace thermostat wiring
Condenser fan runs, compressor doesn't	Loose connection	Check for correct voltage at compressor check & tighten all connections
	Compressor stuck, grounded or open motor winding, open internal overload.	Wait at least 2 hours for overload to reset. If still open, replace the compressor.
	Low voltage condition	At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating
	Low voltage condition	Add start kit components
Insufficient cooling	Improperly sized unit	Recalculate load
	Improper airflow	Check should be approximately 400 CFM per ton.
	Incorrect refrigerant charge	Charge per procedure attached to unit service panel
	Air, non-condensable or moisture in system	Recover refrigerant, evacuate & recharge, add filter drier
	Incorrect voltage	At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.
Compressor short cycles	Incorrect voltage	At compressor terminals, voltage must be ±10% of nameplate marking when unit is operating.
	Defective overload protector	Replace check for correct voltage
	Refrigerant undercharge	Add refrigerant
Registers sweat	Low evaporator airflow	Increase speed of blower or reduce restriction replace air filter
High head-low vapor pressures	Restriction in liquid line, expansion device or filter drier	Remove or replace defective component
	Flow check piston size too small	Change to correct size piston
	Incorrect capillary tubes	Change coil assembly
High head-high or normal vapor pressure Cooling mode	Dirty condenser coil	Clean coil
	Refrigerant overcharge	Correct system charge
	Condenser fan not running	Repair or replace
	Air or non-condensable in system	Recover refrigerant, evacuate & recharge
Low vapor - cool compressor iced evaporator coil	Defective Compressor valves	Replace compressor
	Incorrect capillary tubes	Replace coil assembly
Low vapor cool evaporator coil	Low evaporator airflow	Increase speed of blower or reduce restriction replace air filter
	Operating below 65°F outdoors	Add Low Ambient Kit
	Moisture in system	Recover refrigerant evacuate & recharge add filter drier
High vapor pressure	Excessive load	Recheck load calculation
	Defective compressor	Replace
Fluctuating head & vapor	Air or non-condensate in system	Recover refrigerant, evacuate & recharge
Gurgle or pulsing noise at expansion device or liquid line	Air or non-condensable in system	Recover refrigerant, evacuate & recharge

Furnace Troubleshooting Guide

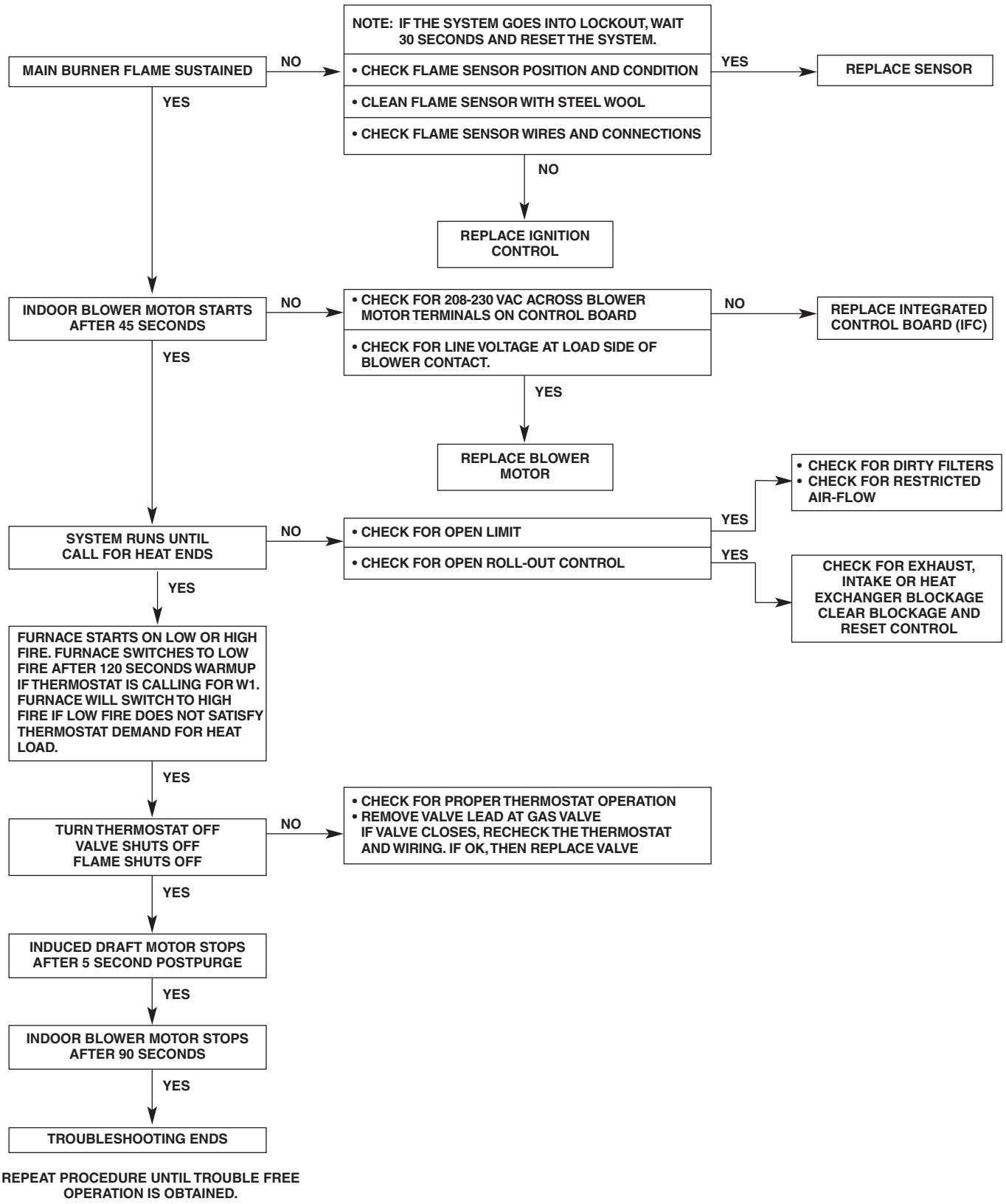
⚠ WARNING

HAZARDOUS VOLTAGE
LINE VOLTAGE
CONNECTIONS

DISCONNECT POWER BEFORE SERVICING.
SERVICE MUST BE BY A TRAINED, QUALIFIED SERVICE TECHNICIAN.



FLOW CHART CONTINUED ON NEXT PAGE


NOTE: IF THE SYSTEM GOES INTO LOCKOUT, WAIT 30 SECONDS AND RESET THE SYSTEM.
MAIN BURNER FLAME SUSTAINED
NO
• CHECK FLAME SENSOR POSITION AND CONDITION
• CLEAN FLAME SENSOR WITH STEEL WOOL
• CHECK FLAME SENSOR WIRES AND CONNECTIONS
YES
REPLACE SENSOR
YES
NO
REPLACE IGNITION CONTROL
INDOOR BLOWER MOTOR STARTS AFTER 45 SECONDS
NO
• CHECK FOR 208-230 VAC ACROSS BLOWER MOTOR TERMINALS ON CONTROL BOARD
• CHECK FOR LINE VOLTAGE AT LOAD SIDE OF BLOWER CONTACT.
NO
REPLACE INTEGRATED CONTROL BOARD (IFC)
YES
YES
REPLACE BLOWER MOTOR
SYSTEM RUNS UNTIL CALL FOR HEAT ENDS
NO
• CHECK FOR OPEN LIMIT
• CHECK FOR OPEN ROLL-OUT CONTROL
YES
• CHECK FOR DIRTY FILTERS
• CHECK FOR RESTRICTED AIR-FLOW
YES
CHECK FOR EXHAUST, INTAKE OR HEAT EXCHANGER BLOCKAGE CLEAR BLOCKAGE AND RESET CONTROL
YES
FURNACE STARTS ON LOW OR HIGH FIRE. FURNACE SWITCHES TO LOW FIRE AFTER 120 SECONDS WARMUP IF THERMOSTAT IS CALLING FOR W1. FURNACE WILL SWITCH TO HIGH FIRE IF LOW FIRE DOES NOT SATISFY THERMOSTAT DEMAND FOR HEAT LOAD.
YES
TURN THERMOSTAT OFF VALVE SHUTS OFF FLAME SHUTS OFF
NO
• CHECK FOR PROPER THERMOSTAT OPERATION
• REMOVE VALVE LEAD AT GAS VALVE IF VALVE CLOSES, RECHECK THE THERMOSTAT AND WIRING. IF OK, THEN REPLACE VALVE
YES
INDUCED DRAFT MOTOR STOPS AFTER 5 SECOND POSTPURGE
YES
INDOOR BLOWER MOTOR STOPS AFTER 90 SECONDS
YES
TROUBLESHOOTING ENDS
REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED.

Replacement Parts

To find your local Daikin Certified Parts Distributor, go to www.DaikinApplied.com and select Parts Locator.

Daikin Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Representative for warranty details. Refer to Form 933-43285Y. To find your local Daikin Representative, go to www.DaikinApplied.com.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Daikin Applied
800.432.1342
www.DaikinApplied.com

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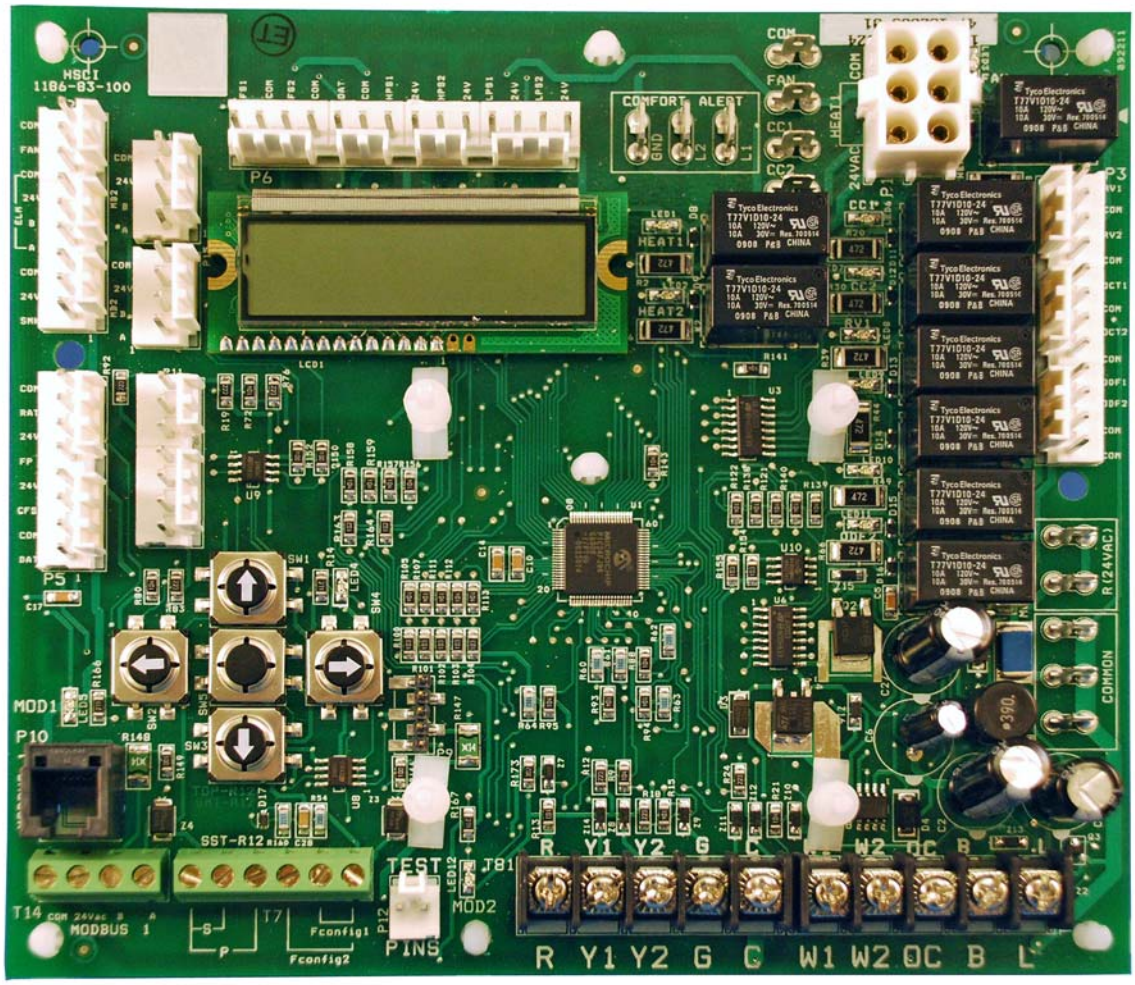
Operation Manual	OM 1077

DDC Rooftop Unit Controller

Group: **Applied Air Systems**
Part Number: **OM 1077**
Date: **August 2010**

Heating & Cooling, Gas/Electric & Electric/Electric
Models MPS 003B – 025B
3 to 25 Tons [10.6 to 87.9 kW]
R-410A Refrigerant



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Contents

General

Read this manual and any instructions packaged with separate equipment prior to installation. Give this manual to the owner and explain its provisions. The owner should retain this manual for future reference.

Unit	Manual
Rooftop unit control configuration	OM 1077
BACnet Communication Module	IM 1000
LonWorks Communication Module	IM 999
Field Installed Accessories	IM 921
Maverick I, 3 to 5 ton Installation and Maintenance	IM 970
Maverick I, 6 to 12 ton Installation and Maintenance	IM 971
Maverick I, 15 to 25 ton Installation and Maintenance	IM 972

Safety Information

⚠ DANGER

These instructions are intended as an aid to qualified service personnel for proper installation, adjustment, and operation of this unit. Read these instructions thoroughly before attempting installation, adjustment, or operation. Failure to follow these instructions can result in improper installation, adjustment, service or maintenance, possibly resulting in fire, electrical shock, property damage, personal injury, or death.

⚠ DANGER

Before beginning any modification, be sure main disconnect switch is in the “off” position. Failure to do so can cause electrical shock resulting in property damage, personal injury or death. Tag disconnect with a suitable warning label.

⚠ CAUTION

Static sensitive components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

NOTICE

This equipment generates, uses, and can radiate radio frequency energy and; if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

The Maverick I 3 to 25 ton Package has a Rooftop Unit Controller factory mounted and wired in their respective control panel. The DDC Controller is a solid-state microprocessor-based control board that provides flexible control and extensive diagnostics for all unit functions. The DDC Controller through proportional/integral control algorithms perform specific unit functions that govern unit operation in response to; zone conditions, system temperatures, ambient conditions and electrical inputs. The DDC Controller features an LCD display and a five-button keypad for local configuration and direct diagnosis of the system.

The Maverick I 3 to 25 ton Package Air Conditioner with integral Rooftop Unit Controller (DDC Controller) is specifically designed to be applied in three distinct applications:

Third party Building Management System

In an application where a third party building management is in use or will be incorporated the Maverick I is communication compatible with the system that supports the BACnet Application Specific Controller device profile, LonMark Space Comfort Controller functional profile. This is accomplished with a field installed BACnet or LonMark communication module. The BAS system provides the schedule functions for the DDC controller.

BACnet Communication Module

The BACnet Communication Module allows communication between the DDC Controller and the BACnet network. The communication module translates input and output variables between the DDC Controller protocol and the BACnet protocol.

The BACnet Communication Module is compatible with MSTP EIA-485 daisy chain networks communicating at 38.4 bps. It is compatible with twisted pair, shielded cables.

See IM 1000 for full documentation

LonMark Communication Module

The LonMark Communication Module allows communication between the DDC Controller and a Lon Works Network. The

Communication module translates input and output variables between the DDC Controller protocol and the Lon Talk protocol. The Lon Talk Communication Module has been developed to communicate with building automation systems that support the Lon Mark Space Comfort Controller (SCC).

The LonMark Communication Module utilizes an FTT-10A free topology transceiver communicating at 78.8 kbps. It is compatible with Echelon qualified twisted pair cable, Belden 8471 or NEMA Level 4 cables. The Module can communicate up to 1640 ft. with no repeater. The LonWorks limit of 64 nodes per segment applies to this device.

See IM 999 for full documentation

Programmable 24 Volt Thermostat

The Maverick with integral DDC Controller is compatible with programmable 24 volt thermostats. The programmable thermostat can supply the time schedule functions when the DDC controller is not connected to a BAS system. Connections are made via conventional thermostat connection screw terminals on terminal T81. Extensive unit status and diagnostics are displayed on the LCD screen.

Zone sensor with time clock

The Maverick I with integral DDC Controller is compatible with a zone sensor and mechanical or solid state time clock.

The DDC Controller in each Maverick I 3 to 25 ton Package Air Conditioner has many design features that optimize operation, installation and service. Each unit with the DDC Controller has the following features:

Blower On/Off Delay. Adjustable time delay between blower on and off mode

Built-in Control Parameter Defaults. No programming required.

Compressor Time-off Delay. Adjustable time delay between compressor shutoff and start up

Dirty Filter Switch Input. The DDC Controller will signal an increase in static pressure across the air filter, indicating a dirty filter condition.

On Board User Interface Display/Keypad. Displays control parameters, diagnostic codes, and sensor readings. The keypad allows scrolling through display menu and field configurable changes to be made.

Economizer Control. The economizer is controlled by the Economizer Logic Module (ELM) that comes with the economizer. The DDC Controller communicates with the ELM for control, setpoint, and diagnostics. The DDC Controller has several choices for controlling the economizer. See Economizer Menu Screen. The ELM monitors the mixed air temperature, return air enthalpy (optional), minimum position set point (local or remote), power exhaust set point, CO2 set point, CO2, and outdoor enthalpy sensor, if selected, to control dampers to an accuracy of ±5% of stroke. The actuator is spring returned to the closed position any time that power is lost to the unit. It is capable of delivering up to 44 inch pounds of torque and is powered by 24VAC.

Unit Diagnostics. The DDC Controller monitors all sensors and functions related to unit operation to provide critical information and maintain diagnostic code information even if a power failure occurs.

Exhaust Fan Control Modes. Exhaust fans are controlled by fresh air damper position. Setpoint is adjustable through the unit display and keypad.

Field Changeable Control Parameters. Over 50 different control parameters allow customization of the unit operation by changing delays, cooling stages, dead bands, and set points.

Minimum Compressor Run Time. Ensures proper oil return to the compressor.

Comfort Alert. The DDC Controller has two inputs to monitor optional Copeland Comfort Alerts. The inputs can provide the following information: Locked rotor, Open Circuits, Missing Phase, Reverse Phase, and Welded Contactor.

Smoke Alarm Mode. The input will shutdown the unit and requires a manual reset. The sensor is used to detect smoke due to fire in the air conditioning or ventilation ducts.

Lead Lag Compressor Operation. Stage 1 compressor operation based on compressor accumulated run time.

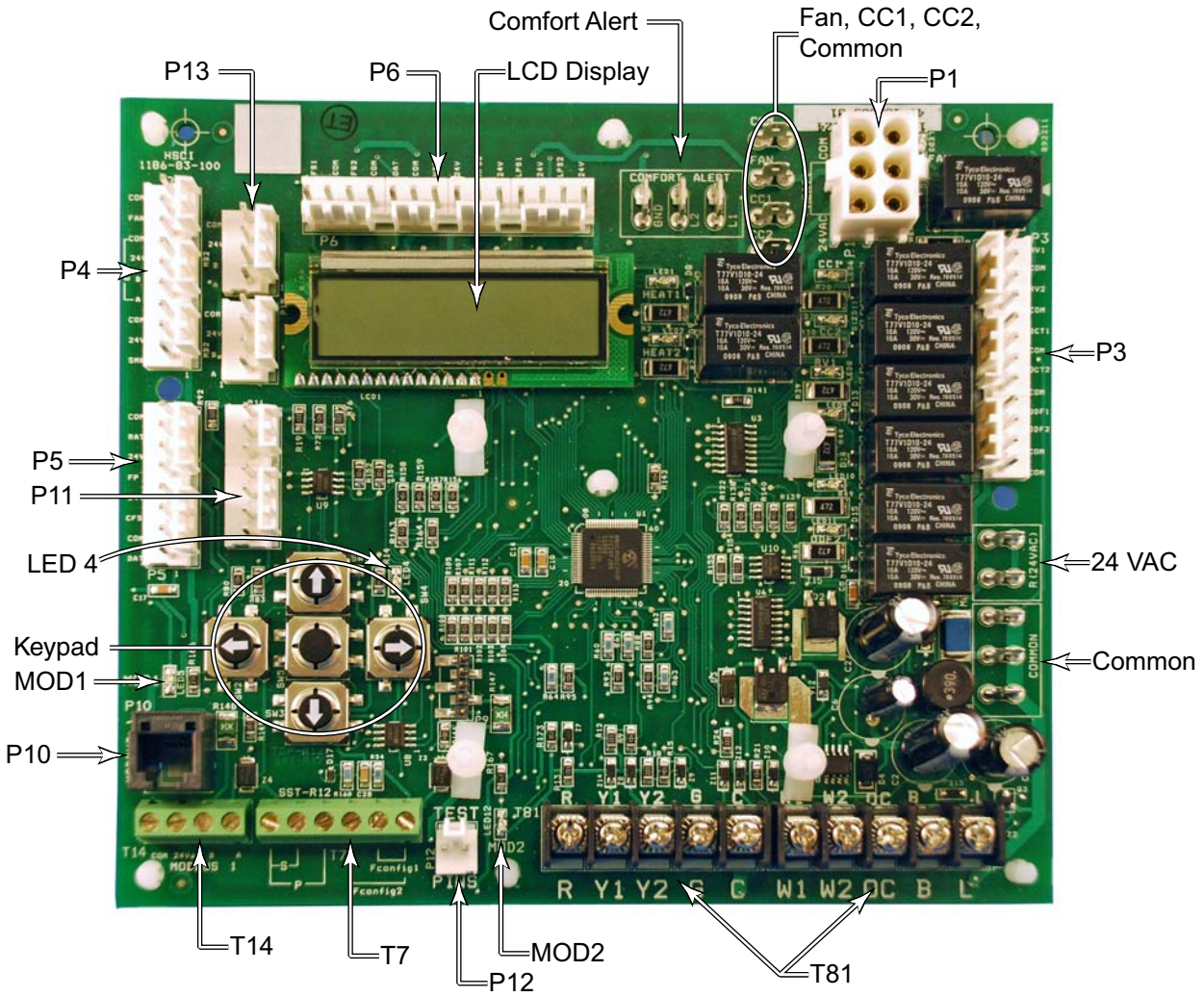
Staging. Depending on the unit controls up to 2 stages of cooling, 2 stages of gas heat, and 2 stages of electric heat.

Active Protection. Provides active unit protection when any of the following occurs three times within a thermostat cycle: low pressure trip, high pressure trip, gas heat limit trip.

Thermostat Bounce Delay. Protects compressor from short cycling when mechanical thermostat is used

Warm-up Mode Delay. Adjustable time that the economizer dampers are kept in the closed position during morning warm-up input

Figure 1: Controller Component Locations



Item	Description
P1	Electric heat connector
Fan	Indoor blower motor connector
CC1	Compressor1 connector
CC2	Compressor 2 connector
P3	Reversing valve 1, Reversing valve 2, Outdoor Coil temperature sensor 1, Outdoor Coil temperature sensor 2, Outdoor Fan 1, and Outdoor Fan 2 connector
P4	Motorized Fresh Air Damper, Economizer Logic Module (ELM), and Smoke Detector connector
P5	Return air temperature sensor, Fan proving switch, Clogged filter switch, and Discharge air temperature sensor connector
P6	Freeze sensor 1, Freeze sensor 2, Outside air temperature sensor, High pressure switch 1, High pressure switch 2, Low pressure switch 1, and Low pressure switch 2 connector
P10	RJ11 connector for factory run test
P11	Configurable pins used to set unit type
P12	Test Pins to force defrost for heat pump models

Item	Description
P13	Connector to Integrated Furnace Control (IFC) – provides power and communication between DDC Controller and IFC
T7	Field Installed Space Temperature Sensor with Setpoint and Override, Field configurable 1, and Field configurable 2 terminal block
T14	Not supported
T81	Thermostat screw terminals
Common terminals	Terminals used for 24 volt common connections & power supply
24 Volt terminals	Terminals used for 24 volt hot connections & power supply
Comfort Alert	Terminals used to connect a Comfort Alert module
LED4	LED4 is blinking when the control has an ALARM present, solid when power is applied.
MOD1 LED	MOD1 LED blinks when the control is communicating on the internal network between the IFC and/or economizer
MOD2 LED	MOD2 LED blinks when the control is communicating between the DDC Controller and field installed communication card

Control Inputs and Outputs

Control Inputs

Table 1: Control Inputs

Item	Description	Type	Option
1	ST - Space temperature	Thermistor 10k?	Field Installed (optional)
2	RAT - Return Air Temperature	Thermistor 10k?	Factory Installed
3	SAT - Supply Air Temperature	Thermistor 10k?	Factory Installed
4	OAT - Outside Air Temperature	Thermistor 10k?	Factory Installed
5	FS1 - Freeze Stat	Thermistor 10k?	Factory Installed
6	FS2 - Freeze Stat	Thermistor 10k?	Factory Installed
7	Field Configurable input #1	Thermistor 10k?	Field Installed (optional)
8	Field Configurable input #2	Analog input	Field Installed (optional)
9	SPA - Set point Adjustment	Resistance input	Field Installed (optional)
10[a]	G - Thermostat fan input	24VAC	Field Installed (optional)
11[†]	Y1 - Thermostat 1st stage compressor	24VAC	Field Installed (optional)
12	Y2 - Thermostat 2nd stage compressor	24VAC	Field Installed (optional)
13	W1 - Thermostat heating demand	24VAC	Field Installed (optional)
14	W2 - Thermostat heating demand	24VAC	Field Installed (optional)
15	HP1 - High Pressure Switch 1	24VAC	Factory Installed
16	LP1 - Low Pressure Switch 1	24VAC	Factory Installed
17[†]	HP2 - High Pressure Switch 2	24VAC	Factory Installed
18	LP2 - Low Pressure Switch 2	24VAC	Factory Installed
19	Smoke Detector	24VAC	Factory or Field Installed
20	FP - Fan proving	24VAC	Factory Installed
21	CFS - Clogged Filter Switch	24VAC	Factory Installed
22	Occupied input	24VAC	Field Installed (optional)
23	L1 - Comfort Alert 1	Pulsed 24VDC	Factory or Field Installed (optional)
24	L2 - Comfort Alert 2	Pulsed 24VDC	Factory or Field Installed (optional)
25	Configuration pins	Polarized Plug P11	Factory Installed

a.Heat Pump Only

Control Input Descriptions

(1) ST - Space temperature. The space temperature sensor is used to measure the building zone temperature. Sensors should be located on an interior building wall.

(2) RAT - Return Air Temperature. The DDC Controller has a return air temperature input. This input is used to monitor system functionality and to provide diagnostics on how the system is operating. This sensor input can be used in place of the space temperature input. It also acts as a backup in case of a space temperature sensor failure.

(3) SAT - Supply Air Temperature. The DDC Controller has a supply air temperature input. This input is used to monitor system functionality and to provide diagnostics on how the system is operating.

(4) OAT - Outside Air Temperature. The outdoor air temperature sensor is factory installed in the unit to monitor the outside temperature. This temperature is used to control the economizer.

(5) FS1 - Freeze Stat. When the thermistor reads a temperature below 37°F continuously for 15 minutes, the control will shutdown compressor #1 and continue to run the indoor blower. The system will return to normal operation when the thermistor reads a temperature above 42°F for 15 minutes.

(6) FS2 - Freeze Stat. When the thermistor reads a temperature below 37°F continuously for 15 minutes, the control will shutdown compressor #2 and continue to run the indoor blower. The system will return to normal operation when the thermistor reads a temperature above 42°F for 15 minutes.

(7) Field Configurable input #1. Used for custom installation of a 10K ohm temperature sensor (e.g. discharge air temperature sensor installed in supply duct).

(8) Field Configurable input #2. Used for custom installation of an analog input (e.g. 0-10VDC input from outdoor airflow monitoring station).

(9) SPA - Set point Adjustment. If the set point adjustment is enabled, then the control will consider the hard wired potentiometer input to determine occupied set points only. If the remote set point adjustment is enabled but the input reads

an invalid number, the control will default back to the occupied set point selection.

(10) G - Thermostat fan input. This is a 24 volt input that is used to control the indoor fan when the DDC Controller is used in conjunction with a thermostat.

(11) Y1 - Thermostat 1st stage compressor. This is a 24 volt input that is used to control the first stage of mechanical cooling when the DDC Controller is used in conjunction with a thermostat.

(12) Y2 - Thermostat 2nd stage compressor. This is a 24 volt input that is used to control the second stage of mechanical cooling when the DDC Controller is used in conjunction with a thermostat.

(13) W1 - Thermostat heating demand. This is a 24 volt input that is used to control the first stage of heating (electric heat or gas heat) when the DDC Controller is used in conjunction with a thermostat.

(14) W2 - Thermostat heating demand. This is a 24 volt input that is used to control the second stage of heating (electric heat or gas heat) when the DDC Controller is used in conjunction with a thermostat.

(15 &17) HP1, HP2 - High Pressure Switch 1 & 2. When the HPC is opened, the compressor for that circuit is turned off. The compressor will not be allowed to restart for a minimum of 3 minutes. If three consecutive open conditions occur during an active call for operation, the compressor will be locked out, a diagnostic will appear on the LCD display and communicated to the network if applicable. Cycling the call for operation will restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

(16 & 18) LP1, LP2 - Low Pressure Switch 1 & 2. When the LPC is opened, the compressor for that circuit is turned off. The compressor will not be allowed to restart for a minimum of 3 minutes. The low pressure switch is ignored during defrost and for the first 90 seconds of compressor run time. If three consecutive open conditions occur during an active call for operation, the compressor will be locked out, a diagnostic will appear on the LCD display and communicated to the Network if applicable. Cycling the call for operation will restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

(19) Smoke Detector. The sensor is only applicable on units equipped with a smoke detector. The input will shutdown the unit and requires a manual reset. The sensor is used to detect smoke due to fire in the air condition or ventilation ducts.

(20)FP - Fan proving. The unit mounted fan proving switch monitors the pressure differential across the unit blower to detect when the indoor fan is blowing air. A diagnostic signal is sent to the LCD display if the pressure differential indicates that the indoor blower is not operating. The control will also monitor the system and if the blower is running and is not required a fault will be sent to the DDC Controller.

(21) CFS - Clogged Filter Switch. The unit mounted clogged filter switch monitors the pressure differential across the return air filters. It is mounted in the filter section and is connected to the DDC Controller. A diagnostic signal is sent to the LCD display if the pressure differential across the filters is at least 0.5" w.c. The contacts will automatically open when the pressure differential across the filters decreases to approximately 0.4" w.c., the clogged filter output is operating, and the clogged filter switch has been closed for at least 2 minutes. The system will continue to operate regardless of the status of the filter switch.

(22) Occupied input (OC). This is a 24 volt input that is used to control the occupancy (occupied or unoccupied mode) when the DDC Controller is used in conjunction with a zone sensor and solid state time clock.

(23 & 24) L1, L2 - Comfort Alert. The DDC Controller has two inputs to monitor up to two compressor circuits using optional Copeland Comfort Alerts. The inputs can provide the following information: Locked rotor, Open Circuits, Missing Phase, Reverse Phase, and Welded Contactor. Note: The Comfort Alert sends the Open Circuit Alarm (code 5) only after the fault has been sensed for a minimum of 4 hours.

(25) Configuration pins (P11). The DDC Controller features a 7 pin header (P11) on board for the connection of a configuration key. This 7-position connector allows the controller to determine the unit application mode without a menu entry. Table 2 describes the connections necessary for each one of the possible options. The configuration connector provides a quick and safe way of replacing boards while keeping the proper configuration of the unit.

Table 2: Configuration Connector Parameters

P11 – Unit configuration	1	2	3	4	5	6	7
Cooling only (default for 3-25T) – default							
Single stage Cooling with 2 stages EH	x	x					
Single stage G/E(cool) with 1 stage GH	x			x			
Single stage G/E(cool) with 2 stages GH		x		x			
2 stages cool with 2 stages EH			x	x			
2 stages G/E(cool) with 2 stages GH		x	x				
Selection is made through the display	x	x	x	x			

Control Inputs and Outputs

Control Outputs

Table 3: Control Outputs

1	CC1 - Compressor output 1	24VAC	1.5A @ 24VAC, pilot duty
2	CC2 - Compressor output 2	24VAC	1.5A @ 24VAC, pilot duty
3	W1 - Heat output	24VAC	1.5A @ 24VAC, pilot duty
4	W2 - Heat Output	24VAC	1.5A @ 24VAC, pilot duty
5	G - Fan Output	24VAC	1.5A @ 24VAC, pilot duty
6	L - thermostat signal	24VAC	25mA loading

Control Output Descriptions

(1) CC1 - Compressor output 1. The DDC Controller can control the compressor contactors. The DDC Controller can monitor the system and respond to system faults and comfort alert inputs to shut down the compressors in the event of a failure.

(2) CC2 - Compressor output 2. The DDC Controller can control the compressor contactors. The DDC Controller can monitor the system and respond to system faults and comfort alert inputs to shut down the compressors in the event of a failure.

(3) W1 - Heat output. The DDC Controller has two outputs to control resistance electric heat.

(4) W2 - Heat Output. The DDC Controller has two outputs to control resistance electric heat.

(5) G - Fan Output. The DDC Controller can control the indoor fan by use of a fan relay.

(6) L - Thermostat signal. The “L” terminal will output a flash code to an indoor 24 V thermostat equipped with an “L” terminal.

Table 4: Thermostat Options

Device	Part Number	Description
Stand alone 24V thermostat / touch screen	113129801	Up to 2-heat / 2-cool
Stand alone 24V thermostat	113129901	Up to 2-heat / 2-cool

Table 5: Zone Sensor Module Wire Guide

Device	Part Number	Wire Gauge	Conductors	Type	Listings
Wall mounted sensor w/ tenant override	113117701	18	3	Solid	18 AWG 3/C CL2P Thermostat
Wall mounted sensor w/ space point adjustment	113117701	18	3	Solid	18 AWG 3/C CL2P Thermostat

Important - The DDC Controller is shipped with the control disabled so units do not accidentally energize during installation. The commissioning of the rooftop unit therefore requires the configuration of the Occupied Mode menu prior to initial startup. See Effective Occupancy, page 17.

⚠ DANGER

Before beginning any modification, be sure main disconnect switch is in the “off” position. Disconnect all electric power, including remote disconnect before servicing. Failure to do so can cause electrical shock resulting in property damage, personal injury or death. Follow proper lockout/tag out procedures to ensure the power cannot be inadvertently energized.

The unit DDC Controller must have a thermostat or zone sensor input in order to operate the unit. If the zone sensor is not present, or has failed, the unit will use the return air temperature sensor to maintain the occupied setpoint. The flexibility of the unit mode capabilities depends upon the type of zone sensor or thermostat selected to interface with the DDC controller.

The descriptions of the following basic Input Devices used within the DDC controller network are to acquaint the operator with their function as they interface with the various modules. Refer to the unit's electrical schematic for the specific module connection.

The following controls are available from the factory for field installation:

Controls using 24 VAC

Before installing any connecting wiring, refer to the unit installation manual for AC conductor sizing guidelines “Field Wire Size For 24 Volt Thermostat Circuits”, for the electrical access locations provided on the unit, and;

- Use copper conductors unless otherwise specified.
- Ensure that the AC control wiring between the controls and the unit's termination point does not exceed three (3) ohms per conductor for the length of the run.

  Note: Resistance in excess of 3 ohms per conductor may cause component failure due to insufficient AC voltage supply.
- Be sure to check all loads and conductors for grounds, shorts, and mis-wirings.
- Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
- Some thermostat wire insulation has a voltage rating less than the line voltage. Route Thermostat Wire behind low voltage shield during unit installation per Figure 2. This is necessary to meet National Electrical Code (NEC) and UL 1995 requirements for separation of high and low voltage circuits.

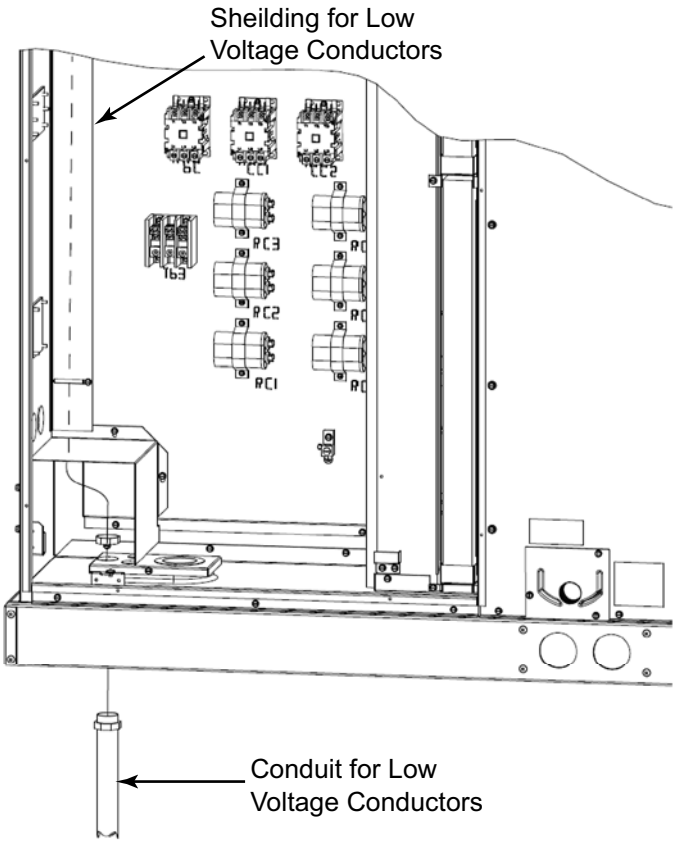
Controls using DC Analog Input/Outputs (Standard Low Voltage Multi-conductor Wire)

Before installing any connecting wiring between the unit and components utilizing a DC analog input/output signal, refer to the unit installation manual for the electrical access locations provided on the unit.

- Use shielded cable for high EMI environments.

  Note: Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.
- Ensure that the wiring between controls and the unit's termination point does not exceed two and a half (2.5) ohms per conductor for the length of the run.
- Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.
- Most sensor wire insulation has a voltage rating less than the line voltage. Route Zone Sensor and Network Cable behind low voltage shield during unit installation per Figure 2. This is necessary to meet NEC and UL 1995 requirements for separation of high and low voltage circuits.

Figure 2: Low Voltage Shielding



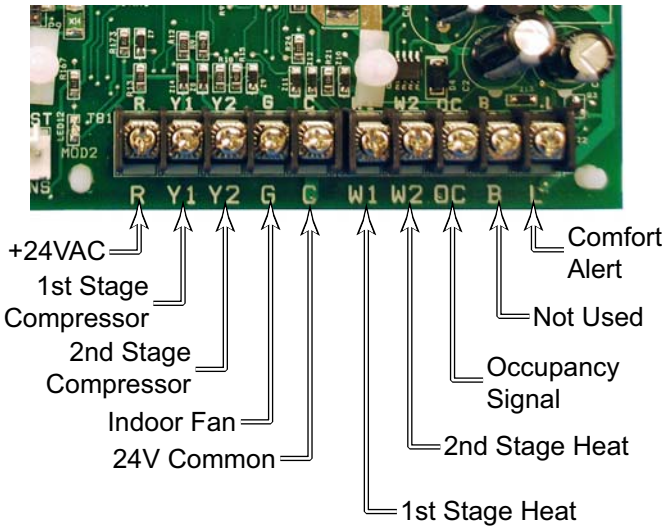
Stand Alone with Thermostat

Once Occupied Mode is set to “Control by Thermostat” the DDC Controller will follow the commands from a regular 24VAC thermostat, according to the following convention:

- G - Indoor fan
- Y1 - First stage of compressor

- Y2 - Second Stage of compressor
- B - Not Used
- W1 - First Stage Auxiliary heat (electric or gas)
- W2 - Second Stage Auxiliary heat (electric or gas)
- L - Comfort Alert signal (output)
- R & C - 24VAC

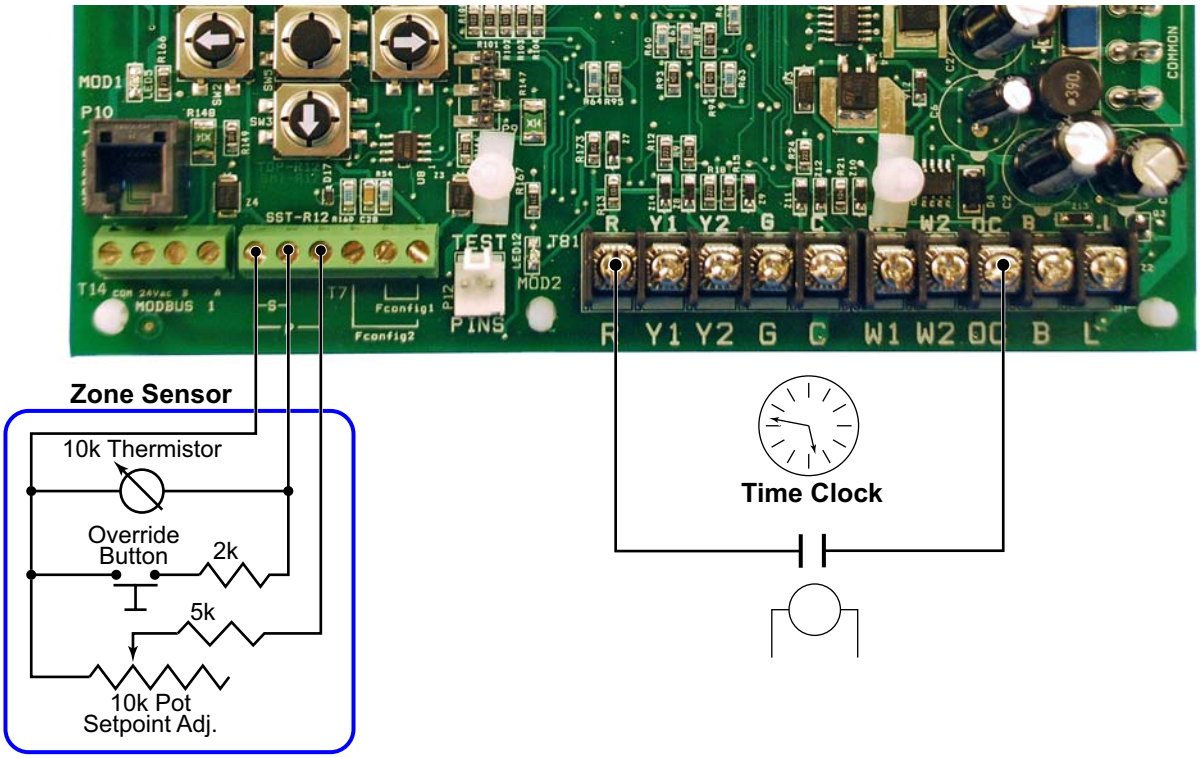
Figure 3: Thermostat Inputs and Outputs



Standalone with Zone Sensor and Time Clock

If Occupied Mode is set to any of the options other than “Off” and “Control By Thermostat”, the control will operate in Stand Alone mode or network using its local temperature sensors to determine demand. The system can be set up with a zone sensor to determine heat or cool demand and a solid state time clock to determine occupancy. (See Occupied Mode, page 17)

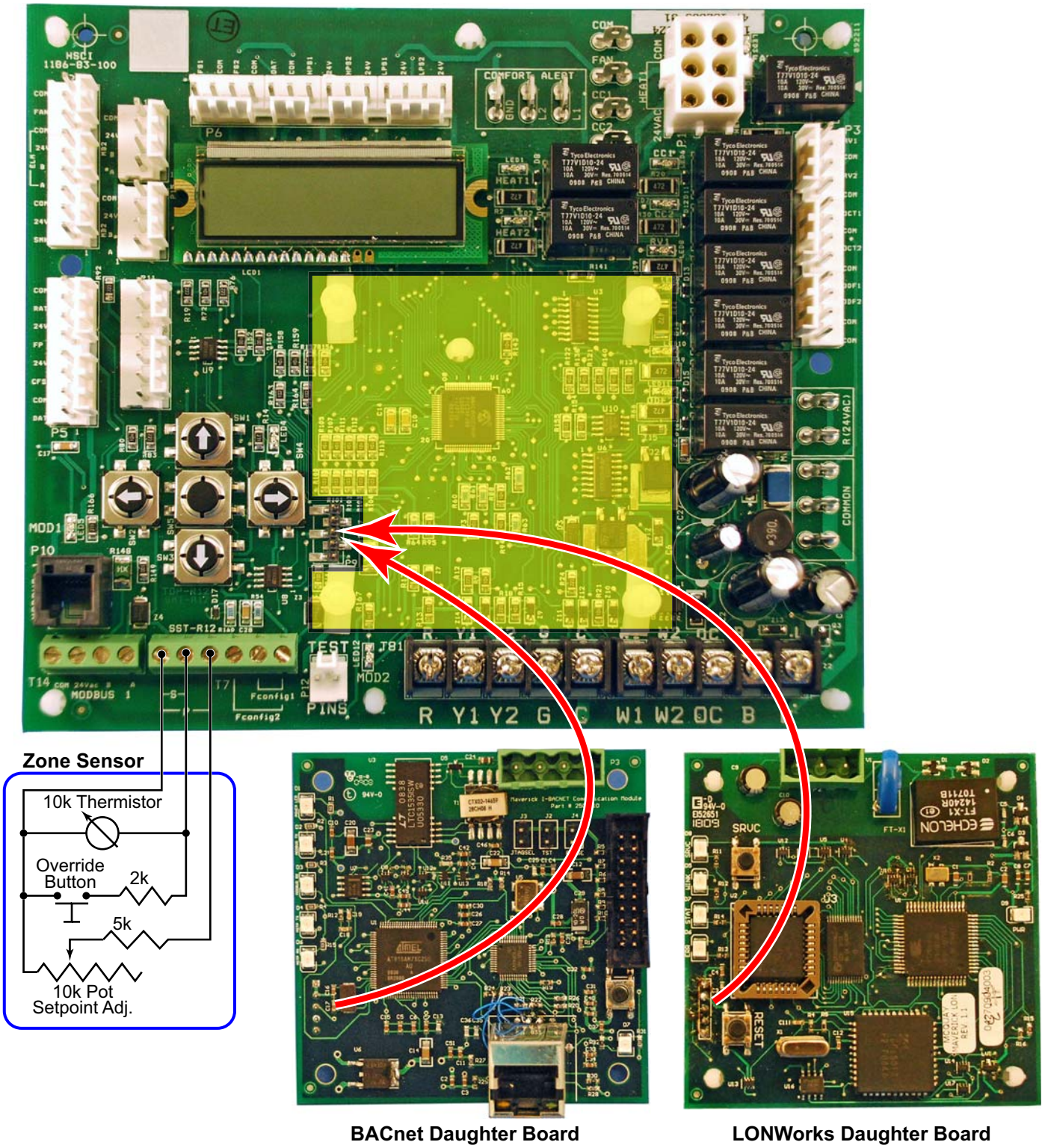
Figure 4: Standalone with Zone Sensor and Time Clock



Standalone with Building Automation System

If Occupied Mode is set to any of the options other than “Off” and “Control By Thermostat”, the control will operate in Stand Alone mode or network using its local temperature sensors to determine demand. The system can be set up with a zone sensor, 910108514 or 910108214 communication card, and 2nd party building automation system that will be controlled from a central location.

Figure 5: Zone Sensor with Building Automation System



Important - The DDC Controller is shipped with the control disabled so units do not accidentally energize during installation. The commissioning of the rooftop unit therefore requires the configuration of the Occupied Mode menu prior to initial startup. See Occupied Mode, page 17.

Cooling

When the DDC Controller receives a call for cooling via thermostat or zone sensor compressor 1 energizes. After the indoor fan on delay (1-180 sec / default 10 sec) the indoor fan energizes. The indoor fan on delay starts when the call for cooling is initiated.

When used in local zone sensor mode of operation, the DDC Controller satisfies the set point using all or a partial number of stages available. When cooling demand exists, the DDC Controller will stage up in the following order: Economizer, First Stage Cooling, and Second Stage Cooling based on demand.

When used in local thermostat mode of operation, the DDC Controller allows the thermostat to control the demand for cooling. When cooling demand exists, the DDC Controller will stage up in the following order: Economizer, First Stage Cooling. Only two stages will be allowed to energize, so if the economizer is active then the first stage mechanical cooling will become second stage and second stage mechanical cooling will not be used.

Heat

When in heating mode of operation, the DDC Controller satisfies the set point using all or a partial number of stages available. When heating demand exists, the DDC Controller will utilize heat sources in the following order of priority as available: Gas Heat and Electric.

When the heat demand requires multiple heating outputs at the same time, a minimum staging delay of 5 seconds between energizing and de-energizing heating outputs is necessary to prevent the inrush current startup of multiple loads. The inter stage is adjustable between 5 and 50 seconds.

The source of demand, like the other modes of operation, is a result of one of either thermostat or remote sensors.

Integrated Furnace Control

The Integrated Furnace Control (IFC) is external to the DDC Controller, and on units so equipped, controls the furnace and gas valve operation based on signals from the DDC controller. The IFC also provides furnace troubleshooting information via LED flashing fault codes. When a fault condition exists, the LED (see Figure 6) flashes the number of times indicated by the code number, pauses, and repeats.

Figure 6: Integrated Furnace Control Status LED

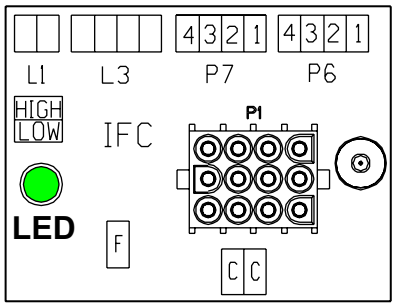


Table 6: Integrated Furnace Control Fault Codes

Code	Meaning
1	Failure To Detect Or Sustain Flame
2	Pressure Switch Or Inducer Problem Detected
3	High Limit Protection Deice Open
4	Gas Valve Not Energized Or No “W” Signal
5	Flame Toll Out Switch Open

Call for Heat

After a call for heat the IFC checks to ensure the high temperature limit and rollout switches are closed. If either is open, the IFC responds with a fault code. If high limit and rollout switches are closed, the IFC checks that both pressure switches are open. If either pressure switch is closed, the IFC will respond with a fault code and it will flash code “2” on the LED, waiting indefinitely for both pressure switches to open. If both pressure switches are open, the IFC proceeds to pre-purge.

Pre-Purge

The IFC energizes the low inducer motor, flashes code “2” on LED, and waits for the low pressure switch to close. If the low pressure switch does not close within 3 minutes, the control will energize the high inducer and wait for both pressure switches to close. The IFC will light on high fire and remain on high fire for the remainder of the heat cycle.

When the low pressure switch has closed, the IFC stops flashing the LED and begins timing the 30 second pre-purge period. If flame is sensed as present during pre-purge, the IFC restarts the pre-purge time to require a full pre-purge after flame is removed. When pre-purge time has expired, the IFC begins the ignition trial.

Ignition Trial

The IFC energizes the gas valve and spark. The IFC ignores flame sense for the first 2 seconds of the ignition trial. If flame is not established within 7 seconds, the gas valve and spark is de-energized and the IFC goes to an inter-purge. If flame is established, the spark is de-energized, the IFC energizes the high inducer (low inducer remains energized) and begins heat blower on delay.

Heat Blower On-Delay

The control waits for 45 second heat fan on delay and then energizes the indoor blower heat speed. If the blower is already energized by a call for cooling or continuous fan, or in a blower off delay period, the on delay is skipped and the blower remains energized. After the blower on delay time is complete, the control goes to high fire warm-up mode.

The high pressure switch is ignored during the heat blower on delay to give time for the high pressure switch to close if lighting on low fire.

High-fire Warm-up

The IFC remains on high fire for 120 seconds after flame is established. If the DDC Controller is calling for 2nd stage heat, the IFC remains in high heat. If the IFC lit on high fire because the low pressure switch did not close within 3 minutes, then the IFC remains on high fire for the entire call for heat regardless of 2nd stage thermostat call. If there is no DDC Controller demand for 2nd stage heat when the 120 second time has expired, the IFC transitions from high heat to low heat.

Low Heat

IFC inputs are continuously monitored to ensure limit, rollout, and pressure switches are closed, flame is established, and the thermostat call for heat remains. Low gas, low inducer, and blower remain energized. If the DDC Controller calls for 2nd stage heat (Hi Heat), the IFC transitions to high heat.

High Heat

IFC inputs are continuously monitored to ensure limit, rollout, and pressure switches are closed, flame is established, and the DDC Controller calls for heat remain. Low gas, high gas, low inducer, high inducer, and blower remain energized. If the DDC Controller terminates the call for 2nd stage heat and the first stage call remains, the IFC transitions to low heat.

Low Heat to High Heat Transition

When the DDC Controller calls for 2nd stage heat after low heat is established, the IFC checks the high pressure switch. If the high pressure switch is closed, the IFC flashes “2” on the LED and waits indefinitely for the high pressure switch to open. When the high pressure switch is proven open, the IFC energizes the high inducer motor and waits for the pressure switch to close. If the high pressure switch does not close within 60 seconds, the control flashes “2” on the LED and de-energizes the high inducer motor for 5 minutes. The high inducer is re-energized after the 5 minute period for 60 seconds and the cycle repeats indefinitely until the high pressure switch closes. When the high pressure switch closes, the IFC energizes the high gas output and proceeds to high heat.

High Heat to Low Heat Transition

When the DDC Controller ends the call for 2nd stage heat and the first stage call remains, the IFC de-energizes the high gas output. The high inducer remains energized for 60 seconds after the high gas de-energizes. The IFC proceeds to low heat.

Post Purge

When the DDC Controller demand for heat is satisfied, the IFC immediately de-energizes the gas valve(s). The Inducer output(s) remains on for a 5 second post-purge period. The IFC continues the heat blower off delay.

Heat Blower Off Delay

The IFC de-energizes the Indoor blower motor 90 seconds after the call for heat terminated

Interrupted Call For Heat

If the DDC Controller demand for heat is removed before the ignition period, the IFC will immediately de-energize the inducer.

If the DDC Controller demand for heat is removed after ignition has begun, the induced draft motor will run through a post purge and the indoor blower motor will run on heat speed for the delay off time.

Ignition Retry

If flame is not established on the first trial for ignition period, the induced draft motor remains energized and the IFC de-energizes the low gas valve. The IFC waits for a 60 second inter-purge period then attempts an ignition re-try. If the second ignition trial is unsuccessful, the IFC energizes the high inducer and waits indefinitely for the high pressure switch to close. When the high pressure switch closes, the IFC energizes the high gas output, interpurges 60 seconds and tries the 3rd and 4th ignition attempts on high fire.

If flame is not established on the fourth trial for ignition, the IFC de-energizes the high and low gas outputs and goes into lockout. The IFC indicates a fault by flashing the status LED 1 time to indicate lockout is due to failed ignition.

Ignition Recycle

If flame is established and maintained during the trial for ignition period and then flame is lost, the gas valve is de-energized, the induced draft motor continues to run, and the control begins timing the pre-purge delay. The indoor blower motor will be energized and/or remain energized on heat speed for the delay off time.

When the pre-purge delay is over, the control energizes the spark and gas valve for an ignition attempt. If ignition is unsuccessful, the IFC will attempt up to 3 more retries as described above. The IFC will recycle up to 17 flame losses (16 recycles) within a single call for heat before going to lockout. The IFC status LED will flash 1 time if lockout is due to too many flame loses. (This is same flash code as failed ignition.).

Open Limit switch

The limit switch is ignored unless a call for heat is present. If the limit switch opens while a call for heat is present, the indoor fan is energized on heat speed and both inducers are energized. The gas valve is de-energized if it was energized. The status LED will flash 3 times indicating the Limit switch

is open. The blower and inducers will remain energized as long as the limit is open and there is a call for heat.

If the call for heat goes away while the limit switch is open, the induced draft motor will run through post purge and the indoor blower will run through the heat fan off delay. The status LED will return to steady on.

If the limit switch re-closes and the call for heat remains, the status LED will return to steady on and the IFC will begin a pre-purge time with high gas output energized to begin a re-ignition attempt. The indoor blower remains on (for the delay off time) through the re-ignition attempt.

Open Rollout switch

The rollout switch is ignored unless a call for heat is present and the limit switch is closed. If the rollout switch opens for more than 1 second, the indoor fan is energized on heat speed for a heat blower off delay period and the inducer motor is energized for a post-purge time period. The gas valve is de-energized if it was energized. The status LED will flash 5 times indicating the rollout switch is open and the IFC is in lockout.

If the rollout switch re-closes before the call for heat goes away, the IFC will remain in lockout with the LED flashes 5 times.

Note: Rollout switch open for less than 1 second will cause interrupted heat cycle from open PS, however it will not lock out.

Pressure switch

The pressure switches are ignored unless a call for heat is present and the limit and rollout switches are closed. When a call for heat occurs and either pressure switch is closed before the inducer is energized, the inducer will remain off and the LED will flash 2 times until both pressure switches open.

If either pressure switch opens before the ignition period, both induced draft motor will remain on, the high gas output will be de-energized, and the LED will flash 2 times. When both pressure switches are closed, the LED flash code is cleared, the high gas output is energized, and the control re-starts the pre-purge period.

If the low pressure switch opens after the gas valve has been energized, the control will de-energize both gas outputs and run the indoor blower on heat speed through the fan off delay. The low inducer remains energized and the high inducer energizes if it was not already energized. When both pressure switches re-close, the control begins the pre-purge period and re-ignites. If the call for heat goes away before the pressure switches close, both inducer motors are de-energized and the control goes to standby.

If the high pressure switch opens while in high heat and the low pressure switch remains closed, the control de-energizes the high gas output and attempts to reestablish high heat.

Call for Fan

When the DDC Controller calls for continuous fan (Cont Fan) without a call for heat, the indoor fan is immediately energized. The fan remains energized as long as the call for fan remains without a call for heat.

The continuous fan operation continues to function while the control is in heat mode lockout.

Undesired Flame

If flame is sensed longer than 2 seconds while the gas valve is de-energized, the IFC will energize both induced draft motors and indoor blower motor. When flame is no longer sensed, the induced draft motors and indoor blower motor will de-energize. The IFC will do a soft lockout, but will still respond to open limit and flame. The status LED will flash 4 times when lockout is due to undesired flame. If there is no call for heat, or the call for heat is removed, lockout will reset.

Gas Valve relay fault

If the IFC senses the gas valve is energized for more than 1 second when the control is not attempting to energize the gas valve, or if the gas valve is sensed as not energized when it is supposed to be energized, then the IFC will lockout with the LED off. The IFC assumes either the contacts of the relay driving the gas valve have welded shut, or the sensing circuit has failed. The inducer is forced off to open the pressure switch to stop gas flow unless flame is present.

If the gas valve was sensed as closed when it should be open, and has not de-energized after the inducer was shut off for 15 seconds, then both inducers are re-energized to vent the unburned gas.

Soft Lockout

The IFC shall not initiate a call for heat while in lockout. A call for continuous fan operates as normal. The IFC will still respond to an open limit and undesired flame.

Lockout shall automatically reset after 1 hour. Lockout may be manually reset by removing the thermostat call for heat for more than 3 seconds or removing power from the control for more than 5 seconds.

Hard lockout

If the IFC detects a fault, the status LED will be de energized and the IFC will lockout as long as the fault remains. Hard lockout may be reset by removing power to the control for more than 5 seconds. Faults detected within the microcontroller continually re-test to see if they are hard failures. Failures detected within the flame sensor or gas valve drive circuits re-test every 1 hour.

Electric Heat

The DDC Controller will always consider two available stages of electric heat, although installation may have only one.

The electric heat is energized whenever the demand for heat is not satisfied. The heat source it will be staged on based on demand.

During electric heat operation the control does not delay energizing the indoor fan.

Keypad

The keypad consists of Up, Down, Left, Right arrow keys, and an Enter key. The Right and Left keys allow the user to select among the different groups of menus. The Up and Down keys allow the user to scroll vertically through sub-menus within the menu group. Up and Down keys also allow the input of certain parameters, such as set points and time delays. Before changing any parameter please see the appropriate sections and have a full understanding of what you are changing. Adjustment are possible only when a blinking cursor is over or next to the parameter to be adjusted. The blinking cursor is available for adjustable parameters after the user presses the Enter key (center key) while the value in question is shown on the display. Once the adjustment is made, the user must press the Enter key again for the change to take effect. During the adjustment, either left or right keys work as “escape” so the parameter reverts back to its original value and the cursor is no longer visible.

Figure 7: Keypad and Display

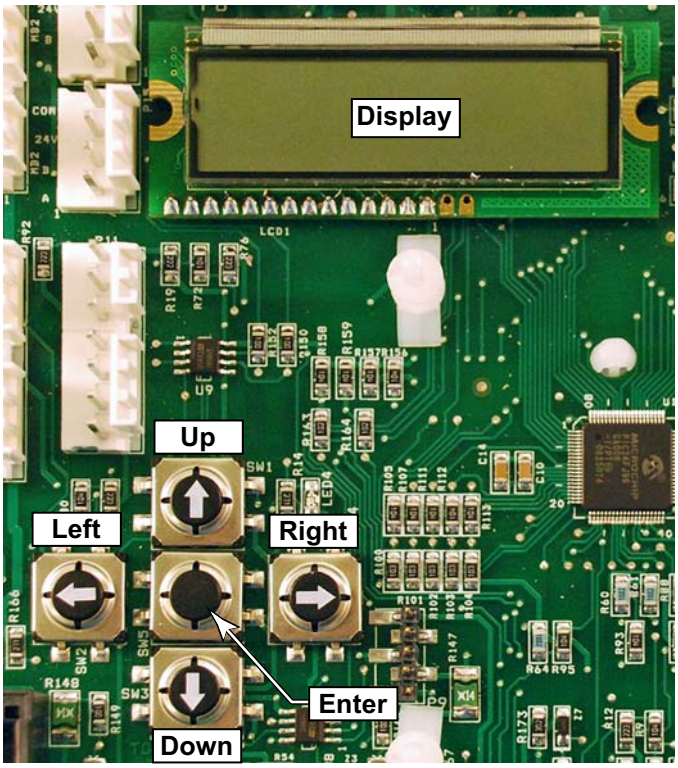
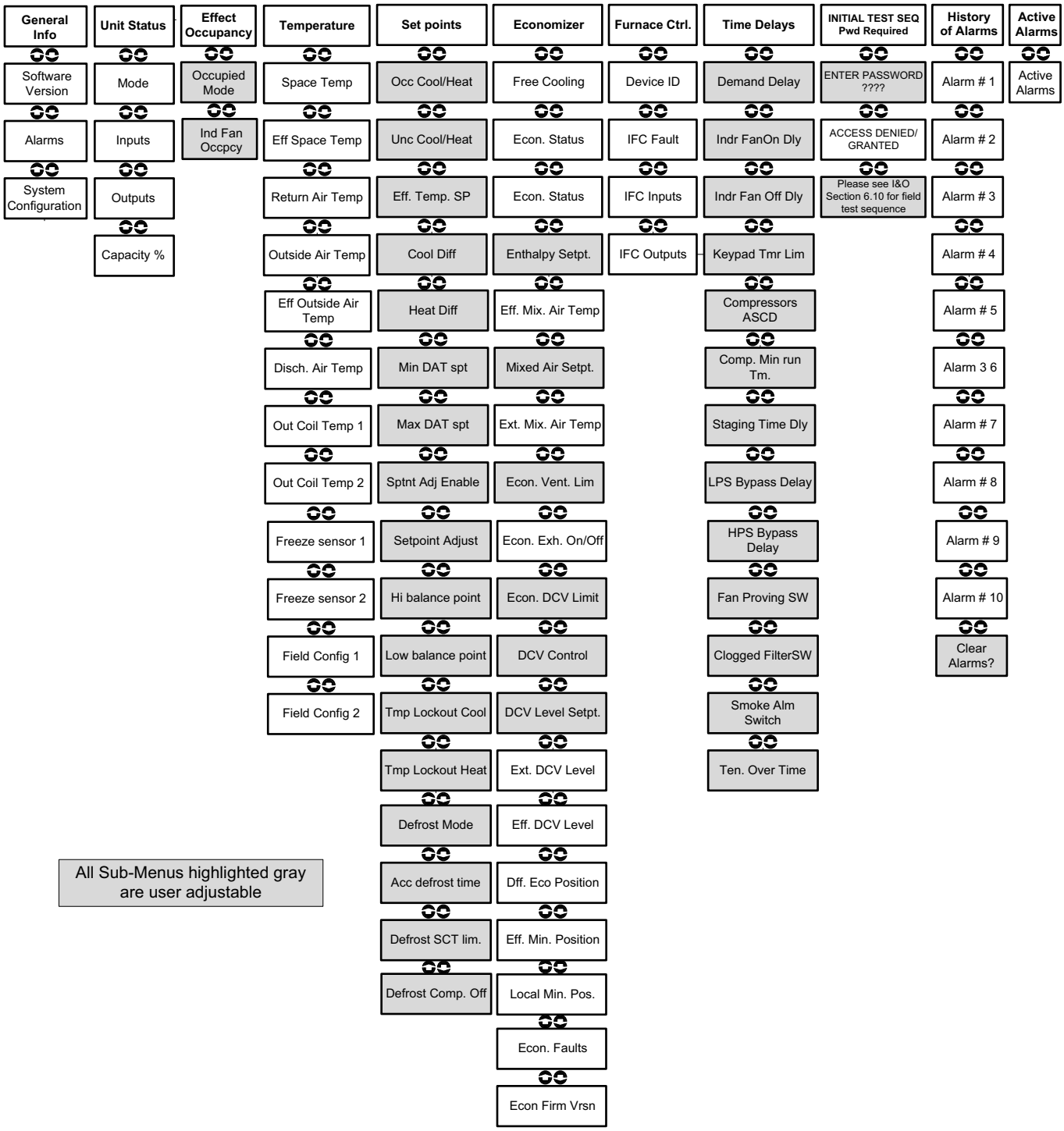


Figure 8: Menu Structure



General information Screen

This is the home page of the system. At power up or after a period of time of 5 minutes (display delay) without the selection of any buttons, the system returns to this screen and resumes scrolling through the items of this group.

The general information screen automatically scrolls through the different menu items at 2-second intervals. When the user presses any button, the changing of screens stops until the display delay expires.

The software is programmed in the factory and cannot be changed. The item “Alarms” is dependent upon the existence of an alarm and it may display either “No Active Alarm” or “Check Alarms!” Another screen outside this group shows the details of existing alarms. The option for system configuration is set with a configuration key from the factory.

Unit Status Screen

The status screen shows basic information about the operation of the unit, such as mode of operation, inputs, outputs, and capacity of cooling or heating.

Table 7: Unit Status Screen

Item	Range
Mode	STANDBY Fan Only COOL STG1 ECON COOL STG2 CC/ECO COOL STG1 COMP COOL STG2 COMP HEAT STG1 COMP HEAT STG2 COMP HEAT STG1 ELEC HEAT STG2 ELEC HEAT STG1 GAS HEAT STG2 GAS HEAT STG2 CC/ELE HEAT STG3 CC/ELE HEAT STG4 CC/ELE Defrost 1 Defrost 2
Inputs	24VAC Inputs Y1 – ON/OFF Y2 – ON/OFF W1 – ON/OFF W2 – ON/OFF B – ON/OFF G – ON/OFF OCC – ON/OFF LPS1 – ON/OFF LPS2 – ON/OFF HPS1 – ON/OFF HPS2 – ON/OFF CFS – ON/OFF SMKS – ON/OFF FPS – ON/OFF
Outputs	OUTPUTS Compressor 1 – ON/OFF Compressor 2 – ON/OFF Rev Vlv 1 – ON/OFF Rev Vlv 2 – ON/OFF Heat 1 – ON/OFF Heat 2 – ON/OFF Outdr Fan 1 – ON/OFF Outdr Fan 2 – ON/OFF Indoor Fan – ON/OFF
CAPACITY Heating: / Cooling:	– 100%

Effective Occupancy Screen

The Occupancy screen determines whether the unit is operating in occupied mode, unoccupied mode, or tenant override. It also displays whether the control is connected to a network, regular thermostat, or if it is just using its local sensors for controlling the temperatures.

Table 8: Effective Occupancy Screen

Item	Range
Effective Occupancy	Occupied / Unoccupied / TntOverr XXX min
Occupied Mode	OFF AUTO FAN ONLY HEAT ONLY COOL ONLY Ctrl by Tstat
Ind Fan Occupcy	Continuous Auto Cont when occup.

Effective Occupancy

Tenant Override, Occupied, or Unoccupied will be displayed depending on the mode. The DDC Controller allows separate adjustment of temperature set points and fan operation according to the building occupancy. This feature is only available when a thermostat is not controlling the ambient.

For the following sections, Occupied Mode implies that the calculation for demand utilizes occupied set points, which are used to satisfy the comfort in the ambient. Unoccupied mode utilizes unoccupied set points and is normally set to save energy during periods in which buildings are closed and unoccupied. Tenant Override Mode is a state in which the control utilizes occupied set points for a limited amount of time, after which it returns to unoccupied mode. To start Tenant Override, the user presses a button on the space sensor for more than 2 seconds. The Tenant Override period is adjustable between 2 and 6 hours and it has priority over any other settings.

All set points are available via network and local human interface.

Occupied Mode

The Occupied Mode is available through network and user interface. The possible selections are:

- Off
- Auto
- Cooling only
- Heating only
- Fan Only
- Control by thermostat: not available through network. This is exclusive to the human interface.

Off mode is the default factory selection, so units do not accidentally energize during installation. The commissioning of the rooftop unit therefore requires the configuration of the Occupied Mode register prior to initial startup.

Auto mode is used with a zone sensor and solid state time clock.

Ind Fan Occupcy

The Ind Fan Occupcy is the option that decides the indoor fan function. It includes the following options.

- Continuous
- Auto
- Cont. when occup.

Continuous is used if it is desired that the fan runs all the time regardless of Effective Occupancy. The Auto option allows the fan to cycle with the heat or cool call regardless of Effective Occupancy. The “Cont. when occup” option lets the indoor fan run continuous when Effective Occupancy is occupied.

Temperature Screen

The temperature screen shows all available temperature readings in the system. If any sensors are not available, the control will either show “Sensor shorted” or “Sensor open” messages.

Table 9: Temperature Screen

Item	Range
Space Temp	XXX °F
Eff Space Temp	XXX °F
Return Air Temp	XXX °F
Outside Air Temp	XXX °F
Eff Out Air Temp	XXX °F
Disch. Air temp	XXX °F
Outdoor Coil temp 1	XXX °F
Outdoor Coil temp 2	XXX °F
Freeze Sensor 1	XXX °F
Freeze Sensor 2	XXX °F
Field Config 1	XXX °F
Field Config 2	XXX V

Set points Screen

These screens allow the input of desired cooling, heating, and defrost set points.

Table 10: Set Points Screen

Item	Range
Occ Cool Spt XXX °F Occ Heat Spt XXX °F	Cooling: 40 to 100°F, default 76°F Heating: 36 to 96°F, default 68°F
Unc Cool Spt XXX °F Unc Cool Spt XXX °F	Cooling: 40 to 100°F, default 76°F Heating: 36 to 96°F, default 68°F
Cool. Diff. X.X °F	0.5 to 9.9°F, default 1.0°F
Heat Diff. X.X °F	0.5 to 9.9°F, default 1.0°F
Min DAT Spt XXX °F	10 to 90°F, default 55°F
Max DAT Spt XXX °F	50 to 120°F, default 55°F
Stpnt Adj Enable	Enable / Disable
Setpoint Adjust. XXX °F	36 to 100°F, default 76°F
Hi Balance Point XXX °F	0 to 120°F, default 40°F
Lo Balance Point XXX °F	0 to 120°F, default 35°F
Tmp Lockout Cool XXX °F	30 to 50°F, default 35°F
Tmp Lockout Heat XXX °F	70 to 95°F, default 90°F

Set Points

Set point is the desired temperature of comfort. The user has two ways to adjust the set point: (a) using the User interface, or (b) sending a command through the network. The set point selection will only be valid when the board is not connected to a thermostat.

The user can select occupied and unoccupied set points for both heating and cooling through either the display or the network. The selection through display does not allow the user to choose set points closer than the value of the dead band plus differential, so the control automatically changes the value of the set point not being adjusted. As an example, if the differential plus dead band equals to three degrees and the user is adjusting cooling set point at 72°F, the control will lower the heating set point to 69°F if the difference between the two is less than three.

If the remote set point adjustment is enabled, then the control will consider the hardwired potentiometer input to determine occupied set points only. If the remote set point adjustment is enabled but the input reads an invalid number, the control will default back to the occupied set point selection.

Network data takes precedence over local selections. In other words the control will follow a valid remote set point adjustment from the network, even if the remote set point adjustment is enabled and the hardwired input reading is valid.

The DDC Controller will consider the hardwired potentiometer reading or the network remote set point adjustment as the cooling set point. It calculates the heating set point by subtracting dead band (2.0°F) and differential from the cooling set point.

Cooling Differential, Heating Differential, and Dead Band

Differential is the maximum difference allowed between the temperature reading and set point before the control considers a valid demand for cooling or heating. The differential is also valid for determining that the unit has satisfied demand. Depending of the mode of operation, the differential will either be added or subtracted from the set point to determine those points.

Dead band is the difference between cooling set point minus cooling differential and heating set point plus heating differential.

Min DAT Spt

The Minimum DAT set point is used to create warnings in the system.

Max DAT Spt

The Maximum DAT set point is used to create warnings in the system.

Stpnt Adj Enable

If the set point adjustment is enabled, then the control will consider the hardwired potentiometer input to determine occupied set points only. If the remote set point adjustment is enabled but the input reads an invalid number, the control will default back to the occupied set point selection.

Setpoint Adjust

This is the actual reading of the potentiometer set point “Stpnt Adj Enable”.

Cooling Lockout Temperature

If the outdoor air temperature is below the cooling lockout temperature the control will prevent the operation of mechanical cooling. The default cooling lockout temperature is 35°F with a range of adjustment from 30°F to 50°F and the cooling lockout resets at 5°F above the set point. As an example, if the setting is 40°F and the compressors are not operating due to low outdoor air temperature, then the DDC Controller will only allow the operation of mechanical cooling again once the OAT reading exceeds 45°F.

Heating Lockout Temperature

If the outdoor air temperature is above the heating lockout temperature the control will prevent the operation of heating. The default heating lockout temperature is 90°F with a range of adjustment from 70°F to 90°F and the heating lockout resets at 5°F below the set point.

Economizer

This screen shows the information available from the Economizer. When this device is not connected, the control will show the word “Unavailable” on the second line of the display.

The Economizer uses controllable dampers to increase the amount of outside-air intake into the building whenever enabled and whenever outside air enthalpy is favorable for conditioning the ambient.

The DDC Controller board communicates to the Economizer Logic Module (ELM) via RS485. Once the ELM receives communication from the main control indicating a cooling demand, the ELM will calculate the outdoor air enthalpy and determine if the economizer operation is favorable for conditioning the ambient. The main control will read the status of the economizer and determine whether it is a valid stage for cooling or not.

If mechanical cooling is active and the enthalpy is favorable for ELM operation, the DDC Controller will override the Economizer opening the damper 100%. ELM will regain control of the damper whenever mechanical cooling is no longer necessary.

If operating from a thermostat, the Economizer is the first stage of cooling. If the unit has two compressors available, the second stage will never be active as long as free cooling is available.

When the DDC Controller is operating from its local temperature sensors, the Economizer is also a first stage of cooling, if free cooling is available. First and second stages of mechanical cooling may be necessary for satisfying the demand in case the temperature trend towards the set point is not large enough. Whenever mechanical cooling is active, DDC Controller overrides the Economizer, opening the damper 100%.

Table 11: Demand Control Ventilation

Economizer	Adjustable Range	Default setting
Econ. Status	Economizer OK / Economizer Not OK	
Econ. Status	Diff Enthalpy / Single Enthalpy	
Econ. Status	Exh. Fan is ON/OFF	
* Enthalpy Setpt.	A/B/C/D/E	A
Eff.Mix.Air Temp	XXX.X °F	
* Mixed Air Setpt.	0 - 99	45
Ext.Mix.Air Temp		
* Econ. Vent. Limit	0 - 100	0
* Econ.Exh. On/off	0 - 100	50
* Econ. DCV Limit	0 - 100	0
DCV Control	Enabled / Disabled	Disabled
* DCV Level Setpt.	500 - 2000 ppm	700
Ext. DCV Level		
Eff. DCV Level		
Eff.Eco.Position		
Eff.Min.Position		
Local. Min. Pos.		
Econ. Faults	DCV Sensor Fault OAE Sensor Fault RAE Sensor Fault MAT Sensor Fault	
Econ Firm Vrsn		0103

* Menus that are user adjustable

Economizer Status

This screen confirms if the enthalpy is acceptable for economization.

Economizer Status

This screen indicates if the system is using single or differential enthalpy.

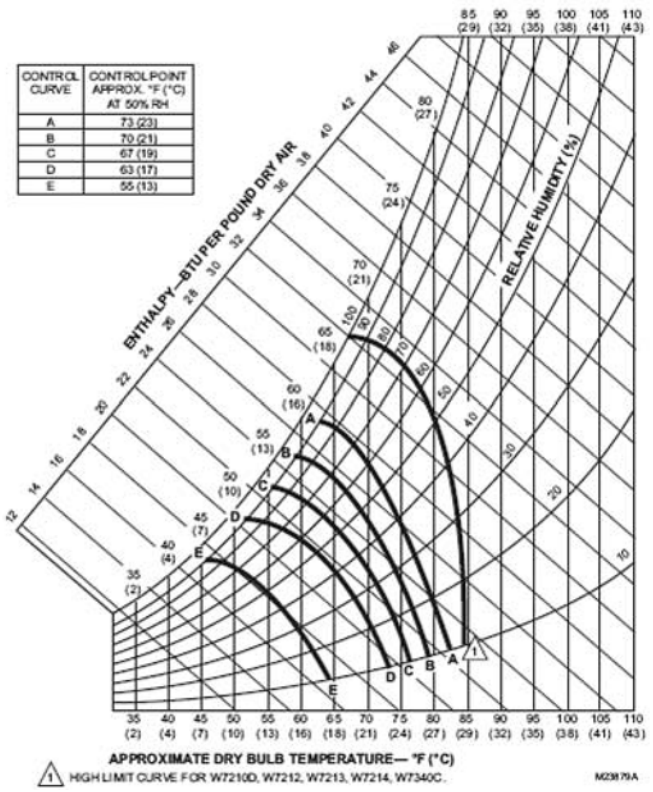
Economizer Status

This screen gives the status of the exhaust fan.

Enthalpy Setpoint

The user has five levels to choose for the enthalpy set point. Figure 9 indicates what each of those levels represents in the psychometric chart. This setting determines the level at which economization is allowed. This setting is only adjustable at economizer potentiometer.

Figure 9: Demand Control Ventilation



Effective Mixed Air Temperature

This is the current value of mixed air temperature.

Mixed Air Setpoint

When the mixed air temperature falls below this set point, the freeze protection control will disable the mixed air control and close the outdoor damper to the effective minimum position.

External Mixed Air Temperature

This screen corresponds to the discharge air temperature reading from the DDC Controller.

Economizer Ventilation Limit

The ventilation limit corresponds to a minimum position of the Economizer that complies with the minimum acceptable outside-air ventilation rate. The volumetric flow-rate of outside air required to provide healthful, comfortable conditions for occupants can be determined from building codes, ASHRAE standards, or standard practice. It is usually expressed in terms of volumetric flow-rate (cfm) per occupant or per unit floor area. The use of a CO2 sensor can lower the ventilation limit by verifying that the indoor air quality is suitable for human occupancy, as described in the next section for Demand Control Ventilation (DCV).

The system allows the adjustment of the ventilation limit through four different methods, listed below in order of priority:

1. Network interface (BACnet, BAS, or LonWorks)
2. Human Systems Interface (HSI)
3. Remote potentiometer
4. Direct adjustment through a potentiometer on ELM control.

Economizer Exhaust ON/OFF

This screen allows the user to change the set point of what percentage the exhaust fan is energized.

Economizer DCV Limit

The economizer will allow the dampers to close more than the minimum position if the indoor air quality is not contaminated. The Econ. DCV Limit can be set from 0 to 100% but must be lower than the minimum position.

Economizer DCV Control

If connected to a CO2 sensor, the ELM measures and regulates the amount of outdoor air supplied to the space in order to maintain the levels of carbon dioxide below the recommended 700ppm above the outdoor levels. In this case, CO2 levels serve as a proxy for building occupancy and the rate of human-generated indoor pollutants.

Once the DCV is operating, the minimum damper position can then be lowered to the DCV ventilation limit. By default, this value is 50% of the ventilation limit, but the user has the option to adjust it through network or human system interface. The user also has the option to disable DCV altogether.

DCV Level Setpoint

The DCV level setpt is a selectable level of carbon dioxide that the system does not allow to be exceeded. The set point is communicated to the economizer and the minimum ventilation position is changed in order to prevent the increase of CO2.

External DCV Level

This is the value DDC Controller sends to the Economizer.

Effective DCV Level

This is the actual DCV Level in ppm.

Effective Economizer Position

This is the actual position of the economizer.

Effective Minimum Position

This displays current value of the effective minimum damper position.

Local Minimum Position

This displays the local minimum position that is set at the ELM.

Economizer Faults

This screen displays any ELM sensor or actuator faults. Check for proper installation of the sensor or actuator, or replace the sensor or actuator so the alarm is cleared. Note: The actuator fault must be present for at least 2 minutes with the unit powered, the indoor fan running, and the outside damper commanded to open more than 0% before the alarm is set.

Integrated Furnace Control Screen

This screen shows the information available from the IFC board. When this device is not connected the control will show the word “Unavailable” on the second line of the display.

Device ID

This screen displays the IFC software version.

IFC Fault

This screen displays any IFC faults. The faults will also be displayed on the main DDC Controller fault screen.

IFC Inputs

Status of IFC Inputs

IFC Outputs

Status of IFC outputs

Time Delays Screen

This screen allows the input of time constants of the system.

Table 12: Time Delays Screen

Time Settings	Adjustable Range	Default
Demand Delay	30– 1800 sec	300 sec
Indoor Fan On Delay	1sec – 180sec	10 sec
Indoor Fan Off Delay	1sec – 180sec	45 sec
Keypad auto scroll timeout	30sec – 10min	5 min
Compressors ASCD (Anti Short Cycle Delay)	10sec – 30 min	3 min
CMRT (Compressor Minimum Run Time)	1 – 20min	2 min
Stage Delay	5 – 300 sec	5 sec
LPS (low pressure switch) bypass timer	10 – 90 sec	30 sec
HPS (high pressure switch) bypass timer	1 – 5 sec	2 sec
Fan Proving Switch	1sec – 180sec	20 sec
Clogged Filter Switch	1sec – 180sec	20 sec
Smoke Alarm Switch	1sec – 180sec	20 sec
Tenant Override	2h – 6h	2h

Demand Delay

The demand delay is the time period in which the control compares set point to zone temperature readings and determines whether the current stage of either cooling or heating is sufficient to satisfy the set point. The demand delay is set by default at 5 minutes, and it can be configured between 30 seconds and 30 minutes.

Indoor Fan On Delay

The indoor fan on delay is the time delay before the fan is allowed to energize after a call for cool, heat, or fan only. This delay is ignored if the indoor fan is in continuous mode. In the heating mode, for electric heat models, there is not a delay; for gas heat models the delay is handled by the integrated furnace control (IFC).

Indoor Fan Off Delay

The indoor fan off delay is the time delay after a call for cool or heat is terminated. This delay is ignored for gas heat units or if the indoor fan is in continuous mode. For gas heat units, the indoor fan off delay is handled by the integrated furnace control (IFC).

Keypad auto scroll timeout

The keypad auto scroll timeout will keep the User Interface from returning to the general information screen for the selected time.

ASCD (Anti Short Cycle Delay)

The anti short cycle delay is an adjustable delay used to keep the compressor from re-energizing too quickly after a cycle. The delay time starts after the compressor de-energizes.

CMRT (Compressor Minimum Run Time)

The compressor minimum run time is an adjustable time used to ensure proper compressor oil return.

Stage Delay

The stage delay is an adjustable time that keeps the next stage of cooling or heat pump from energizing.

LPS (low pressure switch) bypass timer

The low pressure switch bypass timer is an adjustable time that the DDC Controller ignores the refrigerant low pressure switch after a call for cooling or heat pump.

HPS (high pressure switch) bypass timer

The high pressure switch bypass timer is an adjustable time that the DDC Controller ignores the refrigerant high pressure switch after a call for cooling or heat pump.

Fan Proving Switch

The fan proving switch bypass timer is an adjustable time that starts after the indoor fan is energized. The purpose of the timer is to give the indoor fan time to come up to speed.

Clogged Filter Switch

The clogged filter switch bypass timer is an adjustable time that can only be activated if the indoor fan is energized. If the clogged filter switch input is continuously closed until the time expires, the clogged filter alarm is tripped. The purpose of the delay is to prevent nuisance trips when the indoor fan is started or other pulsations in the airflow.

Smoke Alarm Switch

The smoke alarm switch is an input that will lock out the system when an open switch is detected for 2 seconds. To reset the system power must be cycled to the unit or an “all clear” signal must be communicated through the network.

Tenant Override

The DDC Controller allows separate adjustment of temperature set points and fan operation according to the building occupancy. This feature is only available when a thermostat is not controlling the space temperature. For the following sections, Occupied Mode implies that the calculation for demand utilizes occupied set points, which are used to satisfy the comfort in the space. Unoccupied mode utilizes unoccupied set points and is normally set to save energy during periods in which buildings are closed and unoccupied. Tenant Override Mode is a state in which the control utilizes occupied set points for a limited amount of time, after which it returns to unoccupied mode. To start Tenant Override, the user presses a button on the space sensor for more than 2 seconds.

Initial Test Sequence

The DDC Control allows a technician to Field Commission a new or existing installation of a package unit with the DDC control. By entering a password (5555), the technician can select a cooling test or a heating test. If a cooling test was selected, the first stage of cooling is now energized for 5 minutes to check for alarms. At the end of the test, the temperature sensor readings are displayed. If the technician connected refrigerant gauges to the unit, the technician can record their gauge readings along with the sensor temperature readings for future reference or to calculate refrigerant superheat. If the unit has two stages of cooling, the next stage of cooling is now energized for 5 minutes to check for alarms. At the end of the test, the temperature sensor readings are displayed. If the technician connected refrigerant gauges to the unit, the technician can record their gauge readings along with the sensor temperature readings for future reference or to calculate refrigerant superheat for the second stage of cooling. Using the reading from the outdoor air temperature sensor and the refrigerant pressure and temperature readings, the technician can verify unit operation obeys the refrigerant charge chart. The DDC then de-energizes the second stage compressor, the first stage compressor, and finally the indoor fan. The test is then terminated. Temporarily shorting across the “TEST PINS” (P12) on the DDC board during the heating test will cause the gas valves to energize and de-energize instead of the compressors. No temperature display is provided at the end of the gas heat test.

History of alarms

This screen shows the last 10 alarm occurrences of the system. A new alarm enters in position 1, shifting the other occurrences one position down.

The last position of the screen allows the user to clear the entire alarm history, by pressing the enter key.

Current Alarms

This screen shows the current alarms of the system. A maximum of ten alarms can be displayed.

Table 13: Alarm and Diagnostic List

Alarm Designation	Origin	Description	Status/Troubleshooting Information
No Active Alarm			
Locked Rotor Circuit 1	CA1	Comfort Alert Code 4. Circuit 1 shutdown and retry after Anti-Short Cycle Delay (ASCD). Maximum is 3 attempts.	• Low line voltage • Excessive Refrigerant in compressor • Seized bearings in compressor
Open Circuit 1	CA1	Comfort Alert Code 5. Circuit 1 shutdown and retry after ASCD. Note: This alarm is sent by the Comfort Alert Module only after the fault has been sensed for a minimum of 4 hours.	• Condensing unit power disconnect is open • Compressor circuit breaker or fuses are open • Compressor contactor has failed open • High pressure switch is open and requires manual reset • Broken supply wires or connector is not making contact • Unusually long compressor protector reset time due to extreme ambient temperature • Compressor windings are damaged
Missing Phase Circuit 1	CA1	Comfort Alert Code 6 Circuit 1 shutdown	• Compressor fuse is open on one phase • Broken wire or connector on one phase • Compressor motor winding is damaged • Utility supply has dropped one phase
Reverse Phase Circuit 1	CA1	Comfort Alert Code 7 Circuit 1 shutdown.	• Compressor running backward due to supply phase reversal
Welded Contactor Circuit 1	CA1	Comfort Alert Code 8 Run outdoor and indoor fans continuously for circuit 2 and change mode of operation to Unoccupied Auto. This procedure prevents the Space Temperature from reaching extreme values.	• Compressor contactor has failed closed • Thermostat demand signal not connected to module
Low Voltage Circuit 1	CA1	Comfort Alert Code 9. Shutdown and wait for voltage to return to operational levels.	• Control circuit transformer is overloaded • Low line voltage to compressor
Low Voltage	DDC Controller	De-energize all relay outputs.	•
Failed Ignition	IFC	IFC locks out for 1 hour	• Gas Valve Not Turned On • Little or No Supply Gas • Incorrect Manifold Pressure • No Ignition Source, Direct Spark Ignition (DSI) • No 24 Volt Power to Gas Valve • Bad Gas Valve
Low Flame Sense	IFC	IFC flashes error code on LED, transmits the warning through the network, but otherwise operates normally	• Dirty Flame Sensor • Unit Not Properly Grounded • Incorrect Polarity • Flame Sensor Incorrectly Wired • Bad Flame Sensor
Flame Lost	IFC	If lost 17 times within single call for heat, locks out for 1 hour. Otherwise retry ignition.	•
Unexpected Flame	IFC	IFC Energizes inducer and main blower. Locks out for 1 hour	•
AC Low Pressure Switch 1 Trip-LP1	DDC Controller	If the low pressure switch trips 3 times within 120 minutes of operation during the same call for heating operation, the control will lock out compressor and outdoor fan operation. If the lock-out due to low pressure occurs at an outdoor ambient temperature below 5 °F, the control will automatically exit the lock-out mode when the outdoor ambient temperature rises above 5 °F. LPS is ignored during defrost.	• Unit has low refrigerant charge • Indoor coil frozen (cooling mode) • Dirty indoor coil or filter (cooling mode) • Outdoor coil is frozen (heating mode) • Expansion valve in not operating correctly
AC Low Pressure Switch 2 Trip-LP2	DDC Controller		

Alarm List

Alarm Designation	Origin	Description	Status/Troubleshooting Information
MAIN LIMIT OPEN	IFC	IFC Energizes inducer and main blower	• Burner Over Fired • Low Air Flow • Dirty Filter • Poor Duct Design • Blocked Duct, Supply and/or Return • Incorrect Blower Speed Selection
Clogged Filter Warning-CFS	DDC Controller	DDC Controller Displays warning.	• Dirty Filter
AC HI Pressure Switch 1 Trip-HP1	DDC Controller	The DDC Controller recognizes an open high pressure switch after two seconds from its occurrence. Since the high pressure switch is wired in series with the compressor relay, the compressor shuts down immediately until the pressure switch is closed again AND the anti-short cycle delay is expired. Three occurrences of a high pressure switch within the same call will lock the circuit out. The lockout is reset by removing the call.	• Outdoor coil is dirty (heating mode) • Outdoor fan is not running (cooling mode) • Dirty indoor coil or filter (heating mode) • Indoor blower is not running (heating mode) • Liquid line restriction • Excessive refrigerant charge
AC HI Pressure Switch 2 Trip-HP2	DDC Controller		
MANUAL RESET LIMIT SWITCH OPEN (Flame Rollout Switch)	IFC	IFC Runs blower for off delay, inducer for post-purge time and locks out for one hour	• Excessive Burner Pressure • Improper Venting • Incorrect Burner Orifices • Sooted Heat Exchanger • Bad Inducer Gasket • Bad Heat Exchanger
Locked Rotor Circuit 2	CA2	Comfort Alert Code 4. Circuit 2 shutdown.	• Low line voltage • Excessive Refrigerant in compressor • Seized bearings in compressor
Open Circuit 2	CA2	Comfort Alert Code 5. Circuit 2 shutdown and retry after Anti-Short Cycle Delay (ASCD). Note: This alarm is sent by the Comfort Alert Module only after the fault has been sensed for a minimum of 4 hours.	• Condensing unit power disconnect is open • Compressor circuit breaker or fuses are open • Compressor contactor has failed open • High pressure switch is open and requires manual reset • Broken supply wires or connector is not making contact • Unusually long compressor protector reset time due to extreme ambient temperature • Compressor windings are damaged
Missing Phase Circuit 2	CA2	Comfort Alert Code 6 Circuit 2 shutdown	• Compressor fuse is open on one phase • Broken wire or connector on one phase • Compressor motor winding is damaged • Utility supply has dropped one phase
Reverse Phase Circuit 2	CA2	Comfort Alert Code 7 Circuit 2 shutdown.	• Compressor running backward due to supply phase reversal
Welded Contactor Circuit 2	CA2	Comfort Alert Code 8 Run outdoor and indoor fans continuously for circuit 2 and change mode of operation to Unoccupied Auto. This procedure prevents the Space Temperature from reaching extreme values.	• Compressor contactor has failed closed • Thermostat demand signal not connected to module
Low Voltage Circuit 2	CA2	Comfort Alert Code 9.	• Control circuit transformer is overloaded • Low line voltage to compressor
Duct High Limit Fault		Future implementation	•
Invalid Thermostat selection		Indicates that a combination of thermostat inputs is invalid.	•
PRESSURE SWITCH 1 CLOSED	IFC	Leave inducer de-energized until pressure switch open	• Bad Pressure Switch

Alarm Designation	Origin	Description	Status/Troubleshooting Information
PRESSURE SWITCH 1 OPEN	IFC	Energize inducer indefinitely until pressure switch closes or call for heat goes away.	• Blocked Vent • Undersized Vent • Water in Pressure Switch Tubing • Cracked Pressure Switch Tubing • Inducer Not Running or Not Running to Full Speed • Low Line Voltage to Inducer Motor • Bad Inducer Motor Capacitor • Bad Inducer Motor Bearings • Bad Pressure Switch • Blocked Heat Exchanger
Freeze Sensor 1 Out of Range -FS1	DDC Controller	When reading the temperature below 37°F continuously for 15 minutes, the control shuts down compressor and runs indoor fan continuously. After 15 minutes of continuous reading above 42°F, the control recovers from the alarm and resumes operation.	• If temperature is not below 37°F • Replace the sensor • Check sensor is installed correctly on control
Freeze Sensor 2 Out of Range -FS2	DDC Controller	When reading the temperature below 37°F continuously for 15 minutes, the control shuts down compressor and runs indoor fan continuously. After 15 minutes of continuous reading above 42°F, the control recovers from the alarm and resumes operation.	• If temperature is not below 37°F • Replace the sensor • Check sensor is installed correctly on control
Freeze Sensor #1 Fail-FS1	DDC Controller	Occurs when sensors are either open or shorted.	• Replace the sensor • Check sensor is installed correctly on control
Freeze Sensor #2 Fail-FS2	DDC Controller		
Lockout Temperature – cooling	DDC Controller	When the outdoor temperature drops below the cooling lockout temperature setpoint, the unit will prevent the compressor from operating in cool mode. Selectable range is between 30°F and 50°F, with a default of 35°F.	• Check to make sure the outdoor temperature is not below the set point • Replace the sensor
Lockout Temperature – heating	DDC Controller	When the outdoor temperature exceeds the heating lockout temperature setpoint, the unit will prevent any source of heat from operating. Selectable range is between 70°F and 95°F, with a default of 90°F.	• Check to make sure the outdoor temperature is not above the set point • Replace the sensor
PRESSURE SWITCH 2 CLOSED	IFC	Leave inducer de-energized until pressure switch open	• Bad Pressure Switch
PRESSURE SWITCH 2 OPEN	IFC	Energize inducer indefinitely until pressure switch closes or call for heat goes away.	• Blocked Vent • Undersized Vent • Water in Pressure Switch Tubing • Cracked Pressure Switch Tubing • Inducer Not Running or Not Running to Full Speed • Low Line Voltage to Inducer Motor • Bad Inducer Motor Capacitor • Bad Inducer Motor Bearings • Bad Pressure Switch • Blocked Heat Exchanger
Running Blower Fault-Air Flow Switch Stuck	DDC Controller	Unit continues to operate	• Replace the pressure switch
Blower Fault - Blower Not Running-FP	DDC Controller	Complete unit shutdown.	• Indoor motor Not Running or Not Running to Full Speed • Low Line Voltage to Indoor motor • Bad Indoor motor Capacitor/winding • Bad Indoor motor Bearings • Bad Pressure Switch • Broken belt • Indoor motor running backwards (3 phase) • Open internal motor protector

Alarm List

Alarm Designation	Origin	Description	Status/Troubleshooting Information
ELM - OAE Sensor Fail	ELM	Sensor short, failure	• Replace the sensor • Check sensor is installed correctly on control
ELM - RAE Sensor Fail	ELM	Sensor short, failure	• • Replace the sensor • Check sensor is installed correctly on control
ELM - MAT Sensor Fail	ELM	Sensor short, failure	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
ELM – CO2 Sensor Fail	ELM	Sensor short, failure	• DCV is enabled with no sensor • Replace the sensor • Check sensor is installed correctly on control
ELM Actuator Fault	ELM		•
Low Discharge Air Temp-DAT	DDC Controller	Threshold is 30°F.	• Check to make sure the Discharge Air temperature is below the set point • Replace the sensor • Low refrigerant
High Return Air Temp-RAT	DDC Controller	Threshold is 120°F.	• Check to make sure the Return Air temperature is not above the set point • Replace the sensor
Return Air Sensor Fail-RAT	DDC Controller	If the sensor has ever been installed to the unit, the alarm will be set if it becomes unavailable.	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
Discharge Air Sensor Fail-DAT	DDC Controller	If the sensor has never been installed to the unit, the alarm will be set if it becomes unavailable.	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
Outdoor Air Temperature Sensor Fail-OAT	DDC Controller	Control changes defrost to time x temperature mode. The heat source continues to be heat pump, independently of the outdoor air temperature. Additional heat sources are also available in case the demand is not satisfied.	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
Condenser Coil 2 Temperature Out of Range	DDC Controller	No defrost operation, but unit continues to operate in either heating or cooling.	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
Discharge Air Temperature Out of Range	DDC Controller	If the sensor has ever been installed to the unit, the alarm will be set if it becomes unavailable.	• Extreme temperatures • Replace the sensor • Check sensor is installed correctly on control
Emergency Stop Fault		Complete shutdown	•
Comm card miscommunication	DDC Controller	Communication card failed to communicate with the DDC Controller	• Check wire connection at both controls • Bad Comm card and/or DDC Controller
DDC CONTROLLER Miscommunication with IFC	IFC	IFC failed to communicate with the DDC CONTROLLER	• Check wire connection at both controls • Bad IFC and/or DDC Controller
Internal Control Fault - DDC CONTROLLER	DDC Controller		
Internal Control Fault - IFC	IFC		
Space Sensor Alarm	DDC Controller	If the space sensor fails open or shorted, the space sensor alarm will be set, but the control will continue to operate using the return air sensor in place of the space sensor. If the control has never sensed a valid space sensor input, it will assume no space sensor is present to be used, and not set the space sensor alarm. If a valid space sensor input is ever detected, the control will set a non-volatile flag to indicate the control should have and use a space sensor. When the non-volatile flag is set, the control will detect space sensor alarm conditions.	• Replace the sensor • Check sensor is installed correctly on control
Space Sensor & Return Sensor Fail	DDC Controller	Indicate presence of the alarm and convert operation to thermostat mode.	• Replace the sensors • Check sensors are installed correctly on control

Alarm Designation	Origin	Description	Status/Troubleshooting Information
Smoke Detection (Selectable Fault Response)	DDC Controller	DDC Controller reads the smoke detection input as open -- complete shutdown.	• If not due to a fire • Replace the sensor • Check sensor is installed correctly on control
Low Pressure – Circuit 1 Problem - Lockout	DDC Controller	If the low pressure switch trips 3 times within 120 minutes of operation during the same call for heating operation, the control will lock out compressor and outdoor fan operation. If the lock-out due to low pressure occurs at an outdoor ambient temperature below 5 °F, the control will automatically exit the lock-out mode when the outdoor ambient temperature rises above 5 °F. LPS is ignored during defrost.	• Unit has low refrigerant charge • Indoor coil frozen • Dirty indoor coil or filter • Expansion valve in not operating correctly
Low Pressure – Circuit 2 Problem - Lockout	DDC Controller		
High Pressure– Circuit 1 Problem - Lockout	DDC Controller	The DDC Controller recognizes an open high pressure switch after two seconds from its occurrence. Since the high pressure switch is wired in series with the compressor relay, the compressor shuts down immediately until the pressure switch is closed again AND the anti-short cycle delay is expired. Three occurrences of a high pressure switch within the same call will lock the circuit out. The lockout is reset by removing the call.	• Outdoor coil is dirty • Outdoor fan is not running • Dirty indoor coil or filter • Indoor blower is not running • Liquid line restriction • Excessive refrigerant charge
High Pressure– Circuit 2 Problem - Lockout	DDC Controller		

QUICK START - Units with Thermostat Control

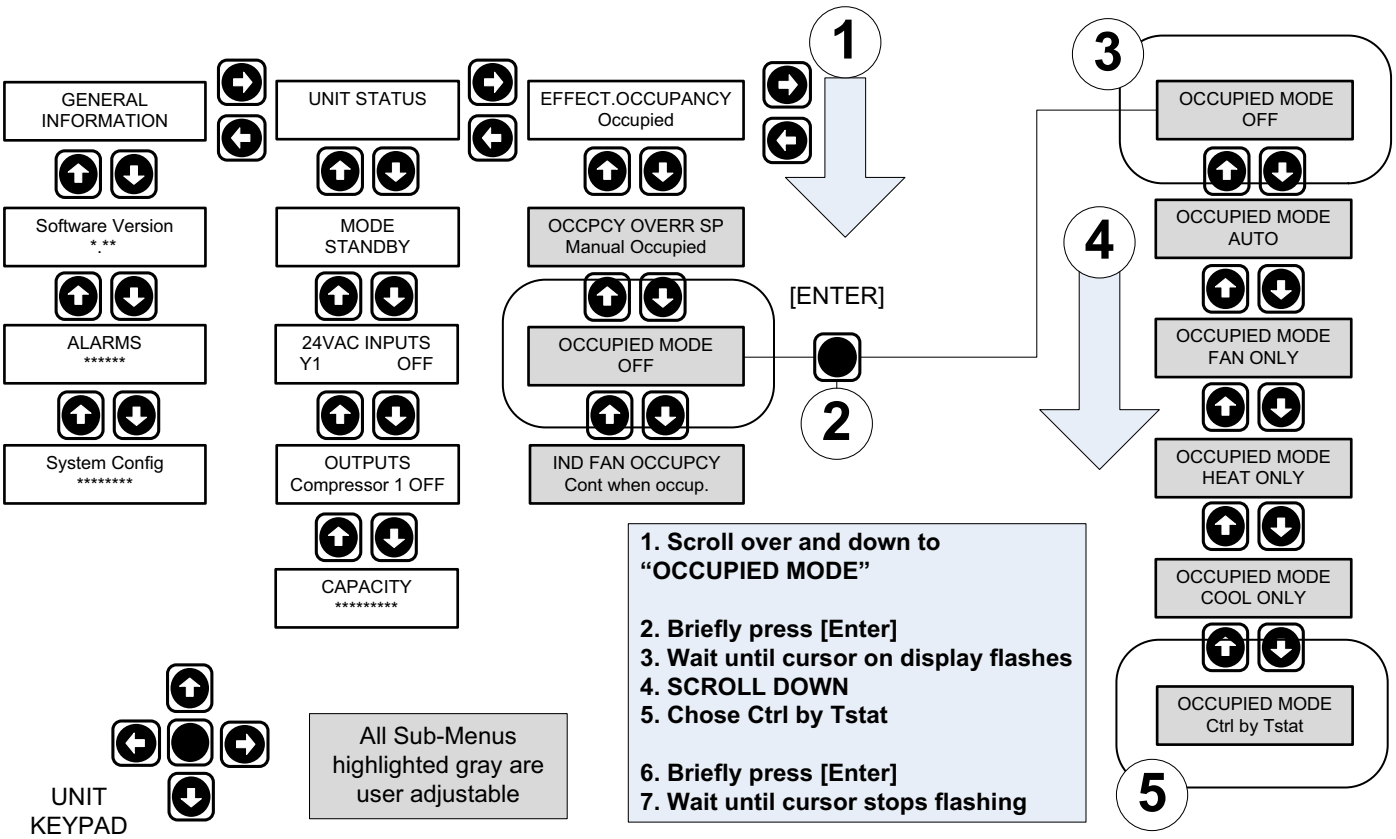
Connect Room Thermostat (and Time Clock if used) to DDC Controller rooftop unit controller circuit board. Follow Unit Installation Instructions obeying all safety guidelines. Replace any low voltage shields removed during the installation of the thermostat wires.

Connect line voltage power wires to the appropriate main power terminal block or disconnect. Connect gas lines for heater section (if applicable).

Apply power to Rooftop Unit.

Using Keypad and Display on DDC Controller circuit board, take unit from “OFF” mode to “Control By Thermostat” by following numbered instructions below. Refer to Effective Occupancy Screen, page 17 for more detail.

Figure 10: Quick Start Menu Steps



Check for any alarms on DDC Controller display. If any alarms are present, find the source and clear the alarm condition.

Scroll through the DDC Controller display using the keypad and set to Runtest mode. Choose either Heating or Cooling runtest. Enter the password to start Runtest. Refer to Initial Test Sequence, page 22

Record temperatures and refrigerant pressures (if applicable) during the runtest. Check for any alarms on the DDC Controller display. If any alarms are present, find the source and clear the alarm conditions.

Figure 11: MPS003B-MPS005B, 208-230/460V, 3-Phase, Gas Heat

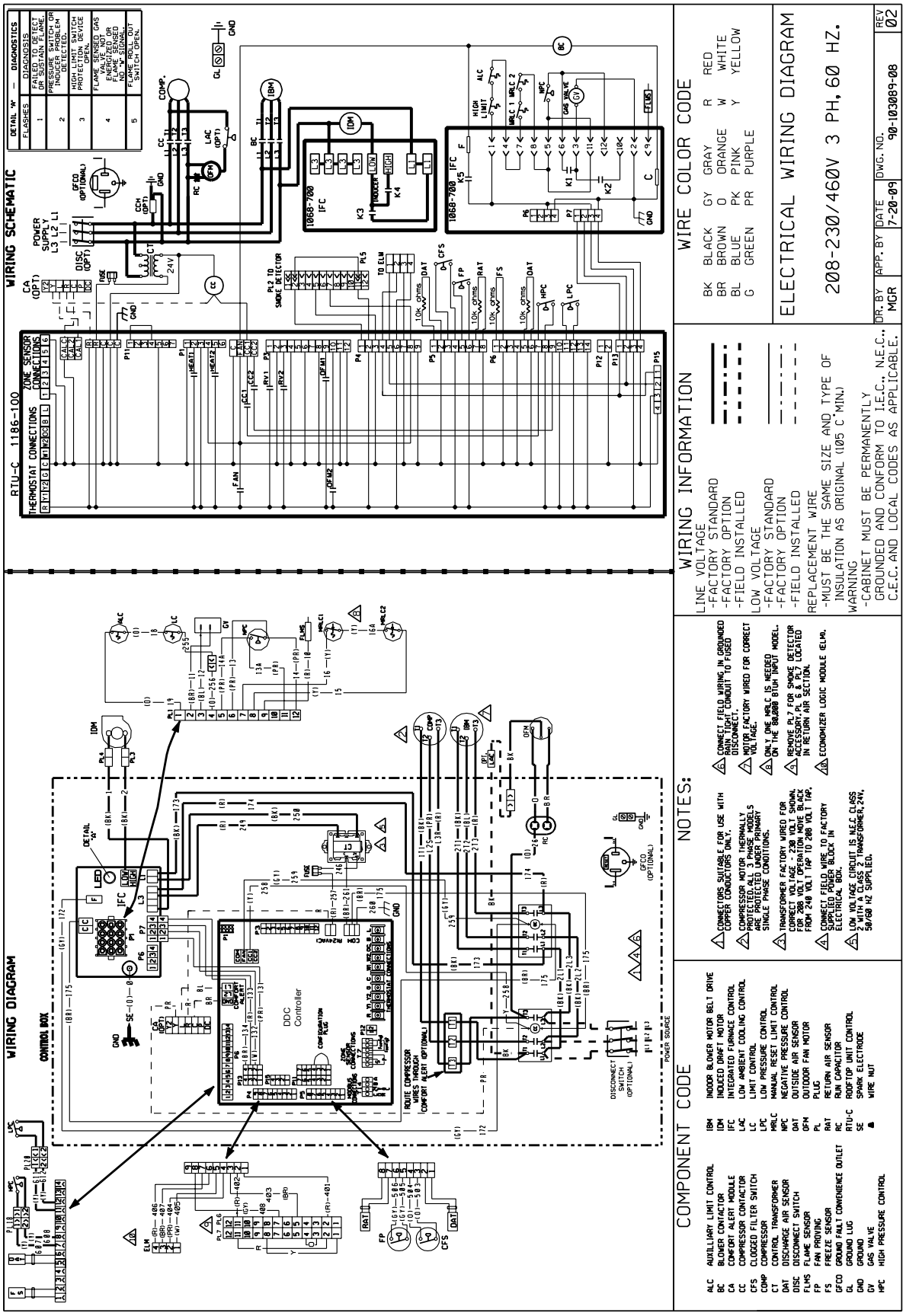


Figure 12: MPS003B-MPS005B, 575V, 3-Phase, Gas Heat

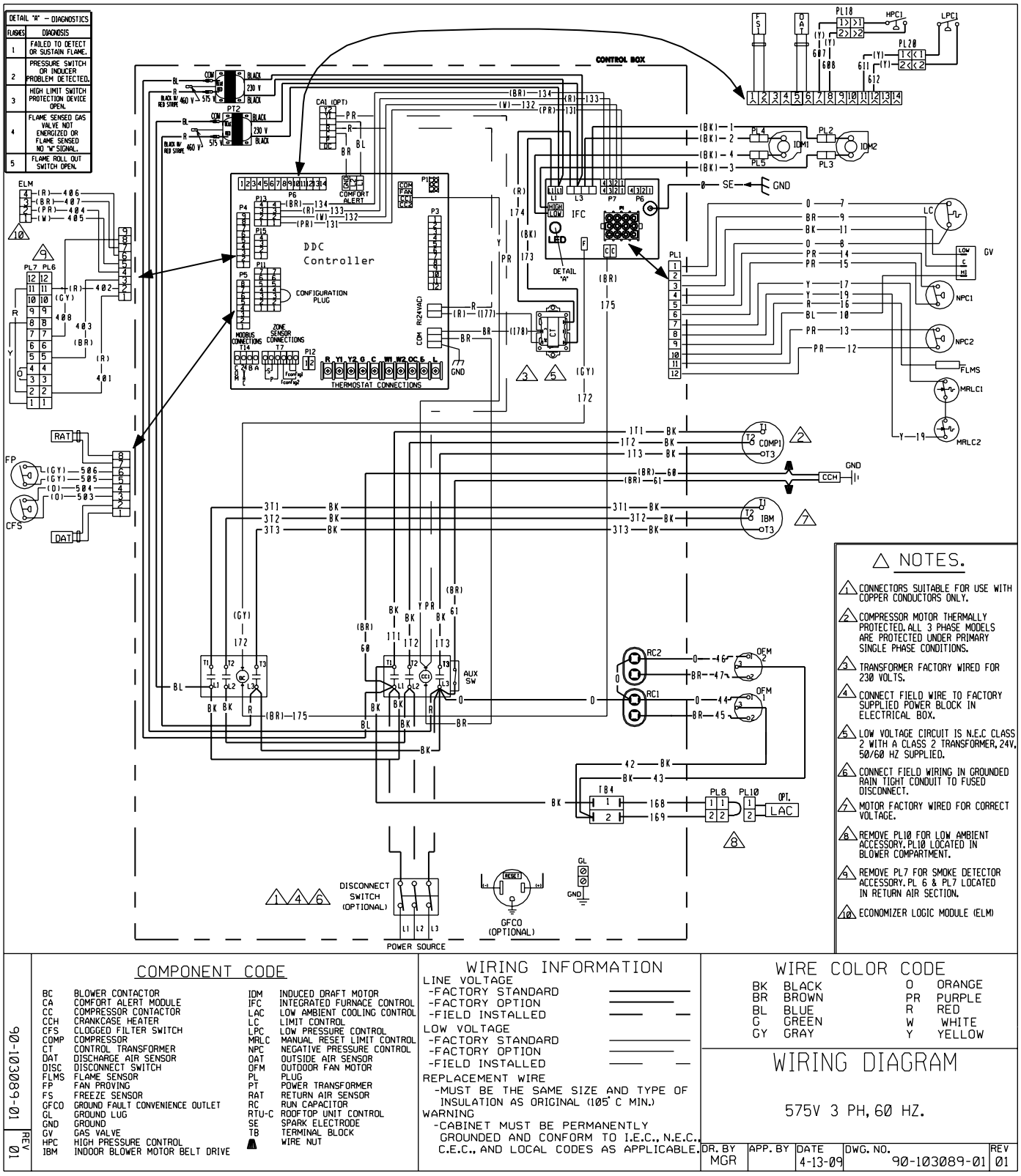


Figure 13: MPS006B-MPS007B, 208-230/460V, 3-Phase, Gas Heat

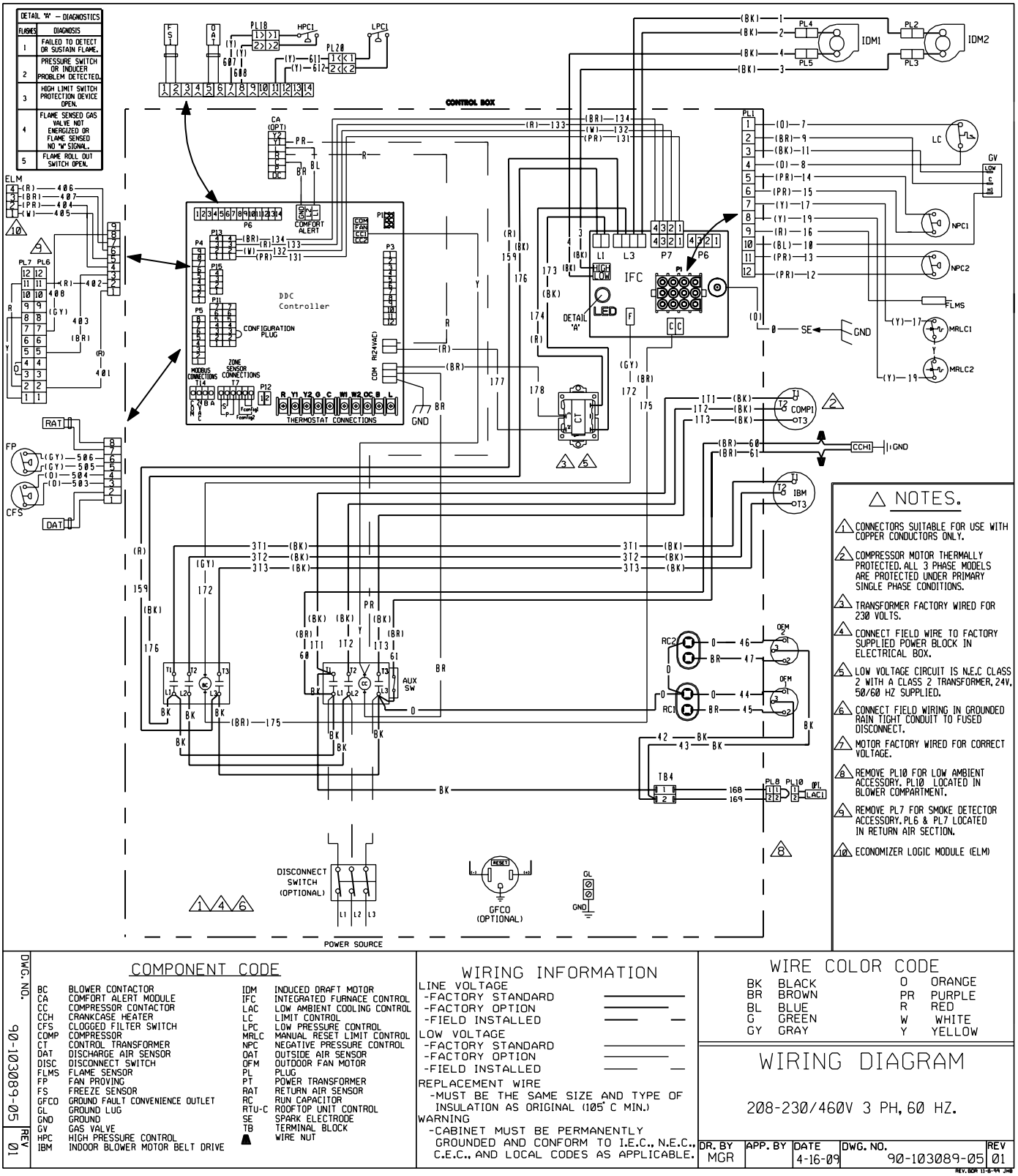


Figure 14: MPS006B-MPS007B, 575V, 3-Phase, Gas Heat

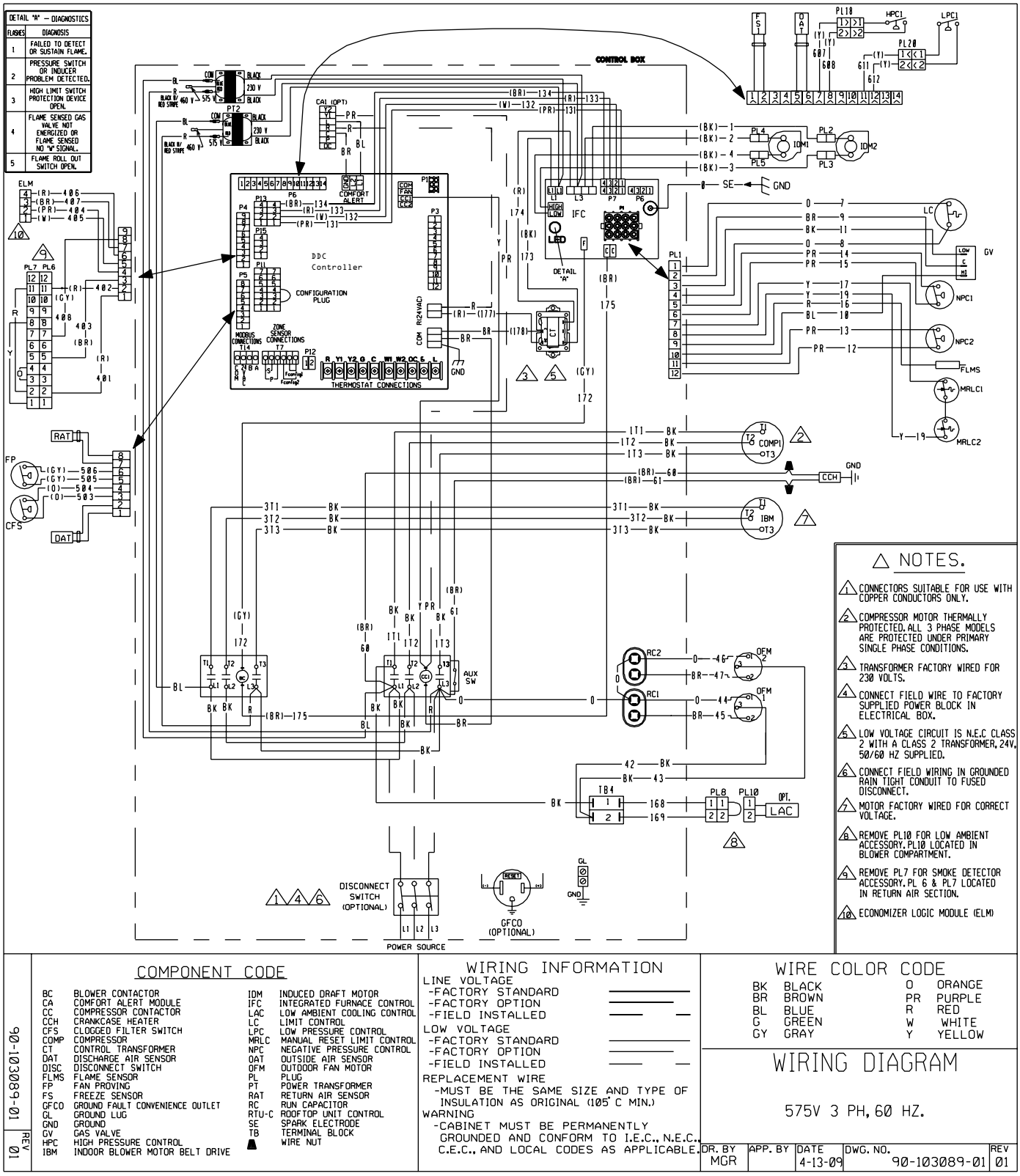
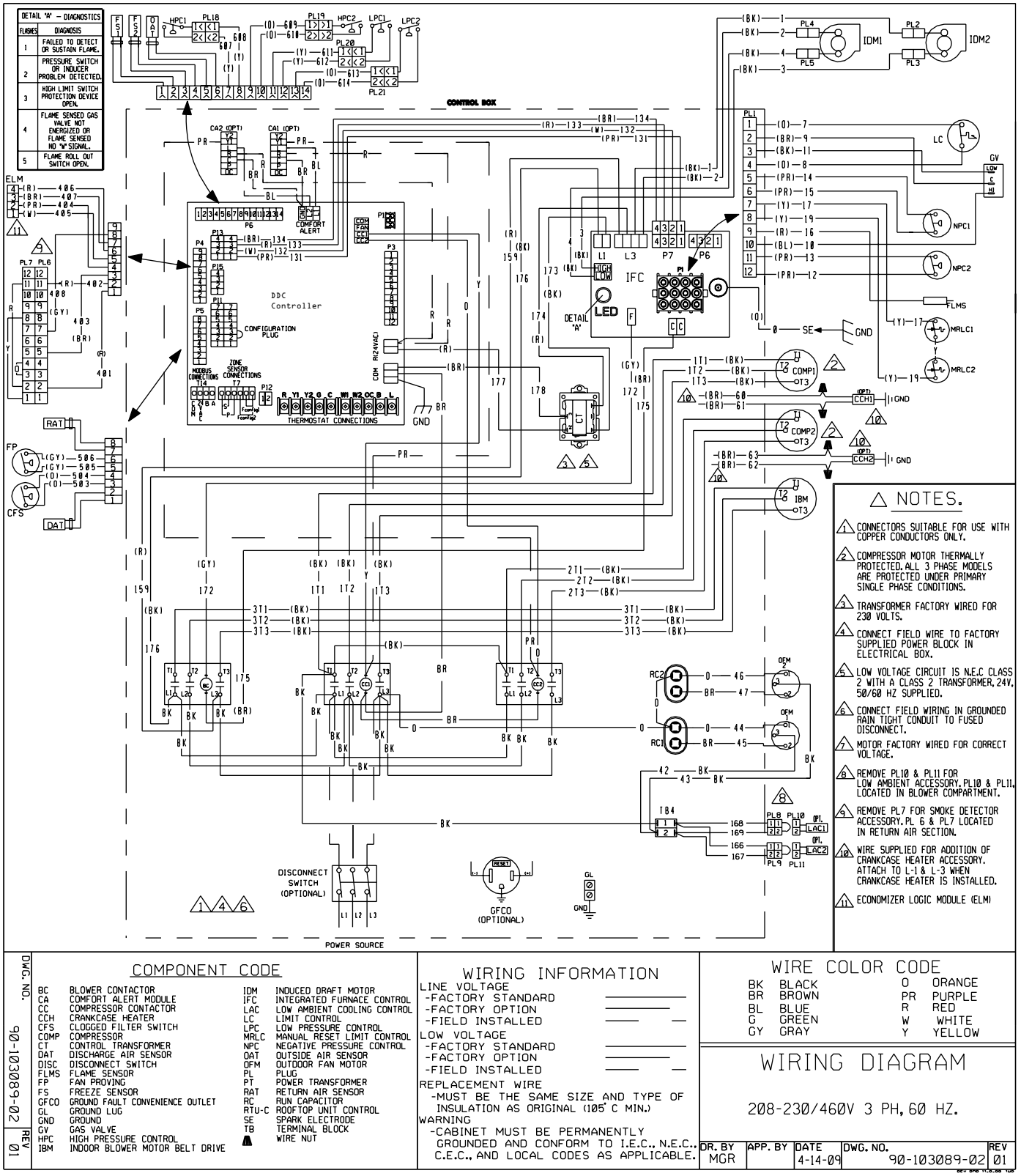


Figure 15: MPS008B-MPS012B, 208-230/460V, 3-Phase, Gas Heat



Wiring Diagrams

Figure 16: MPS008B-MPS012B, 575, 3-Phase, Gas Heat

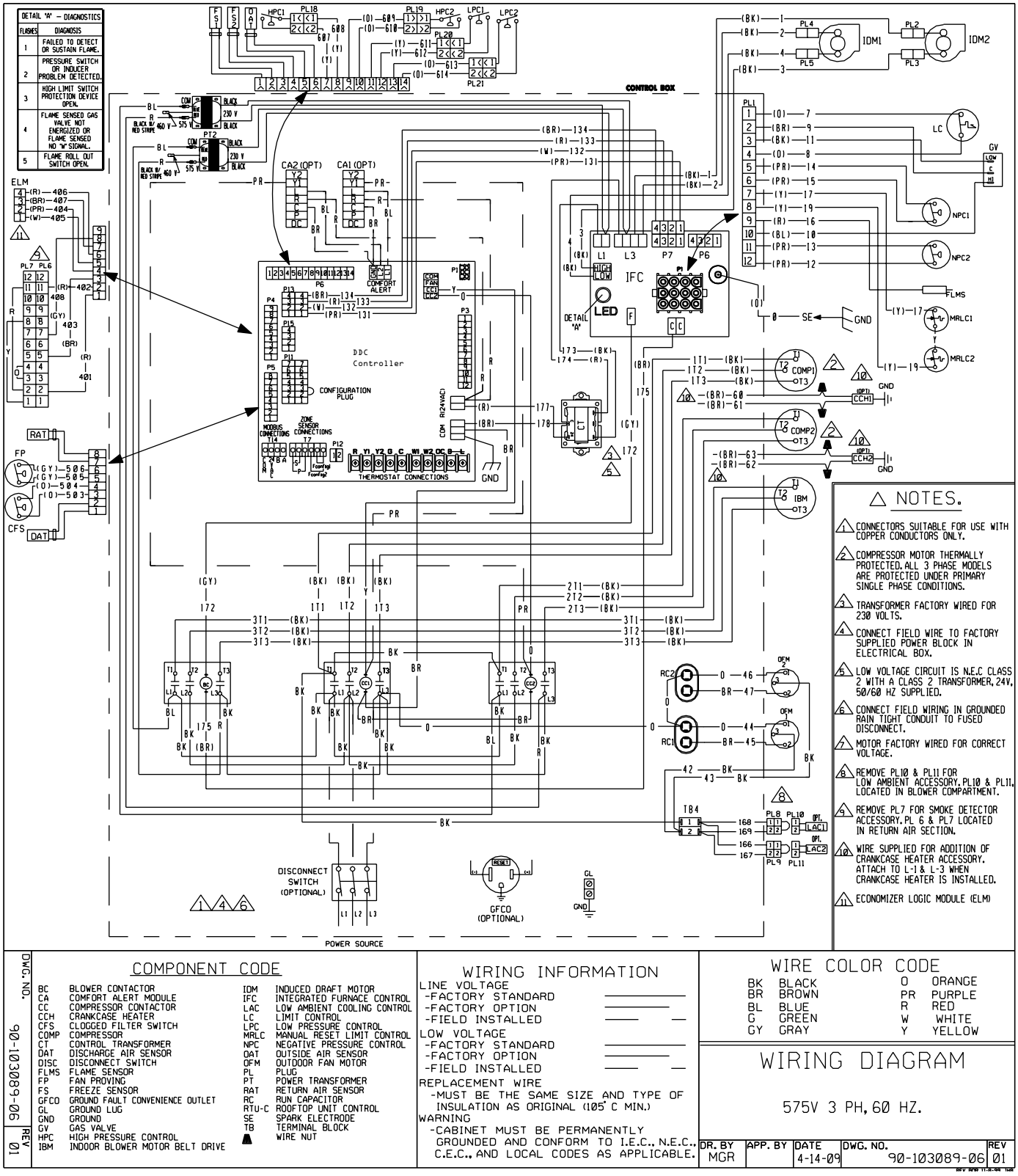
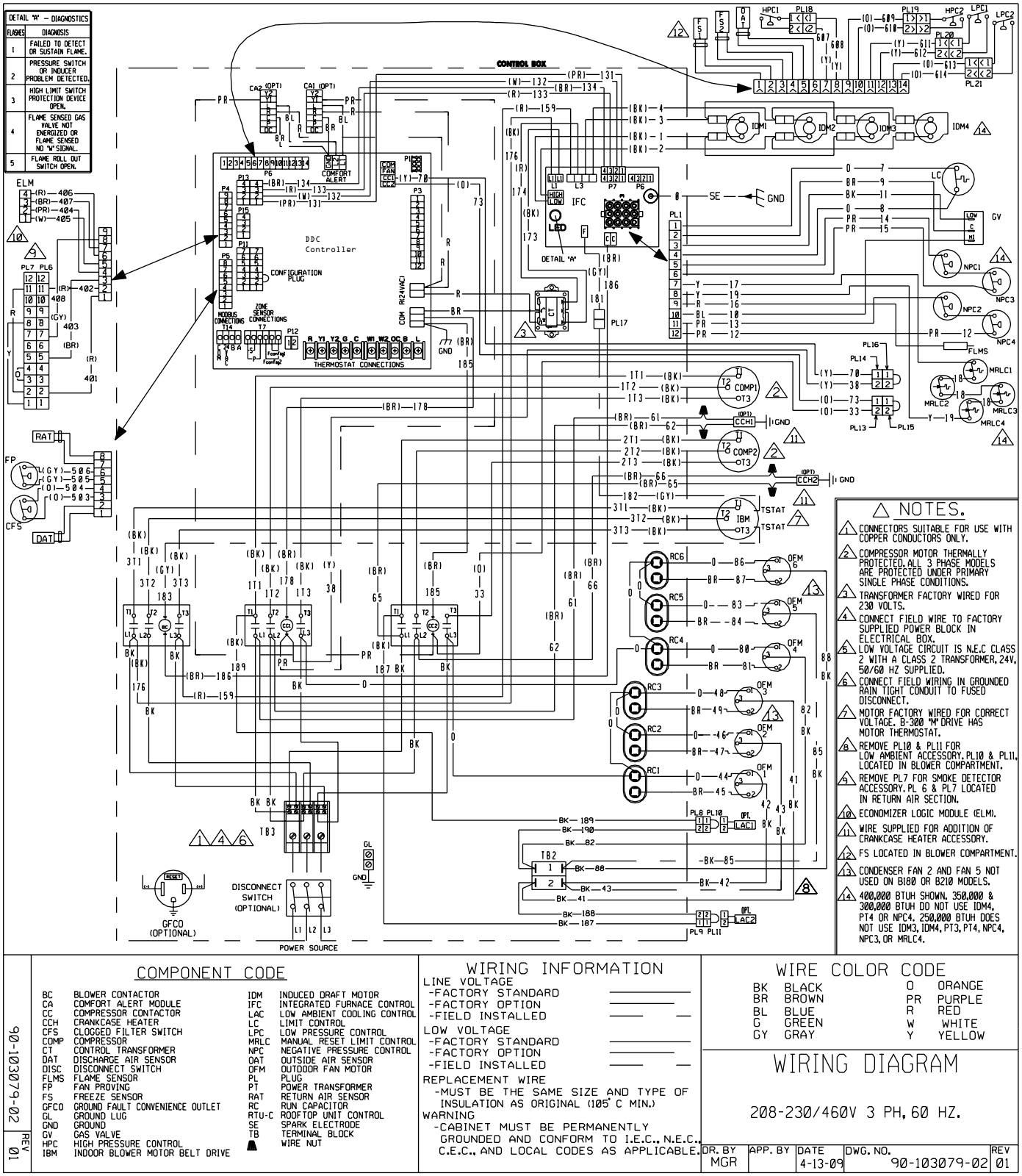


Figure 17: MPS015B-MPS025B, 208-230/460V, 3-Phase, Gas Heat



Wiring Diagrams

Figure 18: MPS015B-MPS025B, 575V, 3-Phase, Gas Heat

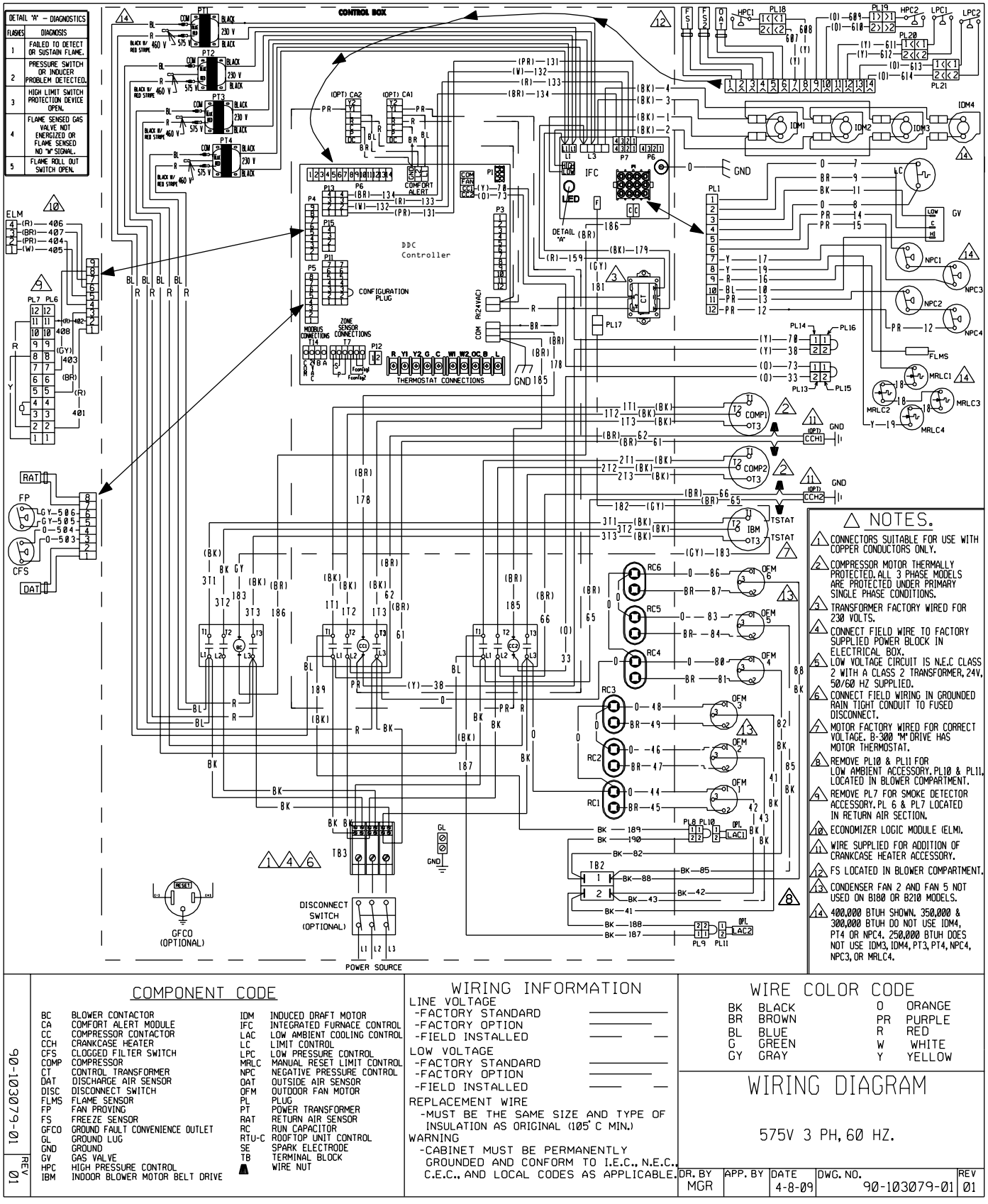


Figure 19: MPS003B-MPS005B, 208-230/460V, 3-Phase, Cooling Only

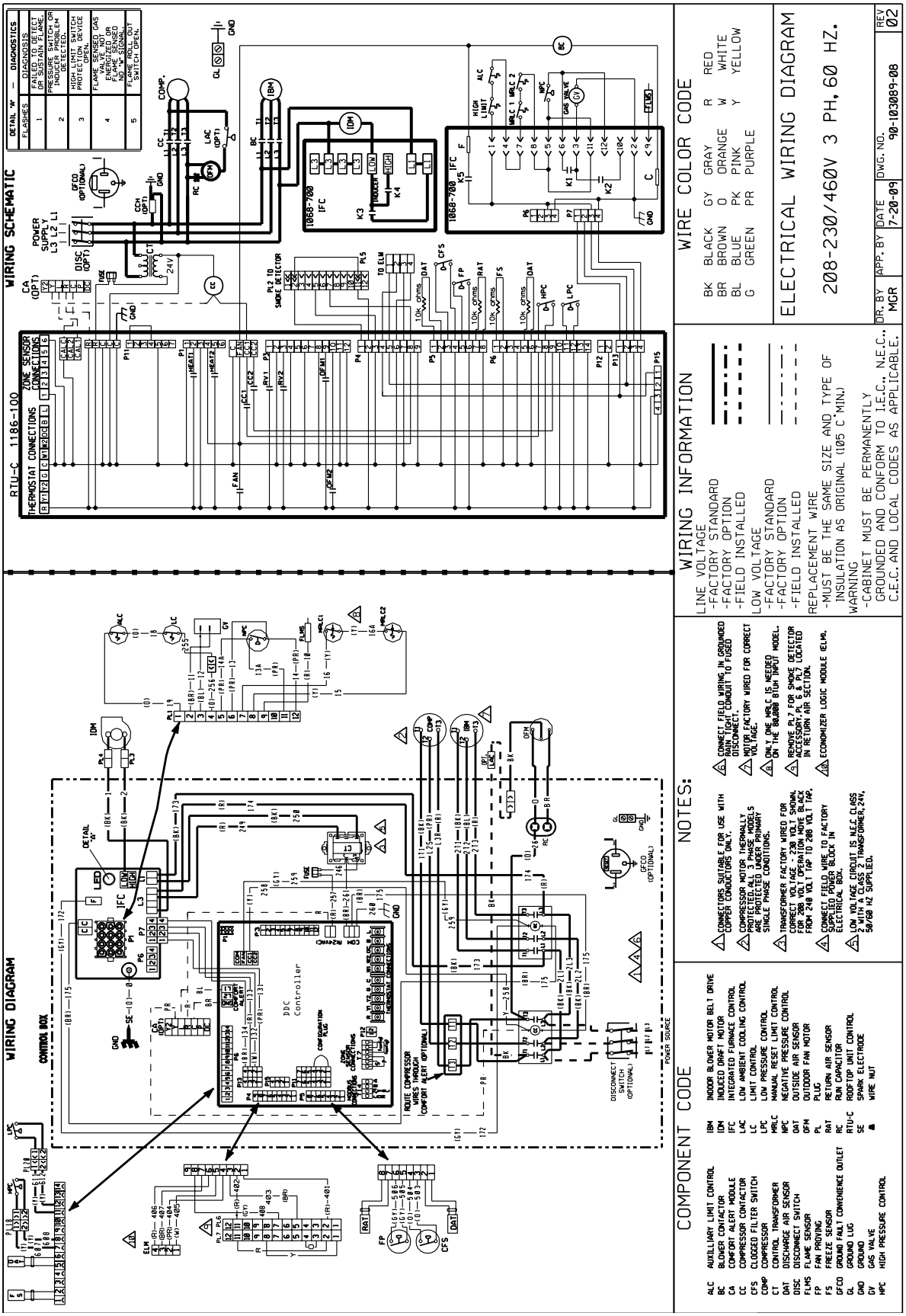


Figure 20: MPS006B-MPS007B, 208-230/460/575V, 3-Phase, Cooling Only

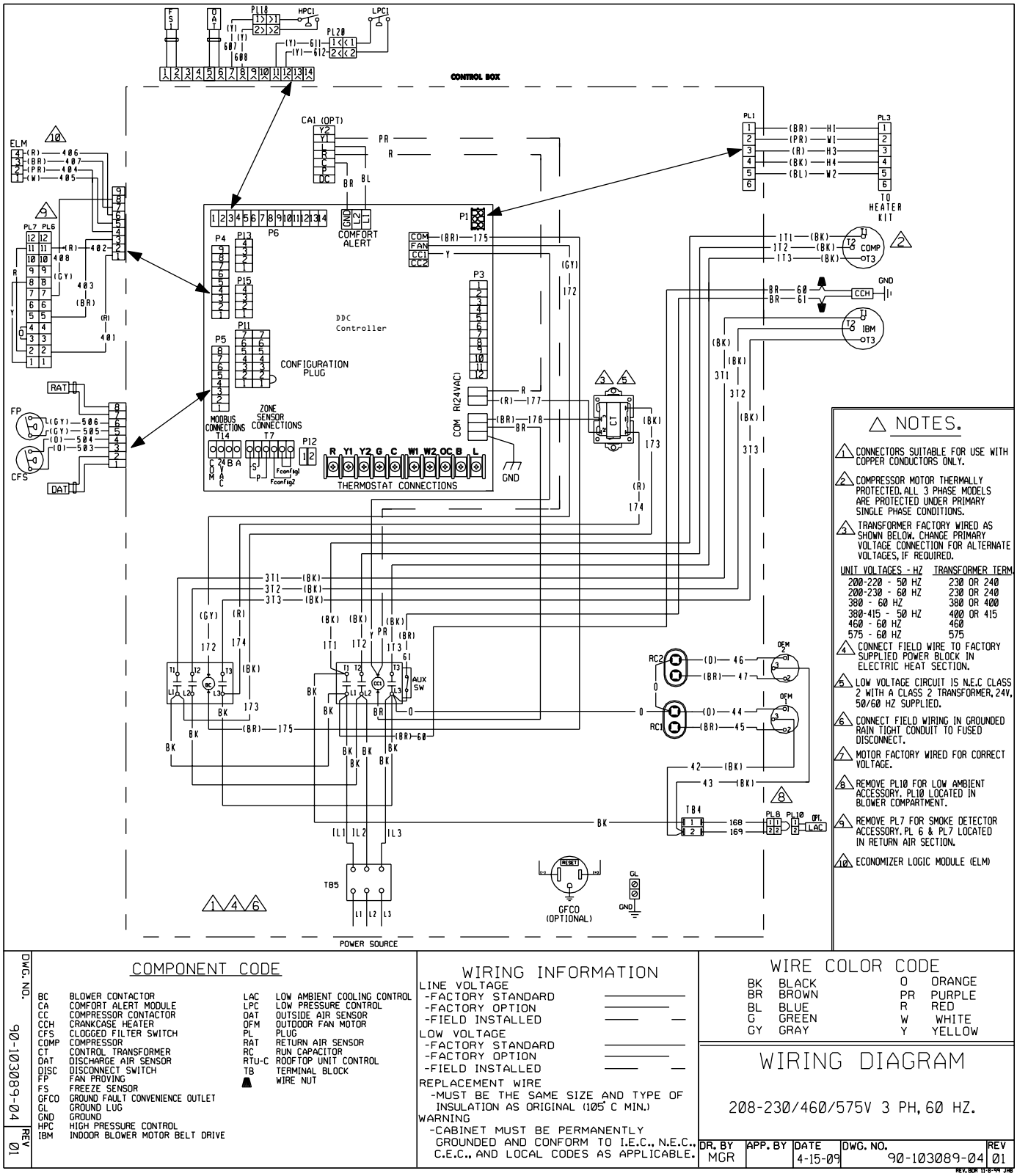


Figure 21: MPS008B-MPS012B, 208-230/460/575V, 3-Phase, Cooling Only

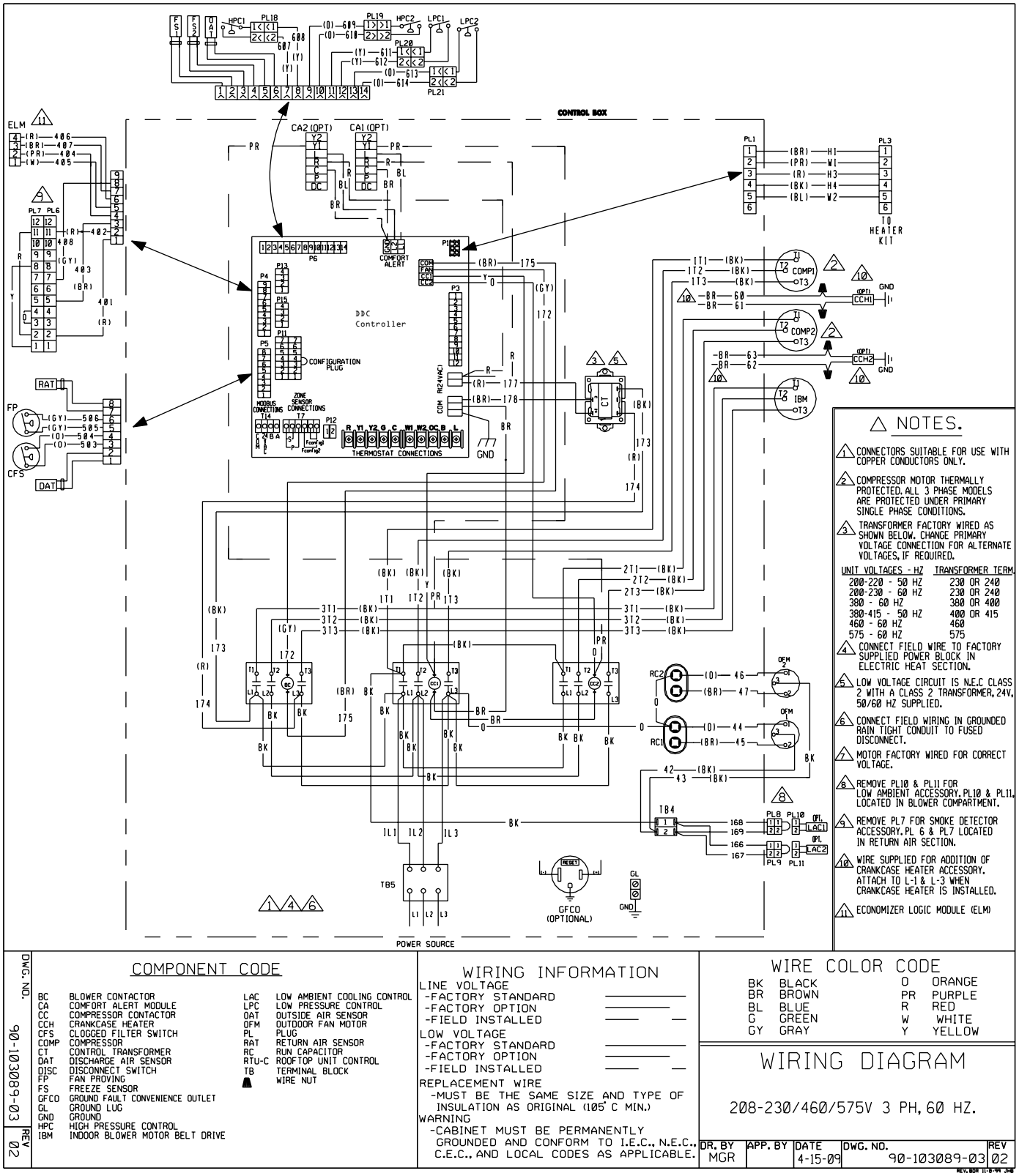


Figure 22: MPS015B-MPS025B, 208-230/460/575V, 3-Phase, Cooling Only

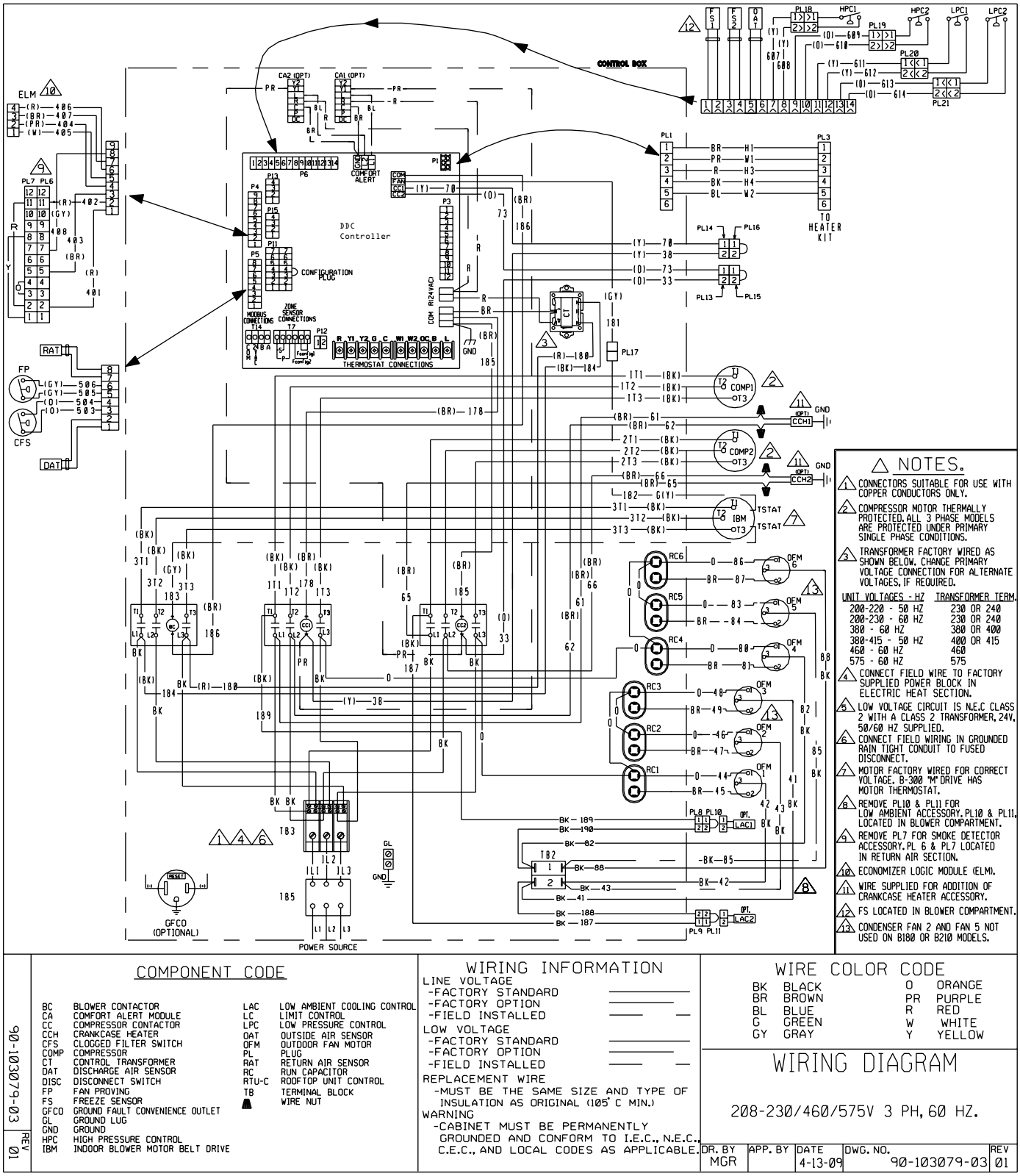


Table 14: Sensor Temperature vs. Resistance

TEMP °F	R (OHMS)	TEMP °F	R (OHMS)	TEMP °F	R (OHMS)	TEMP °F	R (OHMS)
1.4	81,662	77.0	10,000	150.8	2,011	224.6	561
3.2	77,162	78.8	9,571	152.6	1,943	226.4	546
5.0	72,940	80.6	9,164	154.4	1,876	228.2	531
6.8	68,957	82.4	8,776	156.2	1,813	230.0	517
8.6	65,219	84.2	8,407	158.0	1,752	231.8	503
10.4	61,711	86.0	8,056	159.8	1,693	233.6	489
12.2	58,415	87.8	7,720	161.6	1,637	235.4	476
14.0	55,319	89.6	7,401	163.4	1,582	237.2	463
15.8	52,392	91.4	7,096	165.2	1,530	239.0	450
17.6	49,640	93.2	6,806	167.0	1,480	240.8	437
19.4	47,052	95.0	6,530	168.8	1,431	242.6	425
21.2	44,617	96.8	6,266	170.6	1,385	244.4	413
23.0	42,324	98.6	6,014	172.4	1,340	246.2	401
24.8	40,153	100.0	5,803	174.2	1,297	248.0	390
26.6	38,109	100.4	5,774	176.0	1,255	249.8	379
28.4	36,182	102.2	5,546	177.8	1,215	251.6	369
30.2	34,367	104.0	5,327	179.6	1,177	253.4	359
32.0	32,654	105.8	5,117	181.4	1,140	255.2	349
33.8	31,030	107.6	4,918	183.2	1,104	257.0	340
35.6	29,498	109.4	4,727	185.0	1,070	258.8	332
37.4	28,052	111.2	4,544	186.8	1,037	260.6	323
39.2	26,686	113.0	4,370	188.6	1,005	262.4	315
41.0	25,396	114.8	4,203	190.4	974	264.2	305
42.8	24,171	116.6	4,042	192.2	944	266.0	300
44.6	23,013	118.4	3,889	194.0	915	267.8	293
46.4	21,918	120.2	3,743	195.8	889	269.6	285
48.2	20,883	122.0	3,603	197.6	861	271.4	278
50.0	19,903	123.8	3,469	199.4	836	273.2	272
51.8	18,972	125.6	3,340	201.2	811	275.0	265
53.6	18,090	127.4	3,217	203.0	787	276.8	259
55.4	17,255	129.2	3,099	204.8	764	278.6	253
57.2	16,464	131.0	2,986	206.6	742	280.4	247
59.0	15,714	132.8	2,878	208.4	721	282.2	241
60.8	15,000	134.6	2,774	210.2	700	284.0	235
62.6	14,323	136.4	2,675	212.0	680	285.8	230
64.4	13,681	138.2	2,579	213.8	661	287.6	224
66.2	13,071	140.0	2,488	215.6	643	289.4	219
68.0	12,493	141.8	2,400	217.4	626	291.2	214
69.8	11,942	143.6	2,315	219.2	609	293.0	209
71.6	11,418	145.4	2,235	219.9	595	294.8	204
73.4	10,921	147.2	2,157	221.0	592	296.6	199
75.2	10,449	149.0	2,083	222.8	576	298.4	194

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