48HJ004-014
Single Package Rooftop
Gas Heating/Electric Cooling Units

Wiring Diagrams

UNIT WIRING DIAGRAMS

Unit	Volt-Ph-Hz	Type	From Label	Fig. No.
48HJD/E/F004,005	208/230-3-60	Schematic/Component Arrangement	50HJ501028	1
	460-3-60	Schematic/Component Arrangement	50HJ501029	2
48HJG/H/K/L/M/N004,005*	208/230-3-60	Schematic/Component Arrangement	50HJ501028	1
	460-3-60	Schematic/Component Arrangement	50HJ501029	2
48HJE/F/R/T004,005 and 48HJS005	575-3-60	Schematic/Component Arrangement	50HJ501030	3
48HJD/E/F/L/M/N/R/S/T004-006†	208/230-1-60	Schematic/Component Arrangement	50HJ501027	4
48HJG/H/K/L/M/N006*	208/230-3-60	Schematic/Component Arrangement	50HJ501031	5
	460-3-60	Schematic/Component Arrangement	50HJ501029	2
48HJD/E/F/R/S/T006,007	208/230-3-60	Schematic/Component Arrangement	50HJ501031	5
	460-3-60	Schematic/Component Arrangement	50HJ501032	6
	575-3-60	Schematic/Component Arrangement	50HJ501033	7
48HJD/E/F/R/S/T008-014	208/230-3-60	Schematic/Component Arrangement	50HJ501296	8
	460-3-60	Schematic/Component Arrangement	50HJ501297	9
	575-3-60	Schematic/Component Arrangement	50HJ501298	10

*Low NOx/California Compliant Units.
†Applies to Low NOx Units.

OPTION AND ACCESSORY WIRING

Description	48HJ Unit Size	Fig. No.	Serial Number
Apollo Controls Wiring Including Indoor Air Quality	004-014	11	From 2492Gxxxxx
Apollo Thermostat Wiring — Typical	004-007	12	From 0395Gxxxxx
	008-014	13	
Convenience Outlet Schematic	004-014	14	From 0798Gxxxxx
Durablade Economizer Wiring	004-014	15	From 3295Gxxxxx*
Differential Enthalpy Control (Durablade)	004-014	16	From 3295Gxxxxx*
Solid-State Enthalpy Control (Durablade)	004-014	17	From 3295Gxxxxx*
EconoMi$er Wiring	004-014	18	2099Gxxxxx-0702Gxxxxx†
EconoMi$er Dry Bulb Sensor Wiring	004-014	19	2099Gxxxxx-0702Gxxxxx
EconoMi$er Enthalpy Sensor Wiring	004-014	20	2099Gxxxxx-0702Gxxxxx
EconoMi$er Power Exhaust Wiring with the Switch in the Actuator	004-014	21	2099Gxxxxx-4501Gxxxxx
EconoMi$er Power Exhaust Wiring with the Switch Outside the Actuator	004-014	22	4501Gxxxxx-0702Gxxxxx
EconoMi$er2 Wiring	004-014	23	From 0802Gxxxxx
Differential Enthalpy Wiring (EconoMi$er2)	004-014	24	From 0802Gxxxxx
Fire and Smoke Control Wiring (EconoMi$er2)	004-014	25	From 0802Gxxxxx
Indoor Air Quality Sensor Wiring (EconoMi$er2)	004-014	26	From 0802Gxxxxx
Power Exhaust, 208/230, 575 V Units (EconoMi$er2)	004-014	27	From 0802Gxxxxx
Power Exhaust for 460 V Units (EconoMi$er2)	004-014	28	From 0802Gxxxxx
EconoMi$er2 with PremierLink™ or 4-20 mA Control	004-014	29	From 0802Gxxxxx
Factory-Installed Non-fused Disconnect	004-014	30	From 0395Gxxxxx
MoistureMi$er™ Dehumidification Package Humidistat Wiring (Typical)	004-007	31	From 1296Gxxxxx
	008-014	32	From 1296Gxxxxx
Motormaster® I Control Wiring Details	004-014	33	
Motormaster II Control Wiring Schematic	004-007	34	
	008-014	35	
Motormaster IV Control Wiring Schematic	004-007	36	
	008-014	37	
Novar Controls Wiring (EMT3051)	004-014	38	From 2900Gxxxxx
Novar Controls Wiring (EMT2024)	004-014	39	From 2900Gxxxxx
PremierLink Controls Wiring	004-014	40	From 4601Gxxxxx
PremierLink Controls Wiring with Dual Terminal Block	004-014	41	From 4002Gxxxxx
PremierLink Controls with Dual Terminal Block and 62AQ	004-014	42	From 2102Gxxxxx
Smoke Detector Shutdown — Single-Phase	004-014	43	From 0802Gxxxxx
Smoke Detector Shutdown — Three-Phase	004-014	44	From 0802Gxxxxx
Time Guard II Device	004-014	45	
Two-Position Damper Wiring	004-014	46	
62AQ Energy Recycler			
Factory-Installed 62AQ Energy$Recycler Wiring — COBRA™ Energy Recovery Units	008-012	47	From 4902Gxxxxx
	014	48	
Typical COBRA Energy Recycler Wiring with PremierLink Controls	004-014	49	004-007 Units: From 4502Gxxxxx 008-014 Units: From 4902Gxxxxx
Typical COBRA Energy Recycler Wiring with Standard Controls	004-014	50	
Field-Installed 62AQ Energy$Recycler Accessory Wiring (Typical)	004-014	51	

*Durablade Economizer was a factory-installed option (FIOP) until 2/15/02, it is currently available only as a field-installed accessory.
†EconoMi$er wiring in Fig. 18 is generic (for units produced from 5/99-2/02) with the exception of the way the power exhaust switch is wired. Refer to Fig. 21 and 22 for more detailed power exhaust switch information.

OPERATING SEQUENCE

Unit Produced Before 2/18/02

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC), OFC (outdoor-fan contactor), and compressor contactor no. 1 (C1) are energized. Indoor (evaporator) fan motor (IFM), compressor no. 1, and condenser fans start. The outdoor (condenser) fan motors (OFMs) run continuously while unit is cooling. For units with 2 stages of cooling, if the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts.

When the thermostat is satisfied, C1 and C2 are deenergized and the compressors and OFMs shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

COOLING, UNITS WITH DURABLADE ECONOMIZER — When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, the compressor contactor no. 1 is energized to start compressor no. 1 and outdoor (condenser) fan motors (OFMs). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2. After the thermostat is satisfied and the IFM is deenergized, the damper moves to the fully closed position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for Y1 and G, the economizer damper moves to the minimum position when the evaporator fan starts. The first stage of cooling is provided by the economizer. If the supply-air temperature is above 57 F (14 C), a switch on the supply-air thermostat is closed between the T2 terminal and the 24 vac terminal. This causes the damper to continue to modulate open until the supply-air temperature falls below 55 F (13 C) or the damper reaches the fully open position.

When the supply-air temperature is between 55 F and 52 F (13 C and 11 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals and between the T1 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the supply-air temperature falls below 52 F (11 C), a switch on the supply-air thermostat is closed between the T1 terminal and the 24 vac terminal. This causes the damper to modulate closed until the supply-air temperature rises above 55 F (13 C) or the damper reaches the minimum position.

When the supply-air temperature is between 55 F and 57 F (13 C and 14 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. Compressor no. 1 and condenser fans will be energized, and the position of the economizer damper will be determined by the supply-air temperature. Compressor no. 2 is locked out.

When the second stage of cooling is satisfied, the compressor and OFMs will be deenergized. The damper position will be determined by the supply-air temperature.

When the first stage of cooling is satisfied, the IFM shuts off after a 30-second delay. The damper then moves to fully closed position.

COOLING, UNITS WITH ECONOMI$ER — When the outdoor-air temperature (OAT) is above the ECON SP set point and the room thermostat calls for Stage 1 cooling (R to G + Y1), the indoor (evaporator) fan motor (IFM) is energized and the EconoMi$er damper modulates to minimum position. The compressor contactor is energized to start the compressor and outdoor (condenser) fan motor (OFM). After the thermostat is satisfied, the damper modulates to the fully closed position when the IFM is deenergized.

When the OAT is below the ECON SP setting and the room thermostat calls for Stage 1 cooling (R to G + Y1), the EconoMi$er modulates to the minimum position when the IFM is energized. The EconoMi$er provides Stage 1 of cooling by modulating the return and outdoor air dampers to maintain a 55 F supply air set point. If the supply-air temperature (SAT) is greater than 57 F, the EconoMi$er modulates open, allowing a greater amount of outdoor air to enter the unit. If the SAT drops below 53 F, the outdoor air damper modulates closed to reduce the amount of outdoor air. When the SAT is between 53 and 57 F, the EconoMi$er maintains its position.

If outdoor air alone cannot satisfy the cooling requirements of the conditioned space, and the OAT is above the MECH CLG LOCKOUT set point, the EconoMi$er integrates free cooling with mechanical cooling. This is accomplished by the strategies below.

NOTE: Compressor has a 2-minute Minimum On, Minimum Off, and Interstage delay timer.

1. If Y1 is energized, and the room thermostat calls for Y2 (2-stage thermostat), compressor no. 1 and OFM are energized. The EconoMi$er damper is maintained at its current position.
2. If Y1 is energized for more than 20 minutes, and Y2 is not energized (whether or not a 2-stage thermostat is used), compressor no. 1 and OFM are energized. The EconoMi$er damper is maintained at its current position.
3. If Y1 is energized, and compressor no. 1 is already energized (see Step 2) and the room thermostat calls for Y2, the compressor contains to operate. If Y2 remains energized for more than 20 minutes, compressor no. 2 is energized.

NOTE: Compressor no. 2 cannot be energized unless there is a signal for Y2 from the space thermostat.

4. If compressor no. 2 is energized, and the Y2 signal from the thermostat is satisfied, compressors 1 and 2 are deenergized. Reasserting Y2 will start compressor no. 1 and (after a 20-minute interstage delay) compressor no. 2.
5. If compressor no. 1 is energized and the thermostat is satisfied, compressor no. 1, the OFM, and IFM are deenergized and the EconoMi$er modulates closed.

When the OAT is below the MECH CLG LOCKOUT set point, the compressors remain off.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The IFM is energized 45 seconds after a flame is ignited. When additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

HEATING, UNITS WITH ECONOMIZER/TWO-POSITION DAMPER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is then energized and the burner ignition sequence begins. The IFM is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. If the two-position damper is used, the outdoor-air damper opens to the minimum position whenever the evaporator fan runs. When additional heat is needed, W2 is energized and the high-fire solenoid on

the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully-closed position. When using continuous fan, the damper will remain in the minimum position.

Units Produced After 2/17/02

COOLING UNITS WITHOUT ECONOMI$ER2 — When thermostat calls for cooling, terminal G and Y1 are energized. The indoor-fan contactor (IFC), compressor contactor no. 1 (C1) and outdoor-fan contactor (OFC) are energized. Evaporator-fan motor, compressor no. 1, and both condenser fans start. The outdoor-fan motor(s) run continuously while unit is cooling.

When the thermostat is satisfied, C1 and C2 are deenergized and the compressors and outdoor (condenser) fan motors (OFM) shut off. After a 30-second delay, the indoor (evaporator) fan motor (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator-fan motor will run continuously.

HEATING UNITS WITHOUT ECONOMI$ER2 — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

COOLING UNITS WITH ECONOMI$ER2 — When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is positioned through the use of a Proportional-Integral (PI) control process to provide a 55 F supply-air temperature into the zone. If the mixed-air temperature is below the lower end of the set point of 50 F, then the outside-air dampers will modulate to minimum position. If the measured temperature is within the 50 to 56 F range, then the outside dampers will hold their current position. If the mixed-air temperature is above 56 F, then the outside-air dampers will modulate open until the temperature is within range or they modulate to the fully open position.

If outdoor air alone cannot satisfy the cooling requirements of the conditioned space, and the OAT is above the outdoor air mechanical lockout temperature set point (fixed; opens at 35 F, closes at 50 F), the EconoMi$er2 integrates free cooling with mechanical cooling as follows:

Thermostat first stage call for cooling (Y1) uses EconoMi$er2 damper for free cooling.

Thermostat second stage call for cooling uses EconoMi$er2 damper for free cooling, plus compressor no. 1 for mechanical cooling.

NOTE: During EconoMi$er2 operation (damper above minimum position) compressor no. 2 will **not** operate (sizes 008-014).

The high ambient temperature (dry bulb) lockout (fixed): opens at 76 F, closes at 52 F.

If the enthalpy of the outside air is too high, the outside air dampers will modulate to minimum position.

If mechanical cooling is used with free cooling, the outdoor-air damper will be locked into its current position when the compressor starts. If the increase in cooling capacity causes the supply-air temperature to drop below 45 F, then the outdoor-air damper position will be decreased to the minimum position. If the supply temperature continues to fall, the outdoor-air damper will close.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er2 control, a PI-controlled demand ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

HEATING UNITS WITH ECONOMI$ER2 — When the room temperature calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

UNITS WITH MOISTUREMI$ER™ DEHUMIDIFICATION PACKAGE — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan motor (IFM), compressor (C), and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. As shipped from the factory, MoistureMi$er dehumidification circuit is always energized. If MoistureMi$er circuit modulation is desired, a field-installed, wall-mounted LC Humidistat or humidistat are required.

If the MoistureMi$er humidistat is installed and calls for the MoistureMiser subcooler coil to operate, the humidistat internal switch closes. This energizes and closes the liquid line solenoid valve coil (LLSV) of the MoistureMi$er circuit, forcing the hot liquid refrigerant of the liquid line to enter the subcooler coil. As the hot liquid passes through the subcooler coil, it is exposed to the cold supply airflow coming off from the evaporator coil and the liquid is further cooled to a temperature approaching the evaporator coil leaving-air temperature. The state of the refrigerant leaving the subcooler coil is a highly subcooled liquid refrigerant. The liquid then enters a thermostatic expansion valve (TXV) where the liquid is dropped to a lower pressure. The TXV does not have a pressure drop great enough to change the liquid to a 2-phase fluid. The TXV can throttle the pressure drop of the liquid refrigerant and maintain proper conditions at the compressor suction valve over a wide range of operating conditions. The liquid then enters a second fixed restrictor expansion device for a second pressure drop to a 2-phase fluid. The liquid proceeds to the evaporator coil at a temperature lower than normal cooling operation. This lower temperature is what increases the latent capacity of the rooftop. The 2-phase refrigerant passes through the evaporator and is changed into a vapor. The air passing over the evaporator coil will become colder than during normal operation as a result of the colder refrigerant temperatures. However, as it passes over the subcooler coil, the air will be warmed slightly.

As the refrigerant leaves the evaporator, the refrigerant passes a low-pressure switch in the suction line. This low-pressure switch will de-activate the MoistureMi$er package when the suction pressure reaches 60 psig. The low-pressure switch is an added safety device to protect against evaporator coil freeze-up. The low-pressure switch will only de-activate and open the liquid line solenoid valve in the MoistureMi$er circuit. The compressors will continue to run as long as there is a call for cooling, regardless of the position of the low-pressure switch. The solenoid valve and the MoistureMi$er package

will be re-activated only when the call for cooling has been satisfied, the low-pressure switch has closed, and a new call for cooling exists. The crankcase heaters on the scroll compressor provide additional protection for the compressor due to the additional refrigerant charge in the subcooler.

When the humidistat is satisfied, the humidistat internal switch opens cutting power to and opening the LLSV. The refrigerant is routed back through the evaporator and the subcooler coil is removed from the refrigerant loop.

When the thermostat is satisfied, C1 is deenergized and the compressor and OFM shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the IFM will run continuously.

LEGEND

AHA — Adjustable Heat Anticipator
AWG — American Wire Gage
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CER — Compressor Energy Recycler Relay
CH,CCH — Crankcase Heater
CLO — Compressor Lockout
CO_2 — Carbon Dioxide
COC — Cool Changeover Relay
COH — Heat Changeover Relay
COM — Common
COMMS — Communications
COMP — Compressor Motor
CR — Cooling Relay, Compressor Relay
CTD — Compressor Time Delay
D — Diode
DAT — Discharge Air Thermistor
DB — Defrost Board
DDC — Direct Digital Controls
DFT — Defrost Thermostat
DM — Damper Motor
DX — Direct Expansion Coil Sensor
EC — Enthalpy Control
ECON — Economizer
EFC — Exhaust Fan Contactor
EPS — Emergency Power Supply (Nine Volt Battery)
EQUIP — Equipment
ER — Economizer Relay
FC — Supply Air Contactor
FPT — Freeze Protection Thermostat
FR — Fan Relay
FSS — Filter Status Switch
FU — Fuse
GND — Ground
HM — Humidity Relay
HPS — High-Pressure Switch
HR — Heater Relay
HS — Hall Effect Sensor
HT — Heat
HU — Humidistat
HV — High-Voltage
I — Ignitor
IAQ — Indoor Air Quality
IDM — Induced-Draft Motor
IFC — Indoor-Fan Contactor
IFM — Indoor-Fan Motor
IFMOVL — Indoor-Fan Motor Overload Switch
IFR — Indoor-Fan Relay
IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode
LLSV — Liquid Line Solenoid Valve
LPS — Low-Pressure Switch
LS — Limit Switch
LTLO — Low Temp Cooling Lockout
MGV — Main Gas Valve
MTR — Motor
NC — Normally Closed
NO — Normally Open
OAT — Outdoor-Air Thermostat
OATC — Outdoor Air Thermostat (Cool)
OATH — Outdoor Air Thermostat (Heat)
OCR — Occupied Relay
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
OLR — Overload Relay
P — Plug
PL — Plug Assembly
PWR — Power
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
RV — Reversing Valve
RVS — Reversing Valve Solenoid
SAT — Supply-Air Thermostat, Standard Air Temperature
SEN — Sensor
SW1 — Switch Fully Open
SW2 — Switch Fully Closed
SW3 — Switch Minimum Vent Position
SW4 — Switch Maximum Vent Position
S-LPS — Low-Pressure Switch (Subcooler Only)
TB — Terminal Block
TC — Thermostat-Cooling
TDR — Time-Delay Relay
TEMP — Temperature Volume and Temperature
TH — Thermostat-Heating
TRAN — Transformer
VTS — Carrier Temp System
VVT — Variable Volume and Temperature


Field Splice

Marked Wire

Terminal (Marked)


Terminal (Unmarked)

Terminal Block


Splice


Splice Marked


Motormaster IV Controller (32LH900003 Pressure Switch)

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To indicate common potential only; not to represent wiring.

NOTES FOR FIG. 1

1. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
2. Three-phase motors are protected under primary single phasing conditions.
3. Thermostat: HH07AT170, 172 Subbase: HH93AZ176, 177, 178, and 179.
4. Set heat anticipator at .14 amp for 1st stage and .14 amp for 2nd stage.
5. Use copper conductors only.
6. TRAN is wired for 230-v unit. If unit is to be run with 208-v power supply disconnect BLK wire from 230-v tap (ORN) and connect to 208-v tap (RED). Insulate end of 230-v tap.

NOTES FOR FIG. 2, 3, 6 ,7

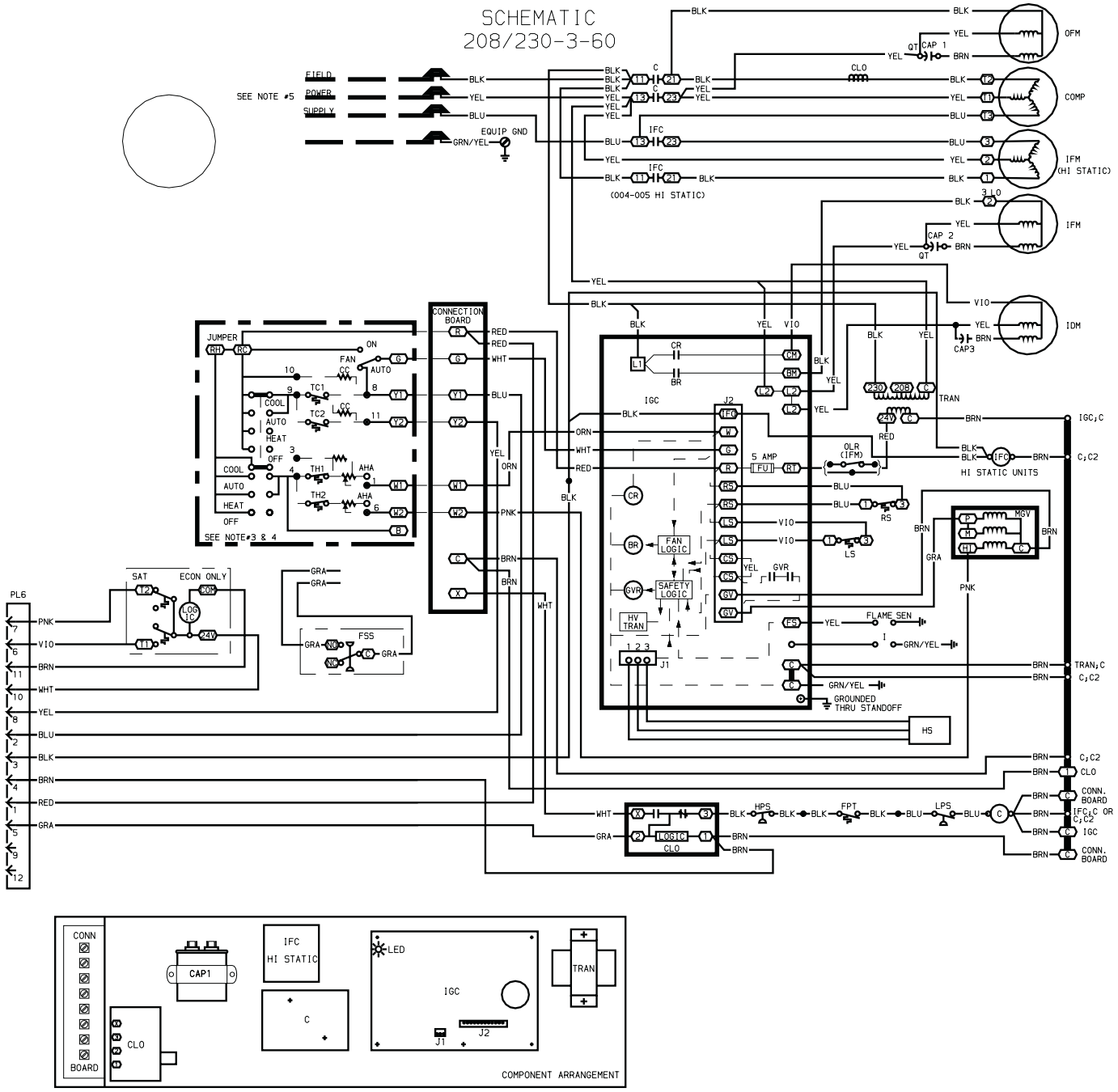
1. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
2. Three-phase motors are protected under primary single phasing conditions.
3. Thermostat: HH07AT170, 172 Subbase: HH93AZ176, 177, 178, and 179.
4. Set heat anticipator at .14 amp for 1st stage and .14 amp for 2nd stage.
5. Use copper conductors only.

NOTES FOR FIG. 5, 8-10

1. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
2. Three-phase motors are protected under primary single phasing conditions.
3. Thermostat: HH07AT170, 172, 174 and P272-2783 Subbase: HH93AZ176, 178 and P272-1882, 1883.
4. Set heat anticipator for first stage at 0.14 amp, second stage at 0.2 amp. For 48HJ008 and 009 low heat, set both first and second stage at 0.14 amp.
5. Use copper conductors only.
6. TRAN is wired for 230-v unit. If unit is to run with 208 v power supply, disconnect BLK wire from 230-v tap (ORN) and connect to 200-v tap (RED). Insulate end of 230-v tap.

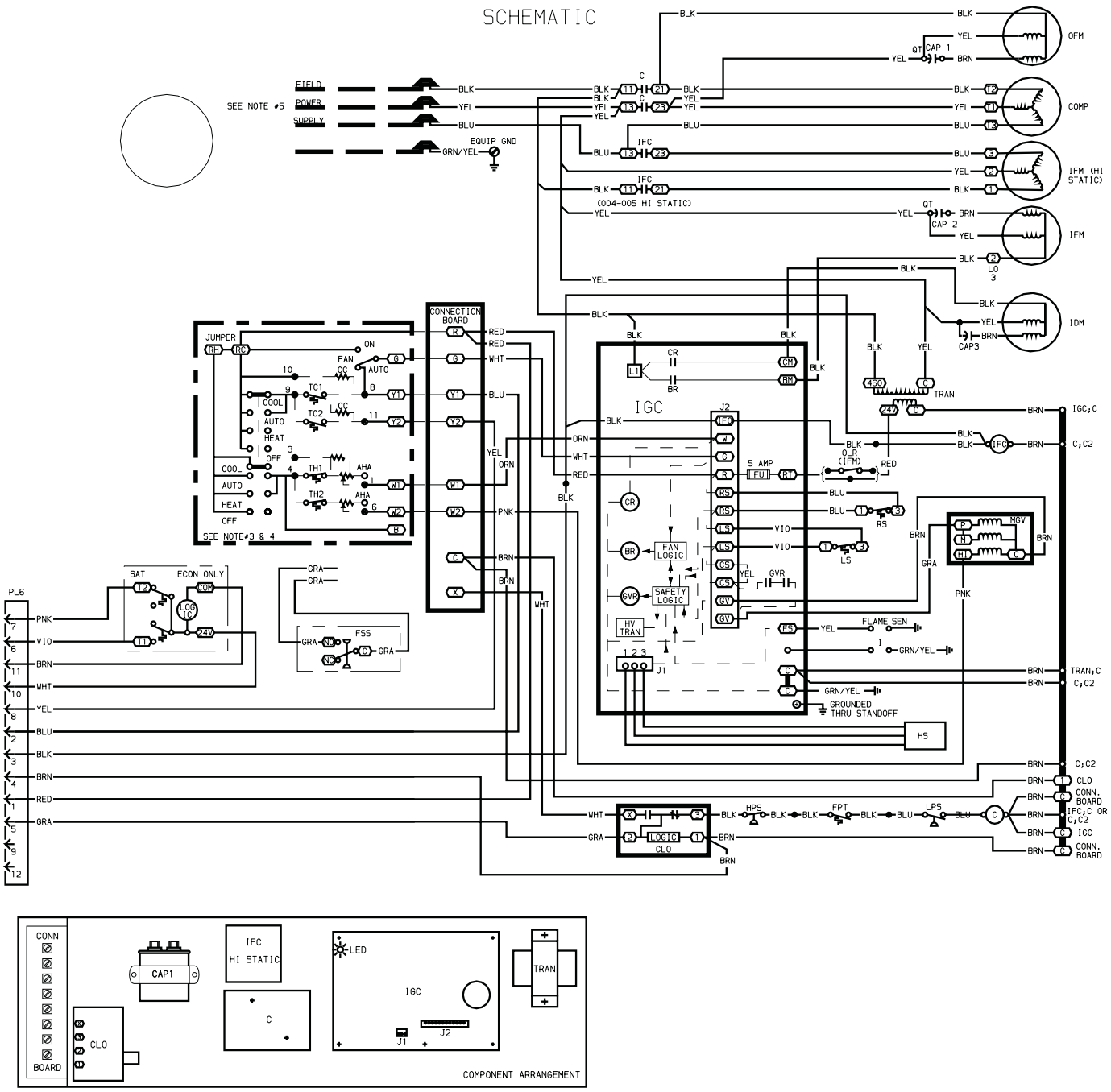
NOTES FOR FIG. 4

1. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
2. Thermostat: HH07AT170, 172 Subbase: HH93AZ176, 177, 178, and 179.
3. Set heat anticipator at .14 amp for 1st stage and .14 amp for 2nd stage.
4. Use copper conductors only.
5. TRAN is wired for 230-v unit. If unit is to be run with 208-v power supply disconnect BLK wire from 230-v tap (ORN) and connect to 208-v tap (RED). Insulate end of 230-v tap.



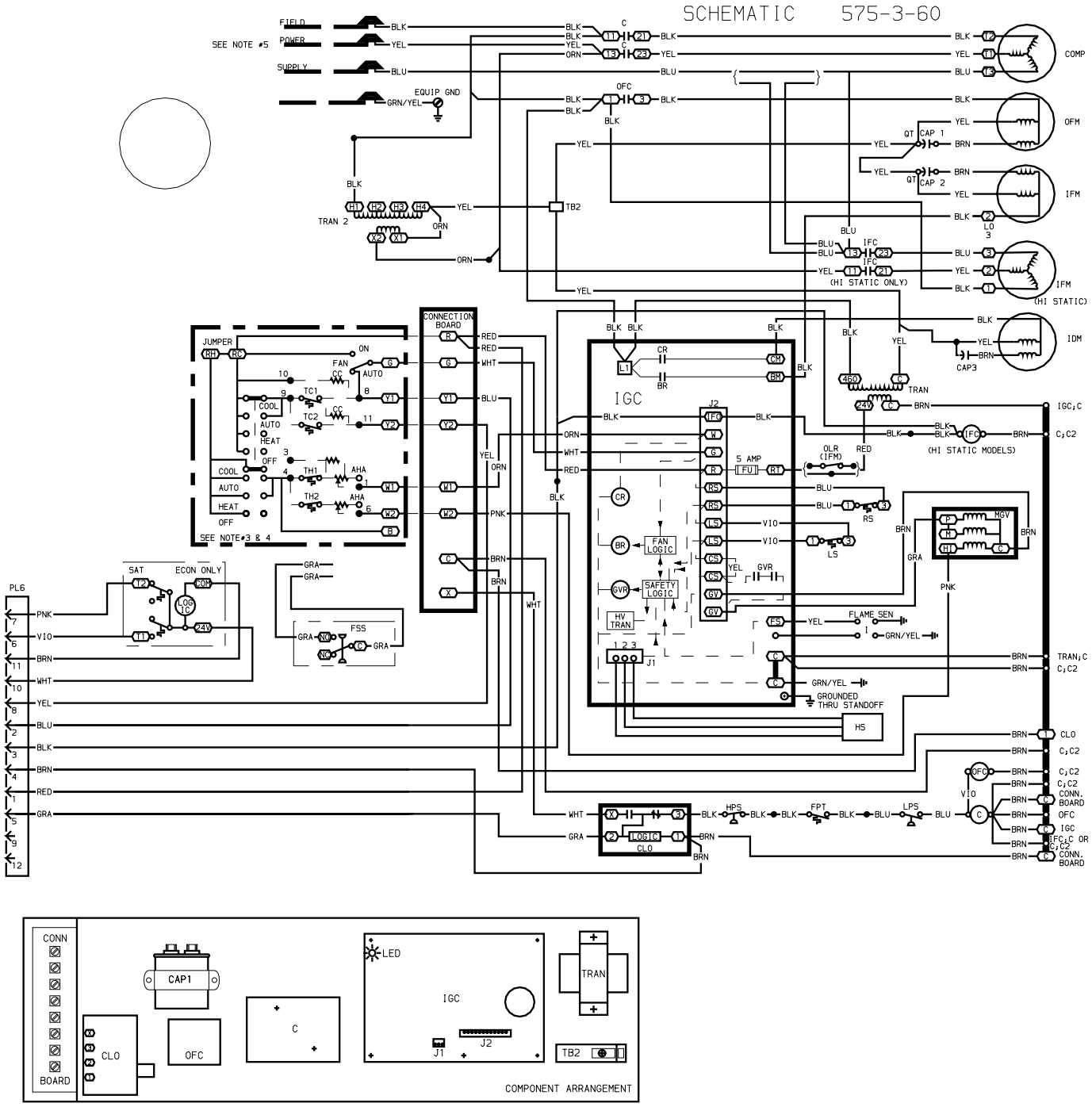
See Legend on page 4.

Fig. 1 — Schematic/Component Arrangement, 48HJD/E/F/G/H/K/L/M004,005; 208/230-3-60



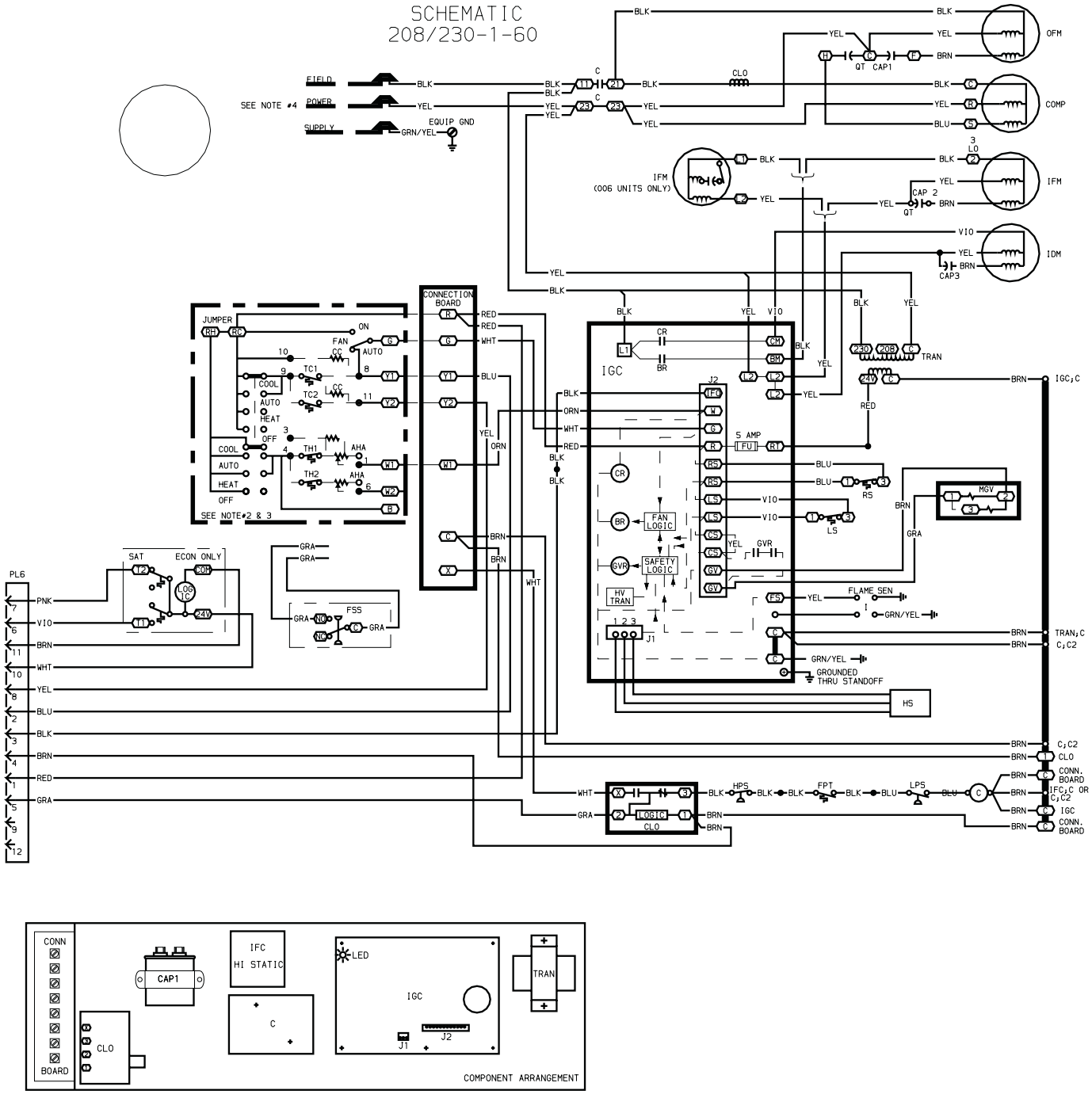
See Legend on page 4.

Fig. 2 — Schematic/Component Arrangement, 48HJD/E/F/G/H/K/L/M/N004-005, 48HJG/H/K/L/M/N006; 460-3-60



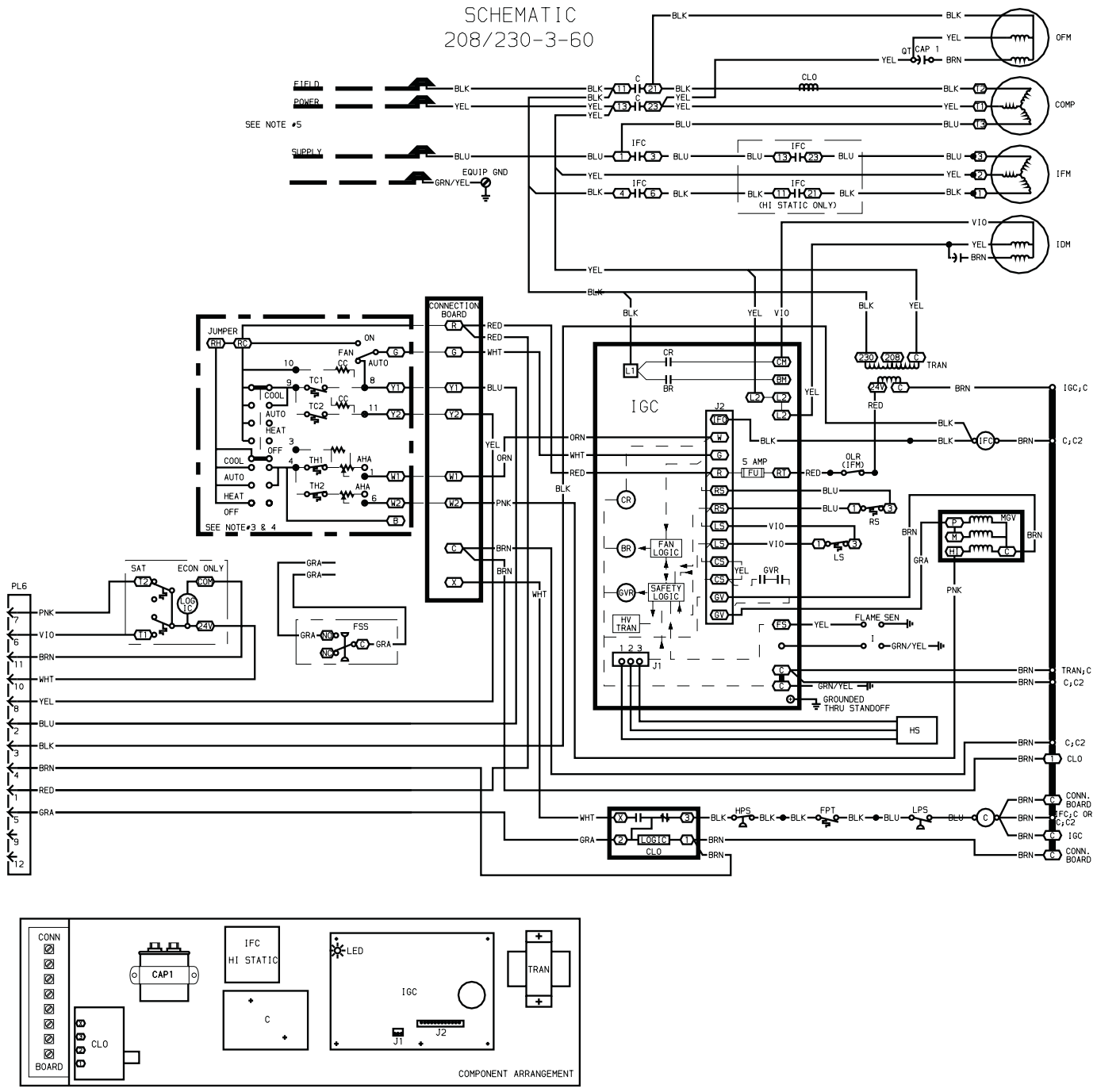
See Legend on page 4.

Fig. 3 — Schematic/Component Arrangement, 48HJE/F/R/T004-005, 48HJS005; 575-3-60



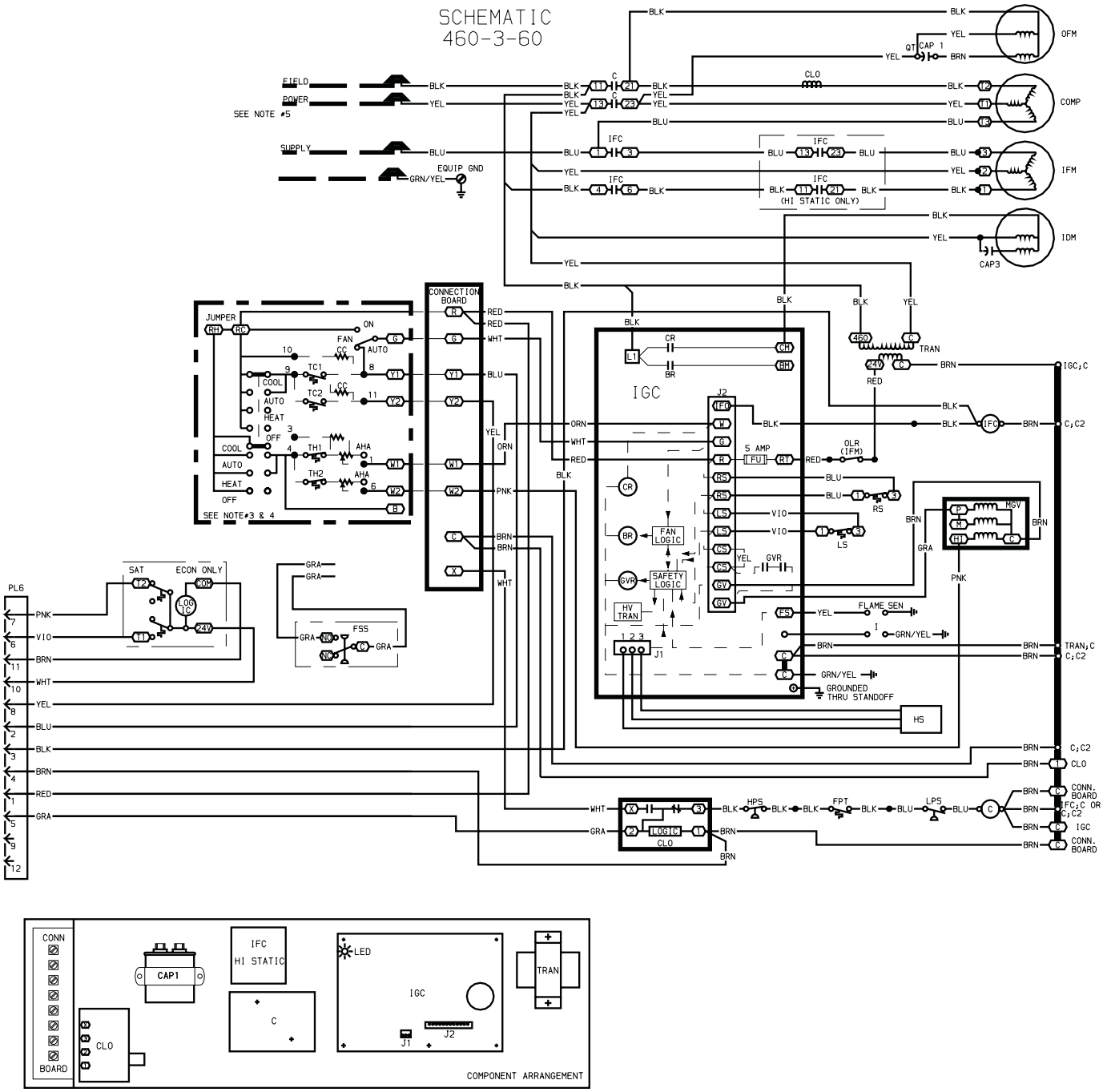
See Legend on page 4.

Fig. 4 — Schematic/Component Arrangement, 48HJD/E/F/L/M/N/R/S/T004-006; 208/230-1-60



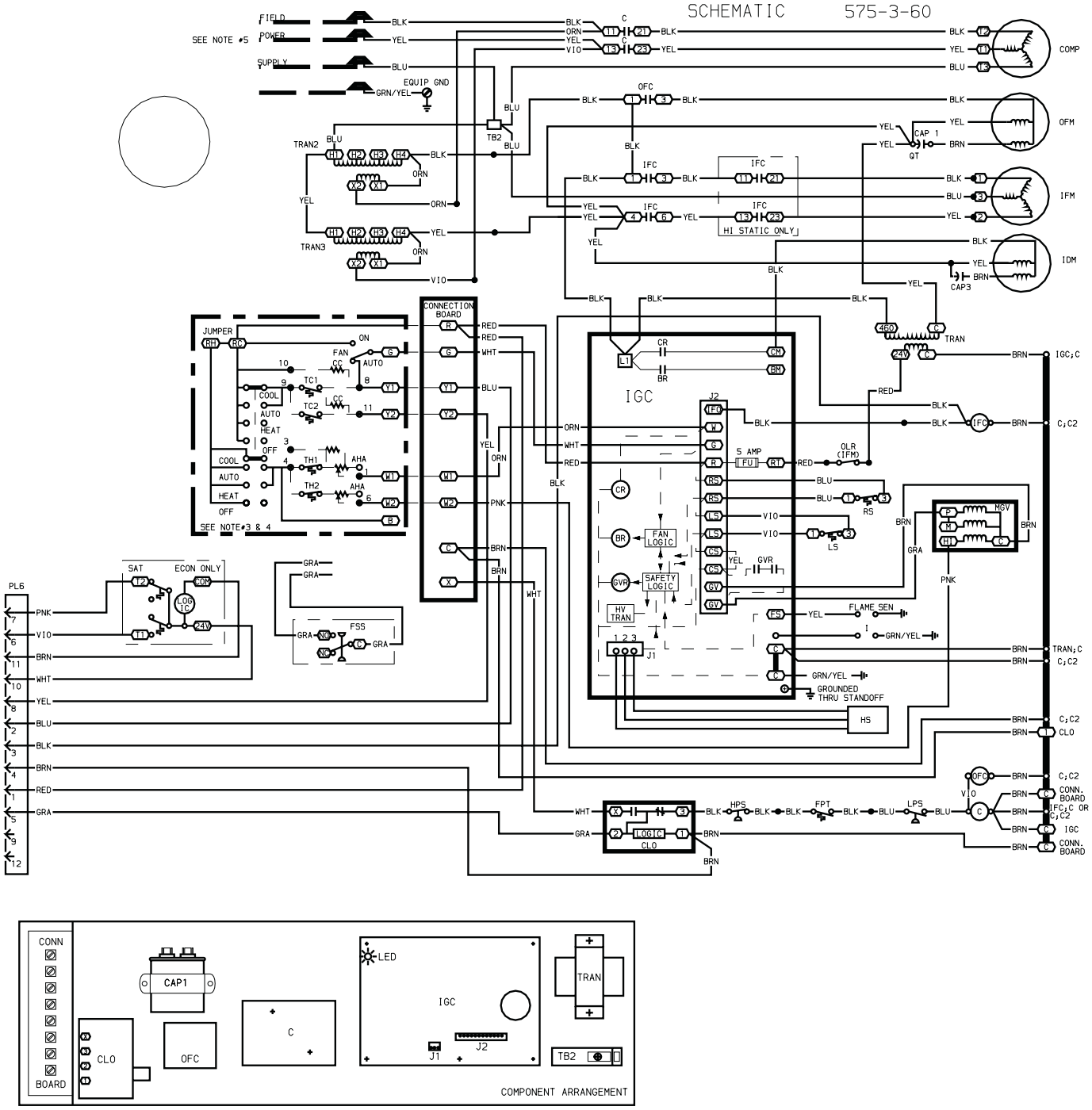
See Legend on page 4.

Fig. 5 — Schematic/Component Arrangement, 48HJG/H/L006, 48HJD/E/F/K/M/N/R/S/T006-007; 208/230-3-60



See Legend on page 4.

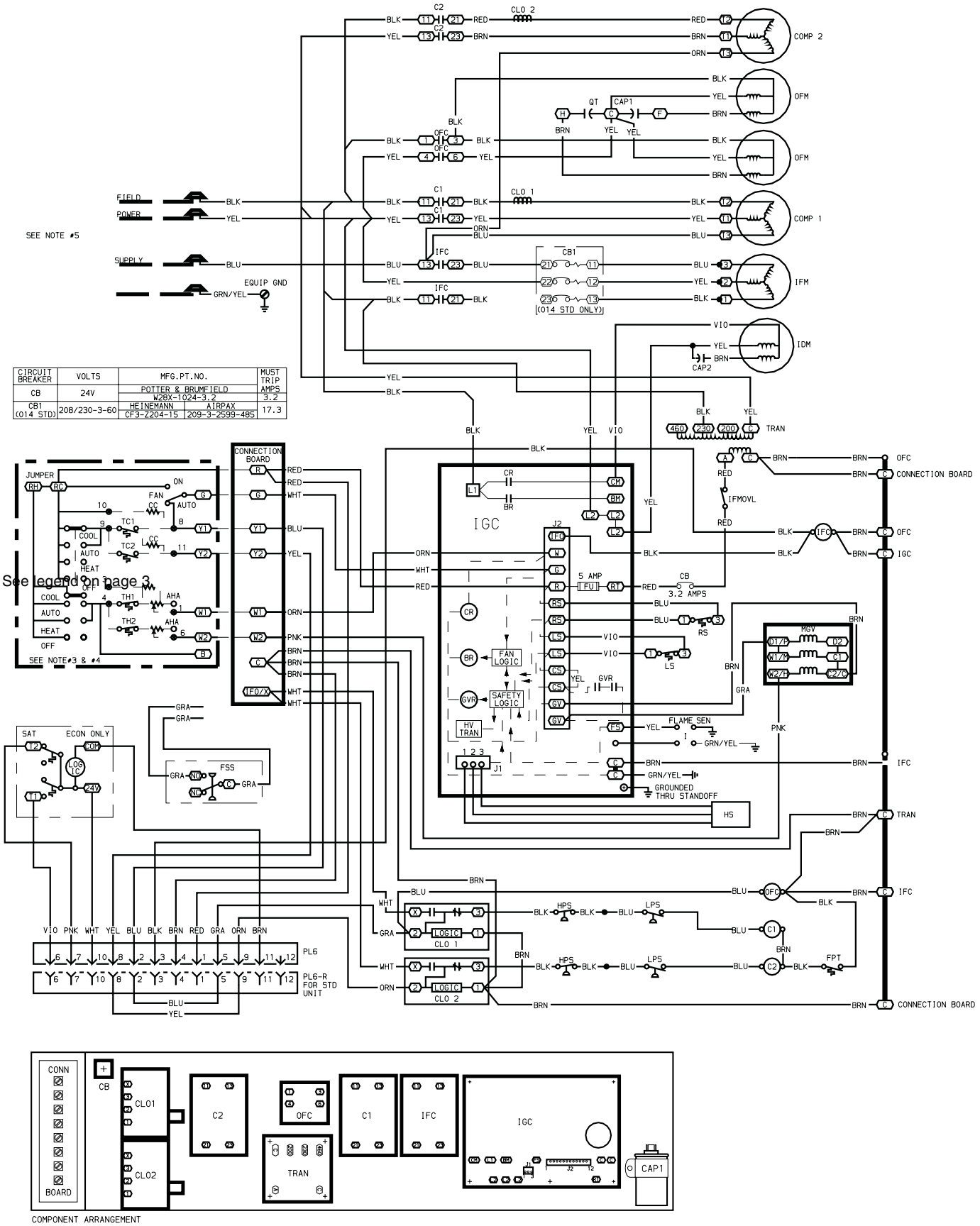
Fig. 6 — Schematic/Component Arrangement, 48HJD/E/F/R/S/T006-007; 460-3-60



See Legend on page 4.

Fig. 7 — Schematic/Component Arrangement, 48HJD/E/F/R/S/T006-007; 575-3-60

208/230-3-60 SCHEMATIC

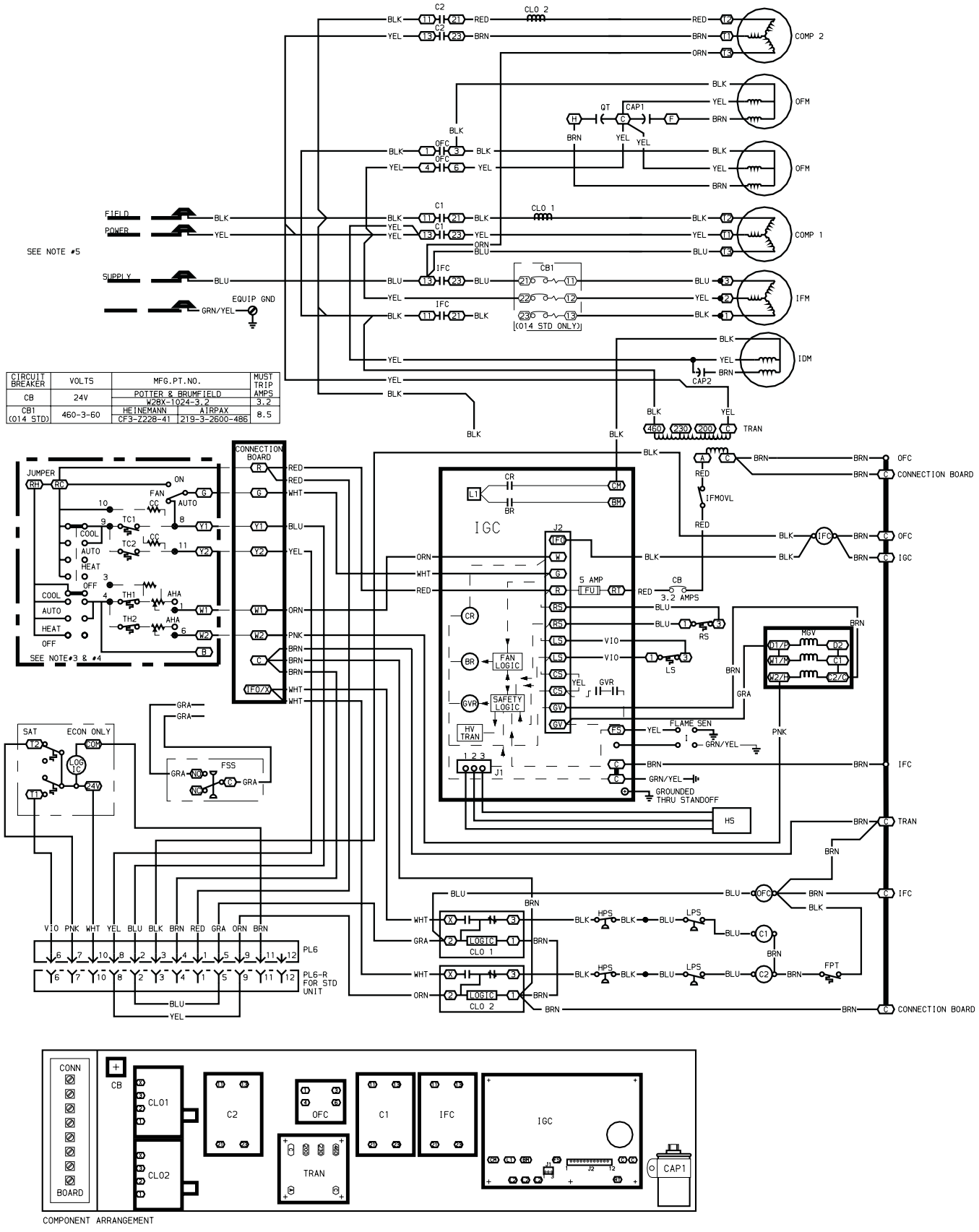


See legend on page 3.

See Legend on page 4.

Fig. 8 — Schematic/Component Arrangement, 48HJD/E/F/R/S/T008-014; 208/230-3-60

460-3-60 SCHEMATIC

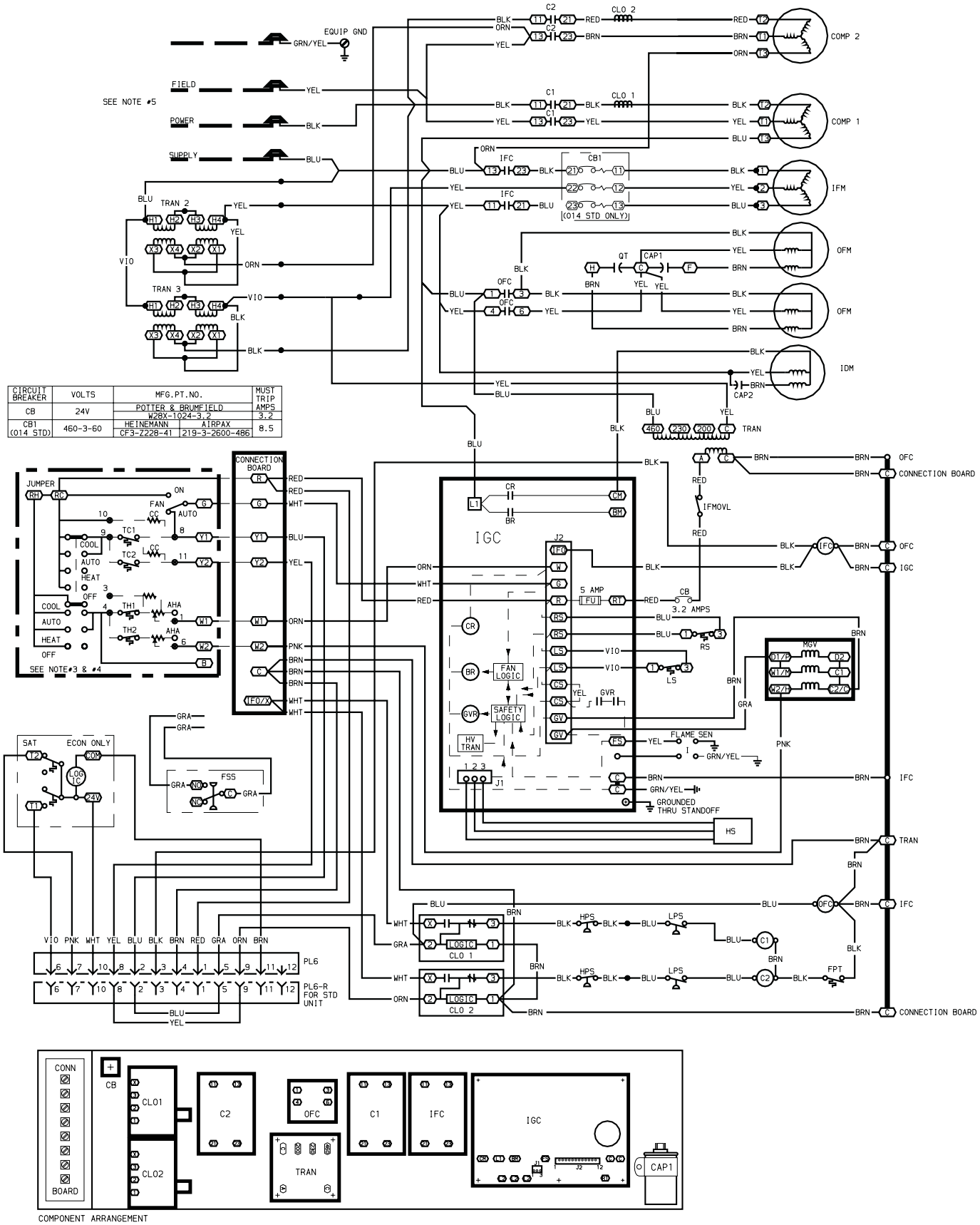


CIRCUIT BREAKER	VOLTS	MFG.PT.NO.		MUST TRIP AMPS
CB	24V	POTTER & BRUMFIELD W28X-1024-3.2		3.2
CB1 (C014 STD)	460-3-60	HEINEMANN CF3-Z228-41	AIRPAX 219-3-2600-486	8.5

See Legend on page 4.

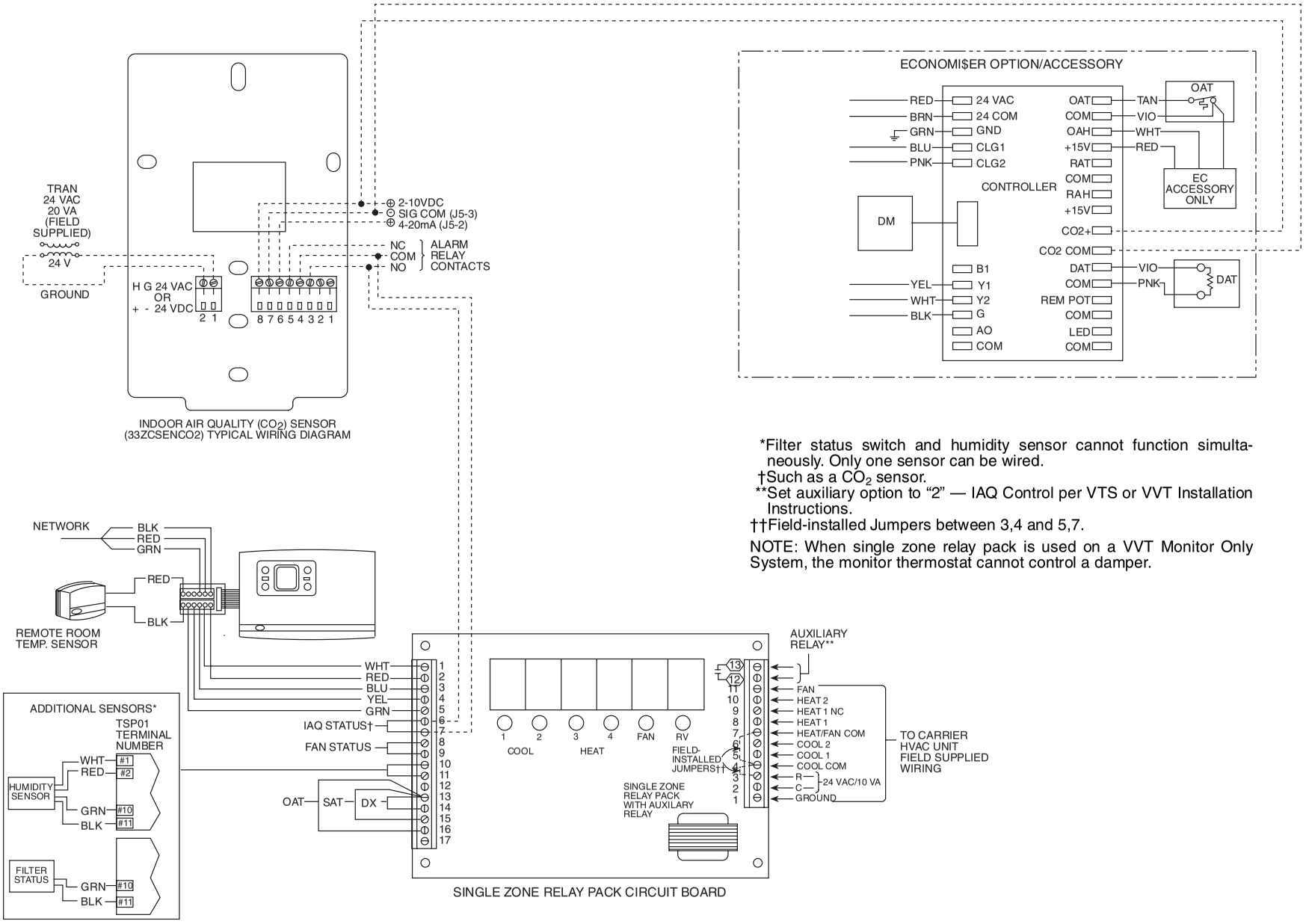
Fig. 9 — Schematic/Component Arrangement, 48HJD/E/F/R/S/T008-014; 460-3-60

575-3-60 SCHEMATIC



See Legend on page 4.

Fig. 10 — Schematic/Component Arrangement, 48HJD/E/F/R/S/T008-014; 575-3-60

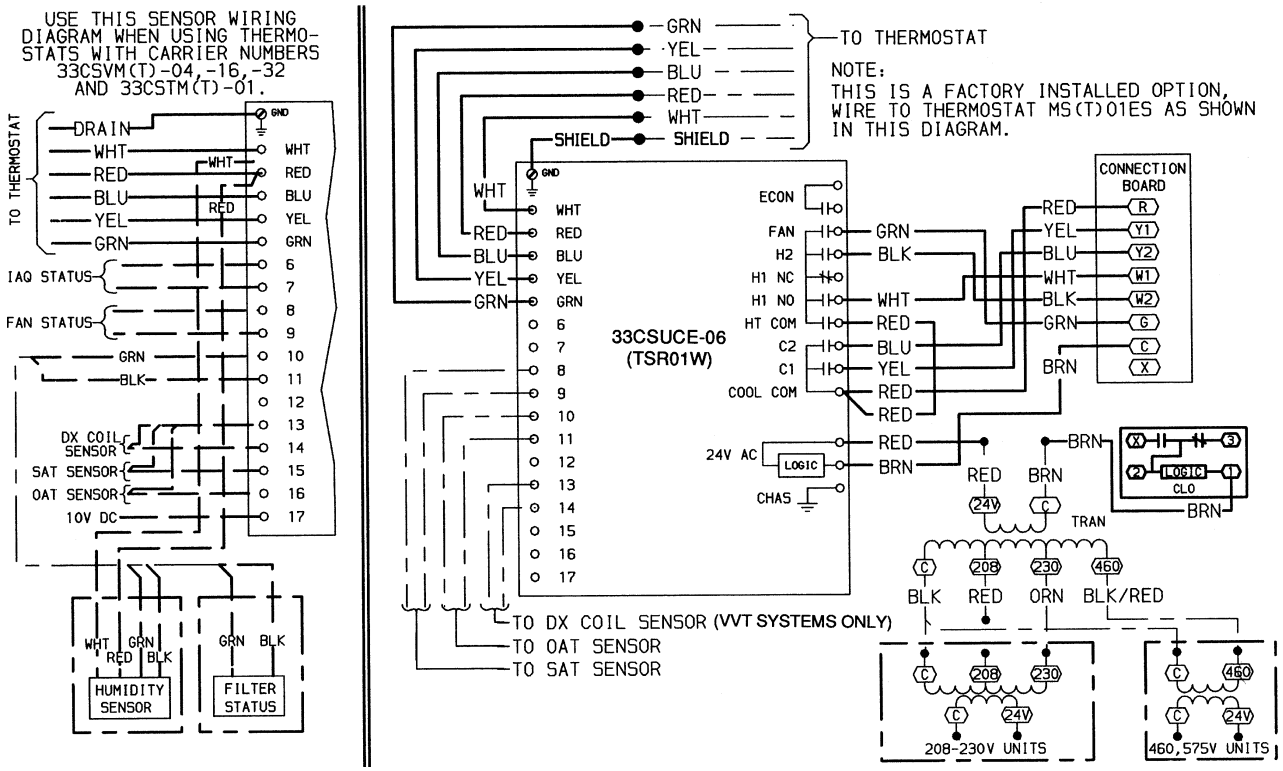


*Filter status switch and humidity sensor cannot function simultaneously. Only one sensor can be wired.
†Such as a CO_2 sensor.
**Set auxiliary option to "2" — IAQ Control per VTS or VVT Installation Instructions.
††Field-installed Jumpers between 3,4 and 5,7.

NOTE: When single zone relay pack is used on a VVT Monitor Only System, the monitor thermostat cannot control a damper.

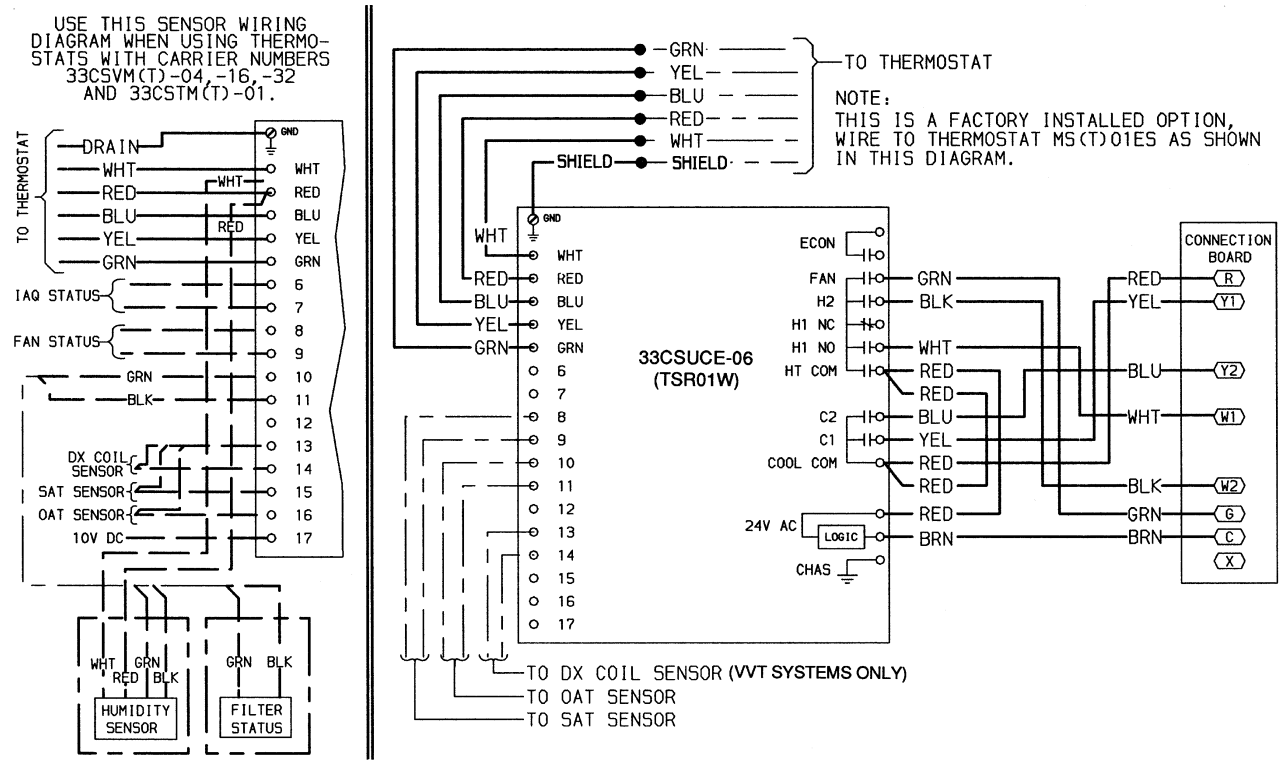
See Legend on page 4.

Fig. 11 — Apollo Controls Wiring — Including Indoor-Air Quality



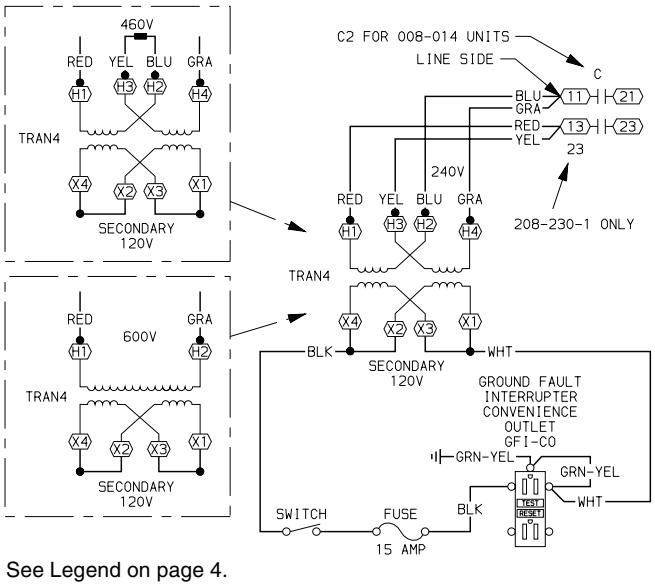
See Legend on page 4.

Fig. 12 — Apollo Thermostat Wiring — 48HJ004-007 (Typical)



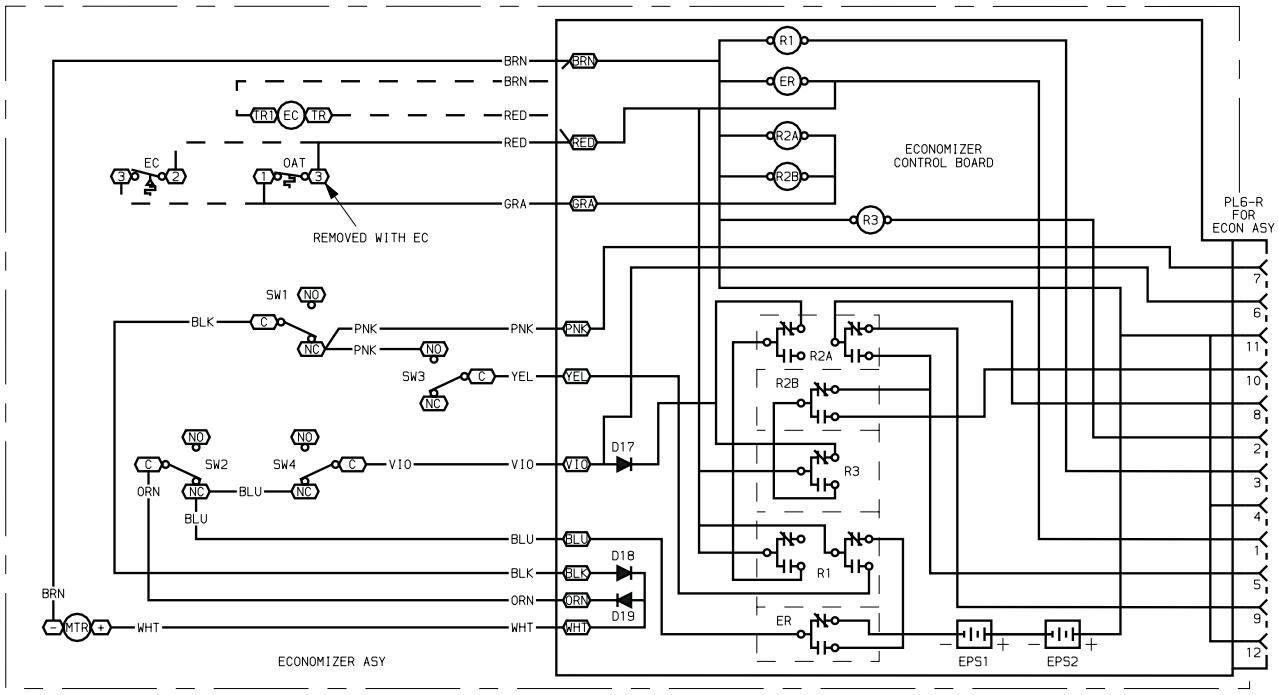
See Legend on page 4.

Fig. 13 — Apollo Thermostat Wiring — 48HJ008-014 (Typical)



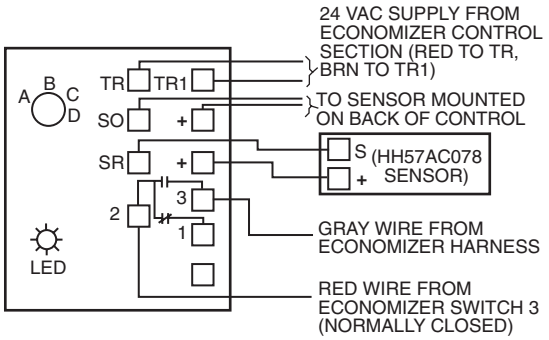
See Legend on page 4.

Fig. 14 — Convenience Outlet Schematic



See Legend on page 4.

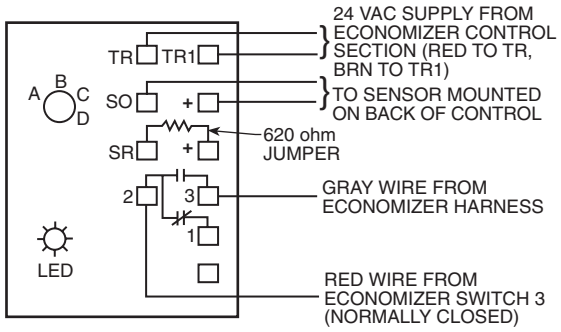
Fig. 15 — Durablade Economizer Schematic



See Legend on page 4.

NOTES:
1. Remove factory-installed jumper across SR and + before connecting wires from HH57AC078 sensor.
2. Switches shown in high outdoor-air enthalpy state. Terminals 2 and 3 close on low outdoor-air enthalpy relative to indoor air enthalpy.

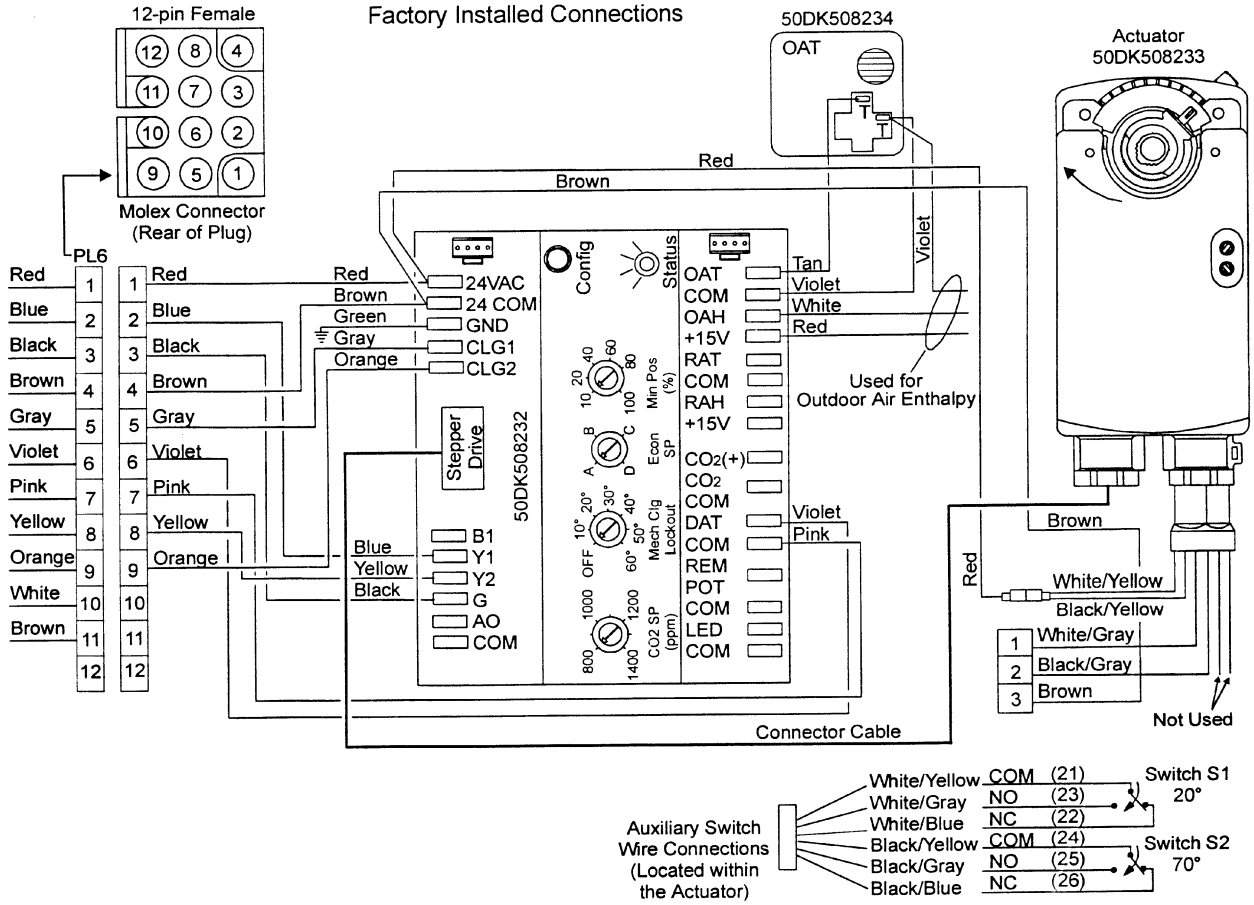
Fig. 16 — Differential Enthalpy Control (Durablade Economizer)



See Legend on page 4.

NOTE: Switches shown in high enthalpy state. Terminals 2 and 3 close on enthalpy decrease.

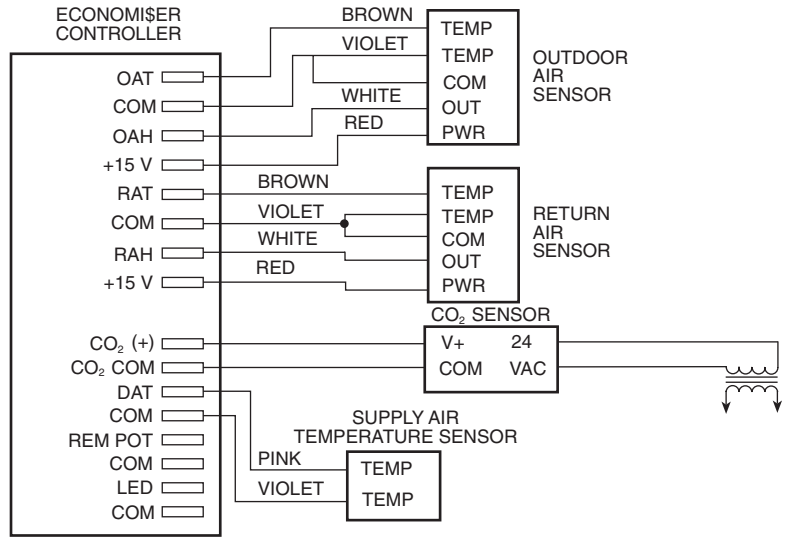
Fig. 17 — Solid-State Enthalpy Control (Durablade Economizer)



See Legend on page 4.

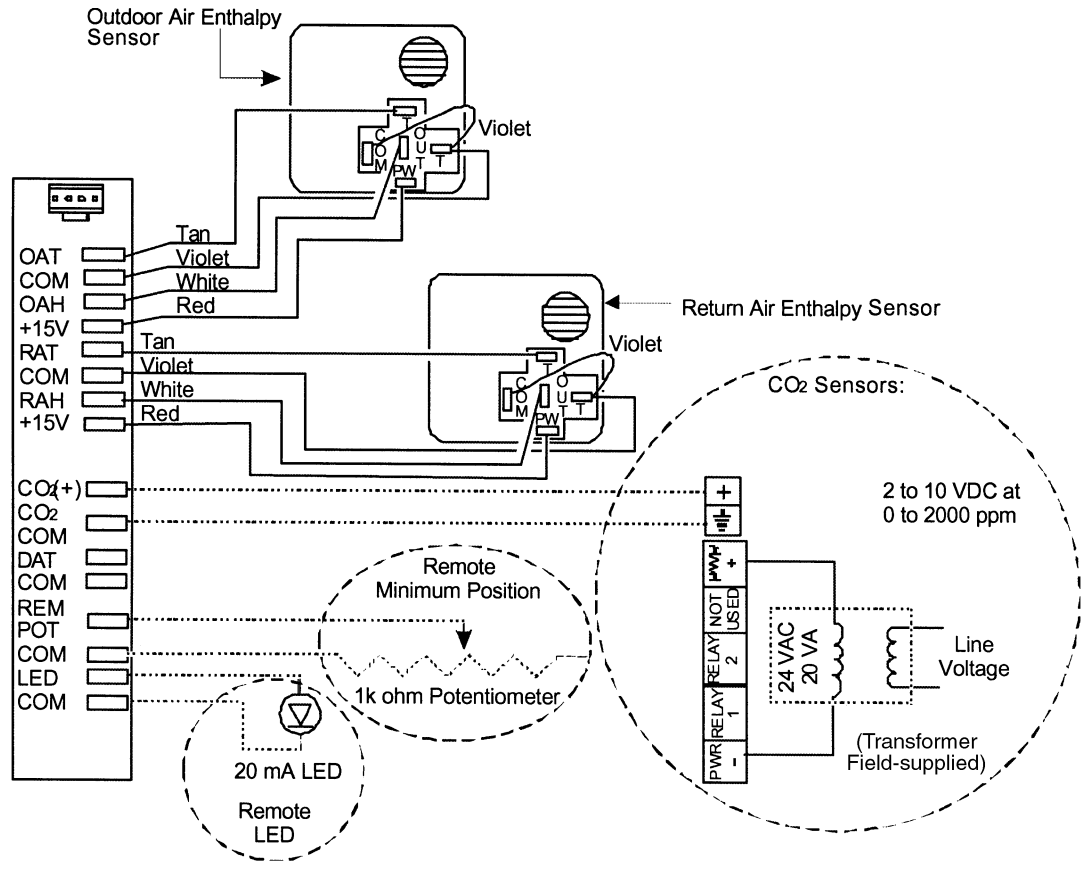
*Wiring is generic for all EconoMi$ers with the exception of the actuator. Refer to Fig. 21 and 22 for specific actuator production dates.

Fig. 18 — EconoMi$er Wiring for Units Produced 5/16/1999 through 2/15/2001*



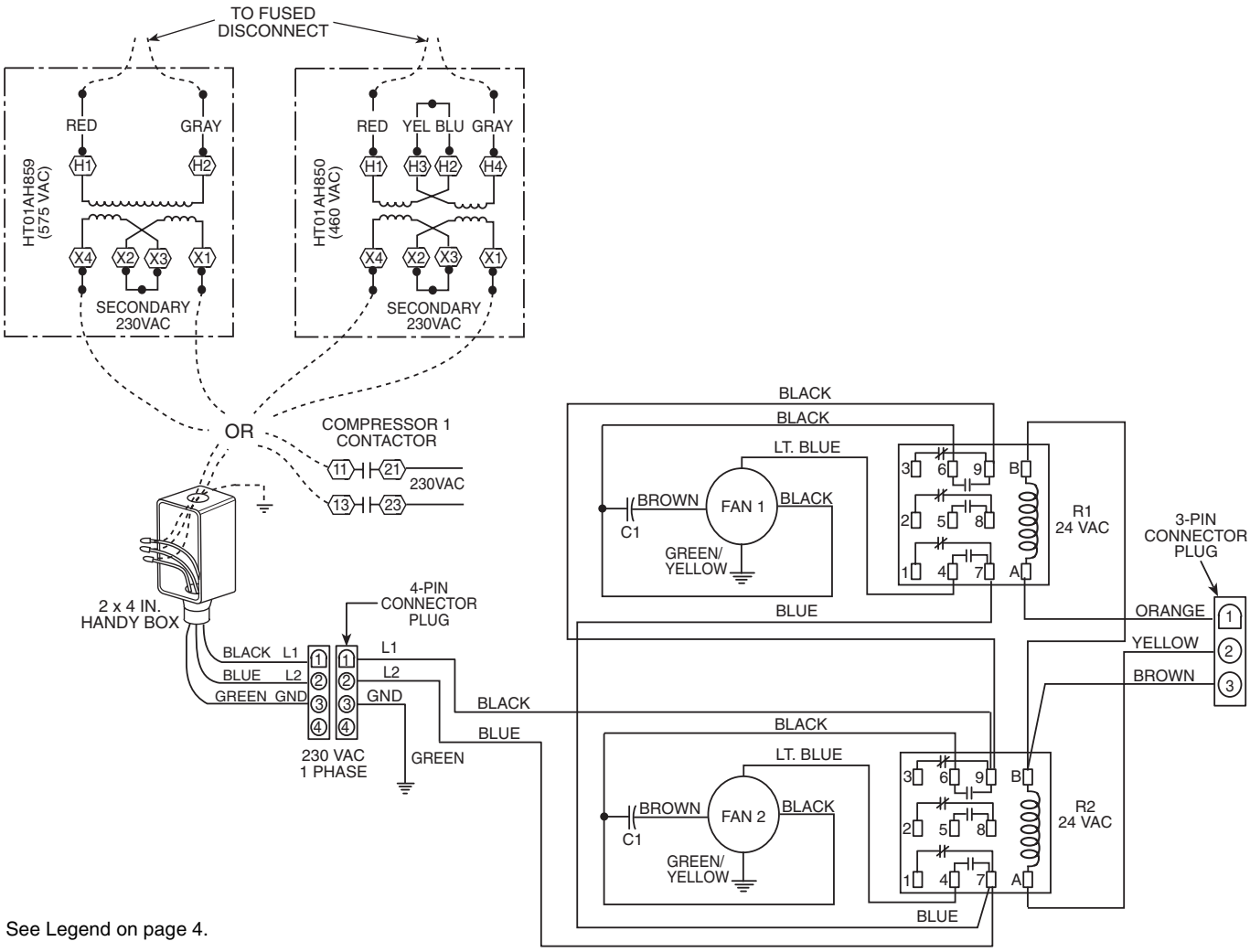
See Legend on page 4.

Fig. 19 — EconoMi$er Dry Bulb Sensor Wiring



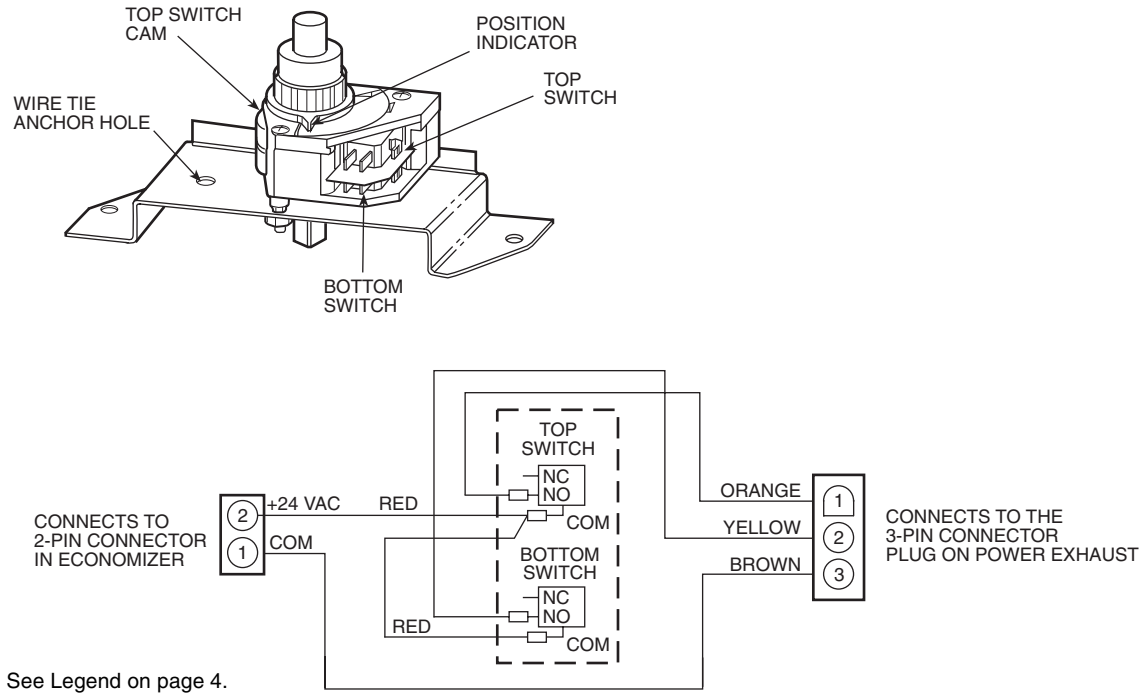
See Legend on page 4.

Fig. 20 — Wiring Diagram for Field-Installed Enthalpy Sensors



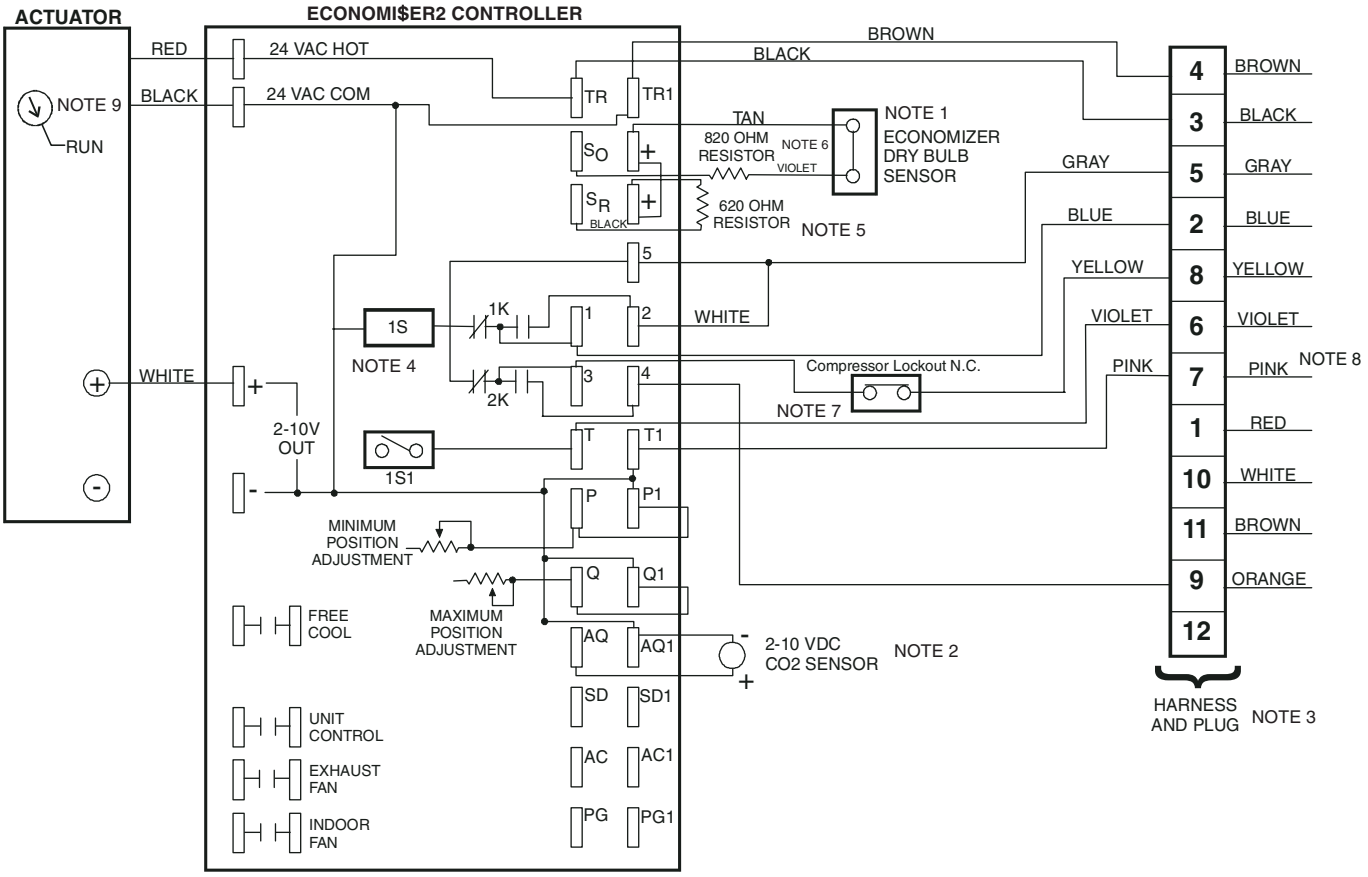
See Legend on page 4.

Fig. 21 — EconoMi$er Power Exhaust with the Switch Inside the Actuator (Units Produced 5/16/1999 - 11/5/2001)



See Legend on page 4.

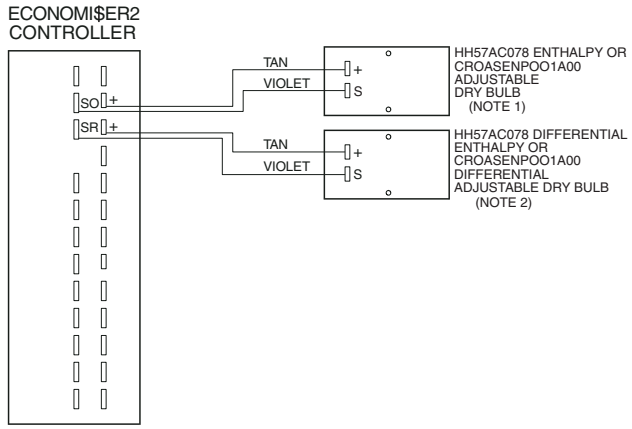
Fig. 22 — EconoMi$er Power Exhaust with Switch Outside of Actuator (Units Produced 11/5/2001 - 2/15/2002)



See Legend on page 4.

NOTES:
1. The standard EconoMi$er2 is shipped with a fixed dry bulb sensor. (Open 67 F — Close 52 F.) An adjustable dry bulb or enthalpy sensor can replace the fixed dry bulb. (See Note 6.)
2. CO_2 sensor is optional. Field-installed accessory. See rooftop price pages for ordering data and pricing. Power for CO_2 sensor should be provided by field-supplied transformer.
3. The HVAC unit is shipped with a jumper plug attached to the EconoMi$er2 harness. Remove the jumper plug and save for future use if economizer is removed. Connect the male side of plug (shown above) to the female side in HVAC unit.
4. 1S is an electronic switch that closes when powered by a 24 vac input.
5. Factory-installed 620-ohm, 1 watt, 5% resistor should be removed only when a HH57AC078 enthalpy sensor or CROASENR001A00 adjustable dry bulb is added to SR and + for differential sensing.
6. When replacing the fixed dry bulb sensor with an enthalpy or adjustable dry bulb, remove the 820-ohm resistor.
7. Compressor lockout (Open 35 F — Close 50 F).
8. See EconoMi$er2 Installation Instructions for details on locating and wiring supply air (mixed air) sensor.
9. Switch on actuator must be in run position for economizer to operate.
10. A 2-stage thermostat is recommended.
11. Before troubleshooting wiring, ensure that all the correct sensors have been installed (refer to EconoMi$er2 Installation Instructions).

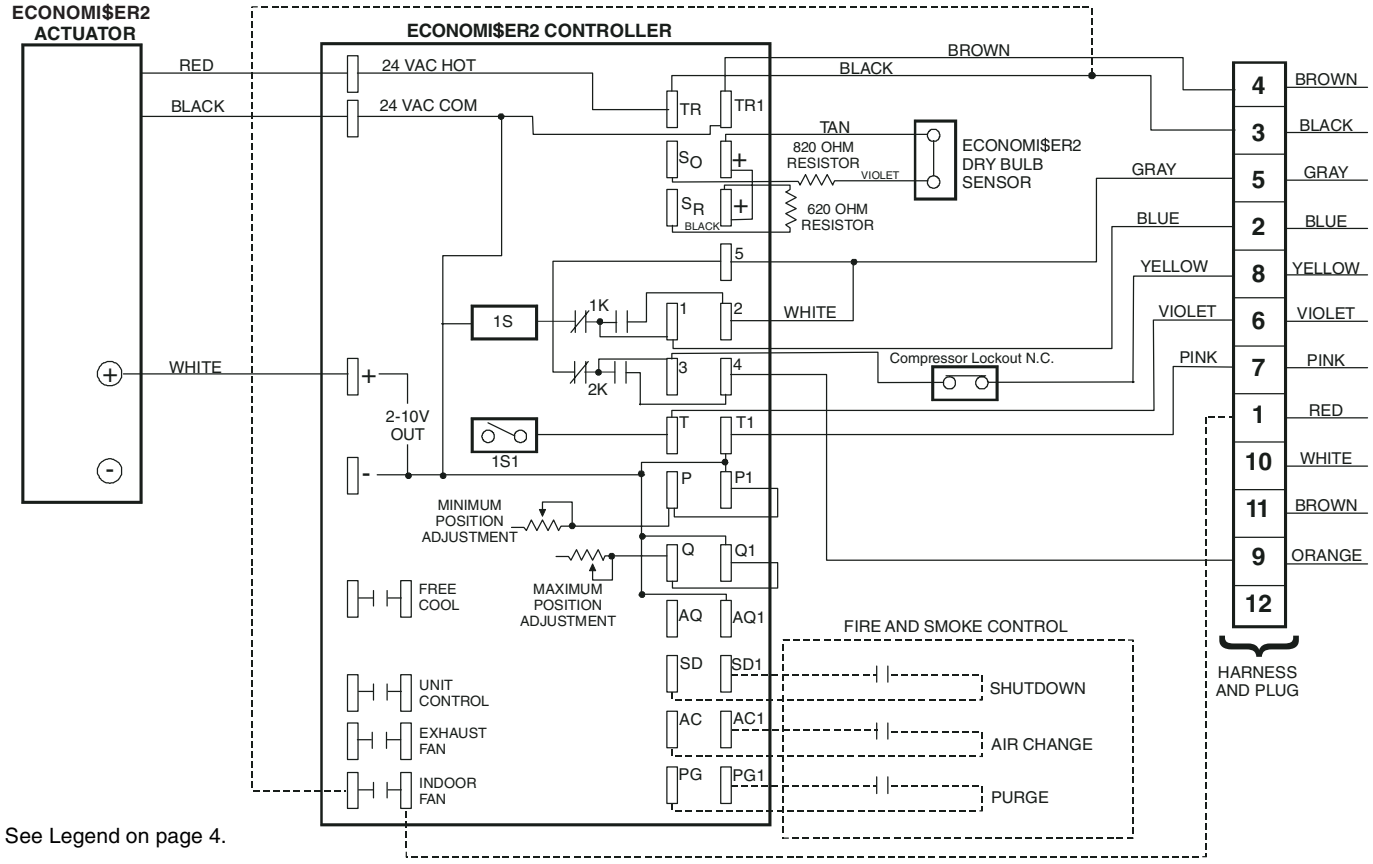
Fig. 23 — EconoMi$er2 Wiring (For Units Produced 2/18/2002 - Present)



See Legend on page 4.

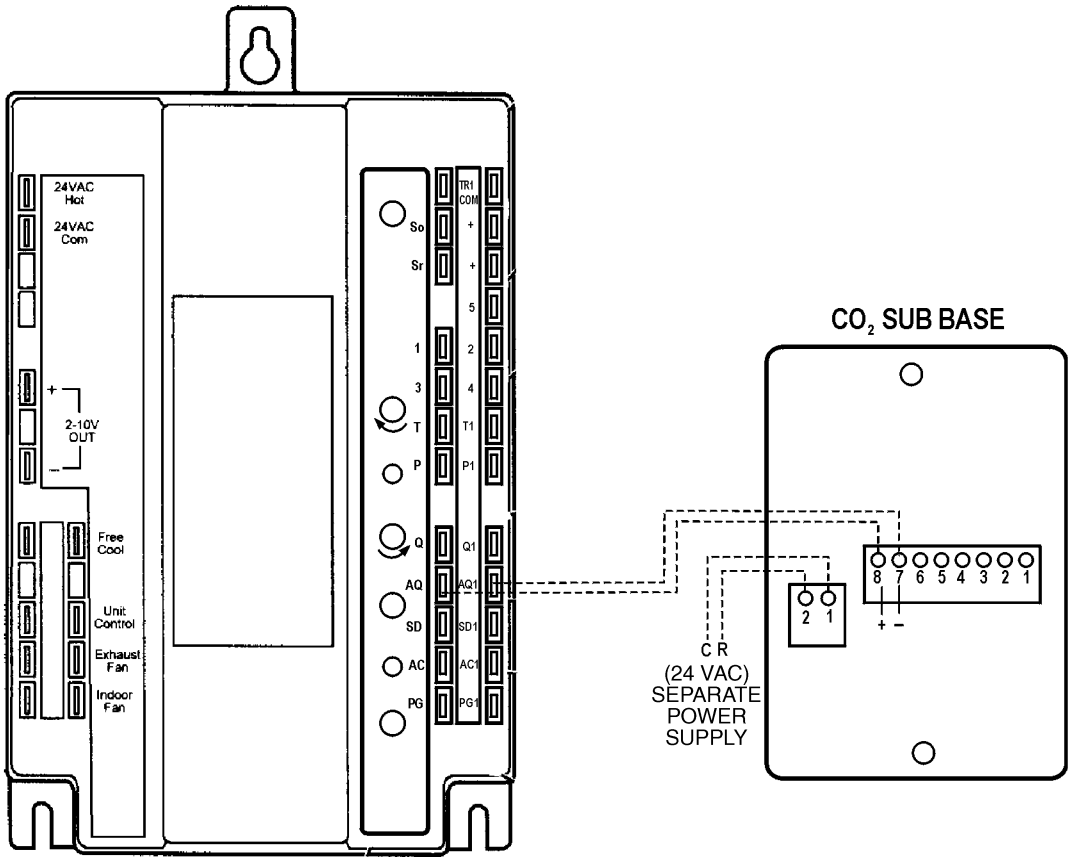
NOTES:
1. Violet wire from SO terminal has a factory-installed 820-ohm in-line resistor. This resistor must be removed when replacing the standard fixed dry bulb with an optional enthalpy or adjustable dry bulb.
2. The standard economizer has a 620-ohm resistor between terminals SR and +. This resistor must be removed when adding differential enthalpy or differential adjustable dry bulb.

Fig. 24 — Differential Enthalpy Wiring for EconoMi$er2



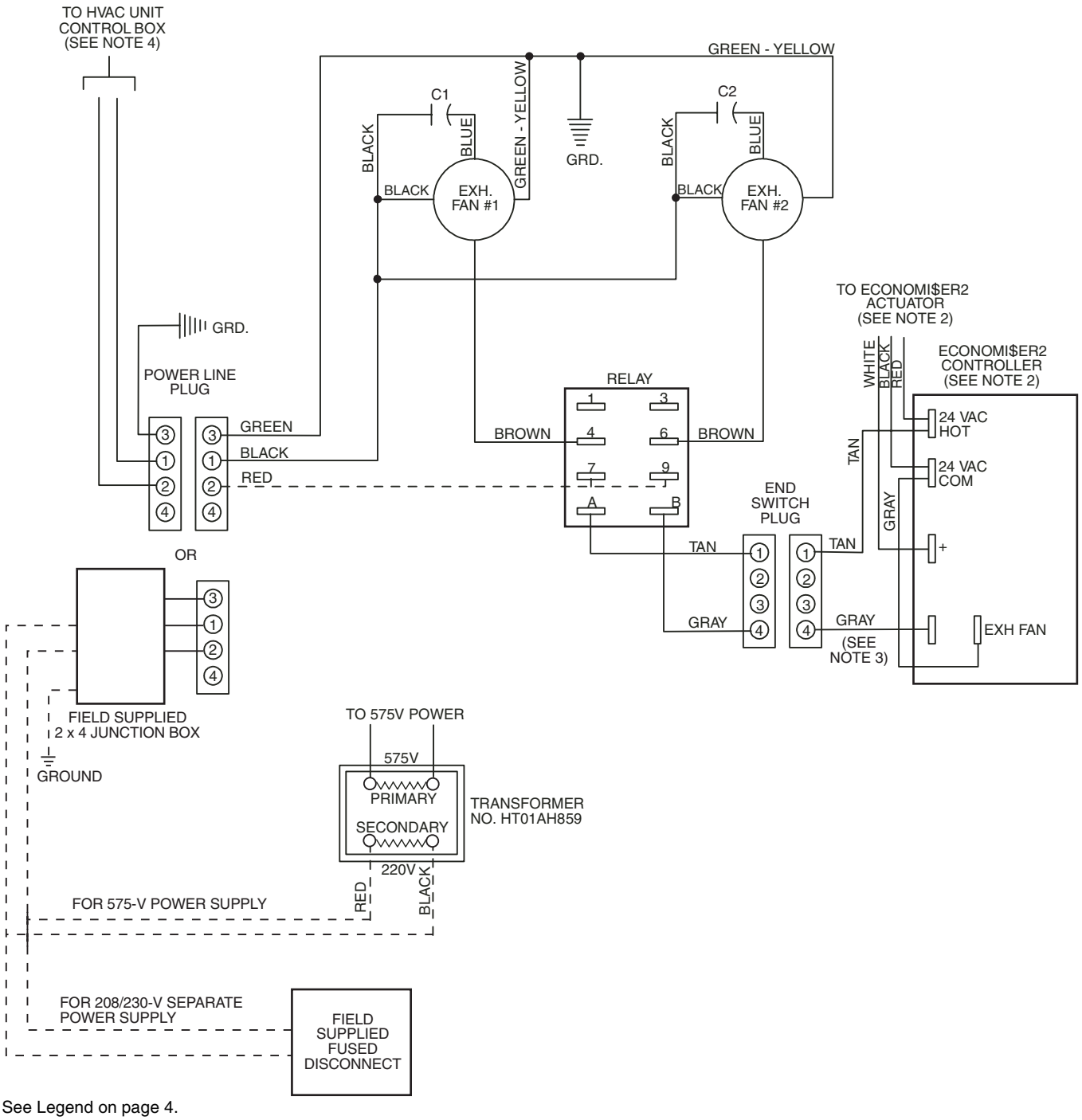
See Legend on page 4.

Fig. 25 — Fire and Smoke Control Wiring for EconoMi$er2



See Legend on page 4.

Fig. 26 — Indoor Air Quality Sensor Wiring for EconoMi$er2



See Legend on page 4.

NOTES:
1. 575 V transformer No. HT01AH859 is ordered separately from power exhaust.
2. EconoMi$er2 actuator and controller are shipped with the EconoMi$er2 — not with power exhaust.
3. Connections from End Switch plug to the EconoMi$er2 controller are made by installer.
4. If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

   Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:

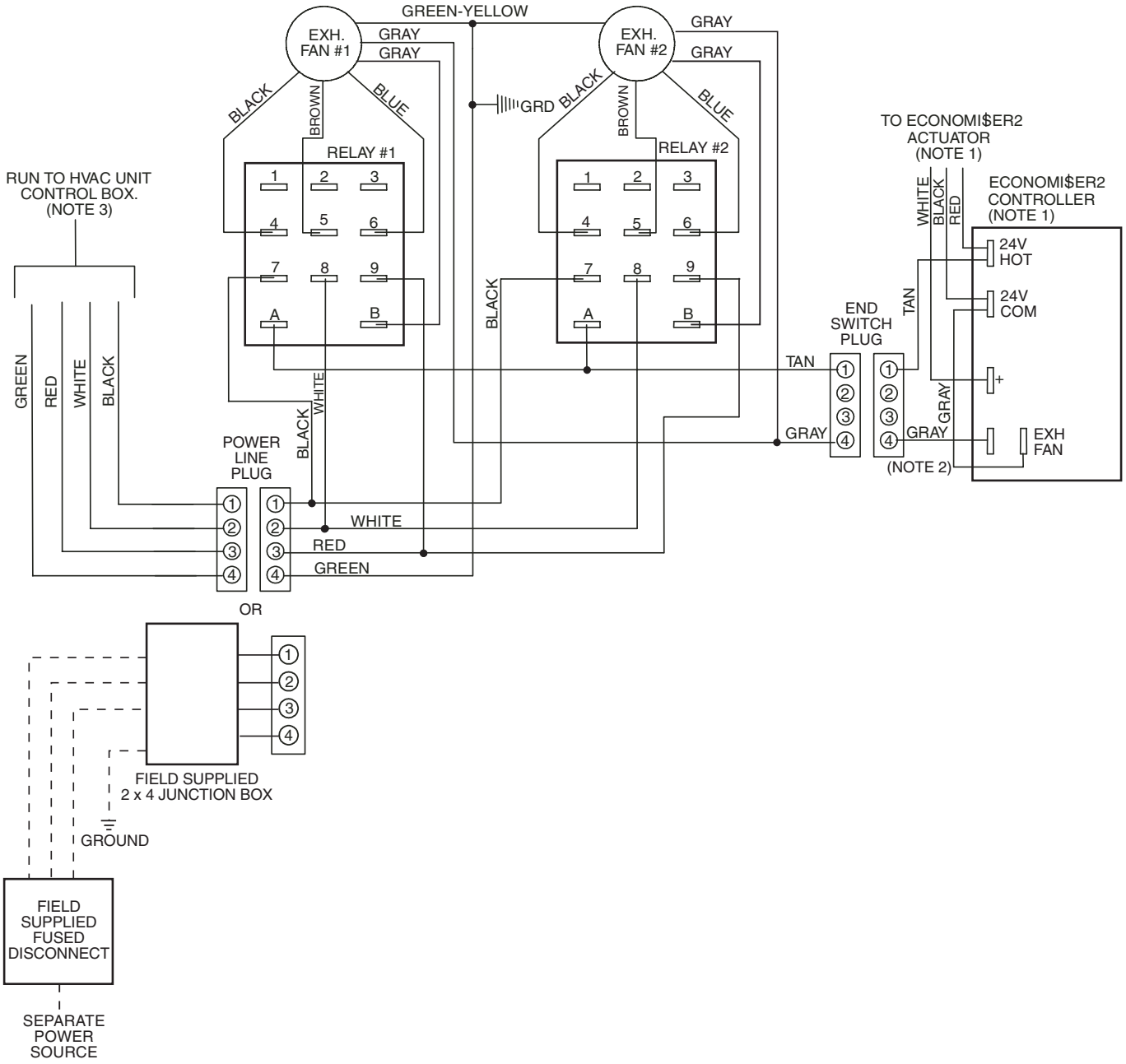
   MCA New = MCA unit only + MCA of Power Exhaust

   For example, using a 48HJD006---5 unit with MCA = 28.9 and MOCP = 35, with CRPWREXH030A00 power exhaust.

   MCA New = 28.9 amps + 1.6 amps = 30.5 amps

   If the new MCA does not go over the MOCP published, then MOCP would not change. The MOCP in this example is 35 amps, the MCA New is below 35, therefore the MOCP is OK. If “MCA New” is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

Fig. 27 — EconoMi$er2 Power Exhaust Wiring — 208/230 V and 575 V Units



See Legend on page 4.

NOTES:
1. 575 V transformer No. HT01AH859 is ordered separately from power exhaust.
2. EconoMi$er2 actuator and controller are shipped with the EconoMi$er2 — not with power exhaust.
3. Connections from End Switch plug to the EconoMi$er2 controller are made by installer.
4. If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

   Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:

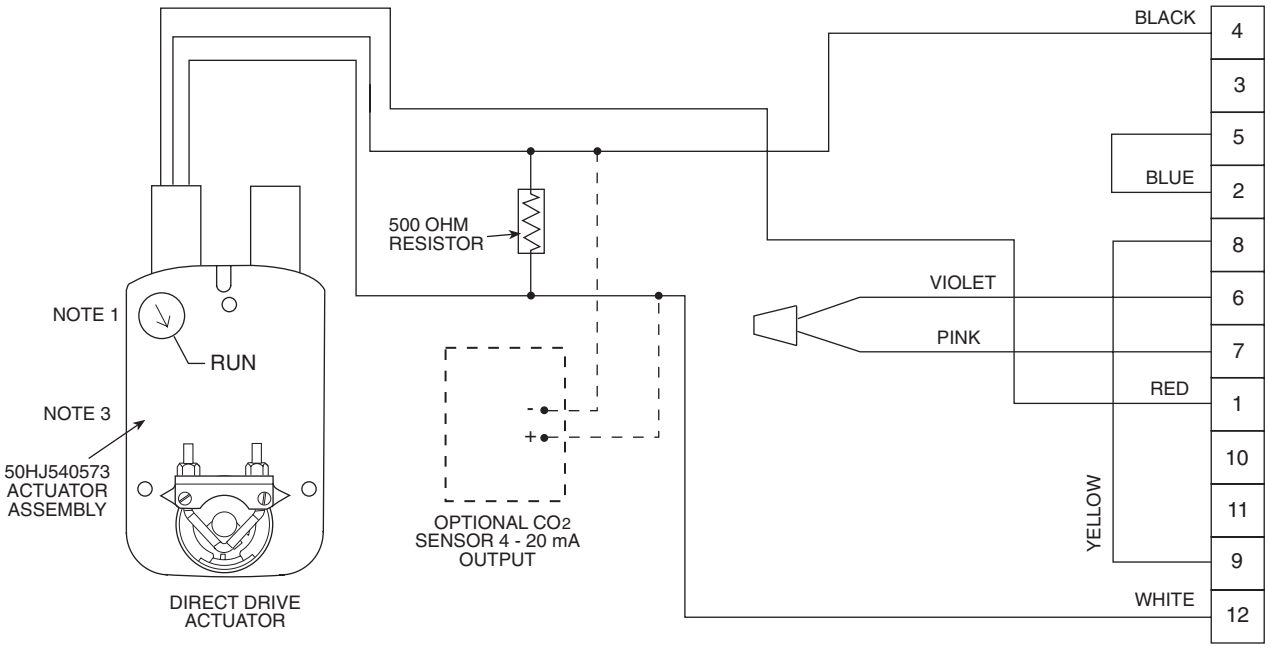
   MCA New = MCA unit only + MCA of Power Exhaust

   For example, using a 48HJD006---5 unit with MCA = 28.9 and MOCP = 35, with CRPWREXH030A00 power exhaust.

   MCA New = 28.9 amps + 1.6 amps = 30.5 amps

   If the new MCA does not go over the MOCP published, then MOCP would not change. The MOCP in this example is 35 amps, the MCA New is below 35, therefore the MOCP is OK. If “MCA New” is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

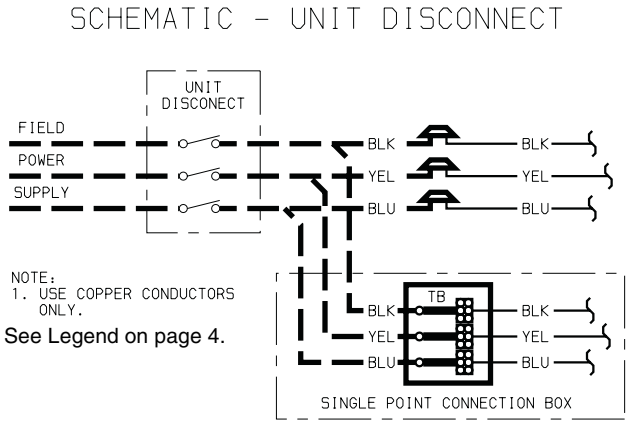
Fig. 28 — EconoMi$er2 Power Exhaust Wiring — 460 V Units



See Legend on page 4.

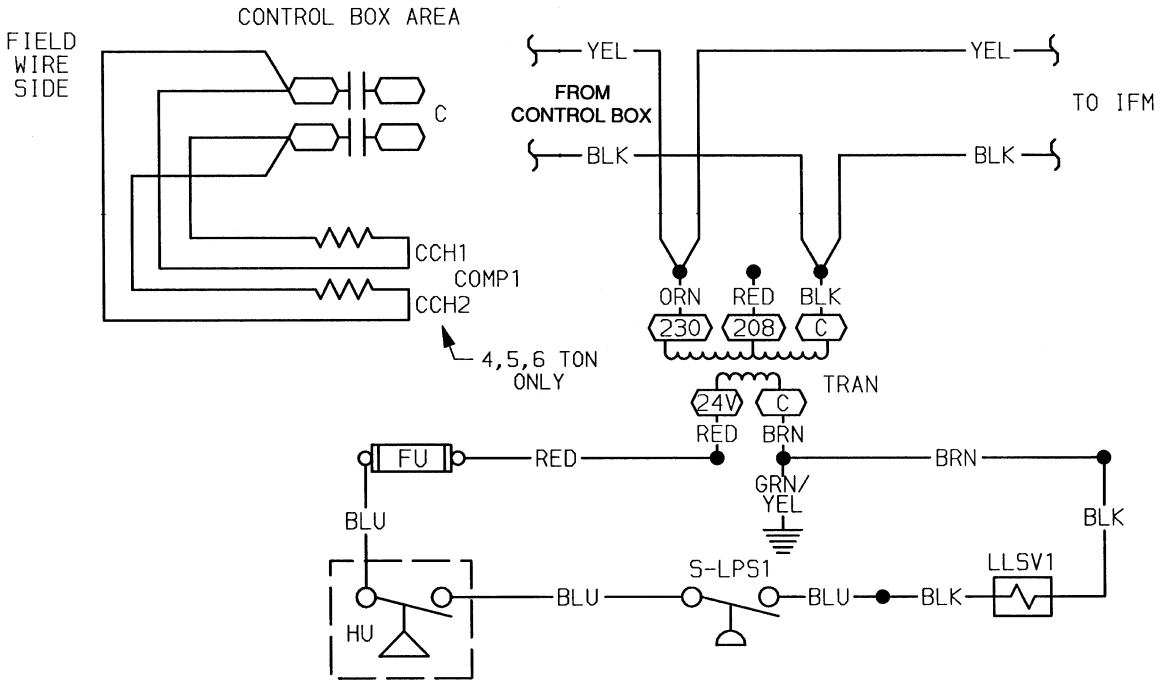
NOTES:
1. Switch on actuator must be in run position for economizer to operate.
2. PremierLink™ control requires that the standard 50HJ540569 outside-air sensor be replaced by either the CROASENR001A00 dry bulb sensor or HH57A077 enthalpy sensor.
3. 50HJ540573 actuator consists of the 50HJ540567 actuator and a harness with 500-ohm resistor.

Fig. 29 — EconoMi$er2 Wiring (With PremierLink™ or 4-20 mA Control)



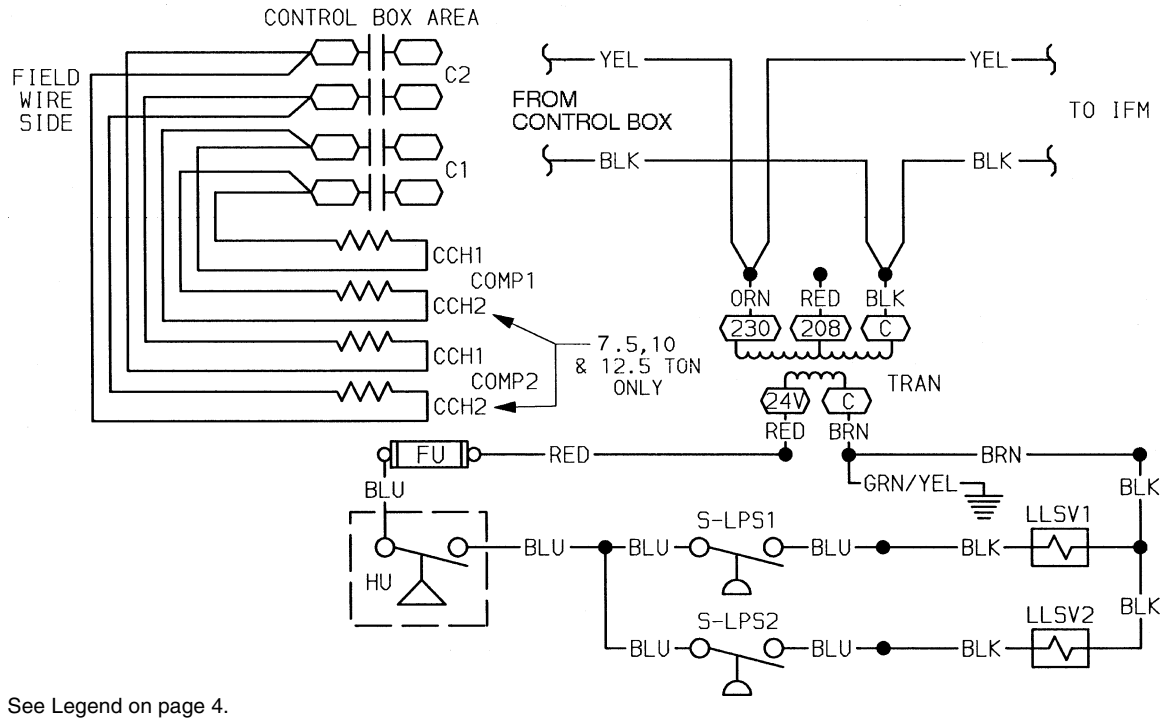
See Legend on page 4.

Fig. 30 — Factory-Installed Non-Fused Disconnect Wiring



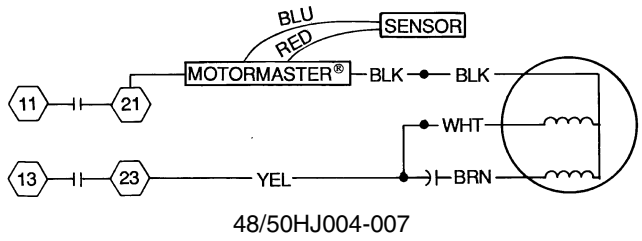
See Legend on page 4.

Fig. 31 — Typical MoistureMi$er™ Dehumidification Package Humidistat Wiring, 48HJ004-007 (208/230-V Unit Shown)

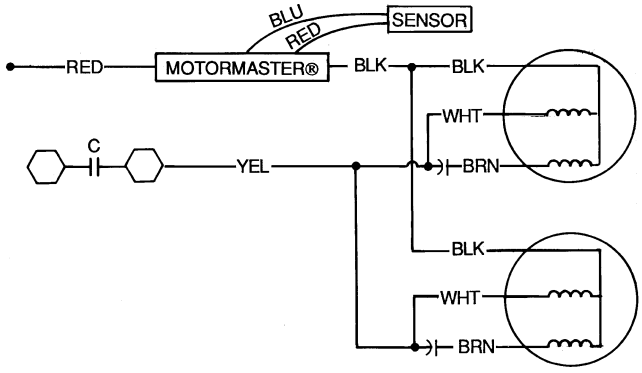


See Legend on page 4.

Fig. 32 — Typical MoistureMi$er Dehumidification Package Humidistat Wiring, 48HJ008-014 (208/230-V Unit Shown)



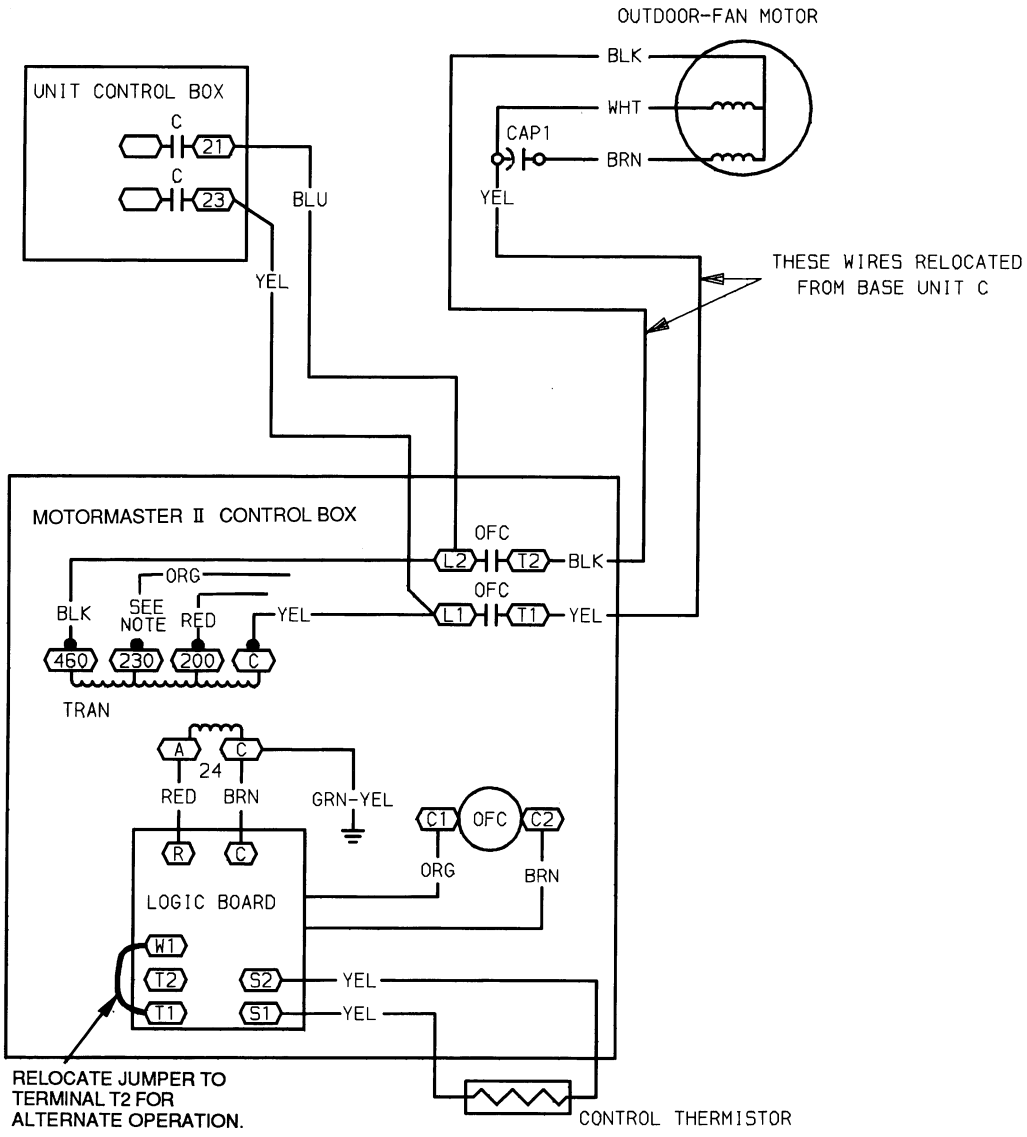
48/50HJ004-007



48/50HJ008-014

See Legend on page 4.

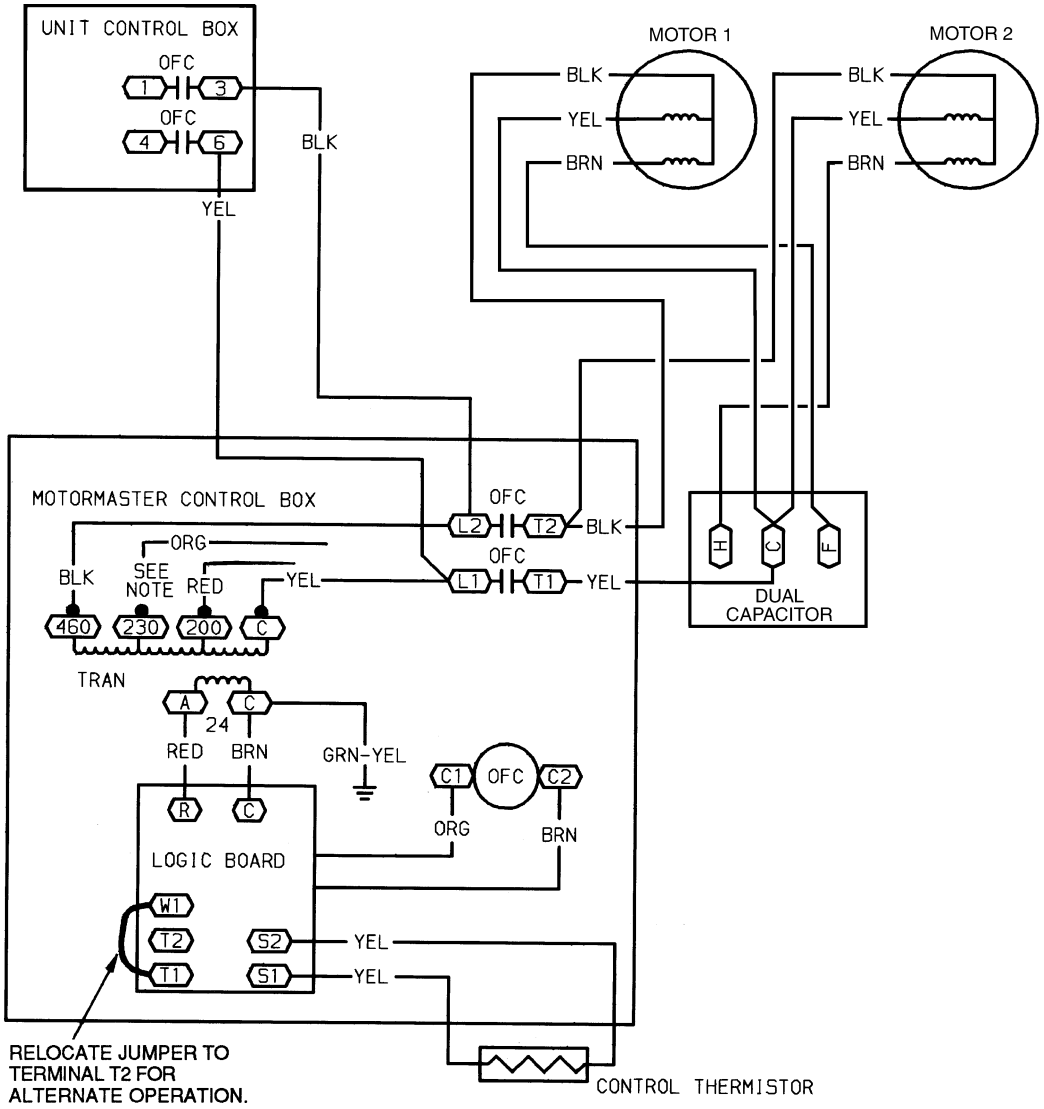
Fig. 33 — Motormaster® I Control Wiring Details



See Legend on page 4.

NOTE: Motormaster II transformer is wired for 460-v supply; it must be rewired for 208/230-v application. Be sure to insulate unused tap. Refer to color code.

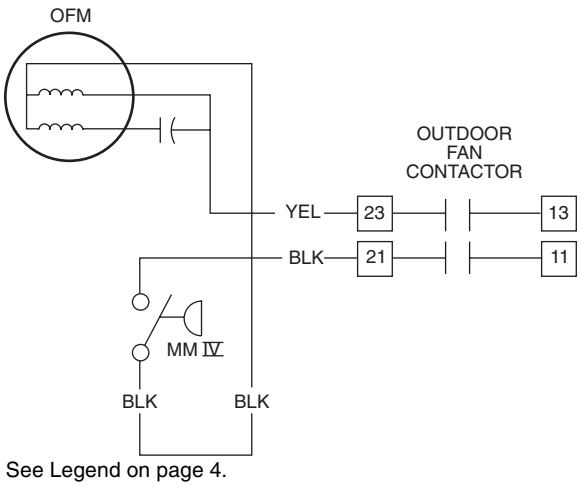
Fig. 34 — Motormaster II Control Wiring Schematic Size 004-007 Units



See Legend on page 4.

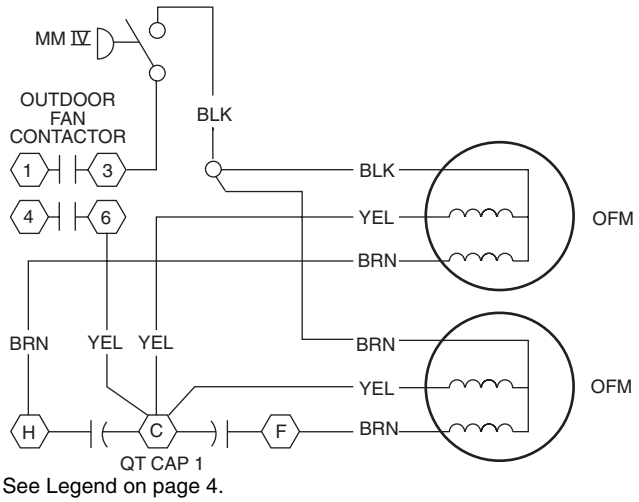
NOTE: Motormaster® II transformer is wired for 460-v supply; it must be rewired for 208/230-v application. Be sure to insulate unused tap. Refer to color code.

Fig. 35 — Motormaster II Control Wiring Schematic Size 008-014 Units



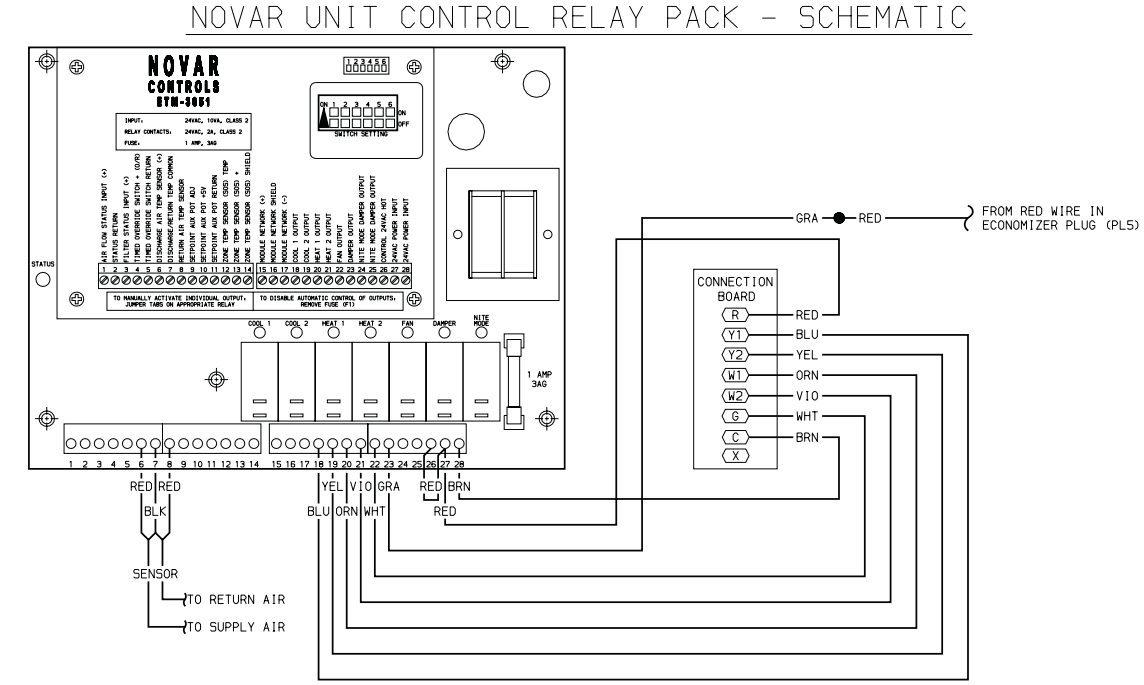
See Legend on page 4.

Fig. 36 — Motormaster IV Control Wiring Schematic — Sizes 004-007



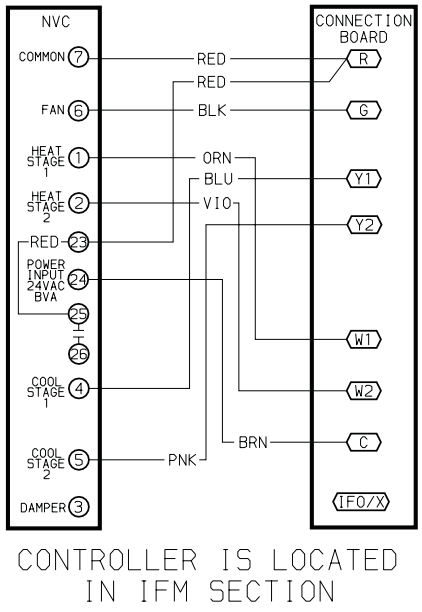
See Legend on page 4.

Fig. 37 — Motormaster IV Control Wiring Schematic — Sizes 008-014



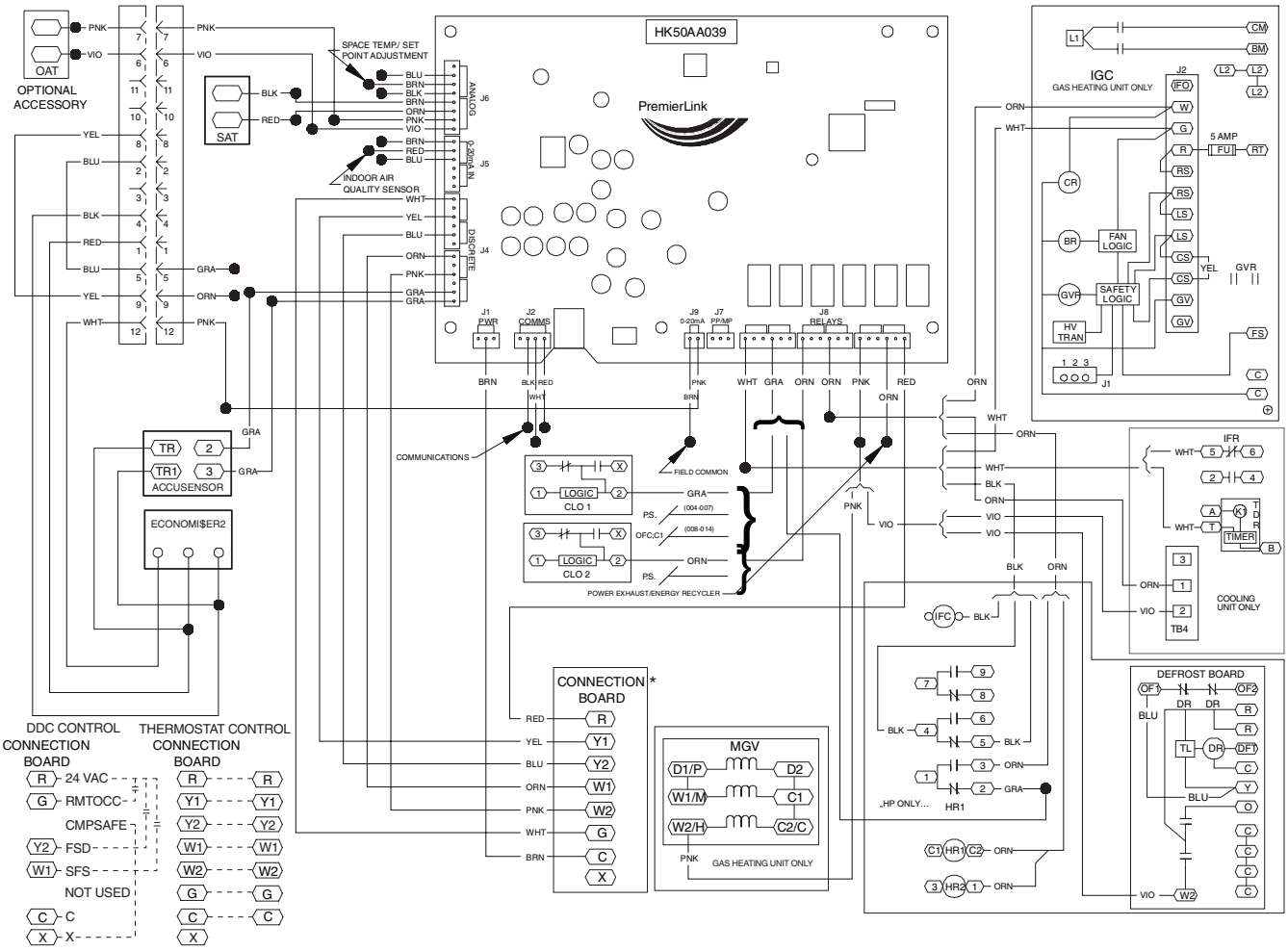
See Legend on page 4.

Fig. 38 — Novar Controls Wiring, EMT3051



See Legend on page 4.

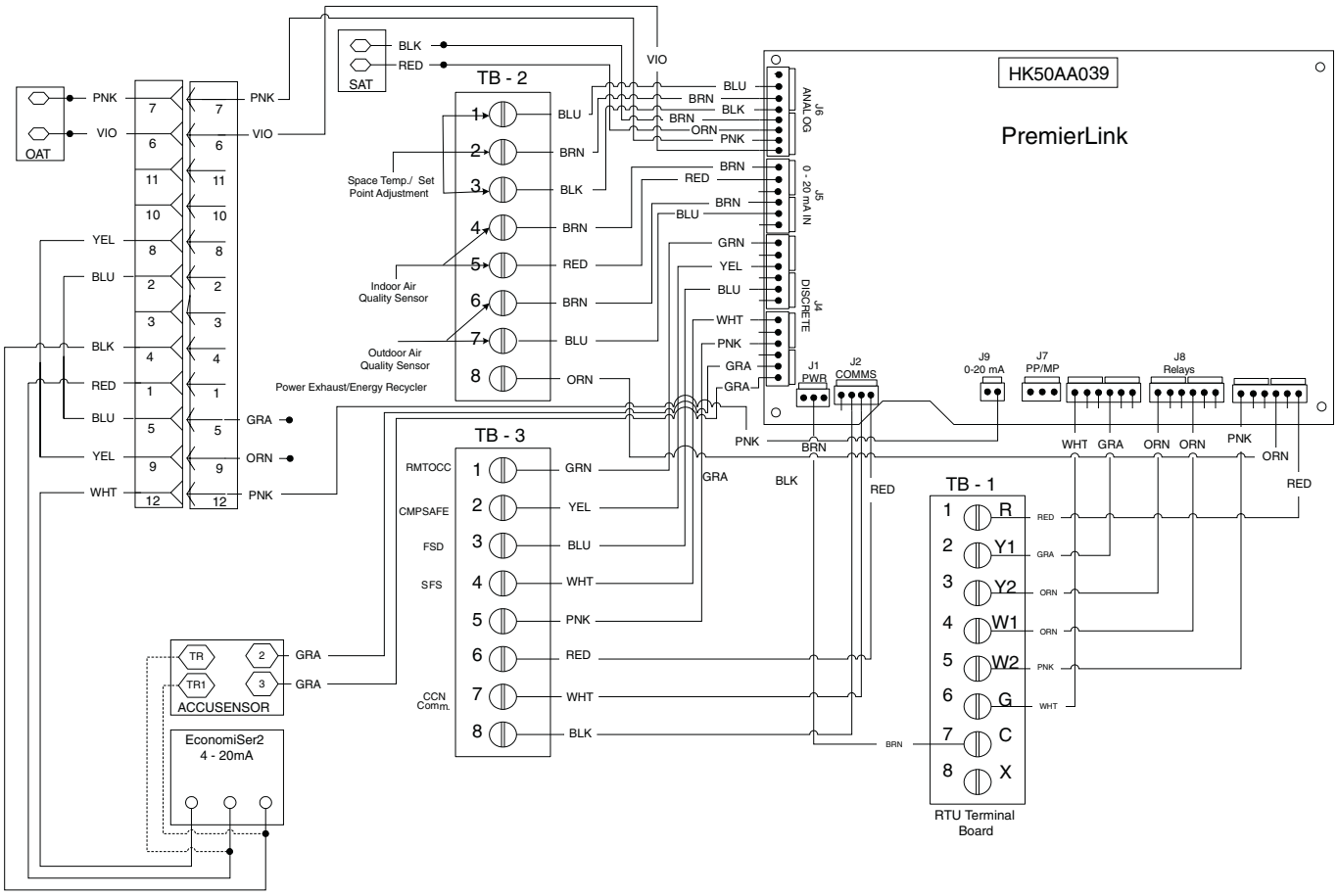
Fig. 39 — Novar Controls Wiring, EMT2024



See Legend on page 4.

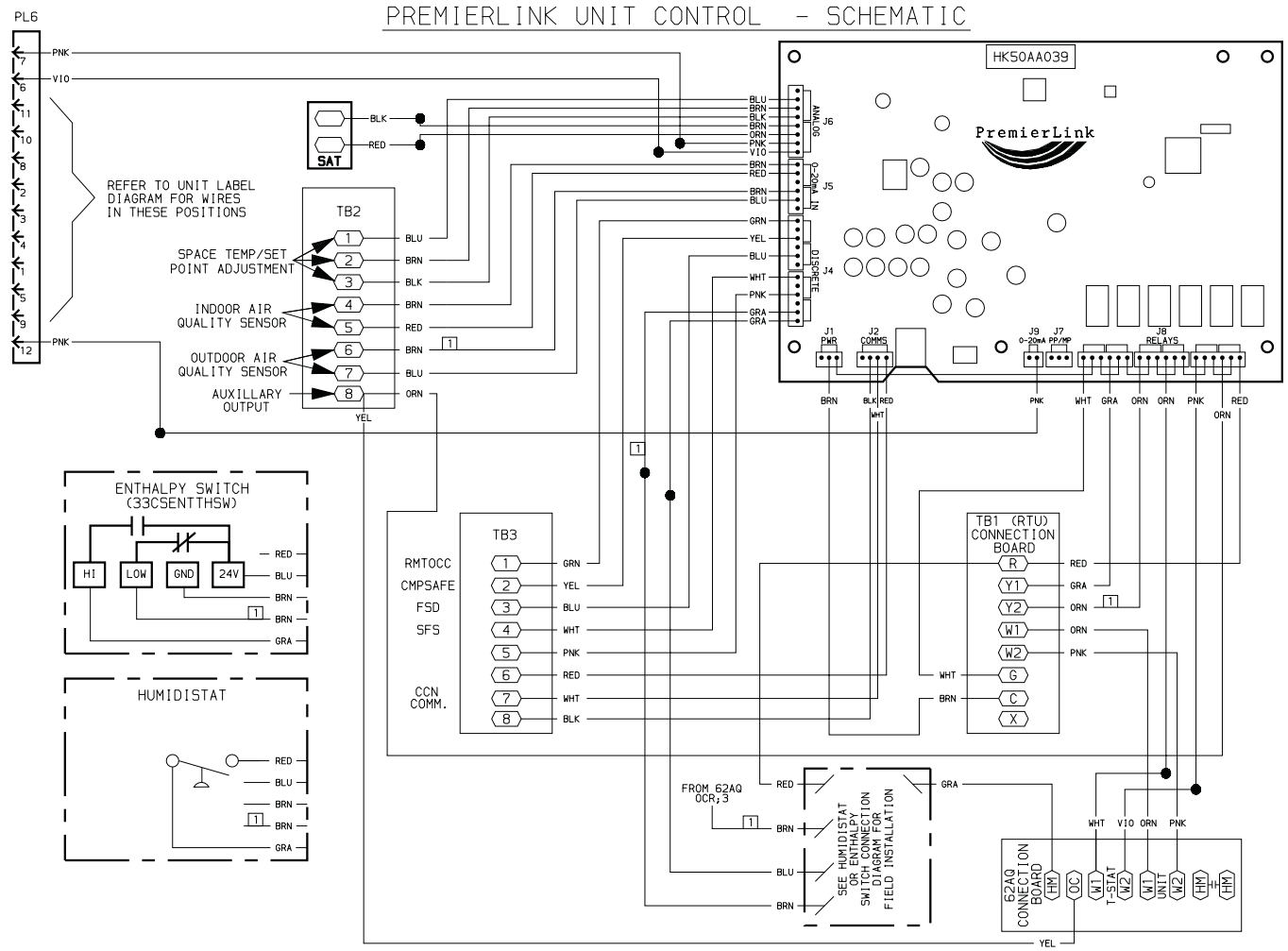
*When connecting DDC or thermostat controls, wire to connection board. Do not wire directly to PremierLink™ board.

Fig. 40 — Typical PremierLink Controls Wiring



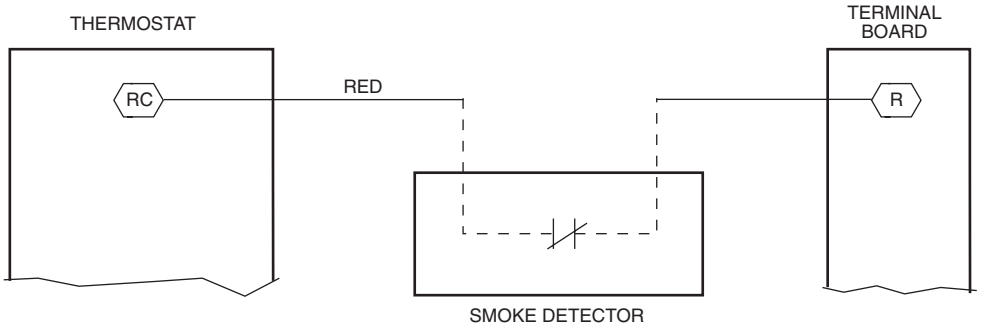
See Legend on page 4.

Fig. 41 — PremierLink™ Controls with Dual Terminal Block (Units Produced 10/02 - Present)

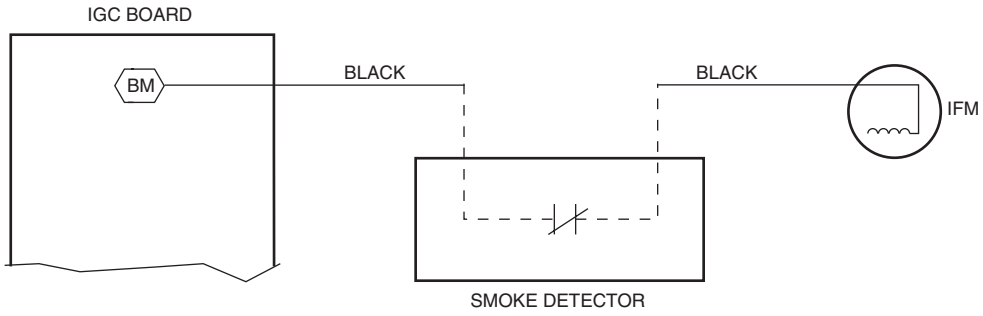


See Legend on page 4.

Fig. 42 — PremierLink™ Controls with Dual Terminal Block and 62AQ Energy$Recycler



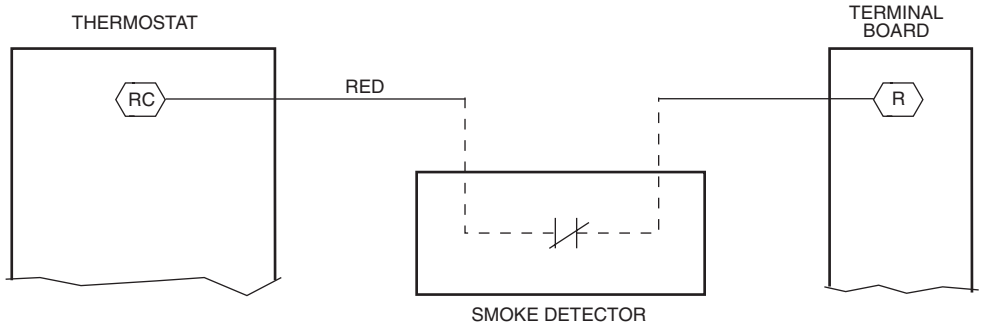
NOTE: Break the Red wire from terminal “RC” on thermostat to terminal “R” on the terminal board.



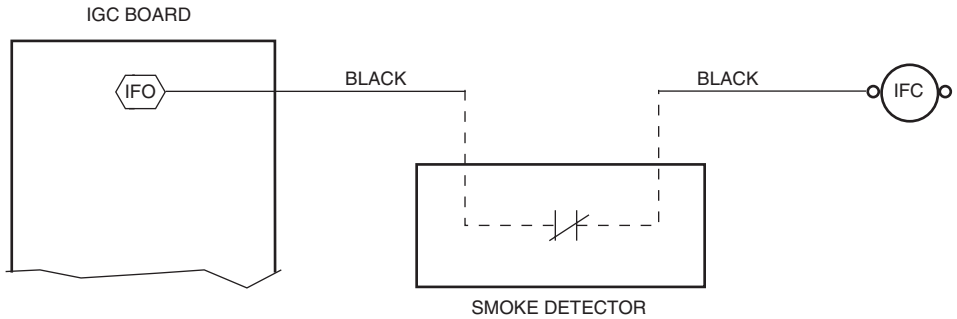
See Legend on page 4.

NOTE: Break the Black wire from terminal “BM” on the IGC board to the indoor-fan motor (IFM).

Fig. 43 — Smoke Control Unit — Shutdown Wiring (48HJ004-014 Single-Phase Units)



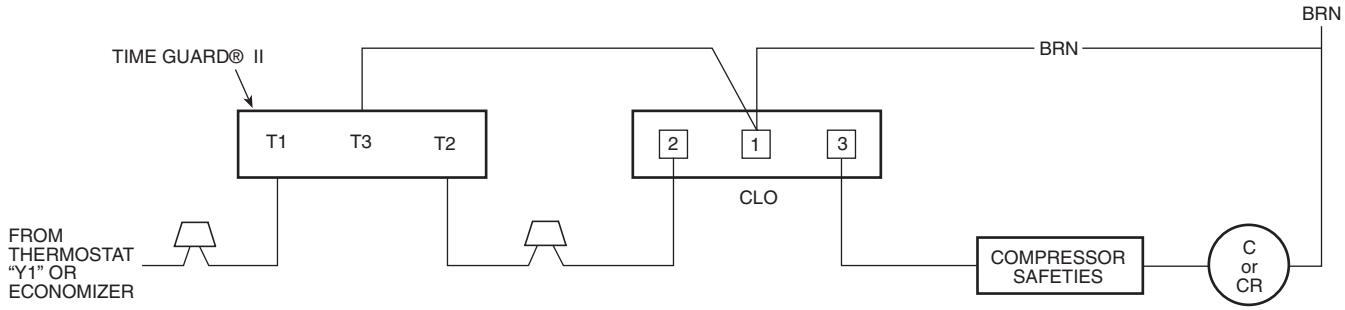
NOTE: Break the Red wire from terminal “RC” on thermostat to terminal “R” on the terminal board.



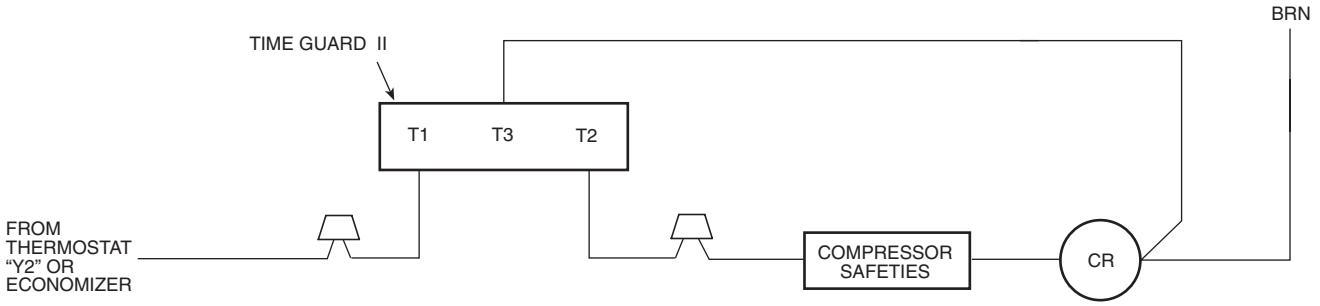
See Legend on page 4.

NOTE: Break the Black wire from terminal “IFO” on the IGC board to the “IFC” terminal.

Fig. 44 — Smoke Control Unit — Shutdown Wiring (48HJ004-014 3-Phase Units)



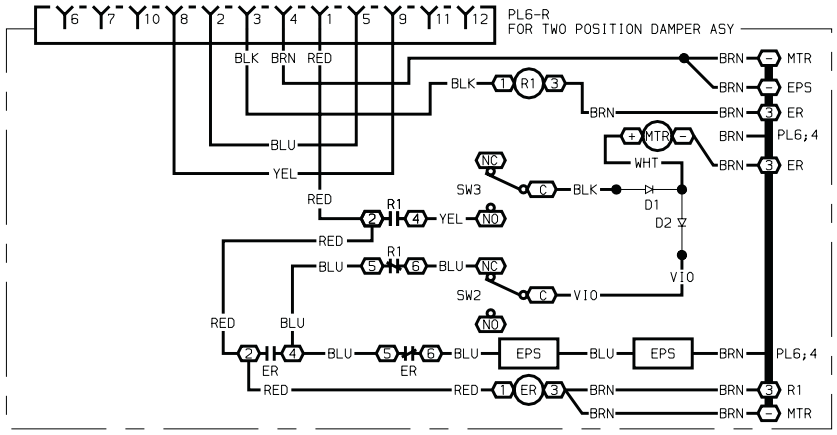
SINGLE COMPRESSOR UNITS



See Legend on page 4.

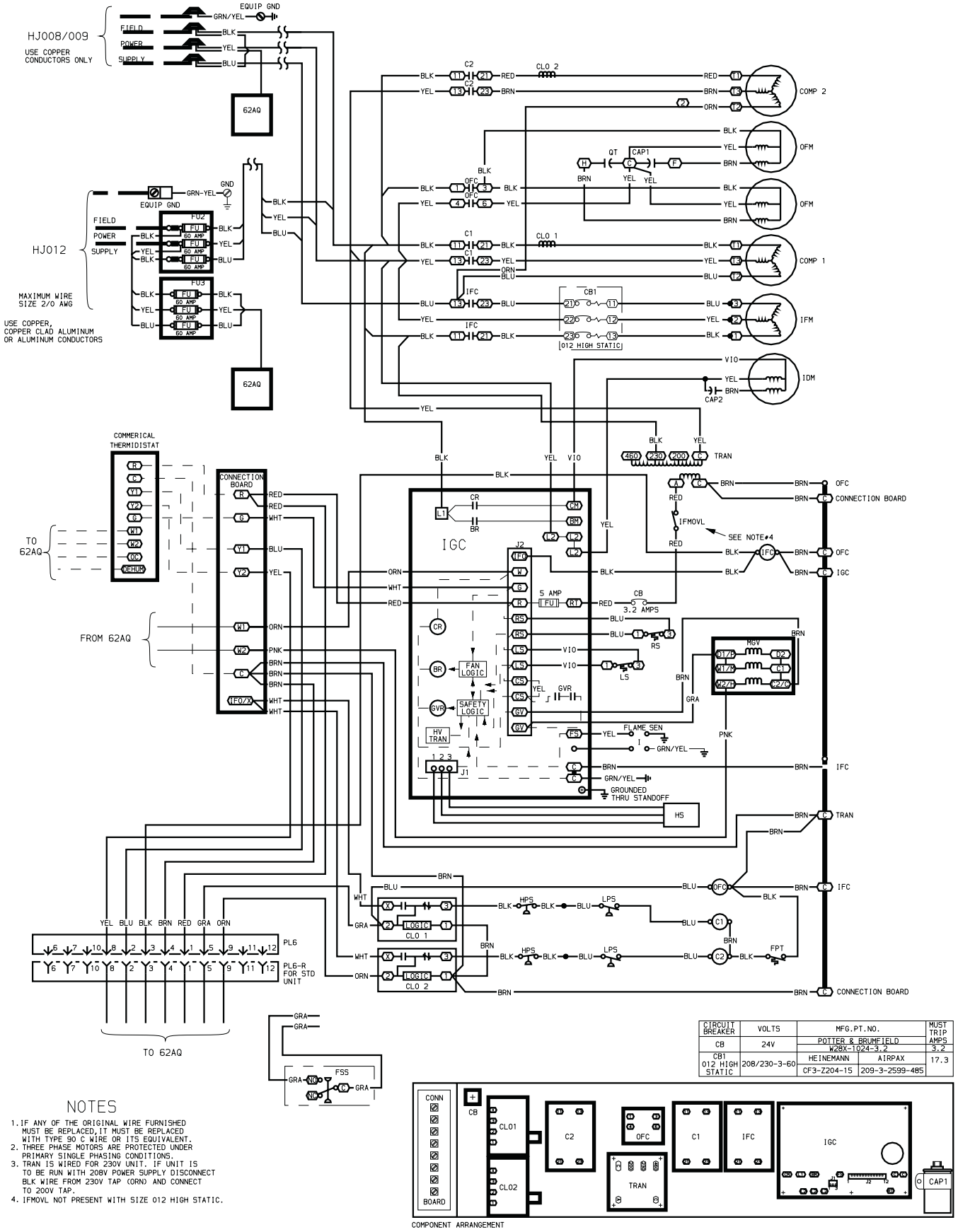
DUAL COMPRESSOR UNITS

Fig. 45 — Time Guard II Control Wiring



See Legend on page 4.

Fig. 46 — Two-Position Damper Wiring



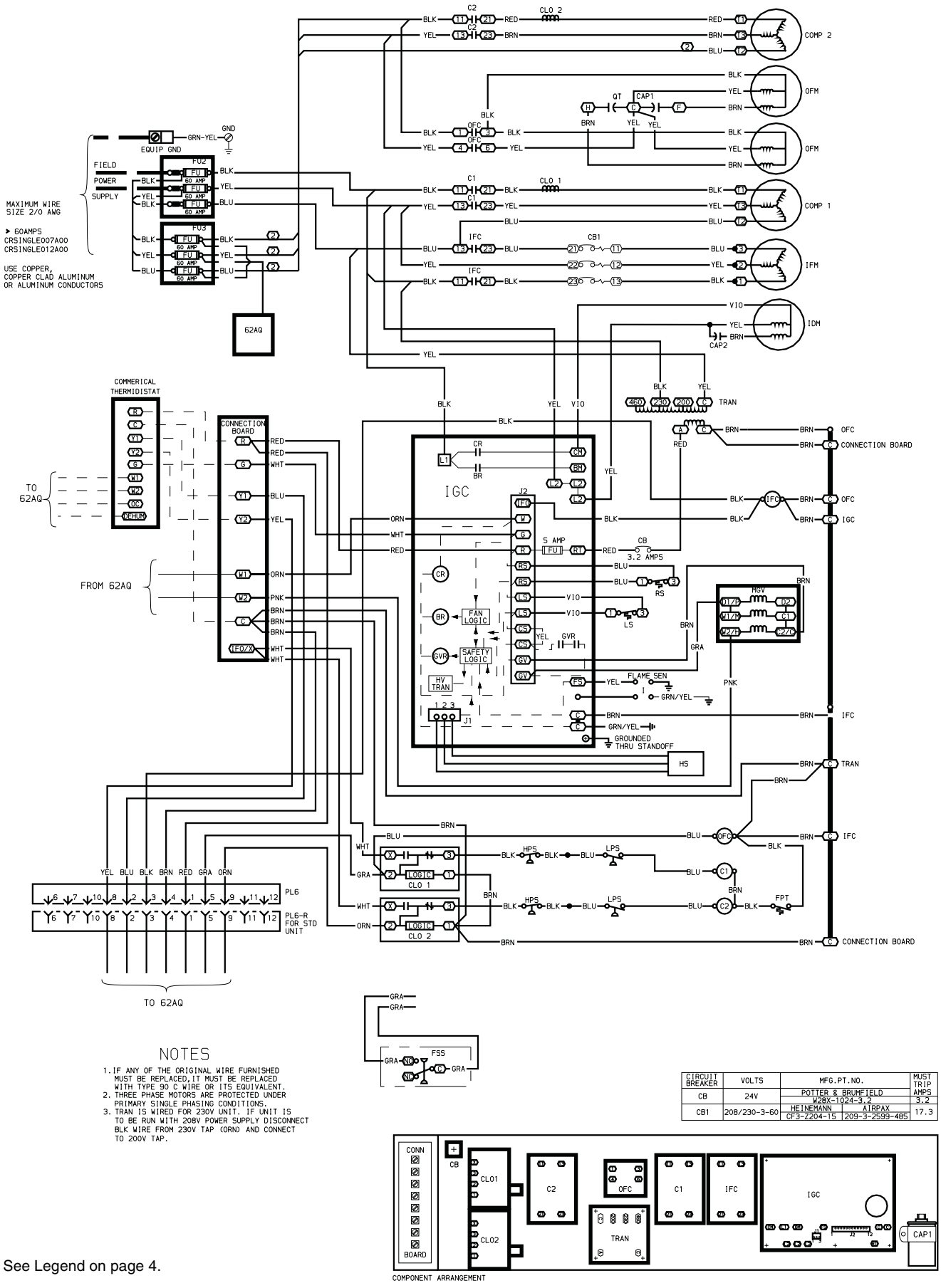
CIRCUIT BREAKER	VOLTS	MFG.PT.NO.		MUST TRIP AMPS
CB	24V	POTTER & BRUMFIELD W28X-1024-3.2		3.2
CB1 012 HIGH STATIC	208/230-3-60	HEINEMANN CF3-Z204-15	AIRPAX 209-3-2599-485	17.3

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. THREE PHASE MOTORS ARE PROTECTED UNDER PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP (ORN) AND CONNECT TO 200V TAP.
4. IFMOVL NOT PRESENT WITH SIZE 012 HIGH STATIC.

See Legend on page 4.

Fig. 47 — Factory-Installed 62AQ Energy$Recycler, 208/230-V COBRA™ Energy Recovery Units — Size 008-012



NOTES

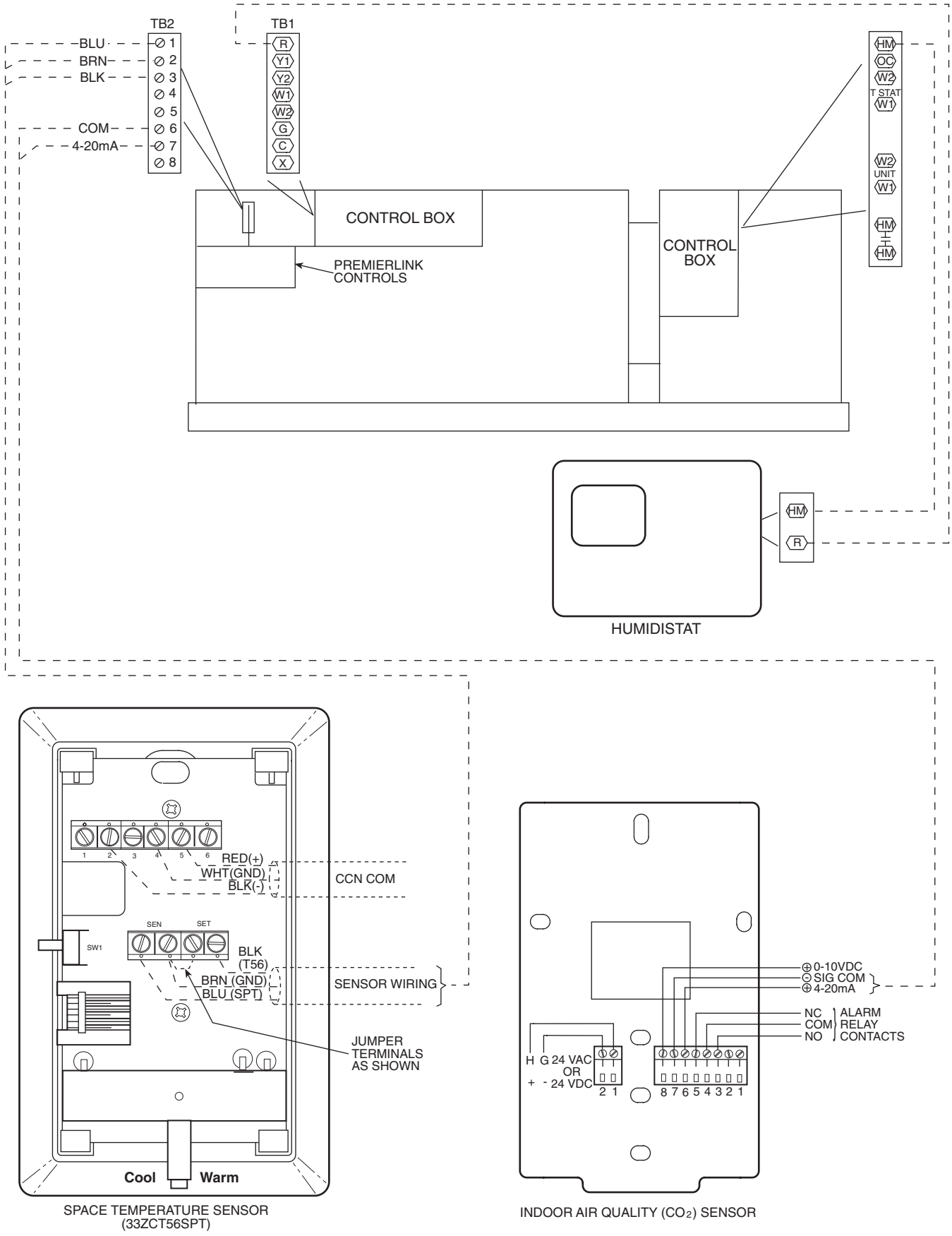
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED,IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. THREE PHASE MOTORS ARE PROTECTED UNDER PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP (ORN) AND CONNECT TO 200V TAP.

CIRCUIT BREAKER	VOLTS	MFG.PT.NO.		MUST TRIP AMPS
CB	24V	POTTER & BRUMFIELD		3.2
		W28X-1024-3.2		
CB1	208/230-3-60	HEINEMANN	AIRPAX	17.3
		CF3-Z204-15	209-3-2599-485	

COMPONENT ARRANGEMENT

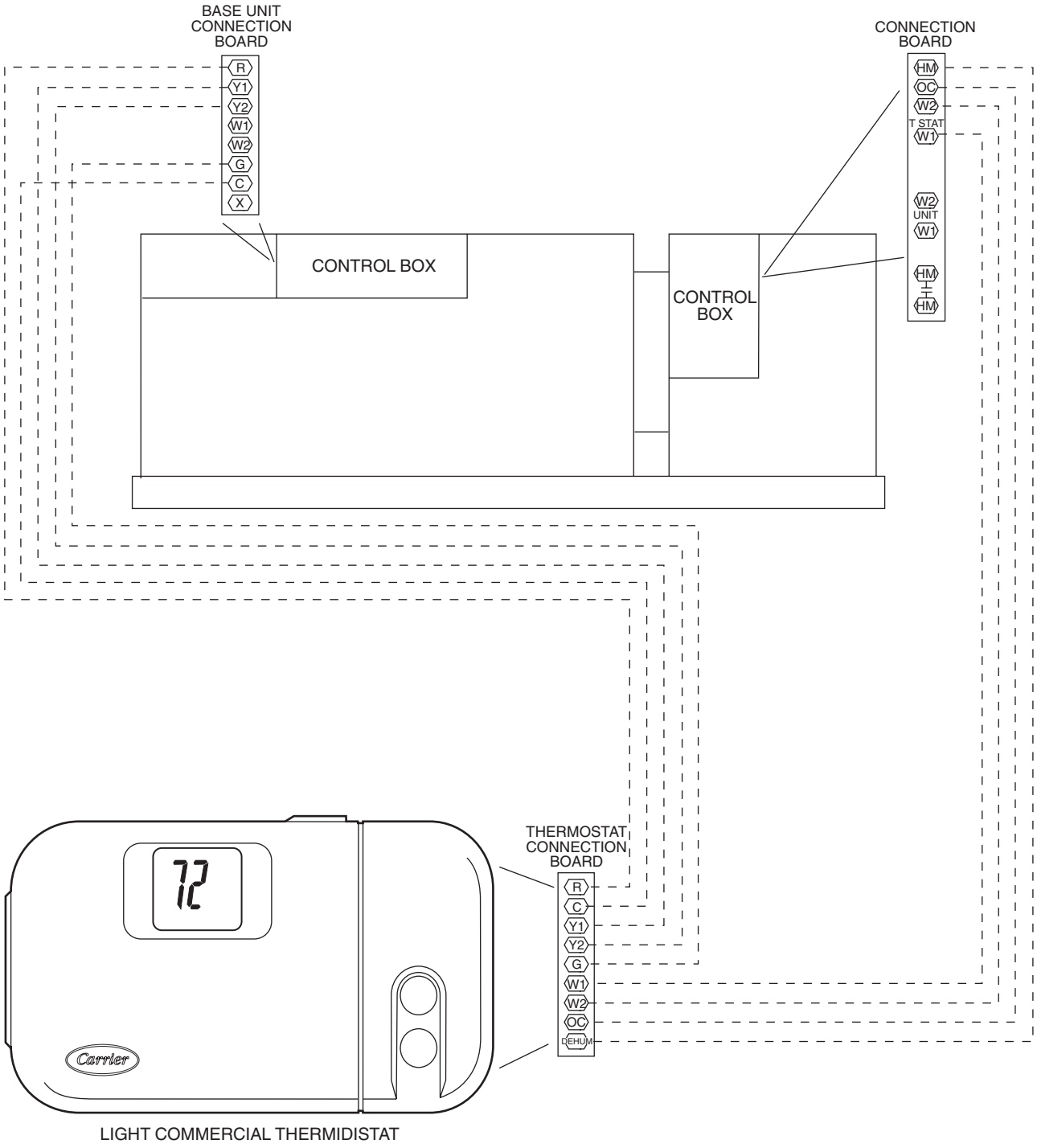
See Legend on page 4.

Fig. 48 — Factory-Installed 62AQ Energy$Recycler, 208/230-V COBRA™ Energy Recovery Unit — Size 014



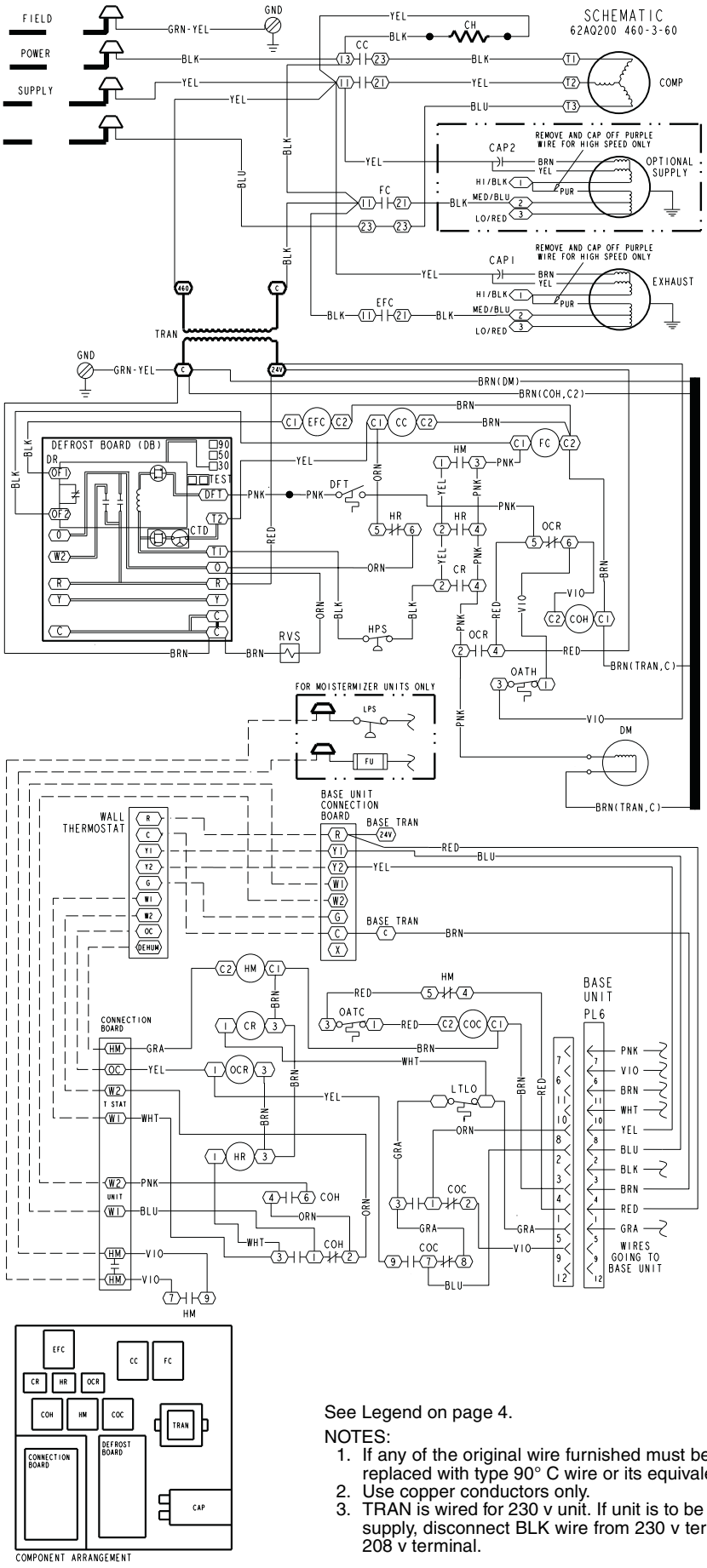
See Legend on page 4.

Fig. 49 — COBRA™ Energy Recycler — Wiring with PremierLink™ Controls



See Legend on page 4.

Fig. 50 — COBRA™ Energy Recycler — Wiring with Standard Controls



See Legend on page 4.

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
2. Use copper conductors only.
3. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v terminal and connect to 208 v terminal.

Fig. 51 — Typical Wiring Schematic for 62AQ Energy$Recycler as a Field-Installed Accessory