Carrier

Aquazone™ 50WC 007-070 Compact Water Source Heat Pumps with Puron Advance™ Refrigerant (R-454B)

Installation, Start-Up, and Service Instructions

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Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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START-UP CHECKLIST CL-1

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when servicing or repairing this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.

Understand the signal words — DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage.

It is important to recognize safety information. These are the safety alert symbols. When you see these symbols on the unit and in instructions or manuals, be alert to the potential for personal injury.







⚠ WARNING

WARNING: RISK OF FIRE

Flammable Refrigerant Used — To be repaired only by trained service personnel. DO NOT puncture refrigerant tubing.

⚠ WARNING

PERSONAL INJURY HAZARD

Do not use means to accelerate the defrosting process or to clean, unless recommended in these instructions.

⚠ WARNING

PERSONAL INJURY HAZARD

Do not pierce or burn refrigerant lines. Be aware that refrigerants may not contain an odor.

⚠ WARNING

WARNING: RISK OF FIRE

Flammable Refrigerant Used — Dispose of properly in accordance with federal or local regulations.

⚠ WARNING

WARNING: RISK OF FIRE

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

⚠ CAUTION

PERONAL INJURY HAZARD

Installation of auxiliary electric heaters in connecting ductwork must adhere to Carrier-approved models exclusively. Carrier bears no responsibility for the installation of any alternative auxiliary devices installed in the field.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation. There may be more than one disconnect switch. Lockout/tagout all disconnect locations to alert others not to restore power until work is completed.

IMPORTANT: The installation of water source heat pump units and all associated components, parts, and accessories which make up the installation shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

GENERAL

This Installation and Start-Up Instructions literature is for Aquazone™ water source heat pump systems. Water source heat pumps (WSHPs) are single-package horizontally and vertically mounted units with electronic controls designed for year-round cooling and heating.

See Fig. 1 for model number nomenclature details. See Tables 1 and 2 for unit physical data.

IMPORTANT: Read the entire instruction manual before starting installation.

PRE-INSTALLATION

INSPECTION

Upon receipt of shipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the carton or crating of each unit, and inspect each unit for damage on both the interior and exterior. Ensure the shipping company makes proper notation of any shortages or damage on all copies of the freight bill.

Concealed damage not discovered during unloading must be reported to the shipping company within 5 days of receipt of shipment.

NOTE: It is the responsibility of the purchaser to file all necessary claims with the shipping company.

STORAGE

If the equipment is not needed for immediate installation upon its arrival at the job site, it should be left in its shipping carton and stored in a clean, dry area between 50 and 95°F. Units must only be stored or moved in the normal upright position as indicated by the UP arrows on each carton at all times. If unit stacking is required, stack units as follows: vertical units less than 6 tons, no more than two high; horizontal units less than 6 tons, no more than three high. Do not stack units larger than 6 tons.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5	0	W	C	A	0	2	4	A	A	A	1	A	A	–	A

Model Series (1-2)
50 = Packaged WSHP Unit

Tier (3-4)
WC = 1-Stage (Compact)

Cabinet Configuration (5)

ORIENTATION	FILTER ACCESS	WATER CONNECTION	
		Front Left	Front Right
Horizontal	Side Filter Access	A	B
	Bottom Filter Access	C	D
Vertical	Side Filter Access	E	F

Nominal Capacity MBH (Tons) (6-8)
007 = 7 (1/2)
009 = 9 (3/4)
012 = 12 (1)
015 = 15 (1-1/4)
018 = 18 (1-1/2)
024 = 24 (2)
030 = 30 (2-1/2)
036 = 36 (3)
042 = 42 (3-1/2)
048 = 48 (4)
060 = 60 (5)
070 = 70 (6)

Airflow Configuration (9)

ORIENTATION	RETURN	DISCHARGE	MOTOR		
			PSC	CT ECM	CA ECM
Horizontal	Right	Back	A	G	N
	Right	Left	B	H	P
	Left	Back	C	J	Q
	Left	Right	D	K	R
Vertical	Right	Top	E	L	S
	Left	Top	F	M	T

Controls — Option/Transformer (10)
A = UPM/50 VA
B = UPM/75 VA
C = UPM + BE/50 VA[a]
D = UPM + BE/75 VA[a]
E = UPM + TV DDC/100 VA
G = UPM + SR/50 VA
H = UPM + SR/75 VA
J = UPM + PR/50 VA
K = UPM + PR/75 VA
L = UPM + EMS/50 VA
M = UPM + EMS/75 VA
N = UPM + BE + PR/50 VA[a]
P = UPM + BE + PR/75 VA[a]
Q = UPM + BE + SR/50 VA[a]
R = UPM + BE + SR/75 VA[a]
S = UPM + BE + SR + PR/50 VA[a]
T = UPM + BE + SR + PR/75 VA[a]
U = UPM + SR + PR/50 VA
V = UPM + SR + PR/75 VA
W = UPM + EMS+ SR/50 VA
X = UPM + EMS + SR/75 VA
Z = UPM + EMS + PR/75 VA
1 = UPM + EMS + SR+ PR/50 VA
2 = UPM + EMS + SR+ PR/75 VA
3 = UPM + EMS + BE/50VA[a]
4 = UPM + EMS + BE/75VA[a]
5 = UPM + EMS + BE + SR/50 VA[a]
6 = UPM + EMS + BE + SR/75 VA[a]
7 = UPM + EMS + BE + PR/50 VA[a]
8 = UPM + EMS + BE + PR/75 VA[a]

LEGEND
BE — Boilerless Electric Heat
CA ECM — Constant Airflow ECM
CB — Compressor Blanket
CCF — Closed Cell Foam Insulation
CO — Cooling Only
CT ECM — Constant Torque ECM
DP — Differential Pressure Flow Switch
ECM — Electronically Commutated Motor
EMS — Energy Management Switch
HGBP — Hot Gas Bypass
HGRH — Hot Gas Reheat
PR — Pump Relay
PSC — Permanent Split Capacitor
REG — Auto Flow Regulator
SCCR — Short Circuit Current Rating
SR — Compressor Status Relay
Std — Standard
TV DDC — TruVu Direct Digital Controller
ULL — Ultra Low Leak Cabinet
UPM — Unit Protection Module
VLV — 2-Way Solenoid Valve
WSE — Water Side Economizer
WSHP — Water Source Heat Pump

Design Revision (16)
A = Initial Release

Miscellaneous Options (15)
– = None
A = Waterside Economizer (WSE)[a]
B = A2L Leak Detection (LD)
C = WSE + LD[a]

Hydronic Options (14)

OPTION	WATER COIL	
	Copper	Cupro-Nickel
None	A	J
2-Way Valve (VLV)	B	K
Auto-Flow Reg. (REG)	C	L
Flow Proving Switch (DP)	D	M
VLV + REG	E	N
VLV + DP	F	P
VLV + REG + DP	G	Q
REG + DP	H	R

Sound, and IAQ Options (13)
A = None (Std insulation)
B = Closed Cell Foam Insulation (CCF)
D = Ultra Low Leak Cabinet (ULL) + 2 in. MERV 8, CCF[b]
F = 2 in. MERV8 Filter, Std Insulation
G = 2 in. MERV8 Filter, CCF
H = 2 in. MERV13 Filter, Std Insulation
J = 2 in. MERV13 Filter, CCF
K = 4 in. MERV13 Filter, Std Insulation
L = 4 in. MERV13 Filter, CCF
M = ULL + 2 in. MERV 13, CCF[b]
P = ULL + 4 in. MERV 13, CCF[b]
U = Compressor Blanket (CB), Std Insulation
V = Compressor Blanket (CB), CCF
W = CB + 2 in. MERV 8, Std Insulation
X = CB + 2 in. MERV 8, CCF
Y = CB + 2 in. MERV 13, Std Insulaton
Z = CB + 2 in. MERV 13, CCF
Y = CB + 2 in. MERV 13, Std Insulation
Z = CB + 2 in. MERV 13, CCF
1 = CB + 4 in. MERV 13, Std Insulation
2 = CB + 4 in. MERV 13, CCF
3 = ULL + CB + 2 in. MERV 8, CCF[b]
4 = ULL + CB + 2 in. MERV 13, CCF[b]
5 = ULL + CB + 4 in. MERV 13, CCF[b]

Electrical Options (12)
1 = 575/3/60
3 = 208-230/1/60
4 = 265/1/60
5 = 208-230/3/60
6 = 460/3/60
B = 208-230/1/60 with Disc.
C = 265/1/60 w/ Disc.
D = 208-230/3/60 with Disc.
E = 460/3/60 with Disc.
F = 575/3/60 with Disc.
G = 208-230/1/60, 65 kA SCCR
J = 265/1/60, 65 kA SCCR
K = 208-230/1/60, 5 kW E-Heat
L = 208-230/1/60, 7.5 kW E-Heat
M = 208-230/1/60,10 kW E-Heat
Z = 460/3/60, 65 kA SCCR

Refrigerant Circuit Options (11)

OPTION	NON-COATED AIR COIL	COATED AIR COIL
None	A	B
Hot Gas Reheat (HGRH)[a]	C	D
Cooling Only (CO)	E	F
Hot Gas Bypass (HGBP)	G	H
HGRH + HGBP[a]	N	P

NOTE(S):
a. Option card board is provided with selection of HGRH/WSE/BE options and without TruVu DDC.
b. ULL represents < 2% air leakage option.

Fig. 1 — 50WC Model Number Nomenclature

Table 1 — Physical Data — 50WC (007-024) Units

UNIT SIZE	007	009	012	015	018	024
Compressor Type (Qty 1)	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll (208/230-v 3 Phase,460-v) Rotary (208/230-v 1 Phase, 265-v)
Max Water Working Pressure (psig/kPa)[a]	400	400	400	400	400	400
FAN MOTOR AND BLOWER						
PSC Fan Motor (hp)	0.10	0.10	0.10	1/6	1/6	0.25
Constant Torque Fan Motor (hp)	0.25	0.25	0.25	0.33	0.33	0.33 (vertical 208/230-v, 265-v) 0.5 (vertical 460-v; horizontal)
Constant Airflow Fan Motor (hp)	—	—	—	—	0.33	0.33 (vertical) 0.50 (horizontal)
Blower Wheel Size (Dia. x W)	5.5 x 4.5	5.5 x 4.5	5.5 x 4.5	9 x 7	9 x 7	9 x 7
WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	0.75	0.75	0.75
Coaxial Coil Volume (gal)	0.07	0.07	0.07	0.07	0.10	0.18
ECONOMIZER OPTION WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	0.75	0.75	0.75
VERTICAL CABINET						
Refrigeration Charge (oz)	17	20	18.5	19	23	30 Scroll (208/230-v 3 Phase, 460-v) 29 Rotary (208/230-v 1 Phase, 265-v)
Air Coil Dimensions (H x W)	10 x 14	10 x 14	10 x 14	15 x 16.5	15 x 16.5	20 x 16.5
Standard Filter - 1" MERV 5 Throwaway (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Optional Filter - 2" MERV 8 or 13 (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Optional Filter - 4" MERV 13 (L x H)	12 x 16	12 x 16	12 x 16	17 x 19	17 x 19	18 x 22
Weight - Operating (lb)	106	112	117	146	170	191
Weight - Shipping (lb)	134	139	144	174	195	218
HORIZONTAL CABINET						
Refrigeration Charge (oz)	18	18.5	18.5	21	24	28 Scroll (208/230-v 3 Phase, 460-v) 30 Rotary (208/230-v 1 Phase, 265-v)
Air Coil Dimensions (H x W)	10 x 14	10 x 14	10 x 14	14 x 20	14 x 20	15 x 22
Standard Filter - 1" Throwaway (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Optional Filter - 2" MERV 8 or 13 (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Optional Filter - 4" MERV 13 (L x H)	10 x 16	10 x 16	10 x 16	16 x 24	16 x 24	17 x 25
Weight - Operating (lb)	98	106	114	147	155	183
Weight - Shipping (lb)	130	135	143	169	189	214

NOTE(S):

a. 300 psig when unit is built with the factory installed 2-way solenoid valve option.

LEGEND

FPT — Female Pipe Thread
PSC — Permanent Split Capacitor

Table 2 — Physical Data — 50WC (030-070) Units

UNIT SIZE	030	036	042	048	060	070
Compressor Type (Qty 1)	Scroll (208-230-v 3 Phase, 460-v) Rotary (208-230-v 1 Phase, 265-v)	Scroll	Scroll	Scroll	Scroll	Scroll
Max Water Working Pressure (psig/kPa)[a]	400	400	400	400	400	400
FAN MOTOR AND BLOWER						
PSC Fan Motor (hp)	0.25 (vertical) 0.50 (horizontal)	0.75 (vertical 208/230-v, 460-v) 0.50 (vertical 265-v; horizontal)	0.75	0.75	0.75	0.75
Constant Torque Fan Motor (hp)	0.33 (vertical 208/230-v, 265-v) 0.50 (vertical 460-v; horizontal)	0.75	0.75	0.75	1.00	1.00
Constant Airflow Fan Motor (hp)	0.33 (vertical) 0.5 (horizontal)	0.75	0.75	0.75	1.00	1.00
Blower Wheel Size (Dia. x W)	9 x 7	10 x 8	10 x 8	10 x 8	11 x 9	11 x 9
WATER CONNECTION SIZE (FPT) (in.)	0.75	0.75	0.75	1.00	1.00	1.00
Coaxial Coil Volume (gal)	0.32	0.32	0.32	0.37	0.49	0.49
Economizer Option Water Connection Size (FPT) (in.)	0.75	0.75	0.75	1.00	1.00	1.00
VERTICAL CABINET						
Refrigeration Charge (oz)	28 Scroll (208/230-v 3 Phase, 460-v) 35 Rotary (208/230-v 1 Phase, 265-v)	34	38	44	48	57
Air Coil Dimensions (H x W)	20 x 16.5	24 x 16.5	28 x 21	28 x 21	28 x 21	40 x 27
Standard Filter - 1" MERV 5 Throwaway (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x3 0	20 x 27 (2)
Optional Filter - 2" MERV 8 or 13 (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x 30	20 x 27 (2)
Optional Filter - 4" MERV 13 (L x H)	18 x 22	19 x 27	24 x 30	24 x 30	24 x 30	20 x 27 (2)
Weight - Operating (lb)	191	215	228	228	275	338
Weight - Shipping (lb)	218	241	254	253	299	362
HORIZONTAL CABINET						
Refrigeration Charge (oz)	31 Scroll (208/230-v 3 Phase, 460-v) 29 Rotary (208/230-v 1 Phase, 265-v)	32	37	44	50	55
Air Coil Dimensions (H x W)	15 x 22	16 x 27.5	16 x27.5	18 x 31	18 x 31	18 x 42
Standard Filter - 1" Throwaway (L x H)	17 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Optional Filter - 2" MERV 8 or 13 (L x H)	17 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Optional Filter - 4" MERV 13 (L x H)	1 x 25	18 x 30	18 x 30	20 x 34	20 x 34	20 x 22 (2)
Weight - Operating (lb)	187	205	213	267	285	296
Weight - Shipping (lb)	221	250	247	292	315	345

NOTE(S):

a. 300 psig when unit is built with the factory installed 2-way solenoid valve option.

LEGEND

FPT — Female Pipe Thread
PSC — Permanent Split Capacitor

INSTALLATION

Step 1 — Check Jobsite

Installation, operation and maintenance instructions are provided with each unit. Before unit start-up, read all manuals and become familiar with the unit and its operation. Thoroughly check out the system before operation. Complete the inspections and instructions listed below to prepare a unit for installation. See Tables 1 and 2 for unit physical data.

HORIZONTAL UNITS

Horizontal units are designed for indoor installation only. Be sure to allow adequate space around the unit for installation and servicing. See Fig. 2 for overall unit dimensions.

VERTICAL UNITS

Vertical units are designed for indoor installations only. Vertical units are typically installed in a floor-level closet or a small mechanical room, Be sure to allow adequate space around the unit for installation and servicing. See Fig. 3 for overall unit dimensions.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

To avoid equipment damage, do not use these units as a source of heating or cooling during the construction process. The mechanical components and filters used in these units quickly become clogged with construction dirt and debris which may cause system damage.

INSTALLATION GUIDELINES (ALL UNITS)

1. Be sure the location chosen for unit installation provides ambient temperatures maintained above freezing.
2. Be sure the installation location is isolated from sleeping areas, private offices and other acoustically sensitive spaces.
3. Be sure unit is mounted at a height sufficient to provide an adequate slope of the condensate lines. If an appropriate slope cannot be achieved, a field-supplied condensate pump may be required.
4. On horizontal units, allow adequate room below the unit for condensate drain trap and do not locate the unit above supply piping.
5. Provide sufficient space for duct connection. Do not allow the weight of the ductwork to rest on the unit.
6. Provide adequate clearance for filter replacement and drain pan cleaning. Do not allow piping, conduit, etc. to block filter access. See Fig. 4.
7. Provide sufficient access to allow maintenance and servicing of the blower and blower motor, compressor, refrigerant circuit, controls, and coils. See Fig. 4.
8. For units with free return (non-ducted), provide adequate space for proper return airflow. For units installed in closets or mechanical rooms, provide sufficient return grill area for proper airflow.
9. Provide ready access to water valves and fittings, and screwdriver access to unit side panels, discharge collar, and all electrical connections.
10. Where access to side panels is limited, pre-removal of the control box side mounting screws may be necessary for future servicing.
11. For units that are installed in enclosed spaces (such as furred in closets or behind finished ceilings), provide access panels to allow for the installation, maintenance, service, and removal of the unit.

IMPORTANT: It is the installing contractor's responsibility to ensure that all equipment is installed with proper access for service, start-up, installation of accessories, configuration of control and other components, and equipment removal in accordance with Carrier's recommended service clearances and installation instructions. Please refer to the Carrier Commercial WSHP Warranty Statement (document number 04-570008-01) for details on warranty exclusions regarding equipment, access, removal and clearances.

Step 2 — Check Unit

Upon receipt of equipment at the jobsite, inspect the carton or crating of each unit, and inspect each unit for damage on both the interior and exterior. Note any damage and contact your local equipment sales office.

⚠ CAUTION

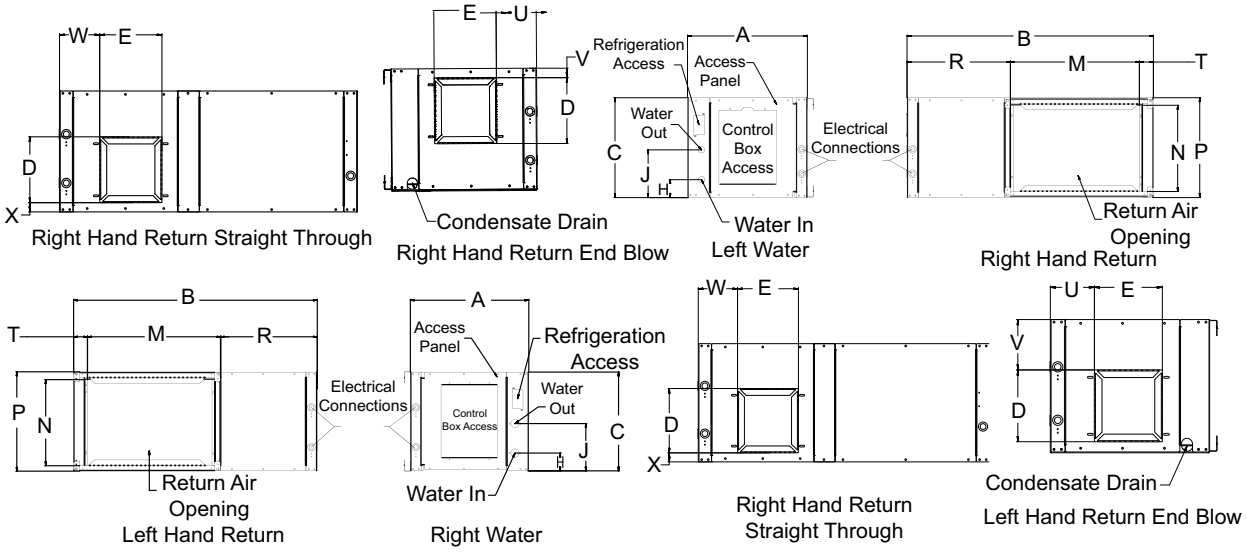
EQUIPMENT DAMAGE HAZARD

DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move units in an upright position. Tilting units on their sides may cause equipment damage.

INSPECT UNIT

To prepare the unit for installation, complete the procedures listed below:

1. Verify the correct unit has been received. Check the unit capacity (tonnage), voltage, orientation, and configuration.
2. Compare the electrical data on the unit nameplate with to verify the jobsite power feed (voltage, amperage, MCA) and power protection (MOCP).
3. Remove the unit packaging, keeping the unit attached to the shipping pallet. Do not destroy packaging. Save for re-installation on the unit if the unit will not be fully installed.
4. Open a unit access panel. Verify the refrigerant tubing is free of kinks or dents, and that it does not touch other unit components.
5. Check the water piping and piping connections to make sure they are free from defects, kinks, dents, and appear to be water tight. Verify system operating water pressure.
6. Inspect the blower assembly. Verify the blower has not come lose during shipping. Verify clearance between the blower wheel and the blower housing. Verify free blower rotation.
7. Inspect all electrical connections. Be sure connections are clean and tight at the terminals.
8. Check unit controls. If factory-installed TruVu™ controller is not provided, verify field provided thermostat is available. If TruVu™ DDC controller is provided, verify proper sensor has been provided and a commissioning interface will be available.
9. Horizontal Units Only: Locate the hanging bracket kit located in the compressor compartment.
10. Remove any shipping brackets from the unit.

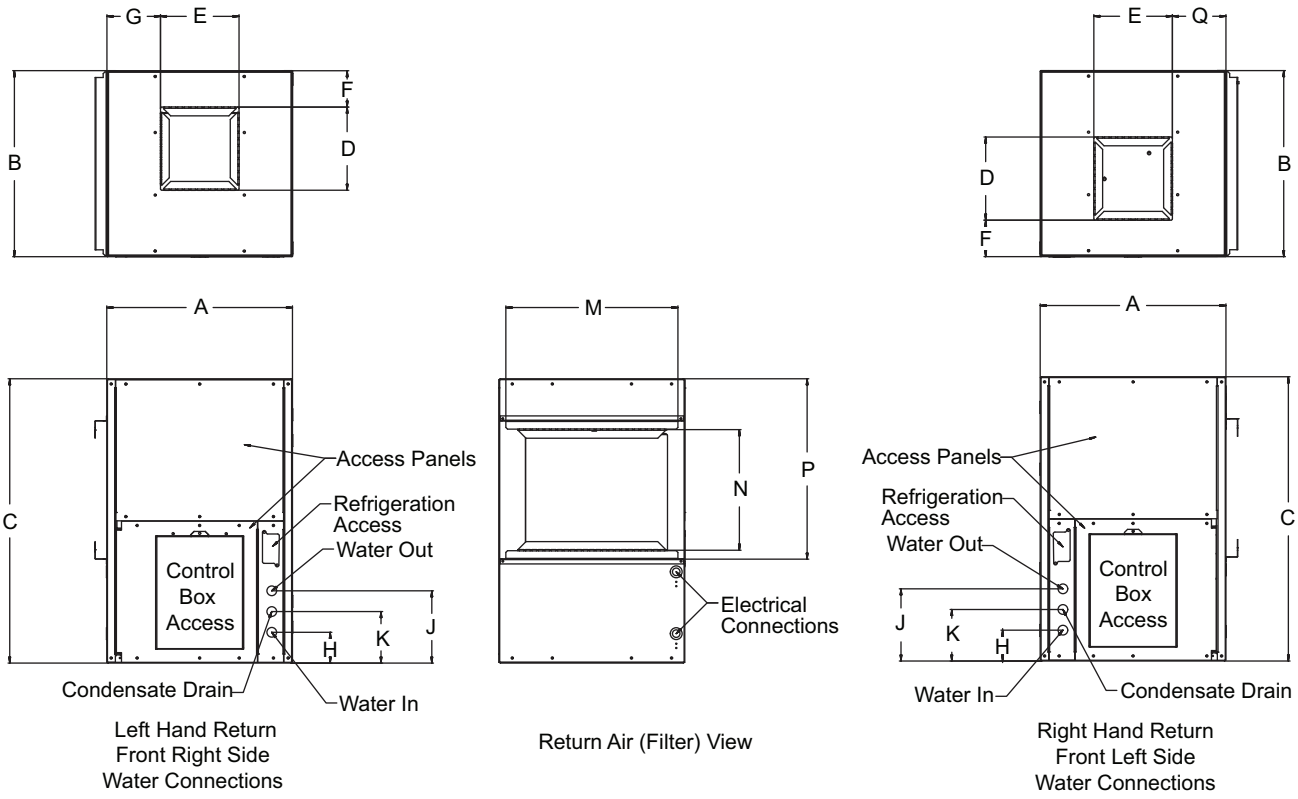


50WC UNIT[a,b,c,d]	A	B	C	D	E	H	J	M	N	P	R	T	U		V		W		X		CONDENSER WATER CONNECTIONS	RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE	CONDENSATE DRAIN CONNECTION
	Width	Depth	Height	Discharge Height	Discharge Width	Water Inlet	Water Outlet	R/A Duct Width	R/A Duct Flange Height	Filter Rack Height	Cabinet Front to Filter Rack	Cabinet End to Filter Rack	Side to Discharge (Left Return End Blow)	Side to Discharge (Right Return End Blow)	Top to Discharge (Left Return End Blow)	Top to Discharge (Right Return End Blow)	End to Discharge (Left Straight Through)	End to Discharge (Right Straight Through)	Bottom to Discharge (Left Straight Through)	Bottom to Discharge (Right Straight Through)			
007	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
009	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
012	19.0	33	11.5	4.00	6.50	3.75	9.0	16.00	8.50	11.00	16.00	1.00	4.75	4.75	5.75	1.50	4.75	4.75	5.75	1.50	3/4" FPT	10 x 16	3/4" FPT
015	21.5	44	17.0	9.75	9.25	3.25	8.5	23.25	14.00	16.00	18.50	0.10	6.00	6.00	5.75	1.50	6.00	6.00	5.75	1.50	3/4" FPT	16 x 24	3/4" FPT
018	21.5	44	17.0	9.75	9.25	3.25	8.5	23.25	14.00	16.00	18.50	0.10	6.00	6.00	5.75	1.50	6.00	6.00	5.75	1.50	3/4" FPT	16 x 24	3/4" FPT
024	21.5	44	18.0	9.75	9.25	3.25	8.5	24.25	15.25	17.00	17.25	0.10	6.00	6.00	6.75	1.50	6.00	6.00	6.75	1.50	3/4" FPT	17 x 25	3/4" FPT
030	21.5	44	18.0	9.75	9.25	3.25	8.5	24.25	15.25	17.00	17.25	0.10	6.00	6.00	6.75	1.50	6.00	6.00	6.75	1.50	3/4" FPT	17 x 25	3/4" FPT
036	21.5	47	19.0	11.25	10.50	3.25	8.5	29.25	16.00	18.25	14.50	1.00	5.75	5.75	6.00	1.75	5.75	5.75	6.00	1.75	3/4" FPT	18 x 30	3/4" FPT
042	21.5	47	19.0	11.25	10.50	3.25	8.5	29.25	16.00	18.25	14.50	1.00	5.75	5.75	6.00	1.75	5.75	5.75	6.00	1.75	3/4" FPT	18 x 30	3/4" FPT
048	24.0	54	21.0	11.25	10.50	3.25	8.0	33.25	18.00	20.00	18.00	1.00	5.25	5.25	7.75	1.50	5.25	5.25	7.75	1.50	1" FPT	20 x 34	3/4" FPT
060	24.0	54	21.0	12.50	11.75	3.25	8.0	33.25	18.00	20.00	18.00	1.00	5.25	5.25	7.75	1.50	5.25	5.25	7.75	1.50	1" FPT	20 x 34	3/4" FPT
070	24.0	62	21.0	12.50	11.75	3.25	8.5	43.50	18.00	20.00	15.00	1.00	5.50	5.50	7.00	1.50	5.50	5.50	7.00	1.50	1" FPT	20 x 22 (Qty 2)	3/4" FPT

NOTE(S):

a. Specifications subject to change without notice.
b. All dimensions within +/– 0.25".
c. Overall unit dimensions do not in 50WC filter rack or duct flanges.
d. Unit sizes 015-070 can be field converted between end blow and straight through supply air configurations.

Fig. 2 — 50WC 007-070 Horizontal Unit Dimensions



Left Hand Return
Front Right Side
Water Connections

Return Air (Filter) View

Right Hand Return
Front Left Side
Water Connections

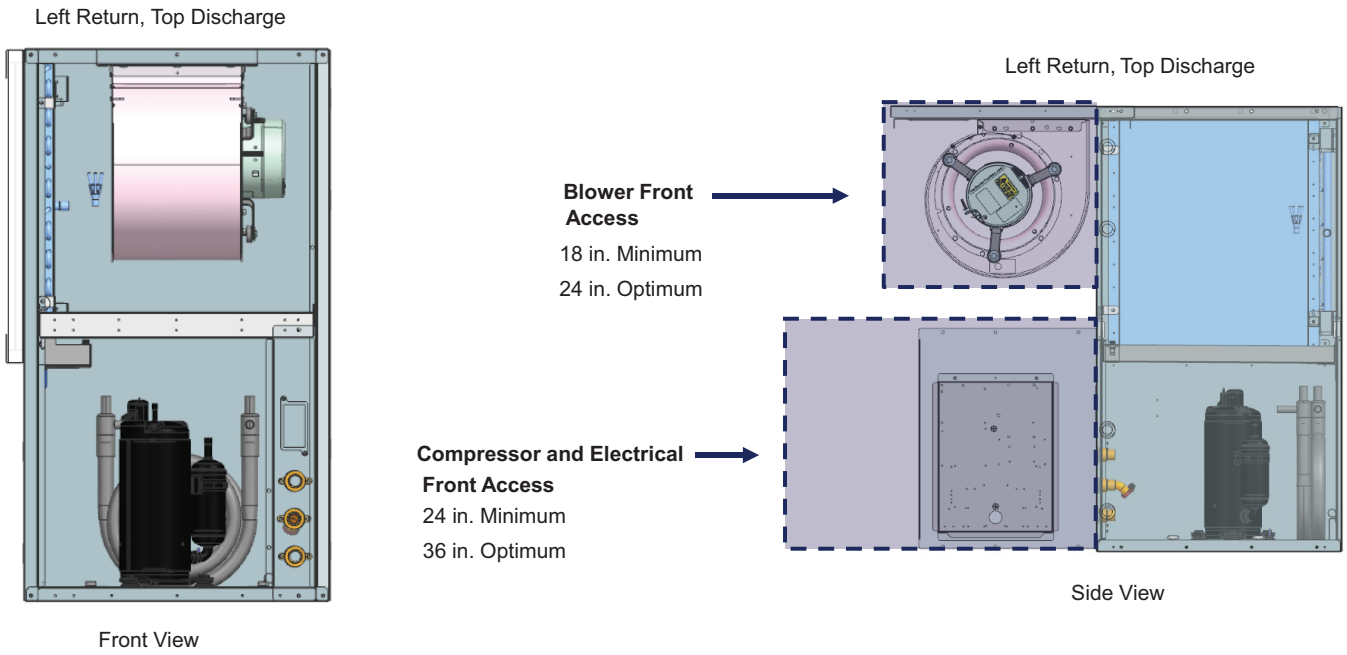
50WC UNIT SIZE [a,b,c,d]	VERTICAL DIMENSIONS (in.)[e,f,g]																	
				Discharge					Water									
	Width	Depth	Hight	Depth	Width	Cabinet Edge to Discharge (Left Hand Return)	Cabinet Edge to Discharge (Right Hand Return)	Cabinet Edge to Discharge (Left Hand Return)	Inlet	Outlet	Condensate Drain	R/A Duct Width	R/A Duct Flange Height	Filter Rack Height[h,i,j]	Cabinet Edge To Discharge (Right Hand Return)	Condenser Water Connections (in.)	Recommended Replacement Nom. Filter (Qty)	Condensate Drain Connections (in.)
	A	B	C	D	E	F	F	G	H	J	K	M	N	P	Q			
007	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
009	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
012	19.0	19.0	23.0	4.00	6.50	6.50	2.64	5.50	3.50	8.5	6.00	14.75	10.00	12.00	5.50	3/4 FPT	12 x 16	3/4 FPT
015	21.5	21.5	33.0	9.75	9.00	4.25	4.25	6.25	3.00	8.5	6.00	17.50	15.25	17.25	6.25	3/4 FPT	17 x 19	3/4 FPT
018	21.5	21.5	33.0	9.75	9.00	4.25	4.25	6.25	3.00	8.5	6.00	17.50	15.25	17.25	6.25	3/4 FPT	17 x 19	3/4 FPT
024	21.5	21.5	39.0	9.75	9.00	4.25	4.25	6.25	3.25	8.5	5.75	18.00	20.00	22.25	6.25	3/4 FPT	28 x 22	3/4 FPT
030	21.5	21.5	39.0	9.75	9.00	4.25	4.25	6.25	3.25	8.5	5.75	18.00	20.00	22.25	6.25	3/4 FPT	28 x 22	3/4 FPT
036	21.5	21.5	39.0	11.50	10.50	2.25	2.25	6.50	3.25	8.5	5.75	18.25	25.00	27.00	6.50	3/4 FPT	19 x 27	3/4 FPT
042	21.5	26.0	44.0	11.25	10.50	5.75	5.75	5.50	3.25	8.5	5.75	24.00	28.25	30.75	5.50	3/4 FPT	24 x 30	3/4 FPT
048	24.0	26.0	44.0	11.25	10.50	5.00	5.00	6.75	3.00	8.5	5.75	24.00	28.25	30.00	6.75	1 FPT	24 x 30	3/4 FPT
060	24.0	26.0	44.0	12.50	11.75	4.25	4.25	6.25	3.25	8.0	5.75	24.00	28.25	30.00	6.00	1 FPT	24 x 30	3/4 FPT
070	24.0	33.0	58.0	12.50	11.75	9.00	9.00	6.25	3.00	8.5	5.75	24.25	38.25	32.00	6.00	1 FPT	20 x 27 (2)	3/4 FPT

NOTE(S):

a. Front of the unit is determined by the location of the control box panel.
b. When DDC controller is installed, control box panel extends 3.0 in. beyond the front of the unit.
c. When disconnect switch is installed, increase width by 2.0 in. beyond side of unit.
d. The local electric codes may require 36 in. or more clearance at the electrical control box.
e. Specifications subject to change without notice.
f. Overall unit dimensions do not include filter rack or duct flanges.
g. All dimensions within ± 0.125 in. Dimensions in inches.
h. The 1 in. filter rack extends 1.25 in. beyond the side of the unit (not including flange).
i. The 2 in. filter rack extends 3.0 in. beyond the side of the unit (not including flange). This filter rack is 4-sided with a filter access door on both ends (front/back) and can accept either a 1 in. or 2 in. filter.
j. The 4 in. filter rack extends 4.75 in. beyond the side of the unit (not including flange). This filter rack is 4-sided with a filter access door on both ends (front/back) and can accept either a 2 in. or 4 in. filter.

Fig. 3 — 50WC 007-070 Vertical Unit Dimensions

Vertical Unit



Horizontal Unit

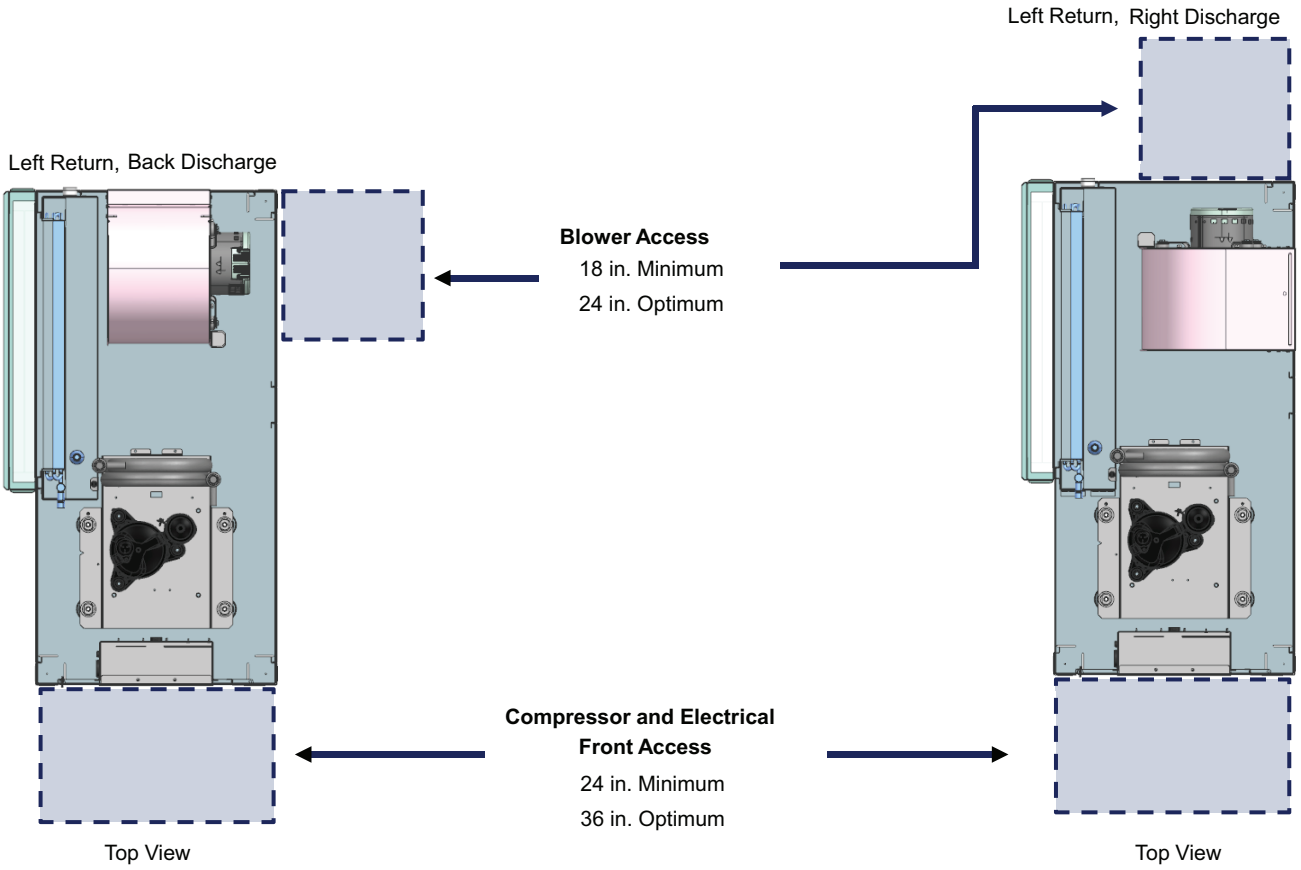


Fig. 4 — 50WC Service Clearance

Step 3 — Locate Unit

Locate the unit in an indoor area that allows easy removal of the filter and access panels, and has enough room for service personnel to perform maintenance or repair. Provide sufficient room to make fluid, electrical, and duct connection(s). If the unit is located in a confined space such as a closet, provisions must be made for return air to freely enter the space. See minimum service clearances in Fig. 4.

Horizontal units condensate drains are not internally trapped. Allow room below the unit base for horizontal models for an adequate condensate trap.

These units are not approved for outdoor installation; therefore, they must be installed inside the structure being conditioned. Do not locate units in areas that are subject to freezing. Units must be installed in conditioned space that is not subject to extremes of temperature or humidity to avoid cabinet sweating and/or equipment damage.

PROTECTION

> IMPORTANT: Care must be taken to prevent the introduction of dust, pain, debris, or chemicals into the unit, which can cause damage to the unit, delay start-up, and may impact unit longevity.

Do not use units for temporary heating, air conditioning or ventilation during construction or remodeling, especially when plastering, sanding or painting or when replacing carpet or flooring. Dust and debris can clog the coil and blower. Chemical vapors can lead to formicary corrosion and damage the coil. Ensure adequate ventilation and debris collection during construction or remodeling.

Once the units are properly positioned on the jobsite, cover them with either a shipping carton, vinyl film, or an equivalent protective covering. Cap open ends of pipes stored on the jobsite. This precaution is especially important in areas where painting, plastering, or spraying of fireproof material, etc. is not yet complete. Foreign material that accumulates within the units can prevent proper start-up and require costly clean-up operations. Before installing any of the system components, be sure to examine each pipe, fitting, and valve, and remove any dirt or foreign material found in or on these components.

Step 4 — Mount the Unit

DUCT FLANGES

The unit heat pumps feature foldout return and supply air duct flanges. These fold-out flanges allow the heat pumps to more easily fit through doorways and other tight spaces, and also prevent damage in shipping and handling.

It is recommended that all fold-out flanges be folded out once the heat pump is installed to ensure that return and supply airflow is not obstructed. These flanges can be easily folded using standard or duckbill pliers. Once folded out these flanges can be used to support light ductwork loads. See Fig. 5.

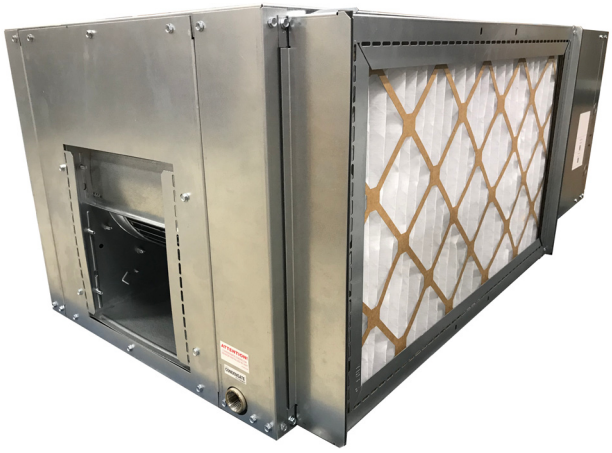


Fig. 5 — Foldout Flanges

HORIZONTAL UNITS

While horizontal units may be installed on any level surface strong enough to hold their weight, they are typically suspended above a ceiling by threaded rods. All horizontal units come with a Hanging Bracket Kit to facilitate suspended unit mounting. Hanging brackets are installed as shown in Fig. 6.

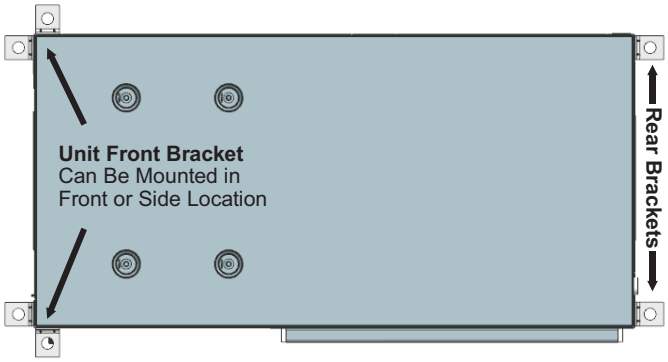


Fig. 6 — Hanging Bracket Locations

The hanging bracket kit includes the following:

- (5) brackets
- (5) rubber vibration isolators
- (8) screws no. 10 x 1/2 in.
- (10) Bolts 1/4 – 28 x 1/2 in. hex bolt (not used on this model)

The following additional materials are needed and must be field supplied:

- threaded rod (3/8 in. maximum diameter)
- hex nuts
- washers (1-3/4 in. minimum O.D.)

Hanging Bracket Installation

1. Remove and discard factory-provided screws from location where hanging brackets will be installed. See Fig. 7.

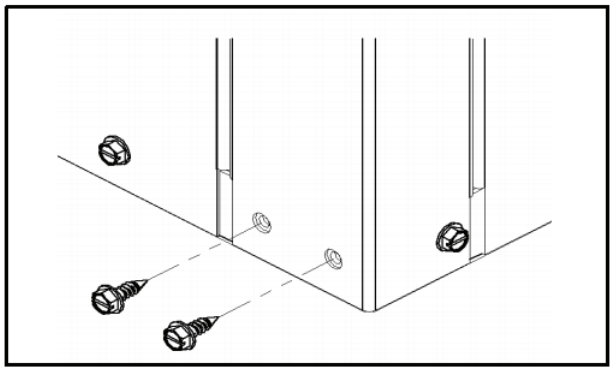


Fig. 7 — Removing Factory Screws

2. Mount 4 brackets to unit corner post using the bolts provided in the kit, as shown in Fig. 8. DO NOT re-use the screws removed from the unit during Step 1 to mount the hanging brackets on the unit.

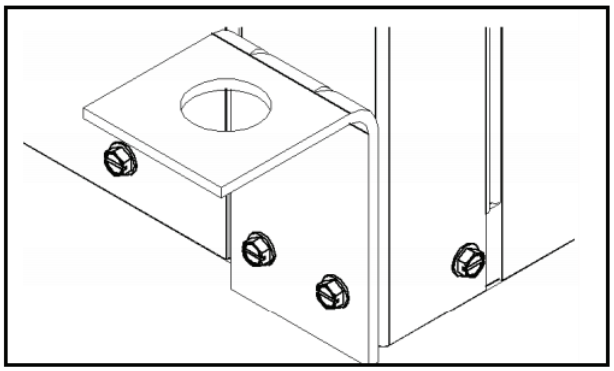


Fig. 8 — Mounting Brackets

3. Install rubber grommet on the bracket as shown in Fig. 9.
4. Hang the unit and assemble the field-provided threaded rod, nuts, and washers on the brackets as shown in Fig. 9.

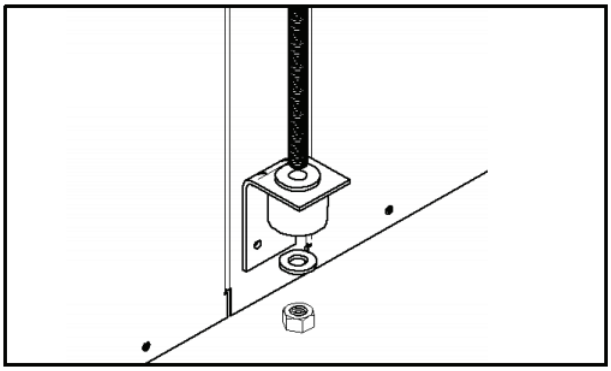


Fig. 9 — Hanging the Unit

IMPORTANT: Units larger than six tons include an integral angle iron frame with mounting holes present.

Horizontal units installed above the ceiling must conform to all local codes. An auxiliary drain pan, if required by code, should be at least 4 in. larger than the bottom of the heat pump.

Plumbing connected to the heat pump must not come in direct contact with joists, trusses, walls, etc. Some applications require an attic floor installation of the horizontal unit. In this case the unit should be set in a full size secondary drain pan on top of a vibration absorbing mesh.

The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing mesh. In both cases, a 3/4 in. drain connected to this secondary pan should be run to an eave at a location that will be noticeable.

⚠ CAUTION

If the unit is located in a crawl space, the bottom of the unit must be at least 4-in. above grade to prevent flooding of the electrical parts due to heavy rains.

VERTICAL UNITS

Vertical units should be mounted level on a vibration absorbing pad slightly larger than the unit base in order to minimize vibration transmission from the unit to the building structure (see Fig. 10). It is generally not necessary to anchor the unit unless required by local code.

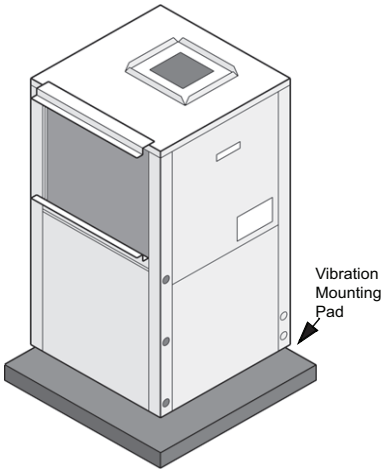


Fig. 10 — Mounting Vertical Units

All major service access for the vertical models is from the front side of the unit. When installing the unit in a confined space such as a closet, ensure the service panel screws are accessible, the filter can be replaced without damage and water and electrical connections are accessible. For models with a unit-mounted disconnect switch, make sure the switch can be easily seen and operated.

To reduce sound transmission, units should be installed using flexible electrical conduit and hose kits. Care should be taken to ensure no part of the unit cabinet is touching part of the building structure. For ducted return applications, a flexible duct connection should be used. Mount the unit on a vibration absorption pad slightly larger than the entire base to minimize vibration transmission. It is not necessary to mount the unit on the floor.

Step 5 — Check Duct System

All units are provided with a return air duct flange and supply air duct connections. Refer to unit dimensional drawings (Fig. 2 and 3) for physical dimensions of the collar and flange.

A flexible connector is recommended for supply and return air duct connections on metal duct systems. All metal ducting should be insulated with a minimum of 1 in. duct insulation to avoid heat loss or gain and prevent condensate from forming during the cooling operation. Application of the unit to uninsulated ductwork is not recommended as the unit's performance will be adversely affected.

⚠ CAUTION

Do not connect discharge ducts directly to the blower outlet. The factory filter rack should be left in place on a free return system.

If the unit will be installed in a new installation with new ductwork, the installation should be designed using current ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) procedures for duct sizing. If the unit will be connected to an existing duct system, a check should be made to assure that the duct system has the capacity to handle the air required for the unit application. If the duct system is too small, larger ductwork must be installed. Be certain to check for existing leaks and repair. The duct system and all diffusers should be sized to handle the designed airflow quietly. To maximize sound attenuation of the unit blower, the supply and return air plenums should be insulated. There should be no direct straight air path through the air grille into the heat pump. The return air inlet to the heat pump must have at least one 90-degree turn away from the space return air grille. If air noise or excessive airflow are a problem, the blower speed can be changed to a lower speed to reduce airflow.

HORIZONTAL SUPPLY AIR CONFIGURATION CONVERSION

The supply air location can be field converted from end blow (back discharge) to straight through or vice-versa.

NOTE: Blower configuration changes should be done prior to unit being installed in the final location.

To convert the supply air direction, follow the steps below (Fig. 11-13):

1. If the unit is connected to power, shut Off the unit and disconnect switch or circuit breaker.
2. Locate the motor access panel (A). Remove the three screws at top and the three screws at the bottom of the panel. Remove the access panel and place it aside.
3. Be careful not to damage the refrigerant coils or any other internal unit components.
4. Locate blower panel (B). Remove the three screws from top and the three screws from bottom of the panel. Leave the blower panel in place on the base pan.
5. Locate access panel corner post (C). Remove the four screws from top and the four screws from the bottom. Remove the corner post and set it aside.
6. Locate blower support bracket (D). Remove the one screw and set it aside.
7. Move blower panel (B) with blower to desired location, rotating it 180 degrees. See Fig. 13. The motor power and control harness can be unplugged to facilitate blower relocation.
8. Reinstall access panel corner post (C) using the eight screws previously removed.
9. Fasten blower panel (B) using the six screws previously removed.
10. Reinstall and fasten blower support bracket (D) using the one screw previously removed.
11. Reattach the motor power and control harness if disconnected earlier.
12. Reinstall and fasten motor access panel (A) using the six screws previously removed.

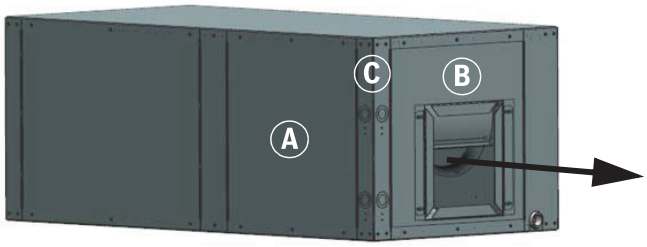


Fig. 11 — End Blow (back discharge) Orientation

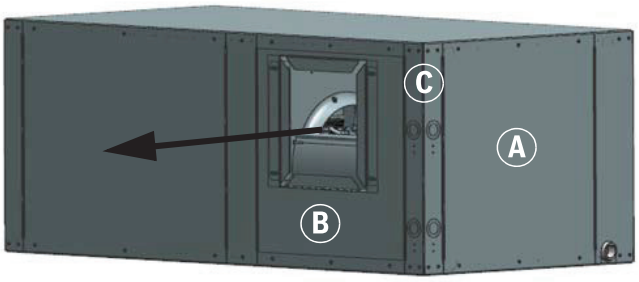


Fig. 12 — Straight Through Orientation

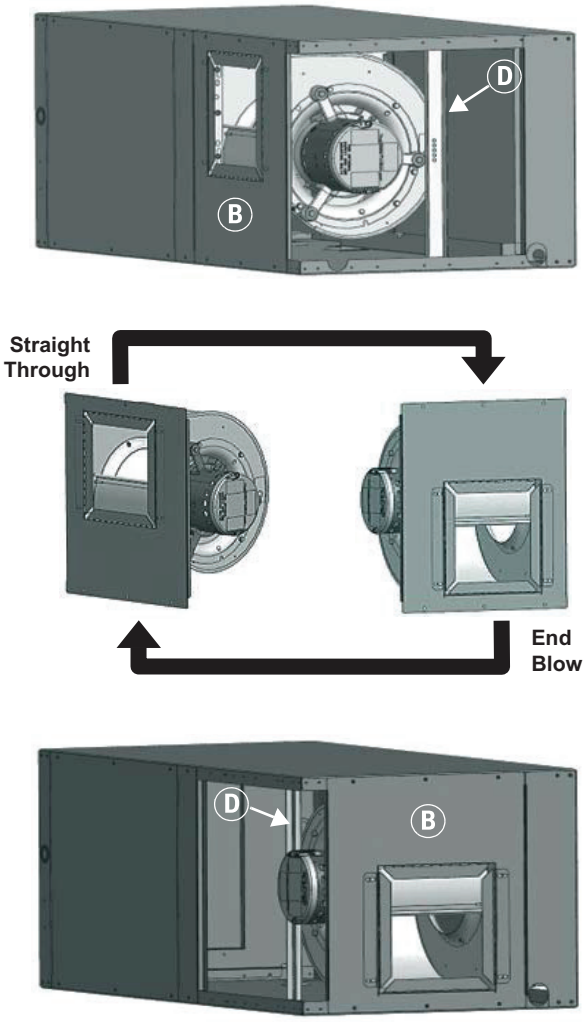


Fig. 13 — Blower Configuration

Step 6 — Install Condensate Drain

All units include a condensate drain pan under the evaporator coil. Units with waterside economizer have an additional condensate drain pan under the economizer coil.

HORIZONTAL UNITS

A drain line must be connected to each drain pain and pitched away from the unit a minimum of 1/8 in. per foot to allow the condensate to flow away from the unit.

This connection must be in conformance with local plumbing codes. A trap must be installed in the condensate line to ensure free condensate flow. (Heat pumps are not internally trapped.) A vertical air vent is sometimes required to avoid air pockets. See Fig. 14.

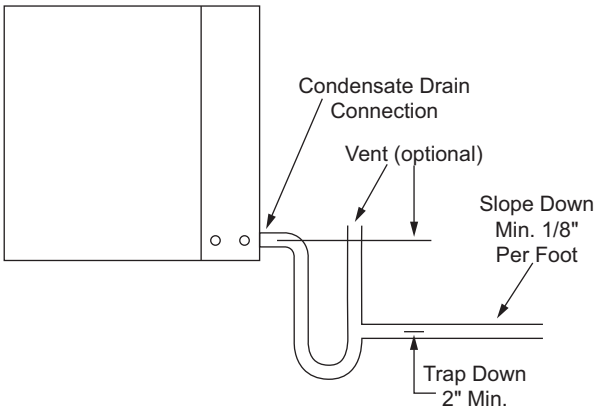


Fig. 14 — Condensate Drain (Horizontal Units)

The depth of the trap depends on the amount of positive or negative pressure on the drain pan. A second trap must not be included. The horizontal unit should be pitched approximately 1/4 in. towards the drain in both directions, to facilitate condensate removal. See Fig. 15.

VERTICAL UNITS.

Vertical configuration units are internally trapped from the factory. a second trap must NOT be included.

Step 7 — Pipe Connections

All WSHP units use female pipe thread fittings for water connections. Refer to Fig. 2 and 3 for connection sizes. When making piping connections, consider the following:

- Use a backup wrench when making screw connections to unit to prevent internal damage to piping.
- Insulation may be required on piping to avoid condensation in the case where fluid in loop piping operates at temperatures below dew point of adjacent air.
- Flexible hoses should be used between the unit and the rigid system to avoid possible vibration.
- Supply and return piping must be as large as the unit connections on the heat pump. Never use flexible hoses of a smaller inside diameter than that of the water connections on the unit.
- Piping systems that contain steel pipes or fittings may be subject to galvanic corrosion. Dielectric fittings may be used to isolate the steel parts of the system to avoid galvanic corrosion.
- Teflon tape thread sealant is recommended when connecting water piping connections to the units to ensure against leaks and possible heat exchanger fouling.
- Balancing valve and supply/return manual isolation valves must be provided for unit isolation and water flow balancing.
- Ensure unit receives the appropriate water flow during operation. To verify the correct water flow, utilize pressure/temperature ports positioned at the supply and return water lines. Refer to Fig. 52 and 53 on under “System Flow” on page 62 for water pressure drop across water to refrigerant heat exchanger.
- Avoid all plastic to metal threaded fittings due to the potential to leak. Use a flange fitted substitute.
- Route piping to avoid service access areas to unit.
- Flush the piping system prior to operation to remove dirt and foreign materials from the system.

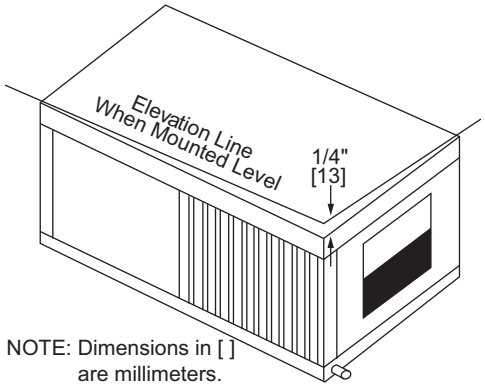


Fig. 15 — Pitched Unit

WATER QUALITY GUIDELINES

Units are supplied with either a copper or optional cupronickel coaxial water coil. Copper is adequate for ground water that is not high in mineral content.

Carrier recommends proper testing to assure the well water quality is suitable for use with water source equipment. In conditions anticipating moderate scale formation or in brackish water a cupronickel heat exchanger is recommended. Additional considerations:

- A secondary heat exchanger (plate frame between the unit and the open cooling tower or open loop ground water system) may also be used. It is imperative that all air is eliminated from the closed loop side of the heat exchanger to prevent condenser fouling.
- In all applications, the quality of the water circulated through the heat exchanger must fall within the ranges listed in Table 3, Water Quality Guidelines. Consult a local water treatment firm, independent testing facility, or local water authority for specific recommendations to maintain water quality within the published limits.

⚠ CAUTION

Water piping exposed to extreme, low ambient temperatures is subject to freezing.

Table 3 — Water Quality Guidelines

CONDITION	HX MATERIAL[a]	CLOSED RECIRCULATING[b]	OPEN LOOP AND RECIRCULATING WELL[c]		
Scaling Potential — Primary Measurement **Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.**					
pH/Calcium Hardness Method	All	N/A	pH < 7.5 and Ca Hardness, <100 ppm		
Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)					
Scaling indexes should be calculated at 150°F for direct use and at 90°F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	N/A	6.0 to 7.5 If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	N/A	–0.5 to +0.5 If <=0.5 minimize steel pipe use. Based upon 150°F direct well, 85°F indirect well HX.		
Iron Fouling					
Iron Fe^{2+} (Ferrous) (bacterial iron potential)	All	N/A	<0.2 ppm (Ferrous) If Fe^{2+} (ferrous) >0.2 ppm with pH 6 to 8, O_2<5 ppm, check for iron bacteria.		
Iron Fouling	All	N/A	<0.5 ppm of Oxygen Above this level deposition will occur.		
Corrosion Prevention[d]					
pH	All	6 - 8.5 Monitor/treat as needed.	6 to 8.5 Minimize steel pipe below 7 and no open tanks with pH <8.		
Hydrogen Sulfide (H_2S)	All	N/A	<0.5 ppm At H_2S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are acceptable to <0.5 ppm.		
Ammonia Ion as Hydroxide, Chloride, Nitrate and Sulfate Compounds	All	N/A	<0.5 ppm		
Maximum Chloride Levels			Maximum allowable at maximum water temperature.		
			50°F (10°C)	75°F (24°C)	100°F (38°C)
	Copper	N/A	<20 ppm	NR	NR
	Cupronickel	N/A	<150 ppm	NR	NR
	304 SS	N/A	<400 ppm	<250 ppm	<150 ppm
	316 SS	N/A	<1000 ppm	<550 ppm	<375 ppm
	Titanium	N/A	>1000 ppm	>550 ppm	>375 ppm
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm “sandfree” for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		
Brackish	All	N/A	Use cupronickel heat exchanger when concentrations of calcium or sodium chloride are greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)		

NOTE(S):

a. Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.
b. Closed recirculating system is identified by a closed pressurized piping system.
c. Recirculating open wells should observe the open recirculating design considerations.
d. If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.
Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water registers a pH of 7.0.
To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

LEGEND

HX — Heat Exchanger
N/A — Design Limits Not Applicable Considering Recirculating Potable Water
NR — Application Not Recommended
SS — Stainless Steel

INSTALLING SUPPLY AND RETURN HOSE KIT

Follow these piping guidelines:

1. Install a drain valve at the base of each supply and return riser to facilitate system flushing.
2. Install shutoff/balancing valves and unions at each unit to permit unit removal for servicing.
3. Place strainers at the inlet of each system circulating pump.
4. Select the proper hose length to allow slack between connection points. Hoses may vary in length by +2% to –4% under pressure.
5. Do not exceed the minimum bend radius for the hose selected. Refer to Table 4. Exceeding the minimum bend radius may cause the hose to collapse, which reduces water flow rate. Install an angle adapter to avoid sharp bends in the hose when the radius falls below the required minimum.

NOTE: Piping must comply with all applicable codes.

Table 4 — Metal Hose Minimum Bend Radii

HOSE DIAMETER (in.)	MINIMUM BEND RADII (in.)
1/2	3-9/16
3/4	3-9/16
1	4-3/8

Insulation is not required on loop water piping except where the piping runs through unheated areas or outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient. Insulation is required if loop water temperature drops below the dew point.

IMPORTANT: Do not bend or kink supply lines or hoses.

Pipe joint compound is not necessary when Teflon threaded tape is pre-applied to hose assemblies or when flared-end connections are used. If pipe joint compound is preferred, use compound only in small amounts on the male pipe threads of the fitting adapters. Prevent sealant from reaching the flared surfaces of the joint.

NOTE: When anti-freeze is used in the loop, assure that it is compatible with Teflon tape or pipe joint compound employed.

Maximum allowable torque for brass fittings is 30 ft-lb. If a torque wrench is not available, tighten finger-tight plus one quarter turn. Tighten steel fittings as necessary.

Optional pressure-rated hose assemblies designed specifically for use with Carrier units are available. Similar hoses can be obtained from alternate suppliers. Supply and return hoses are fitted with swivel-joint fittings at one end to prevent kinking during installation.

⚠ CAUTION

Backup wrench is required when tightening water connections to prevent water line damage. Failure to use a backup wrench could result in equipment damage.

Male adapters secure hose assemblies to the unit and risers. Install hose assemblies properly and check them regularly to avoid system failure and reduced service life. See Fig. 16.

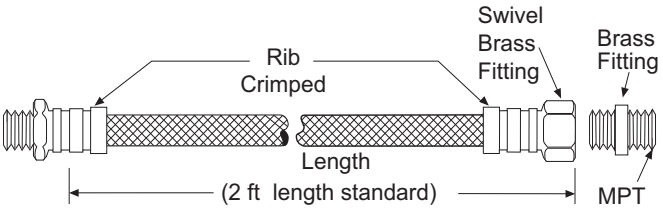


Fig. 16 — Supply/Return Hose Kit

UNITS WITH BOILERLESS HEAT CONTROL

Units with Boilerless Heat Control include entering water temperature sensor that is factory installed on the incoming water piping.

Refer to Step 9 on page 24 for Boilerless control configuration for units with Option Card (units without factory installed TruVu™ controller).

Refer to the TruVu™ controller section of this manual for configuring the entering water temperature set point for boilerless control operation for units with TruVu™ controller.

UNITS WITH WATERSIDE ECONOMIZER

The optional waterside economizer (pre-cooling coil) is factory installed and piped internally, in series with the condenser water circuit (see Fig. 17). A diverting 3-way motorized valve, entering water temperature sensor, drain pan with condensate overflow switch, and factory controls are included with the option.

The remote bulb (EWT sensor) is shipped internal to the unit and requires to be installed on straight incoming water line to the unit/3-way diverting valve (see Fig. 17). Care should be taken not to dent the bulb or mis-calibration may occur. The remote sensing bulb must be installed on a straight section of uninsulated pipe that provides a good measurement of the entering water temperature. It is recommended to insulate the sensing bulb after installation for better water temperature sensing.

When unit is shipped with economizer option, the economizer drain must be connected to a separate trap. Follow the same steps for the economizer drain as described for evaporator condensate drain Step 6 on page 14.

Refer to Step 9 on page 24 for Economizer configuration for units with Option Card (units without factory installed TruVu™ controller).

Refer to the TruVu™ controller section of this manual for configuring the entering water temperature set point for economizer operation for units with TruVu™ DDC controller.

See Tables 1 and 2 for connection sizes. Refer to the unit's performance report for economizer performance and additional water and air pressure drop.

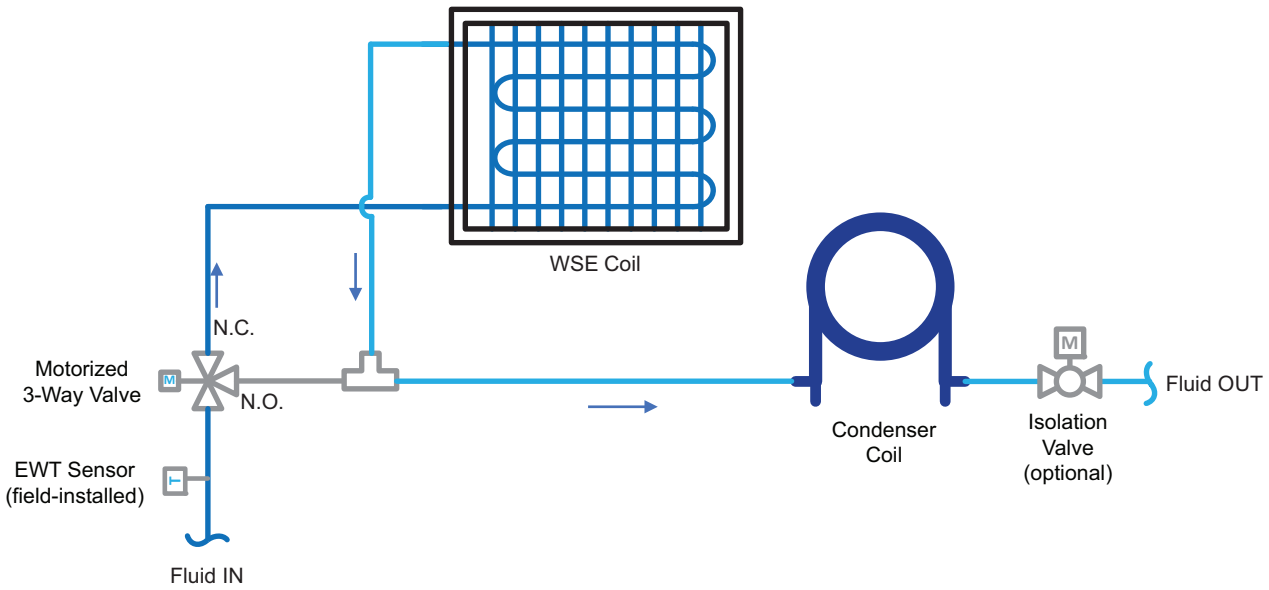


Fig. 17 — Waterside Economizer Diagram

Step 8 — Wire Field Power Supply

See Fig. 18-24 starting on page 23 for low voltage, control wiring.

See Fig. 25-48 starting on page 29 for typical wiring diagrams. See Tables 5-11 for additional electrical data. Please refer to the unit wiring diagram attached to the control panel for field installation.

⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ CAUTION

All power connections must be properly torqued to avoid the risk of overheating.

HIGH VOLTAGE WIRING

All field-installed wiring must comply with the National Electric Code as well as all applicable local codes. Refer to the unit electrical data on the unit nameplate for wire and branch circuit protection sizing. Supply power voltage and phasing should match the required voltage and phasing shown on the unit nameplate. Operating the unit below the minimum voltage, above the maximum voltage or with incorrect phasing can result in poor system performance or damage to the heat pump. All field wiring should be installed by qualified and trained personnel. Refer to the unit wiring diagram for field connection requirements.

Power wiring to the heat pump should be enclosed in flexible conduit to minimize the transmission of vibration from the unit cabinet to the building.

For heat pumps with unit mounted disconnect switches, field power should be connected to the marked terminals on the disconnect switch. For heat pumps without unit-mounted disconnect switches (except units with dual power supply), power is connected to the line (L) side of the compressor contactor and the ground lug in the unit electrical box.

For units with the 65 kA SCCR option, the power supply must be connected to the fuse block located in a dedicated fuse box.

460-v heat pumps with constant airflow motors require five power supply wires: the standard three high-voltage wires, the ground wire, and a neutral wire. These units employ a 265-v motor that requires power from one phase of the 460-v supply and the neutral wire.

Units with a factory-installed electric heater feature have a single-point power connection and can serve as emergency or auxiliary electric heat.

⚠ CAUTION

The power supply ground wire should never be used as a neutral wire.

Transformer Settings for 208/230-v Units

As factory built, all 208/230-v units are wired for 230-v operation. For jobsites with a 208-v power supply, the primary leads on the unit transformer will need to be changed from 230-v to 208-v. Refer to the unit wiring diagram for details.

Table 5 — 50WC without Electric Heat — PSC (Standard) Blower Motor Heat Electrical Data

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	Hp			
007	Vertical/Horizontal	208-230/1/60	197/253	1	2.9	15.0	1.12	0.10	4.0	4.7	15
		265/1/60	238/292	1	2.2	12.0	1.00	0.10	3.2	3.8	15
009	Vertical/Horizontal	208-230/1/60	197/253	1	3.3	20.0	1.12	0.10	4.4	5.3	15
		265/1/60	238/292	1	2.7	19.0	1.00	0.10	3.7	4.4	15
012	Vertical/Horizontal	208-230/1/60	197/253	1	4.7	27.0	1.12	0.10	5.8	6.9	15
		265/1/60	238/292	1	3.9	23.0	1.00	0.10	4.9	5.9	15
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	1.10	0.17	6.9	8.4	15
		265/1/60	238/292	1	4.7	28.0	0.85	0.17	5.6	6.7	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	1.10	0.17	8.4	10.2	15
		265/1/60	238/292	1	5.8	31.0	0.85	0.17	6.7	8.1	15
024	Vertical/Horizontal	208-230/1/60	197/253	1	9.6	58.0	1.80	0.25	11.4	13.8	20
		265/1/60	238/292	1	7.6	36.0	1.60	0.25	9.2	11.1	15
		208-230/3/60	197/253	1	7.7	59.9	1.80	0.25	9.5	11.4	15
		460/3/60	414/506	1	3.8	32.4	0.90	0.25	4.7	5.7	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	1.80	0.25	10.5	12.6	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	4.40	0.50	13.1	15.2	20
	Vertical	265/1/60	238/292	1	10.9	71.7	1.60	0.25	12.5	15.2	25
	Horizontal	265/1/60	238/292	1	10.9	71.7	3.30	0.50	14.2	16.9	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	1.80	0.25	10.1	12.2	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	4.40	0.50	12.7	14.8	20
	Vertical	460/3/60	414/506	1	5.1	38.1	0.90	0.25	6.0	7.3	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	1.80	0.50	6.9	8.2	15
036	Vertical	208-230/1/60	197/253	1	16.7	93.5	4.40	0.75	21.1	25.2	40
	Horizontal	208-230/1/60	197/253	1	16.7	93.5	4.40	0.50	21.1	25.2	40
	Vertical	265/1/60	238/292	1	13.5	90.8	3.30	0.50	16.8	20.1	30
	Horizontal	265/1/60	238/292	1	13.5	90.8	3.30	0.50	16.8	20.1	30
	Vertical	208-230/3/60	197/253	1	12.2	97.5	4.40	0.75	16.6	19.6	30
	Horizontal	208-230/3/60	197/253	1	12.2	97.5	4.40	0.50	16.6	19.6	30
	Vertical	460/3/60	414/506	1	5.8	44.3	2.80	0.75	8.6	10.0	15
	Horizontal	460/3/60	414/506	1	5.8	44.3	1.80	0.50	7.6	9.0	15
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	4.40	0.75	19.1	22.8	35
		208-230/3/60	197/253	1	12.2	102.8	4.40	0.75	16.6	19.6	30
		460/3/60	414/506	1	5.8	50.0	2.80	0.75	8.6	10.0	15
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	4.40	0.75	21.7	26.0	40
		208-230/3/60	238/292	1	12.2	120.4	4.40	0.75	16.6	19.6	30
		460/3/60	197/253	1	6.4	50.0	2.80	0.75	9.2	10.8	15
		575/3/60	518/632	1	5.1	41.0	2.60	0.75	7.7	9.0	15
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	5.50	0.75	31.1	37.6	60
		208-230/3/60	238/292	1	18.6	155.0	5.50	0.75	24.1	28.7	45
		460/3/60	197/253	1	8.3	58.1	2.80	0.75	11.1	13.1	20
		575/3/60	518/632	1	7.7	47.8	2.60	0.75	10.3	12.2	15
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	5.50	0.75	33.1	40.0	60
		208-230/3/60	238/292	1	19.2	156.5	5.50	0.75	24.7	29.5	45
		460/3/60	197/253	1	9.0	74.8	2.80	0.75	11.8	14.0	20
		575/3/60	518/632	1	7.7	47.8	2.60	0.75	10.3	12.2	15

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Table 6 — 50WC without Electric Heat — Constant Torque ECM Blower Motor Electrical Data

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	Hp			
007	Vertical/Horizontal	208-230/1/60	197/253	1	2.9	15.0	2.3	0.25	5.2	5.9	15
		265/1/60	238/292	1	2.2	12.0	2.3	0.25	4.5	5.1	15
009	Vertical/Horizontal	208-230/1/60	197/253	1	3.3	20.0	2.3	0.25	5.6	6.5	15
		265/1/60	238/292	1	2.7	19.0	2.3	0.25	5.0	5.7	15
012	Vertical/Horizontal	208-230/1/60	197/253	1	4.7	27.0	2.3	0.25	7.0	8.1	15
		265/1/60	238/292	1	3.9	23.0	2.3	0.25	6.2	7.2	15
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	2.8	0.33	8.6	10.1	15
		265/1/60	238/292	1	4.7	28.0	2.6	0.33	7.3	8.5	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	2.8	0.33	10.1	11.9	15
		265/1/60	238/292	1	5.8	31.0	2.6	0.33	8.4	9.9	15
024	Vertical	208-230/1/60	197/253	1	9.6	58.0	2.8	0.33	12.4	14.8	20
	Horizontal	208-230/1/60	197/253	1	9.6	58.0	4.1	0.50	13.7	16.1	25
	Vertical	265/1/60	238/292	1	7.6	36.0	2.6	0.33	10.2	12.1	15
	Horizontal	265/1/60	238/292	1	7.6	36.0	3.6	0.50	11.2	13.1	20
	Vertical	208-230/3/60	197/253	1	7.7	59.9	2.8	0.33	10.5	12.4	20
	Horizontal	208-230/3/60	197/253	1	7.7	59.9	4.1	0.50	11.8	13.7	20
	Vertical	460/3/60	414/506	1	3.8	32.4	2.1	0.50	5.9	6.9	15
	Horizontal	460/3/60	414/506	1	3.8	32.4	2.1	0.50	5.9	6.9	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	2.8	0.33	11.5	13.6	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	4.1	0.50	12.8	14.9	20
	Vertical	265/1/60	238/292	1	10.9	71.7	2.6	0.30	13.5	16.2	20
	Horizontal	265/1/60	238/292	1	10.9	71.7	3.6	0.50	14.5	17.2	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	2.8	0.33	11.1	13.2	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	4.1	0.50	12.4	14.5	20
	Vertical	460/3/60	414/506	1	5.1	38.1	2.1	0.50	7.2	8.5	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	2.1	0.50	7.2	8.5	15
036	Vertical/Horizontal	208-230/1/60	197/253	1	16.7	93.5	6.0	0.75	22.7	26.8	40
		265/1/60	238/292	1	13.5	90.8	4.9	0.75	18.4	21.7	35
		208-230/3/60	197/253	1	12.2	97.5	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	5.8	44.3	3.2	0.75	9.0	10.4	15
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	6.0	0.75	20.7	24.4	35
		208-230/3/60	197/253	1	12.2	102.8	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	5.8	50.0	3.2	0.75	9.0	10.4	15
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	6.0	0.75	23.3	27.6	40
		208-230/3/60	197/253	1	12.2	120.4	6.0	0.75	18.2	21.2	30
		460/3/60	414/506	1	6.4	50.0	3.2	0.75	9.6	11.2	15
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	7.6	1.00	33.2	39.7	60
		208-230/3/60	197/253	1	18.6	155.0	7.6	1.00	26.2	30.8	45
		460/3/60	414/506	1	8.3	58.1	4.0	1.00	12.3	14.3	20
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	7.6	1.00	35.2	42.1	60
		208-230/3/60	197/253	1	19.2	156.5	7.6	1.00	26.8	31.6	50
		460/3/60	414/506	1	9.0	74.8	4.0	1.00	13.0	15.2	20

LEGEND

Hp — Horsepower
FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Table 7 — 50WC without Electric Heat — Constant Airflow ECM Blower Motor Electrical Data[a]

UNIT SIZE	CONFIGURATION	V/Ph/Hz	VOLTAGE MIN/MAX	COMPRESSOR			BLOWER MOTOR		TOTAL UNIT FLA	MCA	MOCP
				Qty	RLA	LRA	FLA	HP			
015	Vertical/Horizontal	208-230/1/60	197/253	1	5.8	32.0	4.4	0.33	10.2	11.7	15
		265/1/60	238/292	1	4.7	28.0	4.7	0.33	9.4	10.6	15
018	Vertical/Horizontal	208-230/1/60	197/253	1	7.3	39.0	4.4	0.33	11.7	13.5	20
		265/1/60	238/292	1	5.8	31.0	4.7	0.33	10.5	12.0	15
024	Vertical	208-230/1/60	197/253	1	9.6	58.0	4.4	0.33	14.0	16.4	25
	Horizontal	208-230/1/60	197/253	1	9.6	58.0	5.0	0.50	14.6	17.0	25
	Vertical	265/1/60	238/292	1	7.6	36.0	4.7	0.33	12.3	14.2	20
	Horizontal	265/1/60	238/292	1	7.6	36.0	5.0	0.50	12.6	14.5	20
	Vertical	208-230/3/60	197/253	1	7.7	59.9	4.4	0.33	12.1	14.0	20
	Horizontal	208-230/3/60	197/253	1	7.7	59.9	5.0	0.50	12.7	14.6	20
	Vertical	460/3/60	414/506	1	3.8	32.4	4.7	0.33	8.5	9.7	15
	Horizontal	460/3/60	414/506	1	3.8	32.4	5.0	0.50	8.8	10.1	15
030	Vertical	208-230/1/60	197/253	1	8.7	58.0	4.4	0.33	13.1	15.2	20
	Horizontal	208-230/1/60	197/253	1	8.7	58.0	5.0	0.50	13.7	15.8	20
	Vertical	265/1/60	238/292	1	10.9	71.7	4.7	0.33	15.6	18.3	25
	Horizontal	265/1/60	238/292	1	10.9	71.7	5.0	0.50	15.9	18.6	25
	Vertical	208-230/3/60	197/253	1	8.3	67.7	4.4	0.33	12.7	14.8	20
	Horizontal	208-230/3/60	197/253	1	8.3	67.7	5.0	0.50	13.3	15.4	20
	Vertical	460/3/60	414/506	1	5.1	38.1	4.7	0.33	9.8	11.1	15
	Horizontal	460/3/60	414/506	1	5.1	38.1	5.0	0.50	10.1	11.4	15
036	Vertical/Horizontal	208-230/1/60	197/253	1	16.7	93.5	8.4	0.75	25.1	29.2	45
		265/1/60	238/292	1	13.5	90.8	7.5	0.75	21.0	24.3	35
		208-230/3/60	197/253	1	12.2	97.5	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	5.8	44.3	7.5	0.75	13.3	15.1	20
042	Vertical/Horizontal	208-230/1/60	197/253	1	14.7	109.0	8.4	0.75	23.1	26.8	40
		208-230/3/60	197/253	1	12.2	102.8	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	5.8	50.0	7.5	0.75	13.3	15.1	20
048	Vertical/Horizontal	208-230/1/60	197/253	1	17.3	126.0	8.4	0.75	25.7	30.0	45
		208-230/3/60	197/253	1	12.2	120.4	8.4	0.75	20.6	23.6	35
		460/3/60	414/506	1	6.4	50.0	7.5	0.75	13.9	15.8	20
060	Vertical/Horizontal	208-230/1/60	197/253	1	25.6	155.0	9.1	1.00	34.7	41.2	60
		208-230/3/60	197/253	1	18.6	155.0	9.1	1.00	27.7	32.3	50
		460/3/60	414/506	1	8.3	58.1	9.1	1.00	17.4	19.6	25
070	Vertical/Horizontal	208-230/1/60	197/253	1	27.6	170.0	9.1	1.00	36.7	43.6	70
		208-230/3/60	197/253	1	19.2	156.5	9.1	1.00	28.3	33.1	50
		460/3/60	414/506	1	9.0	74.8	9.1	1.00	18.1	20.3	25

NOTE(S):

a. 460-v units with Constant Airflow ECM blower motors require a neutral wire (4 wires).

LEGEND

Hp — Horsepower
FLA — Full Load Amps
LRA — Locked Rotor Amp
RLA — Rated Load Amps
MCA — Minimum Circuit Amp
MOCP — Maximum Overcurrent Protection

Table 8 — 50WC with 5 kW Electric Heat — Constant Torque ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	5 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		AMPS		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024	Vertical	3.6 K	4.8 K	17.3	20.0	25.2	28.5	30	30
030	Vertical	3.6 K	4.8 K	17.3	20.0	25.2	28.5	30	30
036	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
042	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
048	Vertical	3.6 K	4.8 K	17.3	20.0	29.2	32.5	30	35
060	Vertical	3.6 K	4.8 K	17.3	20.0	39.7	39.7	40	40
070	Vertical	3.6 K	4.8 K	17.3	20.0	42.1	42.1	45	45

Table 9 — 50WC with 10 kW Electric Heat — Constant Torque ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	10 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
036	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
042	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
048	Vertical	7.2 K	9.6 K	34.7	40.0	50.8	57.5	60	60
060	Vertical	7.2 K	9.6 K	34.7	40.0	52.8	59.5	60	60
070	Vertical	7.2 K	9.6 K	34.7	40.0	52.8	59.5	60	60

Table 10 — 50WC with 5 kW Electric Heat — Constant Airflow ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	5 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
024	Vertical	3.6 K	4.8 K	17.3	20.0	27.2	30.5	30	35
030	Vertical	3.6 K	4.8 K	17.3	20.0	27.2	30.5	35	40
036	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
042	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
048	Vertical	3.6 K	4.8 K	17.3	20.0	32.2	35.5	35	40
060	Vertical	3.6 K	4.8 K	17.3	20.0	41.2	41.2	45	45
070	Vertical	3.6 K	4.8 K	17.3	20.0	43.6	43.6	45	45

Table 11 — 50WC with 10 kW Electric Heat — Constant Airflow ECM Blower Motor Electrical Data (208/230-1-60 only)

UNIT SIZE	CONFIGURATION	10 kW EH							
		Heater Element				Unit Data Plate Values			
		Watts		Amps		MCA		MOP	
		208-v	240-v	208-v	240-v	208-v	240-v	208-v	240-v
036	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
042	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
048	Vertical	7.2 K	9.6 K	34.7	40.0	53.8	60.5	60	70
060	Vertical	7.2 K	9.6 K	34.7	40.0	54.7	61.4	60	70
070	Vertical	7.2 K	9.6 K	34.7	40.0	54.7	61.4	60	70

LOW VOLTAGE, CONTROL WIRING

Control wiring for units with PSC and Constant Torque blower motors are connected to a terminal block located in the unit electrical box. Refer to the unit wiring diagram for connection details.

⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ CAUTION

Never route control wiring through the same conduit as power supply wiring. Electrical noise and transients from the power wiring can cause communication issues or damage to the control wiring and connected control components.

Units without factory installed TruVu™ DDC controller can be controlled using the included thermostat inputs (R, O, Y1, C, G) for single stage heat pump thermostat or field-installed DDC (Direct Digital Controls) controls. Note that the reversing valve on the unit is energized when the unit is in the cooling mode. See Fig. 18 for typical thermostat connections.

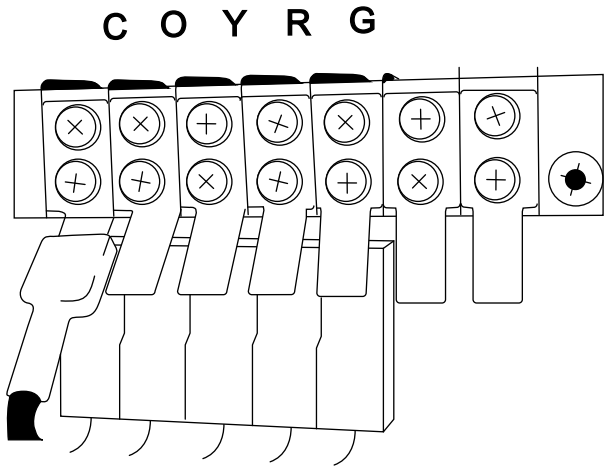
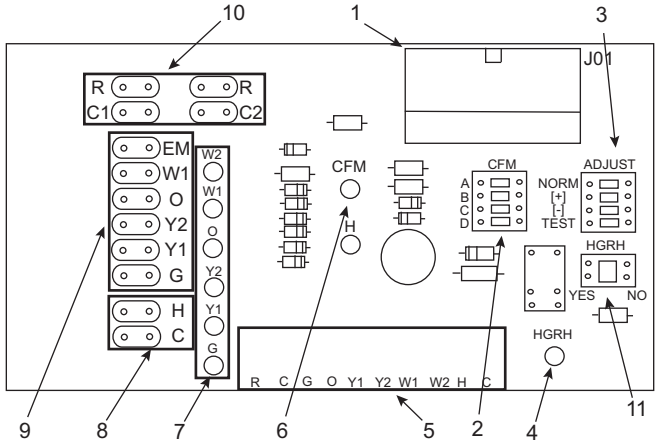


Fig. 18 — Typical Thermostat Connections

Control wiring for units with constant airflow ECM blower motors is routed through a constant airflow ECM interface board. Thermostat input wiring is connected to the 10-pin screw type terminal block on the lower center portion of the ECM Interface Board. In addition to providing a connecting point for thermostat wiring, the interface board also translates thermostat inputs into control commands for the Electronic Commutated Motor (ECM) DC fan motor and displays an LED indication of operating status. Refer to the unit wiring diagrams for complete details. See Fig. 19. The thermostat connections and their functions are as follows.

ECM INTERFACE THERMOSTAT CONNECTIONS

- **Y1** First Stage Compressor Operation
- **Y2** Second Stage Compressor Operation
- **G** Fan
- **O** Reversing Valve (energized in cooling)
- **W1** Auxiliary Electric Heat (runs with compressor)
- **EM/W2** Emergency Heat (electric heat only)
- **NC** Transformer 24 vac Common (extra connection)
- **C1** Transformer 24 vac Common (primary connection)
- **R** Transformer 24 vac Hot
- **H** Dehumidification Mode



LEGEND

1	Motor harness plug
2	Blower CFM adjustment
3	Motor settings
4	Dehumidification indication
5	Thermostat digital contact inputs
6	CFM count indicator
7	Thermostat input status indication
8	Reheat digital outputs
9	Thermostat outputs
10	24 VAC
11	Dehumidification method selector

Fig. 19 — ECM Interface Board Physical Layout

THERMOSTAT AND DDC SENSORS

Thermostats or DDC space sensors should be located on an interior wall away from supply ducts. Avoid locations subject to direct sunlight or drafts, or external walls. Thermostat wiring should be 18 AWG (American Wire Gauge). Refer to the installation instructions for the thermostat for further details.

IMPORTANT: Exceptionally long runs of thermostat wire should be avoided to prevent voltage drops in the control circuit.

ADDITIONAL CONTROLS OPTIONS WIRING

Hot Gas Reheat Control

Units with hot gas reheat (HGRH) will include an additional H terminal on the input terminal board for dehumidification control. To enable a call for dehumidification, a 24-v signal must be sent to the H terminal with no voltage applied to the Y1 or O terminals. Any call for cooling (Y1 and O) will override the dehumidification call.

Pump Relay

Units with selected Pump Relay option can be field wired to enable a field provided loop pump or solenoid valve when there is a call for compressor operation. Represented as AUX relay on Wiring Diagrams (see Fig. 25-48).

Energy Management Switch

Units with selected energy management switch (EMS) can be field wired to disable unit operation when a 24-v signal is removed from the relay. Removing the 24-v signal causes the relay to open, which cuts 24-v power to the unit control circuit. All unit components will be disabled at when the EMS is deactivated. Represented as EMS relay on Wiring Diagrams (see Fig. 25-48).

NOTE: Units with constant torque ECM motors may experience a 30 second delay between when the EMS is activated and when the blower finally shuts off. Constant torque ECM blowers are factory programmed with a 30-second delay when losing the control signal, to prevent nuisance shut downs.

Alarm Output (All Units)

If the unit is being connected to a thermostat or DDC control with an alarm indicator, this connection is made at the unit malfunction output on the Unit Protection Module (UPM). See the Unit Protection Module heading in Step 9 section on page 24 for further details.

TruVu DDC Controller

TruVu™ is a factory installed DDC control that requires the use of Carrier ZS or non-communicating sensors or the Carrier TruVu™ Equipment Touch interface for space temperature sensing. TruVu™ DDC is not compatible with thermostats.

All units equipped with TruVu™ DDC controller include factory-installed EWT, LWT, SAT, and RAT sensors. Additional field-installed sensors should be provided and wired as needed. Please refer to the Operation section of the Installation, Operation, and Maintenance (IOM) manual for available inputs for optional field-installed components.

IMPORTANT: Relocate the factory installed supply air temperature sensor (SAT) when using a field-installed electric heater. The Supply Air Temperature (SAT) sensor should be downstream of any external heating device for effective control.

All TruVu™ wiring is completed at the TruVu™ control board. See Fig. 49 for details.

Control Transformer

All units sizes with selected HGRH or Waterside economizer option, and units sizes from 048 to 070 include a 75VA transformer. Unit sizes from 007 to 042 and without HGRH or waterside economizer include a 50VA transformer. All units with TruVu™ DDC controller include a 100VA transformer.

⚠ CAUTION

Exceeding the transformer capacity can result in low control voltage, erratic unit operation or damage to the heat pump.

The VA capacity of the transformer should be considered when applying low voltage accessories, such as shut off valves, thermostats, or DDC controls. Table 12 shows the VA draw of factory-mounted components in the low voltage heat pump. The total VA draw of the heat pump internal components plus any attached accessories must be lower than the VA capacity of the unit control transformer.

Table 12 — Low Voltage VA Draw

STANDARD CONSTRUCTION	
Component	**VA**
Blower Relay (PSC motors only)	10
Reversing Valve Solenoid	12
Compressor Contactor Single Phase	10
UPM Board	5
Total VA Draw	37
OPTION CARD	
Component	**VA**
Total from 'Standard'	37
Option Card	5
Hot Gas Reheat Solenoid	9
Economizer Valve	3
Total VA Draw	54
OPTIONAL COMPONENTS	
Component	**VA**
Compressor Monitor Relay	4
Blower Monitor Relay	4
Energy Management Relay	4
Fire Alarm Relay	4
Heater Contactor	10
AUX Relay	10
Electric Heating/Blower Relay	4
TruVu™ DDC	37
CA ECM Board	1
Leaving Water Valve	7
Compressor Contactor 3-Phase	10

Step 9 — Configure Unit Control Components

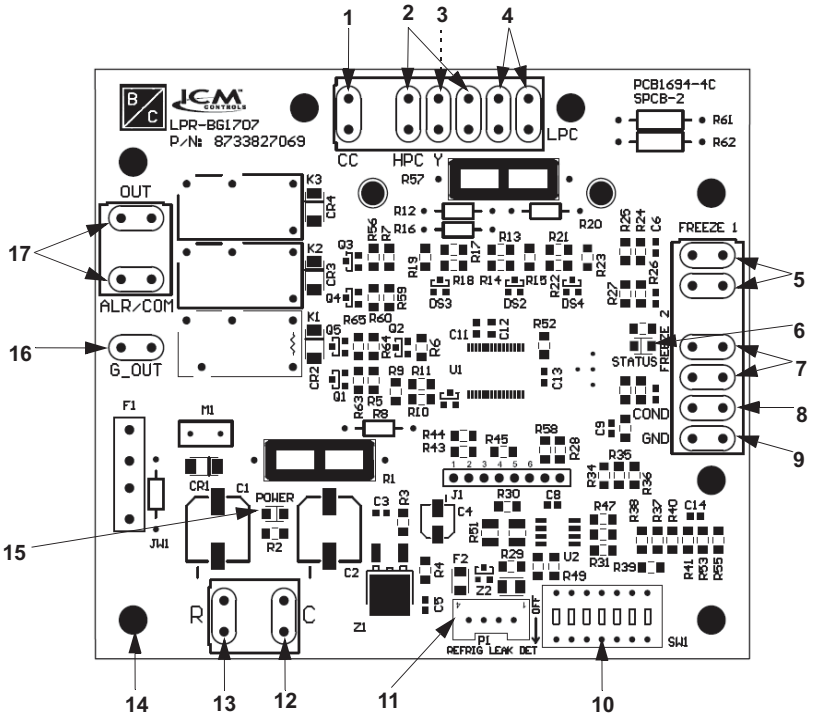
⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

UNIT PROTECTION MODULE (UPM)

The Unit Protection Module (UPM) as shown in Fig. 20 is a printed circuit board (PCB) included in all units, that interfaces with the thermostat or the digital direct controller.

The main purpose of this device is to protect the compressors by monitoring the different states of switches and sensors of each refrigerant circuit. This device provides time delays and protects the unit against freezing of the water and refrigerant heat exchangers as well as condensate overflow when the appropriate sensors are installed.



LEGEND
1 — Compressor Contact Output
2 — High-Pressure Switch Connection
3 — Call for Compressor (Y1)
4 — Low Pressure Switch Connection
5 — Water Coil Freeze Connection (Freeze 1)
6 — UPM Status LED Indicator (Fault Status)
7 — Air Coil Freeze Connection (Freeze 2)
8 — Condensate Overflow Sensor Connection
9 — Ground
10 — UPM Settings DIP Switch (SW1)
11 — A2L Sensor
12 — 24 Vac Power Common
13 — 24 Vac Power Input
14 — UPM Standoff
15 — Power LED
16 — Fan
17 — Dry Contact

Fig. 20 — Unit Protection Module (UPM)

UPM Standard Safeties and Alarms

HI AND LOW REFRIGERANT PRESSURE PROTECTION

- High-pressure switch located in the refrigerant discharge line and wired across the HPC (High-Pressure Switch Connection) terminals on the UPM.
- Low-pressure switch located in the unit refrigerant suction line and wired across the LPC (Low-Pressure Switch Connection) terminals (LPC1 and LPC2) on the UPM.

WATER COIL FREEZE PROTECTION

Waterside freeze protection sensor, mounted close to condensing water coil, monitors refrigerant temperature between condensing water coil and thermal expansion valve. See Fig. 21.

If temperature drops below or remains at freeze limit trip for 120 seconds, the controller will shut down the compressor and enter into a soft-lockout condition. The default freeze limit trip is 25°F; however, this can be changed to 15°F by flipping DIP switch SW1. (See Fig. 20, Item 10, Fig. 22, and Table 13.)

NOTE: The UPM Board Dry Contacts are Normally Open (NO).

IMPORTANT: The freeze sensor will not guard against the loss of water. A flow switch is recommended to prevent the unit from running if water flow is lost or reduced.

IMPORTANT: If the unit is employing a fresh water system (no anti-freeze protection), it is extremely important to have the Freeze 1 set to 25°F (DIP Switch SW1 set to Off) in order to shut down the unit at the appropriate leaving water temperature and protect your heat pump from freezing if a freeze sensor is included.

AIR COIL FREEZE PROTECTION

Air coil freeze protection sensor, mounted between the thermal expansion device and the evaporator, monitors refrigerant temperature between the evaporator coil and thermal expansion valve (see Fig. 23). If temperature drops below or remains at the freeze limit trip for 30 seconds, the controller will shut down the compressor and enter into a soft-lockout condition. The default freeze limit trip is 25°F, this can be changed to 15°F by flipping DIP switch SW1. (See Fig. 20, Item 10, Fig. 22, and Table 13.)

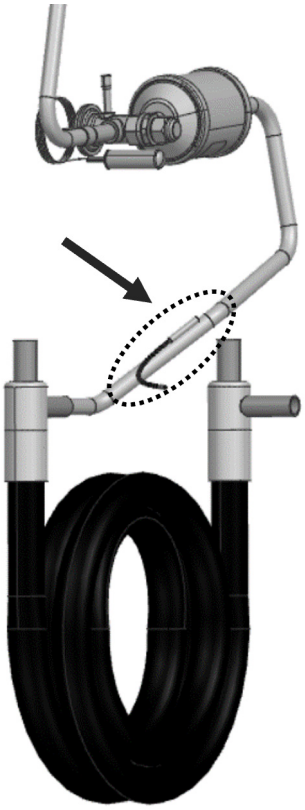


Fig. 21 — Waterside Freeze Sensor Location (FREEZE 1) — Vertical Configuration Shown



Fig. 22 — UPM Settings DIP Switch (SW1)

Table 13 — UPM DIP Switch Selectable Positions

TOGGLE	FUNCTION	ON	OFF	FACTORY DEFAULT
1	Lockout	4	2	2
2	Reset	R	Y	Y
3	Alarm	Cont	Pulse	Pulse
4	Test	Yes	No	No
5	Freeze 1	15°F	25°F	25°F
6	Freeze 2	15°F	25°F	25°F
7	Pump	ON	OFF	OFF

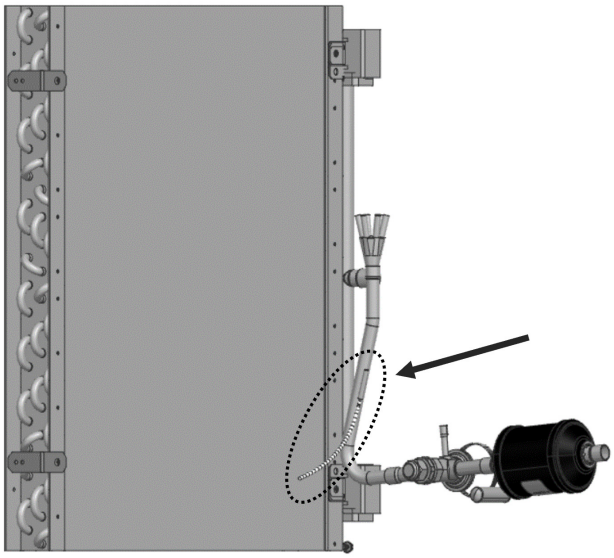


Fig. 23 — Air Coil Freeze Sensor Location (FREEZE 2) — Vertical Configuration Shown

HIGH CONDENSATE LEVEL SHUTDOWN

The condensate overflow protection sensor is located in the drain pan of the unit and connected to the "COND" terminal on the UPM board. See Fig. 20, Item 8.

Anti-Short Cycle Timer

Five minute delay on break timer to prevent compressor short cycling.

Random Start Time Delay

Each controller has an unique random start delay ranging from 270 to 300 seconds on initial power up to reduce the chance of multiple units simultaneously starting at the same time after power up or after a power interruption, in order to avoid creating a large electrical spike.

Low-Pressure Bypass Timer

If the compressor is running and the low pressure switch opens, the controller will keep the compressor On for 120 seconds. After two minutes if the low-pressure switch remains open, the controllers will shut down the compressor and enter a soft lockout. The compressor will not be energized until the low-pressure switch closes and the anti-short cycle time delay expires. If the low-pressure switch opens two or four times in one hour, the unit will enter a hard lockout. In order to exit hard lockout power to the unit would need to be reset. The reset signal is either a Y or R signal depending on the position of the DIP switch as shown in Table 13. If the reset is set to R, the board must be manually powered off and powered back on to exit the hard lock out.

Brownout/Surge/Power Interruption Protection

The brownout protection in the UPM board will shut down the compressor if the incoming power falls below 18 vac. The compressor will remain Off until the voltage is above 18 vac and Anti-Short Cycle Timer (300 seconds) times out. The unit will not go into a hard lockout.

Alarm Output

Alarm output is Normally Open (NO) dry contact. If pulse is selected the alarm output will be pulsed. The fault output will depend on the DIP switch setting for "Alarm". If it is set to "CONST", a constant signal will be produced to indicate a fault has occurred and the unit re-quires inspection to determine the type of fault. If it is set to "PULSE" a pulse signal is produced and a fault code is detected by a remote device indicating the fault. (For blink code explanation, see Table 14). The remote device must have a analog input with malfunction detection capability to interpret PULSE signal when the UPM board is set to "PULSE".

IMPORTANT: If 24 vac output is needed R must be wired to ALR-COM terminal; 24 vac will be available to the ALR-OUT terminal when the unit is in the alarm condition.

Test Mode

A test DIP switch is provided to reduce all time delays settings to 10 seconds during troubleshooting or verification of unit operation.

IMPORTANT: Operation of unit in test mode can lead to accelerated wear and premature failure of components. The "TEST" switch must be set back to "NO" after troubleshooting/servicing.

INTELLIGENT ALARM RESET

If a fault condition is initiated, the five minute delay on break time period is initiated and the unit will restart after these delays expire. During this period the fault LED will indicate the cause of the fault. If the fault condition still exists or occurs two or four times (depending on "2" or "4" settings for Lockout DIP Switch) before 60 minutes, the unit will go into a hard lockout and requires a manual lockout reset. See Fig. 22.

HARD LOCKOUT RESET

A hard lockout can be reset by turning the unit thermostat off and then back on when the "RESET" DIP switch is set to "Y" or by shutting off unit power at the circuit breaker when the "RESET" DIP switch is set to "R".

NOTE: The blower motor will remain active during a lockout condition.

Table 14 — UPM Fault Blink Codes

BLINKS	FAULT	FAULT CRITERIA
None	None	All fault conditions normal.
1	High Pressure	Refrigerant discharge pressure has exceeded 600 psig.
2	Low Pressure	Refrigerant suction pressure has fallen below 40 psig.
3	Water Coil Freeze Condition	Refrigerant temperature to the water coil has fallen below 25°F for 120 seconds.
4	Condensate Overflow	Condensate levels in the unit drain pan are too high.
5	Brown Out	Control voltage has fallen below 18 vac
6	Air Coil Freeze Condition	Refrigerant temperature to the air coil has fallen below 25°F for 120 seconds.
7	Refrigerant Leak Fault	Refrigerant LFL% is more than 15%.

OPTION CARD

Units ordered with the water side economizer or hot gas reheat factory installed options and no factory installed DDC controller will include the Option Card as standard. See Fig. 24.

The card has three primary functions:

"Boilerless" Electric Heat Control

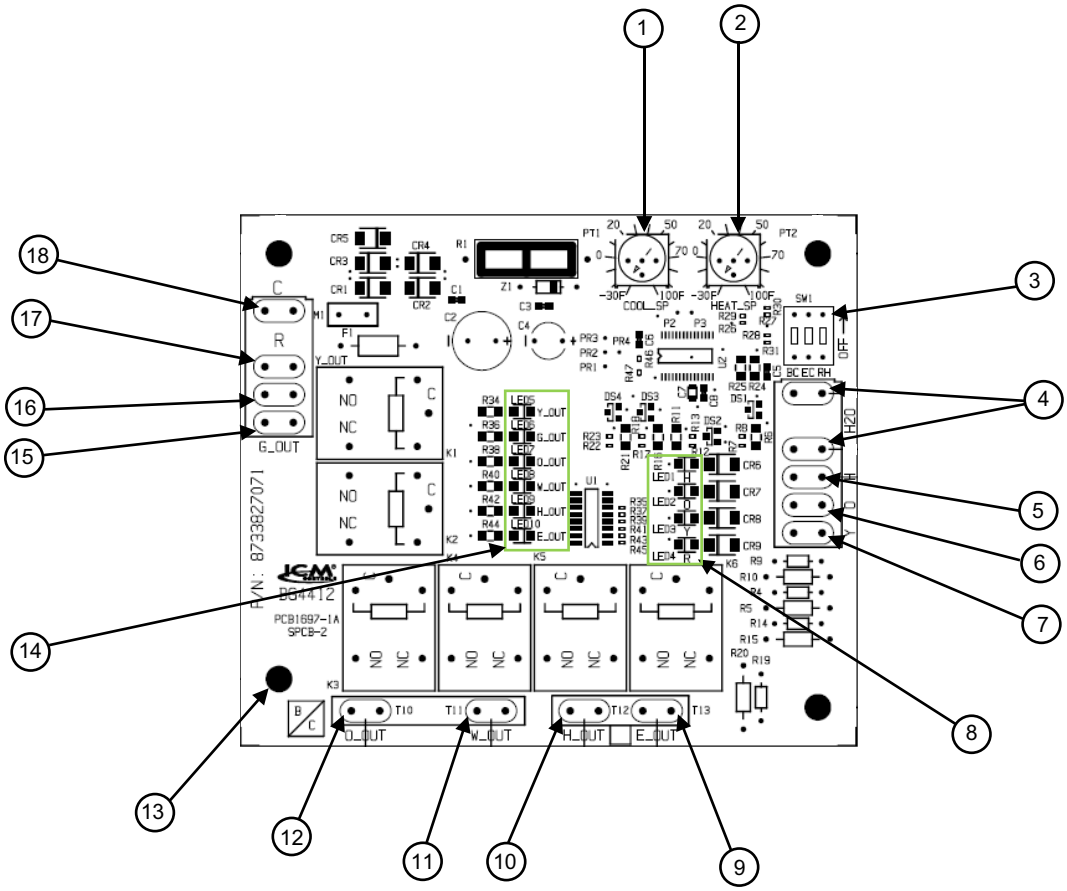
Boilerless heat control is a means to control an auxiliary electric heater on units that are connected to a water loop without a reliable heat injection source. The option card features a potentiometer to configure a water loop heat setpoint (Item 2, Fig. 24, Heat Set Point Potentiometer). When the water loop (EWT) drops below the specified setpoint and there is a call for heating the compressor will be disabled and the option card sends a 24-v out-put to enable the electric heater.

On/Off Hot Gas Reheat Control

Hot gas reheat control is an active means of dehumidification control. HGRH is enabled when the space temperature is satisfied but the space humidity is above the desired setpoint. The Option card energizes the fan, reversing valve, HGRH valve and compressor.

Water Side Economizer Control

Water side economizer control allows for cooling directly with the source water when the source water temperature is below a configurable setpoint. The expansion card features a potentiometer to configure a water loop cool setpoint (Fig. 24, Item 1, Cool Set Point Potentiometer). When the water loop drops below the specified setpoint and there is a call for cooling the WSE diverting valve will divert water through the water side economizer coil. If a cooling call remains for a period of > 10 min the compressor will be enabled to assist the WSE in meeting the cooling demand.



1	Cool Set Point Potentiometer
2	Heat Set Point Potentiometer
3	Operating Mode Dip Switch
4	Entering Water Temperature
5	H Signal Input
6	O Signal Input
7	Y Call Input
8	LED Input Status
9	Economizer Output “E_OUT”
10	Hot Gas Reheat Output “H_OUT”
11	Boilerless Control “W_OUT”
12	Reversing Valve Output “O_OUT”
13	Option Card Standoff
14	LED Output Status
15	FAN Output “G_OUT”
16	Y Call Output “Y_OUT”
17	24 VAC Power Input
18	24 VAC Power Common

Fig. 24 — Option Card

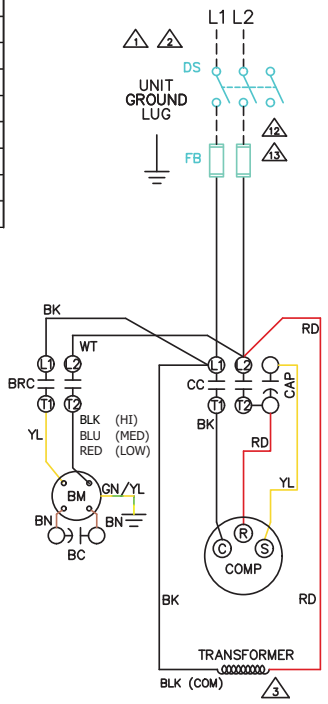
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

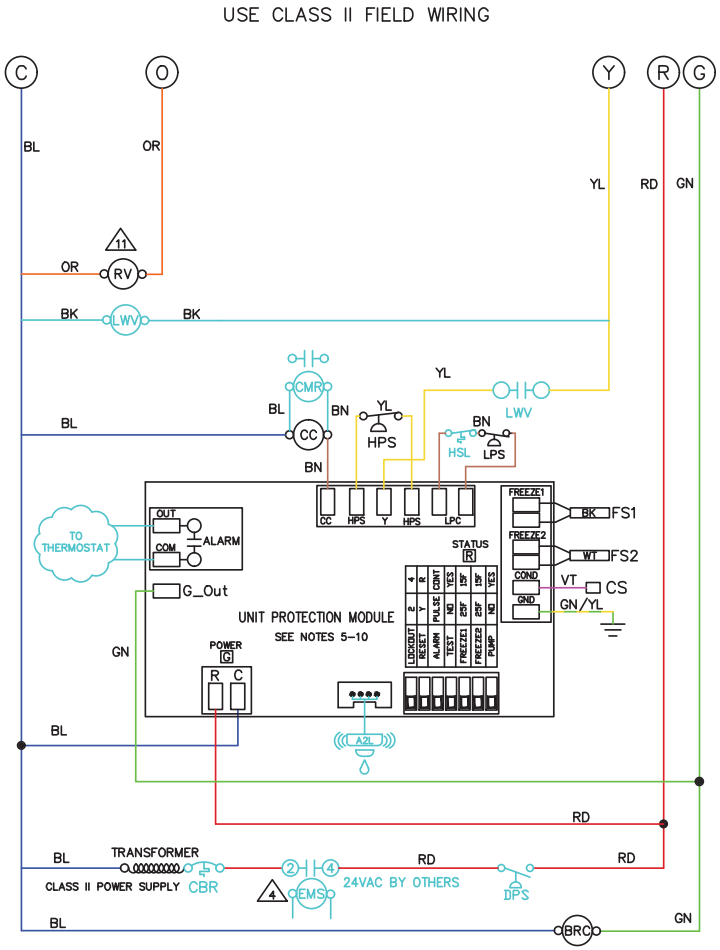
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE --------

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSORS
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE





NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.

8733845309

Fig. 25 — Single Phase, PSC Motor, Standard Unit

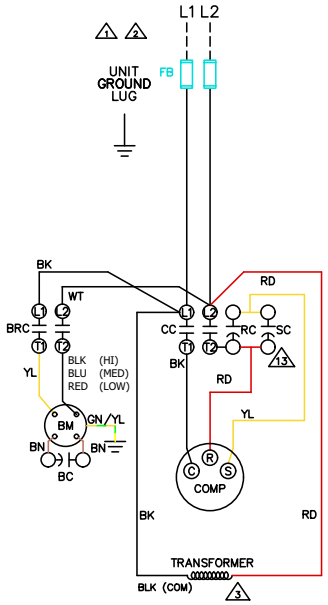
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

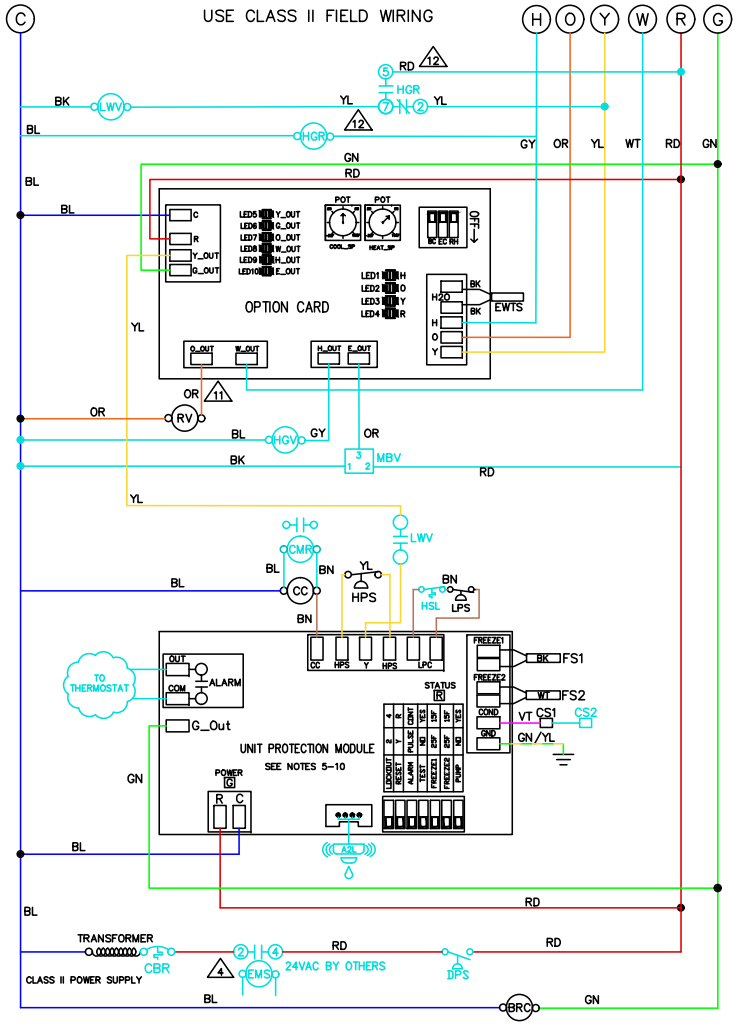
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE – – – – – – – –

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RC – COMPRESSOR RUN CAPACITOR
RV – REVERSING VALVE (HEAT PUMPS)
SC – COMPRESSOR START CAPACITOR

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE





NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED WITH OPTIONS CARD
13. START CAPACITOR WILL BE PRESENT ON SIZES 015 – 024 OF VOLTAGE TYPE 1 & 2 AND START CAPACITOR WILL ALSO BE PRESENT ON SIZE 030 OF VOLTAGE TYPE 1.

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Fig. 26 — Single Phase, PSC Motor, Option Card (WSE, HGRH, Boilerless Heat)

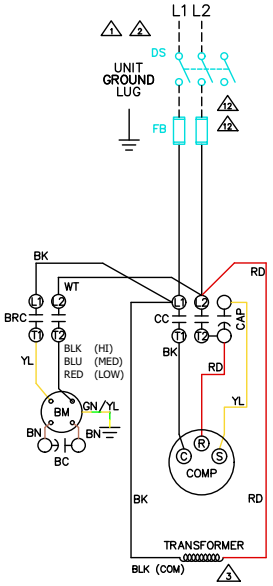
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

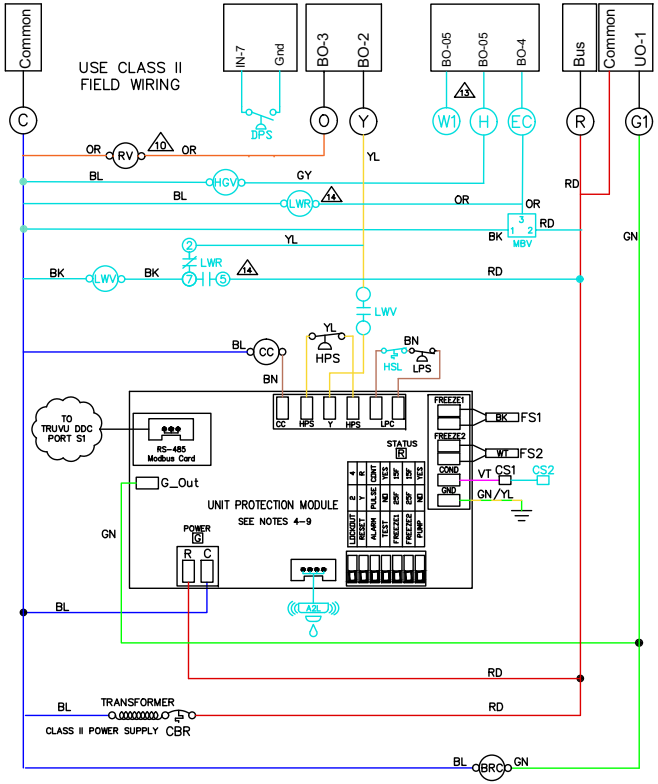
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————
FIELD WIRE - - - - - - -

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSORS
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] LWR – LEAVING WATER RELAY
[ ] MBV – MOTORIZED BALL VALVE





NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
7. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
8. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
9. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
10. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
11. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
12. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
13. UNIT WILL HAVE OPTIONAL HOT GAS REHEAT OR FACTORY INSTALLED ELECTRIC HEAT, UNIT WILL NOT HAVE BOTH.
14. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.

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Fig. 27 — Single Phase, PSC Motor, TruVu DDC

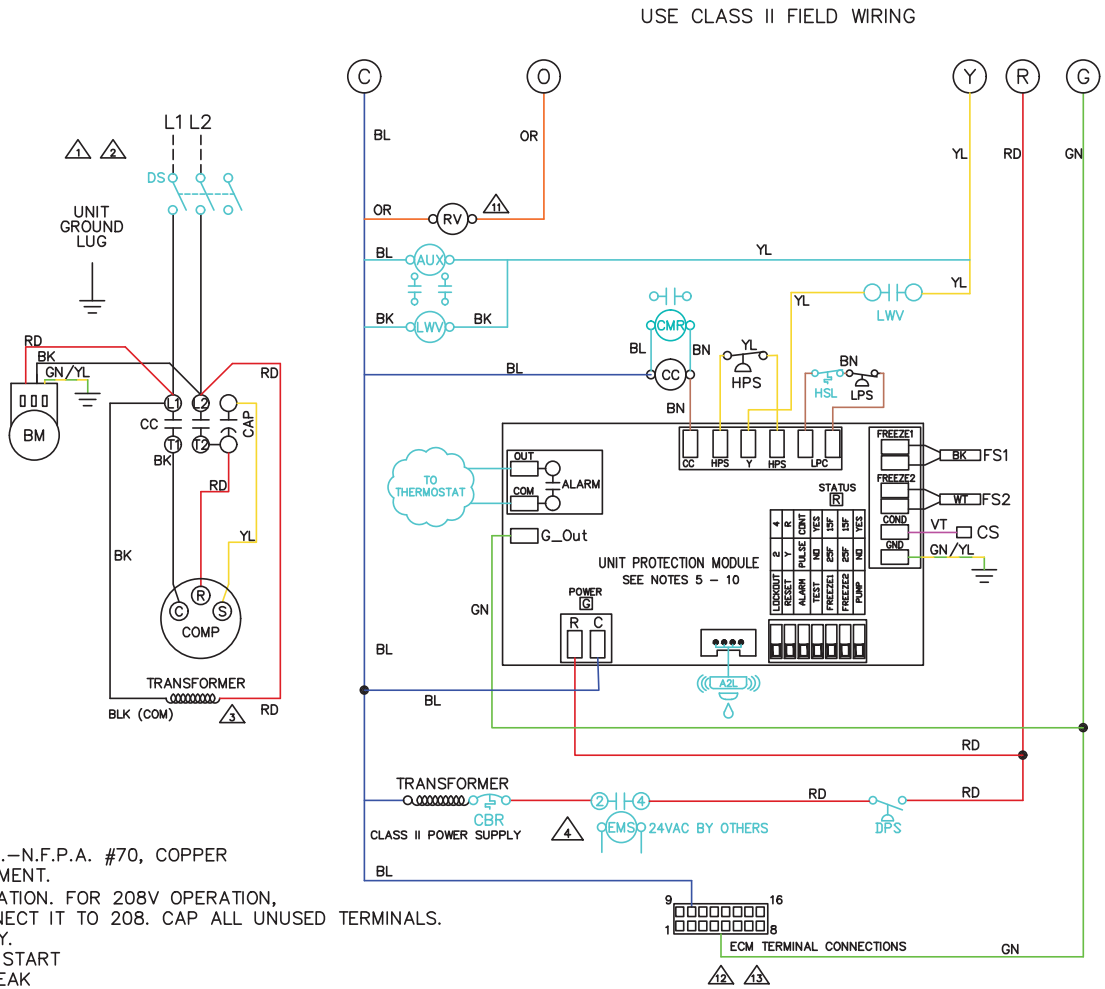
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE – – – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFREGIRENT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24 CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE



NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. SIZE 012 – HIGH SPEED (VIOLET WIRE), SIZE 009 – MEDIUM SPEED (YELLOW WIRE), SIZE 007 – LOW SPEED (ORANGE WIRE)
13. FOR 115VAC OPERATION CONNECT JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16. FOR 208–277VAC OPERATION LEAVE JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16 DISCONNECTED.

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Fig. 28 — Single Phase, Constant Torque ECM Motor, Standard Unit (1/2 to 1 Ton)

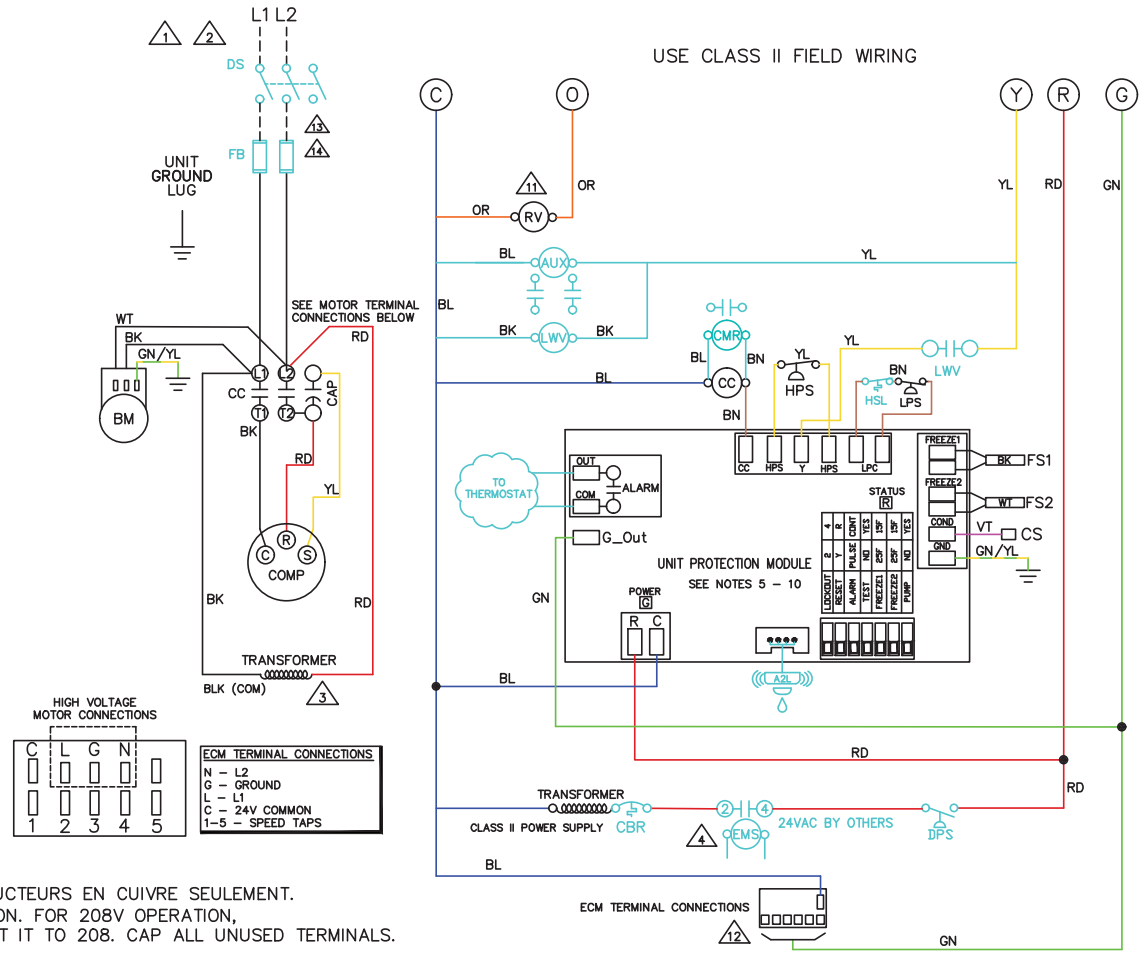
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

FACTORY WIRE ————————
FIELD WIRE - - - - - - -

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE



NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
14. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.

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Fig. 29 — Single Phase, Constant Torque ECM Motor, Standard Unit (1-1/4 to 6 Tons)

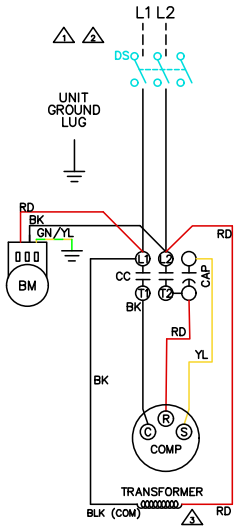
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

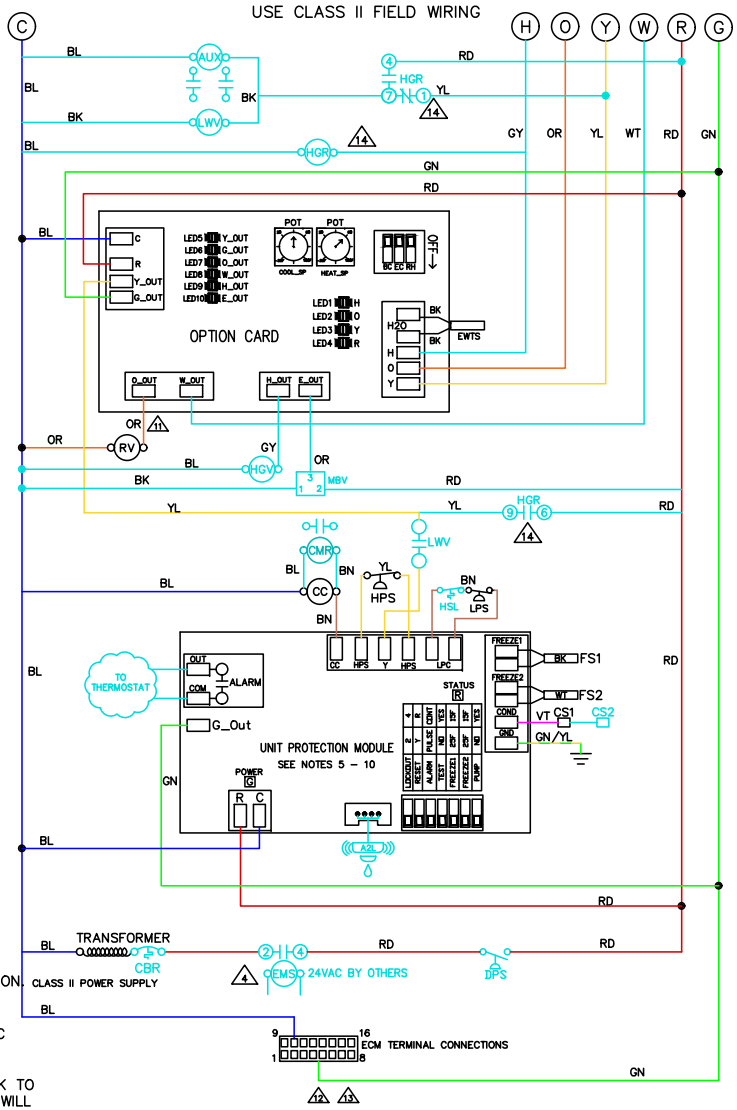
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE – – – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
COMP – COMPRESSOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFREGIRENT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24 CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE





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NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGESA CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. SIZE 012 – HIGH SPEED (VIOLET WIRE), SIZE 009 – MEDIUM SPEED (YELLOW WIRE), SIZE 007 – LOW SPEED (ORANGE WIRE)
13. FOR 115VAC OPERATION CONNECT JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16. FOR 208–277VAC OPERATION LEAVE JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16 DISCONNECTED.
14. PINS 6 AND 9 OF THE HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED. PINS 1, 4 AND 7 OF THE HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED.

Fig. 30 — Single Phase, Constant Torque ECM Motor, Option Card (WSE, HGRH, Boilerless Heat, 1/2 to 1 Ton)

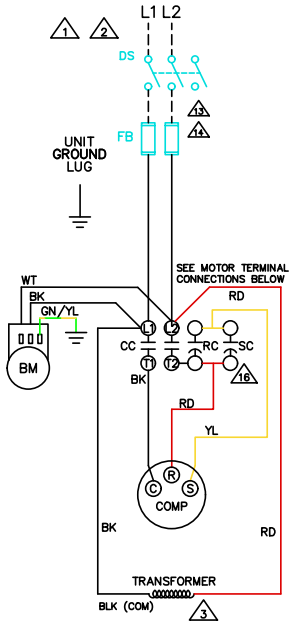
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

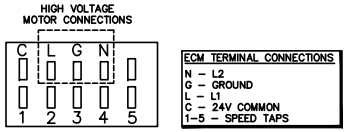
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

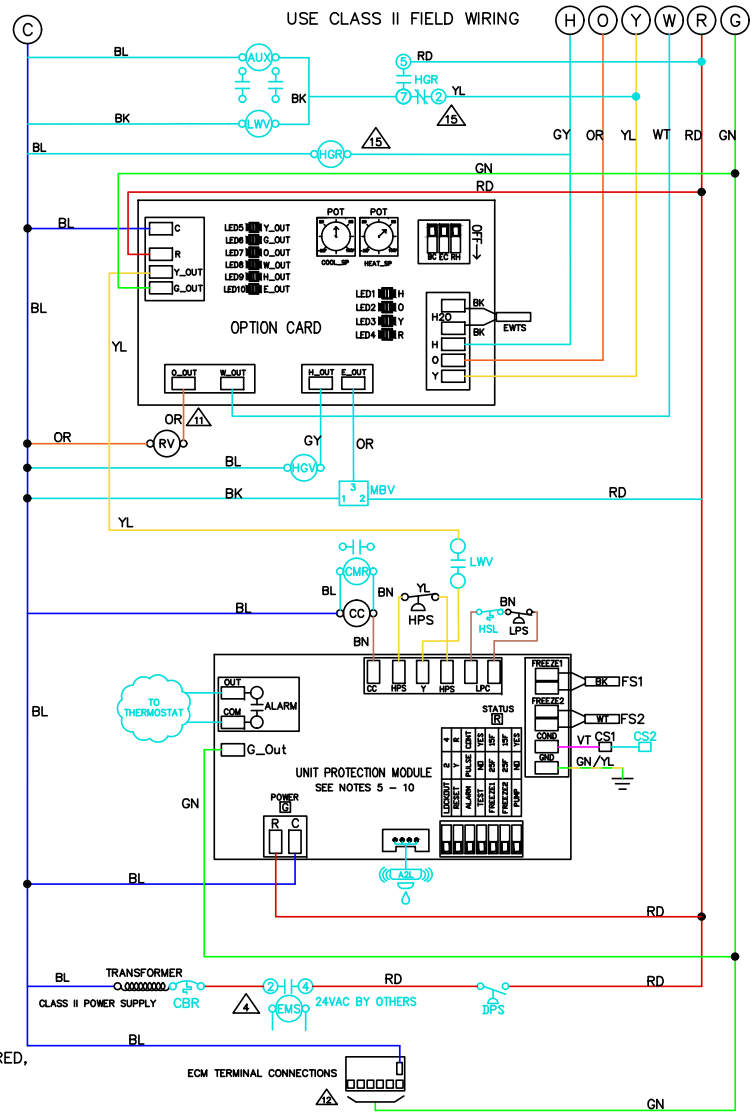
FACTORY WIRE ————
FIELD WIRE – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RC – COMPRESSOR RUN CAPACITOR
RV – REVERSING VALVE (HEAT PUMPS)
SC – COMPRESSOR START CAPACITOR

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE







NOTES:
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2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
14. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
15. HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED WITH OPTIONS CARD
16. START CAPACITOR WILL BE PRESENT ON SIZES 015 – 024 OF VOLTAGE TYPE 1 & 2 AND START CAPACITOR WILL ALSO BE PRESENT ON SIZE 030 OF VOLTAGE TYPE 1.

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Fig. 31 — Single Phase, Constant Torque ECM Motor, Option Card (WSE, HGRH, Boilerless Heat, 1-1/14 to 6 Tons)

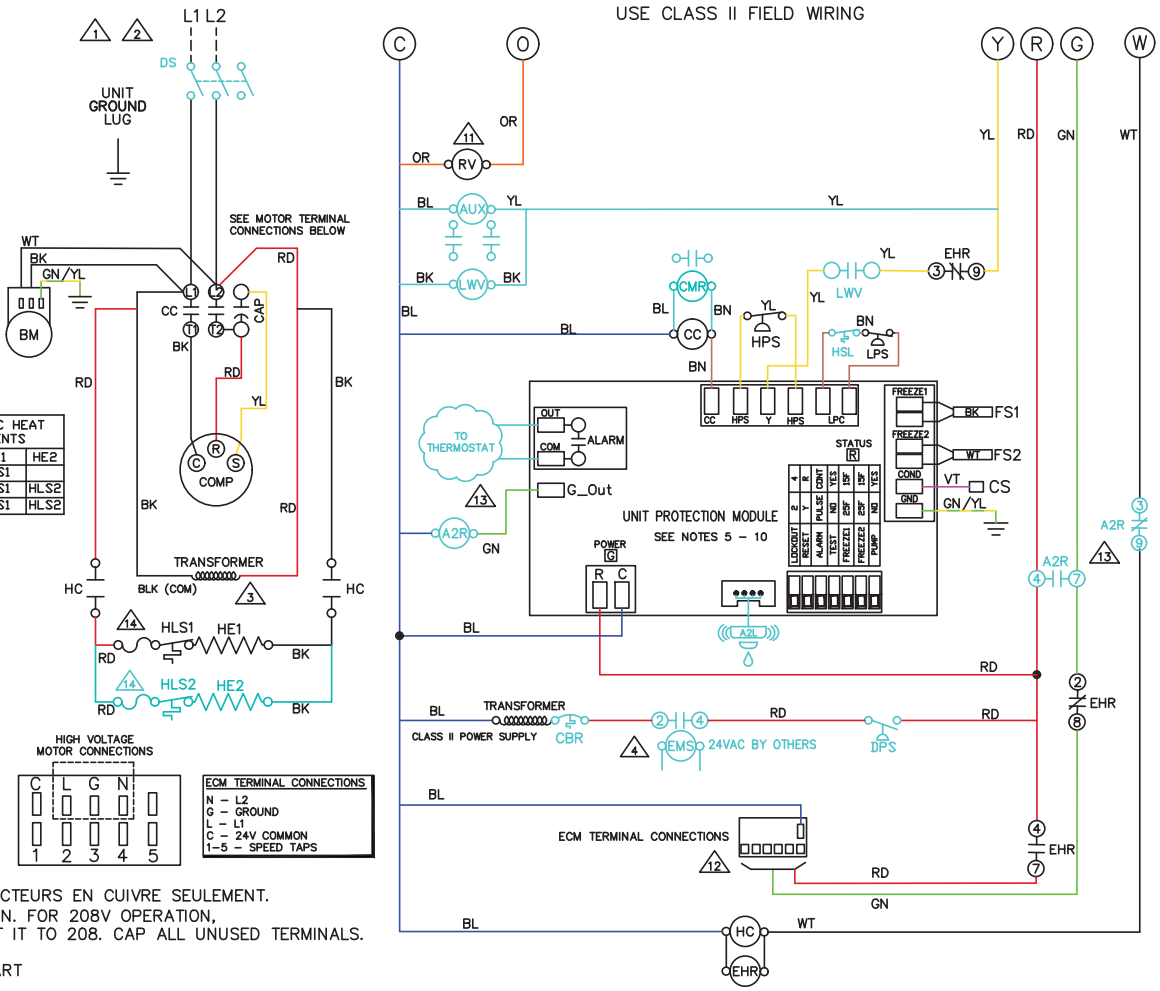
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE - - - - - - - - -

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
EHR – ELECTRIC HEATING/BLOWER RELAY
HE – HEATING ELEMENT
HLS – HEATING LIMIT SWITCH
HPS – HIGH PRESSURE SWITCH
HC – HEATING CONTACTOR
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] A2R – A2L BLOWER RELAY
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE



NOTES:
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4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. A2R WILL ONLY BE PRESENT WHEN OPTIONAL A2L SENSOR IS CONNECTED.
14. DUAL RESET PRIMARY CONTACTS WILL OPEN AT 165°F (+/–5°F) AND CLOSE AT 135°F (+/–9°F). BACK UP CONTACTS WILL OPEN AT 180°F (+/–8°F). BACK–UP CONTACTS WILL NOT RESET.

8733834011

Fig. 32 — Single Phase, Constant Torque ECM Motor, E-Heat, Standard Unit

UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAK

FACTORY WIRE ————————

FIELD WIRE – – – – – – – –

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

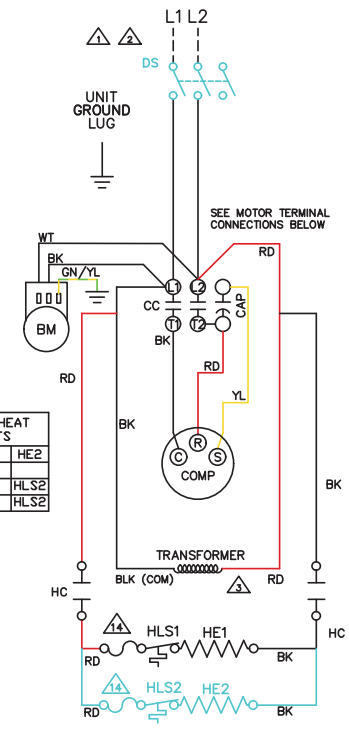
STANDARD COMPONENTS LEGEND:

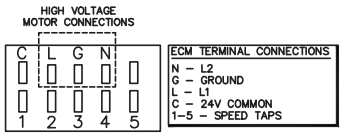
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
EHR – ELECTRIC HEATING/BLOWER RELAY
HC – HEATING CONTACTOR
HE – HEATING ELEMENT
HLS – HEATING LIMIT SWITCH
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

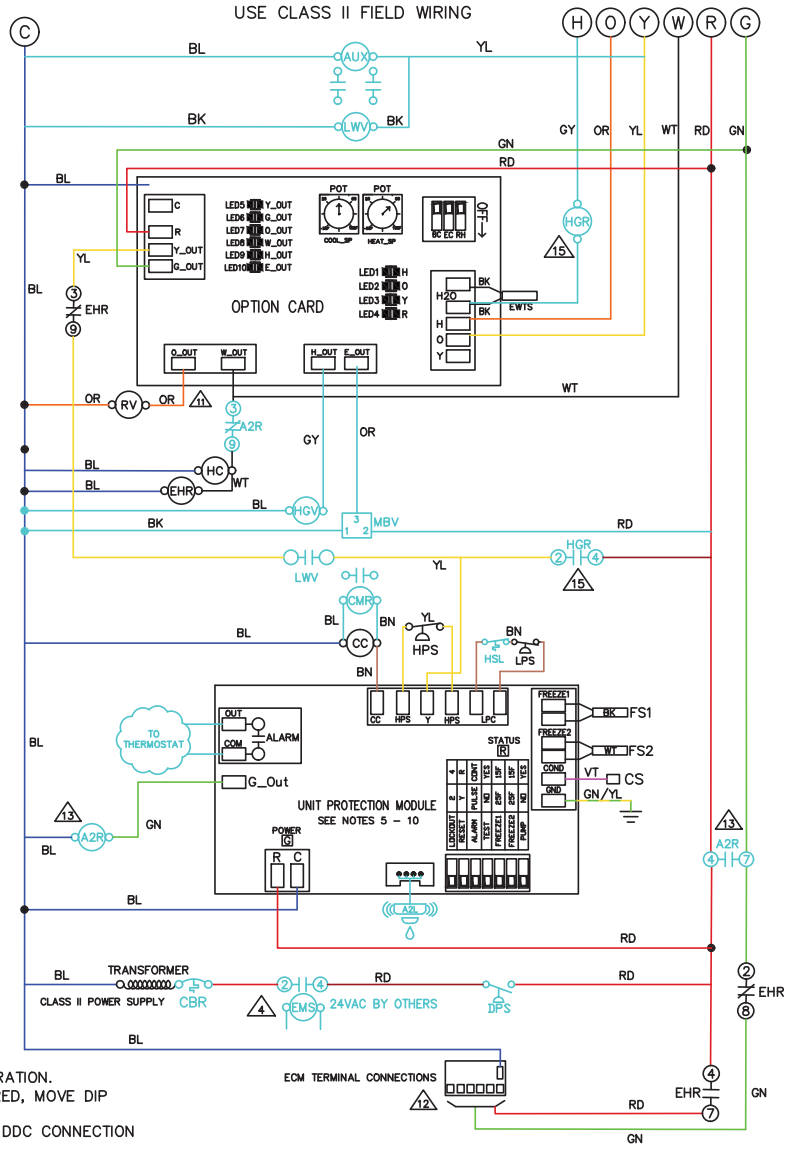
OPTIONAL COMPONENTS LEGEND:

[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] A2R – A2L BLOWER RELAY
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
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[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE

ELECTRIC HEAT ELEMENTS		
kW	HE1	HE2
5	HLS1	
7.5	HLS1	HLS2
10	HLS1	HLS2







NOTES:

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4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
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11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. A2R WILL ONLY BE PRESENT WHEN OPTIONAL A2L SENSOR IS CONNECTED.
14. DUAL RESET PRIMARY CONTACTS WILL OPEN AT 165°F (+/–5°F) AND CLOSE AT 135°F (+/–9°F). BACK UP CONTACTS WILL OPEN AT 180°F (+/–8°F). BACK–UP CONTACTS WILL NOT RESET.
15. HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED.

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Fig. 33 — Single Phase, Constant Torque ECM Motor, E-Heat, Option Card (WSE, HGRH, Boilerless Heat)

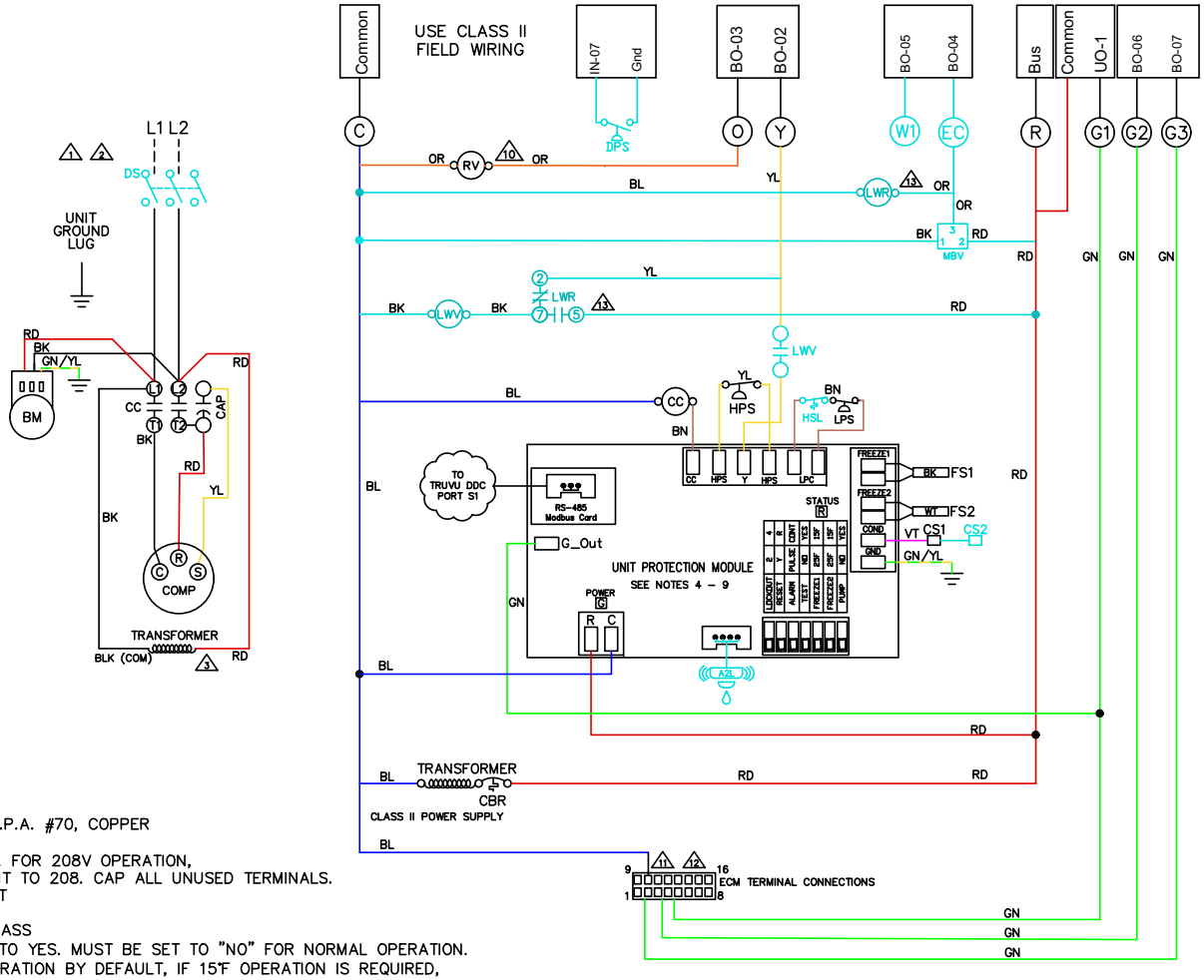
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE - - - - - - - -

STANDARD COMPONENTS LEGEND:
BM — BLOWER MOTOR
CAP — COMPRESSOR CAPACITOR
CBR — 24 CIRCUIT BREAKER
CC — COMPRESSOR CONTACTOR
COMP — COMPRESSOR
CS1 — CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS — FREEZE SENSOR
HPS — HIGH PRESSURE SWITCH
LPS — LOW PRESSURE SWITCH
RV — REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L — AIR TO LIQUID REFREGIRENT LEAK SENSOR
[ ] CS2 — CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS — DIFFERENTIAL PRESSURE SWITCH
[ ] DS — DISCONNECT SWITCH
[ ] HGV — HOT GAS VALVE SOLENOID
[ ] HSL — HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV — LEAVING WATER VALVE
[ ] LWR — LEAVING WATER RELAY
[ ] MBV — MOTORIZED BALL VALVE



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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
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5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
7. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
8. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
9. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
10. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
11. SIZE 012 – HIGH SPEED (VIOLET WIRE), SIZE 009 – MEDIUM SPEED (YELLOW WIRE), SIZE 007 – LOW SPEED (ORANGE WIRE)
12. FOR 115VAC OPERATION CONNECT JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16. FOR 208–277VAC OPERATION LEAVE JUMPERS BETWEEN ECM MOTOR TERMINAL PINS 8 & 16 DISCONNECTED.
13. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.

Fig. 34 — Single Phase, Constant Torque ECM Motor, TruVu DDC (1/2 to 1 Ton)

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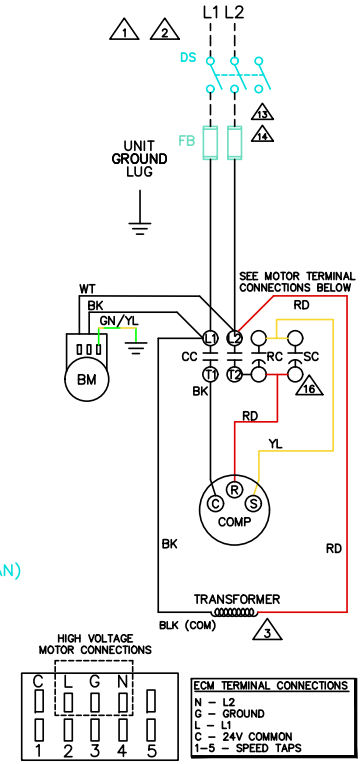
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

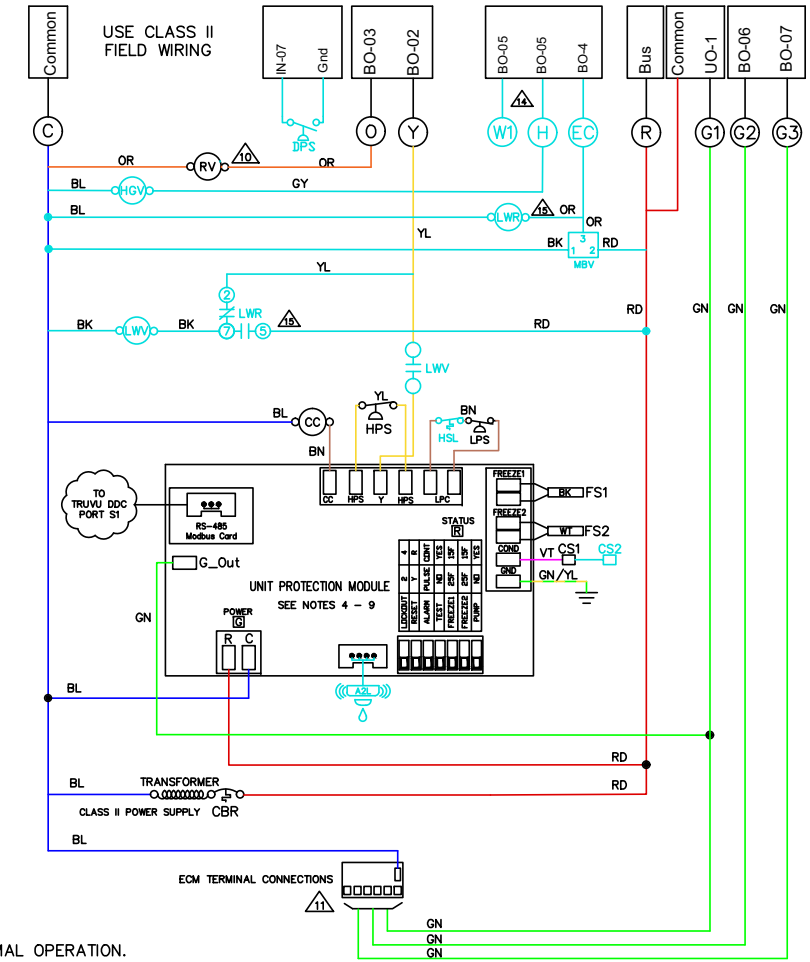
FACTORY WIRE ————
FIELD WIRE – – – – – –

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RC – COMPRESSOR RUN CAPACITOR
RV – REVERSING VALVE (HEAT PUMPS)
SC – COMPRESSOR START CAPACITOR

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] LWR – LEAVING WATER RELAY
[ ] MBV – MOTORIZED BALL VALVE





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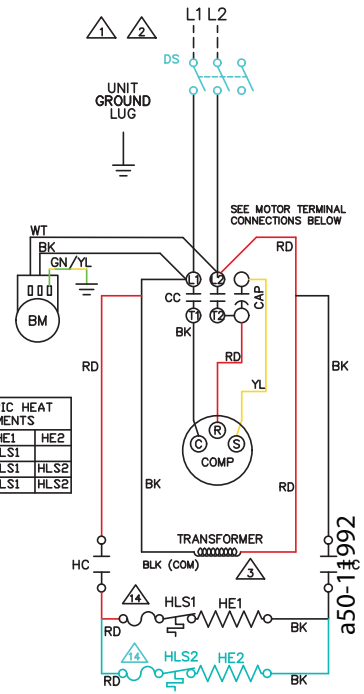
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4. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
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5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
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10. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
11. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
14. UNIT WILL HAVE OPTIONAL HOT GAS REHEAT OR FACTORY INSTALLED ELECTRIC HEAT, UNIT WILL NOT HAVE BOTH.
15. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.
16. START CAPACITOR WILL BE PRESENT ON SIZES 015 – 024 OF VOLTAGE TYPE 1 & 2 AND START CAPACITOR WILL ALSO BE PRESENT ON SIZE 030 OF VOLTAGE TYPE 1.

Fig. 35 — Single Phase, Constant Torque ECM Motor, TruVu DDC (1-1/4 to 6 Tons)

UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
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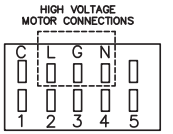
FACTORY WIRE ————————
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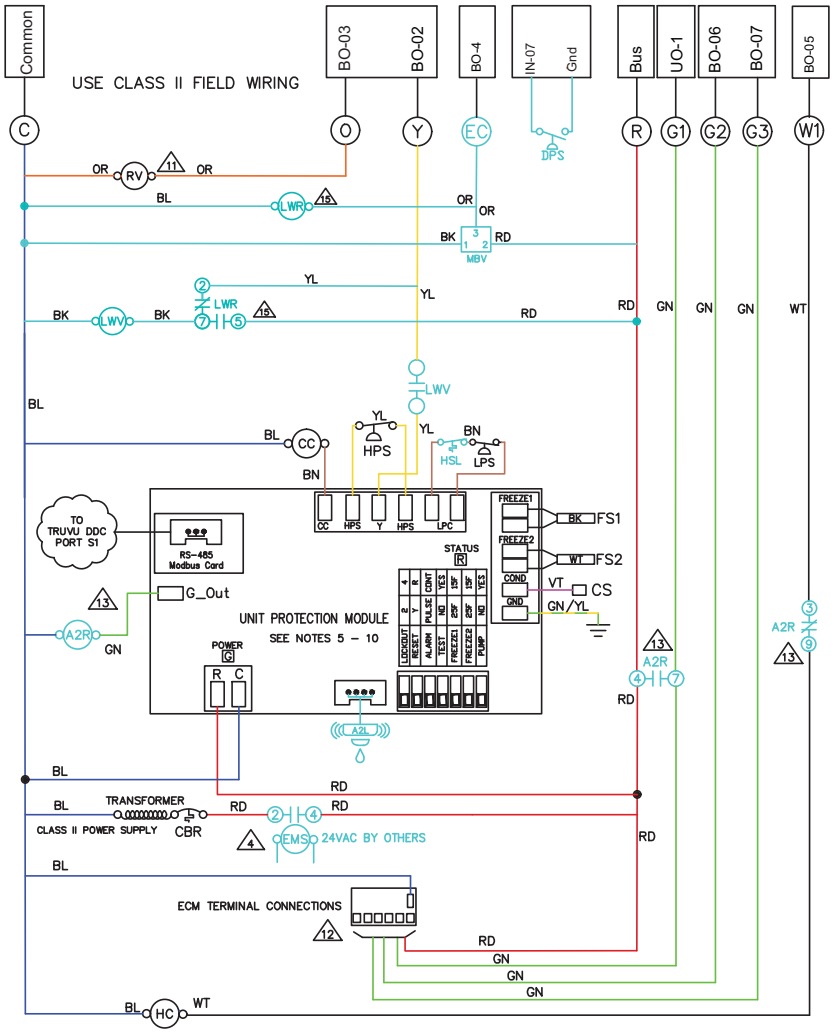


ELECTRIC HEAT ELEMENTS		
kW	HE1	HE2
5	HLS1	
7.5	HLS1	HLS2
10	HLS1	HLS2

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] A2R – A2L BLOWER RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] LWR – LEAVING WATER RELAY
[ ] MBV – MOTORIZED BALL VALVE



ECM TERMINAL CONNECTIONS
N – L2
G – GROUND
L – L1
C – 24V COMMON
1–5 – SPEED TAPS



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10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. A2R WILL ONLY BE PRESENT WHEN OPTIONAL A2L SENSOR IS CONNECTED.
14. DUAL RESET PRIMARY CONTACTS WILL OPEN AT 145°F (+/–5°F) AND CLOSE AT 105°F (+/–9°F). BACK UP CONTACTS WILL OPEN AT 185°F (+/–8°F). BACK–UP CONTACTS WILL NOT RESET IN AMBIENT TEMPERATURES ABOVE –31°F.
15. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.

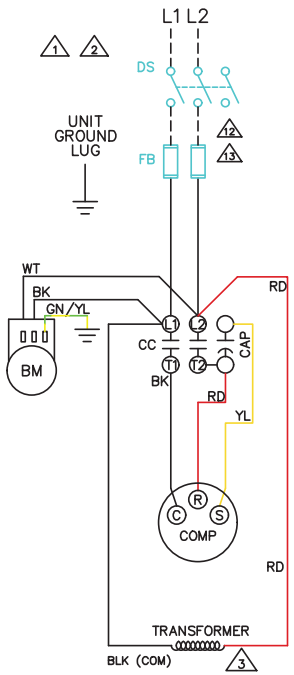
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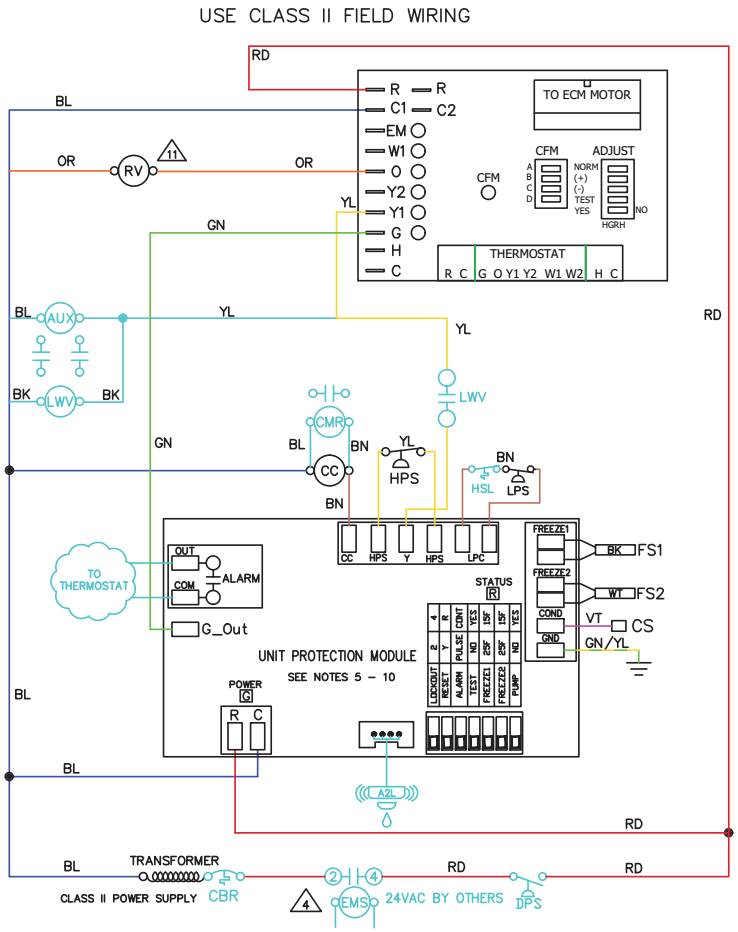
Fig. 36 — Single Phase, Constant Torque ECM Motor, E-Heat, TruVu DDC (2 to 6 Tons)

UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————
FIELD WIRE - - - - - - -





STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] BMR – BLOWER MONITOR RELAY
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.

8733834007

Fig. 37 — Single Phase, Constant Airflow ECM, Standard Unit

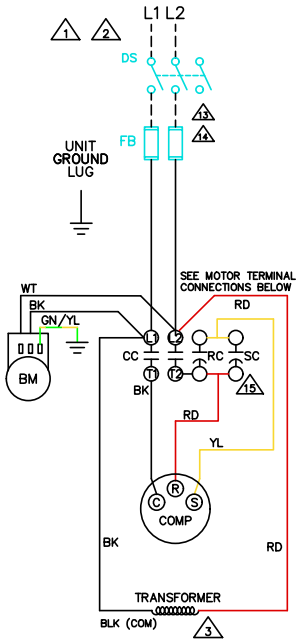
UPM STATUS LED - BLINK CODES	
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2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

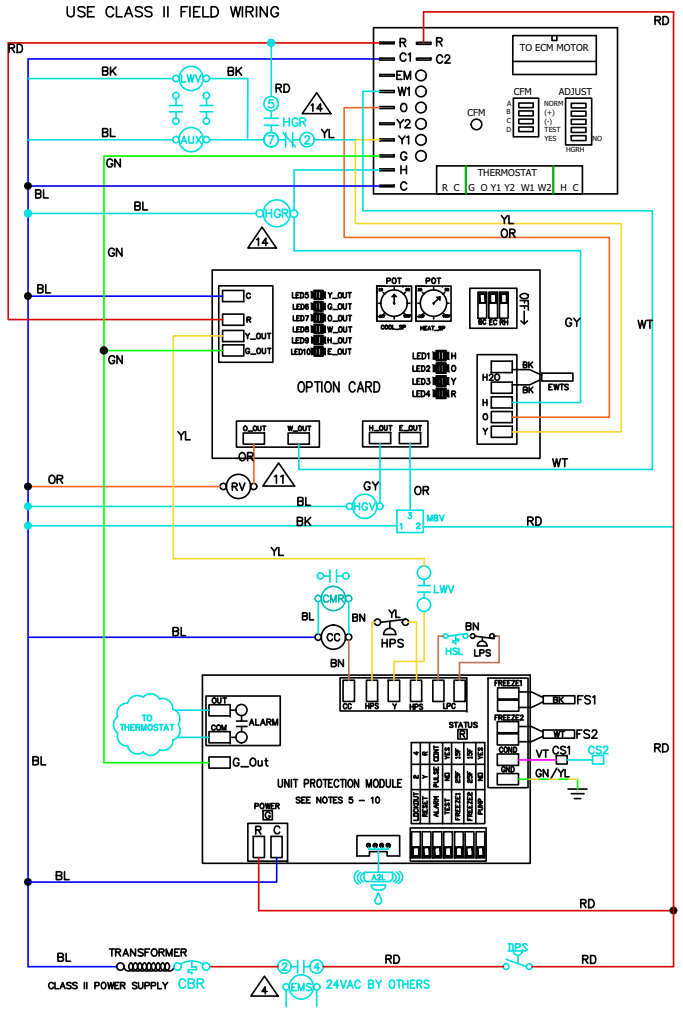
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ———————
FIELD WIRE – – – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RC – COMPRESSOR RUN CAPACITOR
RV – REVERSING VALVE (HEAT PUMPS)
SC – COMPRESSOR START CAPACITOR

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE





8 733 834 010 REV 6

NOTES:
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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
14. HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED WITH OPTIONS CARD
15. START CAPACITOR WILL BE PRESENT ON SIZES 015 – 024 OF VOLTAGE TYPE 1 & 2 AND START CAPACITOR WILL ALSO BE PRESENT ON SIZE 030 OF VOLTAGE TYPE 1.

Fig. 38 — Single Phase, Constant Airflow ECM, Option Card (WSE, HGRH, Boilerless Heat)

UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

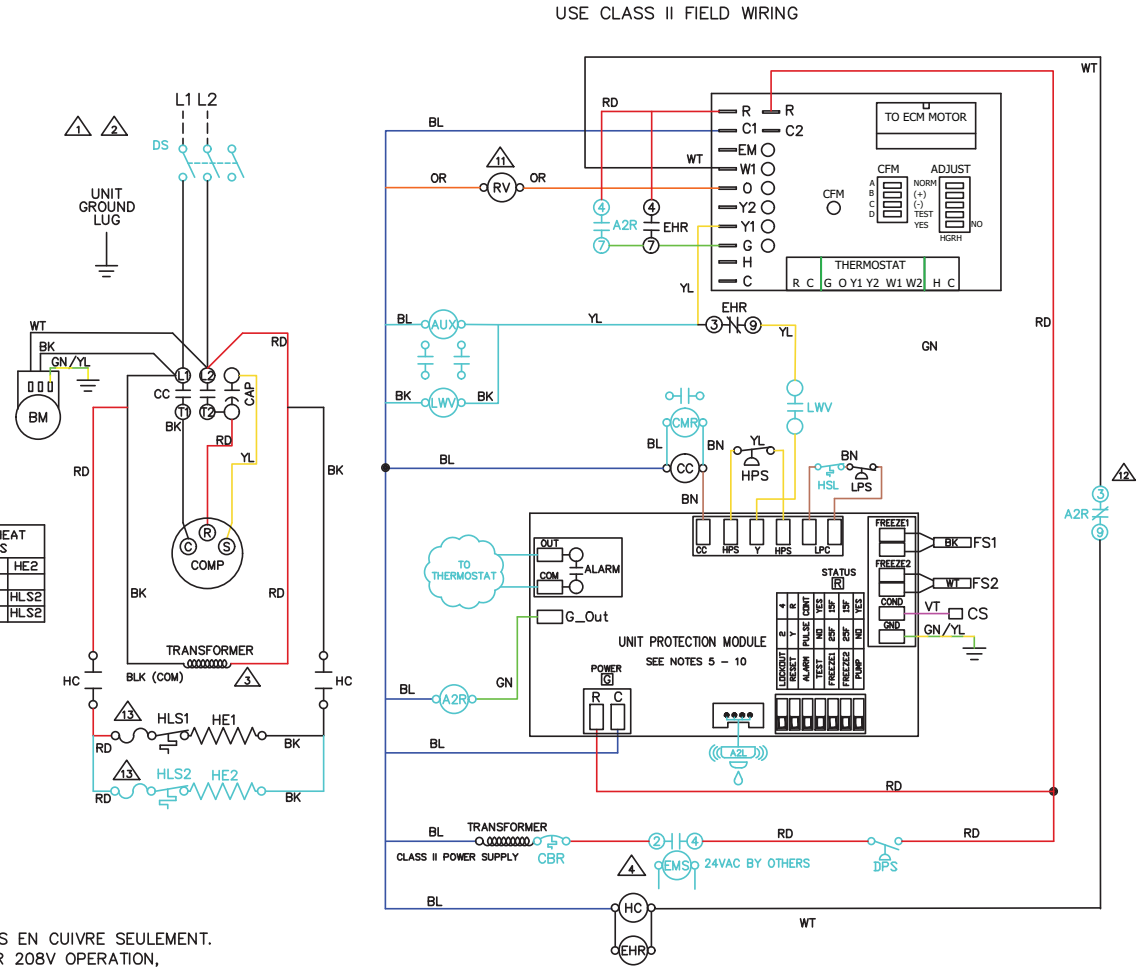
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE - - - - - - - -

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EHR – ELECTRIC HEATING/BLOWER RELAY
FS – FREEZE SENSOR
HE – HEATING ELEMENT
HLS – HEATING LIMIT SWITCH
HPS – HIGH PRESSURE SWITCH
HC – HEATING CONTACTOR
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] A2R – A2L BLOWER RELAY
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE

ELECTRIC HEAT ELEMENTS		
kW	HE1	HE2
5	HLS1	
7.5	HLS1	HLS2
10	HLS1	HLS2



NOTES:
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2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. A2R WILL ONLY BE PRESENT WHEN OPTIONAL A2L SENSOR IS CONNECTED.
13. DUAL RESET PRIMARY CONTACTS WILL OPEN AT 165°F (+/–5°F) AND CLOSE AT 135°F (+/–9°F). BACK UP CONTACTS WILL OPEN AT 180°F (+/–8°F). BACK–UP CONTACTS WILL NOT RESET.

8733834012

Fig. 39 — Single Phase, Constant Airflow ECM, E-Heat, Standard Unit

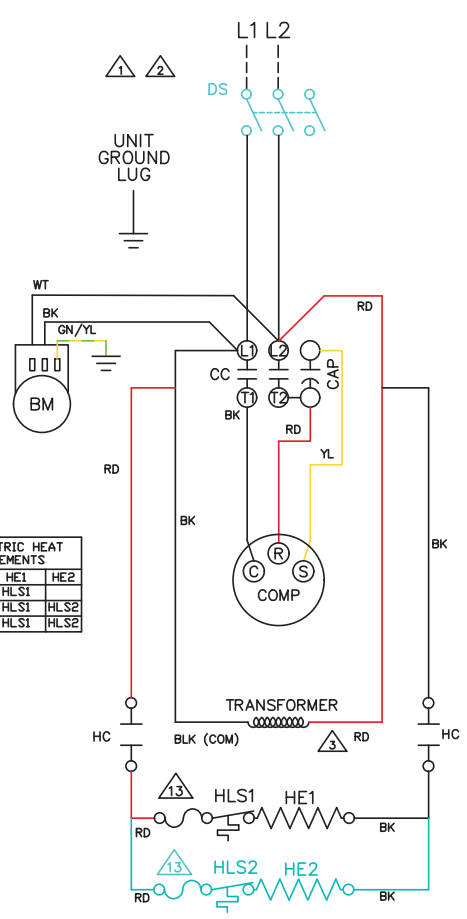
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENDSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

FACTORY WIRE ————————
FIELD WIRE – – – – – – – –

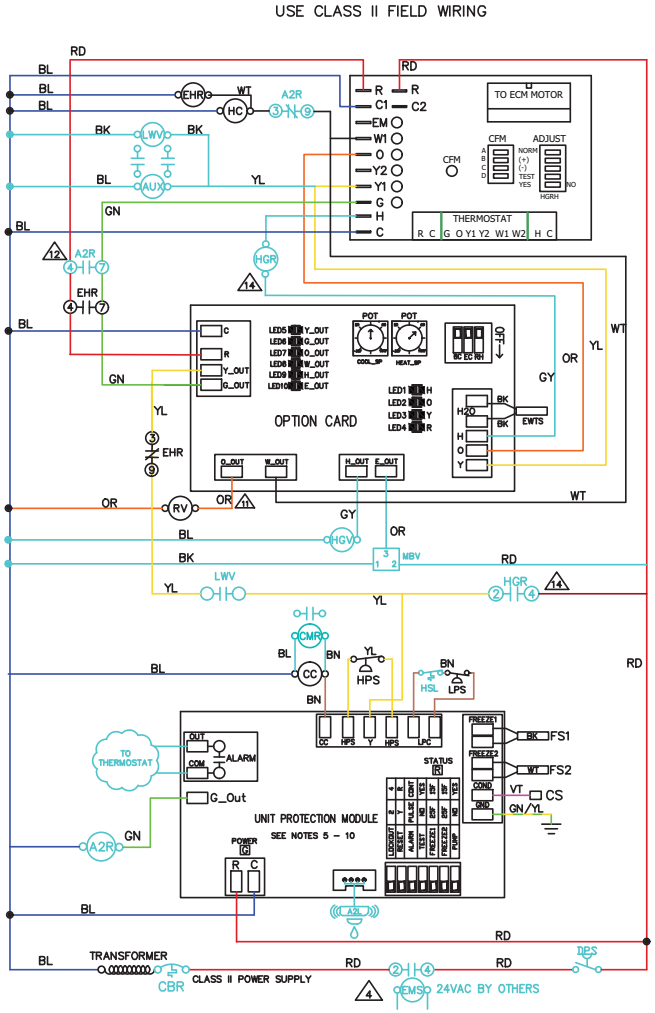
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
EHR – ELECTRIC HEATING/BLOWER RELAY
HE – HEATING ELEMENT
HLS – HEATING LIMIT SWITCH
HPS – HIGH PRESSURE SWITCH
HC – HEATING CONTACTOR
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFREGIRENT LEAK SENSOR
[ ] A2R – A2L BLOWER RELAY
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE



ELECTRIC HEAT ELEMENTS		
kW	HE1	HE2
5	HLS1	
7.5	HLS1	HLS2
10	HLS1	HLS2



NOTES:
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2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. A2R WILL ONLY BE PRESENT WHEN OPTIONAL A2L SENSOR IS CONNECTED.
13. DUAL RESET PRIMARY CONTACTS WILL OPEN AT 165°F (+/–5°F) AND CLOSE AT 135°F (+/–9°F). BACK UP CONTACTS WILL OPEN AT 180°F (+/–8°F). BACK–UP CONTACTS WILL NOT RESET.
14. HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED.

8733834014

Fig. 40 — Single Phase, Constant Airflow ECM, E-Heat, Option Card (WSE, HGRH, Boilerless Heat)

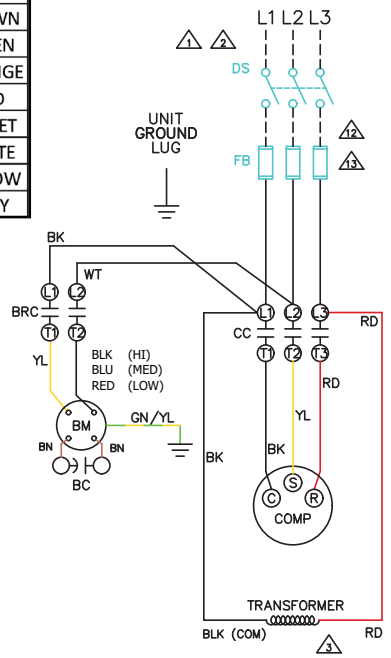
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

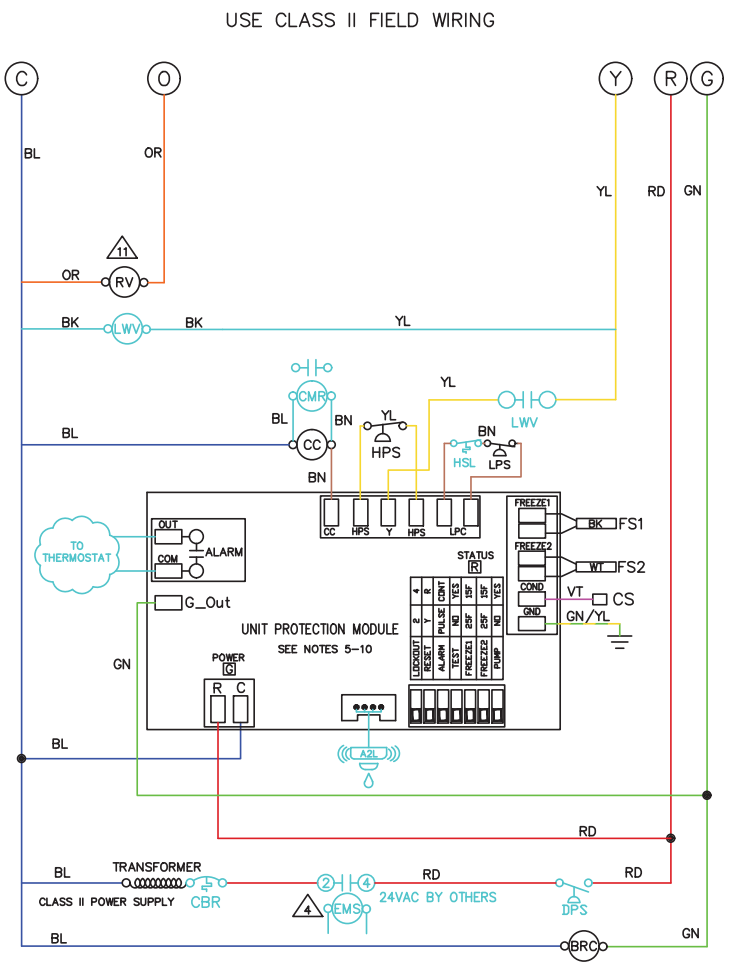
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————
FIELD WIRE --------

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSORS
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE





NOTES:
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4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
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6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
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11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.

8733845311

Fig. 41 — Three Phase, PSC Motor, Standard Unit

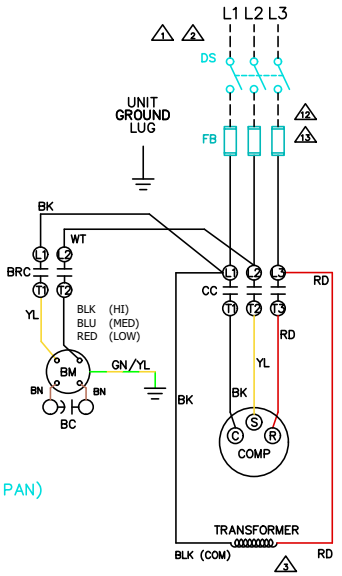
UPM STATUS LED - BLINK CODES	
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2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

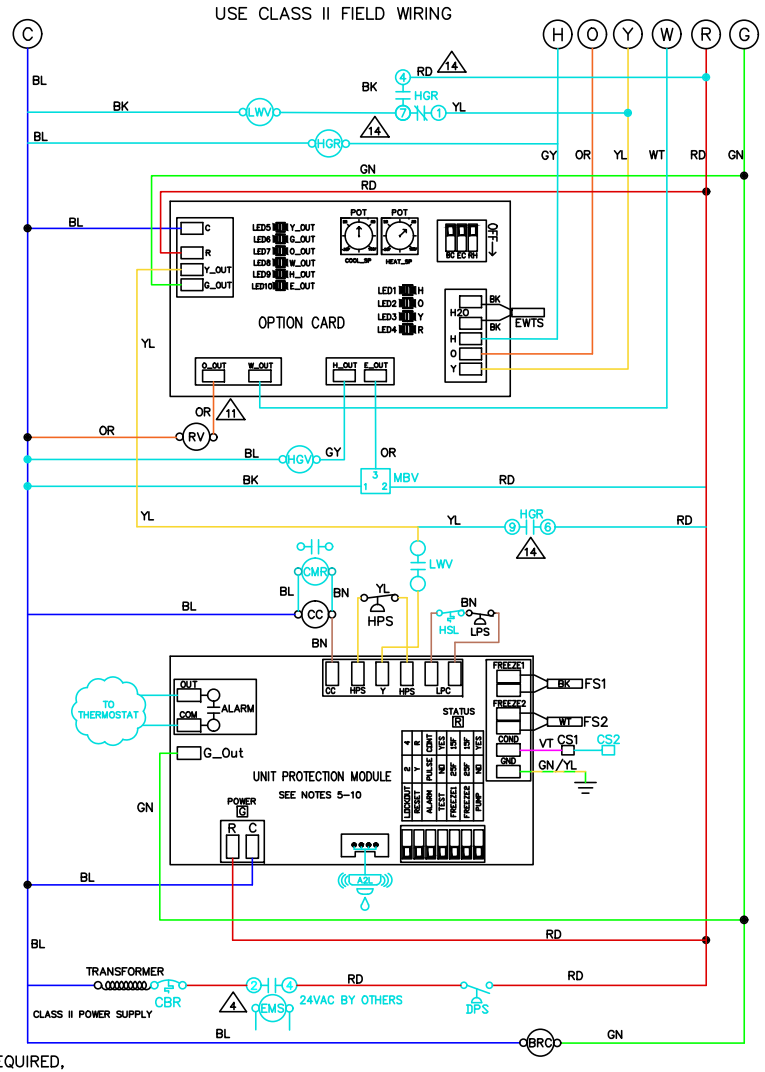
COLOR CHART LEGEND	
ABBREVIATION	COLOR
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GN	GREEN
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RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
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FACTORY WIRE ————————
FIELD WIRE - - - - - - - -

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE





8 733 845 312 REV 3

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
14. PINS 6 AND 9 OF THE HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED. PINS 1, 4 AND 7 OF THE HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED.

Fig. 42 — Three Phase, PSC Motor, Option Card (WSE, HGRH, Boilerless Heat)

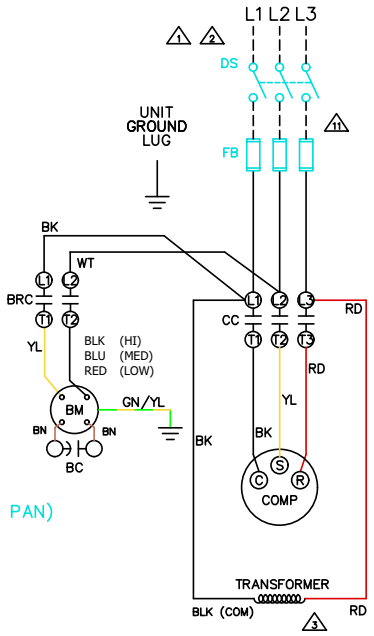
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

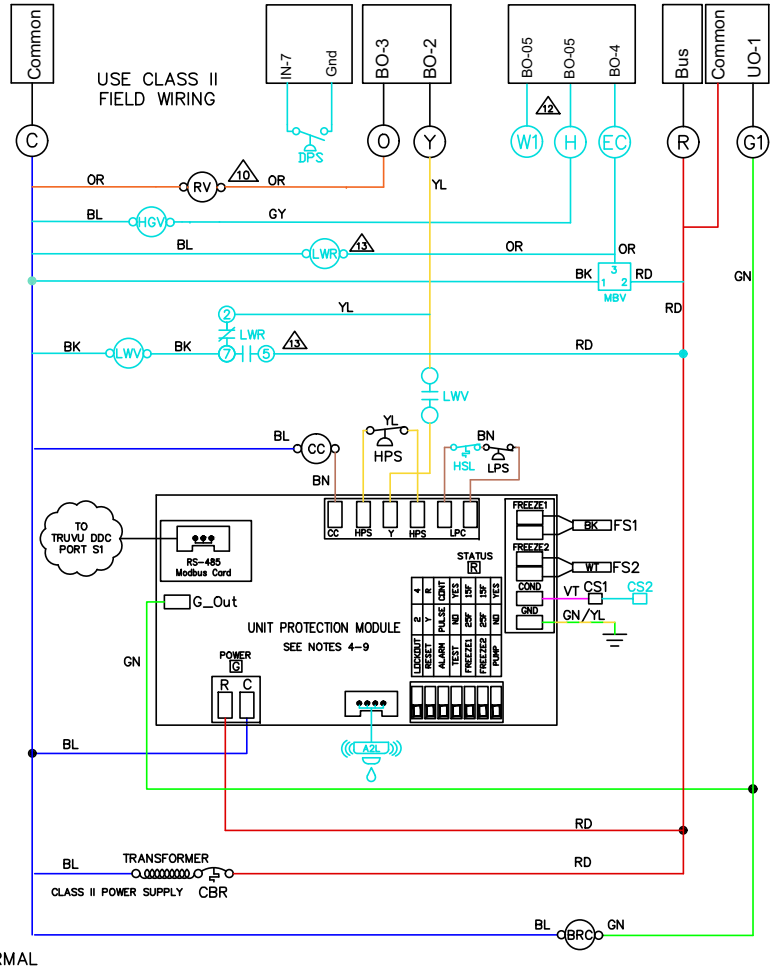
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————
FIELD WIRE - - - - - - -

STANDARD COMPONENTS LEGEND:
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BRC – BLOWER CONTACTOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSORS
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] LWR – LEAVING WATER RELAY
[ ] MBV – MOTORIZED BALL VALVE





NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
7. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
8. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
9. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
10. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
11. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
12. UNIT WILL HAVE OPTIONAL HOT GAS REHEAT OR FACTORY INSTALLED ELECTRIC HEAT, UNIT WILL NOT HAVE BOTH.
13. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.

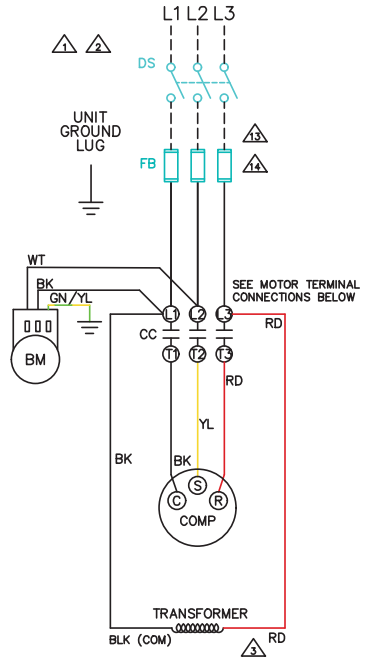
8 733 845 374 REV 3

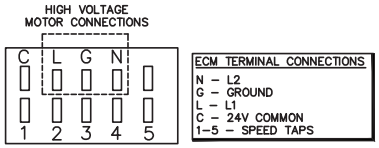
Fig. 43 — Three Phase, PSC Motor, TruVu DDC

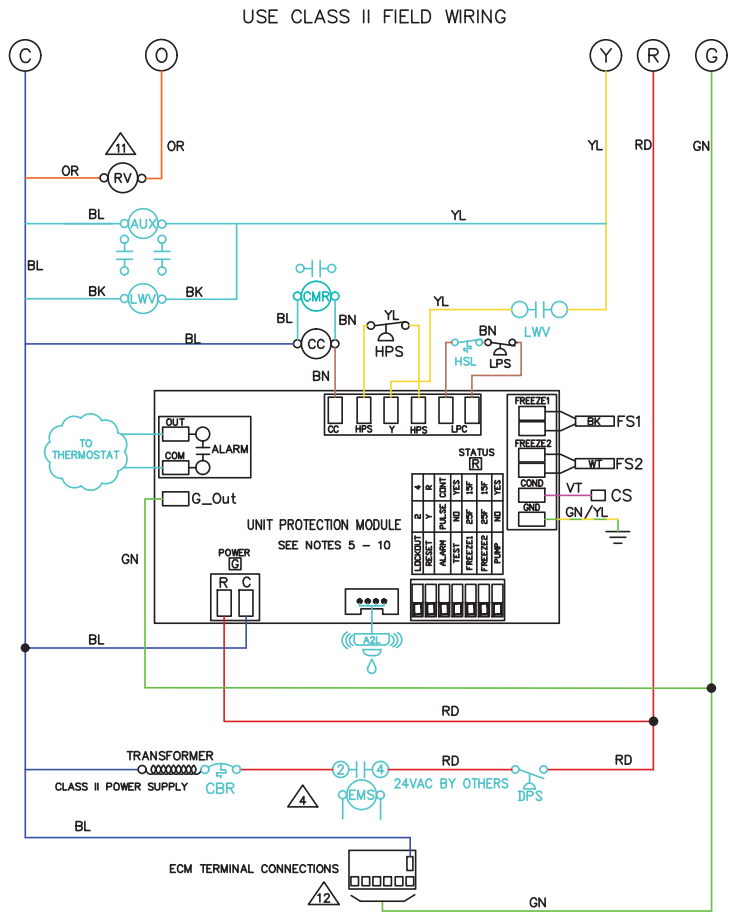
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

FACTORY WIRE ————————
FIELD WIRE --------

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY







STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
14. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.

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Fig. 44 — Three Phase, Constant Torque ECM, Standard Unit

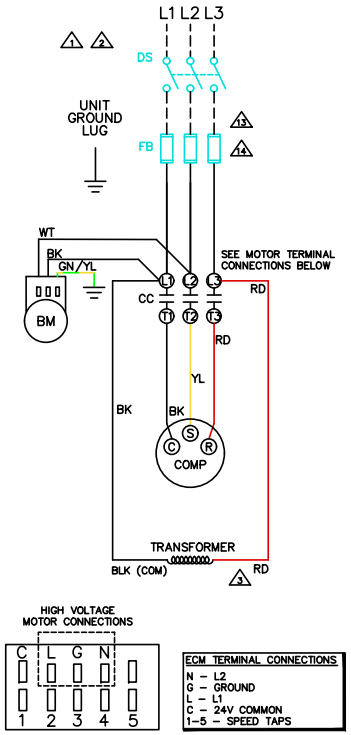
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

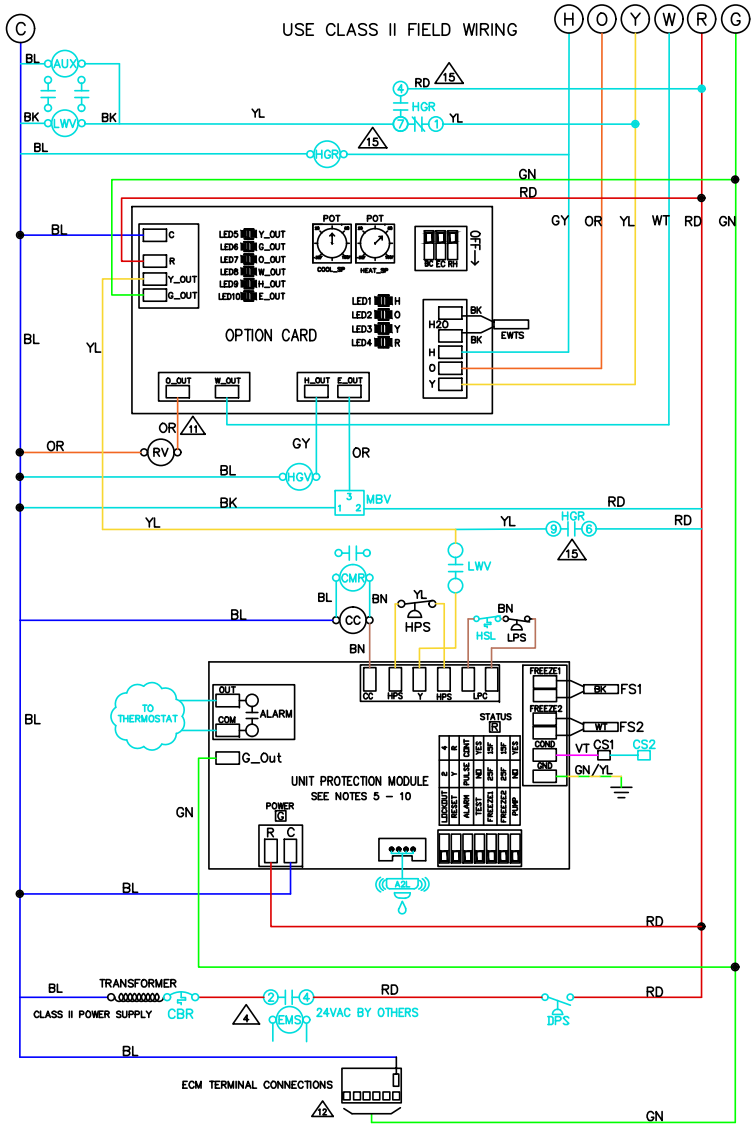
FACTORY WIRE ————
FIELD WIRE – – – – – –

COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE





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NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
13. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
14. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
15. PINS 6 AND 9 OF THE HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED. PINS 1, 4 AND 7 OF THE HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED.

Fig. 45 — Three Phase, Constant Torque ECM, Option Card (WSE, HGRH, Boilerless Heat)

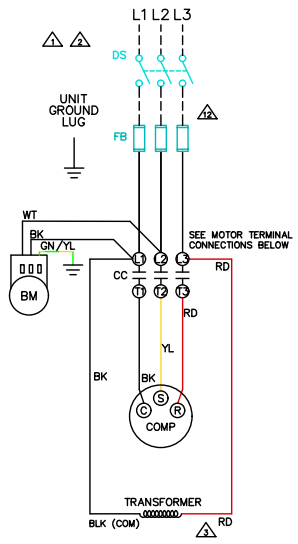
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

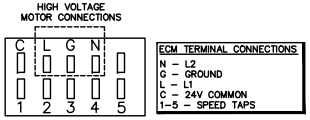
FACTORY WIRE ————
FIELD WIRE – – – – – –

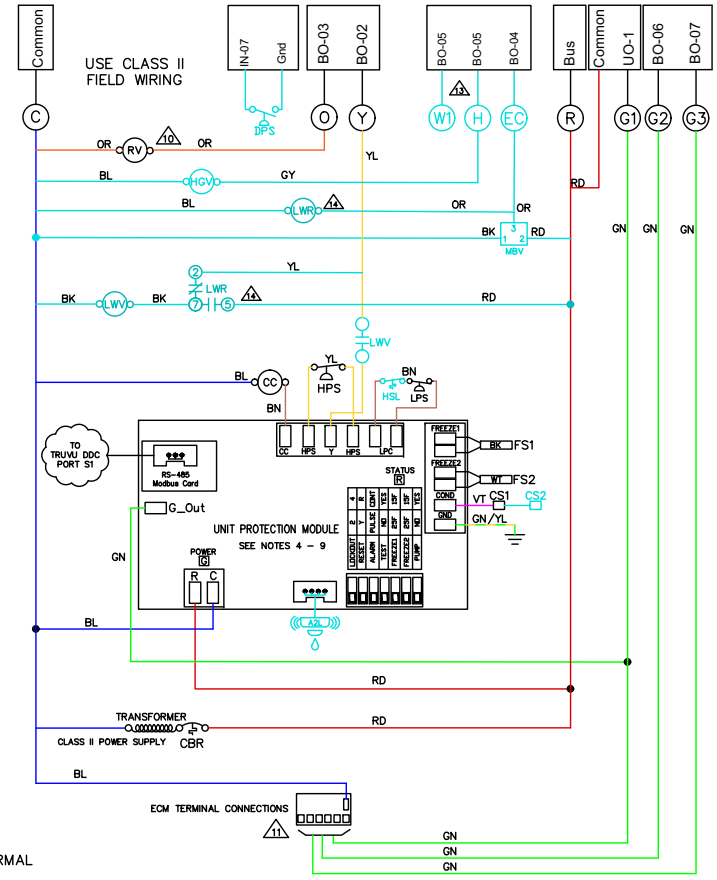
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] LWR – LEAVING WATER RELAY
[ ] MBV – MOTORIZED BALL VALVE







8 733 839 816 REV 5

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
7. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
8. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
9. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
10. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
11. REFER TO UNIT IOM FOR FACTORY DEFAULT MOTOR SPEED INSTALLATION SETTINGS AND AVAILABLE PROGRAMMED SPEED PINS.
12. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
13. UNIT WILL HAVE OPTIONAL HOT GAS REHEAT OR FACTORY INSTALLED ELECTRIC HEAT, UNIT WILL NOT HAVE BOTH.
14. LWR WILL ONLY BE USED IF FACTORY LEAVING WATER VALVE AND ECONOMZIER ARE SELECTED.

Fig. 46 — Three phase, Constant Torque ECM Motor, TruVu DDC

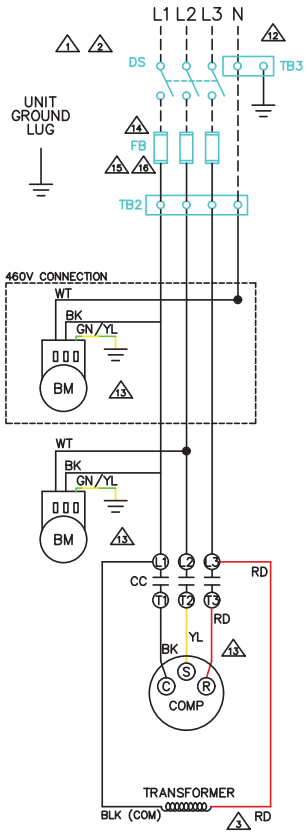
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

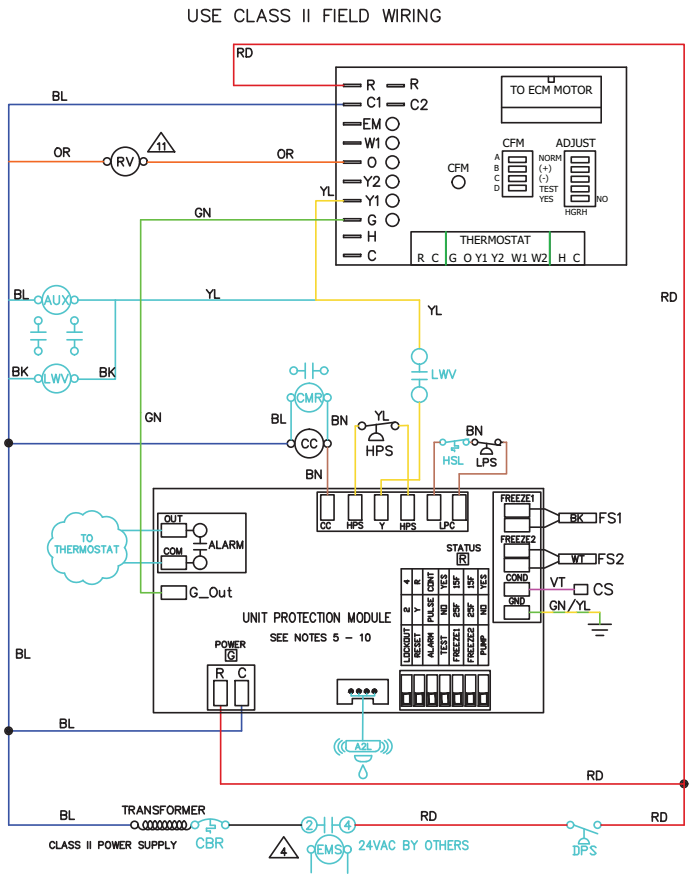
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————
FIELD WIRE – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)





NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION.
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX.
13. EON MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS EON MOTOR IS WIRED BETWEEN LINES.
14. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
15. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
16. SCCR OPTION IS NOT AVAILABLE ON 460 UNITS.

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Fig. 47 — Three Phase, Constant Airflow ECM, Standard Unit

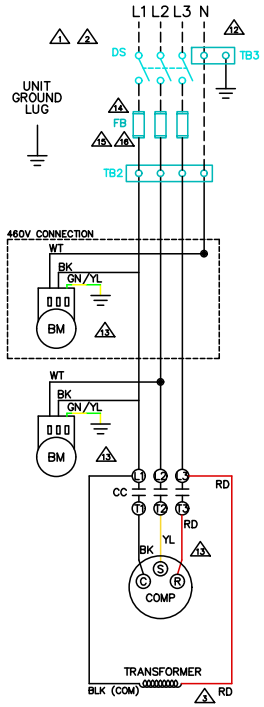
UPM STATUS LED - BLINK CODES	
1	HIGH PRESSURE FAULT
2	LOW PRESSURE FAULT
3	CONDENSER FREEZE CONDITION
4	CONDENSATE OVERFLOW FAULT
5	BROWN OUT FAULT
6	EVAPORATOR FREEZE CONDITION
7	REFRIGERANT LEAKAGE

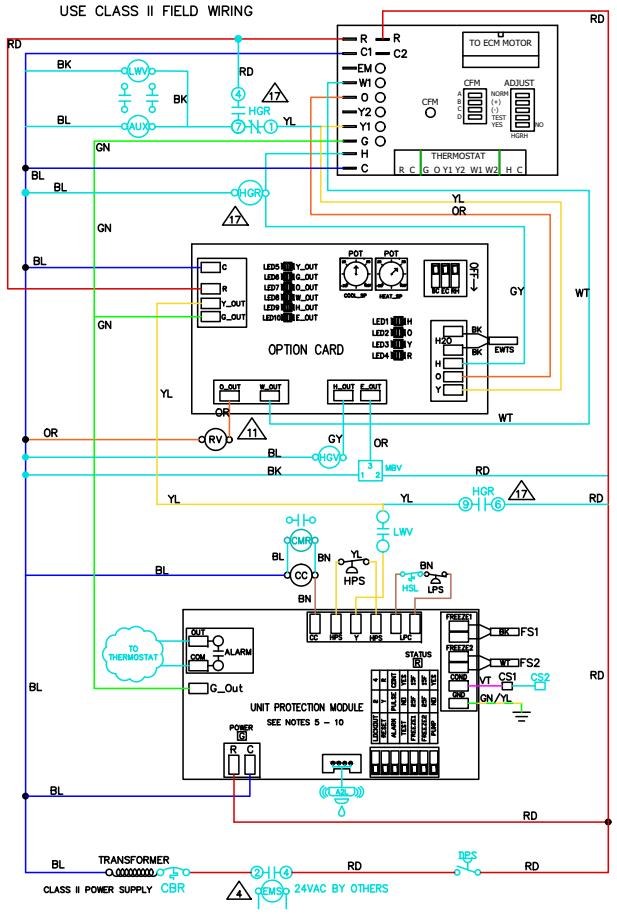
COLOR CHART LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BN	BROWN
GN	GREEN
OR	ORANGE
RD	RED
VT	VIOLET
WT	WHITE
YL	YELLOW
GY	GREY

FACTORY WIRE ————————
FIELD WIRE – – – – – – – –

STANDARD COMPONENTS LEGEND:
BM – BLOWER MOTOR
CAP – COMPRESSOR CAPACITOR
CC – COMPRESSOR CONTACTOR
CS1 – CONDENSATE SENSOR (IN UNIT DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] A2L – AIR TO LIQUID REFRIGERANT LEAK SENSOR
[ ] AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
[ ] CBR – 24V CIRCUIT BREAKER (75VA & 100VA ONLY)
[ ] CS2 – CONDENSATE SENSOR (IN ECONOMIZER DRAIN PAN)
[ ] CMR – COMPRESSOR MONITOR RELAY
[ ] DPS – DIFFERENTIAL PRESSURE SWITCH
[ ] DS – DISCONNECT SWITCH
[ ] EMS – ENERGY MGMT SYSTEM RELAY
[ ] FB – FUSE BLOCK (FOR 65KA SCCR RATING)
[ ] HGR – HOT GAS REHEAT RELAY
[ ] HGV – HOT GAS VALVE SOLENOID
[ ] HSL – HIGH TEMPERATURE SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] LWV – LEAVING WATER VALVE
[ ] MBV – MOTORIZED BALL VALVE
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)





8 733 834 022 REV 4

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY – CONDUCTEURS EN CUIVRE SEULEMENT.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE PRIMARY LEAD FROM 240 TERMINAL AND CONNECT IT TO 208. CAP ALL UNUSED TERMINALS.
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. UPM–I INCLUDES BUILT IN: 270–300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
6. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
7. "FREEZE SENSOR" ON CONDENSER WILL BE SET TO 25°F OPERATION BY DEFAULT, IF 15°F OPERATION IS REQUIRED, MOVE DIP SWITCH SLIDER TO THE 15°F POSITION
8. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED OR IF DDC CONNECTION IS AVAILABLE. CONT FOR NON BLINKING THERMOSTAT CONNECTION.
9. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL.
10. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R FROM TERMINAL BLOCK TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
11. REVERSING VALVE NOT PRESENT ON UNITS WITH STRAIGHT COOL.
12. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX.
13. EON MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS EON MOTOR IS WIRED BETWEEN LINES.
14. UNIT WILL HAVE OPTIONAL DISCONNECT SWITCH OR FUSE PROTECTION, UNIT WILL NOT HAVE BOTH.
15. OPTIONAL 65KA SCCR FUSE PROTECTION AVAILABLE ON 2 THROUGH 5 TON SIZES ONLY.
16. SCCR OPTION IS NOT AVAILABLE ON 460 UNITS.
17. PINS 6 AND 9 OF THE HOT GAS REHEAT RELAY WILL ONLY BE USED WHEN HOT GAS REHEAT AND ECONOMIZER OPTIONS ARE SELECTED. PINS 1, 4 AND 7 OF THE HOT GAS RELAY WILL ONLY BE USED WHEN HGRH AND LEAVING WATER VALVE ARE SELECTED.

Fig. 48 — Three Phase, Constant Airflow ECM, Option Card (WSE, HGRH, Boilerless Heat)

FACTORY INSTALLED COMPONENTS (OUTPUTS):
UO-1 - UNIVERSAL OUTPUT 1:
[ ] G1 - FAN ON (PSC & CT ECM)
[ ] ECM - FAN MODULATION (CA ECM PWM)
[ ] VFD - FAN MODULATION (VFD 0-10VDC)

AO-2 - ANALOG OUTPUT 2:
[ ] MRV - MODULATING REHEAT VALVE

BO-2 - BINARY OUTPUT 2:
[ ] Y1 - COMPRESSOR

BO-3 - BINARY OUTPUT 3:
[ ] O - REVERSING VALVE

BO-4 - BINARY OUTPUT 4:
[ ] Y2 - COMRPESSOR (TWO STAGE/SPEED)
[ ] WSE - WATER-SIDE ECONOMIZER VALVE (SINGLE STAGE)
[ ] W1 - AUX HEAT 1ST STAGE (SINGLE STAGE)

BO-5 - BINARY OUTPUT 5:
[ ] H - DEHUMIDIFICATION (HGRH)
[ ] W1 - AUX HEAT 1ST STAGE (SINGLE OR TWO STAGE/SPEED)

BO-6 - BINARY OUTPUT 6:
[ ] G2 - FAN ON (CT ECM)
[ ] WSE - WATER-SIDE ECONOMIZER VALVE (TWO STAGE)
[ ] W2 - AUX HEAT 2ND STAGE (TWO STAGE/SPEED)

BO-7 - BINARY OUTPUT 7:
[ ] G3 - FAN ON (CT ECM)
[ ] VFD - VFD ENABLE/DISABLE

STANDARD FACTORY INSTALLED COMPONENTS (INPUTS):
IN-2 - UNIVERSAL INPUT 2:
[ ] LWTS - LEAVING WATER TEMPRATURE SENSOR

IN-3 - UNIVERSAL INPUT 3:
[ ] EWTS - ENTERING WATER TEMPRATURE SENSOR

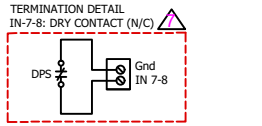
STANDARD FACTORY PROVIDED COMPONENTS (INPUTS):
IN-1 - UNIVERSAL INPUT 1:
[ ] SATS - SUPPLY AIR TEMPRATURE SENSOR

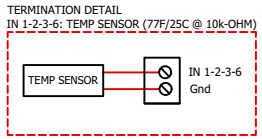
IN-6 - UNIVERSAL INPUT 6:
[ ] RATS - RETURN AIR TEMPRETURE SENSOR

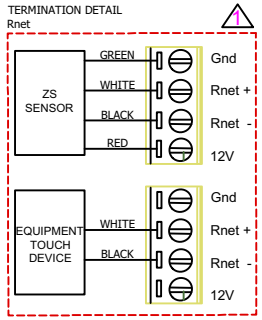
OPTIONAL FACTORY INSTALLED COMPONENTS (INPUTS):
IN-7 - UNIVERSAL INPUT 7:
[ ] DPS - DIFFERENTIAL PRESSURE SWITCH

OPTIONAL FIELD INSTALLED COMPONENTS (INPUTS):
IN-6 - UNIVERSAL INPUT 6:
[ ] SPT - SPACE TEMPRETURE SENSOR

IN-7 OR 8 - UNIVERSAL INPUT 7 OR 8:
[ ] EMSD - EMERGENCY SHUTDOWN
[ ] OCC - REMOTE OCCUPANCY
[ ] SCO - SECONDARY CONDENSATE OVERFLOW
[ ] FS - FLOW SWITCH
[ ] FM - WATER FLOW METER

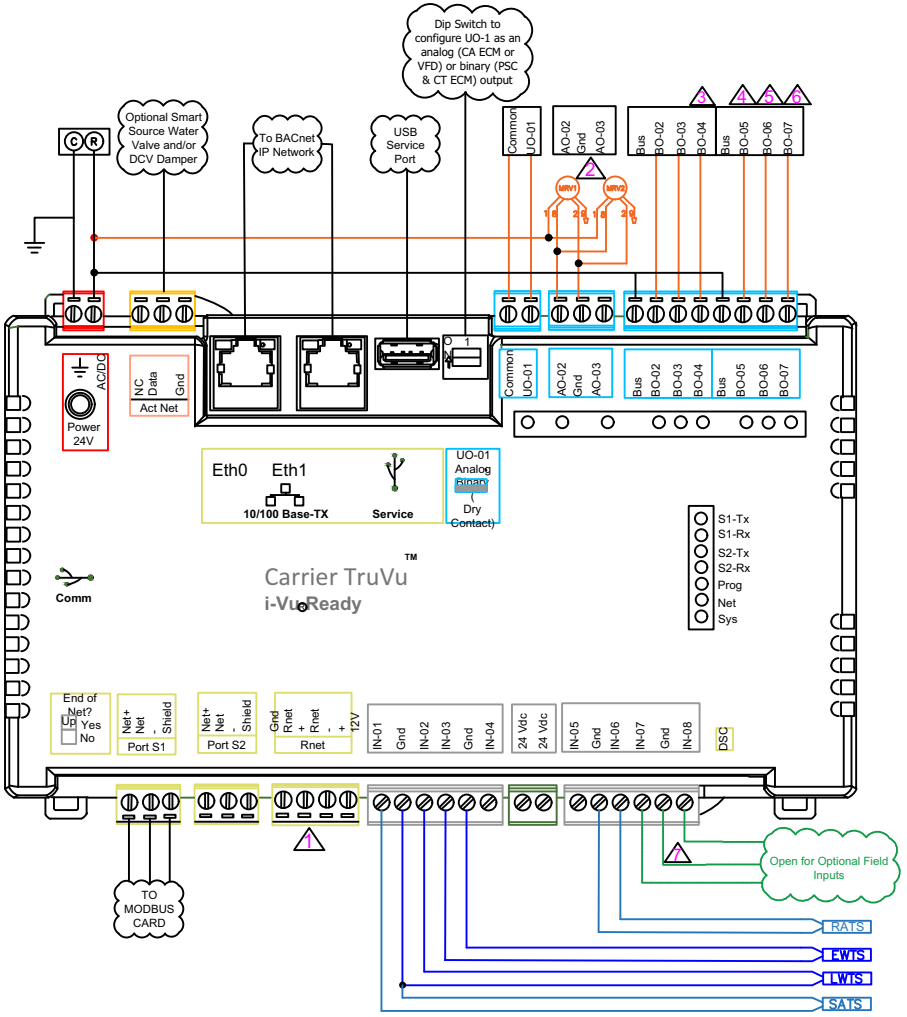






FACTORY WIRE ————————
FIELD WIRE ----------

1. EQUIPMENT TOUCH DEVICE OR OPTIONAL ZS COMBINATION WALL SENSOR CAPABLE OF TEMPERATURE, HUMIDITY, AND CO2 READINGS.
2. OPTIONAL MODULATING REHEAT VALVE (MRV)
3. **TWO STAGE/SPEED UNITS:** BO-4 IS ONLY AVAILABLE FOR OUTPUT SIGNAL (Y2)
   SINGLE STAGE/SPEED UNITS: BO-4 IS AVAILABLE FOR WSE
4. H SIGNAL IS USED ON REHEAT APPLICATIONS
5. **TWO STAGE/SPEED UNITS:** BO-6 IS AVAILABLE FOR WSE OUTPUT SIGNAL
   SINGLE STAGE/SPEED UNITS: BO-6 IS AVAILABLE FOR FAN ON G2 OUTPUT SIGNAL
6. IN-07 UTILIZED FOR OPTIONAL FACTORY INSTALLED DIFFERENTIAL PRESSURE FLOW SWITCH WHEN EQUIPPED



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Fig. 49 — TruVu DDC Controller Wiring Diagram

PRE-START-UP

System Checkout

After completing the installation, and before energizing the unit, the following system checks should be made prior to initial startup:

1. Verify the supply voltage to the heat pump is in accordance with the nameplate ratings.
2. Verify the control transformer is set to the correct voltage for 208/230-v units (factory setting is 230-v).
3. Make sure all electrical connections are tight and secure.
4. Check the electrical fusing/breaker and wiring for the correct size.
5. Verify the low voltage wiring between the thermostat or DDC controls and the unit is correct.
6. Verify the water piping is complete and correct.
7. Verify there are no leaks in the external piping or in the internal unit piping. Correct as necessary.
8. Verify the isolation or flow control valves are open and that any automatic flow control valve or balancing valve are set to the correct setting.
9. Check the water flow is correct and adjust if necessary.
10. Check the blower for free rotation, and that it is secured to the shaft.
11. Verify the foam blower shipping support has been removed.
12. Vertical Units Only - Verify vibration isolation has been provided and the unit has been installed on a solid structure.
13. Horizontal Units Only - Verify the hanging brackets have been installed and the unit is secured to an adequate support structure.
14. Verify the unit has proper service clearance. Be certain that all access panels are secured in place.
15. Verify ductwork has been properly fastened to supply and return duct collars.
16. Verify the ductwork is free from obstruction and that all dampers or registers are open.
17. Make sure return air filters are positioned correctly in the filter rack if removed during installation.
18. Verify the unit is not in TEST mode.
19. Verify all control components have been properly configured and that all control components have been wired.
20. For units with TruVu™ DDC controller, verify a space temperature input is provided via ZS sensor, or non-communication zone sensor (10K thermistor), or over the network and a commissioning interface is available.

CLEAN AIR COIL

To obtain maximum performance, clean the air coil before starting the unit. A ten percent solution of dishwasher detergent and water is recommended for both sides of the coil. Rinse thoroughly with water.

Set Blower Motor Speed

PERMANENT SPLIT CAPACITOR (PSC) MOTOR

All 50WC units are available with PSC blower motors. For 208/230-v, 265-v, or 460-v units, the PSC motor has three speed settings. For 575-v units, the PSC motor only has one speed setting. See Tables 15-18 for blower performance by speed setting, and for the factory default motor setting.

If a motor speed change is required, follow the instructions below:

1. Disconnect power to the heat pump and follow all proper lockout and tagout procedures to ensure that power is removed from the unit.
2. Remove the front access cover.
3. Remove blower speed wire from the blower relay. Clip the 1/4 in. quick connect from the lead and cap the unused lead.
4. Uncap the desired blower speed wire and terminate with 1/4 in. quick connect. Connect to the blower relay.
5. If the motor is a 460-v motor and the speed is changed from high to medium or low, connect the high speed motor lead to the orange intermediate winding lead instead of simply capping it.

CONSTANT TORQUE (ECM) MOTOR

All 50WC units in 208/230-v, 265-v, or 460-v are available with constant torque ECM blower motors. Unit sizes from 007 to 012 have 3 speed settings, and units sizes from 015-070 have 5 speed settings. See Tables 17-18 for blower performance by speed setting, and for the factory default motor setting.

If a motor speed change is required, follow the instructions below:

1. Disconnect power to the heat pump and follow all proper lockout and tagout procedures to ensure that power is removed from the unit.
2. Remove the blower access panel and access the torque tap wire on the motor.
3. Change the torque tap wire to on the molex plug to one of the three or five speed settings. See Fig. 50 and 51.

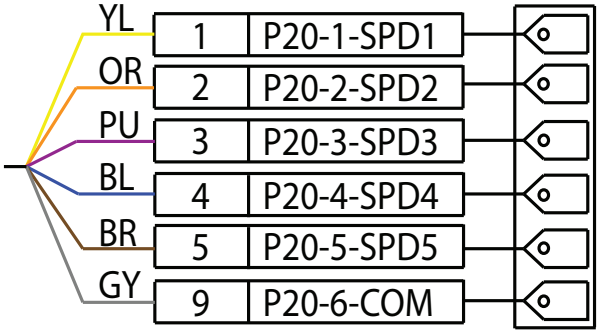


Fig. 50 — 5 Speed Settings Constant Torque ECM Pin Diagram

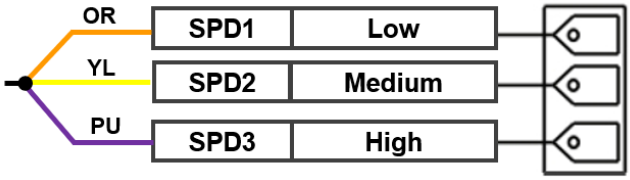


Fig. 51 — 3 Speed Settings Constant Torque ECM Pin Diagram

NOTE: Constant Torque Motors (ECM) are programmed to have a 30s ramp up/down. Contact application engineering for details on applications where immediate ramp down is required.

CONSTANT AIRFLOW (ECM) MOTOR

The 50WC units in 208/230-v, 265-v, or 460-v are available with a constant airflow ECM blower motor. These motors dynamically adjust their power output to precisely match the desired airflow on a pre-programed fan curve. See Tables 15-20 for blower performance by speed setting, and for the factory default motor setting. These motors include the following features:

1. **Three Speed Settings**: Units are factory set to "NORM" but can be field adjusted to "+" to increase CFM by 15% or to "-" to reduce CFM by 15%. See the constant airflow ECM motor blower performance table for complete details on available CFM for each unit size (refer to "Low Voltage, Control Wiring" on page 23 of this manual).
2. **Low CFM Ventilation:** Units circulate air at 70% of full airflow rate when there is a call for fan only.
3. **Passive Dehumidification**: Reduces airflow during a cooling call when dehumidification is also required. This reduces the sensible heat ratio of the cooling coil and extends cooling run time to dehumidify more effectively (refer to "COOLING OPERATION" on page 76 of this manual).
4. **Test Mode:** Operates the motor at a 70% torque setting. This setting can be used to diagnose programming problems in the motor itself (refer to "High Condensate Level Shutdown" on page 26 of this manual).
5. **CFM Indicator Light**: indicator light blinks for each 100 CFM of air delivered.

   NOTE: This blink code is approximate and should not replace test and balance.

Table 15 — 50WC Vertical Units (PSC Motor Performance)[a,b]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low		289	267	244	213	—	—	—	—	—	—	—	—
	Med	X	335	309	283	251	215	—	—	—	—	—	—	—
	High		347	320	294	262	225	185	—	—	—	—	—	—
50WC009	Low		294	281	267	248	—	—	—	—	—	—	—	—
	Med	X	379	360	340	316	289	—	—	—	—	—	—	—
	High		414	391	369	343	314	284	—	—	—	—	—	—
50WC012	Low		294	281	267	248	—	—	—	—	—	—	—	—
	Med		379	360	340	316	289	—	—	—	—	—	—	—
	High	X	414	391	369	343	314	284	—	—	—	—	—	—
50WC015	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC018	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC024	Low		730	723	703	679	637	544	493	—	—	—	—	—
	Med		821	808	787	757	720	667	535	479	—	—	—	—
	High	X	1019	972	943	890	840	779	696	535	473	—	—	—
50WC030	Low		730	723	703	679	637	544	493	412	—	—	—	—
	Med		821	808	787	757	720	667	535	479	—	—	—	—
	High	X	1019	972	943	890	840	779	696	535	473	—	—	—
50WC036 208/230, 460-v	Low		1178	1139	1097	1052	998	935	863	—	—	—	—	—
	Med		1250	1204	1158	1108	1052	987	912	826	—	—	—	—
	High	X	1289	1240	1194	1142	1082	1017	945	857	—	—	—	—
50WC036 265-v	Low		1022	1013	988	953	884	805	750	684	—	—	—	—
	Med		1221	1193	1156	1118	1059	964	837	772	—	—	—	—
	High	X	1353	1304	1261	1206	1147	1062	887	808	—	—	—	—
50WC042	Low		963	999	1016	1013	996	995	860	—	—	—	—	—
	Med		1237	1243	1263	1260	1243	1215	1103	—	—	—	—	—
	High	X	1561	1559	1547	1520	1480	1426	1357	1165	—	—	—	—
50WC048	Low		1424	1422	1410	1393	1364	1327	1273	1210	1124	—	—	—
	Med		1677	1662	1633	1590	1538	1481	1407	1324	1229	—	—	—
	High	X	1953	1896	1847	1778	1704	1609	1515	1422	1319	1167	—	—
50WC060	Low		1646	1636	1627	1592	1573	1540	1505	1462	1415	1397	—	—
	Med		1832	1819	1806	1793	1746	1711	1659	1619	1553	1501	1417	—
	High	X	2081	2076	2029	2008	1976	1934	1876	1812	1740	1659	1575	—
50WC070	Low		1593	1586	1587	1576	1572	1561	1563	1550	1534	1504	1456	1411
	Med		1776	1777	1774	1778	1776	1756	1749	1733	1728	1684	1659	1606
	High	X	2028	2033	2029	2029	2030	2029	2024	1991	1969	1943	1906	1852

NOTE(S):

a. 575-v models employ 1-speed motors (high only).
b. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Table 16 — 50WC Horizontal Units (PSC Motor Performance)[a,b]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low		296	285	271	254	235	—	—	—	—	—	—	—
	Med	X	410	391	373	349	321	—	—	—	—	—	—	—
	High		465	442	420	393	360	—	—	—	—	—	—	—
50WC009	Low		296	281	266	244	—	—	—	—	—	—	—	—
	Med	X	393	373	347	323	293	255	223	—	—	—	—	—
	High		424	401	373	345	314	279	238	196	—	—	—	—
50WC012	Low		296	281	266	244	—	—	—	—	—	—	—	—
	Med		393	373	347	323	293	255	223	—	—	—	—	—
	High	X	424	401	373	345	314	279	238	196	—	—	—	—
50WC015	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC018	Low		542	519	469	437	415	375	—	—	—	—	—	—
	Med		621	598	546	497	452	424	360	—	—	—	—	—
	High	X	814	774	733	602	545	500	449	366	—	—	—	—
50WC024	Low		1010	965	923	878	811	625	—	—	—	—	—	—
	Med	X	1079	1016	967	912	851	721	568	—	—	—	—	—
	High		1118	1060	1000	949	888	795	586	561	—	—	—	—
50WC030	Low		1010	965	923	878	811	625	—	—	—	—	—	—
	Med		1079	1016	967	912	851	721	568	—	—	—	—	—
	High	X	1118	1060	1000	949	888	795	586	561	—	—	—	—
50WC036	Low		1027	1029	1024	1010	930	922	912	857	786	689	—	—
	Med		1282	1272	1245	1217	1168	1026	1001	971	904	796	—	—
	High	X	1535	1497	1444	1384	1315	1250	1034	1026	979	887	—	—
50WC042	Low		1279	1248	1212	1161	1087	992	853	801	744	675	—	—
	Med		1465	1414	1365	1301	1240	1097	917	846	774	702	—	—
	High	X	1569	1509	1418	1358	1298	1189	995	869	816	741	—	—
50WC048	Low		1399	1388	1377	1359	1327	1284	1245	1173	1106	883	—	—
	Med		1651	1605	1562	1525	1481	1420	1362	1293	1209	1101	—	—
	High	X	1816	1764	1712	1660	1590	1519	1446	1367	1284	1198	—	—
50WC060	Low		1639	1620	1597	1565	1529	1482	1424	1358	1276	1194	1100	994
	Med		1812	1789	1737	1698	1653	1600	1539	1472	1388	1287	1187	1076
	High	X	2022	1976	1937	1887	1833	1771	1704	1628	1543	1443	1309	1193
50WC070	Low		1636	1626	1611	1607	1591	1571	1540	1506	—	—	—	—
	Med		1822	1822	1814	1793	1777	1756	1724	1675	1626	1562	—	—
	High	X	2092	2082	2068	2045	2020	1968	1932	1878	1815	1730	1640	1525

NOTE(S):

a. 575-v models employ 1-speed motors (high only).
b. Airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Table 17 — 50WC Vertical Units (Constant Torque Motor Performance)[a,b]

MODEL	TAP NO.	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low	X	335	322	309	298	—	—	—	—	—	—	—	—
	Medium		413	403	392	375	351	—	—	—	—	—	—	—
	High		456	436	415	393	368	345	—	—	—	—	—	—
50WC009	Low		335	322	309	298	—	—	—	—	—	—	—	—
	Medium	X	413	403	392	375	351	—	—	—	—	—	—	—
	High		456	436	415	393	368	345	—	—	—	—	—	—
50WC012	Low		335	322	309	298	—	—	—	—	—	—	—	—
	Medium		413	403	392	375	351	—	—	—	—	—	—	—
	High	X	456	436	415	393	368	345	—	—	—	—	—	—
50WC015	1		577	540	494	458	436	408	372	351	—	—	—	—
	2	X	647	621	564	537	504	468	440	398	—	—	—	—
	3		829	799	777	739	619	572	527	417	295	—	—	—
	4		947	895	838	782	646	594	528	436	316	—	—	—
	5		945	907	860	799	694	605	532	469	—	—	—	—
50WC018	1		577	540	494	458	436	408	372	—	—	—	—	—
	2		647	621	564	537	504	468	440	398	—	—	—	—
	3	X	829	799	777	739	619	572	527	417	—	—	—	—
	4		947	895	838	782	646	594	528	436	—	—	—	—
	5		945	907	860	799	694	605	532	469	—	—	—	—
50WC024	1		600	578	538	498	448	418	—	—	—	—	—	—
	2		669	649	616	588	528	487	467	423	—	—	—	—
	3		861	833	812	787	757	732	645	562	—	—	—	—
	4	X	1034	1005	967	923	867	803	726	583	—	—	—	—
	5		1071	1027	988	939	888	827	738	590	—	—	—	—
50WC030	1		600	578	538	498	448	418	—	—	—	—	—	—
	2		669	649	616	588	528	487	467	423	—	—	—	—
	3		861	833	812	787	757	732	645	562	—	—	—	—
	4		1034	1005	967	923	867	803	726	583	—	—	—	—
	5	X	1071	1027	988	939	888	827	738	590	—	—	—	—
50WC036	1		885	864	832	808	—	—	—	—	—	—	—	—
	2		1028	999	978	951	940	908	872	—	—	—	—	—
	3		1199	1175	1152	1114	1063	1005	929	811	—	—	—	—
	4		1270	1227	1177	1127	1075	996	928	804	—	—	—	—
	5	X	1288	1246	1188	1136	1072	1008	927	809	—	—	—	—
50WC042	1		1202	1175	1150	1128	1108	1080	1021	971	935	903	—	—
	2		1295	1269	1244	1230	1203	1183	1154	1093	1025	940	—	—
	3		1399	1377	1352	1333	1302	1284	1260	1236	1051	963	—	—
	4	X	1500	1475	1452	1425	1400	1377	1364	1321	1251	966	—	—
	5		1607	1580	1558	1532	1509	1492	1420	1351	1264	977	—	—
50WC048	1		1412	1383	1359	1331	—	—	—	—	—	—	—	—
	2		1606	1579	1556	1529	1501	1471	1421	—	—	—	—	—
	3	X	1728	1701	1675	1651	1622	1588	1472	—	—	—	—	—
	4		1827	1801	1780	1751	1680	1593	1468	—	—	—	—	—
	5		1897	1873	1848	1797	1722	1628	1482	1376	—	—	—	—
50WC060	1		1899	1873	1847	1822	1780	1760	—	—	—	—	—	—
	2		2032	2004	1970	1942	1903	1876	—	—	—	—	—	—
	3	X	2152	2116	2091	2057	2015	1984	1953	1927	1888	—	—	—
	4		2252	2224	2194	2165	2132	2099	2066	2021	1948	1866	—	—
	5		2380	2355	2332	2292	2256	2219	2161	2096	2017	1925	1832	1723
50WC070	1		2055	2027	1991	1965	1939	1911	1874	1845	1816	1779	—	—
	2		2149	2122	2096	2060	2034	2008	1979	1945	1916	1887	—	—
	3	X	2225	2198	2172	2140	2111	2087	2057	2029	1995	1968	—	—
	4		2388	2361	2330	2300	2272	2246	2220	2190	2155	2124	2094	2062
	5		2436	2408	2380	2351	2322	2294	2267	2240	2210	2179	2145	2111

NOTE(S):

a. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.
b. Off delay = 30 seconds = After receiving an off command motor will continue running for 30 seconds.

Table 18 — 50WC Horizontal Units (Constant Torque Motor Performance)[a,b]

MODEL	TAP NO.	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC007	Low	X	342	331	317	305	293	281	264	—	—	—	—	—
	Medium		426	414	402	381	356	329	300	267	—	—	—	—
	High		467	446	429	405	381	353	320	282	—	—	—	—
50WC009	Low		342	331	317	305	293	281	264	—	—	—	—	—
	Medium	X	426	414	402	381	356	329	300	267	—	—	—	—
	High		467	446	429	405	381	353	320	282	—	—	—	—
50WC012	Low		342	331	317	305	293	281	264	—	—	—	—	—
	Medium		426	414	402	381	356	329	300	267	—	—	—	—
	High	X	467	446	429	405	381	353	320	282	—	—	—	—
50WC015	1		505	434	392	368	327	—	—	—	—	—	—	—
	2		538	491	440	424	384	338	—	—	—	—	—	—
	3	X	669	636	597	533	499	485	447	—		—	—	—
	4		762	733	704	658	605	569	538	488	—	—	—	—
	5		861	838	823	800	771	641	569	511	—	—	—	—
50WC018	1		505	434	392	368	327	—	—	—	—	—	—	—
	2		538	491	440	424	384	338	—	—	—	—	—	—
	3	X	669	636	597	533	499	485	447	—	—	—	—	—
	4		762	733	704	658	605	569	538	488	—	—	—	—
	5		861	838	823	800	771	641	569	511	—	—	—	—
50WC024	1		723	684	651	613	539	475	—	—	—	—	—	—
	2		772	734	704	644	564	514	—	—	—	—	—	—
	3		928	899	837	814	783	728	508	—	—	—	—	—
	4	X	1012	984	960	925	881	817	557	—	—	—	—	—
	5		1083	1060	1032	925	867	769	503	—	—	—	—	—
50WC030	1		723	684	651	613	539	475	—	—	—	—	—	—
	2		772	734	704	644	564	514	—	—	—	—	—	—
	3		928	899	837	814	783	728	508	—	—	—	—	—
	4	X	1012	984	960	925	881	817	557	—	—	—	—	—
	5		1083	1060	1032	925	867	769	503	—	—	—	—	—
50WC036	1		1205	1178	1158	1130	1104	1075	1050	1020	998	967	877	—
	2		1290	1268	1243	1218	1198	1169	1141	1115	1087	1013	918	—
	3	X	1398	1376	1348	1329	1301	1283	1256	1222	1146	1045	921	—
	4		1503	1481	1451	1434	1412	1378	1320	1250	1149	1043	926	—
	5		1752	1696	1645	1585	1529	1451	1376	1294	1198	1087	946	815
50WC042	1		1205	1178	1158	1130	1104	1075	1050	1020	998	967	877	—
	2		1290	1268	1243	1218	1198	1169	1141	1115	1087	1013	918	—
	3		1398	1376	1348	1329	1301	1283	1256	1222	1146	1045	921	—
	4	X	1503	1481	1451	1434	1412	1378	1320	1250	1149	1043	926	—
	5		1752	1696	1645	1585	1529	1451	1376	1294	1198	1087	946	815
50WC048	1		1424	1400	1374	1351	1329	1308	1285	1262	1241	1209	—	—
	2		1636	1615	1595	1571	1551	1526	1502	1455	1381	1304	—	—
	3	X	1700	1677	1655	1637	1611	1581	1526	1463	1385	1293	—	—
	4		1798	1776	1754	1730	1689	1630	1560	1489	1412	1317	—	—
	5		1889	1865	1827	1777	1718	1652	1579	1499	1412	1328	—	—
50WC060	1		1851	1818	1792	1758	1729	1698	1660	1627	1588	1539	—	—
	2		1945	1911	1886	1852	1823	1793	1757	1720	1659	1579	—	—
	3	X	2026	1994	1965	1938	1901	1874	1825	1760	1683	1593	1487	1370
	4		2081	2055	2021	1993	1949	1903	1840	1775	1695	1594	1486	1370
	5		2239	2201	2151	2086	2028	1977	1903	1822	1737	1650	1529	1397
50WC070	1		2020	1988	1958	1932	1895	1866	1836	1801	—	—	—	—
	2		2114	2081	2056	2027	1993	1966	1936	1896	1863	—	—	—
	3	X	2198	2173	2146	2113	2085	2050	2018	1981	1948	1907	—	—
	4		2334	2303	2272	2245	2215	2181	2148	2103	2046	1972	1886	—
	5		2385	2355	2328	2295	2263	2231	2192	2141	2075	1994	1908	1812

NOTE(S):

a. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.
b. Off delay = 30 seconds = After receiving an off command motor will continue running for 30 seconds.

Table 19 — 50WC Vertical Units (Constant Airflow Motor Performance)[a,b,c]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC015	D - Low	—	460	460	460	460	460	460	460	440	410	390	—	—
	D - Normal	X	550	550	550	550	550	550	550	550	550	550	—	—
	D - High	—	610	620	640	640	640	640	640	640	620	590	—	—
50WC018	A - Low	—	510	510	510	510	510	510	510	500	480	460	—	—
	A - Normal	X	600	600	600	600	600	600	600	580	540	500	—	—
	A - High	—	685	685	685	685	685	685	640	600	560	520	—	—
50WC024	A - Low	—	680	680	680	680	680	680	680	680	650	620	—	—
	A - Normal	X	800	800	800	800	800	800	800	780	740	680	—	—
	A - High	—	900	900	900	900	900	900	900	870	840	710	—	—
50WC030	C - Low	—	810	830	830	830	830	830	830	830	—	—	—	—
	C - Normal	X	930	950	950	950	950	950	950	900	—	—	—	—
	C - High	—	1040	1040	1040	1040	1040	1020	980	940	—	—	—	—
50WC036	A - Low	—	1020	1040	1040	1040	1040	1040	1040	1040	1020	1000	—	—
	A - Normal	X	1200	1200	1200	1200	1200	1200	1200	1160	1140	1060	—	—
	A - High	—	1160	1200	1280	1300	1300	1340	1380	1380	1380	1380	—	—
50WC042	A - Low	—	1180	1200	1200	1200	1200	1200	1200	1200	1200	1200	—	—
	A - Normal	X	1340	1400	1400	1400	1400	1400	1400	1400	1400	1400	—	—
	A - High	—	1520	1530	1550	1550	1550	1550	1550	1550	1550	1580	—	—
50WC048	B - Low	—	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	—	—
	B - Normal	X	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	—	—
	B - High	—	1750	1750	1750	1750	1750	1750	1780	1800	1800	1800	—	—
50WC060	C - Low	—	1700	1725	1725	1725	1725	1725	1725	1725	1725	1700	—	—
	C - Normal	X	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	C - High	—	2260	2260	2260	2260	2260	2260	2260	2260	2200	2160	2120	2080
50WC070	A - Low	—	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
	A - Normal	X	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
	A - High	—	2375	2375	2375	2375	2375	2375	2375	2375	2375	2375	2300	2270

NOTE(S):

a. During fan only operation air flow is 70% of tabulated value.
b. When passive dehumidification mode is enabled, air flow is 85% of tabulated value.
c. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

Table 20 — 50WC Horizontal Units (Constant Airflow Motor Performance)[a,b,c]

MODEL	FAN SPEED	DEFAULT FACTORY MOTOR SETTING	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
50WC015	A - Low	—	440	440	440	440	440	440	440	440	430	420	—	—
	A - Normal	X	500	500	500	500	500	500	500	500	490	480	—	—
	A - High	—	590	590	590	590	590	590	590	590	590	575	—	—
50WC018	D - Low	—	500	500	500	500	500	500	500	500	500	500	—	—
	D - Normal	X	580	600	600	600	600	600	600	600	590	580	—	—
	D - High	—	660	680	700	700	700	700	700	680	650	620	—	—
50WC024	B - Low	—	620	650	650	650	650	650	650	640	630	600	—	—
	B - Normal	X	750	780	800	800	800	800	800	780	700	650	—	—
	B - High	—	880	900	900	900	900	900	900	880	800	700	—	—
50WC030	A - Low	—	780	800	800	800	800	800	800	800	700	650	—	—
	A - Normal	X	920	950	950	950	950	950	950	900	750	700	—	—
	A - High	—	1050	1050	1050	1050	1050	1050	1050	1000	950	900	—	—
50WC036	A - Low	—	960	980	1000	1000	1000	1000	1000	1000	1000	1000	1000	—
	A - Normal	X	1150	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	—
	A - High	—	1310	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	—
50WC042	B - Low	—	1120	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160	—
	B - Normal	X	1340	1350	1400	1400	1400	1400	1400	1400	1400	1400	1380	—
	B - High	—	1530	1550	1550	1550	1550	1550	1550	1550	1550	1530	1480	—
50WC048	A - Low	—	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	—	—
	A - Normal	X	1560	1600	1600	1600	1600	1600	1600	1600	1600	1600	—	—
	A - High	—	1790	1820	1820	1820	1820	1820	1820	1820	1820	1760	—	—
50WC060	A - Low	—	1620	1620	1620	1620	1620	1620	1620	1620	1620	1620	1610	1600
	A - Normal	X	1900	1940	2000	2000	2000	2000	2000	2000	2000	1970	1900	1900
	A - High	—	2150	2150	2150	2150	2150	2150	2150	2150	2100	2050	2000	1950
50WC070	A - Low	—	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
	A - Normal	X	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
	A - High	—	2380	2400	2400	2400	2400	2400	2400	2400	2300	2250	2200	2150

NOTE(S):

a. During fan only operation air flow is 70% of tabulated value.
b. When passive dehumidification mode is enabled, air flow is 85% of tabulated value.
c. Cfm airflow is based on wet coil and 1 in. disposable MERV 5 filter.

System Flushing and Filling

Once the piping is complete, units require final purging and loop charging. A flush cart pump of at least 1.5 hp is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop. Flush the loop in both directions with a high volume of water at a high velocity. Follow the steps below to properly flush the loop:

1. Verify power is off.
2. Fill loop with water from hose through flush cart before using flush cart pump to ensure an even fill. Do not allow the water level in the flush cart tank to drop below the pump inlet line to prevent air from filling the line.
3. Maintain a fluid level in the tank above the return tee to avoid air entering back into the fluid.
4. Shutting off the return valve that connects into the flush cart reservoir will allow 50 psig surges to help purge air pockets. This maintains the pump at 50 psig.
5. To purge, keep the pump at 50 psig until maximum pumping pressure is reached.
6. Open the return valve to send a pressure surge through the loop to purge any air pockets in the piping system.
7. A noticeable drop in fluid level will be seen in the flush cart tank. This is the only indication of air in the loop.
   NOTE: If air is purged from the system while using a 10 in. PVC flush tank, the level drop will only be 1 to 2 in. since liquids are incompressible. If the level drops more than this, flushing should continue since air is still being compressed in the loop. If level is less than 1 to 2 in., reverse the flow.
8. Repeat this procedure until all air is purged.
9. Restore power.

Antifreeze may be added before, during or after the flushing process. However, depending on when it is added in the process, it can be wasted. Refer to the Antifreeze section on page 63 for more detail.

Loop static pressure will fluctuate with the seasons. Pressures will be higher in the winter months than during the warmer months. This fluctuation is normal and should be considered when charging the system initially. Run the unit in either heating or cooling for several minutes to condition the loop to a homogeneous temperature.

When complete, perform a final flush and pressurize the loop to a static pressure of 40 to 50 psig for winter months or 15 to 20 psig for summer months.

After pressurization, be sure to remove the plug from the end of the loop pump motor(s) to allow trapped air to be discharged and to ensure the motor housing has been flooded. Be sure the loop flow center provides adequate flow through the unit by checking pressure drop across the heat exchanger. Compare the results to the data in Fig. 52 and 53.

System Flow

FLOW VERIFICATION

The 50WC WSHP units ordered without factory-installed water flow switch as standard. It is recommend to field install a water flow switch or order the unit with factory-installed water flow switch to prevent the compressor from operating without loop flow.

IMPORTANT: It is recommended to have a flow switch to prevent the unit from running if water flow is lost.

FLOW REGULATION

Flow regulation can be accomplished by two methods. Most water control valves have a flow adjustment built into the valve. By measuring the pressure drop through the unit heat exchanger, the flow rate can be determined. Adjust the water control valve until the desired flow rate is achieved. Since the pressure constantly varies, two pressure gauges may be needed in some applications. See Fig. 52 and 53 for waterside pressure drop.

An alternate method of flow regulation is to install an automatic flow control valve. These valves feature a removable cartridge that controls the maximum flow through the valve assembly. Verify that the water flow control cartridge matches the application flow requirement.

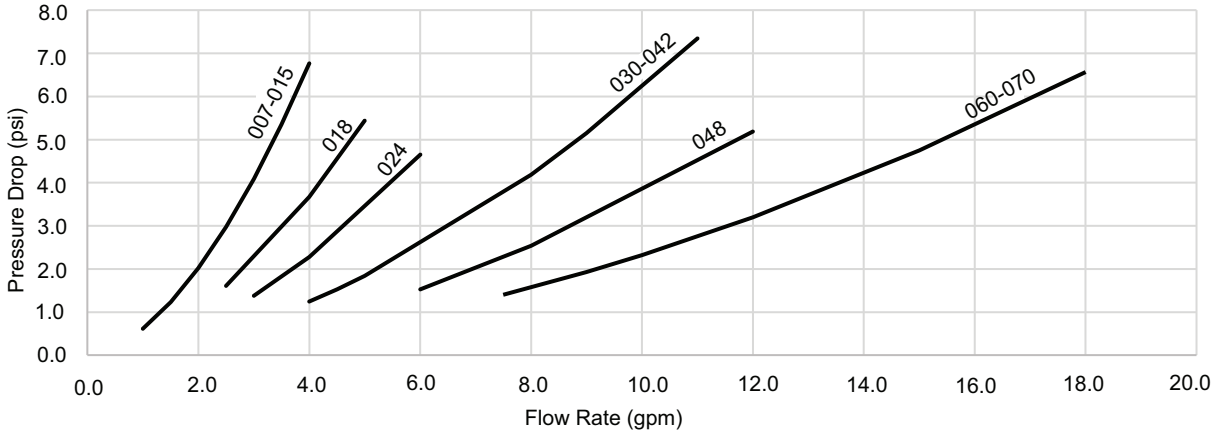


Fig. 52 — Water Pressure Drop Curve for Units Without 2-Way Valve

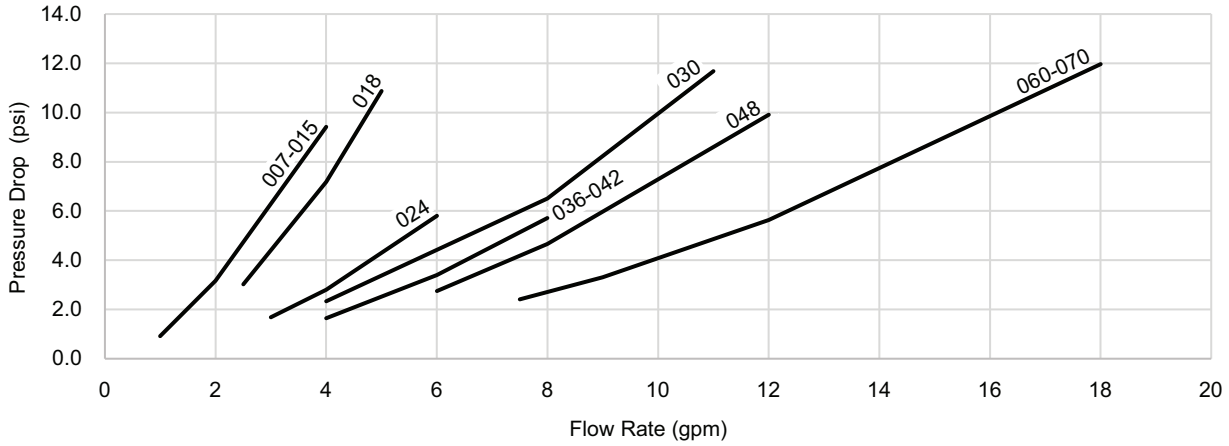


Fig. 53 — Water Pressure Drop Curve for Units With 2-Way Valve

ANTIFREEZE

In areas where leaving water temperatures drop below 40°F or where piping will be routed through areas subject to freezing, antifreeze is needed.

Alcohols and glycols are commonly used as antifreeze agents. Freeze protection should be maintained to 15°F below the lowest expected entering loop temperature. For example, if the lowest expected entering loop temperature is 30°F, the leaving loop temperature would be 22 to 25°F. Therefore, the freeze protection should be at 15°F (30°F – 15°F = 15°F).

NOTE: All alcohols should be pre-mixed and pumped from a reservoir outside of the building or introduced under water level to prevent fuming.

Calculate the total volume of fluid in the piping system (see Table 21). Use the percentage by volume in Table 22 to determine the amount of antifreeze to use. Antifreeze concentration should be checked from a well-mixed sample using a hydrometer to measure specific gravity.

Table 21 — Approximate Fluid Volume (gal.) per 100 ft of Pipe [a]

PIPE	DIAMETER (in.)	VOLUME (gal.)
Copper	1.00	4.1
	1.25	6.4
	1.50	9.2
Rubber Hose	1.00	3.9
Polyethylene	3/4 IPS SDR11	2.8
	1 IPS SDR11	4.5
	1-1/4 IPS SDR11	8.0
	1/2 IPS SDR11	10.9
	2 IPS SDR11	18.0
	1-1/4 IPS SCH40	8.3
	1-1/2 IPS SCH40	10.9
	2 IPS SCH 40	17.0

NOTE(S):

a. Volume of heat exchanger is approximately 1.0 gallon.

LEGEND

IPS — Internal Pipe Size
SCH — Schedule
SDR — Standard Dimensional Ratio

Table 22 — Antifreeze Percentages by Volume

ANTIFREEZE	MINIMUM TEMPERATURE FOR FREEZE PROTECTION (°F)			
	10	15	20	25
Methanol (%)	25	21	16	10
100% USP Food Grade Propylene Glycol (%)	38	30	22	15
Ethanol (%)	29	25	20	14

FREEZE PROTECTION SELECTION

The 25°F FP1 factory setting (water) should be used to avoid freeze damage to the unit.

Once antifreeze is selected, refer to the Step 9 of this manual for FREEZE Protection settings on the UPM board.

START-UP

Use the procedure outlined below to initiate proper unit start-up.

Operating Limits

ENVIRONMENT

This equipment is designed for indoor installation only. Extreme variations in temperature, humidity and corrosive water or air will adversely affect the unit performance, reliability and service life.

NOTE: Two factors determine the operating limits of a unit: entering-air temperature and water temperature. Whenever any of these factors are at a minimum or maximum level, the other factor must be at a normal level to ensure proper unit operation. See Tables 24-35.

POWER SUPPLY

A voltage variation of ± 10% of nameplate utilization voltage is acceptable.

UNIT STARTING CONDITIONS

Depending on the model, units should start and operate with entering water temperature temperatures between 20 and 110°F and entering air temperatures between 45 and 95°F. Water flow rates should be between 1.5 and 3.0 gpm/nominal cooling ton.

NOTE: These operating limits are not normal or continuous operating conditions. Assume that such a start-up is for the purpose of bringing the building space up to occupancy temperature. See Table 23 for operating limits.

Table 23 — Operating Limits

FLUID TYPE	LIMIT		COOLING	HEATING
Air	Minimum Ambient (°F)		50	40
	Maximum Ambient (°F)		100	85
	Rated Ambient (°F)		80	68
	Minimum Entering (°F db/wb)		65/57	45
	Maximum Entering (°F db/wb)		95/85	80
	Rated Entering (°F)		80/67	68/57
Liquid	Minimum Entering (°F)[a]		45	20
	Max Entering (°F)		110	80
	Typical Entering Range (°F)	Water Loop	—	—
		Ground Loop	50-80	25-50
		Ground Water	50-70	40-60
	Rated Entering (°F)	Water Loop	86	68
		Ground Loop	77	32
		Ground Water	59	50
	Anti-Freeze Requirement (LWT / EWT °F)		<40 / <50	
	Maximum operating water pressure (PSI/kPa)		400 psi/2,758 kPa (Standard unit) 300 psi/2,068 kPa (with water valve option)	
	Minimum operating Flow Rate (GPM/Ton)		1.5	

NOTE(S):

a. Units with waterside economizer options can operate with EWT < 45°F.

LEGEND

DB — Dry Bulb
EWT — Entering Water Temperature
LWT — Leaving Water Temperature
WB — Wet Bulb

Start-Up Procedure

⚠ WARNING

When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with the energized equipment. Failure to heed this warning could lead to personal injury.

1. Restore power to system.
2. Turn thermostat blower position to ON or use the DDC interface to enable the unit blower. The blower should start.
3. Balance airflow at diffusers/dampers.
4. Adjust all water valves to the full open position.
5. Use the thermostat or DDC control to enable the compressor by placing the unit in cooling mode.
6. Verify compressor operation. If scroll compressor, verify compressor rotation direction.

SCROLL COMPRESSOR ROTATION

It is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gauges to suction and discharge pressure fittings.
2. Energize the compressor by using the thermostat or DDC control to put the unit in cooling mode.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Turn off power to the unit. Install disconnect tag.
2. Reverse any two of the unit power leads.
3. Reapply power to the unit and verify pressures are correct. The suction and discharge pressure levels should now move to their normal start-up levels.

When the compressor is rotating in the wrong direction, the unit makes more noise and does not provide cooling.

After a few minutes of reverse operation, the scroll compressor internal overload protection will open, thus activating the unit lockout. This requires a manual reset. To reset the lockout, turn the thermostat on and then off or power cycle the unit power feed.

NOTE: There is a 5-minute time delay before the compressor will restart.

COOLING MODE START-UP

1. Using the thermostat or DDC control, operate the unit in the cooling cycle. Refer to Table 23 for operating limits. Allow the unit to run for a minimum of five minutes and record the operating data.
2. Check for water leaks and vibration.
3. Check for cool air delivery at unit grille a few minutes after the unit has begun to operate.
4. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using P/T plugs. Check the elevation and cleanliness of the condensate lines; any dripping could be a sign of a blocked line. Be sure the condensate trap includes a water seal.
5. Check the temperature of both supply and discharge water. Compare to Tables 24-35. If temperature is within range, proceed. If temperature is outside the range, check the cooling refrigerant pressures in Tables 24-35.
6. Check air temperature drop across the coil when compressor is operating. Air temperature drop should be between 15 and 25°F.
7. Disable cooling mode and wait a period of 5 minutes to allow system pressures to equalize.

HEATING MODE START-UP

1. After waiting for a period of 5 minutes after the cooling cycle, use the thermostat or DDC control to operate the unit in the heating cycle. Refer to Table 23 for operating limits. Allow the unit to run for a minimum of five minutes and record the operating data.
2. Check for water leaks and vibration.
3. Check for warm air delivery at unit grille a few minutes after the unit has begun to operate.
4. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using P/T plugs.
5. Check the temperature of both supply and discharge water. Compare to Tables 24-35. If temperature is within range, proceed. If temperature is outside the range, check the cooling refrigerant pressures in Tables 24-35.
6. Check air temperature rise across the coil when compressor is operating. Air temperature rise should be between 20°F and 30°F.
7. Disable heating mode.

Table 24 — 50WC007 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	1.4	—	—	—	—	62-72	261-271	5-6	15-19
	2.0	—	—	—	—	64-74	263-273	4-5	15-19
40	1.4	107-130	155-187	12-18	18-22	76-86	273-283	6-7	17-21
	2.0	107-129	148-177	8-13	18-22	79-89	276-286	4-5	18-22
50	1.4	108-134	178-218	12-16	17-21	92-102	287-297	8-9	20-24
	2.0	108-132	171-208	8-11	17-22	96-106	290-300	5-6	21-25
60	1.4	109-137	205-253	11-16	17-21	109-119	302-312	9-10	23-27
	2.0	109-135	198-241	8-11	17-21	114-124	306-316	6-7	24-28
70	1.4	111-140	235-290	11-14	17-20	127-137	317-327	10-11	26-30
	2.0	110-139	228-278	8-11	18-21	134-144	323-333	7-8	27-31
80	1.4	111-143	268-330	10-16	17-21	147-157	335-345	12-13	30-34
	2.0	111-142	262-319	7-10	17-21	155-165	342-352	8-9	31-35
90	1.4	112-146	305-375	10-14	17-20	169-179	354-364	13-14	33-37
	2.0	112-145	300-364	7-10	17-20	—	—	—	—
100	1.4	114-150	346-423	9-14	16-20	—	—	—	—
	2.0	114-149	343-413	7-10	16-20	—	—	—	—

Table 25 — 50WC009 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	1.8	—	—	—	—	61-81	229-285	5-6	18-22
	2.4	—	—	—	—	62-83	230-287	4-5	19-23
40	1.8	107-132	159-191	11-16	20-25	74-97	240-300	6-7	21-26
	2.4	107-131	153-183	9-12	20-25	75-100	242-302	4-5	21-26
50	1.8	109-135	183-223	11-16	20-25	89-116	254-317	7-9	24-30
	2.4	109-133	178-215	8-12	20-25	91-120	256-320	5-6	24-30
60	1.8	111-138	210-257	11-15	19-24	105-136	268-334	8-10	27-34
	2.4	111-136	205-250	8-11	20-25	108-141	271-339	6-7	27-34
70	1.8	111-139	241-295	11-14	19-24	123-157	284-354	9-12	30-38
	2.4	112-139	236-288	8-11	19-24	127-164	287-359	7-8	31-39
80	1.8	113-142	276-338	10-14	19-23	143-181	300-374	10-12	34-42
	2.4	114-141	271-330	7-10	19-24	148-188	306-381	8-9	34-43
90	1.8	116-146	315-384	9-14	18-23	—	—	—	—
	2.4	116-145	310-376	8-9	18-23	—	—	—	—
100	1.8	117-148	357-434	9-12	18-22	—	—	—	—
	2.4	118-147	354-427	7-10	18-22	—	—	—	—

Table 26 — 50WC012 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	2	—	—	—	—	57-73	229-288	6-7	19-22
	3	—	—	—	—	59-76	232-293	4-5	19-22
40	2	103-129	164-206	14-19	20-24	68-87	241-303	7-8	21-25
	3	103-128	152-191	10-12	20-25	72-92	244-308	5-6	22-26
50	2	104-132	188-237	14-18	20-23	74-110	254-319	8-9	24-28
	3	104-131	176-222	10-11	20-24	78-116	259-325	6-7	25-29
60	2	106-135	215-271	13-18	20-24	97-121	269-337	9-11	27-32
	3	105-133	203-256	10-11	20-24	102-128	275-344	7-8	28-34
70	2	107-137	245-308	13-17	20-23	113-141	286-357	11-13	30-36
	3	107-135	233-293	9-12	19-23	121-149	293-366	7-9	31-37
80	2	109-140	278-349	12-17	19-23	132-162	305-379	12-14	34-40
	3	109-139	267-334	8-11	19-23	141-172	313-389	8-10	35-42
90	2	111-143	314-394	12-16	19-22	—	—	—	—
	3	111-142	303-379	8-11	18-22	—	—	—	—
100	2	113-146	353-443	11-14	18-22	—	—	—	—
	3	113-144	344-428	7-10	18-22	—	—	—	—

Table 27 — 50WC015 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	2.5	—	—	—	—	57-73	235-290	6-7	19-21
	3.8	—	—	—	—	59-76	238-293	4-5	20-23
40	2.5	108-135	178-219	14-20	22-26	69-88	248-305	7-8	22-25
	3.8	108-134	166-204	10-13	22-26	72-92	251-310	5-5	23-26
50	2.5	109-138	204-251	14-20	22-26	75-112	262-322	9-10	25-28
	3.8	108-136	192-236	9-12	21-26	80-118	266-327	6-7	26-30
60	2.5	110-140	233-287	14-18	21-25	98-123	278-340	10-11	28-32
	3.8	110-139	221-272	9-12	22-26	104-130	283-347	7-8	29-33
70	2.5	111-142	265-326	13-18	21-25	115-143	294-360	11-12	32-36
	3.8	111-141	253-311	9-12	21-25	122-151	302-369	8-9	33-38
80	2.5	112-145	301-369	13-17	21-24	134-164	314-382	13-14	35-40
	3.8	112-143	290-355	8-11	21-25	143-175	323-393	9-10	36-42
90	2.5	114-147	339-416	12-17	20-24	155-188	335-406	14-16	39-44
	3.8	114-146	330-403	9-10	20-24	—	—	—	—
100	2.5	116-150	381-469	11-16	20-23	—	—	—	—
	3.8	116-149	374-456	8-10	20-24	—	—	—	—

Table 28 — 50WC018 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	3	—	—	—	—	59-69	266-286	7-8	20-24
	5	—	—	—	—	64-74	272-292	4-5	21-25
40	3	100-118	176-196	15-18	21-25	71-81	281-301	8-9	23-27
	5	99-117	160-180	9-12	21-25	77-87	288-308	5-6	24-28
50	3	102-120	203-223	14-17	20-24	85-95	297-317	9-10	26-30
	5	101-119	187-207	8-11	20-24	93-103	306-326	6-7	28-32
60	3	104-122	234-254	14-17	20-24	101-111	316-336	10-11	29-33
	5	103-121	217-237	8-11	20-24	110-120	326-346	7-8	31-35
70	3	106-124	267-287	14-17	19-23	118-128	335-355	12-13	33-37
	5	105-123	251-271	8-11	20-24	129-139	349-369	7-8	35-39
80	3	108-126	305-325	13-16	19-23	137-147	357-377	13-14	37-41
	5	107-125	289-309	8-11	19-23	151-161	374-394	8-9	39-43
90	3	110-128	346-366	13-16	19-23	158-168	382-402	15-16	41-45
	5	109-127	332-352	7-10	19-23	—	—	—	—
100	3	112-130	391-411	12-15	18-22	—	—	—	—
	5	112-130	378-398	7-10	18-22	—	—	—	—

Table 29 — 50WC024 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	3	—	—	—	—	55-65	256-276	8-9	18-22
	6	—	—	—	—	62-72	264-284	4-5	20-24
40	3	105-122	213-231	20-23	21-25	66-76	269-289	10-11	21-25
	6	102-119	178-196	10-13	21-25	76-86	279-299	5-6	23-27
50	3	106-123	242-260	19-22	20-24	79-89	283-303	11-12	24-28
	6	104-121	206-224	9-12	21-25	91-101	296-316	6-7	26-30
60	3	108-125	274-292	19-22	20-24	93-103	298-318	13-14	27-31
	6	106-123	238-256	9-12	20-24	108-118	314-334	7-8	30-34
70	3	110-127	309-327	18-21	19-23	109-119	315-335	14-15	30-34
	6	108-125	273-291	9-12	20-24	126-136	334-354	8-9	33-37
80	3	112-129	347-365	18-21	19-23	126-136	334-354	16-17	33-37
	6	110-127	312-330	9-12	19-23	147-157	357-377	9-10	37-41
90	3	114-131	390-408	17-20	19-23	145-155	354-374	18-19	37-41
	6	112-129	356-374	8-11	19-23	—	—	—	—
100	3	116-133	436-454	16-19	18-22	—	—	—	—
	6	114-131	404-422	8-11	18-22	—	—	—	—

Table 30 — 50WC030 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	4	—	—	—	—	53-63	273-293	7-8	18-22
	7.5	—	—	—	—	59-69	280-300	4-5	20-24
40	4	102-120	200-218	19-22	21-25	64-74	287-307	9-10	21-25
	7.5	100-118	173-191	10-13	21-25	72-82	296-316	5-6	23-27
50	4	104-122	227-245	18-21	20-24	77-87	302-322	10-11	24-28
	7.5	102-120	201-219	9-12	21-25	87-97	314-334	6-7	26-30
60	4	105-123	257-275	18-21	20-24	91-101	320-340	12-13	27-31
	7.5	104-122	232-250	9-12	20-24	103-113	334-354	7-8	29-33
70	4	107-125	291-309	17-20	20-24	107-117	339-359	13-14	30-34
	7.5	106-124	266-284	9-12	20-24	121-131	357-377	8-9	33-37
80	4	109-127	328-346	16-19	19-23	124-134	360-380	15-16	34-38
	7.5	108-126	305-323	8-11	19-23	142-152	382-402	9-10	37-41
90	4	111-129	370-388	16-19	19-23	143-153	384-404	17-18	37-41
	7.5	110-128	349-367	8-11	19-23	—	—	—	—
100	4	113-131	415-433	15-18	18-22	—	—	—	—
	7.5	113-131	396-414	8-11	19-23	—	—	—	—

Table 31 — 50WC036 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F
30	4.5	—	—	—	—	49-59	257-277	7-8	17-21
	9	—	—	—	—	56-66	266-286	4-5	19-23
40	4.5	115-131	207-231	21-24	23-27	60-70	269-289	9-10	19-23
	9	112-128	171-195	10-13	23-27	67-77	275-295	5-6	21-25
50	4.5	116-132	234-258	20-23	22-26	71-81	278-298	10-11	22-26
	9	114-130	197-221	10-13	23-27	81-91	286-306	5-6	24-28
60	4.5	118-134	264-288	20-23	22-26	84-94	289-309	12-13	25-29
	9	116-132	227-251	10-13	22-26	96-106	299-319	6-7	27-31
70	4.5	119-135	297-321	19-22	21-25	98-108	301-321	13-14	28-32
	9	118-134	260-284	9-12	22-26	113-123	316-336	7-8	31-35
80	4.5	121-137	333-357	18-21	21-25	114-124	317-337	15-16	31-35
	9	119-135	297-321	9-12	21-25	132-142	335-355	8-9	35-39
90	4.5	122-138	372-396	18-21	21-25	131-141	334-354	17-18	35-39
	9	121-137	338-362	9-12	21-25	153-163	356-376	9-10	39-43
100	4.5	124-140	414-438	17-20	20-24	—	—	—	—
	9	123-139	383-407	8-11	20-24	—	—	—	—

Table 32 — 50WC042 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	6	—	—	—	—	54-64	249-273	7-8	18-22
	10.5	—	—	—	—	59-69	254-278	4-5	19-23
40	6	109-125	197-221	17-20	21-25	66-76	262-286	8-9	21-25
	10.5	108-124	174-198	9-12	21-25	72-82	268-292	5-6	22-26
50	6	111-127	224-248	16-19	21-25	79-89	275-299	9-10	23-27
	10.5	110-126	201-225	9-12	21-25	87-97	283-307	6-7	25-29
60	6	112-128	255-279	16-19	20-24	94-104	290-314	11-12	26-30
	10.5	111-127	231-255	9-12	21-25	103-113	300-324	6-7	28-32
70	6	114-130	289-313	15-18	20-24	110-120	307-331	12-13	29-33
	10.5	113-129	266-290	9-12	20-24	122-132	320-344	7-8	32-36
80	6	115-131	326-350	15-18	20-24	129-139	327-351	14-15	33-37
	10.5	114-130	304-328	8-11	20-24	143-153	342-366	8-9	36-40
90	6	117-133	368-392	14-17	19-23	148-158	348-372	15-16	37-41
	10.5	116-132	347-371	8-11	19-23	165-175	367-391	9-10	40-44
100	6	119-135	413-437	14-17	19-23	—	—	—	—
	10.5	118-134	394-418	8-11	19-23	—	—	—	—

Table 33 — 50WC048 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	8	—	—	—	—	49-69	258-278	6-7	18-22
	12	—	—	—	—	53-73	262-282	4-5	19-23
40	8	109-125	204-224	14-17	21-25	61-81	271-291	7-8	21-25
	12	108-124	184-204	9-12	21-25	66-86	276-296	5-6	22-26
50	8	111-127	230-250	14-17	21-25	75-95	286-306	8-9	24-28
	12	110-126	210-230	9-12	21-25	80-100	292-312	6-7	25-29
60	8	112-128	260-280	14-17	21-25	90-110	302-322	9-10	27-31
	12	111-127	239-259	9-12	21-25	97-117	310-330	6-7	28-32
70	8	114-130	294-314	13-16	20-24	106-126	321-341	11-12	30-34
	12	113-129	273-293	9-12	20-24	115-135	330-350	7-8	32-36
80	8	115-131	331-351	13-16	20-24	125-145	341-361	12-13	33-37
	12	114-130	310-330	8-11	20-24	135-155	353-373	8-9	35-39
90	8	117-133	372-392	12-15	19-23	145-165	364-384	13-14	37-41
	12	116-132	352-372	8-11	20-24	157-177	379-399	9-10	39-43
100	8	118-134	417-437	12-15	19-23	—	—	—	—
	12	118-134	398-418	8-11	19-23	—	—	—	—

Table 34 — 50WC060 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	10	—	—	—	—	49-65	264-321	6-8	21-25
	15	—	—	—	—	53-69	268-326	4-5	21-26
40	10	94-119	196-235	14-20	22-26	60-78	278-340	8-9	24-28
	15	94-118	181-217	9-12	22-26	64-83	284-347	5-6	25-30
50	10	95-121	221-267	13-19	21-25	72-93	295-361	9-10	27-32
	15	95-120	206-249	9-12	21-26	77-99	302-370	6-7	28-34
60	10	96-123	249-302	13-19	21-26	86-109	314-385	10-12	30-36
	15	97-122	234-284	9-13	21-25	92-117	323-396	7-8	31-37
70	10	98-125	281-342	12-18	21-25	101-128	336-412	11-13	34-40
	15	98-124	266-323	8-13	21-25	109-137	347-425	8-9	35-42
80	10	99-127	316-384	12-18	20-24	119-148	360-440	12-15	37-44
	15	100-126	303-366	8-11	20-24	128-159	373-456	8-10	39-46
90	10	101-129	355-431	12-18	20-24	138-170	386-472	13-16	41-49
	15	101-128	343-413	8-11	20-24	150-184	402-489	9-11	44-52
100	10	103-132	398-481	12-16	19-23	—	—	—	—
	15	103-130	387-464	8-11	20-24	—	—	—	—

Table 35 — 50WC070 Typical Unit Operating Pressures and Temperatures

ENTER FLUID TEMP (°F)	WATER FLOW (gpm/ton)	COOLING				HEATING			
		Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (°F)	Air Temp Drop (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (°F)	Air Temp Rise (°F)
30	12	—	—	—	—	52-68	252-309	5-7	22-26
	16	—	—	—	—	54-70	255-313	4-5	22-27
40	12	97-123	185-225	13-17	22-27	63-81	265-327	7-8	25-29
	16	97-122	176-214	9-14	22-27	66-85	269-332	5-6	25-30
50	12	98-125	209-257	12-17	22-27	76-97	281-347	8-9	27-32
	16	98-124	200-245	9-12	22-27	79-101	285-353	6-7	28-34
60	12	100-127	236-292	12-17	22-26	91-114	299-370	8-10	30-36
	16	99-126	227-279	9-13	22-26	94-119	304-377	7-8	32-38
70	12	101-129	267-329	12-16	21-26	106-133	318-394	10-12	34-40
	16	101-128	259-318	8-13	21-26	111-139	325-403	8-9	35-42
80	12	102-130	302-372	11-16	21-25	125-154	342-422	10-13	38-45
	16	102-130	293-359	9-12	21-26	131-162	349-432	8-10	40-47
90	12	104-133	339-417	11-15	21-25	145-177	367-453	12-15	42-50
	16	104-132	333-405	8-11	21-25	153-187	377-464	9-11	44-52
100	12	105-135	382-466	10-15	20-24	—	—	—	—
	16	105-134	376-455	8-11	20-24	—	—	—	—

OPERATION

Power Up Mode

The unit will not operate until all the inputs, terminals and safety controls are checked for normal operation.

NOTE: The compressor will have a 5-minute anti-short cycle upon power up.

Unit Protection Module (UPM)

All Carrier WSHP units feature an advanced UPM which implements all the critical equipment safeties and allows for continuous safe and reliable operation. Figure 54 shows the UPM sequence of operations for units safeties. Refer to Step 9 — "Configure Unit Control Components" on page 24 for detailed information about Safeties and Alarms.

Constant CFM Dehumidification

Units with a Constant Airflow ECM, please see Fig. 55 for the dehumidification sequence of operation.

Option Card

An optional expansion card is provided on units that are intended to be controlled by a thermostat. The card supplements the primary thermostat control by controlling auxiliary devices that a thermostat is not typically capable of controlling. Refer to Step 9 —"Configure Unit Control Components" on page 24 for information.

Sequence of Operation of Units Without DDC Controller

STANDBY

Y and W terminals are not active in Standby mode; however, the O and G terminals may be active, depending on the application. The compressor will be off.

COOLING

Y and O terminals are active in Cooling mode. After power up, the first call to the compressor will initiate a 270 to 300 second random start delay and a 5-minute anti-short cycle protection time delay. After both delays are complete, the compressor is energized.

NOTE: On all subsequent compressor calls the random start delay is omitted.

HEATING STAGE 1

Terminal Y is active in heating stage 1. After power up, the first call to the compressor will initiate a 270 to 300 second random start delay and a 5-minute anti-short cycle protection time delay. After both delays are complete, the compressor is energized.

NOTE: On all subsequent compressor calls the random start delay is omitted.

HOT GAS REHEAT WITH OPTION CARD (OPTIONAL)

Terminal H is active in dehumidification mode with hot gas reheat. After a call for H, the reversing valve (O), compressor (Y), and fan (G) are also enabled.

NOTE: Any call for cooling (Y), heating (Y or W), or reversing valve (O) will override dehumidification mode (H).

WATERSIDE ECONOMIZER WITH OPTION CARD (OPTIONAL)

Y and O terminals are active in Cooling mode. When the entering water temperature drops below the configured entering water temperature set point specified on the Option Card, the compressor and reversing valve are disabled and the waterside economizer is enabled. The waterside economizer three way control valve will divert water to the economizer coil for free cooling. If a cooling call remains for a period of > 10 min the compressor will be enabled to assist the WSE in meeting the cooling demand. When the entering water temperature rises above the configured on the Option card board set point, the waterside economizer is disabled and the compressor and reversing valve are enabled.

AUXILIARY ELECTRIC HEAT (OPTIONAL)

The output provided on the controller shall be able to control single stage of electric heat. The sequence of operation of the electrical heat is an alternative/emergency heat. When the terminal W is energized, it will enable Electric heater and disable compressor (Y).

TWO-POSITION MOTORIZED ISOLATION VALVE (2-WAY SOLENOID VALVE) (OPTIONAL)

The two way water flow control valve is enabled anytime there is a call for cooling (Y), heating (Y), or dehumidification (H) and allows water to flow through the unit. When there is no call for cooling, heating, or dehumidification, the water flow control valve is disabled, stopping flow through the unit.

BOILERLESS HEAT WITH OPTION CARD (OPTIONAL)

When the entering water temperature is below the configured set point on the Option Card (refer to Step 9) and there is a call for heating (Y), the compressor is disabled and the auxiliary heat output is enabled (W). When the entering water temperature is above the configured EWT set point, the auxiliary heat output is disabled and the compressor is enabled.

DIFFERENTIAL PRESSURE SWITCH / FLOW SWITCH (OPTIONAL)

The flow switch monitors the pressure difference between two points on the waterside. The unit will be shut down if flow is not met.

REFRIGERANT LEAK DETECTION SYSTEM (OPTIONAL)

The A2L sensor continually samples the air and if the concentration of refrigerant detected is higher than the preset threshold (15% LFL), it sends a signal to the UPM which then switches off the compressor and turns on the blower. The compressor will remain off until saturation level is within acceptable range (12% LFL). The A2L sensor is connected to the UPM, it must always remain connected. If communication is lost, the UPM will enter refrigerant leak hard lockout fault and energize the alarm contact. To test that the communication between the sensor and board is active, the sensor can be disconnected from the UPM, which should simulate a fault. The A2L sensor for the refrigerant leak detection system shall only be replaced with the part specified on the spare parts list.

⚠ WARNING

When refrigerant leak detection system installed, unit must be powered except for service.

⚠ WARNING

Continuous air circulation required for proper functioning.

COMPRESSOR RELAY (OPTIONAL)

Optional relay providing compressor status via a normally open set of dry contacts.

PUMP/VALVE RELAY (OPTIONAL)

The pump/valve relay is enabled anytime there is a call for cooling (Y), heating (Y), or dehumidification (H) and can be used to enable/disable field installed 2-way solenoid valve or circulator pumps. When there is no call for cooling, heating, or dehumidification, pump/valve relay is disabled.