Carrier

Gemini™ Select 09RCS020-030 and 09RCM035-230 Air-Cooled Condensing Units 50/60 Hz

Installation, Start-Up and Maintenance Instructions

CONTENTS

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location.

This appliance is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. Children shall be supervised not to play with the appliance.

Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

Untrained personnel can perform basic maintenance functions, such as cleaning coils. All other operations should be performed by trained service personnel. Qualified installers and service technicians are required to have been trained on the following topics when installing and servicing air-conditioning equipment with A2L refrigerant such as R-32:

1. Explosive potential of A2L refrigerants
2. Potential ignition sources
3. Safety measures for unventilated and ventilated rooms or enclosures
4. Refrigerant detectors
5. Concept of sealed components and sealed enclosures according to IEC 60079-15:2010
6. Correct work procedures for the following:
   a. Commissioning
   b. Maintenance
   c. Repair
   d. Decommissioning
   e. Disposal

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

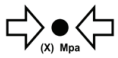
1. Follow all safety codes.
2. Keep quenching cloth and fire extinguisher nearby when brazing.
3. Wear safety glasses and work gloves.
4. Use care in handling, rigging, and setting bulky equipment.

It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and

in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

NOTE: Take notice of the following symbols, which are required for A2L refrigerants and can be found on the unit:

SYMBOL	CODE	MEANING
	IEC 60417-5032 (2002-10)	Alternating current
	IEC 60417-5019 (2006-8)	Protective earth
	IEC 60417-5018 (2006-10)	Functional earthing
	ISO 7000-0434A (2004-01)	Caution
	ISO 7000-0790 (2004-01)	Read operator's manual
	IEC 60417-5036 (2002-10)	Dangerous voltage
	GHS02: Flammable	Flammable gas
	ISO 7010-W021 (2011-05)	Warning: flammable materials
	ISO 7000-1659 (2004-01)	Service indicator: read technical manual
	ISO 7000-1701 (2004-01)	Pressure
	ISO 7000-1641 (2004-01)	Operator's manual: operating instructions

⚠ 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. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ DANGER

Separate power sources (main and control power circuits) are used for these units. Be sure both main and control power circuits are disconnected before servicing. Failure to do so could result in personal injury from electric shock.

⚠ 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. Tag all disconnect locations to alert others not to restore power until work is completed.

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may cause radio interference. It has been tested and found to comply with the limits of a Class A computing device pursuant to International Standard in North America EN 61000-2/3, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

⚠ CAUTION

This system uses an A2L refrigerant (R-32) which have higher pressures than R-22 and other refrigerants. Failure to use gauge set, hoses, and recovery systems designed to handle refrigerant R-32 may result in equipment damage or personal injury. Refer to section "Safety Considerations for R-32 (A2L) Refrigerants" on page 54 for guidelines on proper A2L refrigerant handling and equipment used for A2L refrigerant. If unsure about equipment, consult the equipment manufacturer.

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gauge for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

⚠ WARNING

DO NOT use means to accelerate the defrosting process, or to clean, other than those recommended by the manufacturer.

If unit is to be stored, it shall be stored in an area or room without continuously operating open flames (for example, an operating gas appliance) or other potential ignition sources, such as operating electric heaters or hot surfaces.

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠ CAUTION

The 09RC model is a Partial Unit air conditioner, complying with Partial Unit requirements of UL 60335-2-40/CSA C22.2 No. 60335-2-40, and must only be connected to other units that have been confirmed as complying to corresponding Partial Unit requirements of the same standard or UL 1995/CSA C22.2 No 236.

The definition of Partial Units per UL 60335-2-40 is as follows:

Partial Unit - Condensing unit, evaporating unit, condenser unit, or evaporator unit which are part of a total assembly of a heat pump, air-conditioner, or sanitary hot water heat pump where not all assemblies to create the complete refrigeration system are specified by the manufacturer.

Note 1 to entry: Partial Units are evaluated for safety as a stand-alone.

INSTALLATION

Step 1 — Inspect Shipment

Inspect unit for damage upon arrival. If damage is found, immediately file a claim with the shipping company. Verify proper unit delivery by checking unit nameplate data and the model number nomenclature shown in Fig. 1. See Tables 1-6 for unit physical data.

Step 2 — Rig and Place Unit

This appliance should not be accessible to the general public.

Appliance should not be located within 20 ft (6.1 m) of an opening to an occupied space.

The maximum altitude intended for this appliance is 10,000 ft (3048 m).

All units are designed for overhead rigging, and it is *important that this method be used.* Lifting holes are provided in the frame base rails. It is recommended to use shackles in the lifting holes (see rigging label on the unit and Fig. 2 and 3 for rigging weights and center of gravity). All panels must be in place when rigging.

This appliance should not be accessible to the general public.

IMPORTANT: To maintain unit stability while lifting, use 4 cables, chains or straps of equal length. Attach one end of each cable to shackle attachment point and the other end of each cable to the overhead rigging point.

Use spreader bars or frame to keep the cables, chains, and straps clear of the unit sides. Leave standard coil protection packaging in place during rigging to provide protection to coils. Remove and discard all coil protection after rigging cables are detached.

⚠ CAUTION

All panels must be in place when rigging. Failure to comply could result in equipment damage.

⚠ CAUTION

For unit sizes 020 to 060 when handling with a forklift, handle only through fork pocket holes. Failure to follow this caution could result in equipment damage or personal injury.

⚠ CAUTION

For unit sizes 080-230, do not forklift the unit unless unit is attached to a skid designed for forklifting. Failure to follow this caution could result in equipment damage or personal injury.

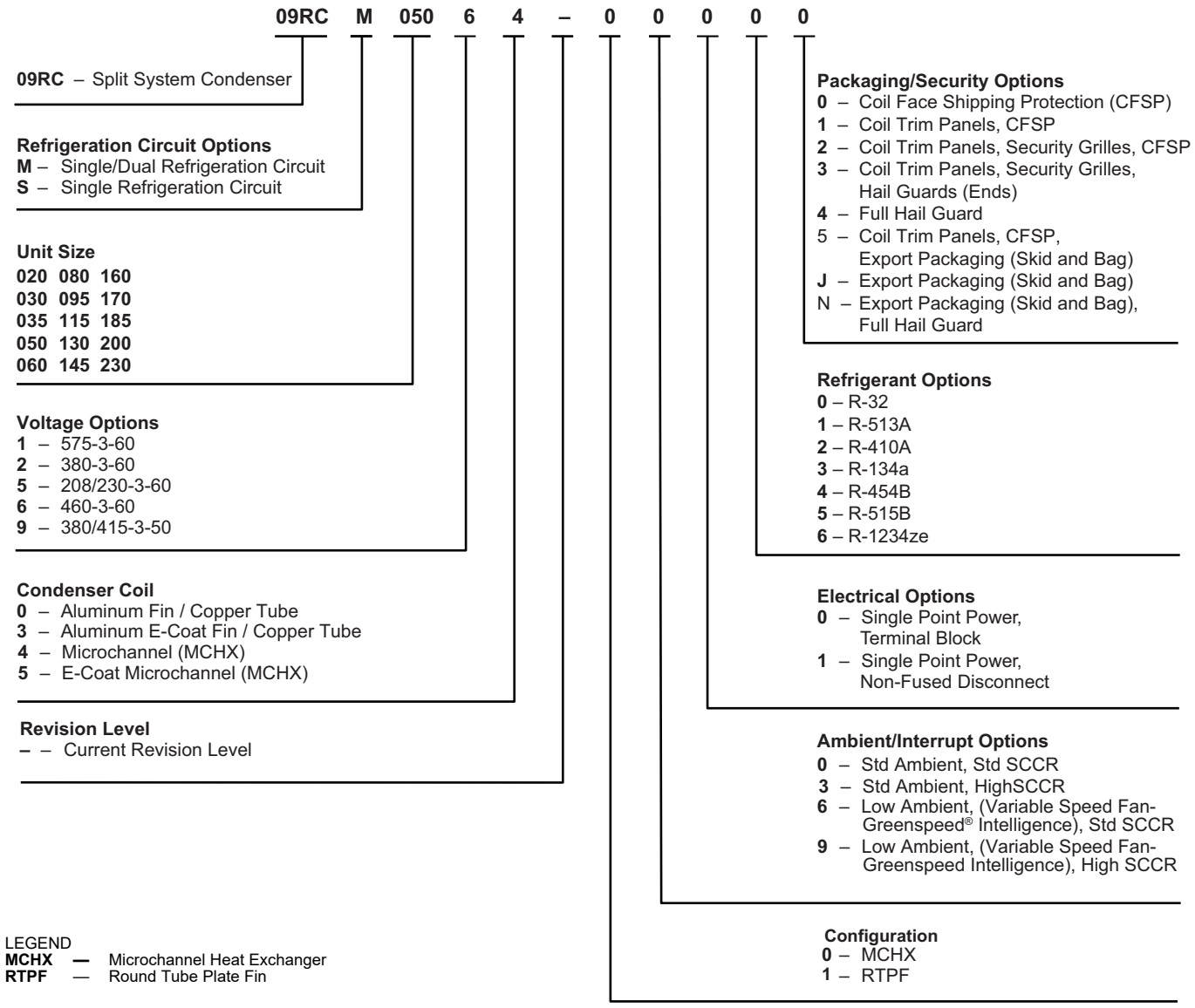


Fig. 1 — Model Number Nomenclature

Table 1 — 09RC 020-060 Units — English

09RC UNIT SIZE	09RCS020	09RCS030	09RCS035	09RCM050		09RCM060	
CIRCUIT	Single	Single	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS							
Length (in.)	88.3	88.3	97.8	97.8		97.8	
Width (in.)	46.1	46.1	88.3	88.3		88.3	
Height (in.)	66.5	78.5	66.5	66.5		78.5	
UNIT WEIGHTS (lb)							
MCHX Standard	805	955	1212	1484		1682	
Cu-Al RTPF	860	1020	1322	1594		1812	
NITROGEN SHIPPING CHARGE (psi)	15						
CONDENSER FANS Axial Flying Bird 6							
Quantity	2	2	2	4		4	
No. Blades… Diameter (in.)	9...30						
Motor HP (per fan)	1.5						
Rpm	850 (60 Hz), 700 (50 Hz)						
Airflow (cfm) AL-CU Coil (60 Hz)[a]	17,908	20,231	21,974	37,994		40,462	
Airflow (cfm) MCHX Coil (60 Hz)[a]	18,500	20,900	22,700	39,250		41,800	
Airflow (cfm) AL-CU Coil (50 Hz)[a]	14,927	16,863	18,315	31,663		33,715	
Airflow (cfm) MCHX Coil (50 Hz)[a]	15,420	17,420	18,920	32,710		34,830	
VARIABLE SPEED (rpm) 8 POLE	850						
Airflow (cfm) AL-CU Coil (60/50 Hz)[a]	17,908	20,231	21,973.6	37,994		40,462	
Airflow (cfm) MCHX Coil (60/50 Hz)[a]	18,500	20,900	22,700	39,250		41,800	
COIL DETAIL							
No. Coils per Circuit (Ckt A/Ckt B)	1	1	2	1/1	2	1/1	2
Circuit % (Ckt A/Ckt B)	N/A	N/A	N/A	50/50	N/A	50/50	N/A
Total Coils	1	1	2	2	2	2	2
sq ft	27.1	27.1	54.2	54.2	54.2	67.8	67.8
PIPING							
Pressure Relief	Fusible Plug on liquid line - 210°F						
Hot Gas Connection Line Size (in.)	1-3/8	1-3/8	1-5/8	1-3/8 + 1-3/8	1-5/8	1-3/8 + 1-3/8	1-5/8
Liquid Connection Line Size (in.)	5/8	5/8	7/8	5/8+ 5/8	7/8	5/8 + 5/8	7/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 95°F ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

Table 2 — 09RC 020-060 Units — SI

09RC UNIT SIZE	09RCS020	09RCS030	09RCS035	09RCM050		09RCM060	
CIRCUIT	Single	Single	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS							
Length (mm)	2 242	2 242	2 485	2 485		2 485	
Width (mm)	1 170	1 170	2 242	2 242		2 242	
Height (mm)	1 689	1 994	1 689	1 689		1 994	
UNIT WEIGHTS (kg)							
MCHX Standard	365	433	550	673		763	
Cu-Al RTPF	390	463	600	723		822	
NITROGEN SHIPPING CHARGE (bar)	1.02						
CONDENSER FANS Axial Flying Bird 6							
Quantity	2	2	2	4		4	
No. Blades… Diameter (in.)	9...30						
Motor kW (per fan)	1.12						
Rpm	850 (60 Hz), 700 (50 Hz)						
Airflow (l/sec) AL-CU Coil (60 Hz)[a]	8 451	9 547	10 369	9 593		9 593	
Airflow (l/sec) MCHX Coil (60 Hz)[a]	8 730	9 863	10 712	9 910		9 910	
Airflow (l/sec) AL-CU Coil (50 Hz)[a]	7 040	7 953	8 638	7 954		7 954	
Airflow (l/sec) MCHX Coil (50 Hz)[a]	7 272	8 216	8 923	8 217		8 217	
VARIABLE SPEED (rpm) 8 POLE	850						
Airflow (l/sec) AL-CU Coil (60/50 Hz)[a]	8 451	9 547	10 369	9 593		9 593	
Airflow (l/sec) MCHX Coil (60/50 Hz)[a]	8 730	9 863	10 712	9 910		9 910	
COIL DETAIL							
No. Coils per Circuit (Ckt A/Ckt B)	1	1	2	1/1	2	1/1	2
Circuit % (Ckt A/Ckt B)	N/A	N/A	N/A	50/50	N/A	50/50	N/A
Total Coils	1	1	2	2	2	2	2
sq m	2.5	2.5	3.1	5	5	6.3	6.3
PIPING							
Pressure Relief	Fusible Plug on liquid line - 99°C						
Hot Gas Connection Line Size (in.)	1-3/8	1-3/8	1-5/8	1-3/8 + 1-3/8	1-5/8	1-3/8 + 1-3/8	1-5/8
Liquid Connection Line Size (in.)	5/8	5/8	7/8	5/8+ 5/8	7/8	5/8 + 5/8	7/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 35°C ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

Table 3 — 09RC 080-145 Units — English

09RC UNIT SIZE	09RCM080		09RCM095		09RCM115		09RCM130		09RCM145	
CIRCUIT	Dual	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS										
Length (in.)	105		152				199			
Width (in.)	88									
Height (in.)	99									
UNIT WEIGHTS (lb)										
MCHX Standard	2521		3372		3425		4289		4343	
Cu-Al RTPF	2901		3887		3996		4993		5102	
PACKAGING ADDER										
NITROGEN SHIPPING CHARGE (psi)	15									
CONDENSER FANS Axial Flying Bird 6										
Quantity	2/2	4	2/3	5	3/3	6	3/4	7	4/4	8
No. Blades… Diameter (in.)	9...30									
Motor HP (per fan)	1.25									
FAN SPEED (rpm) STANDARD 8 POLE	850 (60 Hz), 700 (50 Hz)									
Airflow (cfm) AL-CU Coil (60 Hz)[a]	40,575		50,719		60,863		71,007		81,151	
Airflow (cfm) MCHX Coil (60 Hz)[a]	41,906		52,383		62,860		73,336		83,813	
Airflow (cfm) AL-CU Coil (50 Hz)[a]	33,813		42,266		50,719		59,173		67,626	
Airflow (cfm) MCHX Coil (50 Hz)[a]	34,922		43,653		52,383		61,113		69,844	
Motor HP (per fan)	3									
VARIABLE SPEED (rpm) 6 POLE	1,140									
Airflow (cfm) AL-CU Coil (60/50 Hz)[a]	55,877		69,847		83,816		97,785		111,755	
Airflow (cfm) MCHX Coil (60/50 Hz)[a]	57,633		72,041		86,449		100,857		115,266	
COIL DETAIL										
No. Coils per Circuit (Ckt A/Ckt B)	2/2	4	2/3	5	3/3	6	3/4	7	4/4	8
Circuit % (Ckt A/Ckt B)	50/50	N/A	40/60	N/A	50/50	N/A	43/57	N/A	50/50	N/A
Total Coils	4	4	5	5	6	6	7	7	8	8
sq ft	107.80		134.75		161.70		188.65		215.60	
PIPING										
Pressure Relief	Fusible Plug on liquid lines of both circuits - 210°F									
Hot Gas Connection Line Size (in.)	1-1/8+1-1/8	1-5/8	1-1/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8
Liquid Connection Line Size (in.)	7/8+7/8	1-1/8	7/8+1-1/8	1-3/8	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 95°F ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

Table 4 — 09RC 080-145 Units — SI

09RC UNIT SIZE	09RCM080		09RCM095		09RCM115		09RCM130		09RCM145	
CIRCUIT	Dual	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS										
Length (mm)	2 678		3 872				5 066			
Width (mm)	2 236									
Height (mm)	2 513									
UNIT WEIGHTS (kg)										
MCHX Standard	1143		1529		1553		1945		1970	
Cu-Al RTPF	1316		1763		1812		2264		2314	
NITROGEN SHIPPING CHARGE (bar)	1.02									
CONDENSER FANS Axial Flying Bird 6										
Quantity	2/2	4	2/3	5	3/3	6	3/4	7	4/4	8
No. Blades… Diameter (in.)	9...30									
Motor kW (per fan)	0.93									
FAN SPEED (rpm) STANDARD 8 POLE	850 (60 Hz), 700 (50 Hz)									
Airflow (l/sec) AL-CU coil (60 Hz)[a]	19 143		23 929		28 714		33 500		38 286	
Airflow (l/sec) MCHX Coil (60 Hz)[a]	19 775		24 720		29 664		34 607		39 551	
Airflow (l/sec) AL-CU coil (50 Hz)[a]	15 952		19 940		23 929		27 917		31 905	
Airflow (l/sec) MCHX Coil (50 Hz)[a]	16 480		20 600		24 720		28 839		32 959	
Motor kW (per fan)	2.24									
VARIABLE SPEED (rpm) 6 POLE	1140									
Airflow (l/sec) AL-CU Coil (60/50 Hz)[a]	26 327		32 908		39 490		46 071		52 653	
Airflow (l/sec) MCHX Coil (60/50 Hz)[a]	27 197		33 996		40 795		47 594		54 394	
COIL DETAIL										
No. Coils per Circuit (Ckt A/Ckt B)	2/2	4	2/3	5	3/3	6	3/4	7	4/4	8
Circuit % (Ckt A/Ckt B)	50/50	N/A	40/60	N/A	50/50	N/A	43/57	N/A	50/50	N/A
Total Coils	4	4	5	5	6	6	7	7	8	8
sq m	10.01		12.52		15.02		17.53		20.03	
PIPING										
Pressure Relief	Fusible Plug on liquid line - 99°C									
Hot Gas Connection Line Size (in.)	1-1/8+1-1/8	1-5/8	1-1/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8	1-5/8+1-5/8	2-1/8
Liquid Connection Line Size (in.)	7/8+7/8	1-1/8	7/8+1-1/8	1-3/8	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 35°C ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

Table 5 — 09RC 160-230 Units — English

09RC UNIT SIZE	09RCM160		09RCM170		09RCM185		09RCM200		09RCM230	
CIRCUIT	Dual	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS										
Length (in.)	247				294				341	
Width (in.)	88									
Height (in.)	99									
UNIT WEIGHTS (lb)										
MCHX Standard	5271		5335		6182		6238		7201	
Cu-Al RTPF	6162		6274		7230		7341		8482	
NITROGEN SHIPPING CHARGE (psi)	15									
CONDENSER FANS Axial Flying Bird 6										
Quantity	4/5	9	5/5	10	5/6	11	6/6	12	7/7	14
No. Blades… Diameter (in.)	9...30									
Motor HP (per fan)	3									
VARIABLE SPEED (rpm) 6 POLE	1,140									
Airflow (cfm) AL-CU Coil (60/50 Hz)[a]	125,724		139,693		153,662		167,631		195,570	
Airflow (cfm) MCHX Coil (60/50 Hz)[a]	129,675		144,083		158,491		172,899		201,716	
COIL DETAIL										
No. Coils per Circuit (Ckt A/Ckt B)	4/5	9	5/5	10	5/6	11	6/6	12	7/7	14
Circuit % (Ckt A/Ckt B)	44/56	N/A	50/50	N/A	45/55	N/A	50/50	N/A	50/50	N/A
Total Coils	9	9	10	10	11	11	12	12	14	14
sq ft	242.6		269.5		296.5		323.4		377.3	
PIPING										
Pressure Relief	Fusible Plug on liquid lines of both circuits - 210°F									
Hot Gas Connection Line Size (in.)	1-5/8+2-1/8	2-5/8	2-1/8+2-1/8	2-5/8	2-1/8+2-1/8	2-5/8	2-1/8+2-1/8	3-1/8	2-1/8+2-1/8	3-1/8
Liquid Connection Line Size (in.)	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8	1-1/8+1-3/8	1-5/8	1-3/8+1-3/8	2-1/8	1-3/8+1-3/8	2-1/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 95°F ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

Table 6 — 09RC 160-230 Units — SI

09RC UNIT SIZE	09RCM160		09RCM170		09RCM185		09RCM200		09RCM230	
CIRCUIT	Dual	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single
CHASSIS DIMENSIONS										
Length (mm)	6 260				7 454				8643	
Width (mm)	2 236									
Height (mm)	2 513									
UNIT WEIGHTS (kg)										
MCHX Standard	2390		2420		2804		2829		3266	
Cu-Al RTPF	2795		2845		3279		3329		3847	
NITROGEN SHIPPING CHARGE (bar)	1.02									
CONDENSER FANS Axial Flying Bird 6										
Quantity	4/5	9	5/5	10	5/6	11	6/6	12	7/7	14
No. Blades… Diameter (in.)	9...30									
Motor kW (per fan)	2.24									
VARIABLE SPEED (rpm) 6 POLE	1 140									
Airflow (l/sec) AL-CU Coil (60/50 Hz)[a]	59 329		65 921		72 513		79 105		92 289	
Airflow (l/sec) MCHX Coil (60/50 Hz)[a]	61 193		67 993		74 792		81 591		95 190	
COIL DETAIL										
No. Coils per Circuit (Ckt A/Ckt B)	4/5	9	5/5	10	5/6	11	6/6	12	7/7	14
Circuit % (Ckt A/Ckt B)	44/56	N/A	50/50	N/A	45/55	N/A	50/50	N/A	50/50	N/A
Total Coils	9	9	10	10	11	11	12	12	14	14
sq m	22.5		25.0		27.5		30.0		35.1	
PIPING										
Pressure Relief	Fusible Plug on liquid line - 99°C									
Hot Gas Connection Line Size (in.)	1-5/8+2-1/8	2-5/8	2-1/8+2-1/8	2-5/8	2-1/8+2-1/8	2-5/8	2-1/8+2-1/8	3-1/8	2-1/8+2-1/8	3-1/8
Liquid Connection Line Size (in.)	1-1/8+1-1/8	1-5/8	1-1/8+1-1/8	1-5/8	1-1/8+1-3/8	1-5/8	1-3/8+1-3/8	2-1/8	1-3/8+1-3/8	2-1/8

NOTE(S):

a. Condenser fan airflow and power are for units operating at full load and 35°C ambient.

LEGEND
MCHX — Microchannel Heat Exchanger
RTPF — Round Tube Plate Fin

DOMESTIC UNITS

Standard 09RC unit packaging consists of coil protection only. *Skids are not provided.* If overhead rigging is not available at the jobsite, place the unit on a skid or pad before dragging or rolling. When rolling, use a minimum of 3 rollers. When dragging, pull the pad or skid. *Do not apply force to the unit*. When in final position, raise from above to lift unit off the pad or skid.

EXPORT UNITS

All export units are mounted on skids with vertical coil protection. Leave the unit on the skid until it is in final position. *While on the skid, the unit can be rolled or skidded. Apply force to the skid, not to the unit.* Use a minimum of 3 rollers when rolling. When in final position, raise from above to remove the skid.

PLACING UNITS

When considering location of the unit, be sure to consult National Electrical Code (NEC, U.S.A.) and local code requirements. Allow sufficient space for airflow, wiring, piping, and service. The placement area must be level and strong enough to support the operating weight of the unit. (See Tables 7-10 and Fig. 2.) When unit is in proper location, use of mounting holes in base rails is recommended for securing unit to supporting structure. Fasteners for mounting unit are field supplied. See Fig. 3 and 4.

Refer to Fig. 5-14 for airflow clearances. Recommended minimum clearances are 6 ft (1829 mm) for unrestricted airflow and service on sides of unit, 4 ft (1219 mm) on ends, and unrestricted clear air space above the unit. Provide ample space to connect refrigerant lines to indoor unit. For multiple units, allow 10 ft (3048 mm) separation between airflow surfaces. If walls surround the unit, wall height should not exceed the top of the unit fan discharge. Installation in a pit is not recommended.

Refer to Fig. 15 for outdoor fan and compressor layout.

IMPORTANT: Be sure to mount unit level to ensure proper oil return to compressors.

Refer to Fig. 16 and 17 for unit piping installation.

Table 7 — 09RC Unit MCHX Condenser Coil (lb)

09RC UNIT SIZE	TOTAL WEIGHT	OPERATIONAL CORNER WEIGHT									
		A	B	C	D	E	F	G	H	I	J
020	805	194	189	208	214	—	—	—	—	—	—
030	955	229	223	248	254	—	—	—	—	—	—
035	1212	312	311	294	295	—	—	—	—	—	—
050	1484	383	381	359	361	—	—	—	—	—	—
060	1682	433	430	408	411	—	—	—	—	—	—
080	2521	857	977	399	288	—	—	—	—	—	—
095	3372	949	1111	730	582	—	—	—	—	—	—
115	3425	974	1106	731	614	—	—	—	—	—	—
130	4289	841	967	593	467	766	655	—	—	—	—
145	4343	872	973	580	479	762	677	—	—	—	—
160	5271	640	721	684	602	690	624	708	602	—	—
170	5335	645	727	692	610	696	630	715	620	—	—
185	6182	647	690	966	803	795	632	846	803	—	—
200	6238	651	692	978	81	802	635	854	813	—	—
230	7201	632	727	798	799	724	654	753	685	771	659

Table 8 — 09RC Unit MCHX Condenser Coil (kg)

09RC UNIT SIZE	TOTAL WEIGHT	OPERATIONAL CORNER WEIGHT									
		A	B	C	D	E	F	G	H	I	J
020	365	88	86	94	97	—	—	—	—	—	—
030	433	104	101	113	115	—	—	—	—	—	—
035	550	142	141	133	134	—	—	—	—	—	—
050	673	174	173	163	164	—	—	—	—	—	—
060	763	196	195	185	186	—	—	—	—	—	—
080	1144	389	443	181	131	—	—	—	—	—	—
095	1530	430	504	331	264	—	—	—	—	—	—
115	1554	442	502	332	278	—	—	—	—	—	—
130	1945	381	439	269	212	347	297	—	—	—	—
145	1970	396	441	263	217	346	307	—	—	—	—
160	2390	290	327	310	273	313	283	321	273	—	—
170	2420	293	330	314	277	316	286	324	281	—	—
185	2804	293	313	438	364	361	287	384	364	—	—
200	2830	295	314	444	369	364	288	387	369	—	—
230	3266	287	330	362	362	328	297	341	311	350	299

Table 9 — 09RC Unit RTPF Condenser Coil (lb)

09RC UNIT SIZE	TOTAL WEIGHT	OPERATIONAL CORNER WEIGHT									
		A	B	C	D	E	F	G	H	I	J
020	860	207	202	222	228	—	—	—	—	—	—
030	1019	244	238	265	271	—	—	—	—	—	—
035	1322	340	339	321	322	—	—	—	—	—	—
050	1594	412	409	385	388	—	—	—	—	—	—
060	1812	466	464	440	442	—	—	—	—	—	—
080	2901	948	1073	497	383	—	—	—	—	—	—
095	3887	1070	1248	865	704	—	—	—	—	—	—
115	3996	1136	1291	853	716	—	—	—	—	—	—
130	4993	947	1087	722	583	887	767	—	—	—	—
145	5102	996	1102	710	604	889	801	—	—	—	—
160	6162	718	802	825	741	794	727	814	741	—	—
170	6274	728	813	843	757	807	740	829	757	—	—
185	7230	738	743	1175	982	911	712	987	982	—	—
200	7341	753	755	1198	1006	912	726	998	993	—	—
230	8482	672	671	1074	1073	798	661	861	858	962	852

Table 10 — 09RC Unit RTPF Condenser Coil (kg)

09RC UNIT SIZE	TOTAL WEIGHT	OPERATIONAL CORNER WEIGHT									
		A	B	C	D	E	F	G	H	I	J
020	390	94	92	101	104	—	—	—	—	—	—
030	462	111	108	120	123	—	—	—	—	—	—
035	600	154	154	145	146	—	—	—	—	—	—
050	723	187	186	175	176	—	—	—	—	—	—
060	822	211	210	200	201	—	—	—	—	—	—
080	1316	430	487	225	174	—	—	—	—	—	—
095	1763	485	566	392	319	—	—	—	—	—	—
115	1813	515	586	387	325	—	—	—	—	—	—
130	2265	430	493	327	264	402	348	—	—	—	—
145	2314	452	500	322	274	403	363	—	—	—	—
160	2795	326	364	374	336	360	330	369	336	—	—
170	2846	330	369	382	343	366	336	376	343	—	—
185	3279	335	337	533	445	413	323	448	445	—	—
200	3329	342	342	543	456	414	329	453	450	—	—
230	3847	305	304	487	487	362	300	391	389	436	386

Top View

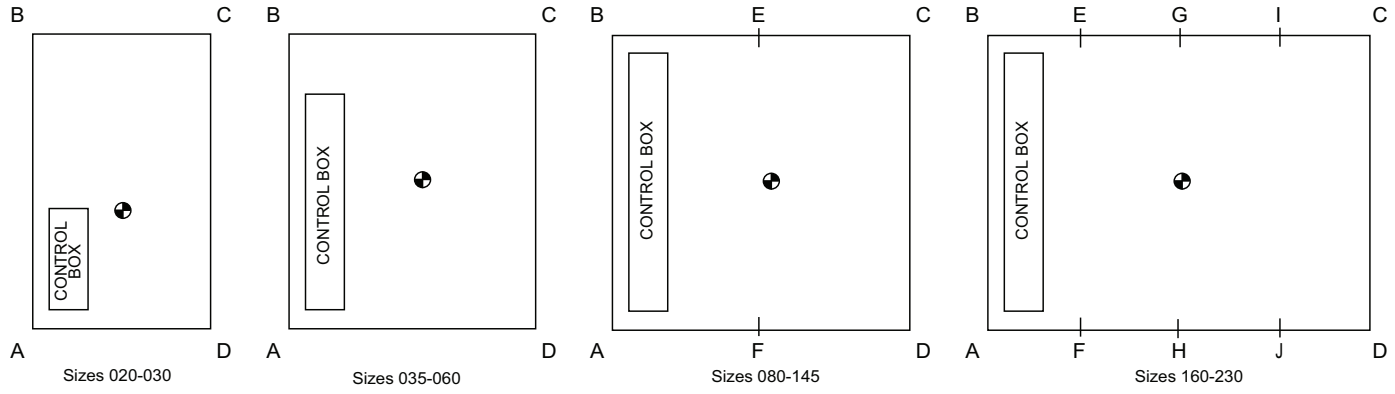
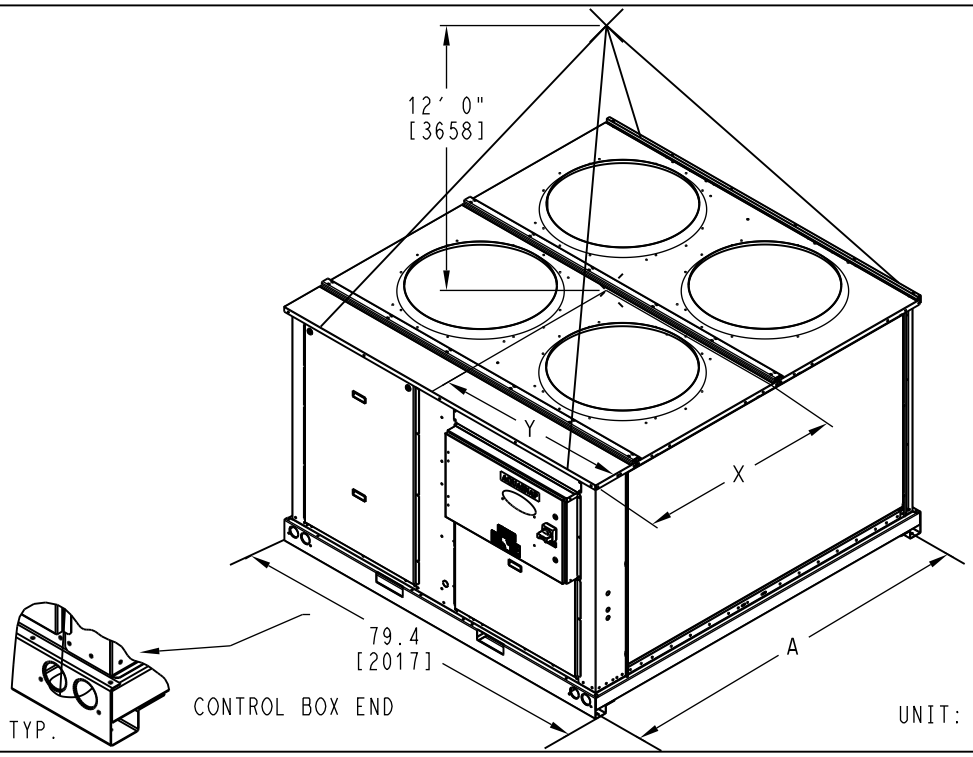


Fig. 2 — Corner Weights (Unit View)

CAUTION - NOTICE TO RIGGERS:

ALL PANELS MUST BE IN PLACE WHEN RIGGING. FORK ONLY THROUGH BASE RAIL FORK OPENINGS.

NOTES:
1. RIG WITH FOUR CABLES USING A MINIMUM 20 FT.(6094mm) LENGTH FOR 020-030 SIZES AND 24 FT.(7315mm) LENGTH FOR 035-060 SIZES.
2. CENTRAL LIFTING POINT MUST BE A MINIMUM OF 10 FT.(3048mm) FOR 020-030 SIZES AND 12 FT.(3658mm) FOR 035-060 SIZES ABOVE THE TOP OF THE UNIT.
3. LIFTING HOLES PROVIDED ARE 2.25 IN.(57.2mm) DIAMETER.
4. CHECK BILL OF LADING FOR SHIPPING WEIGHT OF UNIT.



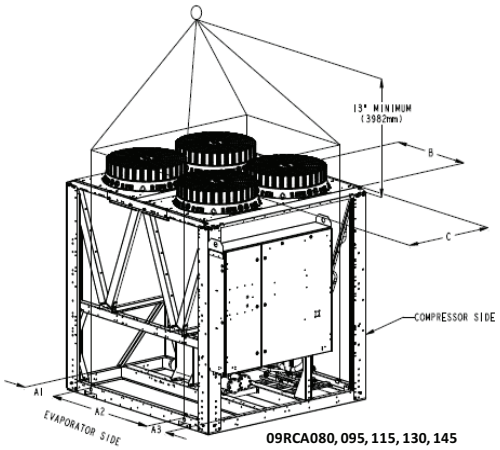
MODEL NUMBER	MCHX				RTPF				LIFTING HOLES		CENTER OF GRAVITY			
	MAX. SHIP WT. W/O PACKAGING		MAX. SHIP WT. W/PACKAGING		MAX. SHIP WT. W/O PACKAGING		MAX. SHIP WT. W/PACKAGING		A		X		Y	
	LBS	KGS	LBS	KGS	LBS	KGS	LBS	KGS	IN	MM	IN	MM	IN	MM
09RC020	793	360	879	399	848	385	934	424	40.3	1022	19.1	486	42.7	1085
09RC030	943	428	1029	467	1008	457	1094	496	40.3	1022	19.2	488	42.9	1089
09RC035	1188	539	1613	732	1298	589	1723	782	92.1	2340	44.8	1139	43.4	1102
09RC050	1460	662	1991	903	1570	712	2101	953	92.1	2340	45.4	1154	43.5	1104
09RC060	1658	752	2189	993	1788	811	2319	1052	92.1	2340	45.9	1166	43.6	1107

2005038172 REV. A

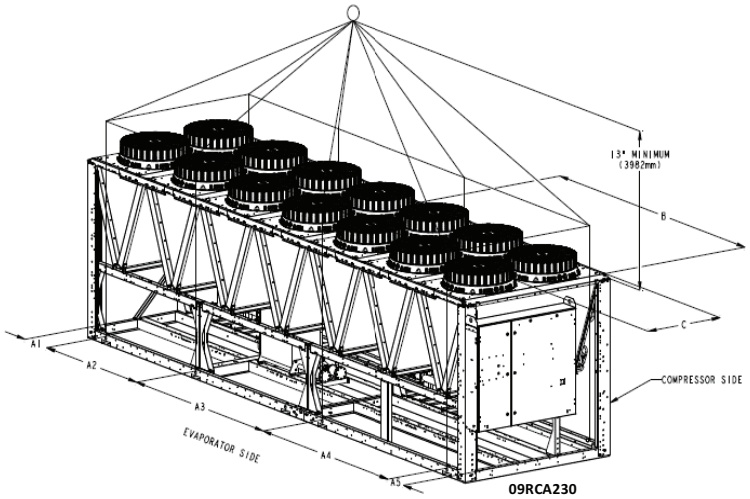
LEGEND

MCHX — Microchannel Heat Exchanger
RTPF — Round Tube, Plate Fin (Condenser Coil)

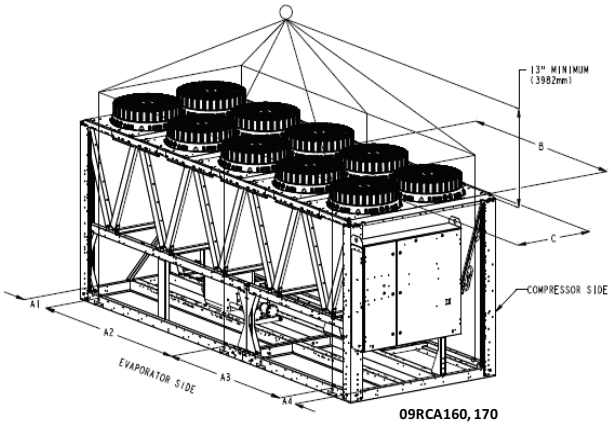
Fig. 3 — Rigging Label (Sizes 020 to 060)



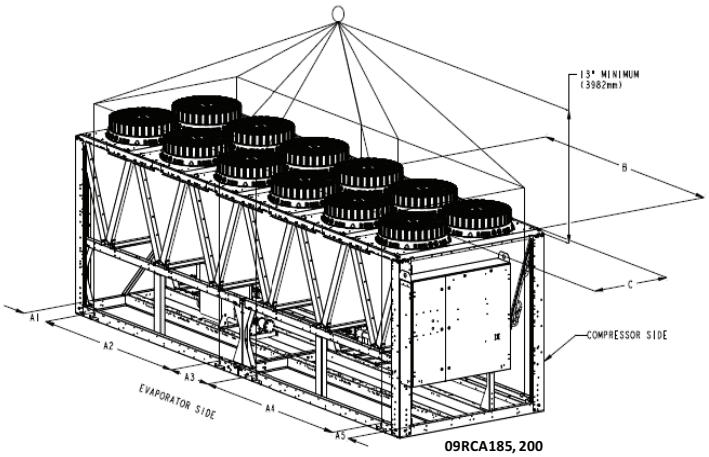
09RCA080, 095, 115, 130, 145



09RCA230



09RCA160, 170



09RCA185, 200

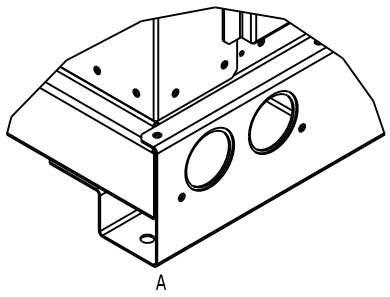
Model Number	Max Shipping Wt w/o Packaging		Max Shipping Wt with Packaging		Max Shipping Wt w/o Packaging		Max Shipping Wt with Packaging		Lifting Holes										Center of Gravity							
	Model Number Position 10 = 4, 5		Model Number Position 10 = 4, 5		Model Number Position 10 = 1, 3		Model Number Position 10 = 1, 3												B				C			
	MCHX		MCHX		RTPF		RTPF		A1		A2		A3		A4		A5		MCHX		RTPF		MCHX		RTPF	
	lb	kg	lb	kg	lb	kg	lb	kg	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
09RCA080	2138	970	2491	1130	2458	1115	2811	1275	16.1	409	62.0	1575	16.1	409	—	—	—	—	32.9	836.4	34.8	882.9	47.9	1217.8	47.5	1206.9
09RCA095	2829	1283	3336	1514	3266	1482	3774	1712	16.1	409	109.0	2769	16.1	409	—	—	—	—	58.4	1484.2	60.0	1524.9	47.9	1217.6	47.7	1210.9
09RCA115	2874	1304	3381	1534	3354	1522	3861	1752	16.1	409	109.0	2769	16.1	409	—	—	—	—	58.8	1493.2	60.5	1535.9	47.1	1197.4	46.8	1188.3
09RCA130	3576	1623	4237	1923	4174	1894	4835	2194	16.1	409	156.0	3963	16.1	409	—	—	—	—	80.4	2043.0	82.6	2096.8	47.6	1209.6	47.4	1203.5
09RCA145	3622	1643	4283	1943	4261	1933	4922	2233	16.1	409	156.0	3963	16.1	409	—	—	—	—	79.9	2029.1	82.0	2082.9	46.8	1188.9	46.5	1180.6
09RCA160	4378	1986	5192	2356	5135	2330	5949	2699	16.1	409	109.0	2769	94.0	2388	16.1	408.9	—	—	104.7	2659.5	106.6	2707.5	46.5	1181.4	46.2	1174.4
09RCA170	4423	2007	5237	2376	5222	2369	6037	2739	16.1	409	109.0	2769	94.0	2388	16.1	408.9	—	—	104.8	2662.7	106.8	2712.0	46.5	1181.1	46.2	1173.9
09RCA185	5097	2313	6066	2752	6014	2729	6983	3168	16.1	409	156.0	3963	32.0	813	109.0	2769.2	16.1	408.9	128.7	3270.2	130.6	3317.8	46.3	1176.4	46.1	1169.9
09RCA200	5142	2333	6111	2773	6102	2768	7071	3208	16.1	409	109.0	2769	32.0	813	109.0	2769.2	16.1	408.9	128.9	3273.1	130.8	3321.7	46.3	1176.1	46.0	1169.5
09RCA230	5920	2686	7043	3195	7039	3194	8162	3703	16.1	409	78.0	1982	110.0	2794	109.0	2769.2	16.1	408.9	152.3	3867.4	154.2	3916.9	46.1	1170.2	45.8	1164.4

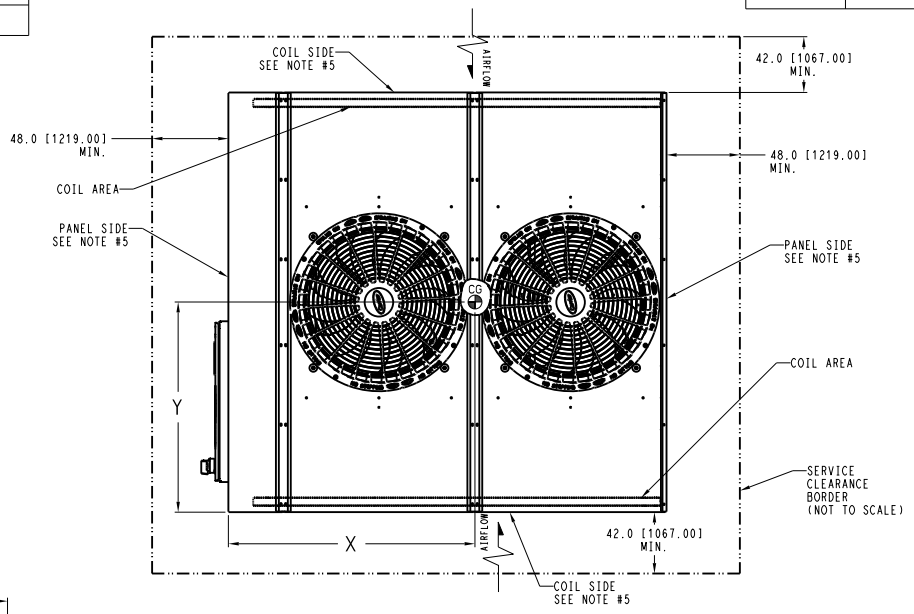
LEGEND

MCHX — Microchannel Heat Exchanger
RTPF — Round Tube, Plate Fin (Condenser Coil)

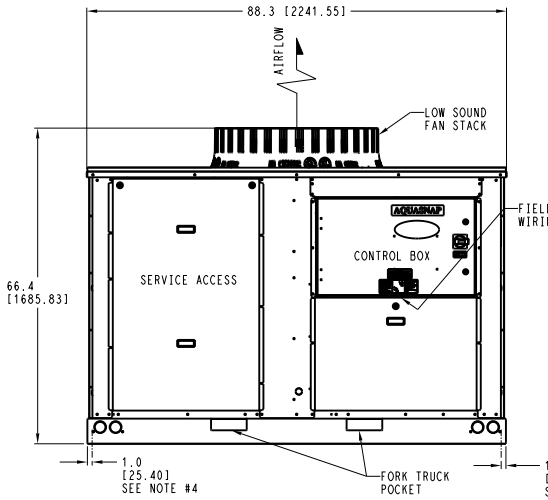
Fig. 4 — Rigging Label (Sizes 080 to 230)

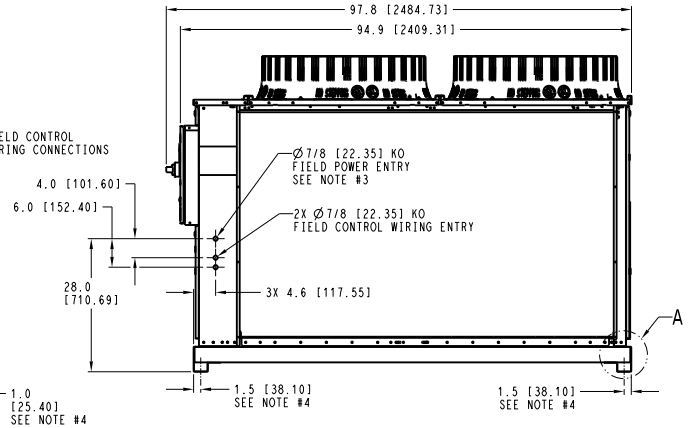
UNIT	CIRCUIT	UNIT HEIGHT "H"	PIPING CONNECTION		CENTER OF GRAVITY	
			HOT GAS	LIQUID	X	Y
09RC035	SINGLE	66.5 [1689.10]	1-5/8"	7/8"	44.8 [1139]	43.4 [1102]

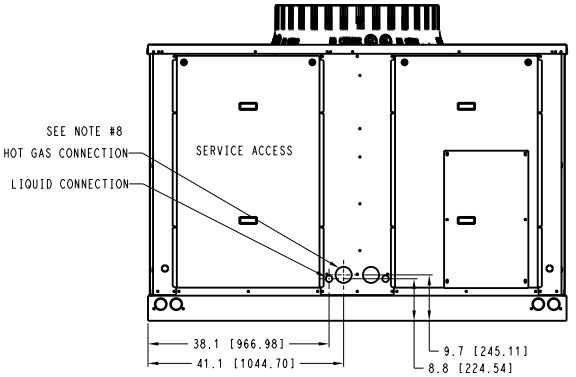




NOTES:
1. BE SURE TO USE A WET RAG AND REMOVE ALL VALVE CORES BEFORE BRAZING FIELD PIPING.
2. TEMPERATURE RELIEF DEVICE(S) LOCATED ON LIQUID LINE AND HAVE A 3/8" SAE FLARE CONNECTION. DO NOT CAP OR OTHERWISE OBSTRUCT THE TEMPERATURE /PRESSURE RELIEF.
3. Ø7/8 [22.41 PILOT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
4. Ø0.524 [13.30] HOLE USED FOR MOUNTING UNIT.
5. UNIT MUST HAVE CLEARANCES AS FOLLOWS: TOP-DO NOT RESTRICT. COIL SIDES - 42.0[1067.00] FROM SOLID SURFACE PANEL SIDES - 48.0[1219.00] PER NEC
6. CARRIER DOES NOT RECOMMEND INSTALLATION IN A PIT.
7. UNIT CAN BE HANDLED USING THE FORK TRUCK LIFT POCKETS
8. THE LIQUID AND HOT GAS PIPING CONNECTION ENDS APPROXIMATELY 12 INCHES INSIDE THE UNIT. FIELD INSTALLED SINGLE CIRCUIT MANIFOLD ENDS APPROXIMATELY 5 INCHES INSIDE THE UNIT.
9. DIMENSIONS IN [] ARE IN MILLIMETERS.



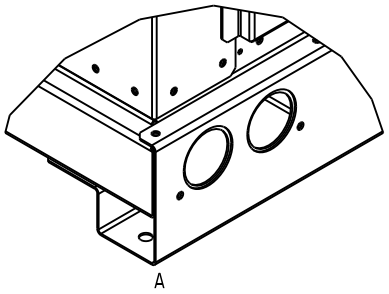


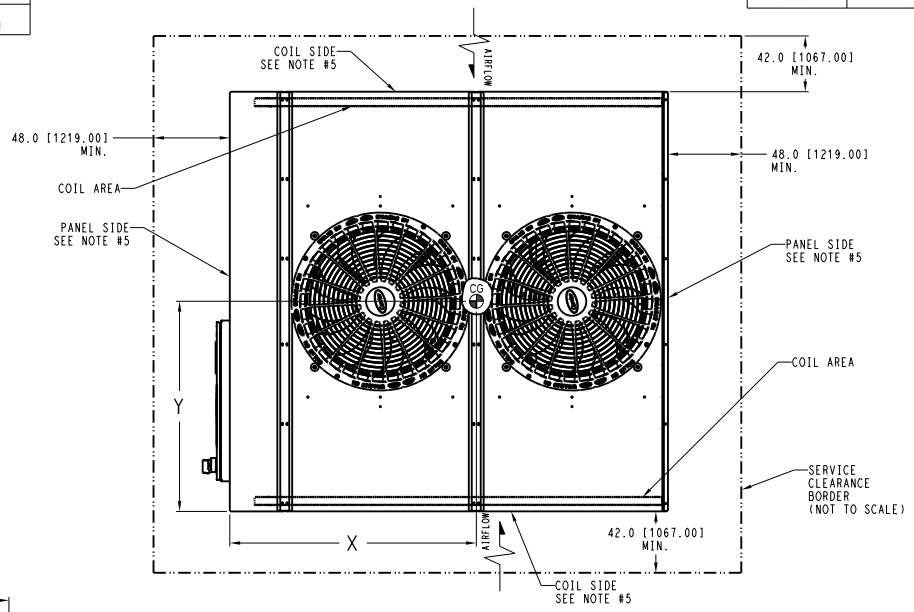


ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 1	02/20/24	-	09RC 035T UNIT ASSY	09RC60001020	-

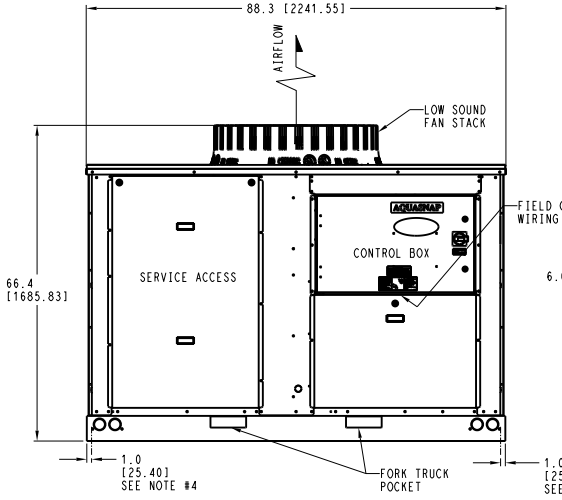
Fig. 5 — Unit Dimensions — 09RC020-030 Units

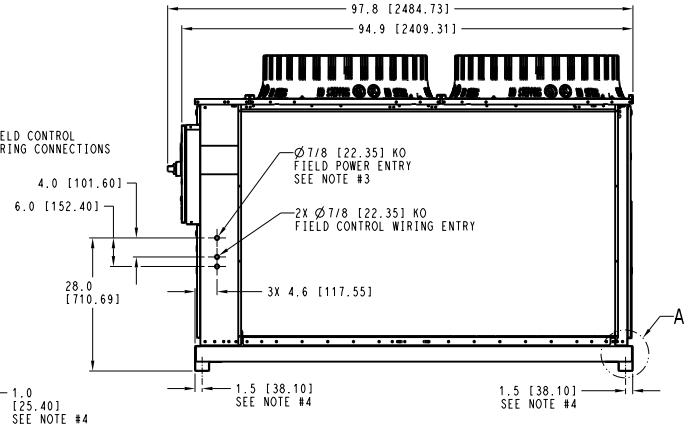
UNIT	CIRCUIT	UNIT HEIGHT "H"	PIPING CONNECTION		CENTER OF GRAVITY	
			HOT GAS	LIQUID	X	Y
09RC035	SINGLE	66.5 [1689.10]	1-5/8"	7/8"	44.8 [1139]	43.4 [1102]

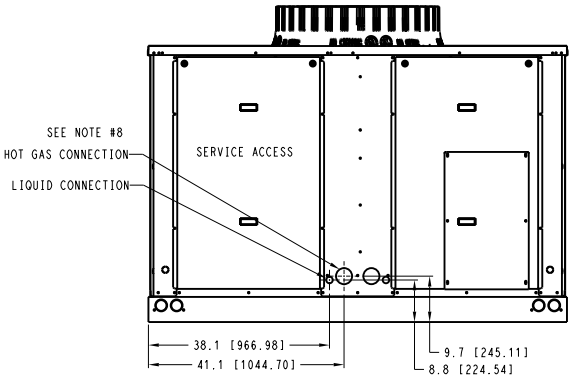




NOTES:
1. BE SURE TO USE A WET RAG AND REMOVE ALL VALVE CORES BEFORE BRAZING FIELD PIPING.
2. TEMPERATURE RELIEF DEVICE(S) LOCATED ON LIQUID LINE AND HAVE A 3/8" SAE FLARE CONNECTION. DO NOT CAP OR OTHERWISE OBSTRUCT THE TEMPERATURE /PRESSURE RELIEF.
3. Ø7/8 [22.41 PILOT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
4. Ø0.524 [13.30] HOLE USED FOR MOUNTING UNIT.
5. UNIT MUST HAVE CLEARANCES AS FOLLOWS: TOP-DO NOT RESTRICT. COIL SIDES - 42.0[1067.00] FROM SOLID SURFACE PANEL SIDES - 48.0[1219.00] PER NEC
6. CARRIER DOES NOT RECOMMEND INSTALLATION IN A PIT.
7. UNIT CAN BE HANDLED USING THE FORK TRUCK LIFT POCKETS
8. THE LIQUID AND HOT GAS PIPING CONNECTION ENDS APPROXIMATELY 12 INCHES INSIDE THE UNIT. FIELD INSTALLED SINGLE CIRCUIT MANIFOLD ENDS APPROXIMATELY 5 INCHES INSIDE THE UNIT.
9. DIMENSIONS IN [] ARE IN MILLIMETERS.



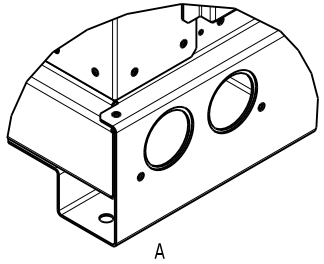


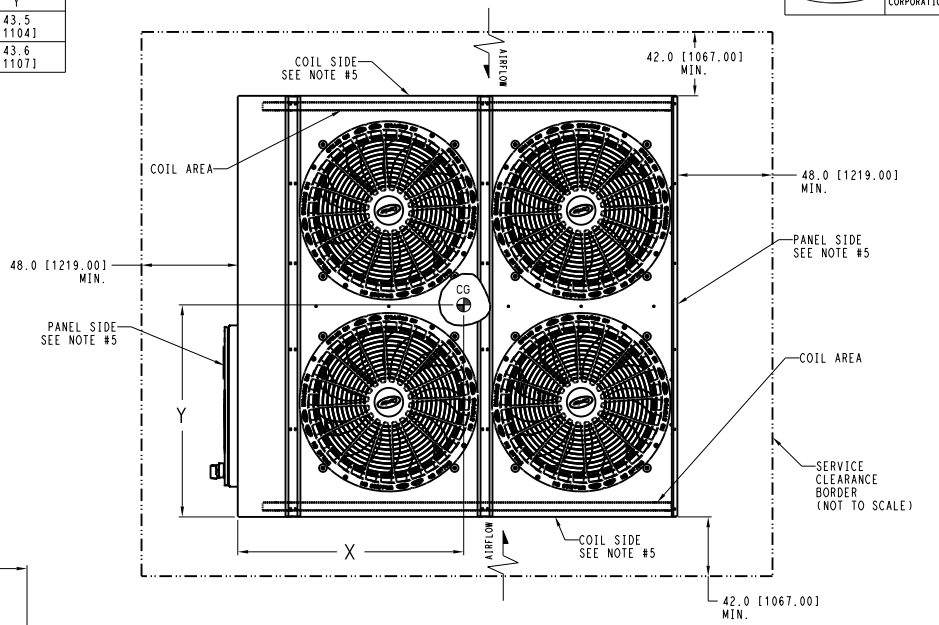


ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 1	02/20/24	-	09RC 035T UNIT ASSY	09RC60001020	-

Fig. 6 — Unit Dimensions — 09RC035 Units

UNIT	CIRCUIT	UNIT HEIGHT "H"	PIPING CONNECTION		CENTER OF GRAVITY	
			HOT GAS	LIQUID	X	Y
09RC050	DUAL	66.5 [1689.10]	1-3/8"	5/8"	45.4 [1154]	43.5 [1104]
09RC060	DUAL	78.5 [1993.90]			45.9 [1166]	43.6 [1107]





NOTES:
1. BE SURE TO USE A WET RAG AND REMOVE ALL VALVE CORES BEFORE BRAZING FIELD PIPING.
2. TEMPERATURE RELIEF DEVICE(S) LOCATED ON LIQUID LINE AND HAVE A 3/8" SAE FLARE CONNECTION. DO NOT CAP OR OTHERWISE OBSTRUCT THE TEMPERATURE /PRESSURE RELIEF.
3. Ø7/8 [22.41 PILOT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
4. Ø0.524 [13.30] HOLE USED FOR MOUNTING UNIT.
5. UNIT MUST HAVE CLEARANCES AS FOLLOWS: TOP-DO NOT RESTRICT. COIL SIDES - 42.0[1067.00] FROM SOLID SURFACE PANEL SIDES - 48.0[1219.00] PER NEC
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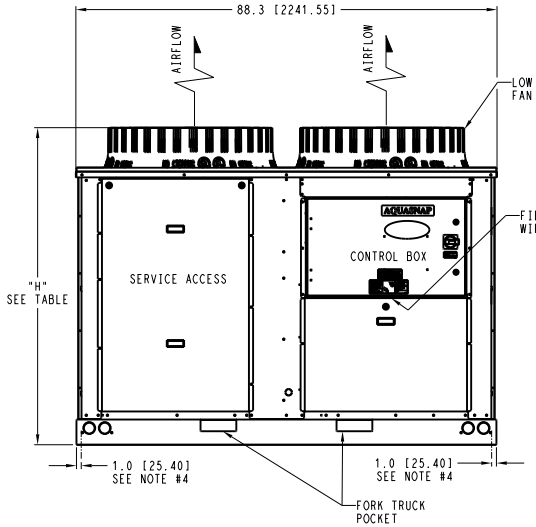
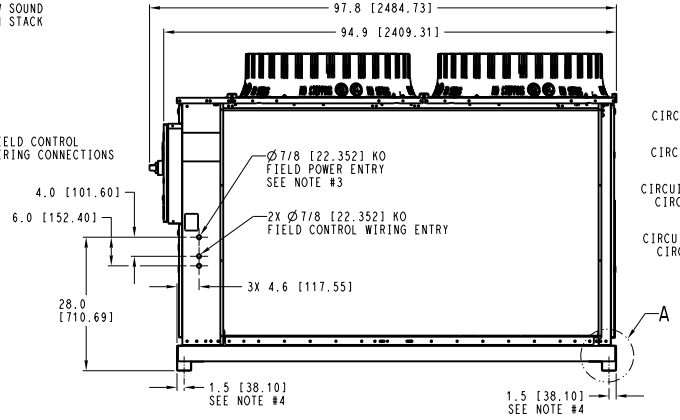
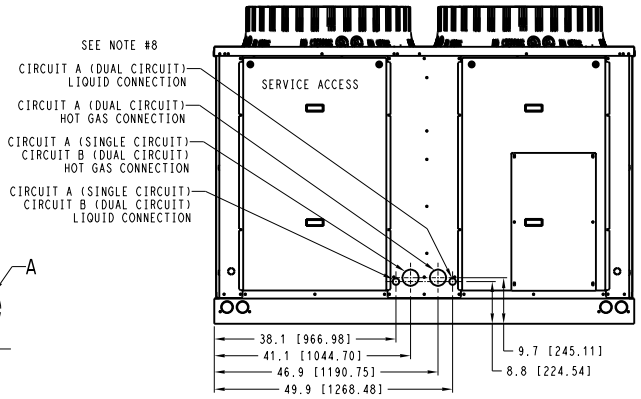
8. THE LIQUID AND HOT GAS PIPING CONNECTION ENDS APPROXIMATELY 12 INCHES INSIDE THE UNIT. FIELD INSTALLED SINGLE CIRCUIT MANIFOLD ENDS APPROXIMATELY 5 INCHES INSIDE THE UNIT.
9. DIMENSIONS IN [] ARE IN MILLIMETERS.







ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 1	02/20/24	-	09RC 050-060T UNIT ASSY	09RC60001030	-

Fig. 7 — Unit Dimensions — 09RC050-060 Units

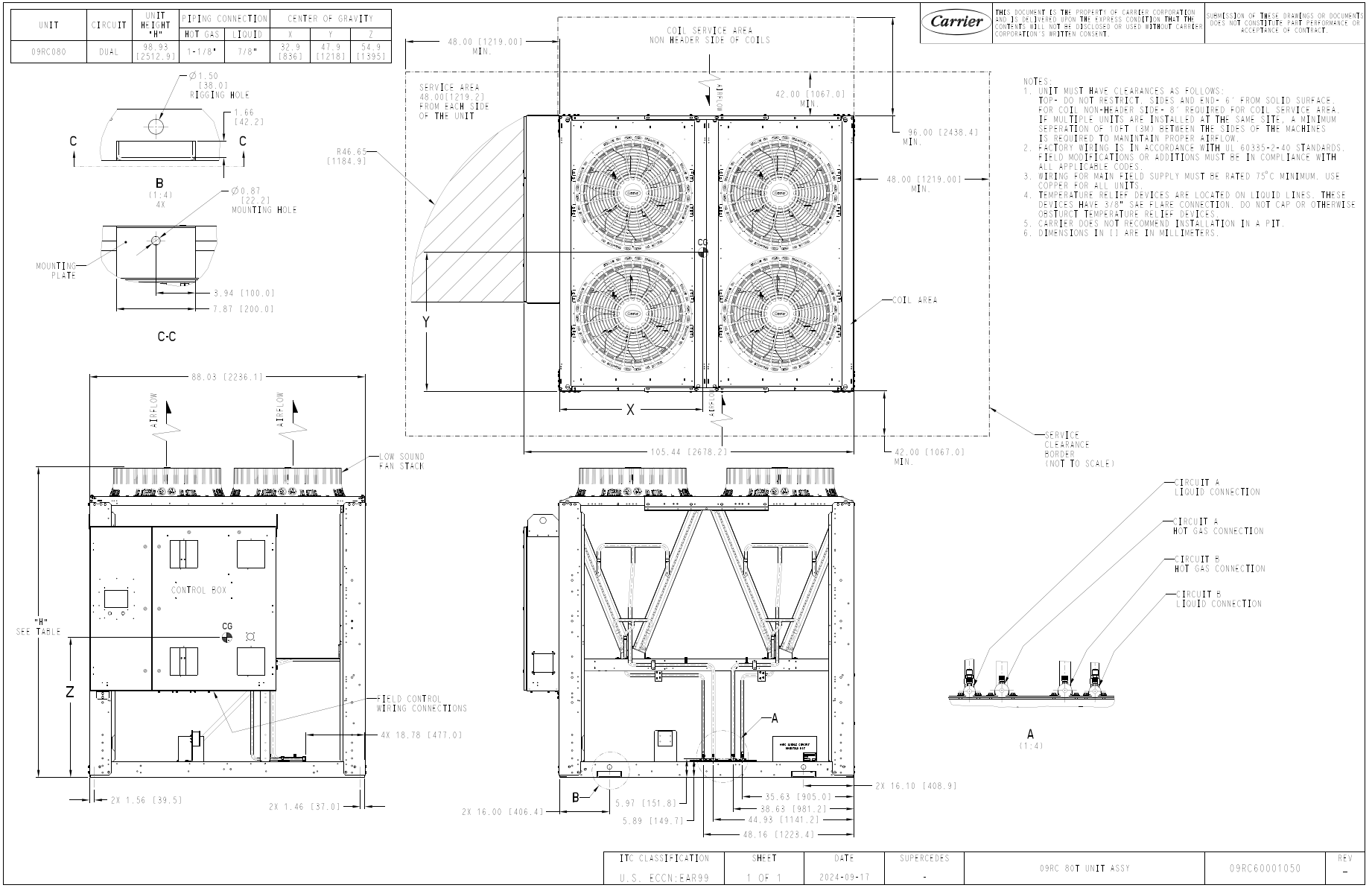


Fig. 8 — Unit Dimensions — 09RC080 Units

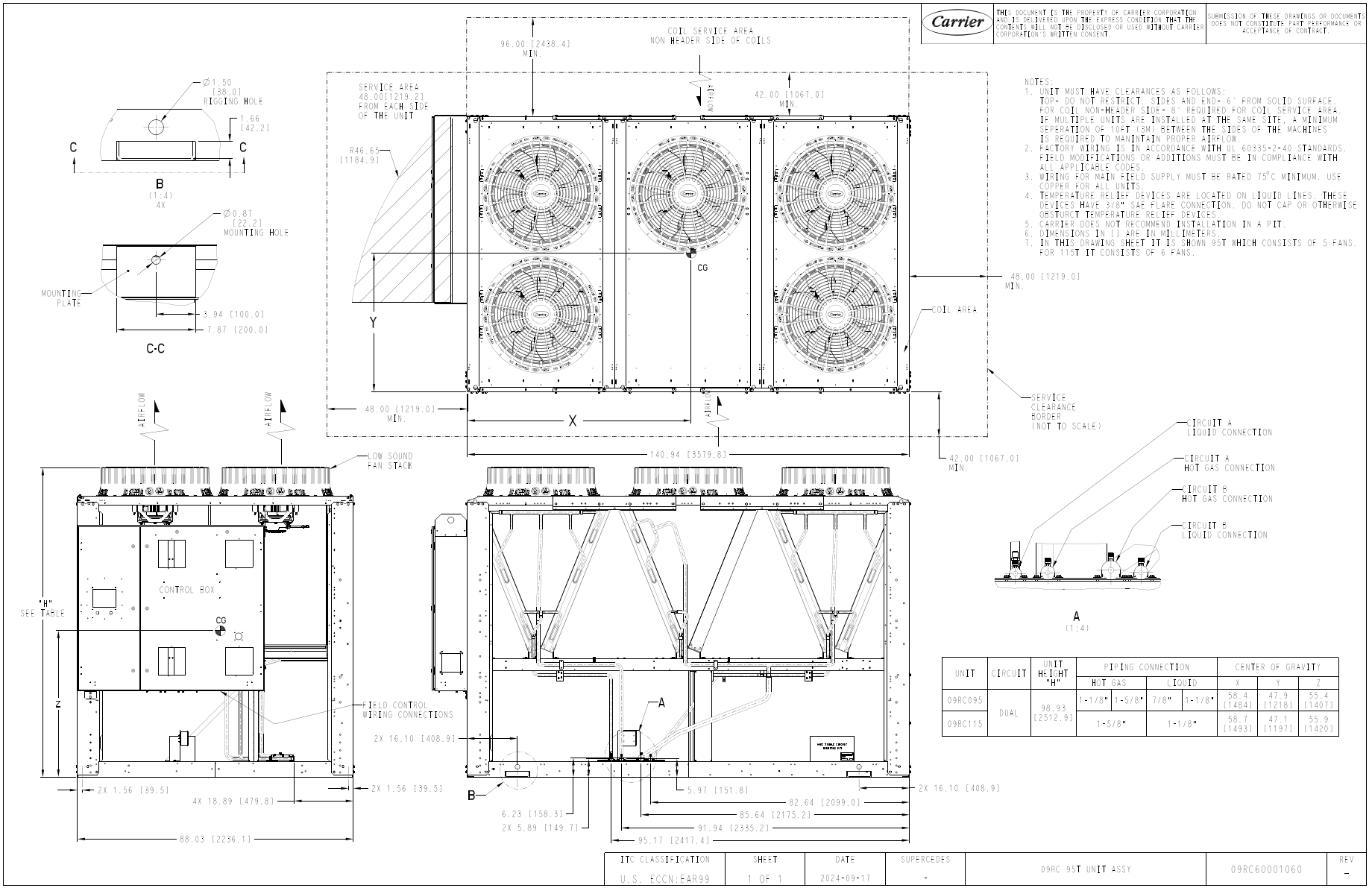
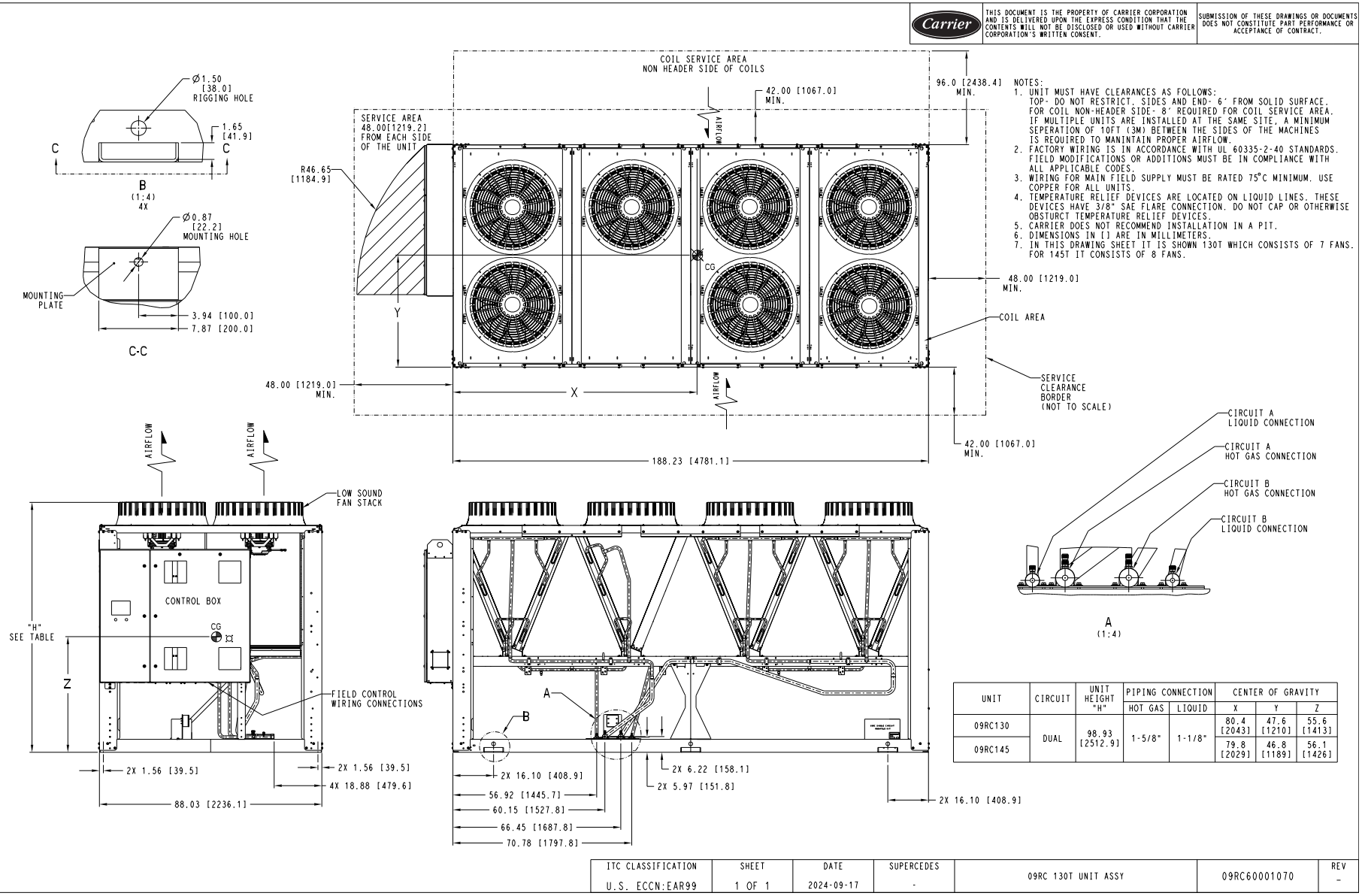


Fig. 9 — Unit Dimensions — 09RC095 Units



UNIT	CIRCUIT	UNIT HEIGHT "H"	PIPING CONNECTION		CENTER OF GRAVITY		
			HOT GAS	LIQUID	X	Y	Z
09RC130	DUAL	98.93 [2512.9]	1-5/8"	1-1/8"	80.4 [2043]	47.6 [1210]	55.6 [1413]
09RC145					79.8 [2029]	46.8 [1189]	56.1 [1426]

Fig. 10 — Unit Dimensions — 09RC130 Units

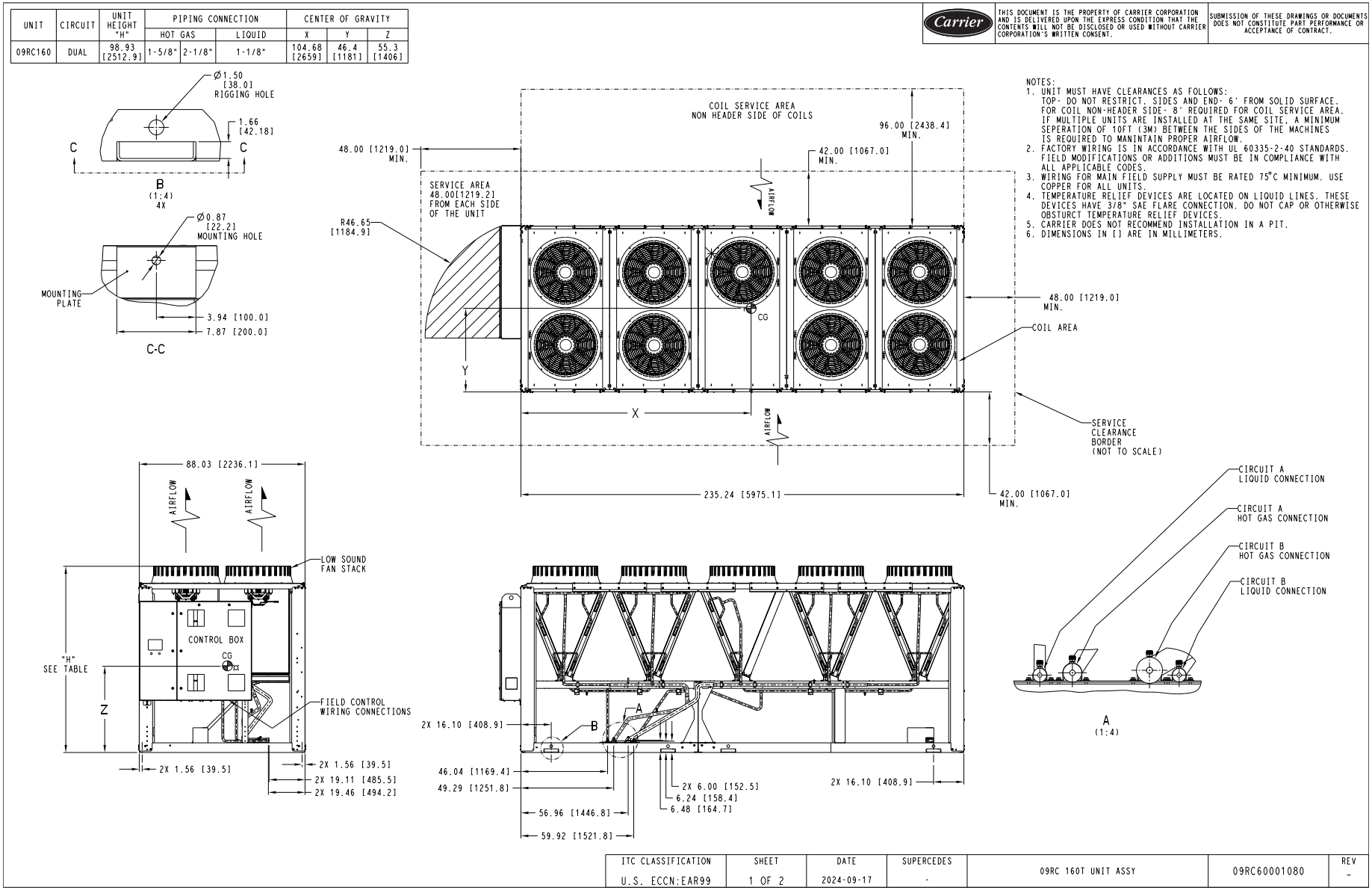


Fig. 11 — Unit Dimensions — 09RC160 Units

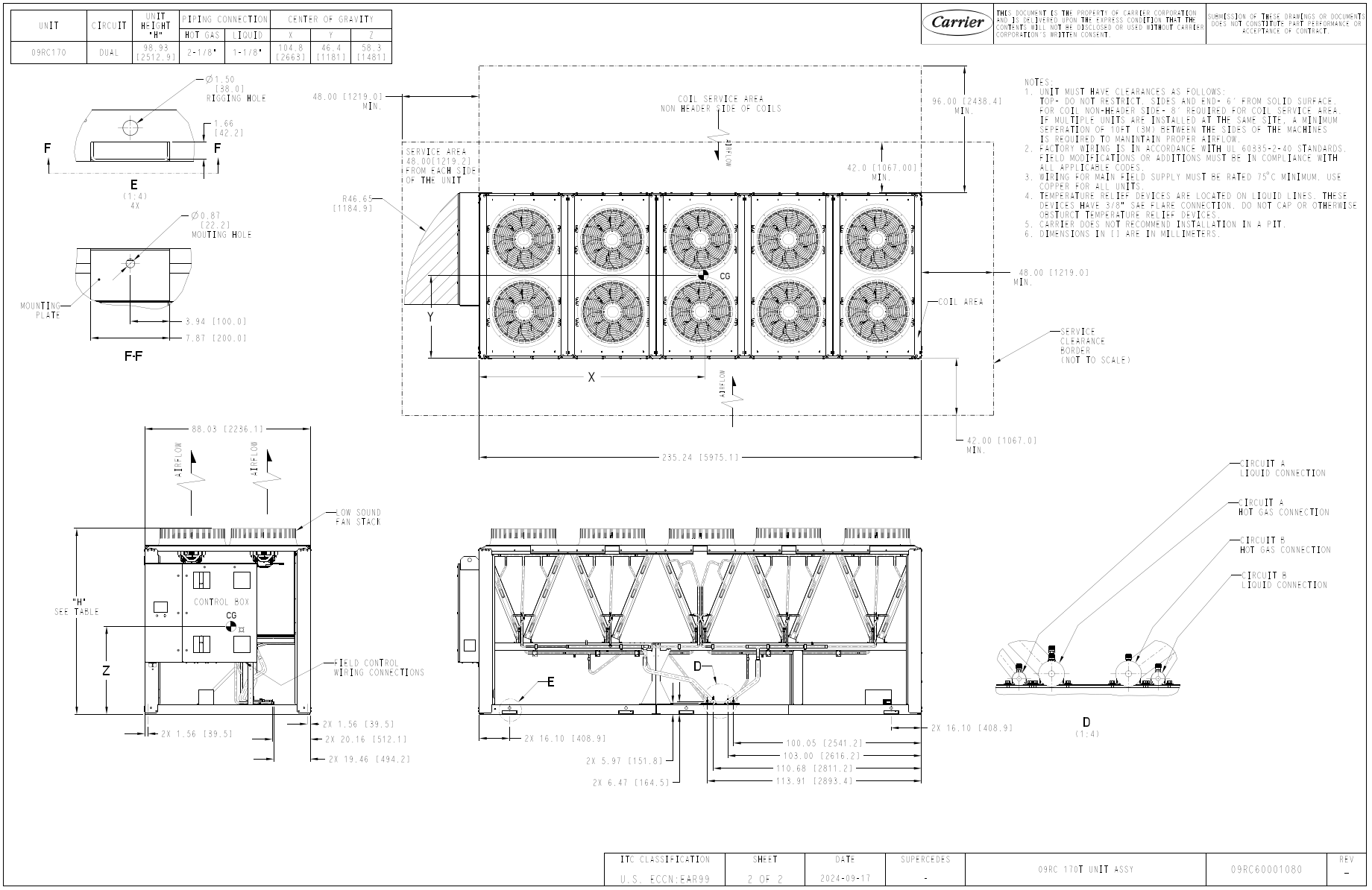
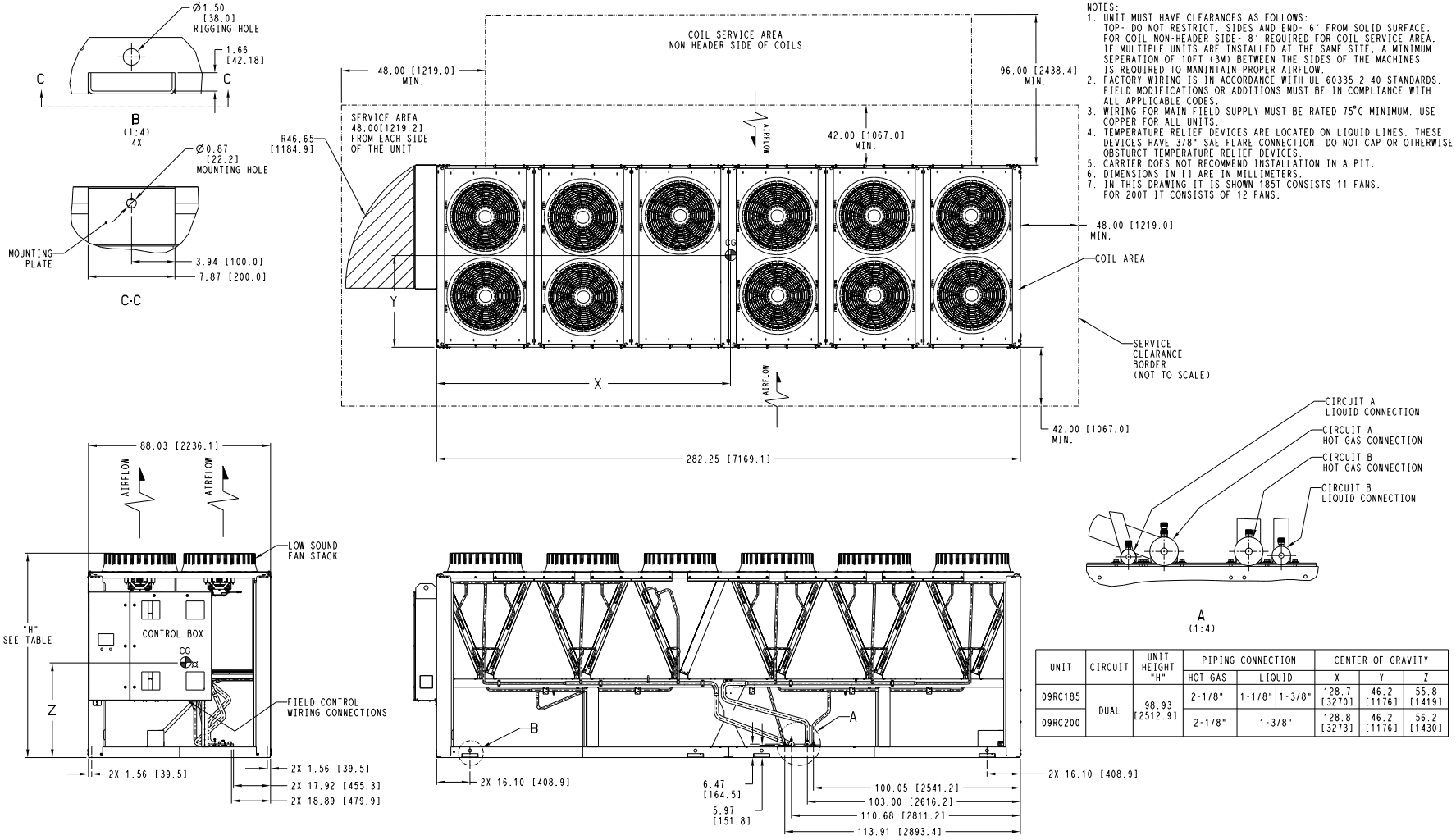


Fig. 12 — Unit Dimensions — 09RC170 Units



UNIT	CIRCUIT	UNIT HEIGHT "H"	PIPING CONNECTION			CENTER OF GRAVITY		
			HOT GAS	LIQUID		X	Y	Z
09RC185	DUAL	98.93 [2512.9]	2-1/8"	1-1/8"	1-3/8"	128.7 [3270]	46.2 [1176]	55.8 [1419]
09RC200			2-1/8"	1-3/8"		128.8 [3273]	46.2 [1176]	56.2 [1430]

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:EAR99	1 OF 1	2024-09-17	-	09RC 185T UNIT ASSY	09RC60001090	-

Fig. 13 — Unit Dimensions — 09RC185 Units

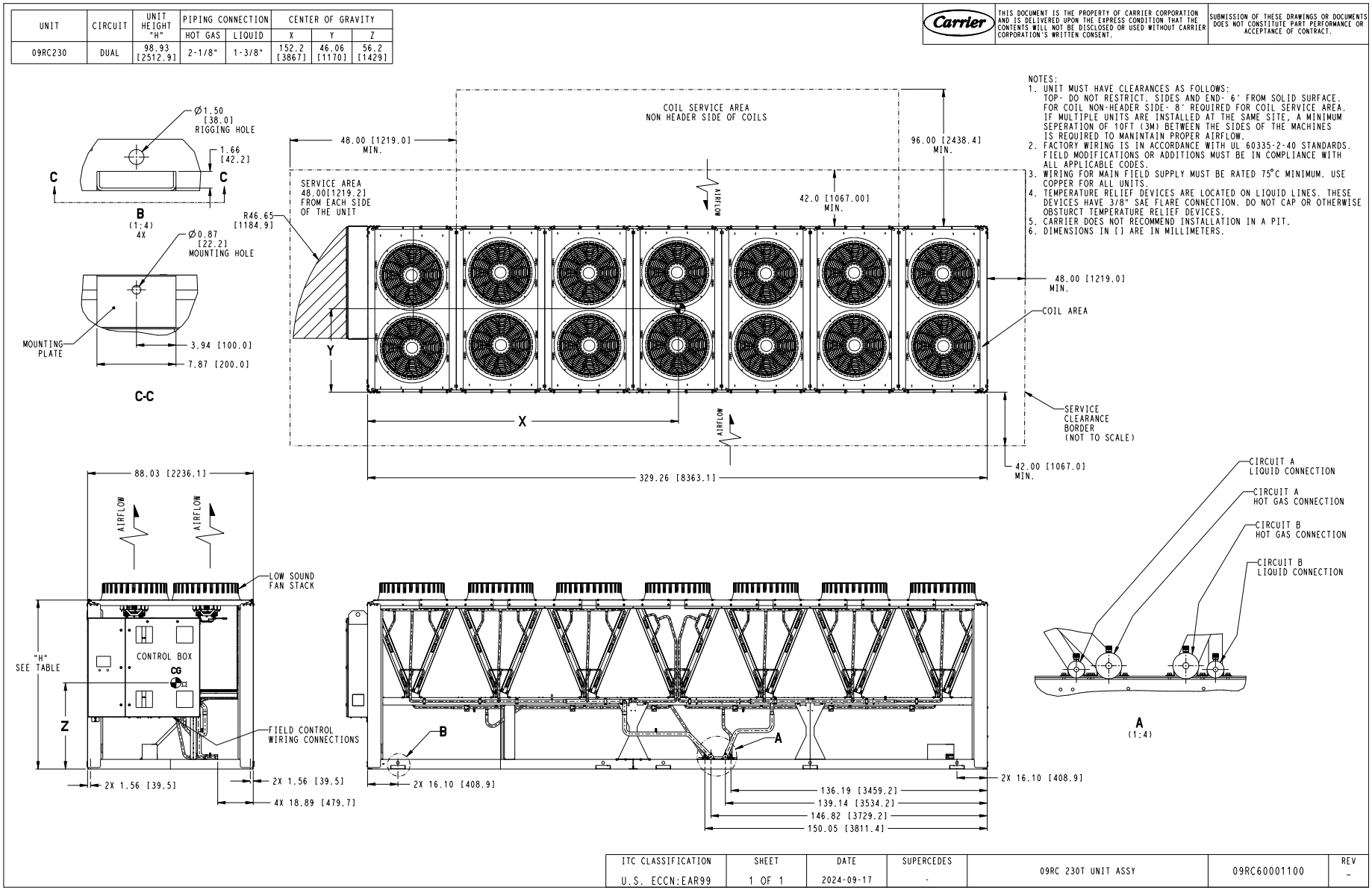
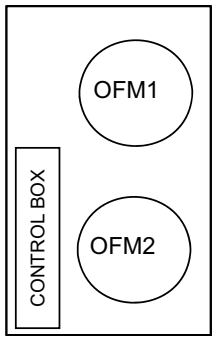
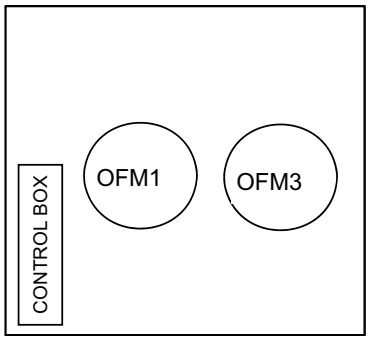


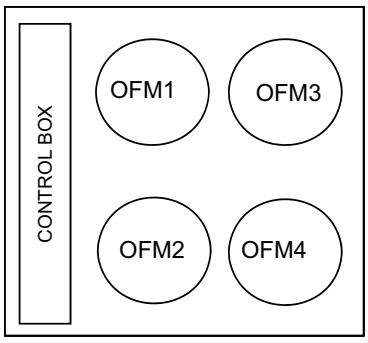
Fig. 14 — Unit Dimensions — 09RC230 Units



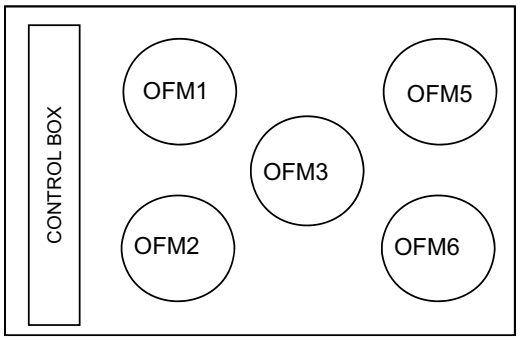
Top View
Sizes 020-030



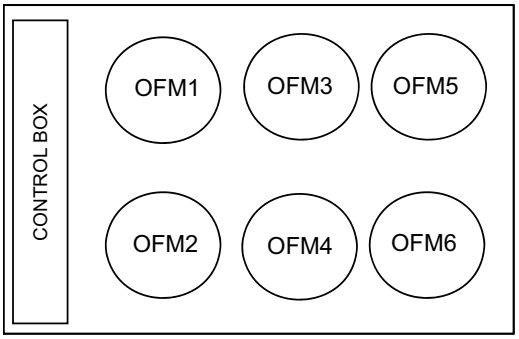
Top View
Size 035



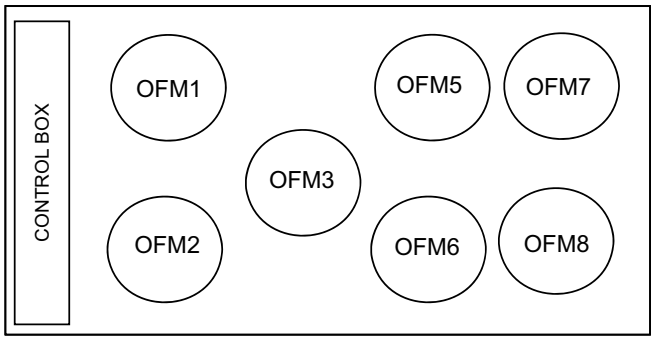
Top View
Sizes 050-080



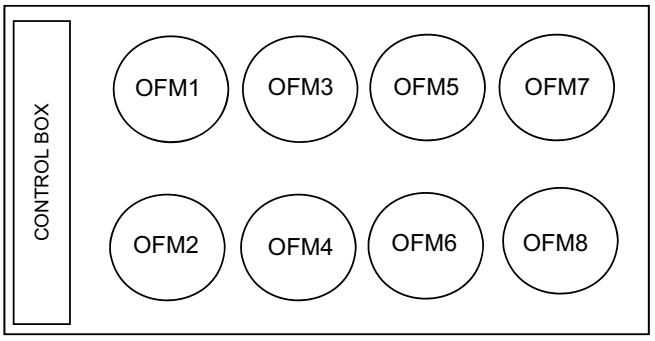
Top View
Size 095



Top View
Sizes 115



Top View
Size 130

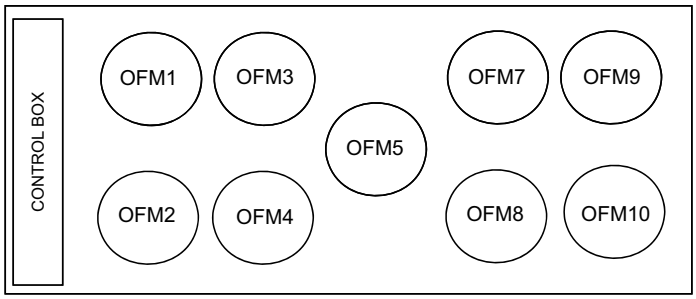


Top View
Size 145

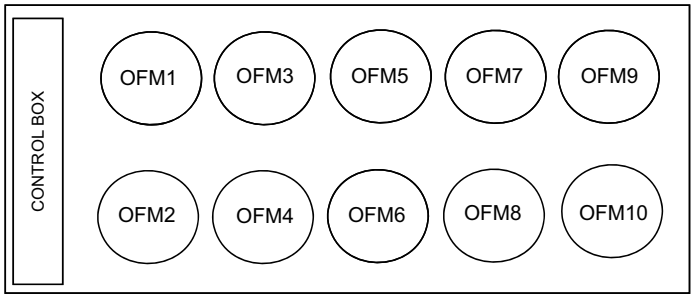
LEGEND

OFM — Outdoor Fan

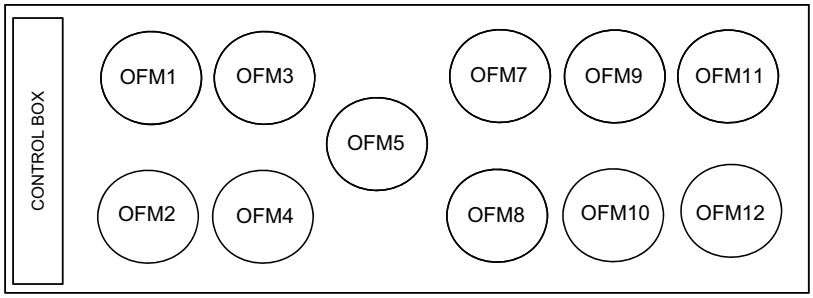
Fig. 15 — Outdoor Fan Layout



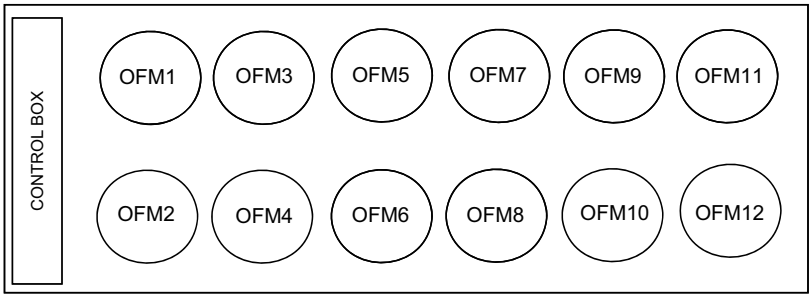
Top View
Size 160



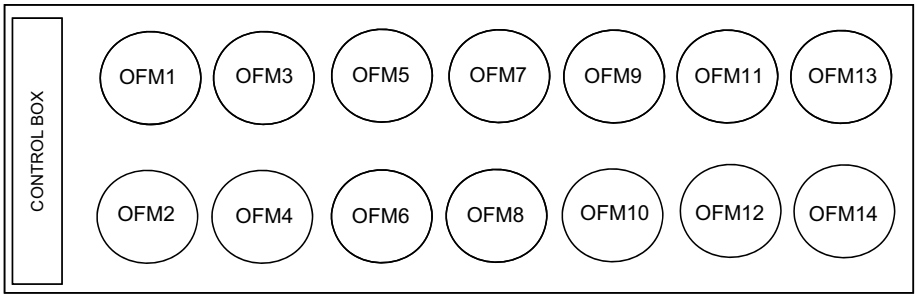
Top View
Size 170



Top View
Size 185

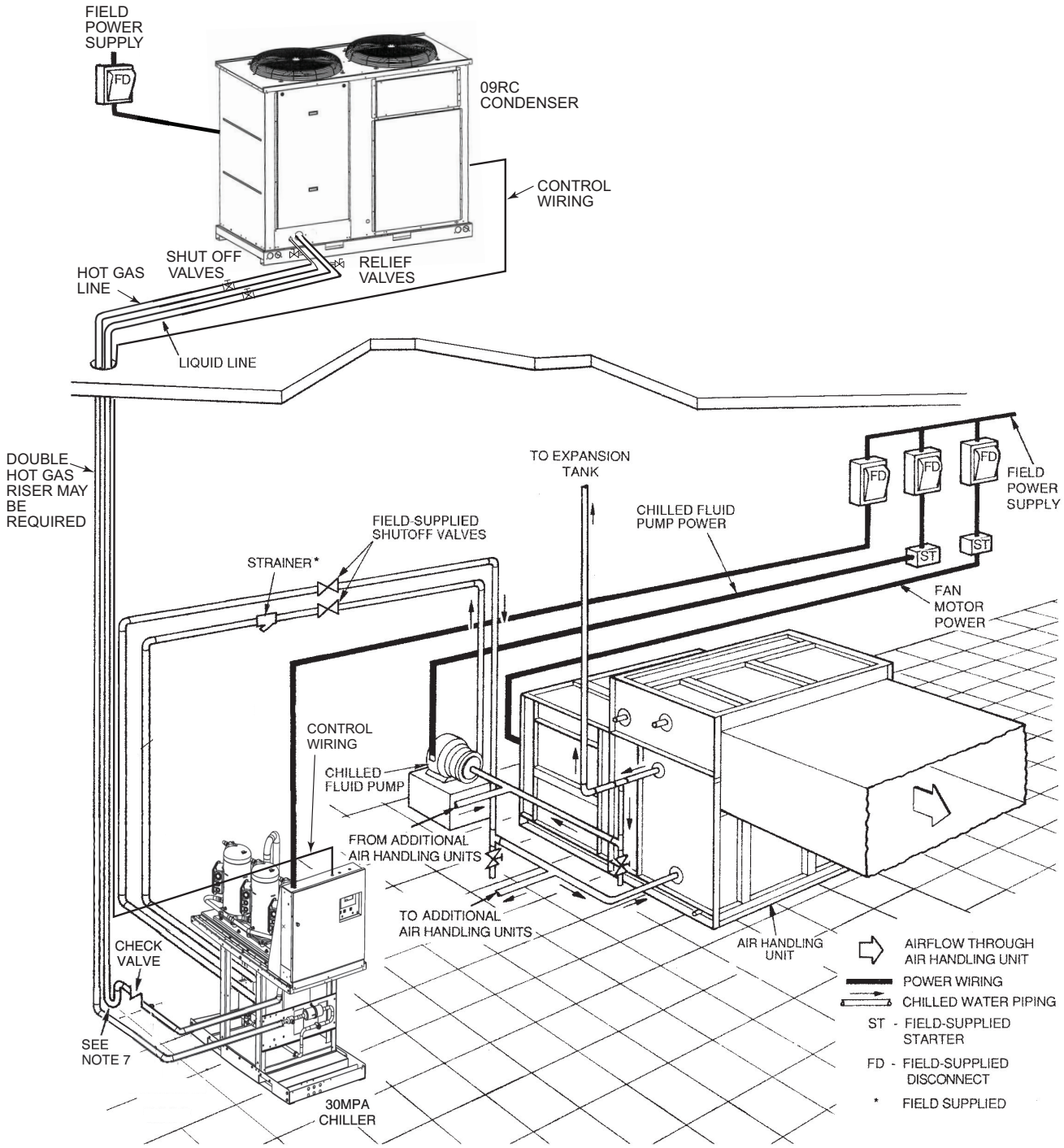


Top View
Size 200



Top View
Size 230

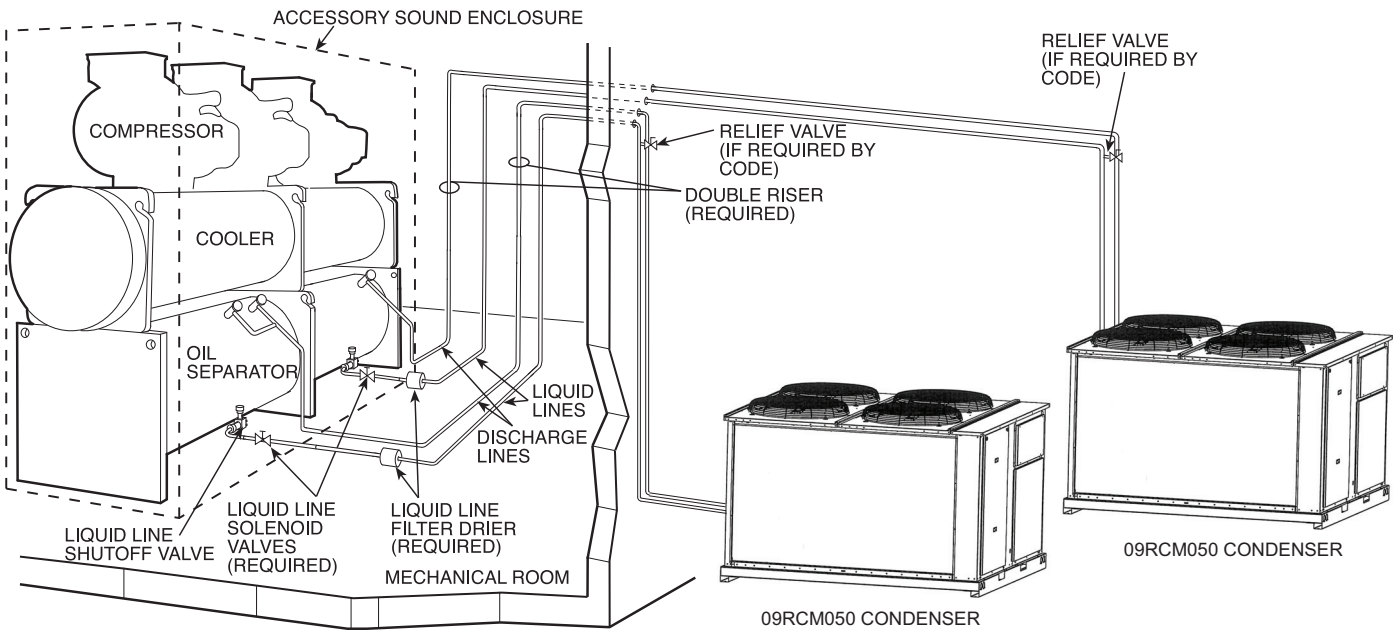
Fig. 15 — Outdoor Fan Layout (cont)



NOTES:

1. Chiller and condenser must be installed *levelly* to maintain proper compressor oil return.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual part 3, Carrier E20-II software Refrigerant Piping program, or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details on proper piping sizes and design.
5. See Physical Data section for approximate refrigerant charge.
6. Hot gas lines should rise above refrigerant level in condenser circuit. Double riser may be required; check unit minimum capacity.
7. Trap should be installed on hot gas lines to prevent condenser oil and refrigerant vapor migration from accumulating in the compressor during off cycle.
8. Pitch all horizontal lines downward in the direction of refrigerant flow.
9. For piping lengths greater than 50 ft, provide support to liquid and gas lines near the connections to the condenser coil.
10. For pressure relief requirements, see latest revision of ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.
11. All 09RC units have factory-installed contactors.
12. **The diagram shown here is for A1 refrigerant installations. A2L refrigerants may require additional components.**

Fig. 16 — Typical 30MPA Refrigerant Piping to 09RC Remote Condenser (30MPA031 and 09RCS030 Units Shown)



NOTES:

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5. See Physical Data section for approximate refrigerant charge.
6. Hot gas lines should rise above refrigerant level in condenser circuit. Double riser may be required; check unit minimum capacity.
7. Trap should be installed on hot gas lines to prevent condenser oil and refrigerant vapor migration from accumulating in the compressor during off cycle.
8. Pitch all horizontal lines downward in the direction of refrigerant flow.
9. For piping lengths greater than 50 ft (15.2 m), provide support to liquid and gas lines near the connections to the condenser coil.
10. For pressure relief requirements, see latest revision of ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.
11. All 09RC units have factory-installed contactors.
12. **The diagram shown here is for A1 refrigerant installations. A2L refrigerants may require additional components.**

Fig. 17 — Typical 30HXA Condenserless Liquid Chiller Refrigerant Piping to 09RC Remote Condensers (30HXA076 and 09RCM050 Units Shown)

MOUNTING UNIT

The unit may be mounted on a level pad directly on the base rails, on rails along the long axis of the machine, or on vibration isolation springs. (See Fig. 18.) For all units, ensure placement area is strong enough to support unit operating weight. (See Tables 7-10 and Fig. 2.) Mounting holes are provided for securing the unit to the pad, mounting rail, or vibration isolation springs.

The base rail is made from steel; See Fig. 5-14 for locations of mounting points. For 09RC080-230, see Fig. 19 for base rail shape. At the mounting points, a U-shaped channel is welded into the base rail to provide a flat plate for mounting. See Fig. 20 for mounting plate dimensions. The 1.46 in. (37 mm) dimension shown is from the outside edge of the rail to the mounting hole.

NOTE: The 1.46 in. (37 mm) dimension in Fig. 20 is not the same dimension as the 1.48 in. (37.5 mm) flange that is turned under the base rail in Fig. 19.

Bolt the unit securely to pad or rails. If vibration isolators (field-supplied, see Fig. 18) are required for a particular installation, see unit weight distribution in Fig. 2 to aid in the proper selection of isolators. Once installed, the unit should be level to within 1/8 in. per ft (1 cm per meter) along the long axis of the unit.

NOTE: For units that are point loaded, such as those using rubber and shear isolators, the mounting pocket in the base rail must be supported. If the isolator includes a plate that spans across the mounting pocket, no further support is needed. If the isolator is point loaded, add a backup plate to the mounting plate 1/4 in. thick x 6 in. wide x 8 in. long, centered on the unit mounting plate.

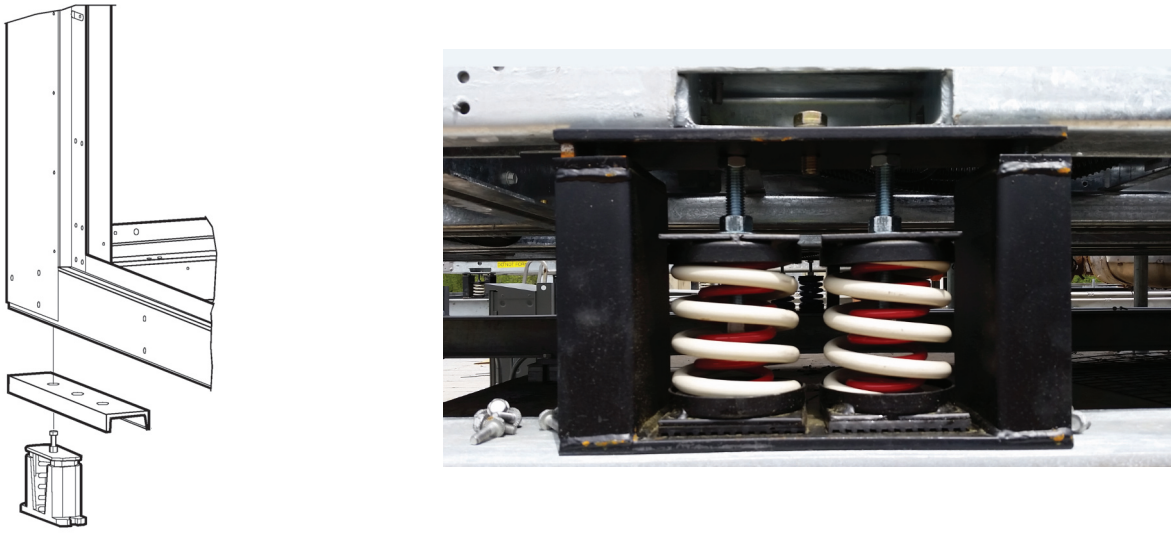


Fig. 18 — Point Loading Support Channel

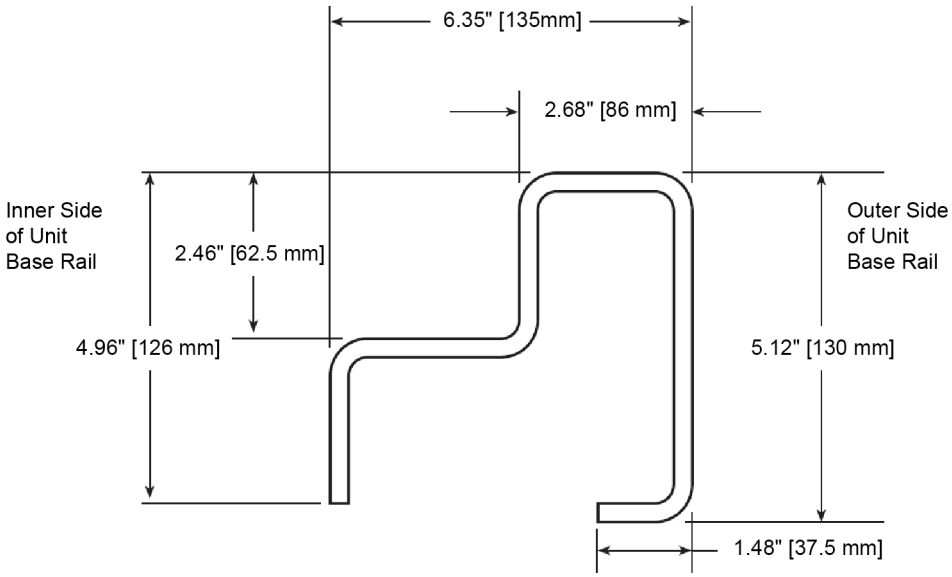


Fig. 19 — 09RC Base Rail Cross Section

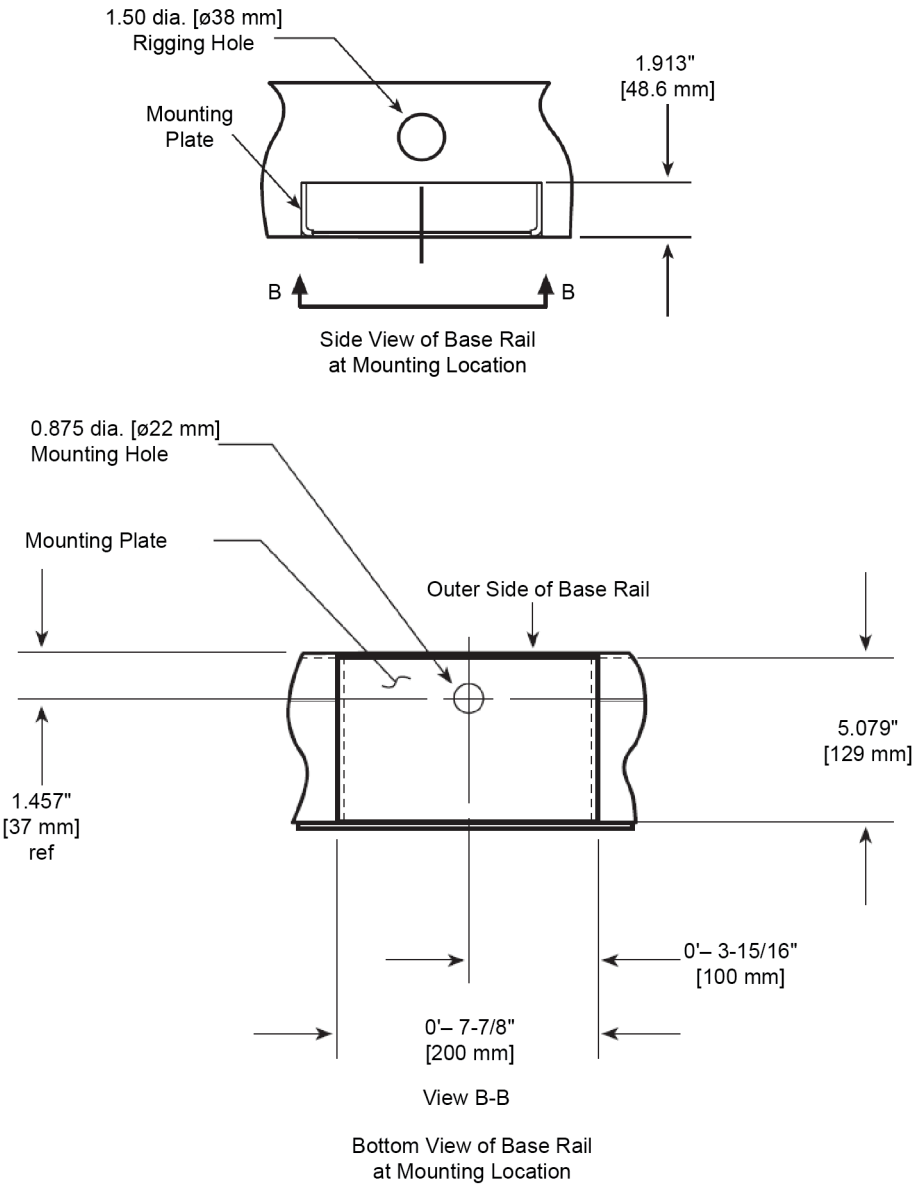


Fig. 20 — 09RC Mounting Plates

Step 3 — Complete Refrigerant Piping

A2L REFRIGERANT SAFETY MEASURES

Qualification of Workers

Qualified installers and service technicians are required to have been trained on the following topics when installing and servicing air-conditioning equipment with A2L refrigerant such as R-32:

1. Explosive potential of A2L refrigerants
2. Potential ignition sources
3. Safety measures for unventilated and ventilated rooms or enclosures
4. Refrigerant detectors
5. Concept of sealed components and sealed enclosures according to IEC 60079-15:2010
6. Correct work procedures for the following:
   a. commissioning
   b. maintenance
   c. repair
   d. decommissioning
   e. disposal

Reference UL 60335-2-40 Annex HH for complete guidelines for qualifications.

Safety Checks

Prior to beginning work on air-conditioning equipment containing A2L refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the air-conditioning equipment, the following must be completed prior to conducting work on the system:

1. Work shall be undertaken under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.
2. All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
3. The area shall be checked with an appropriate refrigerant detector prior to and during work to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants.
4. If any hot work is to be conducted on the refrigerating equipment or any associated parts, then appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.
5. No person carrying out work in relation to refrigerating equipment that involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removal, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

   Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
6. Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
7. The following checks to the air-conditioning equipment shall also apply when using A2L refrigerants:
   a. The chilled water circuit shall be checked for the presence of A2L refrigerant via the vent, drain, or pipe plug ports at the inlet and outlet water piping connections.
   b. Markings to the equipment shall continue to be visible and legible. Markings and signs that are illegible shall be corrected.
   c. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance that may corrode refrigerant-containing components, unless the components are constructed of materials that are inherently resistant to being corroded or are suitably protected against being corroded.
   d. Upon completing equipment work, check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Component Repair

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked up prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that, by working on electrical components, the casing is not altered in such a way that the level of protection is affected:

1. Ensure that the apparatus is mounted securely.
2. Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer’s specifications.

This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Intrinsically safe components must be replaced.

NOTE: The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

Guidelines for A2L refrigerant detection, evacuation, charging procedures, and proper recovery equipment are presented in the Service section. Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection

equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE: Examples of leak detection fluids are

- bubble method,
- fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/ extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Refrigerant section page 32.

GENERAL

All field leak and pressure testing should be in accordance with local code requirements. If a local code does not exist, use ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) Standard 15, Safety Code for Mechanical Refrigeration.

For leak testing procedures, refer to the Carrier "Refrigerant Service Techniques" book, Form SM-1A.

Piping material, pipe routing, and installation shall include protection form physical damage in operation and service, and be in compliance with national and local codes and standards. All field joints shall be accessible for inspection prior to being covered or enclosed. Installation of pipe-work shall be kept to a minimum. Mechanical connections made in accordance with UL 603335-2-40, clause 22.118 shall be accessible for maintenance purposes. Provision shall be made for expansion and contraction of long runs of piping.

Protection devices, piping, and fittings shall be protected as far as possible against adverse environmental effects, for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris.

Piping in refrigeration systems shall be so designed and installed to minimize the likelihood of hydraulic shock and damaging the system.

Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation.

Flexible pipe elements shall be protected against mechanical damage, excessive stress by torsion , or other forces, and they should be checked for mechanical damage annually.

Precautions shall be taken to avoid excessive vibration or pulsation.

Perform phos-copper brazing on all field-made connections while protecting adjacent joints from heat.

Install or replace filter driers.

If the chiller is above the condensing unit, the maximum allowable vertical separation between the condensing unit and the evaporator. See Liquid Lift section on page 21.

Relieve the pressure caused by the nitrogen holding charge. Connect liquid line and discharge line to field piping. Refer to Fig. 21-23 for circuit orientation. Hot gas and liquid connections are located on the same end of the unit and are sealed with tube plugs.

IMPORTANT: Unit is compatible with various refrigerants. Ensure fan cycle pressure switches and Greenspeed Intelligence option are installed correctly per unit refrigeration configuration.

Units are shipped standard with fan cycle pressure switches for use with R-32, R-454B and R-410A refrigerant. Carrier 30HXA units are shipped with fan cycles pressure switches for use with R-513A condensing units.

Fan cycle pressure switches are to be installed on the discharge lines. Do not remove Schraeder valves from fittings. See Fig. 21-23 for unit piping. See Fig. 24 for switch details.

A tubing package for converting dual circuit units into single circuit units is shipped with all 09RC050-230 units. The kit is field installed. See Fig. 25.

IMPORTANT: Protect the liquid and suction service valves from the heat of brazing. Schrader valve cores must be removed from the liquid and suction service valves before brazing in field connection piping to avoid damage. Reinsert cores after brazing is completed.

The refrigerant system must not be opened and exposed to atmosphere for longer than 15 minutes. Connection and pumpdown should be made as soon as possible to avoid acids forming in the compressor POE (polyolester) oils, which could damage the compressors.

Leak test the entire system by using soap bubbles and nitrogen and an electronic leak detector.

Purge nitrogen from system after completion of leak-checking procedure. Repair leak if one is found. When finished, evacuate and dehydrate system using the following method.

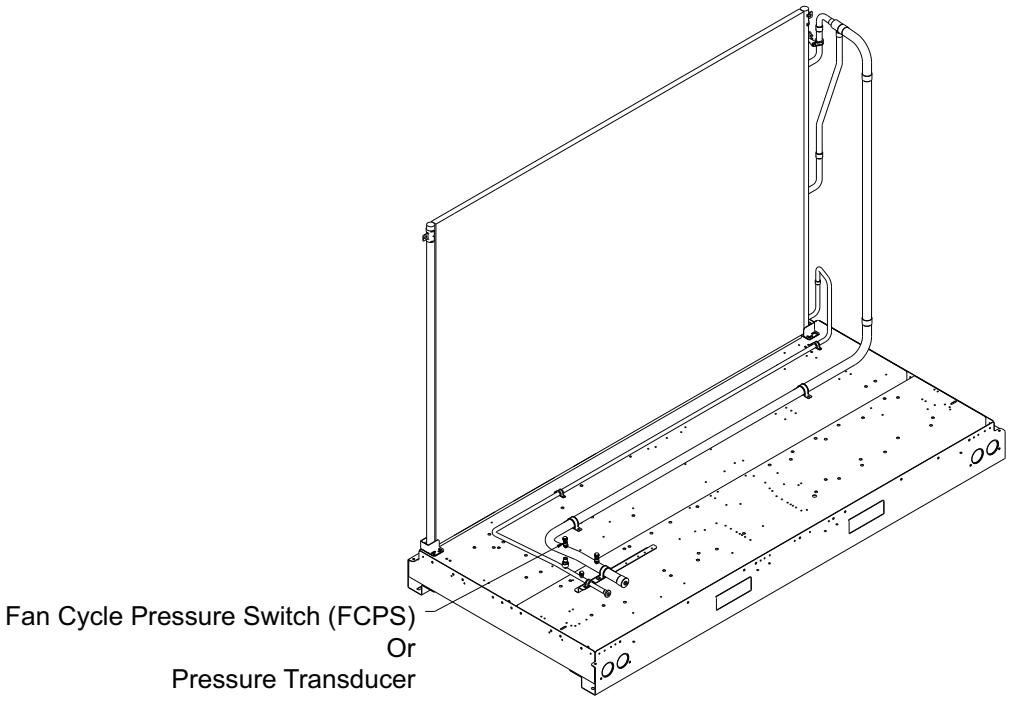


Fig. 21 — Unit Piping — Sizes 020-030

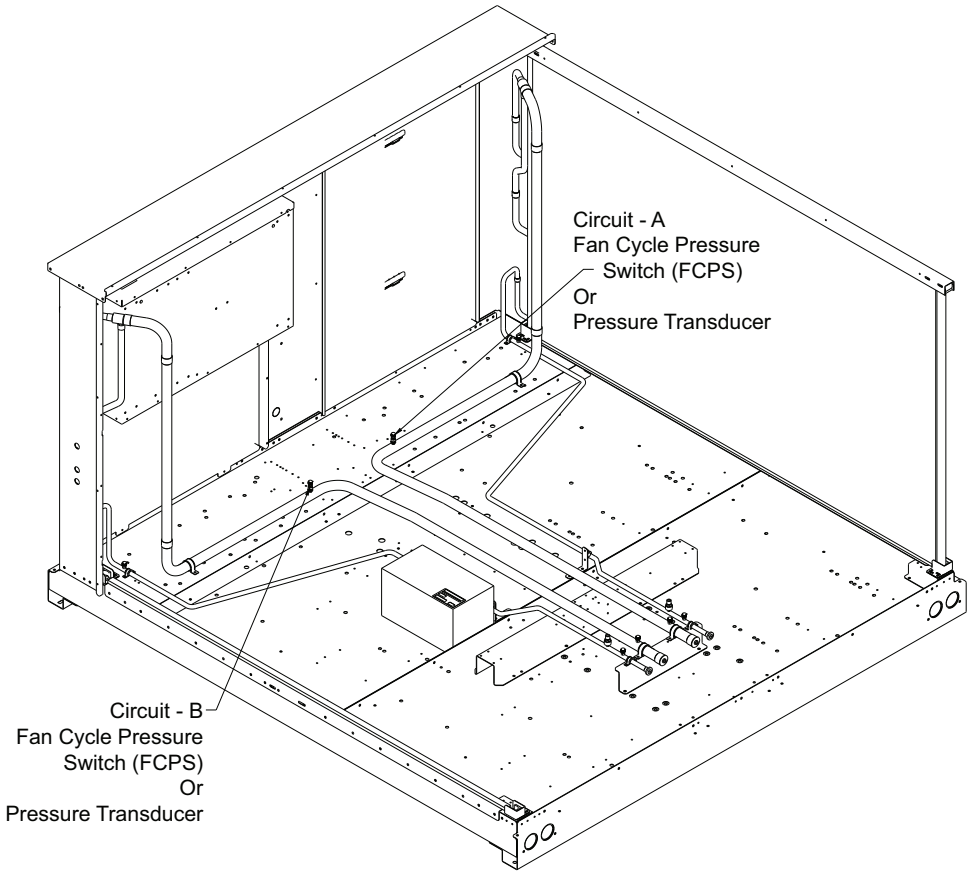


Fig. 22 — Unit Piping — Sizes 035-060

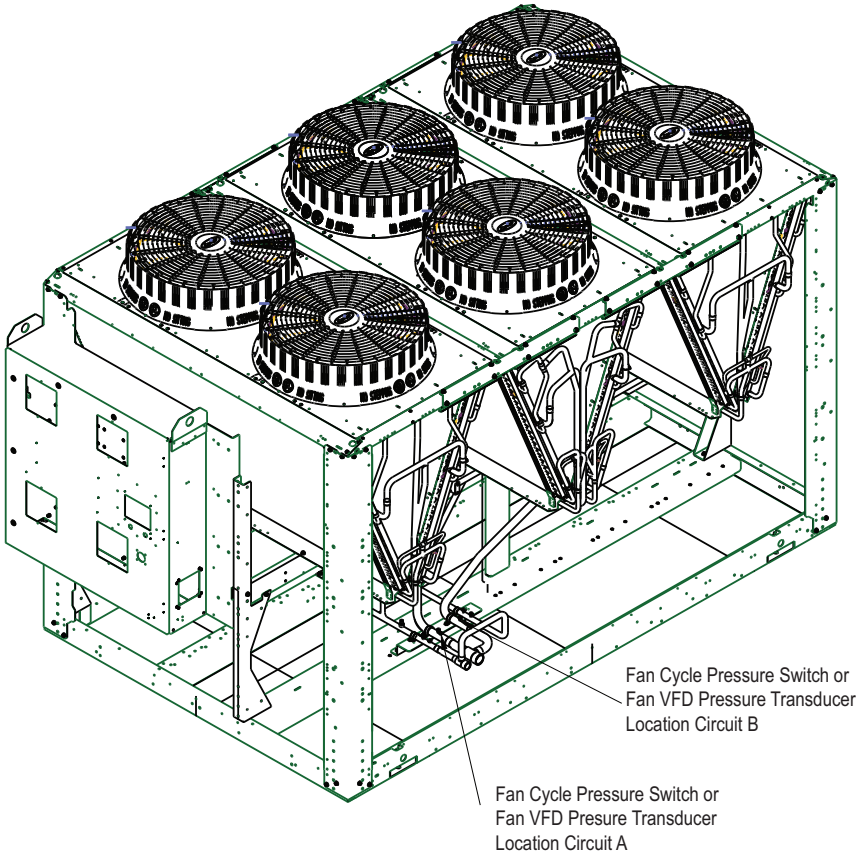
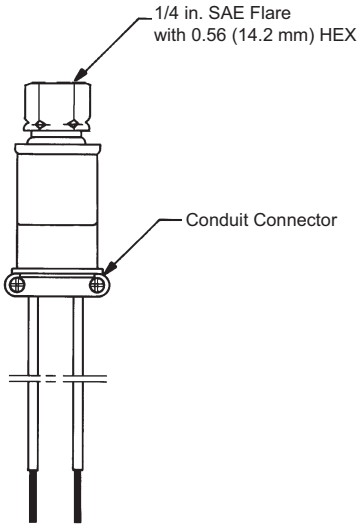


Fig. 23 — Unit Piping — Sizes 080-230 (115 shown)



PART NO.	REFRIGERANT
HK02YB098	R-32, R-410A, R-454B
HK02YB097	R-513A, R-134a
HK02YB099	R-515B, R-1234ze
HK02YB159	R-22

LEGEND

SAE — Society of Automotive Engineers

Fig. 24 — Fan Cycle Pressure Switch

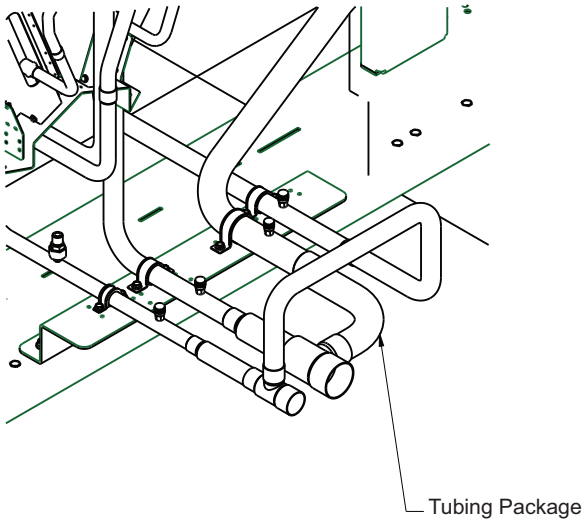


Fig. 25 — Tubing Package Installed in Unit

EVACUATION AND DEHYDRATION

Because the 30MPA and 30HXA systems use polyolester oil, which can absorb moisture, it is important to minimize the amount of time that the system interior is left exposed to the atmosphere. Minimizing the exposure time of the oil to the atmosphere will minimize the amount of moisture that needs to be removed during evacuation.

Once all of the piping connections are complete, leak test the unit and then pull a deep dehydration vacuum. Connect the vacuum pump to the low side and high side of the system. For best results, it is recommended that a vacuum of at least 500 microns (0.5 mm Hg) be obtained. Afterwards, to ensure

that no moisture is present in the system, perform a standing vacuum-rise test.

With the unit in deep vacuum (500 microns or less), isolate the vacuum pump from the system. Observe the rate-of-rise of the vacuum in the system. If the vacuum rises by more than 50 microns in a 30-minute time period, then continue the dehydration process. Maintain a vacuum on the system until the standing vacuum requirement is met. This will ensure a dry system.

By following these evacuation and dehydration procedures, the amount of moisture present in the system will be minimized. It is required that liquid line filter driers be installed between the condenser(s) and the expansion devices to capture any foreign debris and provide additional moisture removal capacity. Be sure to consider the pressure drop of the filter drier when determining piping requirements.

REFRIGERANT LINE SIZING

Sizing depends on length of lines between various sections of the refrigerant system. See Tables 2-6 for pipe connection details. Consider the amount of liquid lift and drop in the system as well as proper compressor oil return. See Liquid Lift section for more information.

PRESSURE RELIEF

The ASHRAE Standard 15, Safety Code for Mechanical Refrigeration states: "Every refrigerating system shall be protected by a pressure relief device or some other means designed to safely relieve pressure due to fire or other abnormal conditions." The 09RC units are provided with a 210°F temperature fusible plug on the liquid line of each circuit. This may or may not meet local code requirements.

REFRIGERANT RECEIVER

A refrigerant receiver is *not* furnished with 09RC units and is *not* recommended for normal applications as its use will be detrimental to the desired effects of subcooling. However, if a particular application requires a receiver to increase refrigerant holding capacity of the condenser, a receiver can be used. Recommended receiver and valve installation and piping are shown in Fig. 26. When a receiver is to be used year-round, it should be installed indoors.

Procedure for Using the Refrigerant Receiver (Fig. 26)

1. *During normal operation* — Valve A is open and valves B and C are closed. Receiver is isolated from the system.
2. *For servicing* — Valves A and C are closed and valve B is open. Run unit until all the refrigerant is in the receiver and then close valve B. Unit is now ready for servicing.
3. *To resume operation* — Leave valve A closed and open valves B and C. Run unit until the stored refrigerant is drawn into the system. To completely remove the refrigerant from the receiver, throttle valve B while noting condition of refrigerant in the liquid line sight glass; also, watch the suction pressure. A sudden surge of bubbles in the sight glass and a rapid decrease in suction pressure indicate that all the refrigerant has been withdrawn from the receiver. Immediately close valves B and C and then open valve A. The unit should now be ready for normal operation, with the receiver isolated from the system. *The system should be charged to a clear sight glass when under normal operation.*

LIQUID LIFT

Amount of liquid lift available before refrigerant flashing occurs depends on amount of liquid sub-cooling in the system.

All 09RC condensers have positive subcooling when applied with optimum charge. With subcooling, it is possible to overcome an appreciable pressure drop and/or static head (due to elevation of the liquid metering device above the condenser).

When 09RC condensers are applied with minimum charge, they do not provide positive subcooling. If subcooling is required, it must be obtained by external means such as a liquid suction interchanger.

The average amount of liquid lift available is shown in Tables 11 and 12 for refrigerants R-32 and R-513A. It is recommended that the evaporator be at the same level as the condenser, or lower.

⚠ WARNING

Do not apply pumpdown cycle with MCHX (microchannel heat exchanger) condensers. Damage to unit or personal injury may occur.

Table 11 — Available Liquid Lift (ft)[a,b] — English

REFRIGERANT	AVAILABLE LIQUID LIFT (ft)
R-410A	75
R-32	85
R-454B	75
R-22	60
R-134a	50
R-513A	50
R-515B	30

NOTE(S):

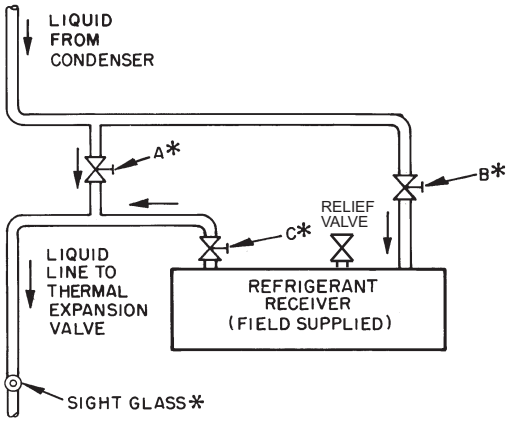
a. Allows 7 psi drop for liquid line accessories with maximum charge.
b. Data based on 15°F subcooling.
Subcooling = Saturated condensing temperature of refrigerant – Actual temperature of refrigerant leaving the coil.

Table 12 — Available Liquid Lift (m)[a,b] — SI

REFRIGERANT	AVAILABLE LIQUID LIFT (m)
R-410A	22.9
R-32	25.9
R-454B	22.9
R-22	18.3
R-134a	15.2
R-513A	15.2
R-515B	9.1

NOTE(S):

a. Allows 48 kPa drop for liquid line accessories with maximum charge.
b. Data based on 8.3°C subcooling.
Subcooling = Saturated condensing temperature of refrigerant – Actual temperature of refrigerant leaving the coil.



*Field-supplied

LEGEND

A — Bypass valve
B — Receiver inlet valve
C — Receiver outlet valve

Fig. 26 — Piping for Field-Supplied Receiver

Step 4 — Make Electrical Connections

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

IMPORTANT: When starting up this equipment for operation, be sure to check tightness of all electrical terminal connections, clamps, screws, etc., as they may have become loose during shipment. It is also advisable to re-tighten all electrical connections after equipment has been in operation and components have reacted to operating temperature.

IMPORTANT: Operating unit on improper supply voltage or with excessive phase imbalance constitutes abuse and may adversely affect Carrier warranty.

⚠ CAUTION

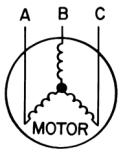
Proper rotation of condenser fan(s) MUST be verified. Failure to comply could result in possible equipment damage.

GENERAL

Verify nameplate electrical requirements match available power supply. Voltage at condenser must be within the minimum and maximum shown in Tables 13 and 14. Phases must be balanced within 2%. Contact local power company for line voltage corrections. Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{Average voltage}}$$

Example: Supply voltage is 240-3-60.



AB = 243 volts
BC = 236 volts
AC = 238 volts

$$\text{Average Voltage} = \frac{243 + 236 + 238}{3}$$

$$= \frac{717}{3}$$

$$= 239$$

Determine maximum deviation from average voltage:

(AB) 243 – 239 = 4 volts

(BC) 239 – 236 = 3 volts

(AC) 239 – 238 = 1 volt

Maximum deviation is then 4 volts. To determine the percentage of voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{239}$$

$$= 1.7\%$$

This amount of phase imbalance is satisfactory since it is below the maximum allowable of 2%.

IMPORTANT: If supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Condenser operation on improper line voltage or excessive phase imbalance may be considered abuse and any resulting damage may not be covered by Carrier warranty.

All wiring must be in accordance with local or NEC regulations.

POWER WIRING

All field power wiring must comply with applicable local and national codes. Install field-supplied branch circuit fused disconnect per NEC of a type that can be locked OFF or OPEN. Disconnect must be within sight and readily accessible from the unit in compliance with NEC Article 440-14.

General Wiring Notes:

1. A terminal strip is provided for field-wired control devices.
2. Power entry is at one end only.
3. All field power enters the unit through a hole located in the corner post of the unit or the bottom of the control box shelf. Refer to Fig. 27 for field power wiring details. Refer to Fig. 6-18 for exact location of field power entry. See Table 15 for incoming power wiring options.
4. Terminals for field power supply are suitable only for copper conductors. Insulation must be rated 7°C minimum.
5. Units with high short circuit ratings require that only RK1, RK5, or J type fuses be used.

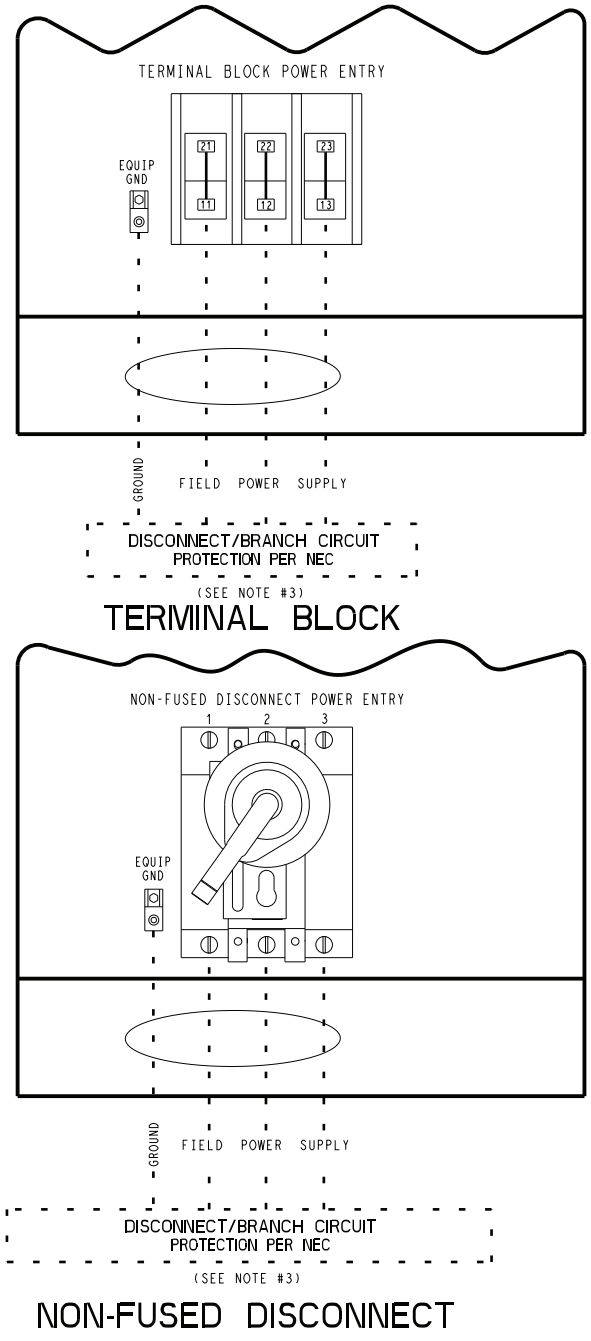


Fig. 27 — Unit Field Power Wiring

Table 13 — 09RC 020-060 Electrical Data [a,b,c,d,e,f]

UNIT 30XV	Single/ Dual CKT	UNIT VOLTAGE				CONDENSER FAN			FIXED SPEED			GREENSPEED		
		V(3 Ph)	Hz	Supplied		Total QTY	Fixed Speed FLA	Greenspeed FLA	MCA	MOCP	REC FUSE SIZE	MCA	MOCP	REC FUSE SIZE
				Min	Max									
20	Single	208/230	60	187	253	2	5.5	5.5	12.4	15	15	12.4	15	15
	Single	380	60	342	418	2	3.1	3.1	7.0	15	15	7.0	15	15
	Single	460	60	414	506	2	2.6	2.6	5.9	15	15	5.9	15	15
	Single	575	60	518	633	2	2.1	2.1	4.7	15	15	4.7	15	15
	Single	380/415	50	342	440	2	3.1	3.1	7.0	15	15	7.0	15	15
30	Single	208/230	60	187	253	2	5.5	5.5	12.4	15	15	12.4	15	15
	Single	380	60	342	418	2	3.1	3.1	7.0	15	15	7.0	15	15
	Single	460	60	414	506	2	2.6	2.6	5.9	15	15	5.9	15	15
	Single	575	60	518	633	2	2.1	2.1	4.7	15	15	4.7	15	15
	Single	380/415	50	342	440	2	3.1	3.1	7.0	15	15	7.0	15	15
35	Single	208/230	60	187	253	2	5.5	5.5	12.4	15	15	12.4	15	15
	Single	380	60	342	418	2	3.1	3.1	7.0	15	15	7.0	15	15
	Single	460	60	414	506	2	2.6	2.6	5.9	15	15	5.9	15	15
	Single	575	60	518	633	2	2.1	2.1	4.7	15	15	4.7	15	15
	Single	380/415	50	342	440	2	3.1	3.1	7.0	15	15	7.0	15	15
50	Dual	208/230	60	187	253	4	5.5	5.5	23.4	25	25	23.4	25	25
	Dual	380	60	342	418	4	3.1	3.1	13.2	15	15	13.2	15	15
	Dual	460	60	414	506	4	2.6	2.6	11.1	15	15	11.1	15	15
	Dual	575	60	518	633	4	2.1	2.1	8.9	15	15	8.9	15	15
	Dual	380/415	50	342	440	4	3.1	3.1	13.2	15	15	13.2	15	15
60	Dual	208/230	60	187	253	4	5.5	5.5	23.4	25	25	23.4	25	25
	Dual	380	60	342	418	4	3.1	3.1	13.2	15	15	13.2	15	15
	Dual	460	60	414	506	4	2.6	2.6	11.1	15	15	11.1	15	15
	Dual	575	60	518	633	4	2.1	2.1	8.9	15	15	8.9	15	15
	Dual	380/415	50	342	440	4	3.1	3.1	13.2	15	15	13.2	15	15

NOTE(S):

a. Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed minimum and maximum limits. Maximum allowable phase imbalance is voltage 2% and amps 10%.
b. All units or modules have single point primary power connection. Main power must be supplied from a field-supplied disconnect.
c. All terminal block units should be capable of handling 14 AWG to 2 AWG.
d. Disconnect units with MOCP of greater than 40 require 8 AWG to 1 AWG.
e. Disconnect units with MOCP less than 40 require 14 AWG to 6 AWG.
f. For all high short circuit capable FIOP units, fuses must be used for overload protection.

Table 14 — 09RC 080-230 Electrical Data [a,b,c,d,e,f]

UNIT 30XV	Single/ Dual CKT	UNIT VOLTAGE				CONDENSER FAN			FIXED SPEED			GREENSPEED		
		V(3 Ph)	Hz	Supplied		Total QTY	Fixed Speed FLA	Greenspeed FLA	MCA	MOCP	REC FUSE SIZE	MCA	MOCP	REC FUSE SIZE
				Min	Max									
80	Dual	208/230	60	187	253	4	5.5	10.6	23.4	25	25	45.1	50	50
	Dual	380	60	342	418	4	3.1	5.8	13.2	15	15	24.7	30	30
	Dual	460	60	414	506	4	2.6	4.8	11.1	15	15	20.4	25	25
	Dual	575	60	518	633	4	2.1	3.8	8.9	15	15	16.2	20	20
	Dual	380/415	50	342	440	4	2.6	4.8	11.1	15	15	20.4	25	25
95	Dual	208/230	60	187	253	5	5.5	10.6	28.9	35	35	55.7	60	60
	Dual	380	60	342	418	5	3.1	5.8	16.3	20	20	30.5	35	35
	Dual	460	60	414	506	5	2.6	4.8	13.7	15	15	25.2	30	30
	Dual	575	60	518	633	5	2.1	3.8	11.0	15	15	20.0	20	20
	Dual	380/415	50	342	440	5	2.6	4.8	13.7	15	15	25.2	30	30
115	Dual	208/230	60	187	253	6	5.5	10.6	34.4	40	40	66.3	70	70
	Dual	380	60	342	418	6	3.1	5.8	19.4	20	20	36.3	40	40
	Dual	460	60	414	506	6	2.6	4.8	16.3	20	20	30.0	35	35
	Dual	575	60	518	633	6	2.1	3.8	13.1	15	15	23.8	25	25
	Dual	380/415	50	342	440	6	2.6	4.8	16.3	20	20	30.0	35	35
130	Dual	208/230	60	187	253	7	5.5	10.6	39.9	45	45	76.9	80	80
	Dual	380	60	342	418	7	3.1	5.8	22.5	25	25	42.1	45	45
	Dual	460	60	414	506	7	2.6	4.8	18.9	20	20	34.8	40	40
	Dual	575	60	518	633	7	2.1	3.8	15.2	20	20	27.6	30	30
	Dual	380/415	50	342	440	7	2.6	4.8	18.9	20	20	34.8	40	40
145	Dual	208/230	60	187	253	8	5.5	10.6	45.4	50	50	87.5	90	90
	Dual	380	60	342	418	8	3.1	5.8	25.6	30	30	47.9	50	50
	Dual	460	60	414	506	8	2.6	4.8	21.5	25	25	39.6	45	45
	Dual	575	60	518	633	8	2.1	3.8	17.3	20	20	31.4	35	35
	Dual	380/415	50	342	440	8	2.6	4.8	21.5	25	25	39.6	45	45
160	Dual	208/230	60	187	253	9	—	10.6	—	—	—	98.1	100	100
	Dual	380	60	342	418	9	—	5.8	—	—	—	53.7	60	60
	Dual	460	60	414	506	9	—	4.8	—	—	—	44.4	50	50
	Dual	575	60	518	633	9	—	3.8	—	—	—	35.2	40	40
	Dual	380/415	50	342	440	9	—	4.8	—	—	—	44.4	50	50
170	Dual	208/230	60	187	253	10	—	10.6	—	—	—	108.7	110	110
	Dual	380	60	342	418	10	—	5.8	—	—	—	59.5	60	60
	Dual	460	60	414	506	10	—	4.8	—	—	—	49.2	50	50
	Dual	575	60	518	633	10	—	3.8	—	—	—	39.0	40	40
	Dual	380/415	50	342	440	10	—	4.8	—	—	—	49.2	50	50
185	Dual	208/230	60	187	253	11	—	10.6	—	—	—	119.3	125	125
	Dual	380	60	342	418	11	—	5.8	—	—	—	65.3	70	70
	Dual	460	60	414	506	11	—	4.8	—	—	—	54.0	60	60
	Dual	575	60	518	633	11	—	3.8	—	—	—	42.8	45	45
	Dual	380/415	50	342	440	11	—	4.8	—	—	—	54.0	60	60
200	Dual	208/230	60	187	253	12	—	10.6	—	—	—	129.9	150	150
	Dual	380	60	342	418	12	—	5.8	—	—	—	71.1	80	80
	Dual	460	60	414	506	12	—	4.8	—	—	—	58.8	60	60
	Dual	575	60	518	633	12	—	3.8	—	—	—	46.6	50	50
	Dual	380/415	50	342	440	12	—	4.8	—	—	—	58.8	60	60
230	Dual	208/230	60	187	253	14	—	10.6	—	—	—	151.1	175	175
	Dual	380	60	342	418	14	—	5.8	—	—	—	82.7	90	90
	Dual	460	60	414	506	14	—	4.8	—	—	—	68.4	70	70
	Dual	575	60	518	633	14	—	3.8	—	—	—	54.2	60	60
	Dual	380/415	50	342	440	14	—	4.8	—	—	—	68.4	70	70

NOTE(S):

a. Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed minimum and maximum limits. Maximum allowable phase imbalance is voltage 2% and amps 10%.
b. All units or modules have single point primary power connection. Main power must be supplied from a field-supplied disconnect.
c. All terminal block units should be capable of handling 14 AWG to 2 AWG.
d. Disconnect units with MOCP of greater than 40 require 8 AWG to 1 AWG.
e. Disconnect units with MOCP less than 40 require 14 AWG to 6 AWG.
f. For all high short circuit capable FIOP units, fuses must be used for overload protection.

Table 15 — Unit Incoming Power Options

MOCP VALUE	UNIT INCOMING POWER OPTION						
	Standard Terminal Block Option		High SCCR Terminal Block Option[a]			Standard and High SCCR Disconnect Option[b]	
	Max Wire Size	Min Wire Size	Max Wire Size	Min Wire Size	High SCCR Fuse Type[c]	Max Wire Size	MinWire Size
100 A or less	2/0 AWG	14 AWG	2/0 AWG	6 AWG	J, RK1, or RK5	1/0 AWG	14 AWG
Greater than 100 A and Less than or Equal to 200 A	2/0 AWG	14 AWG	2/0 AWG	6 AWG	J or RK1	350 kcmil	6 AWG
Greater than 200 A	600 kcmil	2 AWG	600 kcmil	3/0 AWG	J or RK1	500 kcmil (1) 500 kcmil (2)	3/0 AWG

NOTE(S):

a. Terminal block high SCCR option units must use approved fuses to meet high SCCR rating.
b. High SCCR disconnect option units can use either approved fuse or circuit breaker for incoming power protection.
c. Time delay fuse type required.

LEGEND

AWG — American Wire Gage
kcmil — Thousand Circular Mills
MOCP — Maximum Overcurrent Protection
SCCR — Short Circuit Current Rating

CHECKS TO ELECTRICAL DEVICES

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking
- that no live electrical components and wiring are exposed while charging, recovering or purging the system
- that there is continuity of earth bonding

CONTROL CIRCUIT WIRING

09RC020-035 Units

The units require a 24-volt externally supplied power to energize the control circuit connected to TB2 terminal 1 and 2 shown in Fig. 28.

09RC050-230 Units

Size 050 to 230 units are designed to operate with a 24-v field-supplied control power or can be powered by internal control transformer using contact closures to energize each control circuit. The 050-230 size units are designed to operate with either single, dual circuit or multiple unit applications.

When 24-v control power is supplied from external source (30MP application), this application requires the 24-v externally supplied power to energize the control relays for each circuit. Unit 1/Cir A should be connected to TB2 terminal 1 and 2. Unit 2/Cir B should be connected to TB2 terminal 3 and 4. See Fig. 29.

FIELD CONTROL WIRING

With 24-v internally supplied power applications (30HX applications), the application requires field-supplied control relay(s) to energize contacts to energize the 09RC control relays for each circuit.

1. Install field-supplied jumpers between terminals 2, 3 and 6 of TB2. See Fig. 30.
2. Connect field-supplied wiring and relay for Unit 1/Circuit A. Contacts should be connected between TB2 terminal 1 and 5.
3. For single unit applications a jumper should be installed between TB2 terminals 1 and 4. See Fig. 31.
4. Connect field-supplied wiring and relay for Unit 2/Circuit B. Contacts should be connected between TB2 terminals 4 and 5.

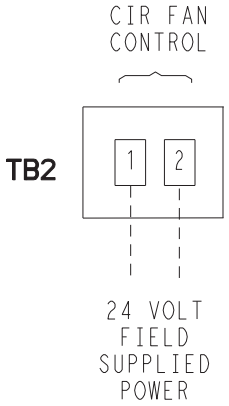


Fig. 28 — 09RC020-035 Control Circuit Wiring

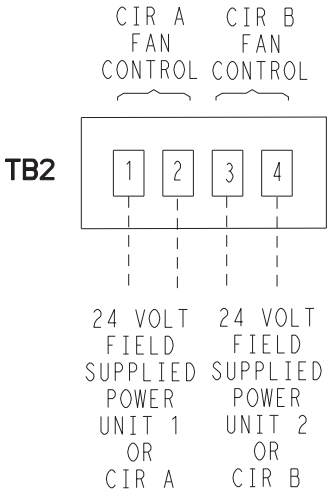


Fig. 29 — 09RC050-230 with 30MP Control Circuit Wiring

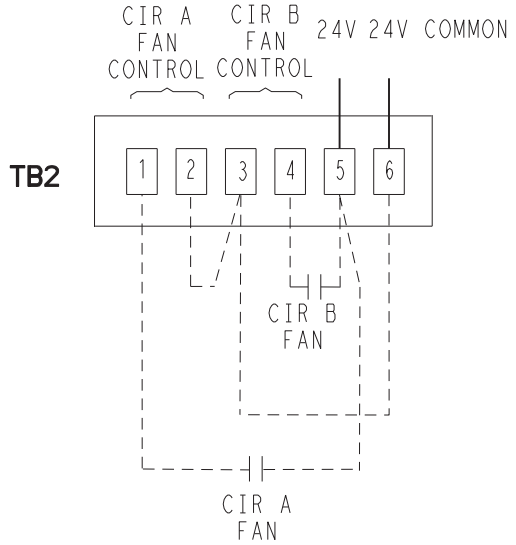


Fig. 30 — 09RC035-230 with 30HX Control Circuit Wiring

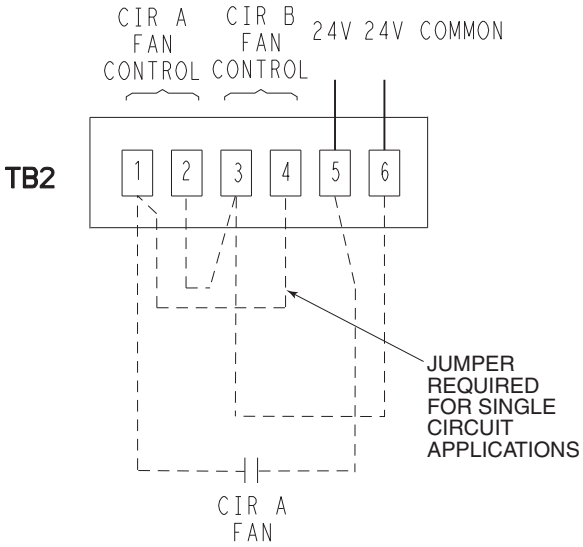


Fig. 31 — Single Circuit 09RC050-230 with 30HX Control Circuit Wiring

Fan Cycling Pressure Switches — Fixed Speed Fans (FCPS)

Condensers with fixed speed fans have fan cycling pressure switches installed and wired into the control circuit. See Fig. 32 and 33 for mounting location of FCPS. Switch is for R-410A, R-32 or R-454B refrigerant for 020-230. If using a different refrigerant, change the FCPS for one with the right setpoint for that refrigerant.

⚠CAUTION

Since the 09RC units are compatible with multiple refrigerants, the correct FCPS must be installed for proper operation of unit. Damage to unit could result.

For sizes 020-060:

1. The FCPS wires should be routed through bushing located in bottom of control box as shown in Fig. 32.
2. The FCPS1 and FCPS2 switches are wired to the second fan on the control circuit as shown in Fig. 33. Connect the FCPS wires to the terminal block position shown on the diagram.

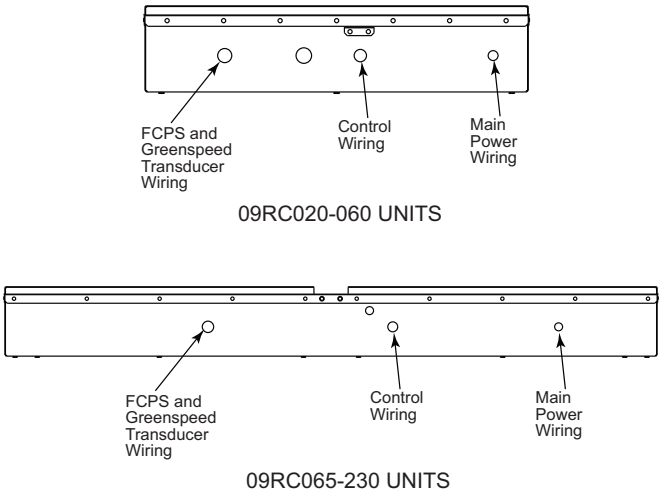


Fig. 32 — Control Box Entry Points

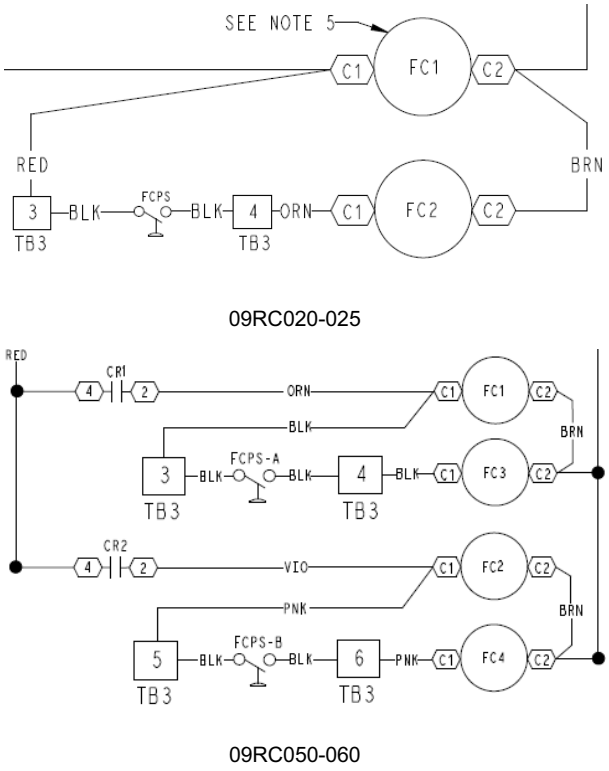


Fig. 33 — Fan Cycle Pressure Switch Wiring 09RC040-060 Units

For sizes 080-145:

1. The FCPS wires should be routed through bushing located in bottom of control box as shown in Fig. 32.
2. See Fig. 38 for wiring instructions.

Step 5 — Check Condenser Fans

Each fan is supported by a formed wire mount bolted to a fan deck and covered with a wire guard.

AEROACOUSTIC™ (LOW SOUND) FANS

Aerocoustic low sound fans are standard on the 30RC chillers. A wire form mount supports the fan motor. The fan is covered with a molded fan shroud.

IMPORTANT: Check for proper fan rotation (counterclockwise when viewed from above). If necessary, switch any 2 power leads to reverse fan rotation.

To remove the fan, a fan puller will likely be needed. The fan motor shaft is protected from weather by the fan cover. If fan motor must be removed for service or replacement, when reinstalling the motor be sure to mount the motor band in the proper location. Do not use grease on the shaft or key. The fan motor has a step in the motor shaft. For proper performance, fan should be positioned such that it is securely seated on this step. Apply Loctite 680 Retaining Compound to the hub and motor keyway only just prior to installing the key. See Fig. 34. Tighten bolt to 24 ± 2 ft-lb (32.5 ± 2.7 N•m). Figure 35 shows the proper position of mounted fan.

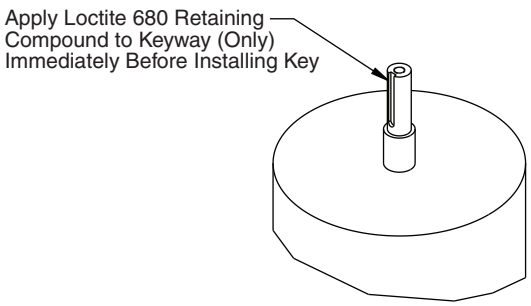


Fig. 34 — AeroAcoustic Fan Motor Keyway

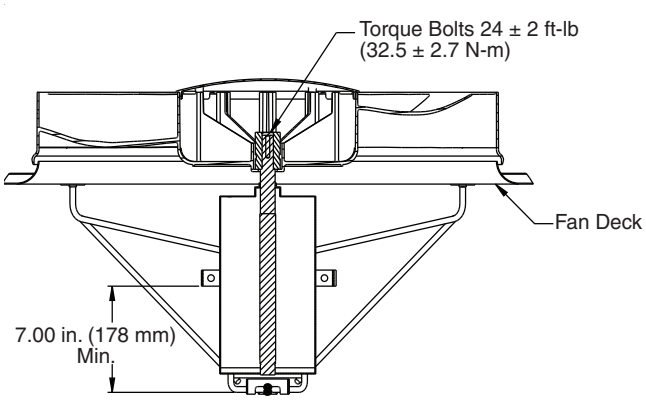


Fig. 35 — AeroAcoustic Fan Mounted Position

Step 6 — Configure Optional Greenspeed Controller

The optional or accessory Greenspeed controller uses a 0 to 10 vdc signal from a pressure transducer to control the speed of the fans. The control is applied in 3 different applications on the 09RC product and must be configured for the proper refrigerant application. See Fig. 36-40 for wiring details.

SINGLE CIRCUIT APPLICATIONS (09RCS020-035)

VFD is used to control the speed of the motor attached to the controller control based on the signal from the liquid line transducer.

DUAL CIRCUIT APPLICATIONS (09RCM050-230)

For 09RCM050-160 - 230V, 09RCM050-230 all other voltages, There is one VFD control for each circuit and the speed output of each VFD is controlled independently by the liquid line transducer reading for each circuit.

For 09RCM170-230 - 230V, there are two VFD control for each circuit and the speed output of each circuit's VFD is controlled independently by the liquid line transducer reading for each circuit. There is one VFD control for each circuit and the speed output of each VFD is controlled independently by the liquid line transducer reading for each circuit.

SINGLE CIRCUIT APPLICATIONS (09RCM050-230)

For 09RCM050-160 - 230V, 09RCM050-230 all other voltages, there are two VFD drives in the unit. The drives and wiring are configured for dual circuit operation from the factory. Wiring modifications are required for single circuit operation. The drives must be wired and configured for a primary/secondary operation. A wire harness is included in the control panel for this purpose. Connect the ends to VFDA and VFDB per the labeling on the harness. Verify wiring per Fig. 36 and 37. Parameter settings must be changed on the secondary drive VFDB per Table 16. No parameters change is required on VFDA.

For 09RCM170-230 - 230V, there are four VFD drives in the unit. The drives and wiring are configured for dual circuit operation from the factory. Wiring modifications are required for single circuit operation. The VFDB2 drive must be wired and configured for a primary/secondary operation. A wire harness is included in the control panel for this purpose. Connect the ends to VFDA2 and VFDB1 per the labeling on the harness. Verify wiring per Fig. 39. Parameter setting must be changed on the VFDB1 per Table 16. No parameter changes are required on VFDA1, VFDA2, VFDB2. Parameters on VFDA do not require modification for this application.

GREENSPEED CONTROLS REFRIGERANT CONFIGURATION

The units are shipped from the factory for application with R-410A/R-32 refrigerant. When applying on R-134a/R-513A systems, the setpoint of the VFD must be changed in parameter 20-21. This is the setting for the head pressure control in psig. See Table 17 for setting by refrigerant type.

If the drive does not function properly, the information in this book and VFD Manual, Section 4, Troubleshooting, can be can be used to troubleshoot.

⚠ CAUTION

If input power has not been applied to the drive for a period of time exceeding three years (due to storage, etc.), the electrolytic DC bus capacitors within the drive can change internally, resulting in excessive leakage current. This can result in premature failure of the capacitors if the drive is operated after such a long period of inactivity or storage. In order to reform the capacitors and prepare the drive for operation after a long period of inactivity, apply input power to the drive for 8 hours prior to actually operating the motor. Before attempting to operate the drive, motor, and driven equipment, be sure all procedures pertaining to installation and wiring have been properly followed. Failure to comply could result in equipment damage.

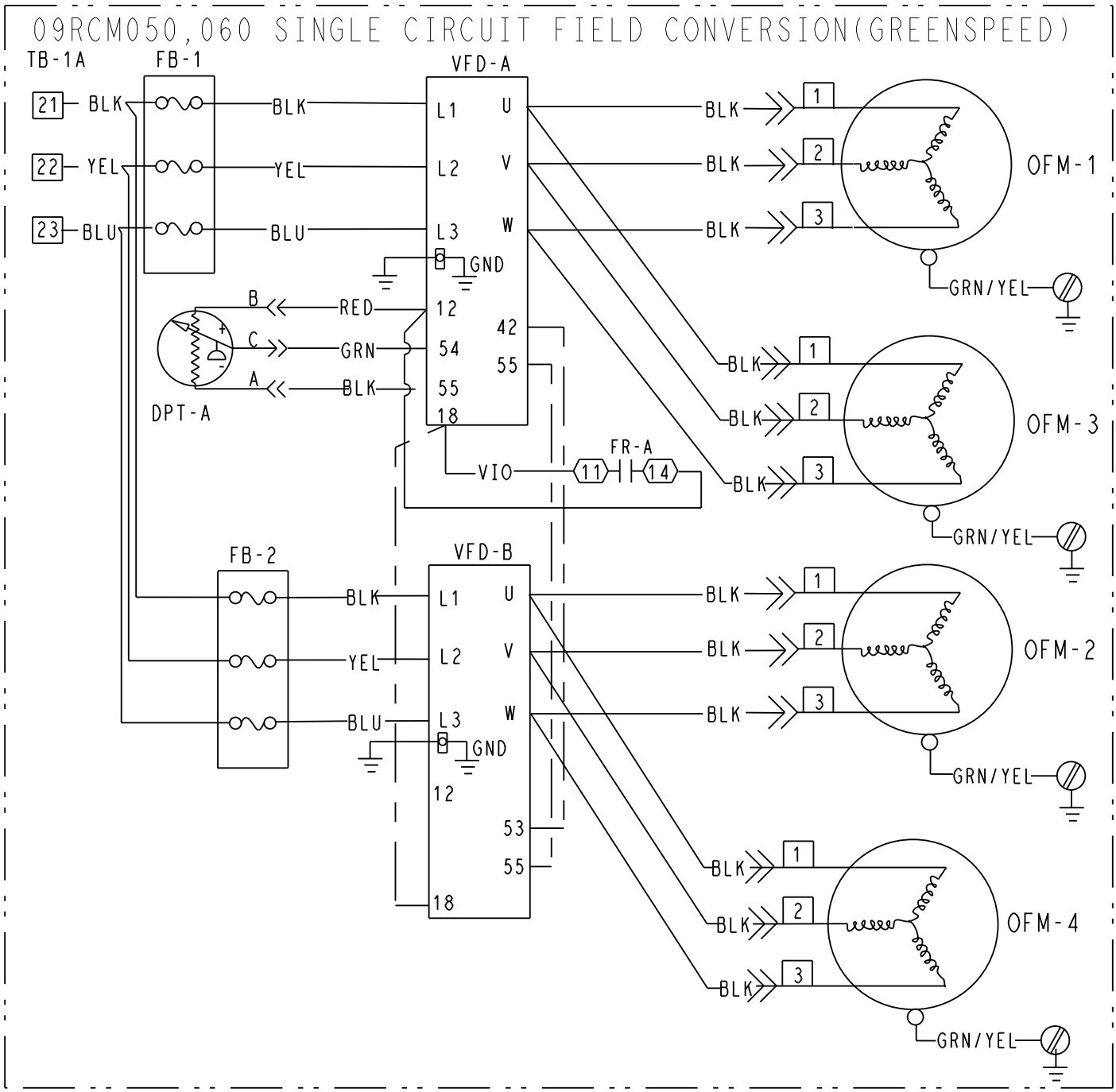


Fig. 36 — Greenspeed Controller Wiring (09RC060 Units Shown)

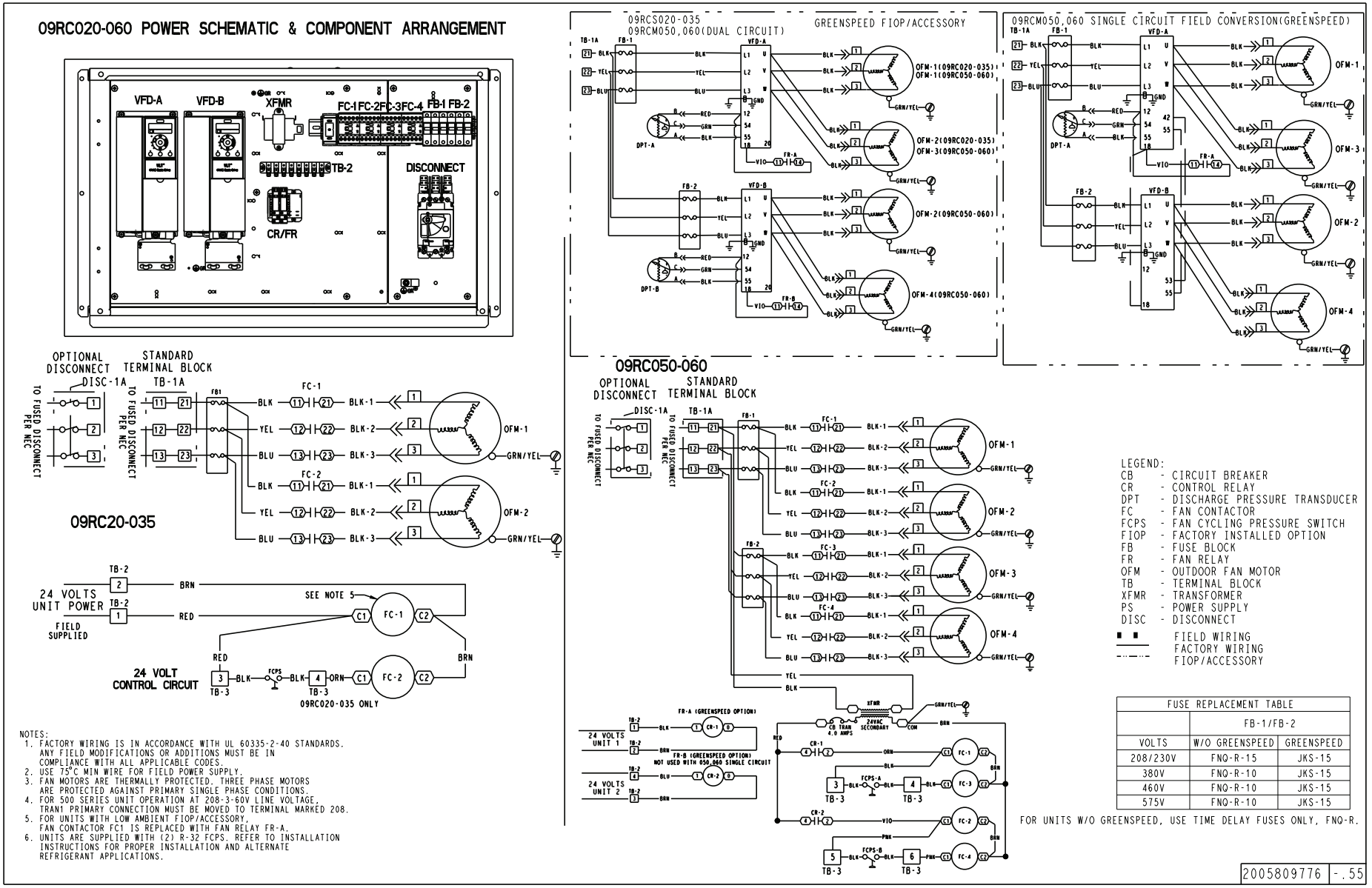
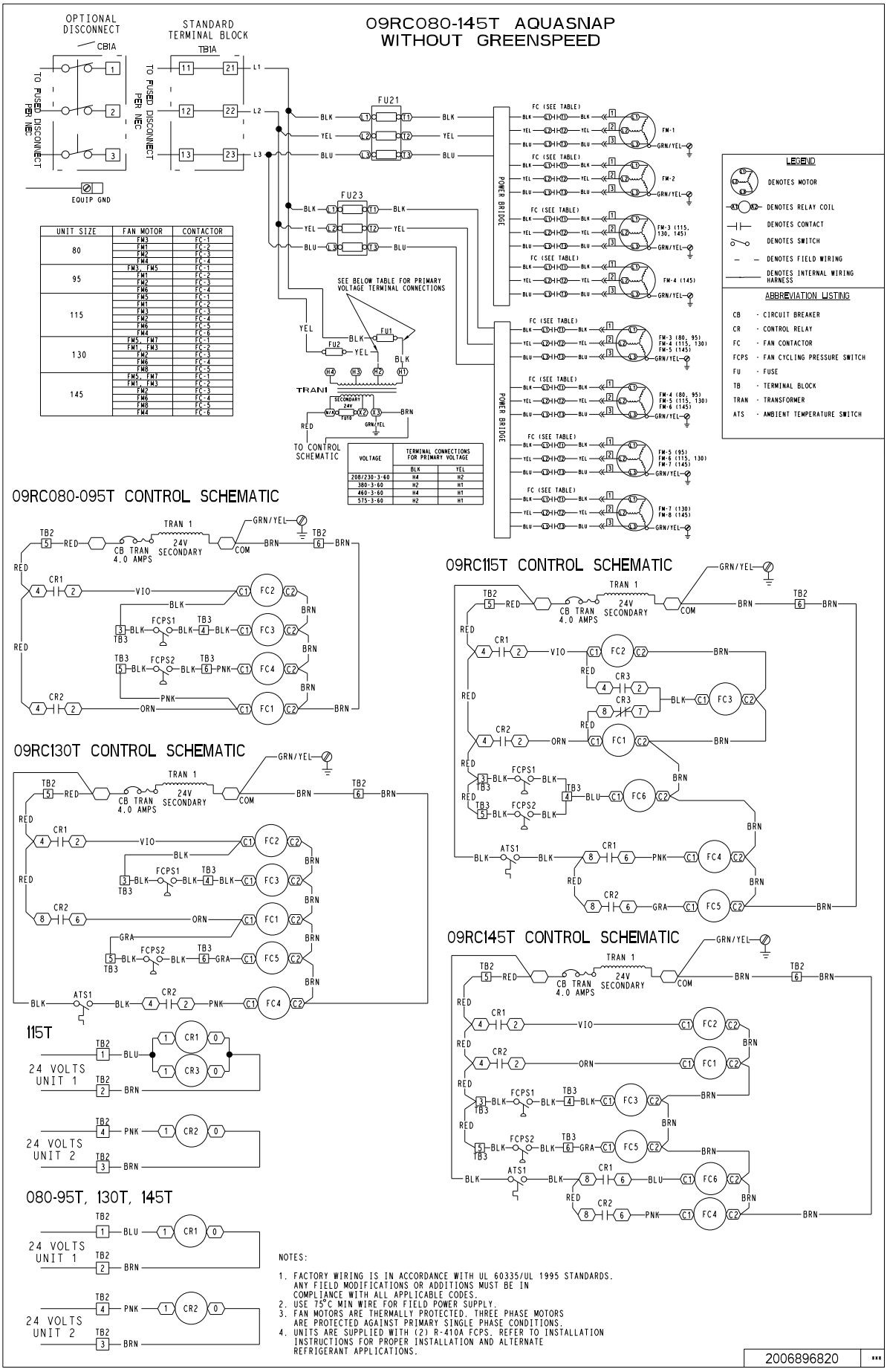


Fig. 37 — 09RC020-060 Power Schematic & Component Arrangement



UNIT SIZE	FAN MOTOR	CONTACTOR
80	FM3	FC-1
	FM1	FC-2
	FM2	FC-3
	FM4	FC-4
95	FM3, FM5	FC-1
	FM1	FC-2
	FM2	FC-3
	FM6	FC-4
115	FM5	FC-1
	FM1	FC-2
	FM3	FC-3
	FM2	FC-4
	FM6	FC-5
	FM4	FC-6
130	FM5, FM7	FC-1
	FM1, FM3	FC-2
	FM2	FC-3
	FM6	FC-4
	FM8	FC-5
145	FM5, FM7	FC-1
	FM1, FM3	FC-2
	FM2	FC-3
	FM6	FC-4
	FM8	FC-5
	FM4	FC-6

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY VOLTAGE	
	BLK	YEL
208/230-3-60	H4	H2
380-3-60	H2	H1
460-3-60	H4	H1
575-3-60	H2	H1

Fig. 38 — 09RC080-145 Fixed Speed Fan Control

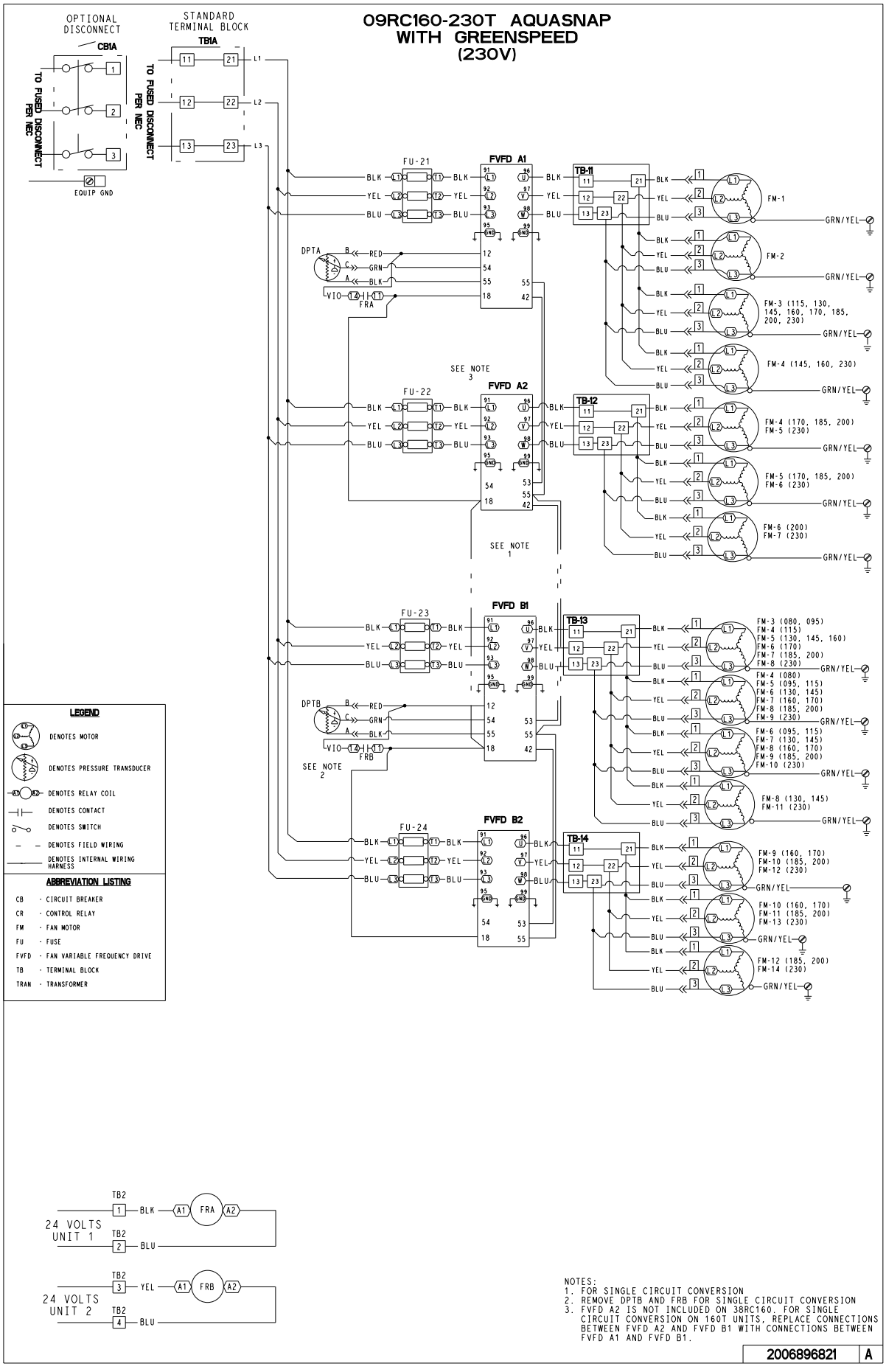


Fig. 39 — 09RC160-230 (230-v) Aquasnap with Greenspeed Controller

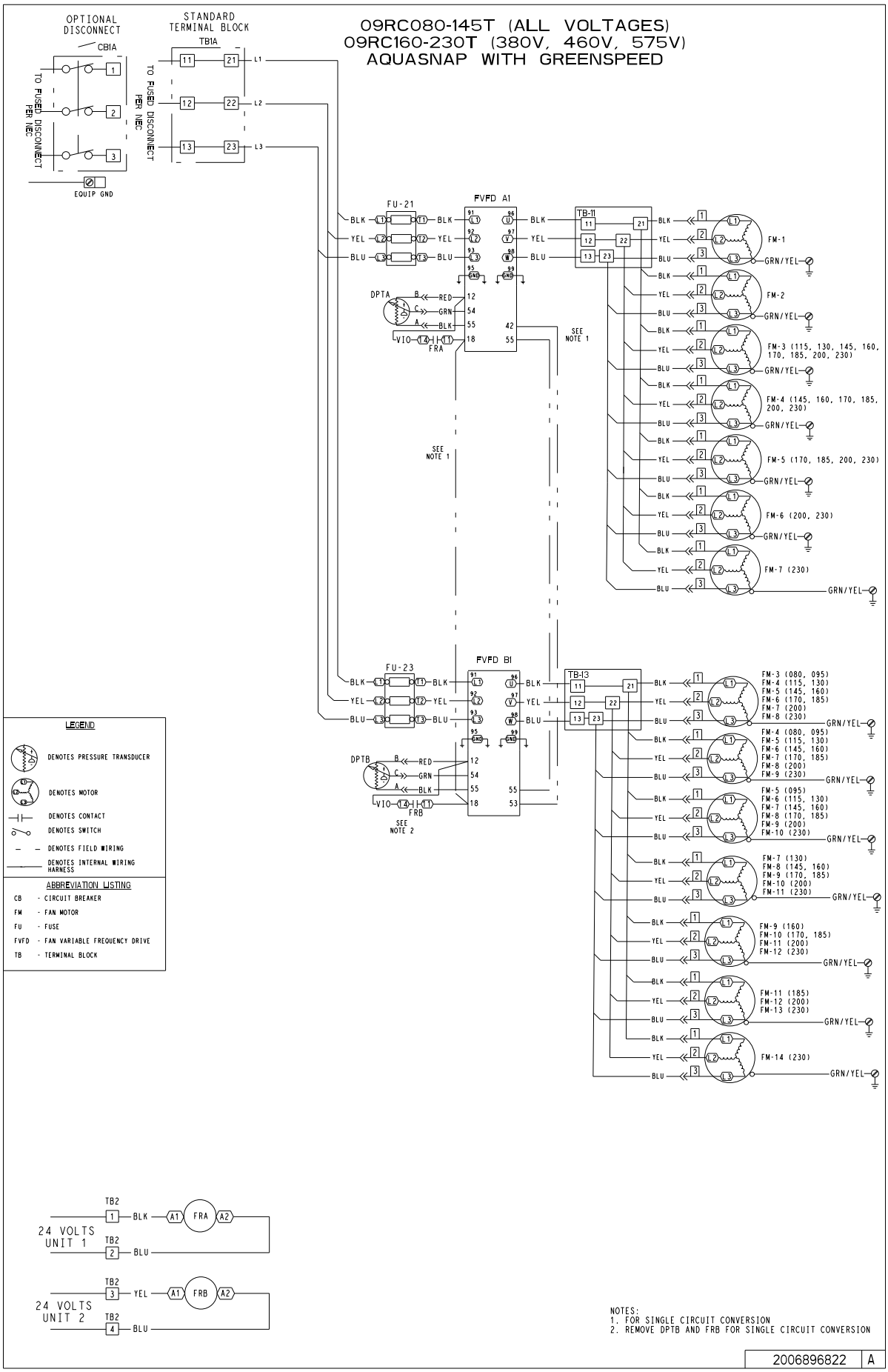


Fig. 40 — 09RC080-145 (All Voltages), 09RC160-230 (380-v, 460-v, 575-v) Aquasnap with Greenspeed Controller

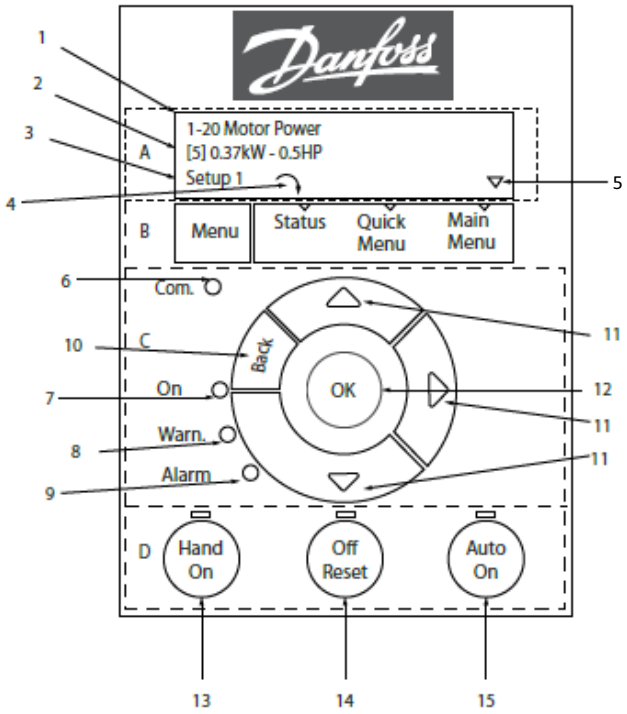
DRIVE PROGRAMMING

⚠ CAUTION

It is strongly recommended that the user NOT change any programming without consulting Carrier service personnel. Unit damage may occur from improper programming.

A fan VFD display, HR89ZZ006, is required to change parameters in the drive. The fans must be stopped to change parameters. See Fig. 41 for controller details.

1. To change a parameter, push the Main Menu button on the display.
2. Navigate to the parameter to be changed.
3. Press the OK button and the value will flash.
4. Use the up and down arrows on the display to change the setting.
5. Push OK again to enable the new setting.
6. Use the Back button to move to the next parameter. If done, push the Menu button to return to the status screen.



Ref Number	Description
1	Parameter Number and Name
2	Parameter Value
3	Setup Number Use Setup 1
4	Motor Direction Showing CW or CCW
5	Arrow Indications if Display is in Status, Quick Menu, or Main Menu
6	Com LED: Flashed During Buss Communication Not Used
7	Green LED/On: Control Section Working Properly
8	Yellow LED/Warn: Indicates a Warning VFD May Still Run
9	Flashing Red LED/Alarm: Indicates an Alarm
10	Back: Moves to the Previous Step
11	Arrows for Navigating through Menu
12	OK: For Selecting a Parameter and Accepting Changes
13	Hand On: Starts the Motor and Enables Control of the VFD
14	Off/Reset: Stops the Motor and Resets an Alarm if Present
15	Auto On: VFD is Controlled via Control Terminals

Fig. 41 — Greenspeed Controller Mode Buttons and Mode Display

Table 16 — Secondary VFD Parameter Settings (09RCM050-230 Single Circuit)

PARAMETER	FUNCTION	FACTORY SETTING	UNIT	NOTES
1-00	Configuration Mode	[0] Open		
1-24	Motor Current	Voltage Code Specific	A	Motor Nameplate
3-03	Maximum Reference	60		
3-15	Reference 1 Source	[1] Analog Input		Signal from Primary Drive
3-41	Ramp 1 Ramp Up Time	5	s	Load dependent
3-42	Ramp 1 Ramp Down Time	5	s	Load dependent
6-12	Terminal 53 Low Current	4	mA	
6-13	Terminal 53 High Current	20	mA	
6-14	Terminal 53 Low Ref./Feedb. Value	0	Hz	
6-15	Terminal 53 High Ref./Feedb. Value	60	Hz	Signal from Primary Drive
6-16	Terminal 53 Filter Time Constant	0.01	s	
6-19	Terminal 53 Mode	[0] Current Mode		Signal from Primary Drive

Table 17 — Greenspeed Controller Program Parameters for Operating Modes

PARAMETER	FUNCTION	FACTORY SETTING	UNIT	NOTES
0-03	Regional Settings	North America		Default settings for 60Hz mains
1-00	Configuration Mode	[3] Process Closed Loop		
1-01	Motor Control Principle	[1] VVC+		
1-03	Torque Characteristics	[1] Variable Torque		
1-22	Motor Voltage	Voltage Code Specific	V	Motor Nameplate
1-23	Motor Frequency	Voltage Code Specific	Hz	Motor Nameplate
1-24	Motor Current	Voltage Code Specific	A	Motor Nameplate
1-25	Motor Nominal Speed	850	rpm	Motor Nameplate
3-02	Minimum Reference	0		
3-03	Maximum Reference	667		
3-15	Reference 1 Source	[0] No function		Select speed reference resource
3-16	Reference 2 Source	[0] No function		Select speed reference resource
3-17	Reference 3 Source	[11] Local bus reference		Select speed reference resource
3-41	Ramp 1 Ramp Up Time	15	s	Load dependent
3-42	Ramp 1 Ramp Down Time	20	s	Load dependent
4-12	Motor Speed Low Limit [Hz]	0	Hz	Motor speed limits
4-14	Motor Speed High Limit [Hz]	60	Hz	Motor speed limits
4-18	Current Limit	110	%	
4-19	Max Output Frequency	62	Hz	Safety limit
5-10	Terminal 18 Digital Input	[8] Start		
5-11	Terminal 19 Digital Input	[0] No operation		
5-12	Terminal 27 Digital Input	[0] No operation		
6-20	Terminal 54 Low Voltage	0.5	V	Transducer scaling
6-21	Terminal 54 High Voltage	4.5	V	Transducer scaling
6-24	Terminal 54 Low Ref./Feedb. Value	14.5		Transducer scaling
6-25	Terminal 54 High Ref./Feedb. Value	667		Transducer scaling
6-90	Terminal 42 Mode	[1] 4-20 mA		Signal to Secondary Drive
6-91	Terminal 42 Analog Output	[100] Output Frequency		Signal to Secondary Drive
6-92	Terminal 42 Digital Output	[0] No Operation		
6-93	Terminal 42 Output Min Scale	0	%	
6-94	Terminal 42 Output Max Scale	100	%	
20-00	Feedback 1 Source	[2] Analog Input 54		Transducer Signal
20-01	Feedback 1 Conversion	[0] Linear		Feedback Source
20-20	Feedback Function	[3] Minimum		Feedback Source
20-21	Setpoint 1	330 for (R32, R410A, R454B) 90 fro (R1234z_9, R515b) 124 for(R513A, R134a) 196 for (R22)		Setpoint
20-81	Reverse PID	[1] Inverse		
20-83	PI Start Speed	0	Hz	
20-84	On Reference Bandwidth	0	%	
20-93	PI Proportional Gain	10		
20-94	PI Integral Time	40	s	

Table 17 — Greenspeed Controller Program Parameters for Operating Modes (cont)

PARAMETER	FUNCTION	FACTORY SETTING	UNIT	NOTES
		208-230V 60 Hz		
1-22	Motor Voltage	208	V	Motor Nameplate
1-23	Motor Frequency	60	Hz	Motor Nameplate
1-24	Motor Current	= 6.6 x the number of motors in each VFD for 09RC020-060 =12.7 x the number of motors in each VFD for 09RC080-230	A	Motor Nameplate
		380V 60 Hz		
1-22	Motor Voltage	380	V	Motor Nameplate
1-23	Motor Frequency	60	Hz	Motor Nameplate
1-24	Motor Current	=3.7 x the number of motors in each VFD for 09RC020-060. =7 x the number of motors in each VFD for 09RC080-230	A	Motor Nameplate
		380V 50 Hz		
1-22	Motor Voltage	380	V	Motor Nameplate
1-23	Motor Frequency	50	Hz	Motor Nameplate
1-24	Motor Current	=3.7 x the number of motors in each VFD for 09RC020-060. =7 x the number of motors in each VFD for 09RC080-230	A	Motor Nameplate
		460V 60 Hz		
1-22	Motor Voltage	460	V	Motor Nameplate
1-23	Motor Frequency	60	Hz	Motor Nameplate
1-24	Motor Current	=3.1 x the number of motors in each VFD for 09RC020-060. =5.8 x the number of motors in each VFD for 09RC080-230	A	Motor Nameplate
		575V 60 Hz		
1-22	Motor Voltage	575	V	Motor Nameplate
1-23	Motor Frequency	60	Hz	Motor Nameplate
1-24	Motor Current	=2.5 x the number of motors in each VFD for 09RC020-060. =4.6 x the number of motors in each VFD for 09RC080-230	A	Motor Nameplate

LEGEND

PID — Proportional Integral Derivative

Step 7 — Install Accessories

LOW-AMBIENT OPERATION

If operating temperatures below those found in Tables 18 and 19 are expected, Greenspeed fan control is recommended.

Table 18 — Minimum Outdoor-Air Operating Temperature — English [a,b,c]

09RC UNIT SIZE	TD (F)	MINIMUM AMBIENT (F)			
		100% Capacity	75% Capacity	50% Capacity	25% Capacity
020	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
030	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
035	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
050	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
060	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
080	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
095	30	33	42	53	65
	25	40	48	57	66
	20	47	53	61	68
115	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67
130	30	33	42	53	65
	25	40	48	57	66
	20	47	53	61	68
145	30	27	38	50	63
	25	35	44	54	65
	20	43	50	59	67

NOTE(S):

a. Based on 80°F condensing temperature at 100% and 75% capacity and a 75°F condensing temperature at 50% and 25% capacity.
b. Units 050 to 060 are based on dual circuit operation. Dual circuit low ambient option should be based on circuit with lowest TD.
c. The minimum outdoor-air operating temperature for variable speed fans is –20°F.

LEGEND

TD — Temperature Difference (F)

Table 19 — Minimum Outdoor-Air Operating Temperature — SI [a,b,c]

09RC UNIT SIZE	TD (C)	MINIMUM AMBIENT (C)			
		100% Capacity	75% Capacity	50% Capacity	25% Capacity
020	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
030	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
035	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
050	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
060	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
080	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
095	16.7	0.56	5.76	11.81	18.06
	13.9	4.44	8.78	13.82	19.03
	11.1	8.33	11.81	15.83	20.00
115	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44
130	16.7	0.56	5.76	11.81	18.06
	13.9	4.44	8.78	13.82	19.03
	11.1	8.33	11.81	15.83	20.00
145	16.7	–2.78	3.26	10.14	17.22
	13.9	1.67	6.70	12.43	18.33
	11.1	6.11	10.14	14.72	19.44

NOTE(S):

a. Based on 26.7°C condensing temperature at 100% and 75% capacity and a 23.9°C condensing temperature at 50% and 25% capacity.
b. Units 050 to 060 are based on dual circuit operation. Dual circuit low ambient option should be based on circuit with lowest TD.
c. The minimum outdoor-air operating temperature for variable speed fans is –28.9°C.

LEGEND
TD — Temperature Difference (C)

START-UP

System Evacuation and Dehydration

Refer to GTAC II (General Training Air Conditioning), Module 4, "Dehydration for Proper Evacuation and Dehydration Techniques."

Preliminary Charge

Refer to GTAC II, Module 5, Charging, Recovery, Recycling, and Reclamation for charging procedures. Using the liquid charging method and charging by weight procedure, charge each circuit with the amount of refrigerant (R-410A or R-134a depending on unit configuration) listed in Table 20.

Table 20 — Preliminary Refrigerant Charge, lb [a,b]

UNIT SIZE	R-410A or R-32		R-134a or R-513A	
	Circuit A	Circuit B	Circuit A	Circuit B
09RCS020	9.8	—	10.8	—
09RCS030	13.5	—	15.0	—
09RCS035	9.8	9.8	10.8	10.8
09RCM050	12.8	12.8	14.2	14.2
09RCM060	13.5	13.5	15.0	15.0
09RCM080	12.1	12.4	13.4	13.7
09RCM095	19.7	193	21.9	21.4
09RCM115	20.0	19.2	22.2	21.4
09RCM130	20.4	26.0	22.6	28.9
09RCM145	25.6	26.0	28.4	28.8
09RCM160	34.4	32.1	38.1	35.6
09RCM170	34.4	32.1	38.1	35.6
09RCM185	41.3	38.0	45.8	42.2
09RCM200	41.3	38.0	45.8	42.2
09RCM230	48.6	45.5	53.9	50.5

NOTE(S):

a. Preliminary charge does not take into account interconnecting piping between indoor and outdoor units.
b. For liquid line piping longer than 25 ft (7.6 m) with R-410A or R-32 refrigerant, use the following information:
1/2 in. (12.7 mm) liquid line — 0.6 lb per 10 linear ft (0.27 kg per 3 m)
5/8 in. (15.9 mm) liquid line — 1.0 lb per 10 linear ft (0.45 kg per 3 m)
7/8 in. (22.2 mm) liquid line — 2.0 lb per 10 linear ft (0.91 kg per 3 m)
1-1/8 in. (28.6 mm) liquid line — 3.5 lb per 10 linear ft (1.59 kg per 3 m)
For liquid line piping longer than 25 ft (7.6 m) with R-134a refrigerant, use the following information:
1/2 in. (12.7 mm) liquid line — 0.7 lb per 10 linear ft (0.32 kg per 3 m)
5/8 in. (15.9 mm) liquid line — 1.2 lb per 10 linear ft (0.53 kg per 3 m)
7/8 in. (22.2 mm) liquid line — 2.4 lb per 10 linear ft (1.06 kg per 3 m)
1-1/8 in. (28.6 mm) liquid line — 4.1 lb per 10 linear ft (1.80 kg per 3 m)

Safety Considerations for R-32 (A2L) Refrigerants

LEAK TESTING

Nitrogen should be added to the system to check for leaks.

Under no circumstances shall potential sources of ignition be used in the search for or detection of refrigerant leaks. A halide torch (or any other detector using a exposed flame) shall NOT be used.

The following leak detection methods are deemed acceptable for all refrigerant systems:

1. Electronic leak detectors may be used to detect refrigerant leaks, but in the case of A2L refrigerants, the sensitivity may not be adequate or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set to the LFL (lower flammability limit) of R-32, which is 14%.
2. Leak detection fluids are also suitable for use with most refrigerants, but the use of detergents containing chlorine shall be avoided, as the chlorine may react with the refrigerant and corrode the copper pipework. Examples of leak detection fluids are the bubble method and fluorescent method agents.

If a leak is suspected, all exposed flames shall be removed/extinguished. If a leakage of refrigerant is found that requires brazing, all of the refrigerant shall be recovered from the system or isolated (by means of shut off valves) in a part of the system remote from the leak. After leaks are repaired, the system must be evacuated and dehydrated if it has not been already.

REFRIGERANT REMOVAL AND EVACUATION

When breaking into the refrigerant circuit to make repairs—or for any other purpose—conventional procedures shall be used. However, for A2L refrigerants, it is important that best practices be followed, since flammability is a consideration. The following procedure shall be adhered to:

1. Safely remove refrigerant following local and national regulations.
2. Purge the circuit with inert gas.
3. Open the circuit by cutting.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used shall be designated for the recovered refrigerant and labeled for that refrigerant (i.e., special cylinders for the recovery of refrigerant). Cylinders shall be complete, with pressure-relief valve and associated shut-off valves, and in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order, with a set of instructions concerning the equipment that is at hand, and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete, with leak-free disconnect couplings, and in good condition. Before using the recovery machine, check that it is in satisfactory working order, it has been properly maintained, and any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units, and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that FLAMMABLE REFRIGERANT does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the supplier. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

For systems requiring R-32, the system shall be purged with oxygen-free nitrogen to render the equipment safe for A2L refrigerants. This process may need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

REFRIGERANT CHARGE

Refer to the Physical Data tables supplied in the 30RC Installation Instructions. There is a 1/4 in. Schrader connection near the lower coil connection, liquid line, for charging liquid refrigerant.

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- safely remove refrigerant following local and national regulations;
- evacuate;
- purge the circuit with inert gas (optional for A2L);
- evacuate (optional for A2L);
- continuously flush or purge with inert gas when using flame to open circuit; and
- open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

RECOVERY

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

DECOMMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

- Become familiar with the equipment and its operation.
- Isolate system electrically.
- Before attempting the procedure, ensure that:
  - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  - all personal protective equipment is available and being used correctly;
  - the recovery process is supervised at all times by a competent person;
  - recovery equipment and cylinders conform to the appropriate standards.
- Pump down refrigerant system, if possible.
- If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- Make sure that cylinder is situated on the scales before recovery takes place.
- Start the recovery machine and operate in accordance with instructions.
- Do not overfill cylinders (no more than 80% volume liquid charge).
- Do not exceed the maximum working pressure of the cylinder, even temporarily.
- When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

LABELING

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

Adjust Refrigerant Charge

⚠ CAUTION

Never charge liquid into the low pressure side of system. Do not overcharge. During charging or removal of refrigeration, be sure indoor fan system is operating. Failure to comply could result in personal injury or equipment damage.

⚠ CAUTION

Charging procedures for MCHX (microchannel heat exchanger) units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (100 gram) increments until complete. Ensure that all fans are on and all compressors are running when using charging charts. Failure to comply may result in equipment damage.

Due to the compact design of microchannel heat exchangers, refrigerant charge is reduced significantly. As a result, charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Add or remove refrigerant until conditions are met. As conditions get close to the desired point, add or remove charge in 1/4 lb (100 gram) increments until complete. Ensure that all fans are on and all compressors are running when charging. If charging at low outdoor ambient, the condenser coil can be partially blocked in order to increase head pressure.

With all fans operating and all compressors on the circuit being serviced operating at full capacity, adjust the refrigerant charge to obtain desired subcooling. Charge vapor into compressor low-side service port. Measure pressure at the liquid line port, making sure a Schrader depressor is used. Also, measure liquid line temperature as close to the liquid service port as possible.

If the sight glass is cloudy, check refrigerant charge again. Ensure all fans and compressors on the circuit being serviced are operating. Also ensure maximum allowable liquid lift has not been exceeded. If the sight glass is cloudy, a restriction could exist in the liquid line. Check for a plugged filter drier or partially open solenoid valve. Replace or repair, as needed.

Head Pressure Control

The head pressure control reduces condensing capacity under low ambient temperature conditions.

FAN CYCLING — FIXED SPEED FANS

The 09RC units are shipped from the factory equipped to work down to ambient temperatures listed in Tables 18 and 19. This is accomplished by cycling condenser fans based on fan cycling pressure switches. See Table 21 for variable speed fan control details.

The units use fan cycling pressure switches (FCPS). The units are shipped from the factory with switches for use with R-410A/R-32. The switches are set to open at 289 psig (1993 kPa) and close at 445 psig (3068 kPa). The 30HXA units which are designed for use with R-134a/R-513A are shipped from the factory with FCPS to be used with the 09RC units. The R-134a/R-513A switch open point is 97 psig (669 kPa) and close point is 185 psig (1275 kPa).

Table 21 — Variable Speed Fan Control

09RC UNIT SIZE	FR-A		FR-B	
	VFD	OFM	VFD	OFM
020-035	VFD-A	OFM-1, OFM-2	—	—
050, 060	VFD-A	OFM-1, OFM-2	VFD-B	OFM-3, OFM-4
080	VFD-A	OFM-1, OFM-2	VFD-B	OFM-3, OFM-4
095	VFD-A	OFM-1, OFM-2	VFD-B	OFM-3, 5, 6
115	VFD-A	OFM-1, 2, 3	VFD-B	OFM-4, 5, 6
130	VFD-A	OFM-1, 2, 3	VFD-B	OFM-4, 5, 6, 7
145	VFD-A	OFM-1, 2, 3, 4	VFD-B	OFM-5, 6, 7, 8
160	VFD-A	OFM-1, 2, 3, 4	VFD-B	OFM-5, 6, 7, 8, 9
170	VFD-A	OFM-1, 2, 3, 4, 5	VFD-B	OFM-6, 7, 8, 9, 10
185	VFD-A	OFM-1, 2, 3, 4, 5	VFD-B	OFM-6, 7, 8, 9, 10, 11
200	VFD-A	OFM-1, 2, 3, 4, 5, 6	VFD-B	OFM-7, 8, 9, 10, 11, 12
230	VFD-A	OFM-1, 2, 3, 4, 5, 6, 7	VFD-B	OFM- 8, 9, 10, 11, 12, 13, 14

MAINTENANCE

Recommended Maintenance Schedule

The following are only recommended guidelines. Jobsite conditions may dictate that maintenance schedule is performed more often than recommended.

Every month:

- Check condenser coils for debris, clean as necessary.

Every 3 months:

- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary.
- Check condenser coils for debris.
- Check all condenser fans for proper operation.

Every 12 months:

- Check all electrical connections, tighten as necessary.
- Inspect all contactors and relays, replace as necessary.
- Check condition of condenser fan blades and ensure they are securely fastened to the motor shaft.

Condenser Coil Maintenance and Cleaning

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the RTPF (round tube plate fin) coil and MCHX (microchannel heat exchanger) coil.

REMOVE SURFACE-LOADED FIBERS

Surface-loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, then a soft, non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged if the tool is applied across the fins (fin edges can be easily bent over and damage the coating of a protected coil).

NOTE: The use of a water stream, such as a garden hose, against a surface-loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface-loaded fibers must be completely removed prior to using low velocity clean water rinse.

PERIODIC CLEAN WATER RINSE

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with a very low velocity water stream to avoid damaging the fin edges. Monthly cleaning is recommended.

ROUTINE CLEANING OF COIL SURFACE

Routine cleaning with Totaline® environmentally balanced coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement Parts division as part number P902-0301 for a one gallon container and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including MCHX, e-coated MCHX, standard copper tube aluminum fin, precoated fin, copper fin, and e-coated coils, be cleaned with the Totaline environmentally balanced coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure the long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally balanced coil cleaner is non-flammable, hypoallergenic, nonbacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components, such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline Environmentally Balanced Coil Cleaner Application Equipment

- 2-1/2 gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

Harsh chemicals, household bleach, or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface, where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline environmentally balanced coil cleaner.

⚠ CAUTION

High velocity water, from a pressure washer or garden hose, or compressed air should never be used to clean an RTPF coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. High velocity water, from a pressure washer or garden hose, or compressed air should never be used to clean an MCHX coil, as it may fracture the tube/fin bond. Reduced unit performance or nuisance unit shutdown may occur.

Totaline Environmentally Balanced Coil Cleaner Application Instructions

1. Proper eye protection, such as safety glasses, is recommended during mixing and application.
2. Remove all surface-loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally balanced coil cleaner in a 2-1/2 gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F (37.8°C).

NOTE: DO NOT USE water in excess of 130°F (54.4°C), as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline environmentally balanced coil cleaner solution to all coil surfaces, including finned area, tube sheets, and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in a horizontal pattern to minimize the potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
10. Thoroughly rinse all surfaces with low velocity clean water using a downward rinsing motion of the water spray nozzle. Protect fins from damage from the spray nozzle.

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

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