

Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

Installing and servicing air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install or service air conditioning equipment.

Untrained personnel can perform basic maintenance, such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe safety precautions in literature, tags, and labels attached to unit.

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

WARNING

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause serious personal injury.

INSTALLATION

Step 1 — Complete Pre-Installation Checks

UNPACK UNIT (See Fig. 1) — Move the unit to final location. Remove carton from unit, being careful not to damage service valves and grilles.

INSPECT SHIPMENT — File a claim with the shipping company if shipment is damaged or incomplete. Check unit nameplate to ensure unit matches job requirements.

CONSIDER SYSTEM REQUIREMENTS — Consult local building codes and NEC for special installation requirements.

Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 2.

Locate unit so that condenser airflow is unrestricted on both sides. Refer to Fig. 2.

Unit may be mounted on a level pad directly on base legs or mounted on raised pads at support points. See Fig. 2 for center of gravity.

Step 2 — Rig and Mount Unit

MOUNTING ON GROUND — Mount unit on a solid, level concrete pad. Position unit so water or ice from roof does not fall directly onto unit. Accessory stacking kits can be used when units are to be stacked. See installation instructions provided with the accessory kit. If conditions or local codes require unit be fastened to a pad, 6 field-supplied tiedown bolts should be used and fastened through slots provided in unit mounting feet.

MOUNTING ON ROOF — Mount unit on a level platform or frame at least 6 in. above roof surface. Isolate unit and tubing from structure.

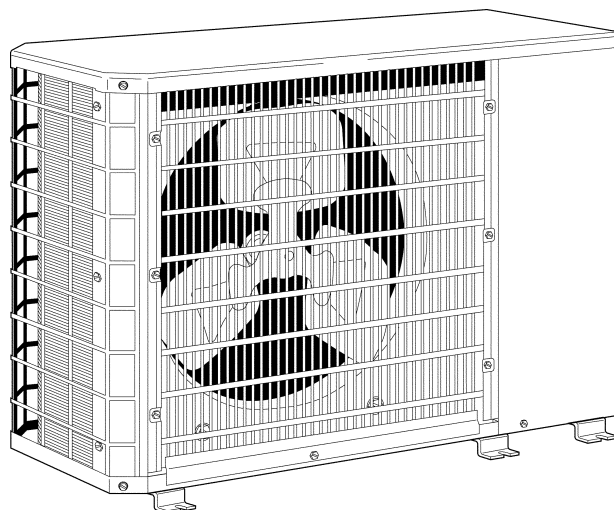


Fig. 1 — 38HDC Commercial Condensing Unit

UNIT 38HDC	A		B		C		D		E		F		G		H		J		K		L		M		N		R		S		OPERATING WEIGHT	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	lb	kg
018	2-11/16	638.2	3-0 5/16	938.2	1-29/16	369.9	1-4	406.4	1-11/16	595.3	1-53/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1 1/4	336.6	0-6 5/8	168.3	0-10 9/16	274.6	0-0 5/8	15.00	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	150	68.0
024	2-1 1/8	638.2	3-0 5/16	938.2	1-29/16	369.9	1-4	406.4	1-11/16	595.3	1-53/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-2 1/16	366.7	0-6 3/4	171.4	1-0	304.8	0-0 5/8	15.00	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	154	69.0
030	2-1 1/8	638.2	3-0 5/16	938.2	1-29/16	369.9	1-4	406.4	1-11/16	595.3	1-53/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.4	0-1 1/8	295.3	0-0 3/4	19.05	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	169	76.6
036	2-1 1/8	638.2	3-0 5/16	938.2	1-29/16	369.9	1-4	406.4	1-11/16	595.3	1-53/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-0 1/16	322.3	0-6 3/4	171.4	0-1 1/8	301.6	0-0 7/8	22.22	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	179	81.2
048	3-1 3/16	944.6	3-8 9/16	1131.9	1-5 1/16	433.4	1-6 7/16	468.3	2-6 1/2	774.7	1-7 9/16	498.5	2-5 5/8	752.5	2-8 9/16	817.6	1-1 1/16	347.7	0-8 1/8	206.4	1-4 1/8	409.6	0-0 7/8	22.22	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	270	122.4
060	3-1 3/16	944.6	3-8 9/16	1131.9	1-5 1/16	433.4	1-6 7/16	468.3	2-6 1/2	774.7	1-7 9/16	498.5	2-5 5/8	752.5	2-8 9/16	817.6	1-2 1/4	361.9	0-8 1/8	206.4	1-4 1/2	419.1	0-0 7/8	22.22	0-0 9/16	9.52	0-4 1/8	115.0	0-6 1/2	166.0	290	131.5

UNIT SIZE 38HDC	MINIMUM MOUNTING PAD DIMENSIONS					
	Support Feet			Snow Stand		
	ft-in.	mm	ft-in.	mm	ft-in.	mm
018,024,030,036	1-11 x 3-6	584.2 x 1066.8	2-2 x 3-6	660.4 x 1066.8	2-2 x 3-6	660.4 x 1066.8
048,060	2-0 x 4-2	609.6 x 1270.0	2-4 x 4-4	711.2 x 1270.0	2-4 x 4-4	711.2 x 1270.0

NOTES:

- Required clearances: With coil facing wall, allow 6-in. minimum clearance on coil side and coil end, and 3 ft minimum clearance on compressor end and fan side. With fan facing wall, allow 8 in. minimum clearance on fan side and coil end, and 3 ft minimum clearance on compressor end and coil side. With multi-unit application, arrange units so discharge of one does not enter inlet of another.
- Dimensions in parentheses are in millimeters.
- Center of gravity.

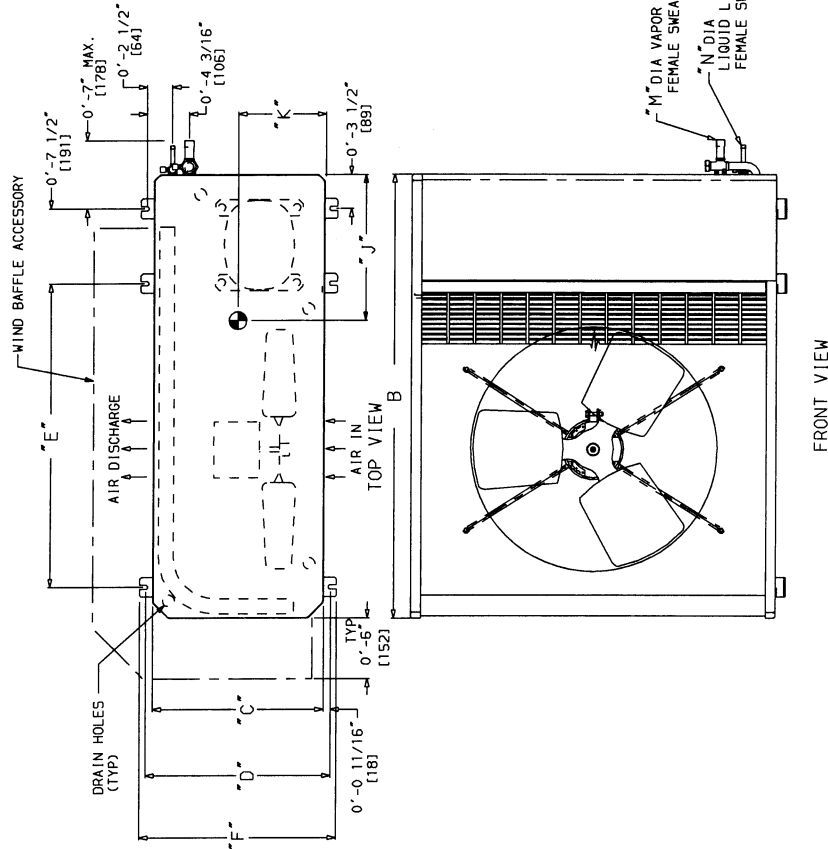


Fig. 2 — Base Unit Dimensions

⚠ CAUTION

Be sure unit panels are securely in place prior to rigging. Loose unit panels could result in equipment damage or personal injury.

Keep the unit upright and lift unit using a sling. Use cardboard or padding under the sling, and spreader bars to prevent sling damage to the unit. See Fig. 3. See Fig. 2 for center of gravity reference. Install the unit so that the coil does not face into prevailing winds. If this is not possible and constant winds above 25 mph are expected, use accessory wind baffle. See installation instructions provided with the accessory kit.

NOTE: Accessory wind baffles should be used on all units with accessory low ambient temperature control.

Field-fabricated snow or ice stands may be used to raise unit when operation will be required during winter months. Units may also be wall mounted using the accessory wall-mounting kit.

Step 3 — Complete Refrigerant Piping Connections — Outdoor units may be connected to indoor units using field-supplied tubing of refrigerant grade and condition. See Table 1 for correct line sizes. Do not use less than 10 ft of interconnecting tubing.

⚠ CAUTION

DO NOT BURY MORE THAN 36 IN. OF REFRIGERANT PIPE IN THE GROUND. If any section of pipe is buried, there must be a 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried refrigerant may migrate to cooler, buried section during extended periods of system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start-up.

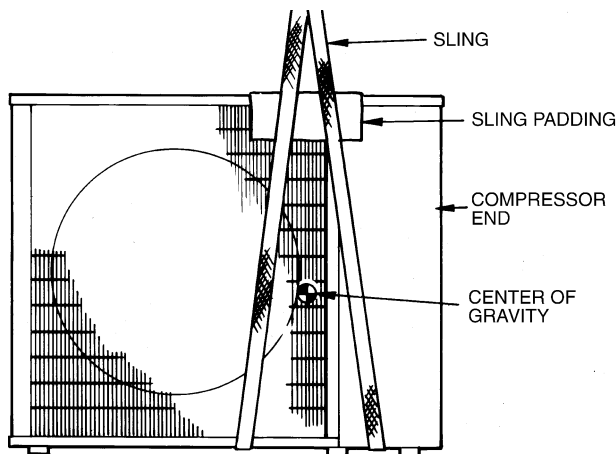


Fig. 3 — Lifting Unit with Sling

When more than 50 ft of interconnecting tubing and more than 30 ft of vertical lift is used, consult the residential long line application instruction guide. For long-line applications, interconnecting lines over 100 ft must be installed with a liquid line solenoid. A liquid line solenoid may also be installed on some units to improve part-load efficiency. Refer to the ARI (Air Conditioning & Refrigeration Institute) Directory.

If either refrigerant tubing or indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 1000 microns to eliminate contamination and moisture in the system.

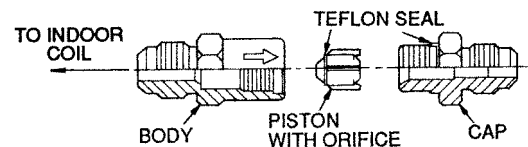
Run refrigerant tubes as directly as possible, avoiding unnecessary turns and bends. Suspend refrigerant tubes so they do not damage insulation on vapor tube and do not transmit vibration to structure. Also, when passing refrigerant tubes through a wall, seal the opening so that vibration is not transmitted to structure. Leave some slack in refrigerant tubes between structure and outdoor unit to absorb vibration. Refer to separate indoor unit installation instructions for additional information.

CHECK ACCURATER CONTROL — The correct AccuRater (bypass type) refrigerant control is required for cooling system capacity optimization. An AccuRater device with field-replaceable piston should be supplied with the indoor unit. Refer to the AccuRater metering device table in separate indoor unit installation instructions to determine the correct AccuRater piston size required for the condenser/evaporator system being installed.

Matching of outdoor unit with indoor unit may require field replacement of piston. Replace piston, *if required*, before connecting refrigerant lines. See Fig. 4. Piston replacement instructions are included in the indoor unit installation instructions. After system installation is complete, see the Refrigerant Charging section on page 9 to check and/or adjust refrigerant charge.

The 38HDC units may also be installed with units using a thermostatic expansion valve (TXV). If a TXV is used, be sure to remove the piston from the indoor coil. See installation instructions shipped with the TXV for proper positioning and adjustment.

INSTALL FILTER DRIER AND MOISTURE INDICATOR — The filter drier is field supplied and installed. The moisture indicator (sight glass) is a field-supplied option and should be installed just after the liquid line shutoff valve. *Do not use a receiver* (a receiver is not provided with unit and one should not be used).



NOTE: Arrow on AccuRater body points in free-flow direction, away from the indoor coil.

Fig. 4 — AccuRater (Bypass Type) Metering Device Components

MAKE PIPING SWEAT CONNECTIONS — Remove plastic caps from liquid and suction service valves. Use refrigerant grade tubing. Service valves are closed from the factory and are ready for brazing. After wrapping the service valve with a wet cloth, the tubing set can be brazed to the service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and the indoor coil are now ready for leak testing.

NOTE: Unit is shipped with R-22 factory charge indicated on nameplate.

Pass nitrogen or other inert gas through piping while brazing to prevent formation of copper oxide.

⚠ CAUTION

To avoid damage while brazing, service valves should be wrapped with a heat-sinking material such as a wet cloth.

⚠ CAUTION

When brazing tubing sets to the service valves, a brazing shield **MUST** be used to prevent damage to the painted unit surface.

PROVIDE SAFETY RELIEF — A fusible plug is located in unit suction line; do not cap this plug. If local code requires additional safety devices, install as directed.

Step 4 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC, and local electrical codes. Failure to follow this warning could result in the installer being liable for the personal injury of others.

⚠ CAUTION

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

⚠ WARNING

Before performing service or maintenance, be sure indoor unit main power switch is turned OFF and indoor blower has stopped. Failure to do so may result in electrical shock or injury from rotating fan blades.

POWER WIRING — Unit is factory wired for voltage shown on nameplate. Provide adequate, fused disconnect switch within sight from unit, readily accessible, but out of reach of children. Provision for locking the switch open (off) is advisable to prevent power from being turned on while unit is being serviced. Disconnect switch, fuses, and field wiring must comply with the NEC and local code requirements. Use copper wire only between the disconnect switch and unit. Use minimum 60 C wire for the field power connection.

Route power wires through the opening in unit side panel and connect in the unit control box as shown on the unit label diagram and Fig. 5 and 6. Unit must be grounded.

CONTROL CIRCUIT WIRING — Control voltage is 24 v (40 va minimum). See Fig. 5 and unit label diagram for field-supplied wiring details. Route control wire through opening in unit side panel to connection in unit control box.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire. For 50 to 75 ft, use no. 16 AWG insulated wire. For over 75 ft, use 14 AWG insulated wire.

NOTE: All wiring must conform to NEC and local codes.

NOTE: Operating unit on improper line voltage constitutes abuse and could affect Carrier warranty. See Table 2. *Do not* install unit in a system where voltage may fluctuate above or below permissible limits.

See Table 2 for recommended fuse sizes. When making electrical connections, provide clearance at the unit for refrigerant piping connections.

NOTE: *Use indoor unit transformer as 24 v (40-va minimum) supply for system.*

Table 1 — Physical Data

UNIT 38HDC	018	024	030	036	048	060
NOMINAL CAPACITY (Tons)	1.5	2.0	2.50	3.0	4.0	5.0
OPERATING WEIGHT (lb)	150	154	169	179	270	290
REFRIGERANT TYPE	R-22					
METERING DEVICE	AccuRater (Located at Fan Coil)					
CHARGE (lb)*	3.6†	4.8†	5.2†	5.4†	7.4†	13.6†
OUTDOOR FAN						
Rpm/Cfm	850/1720	850/1720	850/1720	850/1720	850/3900	850/3900
Diameter (in.)	18	18	18	18	24	24
No. Blades	3	3	3	3	3	3
Motor (hp)	1/8	1/8	1/8	1/8	1/4	1/4
OUTDOOR COIL						
Face Area (sq ft)	6.1	6.1	6.1	6.1	12.3	12.3
No. Rows	1.5	2	3	3	2	3
FPI	15	15	15	15	15	15
HIGH PRESSURE SWITCH						
Cut-In (psig)	320 ± 20	320 ± 20	320 ± 20	320 ± 20	320 ± 20	320 ± 20
Cutout (psig)	426 ± 7	426 ± 7	426 ± 7	426 ± 7	426 ± 7	426 ± 7
LOW PRESSURE SWITCH						
Cut-In (psig)	22 ± 5	22 ± 5	22 ± 5	22 ± 5	22 ± 5	22 ± 5
Cutout (psig)	7 ± 3	7 ± 3	7 ± 3	7 ± 3	7 ± 3	7 ± 3
REFRIGERANT LINES						
Connection Type	Sweat					
Liquid Line (in.) OD	3/8	3/8	3/8	3/8	3/8	3/8
Vapor Line (in.) OD	5/8	5/8	3/4	3/4**	7/8	7/8††
Max Length (ft)	200	200	200	200	200	200
Max Lift (ft)	65	65	65	65	65	65
Max Drop (ft)	150	150	150	150	150	150
COMPRESSOR						
Manufacturer	Carrier					
Model	ZR18KC	ZR24K3	Copeland ZR28K3	ZR34K3	ZR49K3	SY60AC
Type	Scroll					
Oil Charge (oz)	21.0	25.0	25.0	38.0	53.0	52.0
Accumulator	Yes	Yes	Yes	Yes	Yes	Yes
CONTROLS						
Fusible Plug (F)	210					
Control Voltage***	24v					
System Voltage	208/230v	208/230v	208/230v	208/230v, Single and 3 Phase, 460v 3 Phase		
FINISH	Gray					

LEGEND

FPI — Fins Per Inch

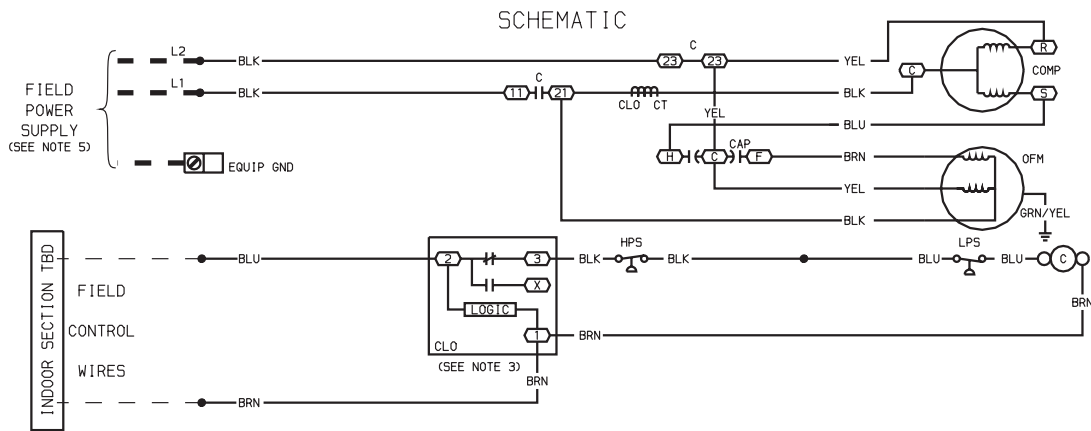
*Unit shipped with full factory charge.

†See ARI (Air Conditioning and Refrigeration Institute) capacity table for proper charge and piston for each fan coil type.

**Valve connection size is 3/4 inch. Recommended line size is 7/8 inches.

††Valve connection size is 7/8 inch. Recommended line size is 1 1/8 inches.

***24 v and a minimum of 40 va is provided in the fan coil unit.



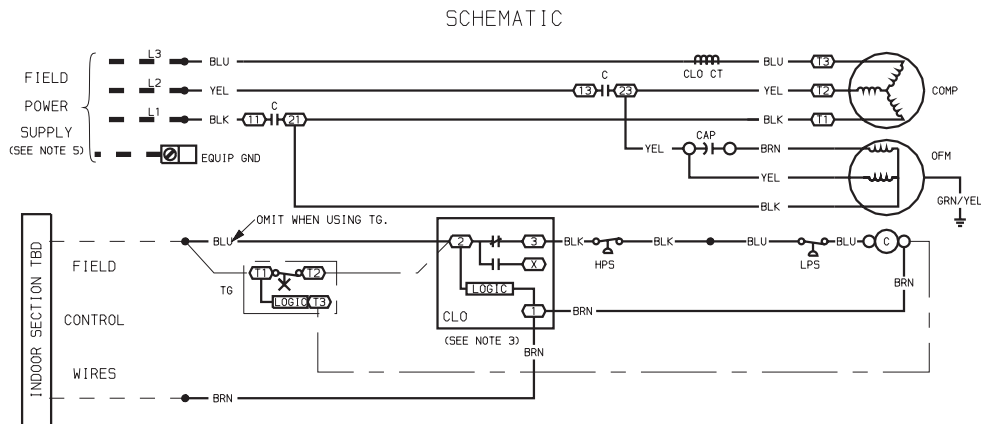
NOTES:

1. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
2. WIRE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC) AND LOCAL CODES. REPLACE ANY ORIGINAL WIRES WITH 90°C WIRE OR ITS EQUIVALENT.
3. THE CLO LOCKS OUT THE COMP TO PREVENT SHORT CYCLING ON COMP OVERLOADS AND SAFETY DEVICES. BEFORE REPLACING CLO CHECK THESE DEVICES.
4. IF INDOOR SECTION HAS A TRANSFORMER WITH A GROUNDED SECONDARY, CONNECT THE GROUNDED SIDE TO "C" ON THE LOW VOLTAGE BOARD.
5. USE MINIMUM 60°C WIRE FOR FIELD POWER WIRING.

LEGEND

	TERMINAL (PCB, FIELD)	C	CONTACTOR, COMPRESSOR
	TERMINAL (PCB, FACTORY)	CAP	CAPACITOR
	TERMINAL (MARKED)	CLO	COMPRESSOR LOCK OUT
	TERMINAL (UNMARKED)	COMP	COMPRESSOR MOTOR
	TERMINAL BLOCK	CT	CURRENT TRANSFORMER
	SPLICE	EQUIP	EQUIPMENT
	FACTORY WIRING	OFM	OUTDOOR FAN MOTOR
	FIELD CONTROL WIRING	GND	GROUND
	FIELD POWER WIRING	HPS	HIGH PRESSURE SWITCH
	OPTION OR ACCESSORY WIRE	LPS	LOW PRESSURE SWITCH
		TBD	TERMINAL BOARD

Fig. 5 — Typical System Wiring — 38HDC Single Phase



NOTES:

1. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED--THREE PHASE MOTOR IS PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
2. WIRE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC) AND LOCAL CODES. REPLACE ANY ORIGINAL WIRES WITH 90°C WIRE OR ITS EQUIVALENT.
3. THE CLO LOCKS OUT THE COMP TO PREVENT SHORT CYCLING ON COMP OVERLOADS AND SAFETY DEVICES. BEFORE REPLACING CLO CHECK THESE DEVICES.
4. IF INDOOR SECTION HAS A TRANSFORMER WITH A GROUNDED SECONDARY, CONNECT THE GROUNDED SIDE TO "C" ON THE LOW VOLTAGE BOARD.
5. USE MINIMUM 60°C WIRE FOR FIELD POWER WIRING.

LEGEND

	TERMINAL (PCB, FIELD)	C	CONTACTOR, COMPRESSOR
	TERMINAL (PCB, FACTORY)	CAP	CAPACITOR
	TERMINAL (MARKED)	CLO	COMPRESSOR LOCK OUT
	TERMINAL (UNMARKED)	COMP	COMPRESSOR MOTOR
	TERMINAL BLOCK	CT	CURRENT TRANSFORMER
	SPLICE	EQUIP	EQUIPMENT
	FACTORY WIRING	OFM	OUTDOOR FAN MOTOR
	FIELD CONTROL WIRING	GND	GROUND
	FIELD POWER WIRING	HPS	HIGH PRESSURE SWITCH
	OPTION OR ACCESSORY WIRE	LPS	LOW PRESSURE SWITCH
		TBD	TERMINAL BOARD
		TG	TIME GUARD

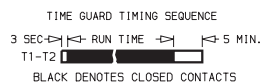


Fig. 6 — Typical System Wiring — 38HDC Three Phase

CONNECTIONS TO DUCT-FREE FAN COIL UNITS —
The 38HDC units are designed for easy match-up to replace with 40QA or 40QK duct-free fan coils. These unit provide 24 v power for the outdoor unit from the fan coil. Connect the Y and C terminals of the indoor unit to the Y and C terminals of the outdoor unit with 20-gage (minimum) thermostat wire. See page 4 for recommended wire sizes.

Step 5 — Accessory Installation — Install all unit accessories per accessory installation instructions prior to start-up.

When ambient temperature will fall below 55 F, accessory low-ambient temperature controller is required. When accessory low-ambient temperature kit is used, unit should also be equipped with accessory winter start kit and wind baffles.

Table 2 — Electrical Data

UNIT 38HDC	VOLTS-PHASE (60 Hz)	VOLTAGE*		COMPRESSOR		FAN		POWER SUPPLY	
		Min	Max	RLA	LRA	FLA	MCA	MOCP	FLA
018	208/230-1	187	253	8.0	49.0	0.7	10.7	15	8.7
024	208/230-1	187	253	12.9	62.5	0.7	16.8	25	13.6
030	208/230-1	187	253	15.0	76.0	0.7	19.5	30	15.7
036	208/230-1	187	253	17.9	88.0	0.7	23.1	40	18.6
	208/230-3	187	253	11.4	77.0	0.7	15.0	25	12.1
	460-3	414	508	5.7	38.5	0.4	7.5	15	6.1
048	208/230-1	187	253	26.4	129.0	1.45	34.5	60	27.9
	208/230-3	187	253	15.0	99.0	1.45	20.2	35	16.5
	460-3	414	508	8.2	49.5	0.8	11.1	15	9.0
060	208/230-1	187	253	28.9	165.0	1.45	36.6	60	30.4
	208/230-3	187	253	16.0	125.0	1.45	21.5	35	17.5
	460-3	414	508	8.0	62.5	0.8	10.8	15	8.8

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection Amps
NEC — National Electrical Code
RLA — Rated Load Amps (Compressor)

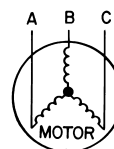
*Permissible limits of the voltage range at which unit will operate satisfactorily.

NOTES:

- Control circuit is 24 v on all units and requires an external power source.
- All motors and compressors contain internal overload protection.
- In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or equipped with a breaker.
- Motor RLA values are established in accordance with UL (Underwriters' Laboratories) Standard 465.
- Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.
 % Voltage Imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
 BC = 464 v
 AC = 455 v

$$\begin{aligned} \text{Average Voltage} &= \frac{452 + 464 + 455}{3} \\ &= \frac{1371}{3} \\ &= 457 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 457 – 452 = 5 v
 (BC) 464 – 457 = 7 v
 (AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

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

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



START-UP

Preliminary Checks

1. Check that all internal wiring connections are tight and that all barriers, covers, and panels are in place.
2. Field electrical power source must agree with unit nameplate rating.
3. All service valves must be open.
4. Crankcase heater must be tight on compressor crankcase (if equipped).

Leak Test — Field piping and fan coil must be leak tested by pressure method. Use R-22 at approximately 25 psig backed up with an inert gas to a total pressure not to exceed 245 psig.

NOTE: Before starting unit, crankcase heater must be on for 12 hours to be sure all refrigerant is out of the oil.

To energize crankcase heater, set space thermostat above ambient temperature so there will be not demand for cooling. Close field disconnect. The crankcase heater is not energized.

Evacuate and Dehydrate — Field piping and fan coil must be evacuated and dehydrated.

⚠ WARNING

Service valves must be fully backseated to close service port. There is no Schrader valve at the service port, and failure to backseat the valve could result in loss of system charge or personal injury.

Charge System — Release charge into system by opening (backseating) liquid and suction line service valves. Refer to separate indoor unit installation instructions for the required total system charge when connected to indoor unit.

To Start Unit

NOTE: When using in conjunction with 40QA or 40QK fan coils, refer to start-up instructions included with fan coil for correct start-up procedures.

Be sure that crankcase heater (if installed) has been on for 12 hours and that field disconnect is closed. Set room thermostat below ambient temperature. Operate unit for 15 minutes, then check system refrigerant charge. See Refrigerant Charging section on page 9.

SERVICE

⚠ WARNING

Before performing recommended maintenance, be sure unit main power switch is turned off. Failure to do so may result in electrical shock or injury from rotating fan blade.

Outdoor Fan — A reinforced wire mount holds the outdoor fan assembly in position. See Fig. 7 for proper mounting position.

High-Pressure Relief Valve — The high-pressure relief valve is located in the compressor. The relief valve opens at a pressure differential of approximately 450 ± 50 psig between suction (low side) and discharge (high side) to allow pressure equalization.

Internal Current and Temperature Sensitive Overload — The control resets automatically when internal compressor motor temperature drops to a safe level (overloads may require up to 45 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester.

Pumpdown Procedure — The system may be pumped down in order to make repairs on the low side without losing complete refrigerant charge.

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the liquid line valve.

⚠ CAUTION

The 38HDC018-060 unit coils hold only the factory-designated amount of refrigerant. Additional refrigerant may cause units to relieve pressure through the compressor internal pressure relief valve (indicated by a sudden rise of suction pressure) before suction pressure reaches 5 psig. If this occurs, shut off unit immediately then frontseat the suction valve and remove and recover excess refrigerant following accepted practices. Equipment damage may result.

3. Start unit and run until suction pressure reaches 5 psig.
4. Shut unit off and frontseat suction valve.
5. Depressurize low side of unit and recover refrigerant following accepted practices.

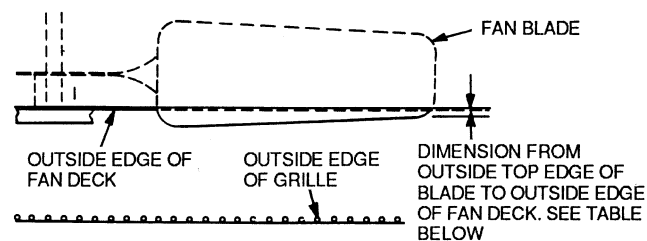
Filter Drier (Field Supplied) — Whenever the moisture liquid indicator shows presence of moisture, replace the filter drier.

High-Pressure Switch — The high-pressure switch, located on discharge line, protects against high discharge pressures caused by such events as overcharge, condenser-fan motor failure, system restriction, etc. It opens on pressure rise at about 426 psig. If system pressures go above this setting during abnormal conditions, the switch opens.

⚠ WARNING

DO NOT attempt to simulate these system abnormalities — high pressures pose a serious safety hazard.

The high-pressure switch is checked with an ohmmeter. If system pressure is below 320 psig switch shows continuity.



38HDC UNIT SIZE — in.		
018	024,030,036	048,060
.433	.709	.16

Fig. 7 — Condenser-Fan Mounting Positions

Low-Pressure Switch — The low-pressure switch, mounted on the suction line, has fixed, non-adjustable settings. To check pressure switch, attach pressure gage to suction service valve gage port. Slowly close liquid shutoff valve and allow compressor to pump down. Do not allow the compressor to pump down below 2 psig. The compressor should shut down when suction pressure drops to cutout pressure in Table 1, and should restart when pressure builds up to cut-in pressure shown after the CLO (compressor lockout switch) has been reset.

Crankcase Heater — The crankcase heater prevents refrigerant migration and compressor oil dilution during shutdown when compressor is not operating. If the crankcase heater is deenergized for more than 6 hours, both compressor service valves must be closed.

The crankcase heater is powered by the high-voltage power of the unit. It is connected across the line side of the contactor and operates continuously. Use extreme caution when troubleshooting this device with unit power on.

To troubleshoot:

1. Apply voltmeter across crankcase heater leads to see if heater voltage is on. *Do not touch heater.* Carefully feel area around crankcase heater; if warm, crankcase heater is functioning.
2. With power off and heater leads disconnected, check across leads with ohmmeter. Do not look for a specific resistance reading. Check for resistance or an open circuit, and change heater if an open circuit is detected.

Service Valves — The service valves in the outdoor unit come from the factory frontseated. This means the refrigerant charge is isolated from the line-set connection ports. To prevent damage to the valve, use a wet cloth or other accepted heat sink material on the valve before brazing.

The service valves must be backseated (turned counter-clockwise until seated) before the service port caps can be removed and the hoses of gage manifold connected. In this position, refrigerant has access from and through the outdoor and indoor units. The service valve cannot be field repaired, therefore, only a complete valve or valve stem seal and service port caps are available for replacement.

AccuRater (Bypass Type) Device — See Fig. 4 for bypass-type AccuRater device components. The piston has a refrigerant metering hole through it. The retainer forms a stop for the piston in the refrigerant bypass mode and a sealing surface for liquid line flare connection. To check, clean, or replace the piston:

1. Shut off power to unit.
2. Pump down unit using Pumpdown Procedure section on page 8.
3. Remove liquid line flare connection from AccuRater device.
4. Pull retainer out of body, being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use locking pliers to remove retainer.
5. Slide piston out by inserting a small soft wire, with small kinks, through metering hole. Ensure metering hole, sealing surface around piston cones, and fluted portion of piston are not damaged.
6. Clean piston refrigerant metering hole.

Refrigerant Charging

⚠ WARNING

To prevent personal injury, wear safety glasses and gloves when handling refrigerant. Do not overcharge system — this can cause compressor flooding.

⚠ WARNING

Service valves must be fully backseated to close service port. There is no Schrader valve at the service port, and failure to backseat the valve could result in loss of system charge or personal injury.

NOTE: Do not vent or depressurize unit refrigerant to atmosphere. Remove and recover refrigerant following accepted practices.

SUPERHEAT METHOD (Cooling, Non-TXV) — To check and adjust charge during the cooling season, use Tables 3 and 4 and the following procedure:

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure suction pressure by attaching a gage to suction valve service port.
3. Measure suction line temperature by attaching a service thermometer to unit suction line near suction valve. Insulate thermometer for accurate readings.
4. Measure outdoor coil inlet-air dry bulb temperature with a second thermometer.
5. Measure indoor coil inlet-air wet bulb temperature with a sling psychrometer.
6. Refer to Table 3. Find air temperature entering outdoor coil and wet-bulb temperature entering indoor coil. At this intersection, note the superheat temperature.
7. Refer to Table 4. Find superheat temperature and suction pressure and note suction line temperature.
8. If unit has higher suction line temperature than charted temperature, add refrigerant until charted temperature is reached.
9. If unit has lower suction line temperature than charted temperature, remove and recover refrigerant until charted temperature is reached.
10. If air temperature entering outdoor coil or pressure at suction valve changes, charge to new suction line temperature indicated on chart.
11. This procedure is independent of indoor-air quantity.

**Table 3 — Superheat Charging Table
(Superheat Entering Suction Service Valve)**

OUTDOOR TEMP (F)	INDOOR COIL ENTERING AIR (F) WB															
	50	52	54	56	58	60	62	64	66	68	70	72	74	76		
55	9	12	14	17	20	23	26	29	32	35	37	40	42	45		
60	7	10	12	15	18	21	24	27	30	33	35	38	40	43		
65	*	6	10	13	16	19	21	24	27	30	33	36	38	41		
70	*	*	7	10	13	16	19	21	24	27	30	33	36	39		
75	*	*	*	6	9	12	15	18	21	24	28	31	34	37		
80	*	*	*	*	5	8	12	15	18	21	25	28	31	35		
85	*	*	*	*	*	*	8	11	15	19	22	26	30	33		
90	*	*	*	*	*	*	5	9	13	16	20	24	27	31		
95	*	*	*	*	*	*	*	6	10	14	18	22	25	29		
100	*	*	*	*	*	*	*	*	8	12	15	20	23	27		
105	*	*	*	*	*	*	*	*	5	9	13	17	22	26		
110	*	*	*	*	*	*	*	*	*	6	11	15	20	25		
115	*	*	*	*	*	*	*	*	*	*	8	14	18	23		

LEGEND

WB — Wet Bulb

*Do not attempt to charge system under these conditions or refrigerant slugging may occur.

**Table 4 — Required Suction-Tube Temperature (F)
(Entering Suction Service Valve)**

SUPERHEAT TEMP (F)	SUCTION PRESSURE AT SERVICE PORT (psig)								
	61.5	64.2	67.1	70.0	73.0	76.0	79.2	82.4	85.7
0	35	37	39	41	43	45	47	49	51
2	37	39	41	43	45	47	49	51	53
4	39	41	43	45	47	49	51	53	55
6	41	43	45	47	49	51	53	55	57
8	43	45	47	49	51	53	55	57	59
10	45	47	49	51	53	55	57	59	61
12	47	49	51	53	55	57	59	61	63
14	49	51	53	55	57	59	61	63	65
16	51	53	55	57	59	61	63	65	67
18	53	55	57	59	61	63	65	67	69
20	55	57	59	61	63	65	67	69	71
22	57	59	61	63	65	67	69	71	73
24	59	61	63	65	67	69	71	73	75
26	61	63	65	67	69	71	73	75	77
28	63	65	67	69	71	73	75	77	79
30	65	67	69	71	73	75	77	79	81
32	67	69	71	73	75	77	79	81	83
34	69	71	73	75	77	79	81	83	85
36	71	73	75	77	79	81	83	85	87
38	73	75	77	79	81	83	85	87	89
40	75	77	79	81	83	85	87	89	91

SUBCOOLING METHOD (Cooling, TXV) — To check and adjust charge during the cooling season, use Table 5 and the following procedure:

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure liquid line temperature near liquid line service valve, and measure liquid pressure at liquid line service valve. Use a digital thermometer for all temperature measurements. DO NOT use mercury or dial-type thermometers.
3. Refer to Table 5. Find measured liquid pressure and read the liquid line temperature at the required subcooling temperature.
4. If the measured liquid line temperature does not agree with the required liquid line temperature, ADD refrigerant to lower the temperature, or REMOVE refrigerant to raise the temperature (allow a tolerance of $\pm 3^\circ\text{F}$).

Compressor Lockout Switch — Units are provided with a compressor lockout protective device. If the compressor shuts down due to any safety device, a current loop monitoring the compressor current senses no current flow. The unit will lock out until the control power is interrupted to reset the lock-out. Determine the reason for the safety trip. To restart, turn the thermostat to the OFF position and then set the thermostat to the COOL position.

Table 5 — Required Liquid Line Temperature (F) (At Service Valve)

REQUIRED SUBCOOLING (F)	LIQUID PRESSURE AT SERVICE VALVE (PSIG)																							
	134	141	148	156	163	171	179	187	196	205	214	223	233	243	253	264	274	285	297	309	321	331	346	359
0	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118	121	124	127	130	133	136	139	142	145
5	71	74	77	80	83	86	89	92	95	98	101	104	107	110	113	116	119	122	125	128	131	134	137	140
10	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	117	120	123	126	129	129	132	135
15	61	64	67	70	73	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118	121	124	127	130
20	56	59	62	65	68	71	74	77	80	83	86	89	92	95	98	101	104	107	110	113	116	119	122	125
25	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	114	117	120

MAINTENANCE

⚠ WARNING

Before performing recommended maintenance, be sure unit main power switch is turned off. Failure to do so may result in electric shock or injury from rotating fan blade.

Lubrication — The motor is permanently lubricated and requires no oiling.

COMPRESSOR — Compressor contains factory oil charge; replace oil when lost. See Table 1 for oil recharge. See Table 6 for recommended compressor oils.

Cleaning Coils — Coil should be washed out with water or blown out with compressor air. Note that the blow-thru design causes dirt and debris to build up on the inside of the coils.

Clean coil annually or as required by location and outdoor air conditions. Inspect coil monthly and clean as required. Fins are not continuous through coil sections. Dirt and debris may

pass through first section, become trapped between the row of fins and restrict condenser airflow. Use a flashlight to determine if dirt or debris has collected between coil sections. Clean coil as follows:

1. Turn off unit power.
2. Using a garden hose or other suitable equipment, flush coil from the outside to remove dirt. Be sure to flush all dirt and debris from drain holes in base of unit. Fan motors are waterproof.

Table 6 — Recommended Compressor Oils

RECOMMENDED OIL	UNIT 38HD					
	018	024	030	036	048	060
Sontex 200LT	•	•	•	•	•	
Zerol 150TD						•

TROUBLESHOOTING

See Fig. 8 for troubleshooting information.

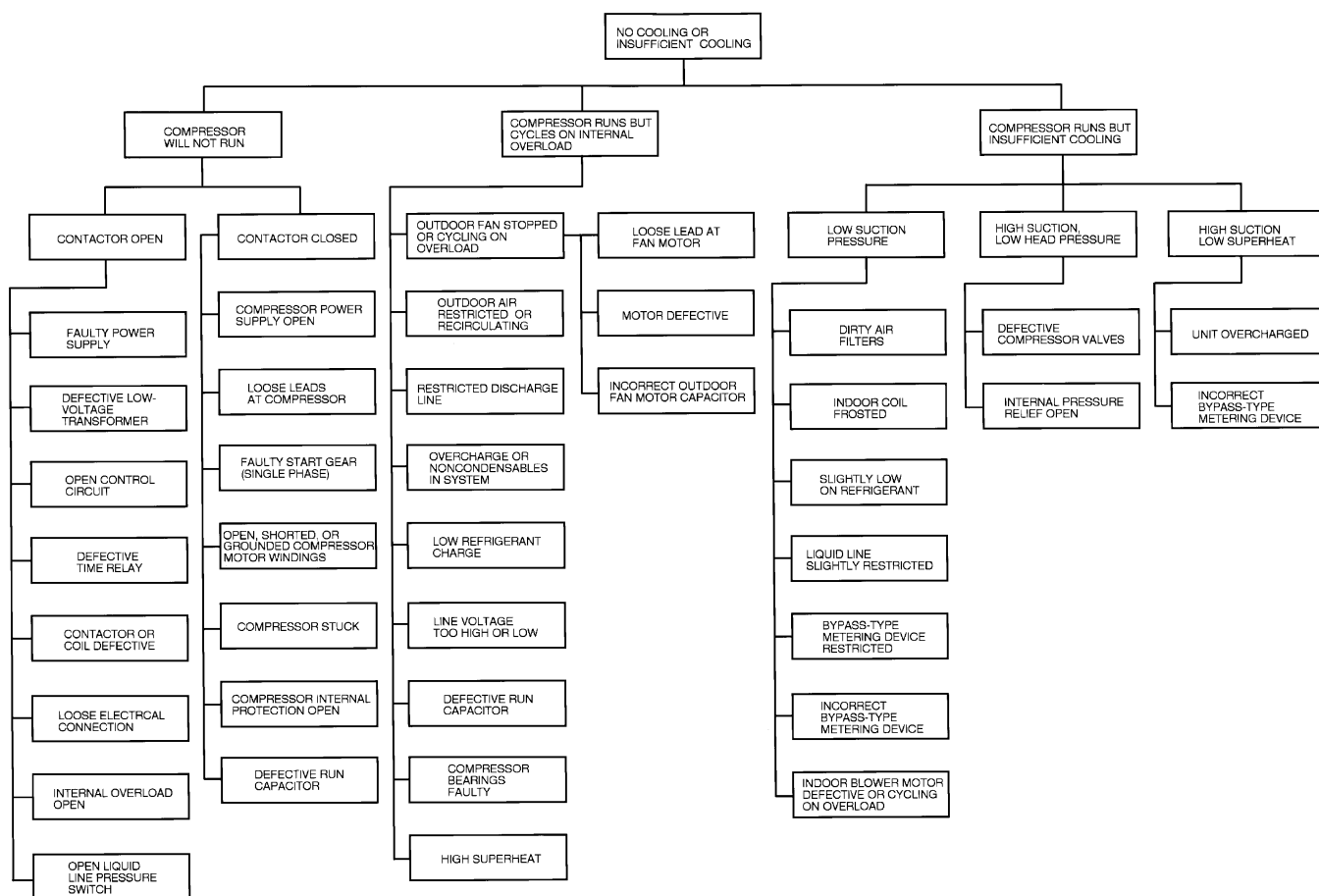


Fig. 8 — Troubleshooting the Cooling Cycle

