

Installation Instructions

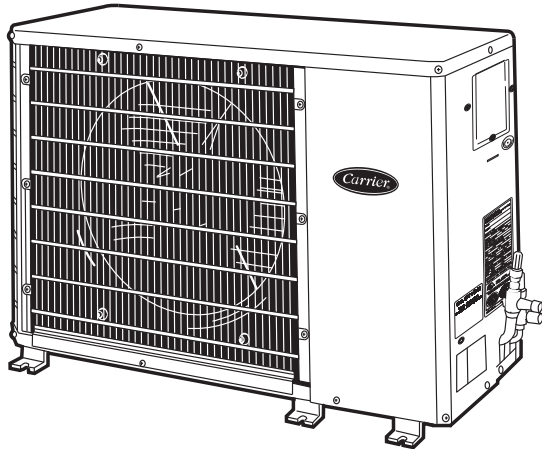


Fig. 1 - 38QRF

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NOTE: Read the entire instruction manual before starting the installation.


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SAFETY CONSIDERATIONS

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

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

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 these signal words; DANGER, WARNING, and CAUTION. 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 **would** 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.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

INSTALLATION

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could result in personal injury or equipment damage.

Puron refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

⚠ CAUTION

PERSONAL INJURY AND EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in personal injury and / or equipment damage.

DO NOT operate the unit without a filter or with grille removed.

Complete Pre-Installation Checks

Unpack Unit

Move the unit to final location. Remove unit from carton, 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 the unit nameplates to ensure units match 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. 3.

Locate unit so that condenser airflow is unrestricted on both sides. Refer to Fig. 3.

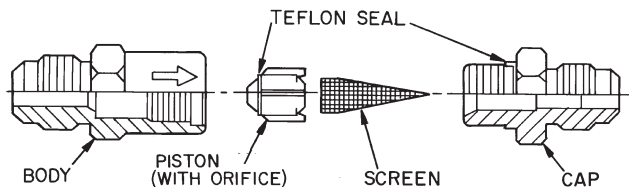
Unit may be mounted on a level pad directly on base legs or mounted on raised pads at support points. See Fig. 3 for center of gravity.

Matching the Heat Pump to an Indoor Unit

The 38QRF018-036 unit can be matched with either a 40QNQ hi-wall unit or 40KMQ in-ceiling cassette unit. The 38QRF035 unit can only be matched with in-ceiling cassette indoor units. The 38QRF036 unit can only be matched with high wall indoor units. Refer to separate indoor unit literature for more information

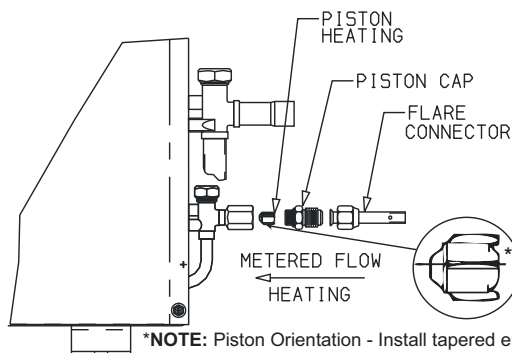
Check AccuRater Metering Device - Heating Mode

The correct AccuRater (bypass type) refrigerant control is required for system capacity optimization. An AccuRater device with field-replaceable piston is supplied with the outdoor unit (see Fig. 2). Select the correct piston for the application from Table 1 (heating & cooling).



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

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*NOTE: Piston Orientation - Install tapered end of piston in the direction of the outdoor equipment for proper heating operation

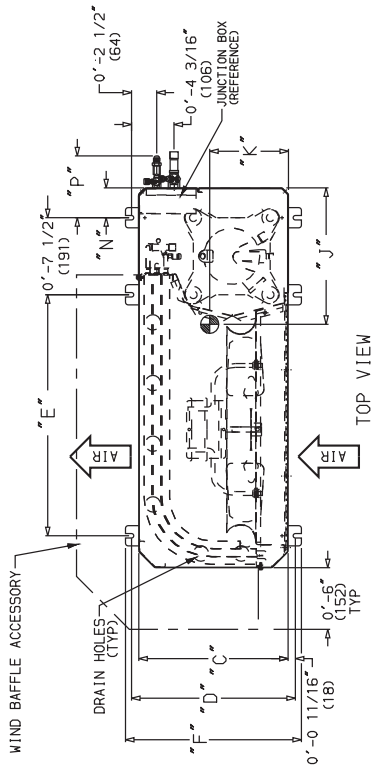
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Fig. 2 - AccuRater (bypass type) Metering Device Components

UNIT MODELS 38QRF Unit Size	CHASSIS SIZE (Reference)	A	B	C	D	E	F	G	H	J	K	L	N	P
		018	0	2-11/16 (638.2)	3-015/16 (938.2)	1-29/16 (369.9)	1-4 (406.4)	1-117/16 (595.3)	1-57/16 (436.6)	1-5/16 (439)	1-10 (659.1)	1-1 (330.2)	0-6 3/4 (168.3)	0-11 1/4 (285.8)
024	0.6	2-7/16 (790.6)	3-015/16 (938.2)	1-29/16 (369.9)	1-4 (406.4)	1-117/16 (595.3)	1-57/16 (436.6)	1-11/16 (587.4)	2-4 (711.5)	1-2 (395.6)	0-6 3/4 (171.5)	0-11 1/4 (285.3)	0-215/16 (75)	0-6 (152.4)
030,035,036	1.0	3-13/16 (944.6)	3-89/16 (1131.9)	1-57/16 (433.4)	1-67/16 (468.3)	2-61/16 (774.7)	1-79/16 (498.5)	2-53/16 (741)	2-10 1/16 (865.5)	1-11 1/16 (347.7)	0-8 1/2 (206.4)	1-37/16 (403.2)	0-37/16 (88)	0-6 1/2 (165.4)

UNIT SIZE	M		OPERATING WT.	
	in.	(mm)	lb	(kg)
018	5/8	15.88	166	75.3
024	5/8	15.88	176	79.8
030	3/4	19.05	187	84.8
035	3/4	19.05	221	100.2
036	3/4	19.05	232	105.2

NOTE: Dimensions shown in feet-inches. Dimensions in () are millimeters.



UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	
	Support Feet	
	ft-in.	mm
CHASSIS SIZES 0 & .6	1-11 x 3-6	584.2 x 1066.8
CHASSIS SIZES 1 & 1.6	2-0 x 4-2	609.6 x 1270

NOTES:

- Required clearances: with coil facing wall, allow 6 in. minimum clearance on coil side and coil end, and 3 feet 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 feet 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 parenthesis are in millimeters.
- Center of Gravity

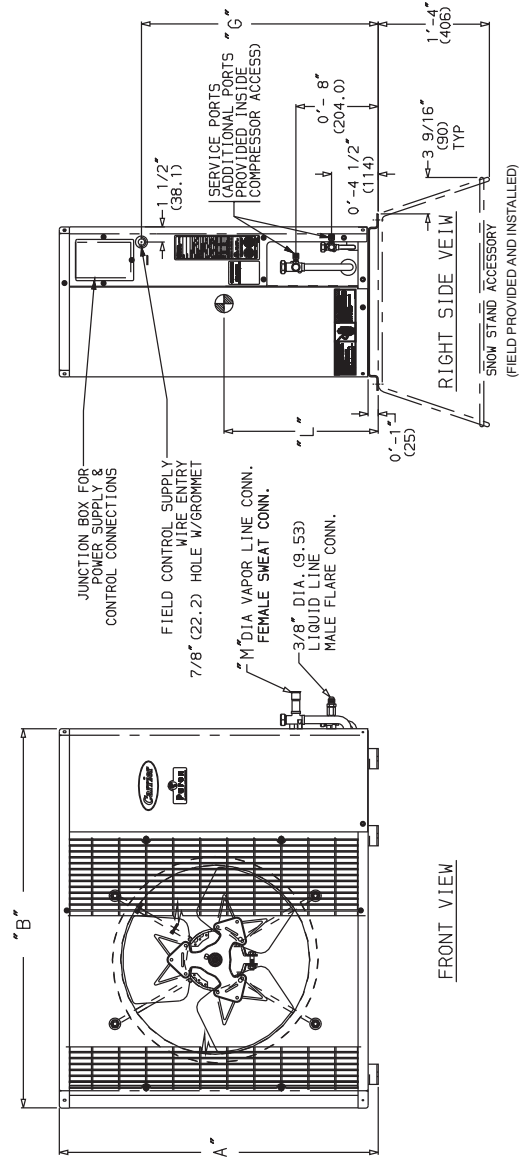


Fig. 3 - 38QRF Unit Dimensions

Table 1 – 38QRF018-036 Physical Data

UNIT 38QRF	018	024	030	035	036
NOMINAL CAPACITY Tons	1.5	2.0	2.5	2.9	3.0
OPERATING WEIGHT lb (kg)	166 (75.3)	176 (79.8)	187 (84.8)	221 (100.2)	232 (105.2)
REFRIGERANT TYPE	Puron® (R-410A)				
BASE UNIT CHARGE lb (kg)	5.5 (2.49)	6.8 (3.08)	10.7 (4.85)	10.5 (4.76)	10.0 (4.54)
ADDITIONAL CHARGE – CASSETTE lb (kg)	0.0 (0.0)	0.0 (0.0)	1.8 (1.04)	0.0 (0.0)	--
ADDITIONAL CHARGE – HI – WALL lb (kg)	0.8 (0.36)	0.5 (0.23)	0.0 (0.0)	--	0.0 (0.0)
METERING DEVICE	Accurater				
High Wall Cooling	49	55	63	--	70
High Wall Heating	45	49	53		63
In – Ceiling Cassette – Cooling	51	55	63	70	
In – Ceiling Cassette – Heating	46	53	55	63	
COMPRESSOR					
Type	Scroll				
Oil Charge (POE – oz)	25.0	25.0	25.0	25.0	42.0
Crankcase Heater (watts)	--	--	40	40	--
OUTDOOR FAN	Propeller Type, Direct Drive, Horizontal				
Rpm/Cfm	840/1720	840/1720	850/3900	850/3900	850/3900
Diameter (in.)	18	18	24	24	24
No. Blades	3	3	3	3	3
Motor (hp)	1/8	1/8	1/4	1/4	1/4
OUTDOOR COIL					
Face Area (sq ft)	5.8	7.3	12.1	12.1	12.1
No. Rows	2	3	2	2	2
FPI	20	20	20	20	20
HIGH PRESSURE SWITCH					
Cut – In (psig) Cutout (psig)	420 ± 25 650 ± 10	420 ± 25 650 ± 10	420 ± 25 650 ± 10	420 ± 25 650 ± 10	420 ± 25 650 ± 10
LOW PRESSURE SWITCH					
Low Cutout (psig)	20 ± 5	20 ± 5	20 ± 5	20 ± 5	20 ± 5
Low Cut – in (psig)	45 ± 25	45 ± 25	45 ± 25	45 ± 25	45 ± 25
REFRIGERANT LINES					
Connection Type	Mixed Phase – Flare / Suction – Sweat				
Suction/Vapor (in.) OD	5/8		3/4		
Mixed Phase* (in.) OD	3/8				
Max Length ft (m)	200 (60.96)				
Max Lift ft (m)	65 (19.81)				
Max Drop ft (m)	150 (45.72)				
CONTROLS					
Control Voltage†	24 vac				
System Electrical	208/230 – 1 – 60	208/230 – 1 – 60	208/230 – 1 – 60	208/230 – 1 – 60, 208/230 – 3 – 60 460 – 3 – 60	208/230 – 1 – 60, 208/230 – 3 – 60 460 – 3 – 60
FUSIBLE PLUG °F (°C)	210 (98.89)				
FINISH	Gray				

* Mixed phase line must be insulated.

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

FPI – Fins Per Inch

POE – Polyol Ester

38QRF

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. Use field-provided snow stand or ice rack where prolonged subfreezing temperatures or heavy snow occurs.

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.

For hurricane tie downs - contact your local distributor for details and PE (Professional Certification), if required by local authorities.

Mounting on Roof

Mount unit on a level platform or frame at least 6 in. (152.4 mm) above roof surface. Isolate unit and tubing from structure.

Rigging

⚠ CAUTION

PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in personal injury and/or equipment damage.

Be sure unit panels are securely in place prior to rigging.

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. 4. See Fig. 3 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.

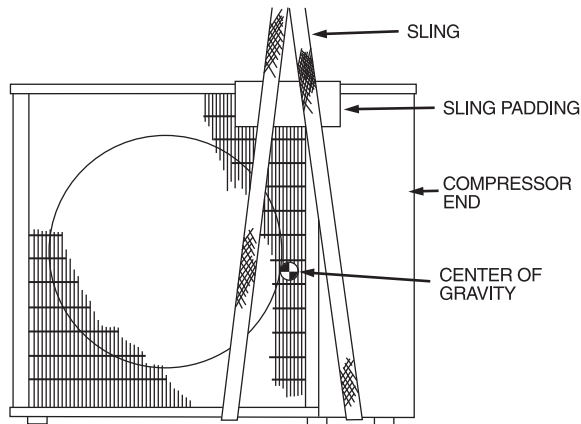


Fig. 4 - Lifting Unit with Sling

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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 (3.05 m) of interconnecting tubing.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

If any section of pipe is buried, there must be a 6 in. (152.4 mm) 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.

When more than 80 ft (24.4 m) of interconnecting tubing is used, consult the Duct-Free Split System Long Line Application Guide for required accessories. If either refrigerant tubing or indoor coil is exposed to the atmosphere, the system must be evacuated following good refrigeration practices.

Run refrigerant tubes as directly as possible. Insulate both tubes, avoiding unnecessary turns and bends. Suspend refrigerant tubes to avoid damage to insulation or tubes so that they do not transmit vibration to structure. Also, when passing refrigerant tubes through a wall, seal the opening so rain or insects do not enter 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.

Filter Drier

Refer to Fig. 2 and install filter drier as follows:

1. Assemble all parts as shown in Fig. 2
2. The filter drier must be replaced whenever the refrigeration system is exposed to the atmosphere.
3. Only use factory specified liquid-line filter driers with rated working pressures less than 600 psig.

NOTE: Do not install a suction-line filter drier in liquid line.

Make Suction Tube Sweat Connection

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 Puron® refrigerant factory charge indicated on nameplate.

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



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

To prevent damage to unit or service valves observe the following:

- Use a brazing shield.
- Wrap service valves with wet cloth or use a heat sink material.

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.

MAKE ELECTRICAL CONNECTIONS



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

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 could void any applicable Carrier warranty.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before performing service or maintenance, be sure indoor unit main power switch is turned OFF and indoor blower has stopped.

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. 7. Unit must be grounded.

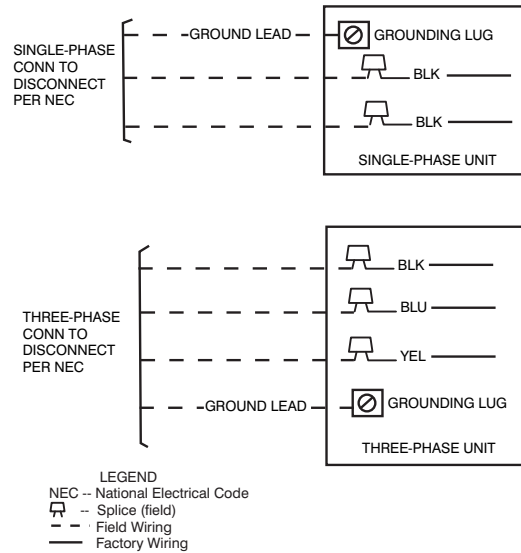


Fig. 5 - Line Power Connections

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Control Circuit Wiring

Control voltage is 24 v (40 va minimum). See Fig. 6 and Fig. 7 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: Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft. from unit, as measured along the control voltage wires, use No. 16 AWG color-coded wire to avoid excessive voltage drop.

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: The 38QRF units use the control transformer supplied with the matched indoor unit.

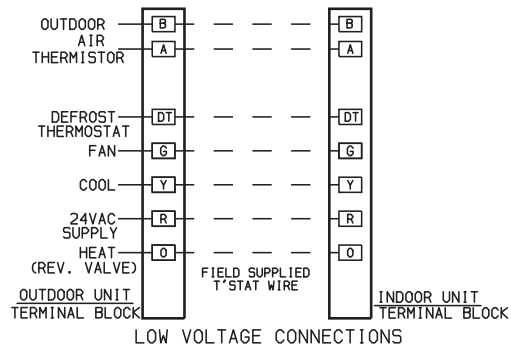
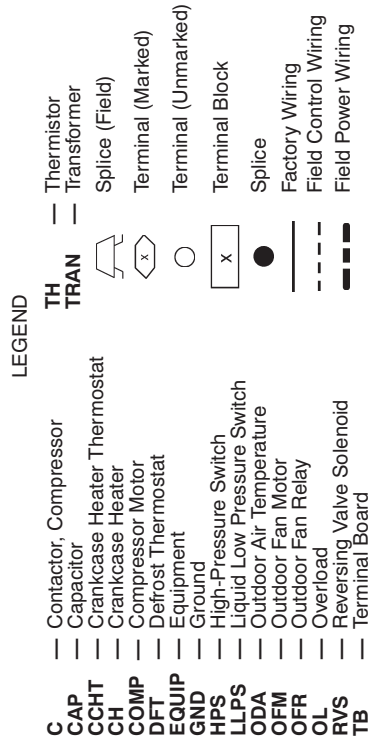
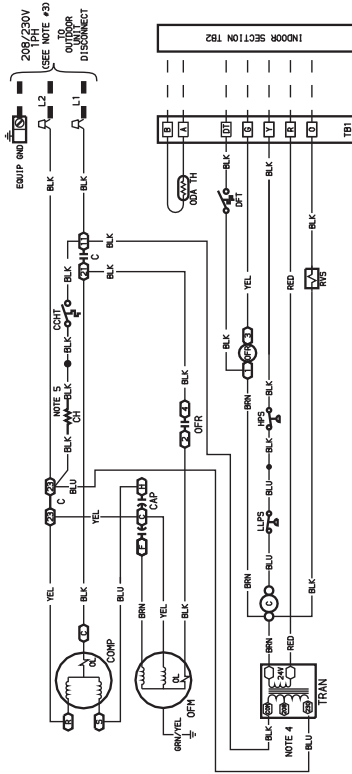


Fig. 6 - 38QRF Typical Control Circuit Connections

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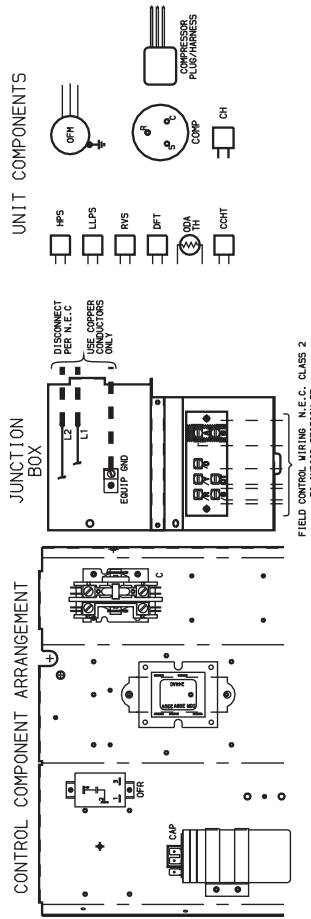
38QRF SCHEMATIC



- NOTES:**
- Compressor and fan motors are thermally protected.
 - Wire in accordance with National Electrical Code (NEC) and local codes. Replace any original wires with 90° C wire or its equivalent.
 - Use minimum 60° C wire for field power wiring.
 - Transformer factory wired for 230 v. For 208 v move blue wire to 208 volt tap.
 - Crankcase heater and thermostat used on selected models only.

THERMISTOR EQUIVALENCE		
Temperature	C	Resistance
F	35	6,500
	72	11,400
	32	32,500

NOTE: All thermistors are identical.



38QRF OPERATION SEQUENCE

- CALL FOR COOLING:**
- Control voltage from transformer to microprocessor control in indoor unit (24 v).
 - At microprocessor control 24 v is switched to "G," "O," and "Y."
 - 24 v from microprocessor control "G" energizes fan relay at outdoor unit and outdoor-fan motor runs.
 - 24 v from microprocessor control "O" energizes RVS at outdoor unit through "O" on outdoor unit terminal board.
 - 24 v from the microprocessor control "Y" energizes the contactor coil in the outdoor unit. The compressor will run.
 - If the HPS, internal protector of the compressor, or LLPS open, the 24 v to the contactor will be interrupted. The compressor and outdoor fan motor will stop.

- CALL FOR HEATING:**
- Control voltage from transformer to microprocessor control in indoor unit (24 v).
 - At microprocessor control 24 v is switched to "G," "Y," and "R."
 - 24 v from microprocessor control "G" energizes fan relay at outdoor unit and outdoor fan motor runs.
 - 24 v from microprocessor control "Y" energizes the contactor coil and the compressor will run.
 - Demand defrost is controlled by the indoor unit microprocessor control.
 - The indoor unit microprocessor control continuously monitors both outdoor coil temperature and outdoor ambient temperature, determining the optimum defrost length and interval for existing outdoor conditions.

- DEFROST MODE:**
- Microprocessor control switches 24 v to "O" and energizes RVS.
 - Microprocessor control switches 24 v from outdoor fan relay, deenergized relay stops outdoor fan motor operation.
 - Microprocessor control will terminate defrost when outdoor coil sensor reaches 64.4 F or after 10 minutes of defrost operation. Unit then switches back to normal heating mode.
 - During heating or defrost, if the HPS, internal protector of the compressor, or LLPS open, the 24 v to the contactor coil will be interrupted, the compressor and outdoor fan motor will stop.

Fig. 7 - 38QRF018-060 Typical Wiring Schematic

Table 2 – 38QRF Electrical Data

38QRF UNIT SIZE	V – PH – Hz	VOLTAGE RANGE*		COMPRESSOR		OUTDOOR FAN MOTOR			MIN CKT AMPS	FUSE/HACR BKR AMPS
		Min	Max	RLA	LRA	FLA	NEC Hp	kW Out		
018	208/230–1–60	187	253	9.0	48.0	0.80	0.125	0.09	12.1	20
024	208/230–1–60	187	253	12.8	58.3	0.80	0.125	0.09	16.8	25
030	208/230–1–60	187	253	14.1	73.0	1.50	0.25	0.19	18.4	30
035	208/230–1–60	187	253	16.7	79.0	1.50	0.25	0.19	22.3	35
	208/230–3–60	187	253	10.4	79.0	1.50	0.25	0.19	14.5	20
036	460–3–60	414	506	5.8	79.0	0.80	0.25	0.19	8.7	15
	208/230–1–60	187	253	17.9	112.0	1.45	0.25	0.19	23.8	40
	208/230–3–60	187	253	13.2	88.0	1.45	0.25	0.19	18.0	30
	460–3–60	414	506	6.0	44.0	0.80	0.25	0.19	8.3	15

LEGEND:

FLA – Full Load Amps

LRA – Locked Rotor Amps

NEC – National Electrical Code

RLA – Rated Load Amps (compressor)

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

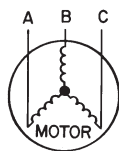
NOTES:

- Control circuit is 24–V on all units and requires external power source. Copper wire must be used from service disconnect to unit.
- All motors/compressors contain internal overload protection.
- In compliance with NEC (U.S.A. Standard) requirements for multi-motor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse.
- Motor RLA values are established in accordance with UL (Underwriters' Laboratories) Standard 465 (U.S.A. Standard).
- 38QRF018–030 units are only available in single–phase voltage.
- 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 percentage of voltage imbalance:

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

EXAMPLE: Supply voltage is 460–3–60



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

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

Determine maximum deviation from average voltage:

(AB) 457–452 = 5v

(BC) 464–457 = 7v

(AC) 457–455 = 2v

Maximum deviation is 7v.

Determine percentage of voltage imbalance

$$\begin{aligned} \% \text{ of voltage imbalance} &= 100 \times \frac{7}{57} \\ &= 1.53\% \end{aligned}$$

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

IMPORTANT: Contact your local electric utility company immediately if the supply voltage phase imbalance is more than 2%.



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. Belly-band crankcase heater must be tight on compressor crankcase for those units with belly-band heaters.

Leak Test

Field piping and fan coil must be leak tested by pressure method. Use Puron® refrigerant at approximately 25 psig backed up with an inert gas to a total pressure not to exceed 245 psig.

NOTE: Leak detectors should be designed to detect HFC (hydrofluorocarbon) refrigerant.

Evacuate and Dehydrate

Field piping and fan coil must be evacuated and dehydrated.

Charge System

Release charge into system by opening (backseating) liquid and suction line service valves.

Refrigerant Charging



WARNING

PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

Failure to follow this warning could result in personal injury and/or equipment damage.

Wear safety glasses and gloves when handling refrigerant. Do not overcharge system - this can cause compressor flooding.



WARNING

PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

Failure to follow this warning could result in personal injury and/or equipment damage.

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 de-pressurize unit refrigerant to atmosphere. Remove and recover refrigerant following accepted practices.

All units are shipped with the refrigerant charge listed on the nameplate.

The recommended procedure for charging is the “weigh-in” method. If using the subcooling method, use 12° for the desired subcooling temperature.

Refer to Table 1 and consider the following when working with Puron® refrigerant:

- Puron refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig, DOT (Department of Transportation) 4BA400 or DOT BW400.
- Puron systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose when charging into suction line with compressor operating.

- Manifold sets should be 700 psig high side and 180 psig low side with 550 psig low-side retard.
- Use hoses with 700 psig service pressure rating.
- Puron refrigerant, as with other HFCs, is only compatible with POE oils.
- Vacuum pumps will not remove moisture from oil.
- Polyol Ester oils absorb moisture rapidly. Do not expose oil to atmosphere.
- Polyol Ester oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- Factory approved, liquid-line filter drier is required on every unit.
- If using a suction line drier, do not leave in place for more than 72 hours.

NOTE: Unit is shipped with a minimum factory charge. For different fan coils, see Charge Adjustment in Table 1. For line length beyond 80 ft. (24.4 m), see the Duct Free Split Systems Long Line Guide.

To Start Unit

Be sure that the field disconnect is closed. Set room thermostat below ambient temperature. Operate unit for 15 minutes, then check system refrigerant charge. See Refrigerant Charging section.

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

SERVICE



WARNING

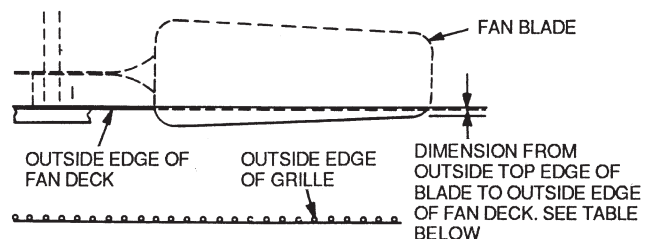
ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

Outdoor Fan

A reinforced wire mount holds the outdoor fan assembly in position. See Fig. 8 for proper mounting position.



38QRF Unit Size, in. (mm)	
018,024	030,035,036
0.433 (11.00)	0

A07401

Fig. 8 - Condenser Fan Mounting Positions

High-Pressure Relief Valve

The high-pressure relief valve is located in the compressor. The relief valve opens at a pressure differential of approximately 550 to

625 ± 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.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Never open system to atmosphere while it is under a vacuum.

When system must be opened for service, recover refrigerant, break vacuum with dry nitrogen before opening system.

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the mixed-phase line valve.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

The unit coils hold only the factorydesignated 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 20 psig. If this occurs, shut off unit immediately then frontseat the suction valve and remove and recover excess refrigerant following accepted practices

3. Start unit and run until suction pressure reaches 20 psig.
4. Shut unit off and frontseat suction valve.
5. De-pressurize low side of unit and recover refrigerant following accepted practices.

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 650 ± 10 psig. If system pressures go above this setting during abnormal conditions, the switch opens.

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this warning could result in personal injury or death.

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 625 psig switch shows continuity.

Crankcase Heater

The crankcase heater prevents refrigerant migration and compressor oil dilution during shutdown when compressor is not operating. If the crankcase heater is de-energized 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 is thermostatically controlled.

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this warning could result in personal injury or death.

Use extreme caution when troubleshooting this device as line voltage is continually present.

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 valve cannot be field repaired, therefore, only a complete valve or valve stem seal and service port caps are available for replacement.

Defrost Controls

The defrost process is controlled by a defrost thermostat switch, an accumulated compressor run timer and an adaptively optimized defrost interval.

The accumulated compressor run timer keeps running when the defrost thermostat switch is closed and the compressor is running in heating mode. When the compressor turns off, the timer stops running but retains its current value. If the compressor turns on later, the timer will resume running from its retained value. When the defrost thermostat switch is open, the accumulated compressor run timer resets to zero.

When the accumulated compressor timer reaches the defrost interval, defrost process is initiated. When in defrost, if the defrost thermostat switch becomes open, the defrost process will terminate. If the defrost time has reached 10 minutes and the defrost thermostat switch is still closed, the defrost process will terminate.

If the defrost process lasts more than 3 minutes, the defrost interval will increase by 5 minutes. If the defrost process lasts more than 7 minutes, the defrost interval will decrease by 5 minutes. The allowed range for defrost interval is 30 - 90 minutes. When a unit is powered up, the defrost interval takes the default value of 90 minutes.

Reversing Valve

In heat pumps, changeover between heating and cooling modes is accomplished with a valve that reverses flow of refrigerant in the system. The reversing valve solenoid can be checked with the power off using an ohmmeter. Check for continuity and shorting to ground. With control circuit (24 v) power on, check for correct voltage at solenoid coil, and for burned or overheated solenoid.

With unit operating, other items can be checked, such as frost or condensate on refrigerant lines.

Using a remote measuring device, check inlet and outlet line temperatures. Do not touch lines. If reversing valve is operating normally, inlet and outlet temperatures on appropriate lines should be similar. Any temperature difference would be due to heat loss or

gain across valve body. Temperatures are best checked with a remote reading electronic-type thermometer with multiple probes.

Figures 9 and 10 show test points on reversing valve for recording temperatures. Insulate points for more accurate reading. If valve is defective:

1. Shut off all power to unit.
2. Remove all charge from system.
3. Remove valve using a tubing cutter.
4. Install new valve (wrap valve with a wet rag to prevent overheating while brazing).
5. After valve is brazed in, check for leaks.
6. Evacuate and charge system. Operate system in both modes several times to be sure valve functions properly.

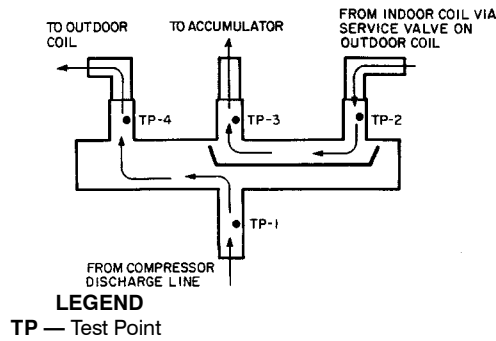


Fig. 9 - Reversing Valve
(Cooling Mode or Defrost Mode, Solenoid Energized)

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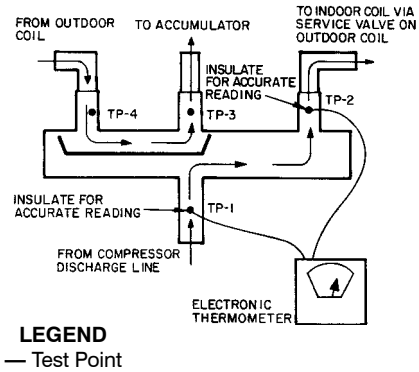


Fig. 10 - Reversing Valve
(Heating Mode, Solenoid De-energized)

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Table 3 – Pressure vs. Temperature Chart - Puron (R-410A) Refrigerant

PRESSURE PSIG	TEMPERATURE		PRESSURE PSIG	TEMPERATURE		PRESSURE PSIG	TEMPERATURE		PRESSURE PSIG	TEMPERATURE		PRESSURE PSIG	TEMPERATURE	
	°F	°C		°F	°C		°F	°C		°F	°C		°F	°C
12	-37.7	-38.72	114	3.22	74.3	23.50	100.2	37.89	420	120.7	49.28	522	137.6	56.87
14	-34.7	-37.06	116	3.72	74.9	23.83	320	38.17	422	121.0	49.44	524	137.9	58.83
16	-32.0	-35.56	118	4.17	75.5	24.17	322	38.39	424	121.4	49.67	526	138.3	59.06
18	-29.4	-34.11	120	4.72	76.1	24.50	324	38.67	426	121.7	49.83	528	138.6	59.22
20	-26.9	-32.72	122	5.17	76.7	24.83	326	38.89	428	122.1	50.06	530	138.9	59.39
22	-24.5	-31.90	124	5.67	77.2	25.11	328	39.11	430	122.5	50.28	532	139.2	59.56
24	-22.2	-30.11	126	6.11	77.8	25.44	330	39.39	432	122.8	50.44	534	139.5	59.72
26	-20.0	-28.89	128	6.56	78.4	25.78	332	39.61	434	123.2	50.67	536	139.8	59.89
28	-17.9	-27.72	130	7.06	78.9	26.06	334	39.83	436	123.5	50.83	538	140.1	60.06
30	-15.8	-26.61	132	7.50	79.5	26.39	336	40.11	438	123.9	51.06	540	140.4	60.22
32	-13.8	-25.44	134	7.94	80.0	26.67	338	40.33	440	124.2	51.22	544	141.0	60.56
34	-11.9	-24.39	136	8.39	80.6	27.00	340	40.61	442	124.6	51.44	548	141.6	60.89
36	-10.1	-23.39	138	8.83	81.1	27.28	342	40.78	444	124.9	51.61	552	142.1	61.17
38	-8.3	-22.39	140	9.28	81.6	27.56	344	41.00	446	125.3	51.83	556	142.7	61.50
40	-6.5	-21.39	142	9.72	82.2	27.89	346	41.28	448	125.6	52.00	560	143.3	61.83
42	-4.5	-20.28	144	10.17	82.7	28.17	348	41.44	450	126.0	52.22	564	143.9	62.17
44	-3.2	-19.56	146	10.61	83.3	28.50	350	41.72	452	126.3	52.39	568	144.5	62.50
46	-1.6	-18.67	148	11.00	83.8	28.78	352	41.94	454	126.6	52.56	572	145.0	62.78
48	0.0	-17.78	150	11.39	84.3	29.06	354	42.17	456	127.0	52.78	576	145.6	63.11
50	1.5	-16.94	152	11.83	84.8	29.33	356	42.39	458	127.3	52.94	580	146.2	63.44
52	3.0	-16.11	154	12.22	85.4	29.67	358	42.67	460	127.7	53.17	584	146.7	63.72
54	4.5	-15.28	156	12.67	85.9	29.94	360	42.89	462	128.0	53.33	588	147.3	64.06
56	5.9	-14.50	158	13.06	86.4	30.22	362	43.11	464	128.3	53.50	592	147.9	64.39
58	7.3	-13.72	160	13.44	86.9	30.50	364	43.33	466	128.7	53.72	596	148.4	64.67
60	8.6	-13.00	162	13.89	87.4	30.78	366	43.56	468	129.0	53.89	600	149.0	65.00
62	10.0	-12.22	164	14.28	87.9	31.06	368	43.78	470	129.3	54.06	604	149.5	65.28
64	11.3	-11.50	166	14.67	88.4	31.33	370	44.00	472	129.7	54.28	608	150.1	65.61
66	12.6	-10.78	168	15.00	88.9	31.61	372	44.22	474	130.0	54.44	612	150.6	65.89
68	13.8	-10.11	170	15.44	89.4	31.89	374	44.44	476	130.3	54.61	616	151.2	66.22
70	15.1	-9.39	172	15.83	89.9	32.17	376	44.67	478	130.7	54.83	620	151.7	66.50
72	16.3	-8.72	174	16.17	90.4	32.44	378	44.78	480	131.0	55.00	624	152.3	66.83
74	17.5	-8.06	176	16.56	90.9	32.72	380	45.06	482	131.3	55.17	628	152.8	67.11
76	18.7	-7.39	178	16.94	91.4	33.00	382	45.28	484	131.6	55.33	632	153.4	67.44
78	19.8	-6.78	180	17.28	91.9	33.28	384	45.50	486	132.0	55.56	636	153.9	67.72
80	21.0	-6.11	182	17.67	92.4	33.56	386	45.72	488	132.3	55.72	640	154.5	68.06
82	22.1	-5.50	184	18.06	92.8	33.78	388	45.94	490	132.6	55.89	644	155.0	68.33
84	23.2	-4.89	186	18.39	93.3	34.06	390	46.11	492	132.9	56.06	648	155.5	68.61
86	24.3	-4.28	188	18.78	93.8	34.33	392	46.39	494	133.3	56.28	652	156.1	68.94
88	25.4	-3.67	190	19.11	94.3	34.61	394	46.56	496	133.6	56.44	656	156.6	69.22
90	26.4	-3.11	192	19.44	94.8	34.89	396	46.78	498	133.9	56.61	660	157.1	69.50
92	27.4	-2.56	194	19.83	95.2	35.11	398	47.00	500	134.0	56.67	664	157.7	69.83
94	28.5	-1.94	196	20.17	95.7	35.39	402	47.22	502	134.5	56.94	668	158.2	70.11
96	29.5	-1.39	198	20.50	96.2	35.67	404	47.39	504	134.8	57.11	672	158.7	70.39
98	30.5	-0.83	200	20.83	96.6	35.89	406	47.61	506	135.2	57.33	676	159.2	70.67
100	31.2	-0.44	202	21.17	97.1	36.17	408	47.83	508	135.5	57.50	680	159.8	71.00
102	32.2	0.11	204	21.50	97.5	36.39	408	48.06	510	135.8	57.67	684	160.3	71.28
104	33.2	0.67	206	21.89	98.0	36.67	410	48.22	512	136.1	57.83	688	160.8	71.56
106	34.1	1.17	208	22.22	98.4	36.89	412	48.44	514	136.4	58.00	692	161.3	71.83
108	35.1	1.72	210	22.56	98.9	37.17	414	48.67	516	136.7	58.17	696	161.8	72.11
110	35.5	1.94	212	22.89	99.3	37.39	416	48.83	518	137.0	58.33	700	162.3	72.39
112	36.9	2.72	214	23.22	99.7	37.61	418	49.06	520	137.3	58.50	704	162.8	72.67

MAINTENANCE



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

LUBRICATION

Compressor

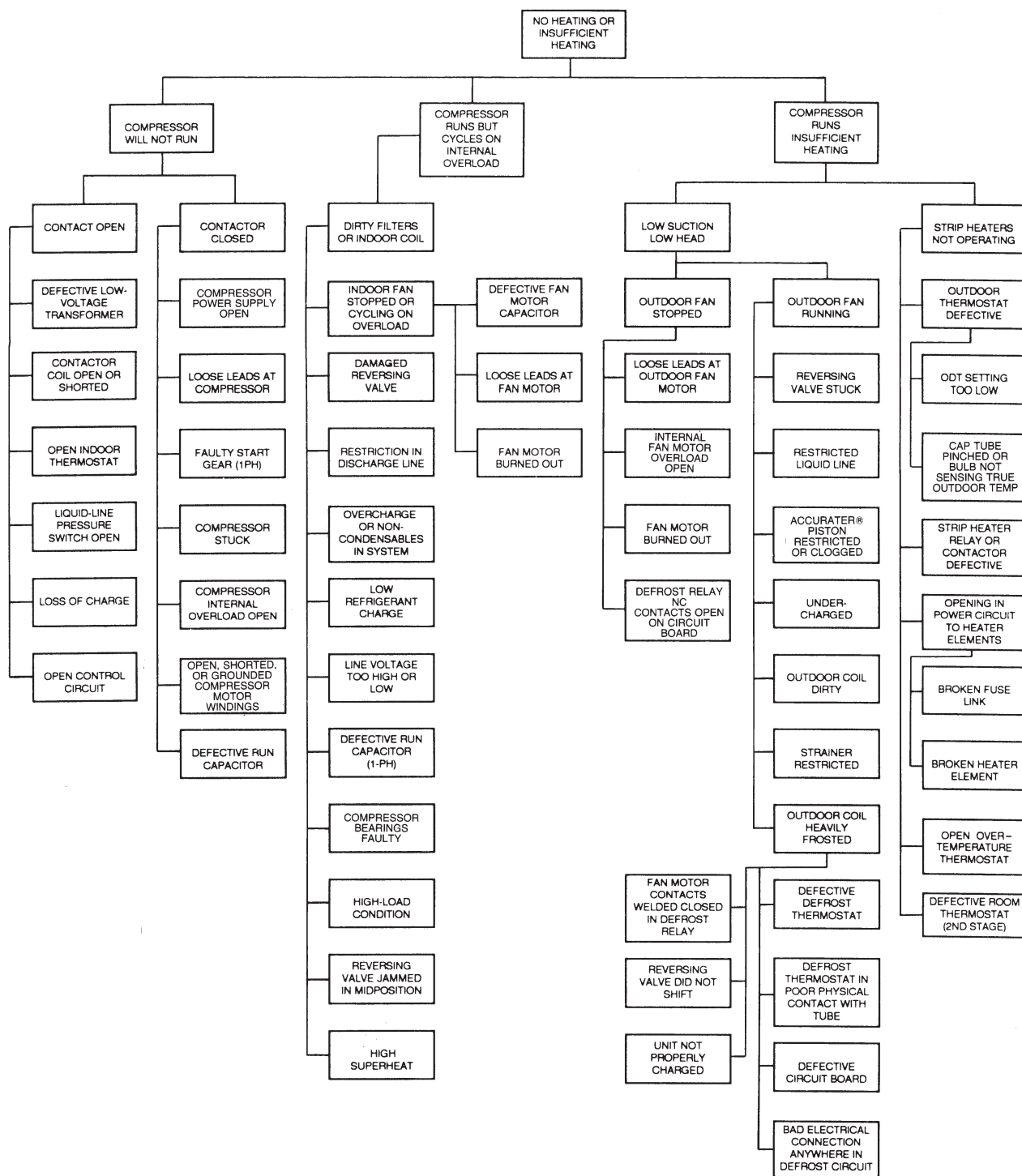
Compressor contains factory oil charge; replace oil when lost. Use Mobile 3MA-POE oil.

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.

TROUBLESHOOTING



LEGEND

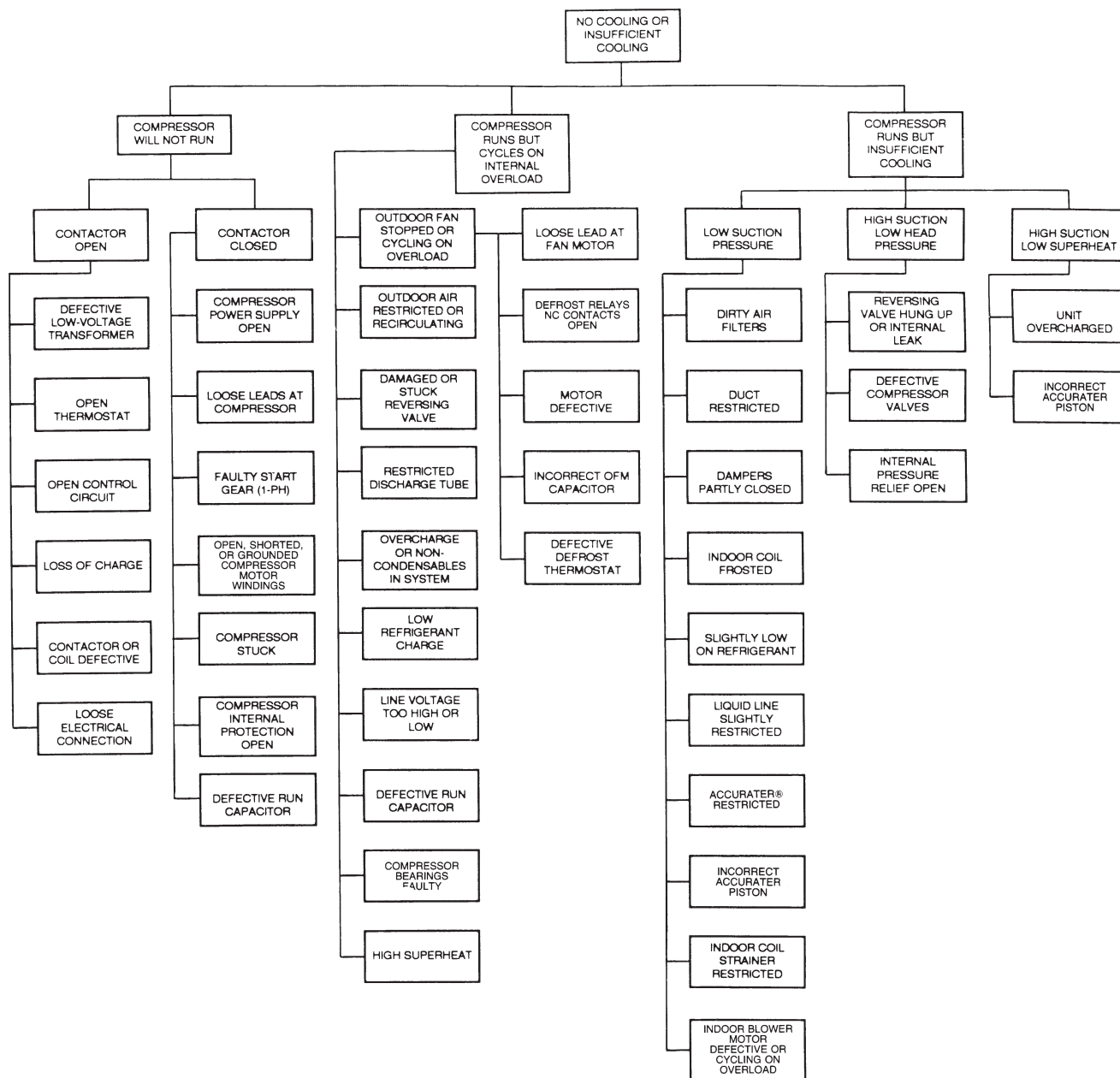
- NC — Normally Closed
- ODT — Outdoor Thermostat

NOTE: For systems with indoor units equipped with microprocessor control, see separate controls, service, and troubleshooting manual.

Fig. 11 - Troubleshooting the Cooling Cycle

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TROUBLESHOOTING (CONT.)



LEGEND

NC — Normally Closed
 ODT — Outdoor Thermostat

NOTE: For systems with indoor units equipped with microprocessor control, see separate controls, service, and troubleshooting manual.

Fig. 12 - Troubleshooting the Heating Cycle

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