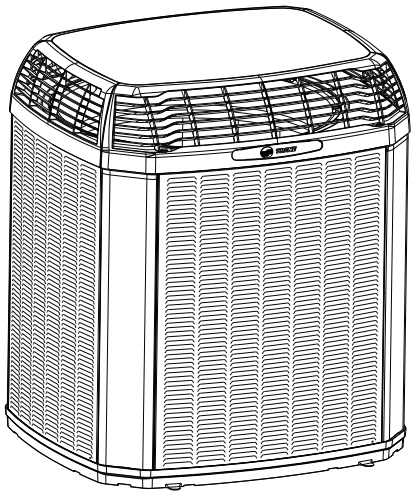
Service Facts

TRANE Link Variable Speed Heat Pumps and Air Conditioners

5TWV0X24A1000A/B
5TWV0X36A1000A/B
5TWV0X48A1000A/B
5TWV0X60A1000A/B

5TTV0X24A1000A/B
5TTV0X25A1000A/B
5TTV0X36A1000A/B
5TTV0X48A1000A/B
5TTV0X60A1000A/B



Note: *Graphics in this document are for representation only. Actual model may differ in appearance.*

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

August 2025

ODR-SVF009B-EN

Introduction

Read this manual thoroughly before operating or servicing this unit.

This document is customer property and is to remain with this unit. Return to the service information pack upon completion of work.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/ sleeves, butyl gloves, safety glasses, hard hat/ bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

⚠ WARNING

Cancer and Reproductive Harm!

This product can expose you to chemicals, including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

This unit 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 concerning the use of the appliance by a person responsible for their safety.

Do not allow children to play or climb on the unit or to clean or maintain the unit without supervision.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

⚠ WARNING

R-454B Refrigerant!

Failure to use proper equipment or components as described below could result in death, serious injury, or equipment damage.

- **Use ONLY R-454B rated service equipment with these units.**
- **All R-454B systems with variable speed compressors use variable speed compressor oil, which absorbs moisture from the air. To limit this hygroscopic action, keep the system sealed. If exposed to air for over 4 hours, replace the compressor oil.**
- **Never break a vacuum with air and always replace driers when opening the system to replace components.**

⚠ WARNING

Hot Surface!

Failure to follow instructions below could result in minor to severe burns.

Do not touch top of compressor. It may be hot.

⚠ WARNING

Refrigerant under High Pressure!

Failure to follow instructions below could result in an explosion which could result in death or serious injury or equipment damage.

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

⚠ WARNING

Grounding Required!

Failure to follow instructions below could result in death or serious injury, or property damage.

- **Reconnect all grounding devices.**
- **All parts of this product that are capable of conducting electrical current are grounded.**
- **If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.**

⚠ WARNING

System Charge!

Failure to follow instructions below could result in abrupt release of system charge and could result in serious injury or property damage.

When opening the suction and liquid line service valve, turn the valve stem counterclockwise only until the stem contacts the rolled edge. Do not apply torque.

⚠ WARNING

Electrical Shock Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

Confirm proper grounding before connecting electrical supply.

⚠ WARNING

Risk of Fire — Flammable Refrigerant!

Failure to follow instructions below could result in death or serious injury, and equipment damage.

- **To be repaired only by trained service personnel.**
- **Do not puncture refrigerant tubing.**
- **Dispose of properly in accordance with federal or local regulations.**

⚠ WARNING

Ventilation Required!

Failure to follow instructions below could result in death or serious injury or property damage.

Confirm the area is adequately ventilated before breaking into the system or conducting any hot work.

⚠ WARNING

Risk of Fire!

Failure to follow instructions below could cause a fire which could result in death, serious injury, and/or property damage.

Use three specified access points on outdoor unit to evacuate refrigerant when servicing compressor.

NOTICE

Equipment Damage!

Failure to follow instructions below could result in equipment damage.

Use only R-454B rated indoor models, service equipment, and components with these units.

⚠ CAUTION

Caution!

Failure to follow instructions below could result in minor to moderate injury or equipment damage.

- **For brazing, confirm all joints are brazed, not soldered.**
- **For mechanical connections, confirm a negative leak test.**
- **Inspect lines and use proper service tools.**

Copyright

Trademark

Revision History

- Updated the Subcool Charging Correction Charts.
- Updated the Refrigerant Line Considerations chapter.
- Updated the Start-up chapter.

General Information

SCAN WITH A PHONE CAMERA

Link™

The Diagnostics Mobile App is available by scanning a QR code above, the one located inside this unit or by searching for the Trane or American Standard Diagnostics App in your App Store®. This system must include a A/T HUI2360A200U thermostat and a TSYS2C60A2VVU system controller to operate and is Link communicating only.

Approved Controllers

- UX360 Smart Thermostat with SC360 System Controller.

Table 1. Approved combinations for variable speed units running in Link mode

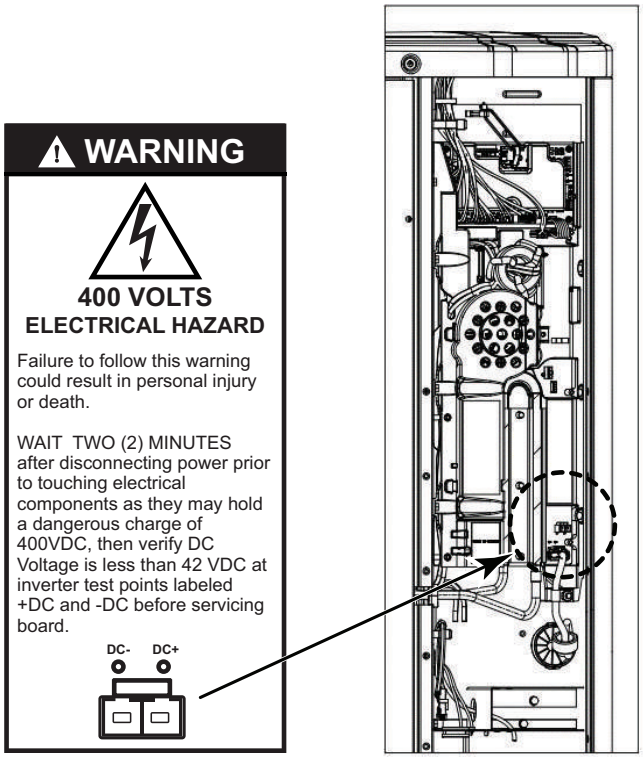
Link Indoor	Link Zoning
5TAMX	Yes
5TEMC	Yes
S8V2–C	Yes
Link Relay Panel	No

Note: *See AHRI directory for approved indoor and outdoor model combinations. Only Trane coils and air handlers are approved for use with variable speed outdoor unit.*

Table 2. Operating Range

Mode	Model	Operating Range
Cooling	2 – 5 Ton	55 °F – 120°F
Heating	2 – 5 Ton	0° F – 66°F

Figure 1. Warning label



Important: *Use caution when cleaning outdoor coil to ensure no water enters the electrical control compartment. When cleaning coil from inside the compressor compartment, take special care not to spray water towards the top rows of the coil near the control panel. Water may enter the control compartment and drive damaging the electronics. Disconnect all electric power, including remote disconnects before servicing.*

Note: *Maintenance should be performed as recommended in warranty documents.*

Product Specifications

Heat Pump Models

OUTDOOR UNIT [a] [b]	5TWV0X24A1000A	5TWV0X24A1000B	5TWV0X36A1000A	5TWV0X36A1000B
POWER CONNS. – V/PH/HZ [c]	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60
MIN. BRCH. CIR. AMPACITY	19	19	26	26
BR CIR PROT RTG - REC/MAX (AMPS)	30	20/30	40	30/40
COMPRESSOR	ROTARY	ROTARY	SCROLL	SCROLL
NO. USED – NO. SPEEDS	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE
MRC	17.8	17.8	18	18
FACTORY INSTALLED				
START COMPONENTS [d]	NA	NA	NA	NA
INSULATION/SOUND BLANKET	YES	YES	YES	YES
COMPRESSOR HEAT	YES	YES	YES	YES
OUTDOOR FAN				
DIA. (IN.) – NO. USED	23-1	23-1	27.5-1	27.5-1
TYPE DRIVE – NO. SPEEDS	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE
NO. MOTORS – HP	1-1/3	1-1/3	1-1/2	1-1/2
MOTOR SPEED R.P.M.	200-1200	200-1200	200-1200	200-1200
VOLTS/PH/HZ	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60
MOC	1.5	1.5	2.3	2.3
OUTDOOR COIL – TYPE	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN
ROWS – F.P.I.	1-24	1-24	1-24	1-24
FACE AREA (SQ. FT.)	19.77	19.77	30.8	30.8
TUBE SIZE (IN.)	3/8	3/8	3/8	3/8
REFRIGERANT	R-454B	R-454B	R-454B	R-454B
LBS. – R-454B (O.D. UNIT) [e]	6 LB-8 OZ	6 LB-8 OZ	9 LB-8 OZ	9 LB-8 OZ
FACTORY SUPPLIED	YES	YES	YES	YES
RATED LINE SIZE – IN. O.D. GAS [f]	1/2	1/2	5/8	5/8
RATED LINE SIZE — IN. O.D. LIQ. [f]	5/16	5/16	5/16	5/16
CHARGING SPECIFICATIONS				
SUBCOOLING	10°	10°	8°	8°
DIMENSIONS				
CRATED (IN.)	50 x 30 x 33	50 x 30 x 33	55 x 35 x 38	55 x 35 x 38
WEIGHT				
SHIPPING (LBS.)	211	211	248	248
NET (LBS.)	192	192	222	222

[a] Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on AHRI standard 210/240.
[b] Rated in accordance with AHRI standard 270/275.
[c] Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
[d] NA means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter.
[e] This value approximate. For more precise value see unit nameplate.
[f] The maximum length of refrigerant lines from outdoor to indoor varies depending on application. See Installer's Guide Table 4 for allowable applications.

Product Specifications

Heat Pump Models

OUTDOOR UNIT [a] [b]	5TWV0X48A1000A	5TWV0X48A1000B	5TWV0X60A1000A	5TWV0X60A1000B
POWER CONNS. – V/PH/HZ [c]	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60
MIN. BRCH. CIR. AMPACITY	32	32	43	40
BR CIR PROT RTG - REC/MAX (AMPS)	50	35/50	60	40/60
COMPRESSOR	SCROLL	SCROLL	ROTARY	ROTARY
NO. USED – NO. SPEEDS	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE
MRC	22.4	22.4	46.1	46.1
FACTORY INSTALLED				
START COMPONENTS [d]	NA	NA	NA	NA
INSULATION/SOUND BLANKET	YES	YES	YES	YES
COMPRESSOR HEAT	YES	YES	YES	YES
OUTDOOR FAN				
DIA. (IN.) – NO. USED	27.5-1	27.5-1	27.5-1	27.5-1
TYPE DRIVE – NO. SPEEDS	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE
NO. MOTORS – HP	1-1/2	1-1/2	1-1/2	1-1/2
MOTOR SPEED R.P.M.	200-1200	200-1200	200-1200	200-1200
VOLTS/PH/HZ	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60
MOC	2.3	2.3	2.3	2.3
OUTDOOR COIL – TYPE	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN
ROWS – F.P.I.	2-24	2-24	2-24	2-24
FACE AREA (SQ. FT.)	30.8	30.8	30.8	30.8
TUBE SIZE (IN.)	3/8	3/8	3/8	3/8
REFRIGERANT	R-454B	R-454B	R-454B	R-454B
LBS. – R-454B (O.D. UNIT) [e]	11 LB-0 OZ	11 LB-0 OZ	11 LB-10 OZ	11 LB-10 OZ
FACTORY SUPPLIED	YES	YES	YES	YES
RATED LINE SIZE – IN. O.D. GAS [f]	7/8	7/8	3/4	3/4
RATED LINE SIZE — IN. O.D. LIQ. [f]	5/16	5/16	5/16	5/16
CHARGING SPECIFICATIONS				
SUBCOOLING	8°	8°	8°	8°
DIMENSIONS				
CRATED (IN.)	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38
WEIGHT				
SHIPPING (LBS.)	268	268	306	306
NET (LBS.)	242	242	280	280

[a] Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on AHRI standard 210/240.
[b] Rated in accordance with AHRI standard 270/275.
[c] Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
[d] NA means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter.
[e] This value approximate. For more precise value see unit nameplate.
[f] The maximum length of refrigerant lines from outdoor to indoor varies depending on application. See Installer's Guide Table 4 for allowable applications.

Air Conditioner Models

OUTDOOR UNIT [a] [b]	5TTV0X24A1000A	5TTV0X24A1000B	5TTV0X25A1000A	5TTV0X25A1000B	5TTV0X36A1000A
POWER CONNS. — V/PH/HZ [c]	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60
MIN. BRCH. CIR. AMPACITY	19	19	19	19	26
BR CIR PROT RTG - REC/MAX (AMPS)	30	20/30	30	20/30	40
COMPRESSOR	ROTARY	ROTARY	ROTARY	ROTARY	SCROLL
NO. USED — NO. SPEEDS	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE
MRC	17.8	17.8	17.8	17.8	18
FACTORY INSTALLED					
START COMPONENTS [d]	NA	NA	NA	NA	NA
INSULATION/SOUND BLANKET	YES	YES	YES	YES	YES
COMPRESSOR HEAT	YES	YES	YES	YES	YES
OUTDOOR FAN					
DIA. (IN.) — NO. USED	23-1	23-1	27.5-1	27.5-1	27.5-1
TYPE DRIVE — NO. SPEEDS	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE
NO. MOTORS — HP	1-1/3	1-1/3	1-1/2	1-1/2	1-1/2
MOTOR SPEED R.P.M.	200-1200	200-1200	200-1200	200-1200	200-1200
VOLTS/PH/HZ	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60
MOC	1.5	1.5	2.3	2.3	2.3
OUTDOOR COIL — TYPE	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN
ROWS — F.P.I.	1-24	1-24	2-24	2-24	2-24
FACE AREA (SQ. FT.)	19.77	19.77	30.8	30.8	30.8
TUBE SIZE (IN.)	3/8	3/8	3/8	3/8	3/8
REFRIGERANT	R-454B	R-454B	R-454B	R-454B	R-454B
LBS. — R-454B (O.D. UNIT) [e]	6 LB-8 OZ	6 LB-8 OZ	10 LB-1 OZ	10 LB-1 OZ	11 LB-5 OZ
FACTORY SUPPLIED	YES	YES	YES	YES	YES
RATED LINE SIZE — IN. O.D. GAS [f]	1/2	1/2	1/2	1/2	5/8
RATED LINE SIZE — IN. O.D. LIQ. [f]	5/16	5/16	5/16	5/16	5/16
CHARGING SPECIFICATIONS					
SUBCOOLING	10	10	8	8	8
DIMENSIONS					
CRATED (IN.)	50 x 30 x 33	50 x 30 x 33	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38
WEIGHT					
SHIPPING (LBS.)	208	208	256	256	291
NET (LBS.)	187	187	230	230	265

[a] Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on AHRI standard 210/240.
[b] Rated in accordance with AHRI standard 270/275.
[c] Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
[d] NA means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter.
[e] This value approximate. For more precise value see unit nameplate.
[f] The maximum length of refrigerant lines from outdoor to indoor varies depending on application. See Installer's Guide Table 4 for allowable applications.

Product Specifications

Air Conditioner Models

OUTDOOR UNIT [a] [b]	5TTV0X36A1000B	5TTV0X48A1000A	5TTV0X48A1000B	5TTV0X60A1000A	5TTV0X60A1000B
POWER CONNS. — V/PH/HZ [c]	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60	208/230/1/60
MIN. BRCH. CIR. AMPACITY	26	32	29	43	33
BR CIR PROT RTG - REC/MAX (AMPS)	30/40	50	30/50	60	30/60
COMPRESSOR	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
NO. USED — NO. SPEEDS	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE	1-VARIABLE
MRC	18	22.4	22.4	27.5	27.5
FACTORY INSTALLED					
START COMPONENTS [d]	NA	NA	NA	NA	NA
INSULATION/SOUND BLANKET	YES	YES	YES	YES	YES
COMPRESSOR HEAT	YES	YES	YES	YES	YES
OUTDOOR FAN					
DIA. (IN.) — NO. USED	27.5-1	27.5-1	27.5-1	27.5-1	27.5-1
TYPE DRIVE — NO. SPEEDS	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE	DIRECT-VARIABLE
NO. MOTORS — HP	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
MOTOR SPEED R.P.M.	200-1200	200-1200	200-1200	200-1200	200-1200
VOLTS/PH/HZ	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60	245-385/3/60
MOC	2.3	2.3	2.3	2.3	2.3
OUTDOOR COIL — TYPE	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN	SPINE FIN
ROWS — F.P.I.	2-24	2-24	2-24	2-24	2-24
FACE AREA (SQ. FT.)	30.8	30.8	30.8	30.8	30.8
TUBE SIZE (IN.)	3/8	3/8	3/8	3/8	3/8
REFRIGERANT	R-454B	R-454B	R-454B	R-454B	R-454B
LBS. — R-454B (O.D. UNIT) [e]	11 LB-5 OZ	12 LB-7 OZ	12 LB-7 OZ	12 LB-0 OZ	12 LB-0 OZ
FACTORY SUPPLIED	YES	YES	YES	YES	YES
RATED LINE SIZE — IN. O.D. GAS [f]	5/8	7/8	7/8	7/8	7/8
RATED LINE SIZE — IN. O.D. LIQ. [f]	5/16	5/16	5/16	5/16	5/16
CHARGING SPECIFICATIONS					
SUBCOOLING	8	8	8	8	8
DIMENSIONS					
CRATED (IN.)	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38	55 x 35 x 38
WEIGHT					
SHIPPING (LBS.)	291	291	291	291	291
NET (LBS.)	265	265	265	265	265

[a] Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on AHRI standard 210/240.
[b] Rated in accordance with AHRI standard 270/275.
[c] Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
[d] NA means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter.
[e] This value approximate. For more precise value see unit nameplate.
[f] The maximum length of refrigerant lines from outdoor to indoor varies depending on application. See Installer's Guide Table 4 for allowable applications.

Charging in Cooling between 55°F to 120°F Outdoor Ambient

Trane recommends installing Trane approved **matched** indoor and outdoor systems.

The benefits of installing approved indoor and outdoor split systems are maximum efficiency, optimum performance and the best overall reliability.

The following charging methods are therefore prescribed for matched systems with indoor TXVs / EEVs.

1. Subcooling (in the cooling mode) is the only recommended method of charging between 55°F to 120°F ambient temperatures.
2. When charging for ambient temperatures above 120°F or below 55°F, charge to 10°F subcooling. It is important to return when the outdoor ambient temperature is between 55°F to 120°F to verify system charge per these instructions.
3. For best results – the indoor temperature should be kept between 70°F to 80°F. Add system heat if needed.
4. Locate the designated subcooling target from the unit nameplate.
5. At startup, or whenever charge is removed or added, the system must be operated for a minimum of 20 minutes to stabilize before accurate measurements can be made.
6. Run the system using the **"Charging Mode-Cooling"** mode found in the UX360 User Interface and Diagnostic Mobile App. This is the only approved method for setting the system charge level.

   Measure Liquid Line Temperature and Refrigerant Pressure at service valves or monitor live data from the Monitor Menu in the Diagnostic Mobile App.
7. Determine total refrigerant line length, and height (lift) if indoor section is above the condenser. Follow the Subcool Charging Corrections Table to calculate additional subcooling target value.
8. Locate your liquid line temperature in the left column of the table, and the intersecting liquid line gauge pressure under the subcool selection column. Add refrigerant to raise the pressure to match the table, or remove refrigerant to lower the pressure. Always wait (20) minutes for the system conditions to stabilize before adjusting charge again.
9. When system is correctly charged, you can refer to System Pressure Curves to verify typical performance.
10. Trane Link systems have a Link Smart Charge feature available. Requires Diagnostic Mobile App and SmartCharge™ Tool BAYCAKT002.

Subcool Charging Correction Charts

The charts below are estimations. For more accurate and up-to-date lineset recommendations, use the Piping Program.

Important: *For 2-, 3- and 4-ton systems with 3/8-inch lineset diameters, use design subcooling for all length and lift combinations.*

Note: *The system will auto-configure airflow in Link mode.*

Figure 2. Subcool charging corrections – X24 and X25 models

Diameter		AC (HP) Subcooling Adders																			
Liquid		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
5/16	50					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	40				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: *For systems with 3/8-inch lineset diameters, use design subcooling for all length and lift combinations.*

*No subcooling adders needed. Use '0' for everything.

Figure 3. Subcool charging corrections – X36 models

Diamater		AC (HP) Subcooling Adders																			
Liquid		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
5/16	50					0	0	0	0	1	1	2	2	2	2	3	3	3	4	4	4
	40				0	0	0	0	0	0	0	1	0	1	1	2	2	2	3	3	3
	30			0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2
	20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: *For systems with 3/8-inch lineset diameters, use design subcooling for all length and lift combinations.*

Figure 4. Subcool charging corrections – X48 models

Diamater		AC (HP) Subcooling Adders																			
Liquid		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
5/16	50																				
	40																				
	25			0	0	1	1	2	3	4	4										
	20		0	0	0	0	1	2	2	3	4										
	10	0	0	0	0	0	0	1	1	2	3										
	0	0	0	0	0	0	0	0	1	1	2										

Note: *For systems with 3/8-inch lineset diameters, use design subcooling for all length and lift combinations.*

Figure 5. Subcool charging corrections – X60 models

Diameter		AC (HP) Subcooling Adders																			
Liquid	ft	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
5/16	50																				
	40																				
	25			0	1	2	4	4													
	20		0	0	0	1	3	4													
	10	0	0	0	0	1	2	3													
	0	0	0	0	0	0	1	2													

Diameter		AC (HP) Subcooling Adders																			
Liquid	ft	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
3/8	50					0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	3
	40				0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2
	30			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

R-454B Refrigerant Charging Chart

LIQUID TEMP (F)	DESIGN SUBCOOLING (F)						
	8	9	10	11	12	13	14
	LIQUID GAUGE PRESSURE (PSIG)						
55	170	172	175	178	181	184	187
60	184	187	190	194	197	200	203
65	200	203	206	210	213	217	220
70	217	220	223	227	230	234	238
75	234	238	241	245	249	252	256
80	252	256	260	264	268	272	276
85	272	276	280	284	288	292	297
90	292	297	301	305	309	314	318
95	314	318	323	327	332	336	341
100	336	341	346	351	355	360	365
105	360	365	370	375	380	385	390
110	385	390	396	401	406	412	417
115	412	417	422	428	433	439	445
120	439	445	450	456	462	468	474
125	468	474	480	486	492	498	504

Note: When charging to Subcooling values, use the Bubble Temp chart. If referencing Superheat, use the Dew Point chart.

Weigh-In Method for Charging

Weigh-In Method can be used for the initial installation, or anytime a system charge is being replaced. Weigh-In Method can also be used when power is not available to the equipment site or operating conditions (indoor/outdoor temperatures) are not in range to verify with the subcooling charging method.

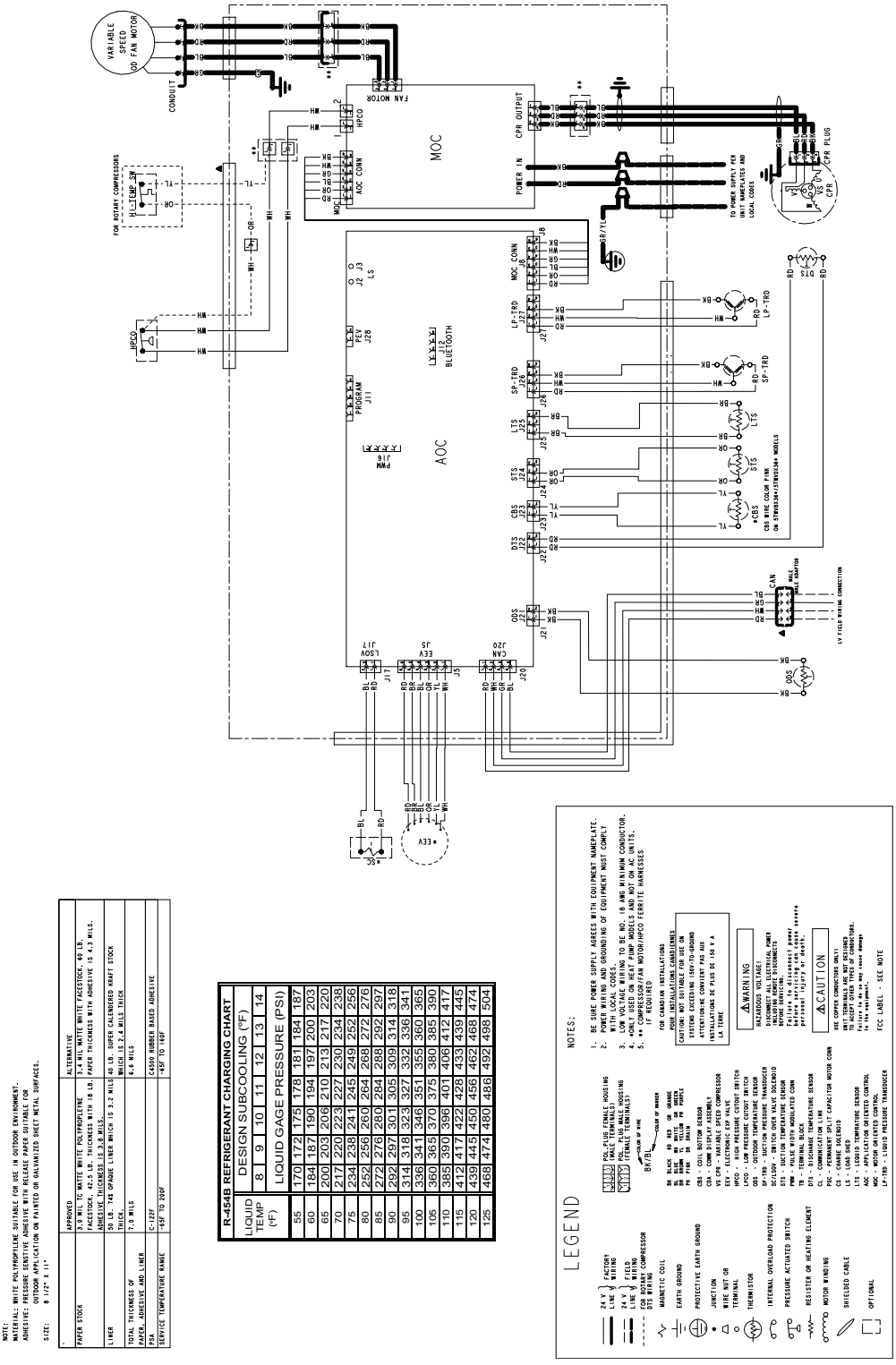
Calculating Charge Using the Weigh-In Method		
STEP 1 - Measure in feet the distance between the outdoor unit and the indoor unit. (Include the entire length of the line from the service valve to the IDU.) Subtract 10 ft from this entire length and record on line 1.	1. Total Line Length (ft) – 10 ft	
STEP 2 - Enter the charge multiplier (0.47 oz./ft for 3/8" and 0.30 0z./ft for 5/16").	2. Charge multiplier	for 3/8", use 0.47 oz.per foot and for 5/16" use 0.30 oz. per foot
STEP 3 - Multiply the total length of refrigerant tubing (Line 1) times the value on Step 2. Record the result on Line 3 of the Worksheet.	3. Step 1 x Step 2	= _____
STEP 4 - This is the amount of refrigerant to weigh-in prior to opening the service valves.	4. Refrigerant (oz)	= _____oz

Note: *The only mode approved for setting or validating system charge is using Charging Mode-Cooling. Charging Mode-Cooling is a variable speed test mode found in the UX360 User Interface and Diagnostic Mobile App. Outdoor Temperature must be between 55°F and 120°F with Indoor Temperature kept between 70°F and 80°F.*

Important: *Unit will auto- configure airflow in Trane Link mode.*

Wiring Diagram

Figure 6. Wiring diagram



R-454B REFRIGERANT CHARGING CHART							
LIQUID TEMP (°F)	DESIGN SUBCOOLING (°F)						
	8	9	10	11	12	13	14
	LIQUID GAGE PRESSURE (PSI)						
55	170	172	175	178	181	184	187
60	184	187	190	194	197	200	203
65	200	203	206	210	213	217	220
70	217	220	223	227	230	234	238
75	234	238	241	245	249	252	256
80	252	256	260	264	268	272	276
85	272	276	280	284	288	292	297
90	292	297	301	305	309	314	318
95	314	318	323	327	332	336	341
100	336	341	346	351	355	360	365
105	360	365	370	375	380	385	390
110	385	390	396	401	406	412	417
115	412	417	422	428	433	439	445
120	439	445	450	456	462	468	474
125	468	474	480	486	492	498	504

NOTE:
MATERIAL: WHITE POLYPROPYLENE SUITABLE FOR USE IN OUTDOOR ENVIRONMENT.
ADHESIVE: PRESSURE SENSITIVE ADHESIVE WITH RELEASE PAPER SUITABLE FOR OUTDOOR APPLICATION ON PAINTED OR GALVANIZED SHEET METAL SURFACES.
SIZE: 8 1/2" X 11"

	APPROVED	ALTERNATIVE
PAPER STOCK	3.0 MIL TC MATTE WHITE POLYPROPLETNE FACESTOCK, 42.5 LB. THICKNESS WITH 18 LB. PAPER ADHESIVE IS 4.3 MILS.	3.4 MIL MATTE WHITE FACESTOCK, 49 LB. THICKNESS WITH ADHESIVE IS 4.3 MILS.
LINER	40 LB. FAS OPAQUE LINER WHICH IS 3.2 MILS THICK.	40 LB. SUPER CALENDERED KRAFT STOCK WHICH IS 2.4 MILS THICK
TOTAL THICKNESS OF PAPER, ADHESIVE AND LINER	7.0 MILS	6.6 MILS
FDA	C-122F	C450 RUBBER BASED ADHESIVE
SERVICE TEMPERATURE RANGE	-40F TO 200F	-40F TO 160F

Electrical – High Voltage

Power Supply

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

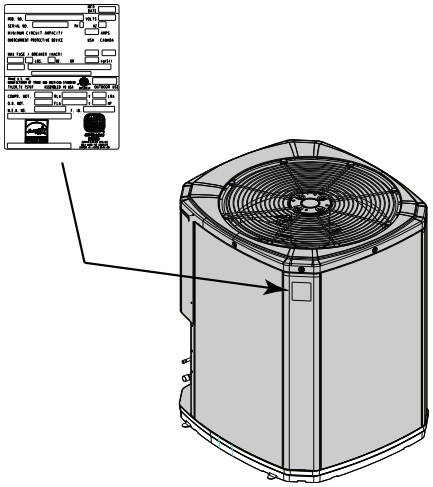
When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

The high voltage power supply must align with the equipment nameplate.

The power wiring must comply with national, state, and local codes.

Follow the instructions on the unit wiring diagram located on the inside of the control box cover.

Figure 7. Equipment nameplate



Disconnect Switch

⚠ WARNING

Electrical Shock Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

Confirm proper grounding before connecting electrical supply.

⚠ WARNING

Hazardous Voltage!

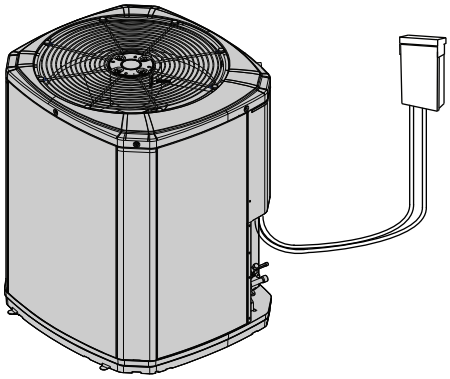
Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Install a separate disconnect switch at the outdoor unit.

For high-voltage connections, flexible electrical conduit is recommended whenever vibration transmission may create a noise problem within the structure.

Figure 8. Disconnect switch



Ground the outdoor unit per national, state, and local code requirements.

Figure 9. Ground symbol

Cabling

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

Confirm the cabling is protected from wear and tear, corrosion, excessive pressure, vibration, sharp edges, and any other adverse environmental effects.

Integrated Variable Speed Control Board LED Indicators

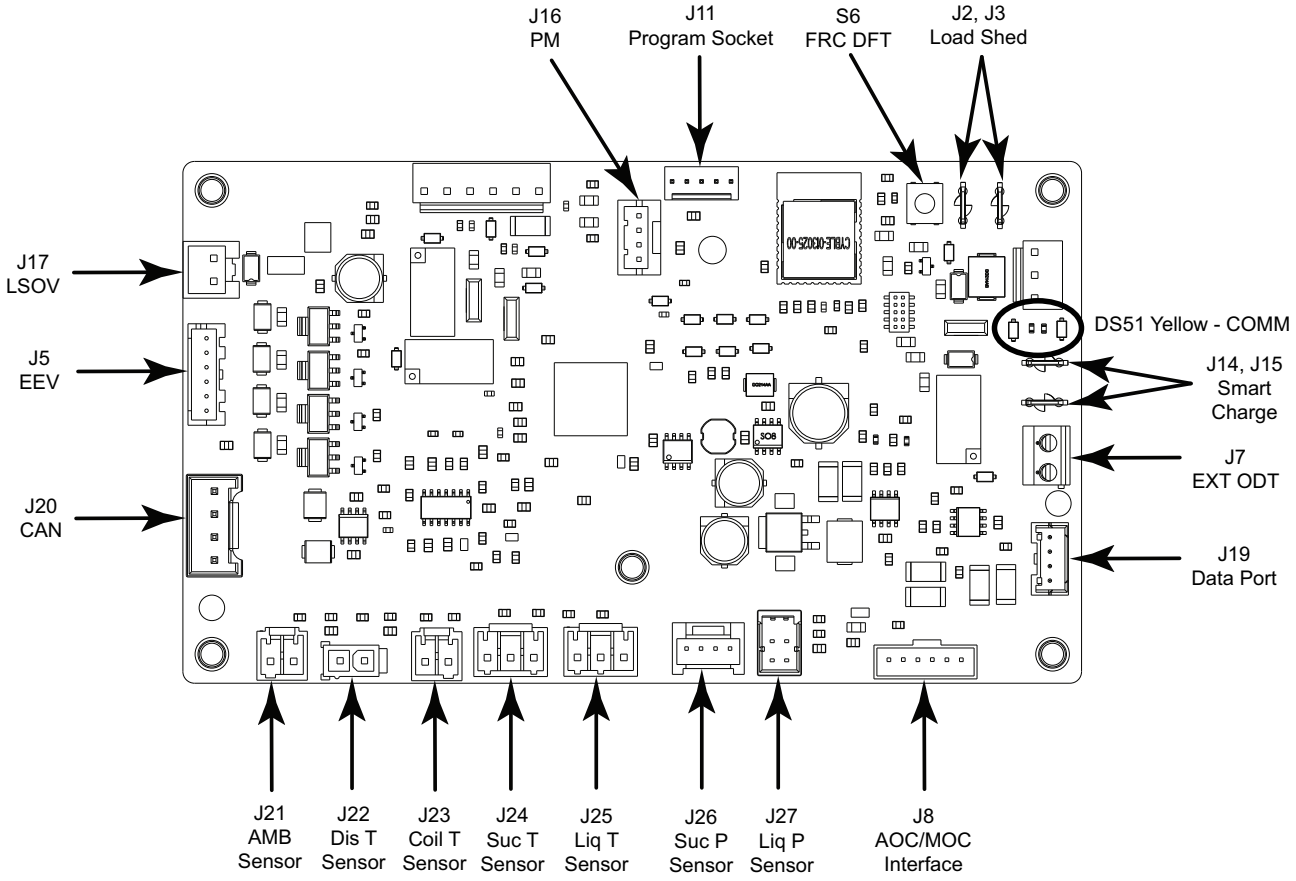


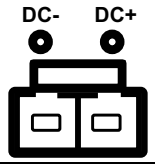
Table 3. AOC LED flash codes

LED	RATE	DESCRIPTION	INDICATION
COMM (AMBER)	SLOW	1 TIME PER DEVICE	DEVICE COUNT
	FAST	5 TIME PER SECOND	LOSS OF COMMUNICA-TION

Table 4. MOC flash codes

MOC STATUS		
LED	Color	Normal Operation
Status	Green	Constant On
Alarm	Red	Constant On when alarm active
Communication	Yellow	Blinks when sending data to AOC

Drive Diagnostic Result Alarm LED TABLE	
DRIVE TEST ALARM CODE	(FLASH COUNT, 2S DELAY REPEATED)
MOC FAULT OR HPS FAULT	KEEP FLASHING
INRUSH/PLC	1
COMPRESSOR OUTPUT SHORT CIRCUIT	2
COMPRESSOR OUTPUT OPEN CIRCUIT	3
COMPRESSOR OUTPUT CIRCUIT	4
FAN OUTPUT SHORT CIRCUIT	5
FAN OUTPUT OPEN CIRCUIT	6
FAN OUTPUT FAILURE	7



Sump Heat Control

Sump Heat Control Guidelines	
Sump Heat ON	At power up; when outdoor temperature is below 85°F.
	When the outdoor temperature is below 80°F and the compressor discharge temperature is less than the outdoor ambient temperature.
Sump Heat OFF	When the outdoor temperature goes above 85°F (Sump Heat remains OFF until outdoor temperature drops below 80°F).
	Anytime the compressor is running.
	For 50 minutes after each compressor run cycle.

Note: *Variable Speed systems are designed so that the compressor and sump heat will not run at the same time. Compressor windings are used for sump heat. When sump heat is active, line-side current will be approximately 1.5 amps. The Diagnostics Mobile App MONITOR MENU has a field for DRIVE > DRIVE AMPS which can also be used to verify operation of sump heat.*

Sequence of Operation

Control Operational Overview

Operation of the communicating, variable speed outdoor unit is managed and monitored by a micro processor based Control located in the control box of the outdoor unit. This component is also referred to as “The Drive”. Heat and Cool demand messages are transmitted from the SC360 system controller over the data lines from the system controller to the indoor and outdoor sections of the system. System mode and capacity requests are received by the outdoor control and responded to by providing control outputs to the switch-over valve (SOV) solenoid coil, electronic expansion valve (EEV) stepper motor, condenser fan motor and compressor. Operating conditions and system commands such as compressor percent demand, indoor airflow, EEV starting position, defrost (For auxiliary heat), outdoor temperature and alerts are transmitted from the outdoor control over the data lines to the SC360 system controller. Additional data that is communicated to the rest of the system includes the type of equipment installed (variable speed, unit size in nominal tonnage, heat pump or air conditioner) which is used during the Auto Discover function to configure the system controller for the equipment installed.

The AOC has one Light Emitting Diode (LED) used for indicating operating status and verifying communications. The COMM LED indicates successful communications by flashing a device count which can be used to verify how many communicating devices are connected to the data lines.

Cooling Mode – A/C and Heat Pump

When a request for cooling capacity is sent from the SC360 control to the outdoor unit, the SC360 control will calculate the required running speed for the compressor and outdoor fan based on the current capacity request sent from the SC360 control. Additionally, a CFM demand message is sent from the SC360 control to the indoor unit for matching indoor airflow.

Regardless of the requested capacity, the outdoor system will start and ramp to a target startup speed and hold steady for a minimum dwell period to ensure proper oil return. This dwell period will typically last for 1 minute but for initial start ups, after power is first applied, the dwell period is 15 minutes. The startup operation will progress to normal operation once this dwell period is completed. The system can duty cycle as needed to provide the required capacity requested from the SC360 control. The default duty cycle setting for stage one demand is 3 Cycles per Hour (CPH).

As capacity request value increases or decreases, so will the compressor, outdoor fan and indoor blower speeds to continuously deliver the capacity requested by the control and meet the demand of the structural load. All indoor CFM demand messages will be sent from the SC360 System Controller to the indoor unit so that the blower motor will run with matching modulating speeds. The System Report Screens and Monitor menus are available in the UX360 User Interface and the Diagnostic Mobile App.

Heat Pump Operation – Cooling

In addition to stage and demand operating sequences outlined in the Cooling Mode description, when a heat pump system receives a demand message for cooling, the Switch Over Valve (SOV) solenoid will be pulsed to position the valve for cooling. Latching Switch Over Valve (LSOV) technology is standard with variable speed outdoor heat pumps. By utilizing components designed to hold the pilot pin of the SOV in place, the valve will maintain the cooling or heating position even when power is removed. Maintaining valve position, or Latching, is accomplished with the help of a magnet mounted in the solenoid coil or a spring manufactured internal to the SOV. To initiate the SOV position, a 12 Volt DC pulse is sent from the J17 plug located on the AOC to the solenoid coil at the start of each call for capacity. Polarity of the DC pulse is critical to the direction the valve’s pilot pin will be set. Always follow the red and blue color coding to ensure proper polarity.

Heat pumps are also equipped with an Electronic Expansion Valve (EEV) which will be set to the “Check Valve Position” and drive wide open. The EEV does not provide refrigeration control in the cooling mode of operation.

Heat Pump Operation – Heating

In the heating mode, the LSOV will get a 4 Volt DC pulse to position the valve for heating at the start of each call for capacity.

During heating mode, the EEV will be in the controlling state. Refrigerant flow is managed by incrementally opening or closing the valve to control compressor superheat under a wide range of conditions. Superheat is calculated with feedback to the AOC from a suction line temperature sensor and a suction line pressure transducer. The AOC will target 10 degrees (+/-2) of superheat and drive a valve position by periodically pulsing the stepper motor and then monitoring compressor superheat results. Control signals to the EEV stepper motor are 12 volt DC pulses from J5 on the AOC. The EEV step position and compressor superheat can be monitored through the technician app monitor menu during runtime operation. The AOC will close the EEV with every OFF cycle and drive the valve to wide open during defrost or cooling mode of operation.

Note: *When a heat pump system is first powered up, the EEV produces an audible sound (soft ratcheting sound) as the valve drives to the closed position.*

Heat Pump Operation – Defrost

When the system is operating in Heat Pump heating and the SC360 control initiates a Defrost, the SC360 control simultaneously:

- De-energizes the outdoor fan motor,
- Drives the OD EEV to full open and,
- Commands the SOV to change to the cooling mode.

There is a brief switchover time-delay (to allow refrigerant pressures to stabilize) before the compressor is commanded to run at Maximum Speed Cooling to perform Defrost.

The SC360 control also sends a demand message to the indoor unit to run the blower at Cooling mode maximum speed (x2) and energize auxiliary heat (if equipped). Auxiliary heat blower speed may be higher than Cooling mode and will take precedence during defrost.

The Defrost Mode will be terminated after the OD coil temperature reaches 47°F or the maximum time override of 15 minutes has lapsed. At Defrost termination, the compressor will be commanded to go to the Defrost Switchover Speed. After that speed is achieved, the SOV position will be changed back to the heating mode of operation and the OD fan will be turned back on. Following the refrigerant stabilizing delay, the compressor will be allowed to run at any speed commanded by demand.

The AOC control will send the necessary pulse signals to the stepper motor coil returning the EEV to a controlling position that matches capacity demand and begin monitoring superheat.

Servicing

- 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, i.e. non-sparking, adequately sealed or intrinsically safe.
- Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
- Have a dry powder or CO_2 fire extinguisher adjacent to the servicing area.
- 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.

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

1. *Electronic leak detectors calibrated for R-454B*
2. *Bubble method*

Important: *Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.*

- 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.
- If repairs must be made after system is charged, properly and safely remove or isolate refrigerant and purge the section of the system needing repair with inert gas or oxygen free nitrogen prior to opening the circuit.
- The REFRIGERANT CHARGE shall be recovered into the correctly marked recovery cylinders. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available."
- Nitrogen purge chart:

Nitrogen purge times				
Flow rate	**Lineset length**			
cu ft/hr	< 50 feet	< 100 feet	< 150 feet	< 200 feet
15	2 minutes	4 minutes	6 minutes	8 minutes
30	1 minute	2 minutes	3 minutes	4 minutes
60	1 minute	1 minute	2 minutes	2 minutes

- Verify that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. Only use cylinders designated for the recovered refrigerant and labelled for that refrigerant. Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.
- A calibrated weighing scale shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Ensure any associated electrical components are sealed.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder. Do not mix refrigerants.
- 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.

Defrost Control – Heat Pump Only

Demand Defrost

The demand defrost control measures heat pump outdoor ambient temperature with a sensor located outside the outdoor coil. A second sensor located on the outdoor coil is used to measure the coil temperature. The difference between the ambient and the colder coil temperature is the difference or delta-T measurement. This delta-T measurement is representative of the operating state and relative capacity of the heat pump system. By measuring the change in delta-T, we can determine the need for defrost. The coil sensor also serves to sense outdoor coil temperature for termination of the defrost cycle.

Fault Identification

A fault condition is announced at the UX360 thermostat and Diagnostic Mobile App.

Defrost Enabled

Demand Defrost is enabled with the following inputs to the AOC:

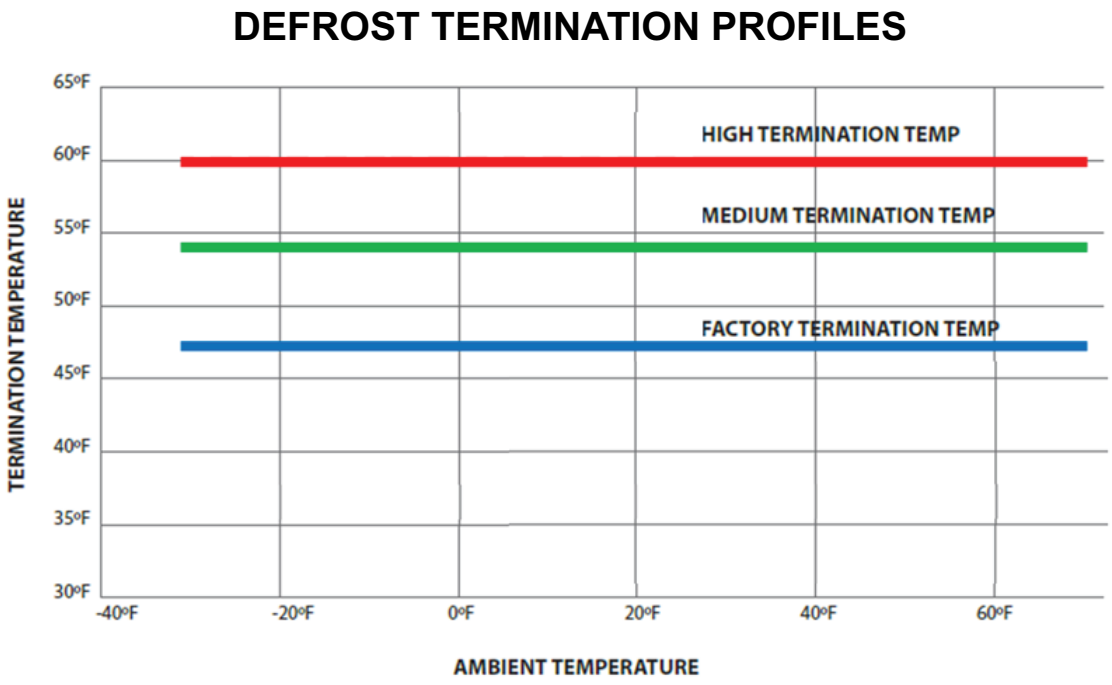
- Outdoor ambient temperature sensor (ODS-B) reporting an outdoor temperature at or below 52°F.
- Coil temperature sensor (CBS) reporting a coil temperature at or below 35°F.
- Heat/Cool Demand (HCD) from the communicating comfort control for at least two minutes or more.

Defrost Initiation

The calculated temperature difference between the outdoor temperature sensor and the coil temperature sensor is called Delta T. Defrost can occur once the current Delta T exceeds the Delta T initiate value. This adaptive logic assures a complete defrost for a range of outdoor temperatures.

Note: *A forced Defrost test can be entered through the UX360 thermostats, the outdoor unit AOC or the Link Diagnostic Mobile App.*

Figure 10. Defrost termination profiles



Forced Defrost

1. FRC DFT test can be run while in the heating mode by pressing the S6 button on the top right of the AOC. DFC TST can also be run while in the Compressor Heating test mode found in the UX360 or Diagnostic Mobile App.
2. Press ENTER to begin forced defrost.
3. Execute Forced Defrost following Forced Defrost (Defrost terminates on Coil Temperature or maximum time override of 15 minutes).
4. When test begins, the Diagnostic Mobile App monitor screens will update with coil temperatures and operation.

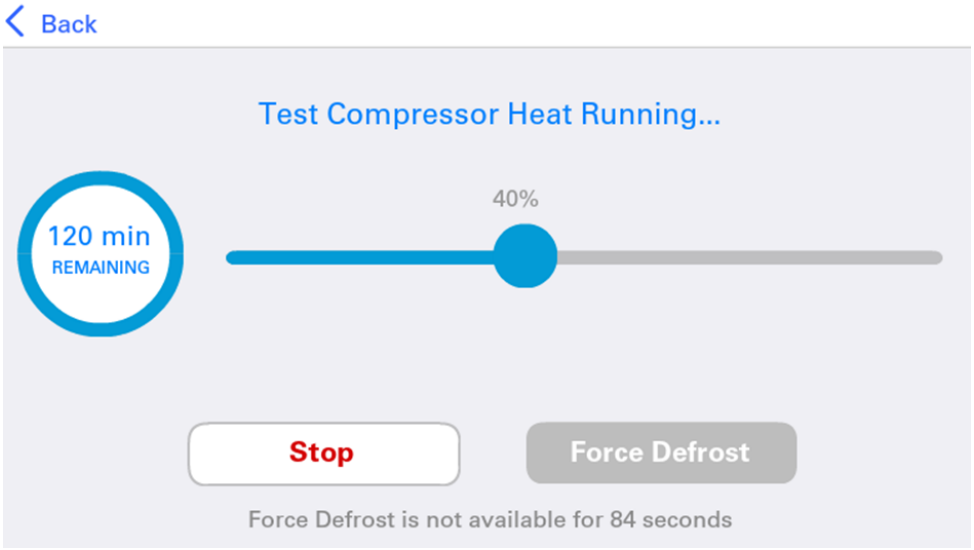
Note: *UX360 Screen, under System Status will display DEFROST.*

5. When test is complete, TEST COMPLETE displays for 10 seconds.
6. If there is a defrost fault condition, test terminates and sends alert to the alert menu in the UX360 and Diagnostic Mobile App.
7. For more information, refer to the Alert Code Tables in Service Facts and Technical Service Manual (Pub. No. 34-4301-01 or newer) documents.

Note: *Monitor screens will update as the test proceeds.*

Note: *Can enter Forced Defrost from UX360, AOC or the Diagnostic Mobile App.*

Figure 11. Force defrost display



Sensors

J22 Compressor Discharge Temperature

This table shows the corresponding voltage, resistance, and temperature readings for the discharge temperature sensor when measured across pins J22. The power source for the discharge temperature sensor is 3.2V DC.

Temp (F)	*Temp (C)*	*Thermistor Resistance (OHMS)*	*Volts DC (pin-to-pin)*
-15	-26.11	139453	3.13
-10	-23.33	118062	3.11
-5	-20.56	100258	3.10
0	-17.78	85393	3.08
5	-15.00	72944	3.06
10	-12.22	62487	3.04
15	-9.44	53676	3.02
20	-6.67	46232	2.99
25	-3.89	39925	2.96
30	-1.11	34567	2.93
35	1.67	30003	2.89
40	4.44	26105	2.85
45	7.22	22767	2.80
50	10.00	19903	2.75
55	12.78	17438	2.70
60	15.56	15312	2.64
65	18.33	13475	2.58
70	21.11	11883	2.51
75	23.89	10501	2.45
80	26.67	9298	2.37
85	29.44	8249	2.30
90	32.22	7333	2.22
95	35.00	6530	2.14
100	37.78	5826	2.06
105	40.56	5208	1.97
110	43.33	4663	1.89
115	46.11	4182	1.80
120	48.89	3758	1.72
125	51.67	3382	1.63
130	54.44	3048	1.55
135	57.22	2752	1.47
140	60.00	2488	1.39
145	62.78	2253	1.31
150	65.56	2043	1.24
155	68.33	1856	1.17
160	71.11	1688	1.10
165	73.89	1537	1.03
170	76.67	1402	0.97
175	79.44	1280	0.91
180	82.22	1170	0.85
185	85.00	1071	0.80
190	87.78	982	0.74
195	90.56	901	0.70
200	93.33	828	0.65
205	96.11	762	0.61
210	98.89	702	0.57
215	101.67	647	0.53
220	104.44	597	0.50
225	107.22	552	0.47
230	110.00	511	0.44
235	112.78	473	0.41
240	115.56	438	0.38
245	118.33	407	0.36
250	121.11	378	0.33
255	123.89	351	0.31
260	126.67	327	0.29
265	129.44	304	0.27
270	132.22	284	0.26
275	135.00	265	0.24
280	137.78	247	0.23
285	140.56	231	0.21
290	143.33	216	0.20
295	146.11	203	0.19
300	148.89	190	0.18
305	151.67	178	0.17
310	154.44	167	0.16
315	157.22	157	0.15
320	160.00	148	0.14
325	162.78	139	0.13
330	165.56	131	0.12

A working compressor discharge temperature sensor is required for:

- Protection (high/low temperature)
- Preheating (sump heat)
- Outdoor EEV control
- Diagnostics; reverse rotation, flooding, charge level

The discharge temperature sensor control contains an NTC thermistor input for sensing the compressor discharge temperature. The thermistor has a nominal resistance of ≈ 10k ohms at 75°F. The minimum range required for the discharge temperature input is -31°F to 302°F when measured across pins J22.

Note: *Secure installation of the discharge sensor is required for reliable compressor and system operation.*

J21 Ambient Temperature Sensor (ODS)

These tables show the corresponding voltage, resistance, and temperature readings for the ambient temperature sensor when measured across pins 5 and 14.

The power source for the ambient, coil, and suction temperature sensors is 3.2V DC.

Temp (F)	*Temp (C)*	*Thermistor Resistance (OHMS)*	*Volts DC*
-15	-26.11	135976	2.43
-10	-23.33	115112	2.33
-5	-20.56	97745	2.22
0	-17.78	83247	2.11
5	-15.00	71108	1.99
10	-12.22	60916	1.87
15	-9.44	52334	1.75
20	-6.67	45088	1.63
25	-3.89	38952	1.52
30	-1.11	33742	1.40
35	1.67	29307	1.29
40	4.44	25520	1.19
45	7.22	22280	1.09

Temp (F)	Temp (C)	Thermistor Resistance (OHMS)	Volts DC
50	10.00	19499	1.00
55	12.78	17108	0.91
60	15.56	15045	0.83
65	18.33	13262	0.75
70	21.11	11717	0.68
75	23.89	10375	0.62
80	26.67	9207	0.56
85	29.44	8188	0.51
90	32.22	7297	0.46
95	35.00	6516	0.42
100	37.78	5830	0.38
105	40.56	5227	0.35
110	43.33	4695	0.31
115	46.11	4224	0.29
120	48.89	3808	0.26
125	51.67	3439	0.24
130	54.44	3111	0.21
135	57.22	2820	0.20
140	60.00	2559	0.18

The ambient temperature sensor control has an NTC thermistor input for sensing the outdoor air temperature and has a nominal resistance of ≈ 10k ohms at 75°F. The ambient temperature is measured on the J21 header. The minimum range required for the ambient temperature sensor is -40°F to 140°F.

A working ambient temperature sensor is required for the following:

- Low pressure monitoring
- Defrost (heat pump)
- Comfort control display (outdoor air temperature)
- Auxiliary heat control during defrost (heat pump)
- Auxiliary heat lockout
- Compressor lockout (heat pump)
- Oil management
- Humidifier dew-point control
- OD EEV startup position
- ID EEV startup position
- Pre heating (sump heat)
- Normal operation of the ID and OD fan
- Diagnostics

J24 Coil, Suction, and Liquid Temperature Sensor

Temp (F)	Temp (C)	Thermistor resistance (OHMS)	Volts DC
-15	-26.11	135976	2.71
-10	-23.33	115112	2.64
-5	-20.56	97745	2.56
0	-17.78	83247	2.48
5	-15.00	71108	2.38
10	-12.22	60916	2.29
15	-9.44	52334	2.19
20	-6.67	45088	2.08
25	-3.89	38952	1.97
30	-1.11	33742	1.86
35	1.67	29307	1.75
40	4.44	25520	1.64
45	7.22	22280	1.53
50	10.00	19499	1.42
55	12.78	17108	1.32
60	15.56	15045	1.22
65	18.33	13262	1.13
70	21.11	11717	1.04
75	23.89	10375	0.96
80	26.67	9207	0.88
85	29.44	8188	0.81
90	32.22	7297	0.74
95	35.00	6516	0.68
100	37.78	5830	0.62
105	40.56	5227	0.57
110	43.33	4695	0.52
115	46.11	4224	0.47
120	48.89	3808	0.43
125	51.67	3439	0.40
130	54.44	3111	0.36
135	57.22	2820	0.33
140	60.00	2559	0.30

The coil temperature sensor control has an NTC thermistor input for sensing the coil temperature. This reading is used by the defrost algorithm on heat pump units. The thermistor has a nominal resistance of 10k ohms at 75°F. The minimum range and resolutions as measured across the J23 header required for coil temperature sensor is -50°F to 150°F.

A working coil temperature sensor is required for the following:

- Defrost initiation and termination
- Compressor sump heat (pre-heating)
- Diagnostics; charge level, indoor/outdoor airflow

The suction temperature sensor control utilizes an NTC thermistor input for sensing the suction/gas temperature. The thermistor has a nominal resistance of ≈ 10k ohms at 75°F. The minimum range and resolutions as measured across J24 required for the suction temperature sensor is -50°F to 150°F.

A working suction temperature sensor is required for:

- Outdoor EEV control (target super heat)
- Diagnostics; charge level, indoor/oudoor airflow

The liquid temperature sensor control utilizes an NTC thermistor input for sensing the liquid temperature. The thermistor has a nominal resistance of ≈ 10k ohms at 75°F. The minimum range and resolutions as measured across J25 header required for the liquid temperature sensor is -50°F to 150°F.

A working liquid temperature sensor is required for:

- Link Smart Charge
- Diagnostics; charge level

J27 Liquid Line Pressure Transducer

This table shows the corresponding voltage and pressure readings for the liquid line pressure transducer when measured across the J27 header.

Pressure (psig)	Volts DC (pin 16 to pin 17)
30	0.66
60	0.83
90	1.00
120	1.18
150	1.35
180	1.52
210	1.69
240	1.86
270	2.03
300	2.21
330	2.38
360	2.55
390	2.72
420	2.89
450	3.06
480	3.23
510	3.41
540	3.58
570	3.75
600	3.92
630	4.09
660	4.26

A working liquid pressure transducer is required for the following:

- Link Smart Charge
- Diagnostics; charge level

The Liquid Pressure Transducer control is measured across J27 White and Black and has an active 0–4.9VDC transducer input for sensing high liquid pressure.

Description	Location	Wire color
4.9V DC power	J27 Header	Red
Output		White
Common		Black
Ground		Green

J26 Suction Line Pressure Transducer

This table shows the corresponding voltage and pressure readings for the suction line pressure transducer when measured across the J26.

Pressure (psig)	Volts DC (pin 7 to pin 8)
10	0.60
20	0.70
31	0.81
41	0.91
51	1.00
60	1.10
70	1.20
82	1.32
92	1.42
101	1.52
111	1.62
120	1.72
130	1.81
140	1.91
152	2.03
161	2.13
171	2.23
181	2.33
190	2.43
200	2.52

A working suction pressure sensor is required for the following:

- Startup (pressure limits)
- Low pressure, loss of charge protection
- Indoor coil freeze protection
- Outdoor EEV control (target super heat)
- Diagnostics; reverse rotation, charge level, indoor/outdoor airflow

The suction pressure transducer control is measured across J26 white and black and has an active 0 to 4.9V DC transducer input for sensing low suction pressure.

Description	Location	Wire color
4.9V DC power	J26 Header	Red
Output		White
Common		Black
Ground		Green

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
18	Control Failure	4	Shutdown. Send Err code to thermostat and Fault text to Diagnostics	Resume normal operation.	Internal control error is detected	Control failure, replace AOC Or MOC. Contact technical support
67	Temp Sensor Fault	0	For Cooling mode, “Assume Ambient Temp” as per Limp along mode and Continue normal operation. For Heating mode, go to timed defrost.	With actual ambient temperature, continue normal operation. For Heating mode, follow demand defrost algorithm	Ambient Temperature Sensor alert	Ambient Sensor out-of-range (Open/Shorted/Missing)
		1	For Cooling mode, continue normal operation. For heating mode, go to timed defrost.	For Cooling mode, continue normal operation. For heating mode, go to timed defrost.	Coil Temperature Sensor alert	Coil Sensor out-of-range (Open/Shorted/Missing)
		2	Unit will not report Liquid Temp to diagnostics or tech app. Smart Charge will not be able to run.	Resume normal operation when fault no longer exists	OD Liquid temperature sensor fault	Damaged sensor or not installed
		3	Cooling – Normal operation	Continue normal operation	External Temperature Sensor alert	Ext Sensor out-of range (Shorted) Open/ Missing revert to Ambient Sensor input
		4	Cooling – Normal operation	Continue normal operation	Discharge Temperature Sensor is faulted in Cooling mode	Discharge Sensor out-of- range (Open/Shorted/Missing)
		5	Heating – Limp along mode of constant speed (compressor speed is limited to 2400 RPM)	Ramp up to demand speed and resume normal operation.	Discharge Temperature Sensor is faulted in Heating mode	Discharge Sensor out-of-range (Open/Shorted/Missing)
		6	Cooling – Normal operation	Continue normal operation	Suction Temperature Sensor is faulted in Cooling mode	Suction Sensor out-of-range (Open/Shorted/Missing)
		7	Heating – Limp along mode of constant speed (Compressor speed is limited to 2400 RPM, EEV is locked to safe position)	Ramp up to demand speed and resume normal operation.	Suction Temperature Sensor is faulted in Heating mode	Suction Sensor out-of-range (Open/Shorted/Missing)
		8	Heating – Limp along mode of constant speed (compressor speed is limited to 2400 RPM)	Ramp up to demand speed and resume normal operation.	Compressor Discharge Temperature Sensor not attached to Compressor (Heating Mode)	Compressor Discharge Temperature Sensor not attached to Compressor (Heating Mode) Introduced with AOCSoftware Version 2, Fall of 2014)
68	Defrost Fault	0	As defined in Defrost algorithm	Continue normal operation	Defrost Fault A has been detected	Low heat pump capacity (Inoperative compressor, loss of charge, shorted coil sensor, open ambient sensor)
		1	As defined in Defrost algorithm	Continue normal operation	Defrost Fault B or C has been detected	Fault B indicates 10 defrosts terminated on time override. Fault C indicates sensor High Delta T.
		2	As defined in Defrost algorithm	Continue normal operation	Defrost Fault A and B or A and C have been detected	Within a given length of time, both faults existed

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
80	High Pressure Monitor Fault	0	5 min of compressor lockout and send “WAIT ”to thermostat	Restart with reduced capacity. (Capacity reduced by 1/5 with each occurrence)	High pressure switch has tripped resulting in a High Pressure Short Lock Out.	Overcharged. **Cooling Mode:** Outdoor Fan Failure, clogged coil, recirculation, excessive high ambient, non condensable. **Heating Mode:** Indoor Fan Failure, clogged coil, non condensable.
		1	Lockout compressor operation until power cycle, No system operation	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	6 High Pressure Short Lock Out events have occurred resulting in a High Pressure Hard Lock Out. (High Pressure Limit = 650psig)	Overcharged. **Cooling Mode:** Outdoor Fan Failure, clogged coil, recirculation, excessive high ambient, non condensable. Heating Mode: Indoor Fan Failure, clogged coil, non condensable.
		2	On restart, after short lockout, compressor will operate at reduced capacity and this alert is declared. (Message on Tstat informing of reduced capacity) Note: Recover reduced capacity with each 2 hr run time window without an HPCO trip.	Normal operation resumes.	High Pressure trip point has been exceeded and a 5 minute time out has been enforced. Restart is allowed but with reduced capacity.	Overcharged. **Cooling Mode:** Outdoor Fan Failure, clogged coil, recirculation, excessive high ambient, non condensable. **Heating Mode:** Indoor Fan Failure, clogged coil, non condensable.
88	Ground fault	1	Emergency shutdown. Drive will protect itself.	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Grounding issue from output of the drive. If the sum of all three currents exceeds 10 amp to ground	Burnt winding, faulty current sensor, internal board short, pinched compressor lead (shorted). Run Drive Test. (GoTo “Compressor Verification” troubleshooting flow chart)
91	Communica-tion Fault	2	Shutdown if Heat/Cool demand message not received for 3 reporting intervals.	Resume normal operation	Loss of Heat/Cool demand message	Open/Shorted Data line Check for reversed polarity
		3	Shutdown	Resume normal operation	Loss of Bit Master	Bit Master Control Fault
94	System Communica-tion Error	0	Shutdown	Resume normal operation	Master detects slave(s) missing, user checks equipment table to find out what devices are missing we would like to know what devices are missing – consider for future implementation. This alert to be reported for missing status on following slave devices only 1. ID AHC 2. OD AOC	ID unit or OD unit is powered down Check for loose/ bad connection between ID and OD unit and System Controller
106	External Shutdown Fault	1	Compressor cooling operation shall not be allowed.	Resume normal operation. Cooling operation allowed.	External shutdown switch is Active and input at T3 to T4 or J2 to J3 is open	External Load Shed device is active with external switch configured to Active and input at T3 to T4 or J2 to J3 is open
106	Indoor External Switch Has Been Activated	0			The External Switch configuration has been enabled and external switch contacts are open at the indoor unit	
106	Indoor External Switch #2 Has Been Activated	0			Indoor External Switch #2 Has Been Activated	
113	Protection Fault	0	Unit will not report Liquid pressure to diagnostics or tech app. Smart Charge will not be able to run	Resume normal operation when fault no longer exists	OD liquid pressure sensor fault	Damaged Transducer open/ short. Should have 5vdc supply voltage to transducer.
114	Bad or Missing PM	0	Continue normal operation	Continue normal operation	PM data corrupt	PM Error
		3	Continue normal operation	Continue normal operation	PM missing with good local copy	PM Error
		4	Continue normal operation	Continue normal operation	Bad data in PM with good local copy	PM error

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
114	Bad or Missing PM	5	Shutdown. No compressor operation until a good PM is inserted.	Resume normal operation	Bad data in PM with no local copy	PM Error
		6	Shutdown. No compressor operation until a good PM is inserted.	Resume normal operation	PM bad or missing with no local copy	PM Error
155	OD EEV Motor Fault	2	Can not run in Heating mode, Can run in Cooling mode	Power cycle	The OD EEV electric coil has an open or intermittent short circuit.	EEV motor coil open or shorted
		3	Limp Mode	EEV operates for PM steps continuously	Diagnostic current or voltage valves are not in range	EEV motor coil open or shorted
156	System Low Charge Fault	1	High Superheat occurrences	Superheat Change occurs and allows control within the EEV range of operation. (Superheat target is 10 degrees +/- 4)	High Superheat occurrence of 35 degrees or more has been detected for more than 60 minutes.	System low charge, liquid line restriction, sensor calibration
164	Outdoor EEV Valve Migrated Open	2	The valve is not responding to a change in position, EEV supposedly opened fully and no change to accommodate superheat occurred.	Superheat Change occurs and allows control within the EEV range of operation	EEV migrated to open position but superheat is not at the desired set point. Valve is not responding to a change in position.	Possible stuck valve or sensor (s) out of calibration
	Outdoor EEV Valve Migrated Closed	3	The valve is not responding to a change in position, EEV supposedly closed fully and no change to accommodate superheat occurred.	Superheat Change occurs and allows control within the EEV range of operation	EEV migrated to closed position but superheat is not at the desired set point. Valve is not responding to a change in position.	Possible stuck valve or sensor (s) out of calibration
165	Low Superheat Error	1	Low Superheat occurrences	Superheat Change occurs and allows control within the EEV range of operation	Low supper heat (less than 3 degrees)has been detected for more than 60 minutes	Possible stuck valve, sensor(s) out of calibration, low airflow, overcharge, check valve leaking.
166	Low Superheat Error	1	Low Superheat with EEV closed	Superheat Change occurs and allows control within the EEV range of operation	EEV valve closed and still flooding	Possible stuck valve, sensor(s) out of calibration, low airflow, overcharge, check valve leaking.
174	Suction Pressure Sensor Fault	0	Shutdown and enter a hard lockout. Compressor locked out until power cycle and requires service call.	Power cycle. After power cycle, the compressor shall resume normal operation.	Pressure transducer is missing, open, shorted or out of range.	Wiring or component failure. (System under vacuum or suction pressure over 500psig)
175	Limp Along Mode	0	High or Low superheat detected for at least 20 minutes. Limp Mode can also be triggered by Loss of Sensor reading. Look for Sensor Error. Limit Compressor Speed to a constant value.	Ramp up to demand speed (normal operation)	High or Low superheat detected for at least 20 minutes. Limp Mode can also be triggered by Loss of Sensor reading. Look for Sensor Error. Limit Compressor Speed to a constant value.	Problem with refrigerant pressure or flow (high or lowsuperheat). Sensor Faulted (out of range). Discharge temp, suction temp, ambient temp, indoor EEV temp sensor (EEV in safe mode).
		1*	Loss of Suction Pressure Transducer reading forces shut down and Hard Lock	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Shutdown. Cannot start system without Service being called. Send error and alert to thermostat	Failed suction pressure transducer, or multiple simultaneous sensor failures. Evaluate sensor failure alerts for troubleshooting / resolution.
		2	Limp along leaky bucket full	Power Cycle	Limp along mode max time expired	Charge, Airflow, EEV not closing, 3rd part coil
		3	Low SH	When SH goes to acceptable valve	Low SH	Charge, Airflow, EEV not closing, 3rd part coil

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
175	Suction Pressure Range Cutout / Limp Mode	1*		With a call for cooling capacity, the blower will turn on for up to 10 minutes in an attempt to lower the suction pressure. If the suction pressure is still above 375 psig at the 10 minute mark, the compressor will be allowed to run for up to 90 seconds. If the suction transducer is still out of range, a fault will then trigger.	For Outdoor Software Version 3.X and higher: **Compressor temporarily disabled due to the suction pressure transducer being out of range on the high end (above approx. 375 psig). Compressor will not be allowed to operate until pressure drops below approx. 365 psig. For Outdoor Software Version 1.0 & 2.0: **Compressor runs fixed speed due to high or low superheat in heating mode for an extended time period	Refrigerant static pressure is >375 psig due to high temperatures or a malfunction of the transducer.
176	Modbus Communica-tion Failure	0	With communication error message, the drive must shut down.	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Loss of internal communication within the Drive.	Loss of internal communication within the Drive. On a persistent 176.00 error, the technician should cycle power to the ODU. If error 176.00 returns, replace the Drive. If replacement Drive has the same issue, investigate for EMI and source.
		1	As soon as communication error message flags, call shut down operation and then call communication check-up operation. Retry 10 times and then lockout.	Resume normal operation	Loss of communications between AOC and MOC	Open or damaged circuit between AOC and MOC
177	Drive Current Failure	0	Compressor speed Derated.	Ramp up to demand speed (normal operation).	Internal Derate is active due to high Drive output current	High load conditions.
		1	Compressor speed Derated. This alert shall be an indication of an extended Derated performance.	Ramp up to demand speed (normal operation).	Drive current is above threshold and the system is being Derated for an extended period of time.	High load conditions.
		2	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation	Drive output current exceeds internal limit set for current sensor	High load condition. Overcharge, dirty coil(s), low airflow, recirculation, compressor failure, Drive hardware failure (Run Drive Diagnostics).
		3	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation	Drive output current exceeds internal limit set for current sensor	Compressor failure (locked rotor, shorted windings), Drive hardware failure (Run Drive Diagnostics)
		4	Emergency shutdown	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	5 occurrences of HW CUR CO in 1 hour, or 15 occurrences of SW CUR CO in 1 hour. Each hour of runtime without a HW or SW cutout will reduce the total count by 1.	High load conditions for 5 consecutive over current cutout periods. Go to Drive Diagnostic Test in Tech App. Also see Compressor Verification Flowchart. Choke possibly not plugged in.
		5	Shutdown AOC send “MOC clear alarm” message every 5 min and retries demand. After 10 retries also set universal hard lockout alarm	Resume normal operation	OD Fan IPM Overcurrent or OD FAn Current Detection Loop Fault has occurred from MOC	MOC Fan Overcurrent

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
178	DC Voltage Failure	0	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation	DC bus voltage is greater than 480VDC	PFC hardware failure. Run Drive Diagnostic Test to verify failure. Call for tech support, record failure mode for warranty claim before replacing Drive. This error can occur after a power disconnect.
		1	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation	DC bus voltage is less than 220VDC	Low line voltage.Verify supply voltage is between 187 VAC and 253VAC.This error can occur after a power disconnect.
		2	DC Voltage Hi Lockout has occurred 10 times consecutively. Control will clear the fault and retry every 5 minutes.	Control will clear fault when condition no longer exists (DC bus voltage is less than 480VDC).	DC Bus excessive over voltage after 10 consecutive 5 minute cutouts (178.00)	PFC hardware failure. Run Drive Diagnostic Test to verify failure. Call for tech support, record failure mode for warranty claim before replacing Drive. This error can occur after a power disconnect.
179	Power Module Temperature Failure	0	Compressor speed Derated.	Ramp up to demand speed (normal operation).	Rectifier temperature greater than the Derate threshold	High Load condition, heat sink performance loss (check thermal grease, cold plate torque)
		1	Compressor speed Derated. This alert shall be an indication of an extended Derated performance.	Ramp up to demand speed (normal operation).	Rectifier temperature greater than the Derate threshold and the system is being Derated for an extended period of time	High Load condition, heat sink performance loss (check thermal grease, cold plate torque) possible Drive hardware failure (Run Drive diagnostics)
		2	Emergency shutdown	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Rectifier temperature greater than the shutdown threshold	High Load condition, heat sink performance loss (check thermal grease, cold plate torque) possible Drive hardware failure (Run Drive diagnostics) Call for tech support, record failure mode for warranty claim before replacing Drive.
		3	Compressor speed Derated.	Ramp up to demand speed (normal operation).	Inverter temperature greater than the Derate threshold	High Load condition, heat sink performance loss (check thermal grease, cold plate torque)
		4	Compressor speed Derated. This alert shall be an indication of an extended Derated performance.	Ramp up to demand speed (normal operation).	Inverter temperature greater than the Derate threshold and the system is being Derated for an extended period of time	High Load condition, heat sink performance loss (check thermal grease, cold plate torque) possible Drive hardware failure (Run Drive diagnostics)
179	Power Module Temperature Failure	5	Emergency shutdown	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Inverter temperature greater than the shutdown threshold	High Load condition, heat sink performance loss (check thermal grease, cold plate torque) possible Drive hardware failure (Run Drive diagnostics) Call for tech support, record failure mode for warranty claim before replacing Drive.
		6		Resume normal operation	Fan module over temp	Clod Plate not attached, thermal grease Control box ventilation High OD conditions
180	Supply Voltage Failure	0	Compressor speed Derated.	Ramp up to demand speed (normal operation).	Low supply voltage and/or high power output from Drive compressor running at a reduced RPM (Derate)	Maximum power is reduced with line voltage less than 200 VAC. High load conditions, recirculation, dirty coils, low airflow
		2	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation	Supply voltage is less than 175VAC	Supply voltage is less than 175 VAC
180	Supply Voltage Failure	3	Shutdown and retry after 5 minutes	Resume normal operation	Drive output current exceeds internal limit set for current sensor	High load condition. Overcharge, dirty coil(s), low airflow, recirculation, compressor failure, Drive hardware failure (Run Drive Diagnostics)

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
181	Gate Drive Failure	0	IGBT Failure. Gate driver fault is activated. Control will clear the fault and retry every 5 minutes.	Control will clear fault when condition no longer exists, 10 occurrences of gate drive failure cause the control to trip lock, which can only be cleared with a power cycle.	Drive hardware failure alert	Drive hardware failure. 10 consecutive occurrences will result in an Err 181.07
	Motor Phase Loss Detection	2	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Compressor cable connection or motor winding problem. (Verify wiring and windings)	Compressor cable connection or motor winding problem. (Verify wiring and windings) Run Drive Diagnostics to confirm failure mode.
	Stall Detection	4	Emergency shutdown. Locked Rotor. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Locked Rotor Condition has been detected	Locked Rotor Condition has been detected. Run Drive Diagnostics to confirm failure mode. Verify system is not grossly overcharged and that service valves are open. Replace compressor.
	Gate Drive Failure Trip Lock	7	10 consecutive occurrences of gate drive failure	Control needs to be power cycled.	10 consecutive occurrences of gate drive failure alert	Drive hardware failure. Run Drive Diagnostic Test to confirm failure mode. Call for tech support, record failure mode for warranty claim before replacing Drive.
	Illegal Configuration	8	Trip lock upon occurrence	Can only be cleared with a Power Cycle	Improper parameters used in Personality Module	Data in PM is corrupt or wrong PM installed.
181	Initialization Error	10	Emergency Shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal fault with micro and cannot initialize	Cycle power. If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC Supply Range exceeded	11	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal communication fault	If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC Inverter temperature range exceeded	12	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal fault with temperature sensor.	If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC Rectifier temperature range exceeded	13	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal fault with temperature sensor.	If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC reference range exceeded	14	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal fault with micro	If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC current range error	15	Emergency shutdown. Control will clear the fault and retry every 5 minutes.	Resume normal operation. Control will clear fault when condition no longer exists.	Internal fault with current sensor	If error continues call for tech support, record failure mode for warranty claim before replacing Drive.
	ADC	16	Shutdown	Resume normal operation when fault no longer exists	Drive internal protections fault	Improper drive configuration or drive grounding. Call for drive authorization if alert continues
	ADC	17	Shutdown	Resume normal operation when fault no longer exists	Heat Sink Temperature sensor fault	Improper drive configuration or drive grounding. Call for drive authorization if alert continues
182	Startup Algorithm Fault	0	Can't execute start-up algorithm Can't start system for at least 5 minutes. Proceed to Normal shutdown. Send "Wait" and alert to thermostat.	Resume normal operation	Compressor has a failed startup attempt.	Drive is limiting compressor speed due to Inverter high temperature or high current.
		1	Shutdown. Can't start system without Service being called. Send error to thermostat and alert to thermostat.	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	5 startup soft lockouts occurred without a successful start.	Drive is limiting compressor speed due to Inverter high temperature or high current.
		2	Shutdown soft lock 5 minutes	Resume normal operation when fault no longer exists or proceed to Hard Lockout	Compressor failed to reach startup speed within 3 minutes.	Other possible faults contributing Refrigerant overcharge Liquid in compressor new startup. Allow Sump heat

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
183	Shutdown Algorithm Fault	0	Control is reset internally. Retry after 5 minutes.	Resume normal operation after compressor comes to a halt.	Compressor does not come to a complete stop even after the defined time and continues to run even after control is released.	Loss of internal communication. If error continues after system resets, call for tech support.
184	Protection Algorithm Fault	0	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after suction pressure is greater than 107psig (35°F saturated)and compressor cutout time has elapsed. Cut Out Time = 5 minutes	(In cooling mode)Indoor coil freeze protection is active. Suction pressure sensor is <78psig (20°F saturated) for 20 minutes.	Restricted airflow, low charge, low ambient operation, restriction in refrigerant system or metering device.
184	Protection Algorithm Fault	1	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after cutout time has elapsed. CO=15 minutes	Compressor High Temperature Protection at High Speed- Shutdown (Discharge Temp Sensor).	High super heat at compressor – Low charge, restricted metering device, restricted condenser airflow in cooling mode, sensor accuracy, high indoor ambient in heat mode, (Indoor set point above 80°F) (Increase IDairflow)
		2	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after compressor cutout time has elapsed. CO=15 minutes	Compressor High Temperature Protection at Low Speed-Shutdown (Discharge Temp Sensor).	High super heat at compressor – Low charge, restricted metering device, restricted condenser airflow in cooling mode, sensor accuracy, high indoor ambient in heat mode, (Indoor set point above 80°F) (Increase ID airflow)
		3	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after compressor cutout time has elapsed. CO=5 minutes	Low Suction Pressure Protection in Cooling Mode. Less than 50 PSIG	Low charge, EEV pump down, restriction. Pressure transducer calibration.
		4	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after compressor cutout time has elapsed. CO=5 minutes	Low Suction Pressure Protection in Heating Mode. Less than 25 PSIG	Low charge, EEV pump down, restriction. Pressure transducer calibration. Extremely low outdoor ambient (ODTless than minus 10°F)
		5	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after compressor cutout time has elapsed. CO=5 minutes	Maximum Current Low Speed Protection. High compressor load during low speed operation.	System operating under temperature extremes. Possible Derate condition, high compression ratio, damaged compressor (bearings/scroll set galled). Check for high discharge temperature alert in previous history.
		6	Shutdown. Soft lockout. Send “Wait” to thermostat, send Alert to thermostat	Resume normal operation after compressor cutout time has elapsed. CO=5 minutes	In the compressor heating mode, current has exceeded allowable limit at the operating conditions.	At high speed operation (3600 RPM and above) Drive output current limit has been exceeded. Check for low indoor airflow, high system charge.
		7	Can’t start system without Service being called. Send error to thermostat and alert to thermostat	Can be cleared only on power cycle. After power cycle, the compressor shall resume normal operation.	Maximum number of protection shutdowns (Err 184.xx) have occurred.	Check previous history for 184. xx faults leading to lockout.
		8	Can’t start system without Service being called. Send error to thermostat and alert to thermostat	Can be cleared only on power cycle. Resume normal operation.	Universal Hard Lockout. Outdoor EEV will drive open.	Occurs anytime the system enters the Hard Lockout State. Investigate Alerts leading to this condition.
184	Protection Algorithm Fault	9	Send error to thermostat and alert to thermostat	5 Minute compressor soft lockout time has elapsed	Internal Lubrication Failure. For 60 minutes internal lube does not occur and compressor RPM is below the limitation for internal lube to be satisfied.	A Derate condition exists that does not allow internal lube speed to be achieved when needed. Check for cause of Derate.
		10	Unit running in opposite mode 5 minute soft lockout	Resume normal operation	LSOV is in heating mode when system is calling for cooling	Reprogram drive AOC software SOV disconnected or mounting. If alert continues, call for replacement authorization

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
185	Protection Derating Fault	0	Discharge temperature is high. Limit compressor speed to prevent higher load.		Compressor Discharge Temperature Protection, Limit compressor speed.	Low outdoor ambient heating condition.
		1	Discharge temperature is high. Decrease compressor speed to reduce load.		Compressor Discharge Temperature Protection, Derate compressor speed.	Low outdoor ambient heating condition.
		2	Discharge temperature is high. Increase compressor speed to improve compressor cooling.		Compressor Discharge Temperature Protection, Increase compressor speed.	Low speed heating with high indoor ambient.
		3	Discharge temperature is high. Limit compressor speed to prevent higher load.		Compressor Discharge Temperature Protection, Limit compressor speed.	Low speed heating with high indoor ambient.
		5			Compressor Lubrication cycle.	Low speed operation requires periodic lubrication cycle.
		6	Low compressor speed with high Drive output current. Increase speed.		Low compressor speed with high Drive output current, Increase compressor speed.	Low speed with high condenser load. (Indoor coil in heating mode/ outdoor coil in cooling mode)
		7	Low compressor speed with high Drive output current. Hold speed.		Low compressor speed with high Drive output current, Limit compressor speed.	Low speed with high condenser load. (Indoor coil in heating mode/ outdoor coil in cooling mode)
		8	Suction saturation temperature is 28 degrees for less (92 PSIG) for at least 20 minutes.	Saturated suction temperature is 35 degrees For higher (107 PSIG)	Indoor coil freeze protection is active, Derate compressor speed.	In cooling mode: low indoor/ outdoor ambient operation. Low airflow, low humidity, Low RH dehumidification target.
		9			System Oil Return function active to bring oil back to compressor.	Low discharge temperature with an ON cycle and/or multiple short cycles.
		10	Suction pressure is low		Low Suction Pressure Protection in cooling mode, Derate compressor speed.	In cooling mode: low indoor/ outdoor ambient operation.
185	Protection Derating Fault	11	Suction pressure is low		Low Suction Pressure Protection in cooling mode, Limit compressor speed.	In cooling mode: low indoor/ outdoor ambient operation.
		12	Suction pressure is low		Low Suction Pressure Protection in heating mode, Derate compressor speed.	In heating mode: low outdoor ambient/indoor temperature operation.
		13	Suction pressure is low		Low Suction Pressure Protection in heating mode, Limit compressor speed.	In heating mode: low outdoor ambient/indoor temperature operation.
		14	Drive output current is high		High compressor speed with high Drive output current, Derate compressor speed.	In heating mode, high indoor coil load or high outdoor ambient.
		15	Drive output current is high		High compressor speed with high Drive output current, Limit compressor speed.	In heating mode, high indoor coil load or high outdoor ambient.

***All 185 faults do not announce on the thermostat home screen; they only appear in the alert history.**

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
186	MOC Protection Derating Fault	0	Drive output current is high		High Drive output current, Limit compressor speed.	High compressor load
		1	Drive output current is high		High Drive output current, Derate compressor speed.	High compressor load
		2	Drive Inverter temperature is high		High Inverter temperature, Limit compressor speed.	High compressor load
		3	Drive Inverter temperature is high		High Inverter temperature, Derate compressor speed.	High compressor load
		4	Drive Rectifier/PFC temperature is high		High Rectifier temperature, Limit compressor speed.	High compressor load
		5	Drive Rectifier/PFC temperature is high		High Rectifier temperature, Derate compressor speed.	High compressor load
		6	High Drive input current		High Drive input current, limit speed	High compressor load
		7	High Drive input current		High Drive input current, reduce speed	High compressor load
186	MOC Protection Derating Fault	8	High OD fan current		High OD fan current, limit speed	Low ambient heating, heavy rains, ice bridging, fan obstruction
		9	High OD fan current		High OD fan current, reduce speed	Low ambient heating, heavy rains, ice bridging, fan obstruction
		10	Cold plate temperature requires a hold condition	Resume normal operation	Excessive Drive temperature at liquid line cold plate	Loss of charge, loose cold plate, missing thermal paste, condenser fan failure, dirty condenser coil.
	Protection Derate Fault	11	OD Unit Operation Limit Speed	Resume normal operation following 15 min soft lock. Drive must be below 165°F	High Drive Chassis Temp	Loss of charge, loose cold plate, missing thermal paste, condenser fan failure, dirty condenser coil
		12	Fan speed limited	Resume normal operation when fault no longer exists	OD Fan power module temperature high	High Load Heat sink performance loss
		13	Fan speed limited	Resume normal operation when fault no longer exists	OD Fan power module temperature high	High Load Heat sink performance loss
187	Evacuation Mode	0	Outdoor unit operation shall not be allowed. EEV drives to full open.	Resume normal operation after Power Cycle	Evacuation mode has been executed from the Tech App. ODU operation is locked out and EEV drives to full open.	Evacuation mode has been executed from the Tech App.
187	Drive Diagnostics Mode	1	Drive diagnostic test has been executed – send alert message to thermostat and Tech App.	After completing the drive test, the system will reset.	Drive Diagnostics Test is in progress	Technician to determine after running the diagnostic test. See the Tech App. This information will be required for warranty replacement part credit.
188	Storage Load Failure	0	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Storage Update Failure	1	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	State Failure	2	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Hardware Variant Read Failure	3	ShutdowN	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Application Exception	4	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.

Variable Speed Alert Codes

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
188	No Configuration	5	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Verify that PM is installed and matches the model number and serial number of unit. Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Bad Configuration	6	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Verify that PM is installed and matches the model number and serial number of unit. Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Voltage VPOS Low	7	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
188	Voltage VPOS High	8	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Voltage VCC Low	9	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	Voltage VCC High	10	Shutdown	Cycle Power to clear hard lockout condition	Internal Error	Cycle Power. If error does not clear, call for tech support, record failure mode for warranty claim before replacing Drive.
	MOC Internal Err	11	OD unit operation not allowed	Resume normal operation	MOC OD fan Comm Fault	Open Fan Circuit, Winding or wiring
189	Control Board Temperature High	0	Compressor speed Derated	Control must clear the flag when this condition no longer exists.	Compressor Actual speed not equal to compressor requested speed Limit compressor RPM.	High ambient conditions, recirculation discharge air, blocked coil, sensor calibration.
		1	Shutdown and retry after 5 minutes	Resume normal operation	Control board temperature is high. Shutdown and retry after 5 minutes.	High ambient conditions, recirculation discharge air, blocked coil, sensor calibration.
191	OD Fan Fault	0	Shutdown AOC send “MOC clear alarm” message every 5 min and retries demand. After 10 retries also set universal hard lockout alarm	Resume normal operation	Outdoor fan motor lost phase	Fan motor cable missing or not plugged in. Open winding in fan motor or harness. Loose wire connection in OD fan molex plus
		1	Shutdown AOC send “MOC clear alarm” message every 5 min and retries demand. After 10 retries also set universal hard lockout alarm	Resume normal operation	Outdoor fan is unable to reach target speed	Look for fan obstructions (possible ice bridging) or strong winds. Run drive diagnostics. Install a wind baffle kit if drive diagnostics passes and reverse rotation alarm returns.

Alert Code	Alert Group	Sub-alarm	State action on occurrence	State action on clearance	Alert Description	Possible Cause
ERR. 67.02	Normal			Liquid Temp Sensor Fault	Liquid temperature sensor fault	Liquid temp sensor open or shorted **Zero or infinite resistance Liquid temp sensor out of range **Compare resistance value of sensor to chart in literature No output voltage from control board to sensor **A reading between 3vDC and 5vDC with the sensor removed confirms a good source voltage
ERR. 113.00	Normal			Liquid Pressure Sensor Fault	Liquid pressure sensor fault	Liquid Pressure Sensor shorted or open **0vDC = Shorted **4.99vDC = Open Liquid Pressure Sensor out of range **Compare DC volt value of sensor to chart in literature No output voltage from control board **With sensor disconnected, 5vDC should be measured on control board

Refrigeration Circuits for Heating and Cooling

Cooling Models

Figure 12. 2-ton AC (X24 model)

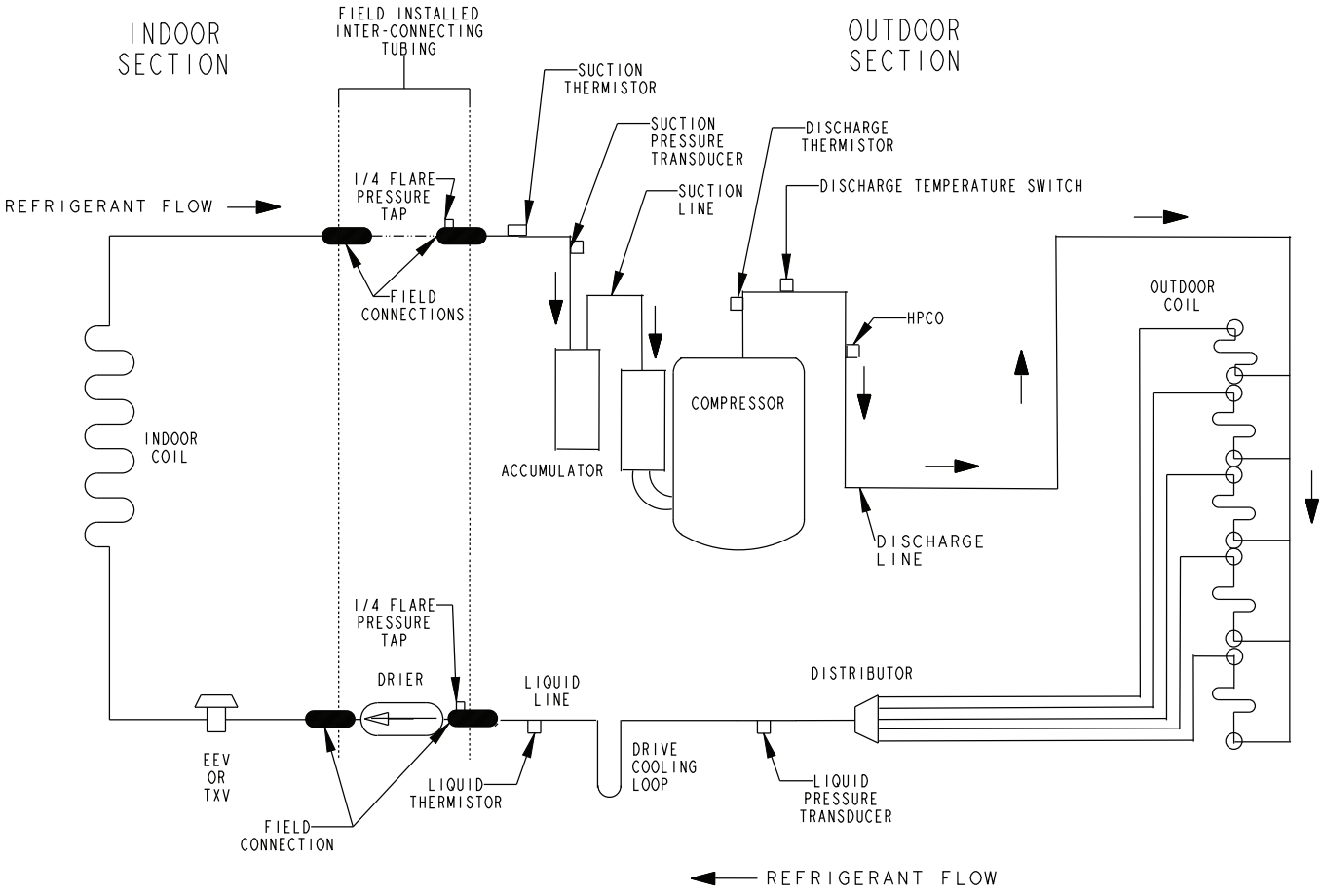


Figure 13. 2-ton AC (X25 model)

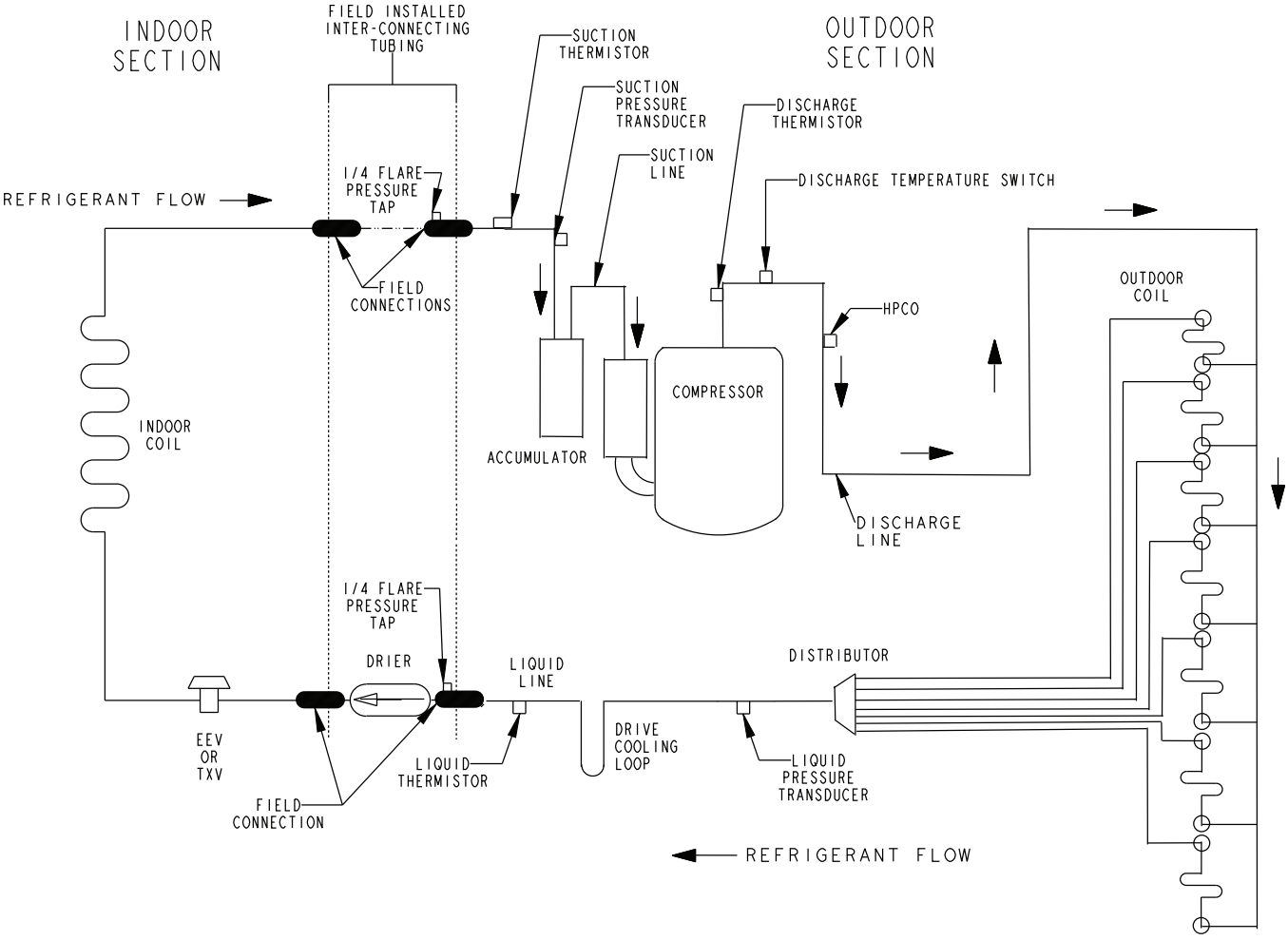
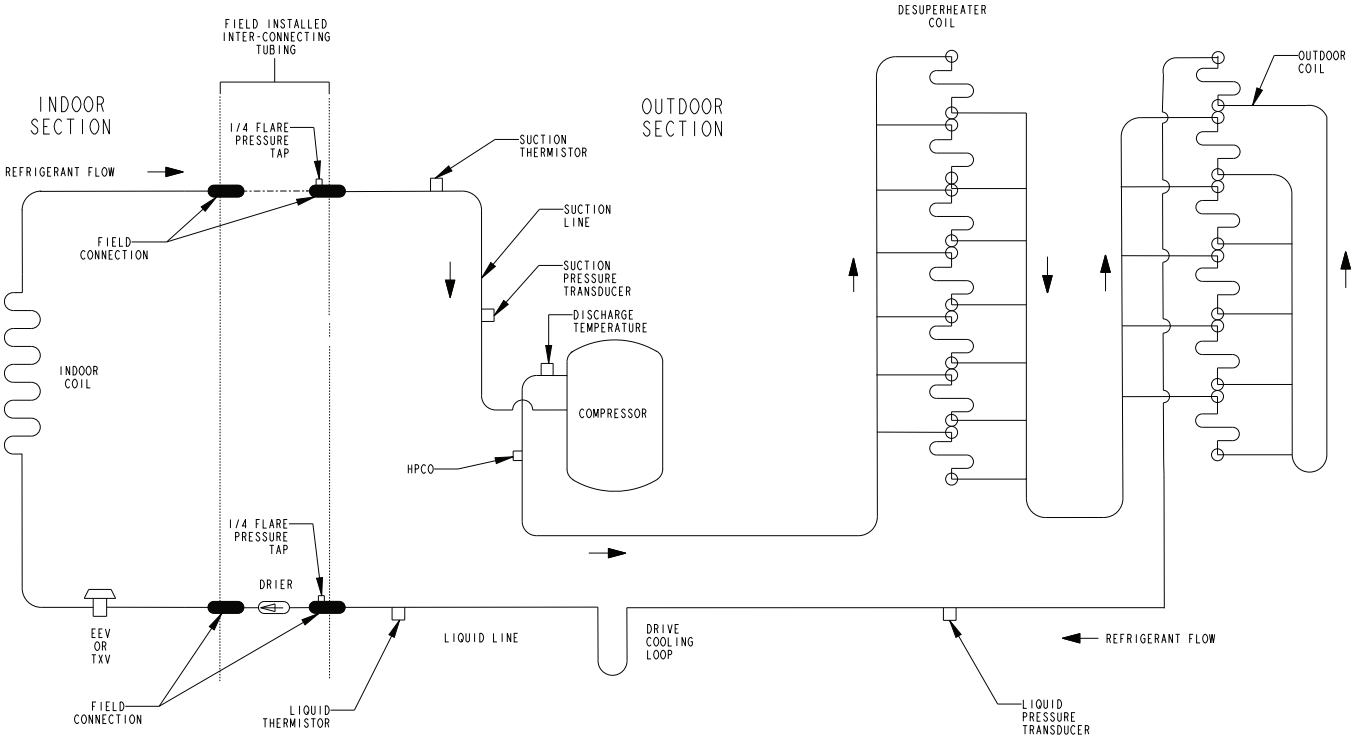


Figure 14. 3-ton, 4-ton, and 5-ton AC (X36, X48, and X60 models)



Heating Models

Figure 15. 2-ton HP (X24 model)

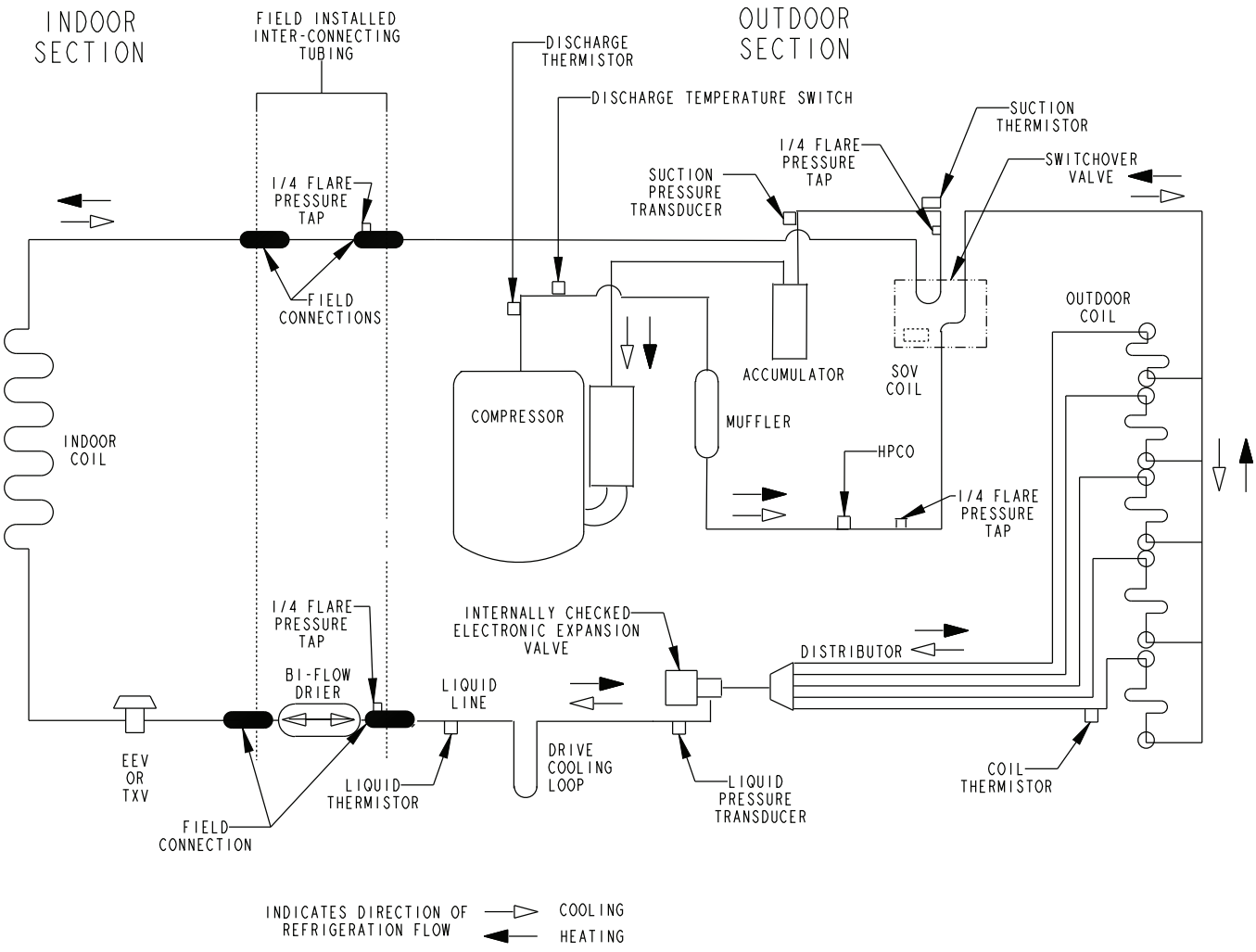


Figure 16. 3-ton HP (X36 model)

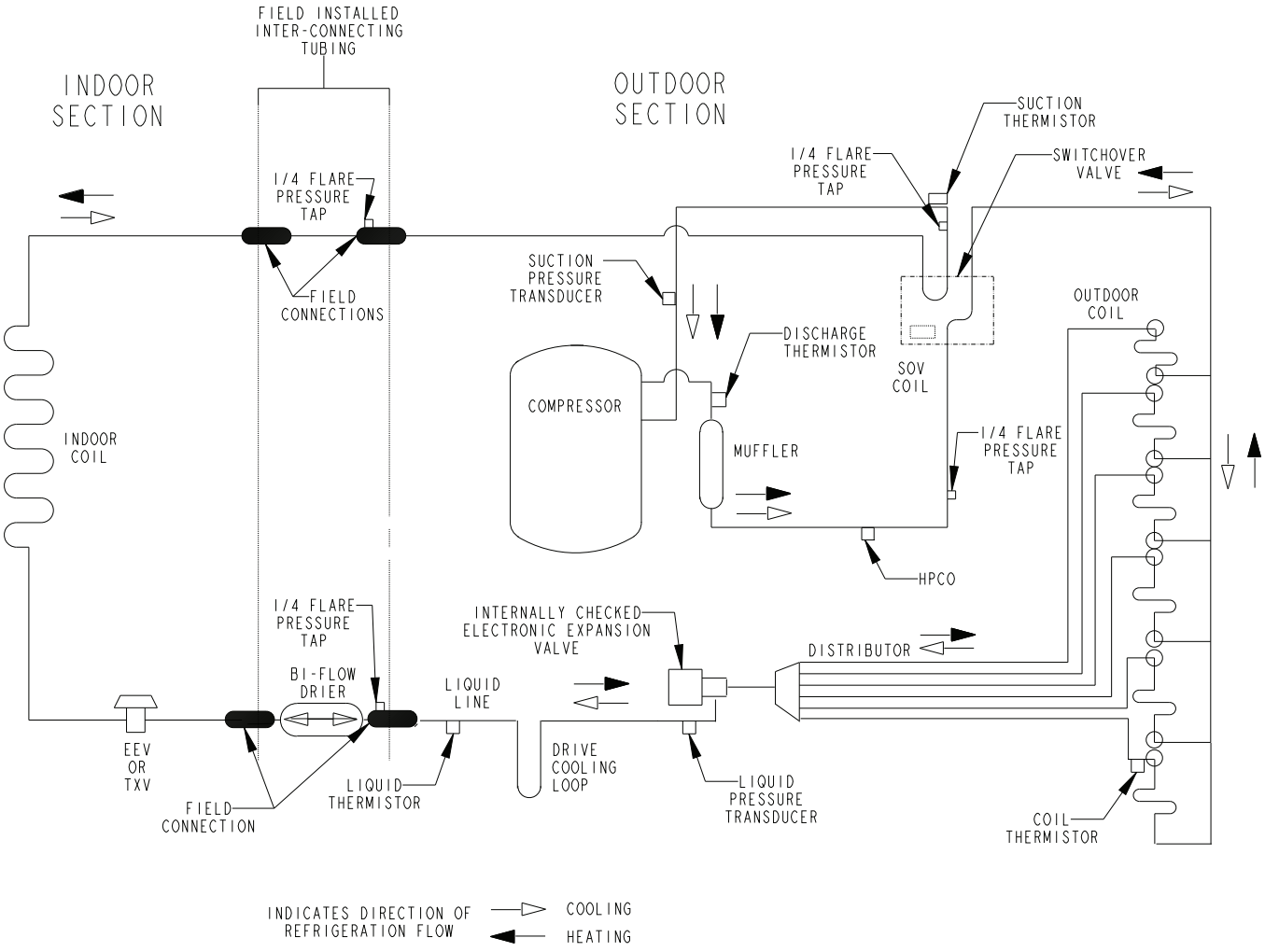


Figure 17. 4-ton HP (X48 model)

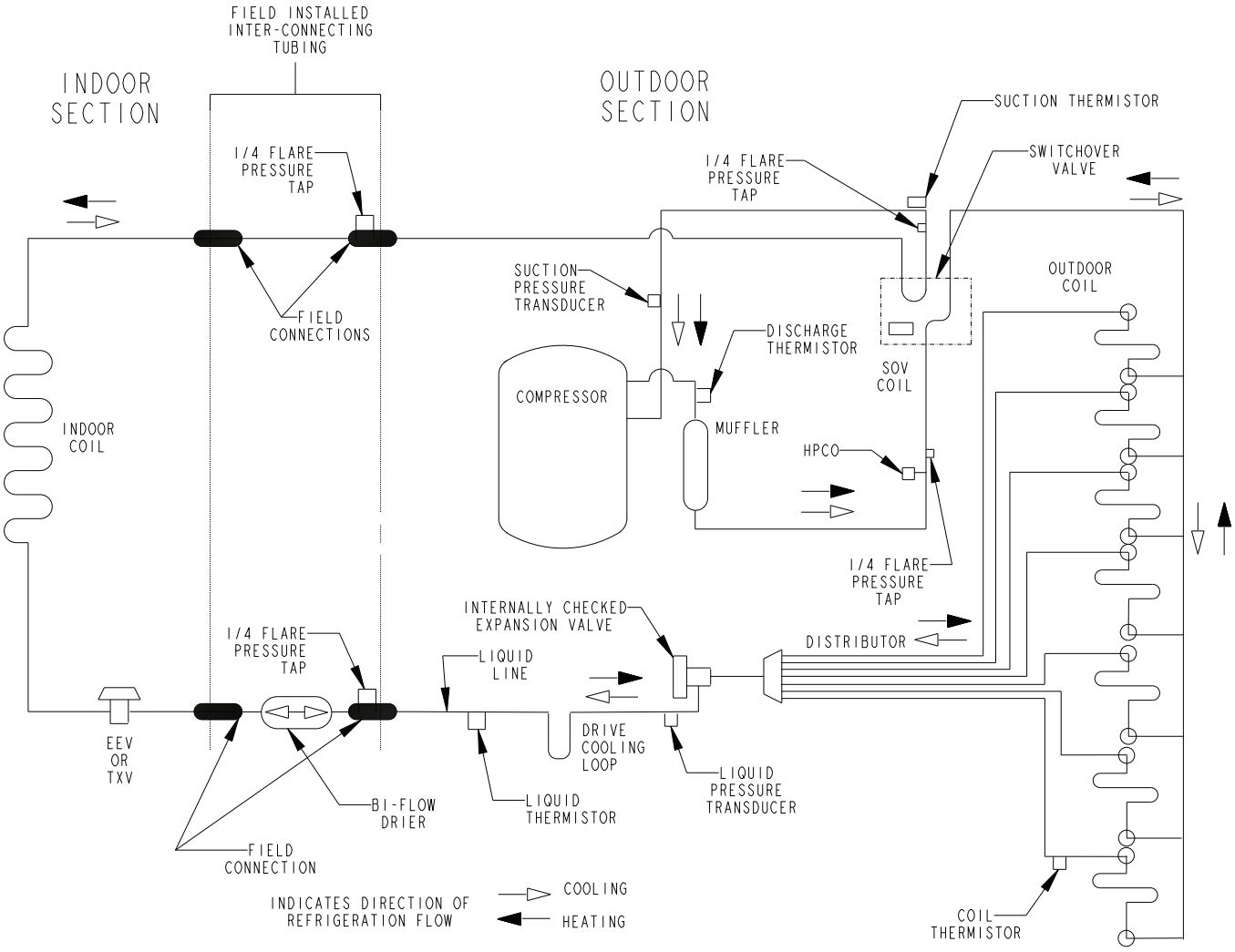
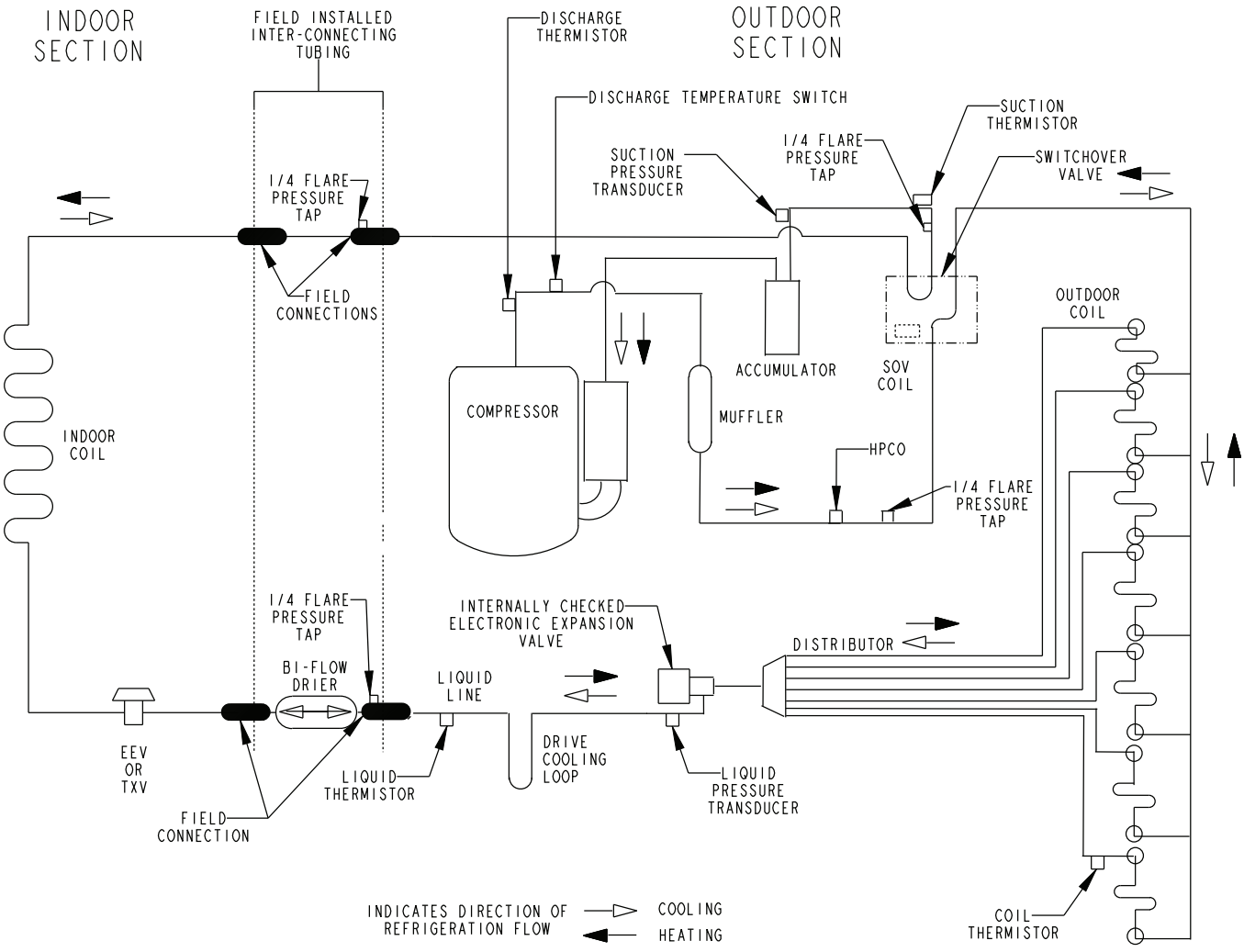


Figure 18. 5-ton HP (X60 models)



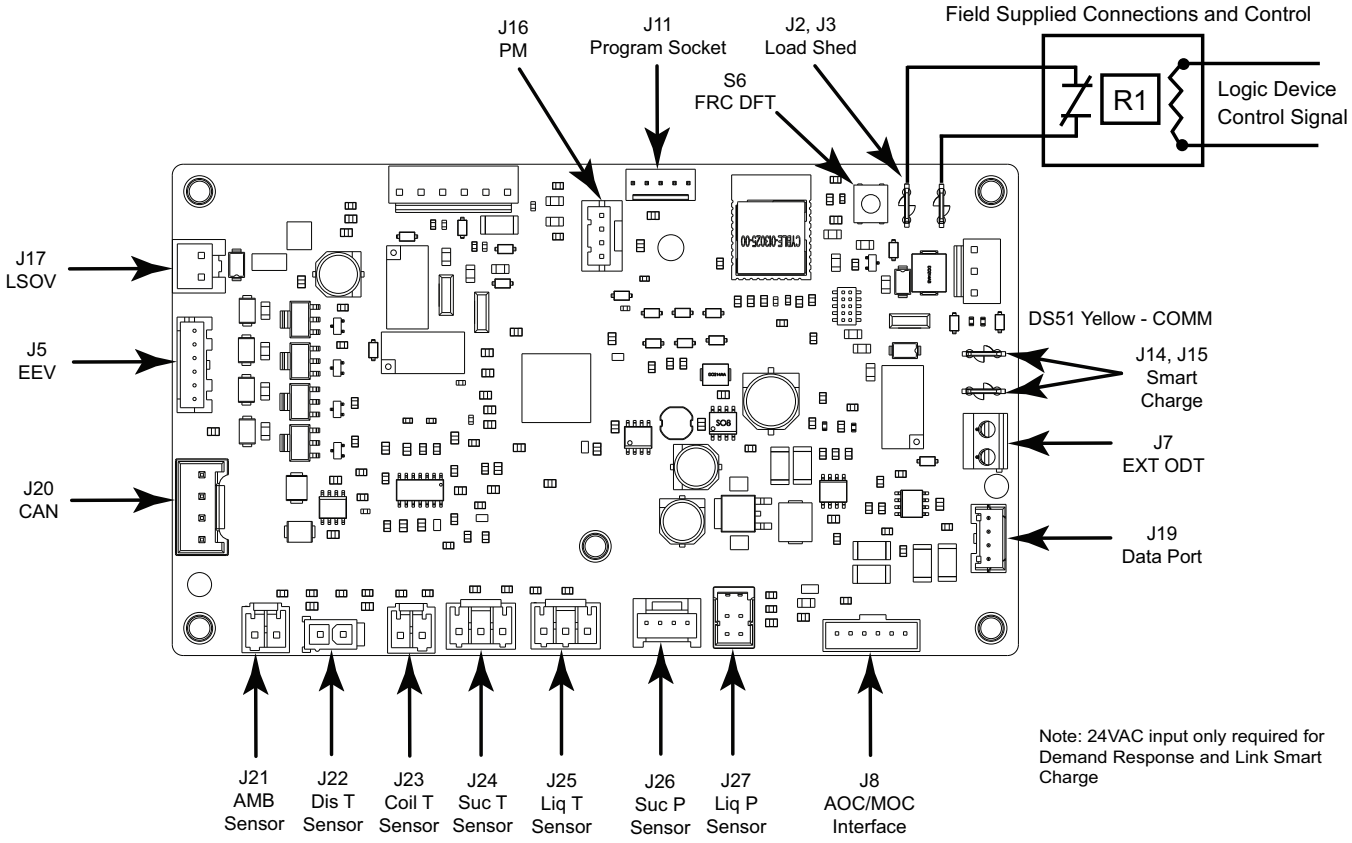
Load Shedding

External Shutdown

External Shutdown is used for Load Shedding and applies to both heating and cooling modes of operation.

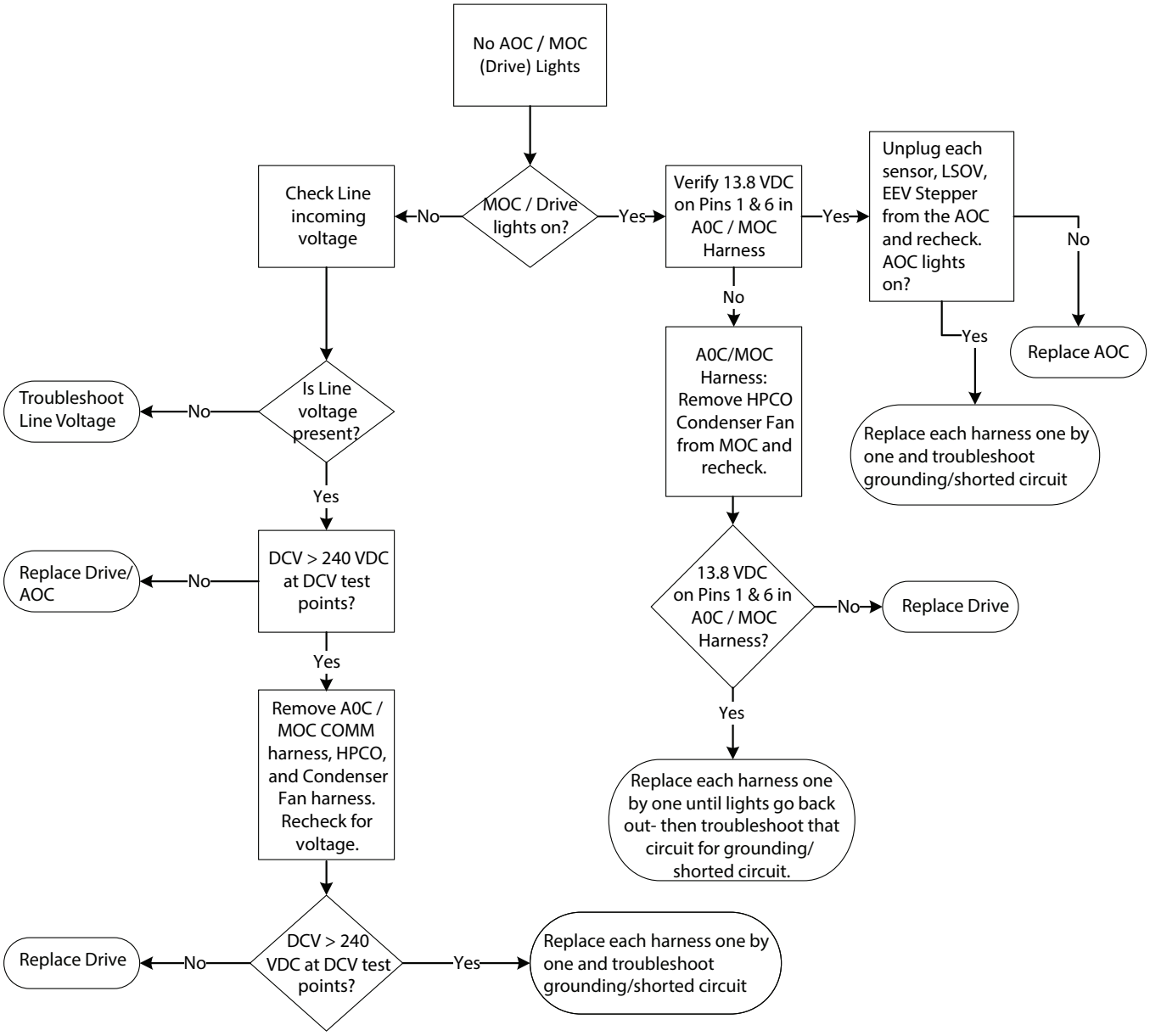
When applied, External Shutdown will allow for an operation to be interrupted when triggered by an external control device. Typical examples of external control devices are smart-home, home automation services, utility load shed/grid management, event/time of day pricing entities. While communicating devices and methodology of application are the responsibility of the provider, connection points with explanations of internal logic and trigger requirements are provided in this Technical Manual.

1. Configuring External Shutdown is accomplished at the UX360 or the Diagnostics Mobile App configuration menu. Field supplied wiring and ¼" stake-on hardware connections will be made at the J2 and J3 Load Shed terminals on the AOC. All External Switch configurations are defaulted INACTIVE from the factory. External Switch inputs are ACTIVE-SENSED meaning that when the control senses a open circuit through an external control relay, the control will react to what has been configured.
2. The system will react to what was configured until the External Switch contacts close and 24 vac is again sensed at the ODU Load Shed contact J3. If the ODU is running and is configured to be disabled during Load Shed and the external contacts open, the ODU will start a shutdown routine and operations will be interrupted for as long as the contacts remain open. When the External Switch contacts are open, the UX360 will display "Load Shed Active".

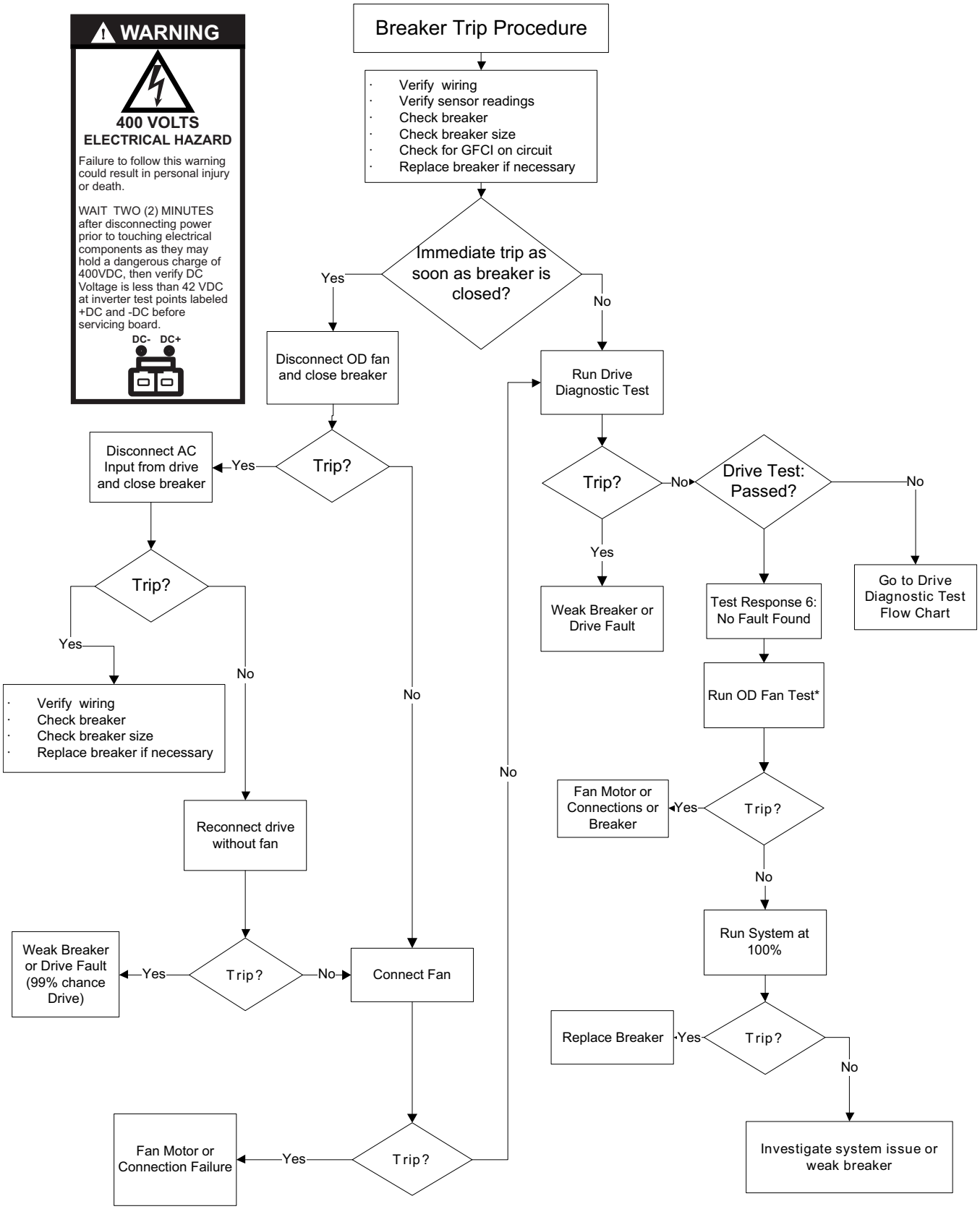


Note: *External Switch configurations are found in the UX360 or Diagnostics Mobile App configuration menu.*

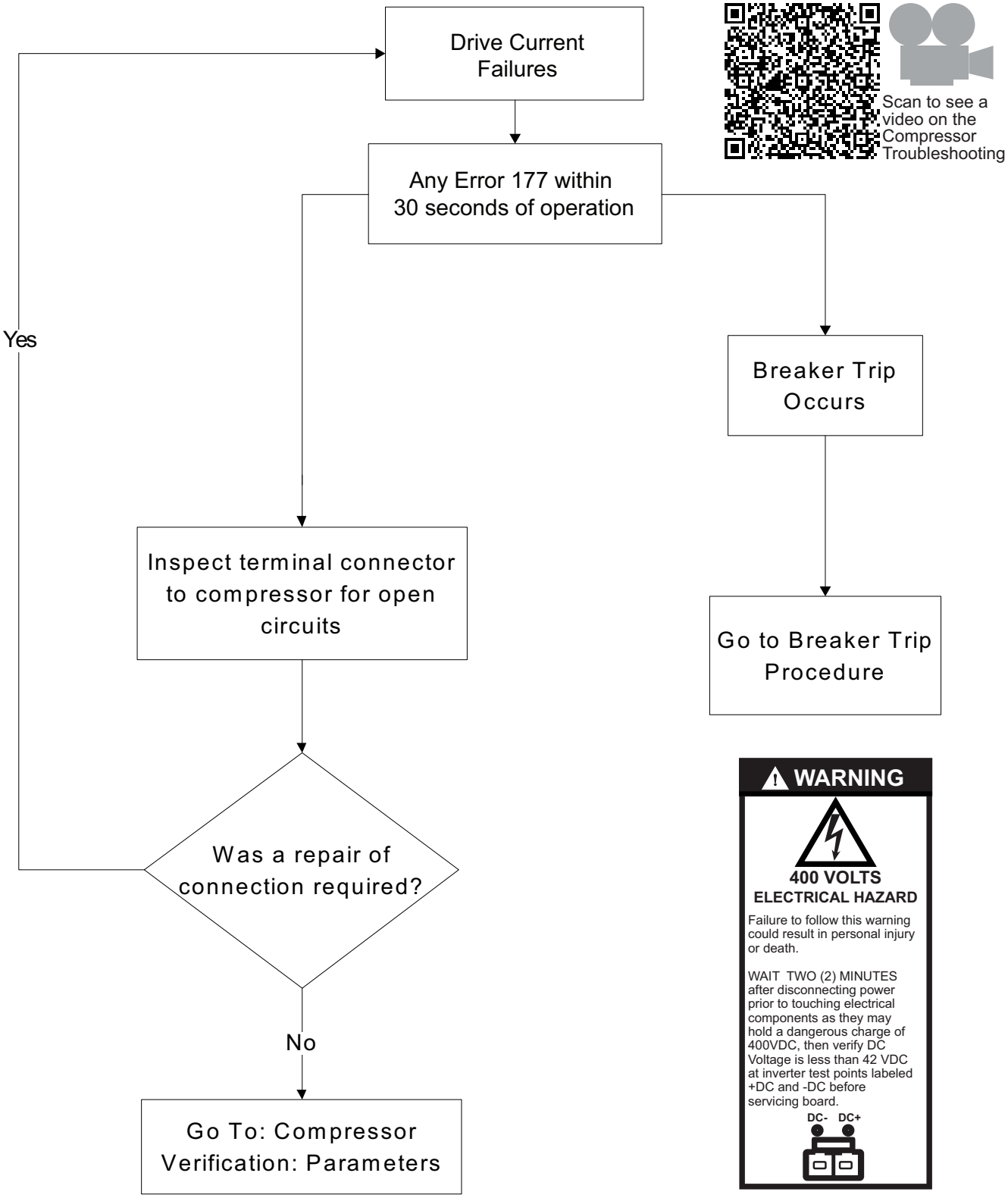
Communication Loss



Breaker Trip Procedure

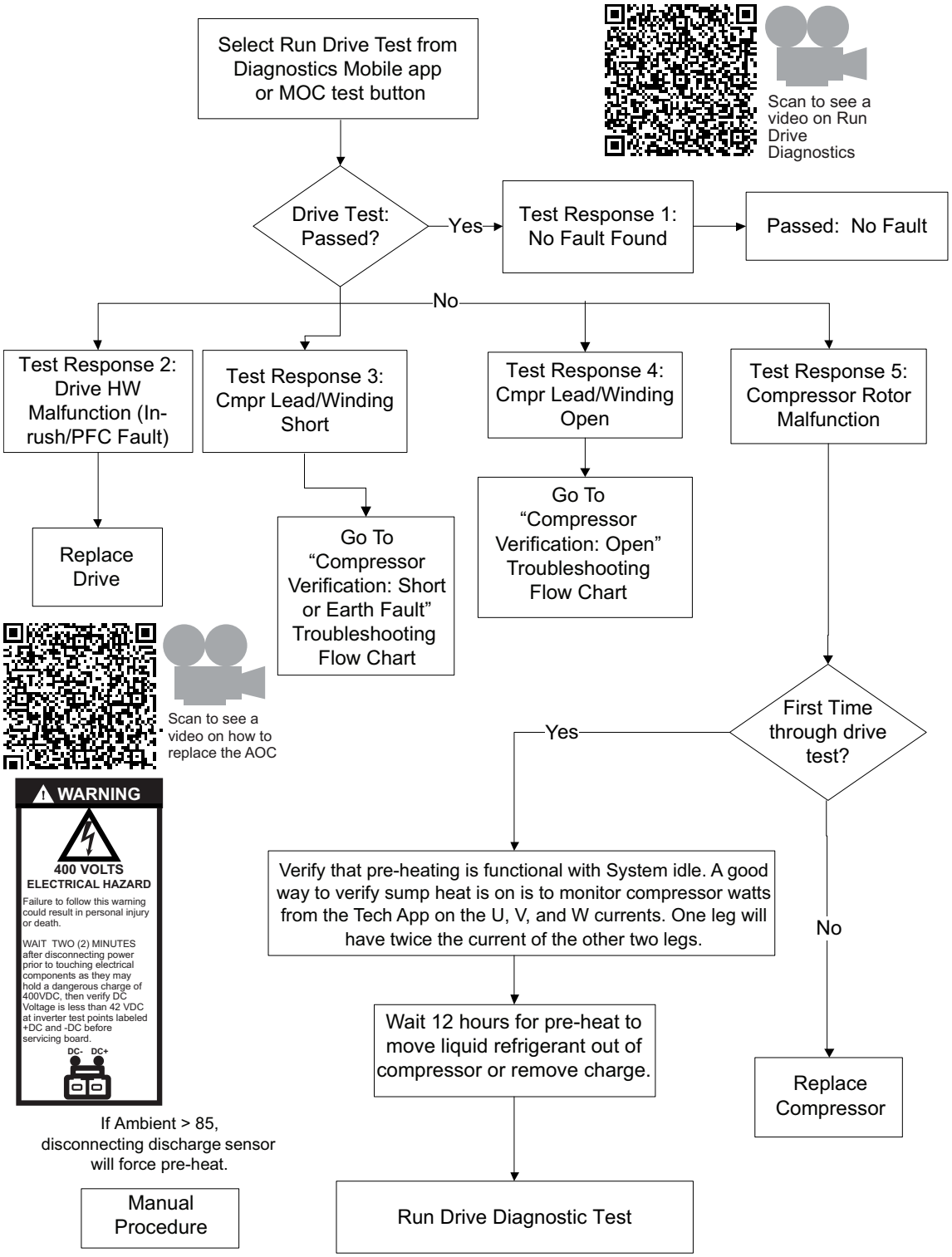


Start Compressor



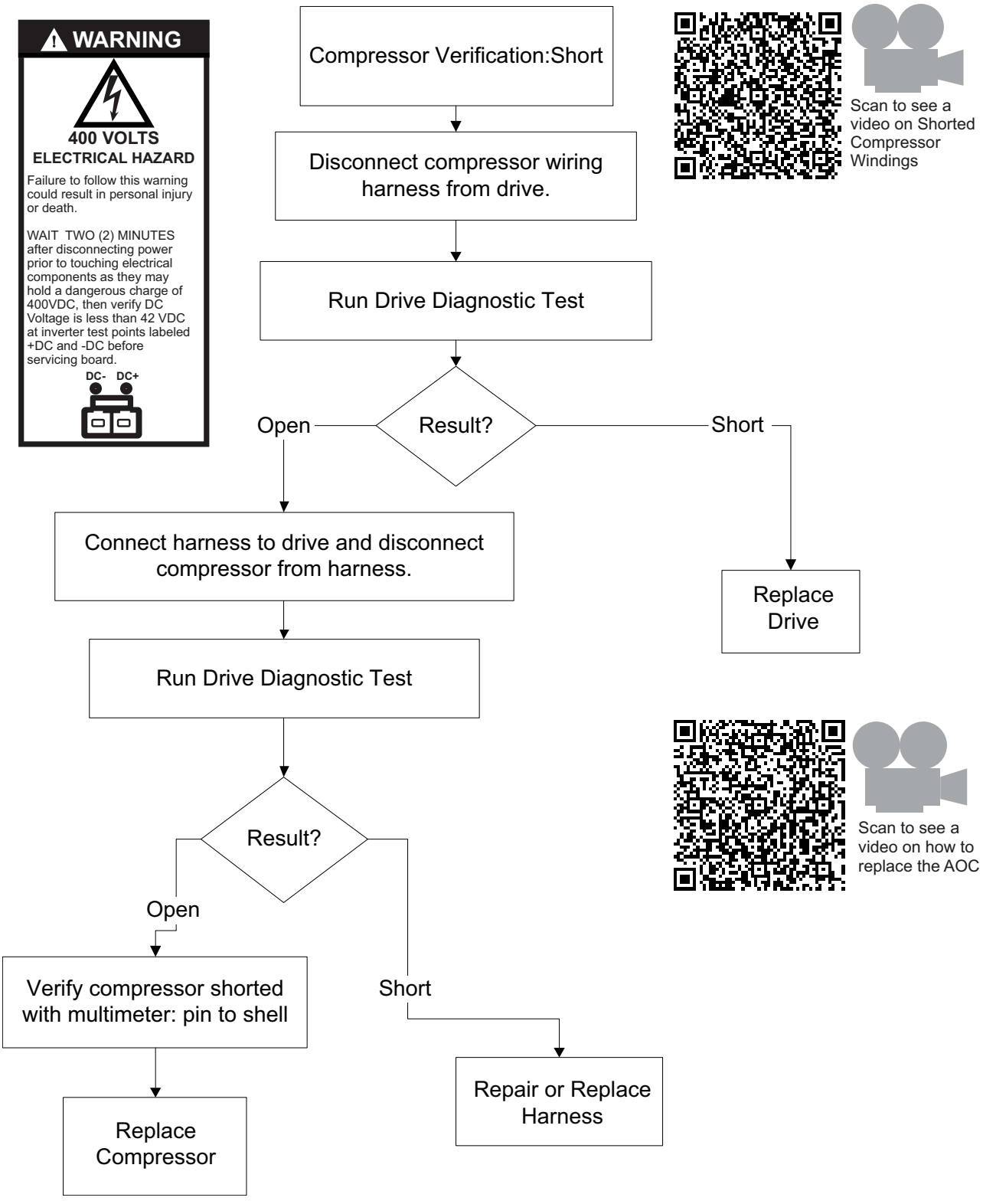
Run Drive Diagnostic Test

Figure 19. Run drive diagnostic test flowchart



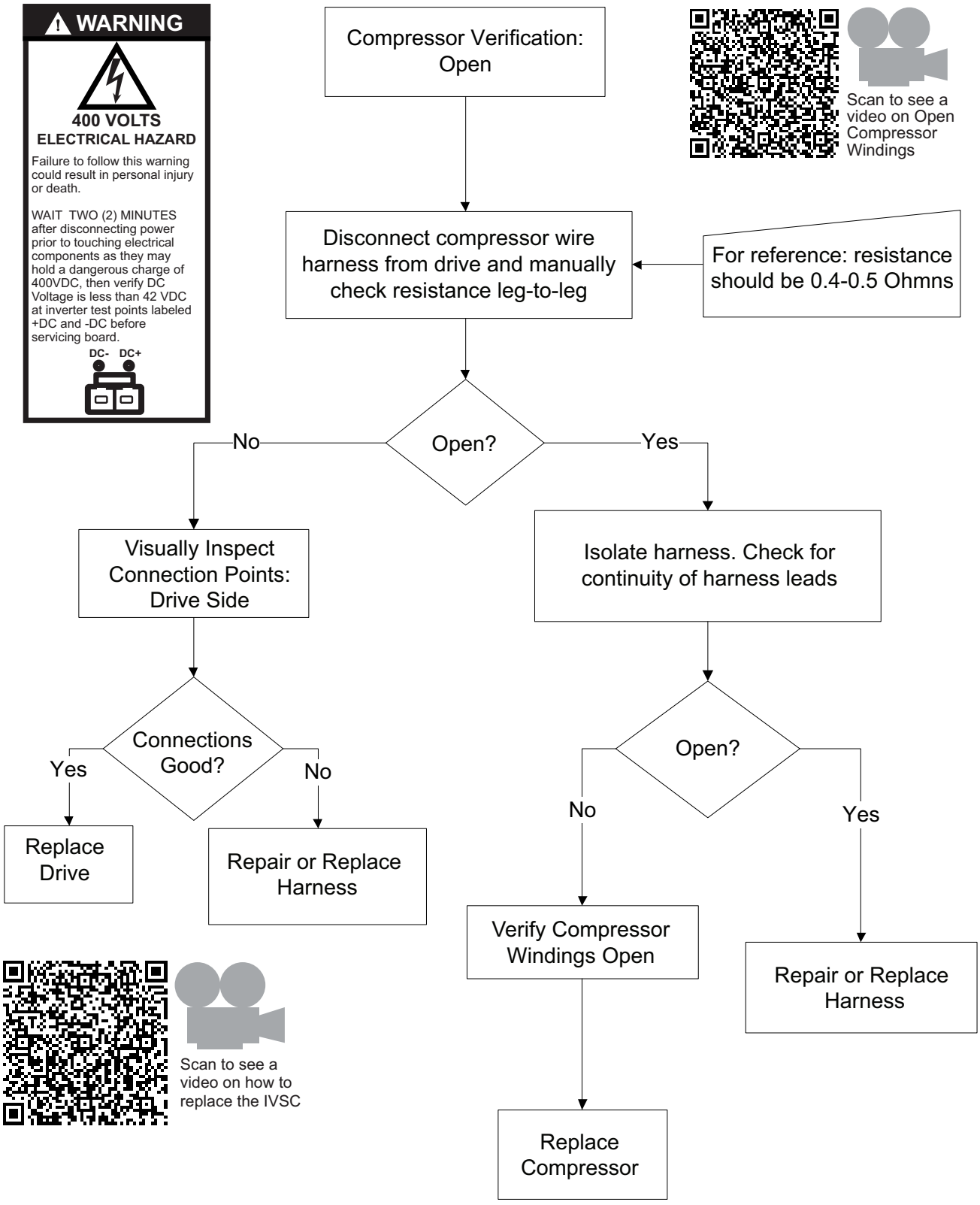
Compressor Verification: Short

Figure 20. Compressor verification: short flowchart



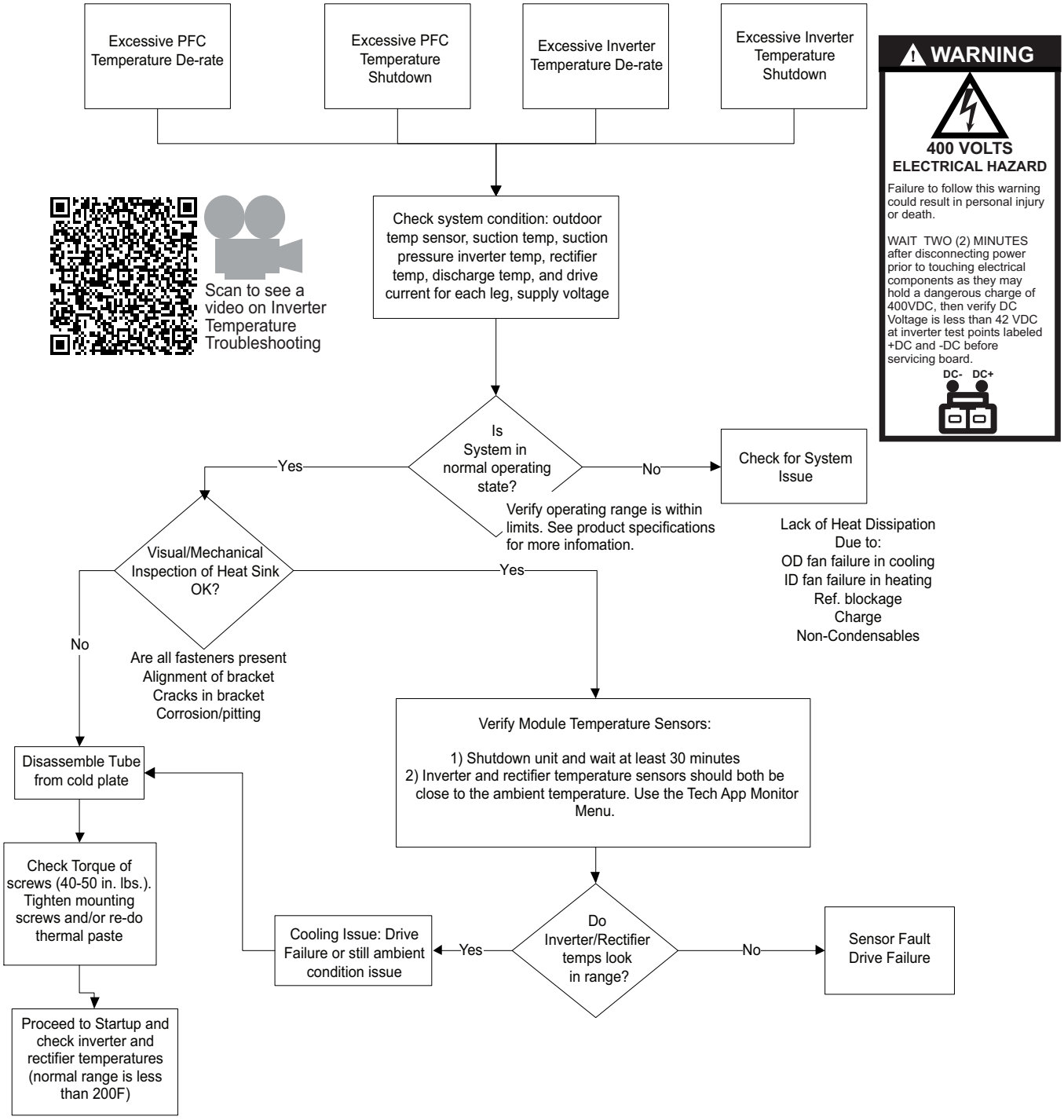
Compressor Verification: Open

Figure 21. Compressor verification: open flowchart



Inverter Temperature

Figure 22. Inverter temperature flowchart



Electronic Expansion Valve (EEV) Troubleshooting Flowchart

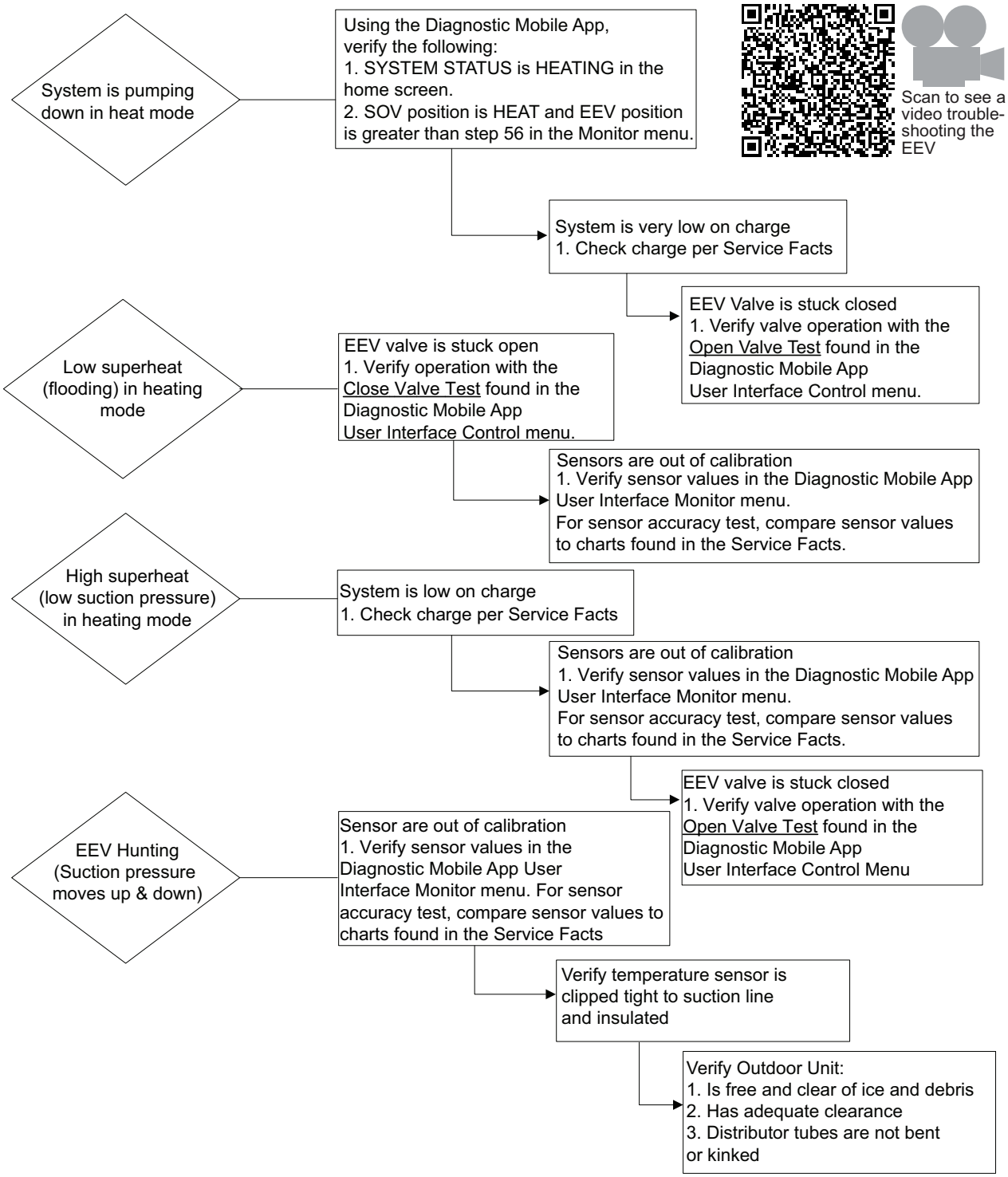
The Electronic Expansion Valve (EEV) installed in this heat pump is designed to control superheat entering the compressor when the system is running in mechanical heating mode. During cooling mode, refrigerant flow is controlled by the expansion device in the indoor unit. Therefore, any operational problems observed in cooling mode are not caused by the outdoor EEV.

The following flow chart was designed to assist in troubleshooting the EEV.

Note: *The EEV closes with every OFF cycle in the heating mode of operation. During Defrost and in the Cooling mode of operation, the EEV will drive to full open.*

Electronic Expansion Valve (EEV) Troubleshooting Flowchart

Figure 23. EEV troubleshooting flowchart

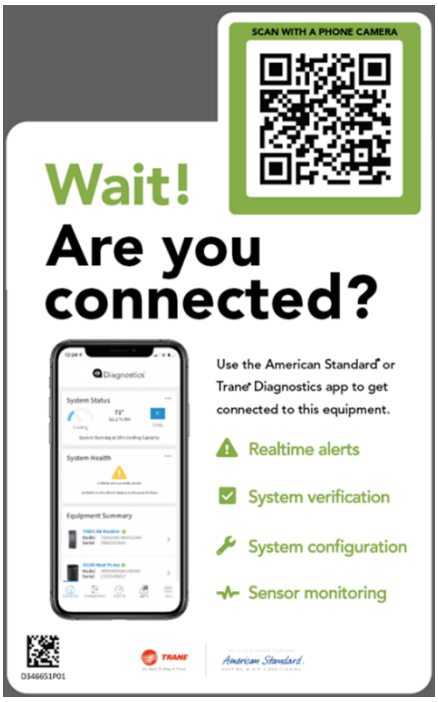


Download the App

The Diagnostics Mobile App can be found in your device App Store when searching for Trane Diagnostics or American Standard Diagnostics. A QR code can be scanned which sends you directly to the location:

The Diagnostics Mobile App allows full system interaction and includes Configuration and Monitor menus. There are no onboard methods to configure outdoor unit parameters. These configurations need to be completed in the Diagnostics Mobile App or from the UX360 thermostat.

Comfortsite or AsDealernet technician credentials are required to log in.



Sound Data

Model	Mode	Speed	A-Weighted Sound Power Level [dB (A)]	Full Octave Sound Power [dB]							
				63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
5TWV0X24A	Cool	Min	52	64.2	48.8	52.0	52.3	44.6	37.1	34.2	33.7
	Cool	Max	64	69.5	62.6	59.5	64.4	59.5	50.5	47.0	42.4
	Heat	Min	51	61.4	45.8	50.9	49.9	44.9	39.2	37.6	38.0
	Heat	Max	71	73.9	70.7	68.7	70.0	67.2	59.9	55.2	49.8
5TWV0X36A	Cool	Min	53	63.6	51.2	52.5	51.5	48.2	43.4	34.7	38.3
	Cool	Max	69	82.2	70.3	68.3	65.6	65.5	58.3	53.3	48.9
	Heat	Min	55	63.8	52.9	55.9	53.4	49.1	44.4	40.4	42.1
	Heat	Max	74	79.0	77.8	75.0	71.8	69.9	63.3	59.5	53.7
5TWV0X48A	Cool	Min	56	64.8	54.6	56.2	53.6	52.4	47.4	38.0	33.0
	Cool	Max	73	79.7	74.4	72.7	71.3	68.4	63.7	58.2	49.8
	Heat	Min	57	64.8	54.9	56.4	53.6	51.3	48.7	45.5	40.1
	Heat	Max	75	82.1	75.5	74.5	72.2	69.7	65.4	61.2	52.8
5TWV0X60A	Cool	Min	63	62.1	56.5	60.2	61.7	61.6	45.4	37.4	38.2
	Cool	Max	74	75.5	74.2	73.1	73.5	68.6	63.6	59.2	51.8
	Heat	Min	61	64.6	56.0	57.4	58.2	59.1	46.4	42.6	39.2
	Heat	Max	73	87.3	77.8	72.0	71.2	67.2	63.3	60.4	52.1

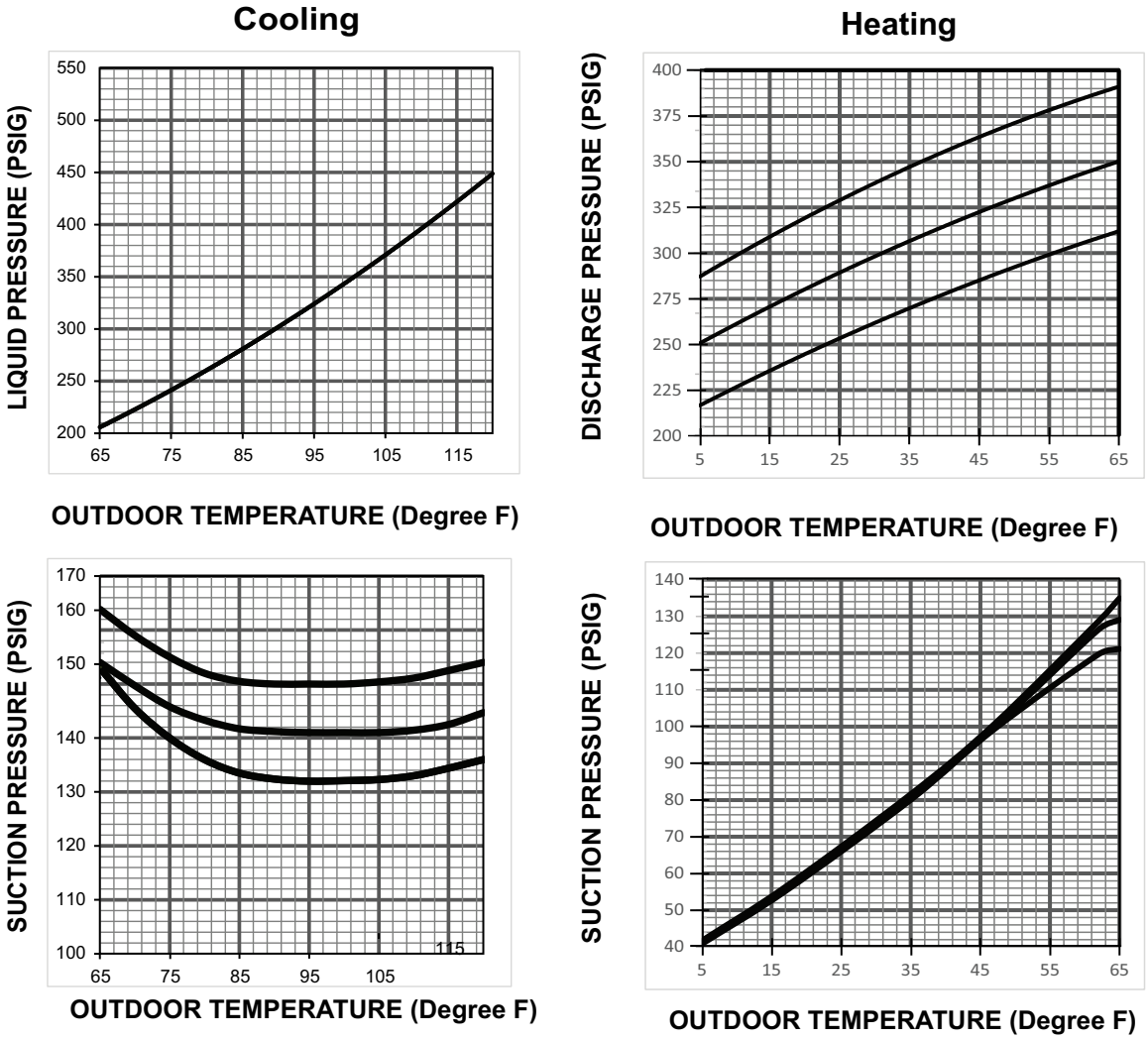
Note: *Rated in accordance with AHRI Standard 270.*

Model	Mode	Speed	A-Weighted Sound Power Level [dB (A)]	Full Octave Sound Power [dB]							
				63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
5TTV0X24A	Cool	Min	52	64.2	48.8	52.0	52.3	44.6	37.1	34.2	33.7
	Cool	Max	64	69.5	62.6	59.5	64.4	59.5	50.5	47.0	42.4
5TTV0X25A	Cool	Min	58	65.9	54.9	54.2	58.5	51.2	41.8	32.5	38.7
	Cool	Max	66	73.6	67.1	64.6	63.4	60.8	54.4	47.2	43.4
5TTV0X36A	Cool	Min	53	63.6	51.2	52.5	51.5	48.2	43.4	34.7	38.3
	Cool	Max	69	82.2	70.3	68.3	65.6	65.5	58.3	53.3	48.9
5TTV0X48A	Cool	Min	56	64.8	54.6	56.2	53.6	52.4	47.4	38.0	33.0
	Cool	Max	73	79.7	74.4	72.7	71.3	68.4	63.7	58.2	49.8
5TTV0X60A	Cool	Min	56	62.1	54.6	56.2	53.6	52.4	47.4	38.0	33.0
	Cool	Max	76	77.6	76.7	74.9	74.4	71.6	66.5	61.9	53.7

Note: *Rated in accordance with AHRI Standard 270.*

Pressure Curves

Figure 24. 2 Ton HP (X24 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING OR CHECK CHARGE MODE - HEATING. TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ DISCHARGE (4) OR SUCTION PRESSURE (5) IN LEFT COLUMN.

THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F).
THE HEATING CHARTS REPRESENT INDOOR ENTERING DRY BULB CURVES (TOP TO BOTTOM ARE 80, 70, AND 60 DEG F).

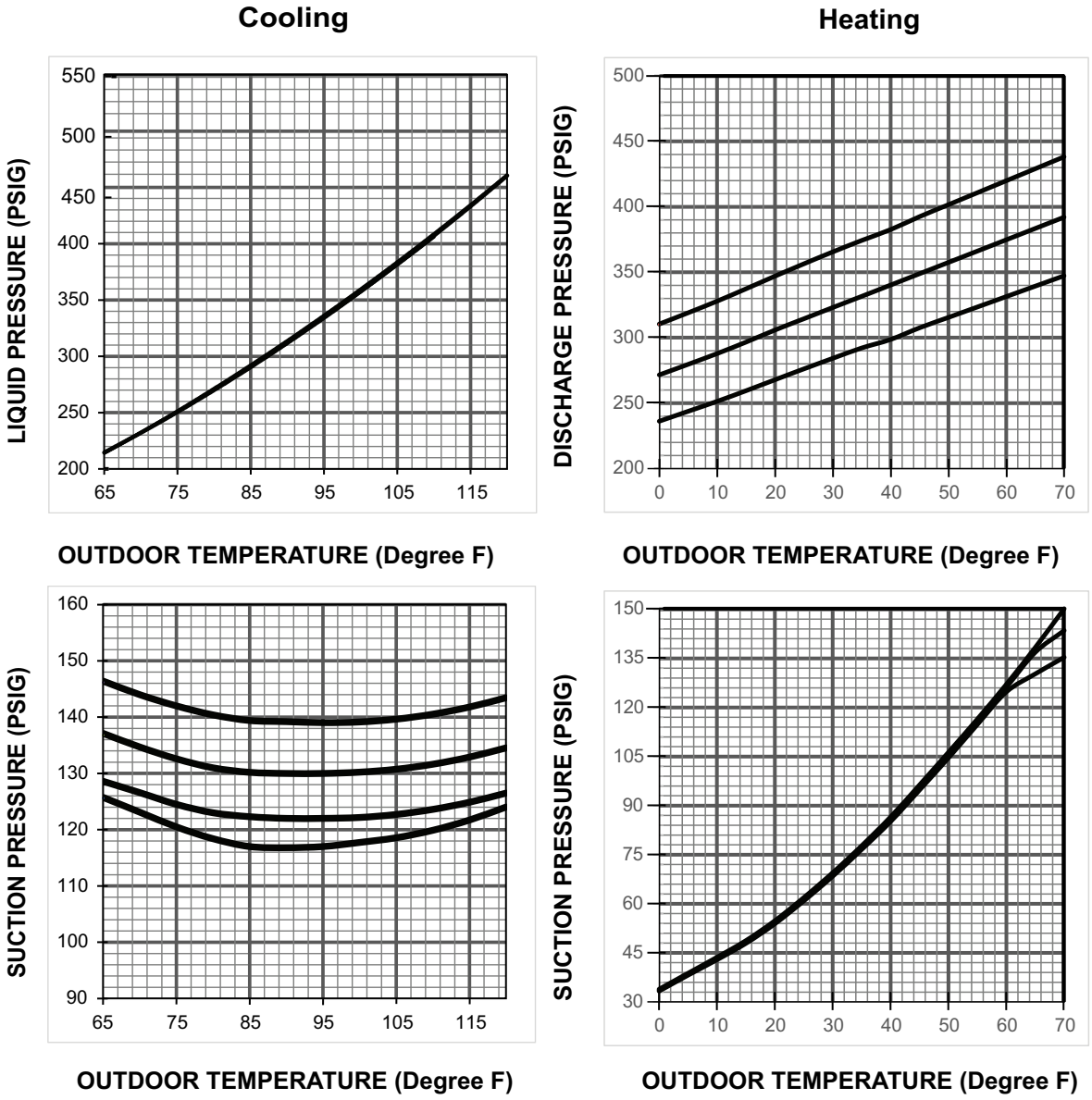
ACTUAL:
DISCHARGE AND LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2” O.D.
LIQUID - 5/16” O.D.

DWG. NO. 5TWV0X24A

Pressure Curves

Figure 25. 3 Ton HP (X36 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING OR CHECK CHARGE MODE - HEATING. TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ DISCHARGE (4) OR SUCTION PRESSURE (5) IN LEFT COLUMN.

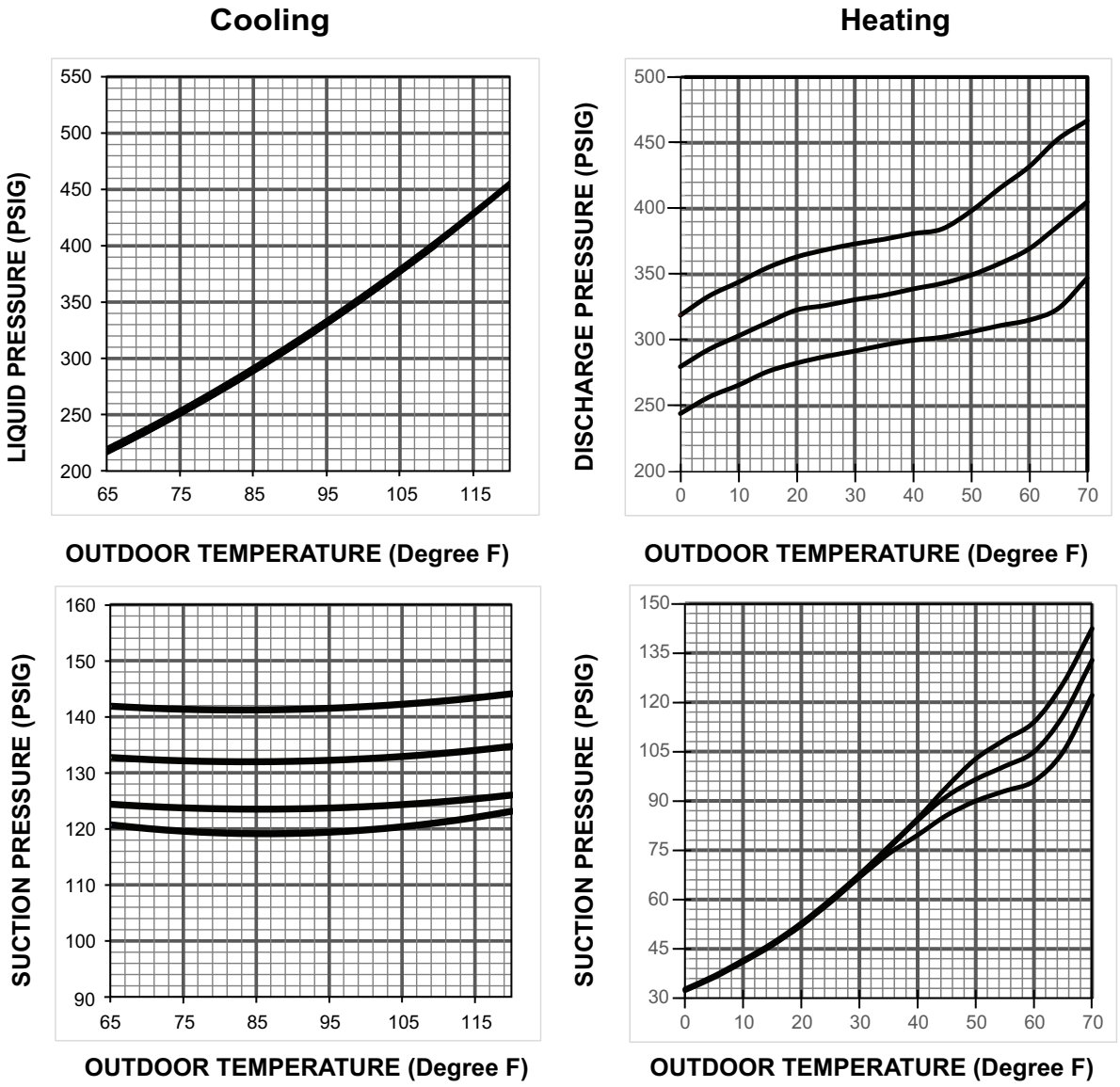
THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F).
THE HEATING CHARTS REPRESENT INDOOR ENTERING DRY BULB CURVES (TOP TO BOTTOM ARE 80, 70, AND 60 DEG F).

ACTUAL:
DISCHARGE AND LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2” O.D.
LIQUID - 5/16” O.D.

DWG. NO. 5TWV0X36A

Figure 26. 4 Ton HP (X48 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING OR CHECK CHARGE MODE - HEATING. TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ DISCHARGE (4) OR SUCTION PRESSURE (5) IN LEFT COLUMN.

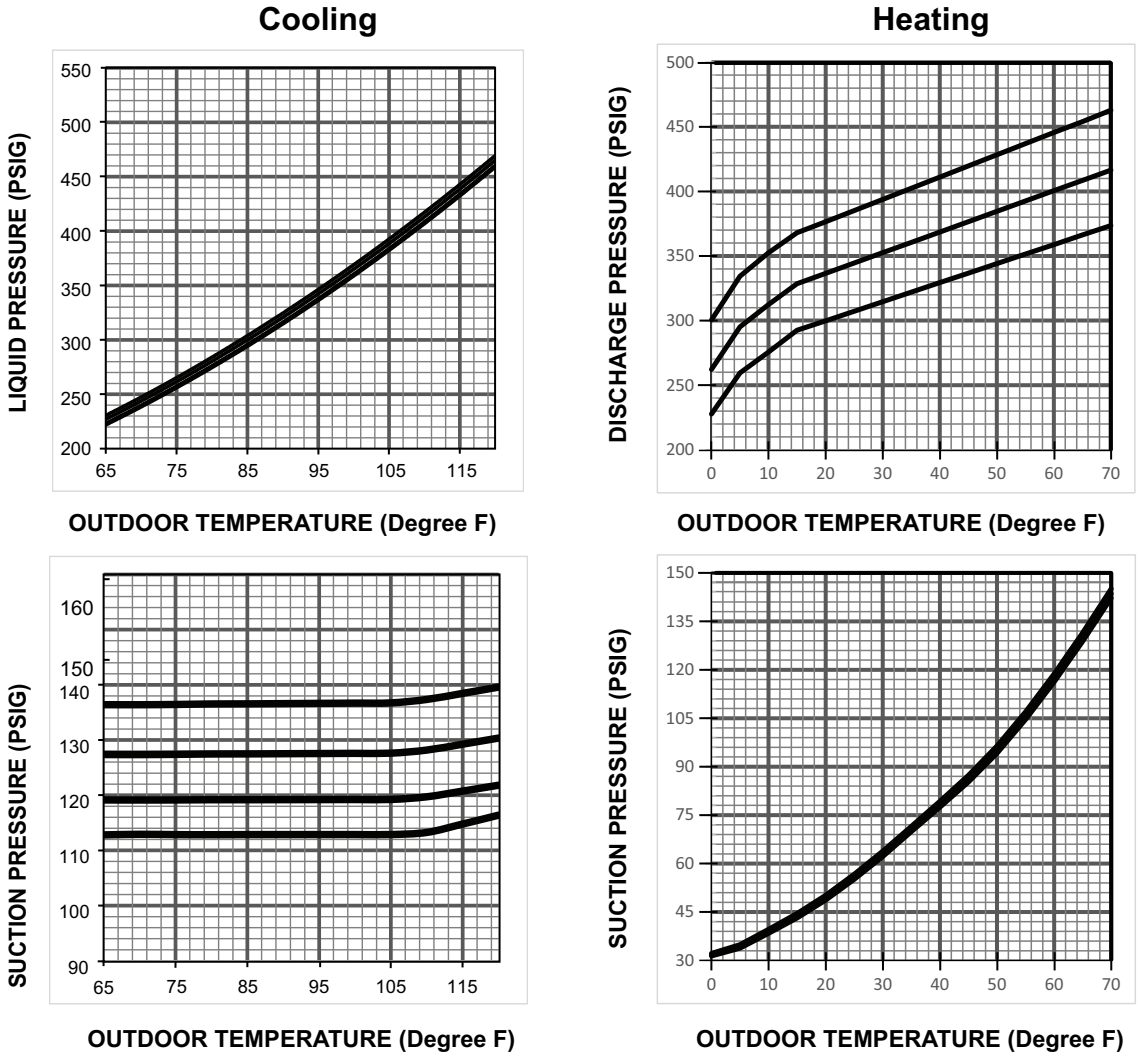
THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F).
THE HEATING CHARTS REPRESENT INDOOR ENTERING DRY BULB CURVES (TOP TO BOTTOM ARE 80, 70, AND 60 DEG F).

ACTUAL:
DISCHARGE AND LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2” O.D.
LIQUID - 5/16” O.D.

DWG. NO. 5TWV0X48A

Figure 27. 5 Ton HP (X60 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING OR CHECK CHARGE MODE - HEATING. TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ DISCHARGE (4) OR SUCTION PRESSURE (5) IN LEFT COLUMN.

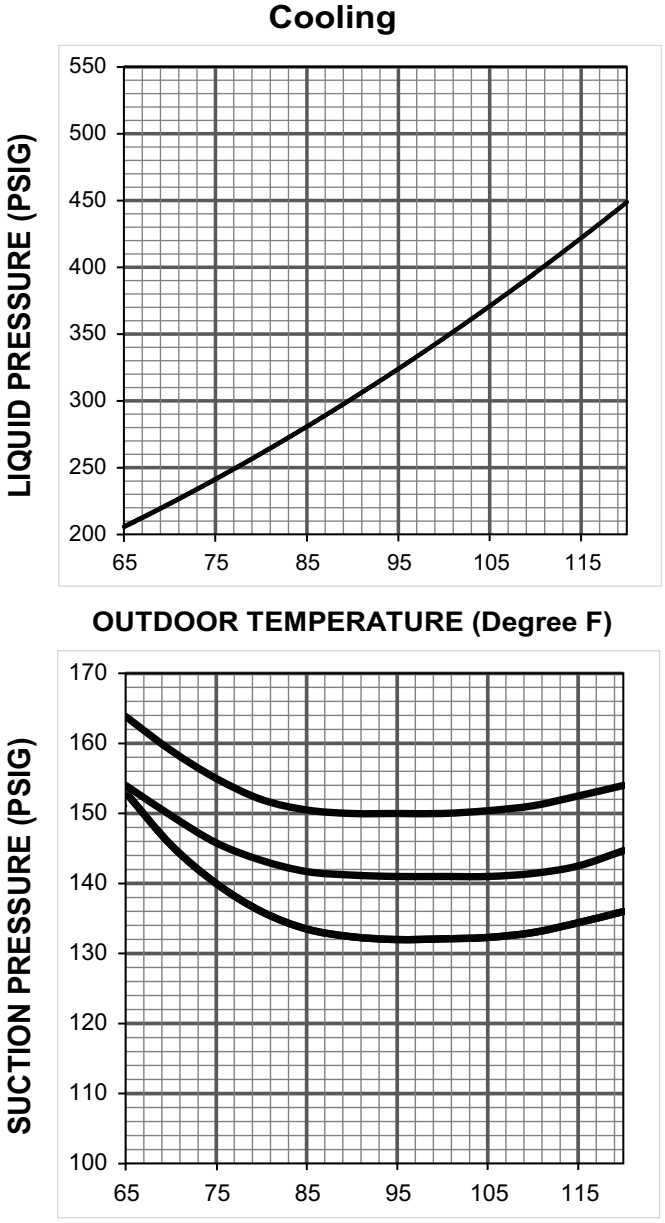
THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F).
THE HEATING CHARTS REPRESENT INDOOR ENTERING DRY BULB CURVES (TOP TO BOTTOM ARE 80, 70, AND 60 DEG F).

ACTUAL:
DISCHARGE AND LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2” O.D.
LIQUID - 5/16” O.D.

DWG. NO. 5TWV0X60A

Figure 28. 2 Ton AC (X24 and X25 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING.

TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ LIQUID (4) OR SUCTION (5) PRESSURE IN LEFT COLUMN.

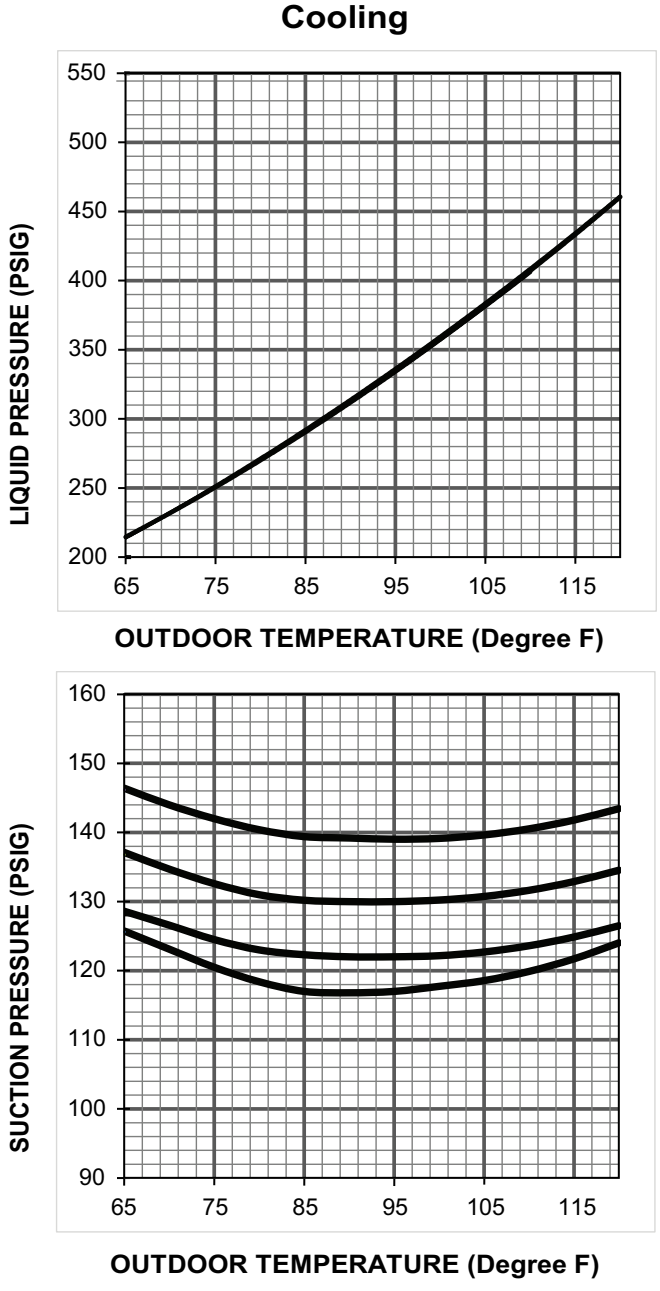
THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F)

ACTUAL:
LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2" O.D.
LIQUID - 5/16" O.D.

DWG. NO. 5TTV0X24A
5TTV0X25A

Figure 29. 3 Ton AC (X36 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING.

TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ LIQUID (4) OR SUCTION (5) PRESSURE IN LEFT COLUMN.

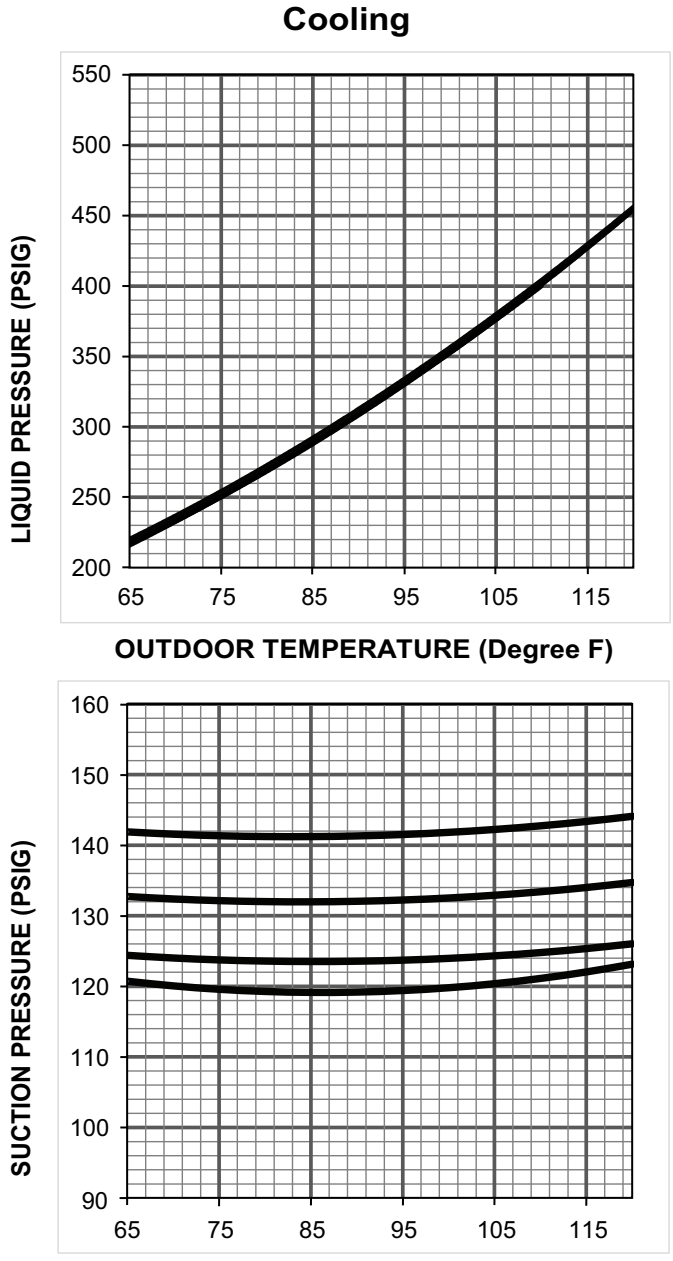
THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F)

ACTUAL:
LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2" O.D.
LIQUID - 5/16" O.D.

DWG. NO. 5TTV0X36A

Figure 30. 4 Ton AC (X48 Models)



COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING.

TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ LIQUID (4) OR SUCTION (5) PRESSURE IN LEFT COLUMN.

THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F)

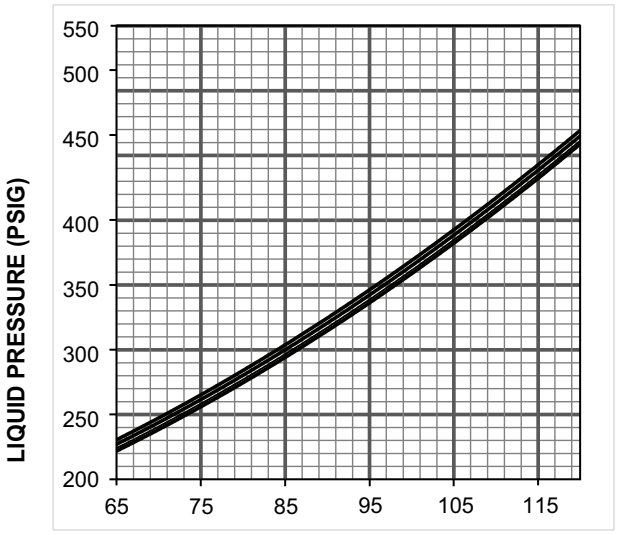
ACTUAL:
LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

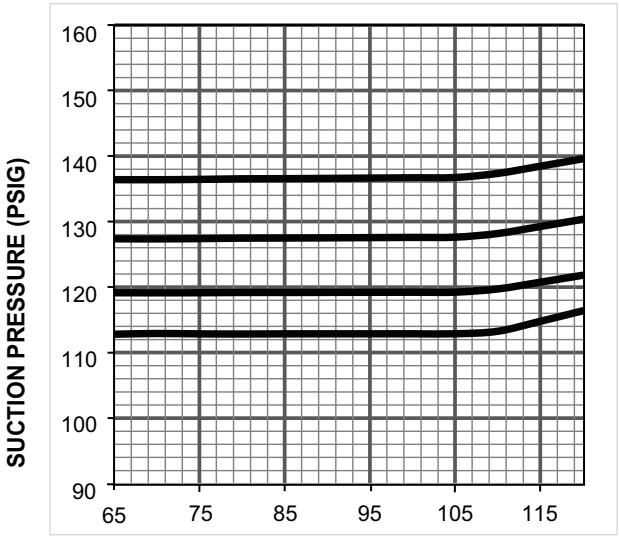
RATED INTERCONNECTING LINES
GAS - 1/2" O.D.
LIQUID - 5/16" O.D.

DWG. NO. 5TTV0X48A

Figure 31. 5 Ton AC (X60 Models)

Cooling





COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 55F.
* WHEN USING PRESSURE CURVES TO VERIFY TYPICAL PERFORMANCE, ALWAYS RUN THE SYSTEM WITH ONE OF THE TEST MODES FOUND IN THE 950/850 COMFORT CONTROL. CHARGING MODE - COOLING.

TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABLIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, LIQUID AND SUCTION PRESSURES. ON THE PLOTS, LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ LIQUID (4) OR SUCTION (5) PRESSURE IN LEFT COLUMN.

THE COOLING CHARTS REPRESENT INDOOR ENTERING WET BULB CURVES (TOP TO BOTTOM ARE 71, 67, 63, AND 59 DEG. F)

ACTUAL:
LIQUID PRESSURE SHOULD BE +/- 10 PSI OF CHART
SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

RATED INTERCONNECTING LINES
GAS - 1/2" O.D.
LIQUID - 5/16" O.D.

DWG. NO. 5TTV0X60A

Warranty Claim Process
Integrated Variable Speed Control (Drive/MOC)

Servicing Dealers must obtain a pre-authorization number from a Field Service Representative (FSR) or a Factory Variable Speed Support Agent to obtain a warranty credit when replacing the Integrated Variable Speed Control Drive.

Pre-Authorization Process

If the Drive is suspected to have failed, servicing technicians must follow all troubleshooting guidelines found in the Service Facts or Technical Manual. The local FSR should be contacted for additional diagnostic assistance and/or to obtain a pre-authorization number when a Drive failure has been confirmed. If the local FSR is not available, technicians should call the Factory Variable Speed Support Agent at 1-855-211-8900. This number can also be found inside the control box cover of the Variable Speed Outdoor Unit.

Before a technician calls for pre-authorization:

- Record all alerts found on the UX360 User Interface and/or Diagnostic Mobile App.
- Record all Alerts reported to the UX360 User Interface and/or Diagnostic Mobile App.
- Run the drive diagnostic test found in the Service Sections of the Diagnostic Mobile App and/or UX360 User Interface.

When a technician calls for pre-authorization from the job site:

- The FSR or Factory Variable Speed Support Agent will create a WMS ticket to log details of the diagnosis for the Drive warranty claim. The WMS ticket number will be provided to the technician.
- The technician should record and save the WMS ticket number. This will serve as the pre-authorization number.
- To file a warranty claim, the technician should provide the WMS pre-authorization number to the Parts Center agent when receiving the replacement Drive. If truck stock is used, provide the pre-authorization number with the returned Drive.
- The Parts Center representative will enter the pre-authorization number for warranty credit and give the technician a return invoice.
- The WMS ticket will be cross referenced. If invalid, the claim will be reversed.
- All Drives are on Mandatory Return. Use the label provided on the replacement Drive packaging box to record the WMS pre-authorization number and return date.

Notices

FCC Notice

Contains FCC ID: WAP3025

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.
This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- *Reorient or relocate the receiving antenna*
- *Increase the separation between the equipment and receiver*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected*
- *Consult the dealer or an experienced radio/TV technician for help*

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC Notice

Contains IC ID: 7922A-3025

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de license. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil de doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Notes

Trane - by Trane Technologies (NYSE: TT), a global innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

The AHRI Certified mark indicates Trane U.S. Inc. participation in the AHRI Certification program. For verification of individual certified products, go to ahridirectory.org.

Trane has a policy of continuous data improvement and it reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.

ODR-SVF009B-EN 23 Aug 2025
Supersedes ODR-SVF009A-EN (April 2025)