Installation Instructions

Start to Finish™ Compressors

SFCOM072***2MSNBC
SFCOM072***7PSNB
SFCOM084***2MSNBC
SFCOM084***7PSNBC
SFCOM096***2MSNBC
SFCOM096***7PSNBC
SFCOM108***2MSNBC
SFCOM108***7PSNBC
SFCOM110***2MSNBA
SFCOM110***7PSNBA
SFCOM120***2MSNBC
SFCOM120***7PSNBC
SFCOM125***2MSNBA
SFCOM125***7PSNBA
SFCOM144***2MSNBA
SFCOM168***2MSNBA
SFCOM168***7PSNBA
SFCOM180***2MSNBA
SFCOM180***7PSNBA

⚠ 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 2020 **PART-SVN229E-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

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. advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Important Responsible Refrigerant Practices

 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. 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 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 Labeling 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.**

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Revision History

Updates to:

- "Model Number Descriptions," p. 5
- "General Information," p. 6
- "Dimensional Data," p. 7
- "Compressor Oils," p. 12

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Model Number Descriptions

Digit 1, 2 — Brand

SF = Start to Finish™

Digit 3, 4, 5 — Unit Type

COM= Scroll Compressor

Digit 6, 7, 8 — Nominal Capacity

072 = 72 MBtu/h
084 = 84 MBtu/h
096 = 96 MBtu/h
108 = 108 MBtu/h
110 = 110 MBtu/h
120 = 120 MBtu/h
125 = 125 MBtu/h
144 = 144 MBtu/h
168 = 168 MBtu/h
180 = 180 MBtu/h

Digit 9, 10, 11 — Electrical Code

200 = 200/3
230 = 230/3
460 = 460/3
575 = 575/3

Digit 12 — Refrigerant

2 = R-22
4 = R-410A
7 = R-407C

Digit 13 — Lubricant

M = Mineral Oil
P = POE Oil

Digit 14 — Connection Type

R = Rotolock
S = Stub Tube

Digit 15 — Motor Protection

E = External Protection
N = Internal Protection

Digit 16 — Revision Level

0 = Initial Release
A = First Revision
B = Second Revision

Digit 17 — Bill of Material

A
C
D
N

General Information

Table 1. Available Start to Finish™ R-22 compressors

Model Number[a]	Service Part Number
SFCOM0722302MSNBC	SFCOM072-2302BC
SFCOM0724602MSNBC	SFCOM072-4602BC
SFCOM0725752MSNBC	SFCOM072-5752BC
SFCOM0842302MSNBC	SFCOM084-2302BC
SFCOM0844602MSNBC	SFCOM084-4602BC
SFCOM0845752MSNBC	SFCOM084-5752BC
SFCOM0962302MSNBC	SFCOM096-2302BC
SFCOM0964602MSNBC	SFCOM096-4602BC
SFCOM0965752MSNBC	SFCOM096-5752BC
SFCOM1082302MSNBC	SFCOM108-2302BC
SFCOM1084602MSNBC	SFCOM108-4602BC
SFCOM1085752MSNBC	SFCOM108-5752BC
SFCOM1102002MSNBA	SFCOM110-2002BA
SFCOM1102302MSNBA	SFCOM110-2302BA
SFCOM1104602MSNBA	SFCOM110-4602BA
SFCOM1105752MSNBA	SFCOM110-5752BA
SFCOM1202302MSNBC	SFCOM120-2302BC
SFCOM1204602MSNBC	SFCOM120-4602BC
SFCOM1205752MSNBC	SFCOM120-5752BC
SFCOM1252002MSNBA	SFCOM125-2002BA
SFCOM1252302MSNBA	SFCOM125-2302BA
SFCOM1254602MSNBA	SFCOM125-4602BA
SFCOM1255752MSNBA	SFCOM125-5752BA
SFCOM1442302MSNBA	SFCOM144-2302BA
SFCOM1444602MSNBA	SFCOM144-4602BA
SFCOM1445752MSNBA	SFCOM144-5752BA
SFCOM1682002MSNBA	SFCOM168-2002BA
SFCOM1682302MSNBA	SFCOM168-2302BA
SFCOM1684602MSNBA	SFCOM168-4602BA
SFCOM1685752MSNBA	SFCOM168-5752BA
SFCOM1802002MSNBA	SFCOM180-2002BA
SFCOM1802302MSNBA	SFCOM180-2302BA
SFCOM1804602MSNBA	SFCOM180-4602BA
SFCOM1805752MSNBA	SFCOM180-5752BA

(a) For more information, refer to "Model Number Descriptions," p. 5.

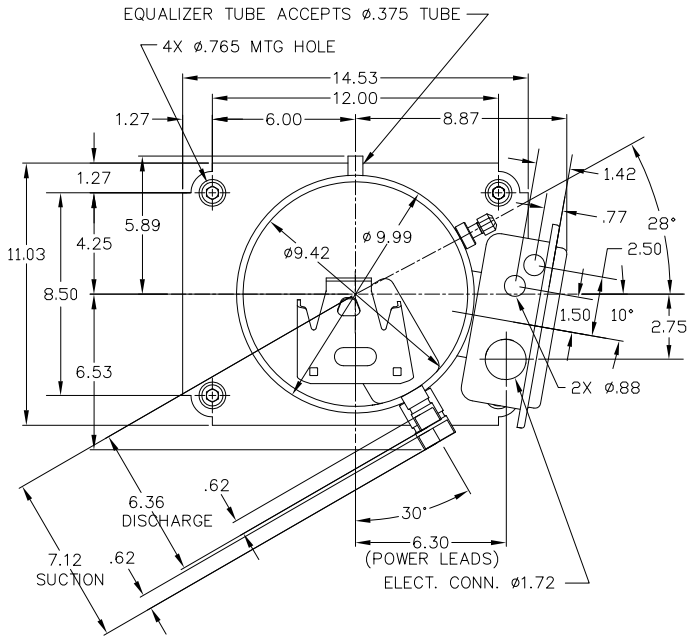
Table 2. Available Start to Finish™ R-407C compressors

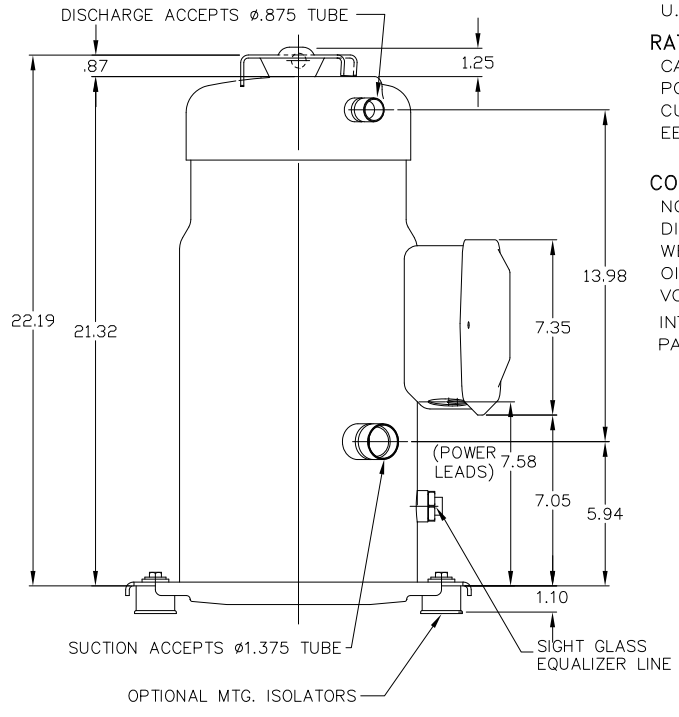
Model Number[a]	Service Part Number
SFCOM0722307PSNBC	SFCOM073-2307BC
SFCOM0724607PSNBC	SFCOM073-4607BC
SFCOM0725757PSNBC	SFCOM073-5757BC
SFCOM0842307PSNBC	SFCOM085-2307BC
SFCOM0844607PSNBC	SFCOM085-4607BC
SFCOM0845757PSNBC	SFCOM085-5757BC
SFCOM0962307PSNBC	SFCOM097-2307BC
SFCOM0964607PSNBC	SFCOM097-4607BC
SFCOM0965757PSNBC	SFCOM097-5757BC
SFCOM1082307PSNBC	SFCOM107-2307BC
SFCOM1084607PSNBC	SFCOM107-4607BC
SFCOM1085757PSNBC	SFCOM107-5757BC
SFCOM1102007PSNBA	SFCOM111-2007BA
SFCOM1102307PSNBA	SFCOM111-2307BA
SFCOM1104607PSNBA	SFCOM111-4607BA
SFCOM1105757PSNBA	SFCOM111-5757BA
SFCOM1202307PSNBC	SFCOM122-2307BC
SFCOM1204607PSNBC	SFCOM122-4607BC
SFCOM1205757PSNBC	SFCOM122-5757BC
SFCOM1252007PSNBA	SFCOM126-2007BA
SFCOM1252307PSNBA	SFCOM126-2307BA
SFCOM1254607PSNBA	SFCOM126-4607BA
SFCOM1255757PSNBA	SFCOM126-5757BA
SFCOM1682007PSNBA	SFCOM169-2007BA
SFCOM1682307PSNBA	SFCOM169-2307BA
SFCOM1684607PSNBA	SFCOM169-4607BA
SFCOM1685757PSNBA	SFCOM169-5757BA
SFCOM1802007PSNBA	SFCOM184-2007BA
SFCOM1802307PSNBA	SFCOM184-2307BA
SFCOM1804607PSNBA	SFCOM184-4607BA
SFCOM1805757PSNBA	SFCOM184-5757BA

(a) For more information, refer to "Model Number Descriptions," p. 5.

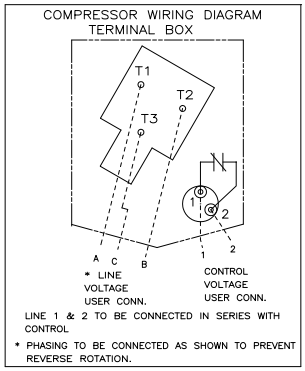
Dimensional Data

Figure 1. SFCOM110 and SFCOM125 compressors[a]





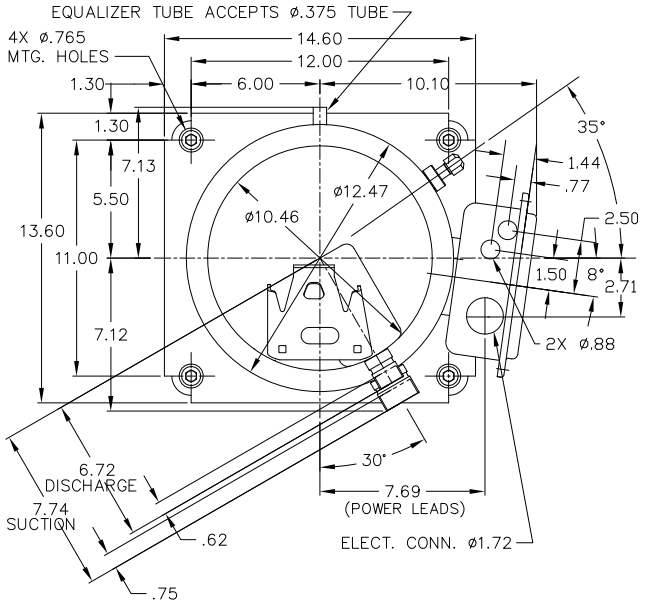
APPLICATION	9 TON 60Hz	10 TON 60Hz
REFRIGERANT	R–22	R–22
U.L. RECOGNIZED USA & CANADA		
RATED PERFORMANCE[a] @45°/130°/20°/15°		
CAPACITY (MBTU/HR)	114.0	121.2
POWER INPUT (KW)	10.52	11.20
CURRENT (460V/400V AMPS)	14.9/14.5	15.8/15.5
EER (BTU/W–HR)	10.8	10.8
COMPRESSOR DATA		
NOMINAL SPEED (RPM)	3500	3500
DISPLACEMENT (IN. CU/REV)	9.46	10.17
WEIGHT (LBS) W/O OIL	160	160
OIL CHARGE (PTS)	8.5	8.5
VOLUME RATIO	2.43	2.43
INTERNAL RELIEF DEVICE	NONE	NONE
PAINT COLOR	SLATE GRAY	SLATE GRAY

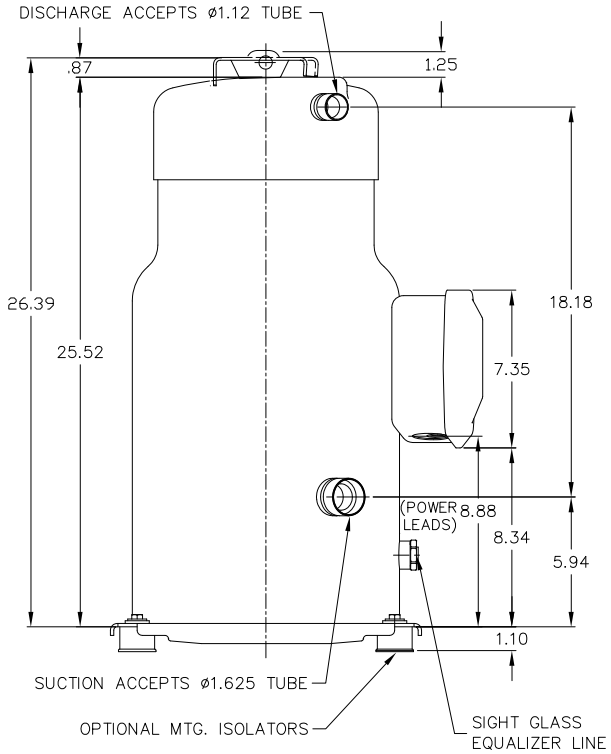


(a) The Start to Finish™ compressors are optimized for R-22 and mineral oil but can also be used for R-407C and POE oil.

Dimensional Data

Figure 2. SFCOM144 compressors[a]

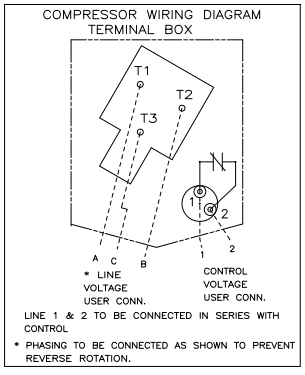




APPLICATION	12.5 TON 60Hz
REFRIGERANT	R-22
U.L. RECOGNIZED USA & CANADA	

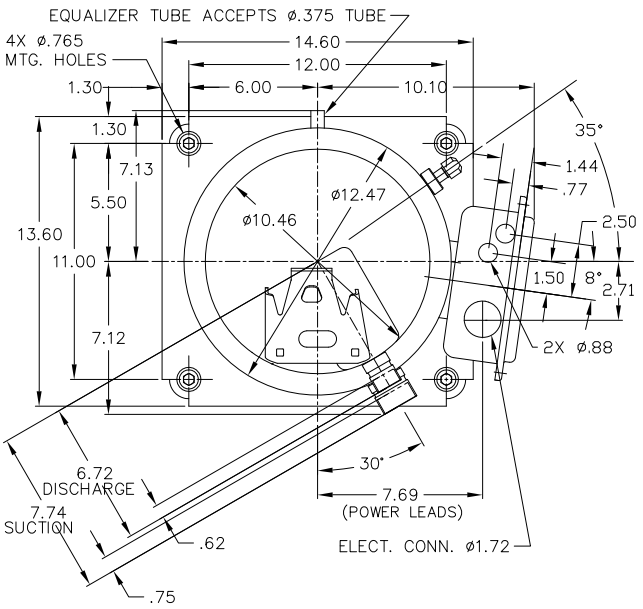
RATED PERFORMANCE[a] @45°/130°/20°/15°	
CAPACITY (MBTU/HR)	148.9
POWER INPUT (KW)	13.99
CURRENT (460V/400V AMPS)	20.8/20.7
EER (BTU/W-HR)	10.6

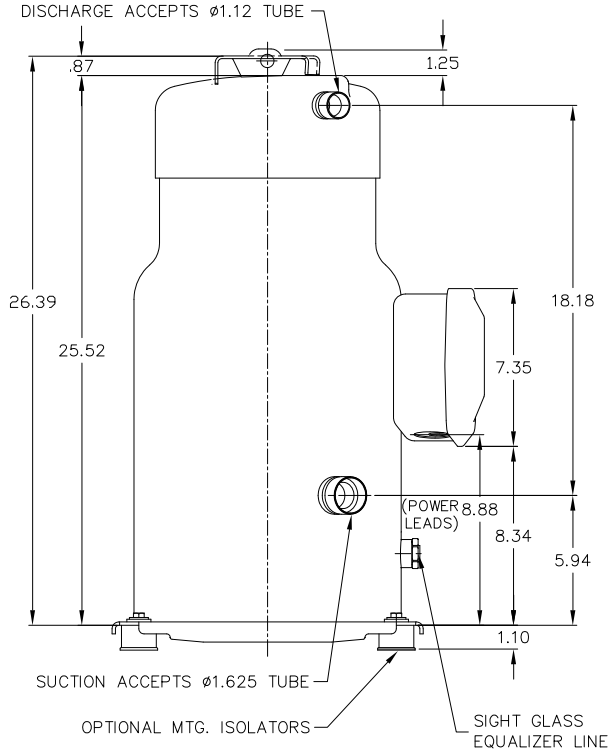
COMPRESSOR DATA	
NOMINAL SPEED (RPM)	3500
DISPLACEMENT (IN. CU/REV)	12.42
WEIGHT (LBS) W/O OIL	227
OIL CHARGE (PTS)	13.8
VOLUME RATIO	2.43
INTERNAL RELIEF DEVICE	NONE
PAINT COLOR	SLATE GRAY



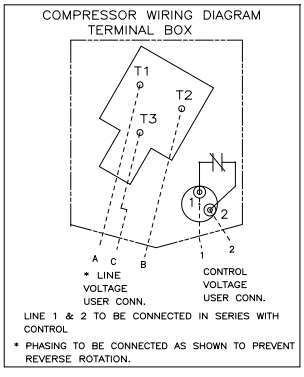
(a) The Start to Finish™ compressors are optimized for R-22 and mineral oil but can also be used for R-407C and POE oil.

Figure 3. SFCOM168 and SFCOM180 compressors[a]





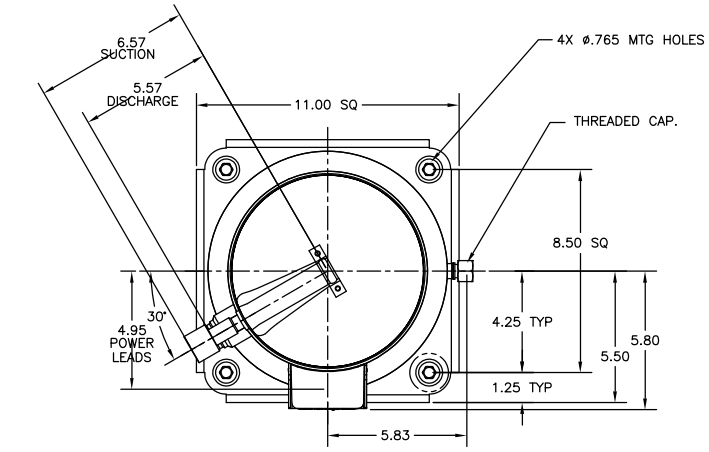
APPLICATION	14 TON 60Hz	15 TON 60Hz
REFRIGERANT	R–22	R–22
U.L. RECOGNIZED USA & CANADA		
RATED PERFORMANCE[a] @45°/130°/20°/15°		
CAPACITY (MBTU/HR)	168.8	179.5
POWER INPUT (KW)	15.72	16.71
CURRENT (460V/400V AMPS)	22.6/22.5	24.1/23.9
EER (BTU/W–HR)	10.7	10.7
COMPRESSOR DATA		
NOMINAL SPEED (RPM)	3500	3500
DISPLACEMENT (IN. CU/REV)	14.23	15.25
WEIGHT (LBS) W/O OIL	227	227
OIL CHARGE (PTS)	13.8	13.8
VOLUME RATIO	2.43	2.43
INTERNAL RELIEF DEVICE	NONE	NONE
PAINT COLOR	SLATE GRAY	SLATE GRAY

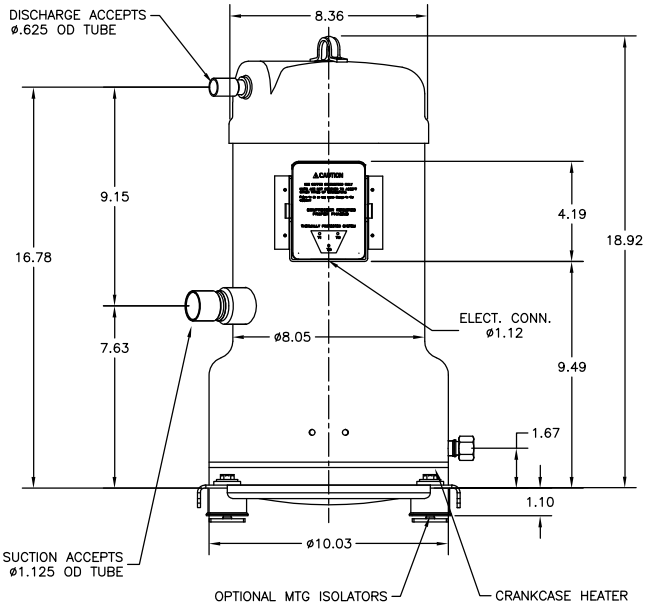


(a) The Start to Finish™ compressors are optimized for R-22 and mineral oil but can also be used for R-407C and POE oil.

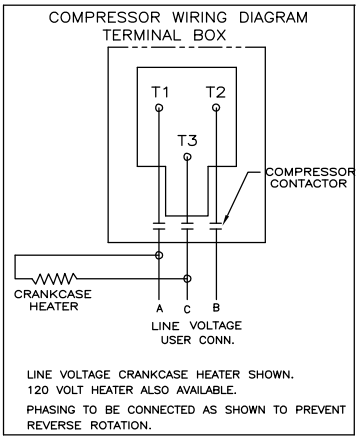
Dimensional Data

Figure 4. SFCOM072 and SFCOM084 compressors[a]



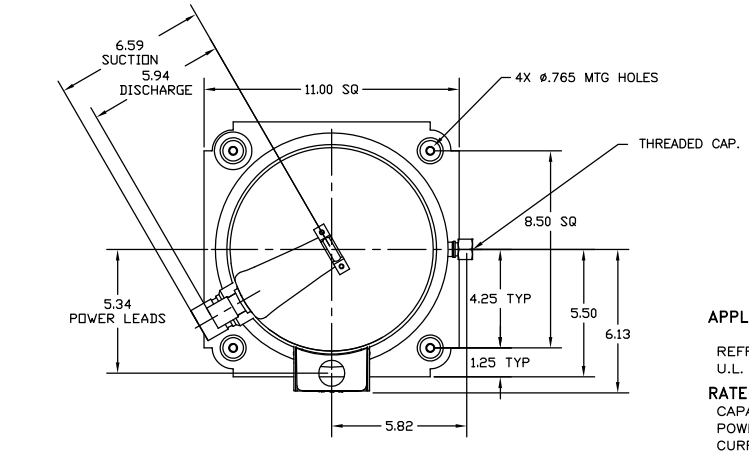


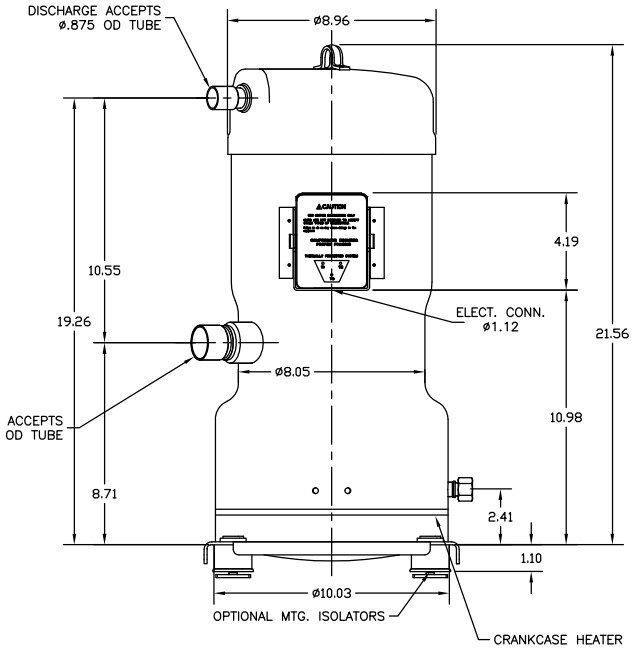
APPLICATION	6.2 TON	7.5 TON
	60Hz	60Hz
REFRIGERANT	R–22	R–22
U.L. RECOGNIZED USA & CANADA		
RATED PERFORMANCE[a] @45° F SST/130° F SCT/20° F SH/15° F SC		
CAPACITY (MBTU/HR)	71.78	87.30
POWER INPUT (KW)	6.81	8.28
CURRENT (460V/400V AMPS)	10.48/10.74	12.35/13.61
EER (BTU/W–HR)	10.54	10.55
COMPRESSOR DATA		
NOMINAL SPEED (RPM)	3500	3500
DISPLACEMENT (IN. CU/REV)	6.17	7.38
WEIGHT (LBS) W/O OIL – W/OIL	115/120	115/120
OIL CHARGE (PTS)	5.25	5.25
VOLUME RATIO	2.43	2.43
INTERNAL RELIEF DEVICE	NONE	NONE
PAINT COLOR	SLATE GRAY	SLATE GRAY



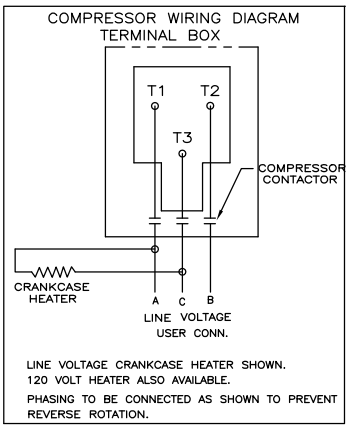
(a) The Start to Finish™ compressors are optimized for R-22 and mineral oil but can also be used for R-407C and POE oil.

Figure 5. SFCOM096, SFCOM108, and SFCOM120 compressors[a]





APPLICATION	8.3 TON	9.3 TON	10 TON
	60Hz	60Hz	60Hz
REFRIGERANT	R–22	R–22	R–22
U.L. RECOGNIZED USA & CANADA			
RATED PERFORMANCE[a] @45° F SST/130° F SCT/20° F SH/15° F SC			
CAPACITY (MBTU/HR)	97.0	114.0	121.3
POWER INPUT (KW)	8.96	10.52	11.20
CURRENT (460V/400V AMPS)	13.1/12.9	14.8/14.5	15.81/15.5
EER (BTU/W–HR)	10.83	10.8	10.8
COMPRESSOR DATA			
NOMINAL SPEED (RPM)	3500	3500	3500
DISPLACEMENT (IN. CU/REV)	8.15	9.46	10.17
WEIGHT (LBS) W/O OIL – W/OIL	134/141	134/141	134/141
OIL CHARGE (PTS)	7.00	7.00	7.00
VOLUME RATIO	2.43	2.43	2.43
INTERNAL RELIEF DEVICE	NONE	NONE	NONE
PAINT COLOR	SLATE GRAY	SLATE GRAY	SLATE GRAY



(a) The Start to Finish™ compressors are optimized for R-22 and mineral oil but can also be used for R-407C and POE oil.

Compressor Oils

Approved Oils Interchangeability of Compressors

Introduction

This chapter explains the different use of approved oils for Start to Finish™ scroll compressors. It discusses the logic for different oils shipped in both factory units and service replacement compressors. It does not completely cover all compressors in use with other manufacturers' products.

Replacement Scroll Compressor Oil

As stated, all service replacement Start to Finish™ scroll compressors are shipped with shipped with OIL00042 for R-22 applications and OIL00078 for R-407C applications, i.e., 150 SUS with a wear additive. The use of this oil allows standardization of the service replacement compressors, regardless of the oil shipped in the original unit compressor.

- The use of 300 SUS oil will have a very slight (less than 1 percent) unit efficiency degradation when used in the Service First scroll compressor.
- On units where compressors without an oil wear additive are being replaced, the use of this additive will not be harmful in any way.
- Mixing of these oils causes no problem as long at the resulting viscosity is no lower than required by any compressor remaining in the circuit.

Corrective Action

The following provides acceptable oil charges when replacing a failed scroll compressor.

Replacement of Compressors in a Manifolded Set

- Any time a compressor in a manifolded set is replaced, the oil in each compressor in that circuit must also be replaced. This will minimize the oil contamination results from the compressor failure, and will improve compressor life and reliability of the remaining compressors.

Replacement of Compressors in a Separate Circuit

- When replacing any scroll compressors in a non-manifolded circuit, OIL00042 or OIL00045 can be used. The replacement Start to Finish™ compressor will, however, contain OIL00042 for R-22 applications and OIL00078 for R-407C applications.

Oil Equalizer Cap and Equalizer Line

⚠WARNING

Hazard of Explosion and Deadly Gases!

Failure to follow all proper safe refrigerant handling practices could result in death or serious injury. Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids.

⚠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.

Single Compressor Refrigeration Circuit

When replacing a scroll compressor in a single compressor refrigeration circuit, it will be necessary to braze the copper cap included with the replacement compressor onto the oil equalizer tube on the compressor shell. **It is recommended that this be done prior to installing the compressor in the unit and making the final suction and discharge line connections.**

Note: *The compressor ships with a full charge of oil.* ***Before removing the plastic cap and rubber plug or brazing onto the oil equalizer tube,*** *drain the oil in the compressor to the bottom of the sight glass.*

- Remove the plastic cap from the outside of the oil equalizer tube.
- Prepare the outside of the tube by properly cleaning the fitting.
- Remove the rubber plug installed inside the oil equalizer tube.
- Using proper brazing procedures, braze the cap provided with the compressor onto the outside diameter of the oil equalizer tube using a BAg-7 or BAg-28 cadmium free brazing alloy such as J.W. Harris-Safety-Silv 1200, Handy & Harman-Braze 560, Engelhard-Braze-it 56F, or equivalent.

Note: *When brazing, always provide a nitrogen purge to prevent scale formation. Allow the purge to run at least one minute before starting to braze. The nitrogen purge can be accomplished by leaving in the suction rubber plug and introducing the nitrogen through the rubber plug in the suction connection. It will be necessary to put a hole in the rubber plug in the suction connection through which the nitrogen purge is introduced into the compressor.*

After operating the compressor, check the oil level in the compressor sight glass; if necessary, add enough oil to bring the level to 1/2 sight glass.

Manifolded Compressor Refrigeration Circuits

When replacing a scroll compressor in a manifolded compressor set, it will be necessary to re-install the oil equalizer line into the equalizer tube on the replacement compressor shell. **It is recommended that this be done prior to making the final suction and discharge line connections.**

Note: *The compressor ships with a full charge of oil.* ***Before removing the plastic cap and rubber plug or brazing onto the oil equalizer tube,*** *drain the oil in the compressor to the bottom of the sight glass.*

- Remove the plastic cap from the outside of the oil equalizer tube.
- Remove the rubber plug installed inside the oil equalizer tube.
- Prepare the inside of the tube by properly cleaning the fitting.
- Prepare the oil equalizer line by properly cleaning the joint area.
- Using proper brazing procedures, braze the oil equalizer line into the inside diameter of the oil equalizer tube using a BAg-7 or BAg-28 cadmium free brazing alloy such as J.W. Harris-Safety-Silv 1200, Handy & Harman-Braze 560, Engelhard-Braze-it 56F, or equivalent.

Note: *When brazing, always provide a nitrogen purge to prevent scale formation. Allow the purge to run at least one minute before starting to braze. The nitrogen purge can be accomplished by leaving in the suction rubber plug and introducing the nitrogen through the rubber plug tn the suction connection. It will be necessary to put a hole in the*

rubber plug in the suction connection through which the nitrogen purge is introduced into the compressor.

After operating the compressor, check the oil level in the compressor sight glass; if necessary, add enough oil to bring the level to 1/2 sight glass in the up-stream compressor on the suction line.

Bracket Information

Important: *Brackets are only used with Start to Finish™ compressors where model number Digit 17 = A. Refer to "Model Number Descriptions," p. 5 for more information.*

Discussion

Begin by determining the configuration of the unit where the Start to Finish™ compressor will be installed.

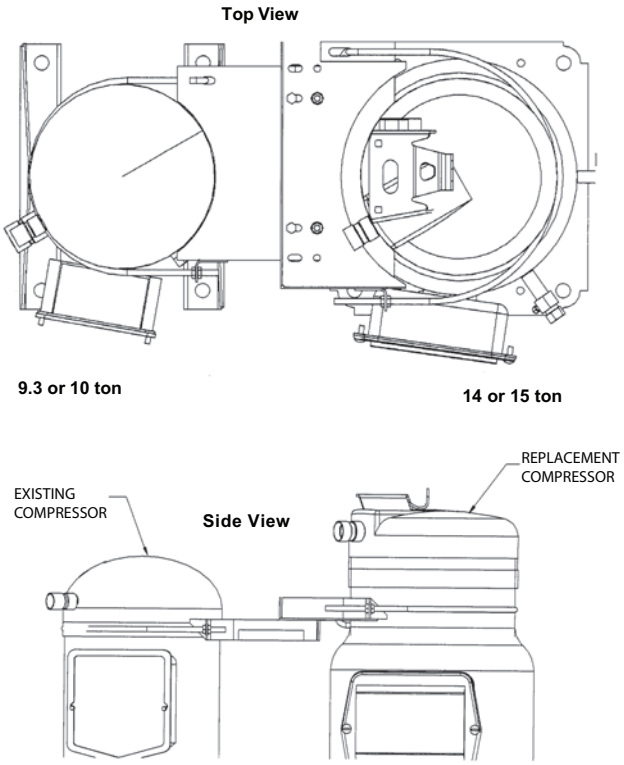
Not all CSHS installations are the same. Some CSHS compressors are installed in refrigeration circuits having only the one compressor. Others may be in stalled in circuits having two, three or even four compressors.

Some of the two compressor circuits use bracing to tie the top of the compressors together. Other two compressor circuits will not have these brackets, i.e., SWUD. All units having three or four compressors per refrigeration circuit do not use top sup port brackets. Where top support brackets are present, there are two de signs that have been utilized. First in production is what is referred to as "hand-cuff" supports that wrapped around the compressor shells. In 1992, these hand-cuffs were replaced with a top mounted flat plate de sign.

When a manifold set is entirely CSHA compressors, all of the electrical modifications and brackets are in place. The use of the orifice in the compressor suction is not important when all compressors are CSHA; i.e., the downstream CSHA compressor can have a mix of compressors with or without orifices.

Typical Hand-cuff Bracket Assembly

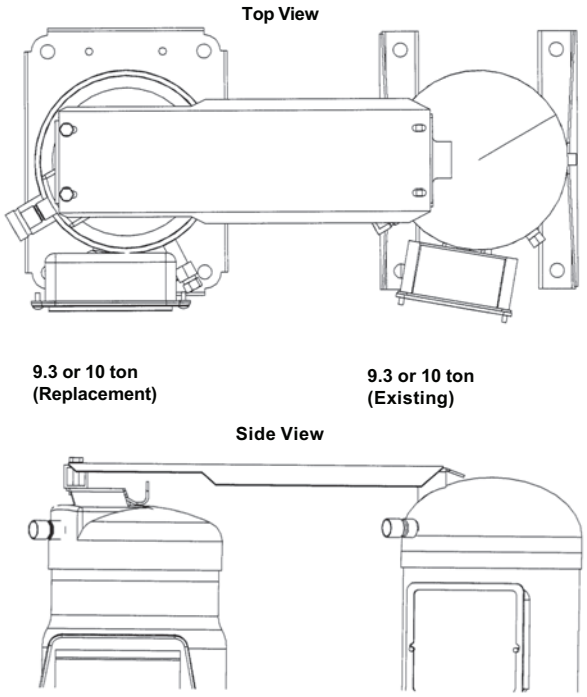
Figure 6. Typical installation (nominal 25-ton circuit shown)



Typical Spacer Bracket Assembly

Reuse existing bracket hardware or refer to CSHA-SB-2B (*Service Bulletin: Scroll Compressors*) for details.

Figure 7. Typical installation (nominal 20-ton circuit shown)



Orifice Assembly for Manifold Applications

The use of the orifice in the compressor suction is not important when all compressors in the manifold set are Start to Finish™ or Trane® compressors, i.e., the downstream compressors can be a mix of Start to Finish or Trane compressors with or without orifices.

Do NOT substitute using field fittings or tubing when connecting suction piping. Existing suction pipe must be reused or replaced with new manufacturer parts. This original suction tubing and fittings assure that oil is returned to the first compressor in a manifold set.

Place the washer-shaped orifice into the compressor suction pipe stub on any Start to Finish compressor mounted in a downstream position. Insert the suction line into the pipe stub so it securely butts up against the face of the orifice. Braze the suction line into place.

Note: *If the Start to Finish compressor is installed in the first upstream position, the orifice is NOT required.*

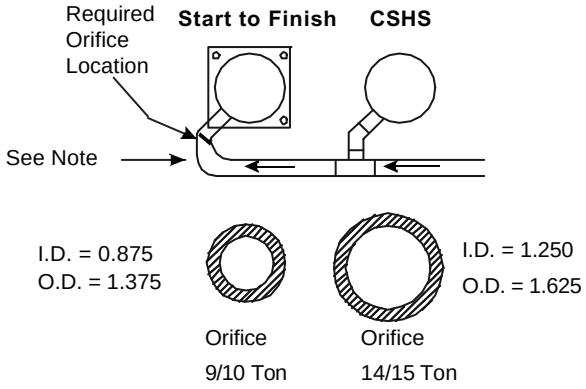
Figure 9 illustrates the location of upstream and downstream compressors in a two-, three-, and four-manifold installation.

NOTICE

Compressor Failure!

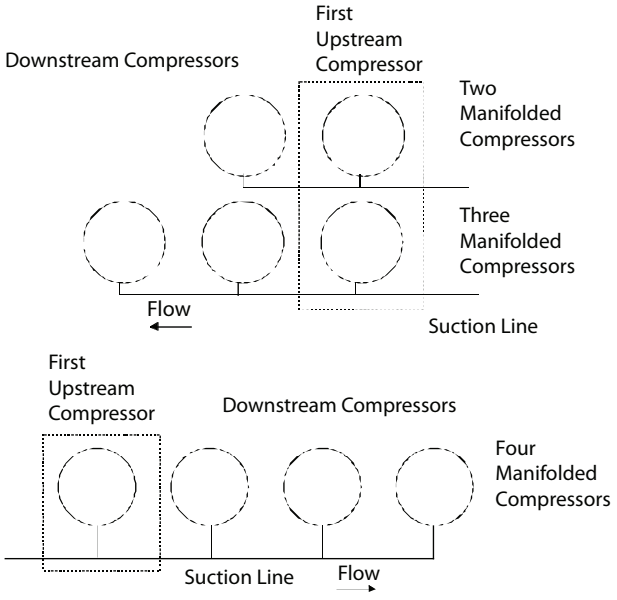
Failure to install the orifice could result in compressor failure.

Figure 8. Placement of an orifice into a Start to Finish compressor when in the DOWNSTREAM position of a Trane CSHS compressor



Note: *Use the appropriate orifice for the replacement Start to Finish compressors size; discard extra orifices.*

Figure 9. Upstream and downstream compressors



Electrical Information

Important: *This electrical information pertains only to Start to Finish™ compressors where model number Digit 17 = A. Refer to "Model Number Descriptions," p. 5 for more information.*

The electrical considerations vary from one unit to another. Some units protect the compressor motor using circuit breakers, others use external overloads, while still others use the unit's UCM and current transformers for current protection. Only in cases where circuit breakers are originally used, is it necessary to provide larger circuit breakers and possibly contactors due to changes to starting current. Other existing overloads can continue to be used with the new Start to Finish compressor.

NOTICE

System Failure!

Failure to replace these electrical components could result in system failure.

Note: *These replacement breakers and contactors apply only to the models listed in Table 4.*

Table 3.

Model	Description
RAUCC20-60**J-K	RAUC, 20 through 60 tons, design sequences J through K
S*HCC20-60	S*HC, 20-60 tons, design sequences P through 3
S*HDC20-30**K-Z	S*HD, 20 through 30 tons, design sequences K through Z
S*HFC20-75**A-J	S*HF, 20 through 75 tons, design sequences A through J
TC*330-600A	TC*, 27.5 through 50 tons, development sequence A and B
TE*330-600A	TE*, 27.5 through 50 tons, development sequence A and B
YC330-600A	YC*, 27.5 through 50 tons, development sequence A and B
TC*240-300B***B-D*	TC*, 20 through 25 tons, design sequences B through D
YC*240-300B***B-D*	YC*, 20 through 25 tons, design sequences B through D
S*HGC90-D13**A-H	S*HG, 90 through 130 tons, Design Sequence A through H

Table 4. Replacement circuit breakers and contactors

Compressor Tons	Voltage	Replacement Circuit Breaker	Replacement Contactor	
9 or 10	208-230	BKR00831	No Change	
	460	BKR00830		
	575	BKR00832		
14 or 15	208-230	BKR00836		
	460	BKR00835	CTR02578	CTR01161
	575	BKR00837	CTR02578	CTR01161

Table 5. Voltage utilization range

Electrical Characteristics	Voltage Utilization Range
208-230/60/3	187-254
460/60/3	414-508
575/60/3	518-635

High Pressure Control

Important: *This high pressure control information pertains only to Start to Finish™ compressors where model number Digit 17 = A. Refer to "Model Number Descriptions," p. 5 for more information.*

The Start to Finish™ compressor does not have an internal pressure relief valve. Therefore, a high pressure control is required for the unit model numbers listed in Table 6.

KIT05446 contains the parts required and is ordered separately.

Install these parts on the existing port in the Start to Finish compressor discharge line as shown in Figure 11. The tee supplied includes a valve core depressor to push open existing Schrader valve on discharge line. One end of the male fittings has capability of housing a Schrader valve core. Place cap on this fitting. Be sure to connect the high pressure switch to the male fitting without the Schrader valve core.

Identify the Start to Finish compressor electrical circuit. Wire the high pressure control in series with the Start to Finish compressor contactor coil. Refer to Figure 10.

Table 6.

Model	Description
TC*240-300B***B-D*	TC*, 20 through 25 tons, design sequences B through D
YC*240-300B***B-D*	YC*, 20 through 25 tons, design sequences B through D

Figure 10. Typical high pressure control wiring

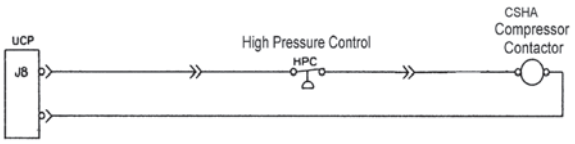
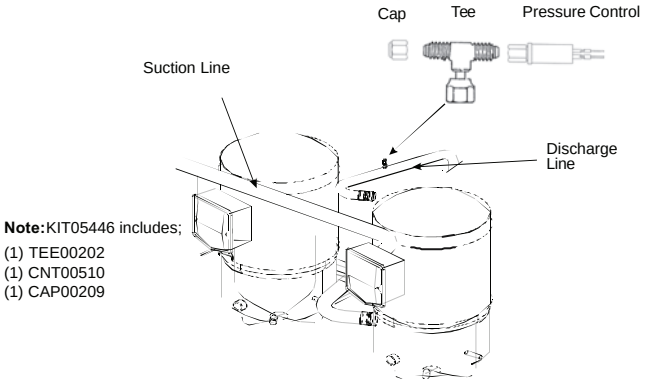


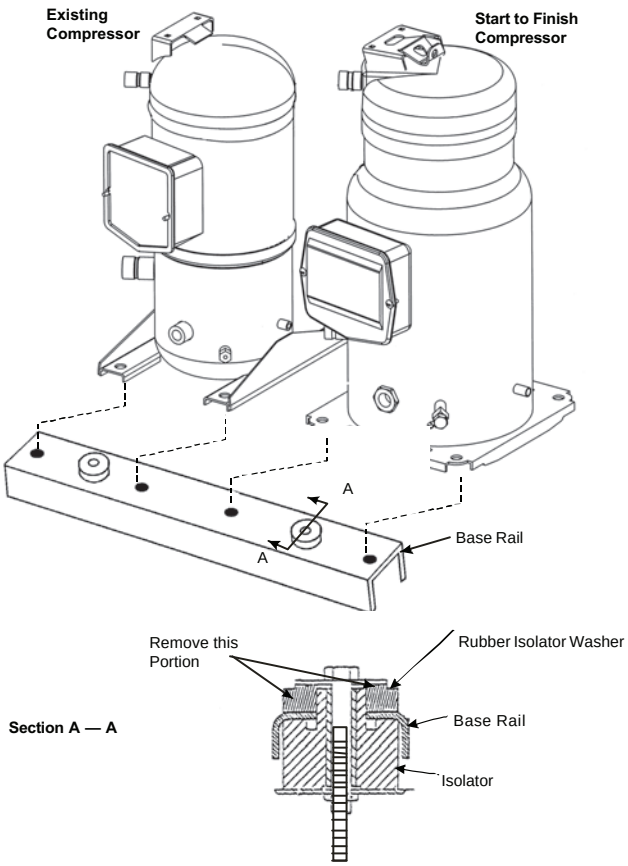
Figure 11. KIT05446, high pressure control installation



Isolator Removal

The Start to Finish™ compressor has a different base than other scroll compressors. Thus, when replacing a compressor that is mounted on base rails the base rail isolator under the new compressor will interfere with the compressor base. Remove the items above the base rail to allow clearance. This usually involves removing the isolator washer, steel sleeve and bolt. The bolt may not be required. Refer to Figure 12.

Figure 12. Isolator



Oil Information

Oil Levels

The oil level can only be evaluated when all the compressors are shut off. During operation the oil levels will vary. Generally speaking the oil level will be highest in the last compressor in the manifold set. The minimum oil level with the compressors shutoff is at the bottom of the oil sight glass.

Figure 13. Oil level for manifold compressors

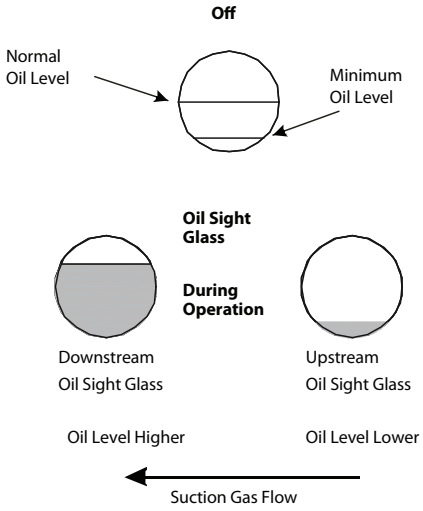
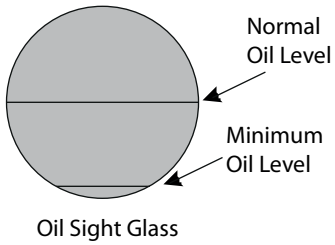


Figure 14. Oil level, single compressor



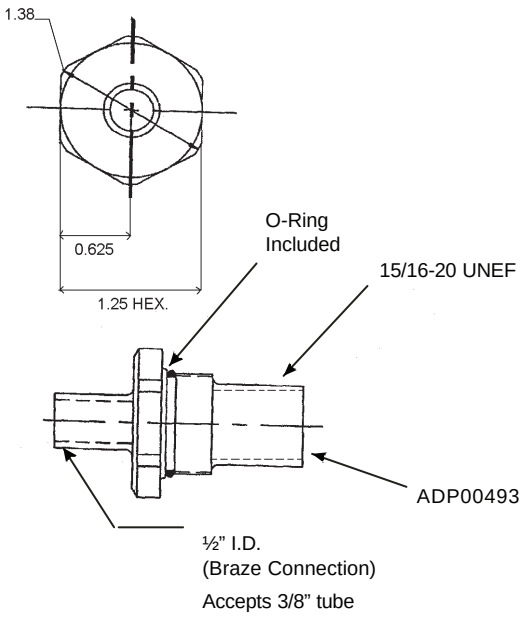
On the center compressor of a three-compressor set and on the middle two compressors of a four-compressor set, it is necessary to remove the oil sight glass(es) and replace it with an adapter (ADP00493, ordered separately) for connecting the oil equalizer line.

1. Tilt the compressor back to remove the sight glass.
2. Install the oil equalizer tube adapter (ADP00493); see Figure 15.
3. Torque the adapter to 45 ±5 ft·lb.

Note: *It may be necessary to drain some oil out of the compressor so that it does not run out of the adapter.*

Following the installation of oil equalizer line, some slope of the line is expected due to the variation of compressors heights. This is normal and does not affect oil return.

Figure 15. Oil equalizer adapter (required for three- and four-compressor manifold set)



Parts Selection

OIL

Does the customer need replacement oil?
Does the customer have general questions about oil?
Is the Start to Finish™ compressor going to be installed in a manifold application?

Yes

Refer to "Compressor Oils," p. 12 and "Oil Information," p. 18 for detailed oil information.
Use ADP00493 for the sight glass oil equalizer connection on middle compressor(s) of three or four manifold sets.

No

HIGH PRESSURE CONTROLS

Is the unit one of the following models?

TC*240-300**B design through TC*240-300**D design or YC*240-300**B design through YC*240-300**D design

Yes

Refer to the "High Pressure Control," p. 17 for details.
Qty one of KIT05446 is required.

No

ELECTRICAL

Does the original scroll compressor installation use circuit breakers to protect individual compressor electrical circuits?

If in doubt, refer to Table 6, p. 17 for a listing of models involved.

Yes

Refer to the "Electrical Information," p. 17 for selection of Circuit Breaker and Contact or parts required.

No

Do the power wires to the compressor arrive from above the compressor?

End of parts selection.

Yes

On some water cooled chillers the power wires may be too short to reach the lower electrical junction box on the Start to Finish™ compressor. In these cases, it is necessary to rewire from the compressor to the contractor.

No

End of parts selection.

Electrical Phasing

⚠CAUTION

Hot Surfaces!

Failure to follow instructions below could result in minor to moderate injury. To avoid possible skin burns, stay clear of the top of the compressor. If servicing is required allow surfaces to cool or wear protective gear.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as unit terminals are not designed to accept other types of conductors.

Proper rotation of the scroll compressor must be confirmed before the machine is started. This is accomplished by confirming that the electrical phasing of the power supply is correct. The motor is internally connected for correct rotation with the inlet power supply phased A, B, and C.

To confirm the correct phase sequence (ABC), use a meter designed to determine phase rotation of three-phase power. See Figure 16.

Figure 16. Heavy duty digital multimeter

Checking for Improper Electrical Phase Sequence

Proper compressor motor electrical phasing can be quickly determined and corrected before starting the unit. Use a quality instrument and follow the instructions provided with the meter to identify L1, L2, and L3.

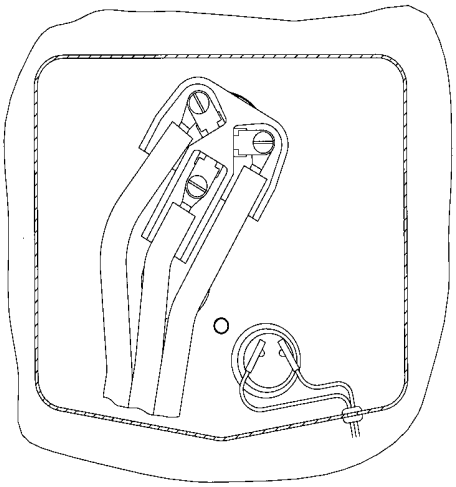
⚠WARNING

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.

1. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block in the control panel (or to the unit-mounted disconnect).
2. Connect meter to determine phase rotation at unit.
3. After verifying L1, L2, and L3 wires connect to compressor per wiring diagram. See Figure 17.

Figure 17. Typical supply power phasing for a scroll compressor



⚠WARNING

Bodily Harm!

Failure to place and secure terminal cover before starting unit could result in death or serious injury due to electrical shock or pressurized burning fluid.

Diagnosing a Compressor that is Running Backwards

If a scroll compressor is running backwards it is detectable from the following symptoms:

- Suction and discharge pressure are about equal.
- Compressor current draw will be substantially less, about 50 percent less, than normal current rating.
- The compressor will be noisy and vibrate more than normal.

Troubleshooting

Causes of Compressor Failure

Compressor failure is usually the result of system deficiencies. Failure to look for and correct the cause of the problem(s) will place the new compressor in jeopardy and may lead to another failure.

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels 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 following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

The following steps are recommended:

1. Determine if the failure is electrical or mechanical. Note that an electrical failure does not rule out the possibility of a mechanical failure also.
2. If the failure is electrical, check for system contamination using an acid test kit for oil analysis.
   - If acid is present, a replaceable core suction filter with an acid cleanup core is required.
   - If no acid is present, a standard suction filter must be installed to remove any debris/ contamination from the original failure.
   - Look for defective contactors, loose connections, unbalanced voltage; review the control system to insure that it works properly; check for chattering contactors or relays.
3. If the failure is mechanical, a standard suction filter must be installed to remove any contamination from the original failure. Mechanical failures can be caused by poor refrigerant control or loss of refrigerant.
   - Check for defective expansion valves, restricted air/ water flow, excessively long or oversized liquid line, defective or improperly selected components such as refrigerant distributors, distributor tubes and hot gas by pass valves, or refrigerant control valves.
   - If the system is equipped with a solenoid valve, it should be checked for proper operation. The scroll compressor must not be allowed to run into a vacuum.
   - Check the low pressure switches to ensure that they are operating properly.
4. Loss of oil may be a problem.
   - Drain the oil out of the compressor and measure the oil. Refer to compressor literature to determine the approximate operating oil charge.
   - If the amount of oil is significantly below the oil charge specified by the compressor literature, look for the cause of oil loss.
   - Look for oversize suction lines, improperly formed suction line traps, poorly designed refrigerant piping, oil leaks, oil logged evaporator or condenser.

   Note: *It is important not to overcharge the system with oil. Overcharging the system with oil can result in suction pressure swings.*
5. Oil Appearance—What it tells:
   - Dark and Thick—Indicates a general motor burn. Oil in the system should be changed. Suction filter-drier cleanup is mandatory.
   - Discolored and Slightly Odorous—Indicates a possible spot burn or probable dirty system due to copper oxides generated during the installation of the system without the use of inert gas-suction line filter suggested.
   - Fine Metallic Particles in the Oil—Indicates a bearing or scroll failure. Look for excessive flood back. Compressor seriously diluted with refrigerant. Oil in system should be changed. Suction filter drier cleanup is mandatory.
   - If Water is in the Oil—If the system is a chiller or has a water cooled condenser, look for a refrigerant to water side leak. Ensure a liquid line drier is replaced/added.
   - Clean and Sweet—This condition does not tell what happened but it tells you what probably didn't happen—no burn out, no system contamination, no excessive wear.
6. Changing Oil Manifold Sets—Whenever one of the compressors fails in a manifold set, the oil must be changed in the remaining compressors in that set.
7. Approved Replacement Oil—Refer to compressor literature to determine approved replacement oil.
8. Liquid Line Driers—Install or change the liquid line drier to help protect the new compressor against the inclusion of moisture or other contaminants. This should be done any time a system is opened for service.
9. Evacuation—Use a vacuum pump and an electronic vacuum gauge; evacuate the system to 500 microns or

less. Once 500 microns has been obtained, a time vs. pressure rise should be performed. Maximum allowable rise over 15 minutes is 200 microns.

10. Charge Properly—Refrigeration systems require accurate charging. Weigh the charge in or charge system to proper subcooling value. Refer to unit operation/maintenance manual for proper charging methods and proper superheat/subcooling valves.

    Subcooling is determined by taking the refrigerant pressure in the liquid line at the liquid line king valve, converting it to a saturated liquid temperature, and subtracting the liquid line temperature. The difference between these two temperatures is subcooling. Standard range (unit running at full load) for water cooled products is 10°F to 15°F and for air-cooled products is 15°F to 20°F, with a minimum allowable at the expansion valve of 5°F.

    Superheat is determined by taking the suction pressure, converting it to a saturated temperature, and subtracting that temperature from the suction line temperature. The difference between these two temperatures is superheat. It should be in the 16°F to 18°F range but should not exceed 20°F at the compressor.

    Oil Sump Superheat is determined by measuring the external oil sump temperature of the compressor and the compressor saturated suction pressure (convert to saturated suction temperature). Oil Sump Superheat = External Oil Sump Temperature - Saturated Suction Temperature. Measure the external oil sump temperature on the bottom of the compressor, preferably in the center, with an insulated thermocouple.

11. Manifolded Compressors—Do not modify suction manifold piping. It contains one or more orifices for proper oil management. Modifying the manifold piping will result in improper oil return to the compressors.

Log Sheet

Replacement Scroll Compressors

Complete and retain a record in the job file for future reference.

Log Sheet for Installers

Job Name:
Job Address:
Equipment Model Number:
Equipment Serial Number:
Compressor Model Number:
Compressor Serial Number:
Startup Date:

Table 7. System operating data

Refrigeration Data	Circuit 1	Circuit 2	Circuit 3	Circuit 4
Suction Pressure/Saturation Temp				
Suction Line Temperature				
Suction Superheat (2-1)				
Discharge Pressure				
Discharge Line Temp				
Liquid Line Pressure/Saturation Temp				
Liquid Line Temp				
Liquid Subcooling (6-7)				

Table 8. Electrical data

Unit Voltage	L1-L2	L2-L3	L1-L3

Table 9. Compressor Amperage

Compressor	#1	#2	#3	#4	#5	#6	#7	#8
T1 amps								
T2 amps								
T3 amps								
Compressor Model 8 Digit Number								

Table 10. Oil sight glass (when available)

Compressor	#1	#2	#3	#4	#5	#6	#7	#8
Level								
Condition								
M=Manifold/S=Single								
Compressor Model 8 Digit Number								

Table 11. Condenser

Type	Air Cooled	Water Cooled
Entering Temperature		
Leaving Temperature		
Ambient		*Not Applicable*
Number of Fans ON		*Not Applicable*
Clean (Yes/No)		

Table 12. Evaporator

Type	DX-Air	DX-Water
Entering Temperature		
Leaving Temperature		
CFM/GPM		
Clean (Yes/No)		
Chiller pressure drop	*Not Applicable*	

Systems Check

- ☐ Suction Line Filter Drier Installed
  - ☐ Pressure Drop After 1 Hour:
  - ☐ PSIG After 4 Hours:
- ☐ Liquid Line Filter Changed
- ☐ Oil Changed
- ☐ Acid Check
- ☐ *If System Includes Liquid Line Solenoid*, Verify Proper Opening/Closing

Operating Controls Check

- ☐ Low Pressure Control
- ☐ High Pressure Control
- ☐ Contactor
  - ☐ Replaced
  - ☐ Checked
- ☐ Verify Proper Cycling of Unit Via Temperature Controls

Observations

Service Technician: Date:

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

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