

Application Engineering

Copelametic Two-Stage Compressors Application and Service Instructions

BULLETIN NO: AE-1132

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Safety

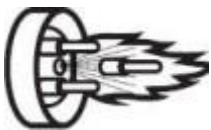
Important Safety Information

Those involved in the design, manufacture, and installation of a system, system purchasers, and service personnel may need to be aware of hazards and precautions discussed in this section and throughout this document. OEMs integrating the compressor into a system should ensure that their own employees follow this bulletin and provide any necessary safety information to those involved in manufacturing, installing, purchasing, and servicing the system.

Responsibilities, Qualifications and Training

- OEMs are responsible for system design, selection of appropriate components, integration of this component into the system, and testing the system. OEMs must ensure that staff involved in these activities are competent and qualified.
- OEMs are also responsible for ensuring that all product, service, and cautionary labels remain visible or are appropriately added in a conspicuous location on the system to ensure they are clear to any personnel involved in the installation, commissioning, troubleshooting or maintenance of this equipment.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission, troubleshoot and maintain this equipment. Electrical connections must be made by qualified electrical personnel.
- Observe all applicable standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment.

Terminal Venting and Other Pressurized System Hazards



If a compressor's electrical terminal pin loses its seal, pressurized oil, refrigerant, and debris may spray out. This is called "terminal venting".

The ejected debris, oil, and refrigerant can injure people or damage property. The oil and refrigerant spray can be ignited by electrical arcing at the terminal or any nearby ignition source, producing flames that may project a significant distance from the compressor. The distance depends on the pressure and the amount of refrigerant and oil mixture in the system. The flames can cause serious or fatal burns and ignite nearby materials.

Each compressor has a terminal cover or molded plug that covers electrical connections. The cover or plug helps to protect against electric shock and the risks of terminal venting. If terminal venting occurs, the cover or plug helps contain the spray of refrigerant and oil and reduces the risk of ignition. If ignition occurs, the plug or cover helps contain the flames. However, neither the terminal cover nor the molded plug can completely eliminate the risk of venting, ignition, or electric shock.

See [copeland.com/terminal-venting](https://www.copeland.com/terminal-venting) for more details about terminal venting. Additionally, a compressor's refrigerant lines keep refrigerant and oil under pressure. When removing or recharging refrigerant from this component during service, this can pose a pressurized fluid hazard.

Flammable Refrigerant Hazards



If flammable refrigerant is released from a system, an explosive concentration can be present in the air near the system. If there is an ignition source nearby, a release of flammable refrigerant can result in a fire or explosion. While systems using flammable refrigerant are designed to mitigate the risk of ignition if the refrigerant is released, fire and explosion can still occur.

See [copeland.com/flammable-refrigerants](https://www.copeland.com/flammable-refrigerants) for more information on flammable refrigerant safety.

Electrical Hazards



Until a system is de-energized, and capacitors have been discharged, the system presents a risk of electric shock.

Hot Surface and Fire Hazards



While the system is energized, and for some time after it is deenergized, the compressor may be hot. Touching the compressor before it has cooled can result in severe burns. When brazing system components during service, the flames can cause severe burns and ignite nearby combustible materials.

Lifting Hazards



Certain system components may be very heavy. Improperly lifting system components or the compressor can result in serious personal injury. Use proper lifting techniques when moving.

POE Oil Hazards

This equipment contains polyol ester (POE) oils. Certain polymers (e.g., PVC/CPVC and polycarbonate) can be harmed if they come into contact with POE oils. If POE oil contacts bare skin, it may cause an allergic skin reaction.

Precautions

- Always wear personal protective equipment (gloves, eye protection, etc.).
- Keep a fire extinguisher at the jobsite at all times.
- Keep clear of the compressor when power is applied.
- **IMMEDIATELY GET AWAY if you hear unusual sounds in the compressor. They can indicate that terminal pin ejection may be imminent. This may sound like electrical arcing (sizzling, sputtering or popping). However, terminal venting may still occur even if you do not hear any unusual sounds.**

- Never reset a breaker or replace a blown fuse without performing appropriate electrical testing
 - **A tripped breaker or blown fuse may indicate an electrical fault in the compressor. Energizing a compressor with an electrical fault can cause terminal venting. Perform checks to rule out an electrical fault.**
- Disconnect power and use lock-out/tag-out procedures before servicing.
 - Before removing the terminal cover or molded plug, check that ALL electrical power is disconnected from the unit. Make sure that all power legs are open. (Note: The system may have more than one power supply.)
 - Discharge capacitors for a minimum of two minutes
 - Always use control of hazardous energy (lock-out/tag-out) procedures to ensure that power is not reconnected while the unit is being serviced.
- Allow time for the compressor to cool before servicing.
 - Ensure that materials and wiring do not touch high temperature areas of the compressor.
- Keep all non-essential personnel away from the compressor during service.
- For A3 refrigerants (R290) remove refrigerant from both the high and low sides of the compressor. Use a recovery machine and cylinder designed for flammable refrigerants. Do not use standard recovery machines because they contain sources of ignition such as switches, high- and low-pressure controls and relays. Only vent the R290 refrigerant into the atmosphere if the system is in a well-ventilated area.
- Never use a torch to remove the compressor. Only tubing cutters should be used for both A2L and A3 refrigerants.
- Use an appropriate lifting device to install or remove the compressor.
- Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.
- Always wear appropriate safety glasses and gloves when brazing or unbrazing system components.
- Charge the system with only approved refrigerants and refrigeration oils.
- Keep POE oils away from certain polymers (e.g., PVC/CPVC and polycarbonate) and any other surface or material that might be harmed by POE oils. Proper protective equipment (gloves, eye protection, etc.) must be used when handling POE lubricant. Handle POE oil with care. Refer to the Safety Data Sheet (SDS) for further details.
- Before energizing the system:
 1. Securely fasten the protective terminal cover or molded plug to the compressor, and
 2. Check that the compressor is properly grounded per the applicable system and compressor requirements.

Signal Word Definitions

The signal word explained below are used throughout the document to indicate safety messages.



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Introduction

Copelametic Two-Stage Compressors Application and Service Instructions

The Copeland® two stage compressors have been developed to efficiently achieve the low temperature demanded by many of today's applications. These are designed primarily to operate systems with evaporating temperatures 0°F to -80°F (Refer to Figure 1 for R-22 and 502 and Figure 2 for R404A and 507 for operating envelopes). With the phase out of CFC and HCFC refrigerants and the growing popularity of HFC's, Copeland has approved the 9T series two stage compressors for use with R-404A and R-507 in addition to R-22 and R-502. Refer to Table 1 for a list of approved refrigerants and models. Due to the higher operating pressures of R-404A, the tube in tube heat exchanger will become obsolete and replaced with a braze plate style heat exchange. Performance data can be accessed at <https://www.copeland.com/en-us> in the Online Product Information section.

Two-stage compressors are divided into low (or first) and high (or second) stages. The three-cylinder models have two cylinders on the low-stage models and one on the high, while the six-cylinder models have four cylinders on the low and two on the high. In each case the low-stage has twice as much displacement as the high-stage.

The suction gas enters the low-stage cylinders where it is raised to a pressure between the suction and condensing pressures (called inter-stage or intermediate pressure). It is then discharged from the low-stage heads into the inter-stage manifold.

At this point the gas has a relatively high temperature and liquid refrigerant is metered by an expansion valve (called desuperheating expansion valve) into the gas stream to reduce the superheat.

Table 1

Model	Refrigerant	Oil
9TK1-050E	22/502/404A/507	POE
9TK1-0505	22/502	MO
9TL2-076E	22/502/404A/507	POE
9TL1-0765	22/502	MO
9TH2-101E	22/502/404A/507	POE
9TH1-1015	22/502	MO
6RB2-1000	22/502	MO
6RB2-2000	22/502	MO
6RB5-2000	22/502	MO
6TM1-2000	22/502	MO

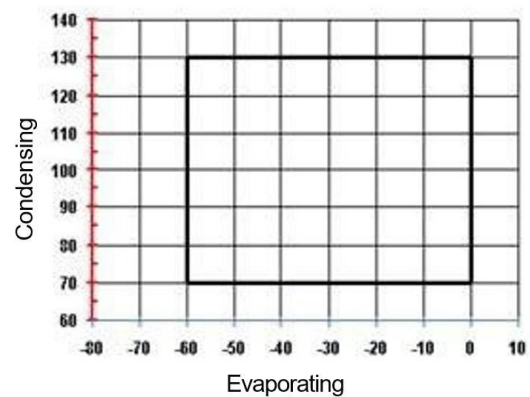


Figure 1 6TM/6BR/9T*1 R-22 Operating Envelope

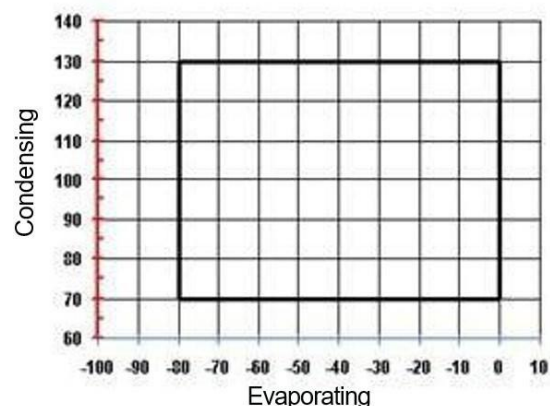


Figure 2 9T*2 R-404A Operating Envelope

The cooled gas then passes through the external manifold, into the motor chamber, through the motor providing the necessary motor cooling in a normal manner, where it is raised to condensing pressure and pumped out of the high-stage head to the condenser. Note that the discharge of the low-stage is pumped into the motor chamber and, therefore, the motor chamber. The cooled gas then passes through the external manifold, into the motor chamber, through the motor providing the necessary motor cooling in a normal manner, where it is raised to condensing pressure and pumped out of the high-stage head to the condenser. Note that the discharge of the low stage is pumped into the motor chamber and, therefore, the motor chamber.

NOTE: When adding refrigerant in a liquid state into the suction of the first stage, an atomizer must be used, or internal damage could result. The first stage uses a direct suction which leads into the cylinder. Any liquid returned through this port will cause a hydro lock condition.

Tables 2, 3, and 4 show the approximate inter-stage (motor chamber and crankcase) pressure at the various suction and head pressures for R-22 R-502 and R-404A. Two low side and one high side gauge will be needed to check the pressures.

Connection Ports

The high- and low-pressure control connections and the discharge and suction service valves are located differently than on single-stage compressors. Figures 4, 5, 6, 7, and 8 show these and indicate the inter-stage pressure ports as well as the low and high-stage cylinders (reference AE4-1094 for further information on part locations).

Two-stage compressors now being produced have a Schrader type valve installed to permit easy checking of inter-stage pressure. Valves can be added to any in use which were not so equipped.

Liquid Sub-Cooler

To prevent leakage through the desuperheating expansion valve during the off period, a solenoid valve must be placed in the liquid supply line immediately ahead of the desuperheating expansion valve. It should be wired so as

to be open when the motor is running and closed when not running. A toggle switch placed in the electric line to the solenoid valve, will facilitate service during pump down.

A 100-mesh strainer must be installed in the liquid line feeding the desuperheating valve, upstream of the solenoid valve, to protect both valves from contaminants.

Oil Pressure Safety Controls

These are standard equipment on all Copelametic two-stage condensing units and are mandatory on all two-stage compressors.

Oil Separators

Oil separators are recommended on these compressors as they not only provide some increase in refrigerant capacity and reduce the quantity of oil in circulation, but also act as a muffler to reduce discharge pulsation and system noise level.

Suction Line and Accumulators

To prevent damage to these compressors caused by slugging with liquid refrigerant and/or oil, adequate suction

line accumulators (designed to prevent oil trapping) are mandatory on any system prone to return slugs of liquid or oil to the compressor.

If the suction vapor returning to the accumulator is 5°F or below, it may be necessary to heat the accumulator in order to return oil to the compressor.

Note: The suction line must be well insulated with at least 1" insulation including the accumulator, filter and suction line vibrator if used.

Suction Line Filters

Suction line filters should be installed to prevent minute particles of scale, flux, dirt, chips of copper, etc., from entering the compressor. Care should be taken in their selection to prevent excessive pressure drop.

Liquid Sight Glasses

A liquid sight glass should be installed in the liquid line just ahead of the desuperheating expansion valve to provide a positive check for shortage of liquid.

When a liquid sub-cooler is used the regular liquid line sight glass (additional to the one ahead of the desuperheating expansion valve) should be installed between the receiver and sub-cooler. If installed beyond the sub-cooler it will not be dependable as it will not show bubbles even when the system is short of gas.

Crankcase Pressure Regulating Valves

With low voltage conditions the motors of two-stage compressors can be overloaded, and protector tripping can expect if the saturated suction temperature at the compressor inlet exceeds the following limits for more than 3 or 4 minutes:

Suction Pressure PSIG	Without Sub-cooler					With Sub-cooler				
	Head Pressure PSIG					Head Pressure PSIG				
	170	202	235	268	300	170	202	235	268	300
12#	55	58	61	64	67	65	68	71	75	78
10#	51	53	56	59	62	60	63	66	69	73
8#	46	49	52	54	57	55	58	60	64	67
6#	42	45	47	50	52	50	53	55	58	61
4#	38	40	43	45	47	45	48	50	53	56
2#	33	35	38	40	42	40	42	45	47	50
0#	28	31	33	35	37	35	37	40	42	45
3"	25	28	30	32	34	32	33	36	38	41
6"	22	24	26	28	30	27	30	32	34	36
9"	18	21	23	25	26	24	26	28	30	32
12"	16	18	20	21	23	21	23	24	26	29

Table 2 INTER-STAGE PRESSURE R-22 (TWO-STAGE 2/1 RATIO)

Suction Pressure PSIG	Without Sub-cooler					With Sub-cooler				
	Head Pressure PSIG					Head Pressure PSIG				
	186	219	252	286	318	186	219	252	286	318
16#	62	65	68	71	74	67	72	77	83	88
14#	57	60	63	66	69	62	68	73	78	84
12#	53	56	59	63	65	58	63	68	73	79
10#	48	51	54	57	60	54	59	64	69	74
8#	44	47	50	53	55	50	55	58	64	68
6#	39	42	45	48	51	46	50	55	59	65
4#	35	38	41	44	47	42	46	51	55	60
2#	30	33	36	39	42	37	42	49	50	55
0#	26	29	32	35	38	33	38	41	45	50

2"	23	26	29	33	36	31	35	39	43	48
4"	21	24	27	30	34	29	33	37	41	46
6"	19	22	25	28	31	27	31	35	39	43
8"	17	20	23	26	29	25	29	33	36	41

Table 3 INTER-STAGE PRESSURE R-502 (TWO-STAGE 2/1 RATIO)

Suction Pressure	Head Pressure (PSIG)				
PSIG	200	230	270	300	350
16#	74.4	77.8	84	89.7	94.4
14#	68	70.9	75.8	80.9	88.7
12#	64.4	69.4	73.4	81.5	84.5
10#	59.4	63.3	69	73.6	79.6
8#	54.4	58	65	69.0	76.3
6#	42.7	46.5	61.1	65.1	71.9
4#	40.8	45.1	50.3	50.8	67.2
2#	42.1	43.8	49	53.6	59.1
0#	38.6	41.2	44.4	48.4	53.6
2"	31.5	34.7	38.8	41.3	46.4
4"	26.6	26.4	31.9	33.5	35.3
6"	21.3	22.3	24.5	26.2	28
8"	14.8	15.6	16.5	17.6	20.1

Table 4 Inner Stage Pressure R-404A W/ Subcooler

Low temperature compressors 0°F. Extra-low temperature compressors -30°F.

The suction pressure on some systems can be limited to a satisfactory point by the size and type of evaporator used or by the use of pressure limiting expansion valves. Others will require crankcase pressure regulating valves. In selecting a regulating valve, limit the pressure drop to 2°F. (equivalent) maximum at normal operating conditions.

Desuperheating Expansion Valves

On all Copelametic two-stage compressors, liquid refrigerant is metered into the inter-stage manifold by means of an expansion valve to reduce the superheat of the discharge gas from the low-stage cylinder. The expansion valves currently supplied as original equipment with Copelametic two-stage compressors are of the non-adjustable superheat type.

If the expansion valve becomes clogged or for other reasons fails to function properly, the liquid line solenoid and strainer should be checked for obstructions and cleaned, and the valve should be thoroughly washed out. If cleaning fails to restore satisfactory performance, the valve must be replaced.

In the event the proper Copeland replacement valve is not available from the local Copeland wholesaler's stock, standard field replacement valves with adjustable superheat which have been approved by Copeland may be used.

Normally it will be necessary to change the factory setting of the adjustable superheat type of valve to obtain proper performance. The valve should be adjusted to obtain a temperature difference (superheat) of 15°F. to 30°F. between the temperature of the manifold (at the bulb) and the saturated temperature of the refrigerant at inter-stage pressure.

Example - Using R-22 with Inter-Stage Pressure of 31 psig. Desired Superheat Limits: 15°F. 30°F. R-22, 31 Psig Saturation Temperature: 8°F. 8°F. Desired Manifold Temperature Limits: 23°F. 38°F.

The desuperheating expansion valve should be adjusted to maintain a manifold temperature at the bulb between 23°F. and 38°F.

The superheat can be raised by turning the superheat adjustment stem clockwise and can be lowered by turning the stem counterclockwise.

Because the characteristics of R-502 and R-404 are such that it has less temperature rise during compression, tests have proven that for this application the same expansion valve may be used for either R-22, R-502, and R-404A with satisfactory results.

Note: Care should be taken in connecting the liquid supply line for the desuperheating expansion valve. It should be not smaller than 3/8" O.D. And should be installed at the bottom of a horizontal line, to insure a constant supply of liquid at all times. This line should never be connected to the top of a horizontal line because vapor only will be picked up when the line is short of liquid. Connection to a vertical line of low velocity will be satisfactory.

Non-Adjustable			Adjustable	
Copelametic model no.	Copeland part no,	Sporlan part no.	Sporlan part no.	Copeland part no,
9TK	510-0144-00	IV-2-Z	CV-2-Z	2 Turns In
9TH, 9TL	510-0144-02	IV-3-Z	CV-3-Z	2 Turns In
9RB	510-0144-03	NCV-4-Z	CV-5-Z	1 1/4 Turns In
9TM	510-0144-04	NCV-5-C	CV-5-Z	1 1/4 Turns In

Table 5 Desuperheating Expansion Valves

Field Replacements for Copelametic Two-Stage Compressors

widely in design, it is not possible to make a general statement as to what special controls may be required. Most manufacturers have thoroughly pretested their systems, but on field installations, restrictor valves to maintain head pressure, additional refrigerant charge, or other special controls may be necessary.

Two-Stage Compressor Pulsation

All reciprocating compressors create pulsation in the discharge gas line. Under normal operating conditions, such pulsations are not of sufficient force to cause any problems. The magnitude of the pulsation increases with a decrease in the number of cylinders pumping into a common discharge chamber, and with increasing volume and density of the gas pumped.

Two-stage compressors handle gas of high density in the second or high stage. On the 9T model compressors, only one cylinder is discharging into the compressor discharge line, and on the 6R model compressors, only two cylinders are pumping into the discharge line. Because of these conditions, pulsation on two-stage compressors may be more pronounced than on single-stage compressors.

Normally these pulsations are not a problem. Occasionally, however, a combination of operating conditions, mounting, and piping arrangement may result in a resonant condition, which tends to magnify the pulsation and cause vibration. To solve this problem, discharge muffler plates have been developed for the 9T and 6R two-stage compressors. The muffler plate fits between the discharge service valve and the compressor body.

The muffler plate will effectively dampen pulsation and reduce vibration. It is now being installed as standard equipment on all new two-stage compressors. If pulsation is a problem on existing equipment, it is recommended that discharge plates be installed. These are available from your Copeland wholesaler under part numbers shown below in Table 6.

If the piping size and connections on a particular unit are such that resonance does occur, and the muffler plate does not dampen it sufficiently, it may be necessary to bolt the compressor to its mounting base with rubber vibration eliminating mounting pads in order to change the vibration frequency.

Valve Plates And Gaskets

Valve plates on some models are the same as used on equivalent single-stage models but the head gaskets are different. Always match the head gasket with the head to be sure there is a gasket section to match each partition in the head. Incorrect gaskets cause leakage between stages.

Warning - Danger

Do not operate a service replacement two-stage compressor without first installing the external inter-stage manifold. There is no provision internally for escape of the high-pressure gas from the low-stage cylinders, and without the external manifold dangerous pressures can be created which could result in possible injury to the operator.

Copeland Part number	Description	Application Data
003-0107-00	Muffler Plate	For all 9T Compressors
003-0383-00	Muffler Plate	For all 6RB and 6TM Compressors
020-0012-09	Gasket (2 required)	1" hole size, 2 3/4" Centers
027-0115-00	Upper Rubber Vibration Mount (4 required)	11/16" hole
027-0114-00	Lower Rubber Vibration Mount (4 required)	11/16" hole

Table 6

Figures and Tables

Comp Model	Valve Plate and Gasket Kits		Body-to-Valve Plate Gasket		Valve Plate head-to-head Gasket			
					Low Stage		High Stage	
	Part No.	No. Req	Part No.	No. Req	Part No.	No. Req	Part No.	No. Req
9TK	998-0061-36	1	020-0128-01	1	020-0270-00	1	Same	
9TL	998-0061-36	1	020-0128-00	1	020-0270-00	1	Same	
9TH	998-0061-36	1	020-0128-04	1	020-0270-00	1	Same	
6RB2 6RB5	998-0061-52	3	020-0626-00	3	020-0631-00	2	020-0630-00	1
6TM	998-0061-49	3	020-0433-00	3	020-0450-00	2	020-0441-00	1

Table 7

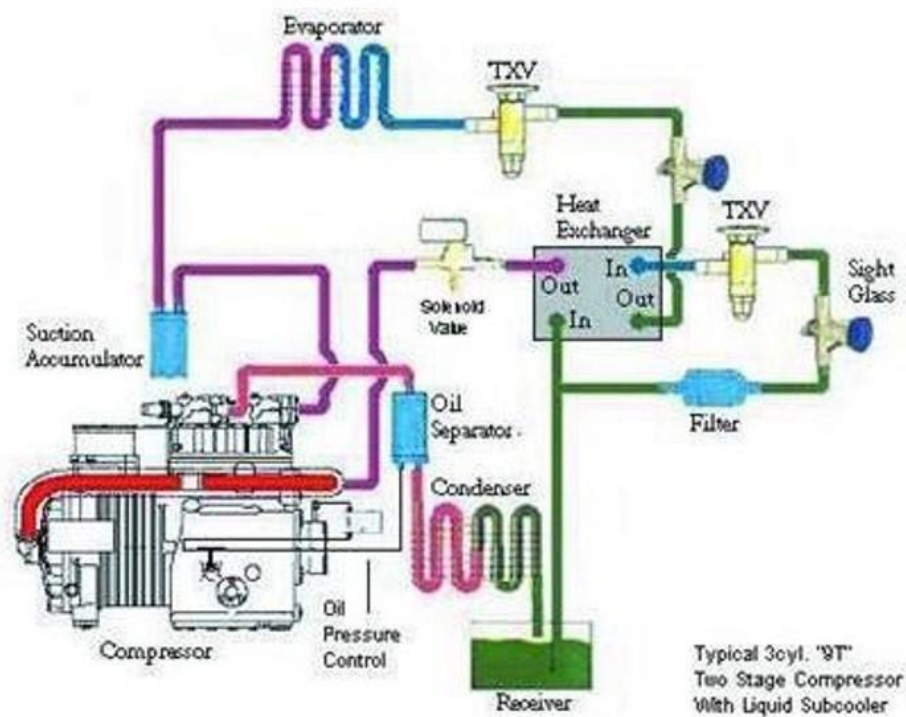


Figure 3 9T*2 WITH BRAZEPLATE SUBCOOLER

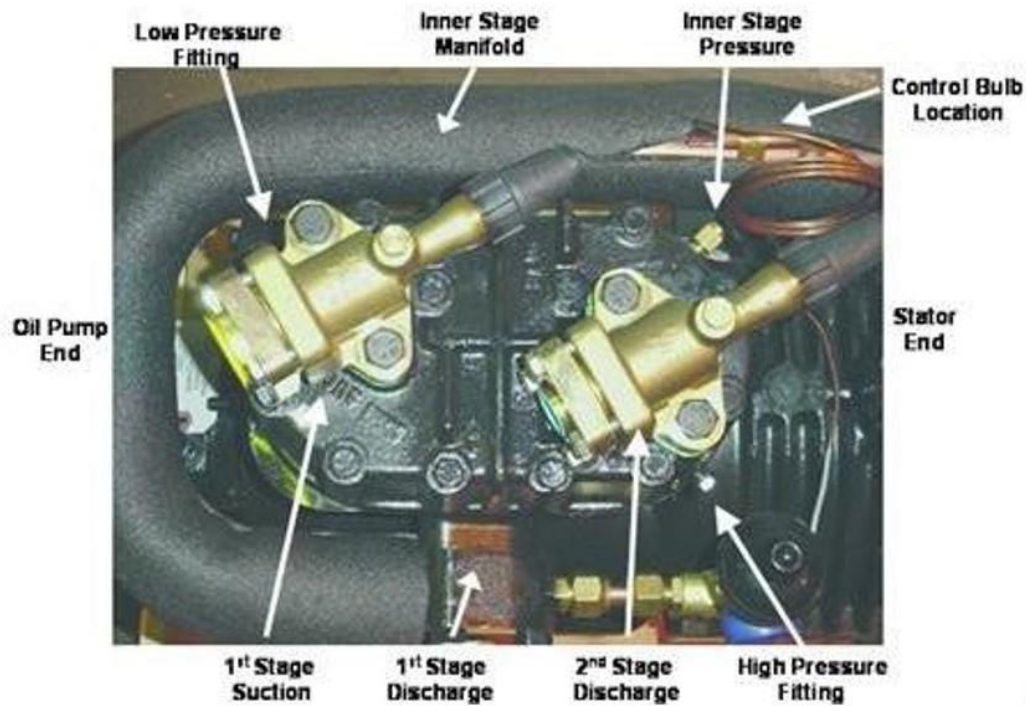


Figure 4 9T PORT IDENTIFICATION

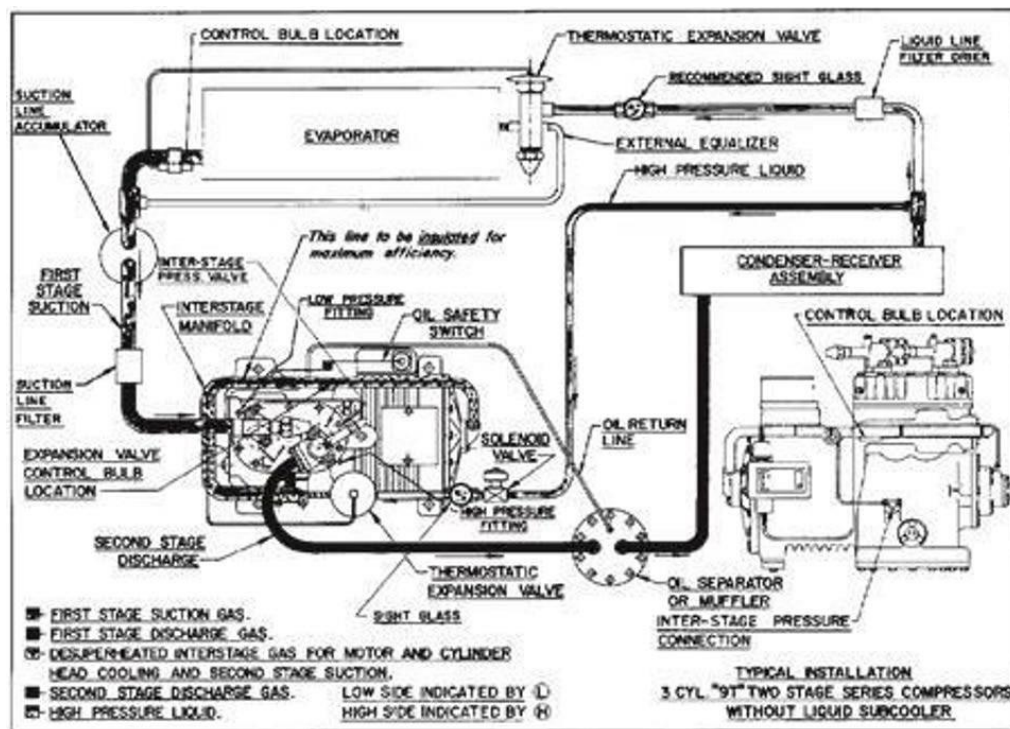


Figure 5 SYSTEM WITH 3-CYLINDER COMPRESSOR (WITH LIQUID SUB-COOLER)

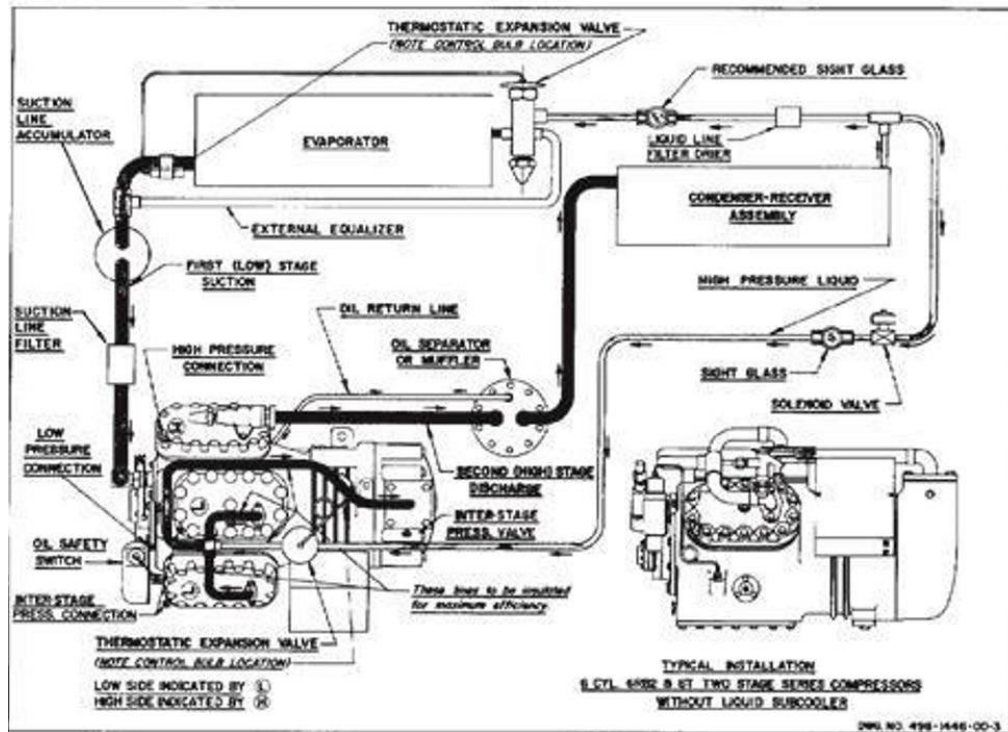


Figure 6 SYSTEM WITH 6-CYLINDER COMPRESSOR (WITH LIQUID SUB-COOLER)

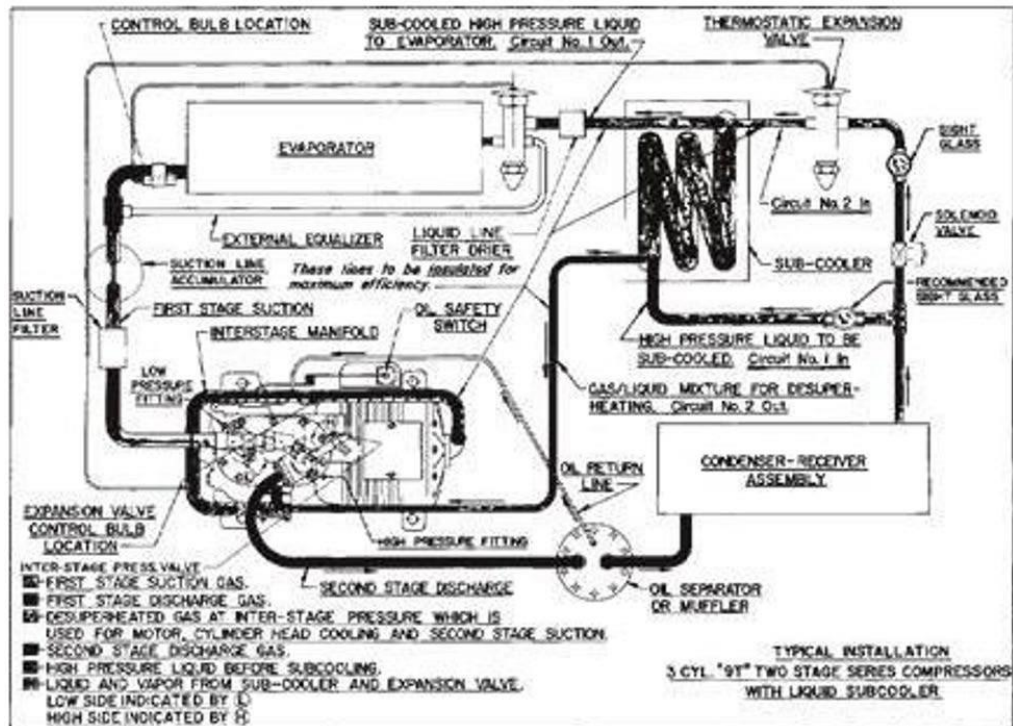


Figure 7 SYSTEM WITH 3-CYLINDER COMPRESSOR (WITH INNER-TUBE LIQUID SUB-COOLER)

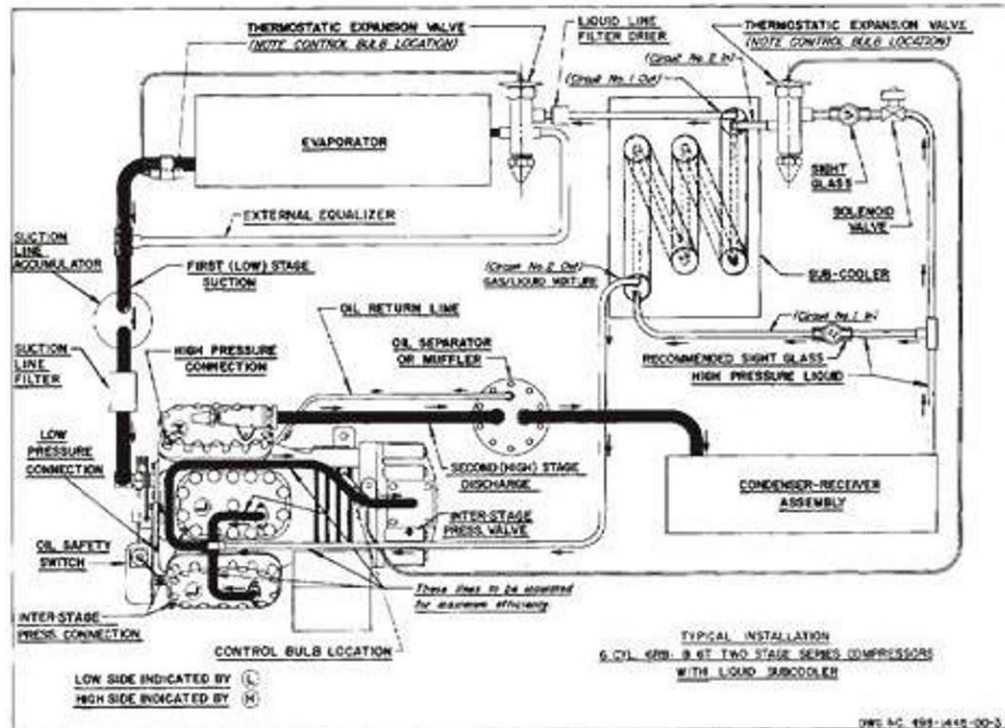


Figure 8 SYSTEM WITH 6-CYLINDER COMPRESSOR (WITH INNER-TUBE LIQUID SUB-COOLER)

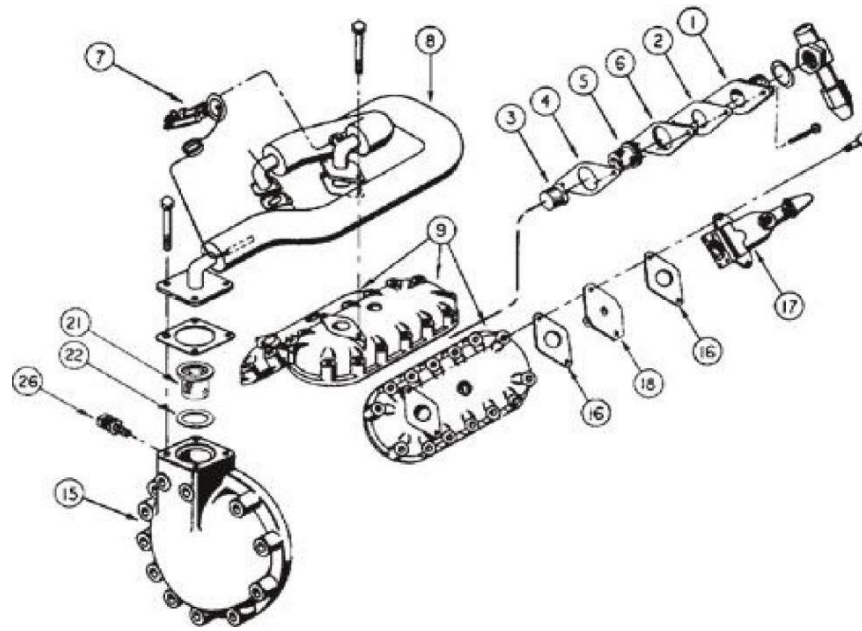
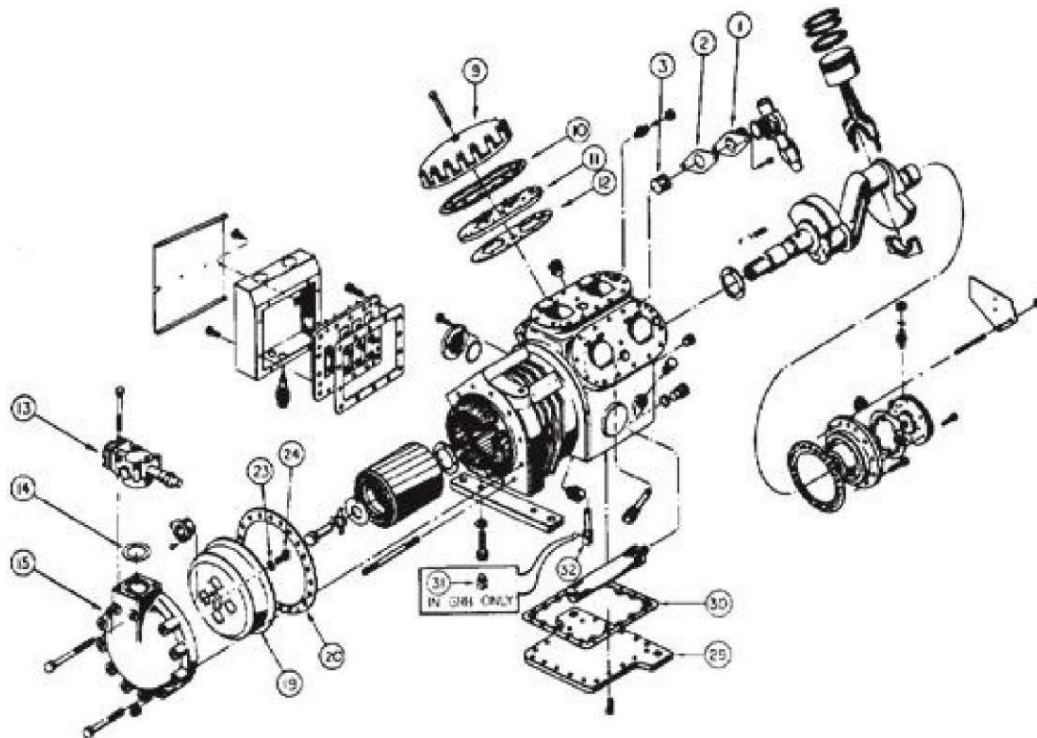


Figure 9 two-stage conversion



Exploded View Model "6R" Series (Single-Stage) Compressor

Figure 10 Exploded View Model "6R" Series (Single-Stage) Compressor

Service

service

No unusual service should be required on a well installed two-stage system. The electrical equipment is identical to single-stage compressors and requires no special comment.

If a valve plate is suspected of being defective, it can easily be checked by observing the head, suction and interstage pressures. If the inter-stage pressure does not correspond within 7 lbs. to that shown in tables 1 and 2, a malfunction is indicated.

The Following Service Chart Will Assist in Diagnosis of Other Possible Troubles:

Complaint	Cause	Correction
1. Suction pressure abnormally low	1. Short of charge 2. Restriction in liquid line 3. Excessive pressure drop in suction line	1. Add charge 2. Remove restriction (can be caused by plugged drier) 3. Increase line size or remove restriction
	4. Inoperative expansion valve 5. Evaporator fan not running 6. Plugged or iced evaporator 7. Discharge pressure too low	4. Replace valve 5. Repair or replace 6. Clean or defrost 7. See complaint number 3
2. Suction pressure abnormally high	1. Inter-Stage pressure too low 2. Inter-Stage pressure too high 3. Evaporator expansion valve bulb loose	1. See complaint number 6 2. See complaint number 5 3. Clamp properly
	4. Evaporator expansion valve malfunction 5. Discharge pressure too high 6. Wrong head gasket	4. Replace 5. See complaint number 4 6. Install correct gasket
3. Discharge pressure abnormally low	1. Short of charge 2. Low ambient on air-cooled condenser 3. Water regulator valve set too low	1. Add charge 2. Install winter control, various types are available 3. Adjust water valve
4. Discharge pressure abnormally high	1. Plugged condenser 2. Excessively high temperature air entering air-cooled condenser 3. High temperature water entering condenser 4. Water valve set too high 5. Condenser fan not running	1. Clean condenser 2. Prevent air from recirculating and assure adequate ventilation 3. Check water supply 4. Adjust 5. Repair or replace
5. Inter-stage pressure too high	1. Blown gasket (discharge to inter-stage) 2. Malfunctioning or broken high-stage reeds	1. Replace 2. Replace valve plate assembly
6. Inter-stage pressure too low	1. Blown gasket (inter-stage too low) 2. Malfunctioning or broken low-stage reeds 3. Wrong high-stage head gasket	1. Replace gasket 2. Replace valve plate assembly 3. Install correct gasket
7. Compressor runs	1. Liquid not being fed to desuperheating	1. Add charge if needed; move line so that

hot, trips thermal protectors when not draw-	expansion valve 2. Improper bulb location	liquid is fed from bottom of horizontal line. Check liquid filter or drier for restriction. 2. Locate properly
ing excessive current, discharge temperature above 270°F	3. Improper setting of adjustable type expansion valve 4. Defective valve 5. Plugged liquid screen, filter, or drier	3. See adjusting instructions 4. Replace valve 5. Clean or replace
8. Ice on stator cover or crankcase	1. Bulb not clamped properly, improper location 2. Improper setting of adjustable type expansion valve 3. Defective valve	1. Clamp properly, locate properly 2. See adjusting instructions 3. Replace valve

Revision Tracking R10

The document format has been updated to the new Copeland format

All occurrences of "Emerson" have been removed

A note regarding A3 and R290 venting has been updated

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