



Installation Instructions

Stealth™ Model RTAE Chillers

Field Replacement of GP4 Classic Compressor

This document applies to service offering applications only.

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.



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. 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 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

Document updated to reflect Service Offering number.



Table of Contents

General Information	5
Installation	6
Compressor Replacement	6
Additional Parts Required	6
GP4 Classic Compressor Parts List	7
Heater Information	8
Compressor Heaters	8
Removal of Output Inductors (1 st Gen GP4 Classic Compressor Only)	9
Adding Common Mode Chokes (1 st Gen GP4 Classic Compressor Only)	12
Reprogramming AFD3	13
Parameter Update Required for 1 st Generation Only	13
Installation Procedure	14

General Information

Initial production RTAE chillers include 1st Gen GP4 Screw Compressors with legacy motors (Phase Motion), external inductors between the drive and compressor, and (on some units) smaller AFD3 frames compared to second generation chillers. While 2nd Gen GP4 Screw Compressors include an updated motor (Regal Beloit), no external inductors, and (on some units) larger AFD3 frames.

Table 1. GP4 classic compressor

Description	1 st Gen GP4 Classic Compressor	2 nd Gen GP4 Classic Compressor
Motor	Phase Motion	Regal Beloit
External Inductor	Yes	No
AFD3 Frame Size	Smaller on some units	Larger on Some units

With conversion to the GP4 Variable VI ratio (VarVI) compressor architecture, in the event of a compressor failure it is not possible to replace 1st or 2nd Gen GP4 Classic Compressors with the new GP4 VarVi model. A service model GP4 VarVi Compressor was developed for replacement of both 1st and 2nd Gen GP4 Classic Compressors. This service model compressor performs similarly as a classic GP4 compressor due to the following adaptations:

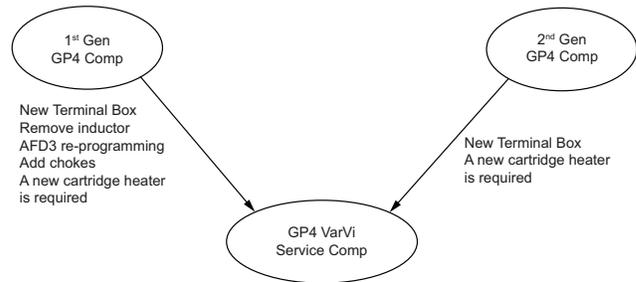
- Locked VI assembly to high VI configuration (same as GP4 Classic).
- 2nd generation motor (Regal Beloit instead of Phase Motion).
- Removal of external inductors (if installed).

Replacement of a 2nd Gen GP4 Classic Compressor requires replacement of the compressor motor terminal box but no other adaptations to unit electrical wiring or AFD3 programming. Replacement of the 1st Gen GP4 Classic Compressor requires extra steps to replicate similar unit operation. This document outlines extra retrofit conversion steps in event of a failure of a 1st Gen GP4 Classic Compressor on an RTAE Chiller:

- Replacement of 1st Gen GP4 Classic Compressor to GP4 Locked VarVI Service Compressor.
- Removal of external inductors.
- Re-programming of AFD3 (including special RLA values for some models).
- Addition of common mode chokes.
- Replacement of the compressor motor terminal box.

Note: *Some units will lose a small portion of top end operational capacity due to the difference in motor performance and the size of the originally installed AFD3 on the 1st Gen RTAE unit. The reduction of top end capacity is small, and noted later in this document.*

Figure 1. Replacement of 1st or 2nd Gen GP4 classic compressor to VarVi service compressor on RTAE





Installation

Compressor Replacement

If a 1st Gen or 2nd Gen GP4 Classic Compressor has failed on an RTAE Chiller, only the Locked VarVi Service Compressor can be used as a replacement. The Classic chassis has been discontinued. Motor information for a specific compressor can be obtained by checking the model number on the compressor nameplate. Motor number (MN) is stored in the 6th and 7th digit of the compressor model number.

Example: Compressor model CHHSRB1A1A0 indicates a B1 motor, which is a 100T Standard Lift 1st Gen GP4 Classic motor. Refer to RTAE Service Guide (RTAE-SVG001*-EN) for more detailed instructions for compressor replacement procedure.

Notes:

- Piping and fitting modifications may be required.
- All units will require field installed insulation. Install insulation before adding refrigerant for proper adhesion.

Table 2. GP4 compressor cross-list for RTAE chiller

GP4 Screw Compressors			1 st Gen GP4 Classic (Phase Motion Motor)		2 nd Gen GP4 Classic (Regal Beloit Motor)		VarVi GP4 Service Model (Regal Beloit Motor)	
Capacity	Lift	Voltage	MN	Service Number	MN	Service Number	MN	Service#
100T	SL	440-528V	B1 ^(a)	COM11023	BA	COM11539	BA	COM13092
		360-439V			BB	COM11540	BB	COM13093
100T	HL	440-528V	C1 ^(a)	COM11024	CA	COM11541	CA	COM13094
		360-439V			CB	COM11542	CB	COM13095
125T	SL	440-528V	E3	COM11027	EA	COM11543	EA	COM13087
125/150T	SL	360-439/440-528V	E2	COM11026	EB	COM11544	EB	COM13086
150T	SL	360-439V	E1	COM11029	EC	COM11545	EC	COM13085
150T	HL	440-528V	F2 ^(a)	COM11031	FA	COM11546	FA	COM13088
		360-439V			FB	COM11547	FB	COM13089

(a) Covers both 360-439V and 440-528V voltage range's. Voltage specific replacement compressor for 360-439V or 440-528V depends on chiller rated voltage. Refer to chiller nameplate to identify the rated voltage. 360-439V motors are used on 380V/400V chillers. 440-528V motors are used on 200V/230V/460V/575V chillers.

Additional Parts Required

Note: Must be ordered separately.

Important: Only the compressor is delivered as standard. Additional parts will be required and must be ordered separately.

Follow steps below to identify additional parts required:

1. Record the model number, digit 5 (R or S) from the RTAE nameplate located on the unit.
2. Record the model number, digit 7 (number or letter) from the motor nameplate located on the compressor motor.
3. Determine which circuit needs the replacement compressor (circuit #1 or #2).
4. Determine which additional parts need to be ordered from the list below using the above information and purchase them for the GP4 Classic compressor replacement.

Example: C H H S R B 1 A 1 X X

Phase motion motors (Early GP4 classic) (Common Mode Choke (cores) will need to be ordered)				
A1	(future use)			
B1	145-010	Motor designations from Phase part numbers -		
C1	170-011	First 3 digits correspond to motor length (A - F in Trane model number)		
C2	170-095	Last 3 digits correspond to winding characteristics. (Numeric digit in Trane model number)		
D1	(future use)			
E1	165-010			
E2	165-014			
E3	165-016			
F1	190-011			
F2	190-014			
GP4 Classic Regal Motors (Regal part number shown) (Common Mode Choke (cores) will not need to be ordered):				
BA	2520869-003	100T	SL	460V
BB	2520869-004	100T	SL	380V
CA	2520869-001	100T	HL	460V
CB	2520869-002	100T	HL	380V
EA	2520867-005	125T	SL	460V
EB	2520867-006	125T/150T	SL	380V/460V
EC	2520867-007	150T	SL	380V
FA	2520867-001	150T	HL	460V
FB	2520867-002	150T	HL	380V
FC	2520867-003	165T	HL	460V
FD	2520867-004	165T	HL	380V

Table 6. Common mode chokes

Description	Quantity	Mnemonic	Part Number
Common Mode Core Assembly	One per circuit	COR00252	50711456
Individual Conductor Core	Five per conductor	COR00253	X13641390010

Note: These parts must be sourced locally.

Inline Connectors

With removal of the output inductor, the power conductors will be need to be spliced together. Polaris Electrical Connectors are recommended (Catalog No.: IT-250). Six pieces are needed. There are two conductors per phase.

Figure 2. Insulated in-line connectors

Piping and Fitting Changes

Piping and fitting changes may be required. Source locally.

Insulation

All units require field installed insulation. Install insulation before adding refrigerant for proper adhesion.

Heater Information

There are two heaters per compressor:

1. One cartridge/rod style that is the same part number for both R and S frame compressors. This part number changed between GP4 classic and VVi. Heaters need to be ordered as separate service parts for the retrofit to work. See [Table 3, p. 7](#) for the correct part numbers to order.
2. The band style has not change between GP4 Classic and VVi. The existing band style heaters on the RTAE compressor can be reused.

Compressor Heaters

The compressor must be heated any time it is not running to prevent refrigerant from condensing in the compressor. The heaters are sized to maintain a minimum of 18°F or 20°F rise above the ambient temperature.

Two heaters are required: a cartridge type in the suction end of the rotor housing and a band type on the muffler. See [Table 3, p. 7](#) for heater details.

Removal of Output Inductors (1st Gen GP4 Classic Compressor Only)

(circuit 2); connect wires 431D to wire 433A (circuit 1); or connect wires 424D to wire 425A (circuit 2). Bypass or cap off coolant lines that pass through the inductor. Reconnect the power conductors together with recommended POLARIS insulated in-line splice connector (See [Step](#)).

Physically remove output inductor from each circuit. Remove thermal cutout limit switch connections 1B3 (circuit 1) or 1B4

Figure 3. Electrical schematic with output inductor - circuit1

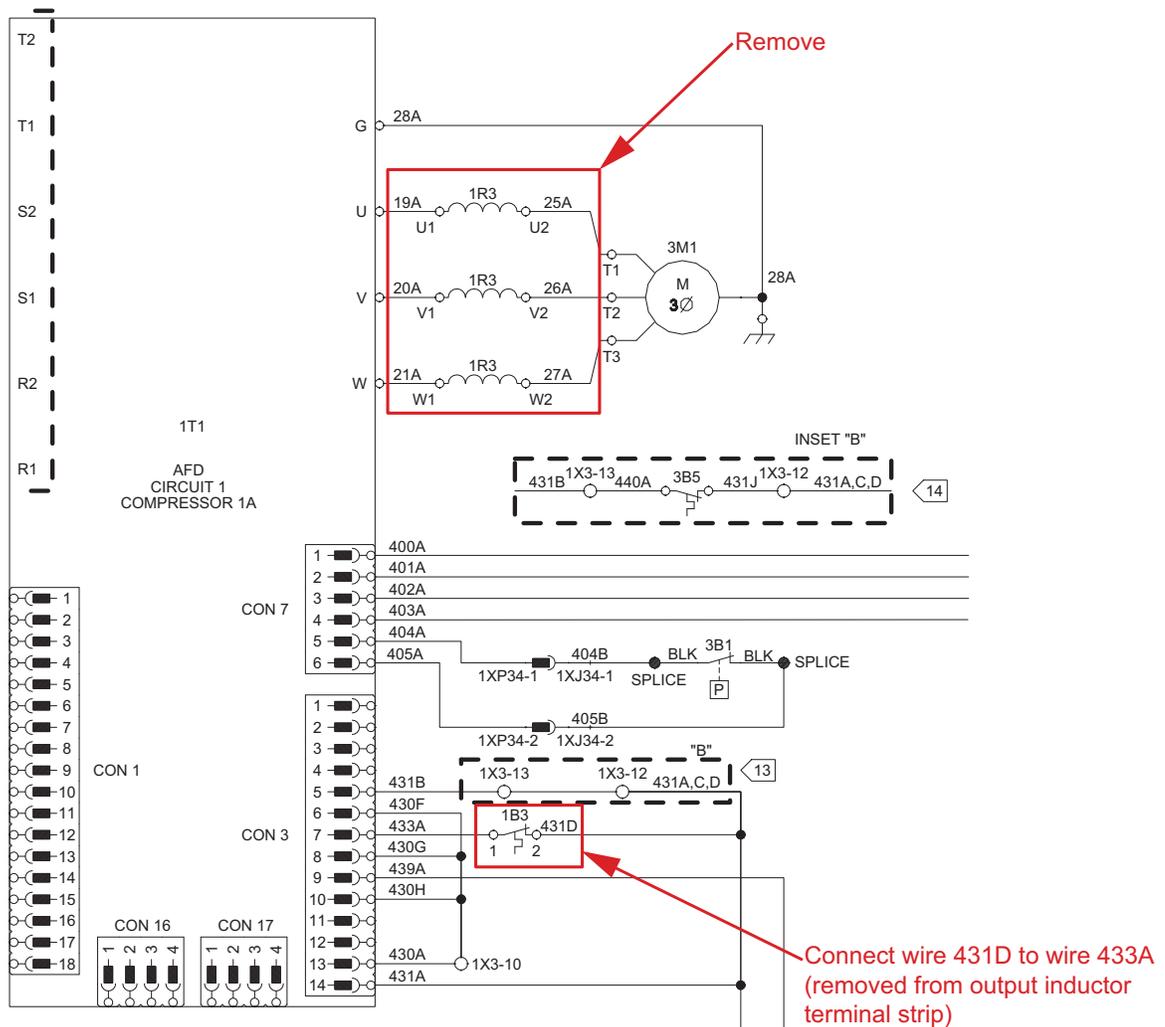


Figure 4. Electrical schematic with output inductor - circuit2

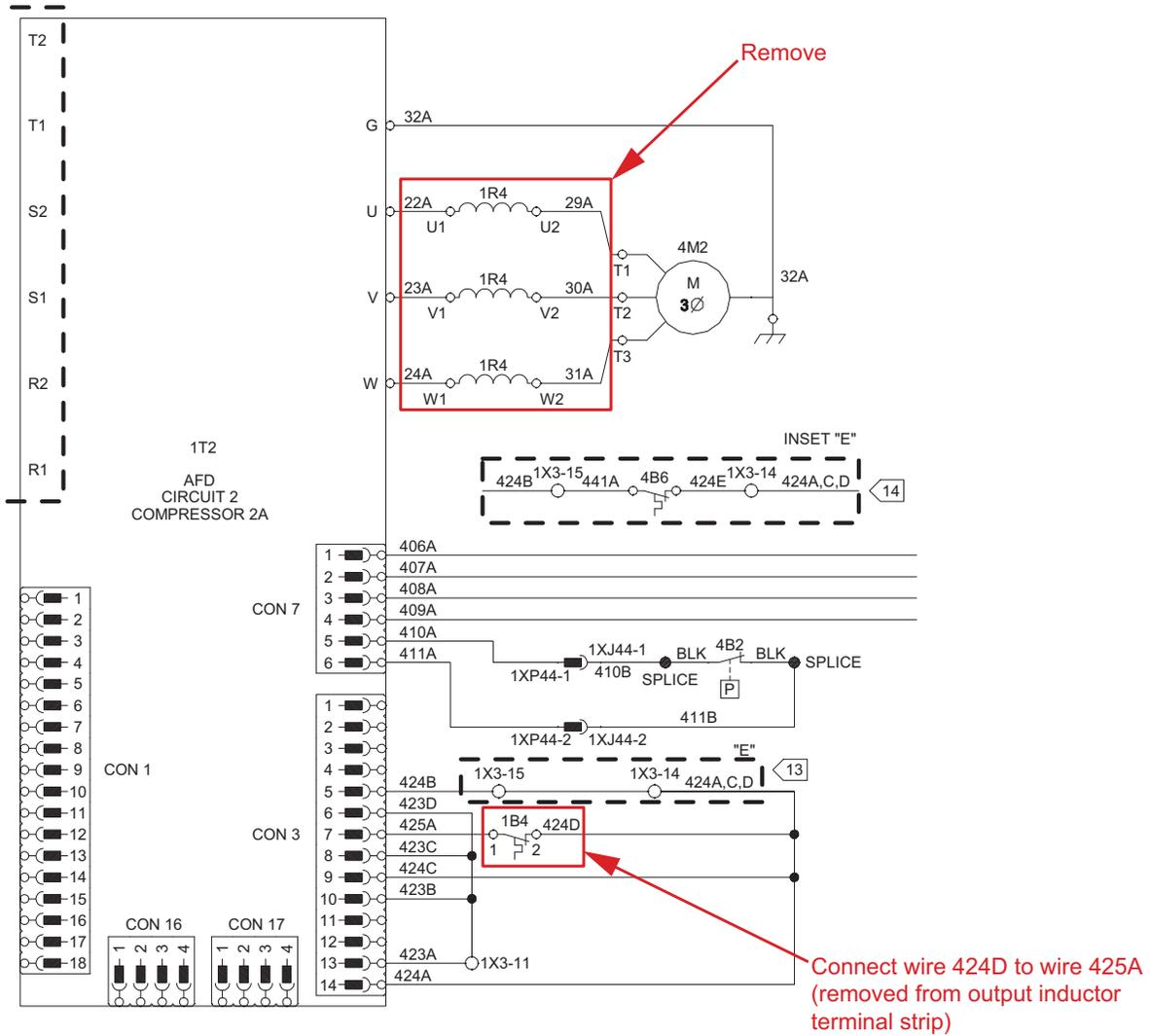


Figure 5. Output inductor location

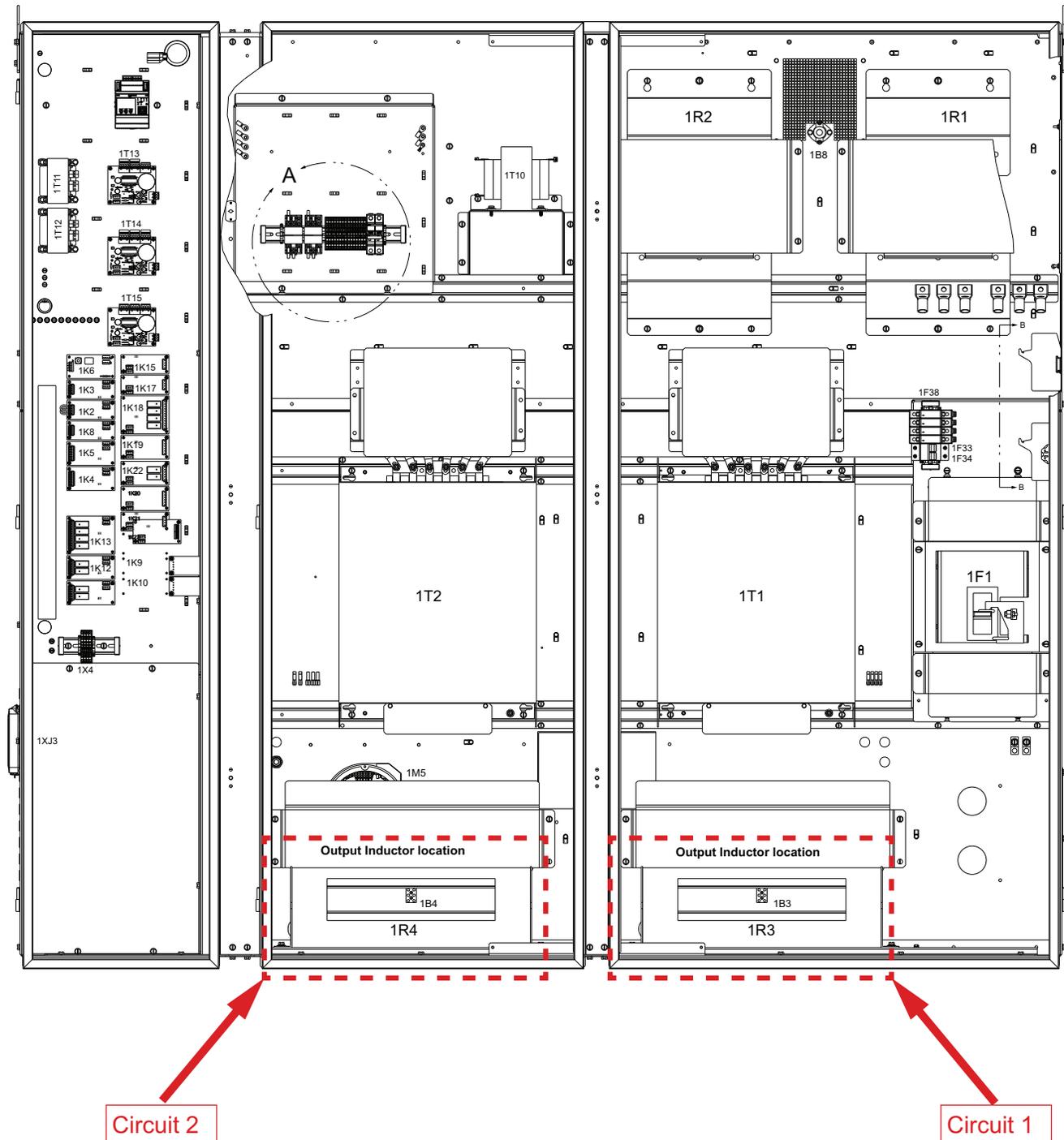


Figure 6. System cooling

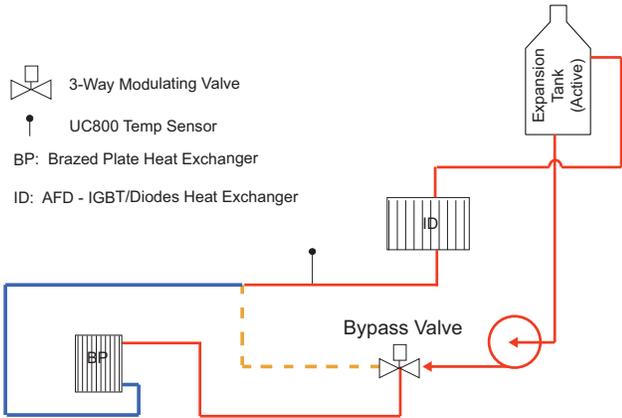


Figure 7. Insulated in-line connectors



Adding Common Mode Chokes (1st Gen GP4 Classic Compressor Only)

Common mode chokes are necessary to maintain protection against bearing currents causing pre-mature failure of the compressor bearings. With the removal of the output inductor,

Figure 9. Output chokes locations

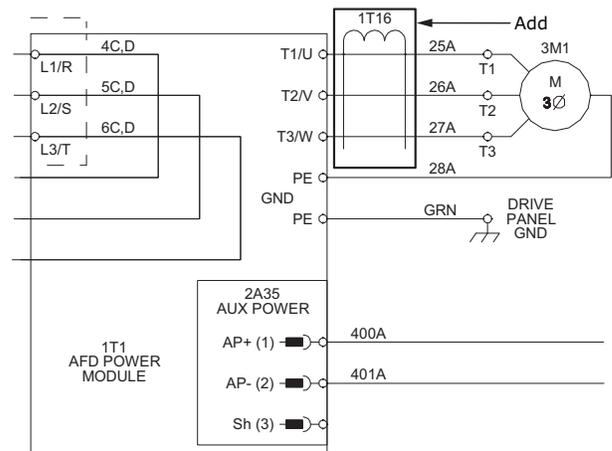


common mode chokes are necessary. The choke assembly encircles all current carrying conductors between the drive and compressor. Do not include ground conductors. Individual cores must also be installed on the power conductors. Refer to the schematic and image below. With removal of the output inductor, the power conductors will be need to be spliced together. Polaris electrical connectors are recommended (Catalog No.: IT-250). Six pieces are needed. There are two conductors per phase.

Table 7. Common mode chokes

Description	Quantity	Mnemonic
Common Mode Core Assembly	One (1) per circuit	COR00252
Individual Conductor Core	Five (5) per conductor	COR00253

Figure 8. Electrical schematic with output chokes



Reprogramming AFD3

Re-programming the AFD3 is necessary after replacing either the 1st or 2nd Gen GP4 Classic compressor with the GP4 VarVi Service Model on an RTAE unit. Re-program the parameters shown in [Table 8, p. 13](#) via the Config and Binding view in TU software.

High level view process:

1. Navigate to the binding process.
2. Unbind appropriate circuit AFD3 drive in binding view.
3. In TU, navigate to the appropriate Config screen.
4. Change required parameters.
5. Navigate to the binding process.
6. Rebind AFD3.

For reference, see AFD3 Service Guide (AFD-SVG01*-EN) and RTAE Installation, Operation, and Maintenance (IOM) manual (RTAE-SVX001*-EN).

Figure 10. AFD1 or compressor1A

Motor Type (MTP1)	Internal Permanent Magnet	Motor Nameplate D-Axis Inductance (MDI1)	378	μH	
Input Transformer Turns Ratio (ITR1)	1	Motor Nameplate Q-Axis Inductance (MQI1)	378	μH	
Total System Inertia (TSI1)	0.36	kg-m ²	Motor Nameplate Stator Resistance (MSR1)	28400	μ#
Motor Nameplate Voltage (MVT1)	400	Vac	Active Harmonic Damping (AHD1)	Disable	
Drive Module Maximum Current (DMA1)	300	Amps	Reset to Defaults (RDF1)	No	
Motor Nameplate RLA (MRA1)	150	Amps	Input Choke Impedance (IMP1)	3	%
Motor Nameplate Power (MRP1)	103	kW	Unit System Voltage (UNV1)	460	Vac
Motor Nameplate Number of Poles (MNP1)	6	poles	Rectifier Type (RCT1)	6 Pulse	
Motor Nameplate RPM (MRS1)	5800	RPM	Motor Leakage SigmaLs Inductance (MLI1)	300	μH
Motor Nameplate Magnet Flux (MMF1)	141	mWb			

Parameter Update Required for 1st Generation Only

Table 8. Programming values for AFD3 drive

AFD3 Parameter Name (FCAT)	GP4 Gen Replacing	GP4 VarVi Service Model Number ^(a)											
		FA	EA	EB ^(b)	CA	BA	EB ^(b)	FC	FB	EC	FD	CB	BB
Motor Type (MTPx)		Internal Permanent Magnet											
Transformer Input Ratio (ITRx)		1											
Total System Inertia (TSIx)		0.36 kg-m ²											
Motor NP Volts (MVTx)		400 V	400 V	400 V	400 V	400 V	330 V	400 V	340 V	340 V	340 V	340 V	330 V
Motor NP RLA Current (MRAx) ^(c)	1 st Gen	274 A	214 A	225 A	188 A	158 A	225 A	304 A	304 A	304 A	365 A	225 A	204 A
	2 nd Gen	298 A	214 A	249 A	188 A	158 A	250 A	304 A	338 A	304 A	397 A	232 A	204 A
Motor NP Power (MRPx)		168 kW	125 kW	153 kW	123 kW	103 kW	128 kW	194 kW	178 kW	151 kW	196 kW	123 kW	103 kW
Motor NP Number of Poles (MNPx)		6 poles											
Motor NP RPM (MRSx)		4805 RPM	4004 RPM	4805 RPM	5800 RPM	5800 RPM	4004 RPM	5250 RPM	4805 RPM	4805 RPM	5250 RPM	5800 RPM	5800 RPM
Motor NP magnet flux (MMFx)		167 mWb	207 mWb	174 mWb	140 mWb	141 mWb	174 mWb	162 mWb	152 mWb	149 mWb	133 mWb	115 mWb	120 mWb

Table 8. Programming values for AFD3 drive (continued)

AFD3 Parameter Name (FCAT)	GP4 Gen Replacing	GP4 VarVi Service Model Number ^(a)											
		FA	EA	EB ^(b)	CA	BA	EB ^(b)	FC	FB	EC	FD	CB	BB
Motor NP D-Axis Inductance (MDIx)		308 μ H	475 μ H	332 μ H	317 μ H	378 μ H	332 μ H	250 μ H	219 μ H	244 μ H	170 μ H	212 μ H	270 μ H
Motor NP Q-Axis Inductance (MQIx)		308 μ H	475 μ H	332 μ H	317 μ H	378 μ H	332 μ H	250 μ H	219 μ H	244 μ H	170 μ H	212 μ H	270 μ H
Stator Resistance (MSRx)		2106 $\mu\Omega$	2780 $\mu\Omega$	1960 $\mu\Omega$	2240 $\mu\Omega$	2840 $\mu\Omega$	1960 $\mu\Omega$	1380 $\mu\Omega$	1220 $\mu\Omega$	1440 $\mu\Omega$	940 $\mu\Omega$	1500 $\mu\Omega$	2040 $\mu\Omega$
Active Harmonic Damping (AHDx)		Disable											
Reset to Defaults (RDFx)		No											
Input Choke Impedance (IMPx)		3%											
Rectifier Type (RCTx)		6 Pulse											
Leakage Signals (MLIx)		200 μ H	280 μ H	230 μ H	230 μ H	300 μ H	270 μ H	190 μ H	180 μ H	185 μ H	135 μ H	175 μ H	215 μ H

(a) Motor information is stored in the 6th and 7th digit of the model number. For example, the digits in bold of this model number correspond to the information in the tables above: CHHSRB**1A**1A0.

(b) Motor model EB is unique in that it has dual ratings at both 460V and 380V. For 200V/230V/460V/575V chillers use the left most EB column. For 380V/400V chillers use the right most EB column.

(c) For certain models, a lesser RLA is used since the installed AFD3 drive is smaller on chillers with 1st Generation GP4 Classic Compressors. Refer to [Table 2, p. 6](#) to decipher the generation of the failed compressor being replaced. Program the appropriate RLA per the 1st Gen or 2nd Gen row in the table.

Installation Procedure

Figure 11. Compressor terminal box

New Compressor Terminal Box



Figure 12. Cartridge heater location

Cartridge Heater Location
(Band heater can be reused)

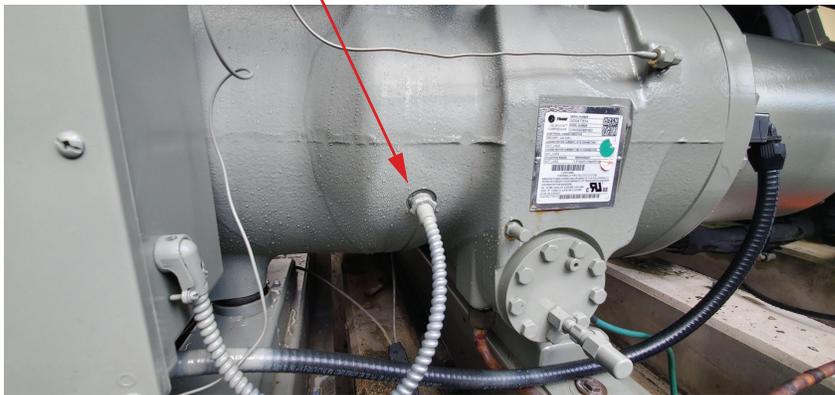


Figure 13. Band heater location

Band Heater Location



Figure 14. High pressure switch location

Location of High Pressure Switch
(Reuse fitting from old compressor)



Figure 15. Intermediate oil pressure transducer location

Location of Intermediate Oil
Pressure Transducer



Figure 16. Solenoid stems

Leave Solenoid Stems Capped

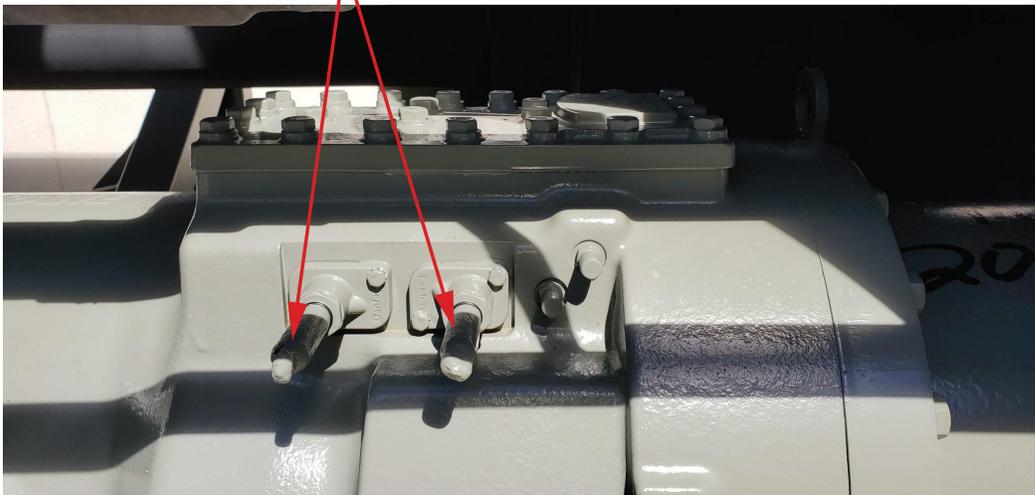


Figure 17. Piping modifications



Figure 18. Fitting installation for suction transducer in the suction line



Figure 19. Threadelet installation - 1/4 inch pipe thread



Figure 20. Follow standard welding procedures when welding 1/4 inch pipe thread threadelet in place



Figure 21. Pressure teat and paint threadolet



Figure 22. Install existing suction transducer



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