

Trane Liqui-Flo Addendum

Instruction Manual D2-3415

 **Rockwell** Automation

Reliance Electric

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is critical for successful application and understanding of the product.



ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The user must provide an external, hardwired emergency stop circuit outside of the drive circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation may result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

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CONTENTS

Chapter 1	Introduction	
1.1	Intended Audience.....	1-1
1.2	Other Required Manuals	1-1
Chapter 2	About the Drive and Cabinet	
2.1	Identifying the Trane Model Number	2-1
2.2	Enclosure Rating	2-2
2.3	Identifying Trane Cabinet Components	2-2
2.4	Trane Options.....	2-6
Chapter 3	Cabinet Mounting, Wire Routing, and Liquid-Cooling Connections	
3.1	Planning the Cabinet Installation	3-1
3.2	Mounting the Cabinet	3-1
3.3	Cabinet Wire Routing	3-4
3.4	Grounding the Cabinet	3-4
3.5	Liquid-Cooling Connections.....	3-6
Chapter 4	Connecting Cabinet Power Wiring	
4.1	Cabinet Input Disconnect	4-1
4.2	Installing Input Power Wiring (6-Pulse Rectifier Cabinet)	4-1
4.3	Installing Input Power Wiring (12-Pulse Rectifier Cabinet)	4-3
4.4	Installing Output Power Wiring	4-5
4.5	Regulator Board Wiring	4-5
Chapter 5	Cabinet Servicing	
5.1	Removing the Liqui-Flo Drive from the Cabinet.....	5-1
5.1.1	Removing the Drive from a 6-Pulse Rectifier Cabinet.....	5-1
5.1.2	Removing the Drive from a 12-Pulse Rectifier Cabinet.....	5-3
5.2	Replacement Parts	5-6
Appendix A	Trane Liqui-Flo Wiring Diagrams.....	A-1
Index	Index-1

List of Figures

Figure 2.1 – Identifying the Trane Model Number	2-1
Figure 2.2 – Trane Cabinet Component Locations (6-Pulse Rectifier)	2-3
Figure 2.3 – Trane Cabinet Component Locations (12-Pulse Rectifier)	2-5
Figure 3.1 – Cabinet Dimensions	3-2
Figure 3.2 – Cabinet Mounting Holes	3-3
Figure 3.3 – Cabinet Wire Routing Locations (6-Pulse Rectifier)	3-5
Figure 3.4 – Cabinet Wire Routing Locations (12-Pulse Rectifier)	3-6
Figure 3.5 – Liquid Cooling Bulkhead Fittings	3-7
Figure 3.6 – Liquid-Cooling Connections.....	3-8
Figure 4.1 – Trane Cabinet Electrical Connections (6-Pulse Rectifier)	4-2
Figure 4.2 – Trane Cabinet Electrical Connections (12-Pulse Rectifier)	4-4

List of Tables

Table 2.1 – Power and Enclosure Ratings	2-2
Table 3.1 – Cabinet Dimensions.....	3-1
Table 3.2 – Cabinet Mounting Hole Dimensions	3-1
Table 5.1 – Hardware Tightening Torques	5-3
Table 5.2 – C-Frame Liqui-Flo Drive Replacement Parts.....	5-6

Introduction

This addendum covers the features and specifications that are unique to the AC Liqui-Flo™ drives being produced for the Trane™ Company. Only product information that differs from that presented in the standard Liqui-Flo instruction manuals is covered here. This addendum must be used with the Liqui-Flo software and hardware instruction manuals listed below.

1.1 Intended Audience

This addendum is intended for the following qualified electrical personnel: Trane manufacturing, Trane service, and Rockwell Automation Global Technical Service personnel who are familiar with the custom liquid-cooling features described.

1.2 Other Required Manuals

This addendum must be used with the following publications:

- D2-3410 Liqui-Flo AC Drive Software Startup and Reference Manual
- D2-3411 Liqui-Flo AC Power Modules Hardware Reference, Installation, and Troubleshooting
- D2-3341 Remote Meter Interface (RMI) Board

About the Drive and Cabinet

This chapter describes how to identify the Trane cabinet and the Liqui-Flo drive using the Trane model number matrix. Liqui-Flo drive power ratings are listed as well as available Trane options. Cabinet component drawings are also provided. Note that in this manual references to the “cabinet” refer to both the 6-pulse and 12-pulse rectifier cabinets, unless otherwise indicated.

2.1 Identifying the Trane Model Number

Each Trane cabinet can be identified by its model number. See figure 2.1. A typical cabinet model number is shown in table 2.1 as are the Liqui-Flo drive power ratings.

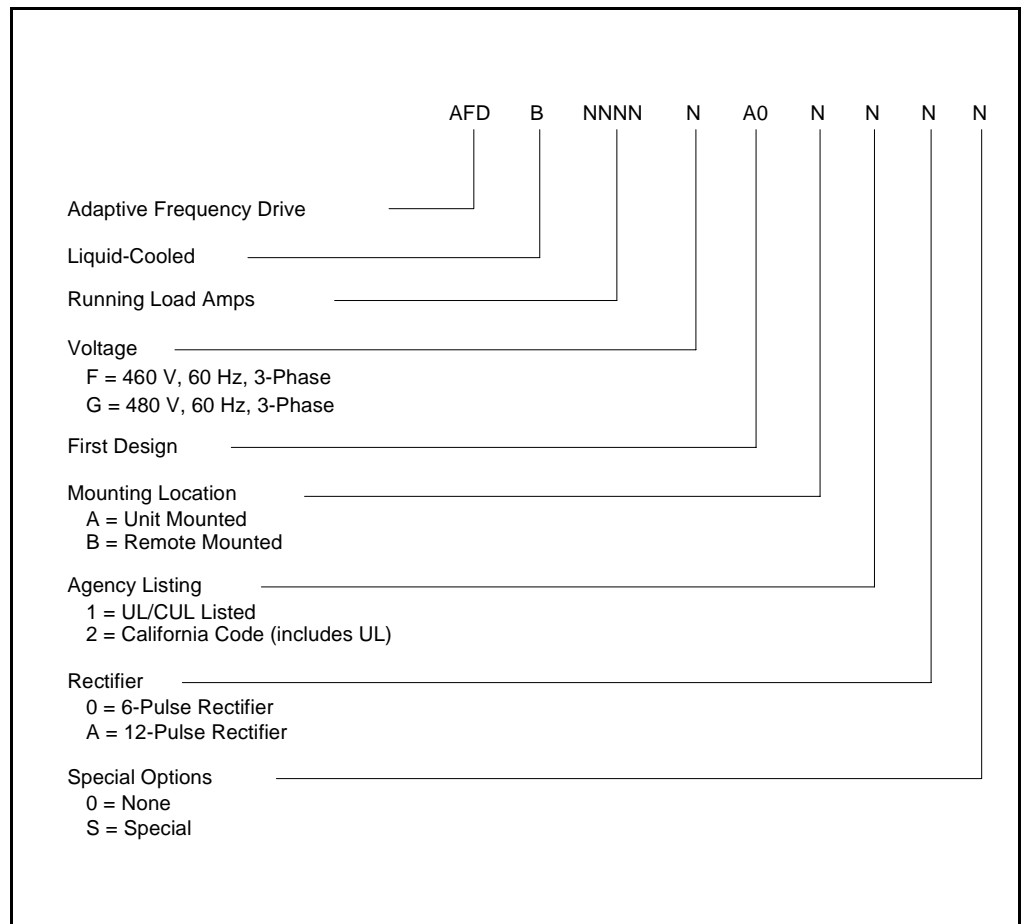


Figure 2.1 – Identifying the Trane Model Number

Table 2.1 – Power and Enclosure Ratings

Trane Cabinet M/N	Reliance Liqui-Flo Drive M/N	Frame Size	Cabinet Enclosure Rating	Input Power (KVA)	Input Current (Amps)	Output Current at 2 kHz (Amps)	Full Load Power Loss Watts
AFDB0643GA0A10	64L4060	C	NEMA 1	555	667	643	9500

2.2 Enclosure Rating

The Trane cabinet has a NEMA 1 enclosure rating:

- NEMA 1: Vented. Intended for general-purpose indoor applications.

NEMA 1 enclosures are to be located in a clean and dry environment that is away from oil, coolant, or other airborne contaminants.

2.3 Identifying Trane Cabinet Components

The 6-pulse rectifier Trane cabinets have the following main components. The identification numbers provided correspond to the numbers used in figure 2.2.

1. **Cabinet**
2. **Control Panel Assembly**
3. **C-Frame Liqui-Flo Drive**
4. **Liqui-Flo Power Module Adapter Board** - Provides the interface between the drive's electronics and power structure
5. **Liqui-Flo Bus Control Board** - Controls the drive's power supplies and SCRs
6. **Liqui-Flo Regulator Board** - Controls overall drive operation
7. **Super Remote Meter Interface (RMI) Board** - Provides additional analog I/O (located under the Regulator board)
8. **Coolant Lines** - (a) Outlet, (b) Inlet
9. **Motor Connection Studs (6) P/O CTV**
10. **AC Input Bus Bars (6-Pulse Rectifier)**
11. **Current Transformers (3)** - Used by the Trane UCP2 Control Panel to monitor output current
12. **1200 A Circuit Breaker**
13. **4 KVA Transformer** - Steps down the 480 VAC input voltage to 115 VAC
14. **(3) Type RK-5 Fuses** - Protect the primary of the 4 KVA transformer - (1 fuse: 2 amp) (2 fuses: 15 amp)
15. **(2) Type K5Fuses** - Protect the coolant pump's reactor (1 fuse: 10 amp) and the Starter module's 115 VAC line (1 fuse: 30 amp)
16. **Terminal Block** - Provides termination points for cabinet I/O wiring
17. **Potential Transformers (3)** - Used by the Trane UCP2 Control Panel to measure the 480 VAC input voltage
18. **Trane Starter Module** - Interfaces the Liqui-Flo drive to the Trane UCP2 Control Panel
19. **Relay 2K1** - Circulating coolant pump motor interposing relay
20. **Relay 2K2** - Oil pump interposing relay
21. **Relay 2K3** - Run/stop function interposing relay
22. **50 VA Transformer 460VAC / 115VAC/ 24 VAC** - Supplies power to the Trane Starter Module
23. **Fan** - Provides cooling for the DC bus reactor
24. **Removable Plate** - Provides chain hoist access
25. **Surge Suppressor**

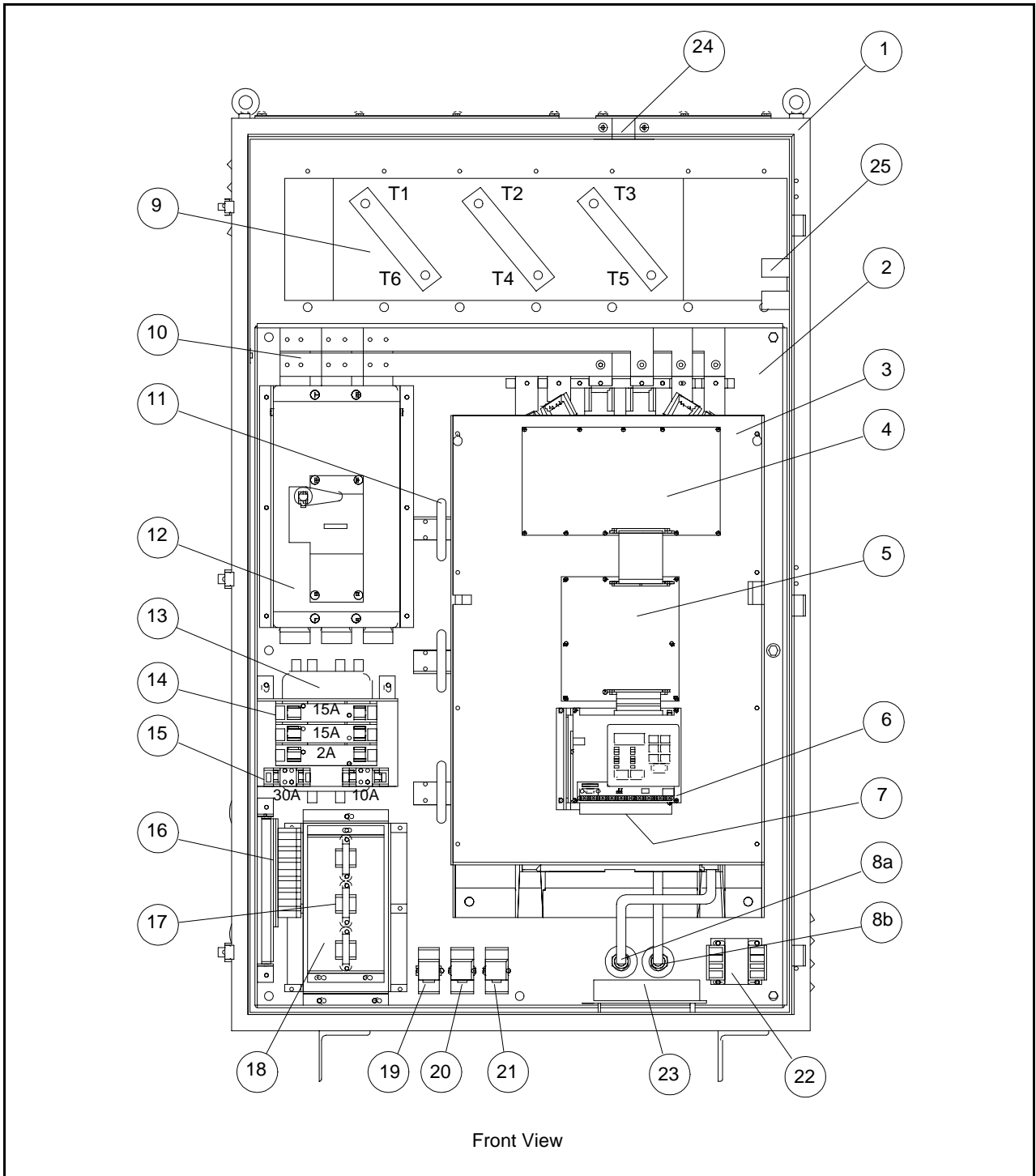


Figure 2.2 – Trane Cabinet Component Locations (6-Pulse Rectifier)

The 12-pulse rectifier Trane cabinets have the following main components. The identification numbers provided correspond to the numbers used in figure 2.3.

1. **Cabinet**
2. **AC Input to Drive** (from Secondary of Delta-Wye Transformer)
3. **Control Panel Assembly**
4. **C-Frame Liqui-Flo Drive**
5. **Liqui-Flo Power Module Adapter Board** - Provides the interface between the drive's electronics and power structure
6. **Liqui-Flo Bus Control Board** - Controls the drive's power supplies and SCRs
7. **Liqui-Flo Regulator Board** - Controls overall drive operation
8. **Super Remote Meter Interface (RMI) Board** - Provides additional analog I/O (located under the Regulator board)
9. **Coolant Lines** - (a) Outlet, (b) Inlet
10. **Motor Connection Studs (6) P/O CTV**
11. **AC Output from Load Side of Circuit Breaker** (located behind item 12)
12. **AC Input Connections** (to Line Side of Circuit Breaker)
13. **Current Transformers (3)** - Used by the Trane UCP2 Control Panel to monitor output current
14. **1200 A Circuit Breaker**
15. **4 KVA Transformer** - Steps down the 480 VAC input voltage to 115 VAC
16. **(3) Type RK-5 Fuses** - Protect the primary of the 4 KVA transformer - (1 fuse: 2 amp) (2 fuses: 15 amp)
17. **(2) Type K5 Fuses** - Protect the coolant pump's reactor (1 fuse: 10 amp) and the Starter module's 115 VAC line (1 fuse: 30 amp)
18. **Terminal Block** - Provides termination points for cabinet I/O wiring
19. **Potential Transformers (3)** - Used by the Trane UCP2 Control Panel to measure the 480 VAC input voltage
20. **Trane Starter Module** - Interfaces the Liqui-Flo drive to the Trane UCP2 Control Panel
21. **Relay 2K1** - Circulating coolant pump motor interposing relay
22. **Relay 2K2** - Oil pump interposing relay
23. **Relay 2K3** - Run/stop function interposing relay
24. **50 VA Transformer 460 VAC/ 115 VAC / 24 VAC** - Supplies power to the Trane Starter Module
25. **Fan** - Provides cooling for the DC bus reactor
26. **Removable Plate** - Provides chain hoist access
27. **Surge Suppressor**

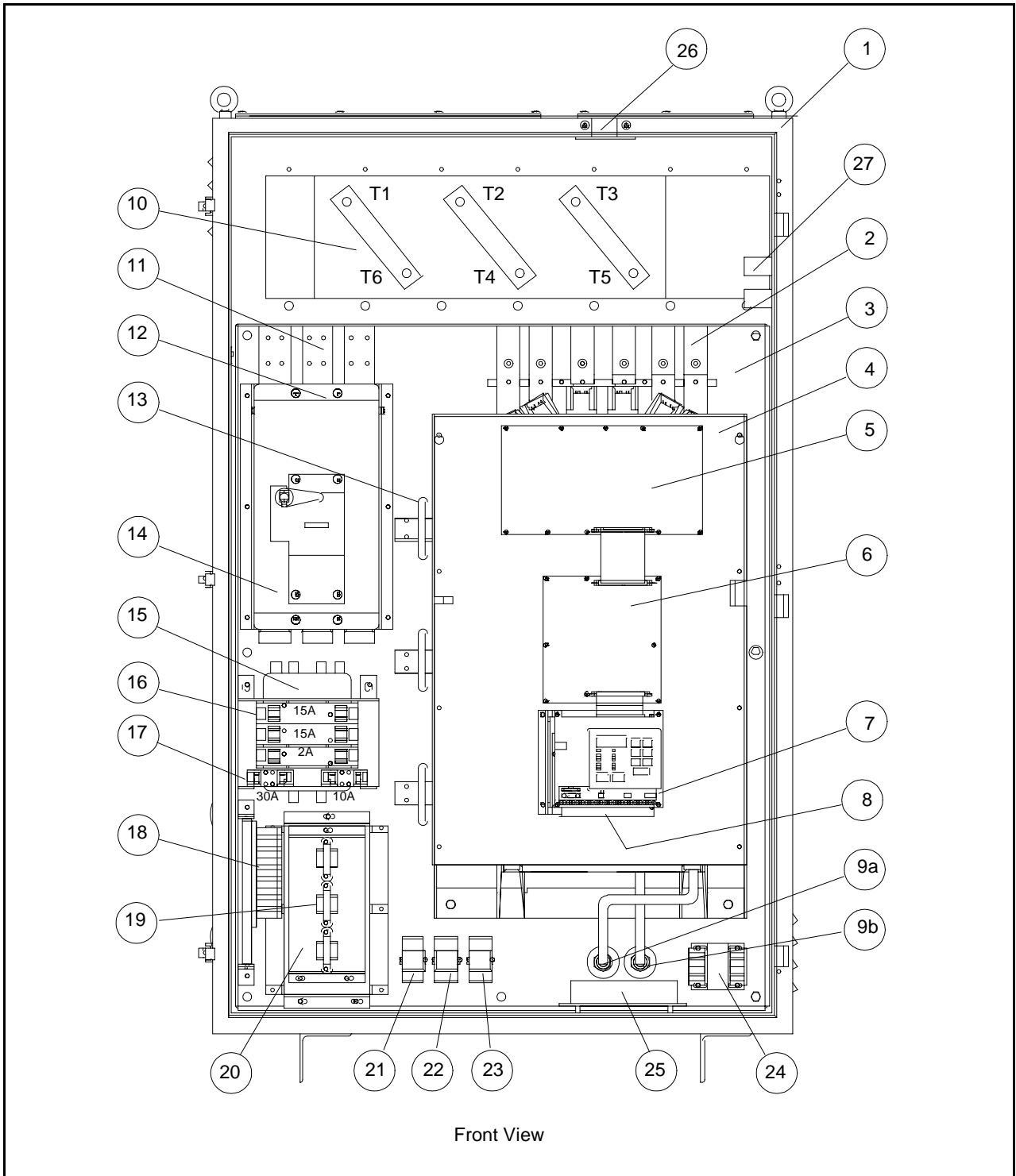


Figure 2.3 – Trane Cabinet Component Locations (12-Pulse Rectifier)

2.4 Trane Options

There is one available Trane option, the 12-pulse rectifier cabinet, which is described in this addendum. Note that all Trane Liqui-Flo drives have a factory-installed Remote Meter Interface (RMI) board and meet California code regulations.

Cabinet Mounting, Wire Routing, and Liquid-Cooling Connections

This chapter provides cabinet dimension information that must be considered when installing a Trane cabinet. It describes how to mount the Trane cabinet and shows where the wire entry areas and liquid-cooling connection points are located.

3.1 Planning the Cabinet Installation

Cabinet dimensions and weights are listed in table 3.1. Overall cabinet dimensions are illustrated in figure 3.1. Cabinet mounting holes are shown in figure 3.2.

Table 3.1 – Cabinet Dimensions

Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Weight
965 mm 38.0"	1524 mm 60.0"	379 mm 15.1"	1608 mm 63.3"	60 mm 2.4"	23 mm 0.91"	440 kg 970 lbs

Be sure there is adequate clearance for air ventilation around the cabinet. Allow a minimum clearance of 1 foot per side. Allow 4 feet of clearance for the door to open.

3.2 Mounting the Cabinet

Attach the cabinet to the CenTraVac™ chiller using the 8 mounting holes provided. In order to maintain a flat mounting surface and to ensure that screw tightness is maintained, use a washer and lock washer under the screw heads. Refer to figure 3.1 and table 3.1 for cabinet mounting dimensions. Use 3/8" (upper) and 1/2" (lower) mounting screws and washers to attach the cabinet to the chiller. See figure 3.2 and table 3.2 for mounting hole locations and dimensions.

Table 3.2 – Cabinet Mounting Hole Dimensions

Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G
1268.4mm 49.94"	85.7mm 3.38"	114.3mm 4.5"	314.3mm 12.38"	127.0mm 5.0"	254.0mm 10.0"	660.4mm 26.0"

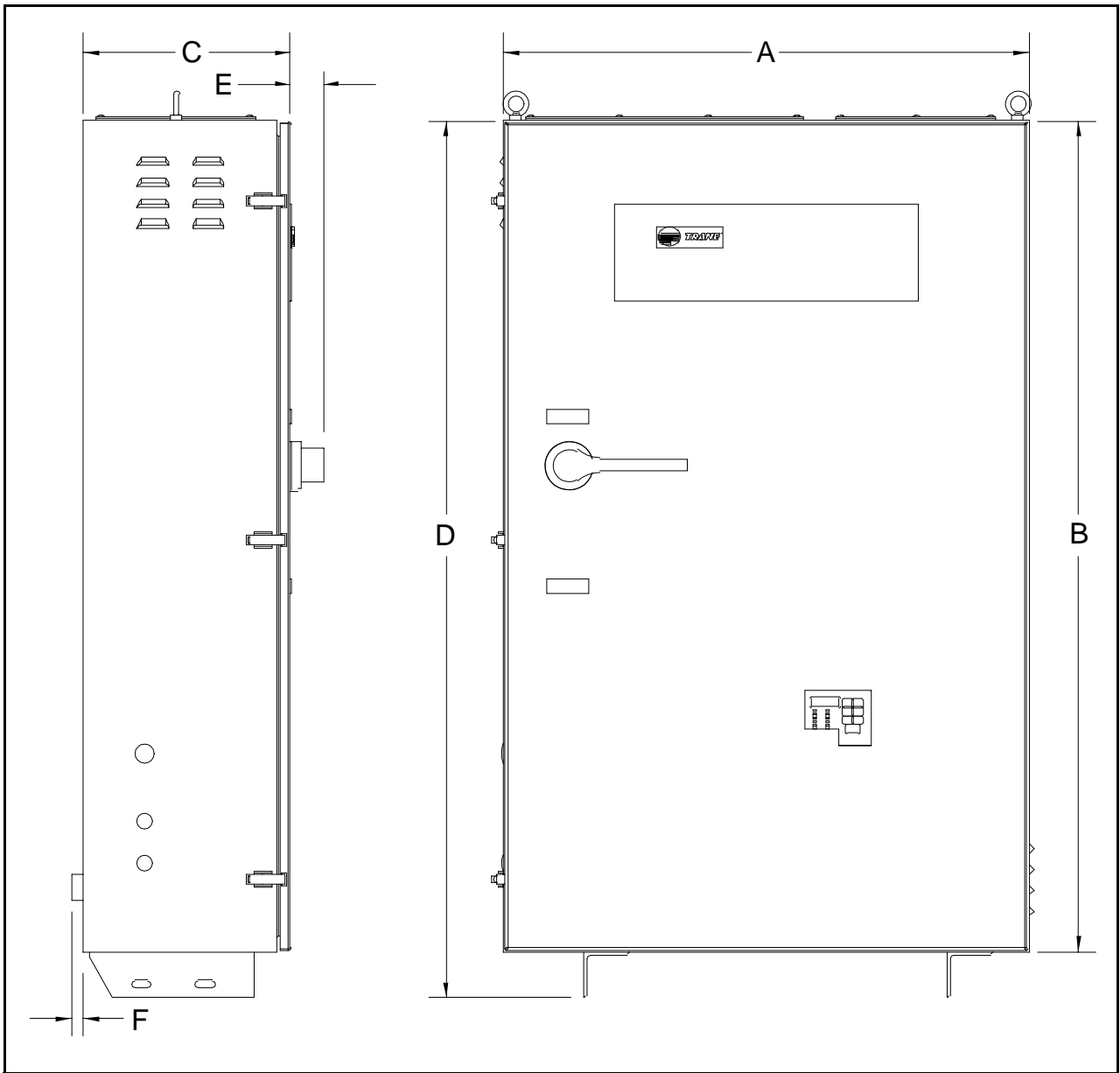


Figure 3.1 – Cabinet Dimensions

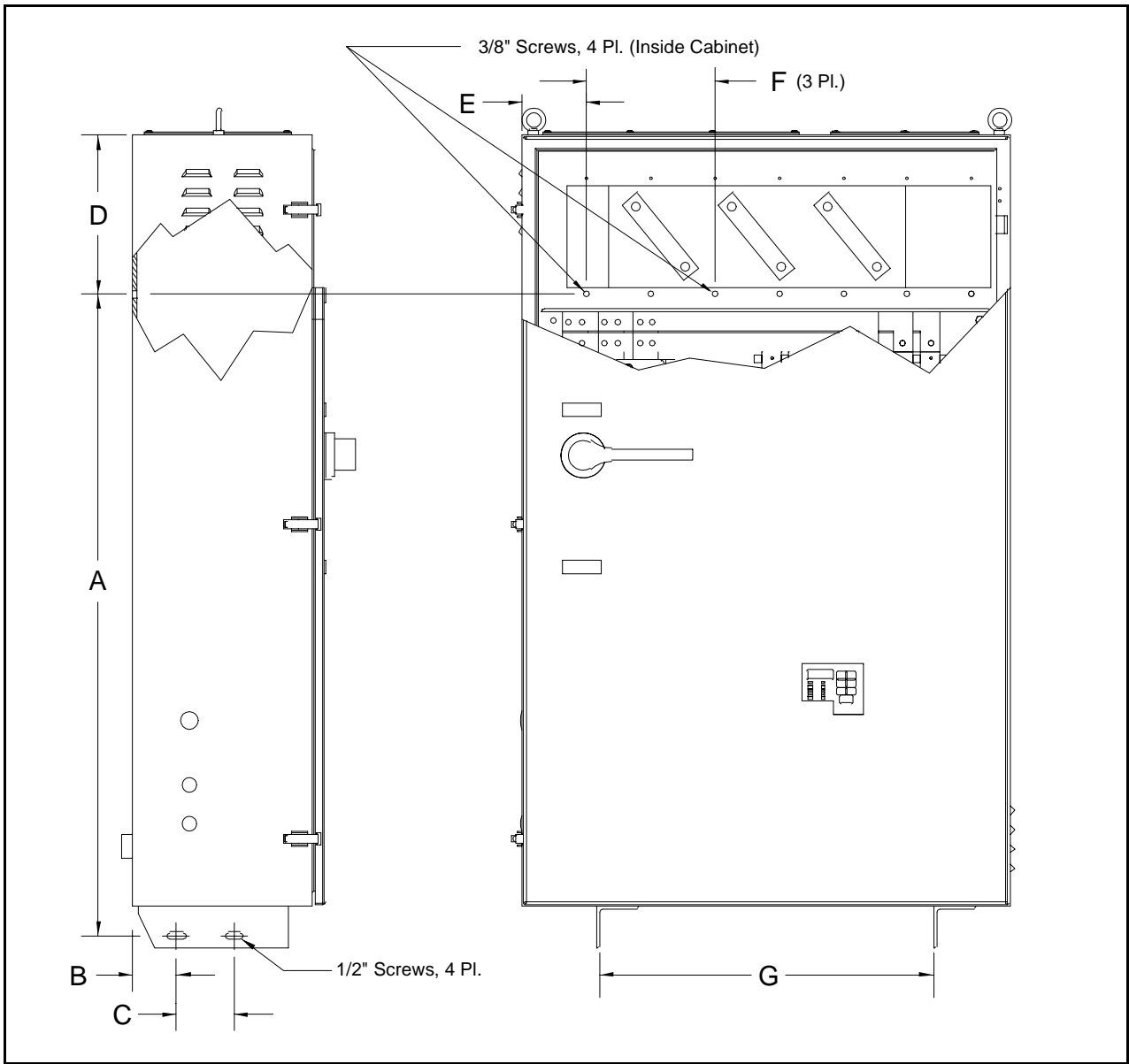


Figure 3.2 – Cabinet Mounting Holes

3.3 Cabinet Wire Routing

All wiring should be installed in conformance with the applicable local, national, and international codes (for example, NEC/CEC). Figures 3.3 and 3.4 show the wire routing, grounding terminal, and power terminal strips of the cabinet. Control wiring enters the cabinet through the three holes on the left side and terminates at the control panel's terminal block. Tighten the control wire connections from 7.1 to 8.9 in-lb.

3.4 Grounding the Cabinet



ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following steps to ground the cabinet:

- Step 1. Open the cabinet's door. The grounding stud is located on the left side of the cabinet.
- Step 2. Run a suitable grounding conductor unbroken from the cabinet's ground stud to the motor's ground terminal and then to earth ground. See figures 3.3 and 3.4. The cabinet's ground stud connection point has two 5/16" socket-head screws. Tighten the ground connections to 23 ft lbs ($\pm 10\%$).
- Step 3. Connect a suitable grounding conductor to the motor frame and the delta-wye transformer (if used). Run each conductor unbroken to earth ground.

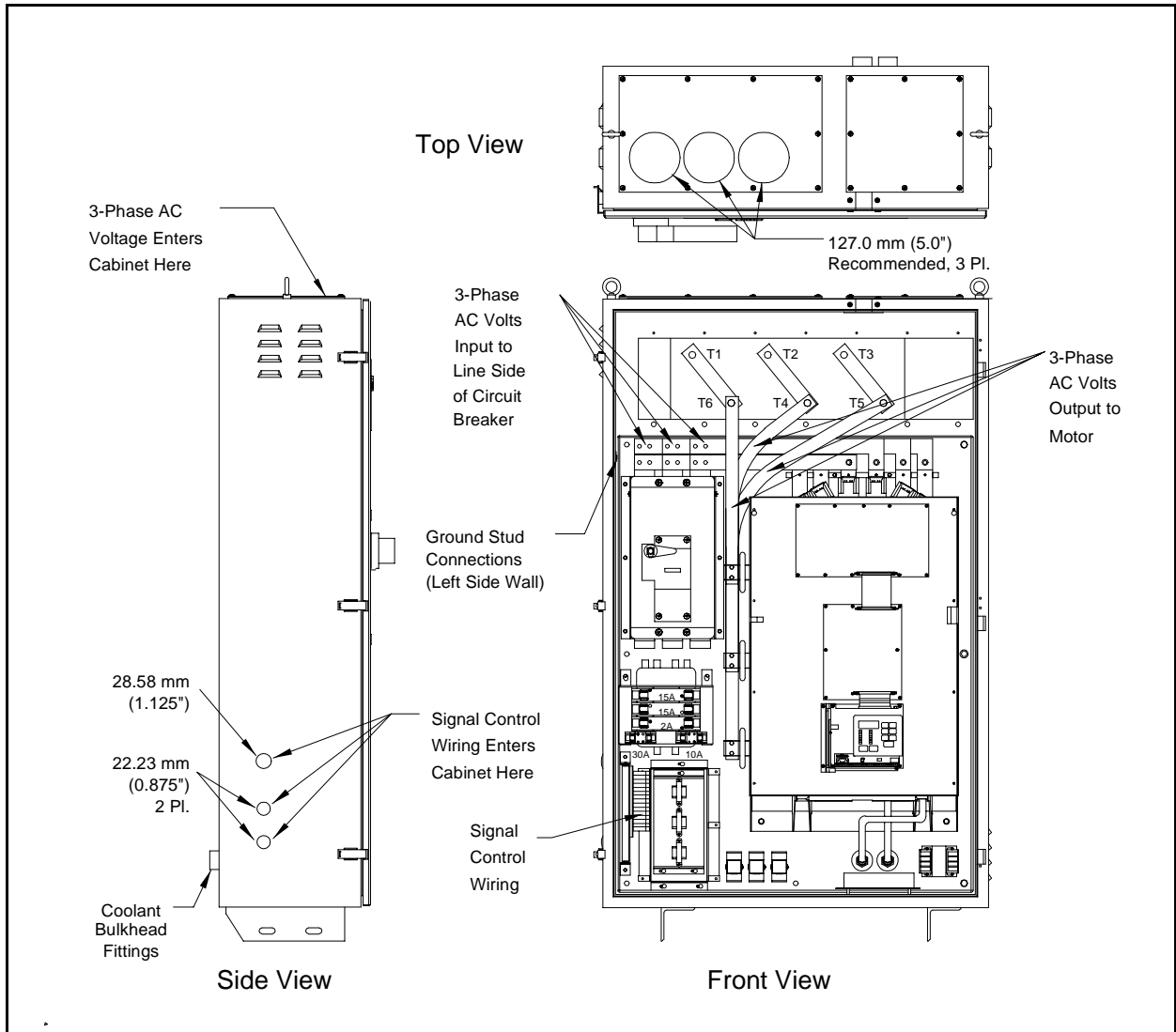


Figure 3.3 – Cabinet Wire Routing Locations (6-Pulse Rectifier)

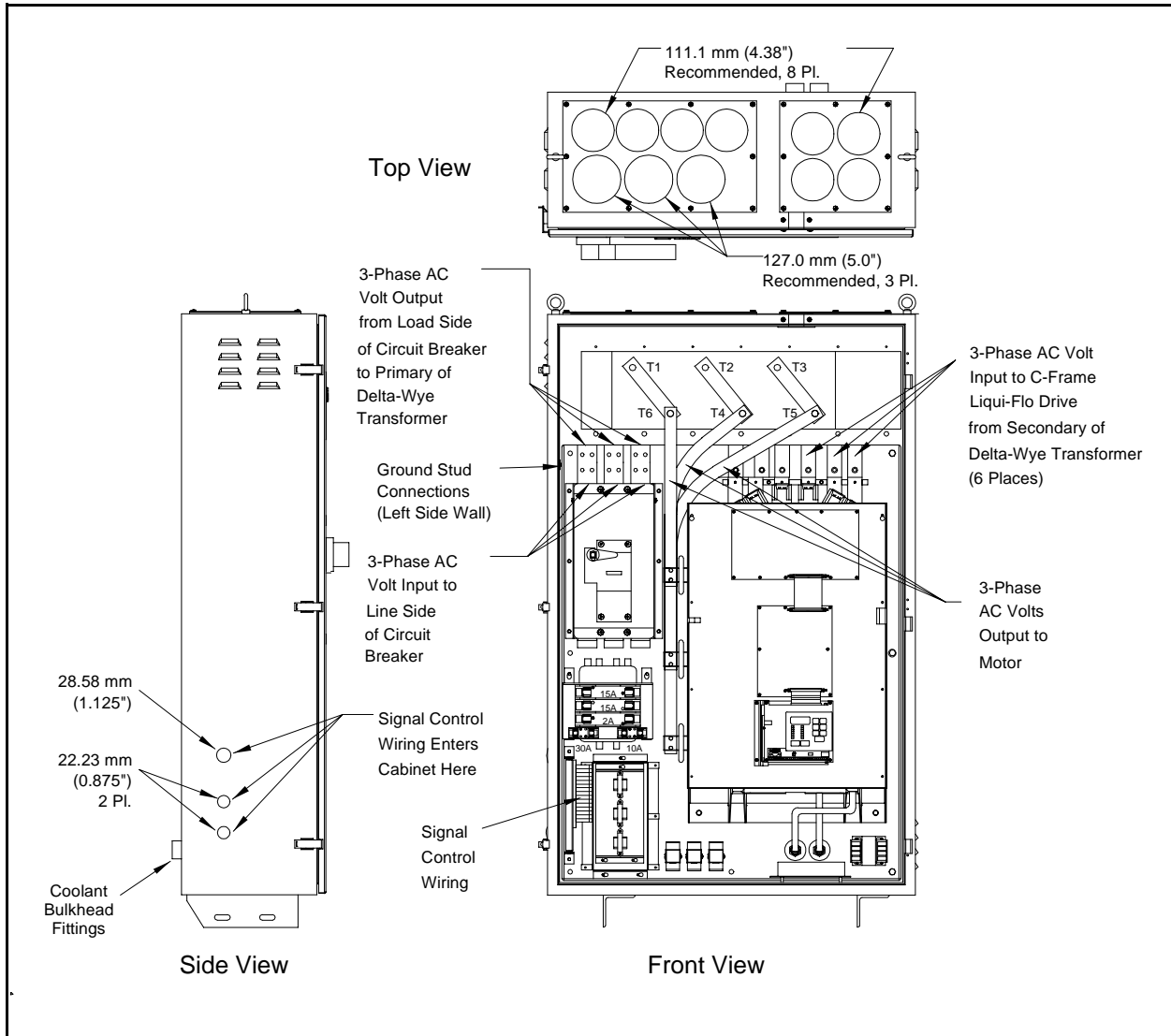



Figure 3.4 – Cabinet Wire Routing Locations (12-Pulse Rectifier)

3.5 Liquid-Cooling Connections

External coolant lines connect to the cabinet through two bulkhead fittings. The bulkhead fittings are located on the rear panel of the cabinet as shown in figure 3.5. Use the following steps to connect the coolant lines to the cabinet:

- Step 1. Be sure the threads of the bulkhead fittings and the CenTraVac chiller's tubing connectors are free of dirt, burrs, and excessive nicks.
- Step 2. Apply liquid sealer to the pipe thread end of the chiller's tubing connectors. Screw the connectors into the cabinet's bulkhead fittings until they are finger-tight. See figure 3.6.

Step 3. Use a wrench to further tighten the connectors 1.5 to 2.5 turns. Do not hold the bulkhead fitting with a pipe wrench when tightening the connectors as the fitting may be damaged. Note that the bulkhead fitting has a built-in anti-rotation feature and will not turn as the connector is screwed in.

 **ATTENTION:** The cabinet's bulkhead fittings may be damaged if they are held with a pipewrench. Do not hold the bulkhead fitting with a pipe wrench when tightening the connectors. The bulkhead fitting has a built-in anti-rotation feature and will not turn as the connector is screwed in. Failure to observe this precaution could result in damage to, or destruction of, the equipment

Step 4. Visually inspect the connections for leaks.

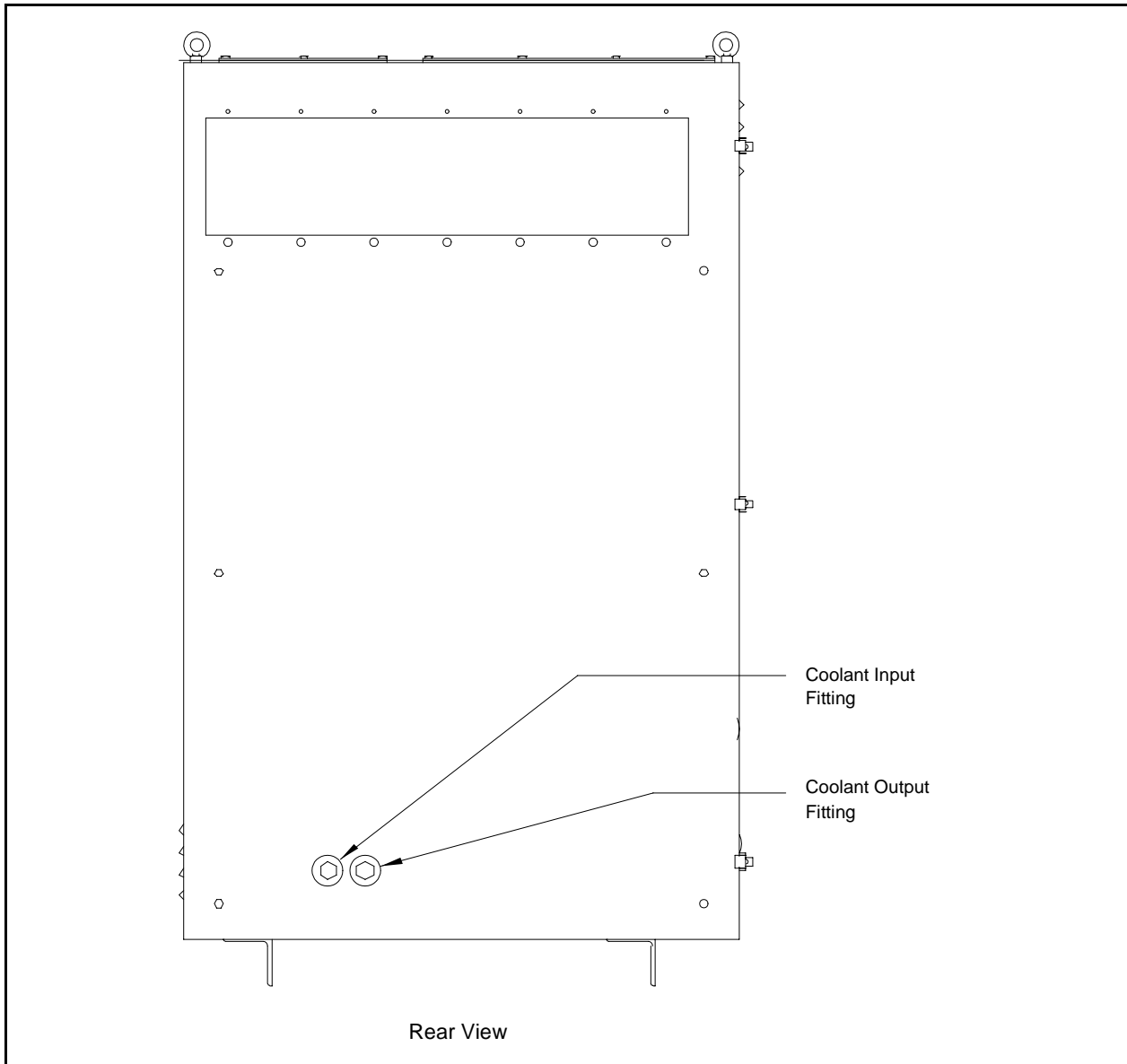


Figure 3.5 – Liquid Cooling Bulkhead Fittings

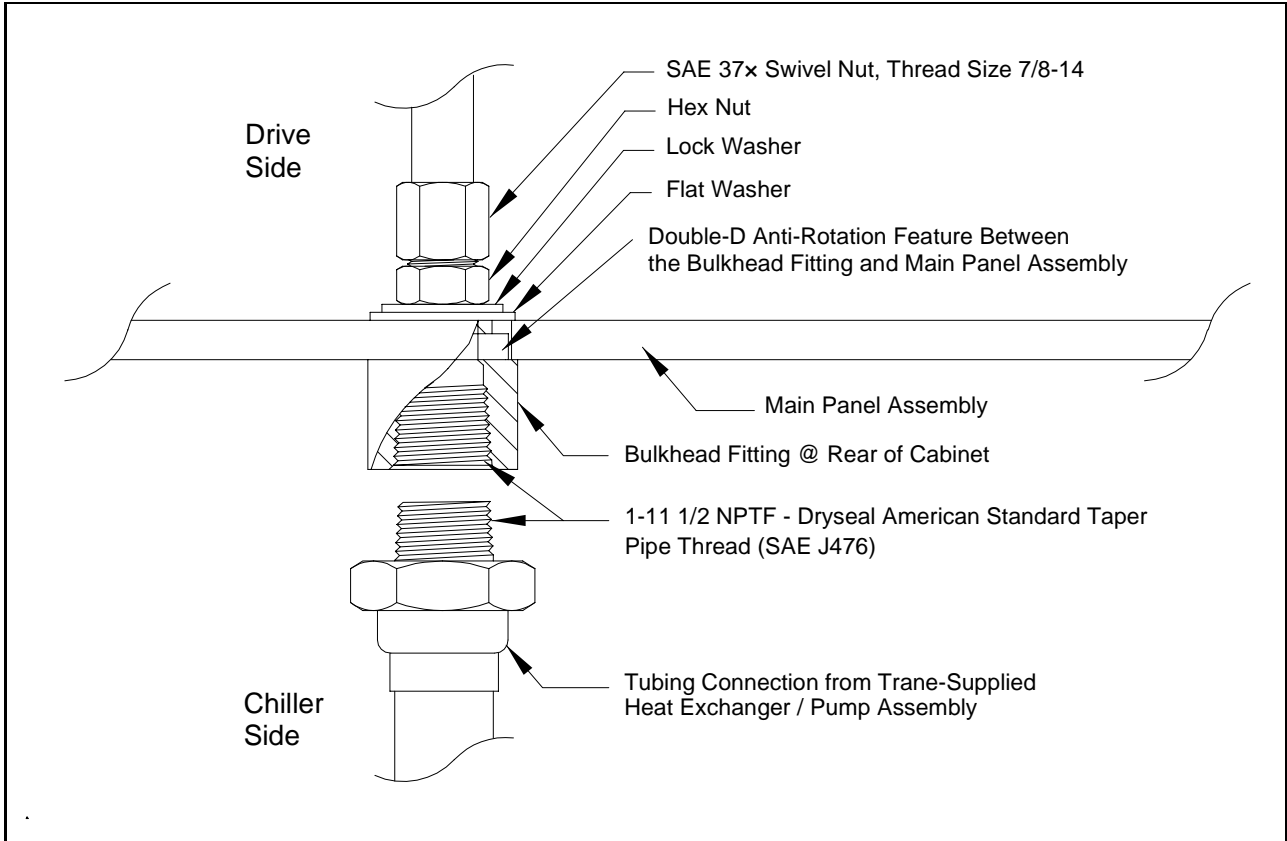


Figure 3.6 – Liquid-Cooling Connections

Connecting Cabinet Power Wiring

This chapter describes how to connect input and output power to the cabinet.

4.1 Cabinet Input Disconnect



ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

An input disconnect circuit breaker is factory-installed in the cabinet. Verify that the available fault current is less than the interrupting rating on the circuit breaker nameplate, which is 65,000 amps at 480 VAC.

4.2 Installing Input Power Wiring (6-Pulse Rectifier Cabinet)



ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following steps to connect AC input power to the cabinet:

Step 1. Remove the top panel of the cabinet.

Important: Care must be taken to prevent debris from falling into the cabinet while performing this installation.

Step 2. Drill the wire routing holes in the panel. Note that the wire routing hole patterns shown in figure 3.3 are recommendations only. These wire routing holes are the only entry points for input power wiring into the cabinet.

Step 3. Install the appropriate conduit hubs.

Step 4. Reinstall the cabinet's top panel.

Step 5. Connect the three-phase 480 VAC input power leads to circuit breaker terminals L1, L2, and L3. See figure 4.1 and Appendix A. Tighten these connections to 23 ft-lb ($\pm 10\%$). Use only copper conductors for the input power leads.

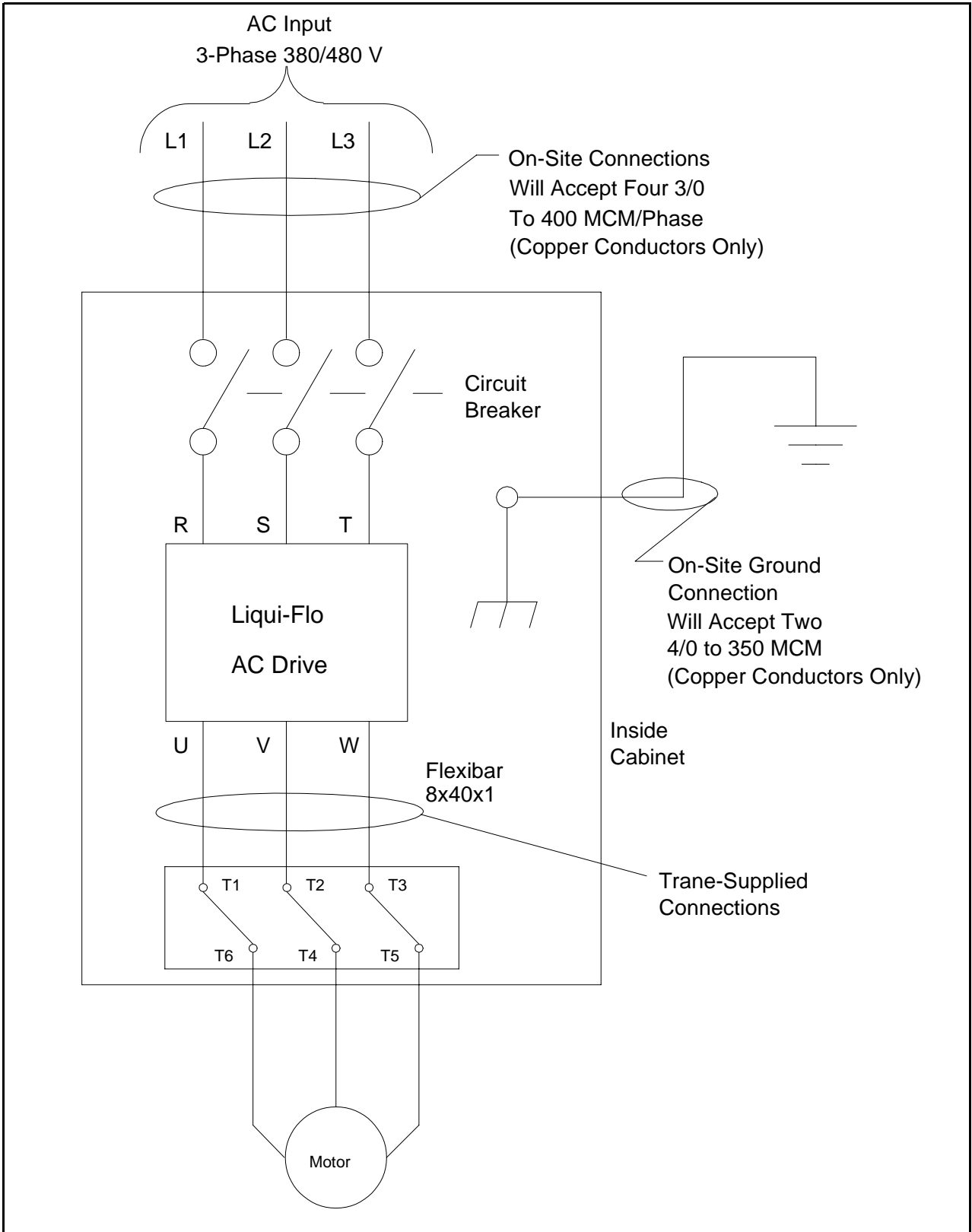


Figure 4.1 – Trane Cabinet Electrical Connections (6-Pulse Rectifier)

4.3 Installing Input Power Wiring (12-Pulse Rectifier Cabinet)



ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following steps to connect AC input power to the cabinet:

Step 1. Remove the top panel of the cabinet.

Important: Care must be taken to prevent debris from falling into the cabinet while performing this installation.

Step 2. Drill the wire routing holes in the panel. Note that the wire routing hole patterns shown in figure 3.4 are recommendations only. These wire routing holes are the only entry points for input power wiring into the cabinet.

Step 3. Install the appropriate conduit hubs.

Step 4. Reinstall the cabinet's top panel.

Step 5. Connect the three-phase 480 VAC input power leads to circuit breaker terminals L1, L2, and L3. See figure 4.2 and Appendix A. Tighten these connections to 23 ft-lb ($\pm 10\%$). Use only copper conductors for the input power leads.

Step 6. Twelve-pulse cabinets require a delta-wye transformer be installed external to the cabinet. Install the Trane-specified transformer by following the installation instructions supplied with it.

Step 7. Connect the load side of the circuit breaker to the R, S, and T terminals on the delta-wye transformer. Tighten these connections to 23 ft-lb ($\pm 10\%$).

Step 8. Connect the load side of the delta-wye transformer to the S1 through S6 terminals on the Liqui-Flo drive. Tighten these connections to 23 ft-lb ($\pm 10\%$).

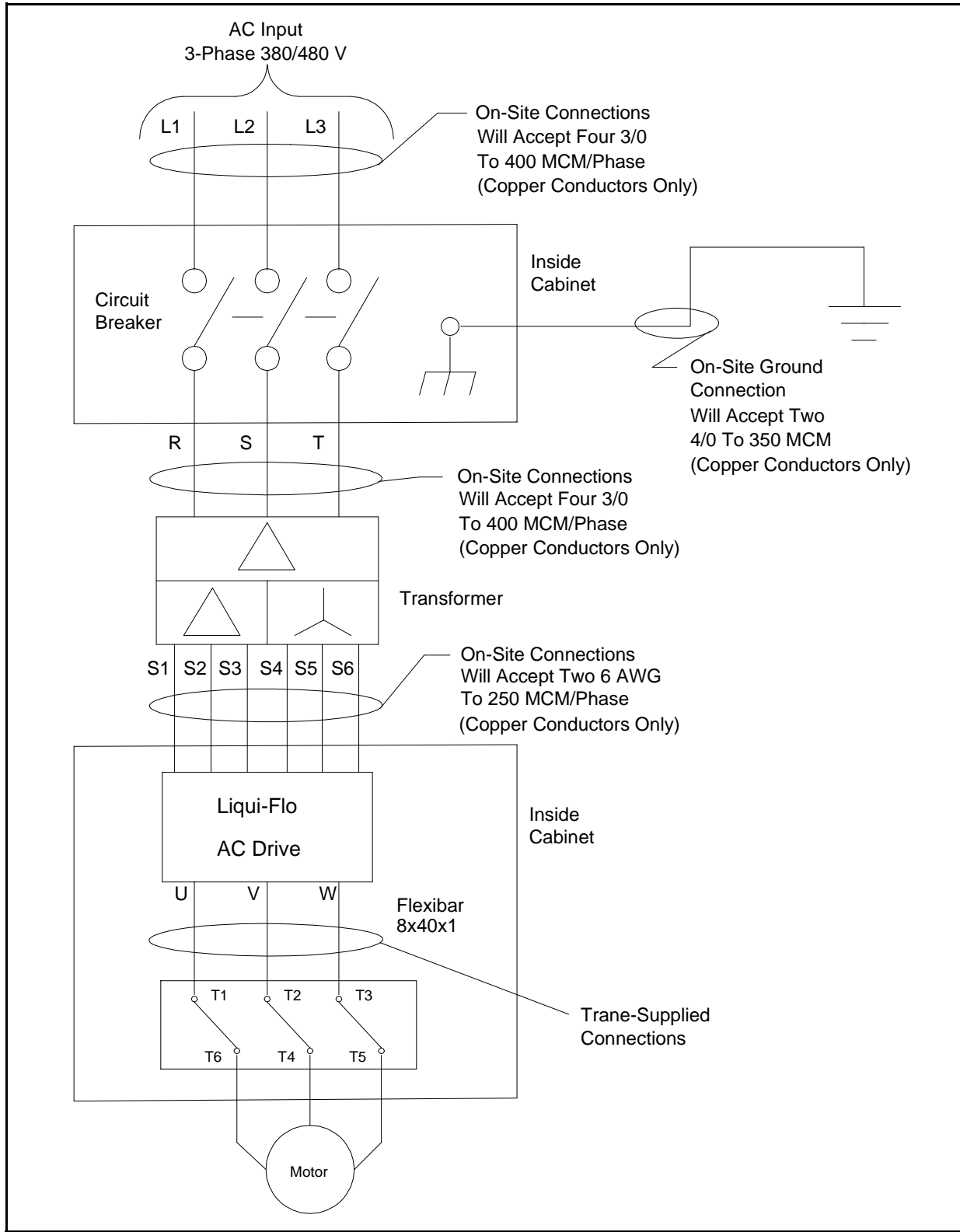


Figure 4.2 – Trane Cabinet Electrical Connections (12-Pulse Rectifier)

4.4 Installing Output Power Wiring



ATTENTION: The user is responsible for conforming with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Use the following steps to connect the cabinet's output power wiring from the Liqui-Flo drive to the chiller motor:

- Step 1. Connect the Trane-supplied Flexibar (8x40x1) conductors to the Liqui-Flo drive's U, V, W output terminals using the Trane-supplied hardware. See figures 3.3, 3.4, 4.1, and 4.2.
- Step 2. Tighten these connections to Trane specifications.
- Step 3. Connect the Flexibar conductors to the T1, T2, and T3 motor connection studs using the Trane-supplied hardware. See figures 3.3, 3.4, 4.1, and 4.2.
- Step 4. Tighten these connections to Trane specifications.

4.5 Regulator Board Wiring

The cabinet's start/stop wiring on the Regulator board's terminal strip is factory-wired as shown in Appendix A.

This chapter describes how to remove the Liqui-Flo drive from the cabinet and provides a list of replacement parts.

5.1 Removing the Liqui-Flo Drive from the Cabinet

Follow the procedure in section 5.1.1 if you are removing a Liqui-Flo drive from a 6-pulse rectifier cabinet. Follow the procedure in section 5.1.2 if you are removing a Liqui-Flo drive from a 12-pulse rectifier cabinet.

5.1.1 Removing the Drive from a 6-Pulse Rectifier Cabinet

Use the following procedure to remove a Liqui-Flo drive from a 6-pulse rectifier cabinet:



ATTENTION: DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

- Step 1. Turn off and lock out AC input power to the cabinet.
- Step 2. Place the circuit breaker in the Off position. Wait five minutes.
- Step 3. Verify that there is no voltage at the drive's input power terminals.
- Step 4. Check the DC bus potential with a voltmeter to ensure that the DC bus capacitors are discharged.
- Step 5. Drain the drive's coolant and disconnect the coolant lines.
 - a. Use a ball valve at the inlet connection to drain the coolant while running the pump for 1 to 2 minutes.
 - b. Connect one end of a drain hose to the accumulator on the closed loop coolant system. Connect the other end of the hose to a drain.
 - c. Connect a shop air line to the closed loop coolant system at the quick disconnect fitting. Pressurize the line to 60-90 psi for 1 to 2 minutes to flush all of the coolant out of the drive.
 - d. Remove the basket from the Y-strainer and check for any contaminants.
 - e. From inside the cabinet, disconnect the coolant lines from the panel using a 1-1/16" wrench on the swivel nut connected to the bulkhead fitting. A crow's-foot wrench is recommended. Verify that no residual coolant remains in the drive.

- Step 6. Disconnect the Flexibar conductors at the drive's U, V, and W output terminals.
- Remove the two 3/8"-16-UNC-2B nuts from the clamp holding the Flexibar to the AC output busbar at output terminals U, V, and W.
 - Remove the load plate and the clamps.
 - Save this hardware for reassembly.
- Step 7. Remove the rigid buswork that connects the load side of the circuit breaker to the drive.
- Remove the 1/12"-13 bolts and washers from each of the drive's AC input terminals (L1 through L6).
 - Remove the two 3/8"-16 bolts, washers, and nuts from each of the six circuit breaker input busbar connections.
 - Save this hardware for reassembly.
- Step 8. Disconnect the 12-position terminal connection located on the lower left side of the drive. Cut the wire tie on the wire mounting base leading to the panel.
- Step 9. Disconnect the leads from each of the three current transformers (CTs). Wrap the CT leads around the AC output busbar to keep them from being damaged. Cut the wire ties on the wire mounting bases.
- Step 10. Disconnect the AC busbar support from the AC input busbar.
- Remove the six M5 pan head screws that connect the AC input busbar (L1 through L6) to the busbar support.
 - Save this hardware for reassembly.
- Step 11. Remove the removable plate and wire entry panels. See figure 2.2.
- Remove the four 1/4" screws and washers from the upper-right corner of the cabinet that hold the removable plate in place. Remove the removable plate which will expose a 2" gap in the lip of the cabinet.
 - Remove the eight 1/4" screws that hold the wire entry panel to the top of the cabinet.
 - Save the panels and hardware for reassembly.
- Step 12. Install two eyebolts into the drive to serve as lifting points.
- Two 3/4" nuts are welded to the drive's baseplate. Screw the eyebolts (recommended: 2" eye I.D., 6" long shank) into the nuts.
 - Connect 18" (nominal) of chain between the eyes, securing them with a clevis clamp.
- Step 13. Using an overhead or portable hoist (minimum 1/2 ton rated capacity), bring a free-fall chain into the cabinet through the access panel and the wire entry panel.
- Step 14. Attach the free-fall chain to the chain secured to the eye bolts. Take up any vertical slack in the chain.
- Step 15. Remove the four 1/2" nuts and washers that secure the baseplate of the drive to the cabinet. Save this hardware for reassembly.

Step 16. Using the hoist, lift the drive slightly to take the load off of the cabinet's panel studs. Pull the drive off of the studs and up through the wire entry and access panels until it is clear of the cabinet enclosure. Note that drive's center of gravity is forward of the hoist, which will result in the top of the drive tilting forward during removal.

Step 17. Move the drive to a horizontal pallet for servicing or shipment. The eyebolts and the chain between them do not need to be removed.

Step 18. Reinstall the drive by following steps 17 to 1 in reverse order.

- a. During reinstallation, tighten the hardware to the torque values ($\pm 10\%$) shown in table 5.1
- b. Visually inspect the insulation of the wiring and buswork to ensure that it was not damaged.
- c. Refill the drive with coolant.

Step 19. Test the drive for proper operation by following the start-up procedures in instruction manual D2-3410.

Table 5.1 – Hardware Tightening Torques

Hardware	Maximum Recommended Tightening Torque
1/4" - 20 UNC Screws	75 in-lb
1/2" - 13 UNC- 2B Nut	45 ft-lb
3/8" - 16 UNC - 2B Nut	19 ft-lb
I/O Terminal Block Screws	4.5 in-lb

5.1.2 Removing the Drive from a 12-Pulse Rectifier Cabinet

Use the following procedure to remove a Liqui-Flo drive from a 12-pulse rectifier cabinet:



ATTENTION: DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

Step 1. Turn off and lock out AC input power to the cabinet.

Step 2. Place the circuit breaker in the Off position. Wait five minutes.

Step 3. Verify that there is no voltage at the drive's input power terminals.

Step 4. Check the DC bus potential with a voltmeter to ensure that the DC bus capacitors are discharged.

Step 5. Drain the drive's coolant and disconnect the coolant lines.

- a. Use a ball valve at the inlet connection to drain the coolant while running the pump for 1 to 2 minutes.

- b. Connect one end of a drain hose to the accumulator on the closed loop coolant system. Connect the other end of the hose to a drain.
 - c. Connect a shop air line to the closed loop coolant system at the quick disconnect fitting. Pressurize the line to 60-90 psi for 1 to 2 minutes to flush all of the coolant out of the drive.
 - d. Remove the basket from the Y-strainer and check for any contaminants.
 - e. From inside the cabinet, disconnect the coolant lines from the panel using a 1-1/16" wrench on the swivel nut connected to the bulkhead fitting. A crow's-foot wrench is recommended. Verify that no residual coolant remains in the drive.
- Step 6. Disconnect the Flexibar conductors at the drive's U, V, and W output terminals.
- a. Remove the two 3/8"-16-UNC-2B bolts and washers from the clamp holding the Flexibar to the AC output busbar at output terminals U, V, and W.
 - b. Remove the load plate and the clamps.
 - c. Save this hardware for reassembly.
- Step 7. Disconnect the AC input wiring at the drive's AC input terminals (L1 through L6) and at the circuit breaker's line and load terminals.
- a. Loosen all of the pressure lugs.
 - b. Bend the individual wires vertically within the cabinet.
- Step 8. Disconnect the 12-position terminal connection located on the lower left side of the drive. Cut the wire tie on the wire mounting base leading to the panel.
- Step 9. Disconnect the leads from each of the three current transformers (CTs). Wrap the CT leads around the AC output busbar to keep them from being damaged. Cut the wire ties on the wire mounting bases.
- Step 10. Remove the removable plate. See figure 2.3.
- a. Remove the four 1/4" screws and washers from the upper-right corner of the cabinet that hold the removable plate in place. Remove the removable plate which will expose a 2" gap in the lip of the cabinet.
 - b. Save the panel and hardware for reassembly.
- Step 11. Place the lifting support bar in the cabinet's stainless steel C-channel brackets. The support bar's pipe supports should face you.
- a. Screw two 3/4" screws through the pipe support into the 3/4" nuts which are welded to the drive's baseplate.
 - b. Hand tighten the screws.
- Step 12. Remove the four 1/2" nuts and washers that secure the drive's baseplate to the cabinet. Save the hardware for reassembly.
- Step 13. Tighten the two 3/4" screws to remove the load on the baseplate. Slide the support bar along the C-channel brackets until it reaches the cabinet's front seal lip.

- Step 14. Using an overhead or portable hoist (minimum 1/2 ton rated capacity), attach a free-fall chain to the 1.5" hole in the support bar. Take up any vertical slack in the chain.
- Step 15. Vertically lift the support bar and the drive 3" to 4".
- a. Rotate the support bar to the right side, towards you, and slip the support bar/drive assembly out of the cabinet.
- Step 16. Move the drive to a horizontal pallet for servicing or shipment. The support bar and screws do not need to be removed.
- Step 17. Reinstall the drive by following steps 16 to 1 in reverse order.
- a. During reinstallation, tighten the hardware to the torque values ($\pm 10\%$) shown in table 5.1.
 - b. Visually inspect the insulation of the wiring and buswork to ensure that it was not damaged.
 - c. Refill the drive with coolant.
- Step 18. Test the drive for proper operation by following the start-up procedures in instruction manual D2-3410.

5.2 Replacement Parts

Table 5.2 lists the replacement parts that are available from Reliance Electric.

Table 5.2 – C-Frame Liqui-Flo Drive Replacement Parts

Description	Part Number	Quantity
		M/N 64L4060
Power Module Adapter (PMA) Printed Circuit Board (PCB)	179067	1
DC Bus Control PCB	179069	1
Gate Driver PCB	179065	2
Membrane Switch Keypad/Bracket	410483-15B	1
Regulator PCB	179116	1
Current Feedback Devices	25503-011-01	3
SCR Module	22501-025-04	6
Bus/Gate Driver Interface Harness	179055	1
Gate Driver Jumper Harness	179056	1
Bus/PMA Interface Harness	179057	1
Power Interface Harness	179058	1
SCR (S1, S2, S3) Gate Interface Harness	179059	1
SCR (S4, S5, S6) Gate Interface Harness	179060	1
LEM Interface Harness	179061	1
Laminate PMA Interface Harness	179062	1
Chill Plate Interface Harness	179063	1
Remote Meter Interface (RMI) PCB	2SI3000	1
Internal Fan Assembly	*	1

*Comair - Rotron M/N PT2B3 or equivalent.

A

Air ventilation, 3-1
Audience, intended, 1-1

B

Board
 Bus Control, 2-2 to 2-5
 Power Module Adapter (PMA), 2-2 to 2-5
 Regulator, 2-2 to 2-5
 Remote Meter Interface, 2-2 to 2-5

C

Cabinet
 dimensions, 3-1 to 3-2
 electrical connections, 4-2, 4-4
 grounding, 3-4 to 3-6
 mounting, 3-1 to 3-3
 weight, 3-1
 wire routing, 3-4 to 3-6
Component locations, 2-2 to 2-5

D

Dimensions, 3-1 to 3-3
Disconnect, input, 4-1
Drive removal, 5-1 to 5-5

E

Enclosures, NEMA, 2-2, 3-1

F

Fan, 2-2 to 2-5, 5-6
Fuses, 2-2 to 2-5

G

Grounding, 3-4

H

I

Input current rating, 2-2
Input disconnect, 4-1
Input power rating, 2-2
Installation
 input power wiring, 4-1 to 4-4
 output power wiring, 4-5
 planning, 3-1

J

K

L

Liquid-cooling
 bulkhead fittings, 3-5 to 3-7
 connections, 3-6 to 3-8

M

Model numbers

Trane, 2-1

Reliance, 2-2

Mounting dimensions, 3-1 to 3-2

N

NEMA enclosure, 2-2

O

Options, Trane, 2-6

Output current rating, 2-2

P

Planning, cabinet installation, 3-1

Power wiring, 4-1 to 4-5

input, 4-1 to 4-4

output, 4-5

sizes, 4-2, 4-4

Publications, related, 1-1

Q

R

Ratings

input, 2-2

output, 2-2

power loss, 2-2

Regulator board, 2-2 to 2-3, 4-5

Replacement parts, 5-6

S

T

U

V

W

Watts loss rating, 2-2

Weight, cabinet, 3-1

Wire

routing, 3-4 to 3-6

sizes, 4-2, 4-4

Wiring diagrams, A-1 to A-2

X

Y

Z

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