



Installation, Operation, and Maintenance

RTAG Air-Cooled Helical Rotary Liquid Chillers



RTAG 085-440 ton units (50Hz)

572517440002

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.

Dec. 2018

RTAG-SVX001B-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

⚠ 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

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-including industry replacements for CFCs such as HCFCs and HFCs.

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. 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 pro-

cedures. 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

Contains Refrigerant!

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.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

⚠ WARNING

USING PERSONAL PROTECTIVE EQUIPMENT (PPE)!

Dealing with refrigerant, Please always refer to the appropriate safety data sheets (MSDS) and the occupational safety and health (OSHA) guidelines, use proper breathing apparatus, pay attention to the eyes and body protection. Otherwise may cause serious injury or death.

⚠ WARNING

ELECTRICAL COMPONENTS MAY BE CHARGED!

Installation, testing, maintenance and fault disposal of this equipment may need to be charged. Must be licensed qualified electrician or other formal charged operation training of personnel to perform the task. If charged operation did not follow all electrical safety prevention measures, may result in serious injury or death.

Literature History

1. RTAG-SVX001A-EN (September 2017)
New manual.

Notice

Unchanging refrigerant before welding, filled with nitrogen for protection, and use cooling method to protecting the electron component. TRANE is not responsible for the equipment damage due to improper welding.



Contents

Warnings, Cautions and Notices.....	1
Unit Model Number	7
CHHP Compressor Model Number	9
CHHW Compressor Model Number	9
Overview	10
Preface.....	10
Warranty	10
Unit Description.....	10
Inspection Checklist	10
Storage.....	10
Unit Identification - Nameplates	11
Unit Nameplate	11
Figure 1. Unit Nameplate	11
Compressor nameplate	11
General Data	12
Table 1. General data — 100-205 Ton 50Hz unit-high efficiency (fixed speed fan).....	12
Table 2. General data — 085-205 Ton 50Hz unit-extra efficiency (fixed speed fan).....	13
Table 3. General data — 085-205 Ton 50Hz unit-premium seasonal efficiency (variable speed fan).....	14
Table 4. General data — 225-440Ton 50Hz unit-high efficiency (fixed speed fan)	15
Table 5. General data — 225-440Ton 50Hz unit- Extra efficiency (fixed speed fan)	16
Table 6. General data — 225-440Ton 50Hz unit- premium seasonal efficiency (variable speed fan)	17
Dimension	18
Figure 2. Dimension- RTAG 100 High, 085/100 Extra/ Premium efficiency unit	18
Figure 3. Dimension - RTAG 125/145/155/170 High efficiency unit.....	19
Figure 4. Dimension- RTAG 125/145/155/170 Extra/ Premium efficiency unit, 190/205high efficiency unit.....	20
Figure 5. Dimension - RTAG 190/205/225 Extra/ Premium efficiency unit	21
Figure 6. Dimension - RTAG 225 Extra efficiency unit	22
Figure 7. Dimension - RTAG 255/285 High/ Premium efficiency unit	23
Figure 8. Dimension - RTAG 255 Extra efficiency unit, 310/340 High/ Premium efficiency unit	24
Figure 9. Dimension - RTAG 285/310 Extra efficiency unit	25
Figure 10. Dimension - RTAG 340 Extra efficiency unit	26
Figure 11. Dimension - RTAG 375/400 High/ Premium efficiency unit	27
Figure 12. Dimension - RTAG 375/400 Extra efficiency unit, 440 High/ Premium efficiency unit	28
Figure 13. Dimension - RTAG 410/440 Extra efficiency unit	29
Installation - Mechanical.....	30
Installation Responsibilities.....	30
Table 7. Installation Responsibilities.....	30
Attention Items	30
Figure 14. Installation clearance	31
Storage Requirement	31
Clearances.....	31
Figure 15. Installation clearance	32
Drainage.....	32
Unit Lifting	32
Figure 16. Unit lifting schematic (4 points)	33
Figure 17. Unit lifting schematic (6 points) ...	33
Figure 18. Unit lifting schematic (8 points) ...	33
Table 8. Lifting Weights and CG Dimensions.	34
Isolator Installation.....	35
Figure 19. Isolator location.....	36
Figure 20. Rubber isolator dimension	37
Table 9. Unit Isolators	37
Table 10. Unit Isolators Part Extension Number	38
Evaporator Water Piping	39
Figure 21. Water side heat exchanger typical piping connection schematic	39
Entering Chilled Water Piping.....	40
Leaving Chilled Water Piping.....	40
System Minimum Water Volume	40
Water Flow Switch.....	40
Figure 22. Water flow switch installation schematic	40

Table 11. Target slice length.....	41	Installation Recommendations	52
Figure 23. Water flow- pressure drop curve ..	41	Table 20. LonTalk Points List	53
Water Treatment.....	42	BACnet Communications Interface for Chillers (BCI-C)	53
Table 12. Water quality requirements.....	42	BACnet Data Points and Configuration Prop- erty Definitions.....	53
Freeze Protection	42	BACnet Protocol Implementation Confor- mance Statement (PICS)	53
Installation - Electrical.....	43	Object Types	55
General Recommendations	43	Table 21. Descriptions and configurations...	55
Table 13. Electrical data –High Efficiency at all ambient operation	43	BACnet Protocol.....	58
Table 14. Electrical data –Super High Efficien- cy at all ambient operation	44	Object Data Points and Diagnostic Data Points with Corresponding Chiller Models.	58
Table 15. Electrical data –PSE at all ambient operation	45	Table 22. Analog Output	58
Installer-Supplied Components	46	Table 23. Analog Input	59
Power Supply Wiring	46	Table 24. Multistate Output	59
Figure 24. Power Entrance of fixed panel	47	Table 25. Multistate Input	60
Figure 25. Power Entrance of AFD panel	47	Table 26. Binary Output	61
Control Power Supply.....	48	Table 27. Binary Input	61
Interconnecting Wiring	48	Controls.....	62
Heater Power Supply.....	48	Overview	62
Chilled Water Flow (Pump) Interlock.....	48	UC800 Specifications.....	62
Chilled Water Pump Control	48	Figure 27. Wiring locations and connection ports	62
Table 16. Pump Relay Operation.....	48	Communication Interfaces	63
Alarm and Status Relay Outputs (Program- mable Relays).....	48	Rotary Switches	63
Table 17. Alarm and Status Relay Output Con- figuration Table.....	49	LED Description and Operation	63
Relay Assignments Using Tracer TU	49	Figure 28. LED locations.....	63
Table 18. Default Assignments.....	49	Table 28. LED behavior	63
Low Voltage Wiring	49	Tracer AdaptiView TD7 Display	63
Emergency Stop	49	Operator Interface.....	63
External Auto/Stop	49	Figure 29. TD7 screens	64
External Chilled Water Setpoint (ECWS) Op- tion	50	Home Screen.....	64
External Current Limit Setpoint (ECLS) Op- tion	50	Figure 30. Home screen.....	64
Figure 26. Wiring Examples for ECLS and ECWS	50	Table 29. Home screen items	64
Chilled Water Reset (CWR).....	51	Viewing Operating Modes	64
Communications Interface Options	52	Figure 31. Chiller operating modes	64
Optional Tracer Communications Interface.....	52	Table 30. Operating modes — chiller.....	65
Table 19. Wire Size	52	Table 31. Operating modes — circuit.....	66
LonTalk Communications Interface for Chillers (LCI-C).....	52	Table 32. Operating modes — compressor..	67
		Alarms.....	68
		Viewing the Alarms Screen.....	68
		Figure 32. Alarm screen.....	68

Contents

Reports.....	68	Figure 53. Log out confirmation screen	75
Viewing the Reports Screen.....	68	Tracer TU	76
Figure 33. Report screen.....	68	Figure 54. Tracer TU	76
Editing a Custom Report	68	Sequence of Operation	76
Figure 34. Edit custom report screen	69	Software Operation Overview	76
Figure 35. Report evaporator screen	69	Figure 55. Software operation overview	77
Table 33. Report evaporator screen items.....	69	Timelines	78
Figure 36. Report condenser screen.....	69	Power Up Diagram	78
Table 34. Report condenser screen items	69	Figure 56. Sequence of operation: power up	
Figure 37. Report compressor screen	69	diagram	78
Table 35. Report compressor screen items..	70	Power Up to Starting	79
Figure 38. Report motor screen	70	Figure 57. Sequence of events: power up to	
Table 36. Report motor screen items.....	70	starting	79
Equipment Settings.....	70	Stopped to Starting	80
Viewing the Settings Screen.....	70	Figure 58. Sequence of events: stopped to	
Figure 39. Setting screen.....	70	starting	80
Viewing and Changing Equipment Settings...	70	Running (Lead Compressor/Circuit Start and	
Figure 40. Equipment setting screen (Chiller		Run).....	81
setting shown)	71	Figure 59. Sequence of operation: running (lead	
Figure 41. Chilled water reset type screen.....	71	compressor/circuit start and run)	81
Figure 42. Changed chilled water setpoint		Running (Lag Compressor/Circuit Start and	
screen	71	Run).....	82
Keypad Features	71	Figure 60. Sequence of operation: running (lag	
Table 37. Settings screen items.....	72	compressor/circuit start and run)	82
Service Settings	72	Satisfied Setpoint.....	83
Figure 43. Warning message	72	Figure 61. Sequence of events: satisfied set-	
Figure 44. Service settings screen.....	72	point	83
Display Settings	72	Unloading Unstaging	84
Viewing and Changing Display Preferences...	73	Figure 62. Sequence of events: Unloading un-	
Figure 45. Display preference screen	73	staging	84
Figure 46. Date format page.....	73	Normal Shutdown to Stopped or Run Inhibit	
Figure 47. Language page	73		85
Figure 48. Date and time screen	74	Figure 63. Sequence of events: normal shut-	
Cleaning the Display	74	down to stopped or run inhibit.....	85
Figure 49. Countdown screen	74	Immediate Shutdown to Stopped or Run	
Security Settings.....	74	Inhibit.....	86
Disabling/Enabling Security.....	74	Figure 64. Sequence of events: immediate	
Figure 50. Security screen - disable.....	75	shutdown to stopped or run inhibit	86
Figure 51. Security settings screen.....	75	Diagnostics	87
Logging In.....	75	Diagnostic Name (Text) and Source:	87
Figure 52. Log in screen	75	AFD Diagnostics.....	88
Logging Out.....	75	Table 38. AFD diagnostics.....	88
		Starter Diagnostics	88
		Table 39. Starter diagnostics	88
		Main Processor Diagnostics.....	90

Table 40. Main processor diagnostics	90	Annual Maintenance	112
Communication Diagnostics.....	98	Table 43. RTAG Start-up Test Log.....	113
Table 41. Communications diagnostics.....	99	Table 44. RTAG Unit Configuration.....	114
Operating Principles.....	103	Table 45. RTAG Chiller Log.....	115
Refrigerant Circuit	103	Maintenance Procedures	117
Figure 65. System Schematic.....	103	Refrigerant and Oil Charge Management .	117
Refrigerant Cycle	103	R134a Field Charging Procedure.....	117
Figure 66. Pressure Enthalpy (P-h) diagram of RTAG	103	Factory (initial) Refrigerant Charging Procedure	117
Figure 67. Pressure Enthalpy (P-h) diagram of RTAG with Economizer	104	Field Refrigerant Charging Procedure.....	117
R134a Refrigerant.....	104	Refrigerant Filter Replacement Procedure	118
Compressor	104	Lubrication System.....	119
Figure 68. Compressor inner configuration.	105	Oil Charging Procedure	119
Figure 69. Compressor with Auxiliary Inlet Port	105	Factory (initial) Oil Charging Procedure....	119
Condenser and Fan	105	Evaporator Tube Replacement	120
Evaporator	105	Compressor Replacement.....	120
Expansion Valve	106	Drive.....	122
Oil Separator.....	106	Drive Overview	122
Oil system	106	Designation Rules and Nameplate	122
Pre-Start Checkout.....	107	Figure 71. Designation Rules and Nameplate example	122
Installation Checklist	107	Drive Outline Sizing.....	122
Check Procedure.....	107	Figure 72. Drive Outline Sizing	122
Figure 70. Ball Valve Open/Close status.....	107	Drive Components Layout	123
Unit Voltage Power Supply	108	Figure 73. Components Layout for 90KW—160KW	123
Unit Voltage Imbalance	108	Drive Model Table.....	123
Unit Voltage Phasing	108	Mechanical and Electrical Installation	124
Water System Flow Rates.....	109	Mechanical Installation.....	124
Water System Pressure Drop	109	Figure 74. Clearance around of 90KW—160KW	124
Unit Start Up and Shut Off Procedures.....	110	Figure 75. Lifting Locations for 90-160kW Drive	124
Start Up	110	Table 46. Power Terminals of Drive Main Loop	124
Table 42. Unit Running Status.....	110	Figure 76. 90KW-160KW	125
Seasonal Unit Startup Procedure	110	Operation and Display	125
System Restart after Extended Shutdown	110	Operation Panel	125
Temporary Shutdown and Restart	111	Figure 77. Diagram of the operation panel..	125
Extended Shutdown Procedure	111	Description of Indicators	125
Seasonal Unit Startup Procedure	111	Function Codes.....	125
Periodic Maintenance.....	112	Structure of Function Codes	125
Weekly Maintenance	112	Table 47. function codes description	125
Monthly Maintenance	112		

Contents

Figure 78. Function code operation.....	126
Maintenance	126
Tool and Torques.....	126
Fans Replacement.....	126
Figure 79. Remove air duct cover plate of fans.	126
Figure 80. Remove Power wires and Fans...	126
Electrolytic Capacitors Replacement.....	127
Safety Information and Precautions.....	127
Common Faults and Solutions	128
Common Faults and Solutions	130
Table 48. Common Faults and Solutions....	130
Wiring Schematics	132
Unit Electrical Data	132
Figure 81. Field Wiring Diagram	132

Unit Model Number

An example of a typical unit model number is:

RTAG 190 C C A 0 P 0 C S N D X F N L 2 S T X X X C X 0 X F R V 0 D 1 N N I
 1~4 5~7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Model number digits are selected and assigned in accordance with the following definitions using the model number example shown above.

Digit 1~4 - Unit Model

RTAG = Air Cooled Series chiller

Digit 5~7 - Unit Nominal Tons

085 = 85 Nominal Tons
 100 = 100 Nominal Tons
 125 = 125 Nominal Tons
 145 = 145 Nominal Tons
 155 = 155 Nominal Tons
 170 = 170 Nominal Tons
 190 = 190 Nominal Tons
 205 = 205 Nominal Tons
 225 = 225 Nominal Tons
 255 = 255 Nominal Tons
 285 = 285 Nominal Tons
 310 = 310 Nominal Tons
 340 = 340 Nominal Tons
 375 = 375 Nominal Tons
 400 = 400 Nominal Tons
 410 = 410 Nominal Tons
 440 = 440 Nominal Tons

Digit 08- Unit Voltage

C = 380V/50Hz/3Ph
 D = 400V/50Hz/3Ph
 6 = 415V/50Hz/3Ph

Digit 09- Manufacturing Location

C = Taicang, China

Digit 10, 11- Design Sequence

XX = Factory/ABU Assigned

Digit 12- Unit Type

H = High Efficiency
 X = Extra Efficiency
 P = Premium seasonal efficiency

Digit 13-Safety Agency Listing

0 = No Safety Agency Listing

Digit 14-Pressure Vessel Code

A = ASME Pressure Vessel Code
 C = Chinese Pressure Vessel Code

Digit 15- Sound Treatment

S = Standard
 X = Medium low noise (compressor or tube sound attenuation)
 L = Low noise(compressor +tube sound wrap)
 M = Low noise + night noise set back

Digit 16 -Unit Application

N = Standard Ambient 32°F~114.8°F(0°C~46°C)
 H = High Ambient 32°F~125°F(0°C~52°C)
 L = Low Ambient 0°F~114.8°F(-18°C~46°C)
 W = Wide Ambient 0°F~125°F(-18°C~52°C)

Digit 17- Relief Valve Option

S = Single Relief Valve
 D = Dual Relief Valve With 3 Way Valve

Digit 18 - Flow Switch

X = No Flow Switch
 F = Field Installed Flow Switch

Digit 19-Water Connection

F = Flange

Digit 20-Evaporator Application

N = Standard Cooling(4°C~20°C)

Digit 21- Evaporator Water Pressure

L = 150psi
 H = 300psi

Digit 22-Evaporator Configurations

1 = 1 Pass Evaporator
 2 = 2 Pass Evaporator

Digit 23-Thermal Insulation

S = Standard Thermal Insulation

Digit 24-Condenser Options

T = Normal Tube Fin Coil

Digit 25-Heat Recovery

X = No Heat Recovery

Digit 26 - Pump Package

X = Pump Signal On/Off

Digit 27-Free Cooling

X = None

Digit 28-Unit Operator Interface Language

C = Chinese
 E = English

Digit 29-Remote Communications Options

X = None
 L = Lontalk Interface
 M = Modbus Interface
 B = BACnet Interface

Digit 30-Easy Remote Controller

0 = Without



Unit Model Number

Digit 31 –External Set Points & Capacity Outputs

- X = None
- A = External Set Points & Capacity Outputs

Digit 32 – Refrigerant Charge

- F = Full Charge
- N = Nitrogen
- P = 12kg Charge

Digit 33-Factory Tests

- R = Standard Functional Test
- P = Non-witnessed Performance Test, With Report
- W = Customer-witnessed Performance Test, With Report

Digit 34-Compressor Motor Starter Type

- V = VFD
- Y = Wye-delta closed transition

Digit 35-Harmonic Filter

- 0 = None

Digit 36-Power Line Connection Type

- T = Terminal Block Connection
- C = Circuit Breaker
- D = Mech Disconnect Switch

Digit 37-Incoming Power Line

- 1 = Single Point Power Connection

Digit 38-Control Output Accessories Options

- N = No Output Options

A = Alarm Relay Outputs

Digit 39-Appearance Options

- N = No Appearance Options

Digit 40-Unit Isolation Installation Accessory

- X = None
- I = Neoprene Isolators

Model number discretion here only list RTAG standard units available option. There will be more option in future.

Main options implementation scheme:

Medium low noise option of Sound Treatment use sound wrap depends compressor configuration: N5, N6 use tube sound wrap, N6E2 use compressor sound box. this option is only for unit nominal tonnage >225.

Low noise option of Sound Treatment use sound wrap to reduce the compressor, suction and discharge line, oil separator noise; low noise with night noise setback is implement with both sound wrap and variable speed fan, adjust fan speed.

For Unit Application, High Ambient option is added oil cooler base on Standard ambient configuration; low ambient option implement with variable speed fan; and wide ambient temperature have both oil cooler and variable speed fan.

NOTICE

Unit application!

RTAG products has been tested in lab at -18°C starting. But if unit need to start up and running in low temperature ($\leq -15^{\circ}\text{C}$) frequently, especially in the case of low wind speed $>2\text{m/s}$, building wall around equipment installation area to keep out the wind is needed. it is only verified in lab with wind speed $<2\text{m/s}$, exceed this limitation, unit may fail to build the pressure deference and can start properly. Contact TRANE local office, TRANE can provide the corresponding special solution base on customer's operation characteristics.

CHHP Compressor Model Number**Digit 1~4**

CHHP = GP2 compressor series

Digit 5~7 Size Designation

0N2 = 120 TON

0N1 = 100 TON

0M2 = 85 TON

0M1 = 70 TON

0L2 = 60 TON

0L1 = 50 TON

0K2 = 40 TON

0K1 = 35 TON

Digit 8 Motor Voltage

A = 200-60-3

R = 220-50-3

C = 230-60-3

D = 380-60-3

H = 575-60-3

T = 460-60-3 OR 400-50-3

Digit 9 Internal Relief

K = 450 psid

Digit 10~11 Design Sequence

** = Factory assigned

Digit 12 Capacity Limit

N = Standard Capacity Controls

Digit 13~15 Motor KW Rating

112 = 112 kW (N2/50Hz)

093 = 093 kW (N1/50Hz)

077 = 077 kW (M2/50Hz)

065 = 065 kW (M1/50Hz)

058 = 058 kW (L2/50Hz)

048 = 048 kW (L1/50Hz)

041 = 041 kW (K2/50Hz)

036 = 036 kW (K1/50Hz)

Digit 16 volume Ratio

A = High Volume Ratio

N = Low Volume Ratio

CHHW Compressor Model Number**Digits 1-4**

CHHW = GP2.5 Compressor Family

Digit 5

0 = All compressors

Digit 6 Frame Size

N = N Frame

Digit 7 Compressor Capacity

5 = GP2.5 Smaller capacity (minor)

6 = GP2.5 Larger capacity (major)

Digit 8 Motor Voltage

T = 400/460-50/60-3 used for 380-50-3

K = 460-60-3 (N6 only)

Digit 9 Internal Relief

K = 450 psid

Digits 10-11 Design Sequence

** = Factory assigned

Digit 12 Capacity Limit

N = Standard capacity

Digits 13-15 Motor kW Rating

093 = N5 50Hz

112 = N5 60Hz

112 = N6 50Hz

134 = N6 60Hz

Digit 16 Volume Ratio

A = HighVolume Ratio



Overview

Preface

This manual includes RTAG air cooled screw chiller installation, operation and maintenance. Related services shall be done by a qualified professional and technical personnel.

Warranty

Warranty scope is suitable for the TRANE company's general terms and conditions. If without Trane's written authorization, any equipment repair, modification, or operation beyond the operating limits of equipment, or modification of the equipment control system, and electrical wiring, the consequences are out of place in the warranty. User's wrong operation, lack of maintenance and the guidance of the TRANE company breach will lose the warranty rights.

Unit Description

RTAG air cooled screw chiller have totally 17 models: 085, 100, 125, 145, 155, 170, 190, 205, 225, 255, 285, 310, 340, 375, 400, 410 and 440. Each model has three efficiency options (except 085 and 410, 085 doesn't have high efficiency; 410 only has extra efficiency). RTAG 085 and RTAG 100 use one compressor, it's single refrigerant cycle, single water loop; other models all have, dual refrigerant cycle, which shares one water loop.

RTAG Units are helical-rotary type, air-cooled liquid chillers, with efficient brass finned air side heat exchanger, TRANE patent CHIL water side heat exchanger, and TRANE proprietary UC800 control. The compressor circuits are completely assembled, hermetic packages that are factory-piped, wired, leak-tested, dehydrated, and tested for proper control operation before shipment.

Chilled water inlet and outlet openings are covered for shipment. Each compressor has a separate compressor motor starter. The RTAG series features Trane's exclusive Adaptive Control™ logic, which monitors the control variables that govern the operation of the chiller unit.

For fixed speed compressor unloaders are solenoid actuated and oil pressure operated. For variable speed compressor has one more VFD unloader. Each refrigerant circuit is provided with filter, electronic expansion valve, and charging valves.

Variable speed compressor installation has requirement about elevation, temperature and relative humidity. Elevation should be lower than 1000meter; temperature should be within the range of -10°C ~ +52°C; relative humidity should be smaller than 95%RH, no water condensates, the detail measurement for the application of exceed these limitation and other information please refer to the

drive section. And variable speed unit Total Harmonic Distortion of Current at rating point full load < 40%.

The shell-and-tube type evaporator is manufactured in accordance with ASME standards or GB codes. Each evaporator is fully insulated and is equipped with water drain and vent connections. Packaged units have heat tape and plug-in heater protection to -20°F (-28.9°C) as standard.

Inspection Checklist

In order to avoid the unnecessary losses in the transport process of goods, please complete the following check when the arrival of the Unit:

- when the unit arrival, please make sure the unit nameplate is consistent with order.
- check the appearance of arrival goods and packaging materials have obvious damage or not. If there is damage, notify the carrier immediately, and indicate unit damaged status on carriers shipping records.
- Before storage, please check whether the unit is internal damage as soon as possible. deliver written report to the carrier about the discovered internal damage within 15 days from arrival of the goods.
- If discover the inner damage, please stop to remove the packing, also don't move away the damage the parts from the scene, try to take photos of the related damage. At the same time provide actively evidence that damage is not occurred after the arrival of the goods.
- Notify carriers immediately about founded damage, check the damage with combination of the carrier. Inform TRANE local office at the same time. Please DON'T repair or install any damaged units before carriers check it.
- The attachment check. Follow the delivery list, check the accessories and detachable parts, including specifications and other documents, and other options which are placed in electrical control cabinet. If found any missing or damaged, please notify the carrier and TRANE local offices.

Storage

Extended storage of the outdoor unit prior to installation requires the following pre-cautionary measures:

- Store the outdoor unit in a secure area.
- At least every three months (quarterly), check the pressure in the refrigerant circuits to verify that the refrigerant charge is intact. If it is not, contact a qualified service organization and the appropriate Trane sales office.

Unit Identification - Nameplates

RTAG nameplates: unit nameplate, compressor nameplate, evaporator nameplate and oil separator nameplate.

RTAG nameplate stick on the outer surface of the control panel, compressor nameplate stick on the compressor housing, evaporator nameplate stick on the heat exchanger shell, where its insulation has been open to look at it, oil separator nameplate stick on oil separator shell.

Unit Nameplate

Unit nameplate include following information, as [Figure 1](#) Unit Nameplate:

- Model number
- Serial number
- Nominal tonnage
- Compressor quantity
- Fan quantity
- Rated Voltage / frequency / phase
- Rated power
- Refrigerant charge and type
- Oil charge and type
- Unit weight
- Unit dimension

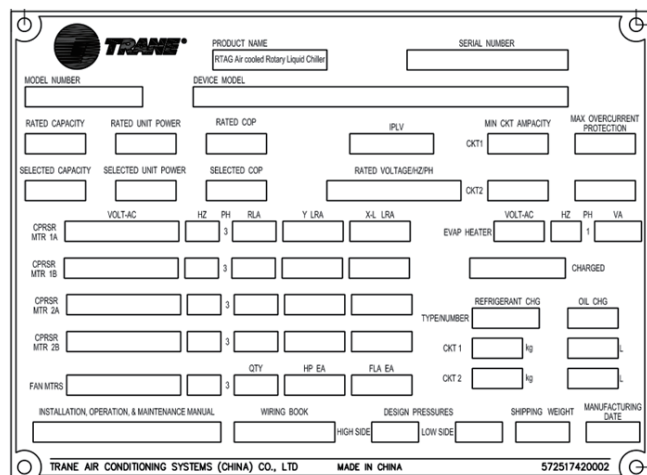


Figure 1. Unit Nameplate

Compressor nameplate

- Compressor model number.
- Compressor serial number.
- Compressor electrical characteristics.
- Utilization range.
- Recommended refrigerant.

General Data

Table 1. General data — 100-205 Ton 50Hz unit-high efficiency (fixed speed fan)

Model	RTAG	100	125	145	155	170	190	205
Refrigerant	R134a							
Compressor								
Model		CHHW (N6)	CHHP (M2+L2)	CHHP (M2+M2)	CHHW(N5)+ CHHP(M2)	CHHW (N5+N5)	CHHW (N6+N5)	CHHW (N6+N6)
Type	Horizontal semienclosed screw compressor							
Starter	Wye-Delta Closed Transition Starter							
Circuits		1	2	2	2	2	2	2
Min load	%	30%	15%	15%	15%	15%	15%	15%
Evaporator								
Type	Shell & Tube (CHIL)							
Rating flow	gpm	257.7	323.7	374.7	403.2	436.6	479.5	517.1
Rating WPD	psid	6.2	5.6	7.5	7.3	5.7	6.8	6.2
Min flow	gpm	130	174	174	200	230	230	265
Max flow	gpm	476	625	625	731	835	835	956
Water storage	lb	119	157	157	183	207	207	238
tube size	inch	4	5	5	5	6	6	6
Air side heat exchanger								
Fan type	Horizontal axial flow							
Quantity		6	8	8	8	8	10	10
power	kW/per	1.5						
Fan speed	RPM	950						
Single fan Airflow	CFM	10584						
RLA								
Compressor 1	A	203	140	140	170	170	203	203
Compressor 2	A	--	98	140	140	170	170	203
LRA								
Compressor 1	A	406	273	273	373	373	406	406
Compressor 2	A	--	190	273	273	373	373	406
Unit start current	A	406	371	413	513	543	576	609
Max RLA	A	244	286	336	372	408	448	487
Refrigerant charge								
ckt 1	Lb	207	176	167	167	167	179	181
ckt 2	Lb	--	137	167	167	167	179	181
Oil charge (the oil type show on unit nameplate)								
ckt 1	gal	2.1	1.6	1.6	1.8	2.1	2.1	2.1
ckt 2	gal		1.6	1.6	1.6	2.1	2.1	2.1
Dimension								
Length	inch	151	198	198	198	198	244	244
width	inch	88						
height	inch	98						
Shipping weight	lb	6184	8426	9105	9202	9570	10360	10578
Operation weight	lb	6527	8920	9621	9746	10147	10958	11211

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.
2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.
3. Detail components structure / location please see Dimension sector.
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

Table 2. General data — 085-205 Ton 50Hz unit-extra efficiency (fixed speed fan)

Model	RTAG	085	100	125	145	155	170	190	205
Refrigerant	R134a								
Compressor									
Model		CHHW (N5)	CHHW (N6)	CHHP (M2+L2)	CHHP (M2+M2)	CHHW(N5)+ CHHP(M2)	CHHW (N5+N5)	CHHW (N6+N5)	CHHW (N6+N6)
Type	Horizontal semienclosed screw compressor								
Starter	Wye-Delta Closed Transition Starter								
Circuits			1	1	2	2	2	2	2
Min load	%		30%	30%	15%	15%	15%	15%	15%
Evaporator									
Type	Shell & Tube (CHIL)								
Rating flow	gpm	222	267	335.3	388.1	418.1	452.7	492.4	535.2
Rating WPD	psid	5.3	6.3	4.3	6.5	6.7	5.8	6.8	5.3
Min flow	gpm	120	130	190	190	200	230	230	290
Max flow	gpm	430	476	685	685	731	835	835	1049
Water storage	lb	108	119	170	170	183	207	207	262
tube size	inch	4	4	5	5	5	6	6	6
Air side heat exchanger									
Fan type	Horizontal axial flow								
Quantity		6	6	10	10	10	10	12	12
power	kW/per					1.5			
Fan speed	RPM					950			
Single fan Airflow	CFM					10584			
RLA									
Compressor 1	A	170	203	140	140	170	170	203	203
Compressor 2	A	/	/	98	140	140	170	170	203
LRA									
Compressor 1	A	373	406	273	273	373	373	406	406
Compressor 2	A			190	273	273	373	373	406
Unit start current	A	373	406	371	413	513	543	576	609
Max RLA	A	204	244	285.6	336	372	408	448	487
Refrigerant charge									
ckt 1	Lb	207	220	196	187	187	187	198	201
ckt 2	Lb			157	187	187	187	198	201
Oil charge (the oil type show on unit nameplate)									
ckt 1	gal	1.6	1.6	1.6	1.6	1.8	2.1	2.1	2.1
ckt 2	gal			1.6	1.6	1.6	2.1	2.1	2.1
Dimension									
Length	inch	151	151	244	244	244	244	291	291
width	inch					88			
height	inch					98			
Shipping weight	lb	6041	6415	9405	10161	10245	10613	11114	11354
Operation weight	lb	6367	6767	9953	10731	10829	11229	11752	12051

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.
2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.
3. Detail components structure / location please see Dimension sector.
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

Overview

Table 3. General data — 085-205 Ton 50Hz unit-premium seasonal efficiency (variable speed fan)

Model	RTAG	085	100	125	145	155	170	190	205
Refrigerant	R134a								
Compressor									
Model		CHHW (N5)	CHHW (N6)	CHHP (M2+L2)	CHHP (M2+M2)	CHHW(N5)+ CHHP(M2)	CHHW (N5+N5)	CHHW (N6+N5)	CHHW (N6+N6)
Type	Horizontal semienclosed screw compressor								
Starter	VFD starter								
Circuits		1	1	2	2	2	2	2	2
Min load	%	36%	36%	18%	18%	18%	18%	18%	18%
Evaporator									
Type	Shell & Tube (CHIL)								
Rating flow	gpm	218	261	335.3	388.3	413.9	443.6	483.3	524.4
Rating WPD	psid	5.3	6.3	5.1	6.8	6.9	5.9	6.9	5.3
Min flow	gpm	120	130	190	190	200	230	230	290
Max flow	gpm	430	476	685	685	731	835	835	1049
Water storage	lb	108	119	170	170	183	207	207	262
tube size	inch	4	4	5	5	5	6	6	6
Air side heat exchanger									
Fan type	Horizontal axial flow								
Quantity		6	6	10	10	10	10	12	12
power	kW/per	1.5							
Fan speed	RPM	Max 910/Min 200							
Single fan Airflow	CFM	10036							
RLA									
Compressor 1	A	170	203	140	140	170	170	203	203
Compressor 2	A	/	/	98	140	140	170	170	203
LRA									
Compressor 1	A	170	203	140	140	170	170	203	203
Compressor 2	A	/	/	98	140	140	170	170	203
Unit start current	A	195	228	285	327	357	387	420	453
Max RLA	A	204	244	286	336	372	408	448	487
Refrigerant charge									
ckt 1	Lb	207	220	196	187	187	187	198	201
ckt 2	Lb			157	187	187	187	198	201
Oil charge (the oil type show on unit nameplate)									
ckt 1	gal	2.1	2.1	1.6	1.6	1.8	2.1	2.1	2.1
ckt 2	gal			1.6	1.6	1.6	2.1	2.1	2.1
Dimension									
Length	inch	156	156	249	249	249	249	296	296
width	inch	88							
height	inch	98							
Shipping weight	lb	6658	7033	10243	10999	11083	11451	11951	12192
Operation weight	lb	6989	7388	10791	11569	11666	12067	12590	12889

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.
2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.
3. Detail components structure / location please see Dimension sector.
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

Table 4. General data — 225-440Ton 50Hz unit-high efficiency (fixed speed fan)

Model	RTAG	225	255	285	310	340	375	400	440
Refrigerant	R134a								
Compressor									
Model		CHHW (N6E2 + N6E2)	CHHW (N5, N5 + N5)	CHHW (N5, N6 + N6)	CHHW (N6, N6 + N6E2)	CHHW (N6E2, N6E2 + N6E2)	CHHW (N5, N6 + N5, N6)	CHHW (N6, N6 + N6, N6)	CHHW (N6E2, N6E2 + N6E2, N6E2)
Type	Horizontal semienclosed screw compressor								
Starter	Wye-Delta Closed Transition Starter								
Circuits		2	2	2	2	2	2	2	2
Min load	%	30%	20%	20%	20%	20%	15%	15%	15%
Evaporator									
Type	Shell & Tube (CHIL)								
Rating flow	gpm	584	663	750	829	872	973	1045	1163
Rating WPD	psid	6.45	7.12	7.25	7.06	7.78	7.56	7.17	5.86
Min flow	gpm	351	398	450	498	523	584	627	698
Max flow	gpm	877	995	1125	1244	1308	1460	1567	1744
Water storage	lb	263	234	265	301	301	332	369	455
tube size	inch	6"						8"	
Air side heat exchanger									
Fan type	Horizontal axial flow								
Quantity		12	14	14	16	16	18	18	20
power	kW/per	1.5				1.65			
Fan speed	RPM	950				970			
Single fan Airflow	CFM	10584				11772			
RLA									
Compressor 1A	A	203	170	170	203	203	170	203	203
Compressor 1B	A	-	170	203	203	203	203	203	203
Compressor 2A	A	203	170	203	203	203	170	203	203
Compressor 2B	A	-	-	-	-	-	203	203	203
LRA									
Compressor 1A	A	406	373	373	406	406	373	406	406
Compressor 1B	A	-	373	406	406	406	406	406	406
Compressor 2A	A	406	373	406	406	406	373	406	406
Compressor 2B	A	-	-	-	-	-	406	406	406
Unit start current	A	753	631 / 441	714 / 524	753 / 524	753 / 524	714 / 708	747 / 741	747 / 747
Max RLA	A	542	455 / 226	495 / 266	542 / 266	542 / 266	495 / 489	536 / 530	536 / 536
Refrigerant charge									
ckt 1	Lb	216	309	309	348	384	326	326	403
ckt 2	Lb	216	152	152	165	165	326	326	403
Oil charge (the oil type show on unit nameplate)									
ckt 1	gal	2.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2
ckt 2	gal	2.1	2.1	2.1	2.1	2.1	4.2	4.2	4.2
Dimension									
Length	inch	291	354	354	399	399	445	445	465
width	inch	88.4							
height	inch	98.5				97.6			
Shipping weight	lb	11804	15700	16184	17699	17734	20308	20639	22481
Operation weight	lb	12067	15933	16449	18001	18036	20641	21007	22935

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.
2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.
3. Detail components structure / location please see Dimension sector.
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

Overview

Table 5. General data — 225-440Ton 50Hz unit- Extra efficiency (fixed speed fan)

Model	RTAG	225	255	285	310	340	375	400	410	440
Refrigerant		R134a								
Compressor										
Model		CHHW (N6E2 + N6E2)	CHHW (N5, N5 + N5)	CHHW (N5, N6 + N6)	CHHW (N6, N6 + N6E2)	CHHW (N6E2, N6E2 + N6E2)	CHHW (N5, N6 + N5, N6)	CHHW (N6, N6 + N6, N6)	CHHW (N6, N6 + N6, N6)	CHHW (N6E2, N6E2+ N6E2,N6E2)
Type		Horizontal semienclosed screw compressor								
Starter		Wye-Delta Closed Transition Starter								
Circuits		2	2	2	2	2	2	2	2	2
Min load	%	30%	20%	20%	20%	20%	15%	15%	15%	15%
Evaporator										
Type		Shell & Tube (CHIL)								
Rating flow	gpm	597	677	777	842	892	992	1066	1098	1190
Rating WPD	psid	5.68	7.42	7.76	7.27	8.14	6.48	6.35	6.73	6.14
Min flow	gpm	358	406	466	505	535	595	639	659	714
Max flow	gpm	895	1016	1165	1263	1338	1488	1598	1647	1785
Water storage	lb	289	234	265	301	301	369	403	403	455
tube size	inch	6"			8"					
Air side heat exchanger										
Fan type		Horizontal axial flow								
Quantity		14	16	18	18	20	20	20	24	24
power	kW/per	1.5					1.65			
Fan speed	RPM	950					970			
Single fan Airflow	CFM	10584					11772			
RLA										
Compressor 1A	A	203	170	170	203	203	170	203	203	203
Compressor 1B	A	-	170	203	203	203	203	203	203	203
Compressor 2A	A	203	170	203	203	203	170	203	203	203
Compressor 2B	A	-	--	-	-	-	203	203	203	203
LRA										
Compressor 1A	A	406	373	373	406	406	373	406	406	406
Compressor 1B	A	-	373	406	406	406	406	406	406	406
Compressor 2A	A	406	373	406	406	406	373	406	406	406
Compressor 2B	A	-	-	-	-	-	406	406	406	406
Unit start current	A	759	637 / 441	720 / 530	753 / 530	759 / 530	717 / 717	747 / 747	753 / 753	753 / 753
Max RLA	A	548	461 / 226	501 / 272	542 / 272	548 / 272	495 / 495	536 / 536	542 / 542	542 / 542
Refrigerant charge										
ckt 1	Lb	229	344	364	366	437	368	368	384	445
ckt 2	Lb	229	152	170	183	181	368	368	384	445
Oil charge (the oil type show on unit nameplate)										
ckt 1	gal	2.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
ckt 2	gal	2.1	2.1	2.1	2.1	2.1	4.2	4.2	4.2	4.2
Dimension										
Length	inch	339	399	445	445	465	465	465	585	585
width	inch	88.4								
height	inch	98.5					98.5			
Shipping weight	lb	13075	16964	18249	18439	19120	22006	22291	23808	24943
Operation weight	lb	13364	17198	18514	18741	19422	22374	22695	24211	25397

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.

2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.

3. Detail components structure / location please see Dimension sector.

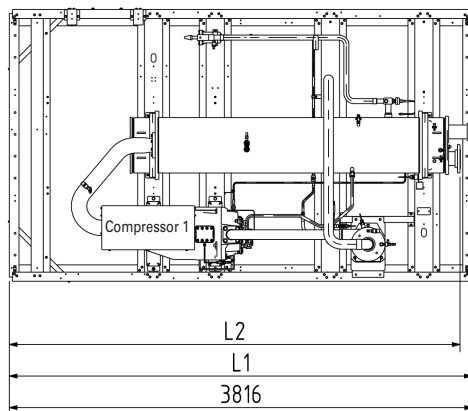
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

Table 6. General data — 225-440Ton 50Hz unit- premium seasonal efficiency (variable speed fan)

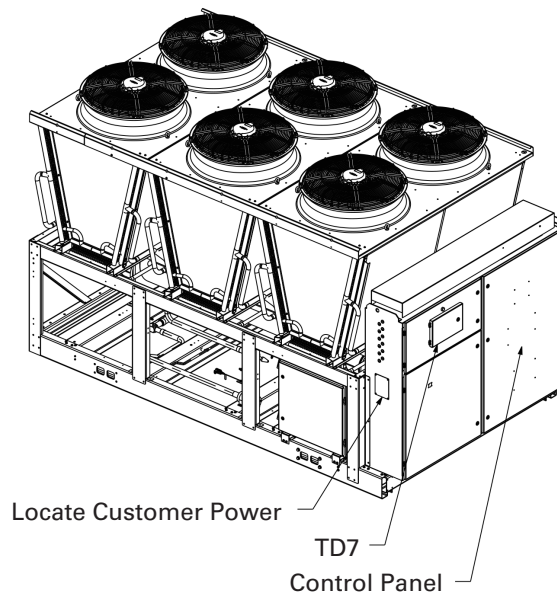
Model	RTAG	225	255	285	310	340	375	400	440
Refrigerant	R134a								
Compressor									
Model		CHHW (N6E2 + N6E2)	CHHW (N5, N5 + N5)	CHHW (N5, N6 + N6)	CHHW (N6, N6 + N6E2)	CHHW (N6E2, N6E2 + N6E2)	CHHW (N5, N6 + N5, N6)	CHHW (N6, N6 + N6, N6)	CHHW (N6E2, N6E2 + N6E2, N6E2)
Type	Horizontal semienclosed screw compressor								
Starter	VFD								
Circuits		2	2	2	2	2	2	2	2
Min load	%	18%	12%	12%	12%	12%	9%	9%	9%
Evaporator									
Type	Shell & Tube (CHIL)								
Rating flow	gpm	584	652	743	822	865	967	1037	1155
Rating WPD	psid	6.45	6.89	7.12	6.94	7.66	7.46	7.06	5.78
Min flow	gpm	351	391	446	493	519	580	622	693
Max flow	gpm	877	978	1115	1233	1297	1450	1555	1732
Water storage	lb	263	234	265	301	301	332	369	455
tube size	inch	6"						8"	
Air side heat exchanger									
Fan type	Horizontal axial flow								
Quantity		12	14	14	16	16	18	18	20
power	kW/per	1.5				1.65			
Fan speed	RPM	950 / 200				970 / 200			
Single fan Airflow	CFM	10036				11772			
RLA									
Compressor 1A	A	203	170	170	203	203	170	203	203
Compressor 1B	A	-	170	203	203	203	203	203	203
Compressor 2A	A	203	170	203	203	203	170	203	203
Compressor 2B	A	-	-	-	-	-	203	203	203
LRA									
Compressor 1A	A	203	170	170	203	203	170	203	203
Compressor 1B	A	-	373	406	406	406	406	406	406
Compressor 2A	A	203	170	203	203	203	170	203	203
Compressor 2B	A	-	-	-	-	-	406	406	406
Unit start current	A	546	631 / 226	670 / 266	753 / 266	753 / 266	631 / 631	747 / 741	747 / 747
Max RLA	A	546	631 / 226	670 / 266	753 / 266	753 / 266	631 / 631	747 / 741	747 / 747
Refrigerant charge									
ckt 1	Lb	216	309	309	348	384	326	326	403
ckt 2	Lb	216	152	152	165	165	326	326	403
Oil charge (the oil type show on unit nameplate)									
ckt 1	gal	2.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2
ckt 2	gal	2.1	2.1	2.1	2.1	2.1	4.2	4.2	4.2
Dimension									
Length	inch	296	362	362	409	409	455	455	465
width	inch	88.4							
height	inch	98.5				98.5			
Shipping weight	lb	12642	16471	16956	18470	18506	21080	21410	22922
Operation weight	lb	12904	16705	17221	18772	18808	21413	21779	23376

Note: 1. Date Containing: Temperature of Inlet/outlet: 54/44°F, Ambient Temperature:95°F, Scaling factor:0.001 ft²·°F·h/Btu.
2. Minimum start-up / operating ambient based on a 5 mph wind across the condenser.
3. Detail components structure / location please see Dimension sector.
4. Electric type could selected according unit voltage, but the current value in table is base on 380V/50Hz/3Ph.

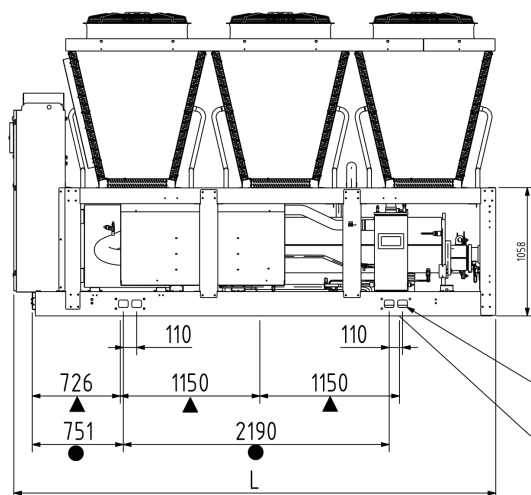
Dimension



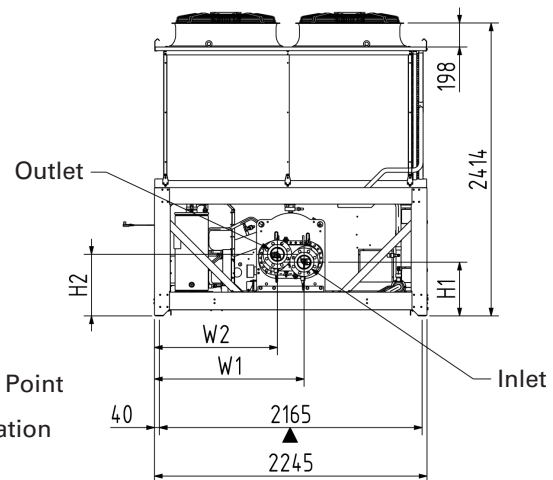
Top View
(With fan/coil removed)



ISO View



Side View

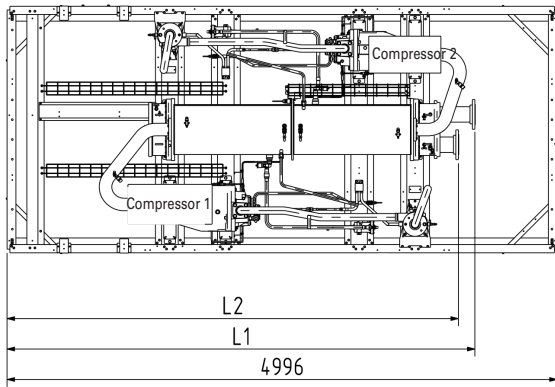


Back View

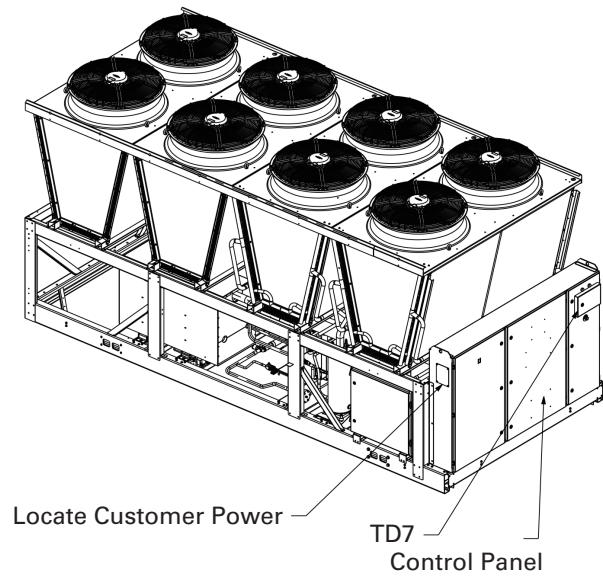
▲ Installation Point
● Lifting Point

		H1 (mm)	H2 (mm)	W1 (mm)	W2 (mm)	L1 (mm)	L2 (mm)	Water pipe	L--Extra eff High eff (mm)	L--Premium eff (mm)
RTAG085X	150PSI	468	478	1252	992	3619	3619	4"	3840	3970
RTAG085P	300PSI	443	508	1233	1013	3813	3713	4"	3840	3970
RTAG100H	150PSI	468	478	1252	992	3619	3619	4"	3840	---
	300PSI	443	508	1233	1013	3813	3713	4"	3840	---
RTAG100X	150PSI	468	478	1252	992	3619	3619	4"	3840	3970
RTAG100P	300PSI	443	508	1233	1013	3813	3713	4"	3840	3970

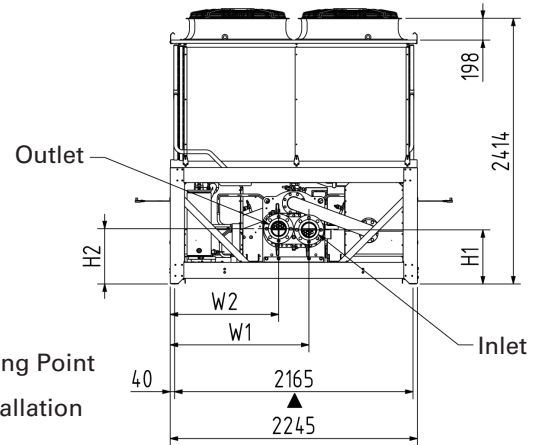
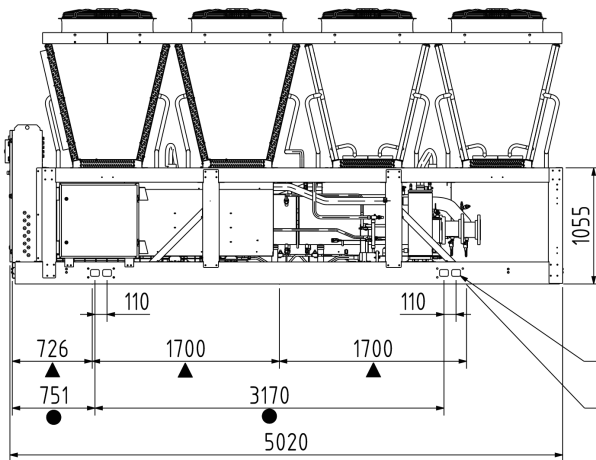
Figure 2. Dimension- RTAG 100 High, 085/100 Extra/ Premium efficiency unit



Top View
(With fan/coil removed)



ISO View



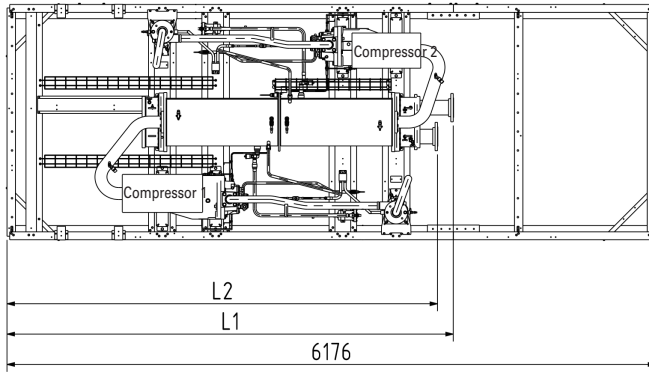
▲ Installation Point
● Lifting Point

Side View

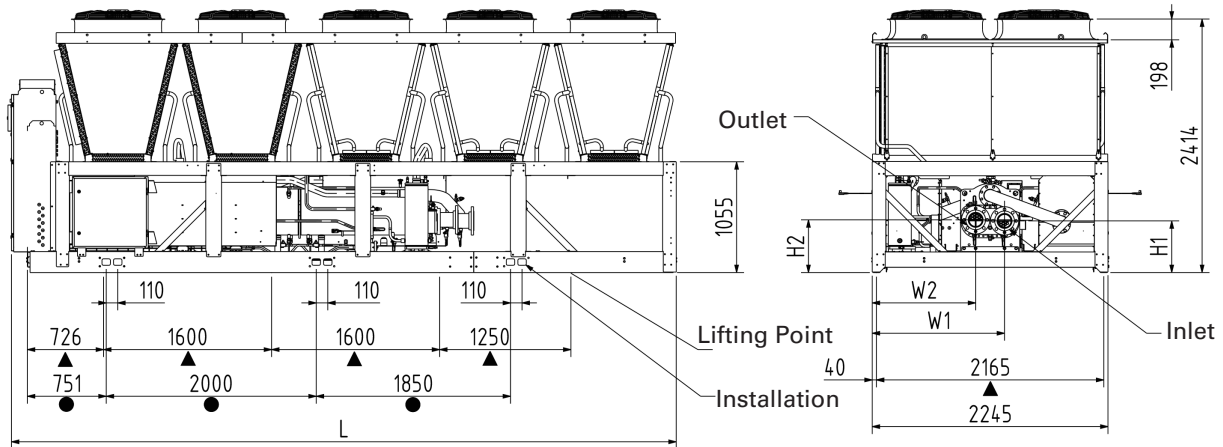
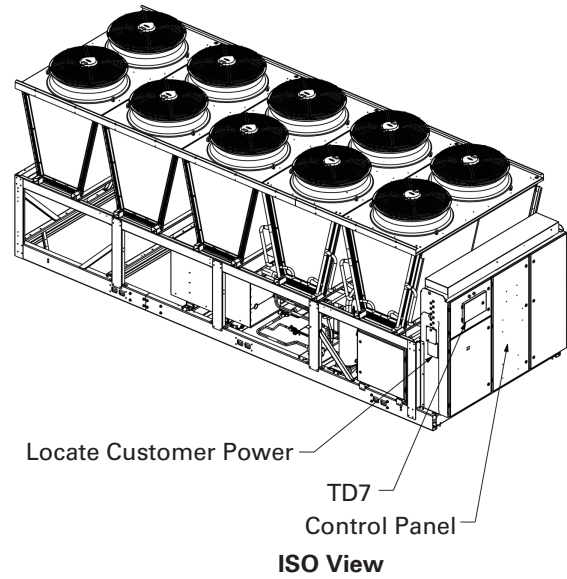
Back View

		H1 (mm)	H2 (mm)	W1 (mm)	W2 (mm)	L1 (mm)	L2 (mm)	Water pipe
RTAG125H	150PSI	492	500	1260	985	3905	3905	5"
	300PSI	492	500	1260	985	4249	4099	5"
RTAG145H	150PSI	492	500	1260	985	3905	3905	5"
	300PSI	492	500	1260	985	4249	4099	5"
RTAG155H	150PSI	492	500	1260	985	3905	3905	5"
	300PSI	492	500	1260	985	4249	4099	5"
RTAG170H	150PSI	450	465	1275	970	3938	3938	6"
	300PSI	450	465	1275	970	4250	4100	6"

Figure 3. Dimension - RTAG 125/145/155/170 High efficiency unit



Top View
(With fan/coil removed)



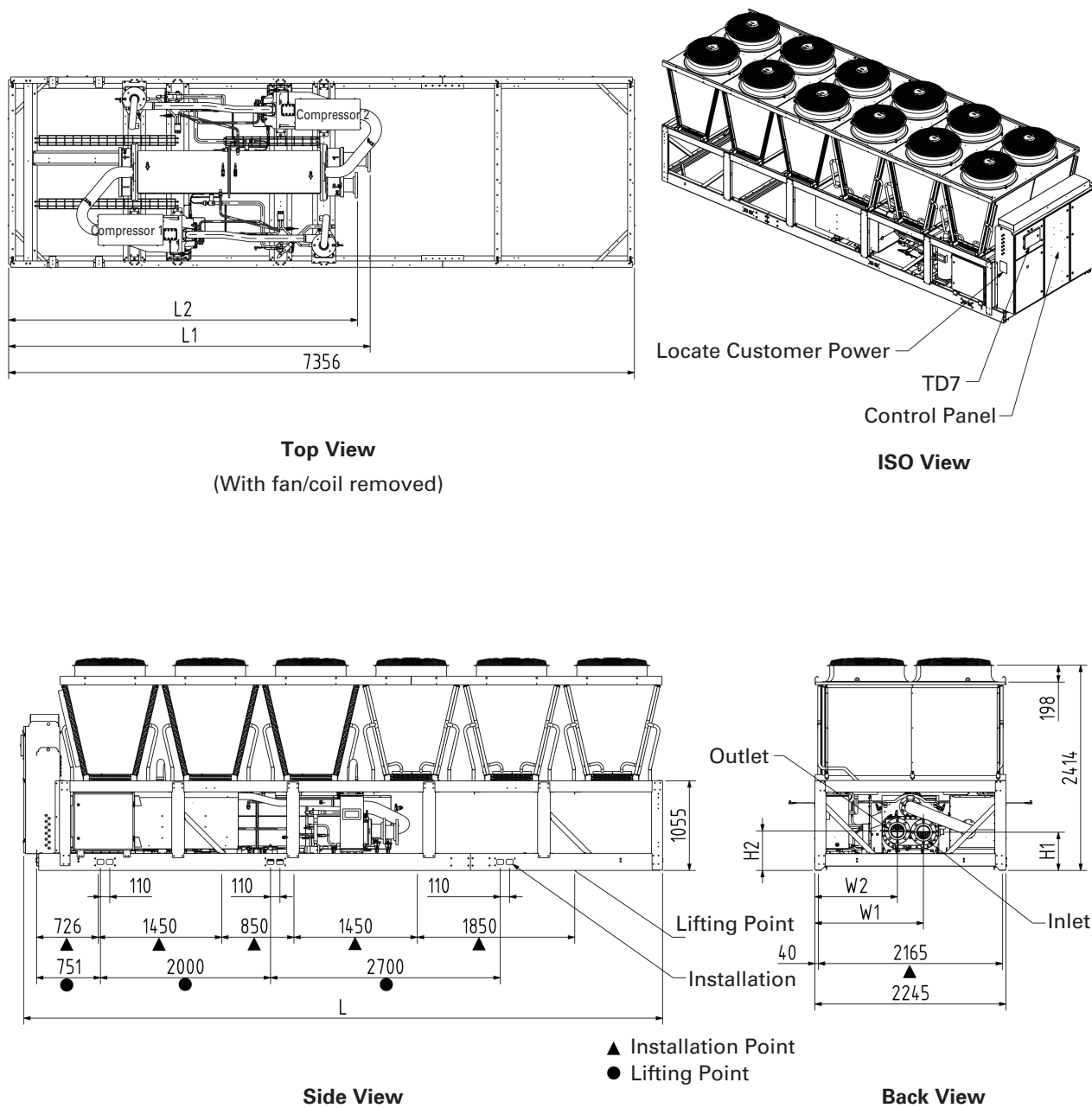
▲ Installation Point
● Lifting Point

Side View

Back View

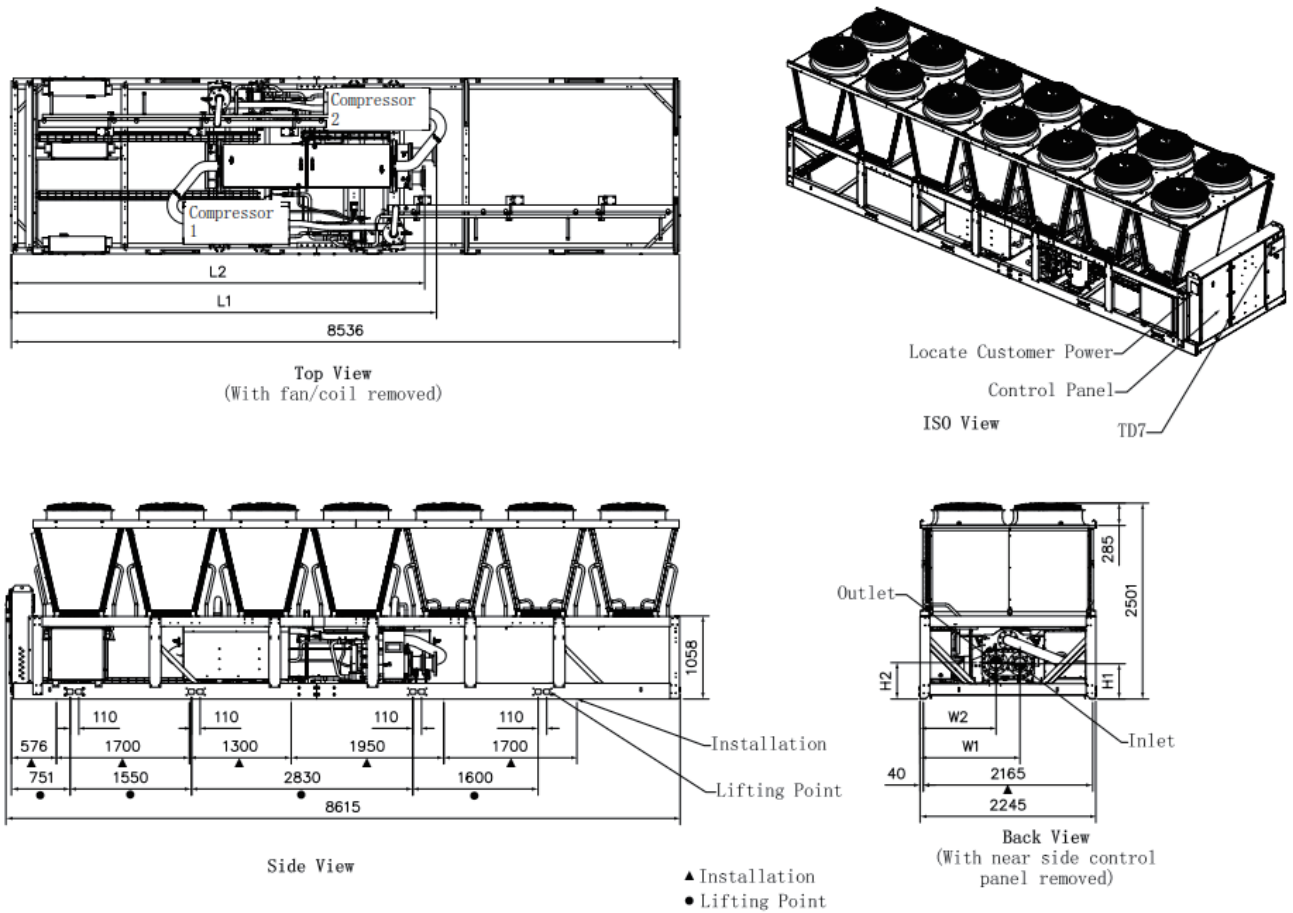
		H1 (mm)	H2 (mm)	W1 (mm)	W2 (mm)	L1 (mm)	L2 (mm)	Water pipe	L (Extra eff) (High eff)	L (Premium seasonal eff)
RTAG125X	150PSI	492	500	1260	985	3905	3905	5"	6200	6330
RTAG125P	300PSI	492	500	1260	985	4249	4099	5"	6200	6330
RTAG145X	150PSI	492	500	1260	985	3905	3905	5"	6200	6330
RTAG145P	300PSI	492	500	1260	985	4249	4099	5"	6200	6330
RTAG155X	150PSI	492	500	1260	985	3905	3905	5"	6200	6330
RTAG155P	300PSI	492	500	1260	985	4249	4099	5"	6200	6330
RTAG170X	150PSI	450	465	1275	970	3938	3938	6"	6200	6330
RTAG170P	300PSI	450	465	1275	970	4250	4100	6"	6200	6330
RTAG190H	150PSI	450	465	1275	970	3938	3938	6"	6200	---
	300PSI	450	465	1275	970	4250	4100	6"	6200	---
RTAG205H	150PSI	450	465	1275	970	3938	3938	6"	6200	---
	300PSI	450	465	1275	970	4250	4100	6"	6200	---

Figure 4. Dimension- RTAG 125/145/155/170 Extra/ Premium efficiency unit, 190/205high efficiency unit



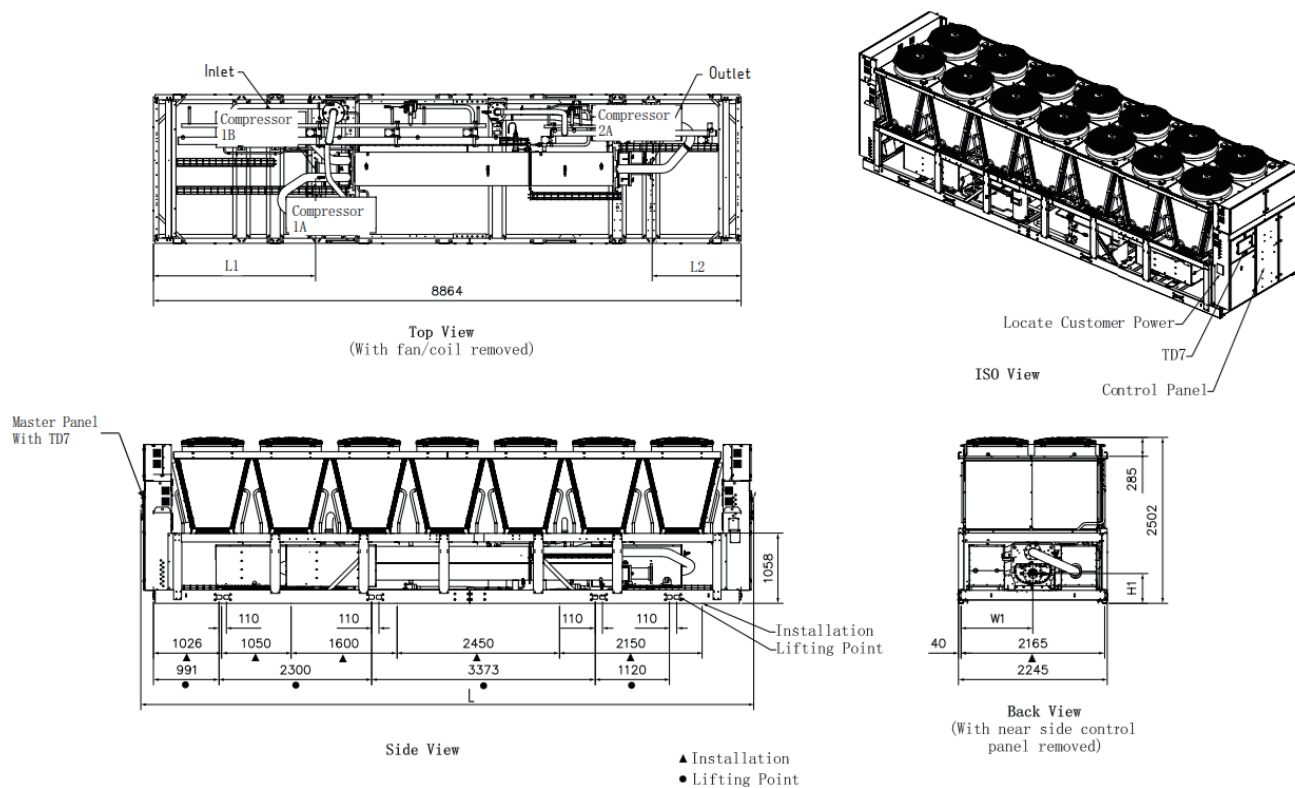
Unit	Water Box	H1 (mm)	H2 (mm)	W1 (mm)	W2 (mm)	L1 (mm)	L2 (mm)	Water pipe	L (High eff) (Extra eff) (mm)	L (Premium Seasonal eff) (mm)
RTAG190X	150psi	450	465	1275	970	3938	3938	DN150	7380	7510
RTAG190P	300psi	450	465	1275	970	4250	4250	DN150	7380	7510
RTAG205X	150psi	450	465	1275	970	3938	3938	DN150	7380	7510
RTAG205P	300psi	450	465	1275	970	4250	4100	DN150	7380	7510
RTAG225H	150psi	450	465	1275	970	3938	3938	DN150	7380	7510
RTAG225P	300psi	450	465	1275	970	4250	4100	DN150	7380	7510

Figure 5. Dimension - RTAG 190/205/225 Extra/ Premium efficiency unit



Unit	Water Box	H1 (mm)	H2 (mm)	W1 (mm)	W2 (mm)	L1 (mm)	L2 (mm)	Water pipe
RTAG 225X	150psi	450	465	1275	970	5118	5118	6"
	300psi	450	465	1275	970	5430	5280	6"

Figure 6. Dimension - RTAG 225 Extra efficiency unit



Unit	Water Box	H1 (mm)	W1 (mm)	L1 (mm)	L2 (mm)	Water pipe	L (High eff) (mm)	L (Premium Seasonal eff) (mm)
255H	150psi	450	1120	2698	1593	6"	9006	---
	300psi	450	1120	2447	1343	6"	9006	---
285H	150psi	450	1120	2698	1593	6"	9006	---
	300psi	450	1120	2447	1343	6"	9006	---
255P	150psi	450	1120	2698	1593	6"	---	9246
	300psi	450	1120	2447	1343	6"	---	9246
285P	150psi	450	1120	2698	1593	6"	---	9246
	300psi	450	1120	2447	1343	6"	---	9246

Figure 7. Dimension - RTAG 255/285 High/ Premium efficiency unit

Dimension

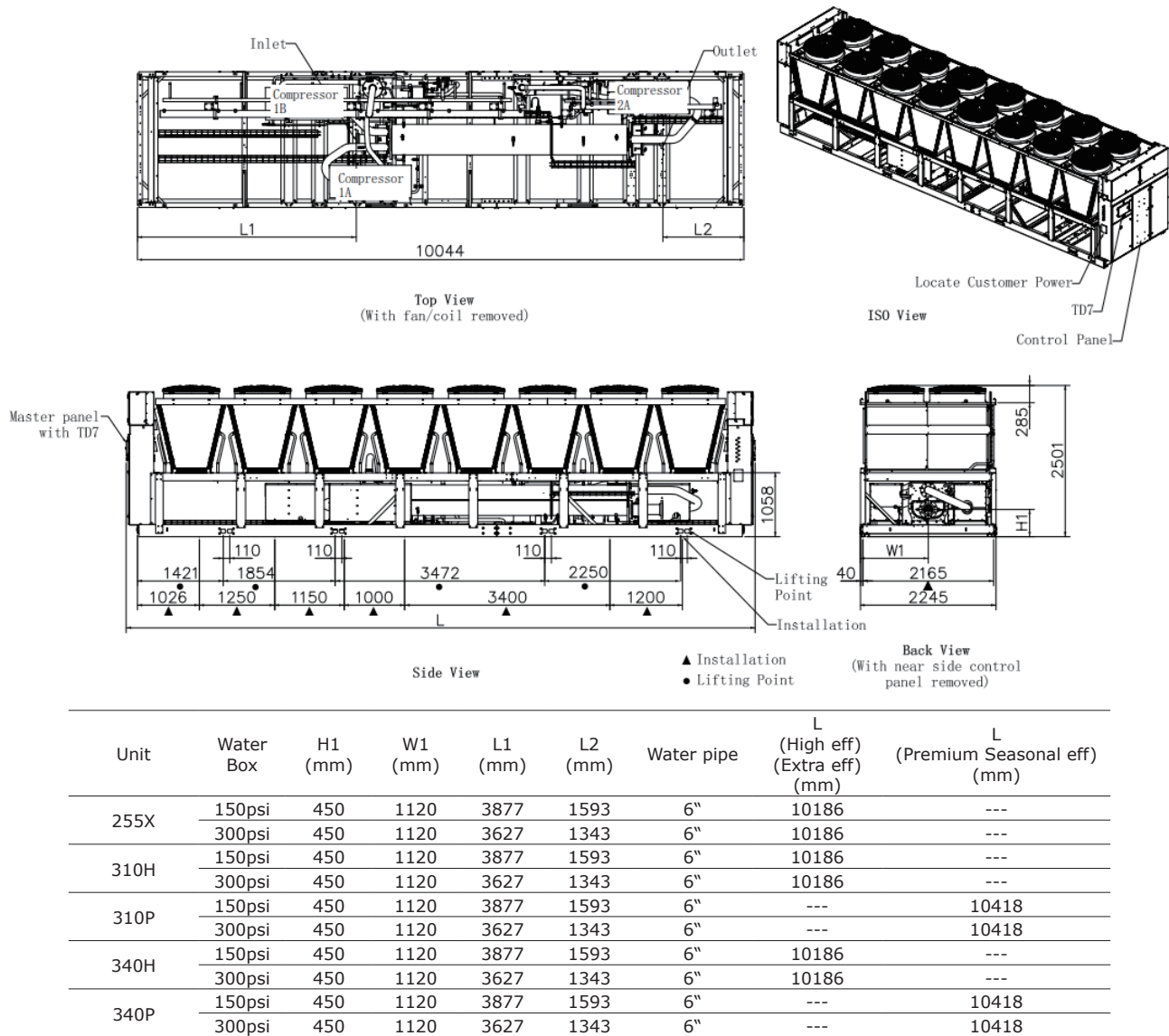


Figure 8. Dimension - RTAG 255 Extra efficiency unit, 310/340 High/ Premium efficiency unit

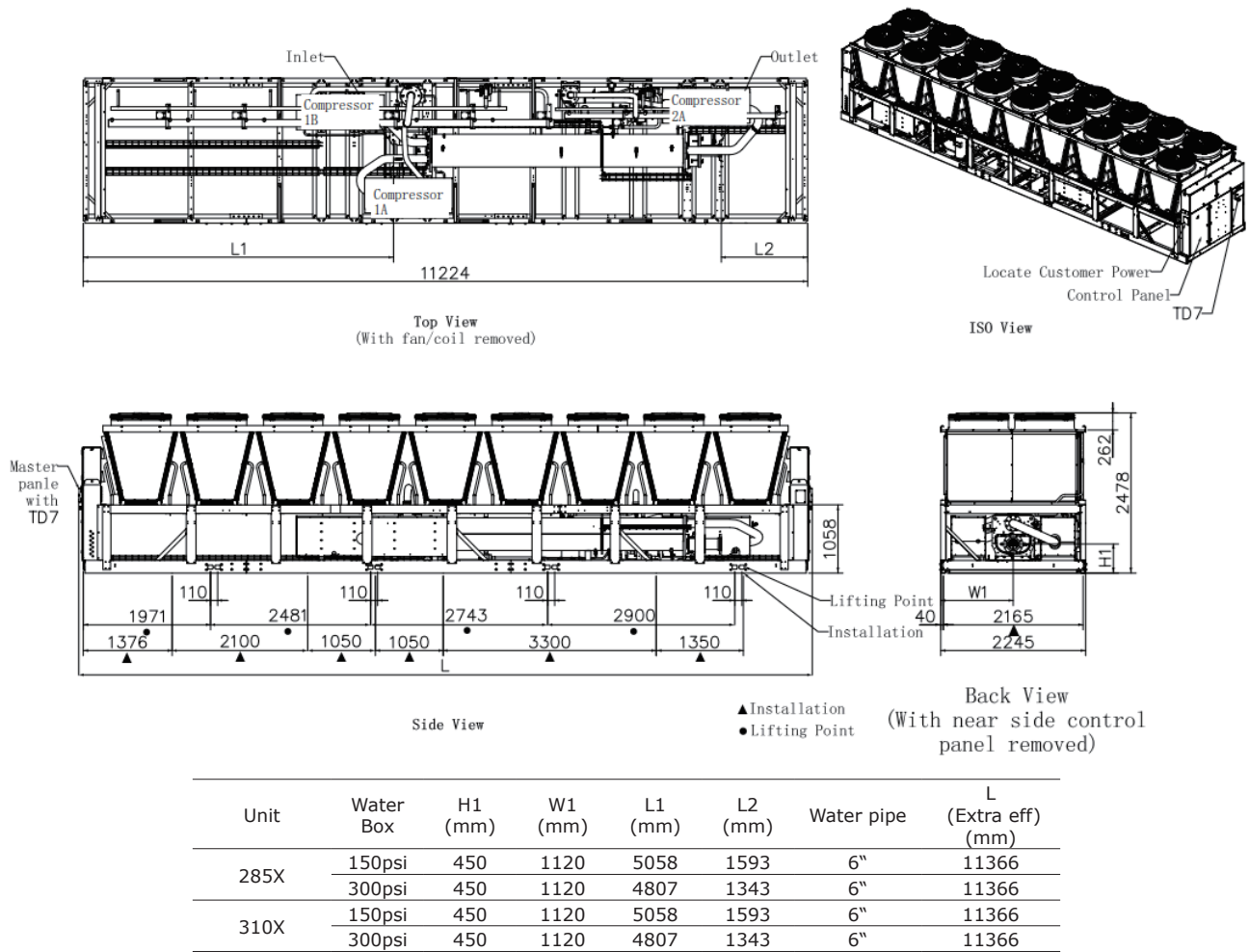


Figure 9. Dimension - RTAG 285/310 Extra efficiency unit

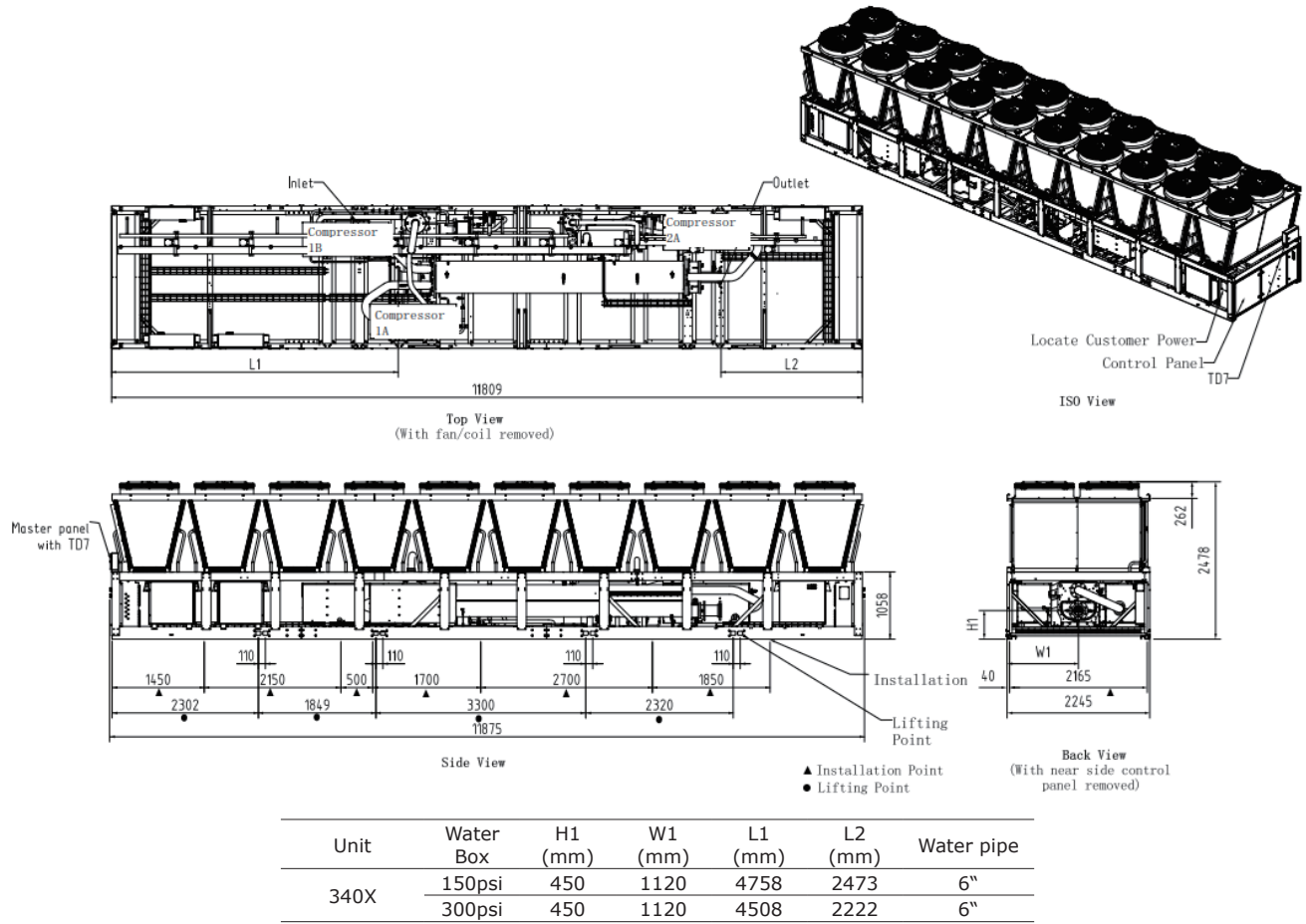


Figure 10. Dimension - RTAG 340 Extra efficiency unit

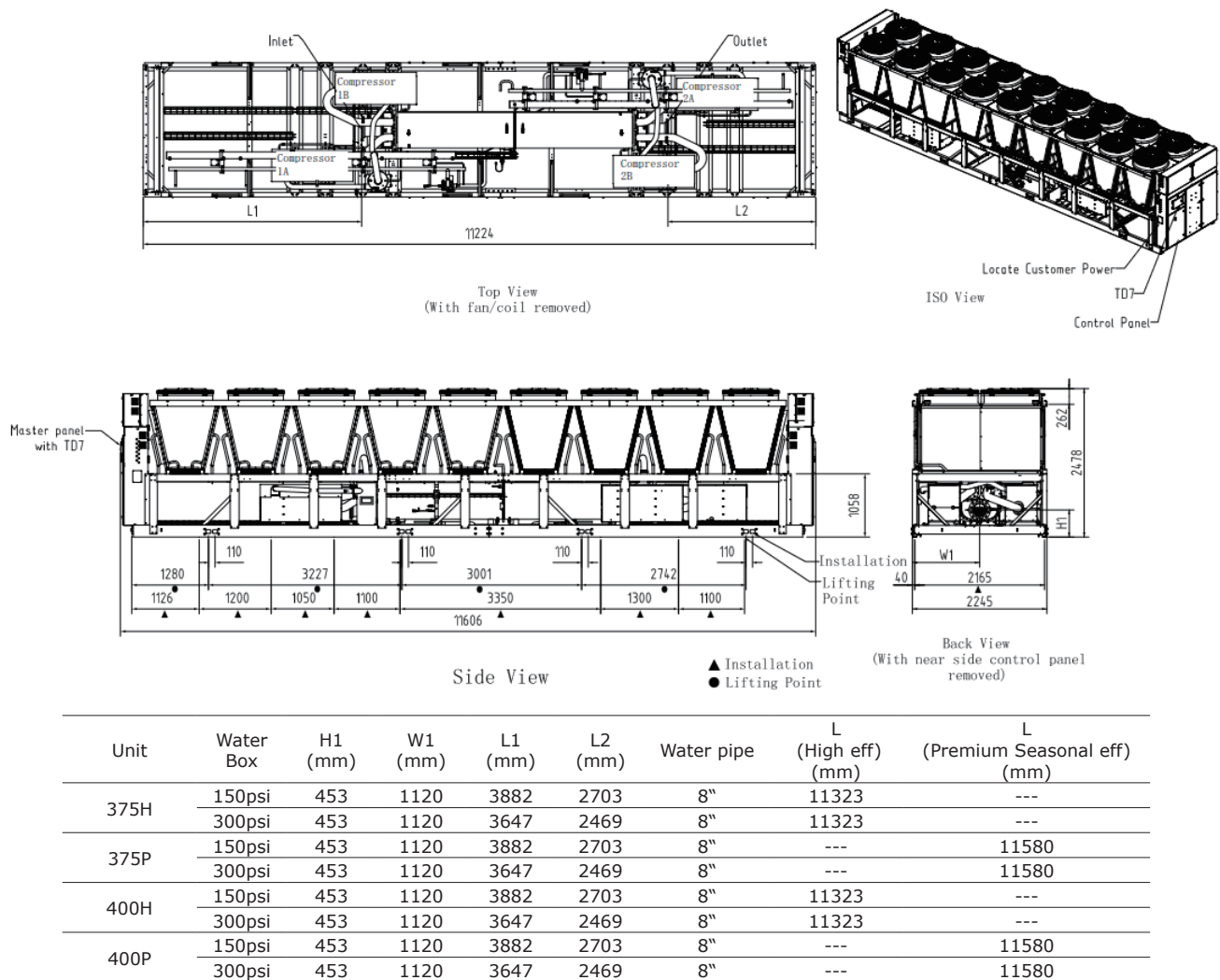


Figure 11. Dimension - RTAG 375/400 High/ Premium efficiency unit

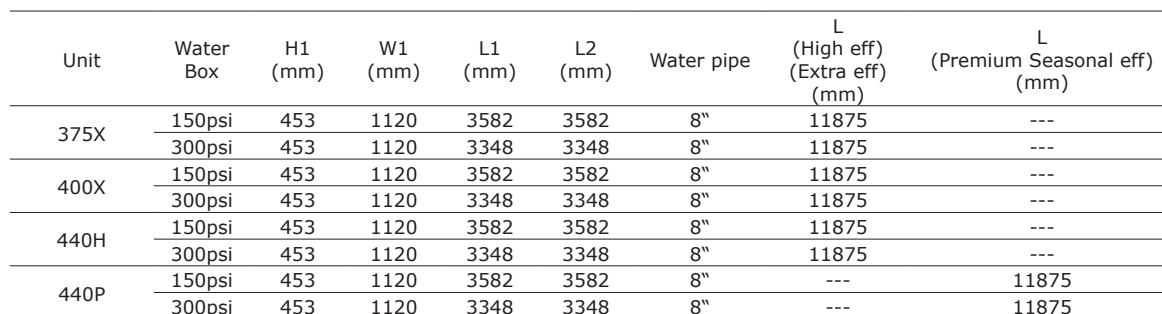


Figure 12. Dimension - RTAG 375/400 Extra efficiency unit, 440 High/ Premium efficiency unit

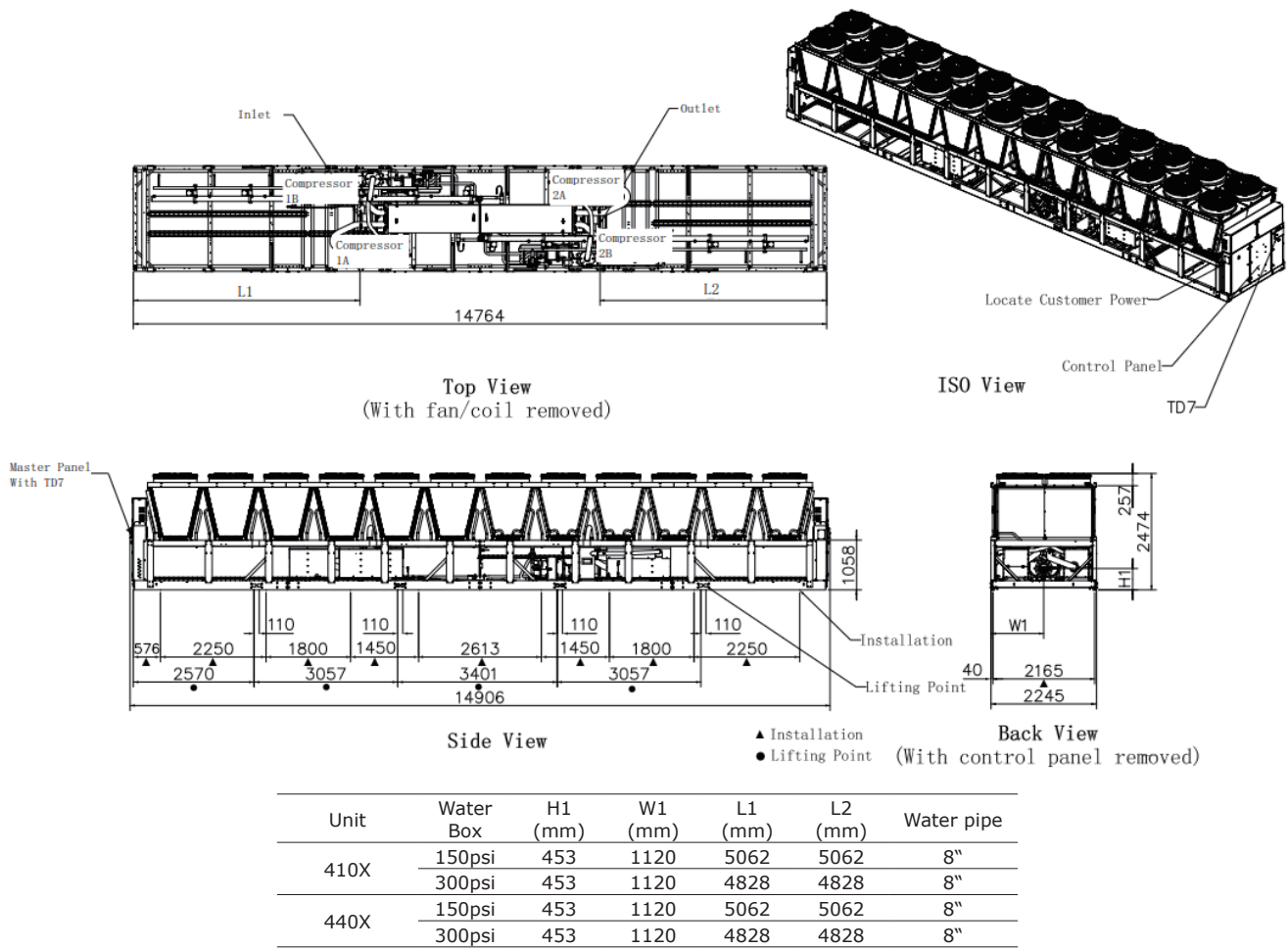


Figure 13. Dimension - RTAG 410/440 Extra efficiency unit

Installation - Mechanical

Installation Responsibilities

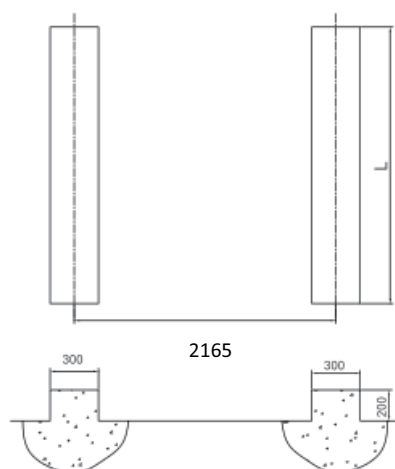
Table 7. Installation Responsibilities

Type	Trane Provide Trane install	Trane Provide field install	Field Provide Field install
Base			• Meet the requirements of installation base
Lifting			• Safety chain,u -joint adapter,hanging beam
Isolator		• Rubber isolator(option)	
Electrical	• Terminal block connection,mech disconnect switch and circuit breaker(option,premium unit only have last two type) • Control panel		• The circuit breaker or fuse way switch (option) • Electric line to connect the unit starter • Wire specifications follow the requirement of NEC standard and unit attachments • Terminal box • Ground wire • Bas wiring (optional) • The control voltage wiring • Chilled water pump contactor and wiring, including interlock • Optional relay and wiring
Water pipe	• Vend point and purge valve on water box	• Water flow switch (option, attached)	• Pressure gauge and coupling on water pipe • Temperature sensor • Filter • Hose • Globe valve and balance valve on water pipe • Drain pipe:connect to water box • Water pipe insulation • Water pipe support
Relief valve	• Dual-relief valve or single relief valve(option)		
Insulation	• Unit insulation		• External water pipe insulation

Attention Items

Pre-installation, the contractor must realize the following items:

- Build a sufficient bearing rigidity, smooth installation platform as [Figure 14](#), to support the equipment operation weight.
- After the unit is in place, adjust the levelness of unit, the levelness deviation must be controlled within 6.0 mm (1/4 "). Trane company is not responsible for the equipment problem caused by the unreasonable foundation design.
- Suggest to leave enough space for coil cleaning.
- Install the attached sensor and connect to UC800.
- Contractor must provide flow switch or differential pressure switch which could interlock with water pump to make sure system water flow.
- Install drain valve at bottom of evaporator water box.
- Install vent valve at top of evaporator water box.
- Install filter and flow switch at inlet of water pump and evaporator.
- Provide all connection electric wire.
- Install evaporator heater and separated water pipe and other parts, make sure unit can run at low ambient temperature.



Unit Tonnage	Efficiency	L (mm)
085; 100	high	2700
	Extra	
	Premium	
125; 145; 155; 170	high	3800
190; 205	high	4850
125; 145; 155; 170	Extra	4850
	Premium	
	Extra	
190; 205	Premium	6000
	High	
	Premium	
225	Extra	7050
255; 285	High	7650
	Premium	
	Extra	
255	High	8400
	Premium	
	Extra	
285; 310	Extra	9250
340	Extra	9300
375; 400	High	9500
	Premium	
	Extra	
440	High	9996
	Premium	
	Extra	
410; 440	Extra	14013

Figure 14. Installation clearance

Storage Requirement

If unit will be stored before installation, please follow requirement below:

- Store the outdoor unit in a secure area.
- At least every three months (quarterly), check the pressure in the refrigerant circuits to verify that the refrigerant charge is intact. If it is not, contact a qualified service organization and the appropriate Trane sales office.
- Close the discharge and liquid line isolation valves.

Note: Report any damage incurred during handling or installation to the Trane sales office immediately.

Clearances

Provide enough space around the outdoor unit to allow the installation and maintenance personnel unrestricted access to all service points. Refer to submittal drawings for the unit dimensions. A minimum of 4 feet (1.2 m) is recommended for compressor service. Provide sufficient clearance for the opening of control panel doors. Refer to [Figure 15](#) for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

Unobstructed flow of condenser air is essential to maintain chiller capacity and operating efficiency. When determining unit placement, give careful consideration to assuring a sufficient flow of air across the condenser heat transfer surface. Two detrimental conditions are possible

and must be avoided if optimum performance is to be achieved: warm air recirculation and coil starvation.

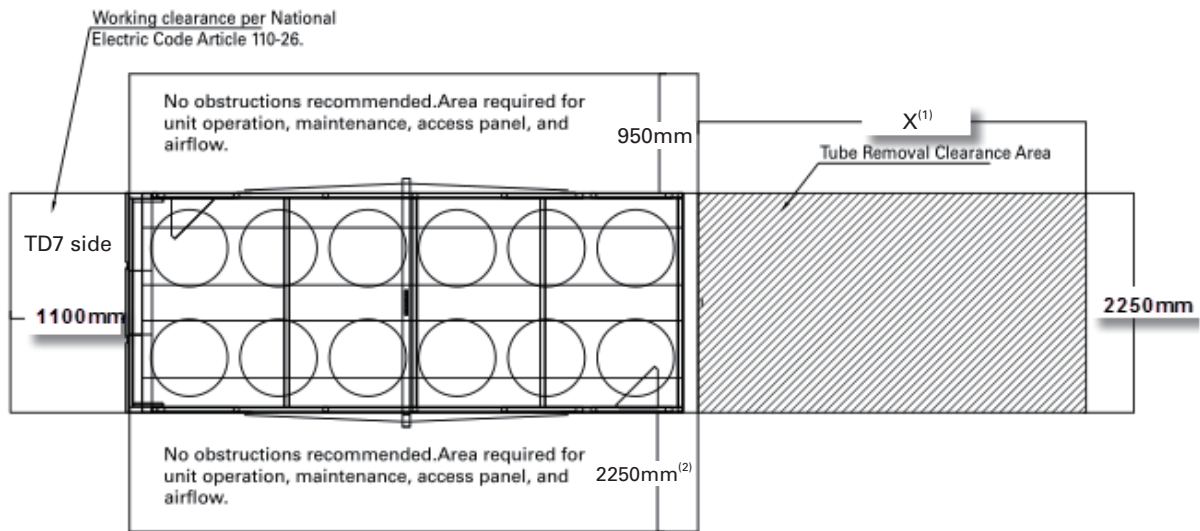
Warm air recirculation occurs when discharge air from the condenser fans is recycled back to the condenser coil inlet. Coil starvation occurs when free airflow to (or from) the condenser is restricted.

Both warm air recirculation and coil starvation cause reduction in unit efficiency and capacity due to the increased head pressures.

Debris, trash, supplies etc. should not be allowed to accumulate in the vicinity of the unit. Supply air movement may draw debris into the condenser coil, blocking spaces between coil fins and causing coil starvation. Special consideration should be given to low ambient units. Condenser

coils and fan discharge must be kept free of snow or other obstructions to permit adequate airflow for satisfactory unit operation.

In situations where equipment must be installed with less clearance than recommended, such as frequently occurs in retrofit and rooftop applications, restricted air flow is common. The Main Processor will direct the unit to make as much chilled water as possible given the actual installed conditions. Consult your Trane sales engineer for more details.



Note:

1. Tube removal clearance area (recommend the side far from operation interface), please keep enough space for tube removal:
NTON ≤ 225ton tech tube length is 2200mm, NTON > 225ton tech tube length is 4000mm, and need remove the control panel at this side.
2. Coil box service space.

Figure 15. Installation clearance

NOTICE

No block above unit vent and no ventilating duct. Make sure there isn't any heat source within 5 meter distance of the unit, such as air compressor exhaust duct, boiler and so on. the inlet air temperature shall not exceed the unit selection of condenser temperature range.

If the installation field is limited, can not meet the minimum service room, or the unit surrounding and top have wall or other blocks, please contract Trane local agency, to make sure it is feasible.

Drainage

Provide a large capacity drain for water vessel drain-down during shutdown or repair. The evaporator is provided with a drain connection. All local and national codes apply. The vent on the top of the evaporator water-box is provided to prevent a vacuum by allowing air into the evaporator for complete drainage.

⚠ CAUTION

Electrical Dangerous!

No ponding in installation field, make sure the drain pipe is unobstructed to avoid water entering the control panel, and damage the unit or lead to electric leakage, and people injury or death.

In heavy snowflow region or long-term ambient temperature below 0°C region, must raise the unit to avoid the snows.

Unit Lifting

Please read unit lifting label before any operation:

1. Only lifting unit at unit marked position, Do not fork lift unit.
2. Lifting chains/cables will not be the same length. Adjust to keep unit level while lifting. follow the [Figure 16](#), [Figure 17](#), [Figure 18](#) and [Table 8](#).
3. Make sure each cord and lifting plug capability is bigger than unit shipping weight.
4. Protect the coil surface to avoid fin damage during lifting
5. Lifting carefully, raising unit slowly and stable, no vibration and tilt.
6. Remove the lifting instrument after unit take its the place.

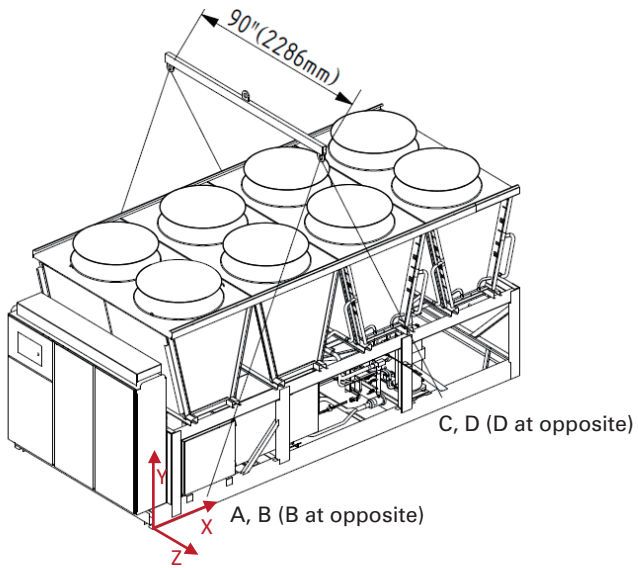


Figure 16. Unit lifting schematic (4 points)

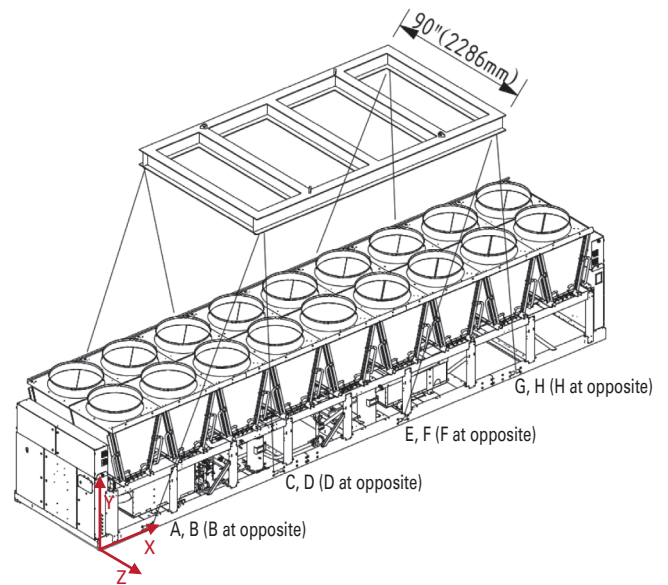


Figure 18. Unit lifting schematic (8 points)

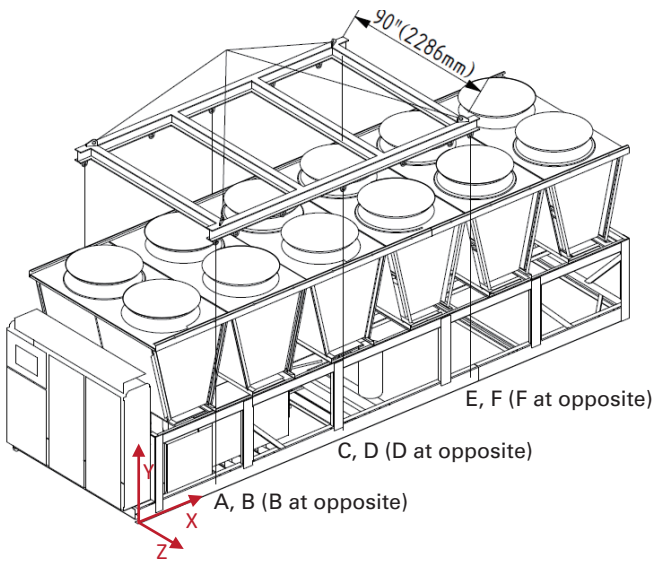


Figure 17. Unit lifting schematic (6 points)

Installation - Mechanical

Table 8. Lifting Weights and CG Dimensions

Tonnage	Efficiency	A (kg)	B (kg)	C (kg)	D (kg)	E (kg)	F (kg)	G (kg)	H (kg)	Shipping weight (kg)	Xcg (mm)	Ycg (mm)	Zcg (mm)
100	High	911	580	751	564	-	-	-	-	2805	1789	914	-911
125	High	1080	828	887	1027	-	-	-	-	3822	2394	944	-1085
145	High	1117	878	950	1185	-	-	-	-	4130	2443	946	-1117
155	High	1139	885	960	1190	-	-	-	-	4174	2438	941	-1111
170	High	1173	917	999	1251	-	-	-	-	4341	2449	926	-1117
190	High	826	613	925	994	640	701	-	-	4699	2711	941	-1100
205	High	832	617	943	1043	646	718	-	-	4798	2718	933	-1109
085	Extra	875	571	735	559	-	-	-	-	2740	1796	924	-922
100	Extra	933	601	782	594	-	-	-	-	2910	1797	935	-918
125	Extra	764	590	822	825	619	646	-	-	4266	2708	984	-1080
145	Extra	784	608	871	955	670	721	-	-	4609	2749	987	-1108
155	Extra	800	611	885	960	670	721	-	-	4647	2742	983	-1103
170	Extra	823	628	925	1014	683	742	-	-	4814	2741	968	-1108
190	Extra	775	555	1096	1216	690	709	-	-	5041	3029	995	-1101
205	Extra	780	561	1122	1276	691	720	-	-	5150	3029	985	-1110
085	Premium	1053	749	696	521	-	-	-	-	3020	1639	929	-940
100	Premium	1112	779	744	556	-	-	-	-	3190	1677	923	-943
125	Premium	994	817	796	800	606	634	-	-	4646	2497	972	-1082
145	Premium	1013	833	846	931	657	709	-	-	4989	2550	976	-1107
155	Premium	1027	837	861	936	657	709	-	-	5027	2545	971	-1103
170	Premium	1049	854	899	992	670	730	-	-	5194	2550	958	-1108
190	Premium	1009	779	1068	1188	678	699	-	-	5421	2824	994	-1100
205	Premium	1015	782	1093	1248	683	710	-	-	5530	2828	985	-1108
225	High	801	581	1168	1321	728	754	-	-	5354	3030	982	-1112
255	High	841	1109	1205	1064	651	885	560	806	7121	4292	925	-1214
285	High	860	1154	1228	1093	673	925	572	836	7341	4299	923	-1221
310	High	598	742	1518	1504	785	913	816	1152	8028	5142	952	-1201
340	High	600	744	1520	1506	787	915	818	1154	8044	5142	952	-1201
375	High	926	1171	1407	1325	1004	1170	1244	964	9212	5882	939	-1126
400	High	934	1178	1449	1344	1018	1205	1255	980	9362	5885	933	-1126
440	High	1143	1465	1341	1155	1176	1320	1441	1155	10197	5893	973	-1120
225	Extra	308	350	1239	952	954	1268	440	419	5931	3858	988	-1129
255	Extra	588	721	1432	1428	754	880	791	1101	7695	5141	955	-1201
285	Extra	779	914	1323	1418	794	867	889	1294	8278	6006	1005	-1214
310	Extra	780	915	1362	1435	808	871	896	1296	8364	5999	1001	-1208
340	Extra	792	971	1414	1455	732	831	1042	1434	8673	6039	1004	-1210
375	Extra	1125	1450	1293	1130	1150	1270	1426	1138	9982	5893	981	-1120
400	Extra	1134	1456	1330	1142	1162	1308	1432	1147	10111	5893	973	-1120
410	Extra	1192	1457	1410	1340	1327	1426	1435	1213	10799	7357	1012	-1120
440	Extra	1285	1504	1484	1384	1400	1468	1530	1260	11314	7357	1032	-1120
225	Premium	1036	805	1140	1293	717	744	-	-	5734	2840	982	-1110
255	Premium	942	1211	1190	1049	628	863	673	916	7471	4297	913	-1209
285	Premium	960	1255	1213	1079	650	903	684	946	7691	4304	912	-1217
310	Premium	712	860	1494	1477	774	901	913	1249	8378	5136	943	-1198
340	Premium	714	862	1496	1479	776	903	915	1251	8394	5136	943	-1198
375	Premium	1029	1277	1386	1313	1000	1159	1342	1057	9562	5871	930	-1126
400	Premium	1036	1283	1435	1331	1007	1194	1353	1074	9712	5875	924	-1126
440	Premium	1205	1530	1330	1140	1159	1306	1507	1219	10397	5893	964	-1120

Isolator Installation

The most effective form of isolation is to locate the unit away from any sound sensitive area. Structurally transmitted sound can be reduced by elastomeric vibration eliminators. Spring isolators are not recommended. Consult an acoustical engineer in critical sound applications. For maximum isolation effect, isolate water lines and electrical conduit. Wall sleeves and rubber isolated piping hangers can be used to reduce the sound transmitted through water piping. To reduce the sound transmitted through electrical conduit, use flexible electrical conduit. State and local codes on sound emissions should always be considered. Since the environment in which a sound source is located affects sound pressure, unit placement must be carefully evaluated.

The optional isolator is rubber isolator, follow following installation steps:

1. According [Figure 19](#) location to install the isolator.
2. Secure the isolators to the mounting surface using the mounting slots in the isolator base plate according figure 10. Do not fully tighten the isolator mounting bolts at this time.
3. Align the mounting holes in the base of the unit with the threaded positioning pins on the top of the isolators.
4. Lower the unit onto the isolators and secure the isolator to the unit with a nut. Maximum isolator deflection should be 1/4 inch (6 mm).
5. Level the unit carefully. Fully tighten the isolator mounting bolts.

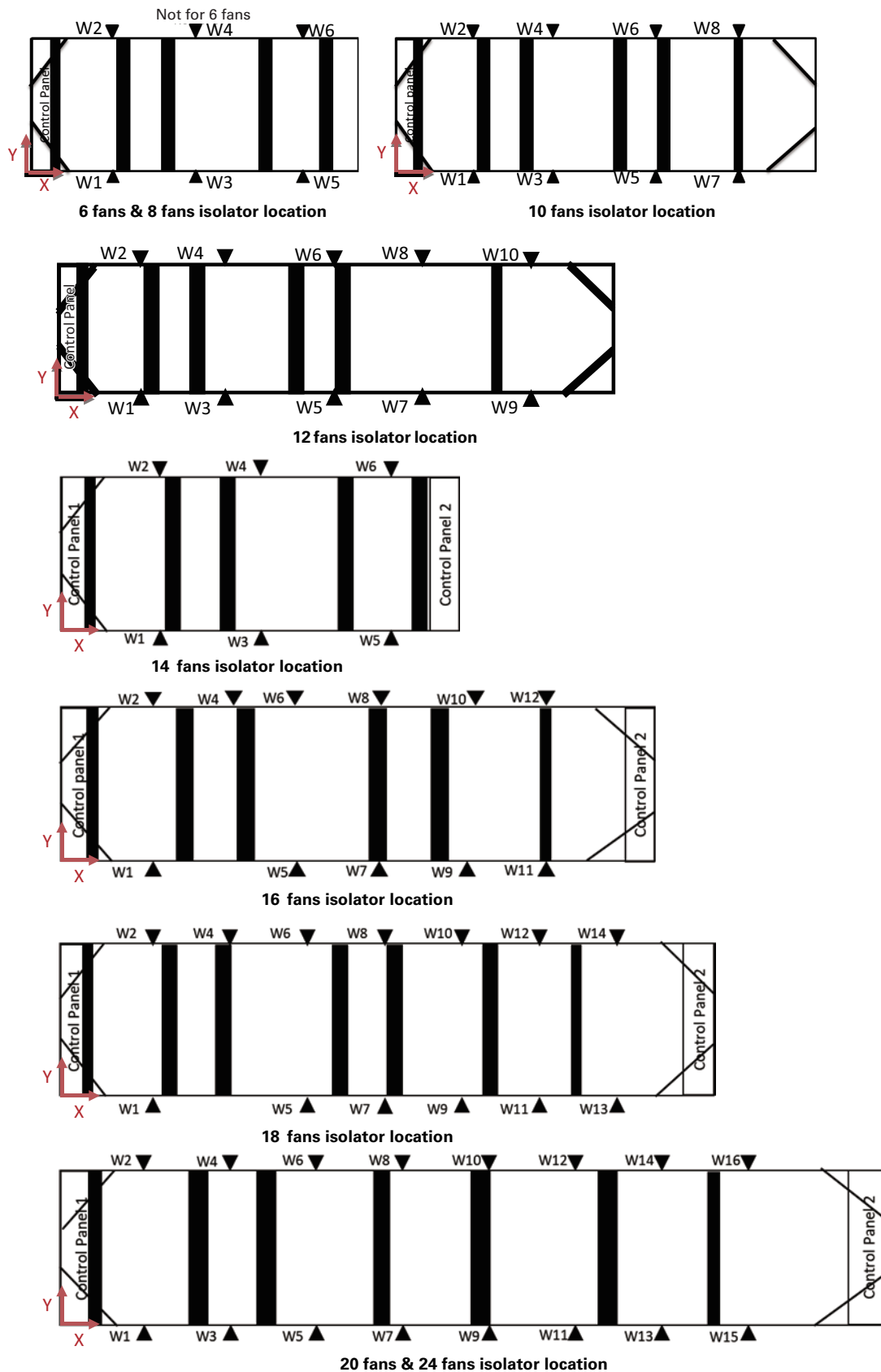
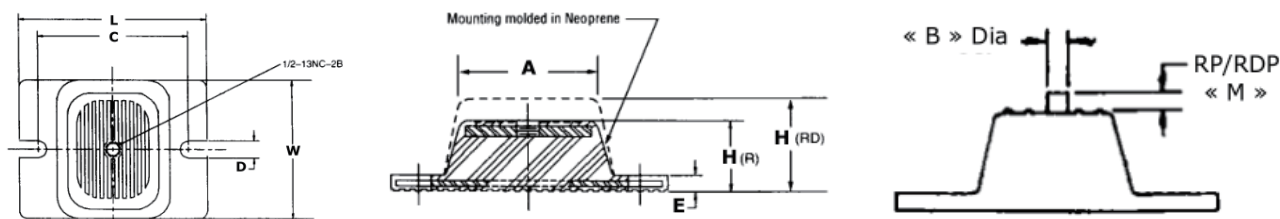


Figure 19. Isolator location

Detail dimension of rubber isolator:

Part number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	H (mm)	L (mm)	M (mm)	W (mm)	Color
X10140305630	76.2	12.7	127.0	14.2	9.7	69.9	158.8	40.6±6.35	117.6	Lime
X10140305620	76.2	12.7	127.0	14.2	9.7	69.9	158.8	40.6±6.35	117.6	Brick Red
X10140305610	76.2	12.7	127.0	14.2	9.7	69.9	158.8	40.6±6.35	117.6	Brown


Figure 20. Rubber isolator dimension
Table 9. Unit Isolators

Unit Type	Fan count	Isolator location at X axis (mm)								Isolator Quantity
		W1, 2	W3, 4	W5, 6	W7, 8	W9, 10	W11, 12	W13, 14	W15, 16	
100H	6	700	1850	3000	--	--	--	--	--	5
125H; 145H 155H; 170H	8	700	2400	4100	--	--	--	--	--	6
190H; 205H	10	700	2300	3900	5150	--	--	--	--	8
085X; 100X 085P; 100P	6	700	1850	3000	--	--	--	--	--	5
125X; 145X 155X; 170X 125P; 145P 155P; 170P	10	700	2300	3900	5150	--	--	--	--	8
190X; 205X 190P; 205P 225H; 225P	12	700	2150	3000	4450	6300	--	--	--	10
225X	14	550	2250	3550	5500	7200	--	--	--	10
255H; 255P 285H; 285P	14	1000	2050	3650	6100	8250	--	--	--	10
255X; 310H 310P; 340H 340P	16	1000	2250	3400	4400	7800	9000	--	--	12
285X; 310X	18	1350	3450	4500	5550	8850	10200	--	--	12
375H; 375P 400H; 400P	18	1100	2300	3350	4450	7800	9100	10200	--	14
340X	20	1450	3600	4100	5800	8500	10350	--	--	12
375X; 400X 440H; 440P	20	1100	2000	2950	4300	7496	8846	9796	10696	16
410X; 440X	24	550	2800	4600	6050	8663	10113	11913	14163	16

Installation - Mechanical

Table 10. Unit Isolators Part Extension Number

Unit Type	Isolator location at X axis (mm)																Isolator Quantity
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	
100H; 085X; 100X	Brick red	Brick red	Brick red	-	Brown	Brick red	-	-	-	-	-	-	-	-	-	-	5
125H; 145H; 155H; 170H	Brick red	Brown	Brick red	Brick red	Brown	Brick red	-	-	-	-	-	-	-	-	-	-	6
125X; 145X; 155X; 170X; 190H; 205H	Brick red	Brown	Brick red	Brick red	Brown	Brick red	Brown	Brown	-	-	-	-	-	-	-	-	8
190X; 205X	Brown	Brown	Brick red	Brown	Brown	Brick red	Brown	Brown	Brown	Brown	-	-	-	-	-	-	10
085P; 100P	Brick red	Brick red	Brick red	-	Brown	Brown	-	-	-	-	-	-	-	-	-	-	5
125P; 145P; 155P; 170P	Brick red	Brick red	Brick red	Brick red	Brown	Brick red	Brown	Brown	-	-	-	-	-	-	-	-	8
190P; 205P	Brick red	Brick red	Brick red	Brown	Brown	Brick red	Brown	Brown	Brown	Brown	-	-	-	-	-	-	10
225H	Brown	Brown	Brick red	Brown	Brown	Brick red	Brown	Brown	Brown	Brown	-	-	-	-	-	-	10
225P	Brick red	Brick red	Brick red	Brown	Brown	Brick red	Brown	Brown	Brown	Brown	-	-	-	-	-	-	10
225X	Brown	Brown	Brick red	Brown	Brick red	Brick red	Brick red	Brick red	Brown	Brown	-	-	-	-	-	-	10
255H; 285H	Brown	Brick red	Brick red	Brick red	Brown	Brown	Brick red	Brick red	Brown	Brick red	-	-	-	-	-	-	10
255P; 285P	Brown	Brick red	Brick red	Brick red	Brown	Brown	Brick red	Brick red	Brick red	Brick red	-	-	-	-	-	-	10
255X; 310H 340H	Brown	Brown	--	Brown	Brick red	Brown	Brick red	Brick red	Brick red	Brick red	Brown	Brick red	-	-	-	-	11
310P; 340P	Brick red	Brown	--	Brown	Brick red	Brown	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	-	-	-	-	11
285X; 310X	Brick red	Brown	--	Brown	Brick red	Brown	Brick red	Brick red	Brick red	Brick red	Brown	Brick red	-	-	-	-	11
375H; 400H	Brown	Brown	--	Brown	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brown	-	13
375P; 400P	Brick red	Brown	--	Brown	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brown	-	13
340X	Brick red	Brick red	--	Brick red	Lime	Brick red	Lime	Brick red	Brick red	Lime	Brick red	Lime	-	-	-	-	11
375X; 400X 440H; 440P	Brown	Brown	--	Brown	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brick red	Brown	--	Brown	Brown	14
410X; 440X	Brown	Brown	Brown	Brown	Lime	Lime	Brown	Brown	Brown	Brown	Lime	Lime	Brown	Brown	Brown	Brown	16

Evaporator Water Piping

Thoroughly flush all water piping to the unit before making the final piping connections to the unit.

NOTICE

Evaporator Damage!

The chilled water connections to the evaporator are to be "Flange" type connections. Do not attempt to weld these connections, as the heat generated from welding can cause microscopic and macroscopic fractures on the cast iron waterbox that can lead to premature failure of the waterbox.

NOTICE

Use Piping Strainers!

To prevent evaporator damage, pipe strainers must be installed in the water supplies to protect components from water born debris. Trane is not responsible for equipment-only-damage caused by water born debris.

NOTICE

Unit Damage!

Before complete the external water pipe leak detection, cleaning, do not connect to unit water side heat exchanger, so as to avoid impurities into the unit interior and cause damage.

Water side heat exchanger typical piping connection schematic, [Figure 21](#):

1. Pressure gauges should be installed on both inlet and outlet water pipe to monitor water inlet/outlet pressure; which should located on straight line and keep away from elbow, keep at same level as possible as could, to reduce the error due to installation

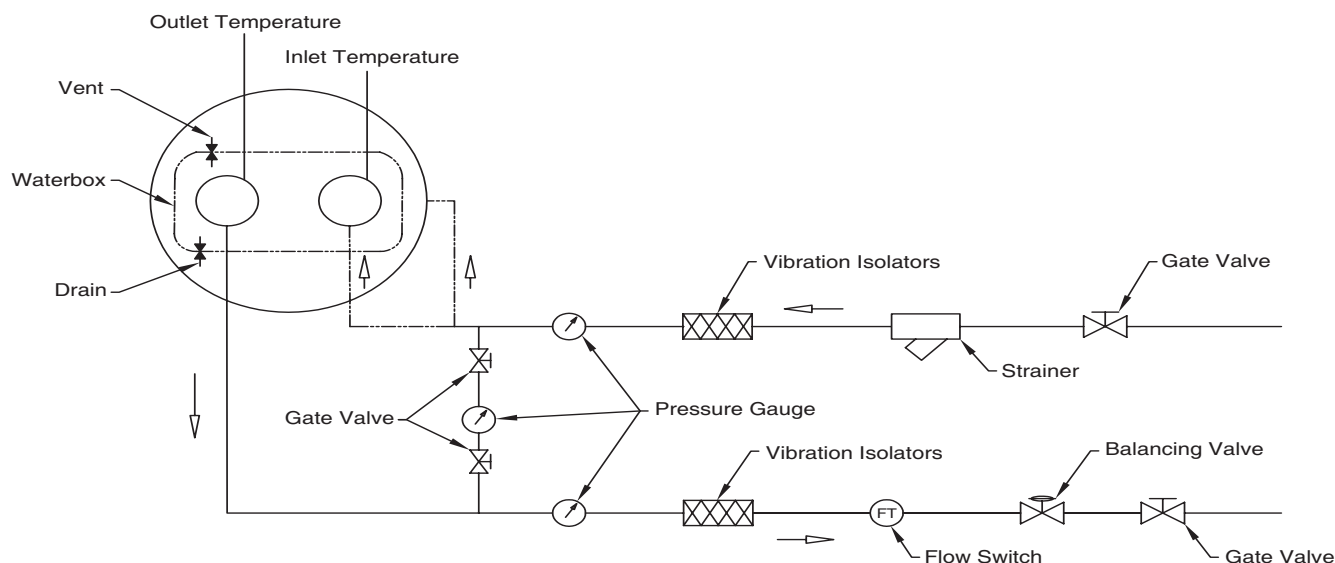


Figure 21. Water side heat exchanger typical piping connection schematic

height; Or bridge joint single gage, through the valve opening and closing to select pressure measure points.

Note: For multiple units installation, please install pressure gauge for each units inlet/outlet pipe.

2. The vibration-proof hose can prevent the vibration propagation along the water pipe.
3. Install temperature sensor on inlet/outlet water pipe to monitor filed inlet /outlet water temperature.
4. Inlet water pipe must install filter to avoid impurity entering into system. Filters screen shall not be less than 20 meshes.
5. install balance valve on outlet water pipe to adjust water flow rate, and install service valve to switch off water flow during maintenance.
6. Install flow switch on inlet water pipe to avoid low flow rate.
7. Install vent valve on water box top to discharge air in water loop; install purge valve on bottom of water box, the purge piping arranged in site.
8. install automatic vent valve on the highest point of water loop.
9. All external water pipe should complete leakage detection, cleaning, insulating and fixed support.

NOTICE

Unit Damage!

To avoid the damage of equipment, water side leakage detecting pressure must not exceed the tube side design pressure which is indicated on heat exchanger nameplate.

Entering Chilled Water Piping

- Air vents (to bleed air from system).
- Water pressure gauges with shutoff valves.
- Vibration eliminators.
- Shutoff (isolation) valves. Thermometers (if desired).
- Clean-out tees.
- Pipe strainer.

Leaving Chilled Water Piping

- Air vents (to bleed air from system).
- Water pressure gauges with shutoff valves. Vibration eliminators.
- Shutoff (isolation) valves.
- Thermometers.
- Clean-out tees.
- Balancing valve.
- Flow Switch

System Minimum Water Volume

Water loop systems minimum volume, include chiller, water piping and indoor unit, all these water flow should not less than 9L/kW, in order to keep the unit steady operation and accurate controlled water temperature. If the volume is lower than this minimum value, should install a water tank with similar volume, which have build-in baffle to get well mixed water.

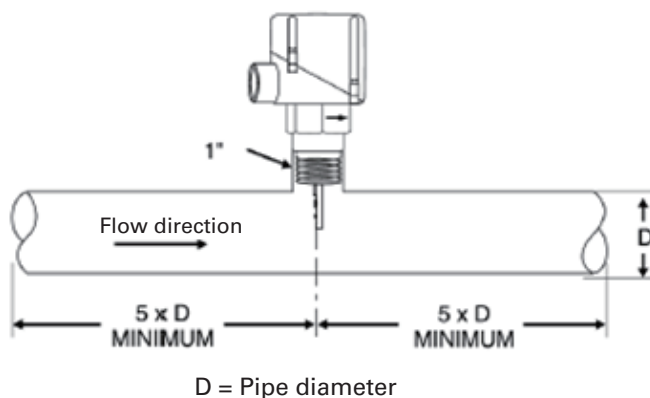


Figure 22. Water flow switch installation schematic

Water Flow Switch

To protect the unit, water loop must be installed flow switch and interlocked with water pump. once the the water flow of heat exchanger was below [Table 1](#) required minimum flow, water flow switch can stop the compressor operation. Water flow switch is accessories, its general installation requirements outlined below, see [Figure 22](#):

- Shall be vertically installed in horizontal pipelines or installed on the vertical tube upward flow direction.
- Please keep away from the elbow, orifice or valve, before and after the switch keep at least 5 times the pipe diameter of straight pipe.
- Flow switch target slice should be selected and cut according [Table 11. Target slice length](#) before usage.
- Control the screw-in depth of the water flow switch, make sure the arrow on the switch is consistent with the direction of flow.
- To prevent switch vibrate, no air in water loop.
- To make sure the flow switch could cutoff at flow smaller than minimum water flow, according [Figure 23](#).
- Water flow switch should be interlocked with water pump control, specific electrical wiring way see "[Figure 81. Field Wiring Diagram](#)" P. 132

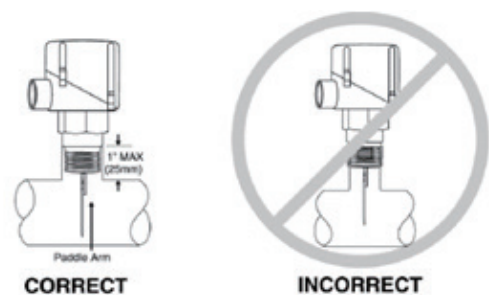


Table 11. Target slice length

UNIT	Water pipe	Slice length A (mm)
085; 100	4"	30
125; 145; 155	5"	39
170; 190	6"	41.5
205	6"	44.5
225	6"	31
255; 285	6"	30
310; 340	6"	46
375	8"	40
400	8"	40
410	8"	40
440	8"	34

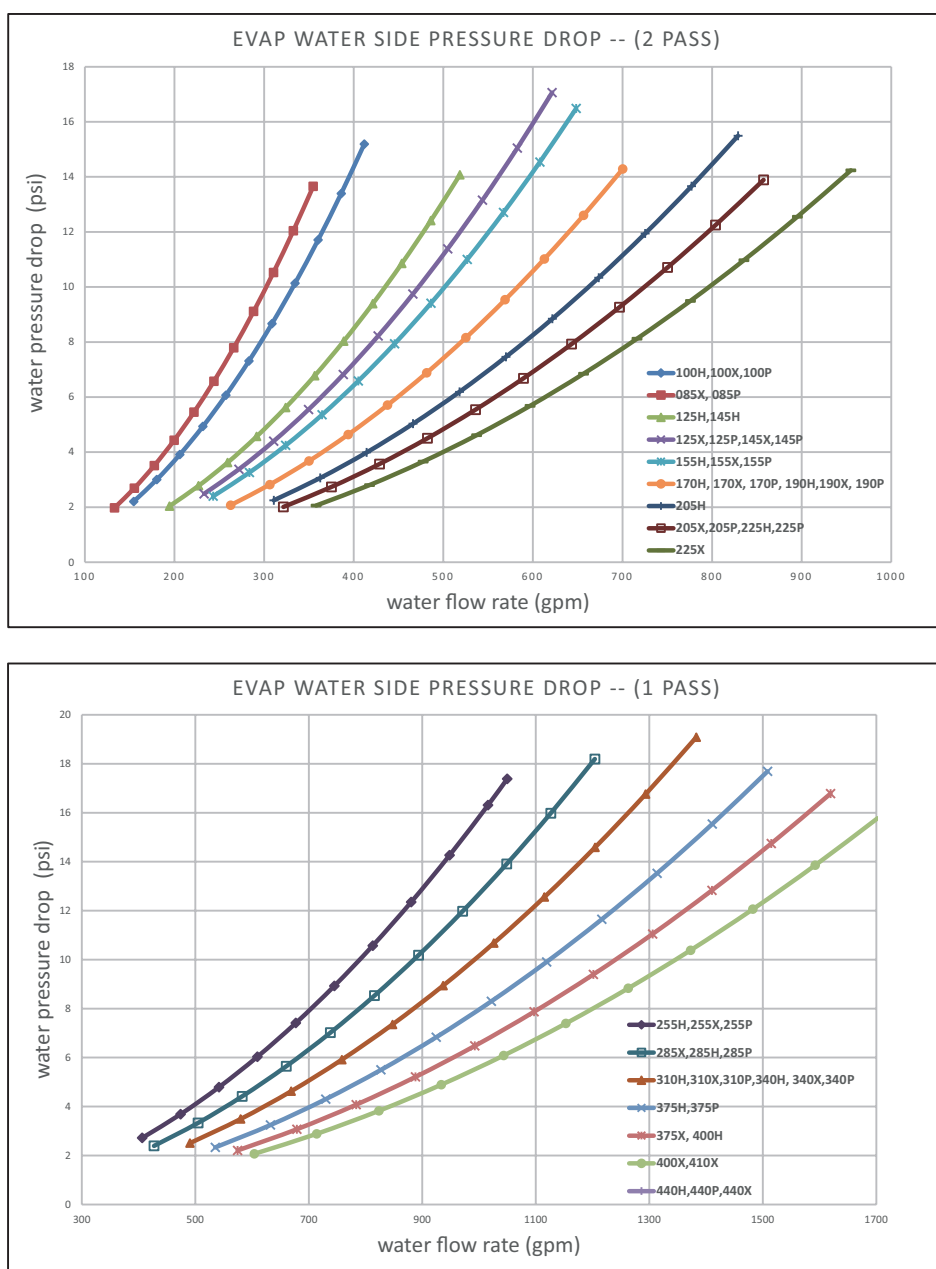
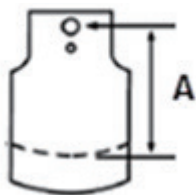


Figure 23. Water flow- pressure drop curve

NOTICE

Water flow protection!

TRANE chiller UC800 controller with has 6 seconds delay responds to water flow switch cutout before unit turn off. If unit has abnormal downtime, please contact the TRANE air conditioning maintenance organization.

Water Treatment

Water side heat exchanger must apply with treated and filtered water, water property quality should within the range [Table 12](#) water quality requirements, to avoid the damage of unit. Detail method please consulting experts in water treatment.

Table 12. Water quality requirements

Water property	requirements
NH ₃	<2 ppm
NH ₄ ⁺	<2 ppm
Cl ₂	<1 ppm
Cl ⁻	< 300 ppm
H ₂ S*	<0.05 ppm
SO ₄ ²⁻	< 70 ppm
CO ₂ ⁺	<5 ppm
Fe ²⁺ /Fe ³⁺	<0.2 ppm
O ₂	< 5 ppm
NO ₃	<100 ppm
Si	< 0.1 ppm
Al	<0.2 ppm
Mn	<0.1 ppm
hardness	71.2<...<151.3mg/l CaCO ₃
resistance	>3000ohm.cm
conductivity	200<...<600μS/cm
pH	7.5<...<9

NOTICE

Unit damage!

Using improper handling or untreated water may cause unit on fouling, wear, corrosion, moss and damage. TRANE company is not responsible for the equipment damage due to improper handling or untreated water or salt water.

Freeze Protection

If the unit will remain operational at subfreezing ambient temperatures, the chilled water system must be protected from freezing.

- water box and shell surface are factory-installed heaters and insulated on the packaged unit evaporator and will help protect it from freezing in ambient temperatures down to -20°F (-29°C).
- control panel does not check the electric heater operation status, which need to be made by qualified technical. Manually inspect electric heating power, and confirm the performance of the electric heater, to avoid catastrophic damage to the water side heat exchanger. User could install optional electric heating failure alarm device, when there is a electric heater disconnecting, it will send out sound and light alarm. detail electrical connection mode as shown in [Figure 81, P 132](#).
- Install heat tape on all water piping, pumps, water box nozzles and other components that may be damaged if exposed to freezing temperatures. Heat tape must be designed for low ambient temperature applications. Heat tape selection should be based on the lowest expected ambient temperature.

NOTICE

Water side heater damage!

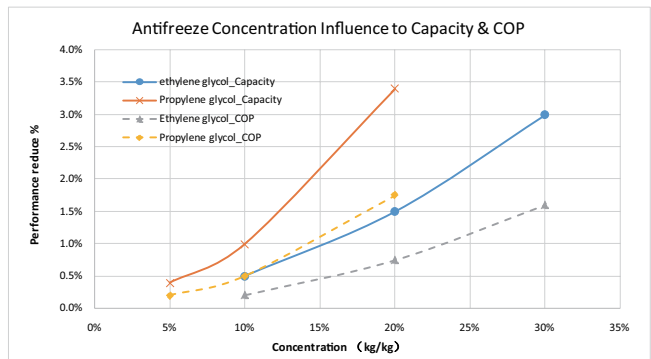
Water side electric heater is separated power supply in field, which needs 220V single phase.

NOTICE

Water side heater damage!

Electric heater could only be engaged after water heat exchanger is filled with water, if heat exchanger is drain away water, must switch off the electric heater, to avoid damage of heater.

- If unit need be operating at low temperature condition for long term, Using antifreeze in water loop is necessary to prevent the evaporator tube frozen and broken. The type and concentration of antifreeze will affect the unit performance. below chart give the performance deviation percentage of two kinds of antifreeze comparing to standard unit performance.



Installation - Electrical

General Recommendations

All wiring must comply with local codes. Typical field wiring diagrams are included at the end of the manual. Minimum current ampacities and other unit electrical data are on the unit nameplate and [Table 13](#) & [Table 14](#) [Table 15](#). See the unit order specifications for actual electrical data. Specific electrical schematic diagram is shipped with the unit.

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout / tagout (LOTO) procedures to ensure the power can't be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

⚠ CAUTION

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors may result in equipment damage.

NOTICE

Any change of the protection set points might result the loss of related guarantee rights without the authorization or approval from Trane Company.

Important!

Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring. To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30 volts.

Table 13. Electrical data –High Efficiency at all ambient operation

Unit Size	Rated Voltage	Power Conns	Unit Power In			Motor Data						
			MCA	Max. Fuse, HACR breaker or	Rec. time delay or	Compressor(Each)				Fan(Each)		
				MOP	RDE	Qty.	RLA Comp1A,Comp1B/ Comp2A,Comp2B	XLRA Comp1B/ Comp2A,Comp2B	YLRA Comp1A,Comp1B/ Comp2A,Comp2B	Qty. Ckt1 / Ckt2	kW	FLA
85	380/50/3	1	285	450	400	1	170	1089	354	6	1.5	3
100	380/50/3	1	336	500	450	1	203	1161	385	6	1.5	3
125	380/50/3	1	372	500	450	2	140/98	796/589	259/180	5/3	1.5	3
145	380/50/3	1	423	550	500	2	140/140	796/796	259/259	4/4	1.5	3
155	380/50/3	1	469	650	550	2	170/140	1089/796	354/259	4/4	1.5	3
170	380/50/3	1	506	700	600	2	170/170	1089/1089	354/354	4/4	1.5	3
190	380/50/3	1	563	800	650	2	203/170	1161/1089	385/354	5/5	1.5	3
205	380/50/3	1	604	850	700	2	203/203	1161/1161	385/385	5/5	1.5	3
225	380/50/3	1	604	850	700	2	203/203	1161/1161	385/385	6/6	1.5	3
255	380/50/3	2	502/275	700/450	600/350	3	170,170/170	1089,1089/1089	354,354/354	9/5	1.5	3
285	380/50/3	2	553/326	800/550	650/500	3	170,203/203	1089,1161/1161	354,385/385	9/5	1.65	3
310	380/50/3	2	604/326	850/550	700/500	3	203,203/203	1161,1161/1161	385,385/385	11/5	1.65	3
340	380/50/3	2	604/326	850/550	700/500	3	203,203/203	1161,1161/1161	385,385/385	11/5	1.65	3
375	380/50/3	2	553/547	800/800	650/650	4	170,203/170,203	1089,1161/1089,1161	354,385/354,385	9/9	1.65	3
400	380/50/3	2	594/588	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161	385,385/385,385	9/9	1.65	3
440	380/50/3	2	594/594	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161	385,385/385,385	10/10	1.65	3

Installation - Electrical

Table 14. Electrical data –Super High Efficiency at all ambient operation

Unit Size	Rated Voltage	Power Conns	Unit Power In			Motor Data						
			MCA	Max. Fuse, HACR breaker or MOP	Rec. time delay or RDE	Compressor(Each)				Fan(Each)		
						Qty.	RLA Comp1A,Comp1B/ p2A,Comp2B	XLRA Comp1B/ Comp2A,- Comp2B	YLRA Comp1A,Comp1B/ Comp2A,Comp2B	Qty. Ckt1 / Ckt2	kW	FLA
85	380/50/3	1	285	450	400	1	170	1089	354	6	1.5	3
100	380/50/3	1	336	500	450	1	203	1161	385	6	1.5	3
125	380/50/3	1	372	500	450	2	140/98	796/589	259/180	6/4	1.5	3
145	380/50/3	1	423	550	500	2	140/140	796/796	259/259	5/5	1.5	3
155	380/50/3	1	469	650	550	2	170/140	1089/796	354/259	5/5	1.5	3
170	380/50/3	1	506	700	600	2	170/170	1089/1089	354/354	5/5	1.5	3
190	380/50/3	1	563	800	650	2	203/170	1161/1089	385/354	6/6	1.5	3
205	380/50/3	1	604	850	700	2	203/203	1161/1161	385/385	6/6	1.5	3
225	380/50/3	1	604	850	700	2	203/203	1161/1161	385/385	7/7	1.5	3
255	380/50/3	2	508/275	700/450	600/350	3	170,170/170	1089,1089/1089	354,354/354	11/5	1.5	3
285	380/50/3	2	559/332	800/550	650/500	3	170,203/203	1089,1161/1161	354,385/385	12/6	1.65	3
310	380/50/3	2	604/332	850/550	700/500	3	203,203/203	1161,1161/1161	385,385/385	12/6	1.65	3
340	380/50/3	2	606/332	850/550	700/500	3	203,203/203	1161,1161/1161	385,385/385	14/6	1.65	3
375	380/50/3	2	553/553	800/800	650/650	4	170,203/170,203	1089,1161/1089,1161	354,385/354,385	10/10	1.65	3
400	380/50/3	2	594/594	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161	385,385/385,385	10/10	1.65	3
410	380/50/3	2	604/604	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161	385,385/385,385	12/12	1.65	3
440	380/50/3	2	604/604	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161	385,385/385,385	12/12	1.65	3

Table 15. Electrical data –PSE at all ambient operation

			Unit Power In			Motor Data						
Unit Size	Rated Voltage	Power Conns	MCA	Max. Fuse, HACR MOP	Rec. time delay or RDE	Compressor(Each)				Fan(Each)		
						Qty.	RLA Comp1A,Comp1B/ p2A,Comp2B	XLRA Comp1B/ Comp2B	Comp1A,- Comp2A,-	YLRA Com-p1A,Comp1B/ Comp2A,Comp2B	Qty. Ckt1 / Ckt2	kW FLA
85	380/50/3	1	285	450	400	1	170	1089		354	6 1.5	3
100	380/50/3	1	336	500	450	1	203	1161		385	6 1.5	3
125	380/50/3	1	372	500	450	2	140/98	796/589		259/180	6/4 1.5	3
145	380/50/3	1	423	550	500	2	140/140	796/796		259/259	5/5 1.5	3
155	380/50/3	1	469	650	550	2	170/140	1089/796		354/259	5/5 1.5	3
170	380/50/3	1	506	700	600	2	170/170	1089/1089		354/354	5/5 1.5	3
190	380/50/3	1	563	800	650	2	203/170	1161/1089		385/354	6/6 1.5	3
205	380/50/3	1	604	850	700	2	203/203	1161/1161		385/385	6/6 1.5	3
225	380/50/3	1	604	850	700	2	203/203	1161/1161		385/385	6/6 1.5	3
255	380/50/3	2	506/279	700/450	600/350	3	170,170/170	1089,1089/1089		354,354/354	9/5 1.5	3
285	380/50/3	2	557/330	800/550	650/500	3	170,203/203	1089,1161/1161		354,385/385	9/5 1.5	3
310	380/50/3	2	604/330	850/550	700/500	3	203,203/203	1161,1161/1161		385,385/385	11/5 1.65	3
340	380/50/3	2	604/330	850/550	700/500	3	203,203/203	1161,1161/1161		385,385/385	11/5 1.65	3
375	380/50/3	2	557/551	800/800	650/650	4	170,203/170,203	1089,1161/1089,1161		354,385/354,385	9/9 1.65	3
400	380/50/3	2	598/592	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161		385,385/385,385	9/9 1.65	3
440	380/50/3	2	598/598	850/850	700/700	4	203,203/203,203	1161,1161/1161,1161		385,385/385,385	10/10 1.65	3

Notes:

1. MCA-Minimum circuit ampacity
2. MOP-Maximum over current protection
3. RDE-Recommend time delay fuse size
4. RLA-Rated load amps
5. XLRA-Locked rotor amps are based on full winding starts
6. YLRA-Locked rotor amps in Wye configuration
7. Voltage range: 380V/50Hz/3 Application range:342~418V/50Hz/3
8. Customer need to provide a isolated power 220V/50Hz/1 to heat the Evaporator. For single circuit chiller,there are three heaters and heaters total power is 1200W;For dual circuit chiller,there are four heaters and heaters total power is 1600W.

Installer-Supplied Components

Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

- Power supply wiring (in conduit) for all field-wired connections.
- All control (interconnecting) wiring (in conduit) for field supplied devices.
- Fused-disconnect switches or circuit breakers.

Power Supply Wiring

WARNING

Ground Wire!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with local codes. Failure to follow this instruction could result in death or serious injuries.

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with local codes.

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout / tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

All wiring must comply with local codes. The installing (or electrical) contractor must provide and install the system interconnecting wiring, as well as the power supply wiring. It must be properly sized and equipped with the appropriate fused disconnect switches.

The type and installation location(s) of the fused disconnects must comply with all applicable codes.

CAUTION

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors may result in equipment damage.

Entrance for income power wiring is located on the left side of the control panel. The wiring is passed through this entrance and connected to the terminal blocks, optional unit mounted disconnects, or circuit breakers. Refer to [Figure 24](#) & [Figure 25](#).

To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as stated on the WARNING label in the starter panel. For additional information on proper phasing, refer to "Unit Voltage Phasing." Proper equipment ground must be provided to each ground connection in the panel (one for each customer supplied conductor per phase).

115 volt field-provided connections (either control or power) are made through knockouts on the right/left side of the panel. Additional grounds may be required for each 115 volt power supply to the unit. Green lugs are provided for 115V customer wiring.

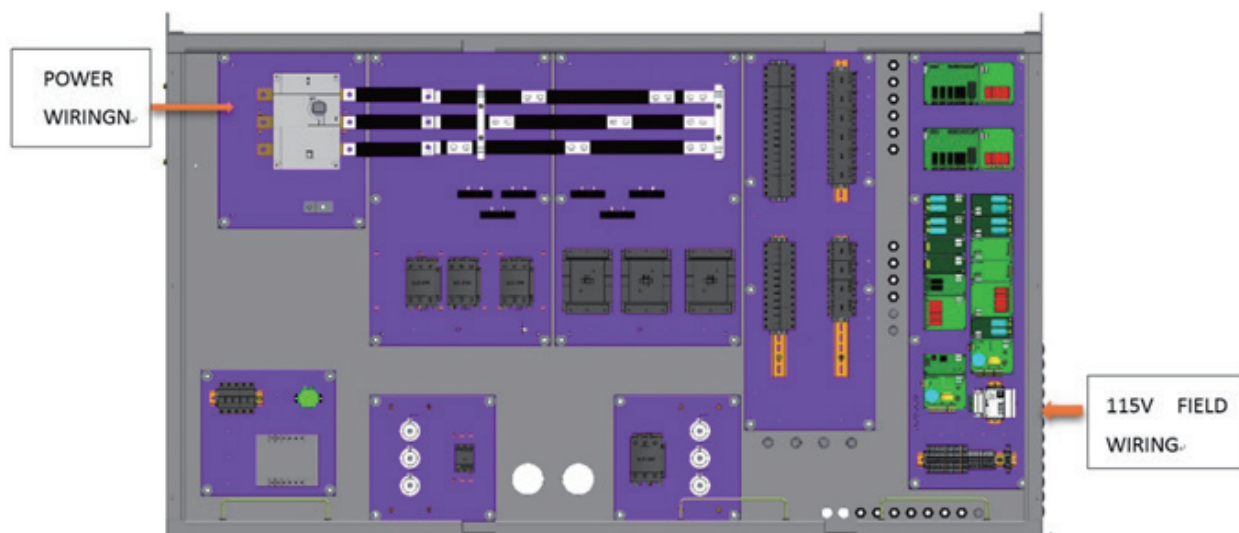


Figure 24. Power Entrance of fixed panel



Figure 25. Power Entrance of AFD panel

Control Power Supply

The unit is equipped with a control power transformer, it is not necessary to provide additional control power voltage to the unit.

All units are factory-connected for appropriate labeled voltages.

Interconnecting Wiring

Heater Power Supply

The evaporator shell is insulated from ambient air and protected from freezing temperatures by two thermostatically-controlled immersion heaters and two strip heaters. Whenever the water temperatures drops to approximately 37°F(2.8°C), the thermostat energized the heaters. The heaters will provide protection from ambient temperatures down to -20°F(-29°C).

It is required to provide an independent power source (220V 50Hz -15amp), with a fused-disconnect.

⚠ CAUTION

Heater Tape!

Control panel main controller UC800 does not check for loss of power to the heat tape nor does it verify thermostat operation. A qualified technician must verify power to the heat tape and confirm operation of the heat tape thermostat to avoid catastrophic damage to the evaporator.

Chilled Water Flow (Pump) Interlock

The Model RTAG Series chiller requires a field-supplied control voltage contact input through a flow proving switch 5B5 and an auxiliary contact 5K9 AUX. Connect the proving switch and auxiliary contact to 1K14 J2-1 and 1X5-27. Refer to the field wiring for details.

The auxiliary contact can be BAS signal, starter contactor auxiliary or any signal which indicates the pump is running. A flow switch is still required and cannot be omitted.

Chilled Water Pump Control

An evaporator water pump output relay closes when the chiller is given a signal to go into the Auto mode of operation from any source. The contact is opened to turn off the pump in the event of most machine level diagnostics to prevent the build up of pump heat.

The relay output from 1K16 is required to operate the Evaporator Water Pump (EWP) contactor. Contacts should be compatible with 115/240 VAC control circuit. The EWP relay operates in different modes depending on UC800 or Tracer commands, if available. Normally, the EWP relay follows the AUTO mode of the chiller. Whenever the chiller has no diagnostics and is in the

AUTO mode, regardless of where the auto command is coming from, the normally open relay is energized. When the chiller exits the AUTO mode, the relay is timed open for an adjustable (using Tracer TU) 0 to 30 minutes. The non-AUTO modes in which the pump is stopped, include Reset (88), Stop (00), External Stop (100), Remote Display Stop (600), Stopped by Tracer (300), Low Ambient Run Inhibit (200).

Regardless of whether the chiller is allowed to control the pump on a full-time basis, if UC800 calls for a pump to start and water does not flow, the evaporator may be damaged catastrophically. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Table 16. Pump Relay Operation

Chiller Mode	Relay Operation
Auto	Instant close
Tracer Override	Close
Stop	Timed Open
Diagnostics	Instant Open

When going from Stop to Auto, the EWP relay is energized immediately. If evaporator water flow is not established in 4 minutes and 15 sec., the UC800 de-energizes the EWP relay and generates a non-latching diagnostic. If flow returns (e.g. someone else is controlling the pump), the diagnostic is cleared, the EWP is re-energized, and normal control resumed.

If evaporator water flow is lost once it had been established, the EWP relay remains energized and a non-latching diagnostic is generated. If flow returns, the diagnostic is cleared and the chiller returns to normal operation.

In general, when there is either a non-latching or latching diagnostic, the EWP relay is turned off as though there was a zero time delay. Exceptions (see above table) whereby the relay continues to be energized occur with:

A Low Chilled Water Temp. diagnostic (non-latching) (unless also accompanied by an evaporator Leaving Water Temperature Sensor Diagnostic) or

A starter contactor interrupts failure diagnostic, in which a compressor continues to draw current even after commanded to have shutdown or

A Loss of Evaporator Water Flow diagnostic (non-latching) and the unit is in the AUTO mode, after initially having proven evaporator water flow.

Alarm and Status Relay Outputs (Programmable Relays)

A programmable relay concept provides for enunciation of certain events or states of the chiller, selected from a list of likely needs, while only using four physical output relays, as shown in the field wiring diagram. The four relays are provided (generally with a Quad Relay Output LLID) as part of the Alarm Relay Output Option. The relay's contacts are isolated Form C (SPDT), suitable for use with 120 VAC circuits drawing up to 2.8 amps induc-

tive, 7.2 amps resistive, or 1/3 HP and for 240 VAC circuits drawing up to 0.5 amp resistive.

The list of events/states that can be assigned to the programmable relays can be found in [Table 17](#). The relay will be energized when the event/state occurs.

Table 17. Alarm and Status Relay Output Configuration Table

	Description
Alarm - Latching	This output is true whenever there is any active diagnostic that requires a manual reset to clear, that affects the Chiller, or the Circuit. This classification does not include informational diagnostics.
Alarm - Auto Reset	This output is true whenever there is any active diagnostic that could automatically clear, that affects the Chiller, or the Circuit. This classification does not include informational diagnostics.
Alarm	This output is true whenever there is any diagnostic affecting any component, whether latching or automatically clearing. This classification does not include informational diagnostics
Alarm Ckt 1	This output is true whenever there is any diagnostic effecting Refrigerant Circuit 1, whether latching or automatically clearing, including diagnostics affecting the entire chiller. This classification does not include informational diagnostics.
Chiller Limit Mode (with a 20 minute filter)	This output is true whenever the chiller has been running in one of the Unloading types of limit modes (Condenser, Evaporator, Current Limit or Phase Imbalance Limit) continuously for the last 20 minutes.
Circuit 1 Running	This output is true whenever compressor is running (or commanded to be running) on Refrigerant Circuit 1, and false when no compressor is commanded to be running on that circuit.
Chiller Running	This output is true whenever compressor is running (or commanded to be running) on the chiller and false when no compressor is commanded to be running on the chiller.
Maximum Capacity	This output is true whenever the chiller has reached maximum capacity or had reached its maximum capacity and since that time has not fallen below 70% average current relative to the rated ARI current for the chiller. The output is false when the chiller falls below 70% average current and, since that time, had not reestablished maximum capacity.

Relay Assignments Using Tracer TU

UC800 Service Tool (Tracer TU) is used to install the Alarm and Status Relay Option package and assign any of the above list of events or status to each of the four relays provided with the option. The relays to be programmed are referred to by the relay's terminal numbers on the LLID board 1K17.

The default assignments for the four available relays of the RTAG Alarm and Status Package Option are:

Table 18. Default Assignments

Relay	
Relay 1 Terminals J2 -12,11,10:	Alarm
Relay 2 Terminals J2 - 9,8,7:	Chiller Running
Relay 3 Terminals J2-6,5,4:	Maximum Capacity
Relay 4 Terminals J2-3,2,1:	Chiller Limit

If any of the Alarm/Status relays are used, provide electrical power, 115 VAC with fused disconnect to the panel and wire through the appropriate relays (terminals on 1K17). Provide wiring (switched hot, neutral, and ground connections) to the remote annunciation devices. Do not use power from the chiller's control panel transformer to power these remote devices. Refer to the field diagrams which are shipped with the unit.

Low Voltage Wiring

WARNING

Ground Wire!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with applicable local codes. Failure to follow this instruction could result in death or serious injuries.

The remote devices described below require low voltage wiring. All wiring to and from these remote input devices to the Control Panel must be made with shielded, twisted pair conductors. Be sure to ground the shielding wire only at the panel.

Note: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

Emergency Stop

UC800 provides auxiliary control for a customer specified/installed latching trip out .When this customer-furnished remote contact 5K24 is provided ,the chiller will run normally when the contact is closed .When the contact opens ,the unit will trip on a manually resettable diagnostic .This condition requires manual reset at the chiller switch on the front of the control panel.

Connect low voltage leads to terminal strip locations on 1K18 J2-3 and 4. Refer to the field diagrams that are shipped with the unit.

Sliver or gold-plated contacts are recommended .These customer-furnished contacts must be compatible with 24VDC. 12 mA resistive load.

External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts 5K23 to the proper terminals on 1K18 J2-1 and 2. The chiller will run normally when the contacts are closed. When either contact opens, the compressor(s), if operating, will go to the RUN: UNLOAD operating mode and

Installation - Electrical

cycle off. Unit operation will be inhibited. Closure of the contacts will permit the unit to return to normal operation.

Field-supplied contacts for all low voltage connections must be compatible with dry circuit 24 VDC for a 12 mA resistive load. Refer to the field diagrams that are shipped with the unit.

External Chilled Water Setpoint (ECWS) Option

The UC800 provides inputs that accept either 4-20 mA or 2-10 VDC signals to set the external chilled water setpoint (ECWS). This is not a reset function. The input defines the set point. This input is primarily used with generic BAS (building automation systems). The chilled water setpoint set via the UC800 or through digital communication with Tracer. The arbitration of the various chilled water setpoint sources is described in the flow charts at the end of the section.

The chilled water setpoint may be changed from a remote location by sending either a 2-10 VDC or 4-20 mA signal to the 1K19, J2-5 and 6. The 2 VDC(4 mA) and 10VDC(20mA) each correspond to a 12 and 18°C (10 and 65°F) external chilled water setpoint.

The following equations apply:

	Voltage Signal	Current Signal
As generated from external source	VDC=0.1455*(ECWS)+0.5454	mA=0.2909(ECWS)+1.0909
As processed by UC800	ECWS=6.875*(VDC)-3.75	ECWS=3.4375(mA)-3.75

If the ECWS input develops an open or short, the LLID will report either a very high or very low value back to the main processor. This will generate an informational diagnostic and the unit will default to using the Front Panel (TD7) Chilled Water Setpoint.

Tracer TU Service Tool is used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA. Tracer TU is also used to install or remove the External Chilled Water Setpoint option as well as a means to enable and disable ECWS.

External Current Limit Setpoint (ECLS) Option

Similar to the above, the UC800 also provides for an optional External Current Limit Setpoint that will accept either a 2-10 VDC (default) or a 4-20 mA signal. The Current Limit Setting can also be set via the Tracer TU or through digital communication with Tracer (Comm 3). The arbitration of the various sources of current limit is described in the flow charts at the end of this section. The External Current Limit Setpoint may be changed from a remote location by hooking up the analog input signal to the 1K19, J2-2 and 3. Refer to the following paragraph on Analog Input Signal Wiring Details. The following equations apply for ECLS:

	Voltage Signal	Current Signal
As generated from external source	VDC+0.133*(%)-6.0	mA=0.266*(%)-12.0
As processed by UC800	%=7.5*(VDC)+45.0	%=3.75*(mA)+45.0

If the ECLS input develops an open or short, the LLID will report either a very high or very low value back to the main processor. This will generate an informational diagnostic and the unit will default to using the Front Panel (TD7) Current Limit Setpoint.

The Tracer TU Service Tool must be used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA current. Tracer TU must also be used to install or remove the External Current Limit Setpoint Option for field installation, or can be used to enable or disable the feature (if installed).

ECLS and ECWS Analog Input Signal Wiring Details:

Both the ECWS and ECLS can be connected and setup as either a 2-10 VDC (factory default), 4-20 mA, or resistance input (also a form of 4-20mA) as indicated below. Depending on the type to be used, the Tracer TU Service Tool must be used to configure the LLID and UC800 for the proper input type that is being used. This is accomplished by a setting change on the Custom Tab of the Configuration View within Tracer TU.

The J2-3 and J2-6 terminal is chassis grounded and terminal J2-1 and J2-4 can be used to source 12 VDC. The ECLS uses terminals J2-2 and J2-3. ECWS uses terminals J2-5 and J2-6. Both inputs are only compatible with high-side current sources.

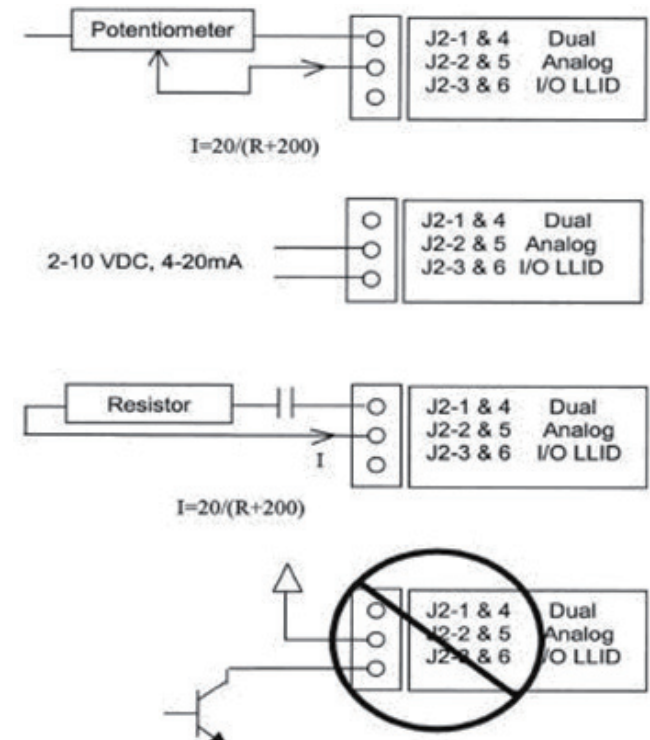


Figure 26. Wiring Examples for ECLS and ECWS

Chilled Water Reset (CWR)

UC800 resets the chilled water temperature setpoint based on return water temperature. Return Reset is standard.

The following shall be selectable:

- One of three Reset Types: None, Return Water Temperature Reset, or Constant Return Water Temperature Reset.
- Reset Ratio Set Points.
- Start Reset Set Points.
- Maximum Reset Set Points.

The equations for each type of reset are as follows:

Return

$$CWS' = CWS + \text{RATIO} (\text{START RESET} - (\text{TWE} - \text{TWL}))$$

and $CWS' \geq CWS$

and $CWS' - CWS \leq \text{Maximum Reset}$

where

CWS' is the new chilled water set point or the "reset CWS"

CWS is the active chilled water set point before any reset has occurred, e.g. normally Front Panel, Tracer, or ECWS

RESET RATIO is a user adjustable gain

START RESET is a user adjustable reference

TWE is evaporator entering water temperature

TWL is evaporator leaving water temperature

MAXIMUM RESET is a user adjustable limit providing the maximum amount of reset.

For all types of reset, $CWS' - CWS \leq \text{Maximum Reset}$.

The values for "RESET RATIO" for each of the reset types are:

Reset Type	Reset Ratio Range	Increment English Units	Increment SI Units	Factory Default Value
Return	10 to 120%	1%	1%	50%

The values for "START RESET" for each of the reset types are:

Reset Type	Reset Ratio Range	Increment English Units	Increment SI Units	Factory Default Value
Return	2.2 to 16.67 C (4 to 30F)	0.1 F	0.1 C	5.56 C (10 F)

The values for "MAXIMUM RESET" for each of the reset types are:

Reset Type	Reset Ratio Range	Increment English Units	Increment SI Units	Factory Default Value
Return	0.0 to 11.11 C (0 to 20 F)	0.1 F	0.1 C	2.78 C (5 F)

In addition to Return, the MP provides a menu item for the operator to select a Constant Return Reset. Constant Return Reset will reset the leaving water temperature set point so as to provide a constant entering water temperature. The Constant Return Reset equation is the same as the Return Reset equation except on selection of Constant Return Reset, the MP will automatically set Ratio, Start Reset, and Maximum Reset to the following.

RATIO = 100%

START RESET = Design Delta Temp.

MAXIMUM RESET = Design Delta Temp.

The equation for Constant Return is then as follows:

$$CWS' = CWS + 100\% (\text{Design Delta Temp.} - (\text{TWE} - \text{TWL}))$$

and $CWS' \geq CWS$

and $CWS' - CWS \leq \text{Maximum Reset}$

When any type of CWR is enabled, the MP will step the Active CWS toward the desired CWS' (based on the above equations and setup parameters) at a rate of 1 degree F every 5 minutes until the Active CWS equals the desired CWS'. This applies when the chiller is running.

When the chiller is not running the CWS is reset immediately (within one minute) for Return Reset and at a rate of 1 degree F every 5 minutes for Outdoor Reset. The chiller will start at the Differential to Start value above a fully reset CWS or CWS' for both Return and Outdoor Reset.

Communications Interface Options

Optional Tracer Communications Interface

This option allows the Tracer UC800 controller to exchange information (e.g. operating setpoints and Auto/Standby commands) with a higher-level control device, such as a Tracer Summit or a multiple-machine controller. A shielded, twisted pair connection establishes the bi-directional communications link between the Tracer UC800 and the building automation system.

Note: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

⚠ WARNING

Ground wiring!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with NEC and applicable local codes. Failure to follow this instruction could result in death or serious injuries.

Field wiring for the communication link must meet the following requirements:

- All wiring must be in accordance with the NEC and local codes.
- Communication link wiring must be shielded, twisted pair wiring (Belden 8760 or equivalent). See the table below for wire size selection:

Table 19. Wire Size

Wire Size	Maximum Length of Communication Wire
14 AWG (2.5 mm ²)	5,000 FT (1525 m)
16 AWG (1.5 mm ²)	2,000 FT (610 m)
18 AWG (1.0 mm ²)	1,000 FT (305 m)

- The communication link cannot pass between buildings.
- All units on the communication link can be connected in a "daisy chain" configuration.

LonTalk Communications Interface for Chillers (LCI-C)

UC800 provides an optional LonTalk Communication Interface (LCI-C) between the chiller and a Building Automation System (BAS). An LCI-C LLID shall be used to provide "gateway" functionality between a LonTalk compatible device and the Chiller. The inputs/outputs include both mandatory and optional network variables as established by the LonMark Functional Chiller Profile 8040.

Installation Recommendations

- 22 AWG Level 4 unshielded communication wire recommended for most LCI-C Installations
- LCI-C link limits: 4500 feet, 60 devices
- Termination resistors are required
- 105 ohms at each end for Level 4 wire
- 82 ohms at each end for Trane "purple" wire
- LCI-C topology should be daisy chain
- Zone sensor communication stubs limited to 8 per link, 50 feet each (maximum)
- One repeater can be used for an additional 4500 feet, 60 devices, 8 communication stubs

Table 20. LonTalk Points List

LonTalk Communications Interface			
Inputs	Variable type		SNVT_Type
Chiller Enable/Disable	binary	start(1)/stop(0)	SNVT_switch
Chilled Water Setpoint	analog	temperature	SNVT_temp_p
Current Limit Setpoint	analog	% current	SNVT_lev_percent
Chiller Mode			SNVT_hvac_mode
Outputs	Variable type		SNVT_Type
Chiller On/Off	binary	on(1)/off(0)	SNVT_switch
Active Chilled Water Setpoint	analog	temperature	SNVT_temp_p
Percent RLA	analog	% current	SNVT_lev_percent
Active Current Limit Setpoint	analog	% current	SNVT_lev_percent
Leaving Chilled Water Temperature	analog	temperature	SNVT_temp_p
Entering Chilled Water Temperature	analog	temperature	SNVT_temp_p
Entering Condenser Water Temperature	analog	temperature	SNVT_temp_p
Leaving Condenser Water Temperature	analog	temperature	SNVT_temp_p
Alarm Description	Note 1		SNVT_str_asc
Chiller Status	Note 2		SNVT_chlr_status

Note 1. Alarm Description denotes alarm severity and target.
Severity: no alarm, warning, normal shutdown, immediate shutdown
Target: Chiller, Platform, Ice Building (Chiller is refrigerant circuit and Platform is control circuit)

Note 2. Chiller Status describes Chiller Run Mode and Chiller Operating Mode.
Run Modes: Off, Starting, Running, Shutting Down
Operating Modes: Cool, Ice Build
States: Alarm, Run Enabled, Local Control, Limited, CHW Flow, Cond Flow

BACnet Communications Interface for Chillers (BCI-C)

The RTAG controller UC800 has an BACnet Communication Interface for Chillers (BCI-C). It is a non-programmable communications module that allows the RTAG unit to communicate on a BACnet communications network.

BACnet Data Points and Configuration Property Definitions

The BCI-C device allows certain models of Trane chillers with UC800 controls to communicate with

BACnet systems and devices using BACnet MS/TP. This section includes information about:

- BACnet protocol implementation conformance statement (PICS)
- Object types: descriptions and configuration (refer to Table 3.8)
- BACnet protocol: data link layers, device address binding, networking options, and character sets
- Object data points and configurations

BACnet Protocol Implementation Conformance Statement (PICS)

Standardized Device Profile (Annex L)

Profile Description	Supported Profile
BACnet Advanced Application Controller (B-AAC)	
BACnet Application Specific Controller (B-ASC)	√
BACnet Building Controller (B-BC)	
BACnet Operator Workstation (B-OWS)	
BACnet Smart Actuator (B-SA)	
BACnet Smart Sensor (B-SS)	



Installation - Electrical

Interoperability Building Blocks (Annex K)

Data Sharing Description	Supported BIBB
Data Sharing-COV-B (DS-COV-B)	
Data Sharing-ReadProperty-A (DS-RP-A)	✓
Data Sharing-ReadProperty-B (DS-RP-B)	✓
Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)	✓
Data Sharing-WriteProperty-A (DS-WP-A)	✓
Data Sharing-WriteProperty-B (DS-WP-B)	✓
Data Sharing-WritePropertyMultiple-B (DS-WPM-B)	✓
Alarm and Event Management Description	Supported BIBB
Alarm and Event-ACKI-B (AE-ACK-B)	✓
Alarm and Event-Alarm Summary-B (AE-ASUM-B)	✓
Alarm and Event-Enrollment Summary-B (AE-ES-UM-B)	✓
Alarm and Event-Information-B (AE-INFO-B)	✓
Alarm and Event-Notification Internal-B (AE-N-I-B)	✓
Trending Description	Supported BIBB
Trending-Automated Trend Retrieval-B (T-ATR-B)	✓
Trending-viewing and Modifying Trends Internal-B (T-VMT-I-B)	✓
Device Management Description	Supported BIBB
Device Management-Backup and Restore-B (DM-BR-B)	✓
Device Management-Device Communication Control-B (DM-DCC-B)	✓
Device Management-Dynamic Device Binding-A (DM-DDB-A)	✓
Device Management-Dynamic Device Binding-B (DM-DDB-B)	✓
Device Management-Dynamic Object Binding-B (DM-DOB-B)	✓
Device Management-List Manipulation-B (DM-LM-B)	✓
Device Management-Object Creation and Deletion-B (DM-OCD-B)	✓
Device Management-Private Transfer-A (DM-PT-A)	✓
Device Management-Private Transfer-B (DM-PT-B)	✓
Device Management-Reinitialize Device-B (DM-RD-B)	✓
Device Management-TimeSynchronization-B (DM-TS-B)	✓

Segmentation Capability

Segmentation Description	Supported Segment
Segmented Requests/ Window Size: 1	✓
Segmented Responses/ Window Size: 1	✓

Object Types

Table 21. Descriptions and configurations

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Analog Input	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Units	- Object_Name - Description - Out_Of_Service - Present_Value - Reliability - Min_Pres_Value - ax_Pres_Value - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Notify_Type	- Description - Reliability - Min_Pres_Value - Max_Pres_Value - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Analog Output	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Units - Priority_Array - Relinquish_Default	- Object_Name - Description - Out_Of_Service - Present_Value - Reliability - Min_Pres_Value - ax_Pres_Value - Relinquish_Default - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Notify_Type	- Description - Reliability - Min_Pres-Value - Max_Pres_Value - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Analog Value	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Units	- Object_Name - Description - Out_Of_Service - Present_Value - Reliability - Relinquish_Default - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Notify_Type	- Description - Reliability - Priority_Array - Relinquish_Default - COV_Increment - Time_Delay - Notification_Class - High_Limit - Low_Limit - Deadband - Limit_Enable - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Binary Input	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Polarity	- Object_Name - Description - Out_Of_Service - Inactive_Text - Active_Text - Present_Value - Reliability - Change_Of_State_Count - Elapsed_Active_Time - Time_Delay - Notification_Class - Alarm_Value - Event_Enable - Acked_Transitions - Notify_Type	- Description - Inactive_Text - Active_Text - Change_Of_State_Time - Change_Of_State_Count - Time_Of_State_Count_Reset - Elapsed_Active_Time - Time_Of_Active_Time_Reset - Time_Delay - Notification_Class - Alarm_Value - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps - Reliability	Yes	Yes, only user created objects

Installation - Electrical

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Binary Output	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Polarity - Priority_Array - Relinquish_Default	- Object_Name - Description - Out_Of_Service - Inactive_Text - Active_Text - Present_Value - Reliability - Change_Of_State_Count - Elapsed_Active_Time - Minimum_On_Time - Minimum_Off_Time - Relinquish_Default - Time_Delay - Notification_Class - Event_Enable - Acked_Transitions - Notify_Type	- Description - Inactive_Text - Active_Text - Change_Of_State_Time - Change_Of_State_Count - Time_Of_State_Count_Reset - Elapsed_Active_Time - Time_Of_Active_Time_Reset - Minimum_On_Time - Minimum_Off_Time - Time_Delay - Notification_Class - Feedback_Value - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps - Reliability	Yes	Yes, only user created objects
Binary Value	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Polarity	- Object_Name - Description - Out_Of_Service - Inactive_Text - Active_Text - Present_Value - Reliability - Change_Of_State_Count - Elapsed_Active_Time - Minimum_On_Time - Minimum_Off_Time - Relinquish_Default - Time_Delay - Notification_Class - Alarm_Value - Event_Enable - Acked_Transitions - Notify_Type	- Description - Inactive_Text - Active_Text - Change_Of_State_Time - Change_Of_State_Count - Time_Of_State_Count_Reset - Elapsed_Active_Time - Time_Of_Active_Time_Reset - Priority_Array - Relinquish_Default - Minimum_On_Time - Minimum_Off_Time - Time_Delay - Notification_Class - Alarm_Value - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps - Reliability	Yes	Yes, only user created objects
Device	- Object_Identifier - Object_Name - Object_Type - System_Status - Vendor_Name - Vendor_Identifier - Model_Name - Firmware_Revision - Application_Software_Version - Protocol_Version - Protocol_Revision - Protocol_Services_Supported - Protocol_Object_Types_Supported - Object_List - Max_APDU_Length_Accepted - Segmentation_Supported - APDU_Timeout - Number_Of_APDU_Retries - Device_Address_Binding - Database_Revision	- Object_Name - Location - Description - APDU_Segment_Timeout - APDU_Timeout - Number_Of_APDU_Retries - Backup_Failure_Timeout	- Location - Description - Max_Segments_Accepted - APDU_Segment_Timeout - Max_Master - Max_Info_Frames - Local_Time - Local_Date - Configuration_Files - Last_Restore_Time - Backup_Failure_Timeout - Active_COV_Subscriptions	None	None

Installation - Electrical

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Event Enrollment Object	- Object_Identifier - Object_Name - Object_Type - Event_Type - Notify_Type - Event_Parameters - Object_Property_Reference - Event_State - Event_Enable - Acked_Transitions - Notification_Class - Event_Time_Stamps	- Object_Name - Notify_Type - Event_Parameters - Object_Property_Reference - Event_Enable - Notification_Class	None	Yes	Yes, only user created objects
Multistate Input	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Number_Of_States	- Object_Name - Description - State_Text - Out_Of_Service - Present_Value - Reliability - Time_Delay - Notification_Class - Alarm_Values - Fault_Values - Event_Enable - Notify_Type	- State_Text - Reliability - Time_Delay - Notification_Class - Alarm_Values - Fault_Values - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Multistate Output	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Number_Of_States - Priority_Array - Relinquish_Default	- Object_Name - Description - State_Text - Out_Of_Service - Present_Value - Reliability - Time_Delay - Notification_Class - Event_Enable - Notify_Type	- State_Text - Reliability - Relinquish_Default - Time_Delay - Notification_Class - Feedback_Values - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Multistate Value	- Object_Identifier - Object_Name - Object_Type - Present_Value - Status_Flags - Event_State - Out_Of_Service - Number_Of_States	- Object_Name - Description - State_Text - Out_Of_Service - Present_Value - Reliability - Priority_Array - Relinquish_Default - Time_Delay - Notification_Class - Alarm_Values - Fault_Values - Event_Enable - Notify_Type	- State_Text - Reliability - Relinquish_Default - Time_Delay - Notification_Class - Alarm_Values - Fault_Values - Event_Enable - Acked_Transitions - Notify_Type - Event_Time_Stamps	Yes	Yes, only user created objects
Notification Class	- Object_Identifier - Object_Name - Object_Type - Notification_Class - Priority - Ack_Required - Recipient_List	- Object_Name - Priority - Ack_Required - Recipient_List	None	Yes	Yes, only user created objects
Trend	- Object_Identifier - Object_Name - Object_Type - Log_Enable - Stop_When_Full - Buffer_Size - Log_Buffer - Record_Count - Total_Record_Count - Event_State	- Object_Name - Log_Enable - Start_Time - Stop_Time - Log_DeviceObjectProperty - Log_Interval - Stop_When_Full - Buffer_Size - Log_Buffer - Record_Count - Notification_Threshold - Notification_Class - Event_Enable - Notify_Type	- Start_Time - Stop_Time - Log_DeviceObjectProperty - Log_Interval - Stop_When_Full - Buffer_Size - Notification_Threshold - Records_Since_Notification - Last_Notify_Record - Notification_Class - Event_Enable - Acked_Transitions - Event_Time_Stamps	Yes	Yes, only user created objects

(a) Properties written for Present_Value and Reliability only if Out_of_Service is TRUE.

Installation - Electrical

BACnet Protocol

Data Link Layer Options

Data Link Layer Description Option	Supported Option
ANSI/ATA 878.1, 2.5 Mb ARCNET (Clause 8)	
ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), Baud Rate(s)	
BACnet IP, (Annex J)	
BACnet IP, (Annex J), Foreign Device	
ISO 8802-3, Ethernet (Clause 7)(10Base2, 10Base5, 10BaseT, Fiber)	
LonTalk, (Clause 11), Medium	
MS/TP Master (Clause 9), Baud Rate(s): 9600, 19200, 38400, 76800, and 115200 @1.5% Nominal Baud Rate	√
MS/TP Slave (Clause 9), Baud Rate(s)	
Other	
Point-to-Point, EIA 232 (Clause 10), Baud Rate(s): 9600, 19200, 38400	
Point-to-Point, Modem (Clause 10), Baud Rate(s): 9600, 19200, 38400	

Device Address Binding

Device Address Binding	Supported?
Static Device Binding Supported	√

Networking Options

Networking Descriptions	Supported Option
Annex H, BACnet Tunneling	√
BACnet/IP Broadcast Management Device (BBMD)	√
Does the BBMD Support Registrations by Foreign Devices?	√
Router	√

Character Sets

Indicates support for multiple characters sets, but does not imply that all character sets are supported simultaneously. Maximum supported string length is 64 bytes (any character set).

Character Set Descriptions	Supported
ANSI X3.4	√
IBM/Microsoft DBCS	
ISO 10646 (UCS-4)	
ISO 10646 (UCS2)	√
ISO 8859-1	√
JIS C 6226	

Object Data Points and Diagnostic Data Points with Corresponding Chiller Models

For quick reference, the following tables are listed two different ways. [Table 22.](#) through [Table 27.](#) are listed by input/output type and sorted by object identifier. These tables provide the user with the units type for each object type. Not all points are available to the user. The available data points are defined during self-configuration and are dependent on the type of equipment.

Note: The last four columns in each table identify which chiller model corresponds with each object name.

Table 22. Analog Output

Object Identifier	Object Name	Description	Units	Valid Range	Default
Analog Output 1	Chilled Water Setpoint	Desired leaving water temperature if chiller is in cooling mode.	Degrees-Fahrenheit (64)	0°F to 75°F	44°F
Analog Output 2	Current Limit Setpoint	Sets the maximum capacity that the chiller can use	Percent (98)	0% to 120%	100%

Table 23. Analog Input

Object Identifier	Object Name	Description	Units
Analog Input 1	Active Cool Setpoint Temperature	Active chiller water setpoint	Degrees-Fahrenheit (64)
Analog Input 2	Active Current Limit Setpoint	Active capacity current limit setpoint.	Percent (98)
Analog Input 5	Actual Running Capacity	Level of capacity that the chiller is currently running at	Percent (98)
Analog Input 7	Suction Pressure- Ckt 1	Circuit 1 suction pressure.	PSI
Analog Input 12	Evaporator Saturated Refrigerant Temperature- Ckt 1	Circuit 1 evaporator refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input 16	Condenser Refrigerant Pressure- Ckt 1	Circuit 1 condenser refrigerant pressure	PSI
Analog Input 20	Condenser Saturated Refrigerant Temperature- Ckt 1	Circuit 1 . Condenser refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input 25	Local Atmosphere pressure	Local Atmosphere pressure	PSI
Analog Input 26	Starter-compressor-1A	Number of starts for compressor-1A	None
Analog Input 27	Starter-compressor-1B	Number of starts for compressor-1B	None
Analog Input 34	Run Time -Compressor 1A	Total run time of compressor 1A	Hours
Analog Input 35	Run Time -Compressor 1B	Total run time of compressor 1B	Hours
Analog Input 44	Evaporator Entering Water Temp	Temperature of the water entering the evaporator	Degrees-Fahrenheit(64)
Analog Input 45	Evaporator Leaving Water Temp	Temperature of the water leaving the evaporator	Degrees-Fahrenheit(64)
Analog Input 46	Condenser Entering Water Temp	Temperature of the water entering the condenser	Degrees-Fahrenheit(64)
Analog Input 47	Condenser Leaving Water Temp	Temperature of the water leaving the condenser	Degrees-Fahrenheit(64)
Analog Input 48	High Side Oil Pressure-Compressor 1A	Pressure of the oil at the high side of the compressor 1A	PSI
Analog Input 49	High Side Oil Pressure-Compressor 1B	Pressure of the oil at the high side of the compressor 1B	PSI
Analog Input 56	Discharge Temp-Compressor 1A	Discharge temperature of compressor 1A	Degrees-Fahrenheit(64)
Analog Input 58	Condenser Control Output	Percentage of condenser water flow being requested by the chiller	Percent(98)
Analog Input 59	Phase AB Voltage-Compressor 1A	Phase AB voltage compressor 1A	volts
Analog Input 71	Line 1 Current (in Amps)-Compressor 1A	Line 1 Current (in Amps)-Compressor 1A	Amps
Analog Input 72	Line 2 Current (in Amps)-Compressor 1A	Line 2 Current (in Amps)-Compressor 1A	Amps
Analog Input 73	Line 3 Current (in Amps)-Compressor 1A	Line 3 Current (in Amps)-Compressor 1A	Amps
Analog Input 74	Line 1 Current (in Amps)-Compressor 1B	Line 1 Current (in Amps)-Compressor 1B	Amps
Analog Input 75	Line 2 Current (in Amps)-Compressor 1B	Line 2 Current (in Amps)-Compressor 1B	Amps
Analog Input 76	Line 3 Current (in Amps)-Compressor 1B	Line 3 Current (in Amps)-Compressor 1B	Amps
Analog Input 83	Line 1 Current (%RLA)-Compressor 1A	Line 1 Current (%RLA)-Compressor 1A	Percent (98) Amps
Analog Input 84	Line 2 Current (%RLA)-Compressor 1A	Line 1 Current (%RLA)-Compressor 1A	Percent (98) Amps
Analog Input 85	Line 3 Current (%RLA)-Compressor 1A	Line 2 Current (%RLA)-Compressor 1A	Percent (98) Amps
Analog Input 86	Line 1 Current (%RLA)-Compressor 1B	Line 1 Current (%RLA)-Compressor 1B	Percent (98) Amps
Analog Input 87	Line 2 Current (%RLA)-Compressor 1B	Line 1 Current (%RLA)-Compressor 1B	Percent (98) Amps
Analog Input 88	Line 3 Current (%RLA)-Compressor 1B	Line 2 Current (%RLA)-Compressor 1B	Percent (98) Amps
Analog Input 95	Number of Circuits	Number of Circuits	None
Analog Input 96	Number of Compressors Ckt 1	Number of Compressors, Ckt 1	None

Table 24. Multistate Output

Object Identifier	Object Name	Description	Relinquish Default	Object States
Multi-StateOutput 1	Chiller Mode Command	Mode of operation of the chiller	1=cooling	1=HVAC_Heat 4=Not Used

Installation - Electrical

Table 25. Multistate Input

BCI-C Object Identifier	Object Name	Description	Object States
Multi-State Input 1	Running Mode	Indicates the primary running mode of the chiller	1=Chiller Off 2=Chiller in Start Mode 3=Chiller in Run Mode 4=Chiller in Pre-shutdown Mode 5=Chiller in Service Mode
Multi-State Input 2	Operation Mode	Indicates the primary operation mode of the chiller	1=HVAC_Heat 2=HVAC_Cool 3=HVAC_Ice 4=Not Used
Multi-State Input 3	MP Communication Status	Communication status	1=R-22 2= Communication 3= Communication Lost 4= Failed to Established 5= Waiting to Establish
Multi-State Input 4	Refrigerant Type	Refrigerant Type	1=R-11 2=R-12 3=R-22 4=R-123 5=R-134a 6=R-407C 7=R-410A
Multi-State Input 5	Model Information	Indicates the model type of the chiller	1=RTA 2=CVH 3=CVG 4=CVR 5=CDH 6=RTH 7=CGW 8=CGA 9=CCA 10=RTW 11=RTX 12=RTU 13=CCU 14=CXA 15=CGC 16=RAU
Multi-State Input 6	Cooling Type	Cooling type of the condenser	1=Water Cooled 2=Air Cooled
Multi-State Input 7	Manufacturing Location	Location where chiller was manufacture	1=Field Applied 2=La Crosse 3=Pueblo 4=Charmes 5=Rushville 6=Macon 7=Waco 8=Lexington 9=Forsyth 10=Clarksville 11=Ft.Smith 12=Penang 13=Colchester 14=Curitiba 15=Taicang 16=Taiwan 17=Epinal 18=Golbey

Table 26. Binary Output

Object Identifier	Object Name	Description	Relinquish Default	Object States
Binary Output 1	Chiller Auto Stop Command	Allows the chiller to run if conditions for running are met.	True	Inactive = Stop Active = Auto
Binary Output 2	Remote Diagnostic Reset Command	Resets remotely diagnostics that can be reset.	False	Inactive = No Reset Request Active = Reset Request
Binary Output 4	Noise Reduction Request	Request chiller enter mode to reduce noise.	False	Inactive = Normal Active = Reduced Noise

Table 27. Binary Input

Object Identifier	Object Name	Description	Object States
Binary Input 1	Run Enabled	Indicates if the chiller is available to run or is currently running.	Inactive = Stop Active = Auto
Binary Input 2	Local Setpoint Control	Indicates if the chiller is being controlled by local setpoints instead of BAS setpoints.	Inactive = Remote Control Active = Local Control
Binary Input 3	Capacity Limited	Indicates if conditions may exist that prevent the chiller from reaching setpoint.	Inactive = Not Limited Active = Limited
Binary Input 4	Chiller Running State	Indicates if the chiller is running or stopped	Inactive = Off Active = On
Binary Input 5	Condenser Water Flow Status	Condenser water flow status	Inactive = Normal Active = Reduced Noise
Binary Input 6	Chiller Auto Stop Command	Allows the chiller to run if conditions for running are met.	Inactive = No Flow Active = Flow
Binary Input 7	Head Relief Request	Indicates if the chiller is asking an outside system to provide more heat rejection from the condenser water loop	Inactive = Off Active = On
Binary Input 9	Compressor 1A Running	Indicates if compressor 1A is running	Inactive = Off Active = Running
Binary Input 10	Compressor 1B Running	Indicates if compressor 1B is running	Inactive = Off Active = Running
Binary Input 17	Evaporator Water Pump Request	Indicates a request from the chiller to turn on the evaporator water pump	Inactive = Off Active = On
Binary Input 19	Condenser Water Pump Request	Indicates a request from the chiller to turn on the condenser water pump	Inactive = Off Active = On
Binary Input 23	Alarm Present	Indicates if an alarm is active	Inactive = No Alarm Active = Alarm
Binary Input 24	Shutdown Alarm Present	Indicates if a shutdown alarm is active	Inactive = No Alarm Active = None
Binary Input 25	Last Diagnostic	Indicates last diagnostic for the chiller	Inactive = Off Active = On

Controls

Overview

RTAG chillers utilize the following control/ interface components:

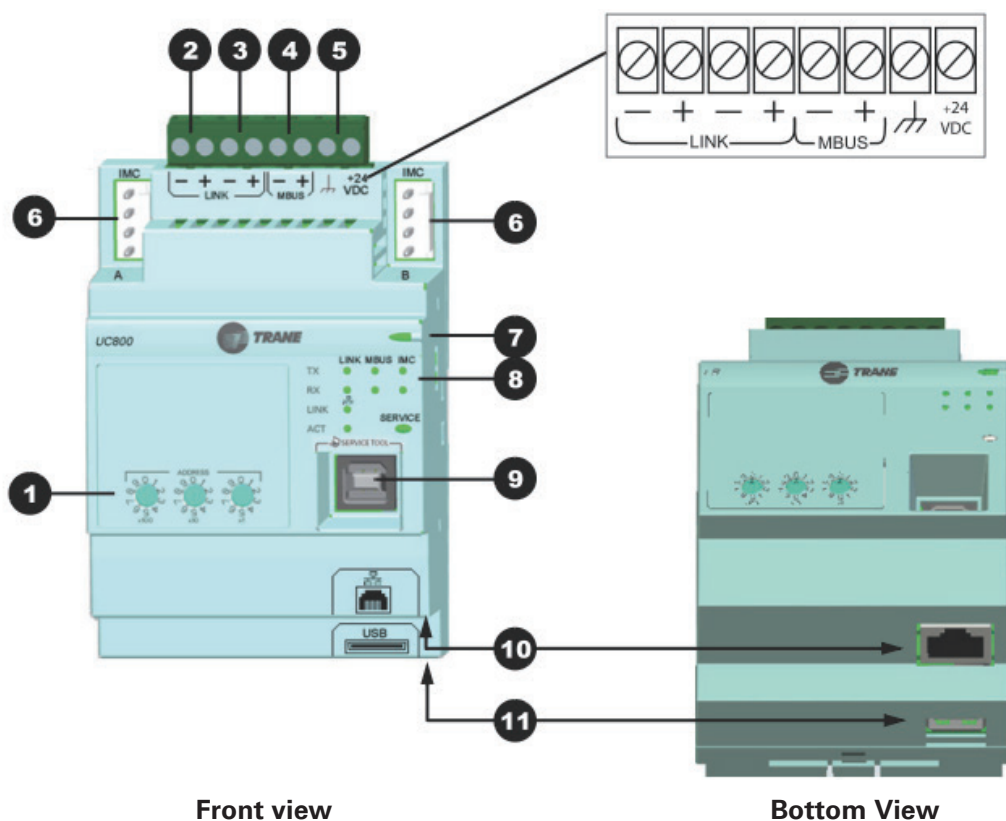
- Tracer™ UC800 Controller
- Tracer AdaptiView™ TD7 Operator Interface

UC800 Specifications

This section covers information pertaining to the UC800 controller hardware.

Wiring and Port Descriptions

Figure 27 illustrates the UC800 controller ports, LEDs, rotary switches, and wiring terminals. The numbered list following Figure 27 corresponds to the numbered call-outs in the illustration.



1. Rotary Switches for setting BACnet® MAC address or MODBUS ID.
2. LINK for BACnet MS/TP, or MODBUS Slave (two terminals, $\pm$). Field wired if used.
3. LINK for BACnet MS/TP, or MODBUS Slave (two terminals, $\pm$). Field wired if used.
4. Machine bus for existing machine LLIDs (IPC3 Tracer bus 19.200 baud). IPC3 Bus: used for Comm4 using TCI or LonTalk® using LCI-C.
5. Power (210 mA at 24 Vdc) and ground terminations (same bus as item 4). Factory wired.
6. IMC for MODBUS Master (two terminals, $\pm$). Field wired if used.
7. Marquee LED power and UC800 Status indicator (Table 28, P 63.).
8. Status LEDs for the BAS link, MBus link, and IMC link.
9. USB device type B connection for the service tool (Tracer TU).
10. The Ethernet connection can only be used with the Tracer AdaptiView display.
11. USB Host (not used).

Figure 27. Wiring locations and connection ports

Communication Interfaces

There are four connections on the UC800 that support the communication interfaces listed. See Figure 17 for the locations of each of these ports.

- BACnet® MS/TP
- MODBUS™ Slave
- LonTalk™ using LCI-C (from the IPC3 bus)
- Comm 4 using TCI (from the IPC3 bus)

Rotary Switches

There are three rotary switches on the front of the UC800 controller. Use these switches to define a three-digit address when the UC800 is installed in a BACnet or MODBUS system (e.g., 107, 127, etc.).

Note: Valid addresses are 001 to 127 for BACnet and 001 to 247 for MODBUS.

LED Description and Operation

There are 10 LEDs on the front of the UC800. Figure 28 shows the locations of each LED and Table 28 describes their behavior in specific instances.

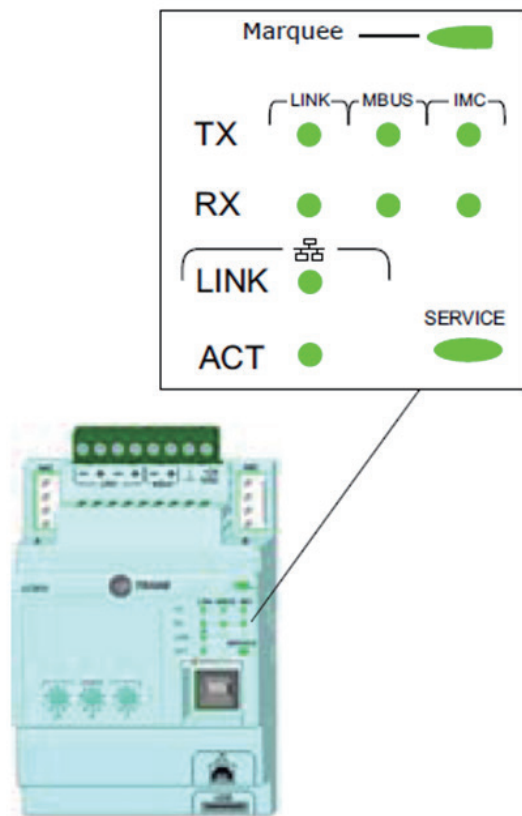


Figure 28. LED locations

Table 28. LED behavior

LED	UC800 Status
Marquee LED	Powered. If the Marquee LED is green solid, the UC800 is powered and no problems exist. Low power or malfunction. If the Marquee LED is red solid, the UC800 is powered, but there are problems present. Alarm. The Marquee LED blinks Red when an alarm exists.
LINK, MBUS, IMC	The TX LED blinks green at the data transfer rate when the UC800 transfers data to other devices on the link. The Rx LED blinks yellow at the data transfer rate when the UC800 receives data from other devices on the link.
Ethernet Link	The LINK LED is solid green if the Ethernet link is connected and communicating. The ACT LED blinks yellow at the data transfer rate when data flow is active on the link.
Service	The Service LED is solid green when pressed. For qualified service technicians only. Do not use.

Important: Maintain at least 6 inches between low-voltage (<30V) and high voltage circuits. Failure to do so could result in electrical noise that could distort the signals carried by the low-voltage wiring, including IPC.

Tracer AdaptiView TD7 Display

Operator Interface

Information is tailored to operators, service technicians, and owners. When operating a chiller, there is specific information you need on a day-to-day basis—setpoints, limits, diagnostic information, and reports. Day-to-day operational information is presented at the display. Logically organized groups of information — chiller modes of operation, active diagnostics, settings and reports put information conveniently at your fingertips.



Operator Display Boot Screen



Display Loading Data



Home Screen, Auto Mode

Figure 29. TD7 screens

Home Screen

The home screen (Figure 30) provides the most frequently needed chiller status information on "touch targets" (the entire white rectangular areas) for each chiller component. Touching any touch target displays a screen containing more chiller status information related to each component.

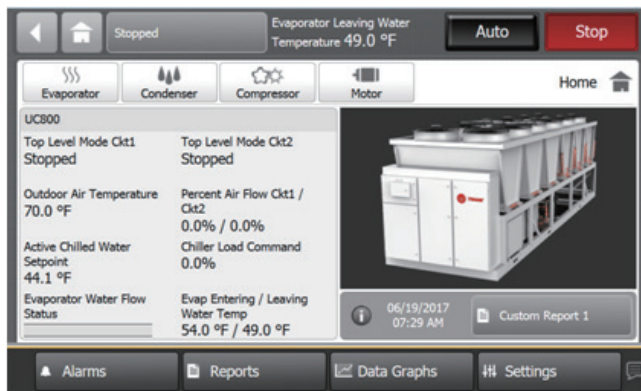


Figure 30. Home screen

Table 29. Home screen items

Description	Resolution	Units
Top Level Mode Ckt1		
Top Level Mode Ckt 2		
Outdoor Air Temperature	XXX.X	°F / °C
Percent Air Flow Ckt1/Ckt2	XXX.X/XXX.X	%
Active Chilled Water Setpoint	XXX.X	°F / °C
Chiller Load Command	X.X	%
Evaporator Water Flow Status	Flow/No Flow	
Evap Entering/Leaving Water Temp	XXX.X/XXX.X	°F / °C

Viewing Operating Modes

On the Reports screen, touch Operating Modes to view the current operating status of the chiller in terms of the top- level operating mode and submodes.

Note: You can also access the Chiller Operating Modes screen from the chiller status button in the upper left: corner of the screen.

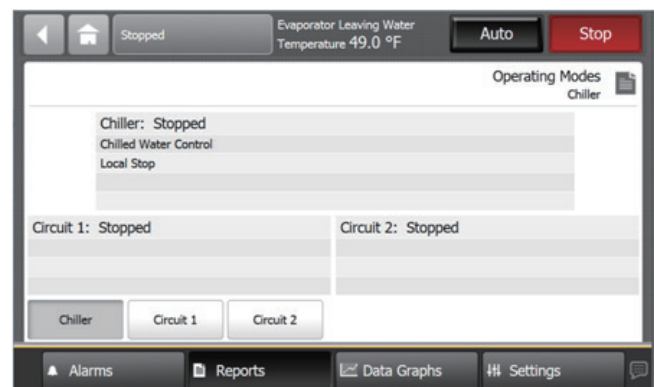


Figure 31. Chiller operating modes

Touch Circuit 1 or Circuit 2 on Operating Modes screen to view circuit and compressor modes and sub modes.

Table 30. Operating modes — chiller

Chiller Modes	Description
MP Resetting	The main processor is going through reset
	No chiller sub-modes.
Stopped	The chiller is not running either circuit and cannot run without intervention. Further information is provided by the sub-mode:
Local Stop	Chiller is stopped by TD7 Stop button command- cannot be remotely overridden.
Immediate Stop	Chiller is stopped by the TD7 Panic Stop (by pressing Stop then Immediate Shutdown in succession) - previous shutdown was manually commanded to shutdown immediately.
No Circuits Available	The entire chiller is stopped by circuit diagnostics or lockouts that may automatically clear.
Diagnostic Shutdown- Manual Reset	The chiller has been shut down on a latching diagnostic that requires manual intervention to reset.
Chilled Water Control	Chiller is running to provide a chilled water temperature per the active chilled water setpoint (may be as arbitrated from various sources). (For cooling only units, this mode may be suppressed.)
Starting is Inhibited by Low Ambient Temperature	The chiller is inhibited based on the outdoor air temperature.
Starting is Inhibited by External Source	The chiller is inhibited from starting or running by the "external stop" hardwired input.
Power Up Delay Inhibit: min:sec	On power up, the chiller will wait for the Power Up Delay Timer to expire.
Run Inhibit	The chiller is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared. Further information is provided by the submode:
No Circuits Available	The entire chiller is stopped by circuit diagnostics or lockouts that may automatically clear.
Start Inhibited by BAS	The chiller is stopped by Tracer® or other Building Automation System (BAS).
Starting is Inhibited by External Source	The chiller is inhibited from starting or running by the "external stop" hardwired input.
Diagnostic Shutdown - Auto Reset	The entire chiller is stopped by a diagnostic that may automatically clear.
Starting is Inhibited by Low Ambient Temperature	The chiller is inhibited based on the outdoor air temperature.
Power Up Delay Inhibit: min:sec	On power up, the chiller will wait for the Power Up Delay Timer to expire.
Chilled Water Control	Chiller is running to provide a chilled water temperature per the active chilled water setpoint (may be as arbitrated from various sources). (For cooling only units, this mode may be suppressed.)
Auto	The chiller is not currently running but can be expected to start at any moment given that the proper conditions and interlocks are satisfied. Further information is provided by the submode:
Waiting For Evaporator Water Flow	The chiller will wait up to 20 minutes in this mode for evaporator water flow to be established per the flow switch hardwired input.
Waiting for A Need to Cool	The chiller will wait indefinitely in this mode, for an evaporator leaving water temperature higher than the Chilled Water Setpoint plus some control dead-band.
Chilled Water Control	Chiller is running to provide a chilled water temperature per the active chilled water setpoint (may be as arbitrated from various sources). (For cooling only units, this mode may be suppressed.)
Waiting to Start	The chiller is not currently running and there is a call for cooling but lead circuit start is delayed by certain interlocks or proofs.
	No chiller sub-modes.
Running	The chiller, circuit, and compressor are currently running. Further information is provided by the sub-mode:
Chilled Water Control	Chiller is running to provide a chilled water temperature per the active chilled water setpoint (may be as arbitrated from various sources). (For cooling only units, this mode may be suppressed.)
Maximum Capacity	The chiller is operating at its maximum capacity.
Capacity Control Softloading	The control is limiting the chiller loading due to capacity based softloading settings.
Demand Limit Softloading	The chiller is running, and loading of individual compressors may be limited by a gradual filter of the chiller's softloading demand limit setpoint. The starting demand limit and the settling time of this filter is user adjustable as part of the demand limit softload feature. The mode will be displayed as long as the Demand Limit Softloading is ramping or "settling".
Running - Limited	At least one circuit on the chiller is currently running, but the operation of any of the circuits on the chiller is being actively limited by a chiller level limit. Other sub modes that apply to the Chiller Running top level modes may also be displayed here. Refer to the list of circuit limit modes for circuit limits that will cause display of this Chiller Level Running Limit mode.
Demand Limit	The chiller is running and the compressor capacity is unloaded or restricted to load slowly or not at all to keep the chiller from exceeding the demand limit set by the customer.
Demand Limit Softloading	The chiller is running, and loading of individual compressors may be limited by a gradual filter of the chiller's softloading demand limit setpoint. The starting demand limit and the settling time of this filter is user adjustable as part of the demand limit softload feature. The mode will be displayed as long as the Demand Limit Softloading is ramping or "settling".

Controls

Chiller Modes	Description
Shutting Down	The chiller is still running but shutdown is imminent. The chiller is going through a compressor run-unload or extended operational pumpdown of the lag circuit/compressor (or all circuits simultaneously).
Evaporator Water Pump Off Delay min:sec	The evaporator water pump is continuing to run past the shutdown of the compressors, executing the pump off delay timer.
Local Stop, Maximum Capacity	Chiller is in the process of being stopped by TD7 Stop button command
Misc	These sub-modes may be displayed in most of the top level circuit modes.
Manual Evaporator Pump Override	The evaporator water pump relay is on due to a manual command.
Diagnostic Evaporator Water Pump Override	The evaporator water pump relay is on due to a diagnostic.
Manual Compressor Control Signal	Chiller capacity control is being controlled by Operator Display or Service Tool.
Noise Reduction Request	The Noise Reduction Request feature has been activated. If the unit is running, fans will be running at lower speed.
Evaporator Water Pump X Locked Out	Evaporator Water Pump X has been locked out by manual override from TD7 or TU.
Waiting for BAS Communications	The chiller has not detected communication with the BAS. This mode is only supported by LonTalk systems. Depending on configurations and Setpoint source setting, lack of communication may cause the chiller to shut down and or become inhibited from starting, but if so, the "Starting is Inhibited by BAS" mode will also occur.

Table 31. Operating modes — circuit

Circuit Level Modes	Description
Stopped	The circuit is not running, and cannot run without intervention.
Front Panel Circuit Lockout	The circuit is manually locked out by the circuit lockout setting - the nonvolatile lockout setting is accessible through either the Operator Display or Service Tool.
External Circuit Lockout	The respective circuit is locked out by the external circuit lockout binary input.
No Compressors Available	The circuit cannot run because necessary compressors are being prevented from running.
Diagnostic Shutdown - Manual Reset	The circuit has been shut down on a latching diagnostic that requires manual intervention to reset.
Run Inhibit	The given circuit is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared.
Diagnostic Shutdown - Auto Reset	The circuit has been shutdown on a diagnostic that may clear automatically.
No Compressors Available	The circuit cannot run because necessary compressors are being prevented from running.
Auto	The circuit is not currently running but can be expected to start at any moment given that the proper conditions are satisfied.
Calibrating EXV	This submode is displayed when the EXV is performing a calibration. A calibration is only performed when the chiller is not running and never more frequently than once every 24 hours.
Waiting to Start	The chiller is going through the necessary steps to allow the lead circuit to start.
Start Inhibited Waiting For Oil	The compressor (and thus its circuit) will wait up to 2 minutes in this mode for oil level to appear in the oil tank.
Waiting For EXV Preposition	The circuit will wait for the time it takes the EXV to get to its commanded pre-position prior to starting the compressor. This is typically a relatively short delay and no countdown timer is necessary (less than 15 seconds)
Running	A compressor on the given circuit is currently running.
Running - Limit	The circuit, and compressor are currently running, but the operation of the chiller/compressor is being actively limited by the controls. Further information is provided by the sub-mode.* See the section below regarding criteria for annunciation of limit modes
Condenser Pressure Limit	The circuit is experiencing condenser pressures at or near the condenser limit setting. Compressors on the circuit will be unloaded to prevent exceeding the limits.
Evaporator Temperature Limit	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. Compressors on the circuit will be unloaded to prevent tripping.
EXV Capacity Limit	The EXV is near or beyond 95% wide open, and the capacity of the circuit (compressor speed) is being held or reduced in order to prevent loss of oil return or insufficient drive cooling.
Establishing Minimum Capacity - Low Differential Pressure	For circuits with manifolded compressors only, the compressor(s) are being loaded to meet requested capacity. See Low Compressor Differential Pressure Limit spec. Note: This mode can be displayed at a Compressor level as well.
Shutting Down	The circuit is preparing to de-energize the compressor.
Operational Pumpdown	The circuit is in the process shutting down by performing an operational pumpdown just prior to stopping the last running compressor. The EXV is commanded closed. Pumpdown will terminate when both the liquid level and the evap pressure are low (below specific criteria) or after a specific time has expired.
Misc.	These sub modes may be displayed in most of the top level circuit modes.
Diagnostic Shutdown - Manual Reset	The circuit has been shut down on a latching diagnostic that requires manual intervention to reset.

Table 32. Operating modes — compressor

Compressor Level Modes	Description
Stopped	The compressor is not running, and cannot run without intervention.
Diagnostic Shutdown - Manual Reset	The compressor has been shut down on a latching diagnostic that requires manual intervention to reset.
Front Panel Compressor Lockout	Compressor is manually locked out by the compressor lockout setting - the nonvolatile lockout setting is accessible through either the Operator Display or Service Tool.
Low Oil Flow Cool Down Time min:sec	See oil flow protection spec.
Run Inhibit	The given compressor is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared.
Diagnostic Shutdown - Auto Reset	The compressor has been shut down on a diagnostic that may clear automatically.
Auto	The compressor is not currently running but can be expected to start at any moment given that the proper conditions are satisfied.
Running	A compressor on the given circuit is currently running.
Minimum Capacity - High Discharge Temperature	The compressor is running with high discharge temperatures and is being forced loaded to its step load point, without regard to the leaving water temperature control, to prevent tripping on high compressor discharge temperature.
Establishing Minimum Capacity - High Oil Temperature	The compressor is running with high oil temperatures and is being force loaded to its step load point, without regard to the leaving water temperature control, to prevent tripping on high compressor oil temperature.
Running - Limit	The compressor is currently running, but the operation of the chiller/compressor is being actively limited by the controls. Further information is provided by the sub-mode. See the section below regarding criteria for annunciation of limit modes
Current Limit	The compressor is running and its capacity is being limited by high currents. The current limit setting is 120% RLA (to avoid overcurrent trips) or lower as set by the compressor's "share" of the active current limit (demand limit) setting for the entire chiller.
Hot Start Limit	This mode will occur if the compressor's suction saturated temperature exceeds the Hot Start Threshold Temperature at the point at which the step load for the respective circuit would be desired. This is often the case in a high water temperature pulldown. While in this mode, the compressor will not be allowed to load past its minimum load capacity step, but it will not inhibit other compressors from staging on. This mode is necessary to prevent nuisance trips due to compressor overcurrent or high pressure cutout. Reasonable pulldown rates can still be expected despite this limit, since the compressor's capacity even at partial load is much greater at high suction saturated temperatures.
Compressor Differential Pressure Limit	The compressor is running and is inhibited to load or unload in order to prevent conditions that would exceed safety trip points. See High Compressor Differential Pressure Limitation spec.
Compressor Pressure Ratio Limit	The compressor is running and is inhibited to load or unload in order to prevent conditions that would exceed safety trip points. See High Compressor Differential Pressure Limitation spec.
Establishing Minimum Capacity - Low Differential Pressure	For manifolded compressors only, the Compressor's Low Differential Pressure Protection Integral has risen to 30% of its trip value. This will force load the female load step on that circuit's compressor. Note: This mode can be displayed at a Circuit level as well.
Oil Return Limit	A compressor is in this limit due to low discharge superheat. The oil return solenoid valve will be cycled closed/open which allows the discharge gas temperature and the corresponding discharge superheat to increase, improving oil quality to the compressor.
Shutting Down	The circuit is preparing to de-energize the compressor.
Compressor Unloading	The compressor is in its run unload time. The run unload time must expire before the compressor will shut down. (The unload time is typically about 5 seconds.)
Misc.	The circuit is preparing to de-energize the compressor.
Service Pumpdown	The compressor is currently performing a service pumpdown.
Restart Inhibit min:sec	If there is accumulated Restart Inhibit Time, it must expire before a compressor is allowed to start.

Alarms

You can use the display to view alarms and to reset them. Alarms are communicated to the display immediately upon detection.

Viewing the Alarms Screen

Touch the Alarms button in the home screen menu to view the Alarms screen. A table of active alarms appears that is organized chronologically with the most recent at the top of the list, as shown in [Figure 32](#). This example shows the default view, which appears each time you return to the screen. List can be sorted by any of the other columns if desired.

Note: A page number appears in the lower right corner of the screen. If a screen contains more than one page, up/down arrows also appear for viewing the other pages.

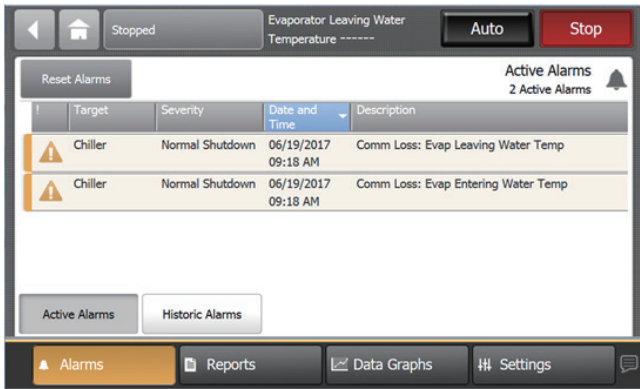


Figure 32. Alarm screen

The Alarms screen is accessible by depressing the Alarms enunciator. A verbal description will be provided. A scrollable list of the last active Alarms is presented. Performing a "Reset Alarms" will reset all active Alarms regardless of type, machine or circuit. The scrollable list will be sorted by time of occurrence.

"Alarms" Key Behavior:

- Alarm Shutdown (immediate) has occurred: Flash red
- Alarm Shutdown (normal) has occurred: Flash yellow
- Informational warning is present: Flash blue
- No alarms present: Default button color, not flashing

Reports

You can use the Tracer display to view a variety of reports and to create and edit a custom report. All reports contain live data that refreshes every 2-5 seconds.

Viewing the Reports Screen

Touch the Reports button in the main menu area ([Figure 29](#)) to view the Reports screen. The Reports screen contains the following buttons:

- Custom Report1
- Custom Report2
- Custom Report3
- Evaporator
- Condenser
- Compressor
- Motor About
- Operating Modes
- Log Sheet
- ASHRAE Chiller Log

Each button links to the report named on the button.

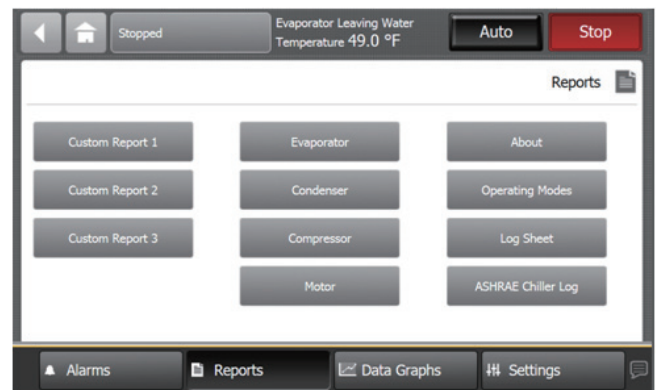


Figure 33. Report screen

The Reports tab allows a user to select from a list of reports headings. Each report will generate a list of status items as defined in the tables that follow.

Editing a Custom Report

You can edit the custom report by adding, removing, or reorder data as follows:

1. On the Custom Report screen, touch Edit. The Edit Custom Report screen appears.
2. Add, remove, or re-order as follows:
 - a. To add an item to the custom report, touch it. It responds by changing to blue. You can use the arrows to scroll through the rest of the items that can be added to the custom report. Then touch Add to move the selected item to the box on the right side of the screen.
 - b. To remove an item from the custom report, touch it. It responds by changing to blue. You can use the arrows to scroll through the rest of the items that can be removed from the custom report. Then touch Remove to move the selected item to

the box on the left side of the screen.

- c. To re-order items in the custom report, touch it. It responds by changing to blue. Use the arrows to change the order of a highlighted item.
3. To save and view your edited custom report, touch Save.

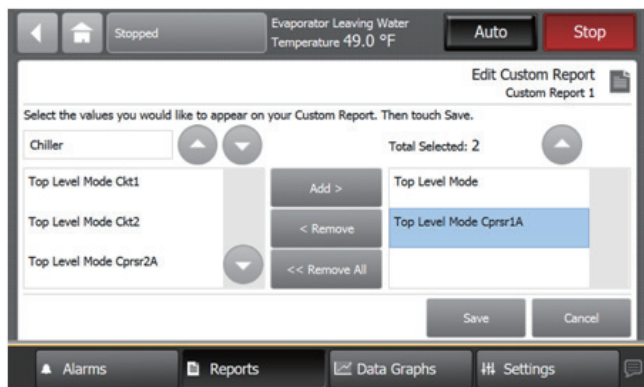


Figure 34. Edit custom report screen

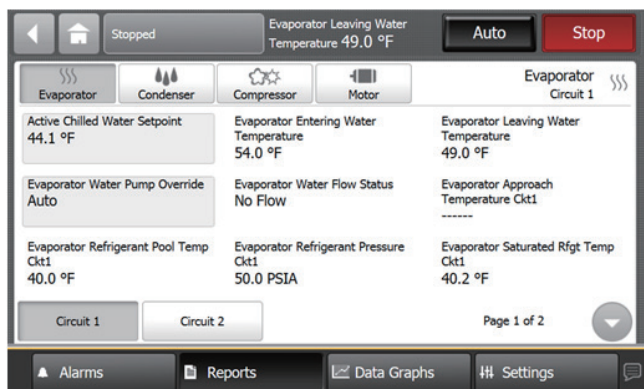


Figure 35. Report evaporator screen

Table 33. Report evaporator screen items

Description	Resolution	Units
Active Chilled Water Setpoint	XXX.X	°F / °C
Evaporator Entering Water Temperature	XXX.X	°F / °C
Evaporator Leaving Water Temperature	XXX.X	°F / °C
Evaporator Water Pump Override	Auto/On	
Evaporator Water Flow Status	Flow/No Flow	
Evaporator Approach Temperature CktX	XXX.X	°F / °C
Evaporator Refrigerant Pool Temp CktX	XXX.X	°F / °C
Evaporator Refrigerant Pressure CktX	XXX.X	°F / °C
Evaporator Saturated Rfght Temp CktX	XXX.X	°F / °C
Oil return Solenoid Valve CprsrXA	Open/Closed	
Oil return Solenoid Valve CprsrXB	Open/Closed	
EXV Percent Open CktX	XXX.X	%

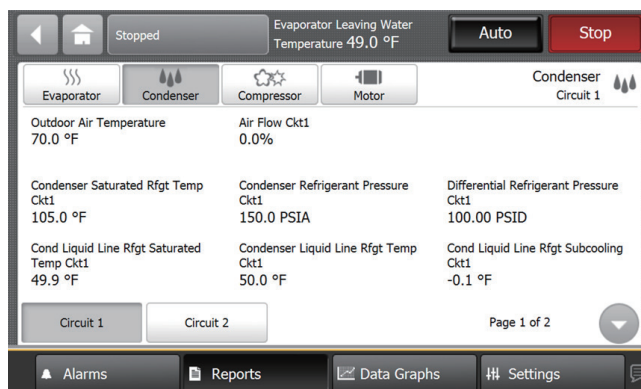


Figure 36. Report condenser screen

Table 34. Report condenser screen items

Description	Resolution	Units
Outdoor Air Temperature	XXX.X	°F / °C
Percent Air Flow Ckt1/Ckt2	XXX.X	%
Condenser Saturated Rfght Temp CktX	XXX.X	°F / °C
Condenser Refrigerant Pressure CktX	XXX.X	PSI/kPa
Differential Refrigerant Pressure CktX	XXX.X	PSID/kPa
Cond Liquid Line Rfght Saturated Temp CktX	XXX.X	°F / °C
Condenser Liquid Line Rfght Temp CktX	XXX.X	°F / °C
Condenser Liquid Line Rfght Subcooling CktX	XXX.X	°F / °C
EXV Percent Open CktX	XXX.X	%
Condenser Liquid Line Rfght Pressure CktX	XXX.X	PSI/kPa
Condenser Refrigerant Tank Valve CktX	Open/Closed	

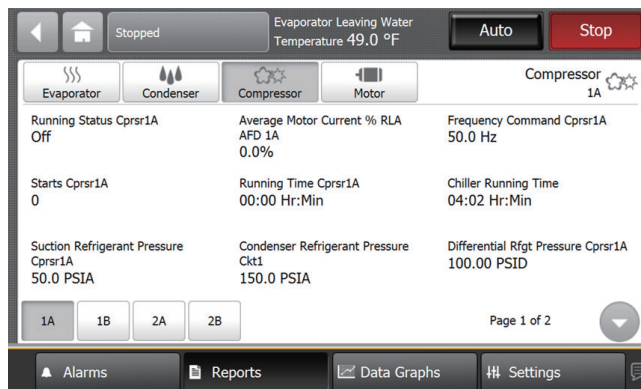


Figure 37. Report compressor screen

Controls

Table 35. Report compressor screen items

Description	Resolution	Units
Running Status	On/Off	
Average Line Current % RLA Starter XX	XXX.X	%
Average Motor Current % RLA AFD XX	XXX.X	%
Frequency Command CprsrXX	XX.X	Hz
Starts CprsrXX	XXXX	
Running Time CprsrXX	XXXX.XX	Hr:Min
Chiller Running Time	XXXX.XX	Hr:Min
Suction Refrigerant Pressure CprsrXX	XXX.X	PSI/kPa
Condenser Refrigerant Pressure CktX	XXX.X	PSI/kPa
Differential Rfgrt Pressure Cprsr XX	XXX.XX	PSI/kPa
Oil Loss Level Sensor	Wet/Dry	
Discharge Temperature CprsrXX	XXX.X	°F /°C
Discharge Superheat CprsrXX	XXX.X	°F/°C
Oil Pressure CprsrXX	XXX.X	PSI/kPa
Oil Temperature CprsrXX	XXX.X	°F/°C
Economizer Valve Percent Open CprsrXX	XXX.X	%
Economizer Discharge Pressure CprsrXX	XX.X	PSI/kPa
Economizer Discharge Temperature CprsrXX	XXX.X	□F/°C
Economizer Superheat CprsrXX	XXX.X	□F/°C

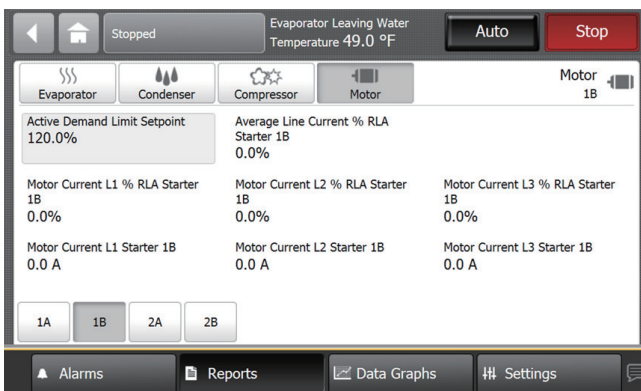


Figure 38. Report motor screen

Table 36. Report motor screen items

Description	Resolution	Units
Active Demand Limit Setpoint	XXX.X	%
Average Line Current %RLA Starter XX	XXX.X	%
Average Motor Current %RLA AFD XX	XXX.X	%
Frequency Command Cprsr XX	XX.X	Hz
Motor Current L1 % RLA Starter XX	XXX.X	%
Motor Current L2 % RLA Starter XX	XXX.X	%
Motor Current L3 % RLA Starter XX	XXX.X	%
Motor Current L1 Starter XX	XXX.X	Amps
Motor Current L2 Starter XX	XXX.X	Amps
Motor Current L3 Starter XX	XXX.X	Amps
Motor Voltage AB Starter XX	XXXX.X	Volts
Motor Voltage BC Starter XX	XXXX.X	Volts
Motor Voltage CA Starter XX	XXXX.X	Volts

Equipment Settings

You can use the TD7 display to monitor and change a variety of equipment settings.

Viewing the Settings Screen

Touch the Settings button in the main menu area to view the Settings screen. Equipment Settings identifies a column of buttons located on the screen (see the outlined column in [Figure 39](#)). The buttons are:

- Chiller Settings
- Feature Settings
- Chiller Water Reset
- Manual Control Settings
- Service Settings

Each of these buttons provide access to a screen that contains additional buttons related to each topic. This section provides detailed information about these screens.

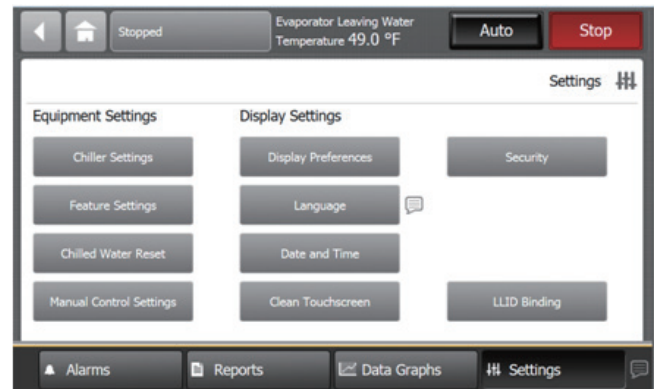


Figure 39. Setting screen

Viewing and Changing Equipment Settings

Each button in the Equipment Settings column on the Settings screen takes you to a menu screen that contains a group of buttons. Each button displays the name of a setting and its current value ([Figure 39](#)). Touch any button to view a screen where you can change the setting for the feature shown on the button.

Note: A page number appears in the lower right corner of the screen. If a screen contains more than one page, up/down arrows also appear for viewing the other pages, as in [Figure 40](#).

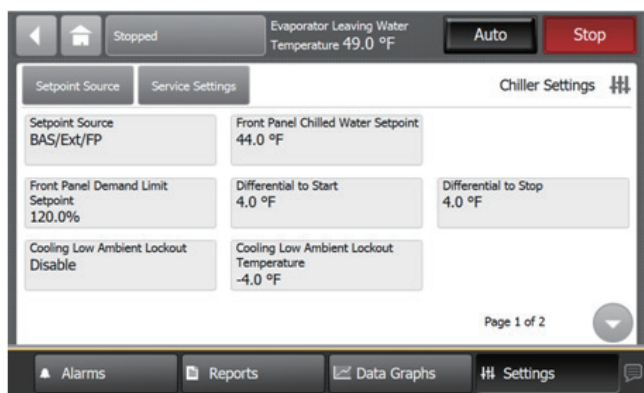


Figure 40. Equipment setting screen (Chiller setting shown)

To change an equipment setting, follow this procedure:

1. Touch one of the buttons in the Equipment Settings column on the Settings screen, such as Chiller Settings. The corresponding screen appears (in this case, the Chiller Settings screen).
2. Touch the button that shows the equipment setting you want to change. A screen that allows you to change the equipment setting appears. There are two types of these screens:
 - a. For screens with button selections (Figure 40), touch the button that represents the setting you want. The button becomes shaded, and a Save button appears at the bottom of the screen.
 - b. For screens with numerical keypads (Figure 41), touch the appropriate numbers to change the current value. The new value appears above the keypad.
3. Touch Save to complete the change. The current value is updated in the upper left side of the screen, demonstrating that the change has been communicated to the Tracer UC800 controller. The screen you were previously viewing appears.

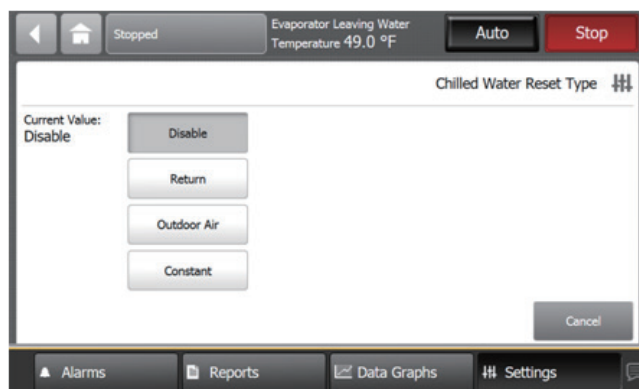


Figure 41. Chilled water reset type screen

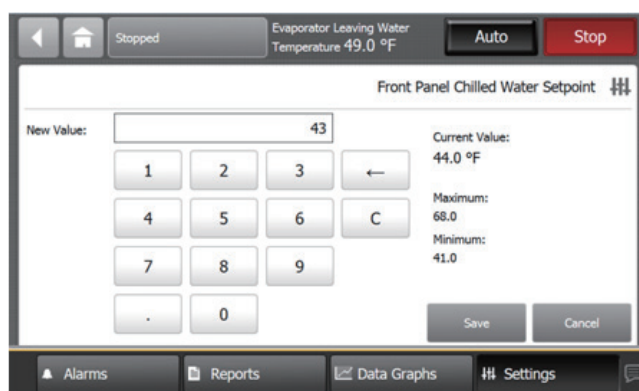


Figure 42. Changed chilled water setpoint screen

Keypad Features

- When you enter a new number, the value in the New value field is deleted and replaced with the new entry.
- The backspace (arrow) key deletes the characters you previously entered.
- If the keypad is used to enter a setpoint that is out of range, an error dialog will appear when you touch the Save button.
- Keypads that allow negative numbers have positive and negative number (+/-) keys.

Controls

Table 37. Settings screen items

Description	
Chiller Settings	
Setpoint Source	
Front Panel Chilled Water Setpoint	
Auxiliary Chilled Water Setpoint	
Front Panel Demand Limit Setpoint	
Differential to Start	
Differential to Stop	
Cooling Low Ambient Lockout	
Cooling Low Ambient Lockout Temperature	
Condenser Pressure Limit Setpoint	
Evaporator Water Pump Off Delay	
High Evaporator Water Temp Cutout	
Low Evaporator Water Temp Cutout	
Low Refrigerant Temperature Cutout	
Demand Limit Startup Target	
Demand Limit Softload Time	
Capacity Control Softload Time	
Front Panel Noise Reduction Request	
Noise Reduction Cond Fan Speed Clamp	
Power-Up Start Delay	
Chiller Power Demand Time Period	
Local Atmospheric Pressure	
Feature Settings	
External Chiller Water Setpoint Enable	
External Demand Limit Setpoint Enable	
Staging Sequence	
Chilled Water Reset Type	
Return Water Reset Ratio	
Return Water Start Ratio	
Return Water Maximum Reset	
Outdoor Air Reset Ratio	
Outdoor Air Start Reset	
Outdoor Air Maximum Reset	
Mode Overrides	
Manual Capacity Control	Auto/Manual
Evaporator Water Pump Override	Auto/On
Evaporator Water Pump Lockout Pump 1	Not Locked Out/ Locked Out
Evaporator Water Pump Lockout Pump 2	Not Locked Out/ Locked Out
Front Panel Circuit Lockout Ckt1	Not Locked Out/ Locked Out
Front Panel Circuit Lockout Ckt2	Not Locked Out/ Locked Out
EXV Manual Control Override Ckt1	Auto/Manual
EXV Manual Control Override Ckt2	Auto/Manual
Front Panel Compressor Lockout Cprsr 1A	Not Locked Out/ Locked Out
Service Pumpdown Command Cprsr1A	Abort/Start
Front Panel Compressor Lockout Cprsr 2A	Not Locked Out/ Locked Out
Service Pumpdown Command Cprsr2A	Abort/Start

Service Settings

Setpoints on the Service Settings screen are only intended for use by experienced service personnel. Setpoints include security, if enabled.

The Service Settings screen is found through Chiller Settings, and includes a warning message for the user.

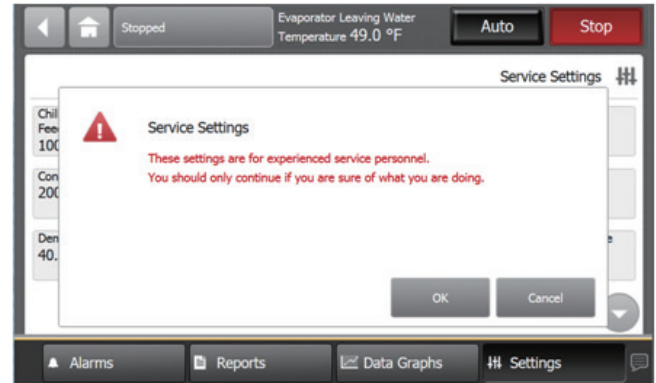


Figure 43. Warning message

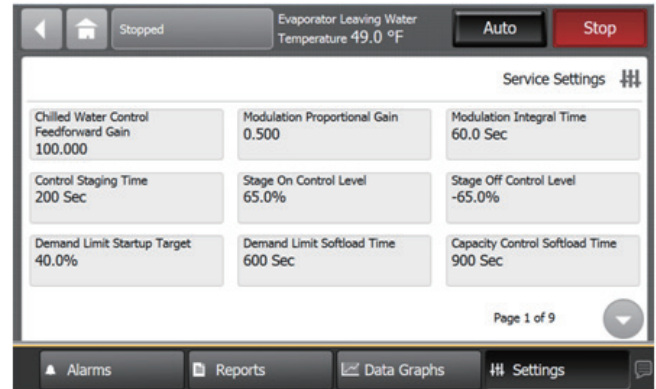


Figure 44. Service settings screen

Display Settings

You can use the Tracer AdaptiView display to change the format of the information that appears on the display, and to clean the touch screen.

Touch the Settings button in the main menu area to view the Settings screen. Display Settings identifies a column of buttons located on the screen (see [Figure 45](#)). The buttons are:

- Display Preferences
- Language
- Date and Time
- Clean Display

Each button provide access to a screen that is related to the button name.

Viewing and Changing Display Preferences

On the Settings screen, touch Display Preferences to view a screen containing these buttons (see [Figure 45](#)):

- Date Format
- Date Separator
- Time Format
- Unit System
- Pressure Units
- Number Format

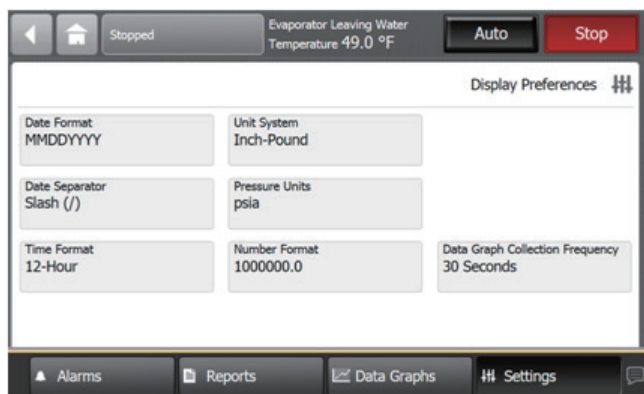


Figure 45. Display preference screen

Each of the buttons shows the name of a display preference and its format (current value). Touch any of these buttons to view a screen where you can change the format. The button representing the format currently used is shaded (see the "MMDDYYYY" button).

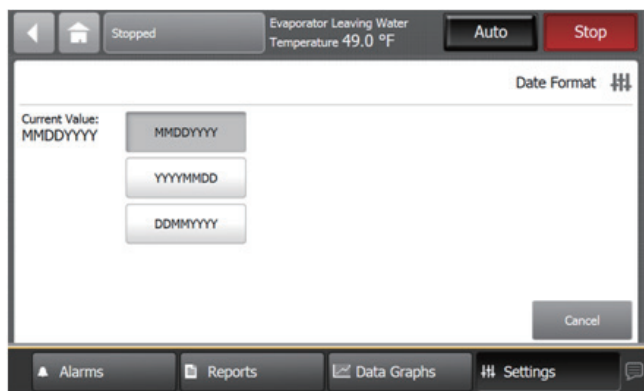


Figure 46. Date format page

To change the format:

1. Touch the button that shows that format you prefer.
2. Touch Save to confirm your selection and to return to the Display Preferences screen.

Date Format

Use the Date Format screen to choose from the following date formats:

- MMDDYYYY (default)
- YYYYMMDD
- DDMMYYYY

Date Separator

Use the Date Separator screen to choose from the following date formats:

- None
- Slash (default)
- Hyphen

Time Format

Use the Time Format screen to choose from the following time formats:

- 12 hour (default)
- 24 hour

Units System

Use the Display Units screen to choose from the following display units:

- SI
- Inch-Pounds (default)

Pressure Units

Use the Pressure Units screen to choose from the following pressure units:

- kPaA (default if "SI" is chosen for display units)
- kPaG
- PSIA (default if "Inch-Pound" is chosen for display units)
- PSIG

Number Format

- 1000000.0
- 1000000,0



Figure 47. Language page

Controls

The language that is currently in use on the display is expressed as the current value on the Language screen. The button that displays the current value is shaded (see the "English" button in [Figure 47](#) as an example).

To change the language:

1. Touch the button that identifies the language you prefer.
2. Touch Save to confirm your selection and to return to the Settings screen.

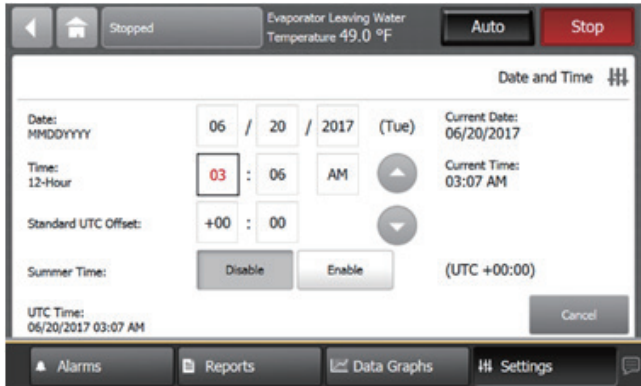


Figure 48. Date and time screen

The current date and time for the display is expressed as the current value. The current value appears below the center line on the screen.

Above the center line, the following date and time attributes appear:

- Month
- Day
- Year
- Hour
- Minute
- AM/PM

To change the date or time:

1. Touch the square presenting the attribute you want to change. The square becomes highlighted.
2. Touch the up or down arrow key on the screen until the your desired selection appears. Repeat the process for any other attributes you want to change.
3. Touch Save to confirm your selection and return to the Settings screen.

Note: Alternately, fields can be edited by touching the highlighted square a second time to access a keypad.

Cleaning the Display

On the Settings screen, touch Clean Display to disable the Tracer AdaptiView display screen for 5 seconds after finger is removed. This process allows screen cleaning without it responding to touch. During this time, the screen is black with a number in the center that counts down the seconds. After 5 seconds, the Settings screen re-appears.



Figure 49. Countdown screen

Security Settings

If security is enabled, the Tracer AdaptiView display requires that you log in with a four-digit security PIN to make setting changes that are protected by security. This feature prevents unauthorized personnel from doing so. There are two levels of security, each allowing specific changes to be made.

You can view all data without logging in. The log-in screen appears only when you try to change a setting that is protected by security, or when you touch the Log in button from the Settings screen.

Disabling/Enabling Security

The Tracer AdaptiView display gives you the ability to disable or enable the security feature that allows a user to log in and log out.

To disable security, you must be logged in:

1. From the Settings screen, touch the Security button. The Security screen appears ([Figure 51](#)).

Note: If you are logged out, the Log in screen appears.

2. Touch the Disable button. The button becomes shaded.
3. Touch Save. The Settings screen appears with only the Security button visible. The Log in/Logout button is gone.

To enable security:

1. From the Settings screen, touch the Security button. The Security screen appears ([Figure 51](#)).
2. Touch the Enable button. The button becomes shaded.

3. Touch Save. The Settings screen appears with a Log out button, in addition to the Security button.

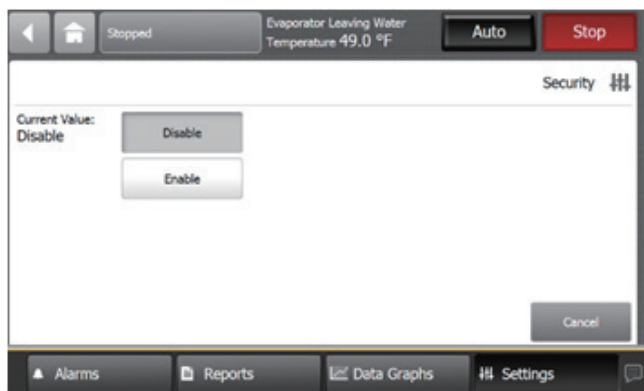


Figure 50. Security screen - disable

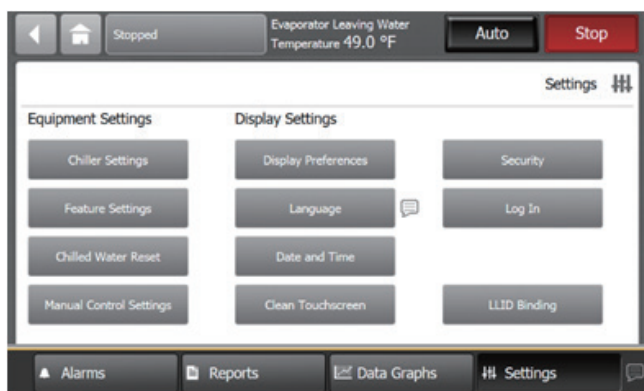


Figure 51. Security settings screen

Logging In

There are two levels of security:

- Security Level 1 allows users to change a limited group of secure settings. The default security PIN is 1111.
- Security Level 2 allows users to change all secure settings. The default security PIN is 7123.

A technician must use the Tracer TU service tool to define a different PIN, or to recall a PIN that has been forgotten.

When defining a PIN in Tracer TU, the technician enters a 4-digit PIN that corresponds with the desired level of Security.

To log in:

1. Touch the Log in button. The Log in screen appears (Figure 52).
2. Use the keypad to enter your PIN.
 - a. The PIN is a four-digit number, which was configured for your system with the Tracer TU service tool.
 - b. As you enter the number, the PIN remains hidden

by asterisks.

Note: If you enter an invalid PIN, an error message appears on the Log in screen.

3. Touch Save.

- a. If you viewed the Log in screen from touching Log in on the Settings screen, the Settings screen appears with a Log out button on it.
- b. If the Log in screen appeared when you tried to change a setting, you return to that setting screen.

Note: The PIN is valid until 30 minutes of inactivity passes, or until you log out.

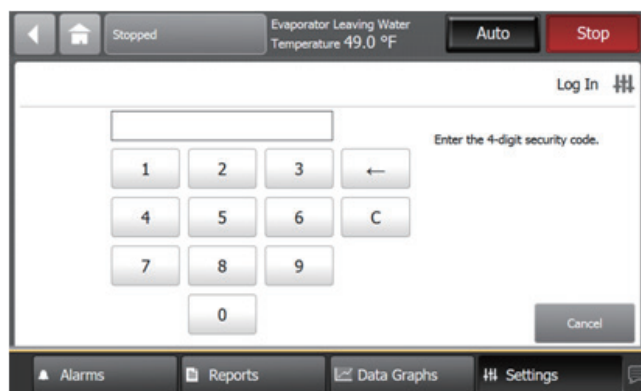


Figure 52. Log in screen

Logging Out

To log out:

1. Touch the Log out button. A confirmation screen appears (Figure 53).
2. Touch Yes to confirm that you want to log out. The Settings screen appears with a Log in button on it.

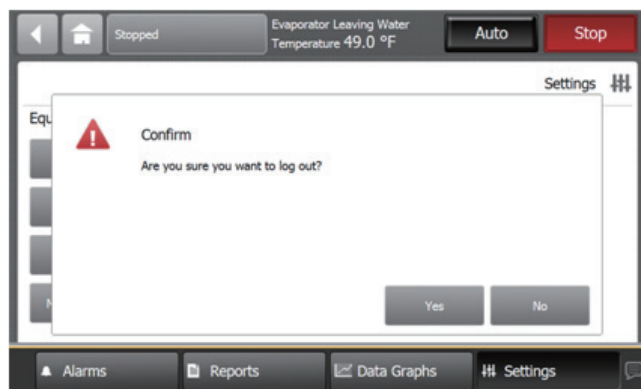


Figure 53. Log out confirmation screen

Tracer TU

The AdaptiView™ TD7 operator interface allows for daily operational tasks and setpoint changes. However, to adequately service RTAG chillers, Tracer® TU service tool is required. (Non-Trane personnel, contact your local Trane office for software purchase information.) Tracer TU adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime. This portable PC-based service-tool software supports service and maintenance tasks, and is required for software upgrades, configuration changes and major service tasks.

Tracer TU serves as a common interface to all Trane® chillers, and will customize itself based on the properties of the chiller with which it is communicating. Thus, the service technician learns only one service interface.

The panel bus is easy to troubleshoot using LED sensor verification. Only the defective device is replaced. Tracer TU can communicate with individual devices or groups of devices.

All chiller status, machine configuration settings, customizable limits, and up to 100 active or historic diagnostics are displayed through the service-tool software interface.

LEDs and their respective Tracer TU indicators visually confirm the availability of each connected sensor, relay, and actuator.

Tracer TU is designed to run on a customer's laptop, connected to the Tracer AdaptiView control panel with a USB cable. Your laptop must meet the following hardware and software requirements:

- 1 GB RAM (minimum)
- 1024 x 768 screen resolution
- Ethernet 10/100 LAN card
- Available USB 2.0 port
- Microsoft® Windows® 7 Enterprise or Professional operating system (32-bit or 64-bit) or Windows 8.1.

Important: *Tracer TU V8.6 was the final release to support Windows XP. Beginning with Tracer TU V9.0, you will need to migrate to Windows 7 or Windows 8.1 operating system.*

Notes:

- Tracer TU is designed and validated for this minimum laptop configuration. Any variation from this configuration may have different results. Therefore, support for Tracer TU is limited to only those laptops with the configuration previously specified.
- For more information, see TTU-SVN01*-EN Tracer TU Getting Started Guide

NOTICE

Equipment Damage!

Ensure that the compressor and oil sump heaters have been operating properly for a minimum of 24 hours before starting. Failure to do so could result in equipment damage.

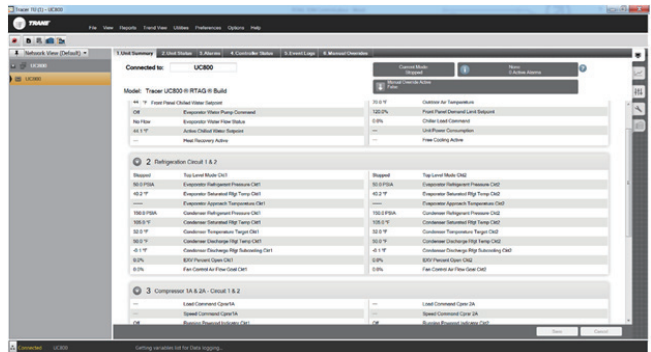


Figure 54. Tracer TU

Sequence of Operation

This section will provide basic information on chiller operation for common events. With microelectronic controls, ladder diagrams cannot show today's complex logic, as the control functions are much more involved than older pneumatic or solid state controls.

Adaptive control algorithms can also complicate the exact sequence of operations. This section illustrates common control sequences.

Software Operation Overview

The Software Operation Overview shown in Figure 55 is a diagram of the five possible software states. This diagram can be thought of as a state chart, with the arrows and arrow text depicting the transitions between states.

- The text in the circles is the visible top level operating mode displayed on Tracer™ AdaptiView.
- The shading of each software state circle corresponds to the shading on the time lines that show the state the chiller is in.

There are five generic states that the software can be in:

- Power Up
- Stopped
- Starting
- Running
- Stopping

RTAG Sequence of Operation: Chiller State Chart

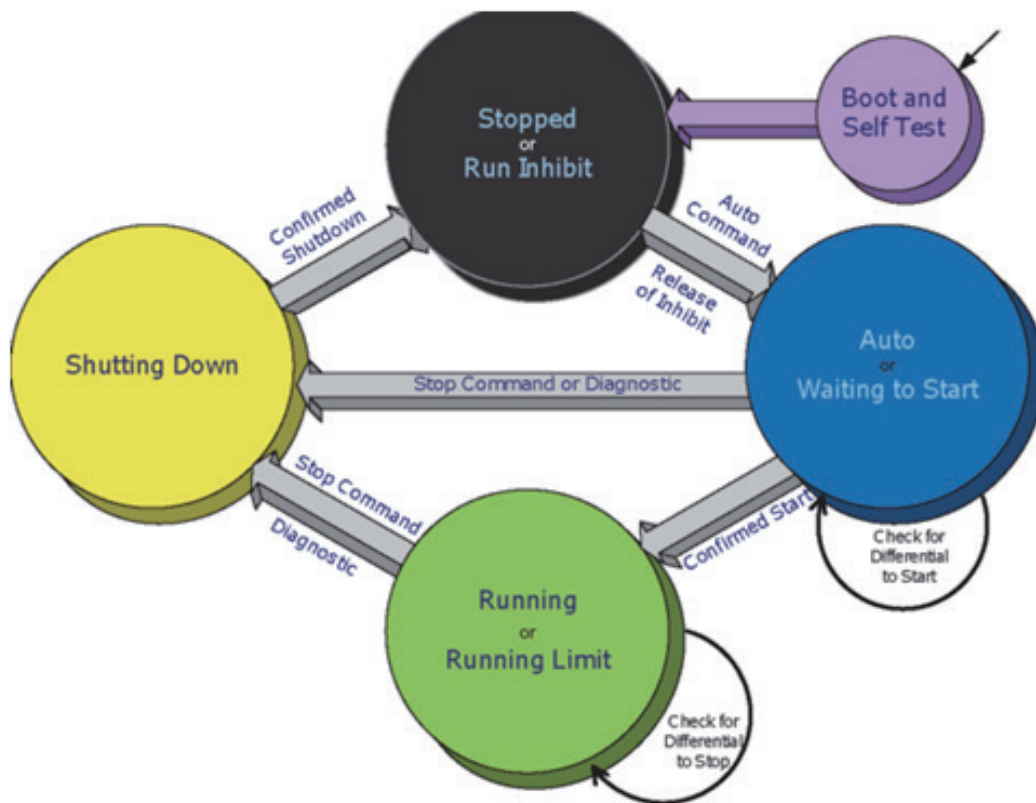


Figure 55. Software operation overview

Timelines

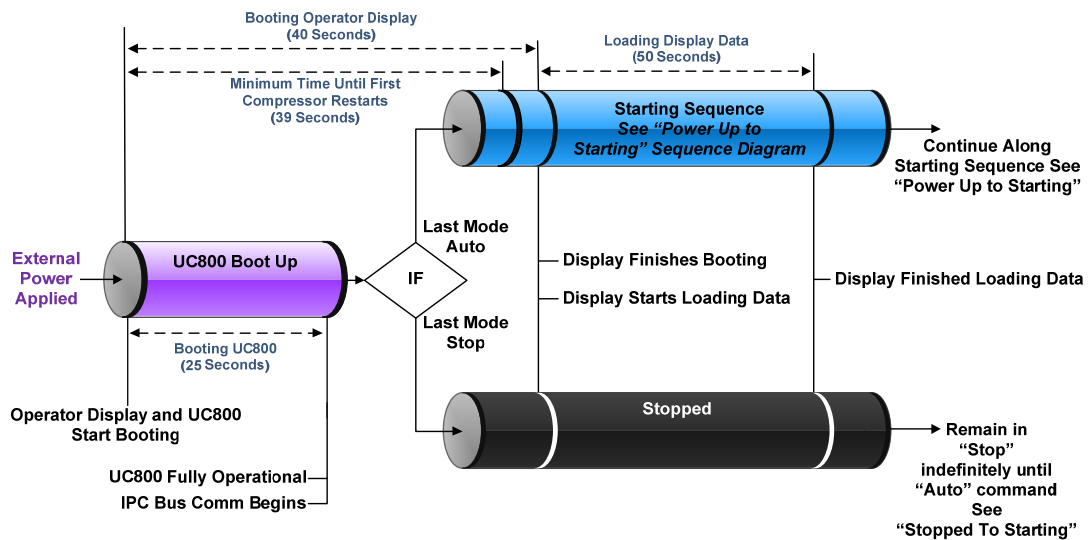
- The time line indicates the upper level operating mode, as it would be viewed on the Tracer AdaptiView.
- The shading color of the cylinder indicates the software state.
- Text in parentheses indicates sub-mode text as viewed on Tracer AdaptiView.
- Text above the time line cylinder is used to illustrate inputs to the Main Processor. This may include user input to the Tracer AdaptiView Touch screen, control inputs from sensors, or control inputs from a Generic BAS.
- Boxes indicate control actions such as turning on relays, or pulsing compressor load or unload solenoids.
- Smaller cylinders under the main cylinder indicate diagnostic checks.

- Text outside a box or cylinder indicates time based functions.
- Solid double arrows indicate fixed timers.
- Dashed double arrows indicate variable timers.

Important: *Sequence of events timelines include options that may not be available on specific unit configurations.*

Power Up Diagram

Figure 56 shows the respective TD-7 AdaptiView screens during a power up of the UC800 and display. This process takes 25 seconds for the UC800 and 90 seconds for the display. On all power ups, the software model always will transition through the 'Stopped' Software state independent of the last mode. If the last mode before power down was 'Auto', the transition from 'Stopped' to 'Starting' occurs, but it is not apparent to the user.



**Display will show either Auto or Stop button active once it is fully loaded*

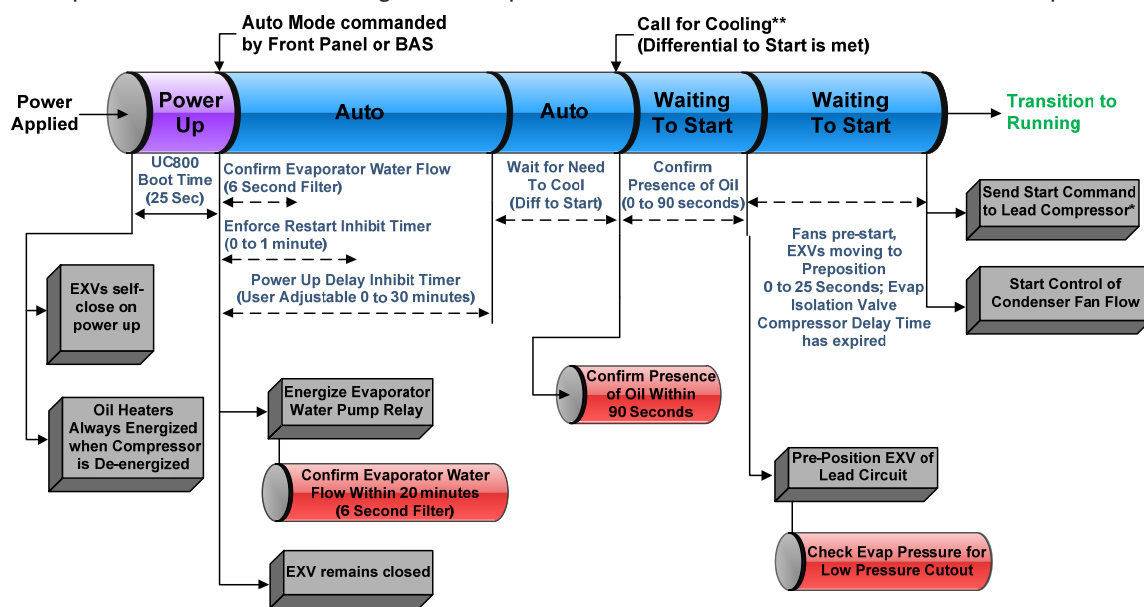
Figure 56. Sequence of operation: power up diagram

Power Up to Starting

Figure 57, diagram shows the timing from a power up event to energizing the first compressor. The shortest allowable time would be under the following conditions:

- No motor restart inhibit time left from subsequent starts
- Evaporator Water flow occurs quickly with pump on command
- Power up Start Delay set to 0 minutes
- Need to cool (differential to start) already exists
- Oil level is detected immediately

The above conditions would allow for a minimum power up to starting the first compressor time of about 45 seconds (variations may exist due to options installed). Note that it is not advisable to start a chiller "cold" the oil heaters should be in operation for a sufficient length of time prior to first start. Consult the chiller's IOM for specifics.



* Lead Compressor (and its lead circuit) is determined by staging algorithm – "Balanced", "Circuit 1 Lead", or "Circuit 2 Lead" selection – also influenced by lockouts, restart inhibit, or diagnostics present

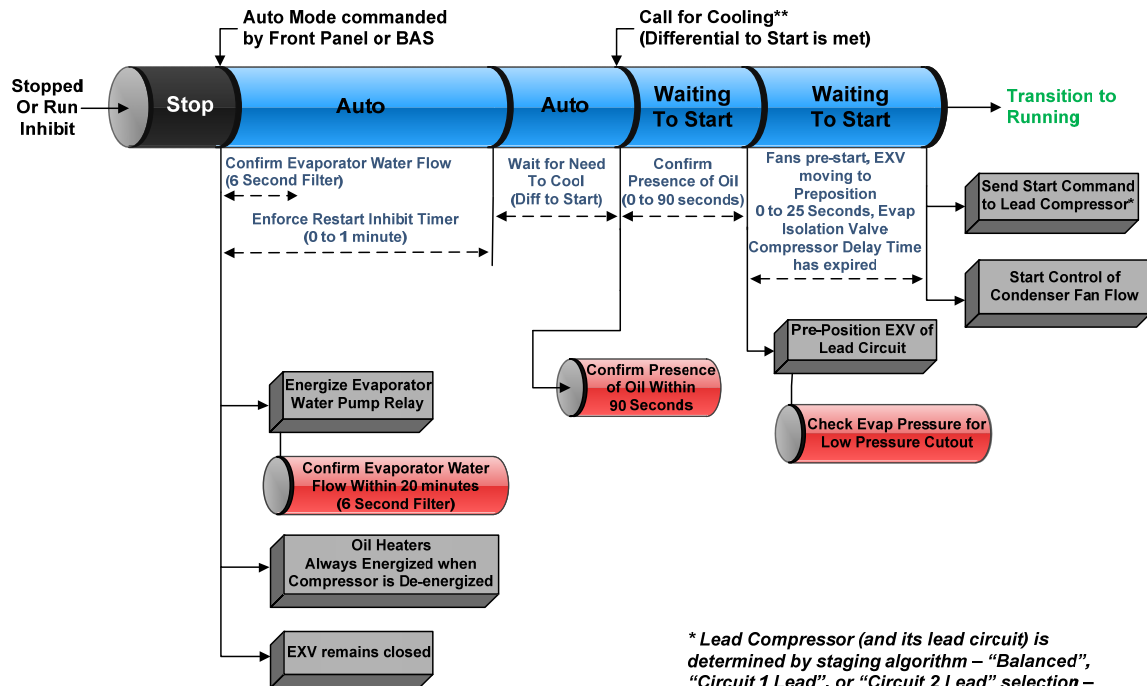
Figure 57. Sequence of events: power up to starting

Stopped to Starting

Figure 58 shows the timing from a stopped mode to energizing the first compressor. The shortest allowable time would be under the following conditions:

- No motor restart inhibit time left from subsequent starts
- Evaporator Water flow occurs quickly with pump on command
- Need to cool (differential to start) already exists

The above conditions would allow a compressor to start in about 20 seconds.

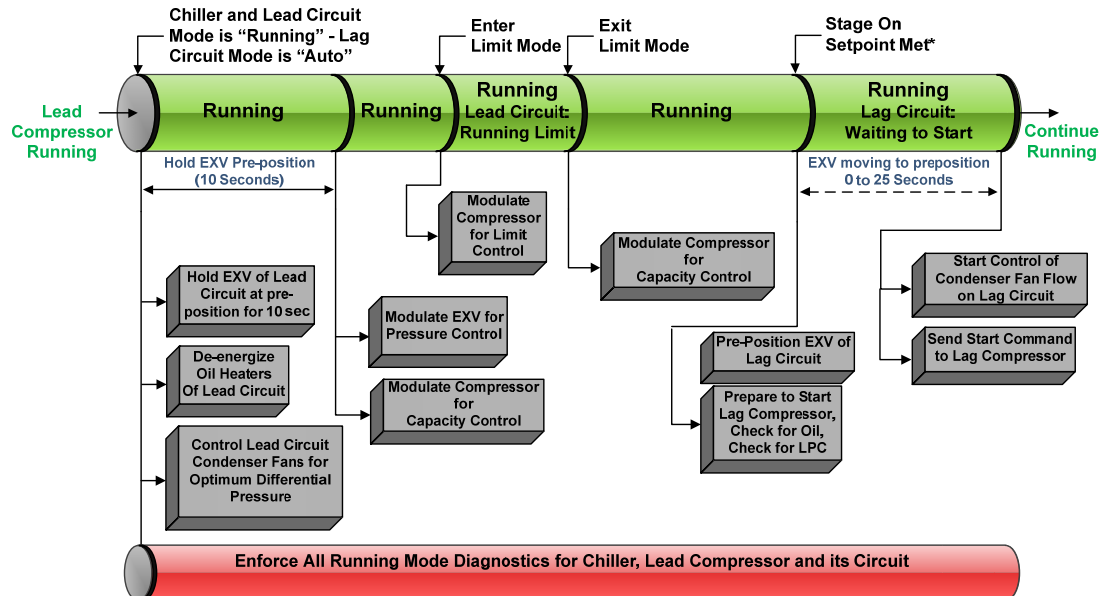


* Lead Compressor (and its lead circuit) is determined by staging algorithm – “Balanced”, “Circuit 1 Lead”, or “Circuit 2 Lead” selection – also influenced by lockouts, restart inhibit, or diagnostics present
 **Note: If Free Cooling is active, it will be the first stage of cooling to stage on.

Figure 58. Sequence of events: stopped to starting

Running (Lead Compressor/Circuit Start and Run)

Figure 59 shows a typical start and run sequence for the lead compressor and its circuit.

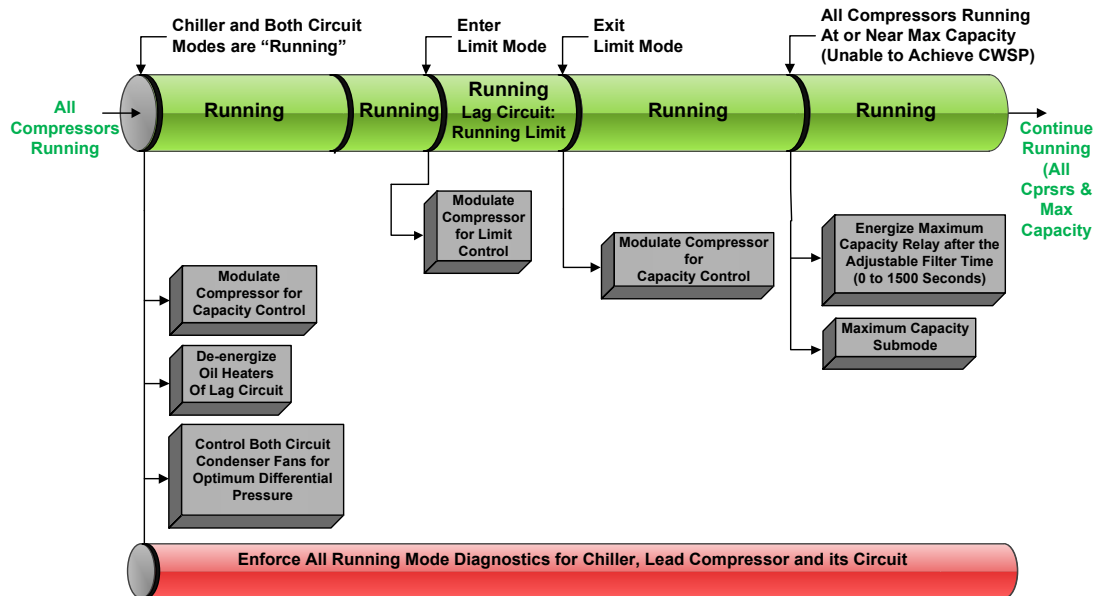


**Note: The decision to stage on or off another compressor is determined by the Average Running Compressor Load Command, Water Temperature Error, and Time Since Last Stage Circuit X Lead: A compressor on the selected circuit will lead followed by a compressor on the alternate circuit, given an appropriately increasing chiller load. Additional compressors will alternate between lead and lag circuits. Variable speed compressors will always be the first compressors to start and last compressors to stop.*

Figure 59. Sequence of operation: running (lead compressor/circuit start and run)

Running (Lag Compressor/Circuit Start and Run)

Figure 60 shows a typical start and run sequence for the lag compressor and its circuit.

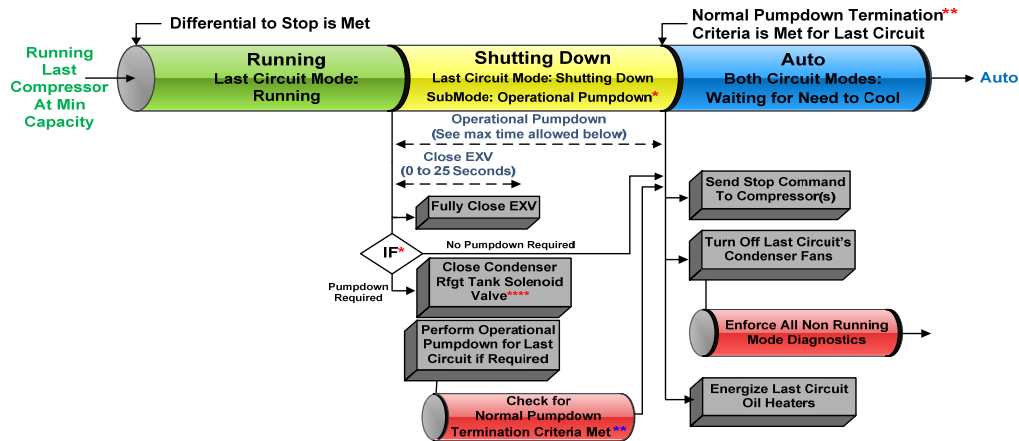


**Note: The decision to stage on or off another compressor is determined by the Average Running Compressor Load Command, Water Temperature Error, and Time Since Last Stage*

Figure 60. Sequence of operation: running (lag compressor/circuit start and run)

Satisfied Setpoint

Figure 61 shows the normal transition from Running to shutting down due to the Evap Leaving water temp falling below the differential to stop setpoint.



*Operational Pumpdown is required if the Outdoor Air Temperature is less than 50°F, or the Entering Evaporator Water Temperature is greater than (outdoor air temperature – 10°F). With AFD, compressors will be at max speed for operational pumpdown.

** Operational pumpdown is terminated normally in the following configurations when:

Water with 2-Pass Evaporator:

- The evaporator (suction) pressure is at or below the "Pumpdown Termination Pressure" setting OR LERTC saturated pressure (28.6°F), which ever is greater
- The condenser (compressor discharge) pressure exceeds 315psia.
- The compressor pressure ratio exceeds 8.
- The system differential pressure exceeds 265psid or < 25min.

Glycol with 2-Pass Evaporator:

- The evaporator (suction) pressure is at or below the "Pumpdown Termination Pressure" setting OR LERTC saturated pressure (per guidance -5°F minimum), which ever is greater
- The condenser (compressor discharge) pressure exceeds 315psia.
- The compressor pressure ratio exceeds 8.
- The system differential pressure exceeds 265psid or < 25min.

Water with Single Pass Evaporator:

- The evaporator (suction) pressure is at or below the "Pumpdown Termination Pressure" setting OR LERTC saturated pressure (32°F), which ever is greater
- The condenser (compressor discharge) pressure exceeds 315psia.
- The compressor pressure ratio exceeds 12.3
- The system differential pressure exceeds 265psid.

Glycol with Single Pass Evaporator:

- The evaporator (suction) pressure is at or below the "Pumpdown Termination Pressure" setting OR LERTC saturated pressure (per guidance -5°F minimum), which ever is greater
- The condenser (compressor discharge) pressure exceeds 315psia.
- The compressor pressure ratio exceeds 12.3
- The system differential pressure exceeds 265psid.

The maximum allowed time for Operational Pumpdown is Max Pumpdown Time setting (default to 120 sec.) * number of compressors configured on the circuit.

***Automatic evaporator isolation valve control will close valve if Outdoor Ambient Air Temperature at circuit shutdown is less than evaporator leaving water cutout setpoint plus 3°C.

****If Condenser Refrigerant Tanks are installed

Figure 61. Sequence of events: satisfied setpoint

Unloading Unstaging

Figure 62 shows the normal transition from full load to minimum load while the chiller is running.

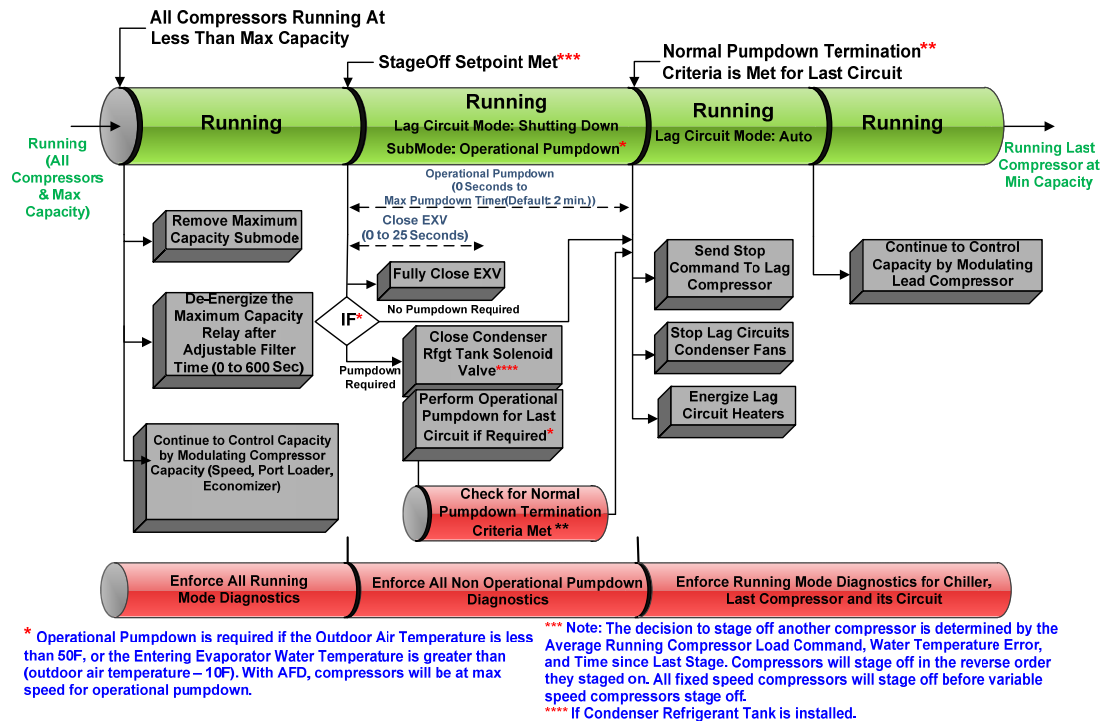


Figure 62. Sequence of events: Unloading unstaging

Normal Shutdown to Stopped or Run Inhibit

Figure 63 shows the transition from Running through a Normal (friendly) shutdown. The dashed lines on the top attempt to show the final mode if you enter the stop via various inputs.

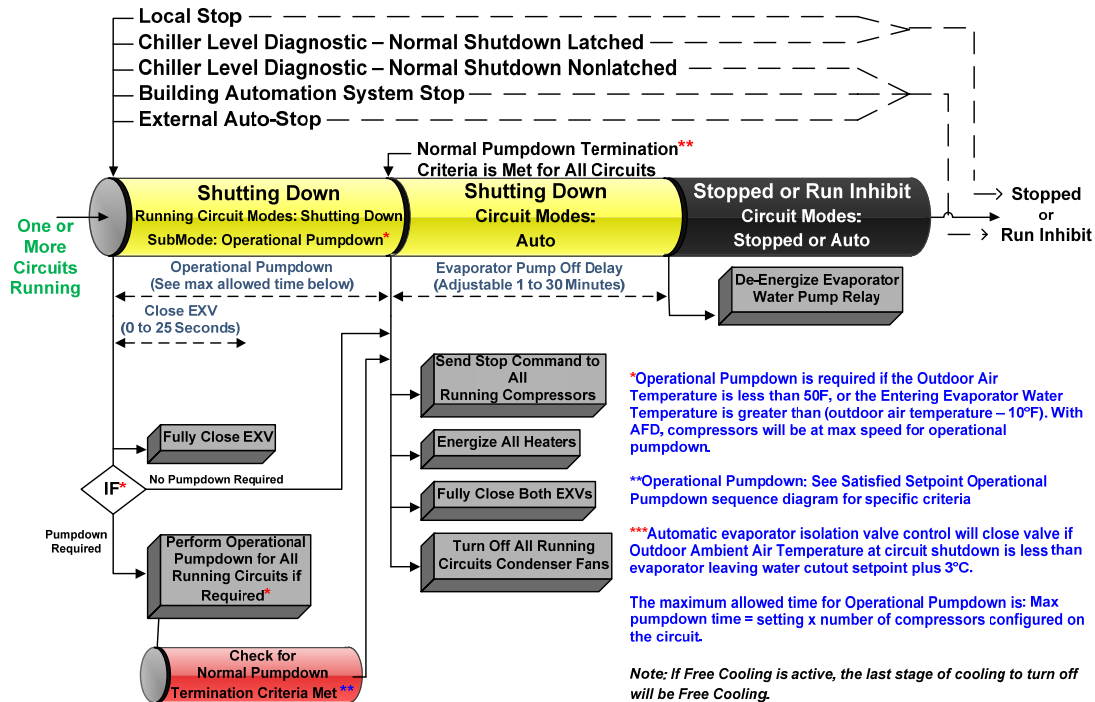


Figure 63. Sequence of events: normal shutdown to stopped or run inhibit

Immediate Shutdown to Stopped or Run Inhibit

Figure 64 shows the transition from Running through an immediate shutdown. The dashed lines on the top attempt to show the final mode if you enter the stop via various inputs.

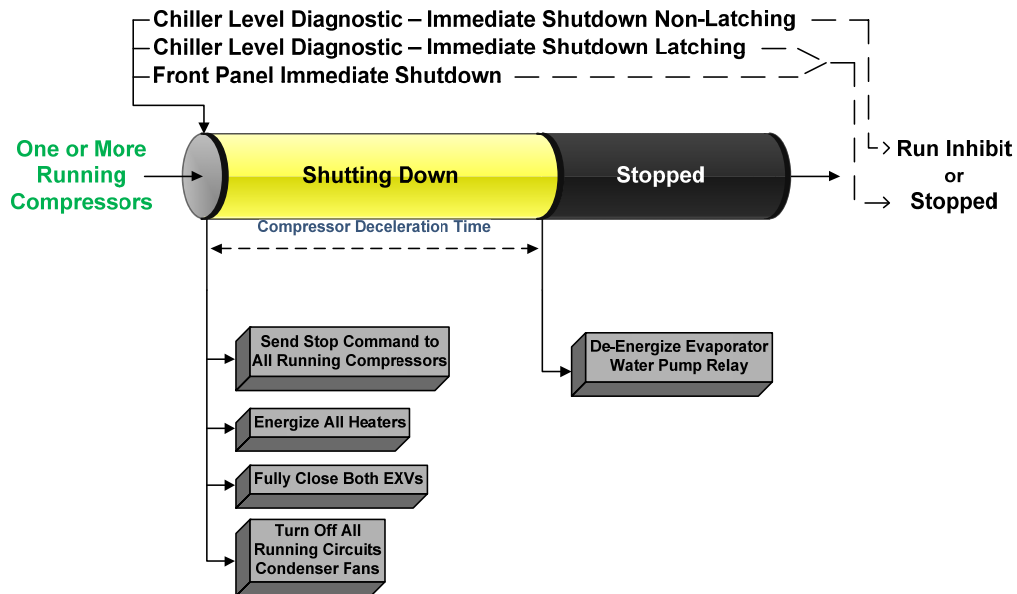


Figure 64. Sequence of events: immediate shutdown to stopped or run inhibit

Diagnostics

Diagnostic Name (Text) and Source:

Diagnostic Name Source: Diagnostics may be shown in the spec with a source of "xy". In this case, letter "x" can be either "1" or "2" (signifying which circuit) and letter "y" can be "A" or "B" (signifying which compressor on that circuit).

Affects Target: Defines the "target" or what is affected by the diagnostic. Usually either the entire Chiller, or a particular Circuit or Compressor is affected by the diagnostic (the same one as the source), but in special cases functions are modified or disabled by the diagnostic. None implies that there is no direct affect to the chiller, sub components or functional operation.

Design Note: TU does not support the display of certain targets on its Diagnostics pages although the functionality implied by this table is supported. Targets such as Evap Pump, Ice Mode, Heat Mode, Chilled Water Reset, External Setpoints etc. - are displayed as simply "Chiller" even though they do not imply a chiller shutdown - only a compromise of the specific feature.

Severity: Defines the severity of the above effect. Immediate means immediate shutdown of the affected portion; for AFD generated diagnostics, Immediate implies immediately de-energized compressor windings, while Immediate implies controlled deceleration to compressor stop. Normal means normal or friendly shutdown of the affected portion, Special Action means a special action or mode of operation (limp along) is invoked, but without shutdown, and Info means an Informational Note or Warning is generated. Design Note: TU does not support display of "Special Action" on its Diagnostics pages, so that if a diagnostic has a special action defined in the table below, it will be displayed only as "Informational Warning" as long as no circuit or chiller shutdown results. If there is a shutdown and special action defined in the table, then the TU Diagnostics Page display will indicate the shutdown type only.

Persistence: Defines whether or not the diagnostic and its effects are to be manually reset (Latched), or can be either manually or automatically reset when and if the condition returns to normal (Nonlatched).

Active Modes [Inactive Modes]: States the modes or periods of operation that the diagnostic is active in and, as necessary, those modes or periods that it is specifically "not active" in as an exception to the active modes. The inactive modes are enclosed in brackets, []. Note that the modes used in this column are internal and not generally annunciated to any of the formal mode displays.

Criteria: Quantitatively defines the criteria used in generating the diagnostic and, if nonlatching, the criteria for auto reset. If more explanation is necessary a hot link to the Functional Specification is used.

Reset Level: Defines the lowest level of manual diag-

nostic reset command which can clear the diagnostic. The manual diagnostic reset levels in order of priority are: Local or Remote. For example, a diagnostic that has a reset level of Remote, can be reset by either a remote diagnostic reset command or by a local diagnostic reset command.

Help Text: Provides for a brief description of what kind of problems might cause this diagnostic to occur. Both control system component related problems as well as chiller application related problems are addressed (as can possibly be anticipated). These help messages will be updated with accumulated field experience with the chillers.

Controls

AFD Diagnostics

Table 38. AFD diagnostics

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD Fault - xA	Cprsr	Immediate	NonLatch	All	AFD Fault. Numerous drive faults can cause this general fault including High Pressure Cutout for AFD compressors. See Service Literature xxxx for a list of fault codes and description.	Local
AFD Motor Current Overload - xA	Circuit	Immediate	Latch	All	Compressor current exceeded overload time vs. trip characteristic. Must trip = 132% RLA, Must hold=125%	Local
AFD Interrupt Failure - xA	Chiller	Immediate Shutdown and Special Action	Latch	AFD Intended to be OFF	Respective AFD is reporting that it is still running the compressor when the MP has commanded the drive/compressor to be Off. Detection time shall be 10 seconds minimum and 15 seconds maximum.	Local

Starter Diagnostics

Table 39. Starter diagnostics

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Starter Did Not Transition - xy	Cprsr	Immediate	Latch	On the first check after transition.	The Starter Module did not receive a transition complete signal in the designated time from its command to transition. The Must Hold time from the Starter Module transition command is 1 second. The Must Trip time from the transition command is 6 seconds. Actual design is 2.5 seconds. This diagnostic is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters.	Local
Phase Reversal - xy	Cprsr	Immediate	Latch	Compressor energized to transition command [All Other Times]	A phase reversal was detected on the incoming current. On a compressor startup, the phase reversal logic must detect and trip in a maximum of .3 second from compressor start.	Local
Starter Dry Run Test - xy	Cprsr	Immediate	Latch	Starter Dry Run Mode	While in the Starter Dry Run Mode either 50 % Line Voltage was sensed at the Potential Transformers or 10 % RLA Current was sensed at the Current Transformers.	Local
Phase Loss - xy	Cprsr	Immediate	Latch	Start Sequence and Run modes	a. No current was sensed on one or two of the current transformer inputs while running or starting (See Non-latching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b. If Phase reversal protection is enabled and current is not sensed on one or more current transformer inputs. Logic will detect and trip in a maximum of 0.3 seconds from compressor start.	Local

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Power Loss - xy	Cprsr	Immediate	NonLatch	All compressor running modes [all compressor starting and non-running modes]	The compressor had previously established currents while running and then all three phases of current were lost. Design: Less than 10% RLA, trip in 2.64 seconds. This diagnostic will preclude the Phase Loss Diagnostic and the Transition Complete Input Opened Diagnostic from being called out. To prevent this diagnostic from occurring with the intended disconnect of main power, the minimum time to trip must be greater than the guaranteed reset time of the Starter module. Note: This diagnostic prevents nuisance latching diagnostics due to a momentary power loss – It does not protect motor/compressor from uncontrolled power reapplication. See Momentary Power Loss Diagnostic for this protection. This diagnostic is not active during the start mode before the transition complete input is proven. Thus a random power loss during a start would result in either a "Starter Fault Type 3" or a "Starter Did Not Transition" latching diagnostic.	Remote
Severe Current Imbalance - xy	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Starter Failed to Arm/Start - xy	Cprsr	Immediate	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Fault Type I - xy	Cprsr	Immediate	Latch	Starting - Y Delta Starters Only	This is a specific starter test where 1M(1K1) is closed first and a check is made to ensure that there are no currents detected by the CT's. If currents are detected when only 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type II - xy	Cprsr	Immediate	Latch	Starting All types of starters	a. This is a specific starter test where the Shorting Contactor (1K3) is individually energized and a check is made to ensure that there are no currents detected by the CT's. If current is detected when only S is energized at Start, then 1M is shorted. b. This test in a. above applies to all forms of starters (Note: It is understood that many starters do not connect to the Shorting Contactor.).	Local
Starter Fault Type III - xy	Cprsr	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	As part of the normal start sequence to apply power to the compressor, the Shorting Contactor (1K3) and then the Main Contactor (1K1) were energized. 1.6 seconds later there were no currents detected by the CT's for the last 1.2 Seconds on all three phases. The test above applies to all forms of starters except Adaptive Frequency Drives.	Local
Transition Complete Input Shorted - xy	Cprsr	Immediate	Latch	Pre-Start	The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters.	Local
Transition Complete Input Opened - xy	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be opened with the compressor motor running after a successful completion of transition. This is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters. To prevent this diagnostic from occurring as the result of a power loss to the contactors, the minimum time to trip must be greater than the trip time for the power loss diagnostic.	Local

Controls

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Motor Current Overload - xy	Circuit	Immediate	Latch	Cprsr Energized	Compressor current exceeded overload time vs. trip characteristic. Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds	Local
Starter Contactor Interrupt Failure - xy	Chiller	Immediate and Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evap Pump Output, and continue to command the affected compressor off, fully unload the effected compressor and command a normal stop to all other compressors. For as long as current continues, perform liquid level, oil return, and fan control on the circuit effected. During contactor interrupt failure, circuit will not be confirmed off, so THR unit sequence should continue running. If THR turns off due to a diagnostic or lockout during contactor interrupt failure, the circuit reverts to air-cooled condenser fan control within 1 second.	Local
Over Voltage	Chiller	Normal	NonLatch	Pre-Start and Any Ckt(s) Energzd	Nom. trip: 60 seconds at greater than 112.5%, $\pm 2.5\%$, Auto Reset at 110% or less for 10 continuous seconds.	Remote
Under Voltage	Chiller	Normal	NonLatch	Pre-Start and Any Ckt(s) Energzd	Nom. trip: 60 seconds at less than 87.5%, $\pm 2.8\%$ at 200V $\pm 1.8\%$ at 575V, Auto Reset at 90% or greater for 10 continuous seconds.	Remote
Starter Comm Loss: Main Processor - xy	Cprsr	Immediate	Latch	All	The Starter module detected a continual loss of communication with the main processor for greater than the Communications Loss Time bound setpoint.	Local
Starter Module Memory Error Type 1 - xy	Cprsr	Warning	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
Starter Module Memory Error Type 2 - xy	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Default configuration loaded into RAM and EEPROM.	Local

Main Processor Diagnostics

Table 40. Main processor diagnostics

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
MP: Reset Has Occurred	Platform	Warning	NonLatch	All	The main processor has successfully come out of a reset and built its application. A reset may have been due to a power up, installing new software or configuration. This diagnostic is immediately and automatically cleared and thus can only be seen in the Historic Diagnostic List in Tracer TU.	Remote
Unexpected Starter Shutdown - xy	Cprsr	Normal	NonLatch	All Cprsr Running modes, Starting, Running and Preparing to Shutdown	The Starter module status reported back that it is stopped when the MP thinks it should be running and no Starter diagnostic exist. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the Starter to the MP, or due to mis-binding	Local

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Motor Winding Temperature - xA	Cprsr	Immediate	Latch	All	The respective compressor's motor winding thermostat is detected to be open. The compressor shall stop within 5 seconds of this diagnostic.	Local
AFD %RLA Feed-back - xA	Cprsr	Normal	Latch	All	Out-Of-Range Low or Hi or bad LLID	Remote
Low Refrigerant Temperature	Circuit	Immediate	Latch	All Ckt Running Modes	The warmer of either the either the Evaporator Refrigerant Pool Temperature or Active Rfgt Sat Temp for the respective circuit dropped below the Low Refrigerant Temperature Cutout Setpoint for 2250°F-sec (12°F-sec max rate for early circuit startup period) while the circuit was running. The minimum LRTC setpoint is -5°F the point at which oil separates from the refrigerant. The integral is held nonvolatile though power down, is continuously calculated, and can decay or build during the circuit off cycle as conditions warrant.	Remote
Low Oil Flow - xy	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The intermediate oil pressure sensor for this compressor was out of the acceptable pressure range for 15 seconds, while the Delta Pressure was greater than 15 Psid (172.4 kPa).: Acceptable range is $0.50 > (PC-PI) / (PC-PE)$ for the first 2.5 minutes of operation, and $0.28 > (PC-PI) / (PC-PE)$ thereafter.	Local
Loss of Oil for Compressor (Running)	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes, Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow).	Local
Loss of Oil for Compressor (Stopped)	Circuit	Immediate and Special Action	Latch	Compressor Pre-start [all other modes]	Oil Loss Level Sensor detects a lack of oil in the oil sump feeding the compressor for 90 seconds after EXV preposition is completed (and before EXV equalization, if applicable) on an attempted circuit start. Note: Compressor start is delayed pending oil detection during that time, but not allowed once the diagnostic occurs.	Local
No Differential Refrigerant Pressure - xy	Cprsr	Immediate	NonLatch	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr/circuit startup had expired. In a two compressor circuit, the lower of the two suction pressure is used for circuit DP. Note: This diagnostic will be cleared automatically within 10s.	Remote
No Differential Refrigerant Pressure Lockout - xy	Cprsr	Immediate	Latch	Compressor running on Circuit	Diagnostic No Differential Refrigerant Pressure is triggered 3 times with one hour.	Remote
Low Differential Refrigerant Pressure - xy	Cprsr	Immediate	Latch	Cprsr Energized	For startup, please refer to oil flow protection spec. For running, the system differential pressure for the respective circuit was below the greater of 25 psid (240.5 kPa) or the pressure ratio listed in the table in GP2 Compressor Type Function specification while the compressor is running for a period of time dependent on the deficit (15 sec ignore time from circuit start) – refer to the Oil Flow Protection specification for the time to trip function.	Remote
High Differential Refrigerant Pressure - xy	Cprsr	Normal	Latch	Cprsr Energized	GP2 Cprsr: The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples 5 seconds apart.	Remote

Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Refrigerant Pressure Ratio - xy	Cprsr	Immediate	Latch	Cprsr Energized	The pressure ratio for the respective circuit exceeded 12.3 for 1 contiguous minute while any compressor is running or in service pumpdown. This pressure ratio is a fundamental limitation of the HiVi compressor. The pressure ratio is defined as $P_{cond}(abs)/P_{evap}(abs)$.	Remote
High Oil Temperature - xy	Cprsr	Immediate	Latch	All [compressor run unload or compressor not running]	The oil temperature entering the compressor exceeded 199.4°F.	Remote
Oil Temperature Sensor - xy	Cprsr	Normal	Latch	All	Bad Sensor or LLID	Remote
High Compressor Refrigerant Discharge Temp - xy	Cprsr	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 199.4°F (without oil cooler) or 230°F (with oil cooler). This diagnostic will be suppressed during Stopping mode or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190°F (without oil coolers), or 220°F (with oil coolers).	Remote
Low Discharge Superheat - xy	Cprsr	Normal	Latch	Any Running Mode	While Running Normally, the Discharge Superheat was less than the Low Discharge Superheat Setpoint for more than 7800 degree F seconds. At circuit startup, the Discharge Superheat will be ignored for 5 minutes.	Remote
Compressor Discharge Refrigerant Temperature Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Restart Inhibit Invoked - xy	Cprsr	Warning	NonLatch	All	When restart inhibit warning is enabled, the warning exists when unit has been inhibited from starting and is cleared when a start of a compressor is possible (Start-to-Start Timer expires)	Remote
BAS Failed to Establish Communication	Chiller	Warning and Special Action	NonLatch	At power-up	The BAS was setup as "installed" and the BAS did not communicate with the Lontalk LCIC within 15 minutes after chiller controls power-up. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be affected. Note that this diagnostic is never operational for BACnet Communication interface (BCIC) and only operational with a LonTalk Communication interface (LCIC) if so configured by the BAS or Tracer system.	Remote
BAS Communication Lost	Chiller	Warning and Special Action	NonLatch	All	The BAS was setup as "installed" at the MP and the Lontalk LCIC lost communications with the BAS for 15 contiguous minutes after it had been established. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be affected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored nonvolatile by the MP (either use local or shutdown). Note that this diagnostic is never operational for BACnet Communication interface (BCIC) and only operational with a LonTalk Communication interface (LCIC) if so configured by the BAS or Tracer system.	Remote

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
External Chilled Water Setpoint	Chiller	Warning	Latch	All	a. Function Not "Enabled": no diagnostics. b. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CWS to next level of priority (e.g. Front Panel SetPoint).	Remote
External Demand Limit Setpoint	Chiller	Warning	Latch	All	a. Not "Enabled": no diagnostics. b. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CLS to next level of priority (e.g. Front Panel SetPoint.)	Remote
Inverted Evaporator Water Temperature	Chiller	Warning	NonLatch	Any Ckt Energized [No Ckts Energized]	The entering evaporator water temp fell below the leaving evaporator water temp by more than 2°F for 180 °F-sec, minimum trip time 30 seconds. Diagnostic will auto clear if the leaving water temp – entering water temp < 2F. It can warn of improper flow direction through the evaporator, misbound water temperature sensors, improper sensor installation, partially failed sensors, or other system problems. Note that either entering or leaving water temp sensor or the water system could be at fault.	Remote
Evaporator Entering Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making so it must cause a unit shutdown even if ice or CHW reset is not installed.	Remote
Evaporator Leaving Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
Condenser Refrigerant Pressure Sensor	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Suction Refrigerant Pressure Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Evaporator Refrigerant Pool Temperature Sensor	Circuit	Warning and Special Action	Latch	All	Bad Sensor or LLID. Note: The Evap Pool Temp Sensors are used for evaporator freeze protection (running and non-running). Invalidate evaporator pool temperature sensor measurement if this diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions.	Remote
Evaporator Refrigerant Pool Temperature Sensor Error	Circuit	Warning and Special Action	Latch	Ckt Energized [Ckt Not Energized]	The evaporator refrigerant pool temperature measurement is larger than the evaporator entering water temperature by more than 4°C (7.2°F) for 5 continuous minutes. There is an ignore time of 2 minutes following circuit startup. The trip criteria is not evaluated (and time above the threshold is not counted) until the ignore time passes. Invalidate evaporator pool temperature sensor measurement if this diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions.	Local
Liquid Line Temperature Sensor	Circuit	Normal	Latch	All	Bad Sensor or LLID. Note: This is the subcooled liquid line temp sensor.	Remote

Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Liquid Line Pressure Sensor	Circuit	Normal	Latch	All	Bad Sensor or LLID. Note: This is the subcooled liquid line pressure sensor.	Remote
Evaporator Approach Error	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt x) is negative by more than 10°F for 1 minute continuously while the circuit / compressor is operating. Either the Evap Leaving Water Temp sensor or Evap Suction Rfgr Pressure Sensor Ckt x is in error.	Remote
Oil Pressure Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Oil Flow Protection Fault - xy	Cprsr	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Sensor for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psid or more, or below its respective compressor Suction Pressure 10 Psid or more for 30 seconds continuously.	Local
Low Suction Refrigerant Pressure	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Suction Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). b. During Early Startup Period: the Suction Pressure fell below a pressure equal to Condenser Pressure ÷ 8 but as limited to not less than 6 or greater than 10 psia. c. After Early Startup Period expires: The Suction Pressure fell below 16 Psia.	Local
Very Low Evaporator Rfgr Pressure - xy	Chiller	Immediate	Latch	All	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrigerant Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. Note: Unlike previous products, even if the circuit associated with the suction pressure sensor is locked out, it will not defeat the protection afforded by this diagnostic.	Local
Low Evaporator Water Temp (Unit On)	Chiller	Immediate and Special Action	NonLatch	Any Ckt[s] Energzd [No Ckt(s) Energzd]	The evaporator entering or leaving water temperature fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when both of the temperature rises 2 °F (1.1°C) above the cutout setting for 2 minutes. This diagnostic shall not de-energize the Evaporator Water Pump Output.	Remote
Low Evaporator Water Temp (Unit Off)	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energzd [Any Ckt Energzd]	Either the entering or leaving evaporator water temp. fell below the leaving water temp cutout setting for 30 degree F seconds while the Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Freeze Avoidance Request Relay and Evap Water Pump Relay until diagnostic auto resets, then de-energize the Freeze Avoidance Request Relay and return to normal evap pump control. Automatic reset occurs when both temps rise 2°F (1.1°C) above the cutout setting for 5 minutes, or either circuit starts. This diagnostic even while active, does not prevent operation of either circuit.	Remote

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Evaporator Rfgt Temp Circuit 1: Unit Off	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	The respective circuit's LERTC Integral was seen to be > 0 while the chiller is in the Stop mode, or in Auto mode with no compressors running for at least one minute. The LERTC integral is increased if the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 2°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 4°F (1.1°C) above the LERTC cutout setting for 1 minute and the Chiller Off LERTC Integral = 0.. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Low Evaporator Rfgt Temp Circuit 2: Unit Off	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	The respective circuit's LERTC Integral was seen to be > 0 while the chiller is in the Stop mode, or in Auto mode with no compressors running for at least one minute. The LERTC integral is increased if the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 2°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 4°F (1.1°C) above the LERTC cutout setting for 1 minute and the Chiller Off LERTC Integral = 0.. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Evaporator Water Flow Overdue	Chiller	Normal	NonLatch	Estab. Evap. Water Flow on going from STOP to AUTO or Evap Pump Override.	Evaporator water flow was not proven within 20 minutes of the Evaporator water pump relay being energized in normal "Stop" to "Auto" transition. If the pump is overridden to "On" for certain diagnostics, the delay on diagnostic callout shall be only 255 seconds. The pump command status will not be effected by this diagnostic in either case.	Local
Evaporator Water Flow Overdue – Pump 1	Chiller	Warning and Special Action	NonLatch	All	After the pump request was activated, the evaporator water flow overdue wait time elapsed before water flow was established. Special action is to keep the evap pump request active in a diagnostic override mode. See Evaporator_Water_Pump_Control.doc	Local
Evaporator Water Flow Overdue – Pump 2	Chiller	Warning and Special Action	NonLatch	All	After the pump request was activated, the evaporator water flow overdue wait time elapsed before water flow was established. Special action is to keep the evap pump request active in a diagnostic override mode. See Evaporator_Water_Pump_Control.doc	Local
Evaporator Water Flow Lost	Chiller	Immediate	NonLatch	[All Stop modes]	a. The Evaporator water flow switch input was open for more than 6 contiguous seconds (or 20 seconds for thermal dispersion type flow switch). b. This diagnostic does not de-energize the evap pump output. c. 6 seconds of contiguous flow shall clear this diagnostic. (further review needed when implementing thermal dispersion for Pueblo)	Local

Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Water Flow Lost – Pump 1	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Lost diagnostic occurred while Pump 1 was the selected pump. Specific details of special action are described in Evaporator_Water_Pump_Control.doc	Local
Evaporator Water Flow Lost – Pump 2	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Lost diagnostic occurred while Pump 2 was the selected pump. Specific details of special action are described in Evaporator_Water_Pump_Control.doc	Local
Evaporator Pump 1 Fault	Chiller	Immediate or Warning and Special Action	NonLatch	All	For systems with no evaporator pump, a single evaporator pump, or a single inverter driving dual evaporator pumps, an immediate shutdown shall be performed. For multiple pump systems, detection of a pump fault will generally cause pump control to switch to the redundant pump. For single inverter, dual pump configuration, switching to the redundant pump can only happen after the fault is cleared. Specific details of special action are described in Evaporator_Water_Pump_Control.doc	Local
Evaporator Pump 2 Fault	Chiller	Immediate or Warning and Special Action	NonLatch	All	For systems with no evaporator pump, a single evaporator pump, or a single inverter driving dual evaporator pumps, an immediate shutdown shall be performed. For multiple pump systems, detection of a pump fault will generally cause pump control to switch to the redundant pump. For single inverter, dual pump configuration, switching to the redundant pump can only happen after the fault is cleared. Specific details of special action are described in Evaporator_Water_Pump_Control.doc	Local
Evap Pump 1 Starts Run Time Written	Chiller	Warning	NonLatch	All	Diagnostic is triggered when the Evap Pump 1 Starts Run Time is manually over written. Diagnostic automatically clears and is immediately placed into the Historic Diagnostic Log.	Local
Evap Pump 2 Starts Run Time Written	Chiller	Warning	NonLatch	All	Diagnostic is triggered when the Evap Pump 2 Starts Run Time is manually over written. Diagnostic automatically clears and is immediately placed into the Historic Diagnostic Log.	Local
High Evaporator Refrigerant Pressure	Chiller	Immediate	NonLatch	All	The evaporator refrigerant pressure of either circuit has risen above 190 psig. The evaporator water pump relay will be de-energized to stop the pump regardless of why the pump is running. The diagnostic will auto reset and the pump will return to normal control when all of the evaporator pressures fall below 185 psig. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing refrigerant side pressures, close to the evaporator relief valve setting, when the chiller is not running, such as could occur with Evap Water Flow Overdue or Evaporator Water Flow Loss Diagnostics.	Remote

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Evaporator Water Temperature	Chiller	Warning and Special Action	NonLatch	Only effective if either 1) Evap Wtr Flow Overdue, 2) Evap Wtr Flow Loss, or 3) Low Evap Rfgt Temp,- Unit Off, diagnostic is active.	Either the leaving or the entering water temperature exceeded the high evap water temp limit (TU service menu settable –default 105F (65.55C), range 80F (26.67C)-150F(65.55C) for 15 continuous seconds. The evaporator water pump relay will be de-energized to stop the pump but only if it is running due one of the diagnostics listed on the left. The diagnostic will auto reset and the pump will return to normal control when both the entering and leaving temperatures fall 5°F below the trip setting. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing excessive waterside temperatures and waterside pressures when the chiller is not running but the evap pump is on due to either Evap Water Flow Overdue, Evaporator Water Flow Loss , or Low Evap Temp – Unit Off Diagnostics. This diagnostic will not auto clear solely due to the clearing of the enabling diagnostic.	Remote
High Pressure Cut-out - xy	Cprsr	Immediate	Latch	All	A high pressure cutout was detected; trip at 315 ± 5 PSIG. For AFD compressor configurations, the HPC is connected directly to the AFD and the UC800 will get an AFD Fault – xA diagnostic when the HPC is tripped.	Local
Excessive Condenser Pressure	Circuit	Immediate	Latch	All	The condenser pressure sensor of this circuit has detected a condensing pressure in excess of the design high side pressure as limited by the particular compressor type.	Remote
Emergency Stop Feedback Input	Chiller	Immediate	Latch	All	a. Emergency stop feedback input is open. An external interlock has tripped. Time to trip from input opening to unit stop shall be 0.1 to 1.0 seconds.	Local
Outdoor Air Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID.	Remote
Pumpdown Terminated By Time	Circuit	Warning	Latch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time. Reference Service Pumpdown spec for maximum time allowed.	Local
Chiller Service Recommended	Chiller	Warning	Latch	Service Messages Enabled	Chiller service interval time has elapsed. Chiller service is recommended.	Remote
Evap Water Pump 1 Svc Recommended	Chiller	Warning	Latch	Service Messages Enabled	Pump service recommended as service interval hours have elapsed.	Remote
Evap Water Pump 2 Svc Recommended	Chiller	Warning	Latch	Service Messages Enabled	Pump service recommended as service interval hours have elapsed.	Remote
Mfr Maintenance Recommended - xy	Cprsr	Warning	Latch	Service Messages Enabled	Compressor service recommended as service interval hours have elapsed.	Remote
Water System Differential Pressure	Chiller	Warning	Latch	All	Bad Sensor or LLID	Remote
Evaporator Differential Water Pressure	Chiller	Warning	Latch	All	While the water pumps are running, the difference between the Evaporator Entering Water Pressure and Evaporator Leaving Water Pressure reading is a negative number. A negative number will trigger this diagnostic.	Remote
Evaporator Entering Water Pressure	Chiller	Warning	Latch	All	Bad Sensor or LLID	Remote
Evaporator Leaving Water Pressure	Chiller	Warning	Latch	All	Bad Sensor or LLID	Remote
MP: Invalid Configuration	N/A	N/A	Latch	All	MP has an invalid configuration based on the current software installed.	Remote

Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
LCI-C Software Mismatch: Use BAS Tool	Chiller	Warning	NonLatch	All	The neuron software in the LCI-C module does not match the chiller type. Download the proper software into the LCI-C neuron. To do this, use the Rover service tool, or a LonTalk® tool capable of downloading software to a Neuron 3150®.	Remote
Starts/Hours Modified - xy	Cprsr	Warning	NonLatch	All	The current value for the cumulative starts and or hours for the given compressor have been modified by a write override from TU.	Remote
Software Error 1001: Call Trane Service	Chiller	Immediate	Latch	All	A high level software watchdog has detected a condition in which there was a continuous 1 minute period of compressor operation, with neither Evaporator water flow nor a" contactor interrupt failure" diagnostic active. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Software Error 1002: Call Trane Service	Chiller	Immediate	Latch	All	Reported if state chart misalignment in stopped or inactive state occurred while a compressor was seen to be operating and this condition lasted for at least 1 minute (cprsr operation due to Service Pumpdown or with Contactor Interrupt Failure diagnostic is excluded). The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Software Error 1003: Call Trane Service	Chiller	Immediate	Latch	All	Reported if state chart misalignment occurred inferred from the Capacity Control, Circuit, or Compressor State Machines remaining in the Stopping state for more than 3 minutes. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local

Communication Diagnostics

Notes:

- The following communication loss diagnostics will not occur unless that input or output is required to be present by the particular configuration and installed options for the chiller.
- Communication diagnostics (with the exception of "Excessive Loss of Comm" are named by the Functional name of the input or output that is no longer being heard from by the Main Processor. Many LLIDs, such as the Quad Relay LLID, have more than one functional output associated with it. A comm loss with such a multiple function board, will generate multiple diagnostics. Refer to the Chiller's wiring diagrams to relate the occurrence of multiple communication diagnostics back to the physical LLID boards that they have been assigned to (bound).
- Communication loss diagnostics shall be timed based on action (target status) and not annunciation on the operator display.

Table 41. Communications diagnostics

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: External Auto/Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Emergency Stop Feed-back Input	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: External Ckt Lockout	Circuit	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatile hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Remote
Comm Loss: Outdoor Air Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Leaving Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Entering Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making & CHW reset, so it must cause a unit shutdown even if Ice or CHW reset is not installed.	Remote
Comm Loss: External Chilled Water Setpoint	Chiller	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Chilled Water Setpoint source and revert to the next higher priority for setpoint arbitration	Remote
Comm Loss: External Demand Limit Setpoint	Chiller	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Demand limit setpoint and revert to the next higher priority for Demand Limit setpoint arbitration.	Remote
Comm Loss: Motor Winding Thermostat Compressor xA	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Water Flow Switch	Chiller	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Suction Refrigerant Pressure - xy	Cprsr	Immediate	Latch	All [Ckt/Cprsr lock out]	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Condenser Refrigerant Pressure	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Pressure - xy	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Temperature - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Loss Level Sensor Input	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Return Line Solenoid Valve -xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Compressor Discharge Rfght Temperature - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Slide Valve Load - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Slide Valve Unload - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Step Load - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Economizer Valve - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Economizer Discharge Pressure - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Economizer Discharge Temp - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Water Pump 1 Relay	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Water Pump 2 Relay	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Starter xy	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Speed Command - xA	Cprsr	Normal	NonLatch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 15-30 second period.	Remote
Comm Loss: %RLA Indication Output(-Vdc)	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 15-30 second period.	Remote
Comm Loss: Local BAS Interface	Chiller	Warning	NonLatch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Use last valid BAS setpoints. Diagnostic is cleared when successful communication is established with the LonTalk LLID (LCIC) or BACnet LLID (BCIC).	Remote
Comm Loss: Programmable Relay Board 1	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Programmable Relay Board 2	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch - xy	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Auxiliary Setpoint Command	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 15-30 second period.	Remote
Comm Loss: Energy Meter Pulse Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Ext Noise Reduction Request	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Inverter Speed Command	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 15-30 second period.	Remote
Comm Loss: Fan Inverter Speed Command, Shared Circuit 1 & 2	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 15-30 second period. This is a warning, as it is conceivable that the circuit may run without the center shared fan deck working if there are many other coils/fans on the circuits.	Remote

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Con- denser Fan Enable	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Board 1 Relay X	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Board 2 Relay X	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Con- denser Fan Enable, Shared Circuit 1&2	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. This is a warning, as it is conceivable that the circuit may run without the center shared fan deck working if there are many other coils/fans on the circuits.	Remote
Comm Loss: Con- denser Refrigerant Tank Valve	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap- orator Refrigerant Pool Temperature	Circuit	Special Action and Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Invalidate evaporator pool temperature sensor measurement if this diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions.	Remote
Comm Loss: Liquid Line Temperature	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: The Subcooled Liquid Line Temperature Sensors are used for determination of charge and accurate tonnage predictions	Remote
Comm Loss: Liquid Line Pressure	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Elec- tronic Expansion Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the EXV Step Status has occurred for a 30 second period, OR EXV Steps Maximum Position has not been received. If EXV Steps Maximum Position has not been received, MP will periodically request EXV Steps Maximum Position, since it is only transmitted upon request.	Remote
Comm Loss: Evap- orator Pump 1 Fault Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap- orator Pump 2 Fault Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap- orator Water Pump Inverter 1 Fault Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Water System Differential Pressure	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap- orator Differential Water Pressure	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evapo- rator Pump Inverter 1 Run Command	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evapo- rator Water Pump Inverter Speed	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote



Controls

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Evaporator Water Pump Inverter Frequency Input	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Entering Water Pressure	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Leaving Water Pressure	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Operating Principles

This chapter describes the overall operating principles of the RTAG design. The detail information of a specific unit see the attached documents of unit.

Refrigerant Circuit

The refrigerant cycle of the RTAG chiller is similar to that of other Trane air cooled screw chillers. Which includes

single circuit , two circuits duplex system. RTAG085 and RTAG100 are single circuit, with one rotary screw compressor; while others are two circuits with one or two compressors per circuit, and one chilled water loop . The system schematic of two circuits is shown in [Figure 65. System Schematic](#).

RTAG Schematic

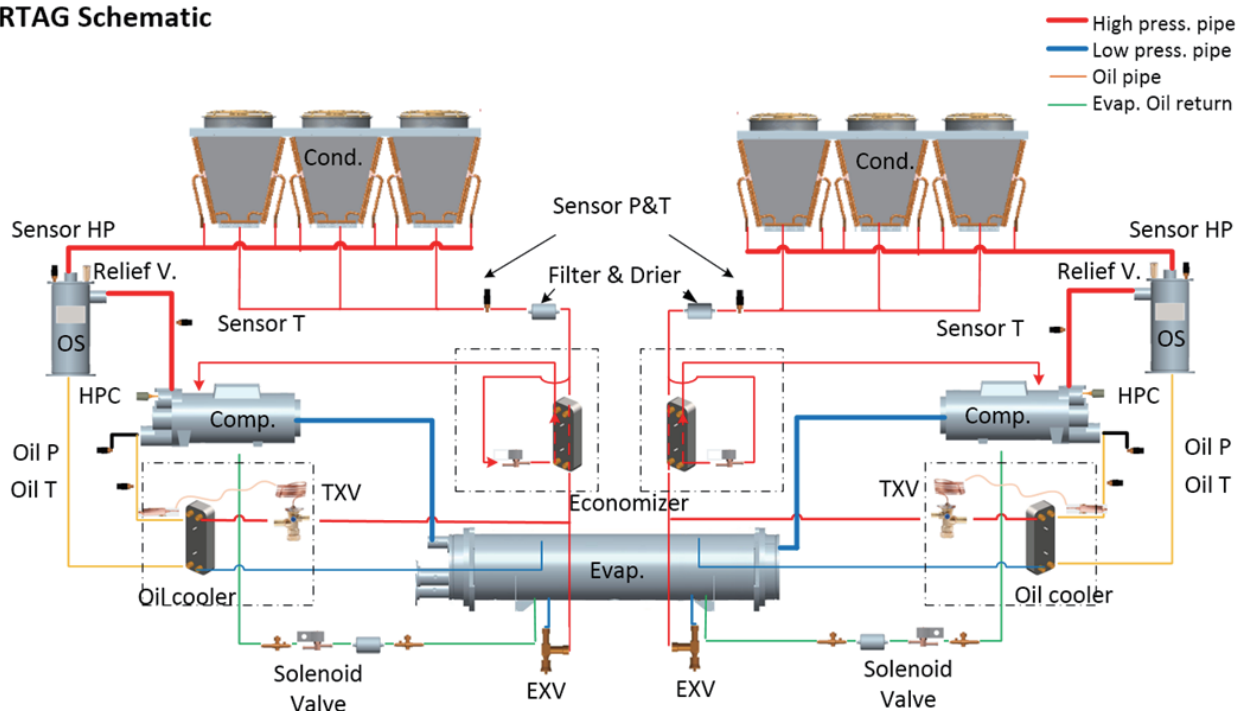


Figure 65. System Schematic

Refrigerant Cycle

The refrigerant cycle of unit without economizer (NTon: 085~225, 255, 285, 375,400, 410) is represented in the pressure enthalpy diagram in [Figure 66](#). Key state points are indicated on the figure. The cycle for the full load ARI design point is represented in the plot. The RTAG chiller uses a shell and tube evaporator design with refrigerant evaporating on the shell side and water flowing inside tubes having enhanced surfaces (states 4 to 1). The suction lines are designed to minimize pressure drop (states 1 to 1b). The compressor is a twin rotor helical rotary compressor designed similarly to the compressors offered in other Trane screw compressor based chiller (states 1b to 2). The discharge lines include a highly efficient oil separation system that removes 99.5% of the oil from the refrigerant stream going to the heat exchangers (states 2 to 2b). De-superheating, condensing and sub-cooling are accomplished in fin and tube air cooled heat exchanger where refrigerant is condensed in

the 7mm tube (states 2b to 3b). Refrigerant flow through the system is balanced by an electronic expansion valve (states 3b to 4).

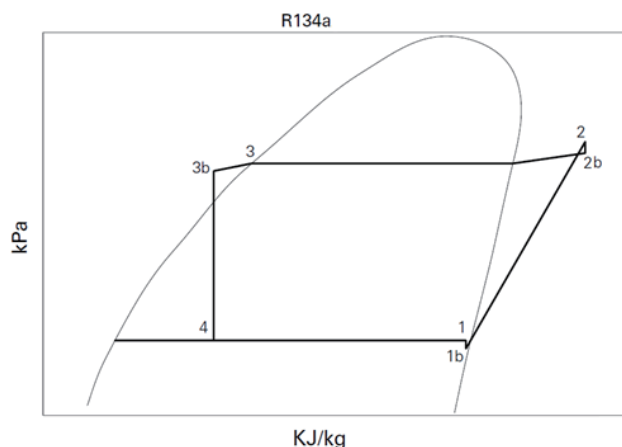


Figure 66. Pressure Enthalpy (P-h) diagram of RTAG

Operating Principles

Figure 67 show the refrigerant cycle of pressure enthalpy diagram of RTAG with economizer unit (nominal tonnage 225, 310, 340, 440). Comparing to figure 57, the leaving condenser refrigerant (states 5) don't enter EXV, which is separated into two parts. The minor parts pass through minor EXV (states 5-6), enters brazed plates heat exchanger economizer, evaporating in economizer (states 6-7), the superheated refrigerant gas entering compressor auxiliary port (states 7). The major parts of refrigerant leaving condenser also enter economizer and be cooled again (states 5-3b), the super cooled major refrigerant go through EXV (states 3b-4), enters evaporator (4-1).

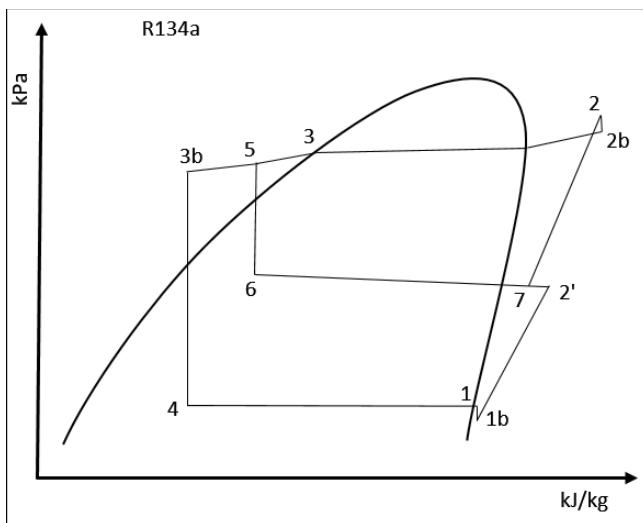


Figure 67. Pressure Enthalpy (P-h) diagram of RTAG with Economizer

R134a Refrigerant

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 properly qualified. All local and international regulations in what handling, reclaiming, recovering and recycling, must be followed.

R134a is a medium pressure refrigerant. It may not be used in any condition that would cause the chiller to operate in a vacuum without a purge system. RTAG is not equipped with a purge system. Therefore, the RTAG chiller may not be operated in a condition that would result in a saturated condition in the chiller of -26°C or lower.

NOTICE

R134a requires the use of specific POE oils as designated on the unit nameplate. To avoid compressor damage and insure the performance requirement, use only R134a.

Compressor

The compressor is a semi-hermetic, direct-drive rotary type compressor. Each compressor has only four moving parts: two rotors that provide compression and male and female load-control valves. The male rotor is attached to the motor and the female rotor is driven by the male rotor. The rotors and motor are supported by bearings.

The helical rotary compressor is a positive displacement device. Refrigerant vapor from the evaporator is drawn into the suction opening of the compressor (state 1b), through a suction strainer screen across the motor (which provides motor cooling) and into the intake of the compressor rotors. The gas is then compressed and discharged through a check valve and into the discharge line (state 2).

There is no physical contact between the rotors and the compressor housing. The rotors contact each other at the point where the driving action between the male and female rotors occurs. Oil is injected into the rotors of the compressor, coating the rotors and the compressor housing interior. Although this oil does provide rotor lubrication, its primary purpose is to seal the clearance spaces between the rotors and compressor housing. A positive seal between these internal parts enhances compressor efficiency by limiting leakage between the high pressure and low pressure cavities. dictated by the position of the loading valve relative to the rotors. When the valve slides toward the discharge end of the rotors compressor capacity is reduced.

RTAG high efficiency units and extra efficiency units apply fixed speed compressor, which capacity control is accomplished by means of a female step load-control valve and a male control valve. The female step valve is the first stage of loading after the compressor starts and the last stage of unloading before the compressor shuts down. The male control valve is positioned by a piston cylinder along the length of the male rotor. Compressor capacity is dictated by the position of the loading valve relative to the rotors. When the valve slides toward the discharge end of the rotors compressor capacity is reduced.

For premium seasonal efficiency unit apply varied speed compressor, capacity control is combined action of slide valve and variable frequency driver.

Figure 68, each compressor has an interior replaceable core oil filter. It can remove the impurity which may block the check valve or oil channel of oil, to avoid the excessive wear of rotors and bearing.

Some RTAG unit has economizer, its compressor has a gas inlet at female rotor compression chamber, where refrigerant gas from economizer is inhaled. Compressor with economizer inlet is shown below.

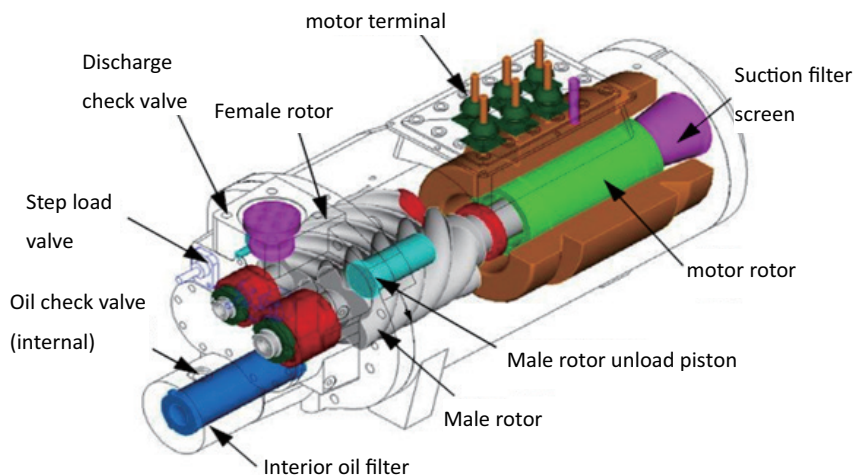


Figure 68. Compressor inner configuration

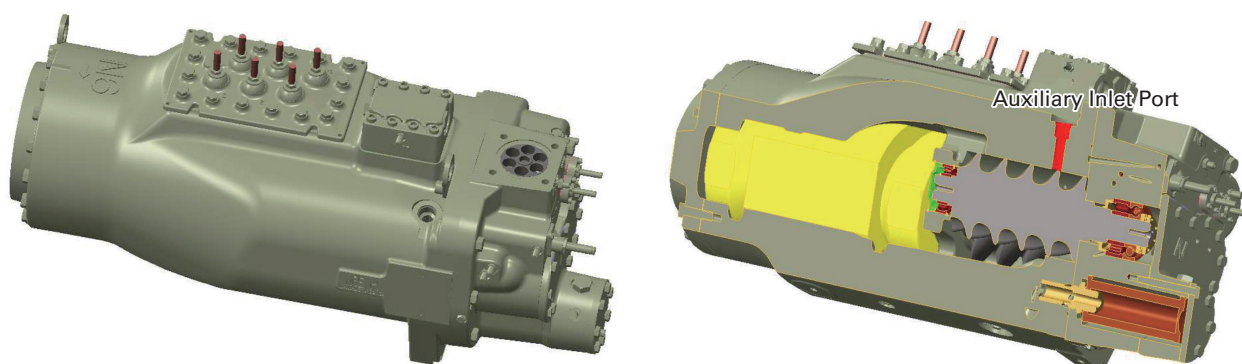


Figure 69. Compressor with Auxiliary Inlet Port

Condenser and Fan

The condenser and subcooler consist of 7mm inner-grooved copper tube which contain the refrigerant, large fins are in the air flow side and fans that draw air through the fins and tubes. Heat is transferred from the refrigerant through the tubes and fins to the air. High pressure gas from the compressor enters the tubes of the condenser through a distribution header (state 2b). As refrigerant flows through the tubes, the heat of compression and cooling load are rejected to the air. In this process the refrigerant is de-superheated, condensed (states 2b to 3) and finally subcooled (states 3 to 3b) to a temperature slightly above the ambient air temperature. The subcooled liquid refrigerant is collected in the leaving header where it is transferred to the liquid line (state 3b).

The air flow rate of fan is controlled according to principle of getting maximum efficiency, mean while considering the system pressure differential. If a warm enough ambient is sensed, all the fans will run. If the ambient is

cooler, some fans are shut off. Fan staging depends on the chiller load, evaporator pressure, condenser effectiveness, ambient temperature, and numbers and sizes of fans installed on the circuit.

Evaporator

RTAG evaporator is CHIL evaporator which is patented by Trane. It is divided into two area: high efficiency boil area and high oil concentration area. A distributor is installed in bottom of high efficiency boil area. Two phase refrigerant (state 4) inject towards to heat exchange through the distributor. The uplifted bubbles enforce the disturb of refrigerant, so the heat exchange efficiency is high. The liquid refrigerant-oil mixture continue flow to high oil concentration area and go on evaporating, oil concentration further increase, and finally go back to compressor. Refrigerant vapor exits the evaporator through the suction line (state 1).

The material of evaporator shell is carbon steel, and tube is internally and externally finned seamless cop-

Operating Principles

per tubes, mechanically expanded into the tube sheets. Tubes are cleanable with dismountable water boxes. Tubes exterior diameter is 19mm. The evaporator is designed, tested and stamped in accordance with GB or ASME Pressure regulation for a refrigerant side working pressure of 1.38MPa. Water side working pressure has two kinds: 1.03MPa (150psig) and 2.06MPa (300psig). Standard water connections are Flange.

Expansion Valve

RTAG adopt EXV to control refrigerant flow. As refrigerant passes through the valve the pressure is dropped substantially, which results in vaporization of some of the refrigerant. So two phase refrigerant enter the distribution of evaporator (state 4), then spray on tube of evaporator evenly.

A TXV (Thermal Expansion Valve) is applied in oil cooler circuits.

Oil Separator

To enhance the performance of the heat exchanger surfaces an oil separator is placed in the discharge line between the compressor and the condenser. RTAG oil separator is centrifuge type. The refrigerant gas is discharged by the compressor, entering oil separator cylinder from the tangential direction of the upper part of it. Oil drop will be thrown out from the refrigerant gas due to the centrifugal force produced by the rotating in the cylinder. Oil that is removed from the refrigerant falls along the cylinder wall by gravity into the oil sump, and then returned to the compressor. The refrigerant vapor, get rid of the oil, is discharged from the top of the oil separator, flow into the condenser. Approximately 99.5% of the oil is removed from the refrigerant in the separator.

Oil system

See [Figure 65](#) System Schematic. Screw compressors require large quantities of oil for lubricating and sealing the rotors and lubricating the bearings, pushing slide valve. The oil mixed with refrigerant at the discharge of the compressor, majority of it is separated and flow to bottom of oil separator, minority enters system circuits with refrigerant. Oil in the oil sump of separator is discharge from oil separator by high pressure when compressor is working. It flows through oil cooler, angle valve, compressor inner filter and shut off valve, then is divided into two ways: one injects to rotors from the top shell of compressor, to lubricate rotors, and seal the gaps between rotors and compressor shell. Another way inject to the bearing chamber to lubricate bearing, then go back to suction port of rotor through oil circuits in the compressor shell. Once oil is injected into the compressor rotors it mixes with the refrigerant again and is delivered back to the oil separator. Very little amount of

oil pasts the oil separator, and flows through the condenser, subcooler and expansion valve into the evaporator. This part of oil is collected with refrigerant at rich oil range of CHIL evaporator, is returned through a line that is connected to the compressor.

An internal, pilot operated shutoff valve is provided to prevent oil flow into the compressor when the compressor is not running.

Pre-Start Checkout

Installation Checklist

Complete this checklist as the unit is installed, and verify that all recommended procedures are accomplished before the unit is started. Fill out [“Table 45. RTAG Chiller Log” P. 115](#). This checklist does not replace the detailed instructions given in the “Installation Mechanical” and “Installation Electrical” sections of this manual. Read both sections completely, to be familiar with the installation procedures, prior beginning the work.

Check Procedure

When installation is complete, before starting the unit, the following prestart procedures must be reviewed and verified:

1. Inspect all wiring connections in the compressor power circuits (disconnects, terminal block, contactors, compressor junction box terminals and so forth) to ensure they are clean and tight.
2. Open all refrigerant valves in the discharge, liquid, and oil return lines, open inlet/outlet valve in water loop; angle valve operation: In the face of valve stem, rotate stem clockwise is close and counterclockwise is open) ; ball valve operation: ball valve open/close status see [Figure 70](#).



Open



Close

Figure 70. Ball Valve Open/Close status

3. Check the power-supply voltage to the unit at the main-power fused-disconnect switch. Voltage must be within the voltage use range which is stamped on the unit nameplate. Voltage fluctuation must not exceed 10%. Voltage imbalance must not exceed 2%.
4. Check the unit power phasing L1-L2-L3 in the starter to ensure that it has been installed in a “A-B-C” phase sequence.
5. Check and confirm all the fans can rotate freely.

6. Fill the evaporator chilled-water circuit. Vent the system while it is being filled. Open the vents on the top of the evaporator water box while filling and close when filling is completed.
7. Start the chilled-water pump to begin circulation of the water. Inspect all piping for leakage and make any necessary repairs.
8. With water circulating through the system, adjust the water flow meet the range of [“Table 1. General data — 100-205 Ton 50Hz unit-high efficiency \(fixed speed fan\)” P. 12](#) and check the water pressure drop through the evaporator according to [“Figure 23. Water flow- pressure drop curve” P. 41](#).
9. Adjust the chilled-water flow switch for proper operation
10. Stop the chilled-water pump
11. Electric evaporator heater with separated single-phase 220V.
12. Maintain power supply, so that compressor and oil electric heater could work. switch button on control touch screen should be in stop state.
13. Check oil level in oil separator.
14. Check and set, as required, all UC800 TD7 menu items
15. Energize the compressor and oil separator heaters 24 hours, prior to unit start up.
16. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer’s literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

NOTICE

Equipment Damage!

Confirm the terminal blocks and the compressor power line has tightened (including circuit breaker, contactor, compressor connector terminals, etc.). Loose connections can cause overheating and under-voltage conditions at the compressor motor.

NOTICE

Compressor Damage!

Catastrophic damage to the compressor will occur if the refrigerant circuit or water circuit are closed on unit start-up.

Pre-Start Checkout

NOTICE

Compressor Damage!

It is imperative that L1, L2, L3 in the starter be connected in the A-B-C phase sequence to prevent equipment damage due to reverse rotation.

NOTICE

Equipment Damage!

Low ambient temperatures, ensure the power supply of evaporator heater so as to avoid the evaporator freezing damage.

NOTICE

Compressor Damage!

Ensure that the compressor and oil separator heaters have been operating for a minimum of 24 hours before first starting after a long down time. Failure to do so may result in equipment damage.

Unit Voltage Power Supply

Unit voltage must meet the criteria given in the installation Electrical Section. Measure each lead of the supply voltage at the main power fused-disconnect switch for the unit. If the measured voltage on any lead is not within the specified range, notify the supplier of the power and correct the situation before operating the unit.

NOTICE

Equipment Damage!

Provide adequate voltage to the unit. Failure to do so can cause control components to malfunction and shorten the life of relay contact, compressor motors and contactors.

Unit Voltage Imbalance

Excessive voltage imbalance between the phases of a three-phase system can cause motors to overheat and eventually fail. The maximum allowable unbalance is 2%. Voltage imbalance is determined using the following calculations:

$$\% \text{ Imbalance} = \frac{(V_x - V_{ave}) \times 100}{V_{ave}}$$

$$V_{ave} = \frac{(V_1 + V_2 + V_3)}{3}$$

V_x = phase with greatest difference from V_{ave}
(without regard to the sign)

For example, if the three measured voltages are 221, 230, and 227 volts, the average would be:

$$(221+230+227)/3 = 226$$

The percentage of the imbalance is then:

$$100 \times (221-226)/226 = -2.2\%$$

This exceeds the maximum allowable (2%) by 0.2 percent.

Unit Voltage Phasing

It is important that proper rotation of the compressors be established before the unit is started. Proper motor rotation requires confirmation of the electrical phase sequence of the power supply. The motor is internally connected for clockwise rotation with the incoming power supply phases A-B-C. When rotation is clockwise, the phase sequence is usually called "ABC", when counter-clockwise "CBA"

This direction may be reversed by interchanging any two of the line wires. It is this possible interchange of wiring that makes a phase sequence indicator necessary if the operator is to quickly determine the phase rotation of the motor.

Proper compressor motor electrical phasing can be quickly determined and corrected before starting the unit. Use a quality instrument, such as the Associated Research Model 45 Phase Sequence Indicator, and follow this procedure:

1. Stop the unit from TD7/UC800.
 2. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block(s) in the starter panel (or to the unit mounted disconnect).
 3. Connect the phase-sequence indicator leads to the line power terminal block (L1-L2-L3).
- | Phase Seq. Lead | Terminal |
|------------------|----------|
| Black (Phase A) | L1 |
| Red (Phase B) | L2 |
| Yellow (Phase C) | L3 |
4. Turn power on by closing the unit supply-power fused-disconnect switch.
 5. Read the phase sequence on the indicator. The "ABC" LED on the face of the phase indicator will glow if phase is "ABC". After service compressor terminal connection should be same as ["Figure 81. Field Wiring Diagram" P. 132](#), to make sure the compressor turn in right direction.
 6. If the "CBA" indicator glows instead, open the unit main power disconnect and switch two line leads on the line power terminal block(s) (or the unit mounted disconnect). Re-close the main power disconnect and recheck the phasing.
 7. Reopen the unit disconnect and disconnect the phase indicator.

NOTICE

It is imperative that L1, L2, and L3 in the starter be connected in the A-B-C phase sequence to prevent equipment damage due to reverse rotation.

NOTICE

To prevent injury or death due to electrocution, take extreme care when performing service procedures with electrical power energized.

NOTICE**Equipment Damage!**

Do not interchange any load leads that are from the unit contactors or the motor terminals. Doing so may damage the equipment.

Water System Flow Rates

Establish a balanced chilled water flow through the evaporator. The flow rates should fall in the range of Table 1 Evaporator Flow Rate (fall between the minimum and maximum values given on the pressure drop curves). Chilled water flow rates below the minimum values will result in laminar flow, which reduces heat transfer and causes either loss of EXV control or repeated nuisance, low temperature, cutouts. Flow rates that are too high can cause tube erosion in the evaporator.

Water System Pressure Drop

According to [“Figure 21. Water side heat exchanger typical piping connection schematic” P. 39](#), Measure the water-pressure drop through the evaporator by field installed pressure gauge on the system water piping. Use the same gauge for each measurement. Do not include valves, strainers, or fittings in the pressure drop readings. The water flow rate corresponding to the pressure drop reading must fall in the range of flow shown in [“Table 1. General data — 100-205 Ton 50Hz unit-high efficiency \(fixed speed fan\)” P. 12](#).



Unit Start Up and Shut Off Procedures

Start Up

If the present checkout, as discussed above chapter, has been completed, the unit is ready to start.

1. Make sure the STOP key display on the TD7.
2. Adjust the set point values as necessary on the TD7 menus using Tracer TU, and fill in the [Table 45](#).
3. Close the fused-disconnect switch for the chilled water pump. Energize the pump(s) to start water circulation.
4. Check all the service valves are open for each circuit, for example, valve on liquid line, oil line etc.
5. Make sure evaporator heater is energized right.
6. Ensure that the compressor and oil separator heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.
7. Press the AUTO key. If the chiller control calls for cooling and all safety interlocks are closed, the unit will start. The compressor(s) will load and unload in response to the leaving chilled water temperature.
8. After the system has been operating for at least 30 minutes and has become stabilized, complete the remaining start up procedures, as follows
 - a. Check the evaporator refrigerant pressure, the condenser refrigerant pressure, approach temperature, under Refrigerant Report on the TD7, they should in range of table 10, when compressor in full load.
 - b. Measure the system discharge superheat.

Table 42. Unit Running Status

Evaporator Approach		Condenser Approach	
Range (°C)	Calculation Method	Range (°C)	Calculation Method
2~4	Leaving water temperature-saturated suction temperature	12~20	Leaving water temperature-saturated suction temperature

NOTICE

Compressor Damage!

Catastrophic damage to the compressor will occur if the oil line shut off valve or the angle valves are closed on unit start-up.

NOTICE

Equipment Damage!

Use only refrigerants specified on the unit nameplate (HFC 134a) and Trane oil specified on the unit nameplate. Failure to do so may cause compressor damage and improper unit operation.

⚠ CAUTION

Avoid direct touch of refrigerant, otherwise skin may be frostbitten.

NOTICE

Efficiency Decrease!

According to the filling option, if whole charge option, Trane factory finish debugging operation, don't need be charge before first start, else for nitrogen charging options or 12 kg filling options, filling unit must strictly follow [Table 1](#) ~ [Table 3](#) charge amount before starting. For later adding refrigerant, please find the leak point and complete the repair, do not add refrigerant randomly which may led to overcharge or lesscharge.

Seasonal Unit Startup Procedure

Steps as below:

1. Close all valves and reinstall the drain plugs in the evaporator.
2. Service the auxiliary equipment according to the startup and maintenance instructions provided by the respective equipment manufacturers.
3. If the evaporator was previously drained, vent and fill the evaporator and chilled-water circuit. When all air is removed from the system (including each pass), install the vent plugs in the evaporator water boxes.
4. Open all the valves in the evaporator chilled-water circuits.
5. Open all refrigerant valves.
6. Check the adjustment and operation of each safety and operating control.
7. Close all disconnect switches.
8. Refer to the sequence for daily unit start up for the remainder of the seasonal start up.

System Restart after Extended Shutdown

1. Verify that the liquid-line service valves, oil line, are open (back seated).
2. Check the oil separator oil level (see Maintenance procedures section).
3. Fill the evaporator water circuit. Vent the system while it is being filled. Open the vent on the top of the evaporator while filling, and close it when filling is completed.
4. Close the fused-disconnect switches that provide power to the chilled-water pump.
5. Start the evaporator water pump and, while water is circulating, inspect all piping for leakage. Make any

Unit Start Up and Shut Off Procedures

necessary repairs before starting the unit.

6. While the water is circulating, adjust the water flow and check the water pressure drops through the evaporator. Refer to "water-system flow rates" and "water-system pressure drop".
7. Adjust the flow switch on the evaporator piping for proper operation.
8. Stop the water pump. The unit is now ready for start-up as described "Startup procedures"

Temporary Shutdown and Restart

To shut the unit down for a short time, use the following procedure:

1. Press the STOP key on the TD7. The compressors will continue to operate and, after unloading for 20 seconds, will stop when the compressor contactors de-energize.
2. Stop the water circulation by turning off the chilled water pump at least one minute after the stop of the compressors.

NOTICE

Equipment Damage!

After unit shut down, should maintain unit power supply to ensure the power of the compressor, oil heater. During Winter, the evaporator antifreeze heater must be power supply, electric heaters so as to avoid frost crack under low ambient temperature evaporator.

The unit will start normally, provided the following conditions exist:

1. The controller receives a call for cooling and the differential-to-start is above the setpoint.
2. All system operating interlocks and safety circuits are satisfied.

Extended Shutdown Procedure

The following procedure is to be followed if the system is to be taken out of service for an extended period of time (i.e. seasonal shutdown):

1. Test the unit for refrigerant leaks and repair as necessary.
2. Open the unit main electrical disconnect and unit-mounted disconnect (if installed) and lock in the "OPEN" position.
3. Disconnect the evaporator heater, to avoid burn out of heater.
4. Open the electrical disconnect switches for the chilled-water pump. Lock the switches in the "OPEN" position.
5. Close all chilled-water supply valves. Drain the water

from the evaporator.

6. At least every three months (quarterly), check the refrigerant pressure in the unit to verify the refrigerant charge integrity.

NOTICE

Evaporator Anti-Freezing Heater Damage!

If Evaporator water is drained out, the evaporator anti-freezing heater should be power off and latched, to avoid the heater damage due to higher temperature.

Seasonal Unit Startup Procedure

Follow the 3.1 Start Up to start the unit, Only after pass through the procedure of 2.2 Check Procedure, steps 1 to 15.



Periodic Maintenance

Perform all maintenance procedures and inspections at the recommended intervals. This will prolong the life of the chiller and minimize the possibility of costly failures.

Use an "Operator's Log", such as that shown at the end of the section, to record an operating history for the unit. The log serves as a valuable diagnostic tool for service personnel. By observing trends in operating conditions, an operator can anticipate and prevent problem situations before they occur. If the unit does not operate properly during maintenance inspections, refer to "Diagnostics and Troubleshooting".

After the unit has been operating for approximately 30 minutes and the system has stabilized, check the operating conditions and complete the procedures below:

Weekly Maintenance

While unit is running in stable conditions.

1. Check MP pressure for evaporator, condenser and intermediate oil.
2. Observe liquid line sight glass on EXV.
3. If liquid line sight glass has bubbles measure the subcooling entering the EXV. The subcooling should never be less than 4 °F under any circumstances. A clear sight glass alone does not mean that the system is properly charged. Also check the rest of the system operating conditions.
4. Inspect the entire system for unusual conditions and inspect the condenser coils for dirt and debris. If the coils are dirty, refer to coil cleaning.

Monthly Maintenance

1. Perform all weekly maintenance procedures.
2. Record the system subcooling.
3. Make any repairs necessary.

Annual Maintenance

1. Perform all weekly and monthly procedures.
2. Check oil sump oil level while unit is off.
Note: Routine changing of the oil is not required. Use an oil analysis to determine the condition of the oil.
3. Have a qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level. This analysis is a valuable diagnostic tool.
4. Contact a qualified service organization to leak test the chiller, to check operating and safety controls, and to inspect electrical components for deficiencies.
5. Inspect all piping components for leakage and damage. Clean out any inline strainers.

6. Clean and repaint any areas that show signs of corrosion.
7. Clean the condenser coils.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

8. Check and tighten all electrical connections as necessary.

Table 43. RTAG Start-up Test Log

RTAG Start-up Test Log					
Job Name			Job Location		
Model #					
CRC #			Serial #		
Sales Order #		Ship Date		Job Elevation (ft. above sea level)	
Starter Data:			Start-up Only		
Manufacturer			Chiller Appearance on arrival:		
Type: (wye-delta or x-line)			Machine gauge pressure: ckt1/ckt2		
Vendor ID #/ Model #:			Machine UC800 pressure ckt1/ckt2		
Volts	Amps	Hz	Unit R-134a Charge		lbs
Compressor Data:			Unit oil charge (OIL RL68H/SOL120) gal		
Compressor A:			Pressure Test (if required)		
	Model #:	Vacuum after leak test= mm			
	Serial #	Standing Vacuum test= mm rise in hrs			
	RLA	Current Transformers			
	KW	Part number ("X" code and 2-digit extension)			
	Volts	X			
Compressor B:	Model #:	X			
	Serial #	X			
	RLA	X			
	KW	Summary of Options Installed			
	Volts	Y N	Tracer Communications Interface		
Compressor C:	Model #:	Y N	Other		
	Serial #	Y N	Other		
	RLA	Evap Design Conditions			
	KW	GPM	PSID		
	Volts	Entering Water:	Leaving Water:		
Compressor D:	Model #:	Type of Glycol:			
	Serial #	Evap Actual Conditions			
	RLA	GPM	PSID		
	KW	Entering Water:	Leaving Water:		
	Volts	% Glycol:			
	Hz	Type of Glycol:			

Owner Witness Signature:



Periodic Maintenance

Table 44. RTAG Unit Configuration

RTAG Unit Configuration		
Job Name		Job Location
Model #		
Serial #		CRC#
Sales Order #	Ship Date	Job Elevation (ft. above sea level)
Setpoint View *		
Front Panel Degree Units (circle one)		F or C
Front Panel Chilled Water Setpoint		
Front Panel Current Limit		
Differential to Stop		
Differential to Start		
Leaving Water Temperature Cutout		
Low Refrigerant Temperature Cutout		
Condenser Limit		
Low Ambient Lockout Setpoint		
Low Ambient Lockout (circle one)		Enable or Disable
Under/Over Voltage Protection		Enable or Disable
Local Atmospheric Pressure		psi
Design Delta T		F or C
Reset Type (circle one)		None Return Reset Type Outdoor Air Temp. Constant Return
Return Reset Ratio		%
Return Start Reset		
Return Max Reset		
Outdoor Reset Ratio		%
Outdoor Start Reset		
Outdoor Max Reset		
Chilled Water Pump Delay Time		minutes
Chilled Water Setpoint Filtering Settling Time		sec
Compressor Staging Deadband		
Compressor Service View **		
Unit Status:		
Circuit 1 Control		
	Front Panel Circuit Lockout	Locked or Unlocked
	Electronic Expansion Valve	Open or Auto
Circuit 2 Control		
	Front Panel Circuit Lockout	Locked or Unlocked
	Electronic Expansion Valve	Open or Auto
Configuration ***		
Nameplate		
Model #		
Confirm Code		
Serial Number		

Note:

* Using Techview, click on "View" and then click "Setpoint View" Log accordingly.

** Using Techview, click on "View" and then click "Compressor Service View" Log accordingly.

*** Using Techview, click on "View" and then click "Configuration" (Nameplate Tab) Log accordingly.

Table 45. RTAG Chiller Log

RTAG Chiller Log						
Job Name				Job Location		
Model #				Serial #		
Status View: *						
Chiller Tab:	15 min	30 min	45 min	15 min	30 min	45 min
Operating Mode						
Outdoor Air Temperature <i>F or C</i>						
Active Chill Water Setpoint <i>F or C</i>						
Active Current Limit Setpoint						
Evaporator Entering Water Temp. <i>F or C</i>						
Evaporator Leaving Water Temp. <i>F or C</i>						
	Circuit 1 Tab			Circuit 2 Tab		
External Hardwired Lockout	Not Locked out/ Locked out			Not Locked out/ Locked out		
Front Panel Lockout	Not Locked out/ Locked out			Not Locked out/ Locked out		
	15 min	30 min	45 min	15 min	30 min	45 min
AirFlow %						
Inverter Speed %						
Condenser Refrigerant Pressure <i>psig/kPa</i>						
Saturated Condenser Rfgt. Temp. <i>F or C</i>						
Differential Refrigerant Pressure <i>psid/kPa</i>						
Evaporator Refrigerant Pressure <i>psig/kPa</i>						
Saturated Evaporator Rfgt. Temp. <i>F or C</i>						
EXV Position %						
Evaporator Rfgt Liquid Level <i>inches/mm</i>						
	Compressor 1A Tab			Compressor 1B Tab		
Operating Mode						
Hours	Hrs/mins			Hrs/mins		
Starts						
	15 min	30 min	45 min	15 min	30 min	45 min
Phase A - B Voltage <i>volts</i>						
Average Line Current <i>%RLA</i>						
Line 1 current <i>amps</i>						
Line 2 current <i>amps</i>						
Line 3 current <i>amps</i>						
Line 1 current <i>%RLA</i>						
Line 2 current <i>%RLA</i>						
Line 3 current <i>%RLA</i>						
Evaporator Oil Return Solenoid	open / closed	open / closed	open / closed	open / closed	open / closed	open / closed
Supply Oil Temperature <i>F or C</i>						
Intermediate Oil Pressure <i>psig/kPa</i>						
Female Step solenoid	load / unload	load / unload	load / unload	load / unload	load / unload	load / unload
High Pressure Cutout switch	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped
Comments:						

116

Maintenance Procedures

Refrigerant and Oil Charge Management

Proper oil and refrigerant charge is essential for proper unit operation, unit performance, and environmental protection. Only trained and licensed service personnel should service the chiller.

Some symptoms of a refrigerant under-charged unit:

- Low subcooling
- Higher than normal discharge superheat
- Bubbles in EXV sight glass
- Larger than normal evaporator approach temperatures (leaving water temperature - saturated evaporator temperature)
- Low evaporator refrigerant temperature limit
- Low refrigerant temperature cutout diagnostic
- Fully open expansion valve
- Possible whistling sound coming from liquid line (due to high vapor velocity)
- High condenser + subcooler pressure drop

Some symptoms of a refrigerant over-charged unit:

- Evaporator liquid level higher than centerline after shut down
- Larger than normal condenser approach temperatures (entering condenser saturated temperature – entering air temperature)
- Condenser pressure limit
- High pressure cutout diagnostic
- More than normal number of fans running
- Erratic fan control
- Higher than normal compressor power
- Very low discharge superheat at startup
- Compressor rattle or grinding sound at startup

Some symptoms of an oil over-charged unit:

- Larger than normal evaporator approach temperatures (leaving water temperature - saturated evaporator temperature)
- Low evaporator refrigerant temperature limit
- Low unit capacity
- Low discharge superheat (especially at high loads)
- Low liquid level diagnostics
- High oil sump level after normal shut down

Some symptoms of an oil under-charged unit:

- Compressor rattle or grinding sound
- Lower than normal pressure drop through oil system
- Seized or welded compressor
- Low oil sump level after normal shut down
- Lower than normal oil concentrations in evaporator

R134a Field Charging Procedure

Be certain that the electrical power to the unit is disconnected before performing this procedure.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Factory (initial) Refrigerant Charging Procedure

The initial charging procedure should be followed the first time the unit is charged in the factory, as well as for charging any time after the charge has been completely removed from the entire system in the event of repair.

1. As part of automatic vacuum/charge procedure, verify that the EXVs are OPEN.
2. Attach vacuum hoses to evaporator service valves (one per circuit). Open service valves.
3. Attach charging hoses to the charging port on the liquid line filter (one per circuit). The filters contain a port with a 1/4" (6mm) flare.
4. Begin semi-automatic vacuum procedure.
5. When vacuum is complete (indicated), manually isolate the unit from vacuum.
6. Charge unit through the filter housing port per nameplate.
7. When charging is complete, shut evaporator service valve and disconnect vacuum and charging hoses.

Field Refrigerant Charging Procedure

Follow this procedure when the unit is empty of all refrigerant and under a vacuum. Add the charge through the evaporator service valve.

Maintenance Procedures

⚠ CAUTION

Evaporator Damage!

Water must be flowing through the evaporator during the entire charging process to avoid freezing and rupturing of the evaporator tubes. Charge first with vapor to avoid freezing tubes.

1. Note the weight of the amount of charge removed. Compare it to nameplate. A difference in charge may indicate a leak.
2. Attach charging hose to evaporator service valve. Open service valve.
3. Add charge to evaporator to bring total circuit charge up to the level indicated in the above chart.
4. Close service valve and disconnect charging hose.

Adding charge:

This procedure should be followed when adding charge to an undercharged unit. When low charge is indicated by low subcooling in the liquid line, charge should be added until sufficient subcooling is achieved.

1. Attach charging hose to evaporator service valve. Open service valve.
2. Add 10 pounds of refrigerant (R-134a) charge.
3. Close valve, remove charging hose and start unit. Monitor subcooling.
4. If subcooling is still insufficient, return to step #1.

Note: Proper subcooling can be determined from run log history, service experience, or by contacting Trane technical service.

Returning unit to running condition:

1. Open all valves.
2. Manually open EXV for 15 minutes to allow refrigerant to drain to evaporator by gravity (ensure water is flowing in the evaporator prior to opening the EXV).
3. Let unit sit with heaters on to drive refrigerant out of oil and warm up compressor bearings. Depending upon ambient conditions, this may take up to 24 hours. Ensure the UCM is powered so the pump may be energized if it detects a freeze condition.
4. Once the oil level has returned to normal, the unit can be put back into operation.

Low side charge isolation procedure:

After normal shut down under some conditions most of the charge resides in the evaporator. Running cold water through the evaporator may also drive much of the refrigerant to the evaporator.

1. Make sure circuit is off.
2. Close suction line isolation valve.
3. Close oil return line service valve.

4. Close liquid line service valve.
5. Manually open EXV.
6. Use a liquid pump or vacuum pump to move refrigerant from the condenser to evaporator. The liquid pump will only be effective if there is a lot of charge in the condenser. It may be connected to the condenser drain port on the liquid line isolation valve.

Note: If a pump is to be used, connect it before closing this valve. This port is only isolated when the valve is back seated. If a vacuum pump is used, then connect it to the discharge line service valve near the oil separator. A vacuum pump will be required for part of the procedure.

The evaporator is large enough to hold all the charge for any unit to below the centerline of the shell. Therefore, no special precautions are required to restart the unit after isolating the charge in the evaporator.

Refrigerant Filter Replacement Procedure

A dirty filter is indicated by a temperature gradient across the filter, corresponding to a pressure drop. If the temperature downstream of the filter is 8°F (4.4°C) lower than the upstream temperature, the filter should be replaced. A temperature drop can also indicate that the unit is undercharged. Ensure proper subcooling before taking temperature readings.

1. With the unit off, verify that the EXV is closed. Close liquid line isolation valve. On units with remote evaporators or oil cooling circuits, close ball valve on oil cooler liquid line.
2. Attach hose to service port on liquid line filter flange.
3. Evacuate refrigerant from liquid line and store.
4. Remove hose.
5. Depress schrader valve to equalize pressure in liquid line with atmospheric pressure.
6. Remove bolts that retain filter flange.
7. Remove old filter element.
8. Inspect replacement filter element and lubricate o-ring with Trane OIL.
9. Install new filter element in filter housing.
10. Inspect flange gasket and replace if damaged.
11. Install flange and torque bolts to 14-16 lb-ft (19-22 n-m).
12. Attach vacuum hose and evacuate liquid line.
13. Remove vacuum hose from liquid line and attach charging hose.
14. Replace stored charge in liquid line.
15. Remove charging hose.
16. Open liquid line isolation valve. On units with remote evaporators or oil cooler

Note: Do not use mineral oil. It will contaminate the system. circuits, open oil cooler liquid line ball valve.

Lubrication System

The lubrication system has been designed to keep most of the oil lines filled with oil as long as there is a proper oil level in the oil sump.

The total oil charge can be removed by draining the oil system, oil return line from the evaporator, the evaporator, and the compressor. Very small quantities of oil may be found in other components.

Like many machines, an excessive oil charge can cause operational problems. Special care should always be taken to avoid adding extra oil.

Units that exhibit the symptoms of an oil overcharge at high loads may still run fine at light loads. An oil overcharged unit may result in an evaporator limit warning or even a low liquid level or low evap temp (LRTC) diagnostic. An oil overcharged unit may exhibit increased approach temperatures and decreased overall unit efficiency.

Oil Charging Procedure

Proper charging of the oil system is critical to the reliability of the compressor and chiller. Too little oil can cause the compressor to run hot and inefficient. When taken to an extreme, low oil level may result in instant failure of the compressor. Too much

oil will result in high oil circulation rates which will foul the condenser and evaporator performance. This will result in inefficient operation of the chiller. Taken to an extreme, high oil levels may result in erratic expansion valve control or shut down of the chiller due to low evaporator refrigerant temperature. Too much oil may contribute to long term bearing wear. Additionally, excessive compressor wear is probable when the compressor is started with the oil lines dry.

1. To measure oil level, use the oil drain valve on the oil line and a service valve on the discharge line. This measurement can only be made when the circuit is not running.
2. Note: The level is measured from the bottom of the separator and 1" must be subtracted for the thickness of the bottom plate.
3. The initial oil charge should be approximately at the level in the above chart. This is the approximate oil level if all the oil is in the oil lines, filter and oil sump and the unit is in vacuum so that there is no refrigerant dissolved in the oil.
4. After the unit has run for a while, the oil level in the sump can vary greatly. However, if the unit has run "normal" conditions for a long time the level should resemble the level in the above chart. (+1" to - 4" (25 to -101mm) is acceptable.)

Factory (initial) Oil Charging Procedure

The field charging procedure depends on the circumstances that resulted in the need for oil charge.

1. Some service procedures may result in loss of small quantities of oil which must be replaced (oil analysis, filter replacement, re-tubing the evaporator, etc.).
2. Additionally, some maintenance procedures may result in virtually all of the oil being removed (compressor motor burn or total removal of the charge to trouble shoot a unit).
3. Finally, leaks may result in a loss of oil that must be replaced.

The initial charging procedure should be followed any time the unit is new or has had all of the oil removed.

4. If the isolation valves is closed, then the charge may be trapped in the evaporator. In either case, the high side of the system should not be pressurized.
5. The oil line shut off valve must be open to allow the oil to pass into the oil lines and the oil separator.
6. The oil charging port is a ¼" (6mm) flare fitting with a schrader valve that is on the side of the oil filter housing. This is the port that must be used to add oil into the compressor so that the filter and lines are full at the first start of the compressor.
7. On single compressor circuits all the oil should be put into the circuit through the oil charging port on the compressor filter housing. On two compressor circuits put approximately ½ of the oil into the unit through each of the two oil charging ports on the two compressors.
8. Oil may be put into the unit using either of two methods.

CAUTION

Equipment Damage!

Use only Trane OIL (specified on the unit nameplate), in the RTAG units to avoid any catastrophic damage to the compressor or unit.

- Have the unit in vacuum. Note that the vacuum connection should be made on the unit at the service valve that is on the discharge line. Hook up the oil charging hose to the oil charging fitting and submerge the other end into the oil container. Let the vacuum draw the required amount of oil into the unit.
- Have the unit at the same pressure as the oil. Hook up the oil charging hose to the oil charging fitting and the other end to an oil pump. Use the pump to draw oil out of the oil container and push the required amount of oil into the unit.

Note: The compressor filter has an internal shut off valve that will prevent oil from entering the compressor while the compressor is not running.

Maintenance Procedures

Therefore, there is no concern about flooding the compressor with oil.

Field Oil Charging Procedure

Use the initial charging procedure under the following circumstances:

- When virtually all of the oil has been removed.
- If the oil charge is removed from the compressor and oil system only but the unit has been run for less than 15 minutes.
- If the oil charge is removed from the compressor and oil system only and the unit has been run for more than 15 minutes. However, reduce the amount of oil added to the unit by the normal quantity of oil in refrigeration system.

Note: *This procedure can be followed even with the refrigerant charge isolated in the evaporating section of the unit.*

If small quantities of oil were removed to service refrigeration components, such as the evaporator, simply replace the oil that was removed into the serviced component prior to vacuum and recharge of the refrigerant.

If oil was removed from the compressor only to service a compressor or change the oil filter follow this procedure:

1. If the compressor is a new compressor or has been removed from the system and reworked, add 1 quart (2 lb.) oil to the motor cavity prior to installing the compressor into the chiller.
2. Install the compressor in the system. Make sure that the filter shut off valve is closed. Other compressor isolation valves may also be closed depending upon the service that was completed. For example, changing the oil filter would require the compressor to be isolated and pulled into vacuum.

Note: *Make sure that compressor is not pressurized.*

3. Open the flare fitting on the oil line shut off valve.
4. Open the flare fitting on the filter housing. This is the port that must be used to put oil into the compressor.
5. Install charging hose on oil charging port (with schrader valve) and the other on the oil canister.
6. Lift the oil canister, or use a pump, to pour oil into the filter housing.
7. When oil comes out of the flare fitting on the oil line shut off valve the filter is full. Stop adding oil.
8. Put the cap on the flare on the oil line shut off valve, remove the charging hose and put the cap back on the flare on the filter housing.
9. Vacuum the compressor (low side) and prepare it for inclusion in the system. There is a service valve on the suction line and on the evaporator. Use these valves to vacuum the compressor.
10. Open the oil line shut off valve. Severe damage to the compressor can result if the oil line shut off valve

is closed when the compressor is started.

⚠ CAUTION

Compressor Damage!

Catastrophic damage to the compressor will occur if the oil line shut off valve or the isolation valves are left closed on unit start-up.

11. Open the other compressor isolation valves.

Note: *This procedure assumes that the oil that is put into the filter housing does not have contaminants such as non-condensable gases. The oil forces these gases out of the filter and oil line shut off valve without the need to pull a vacuum on this small volume. If the oil has been in an open container or is otherwise contaminated, then this small volume must be subject to vacuum as well. However, the filter cavity is full of oil. Therefore, be sure to use a flash tank in line with the vacuum pump to make sure that oil, that is pulled out of the filter cavity, does not slug the vacuum pump.*

Evaporator Tube Replacement

The units were designed for installation of the tubes from the end of the evaporator opposite the control panel end. If tube is leakage and water entering into shell side of evaporator, replace whole evaporator, not just replace the leaked tube.

⚠ CAUTION

Evaporator Damage!

The tubes are rolled at both ends and in the center. When replacing tubes, take care to ensure that the tube is removed and rolled into the center tube sheet properly. Failure to do so could result in damage to the tubes and improper operation of the system.

Compressor Replacement

If a compressor needs to be replaced follow the procedures listed below.

1. Isolate the refrigerant charge outside of the compressor and close all four valves leading to the compressor. This includes the oil line service valve located on the oil filter cover of the compressor, the valve on the oil return line from the evaporator, the discharge service valve, and the suction service valve. In the event that the optional suction service valve was not ordered with the unit, insure that the liquid line service valve is closed.
2. Disconnect power to the chiller. Remove the electrical junction box cover and disconnect the wires.

⚠ WARNING**Hazardous Voltage!**

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

3. Evacuate the compressor through the service fitting provided. Disconnect all four lines attached to the compressor, as well as the junction box. Remove three screws from the bottom of the compressor.
4. Remove the compressor by sliding it out of the chiller onto a well supported skid or other platform. The compressor is very heavy, so insure that the support is sturdy. A piece of 1x4 lumber placed between the isolators works well to support the compressor feet as it is pulled from the chiller.
5. Install the new compressor. Reinstall all lines, wires, and screws. Open the service valves, and trim charge as required.



Drive

Drive Overview

Designation Rules and Nameplate

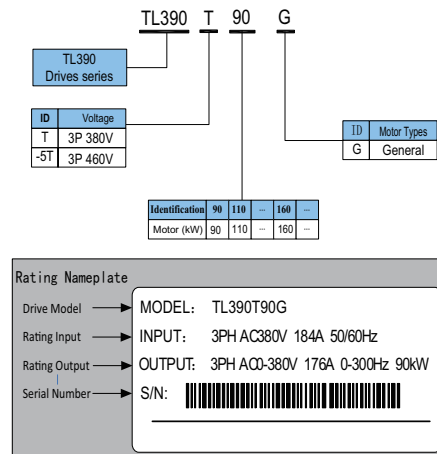


Figure 71. Designation Rules and Nameplate example

Drive Outline Sizing

Outline Sizing for Drives 90KW-160KW

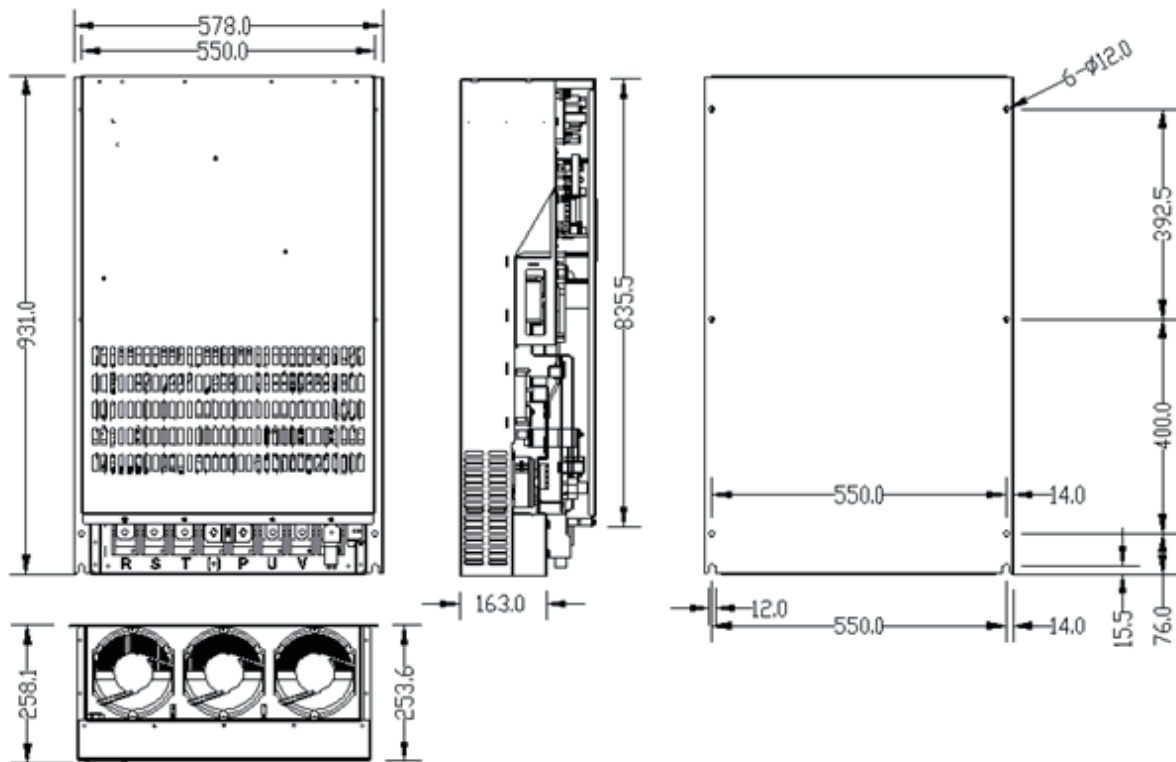


Figure 72. Drive Outline Sizing

Drive Components Layout

Components Layout for Drive 90KW-160KW

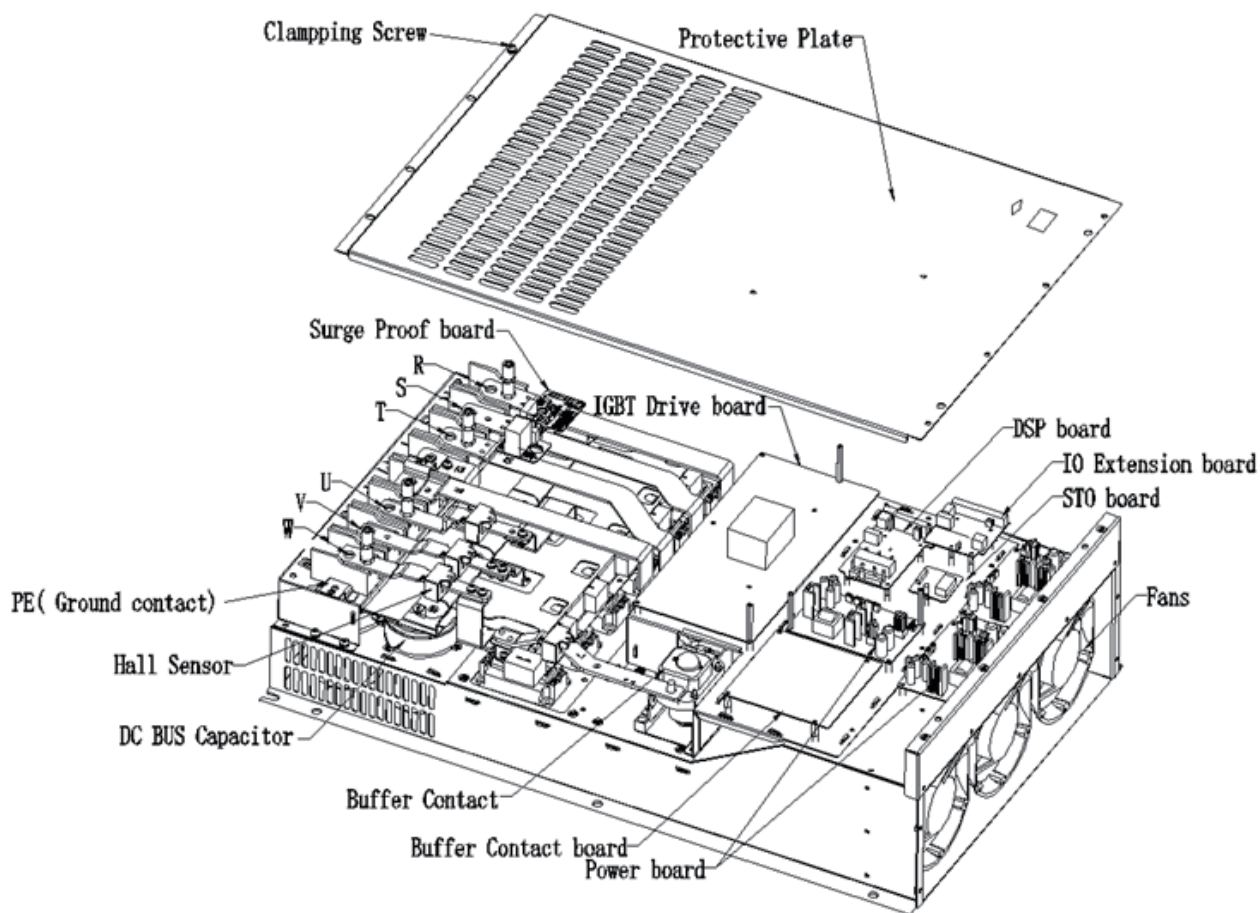


Figure 73. Components Layout for 90KW—160KW

Drive Model Table

Drive Model	Power (KW)	Input Current (A)	Output Current (A)	Motor Type (KW)	Weight (Kg)
TL390T90G	90	184	176	90	104
TL390T110G	110	221	212	110	107
TL390T132G	132	270	260	132	113
TL390T160G	160	328	315	160	115.5

Mechanical and Electrical Installation

Mechanical Installation

Installation Environment Requirements

Item	Requirements
Ambient temperature	-10°C to 52°C
Heat dissipation	Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the AC drive vertically on the support using screws.
Mounting location	Free from direct sunlight, high humidity and condensation Free from corrosive, explosive and combustible gas Free from oil dirt, dust and metal powder
Vibration	Less than 0.6 g Far away from the punching machine or the like
Protective enclosure	The TL390 series AC drive of plastic housing is a built-in product and needs to be installed in the final system. Only the operation panel exposes on the final cover for the user to perform operations. The final system must have the required fireproof cover, electrical protective cover and mechanical protective cover, and satisfy the regional laws & regulations and related IEC requirements.

Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the TL390, as shown in the following figure.

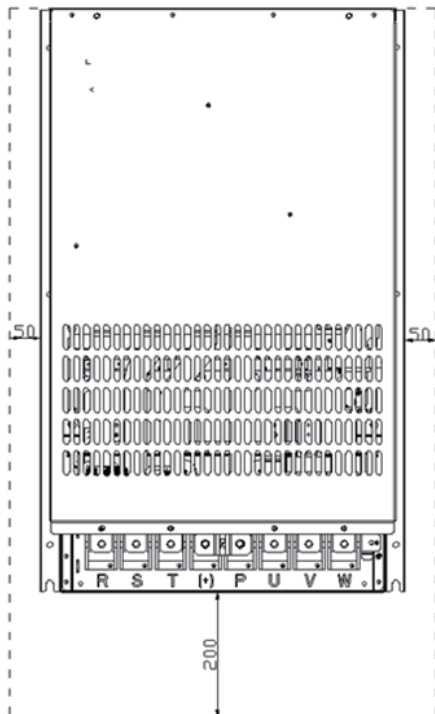


Figure 74. Clearance around of 90KW—160KW

Lifting

TRANE Drive has four mounting holes for lifting lugs (M8 for 90-160kW). During lifting, mount the lifting lugs into mounting hole. It is highly recommended to lift perpendicular to bottom mounting face with four lifting lugs tied with lifting rope. For detailed lifting lugs' mounting locations, refer to [Figure 75](#).

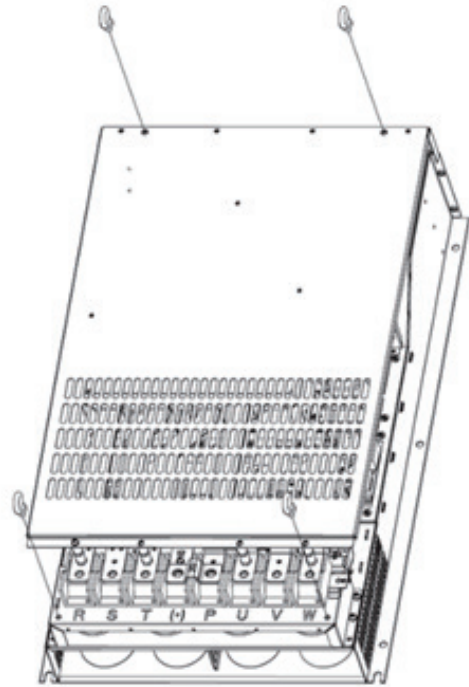


Figure 75. Lifting Locations for 90-160kW Drive

Wiring for Power Terminals

Power Terminals of Three Phase Drive Main Loop please refer to [Table 46](#).

Table 46. Power Terminals of Drive Main Loop

Terminals Marking	Terminals Name	Purpose
R,S,T	Three Phase AC Power Input	Connection to Three Phase AC Power Input
P,(+)	Terminals for External Reactor	Connection to External Reactor
U,V,W	Drive Output Terminals	Connection to Three Phase Motor
PE		Connection to Ground

* Only applied for drive between 110kW~200kW

Power terminals on TRANE drive have corresponding markings shown by [Figure 76](#). Customers could use Cable or Copper bar for connection to Power terminals based on different applications needs.

For 90-160kW: M12x30 screws for R/S/T and U/V/W terminals, and M8x20 screws for PE terminals is suggested.

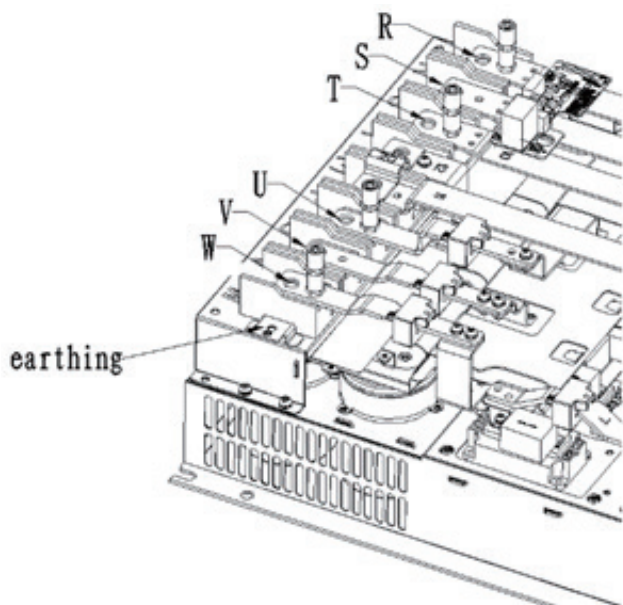


Figure 76. 90KW-160KW

Operation and Display

Operation Panel

You can modify the parameters, monitor the working status and start or stop the TL390 by operating the operation panel, as shown in the following figure.

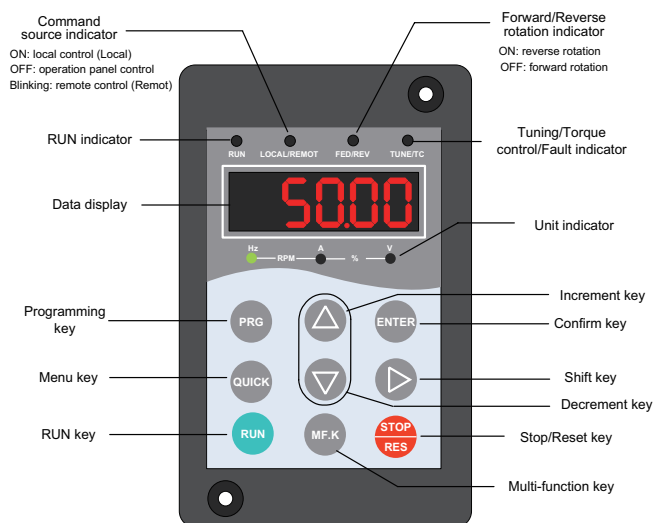


Figure 77. Diagram of the operation panel

Description of Indicators

- RUN**
 ON indicates that the AC drive is in the running state, and OFF indicates that the AC drive is in the stop state.
- LOCAL/REMOT**
 It indicates whether the AC drive is operated by means of operation panel, terminals or communication.

○ LOCAL/REMOT: OFF	Operation panel control
● LOCAL/REMOT: ON	Terminal control
◐ LOCAL/REMOT: blinking	Communication control
- FWD/REV**
 ON indicates reverse rotation, and OFF indicates forward rotation.
- TUNE/TC**
 When the indicator is ON, it indicates torque control mode. When the indicator is blinking slowly, it indicates the auto-tuning state. When the indicator is blinking quickly, it indicates the fault state.
- Unit Indicators**
 ● means that the indicator is ON, and ○ means that the indicator is OFF.

Hz	●	RPM	○	A	○	%	○	V	Hz: unit of frequency
Hz	○	RPM	○	●	A	%	○	V	A: unit of current
Hz	○	RPM	○	○	A	%	○	●	V: unit of voltage
Hz	●	RPM	○	○	A	%	○	○	RPM: unit of motor speed
Hz	○	RPM	○	○	●	%	○	○	%: percentage
- Digital Display**
 The 5-digit LED display is able to display the frequency reference, output frequency, monitoring data and fault codes.

Function Codes

Structure of Function Codes

TL390 has three groups for function code, they are F group, A group, U group.

Table 47. function codes description

Code Group	Code Name	Description
F0 ~ FP	General Code	Basic parameter setting for VFD and motor
A0 ~ AC	Extend Code	Multi motor data,AI/AO calibration,Optimal control,PLC card,extension function
U0 ~ U3	Status Code	Show the status of running

In the function code display state, select the required function code by pressing the key, as shown in the following figure:

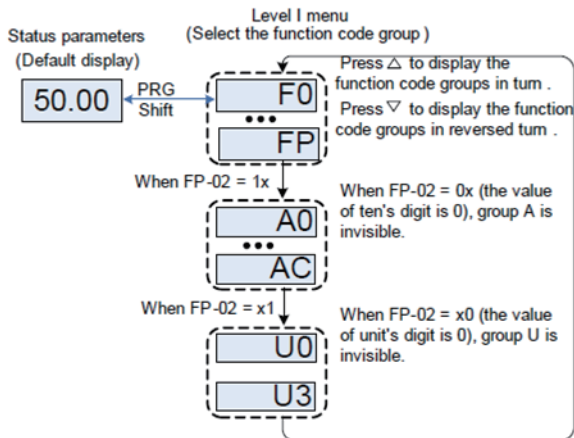


Figure 78. Function code operation

Maintenance

Tool and Torques

The Screw drivers for M4 ~ M6 screws

The sleeve and the wrench for M8 ~ M12 screws

Torques for fastening piece:

Screw Types	Fastening Torques unit(N.M)		
	Steel Screw Grade		
	4.8	8.8	12.9
M3	0.55	1.25	2.15
M4	1.2	2.9	4.95
M5	2.5	5.5	9.5
M6	4	9.5	16.5
M8	10.5	20	40
M10	20	45	80
M12	35	80	140

Fans Replacement

Possible Failure Cause: Bearing Wear or Leaf Aging,

Diagnosis Criteria: Crack on Fan Leaf or Abnormal sound when drive starts up.

Fan Replacement Steps for 90KW—160KW

1. Remove air duct cover plate of fans (All nine M6 screws),

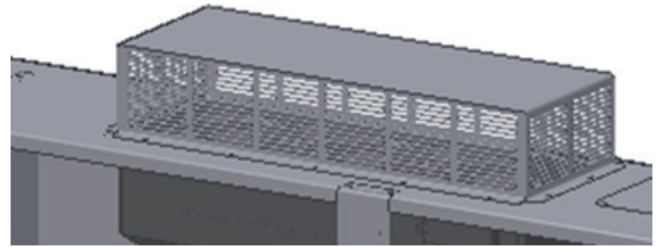


Figure 79. Remove air duct cover plate of fans

2. Remove Power wiring of Fan (Ellipse shown in Figure 59),
3. Remove M4 Fastening screws for fans (Circle shown in Figure 80),
4. Take fans out.
5. Install new fans; reconnect the power wires and install air duct cover plate of fans according to the sequence from steps 4 to step 1.



Figure 80. Remove Power wires and Fans

Electrolytic Capacitors Replacement

Possible failure cause:

- Bad input power supply quality
- High ambient temperature
- Frequent load changes
- Electrolyte aging

Diagnosis Criteria:

- Liquid leakage
- Safe Valve protrusion
- Electrostatic capacity determination
- Insulation resistance determination

Middle loop of TRANE drive utilizes multiple electrolytic capacitors whose life depends on drive load and ambient temperature. Capacitors' life could be prolonged by decreasing ambient temperature.

Capacitor failure could be predicted. In general, capacitor failure comes from main circuit fuse blows or breakdown tripping. Don't replace capacitors by yourself and please contact TRANE service if capacitors have to be replaced.

Safety Information and Precautions

Read this chapter carefully so that you have a thorough understanding, and perform all operations such as installation, commissioning or maintenance by following the notices in this chapter. Trane will assume no liability or responsibility for any injury or loss caused by improper operation.

Use Stage	Safety Grade	Precautions
Before installation	 DANGER	• Do not install the equipment if you find water seepage, component missing or damage upon unpacking. • Do not install the equipment if the packing list does not conform to the product you received.
	 WARNING	• Handle the equipment with care during transportation to prevent damage to the equipment. • Do not use the equipment with any damaged or missing component. Failure to comply may result in personal injury. • Do not touch the components with your hands. Failure to comply may result in static electricity damage.
During installation	 DANGER	• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • Do not loosen the fixed screws of the components, especially the screws with red mark.
	 WARNING	• Do not drop wire end or screw into the equipment. Failure to comply will result in equipment damage. • Install the AC drive in places free of vibration and direct sunlight. • When two AC drives are laid in the same cabinet, arrange the installation positions properly to ensure the cooling effect.
At wiring	 DANGER	• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the equipment. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Ground the equipment properly according to the requirements. Failure to comply may result in electric shock.
	 WARNING	• Never connect the power cables to the output terminals (U, V, W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in equipment damage. • Never connect the braking resistor between the (+) and (-) terminals of the DC bus. Failure to comply may result in a fire. • Use cables with dimensions recommended in the manual. Failure to comply may result in accidents. • Use a shielded cable for the encoder, and ensure that the shield is reliably grounded.
Before power-on	 DANGER	• Check that the following requirements are met: • The voltage class of the power supply is consistent with the rated voltage class of the AC drive. • The input terminals (R, S, T) and output terminals (U, V, W) are properly connected. • No short-circuit exists in the peripheral circuit. • The wiring is secured. • Failure to comply may result in equipment damage. • Do not perform the voltage resistance test on any part of the AC drive because such test has been done in the factory. Failure to comply may result in accidents.
	 WARNING	• Cover the AC drive properly before power-on to prevent electric shock. • All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply may result in accidents
After power-on	 DANGER	• Do not open the cover after power-on. Failure to comply may result in electric shock. • Do not touch any I/O terminal of the AC drive. Failure to comply may result in electric shock.
	 WARNING	• Prevent personal injury during motor rotation if motor auto-tuning is required. Failure to comply may result in accidents. • Do not change the factory parameters of the AC drive to prevent equipment damage.

Drive

Use Stage	Safety Grade	Precautions
During operation	 DANGER	- Signal detection during running must be performed only by qualified personnel. Failure to comply may result in personal injury or equipment damage. - Do not touch the fan or the discharging resistor to check the temperature. Otherwise, you may get burnt
	 WARNING	- Prevent dropping objects into the AC drive during drive running. Failure to comply may result in equipment damage. - Do not start or stop the AC drive by turning on or off the contactor. Failure to comply will result in equipment damage.
During maintenance	 DANGER	- Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply may result in personal injury or equipment damage. - Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock. - Repair or maintain the AC drive at least ten minutes after the AC drive is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. - Ensure that the AC drive is disconnected from all power supplies before starting the repair or maintenance work. - All the pluggable components must be plugged or removed only after power-off. - Set and check the parameters again after the AC drive is replaced.
	 WARNING	The rotating motor generally feeds back power to the AC drive. As a result, the AC drive is still energized, even if the motor stops, and the power supply is cut off. Thus ensure that the AC drive is completely disconnected from the motor before starting the repair or maintenance work.

Common Faults and Solutions

Solutions to the faults of the TL390

Fault Name	Display	Possible Causes	Solutions
Inverter unit protection	Err01	- The output circuit is grounded or short circuited. - The cable between the motor and the AC drive is too long. - The module overheats. - The internal connections become loose. - The main control board is faulty. - The drive board is faulty. - The inverter module is faulty.	- Eliminate external faults. - Install a reactor or an output filter. - Check that the air filter and the cooling fan work properly. - Connect all cables properly. - Contact the agent or Inovance for technical support.
Overcurrent during acceleration	Err02	- The output circuit is grounded or short circuited. - Motor auto-tuning is not performed. - The acceleration time is too short. - Customized torque boost or V/F curve is not appropriate. - The voltage is too low. - The motor is started during rotating. - A sudden load is added during acceleration. - The AC drive size is small.	- Eliminate external faults. - Perform the motor auto-tuning. - Increase the acceleration time. - Adjust the manual torque boost or V/F curve. - Adjust the voltage to normal range. - Enable the catching a spinning motor function or start the motor after it stops. - Remove the added load. - Replace a large drive.
Overcurrent during deceleration	Err03	- The output circuit is grounded or short circuited. - Motor auto-tuning is not performed - The deceleration time is too short. - The voltage is too low. - A sudden load is added during deceleration. - The braking unit and braking resistor are not installed.	- Eliminate external faults. - Perform the motor auto-tuning. - Increase the deceleration time. - Adjust the voltage to normal range. - Remove the added load. - Install the braking unit and braking resistor.
Overcurrent at constant speed	Err04	- The output circuit is grounded or short circuited. - Motor auto-tuning is not performed. - The voltage is too low. - A sudden load is added during operation. - The AC drive size is small.	- Eliminate external faults. - Perform the motor auto-tuning. - Adjust the voltage to normal range. - Remove the added load. - Replace a large drive.
Overvoltage during acceleration	Err05	- The input voltage is too high. - An external force drives the motor during acceleration. - The acceleration time is too short. - The braking unit and braking resistor are not installed.	- Adjust the voltage to normal range. - Cancel the external force or install a braking resistor. - Increase the acceleration time. - Install the braking unit and braking resistor.
Overvoltage during deceleration	Err06	- The input voltage is too high. - An external force drives the motor during deceleration. - The deceleration time is too short. - The braking unit and braking resistor are not installed.	- Adjust the voltage to normal range. - Cancel the external force or install the braking resistor. - Increase the deceleration time. - Install the braking unit and braking resistor.
Overvoltage at constant speed	Err07	- The input voltage is too high. - An external force drives the motor during deceleration.	- Adjust the voltage to normal range. - Cancel the external force or install the braking resistor.
Control power supply fault	Err08	The input voltage is not within the allowable range.	Adjust the input voltage to the allowable range.

Fault Name	Display	Possible Causes	Solutions
Undervoltage	Err09	1. Instantaneous power failure occurs on the input power supply. 2. The AC drive's input voltage is not within the allowable range. 3. The bus voltage is abnormal. 4. The rectifier bridge and buffer resistor are faulty. 5. The drive board is faulty. 6. The main control board is faulty.	1. Reset the fault. 2. Adjust the voltage to normal range. 3. Contact the agent or Inovance.
AC drive over-load	Err10	1: The load is too heavy or locked-rotor occurs on the motor. 2: The AC drive size is small.	1: Reduce the load and check the motor and mechanical conditions. 2: Replace a large drive.
Motor overload	Err11	1: F9-01 is set improperly. 2: The load is too heavy or motor standstill occurs. 3: The AC drive size is small.	1: Set F9-01 correctly. 2: Reduce the load and check the motor and mechanical conditions. 3: Replace a large drive.
Power input phase loss	Err12	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightening protection board is faulty. 4: The main control board is faulty.	1: Eliminate external faults. 2: Contact the agent or Inovance for technical support.
Power output phase loss	Err13	1: The cable connecting the AC drive and the motor is faulty. 2: The AC drive's three-phase outputs are unbalanced when the motor is running. 3: The drive board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Contact the agent or Inovance.
Module over-heat	Err14	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
External equipment fault	Err15	1: External fault signal is input via DI. 2: External fault signal is input via virtual I/O.	Reset the operation.
Communication fault	Err16	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: F0-28 is set improperly. 4: The communication parameters in group FD are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set F0-28 correctly. 4: Set the communication parameters properly.
Contactor fault	Err17	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty contactor.
Current detection fault	Err18	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Motor auto-tuning fault	Err19	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the AC drive and the motor.
Encoder fault	Err20	1: The encoder type is incorrect. 2: The cable connection of the encoder is incorrect. 3: The encoder is damaged. 4: The PG card is faulty.	1: Set the encoder type correctly based on the actual situation. 2: Eliminate external faults. 3: Replace the damaged encoder. 4: Replace the faulty PG card.
EEPROM read-write fault	Err21	1: The EEPROM chip is damaged.	1: Replace the main control board.
AC drive hardware fault	Err22	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on overvoltage. 2: Handle based on overcurrent.
Short circuit to ground	Err23	The motor is short circuited to the ground.	Replace the cable or motor.
Accumulative running time reached	Err26	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function.
User-defined fault 1	Err27	1: The user-defined fault 1 signal is input via DI. 2: User-defined fault 1 signal is input via virtual I/O.	Reset the operation.
User-defined fault 2	Err28	1: The user-defined fault 2 signal is input via DI. 2: The user-defined fault 2 signal is input via virtual I/O.	Reset the operation.
Accumulative power-on time reached	Err29	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Load lost	Err30	The AC drive running current is lower than F9-64.	Check that the load is disconnected or the setting of F9-64 and F9-65 is correct.

Drive

Fault Name	Display	Possible Causes	Solutions
PID feedback lost during running	Err31	The PID feedback is lower than the setting of FA-26.	Check the PID feedback signal or set FA-26 to a proper value.
Pulse-by-pulse current limit fault	Err40	1: The load is too heavy or motor standstill occurs. 2: The AC drive size is small.	1: Reduce the load and check the motor and the machine. 2: Replace a large drive.
Motor switch-over fault during running	Err41	Change the selection of the motor via terminal during running of the AC drive.	Perform motor switchover after the AC drive stops.
Speed feedback error too large	Err42	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: F9-69 and F9-70 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set F9-69 and F9-70 correctly based on the actual situation.
Motor over-speed	Err43	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: F9-69 and F9-70 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor auto-tuning. 3: Set F9-69 and F9-70 correctly based on the actual situation.
Motor overheat	Err45	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high.	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation measures.
Initial position fault	Err51	The motor parameters are not set based on the actual situation.	Check whether the motor parameters are set correctly and whether the setting of rated current is too small.
Filter Over Temperature	Err61	1. Bad contact from Filter output terminals to Drive Input Terminals (DI1 & COM) 2. Filter over load 3. Filter over temperature function abnormal 4. Filter Fan can't provide enough air volume	1. Check wiring and terminals from Filter output to drive input; 2. Check root cause of over load; 3. Trane to contact Filter vendor to check reason why over temperature function abnormal. 4. Clean Fans to keep enough air volume.
HPC	Err62	1.Bad contact from emergency switch to STO Terminals; 2.STO board abnormal.	Check wiring and terminals from ST; Check STO board.
DC BUS Hall sensor fault	Err63	1.Bad contact from BUS current sensor to Drive Input Terminals(AI2 & GND); 2.BUS current sensor abnormal.	Check wiring and terminals from BUS current sensor to Drive Input Terminals(AI2 & GND); Check BUS current sensor.

Common Faults and Solutions

You may come across the following symptoms during the use of the AC drive. Refer to the following table for simple analysis.

Table 48. Common Faults and Solutions

SN	Symptom	Possible Causes	Solutions
1	There is no display at power-on.	1. There is no power supply to the AC drive or the power input to the AC drive is too low. 2. The power supply of the switch on the drive board of the AC drive is faulty. 3. The rectifier bridge is damaged. 4.DC Reactor abnormal 5. The control board or the operation panel is faulty. 6. The cable connecting the control board and the drive board and the operation panel breaks.	1. Check the power supply. 2. Check the bus voltage. 3. Re-connect the 8-core and 28-core cables. 4.Check the contact from DC reactor to BUS capacitors and Check the DC reactor. 5~6 Contact the agent or Inovance for technical support.
2	"HC" is displayed at power-on.	1. The cable between the drive board and the control board is in poor contact. 2. Related components on the control board are damaged. 3. The motor or the motor cable is short circuited to the ground. 4. The HALL device is faulty. 5. The power input to the AC drive is too low.	1. Re-connect the 8-core and 28-core cables. 2. Contact the agent or Inovance for technical support.
3	"Err23" is displayed at power-on.	1. The motor or the motor output cable is short-circuited to the ground. 2. The AC drive is damaged.	1. Check insulation status of the motor and the output cable with a megger. 2. Contact the agent or Inovance for technical support.
4	The AC drive display is normal upon power-on. But after running the AC drive displays "HC" and stops immediately.	The cooling fan is damaged or locked-rotor occurs. The external control terminal cable is short circuited.	Replace the damaged fan. Eliminate external fault.

SN	Symptom	Possible Causes	Solutions
5	Err14 (module over-heat) is reported frequently.	1. The setting of carrier frequency is too high. 2. The cooling fan is damaged, or the air filter is blocked. 3. Components inside the AC drive are damaged (thermal coupler or others).	1. Reduce the carrier frequency (F0-15). 2. Replace the fan and clean the air filter. 3. Contact the agent or Inovance for technical support.
6	The motor does not rotate after the AC drive runs.	1. Check the motor and the motor cables. 2. The motor parameters are set improperly. 3. The cable between the drive board and the control board is in poor contact. 4. The drive board is faulty.	Check that cabling between the AC drive and the motor is normal. Replace the motor or rectify mechanical faults. Check and set the motor parameters again.
7	The DI terminals are disabled.	1. The related parameters are set incorrectly. 2. The external signal is incorrect. 3. The jumper across OP and +24 V becomes loose. 4. The control board is faulty.	1. Check and set the parameters in group F4 again. 2. Re-connect the external signal cables. 3. Re-confirm the jumper bar across OP and +24 V. 4. Contact the agent or Inovance for technical support.
8	The motor speed is always low in CLVC mode.	1. The encoder is faulty. 2. The encoder cable is connected incorrectly or in poor contact. 3. The PG card is faulty. 4. The drive board is faulty.	1. Replace the encoder and ensure the cabling is proper. 2. Replace the PG card. 3. Contact the agent or Inovance for technical support.
9	The AC drive reports overcurrent and over-voltage frequently.	1. The motor parameters are set improperly. 2. The acceleration/deceleration time is improper. 3. The load fluctuates.	1. Set the motor parameters or perform motor auto-tuning again. 2. Set proper acceleration/deceleration time. 3. Contact the agent or Inovance for technical support.
10	Err17 is reported upon power-on or running.	The soft startup contactor is not closed.	1. Check whether the contactor cable is loose. 2. Check whether the contactor is faulty. 3. Check whether 24 V power supply of the contactor is faulty. 4. Contact the agent or Inovance for technical support.
11	is displayed upon power-on.	Related component on the control board is damaged.	Replace the control board.
12	HPC fault	HPC switch failure or high pressure in unit	Replace the HPC or recover the pressure in unit



Wiring Schematics

Typical field connection diagrams, electrical schematics for the RTAG units are shown in this section.

Note: The drawings in this section are provided for reference only. These diagrams may not reflect the actual wiring of your unit. For specific electrical connection and schematic information, always refer to the wiring diagrams that were shipped with the unit.

Unit Electrical Data

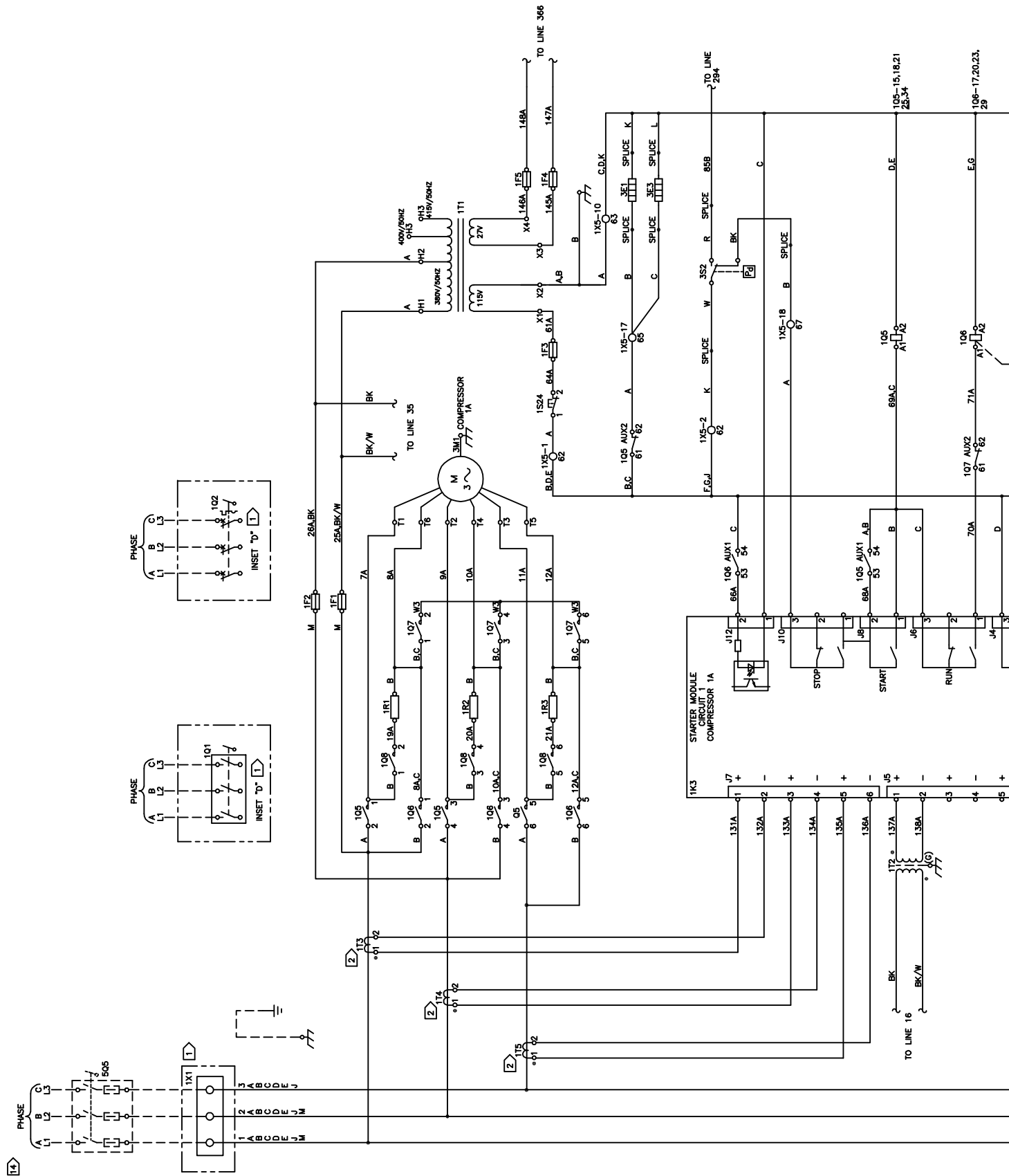
To determine the specific electrical characteristics of a particular chiller, refer to the nameplates mounted on the units.

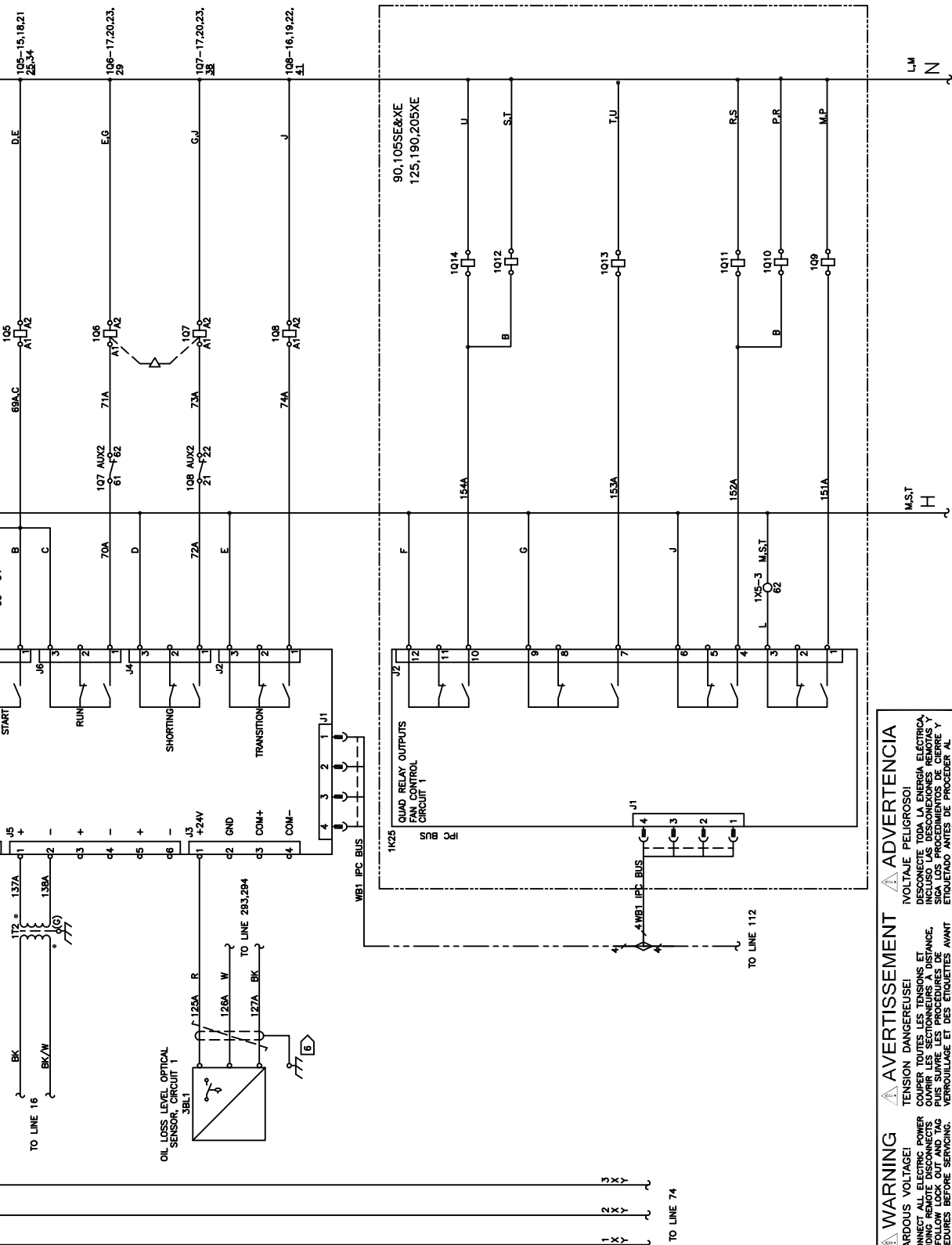
Drawing	Description	IOM Pages
2311-4594	Schematic, 85-225ton, page 1 - WYE-DELTA Starter	133
2311-4594	Schematic, 85-225ton, page 2 - WYE-DELTA Starter	135
2311-4594	Schematic, 85-225ton, page 3 - WYE-DELTA Starter	137
2311-4594	Schematic, 85-225ton, page 4 - WYE-DELTA Starter	139
2311-4594	Schematic, 85-225ton, page 5 - WYE-DELTA Starter	141
2311-4594	Schematic, 85-225ton, page 6 - WYE-DELTA Starter	143
2311-4594	Schematic, 85-225ton, page 7 - WYE-DELTA Starter	145
2311-4594	Schematic, 85-225ton, page 8 - WYE-DELTA Starter	147
2311-4568	Schematic, 85-225ton, page 1 - AFD Starter	149
2311-4568	Schematic, 85-225ton, page 2 - AFD Starter	151
2311-4568	Schematic, 85-225ton, page 3 - AFD Starter	153
2311-4568	Schematic, 85-225ton, page 4 - AFD Starter	155
2311-4568	Schematic, 85-225ton, page 5 - AFD Starter	157
2311-5016	Schematic, 255-440ton, page 1 - Y-D Starter, AC fans	159
2311-5016	Schematic, 255-440ton, page 2 - Y-D Starter, AC fans	161
2311-5016	Schematic, 255-440ton, page 3 - Y-D Starter, AC fans	163
2311-5016	Schematic, 255-440ton, page 4 - Y-D Starter, AC fans	165
2311-5016	Schematic, 255-440ton, page 5 - Y-D Starter, AC fans	167
2311-5016	Schematic, 255-440ton, page 6 - Y-D Starter, AC fans	169
2311-5016	Schematic, 255-440ton, page 7 - Y-D Starter, AC fans	171
2311-5016	Schematic, 255-440ton, page 8 - Y-D Starter, AC fans	173
2311-5016	Schematic, 255-440ton, page 9 - Y-D Starter, AC fans	175
2311-5016	Schematic, 255-440ton, page 10-Y-D Starter, AC fans	177
2311-5016	Schematic, 255-440ton, page 11-Y-D Starter, AC fans	179

Drawing	Description	IOM Pages
2311-5016	Schematic, 255-440ton, page 12-Y-D Starter, AC fans	181
2311-5031	Schematic, 255-440ton, page 1 - Y-D Starter, EC fans	183
2311-5031	Schematic, 255-440ton, page 2 - Y-D Starter, EC fans	185
2311-5031	Schematic, 255-440ton, page 3 - Y-D Starter, EC fans	187
2311-5031	Schematic, 255-440ton, page 4 - Y-D Starter, EC fans	189
2311-5031	Schematic, 255-440ton, page 5 - Y-D Starter, EC fans	191
2311-5031	Schematic, 255-440ton, page 6 - Y-D Starter, EC fans	193
2311-5031	Schematic, 255-440ton, page 7 - Y-D Starter, EC fans	195
2311-5031	Schematic, 255-440ton, page 8 - Y-D Starter, EC fans	197
2311-5031	Schematic, 255-440ton, page 9 - Y-D Starter, EC fans	199
2311-5031	Schematic, 255-440ton, page 10-Y-D Starter, EC fans	201
2311-5031	Schematic, 255-440ton, page 11-Y-D Starter, EC fans	203
2311-5031	Schematic, 255-440ton, page 12-Y-D Starter, EC fans	205
2311-5015	Schematic, 255-440ton, page 1 - AFD Starter	207
2311-5015	Schematic, 255-440ton, page 2 - AFD Starter	209
2311-5015	Schematic, 255-440ton, page 3 - AFD Starter	211
2311-5015	Schematic, 255-440ton, page 4 - AFD Starter	213
2311-5015	Schematic, 255-440ton, page 5 - AFD Starter	215
2311-5015	Schematic, 255-440ton, page 6 - AFD Starter	217
2311-5015	Schematic, 255-440ton, page 7 - AFD Starter	219
2311-5015	Schematic, 255-440ton, page 8 - AFD Starter	221
2311-5015	Schematic, 255-440ton, page 9 - AFD Starter	223
2311-4578	Field Wiring Diagram, 85-225ton	225
2311-5030	Field Wiring Diagram, 255-440ton	227

Figure 81. Field Wiring Diagram

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WARNING **AVERTISSEMENT** **ADVERTENCIA**

HAZARDOUS VOLTAGE! TENSION DANGEREUSE! VOLTAJE PELIGROSO!
DISCONNECT ALL ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING TO SERVICE IT. OUVRIRE LES SECTIONNEURS A DISTANCE. DESCONNECTE TODA LA ENERGIA ELECTRICA INCLUIDO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y REABRIR LAS SECCIONES DE LA UNIDAD ANTES DE REALIZAR CUALQUIER TRABAJO DE MANTENIMIENTO. AVERTIR A TOUTES LES PERSONNES PRESENTES QUE LES CAPACITEURS DES MOTEURS SONT DECHARGES, DANS LE CAS D'UNITES A TENSION VARIABLE, CONSULTER LES INSTRUCTIONS POUR LA DESCARGA DEL CONDENSADOR.
FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.
UN MANUEUVRE A LA PROCEDURE CI-DESSUS PEUT PROVOQUER LA MORT O LESIONS GRAVES.

NOTICE

USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

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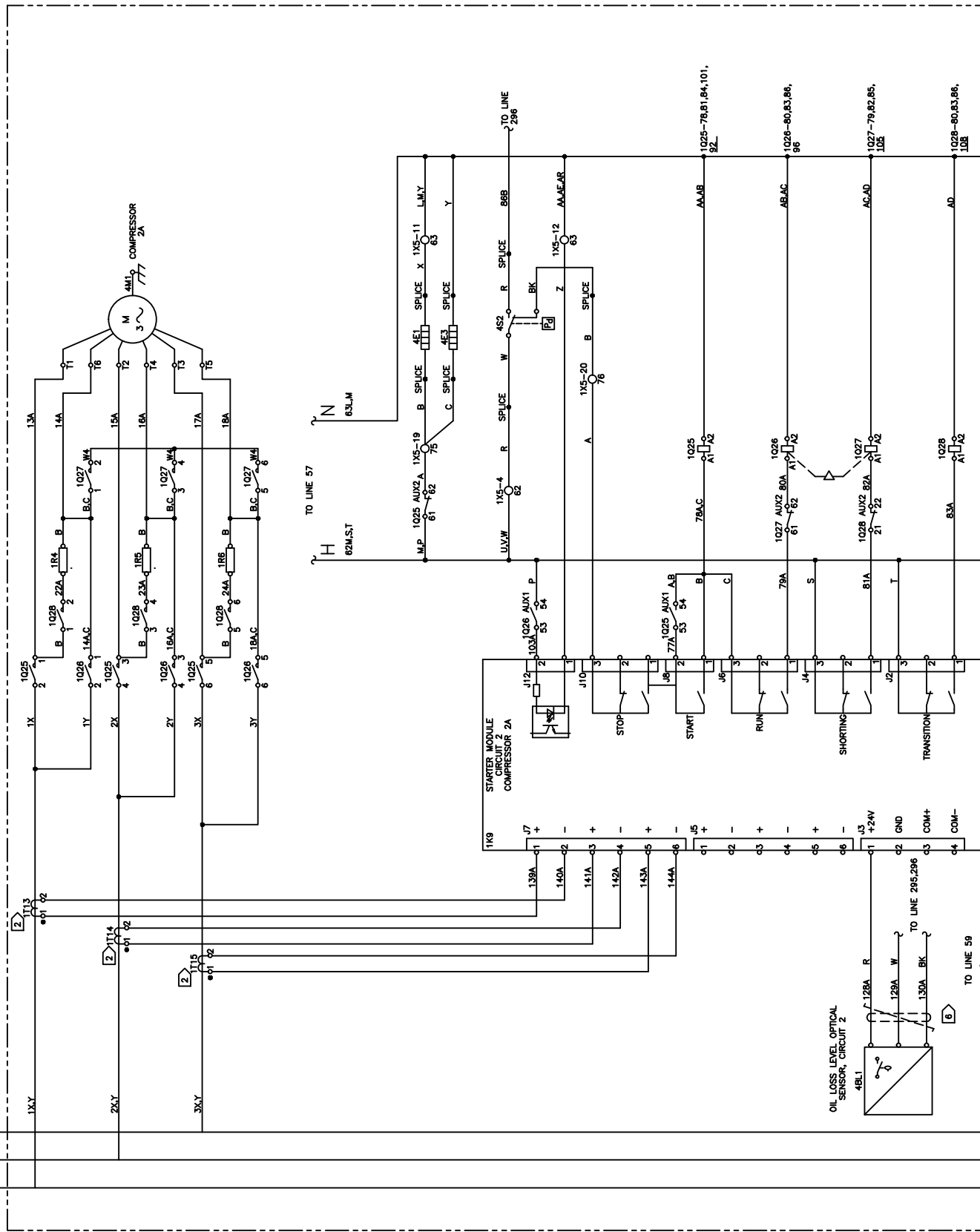
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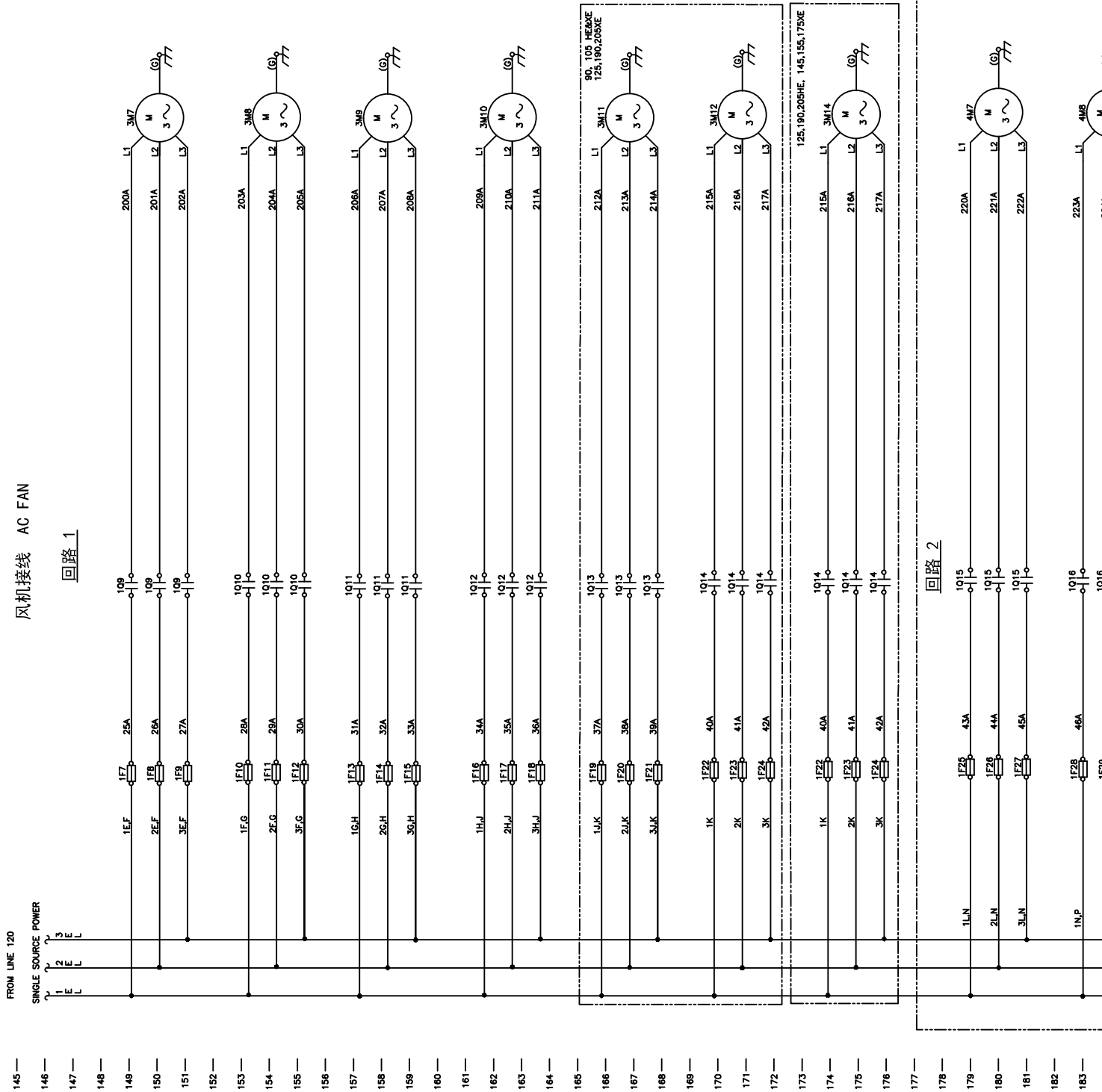
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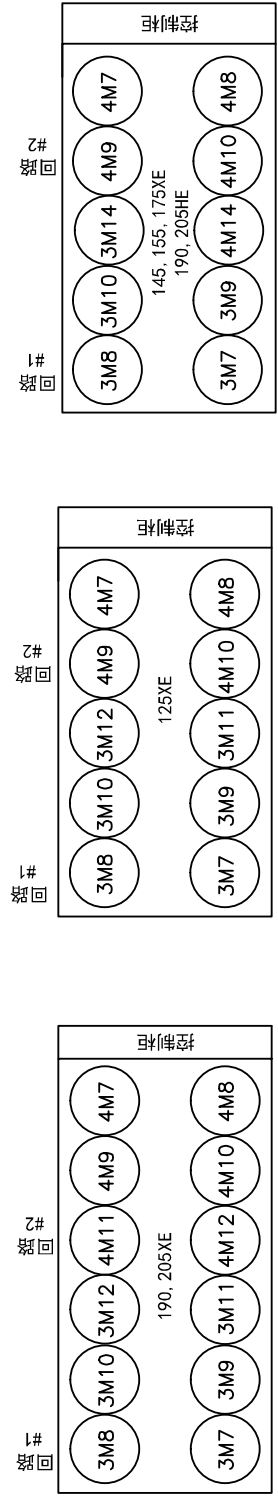
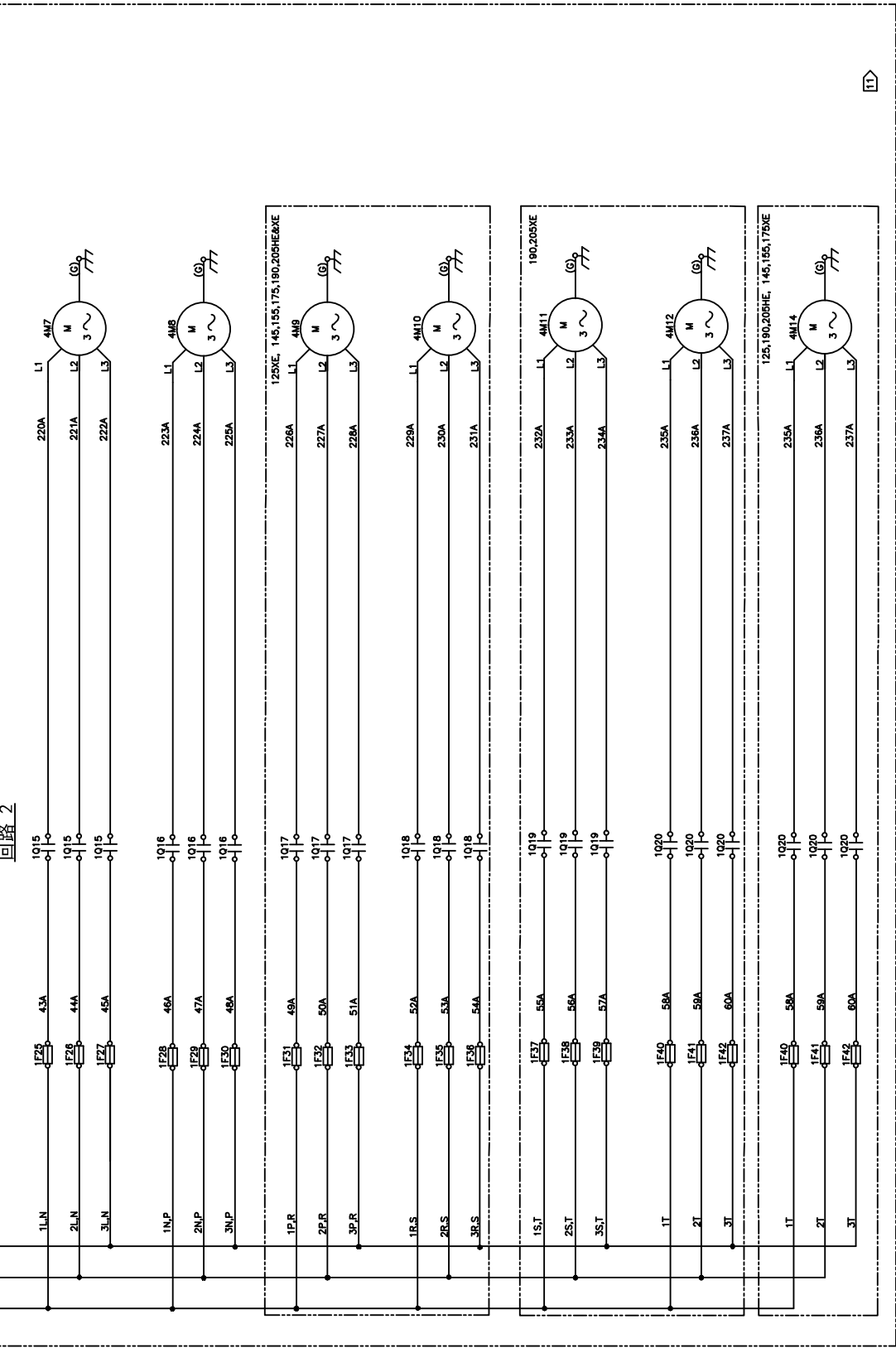
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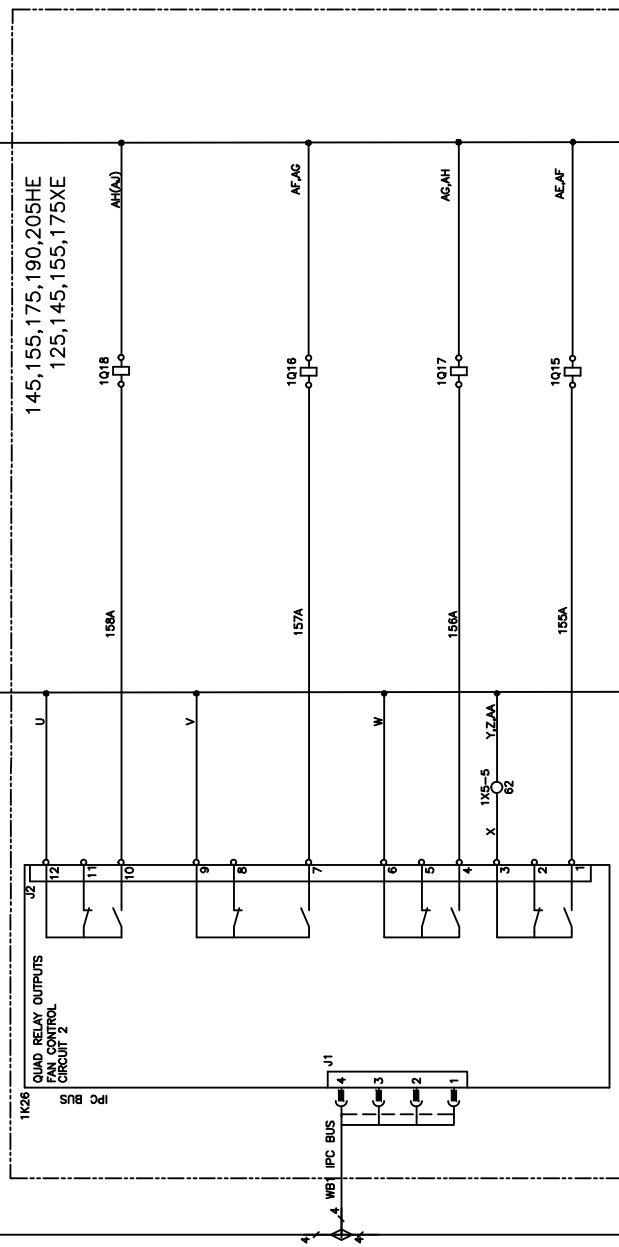
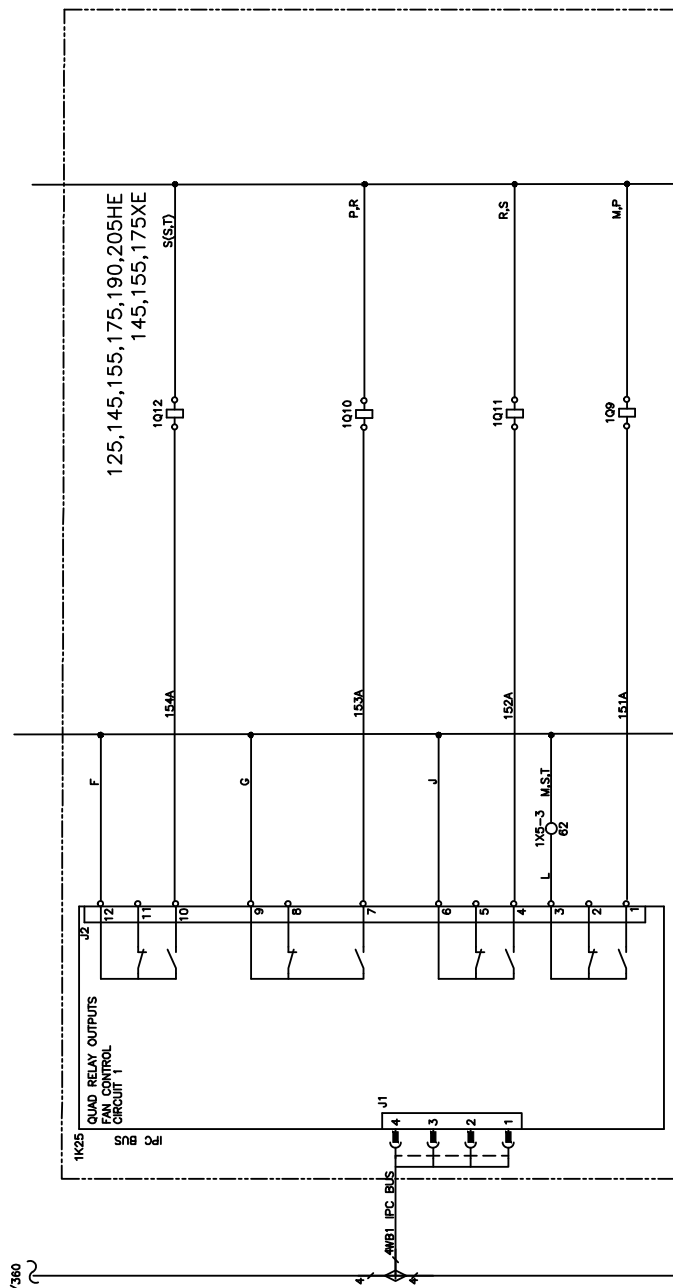


风机接线 AC FAN





风机接线 AC FAN

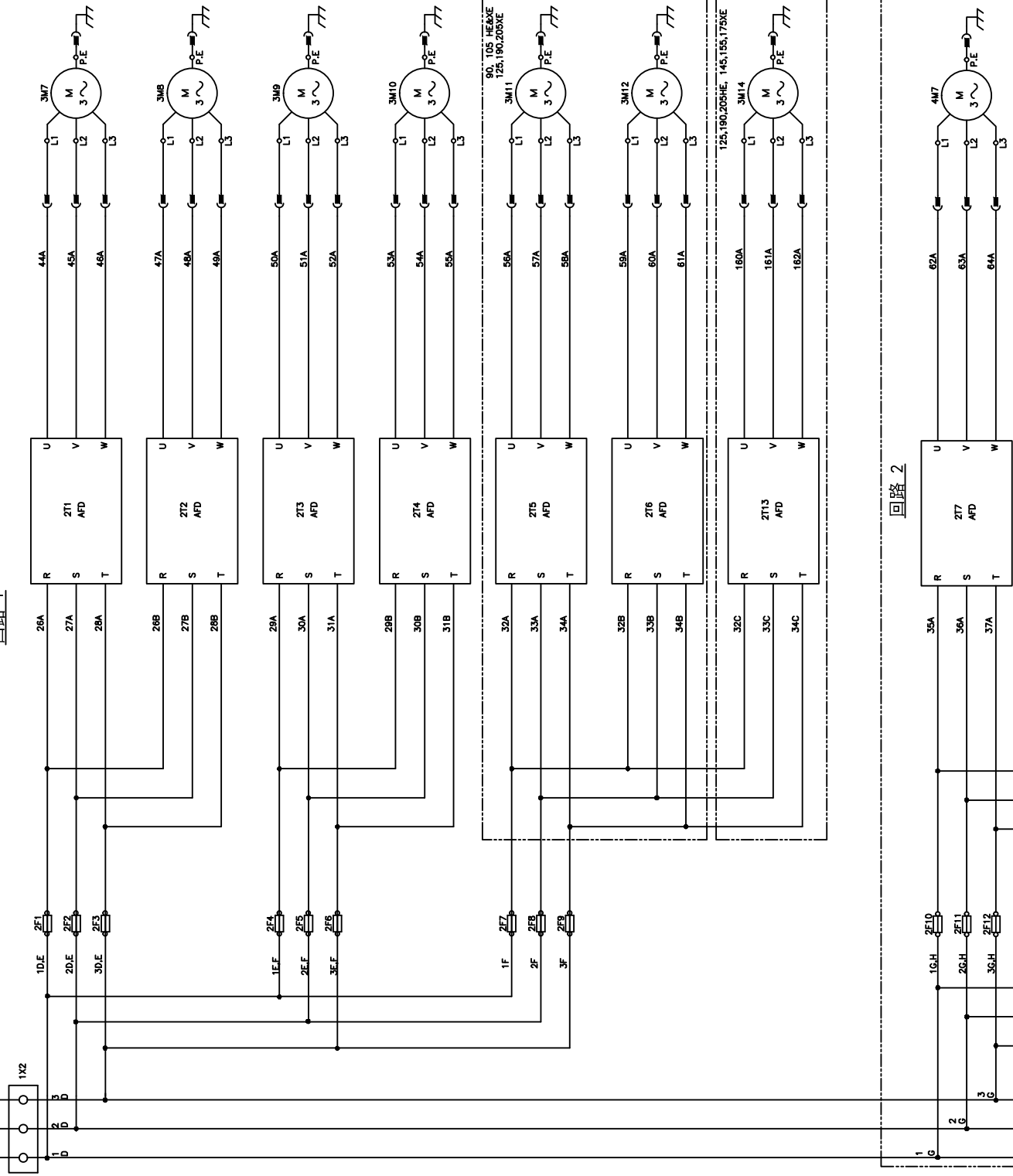


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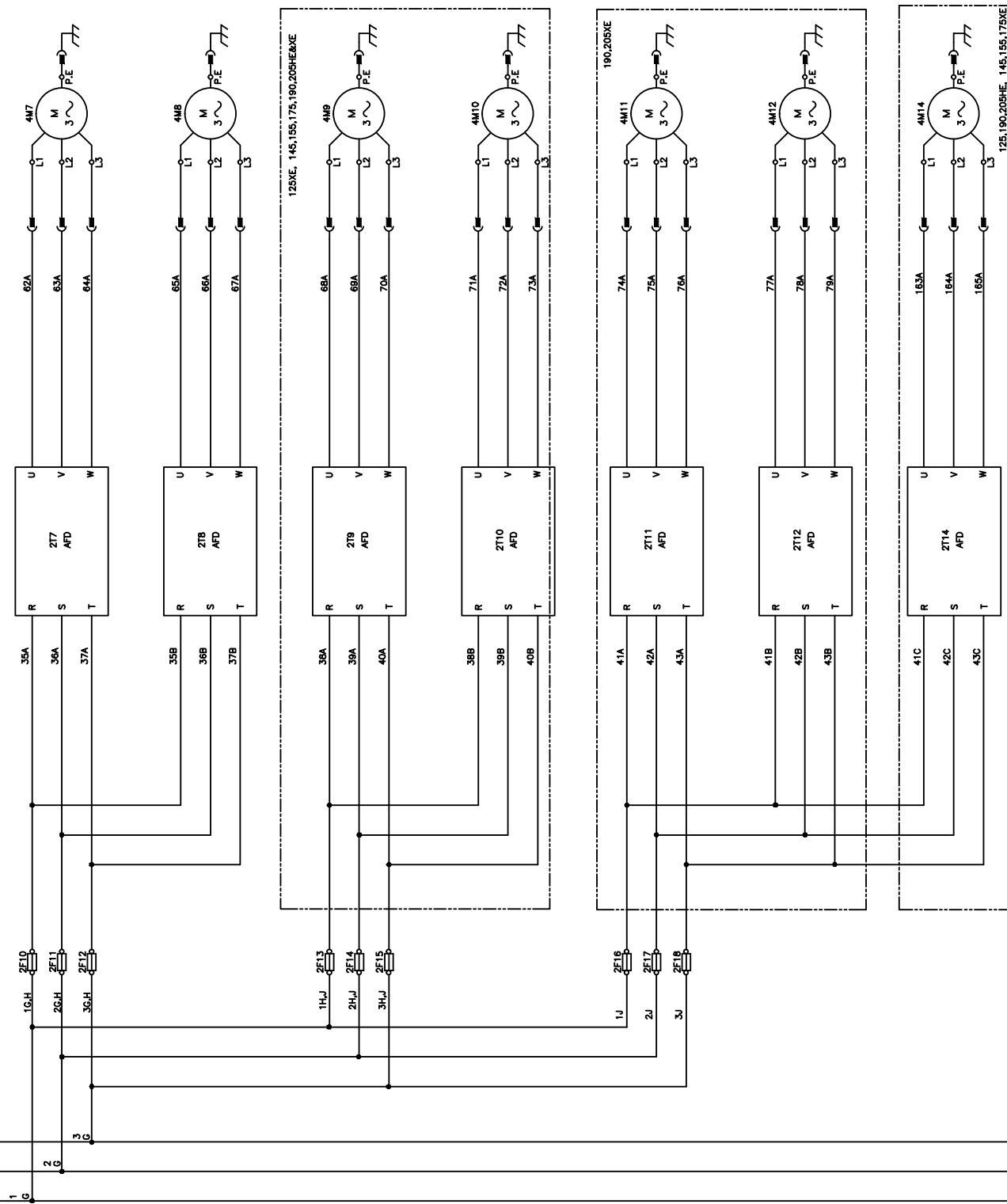
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风机接线 EC FAN



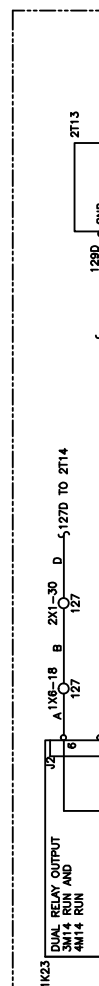
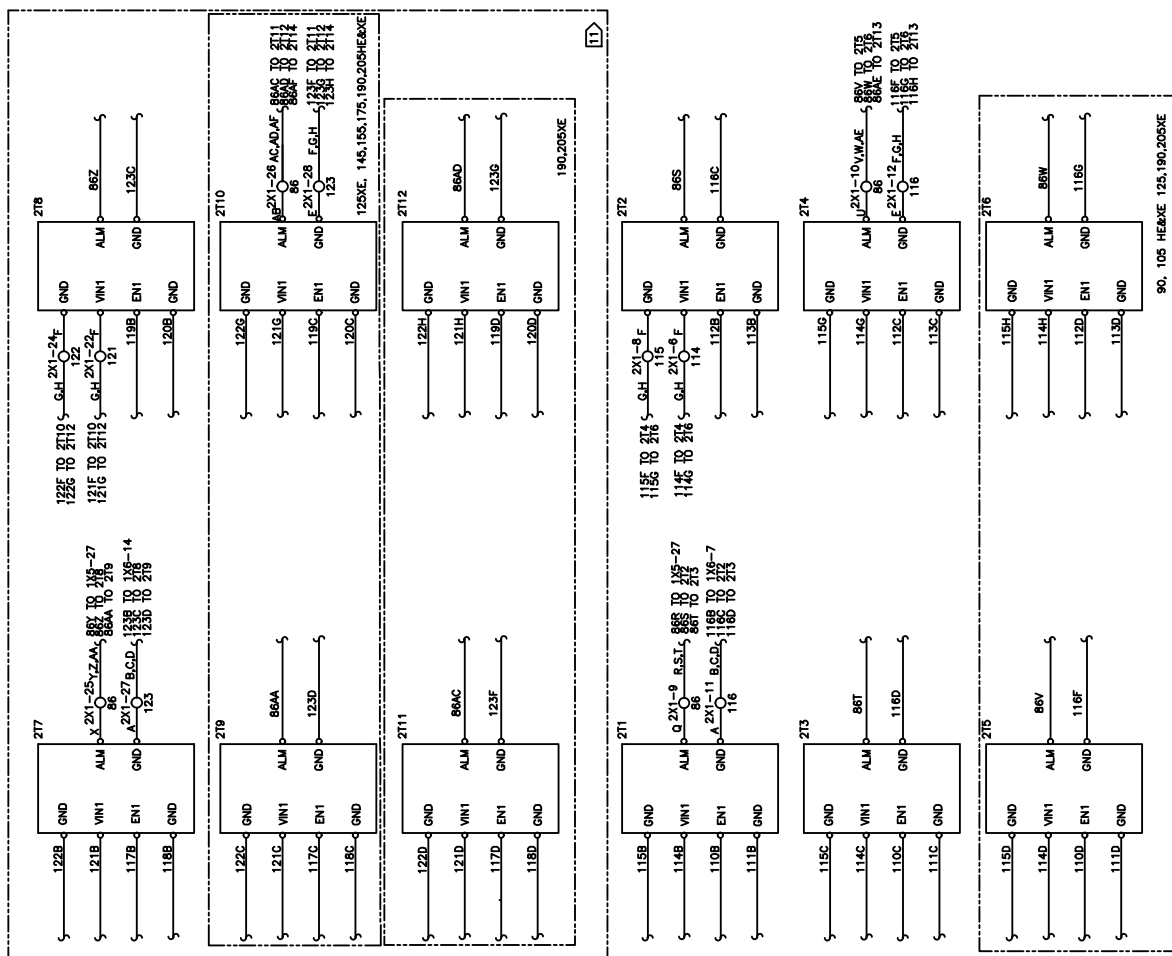
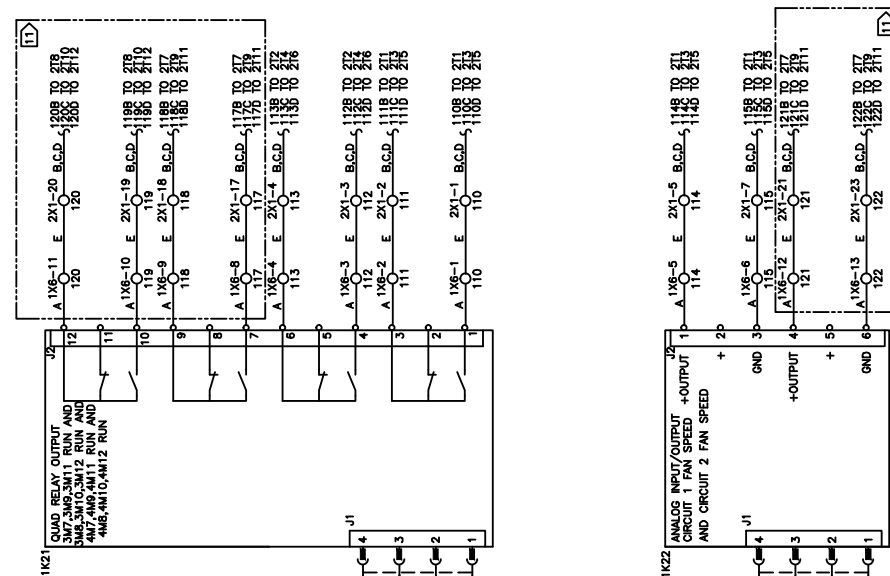
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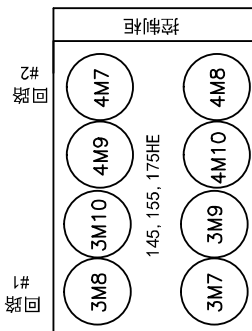
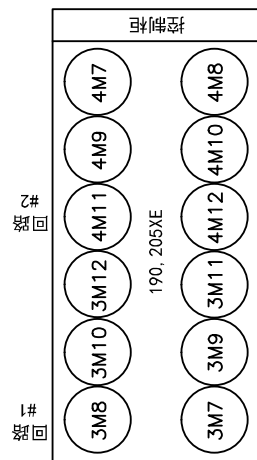
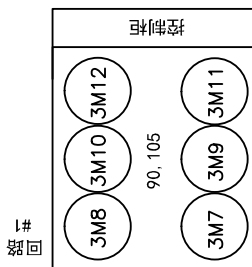
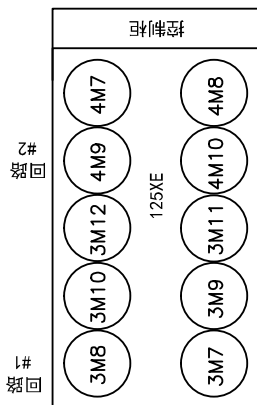
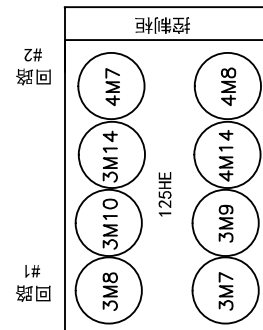
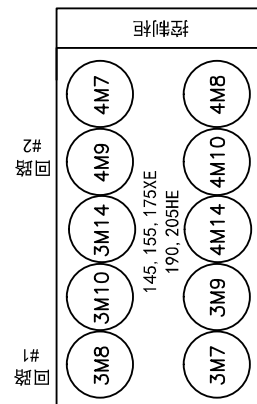
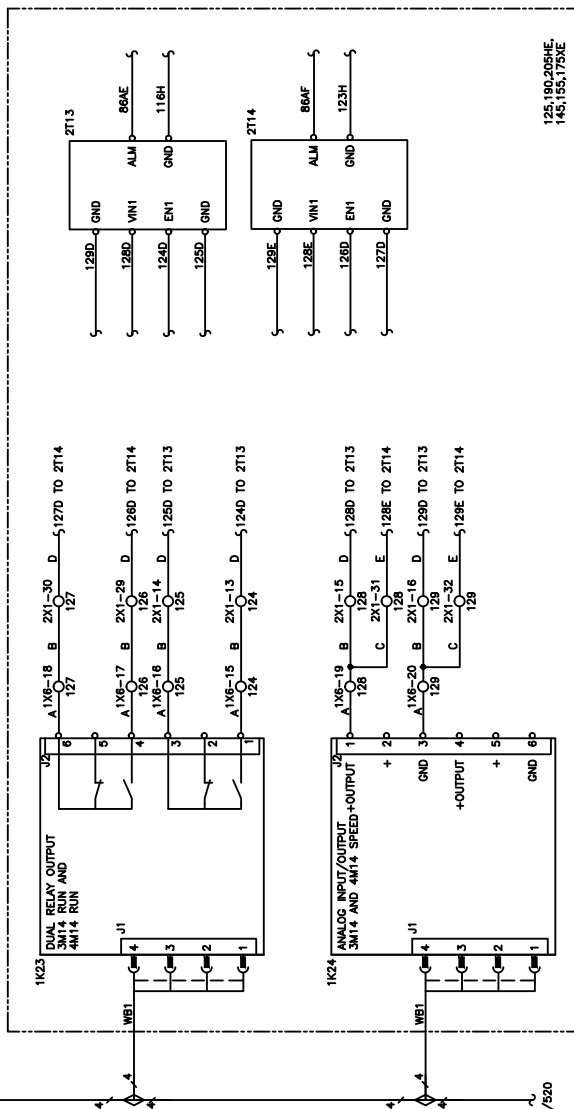
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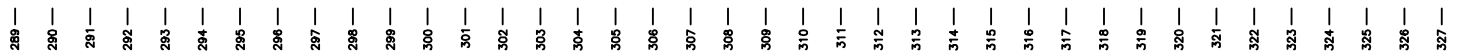


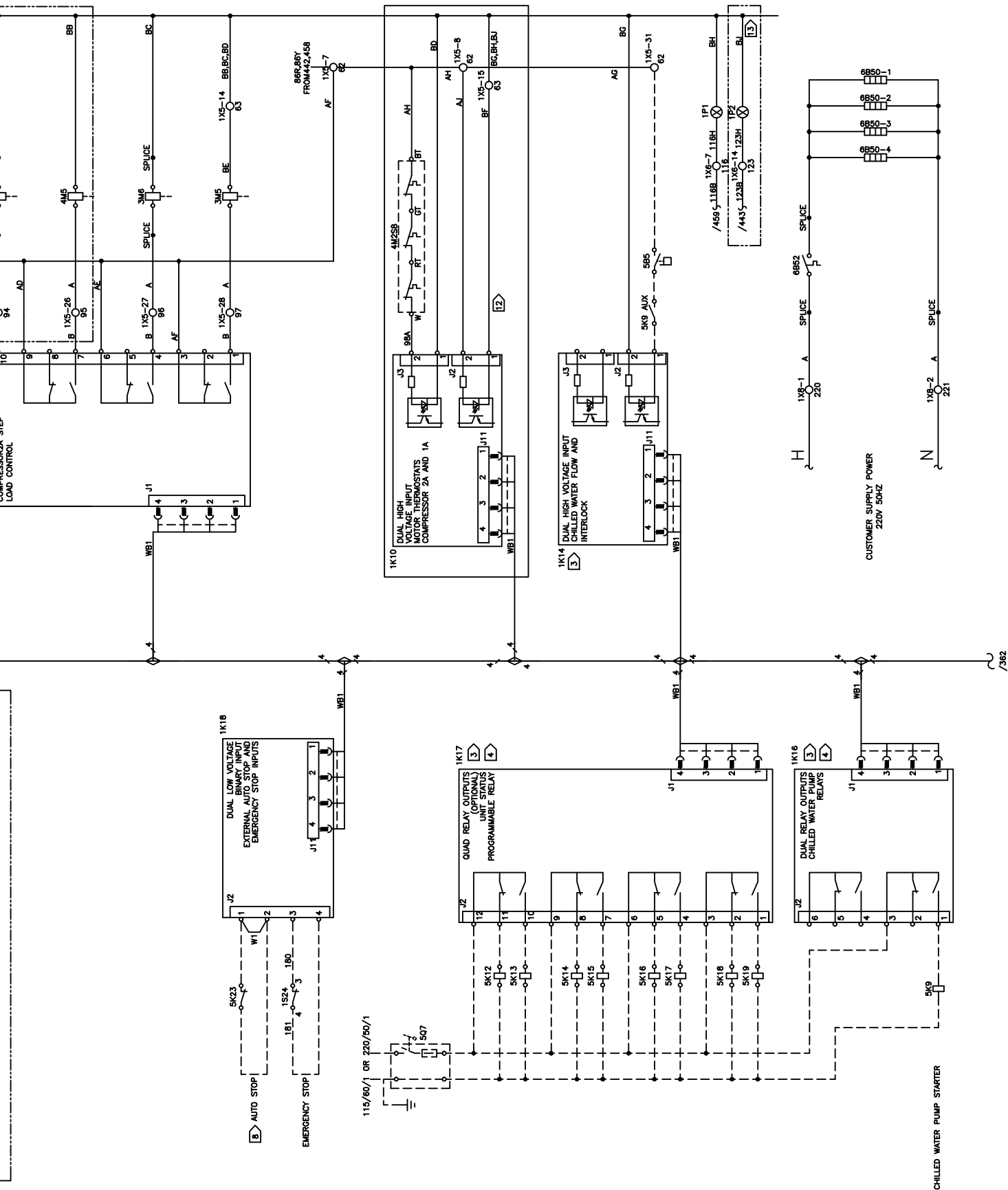
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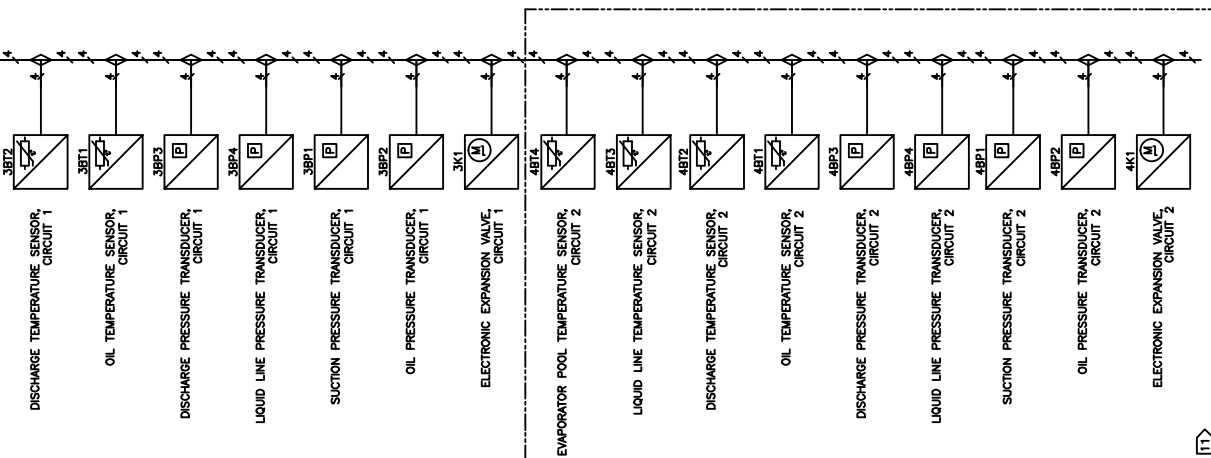
风机接线 EC 风机











Device Prefix	Location Code
1	CONTROL PANEL
2	FANS AFD PANEL
3	REFRIGERATION CIRCUIT1
4	REFRIGERATION CIRCUIT2
5	CUSTOMER REMOTELY INSTALLED
6	UNIT MOUNTED

Color	Wire Color
BK	BLACK
BR	BROWN
BU	BLUE
GR	GRAY
RD	RED
WH	WHITE
GN	GREEN
Y	YELLOW

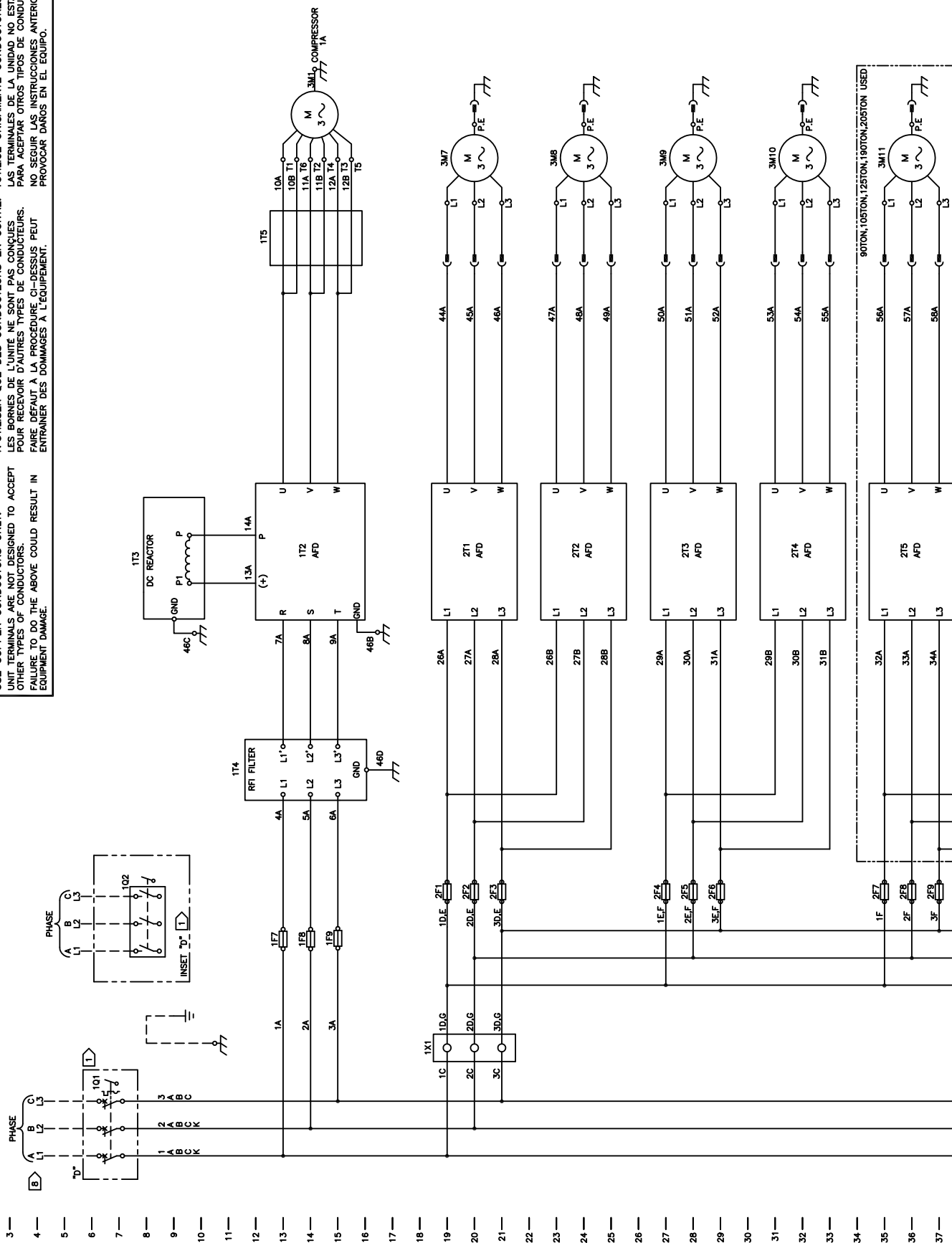
GENERAL NOTES:

- 1 UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 2BT 0 (77 F) AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- 2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- 3 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER. AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
- 4 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
- 5 CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.

NOTES:

- 1 SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS. FIELD CONNECTIONS FOR SINGLE SOURCE POWER ARE MADE TO 1X1, 1Q1, OR 1Q2.
- 2 POLARITY MARKING ON THE CURRENT TRANSFORMER (DOT OR 1 ON CT) MUST BE FACING TOWARDS THE INCOMING CURRENT.
- 3 CLASS 1 FIELD WIRE MODULE.
- 4 RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC: 5 AMPS GENERAL PURPOSE.
- 5 COMPONENTS (LUIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS (NBA) IN THE ORDER SHOWN.
- 6 DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. SHIELD IS ATTACHED INTERNALLY TO METAL WASHER ON SENSOR.
- 7 OPTIONAL MODULE. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
- 8 AUTO STOP CONTACTS ARE JUMPERED AT THE FACTORY BY JUMPER W1 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPER AND CONNECT TO THE DESIRED CONFIGURATION.
- 10 ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION TEMPERATURE RATING OF 90°C AND BE SELECTED AT 75°C RATINGS.
- 11 ONLY USED IN RTAG DUPLEX UNITS.
- 12 ONLY 125 TON USED

CAUTION
TRANE PUMP CONTROL MUST BE USED
TO PROVIDE PUMP CONTROL. EVAPORATOR
CHILLED WATER PUMP MUST BE
CONTROLLED BY THE CHILLER OUTPUT.
FAILURE TO COMPLY WITH THIS REQUIREMENT
MAY RESULT IN DAMAGE TO THE UNIT.



NOTICE

USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT
OTHER TYPES OF CONDUCTORS.
FAILURE TO DO THE ABOVE COULD RESULT IN
EQUIPMENT DAMAGE.

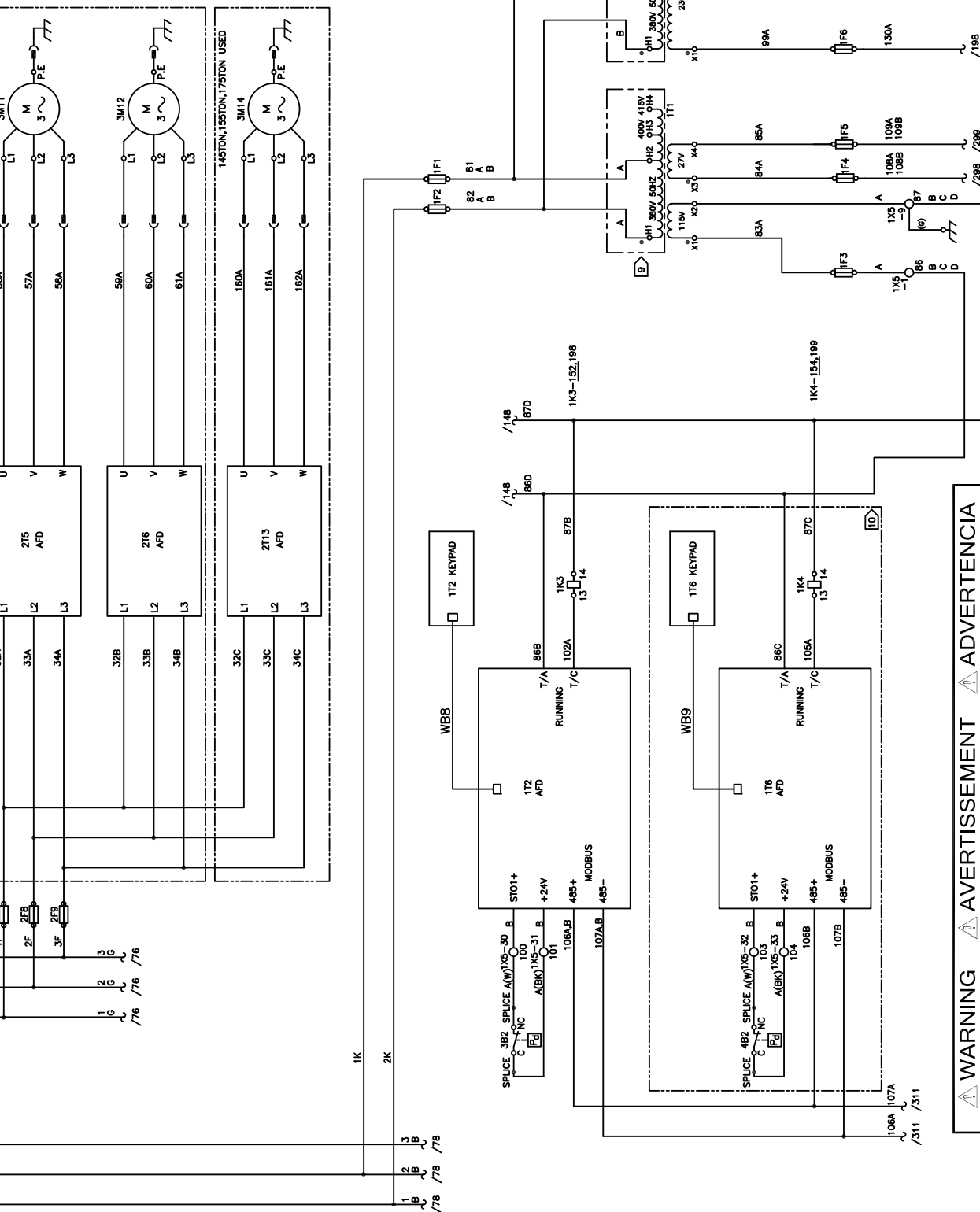
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POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT
ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

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NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE
PROVOCAR DAÑOS EN EL EQUIPO.

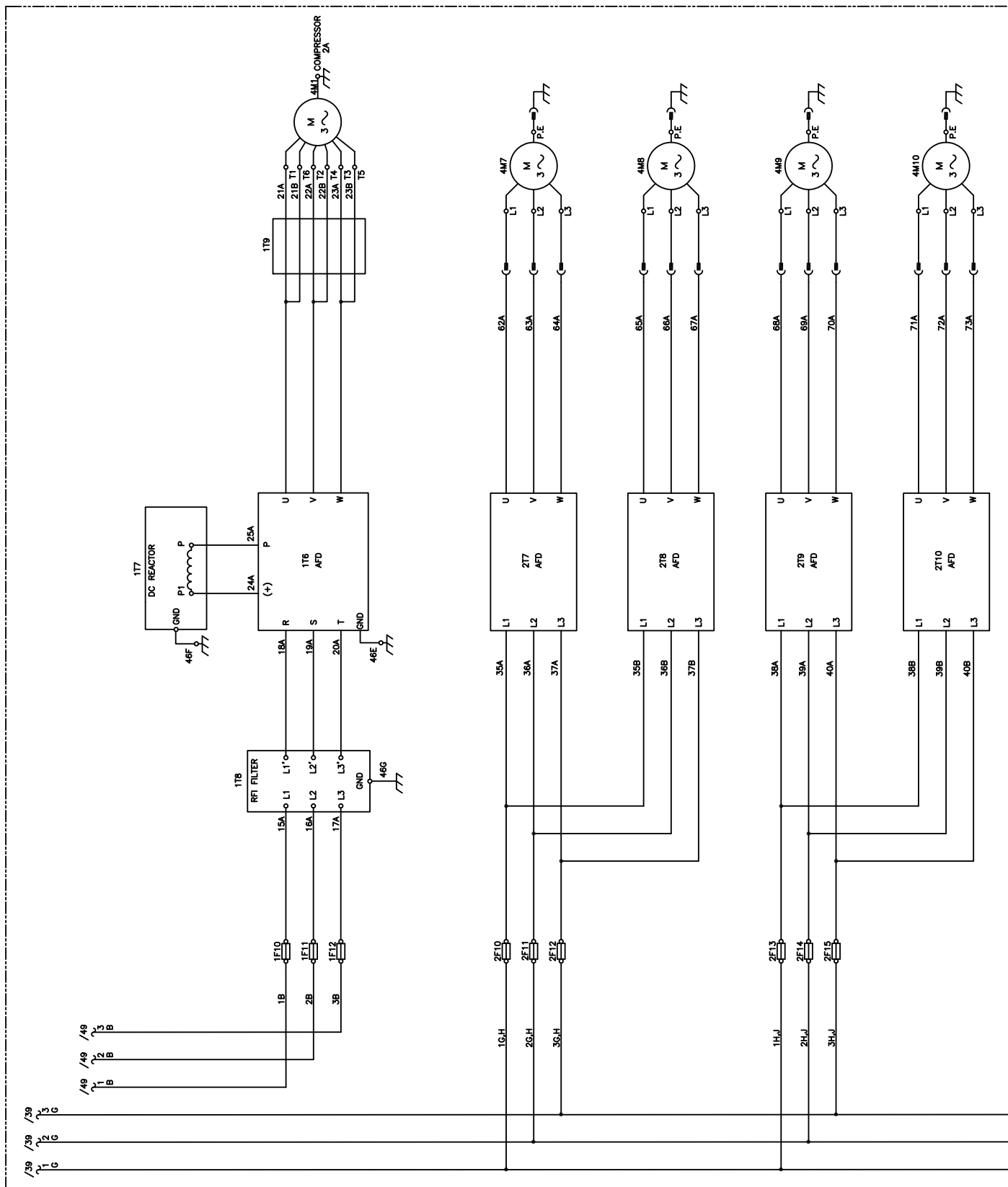
90TON,105TON,125TON,190TON,205TON USED

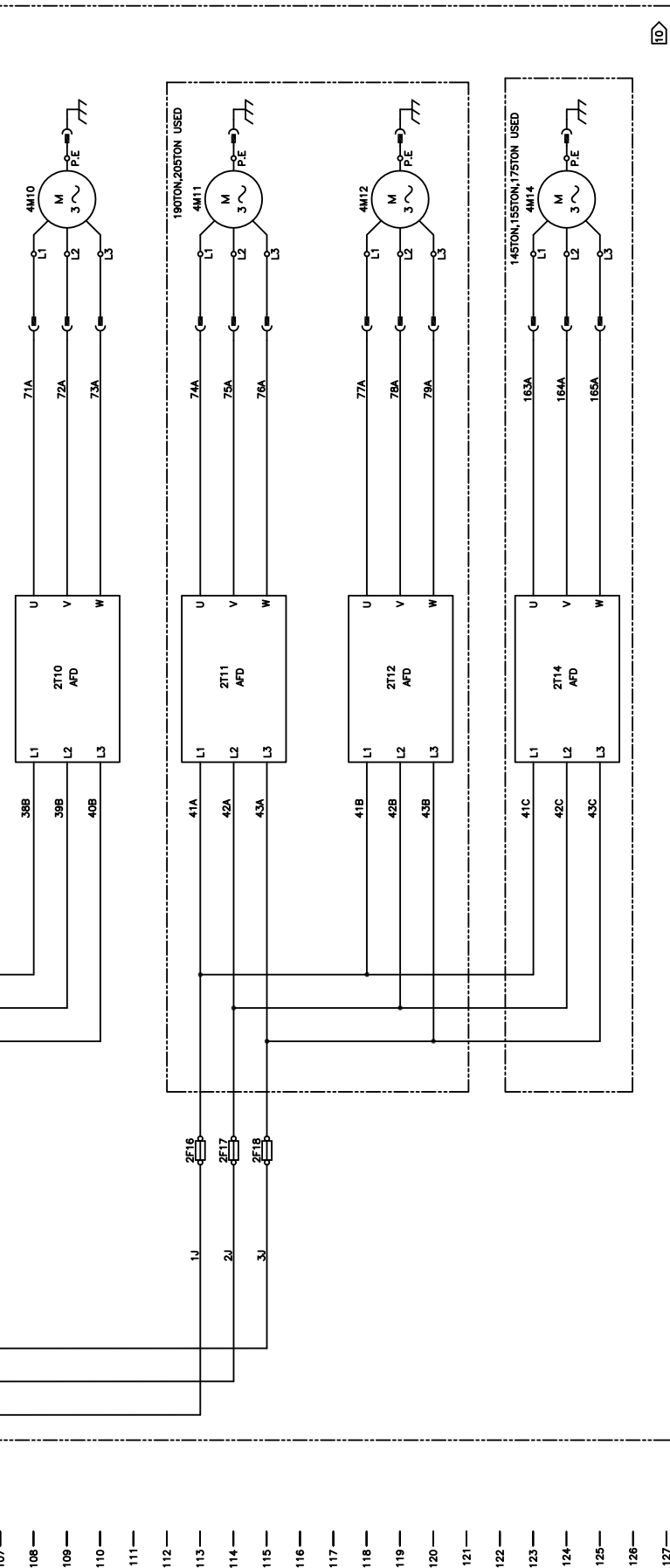


WARNING **HAZARDOUS VOLTAGE!** DISCONNECT ALL ELECTRIC POWER FROM THE SYSTEM BEFORE SERVICING. FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED. VOLTAGE UNITS WITH STORED VOLTAGE CAPACITORS TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.

AVERTISSEMENT **TENSION DANGEREUSE!** COUPER TOUTES LES TENSIONS ET DÉCONNECTER LE SYSTÈME AVANT LE SERVICE. SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUTS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS À TENSION ALIMENTÉES, CONSULTER LES INSTRUCTIONS POUR DÉCHARGER LES CONDENSATEURS. UN MANQUEMENT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES BLESSURES GRAVES, VOIRE LA MORT.

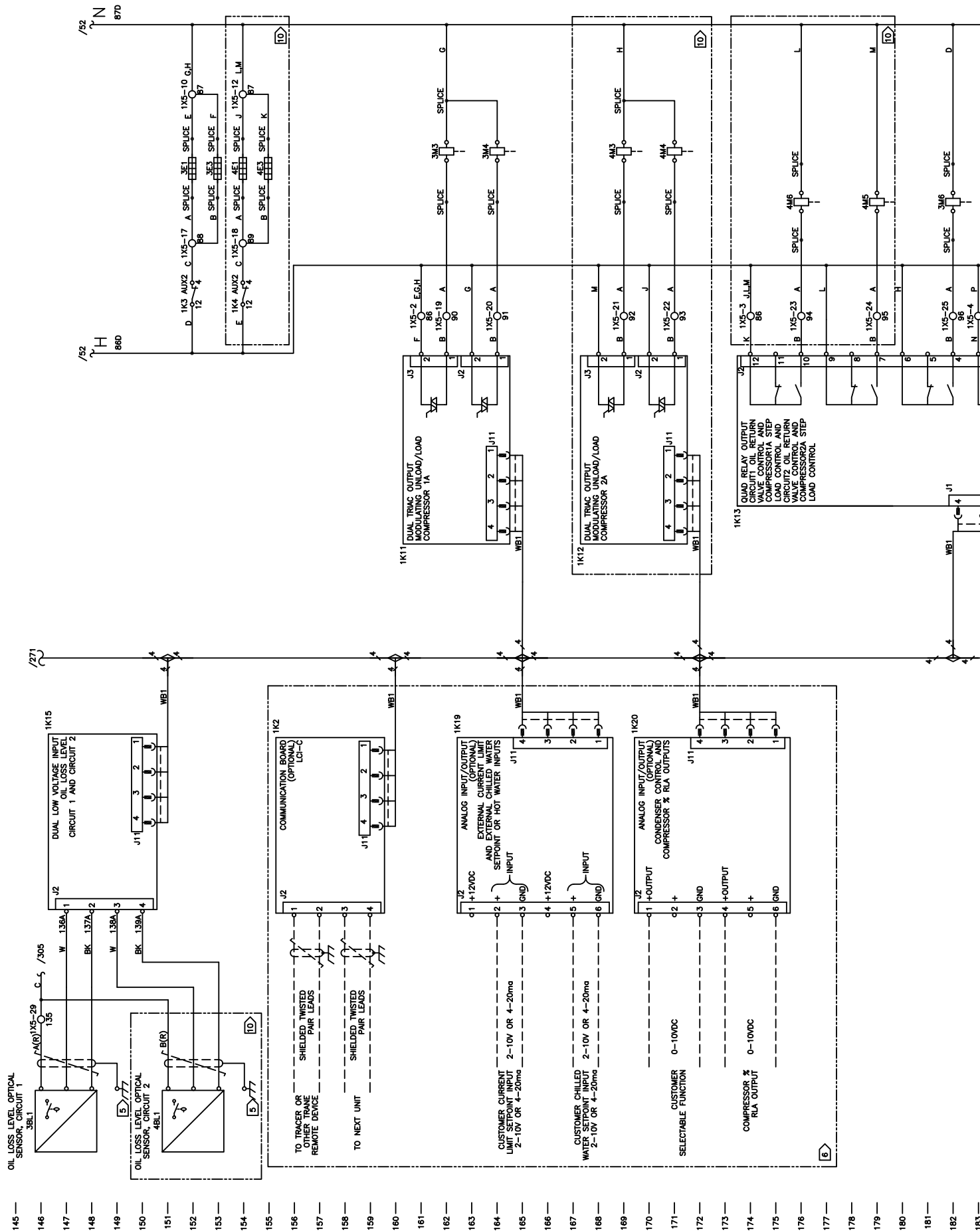
ADVERTENCIA **VOLTAJE PELIGROSO!** DESCONECTE TODA LA ENERGÍA ELÉCTRICA DEL SISTEMA ANTES DE PROCEDER AL SERVICIO. ASEGURESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. EN LAS UNIDADES CON TENSION ALIMENTADA, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. NO REALIZAR LO ANTERIOR PUEDA PROVOCAR LA MUERTE O LESIONES GRAVES.

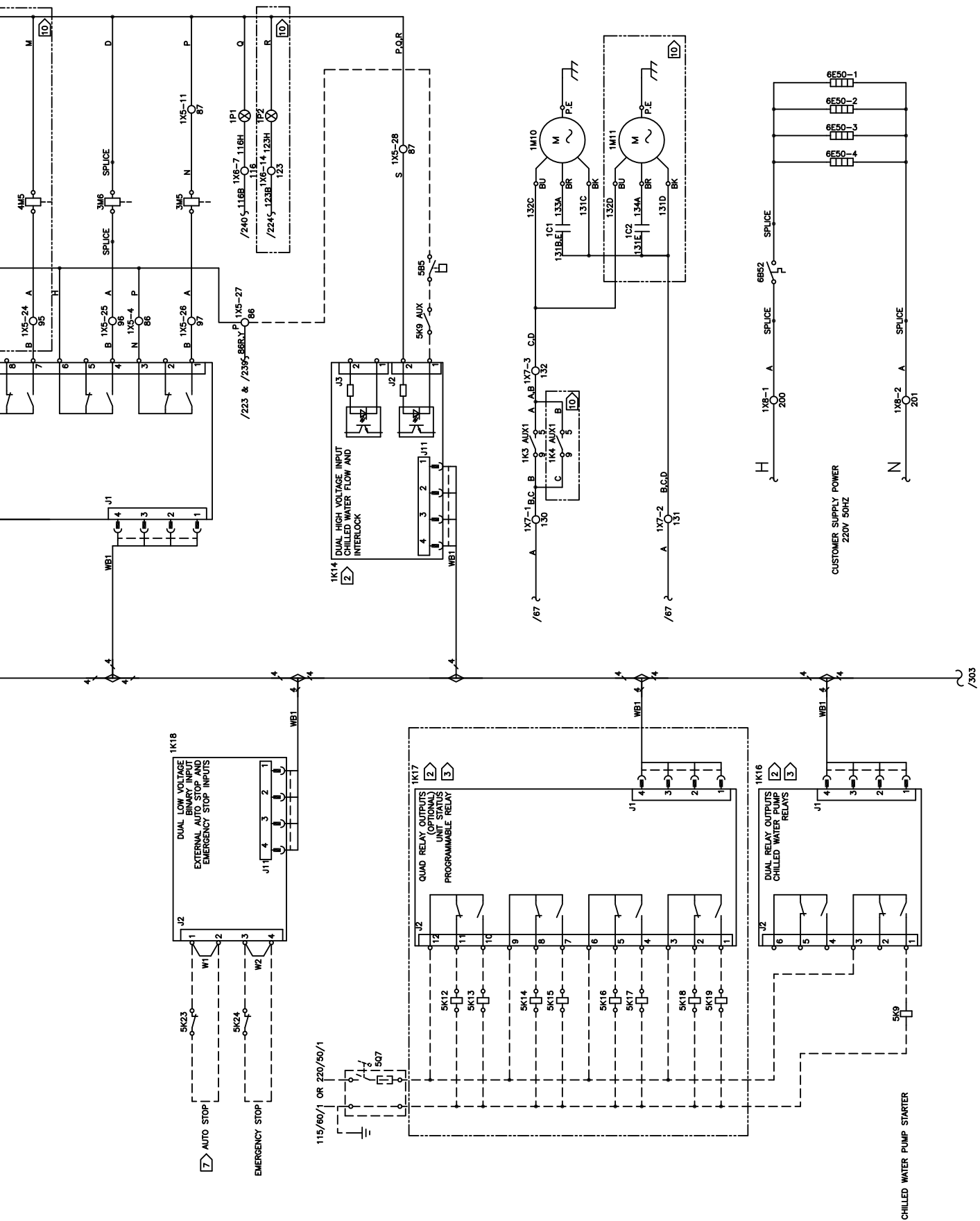




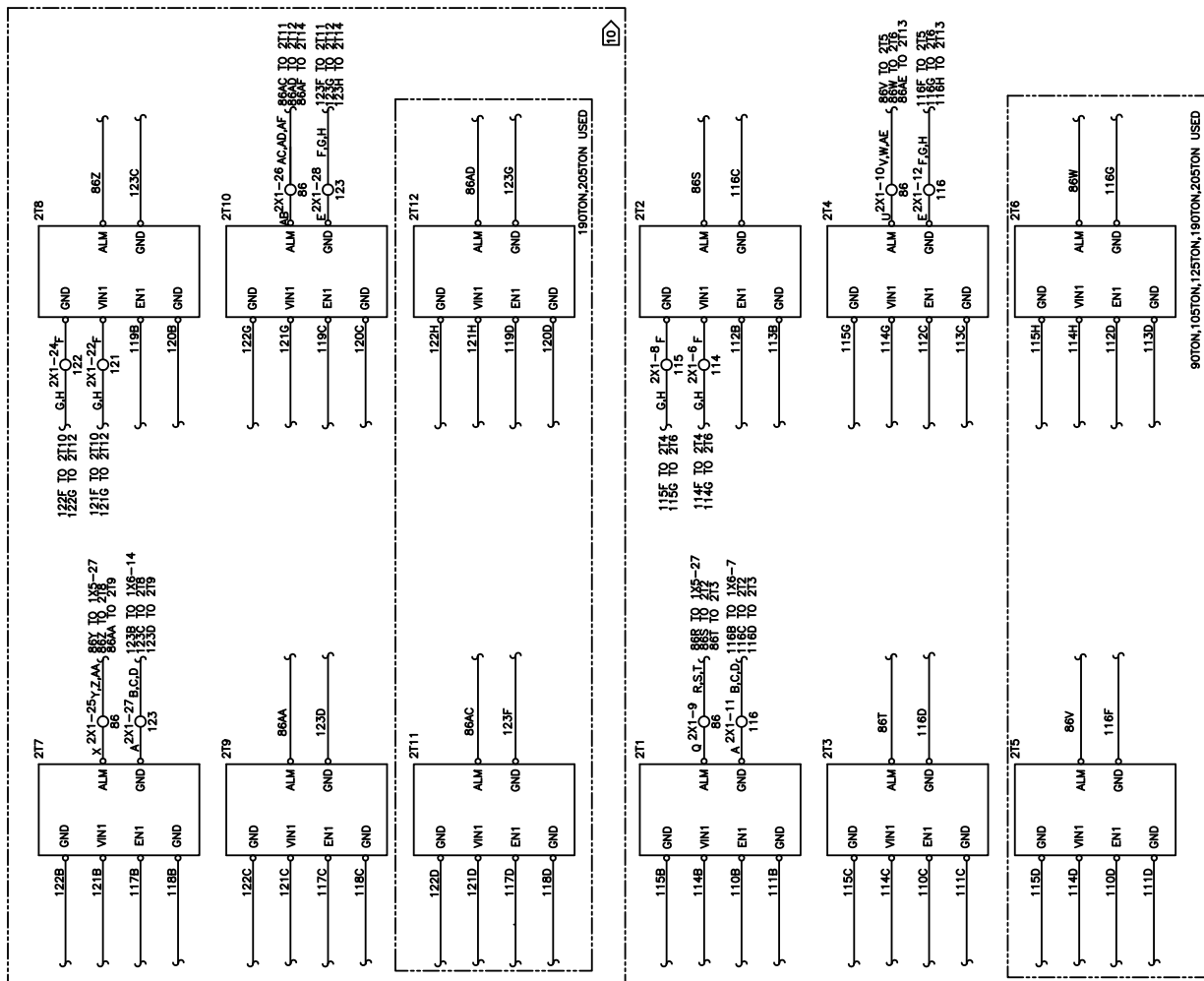
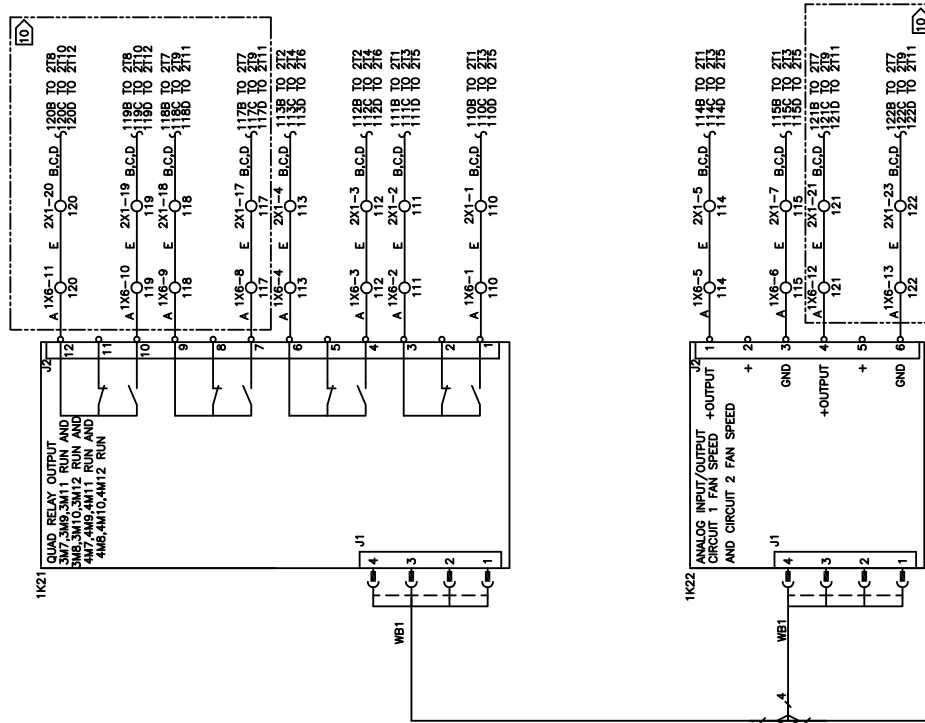
WARNING	AVERTISSEMENT	ADVERTENCIA
HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT BEFORE SERVICING CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.	TENSION DANGEREUSE! COUPER TOUTES LES TENSIONS ET OUIR LES SECTIONNEURS A DISTANCE. PLUS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET D'ÉTIQUETAGE AVANT L'ENTRETIEN. LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS À ALIMENTATION VARIABLE, CONSULTER LES INSTRUCTIONS DE L'ENTRETIEN POUR DÉCHARGER LES CONDENSATEURS. UN MANQUEMENT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES BLESSURES GRAVES, VOIRE LA MORT.	VOLTAJE PELIGROSO! DESCONECTE TODA LA ENERGÍA ELÉCTRICA INCLUIDO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA UNIDADES CON ALIMENTACIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. NO REALIZAR LO ANTERIOR PUEDE CAUSAR LA MUERTE O LESIONES GRAVES.

NOTICE	AVIS	AVISO
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254 —
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351	HEATER, COMPRESSOR 1A	152
352	HEATER, OIL SEPARATOR, CIRCUIT 1A	153
353	MOTOR, EXPANSION VALVE, CIRCUIT 1	154
354	MOTOR, COMPRESSOR 1A	155
355	MOTOR, COMPRESSOR 1A	156
356	MOTOR, COMPRESSOR 1A	157
357	MOTOR, COMPRESSOR 1A	158
358	MOTOR, COMPRESSOR 1A	159
359	MOTOR, COMPRESSOR 1A	160
360	MOTOR, COMPRESSOR 1A	161
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363	MOTOR, COMPRESSOR 1A	164
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365	MOTOR, COMPRESSOR 1A	166
366	MOTOR, COMPRESSOR 1A	167
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368	MOTOR, COMPRESSOR 1A	169
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559	MOTOR, COMPRESSOR 1A	360

COLOR CODE	AREA	DEVICE PREFIX	LOCATION CODE
BR	1	CONTROL PANEL	1
BL	2	FANS AFD PANEL	2
BU	3	REFRIGERATION CIRCUIT1	3
GY	4	REFRIGERATION CIRCUIT2	4
GR	5	CUSTOMER REMOTELY INSTALLED	5
OR	6	UNIT MOUNTED	6

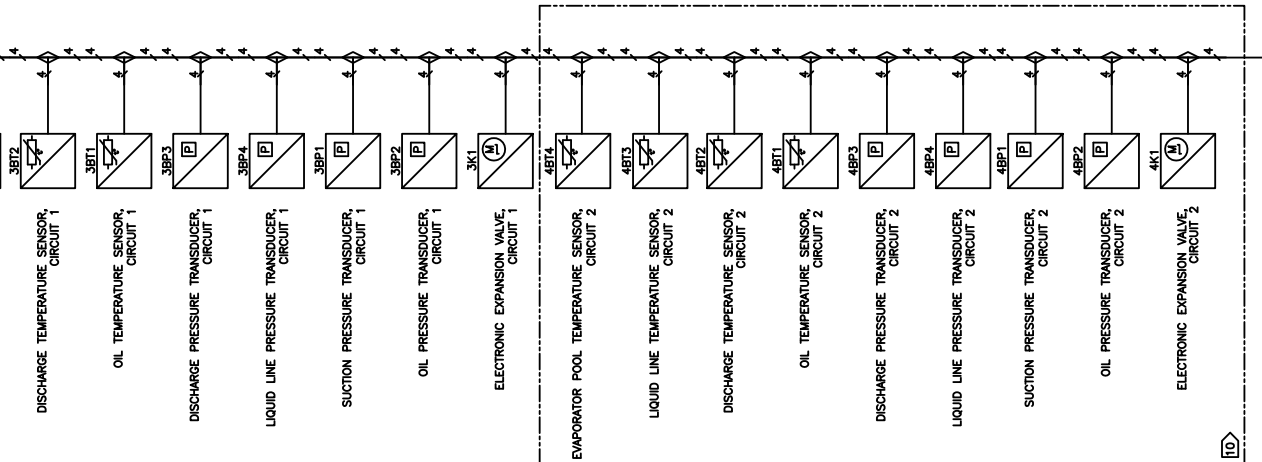
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GENERAL NOTES:

- UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25 C (77 F). AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER. AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
- ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
- CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.

NOTES:

- SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS. FIELD CONNECTIONS FOR SINGLE SOURCE POWER ARE MADE TO 1Q1 OR 1Q2.
- CLASS 1 FIELD WIRE MODULE.
- RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC: 5 AMPS GENERAL PURPOSE.
- COMPONENTS (LIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS (WB3) IN THE ORDER SHOWN.
- DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. SHIELD IS ATTACHED INTERNALLY TO METAL WASHER ON SENSOR.
- OPTIONAL MODULE. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
- AUTO STOP CONTACTS ARE JUMPERED AT THE FACTORY BY JUMPER W1 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPER AND CONNECT TO THE DESIRED CONFIGURATION.
- ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION TEMPERATURE RATING OF 90C AND BE SELECTED AT 75C RATINGS.
- WIRING FOR 380V/50Hz UNIT SHOWN. FOR 400V/50Hz UNIT, CONNECT H1 AND H3. FOR 415V/50Hz UNIT, CONNECT H1 AND H4.
- ONLY USED IN RTAG AFD DUPLEX UNITS.



NOTICE

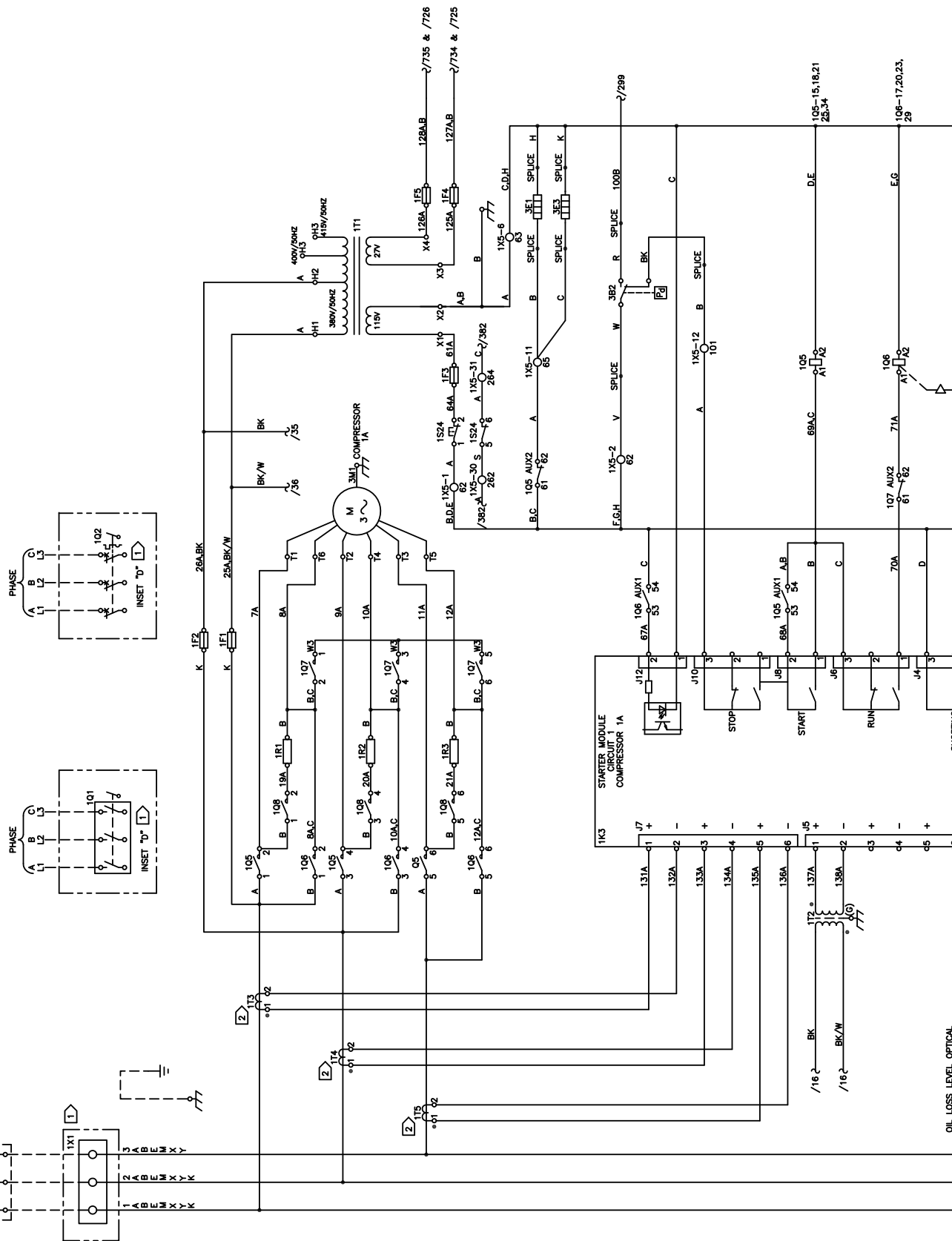
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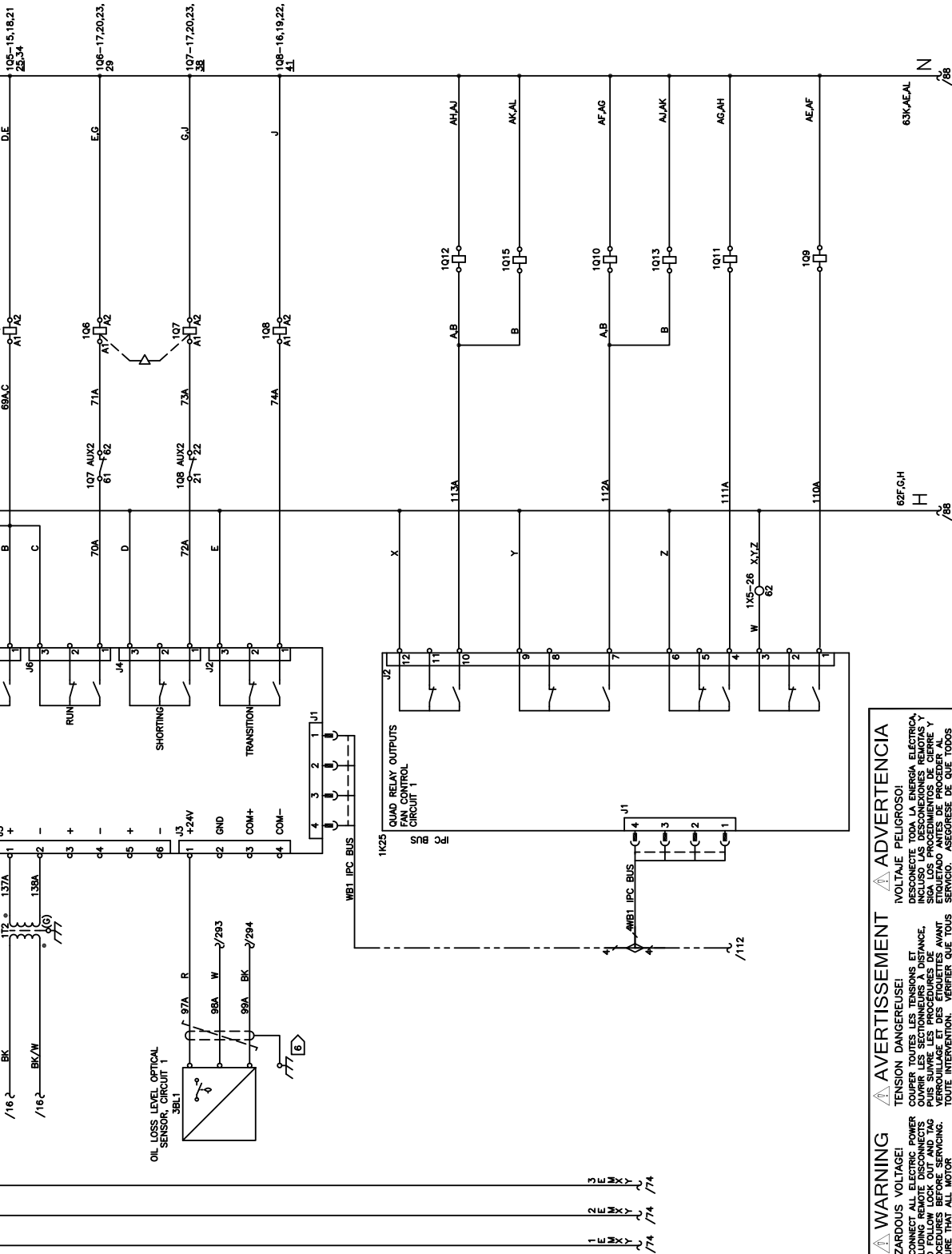
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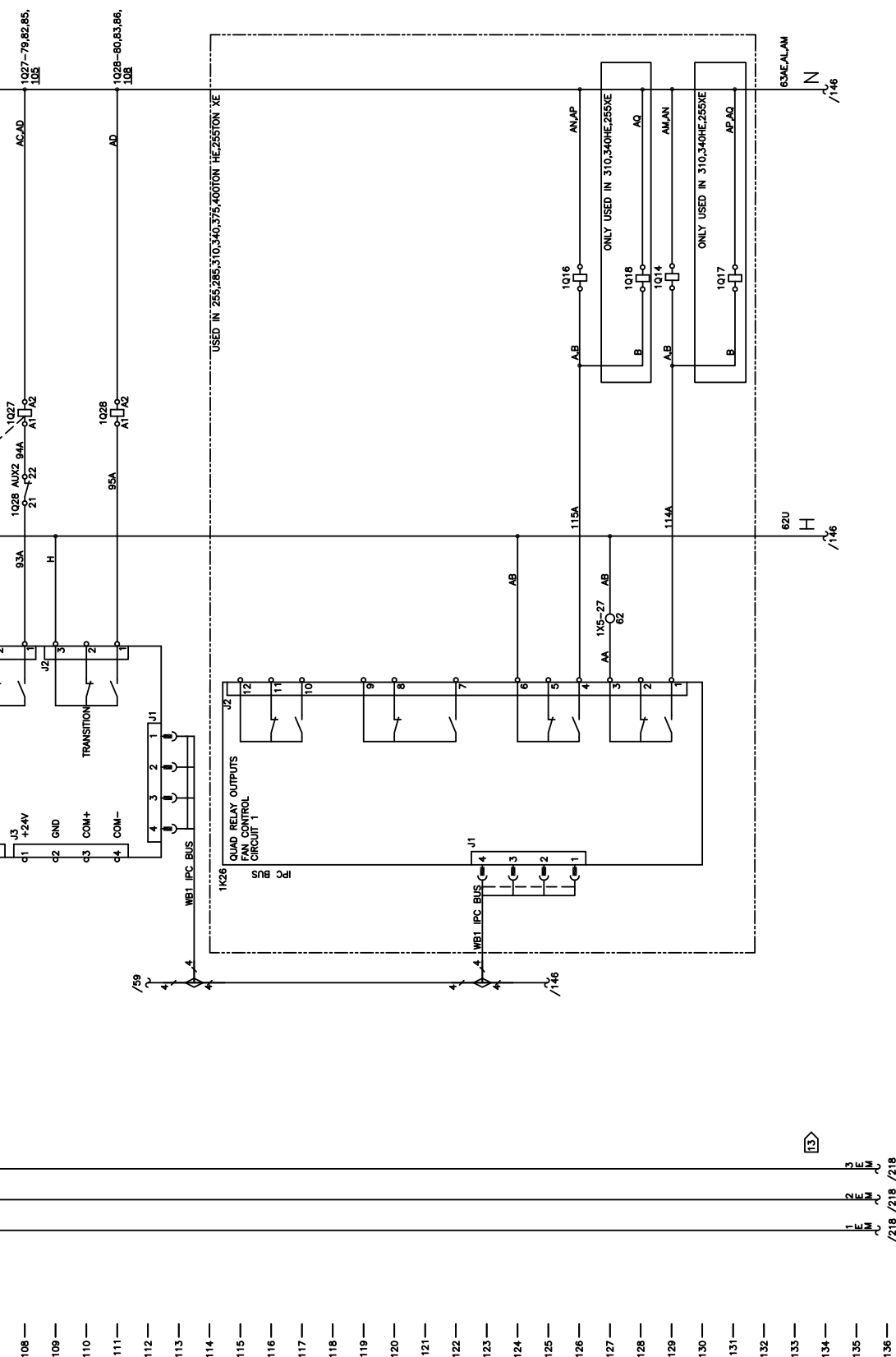
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WARNING	AVERTISSEMENT	ADVERTENCIA
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NOTICE

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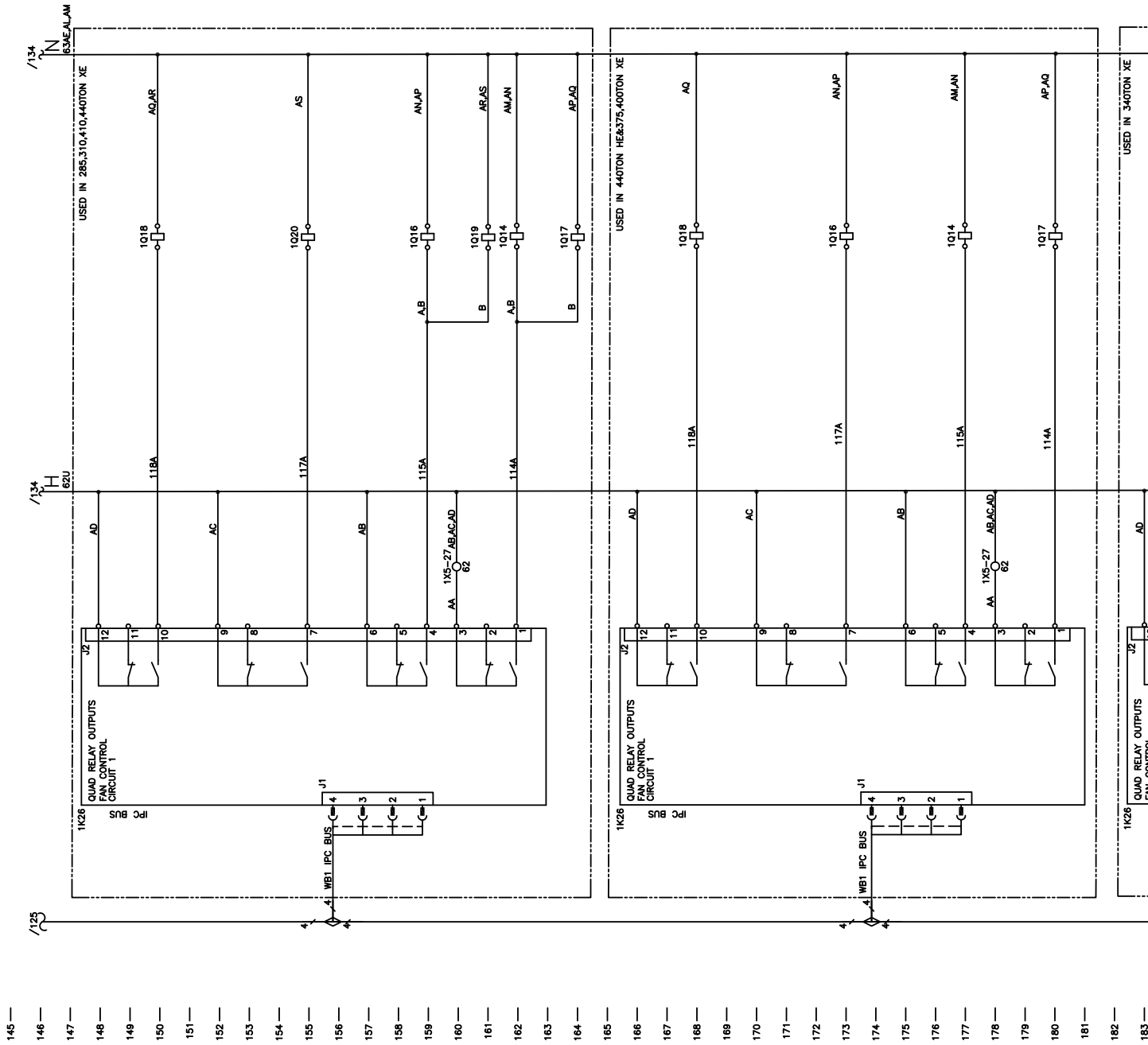
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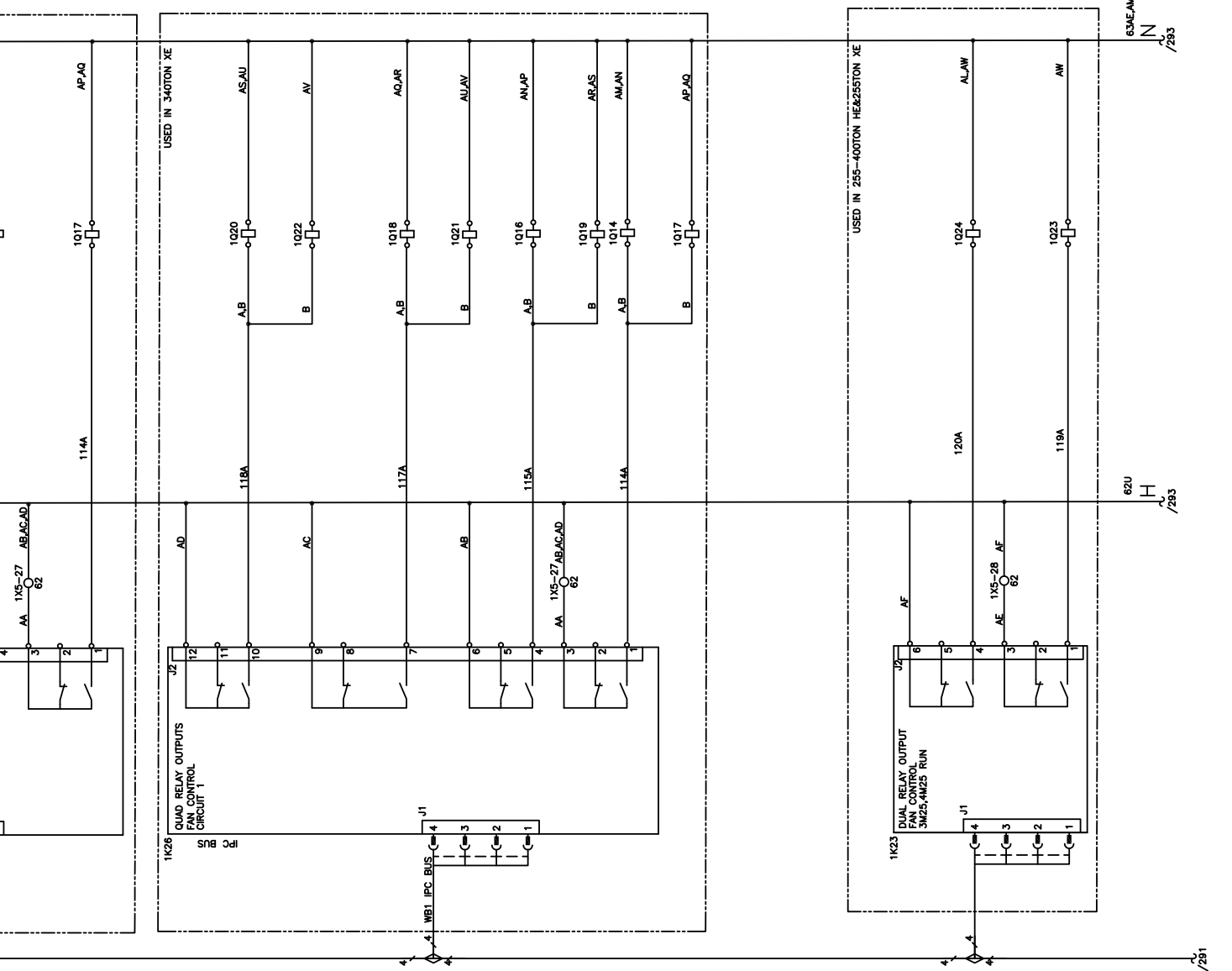
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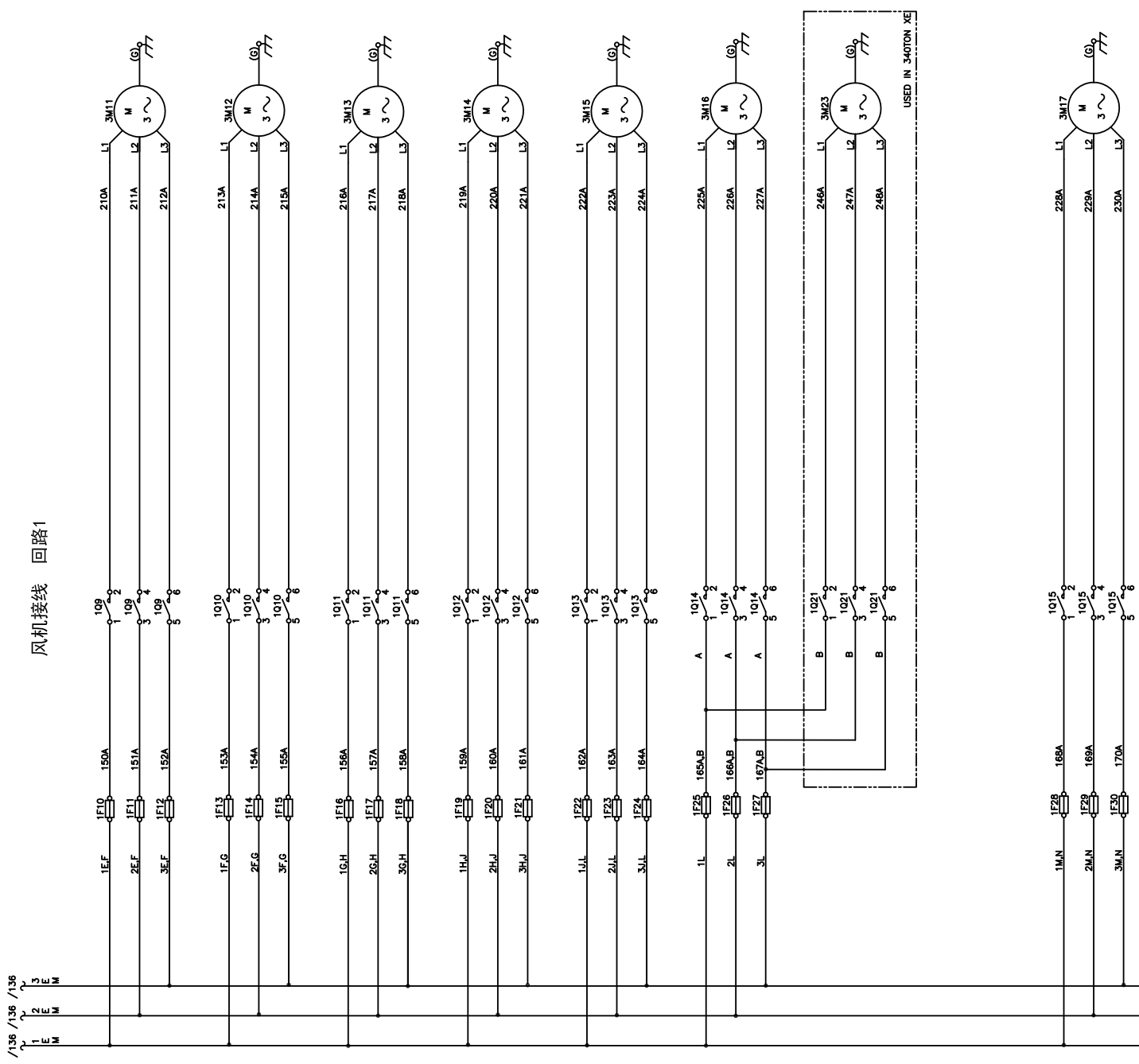
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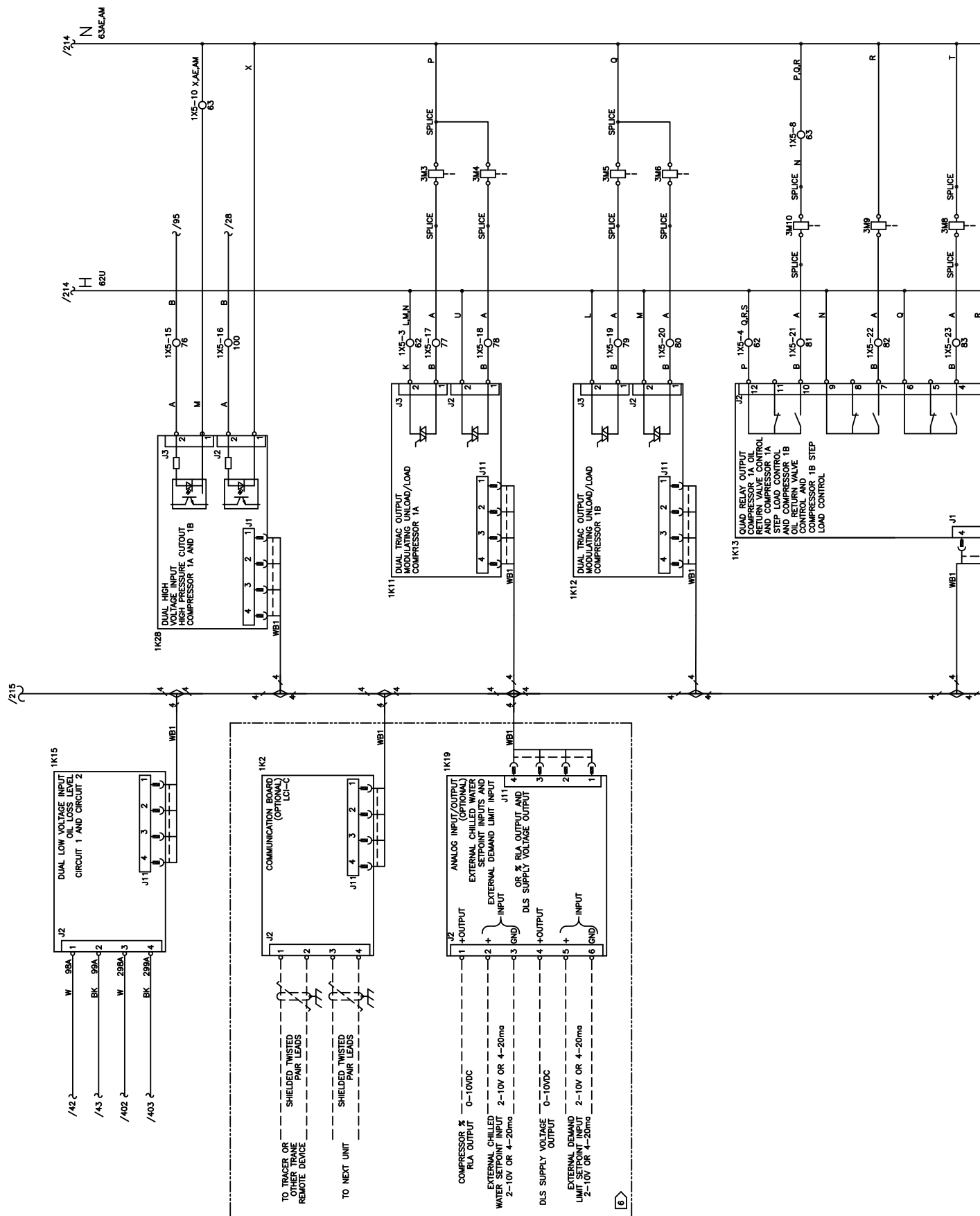




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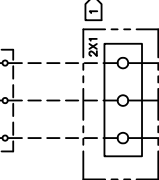
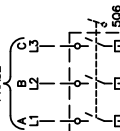
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NOTICE

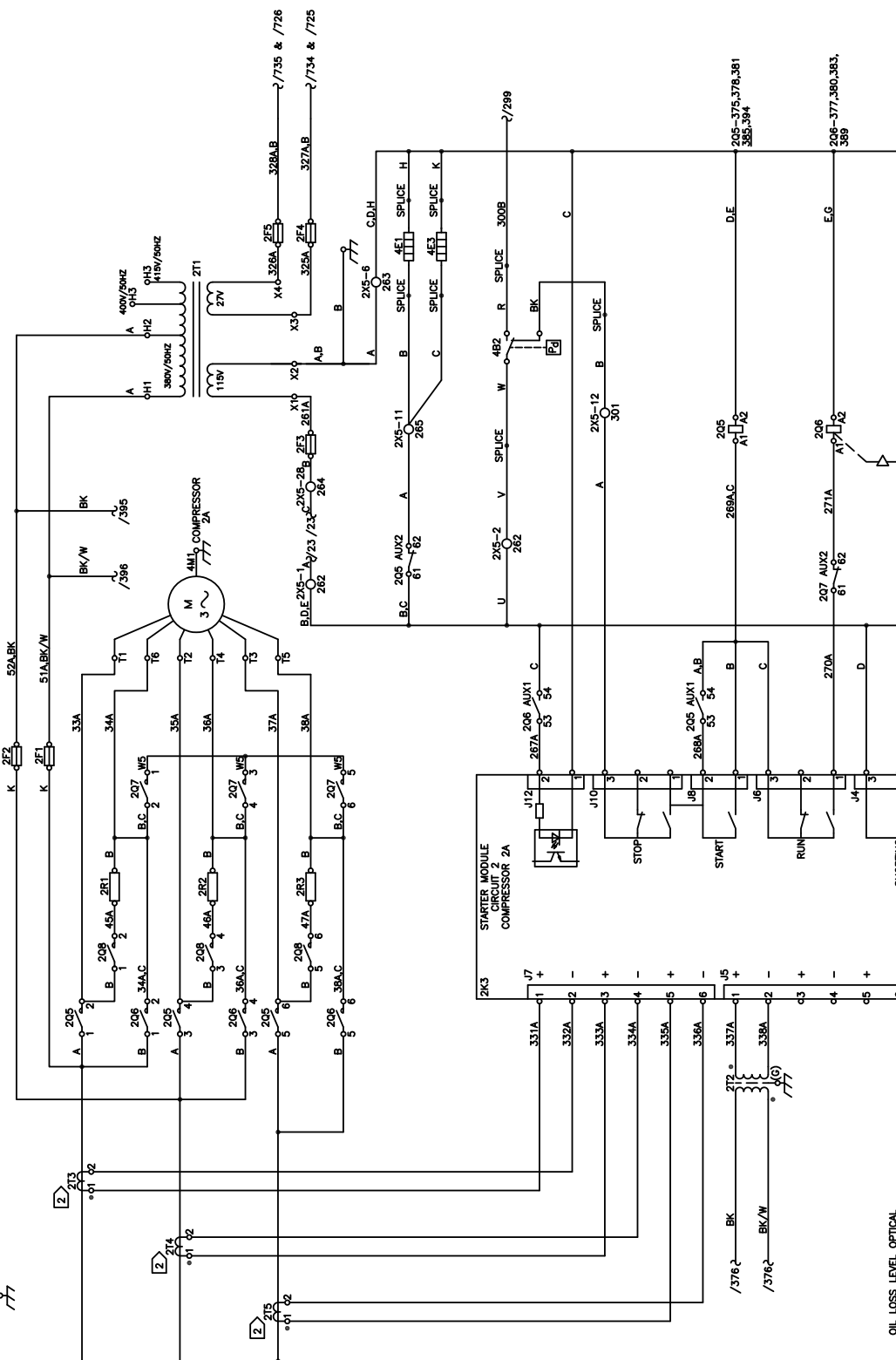
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OIL LOSS LEVEL OPTICAL



AVIS

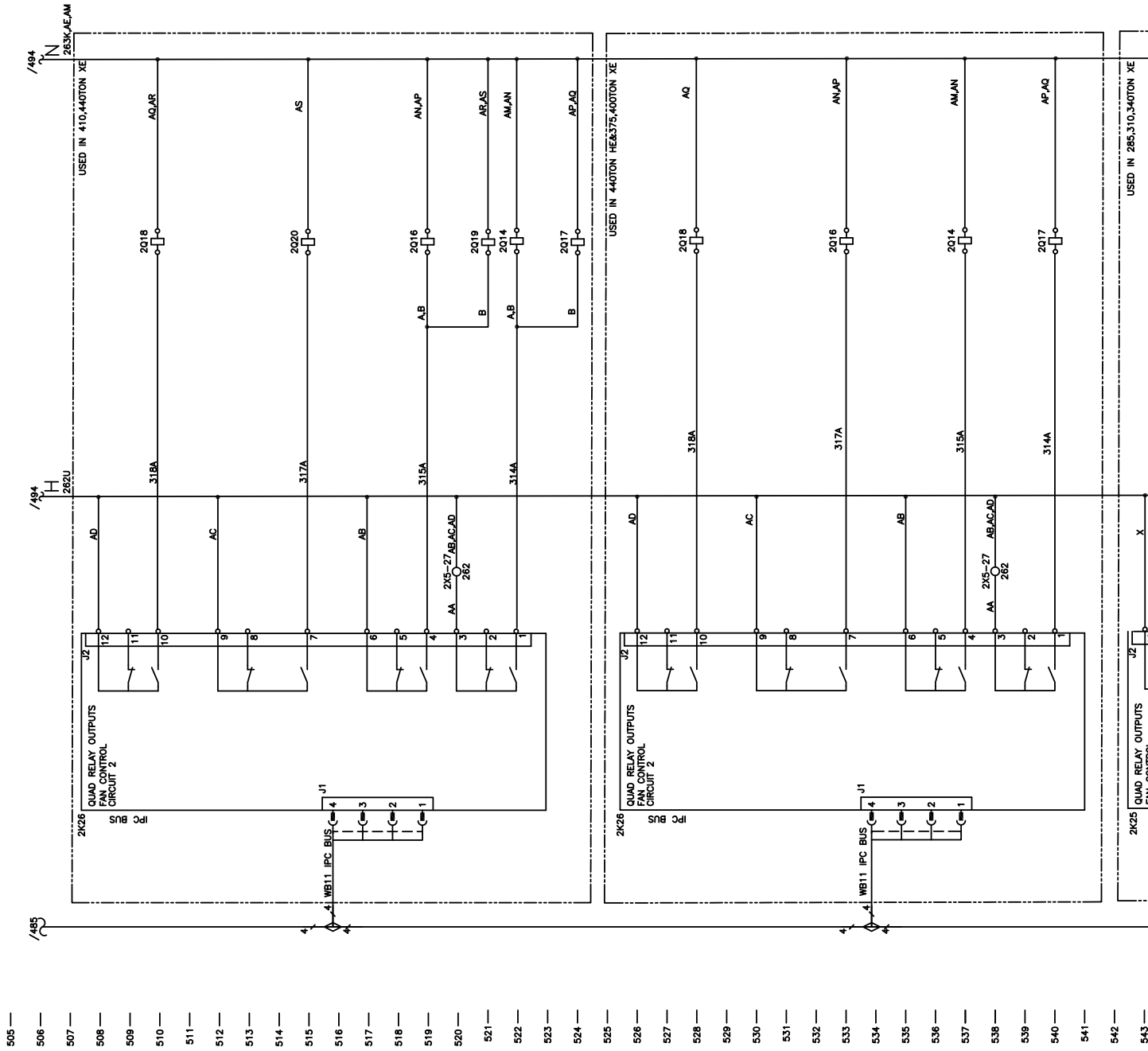
NE PAS
UTILISER QUE DES CONDUCTEURS EN CUIVRE
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES
POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT
ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE
PROVOCAR DAÑOS EN EL EQUIPO.



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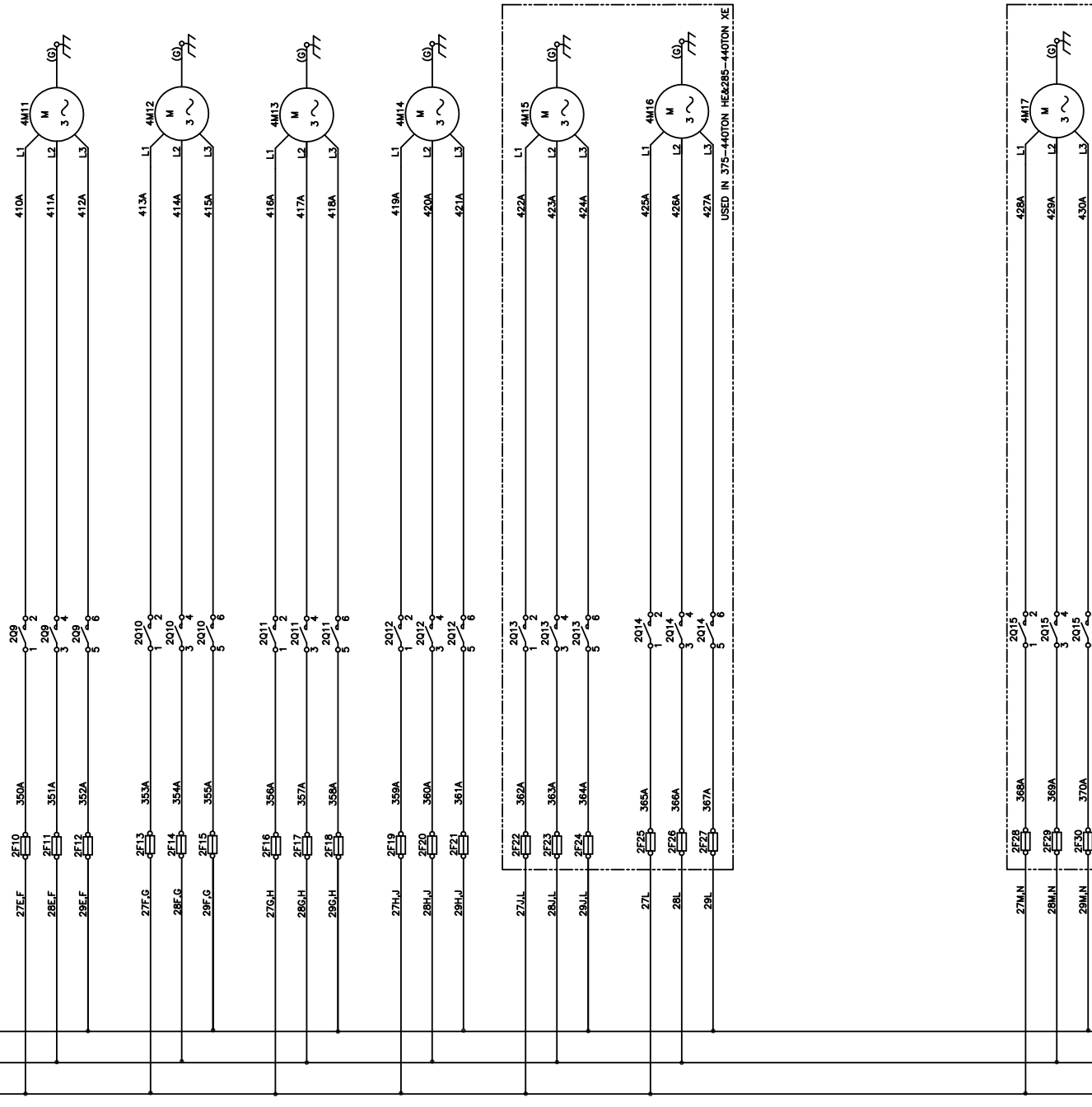




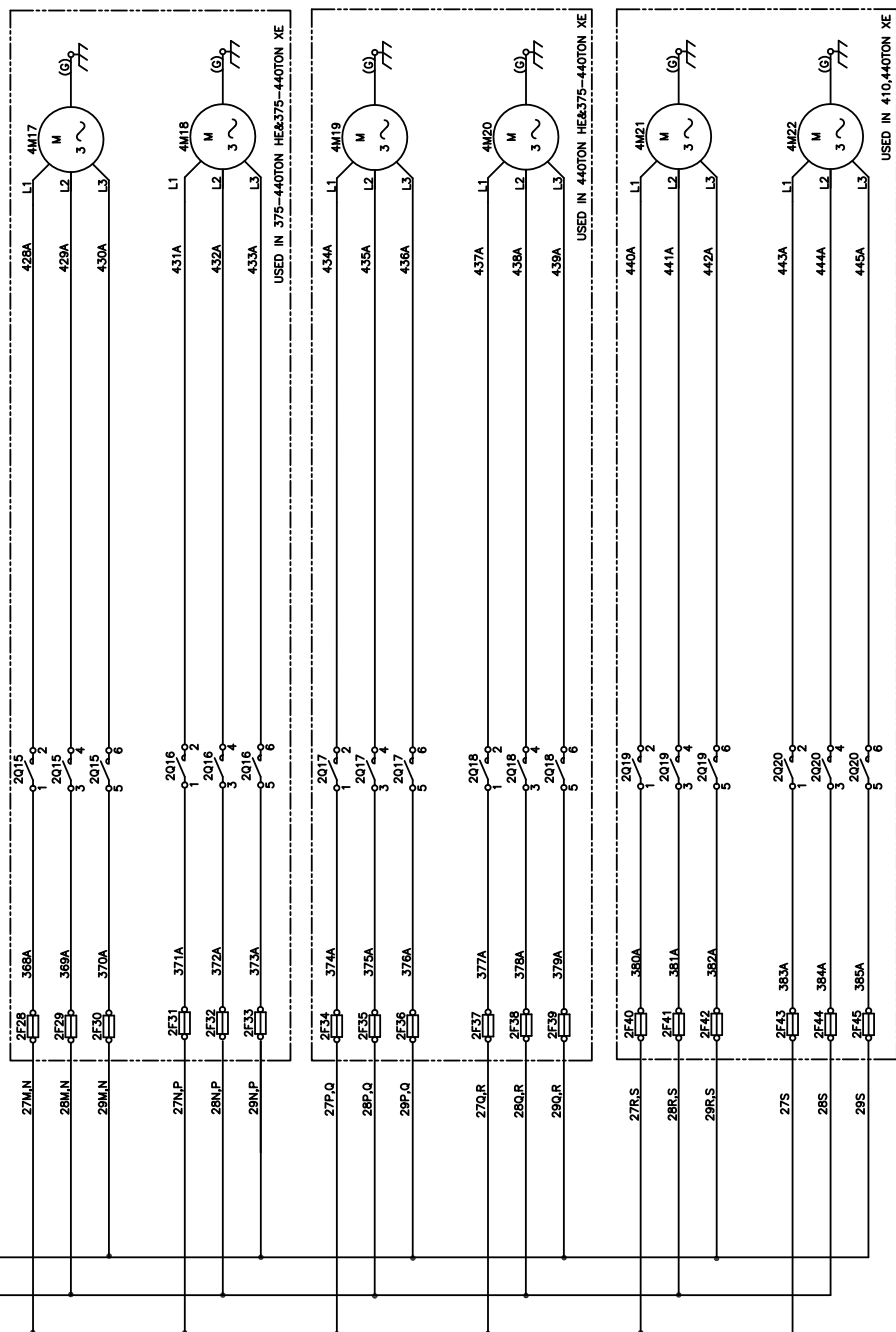
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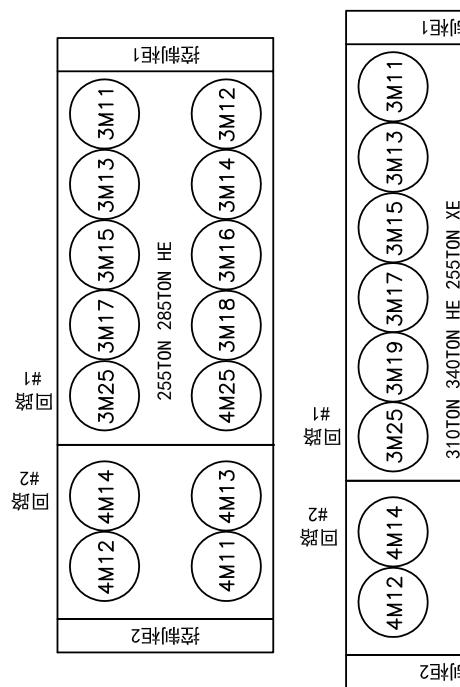
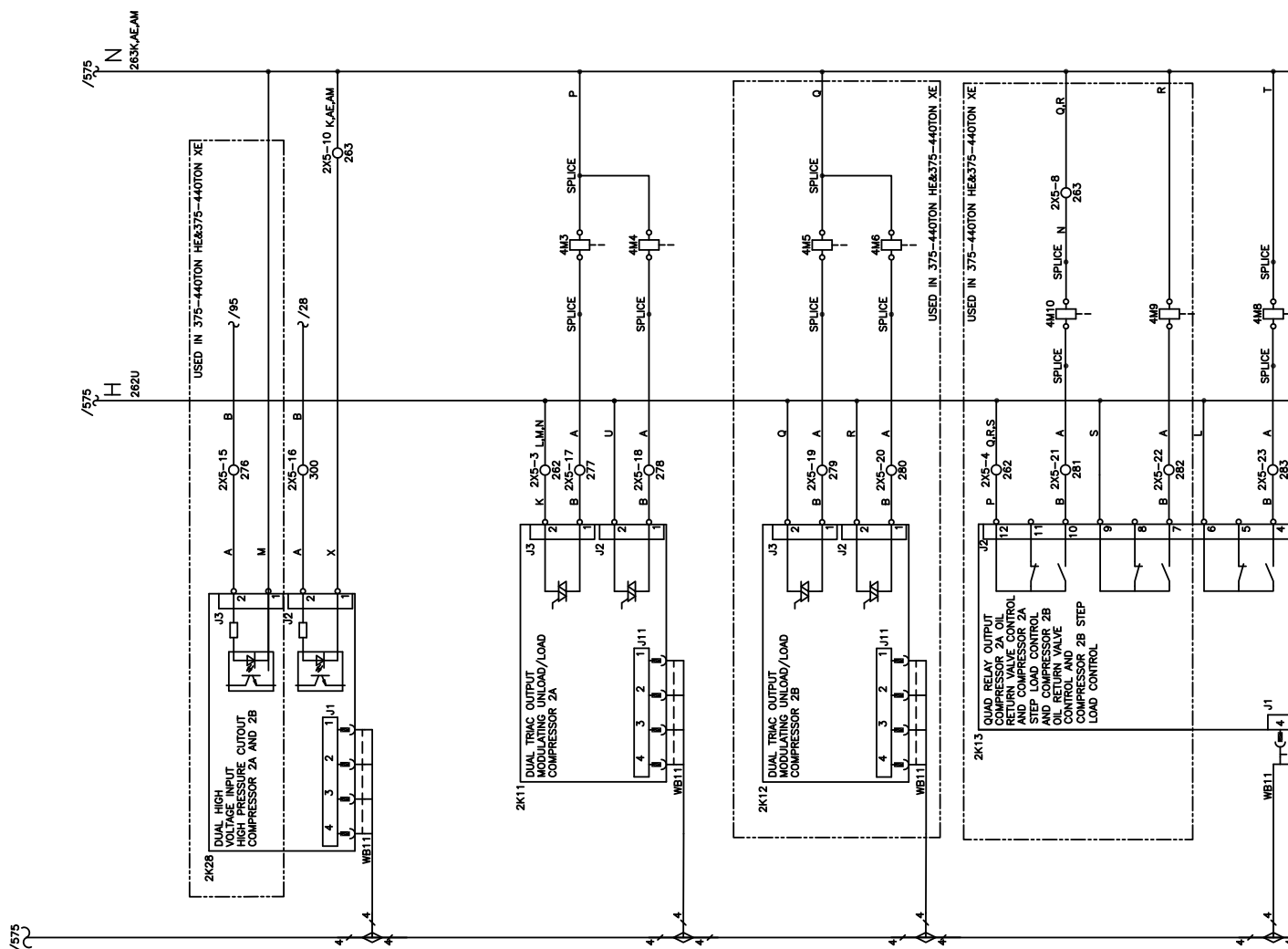
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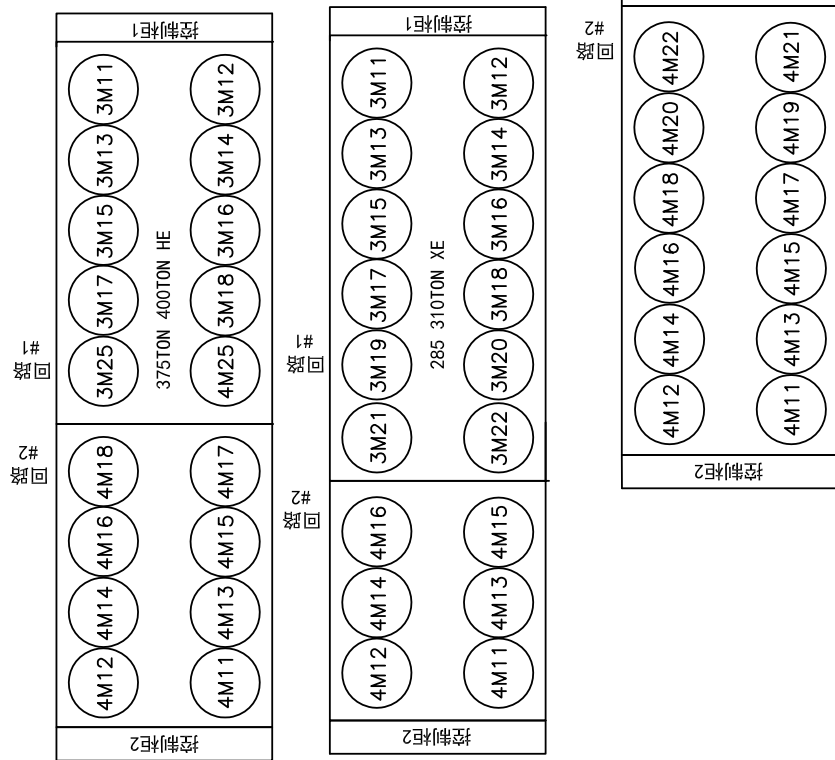
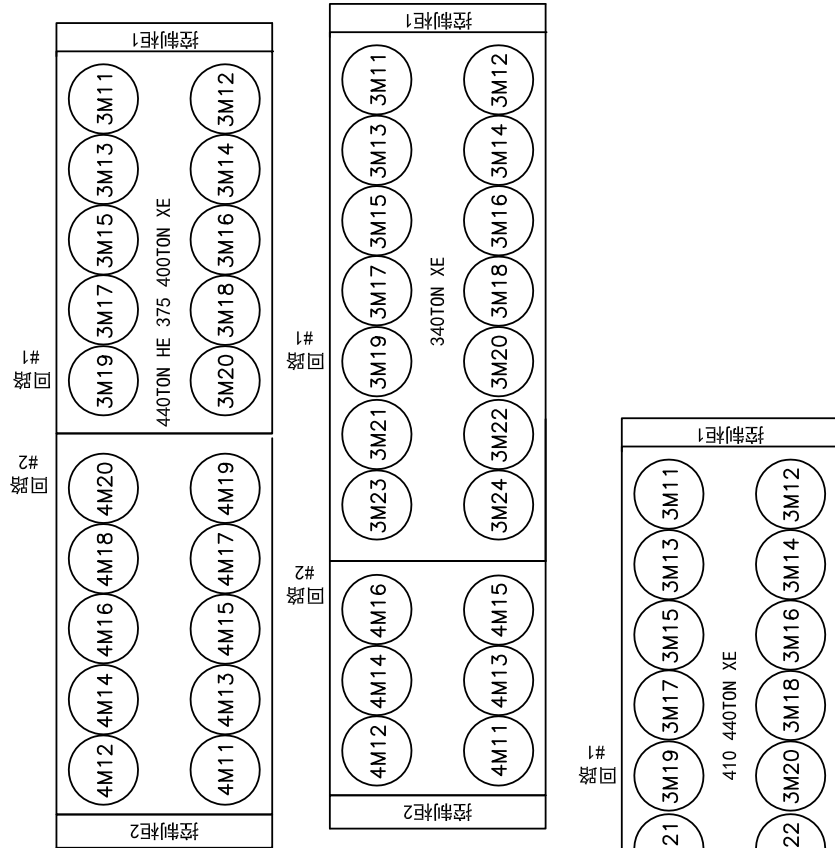
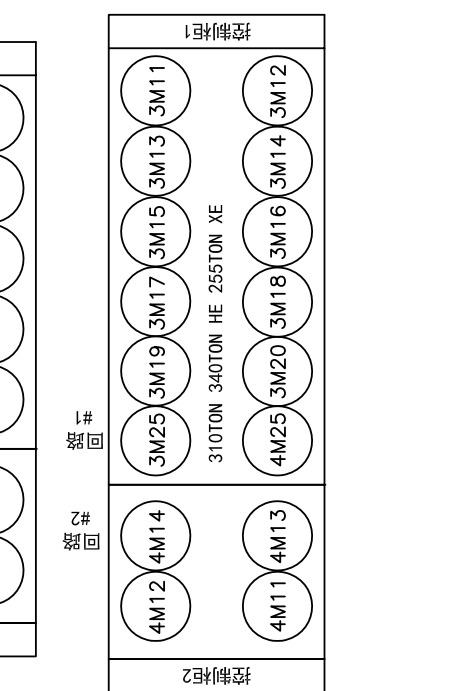
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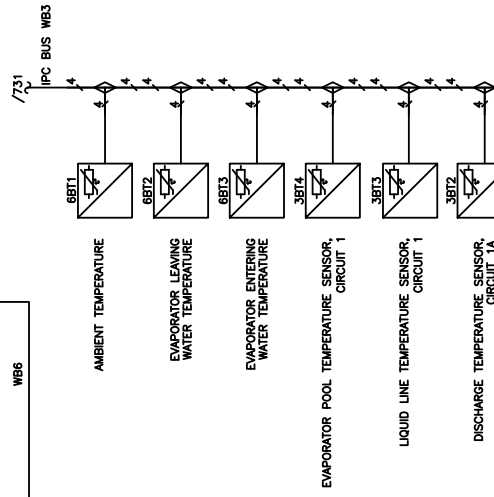
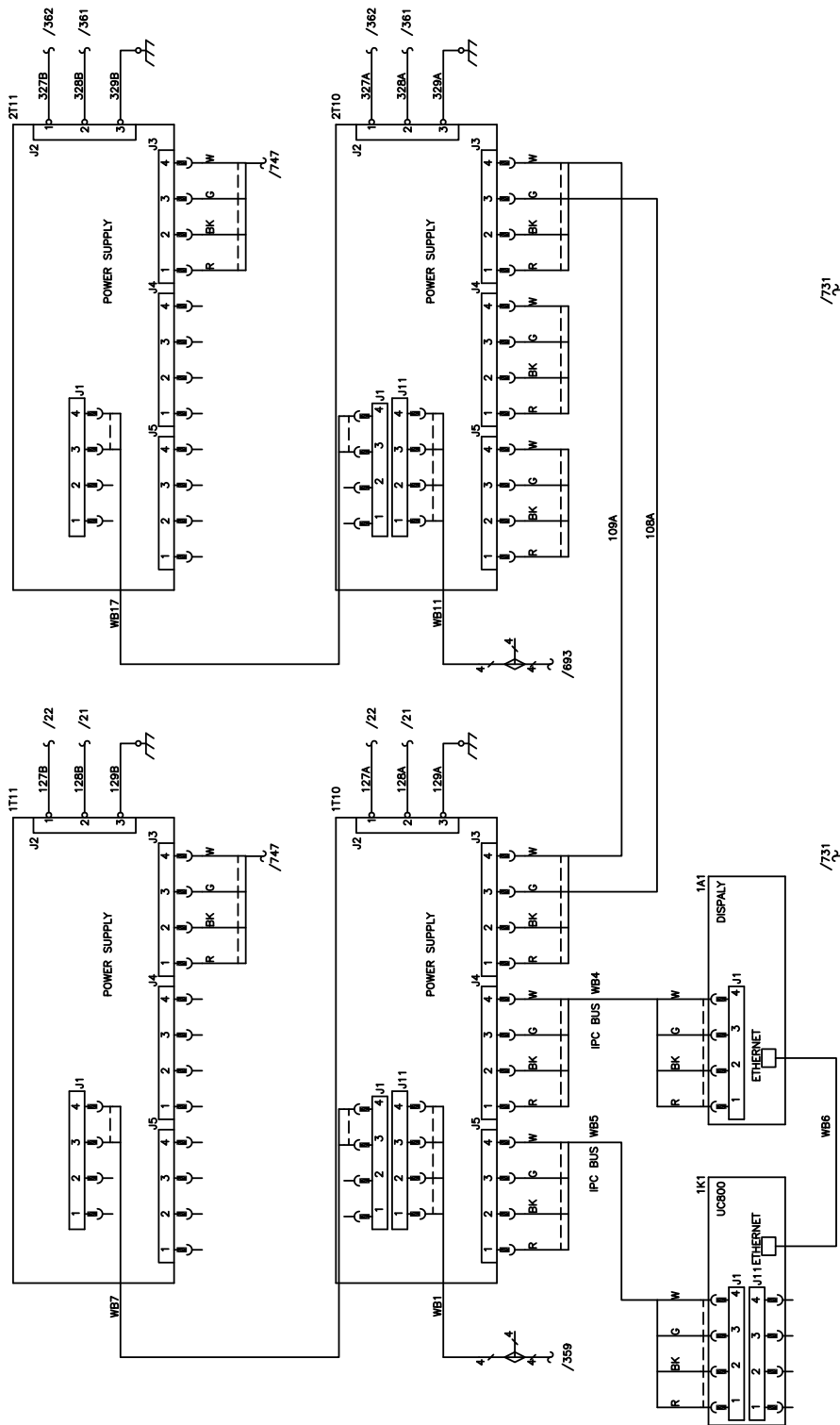


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COLOR CODE

BK	BLACK
BRN	BROWN
BLU	BLUE
GRY	GRAY
R	RED
W	WHITE
GRN	GREEN
ORNG	ORANGE
Y	YELLOW

DEVICE PREFIX LOCATION CODE

AREA	LOCATION
1	CONTROL PANEL1
2	CONTROL PANEL2
3	REFRIGERATION CIRCUIT1
4	REFRIGERATION CIRCUIT2
5	CUSTOMER REMOTEY INSTALLED
6	UNIT MOUNTED
7	EC FAN DRIVES PANEL CIRCUIT 1A
8	EC FAN DRIVES PANEL CIRCUIT 1B
9	EC FAN DRIVES PANEL CIRCUIT 2A
10	EC FAN DRIVES PANEL CIRCUIT 2B

GENERAL NOTES:

- 1 UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- 2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- 3 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER AND LINE NUMBER NUMBER.

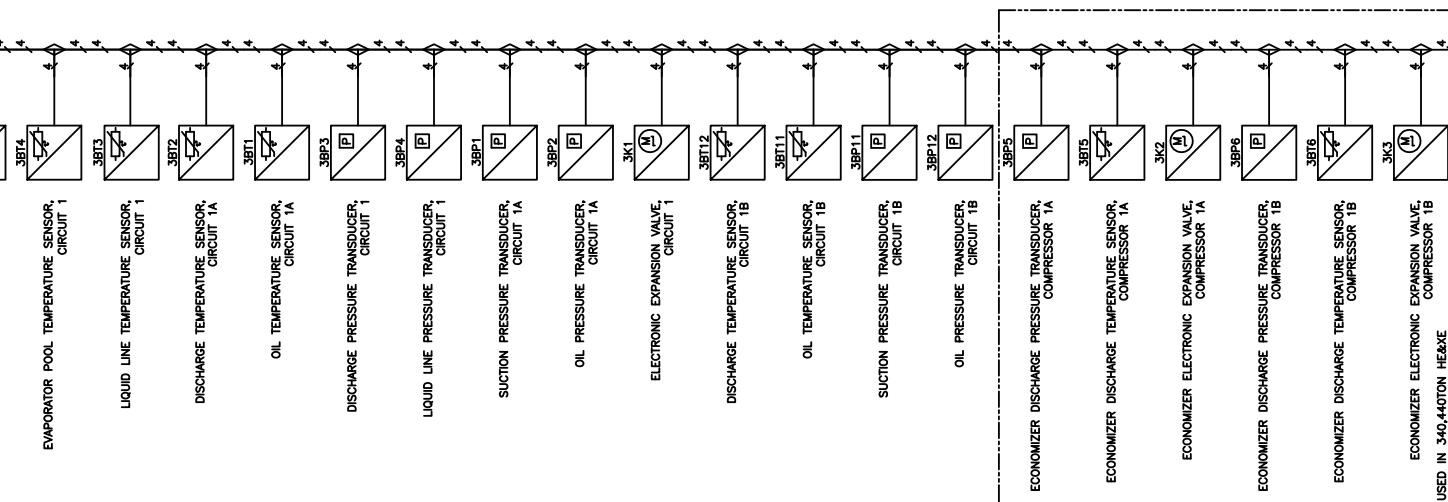
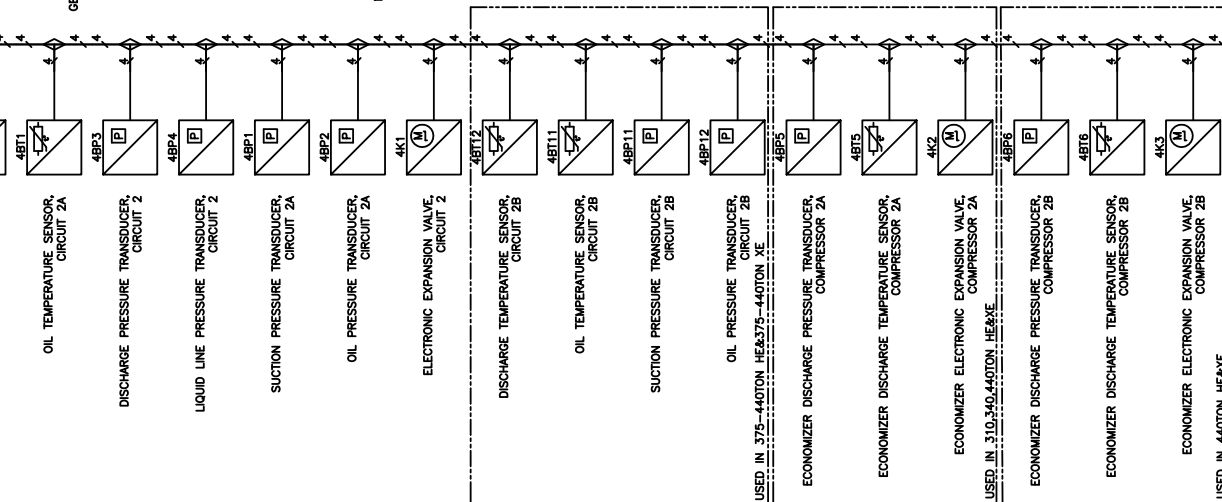
8	EC FAN DRIVES PANEL CIRCUIT 1B
9	EC FAN DRIVES PANEL CIRCUIT 2A
10	EC FAN DRIVES PANEL CIRCUIT 2B

GENERAL NOTES:

- 1 UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F) AT ATMOSPHERIC PRESSURE. AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- 2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- 3 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER. AN UNDERSCORED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
- 4 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
- 5 CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.

NOTES:

- 1 SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS. FIELD CONNECTIONS FOR SINGLE SOURCE POWER ARE MADE TO 1Q1 OR 1Q2.
- 2 CLASS 1 FIELD WIRE MODULE.
- 3 RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC; 5 AMPS GENERAL PURPOSE.
- 4 COMPONENTS (LUIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS (WB3 & WB13) IN THE ORDER SHOWN.
- 5 DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. SHIELD IS ATTACHED INTERNALLY TO METAL WASHER ON SENSOR.
- 6 OPTIONAL MODULE. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
- 7 AUTO STOP CONTACTS ARE JUMPED AT THE FACTORY BY JUMPERS W1 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONFIGURATION.
- 8 ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION TEMPERATURE RATING OF 90°C AND BE SELECTED AT 75°C RATINGS.
- 9 WIRING FOR 380V/50Hz UNIT SHOWN. FOR 400V/50Hz UNIT, CONNECT H1 AND H3. FOR 415V/50Hz UNIT, CONNECT H1 AND H4.

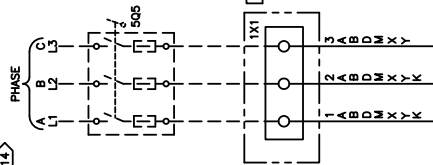


DEVICE DESIGNATION	DESCRIPTION	LEGEND	LINE NUMBER
1A1	TD7 DISPLAY		744
1S24	EMERGENCY STOP		22
1F1	FUSE, PRIMARY		18
1F2	FUSE, PRIMARY		19
1F3	FUSE, SECONDARY, 115V		32
1F4	FUSE, SECONDARY, 27V		34
1F5	FUSE, SECONDARY, 27V		
1F10,1F11,1F12	FUSE, 3M11		
1F13,1F14,1F15	FUSE, 3M12		
1F16,1F17,1F18	FUSE, 3M13		
1F19,1F20,1F21	FUSE, 3M14		
1F22,1F23,1F24	FUSE, 3M15		
1F25,1F26,1F27	FUSE, 3M16/3M23/3M25		
1F28,1F29,1F30	FUSE, 3M17		
1F31,1F32,1F33	FUSE, 3M18		
1F34,1F35,1F36	FUSE, 3M19		
1F37,1F38,1F39	FUSE, 3M20		
1F40,1F41,1F42	FUSE, 3M21		
1F43,1F44,1F45	FUSE, 3M22/3M24/4M25		
1K1	UC800		744
1K2	DUAL LOW VOLTAGE INPUT, LCI-C COMMUNICATIONS (ECHELON)		302
1K3	STARTER MODULE, COMPRESSOR 1A		30
1K9	STARTER MODULE, COMPRESSOR 1B		98
1K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1A		307
1K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1B		314
1K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 1A/COMPRESSOR 1B		321
1K14	DUAL HIGH VOLTAGE INPUT, CHILLED WATER FLOW AND INTERLOCK		344
1K15	DUAL LOW VOLTAGE INPUT, OIL LOSS LEVEL, CIRCUIT 1&CIRCUIT 2		293
1K16	DUAL RELAY OUTPUTS, CHILLED WATER PUMP START COMMAND		353
1K17	QUAD RELAY OUTPUTS, UNIT STATUS PROGRAMMABLE RELAYS		341
1K18	DUAL LOW VOLTAGE INPUT, EXTERNAL AUTO STOP AND EMERGENCY STOP INPUTS		331
1K19	ANALOG INPUT/OUTPUT, EXTERNAL CHILLED WATER SETPOINT INPUT AND EXTERNAL DEMAND LIMIT SETPOINT INPUT		310
1K23	DUAL RELAY OUTPUTS, 3M25 FAN RUN AND 4M25 FAN RUN		207
1K25	QUAD RELAY OUTPUTS, CIRCUIT 1 FANS RUN		50
1K26	QUAD RELAY OUTPUTS, CIRCUIT 1 FANS RUN		
1K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOUT,COMPRESSOR 1A&1B		297
1Q1	CIRCUIT BREAKER, POWER DISTRIBUTION		7
1Q2	DISCONNECT SWITCH, POWER DISTRIBUTION		8
1Q5	CONTACTOR, COMPRESSOR 1A START		35
1Q6	CONTACTOR, COMPRESSOR 1A RUN		38
1Q7	CONTACTOR, COMPRESSOR 1A SHORT		41
1Q8	CONTACTOR, COMPRESSOR 1A TRANSITION		44
1Q9	CONTACTOR, FAN 3M11 START		62
1Q10	CONTACTOR, FAN 3M12 START		55
1Q11	CONTACTOR, FAN 3M13 START		59
1Q12	CONTACTOR, FAN 3M14 START		50
1Q13	CONTACTOR, FAN 3M15 START		57
1Q14	CONTACTOR, FAN 3M16 START		51
1Q15	CONTACTOR, FAN 3M17 START		52
1Q16	CONTACTOR, FAN 3M18 START		57
1Q17	CONTACTOR, FAN 3M19 START		48
1Q18	CONTACTOR, FAN 3M20 START		51
1Q19	CONTACTOR, FAN 3M21 START		54
1Q20	CONTACTOR, FAN 3M22 START		57
1Q21	CONTACTOR, FAN 3M23 START		48
1Q22	CONTACTOR, FAN 3M24 START		51
1Q23	CONTACTOR, FAN 3M25 START		54
1Q24	CONTACTOR, FAN 4M25 START		57
1Q25	CONTACTOR, COMPRESSOR 1B START		102
1Q26	CONTACTOR, COMPRESSOR 1B RUN		105
1Q27	CONTACTOR, COMPRESSOR 1B SHORT		108
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION		111
1R1	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE A		16
1R2	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE B		19
1R3	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE C		22
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A		79
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B		82
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C		85
1T1	TRANSFORMER, CONTROL POWER		35
1T2	TRANSFORMER, POTENTIAL UNDER/OVER VOLTAGE		
2Q16	CONTACTOR, FAN 4M18 START		486
2Q17	CONTACTOR, FAN 4M19 START		524
2Q18	CONTACTOR, FAN 4M20 START		510
2Q19	CONTACTOR, FAN 4M21 START		521
2Q20	CONTACTOR, FAN 4M22 START		515
2Q25	CONTACTOR, COMPRESSOR 2B START		462
2Q26	CONTACTOR, COMPRESSOR 2B RUN		465
2Q27	CONTACTOR, COMPRESSOR 2B SHORT		468
2Q28	CONTACTOR, COMPRESSOR 2B TRANSITION		471
2R1	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE A		376
2R2	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE B		379
2R3	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE C		382
2R4	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE A		439
2R5	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE B		442
2R6	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE C		445
2T1	TRANSFORMER, CONTROL POWER		378
2T2	TRANSFORMER, POTENTIAL UNDER/OVER VOLTAGE		395
2T3	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE A		375
2T4	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE B		378
2T5	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE C		381
2T10	POWER SUPPLY MODULE		734
2T11	POWER SUPPLY MODULE		725
2T13	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE A		438
2T14	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE B		441
2T15	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE C		444
2X1	INPUT POWER TERMINAL		369
2X5	FACTORY CONTROL TERMINAL		
3B1	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 1		42
3BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1A		767
3BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 1A		769
3BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 1		763
3BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 1		765
3BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1A		781
3BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1B		787
3BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1B		777
3BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 1B		779
3BT1	OIL TEMPERATURE SENSOR, CIRCUIT 1A		761
3BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1A		759
3BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 1		757
3BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 1		755
3BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1A		783
3BT6	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1B		789
3BT11	OIL TEMPERATURE SENSOR, CIRCUIT 1B		775
3BT12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1B		773
3B2	PRESSURE SWITCH, HIGH PRESSURE CUTOUT, COMPRESSOR 1A		28
3B3	PRESSURE SWITCH, HIGH PRESSURE CUTOUT, COMPRESSOR 1B		95
3E1	HEATER, COMPRESSOR 1A		21
3E2	HEATER, COMPRESSOR 1B		92
3E3	HEATER, OIL SEPARATOR, CIRCUIT 1		26
3K1	MOTOR, EXPANSION VALVE, CIRCUIT 1		771
3K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1A		785
3K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1B		791
3M1	MOTOR, COMPRESSOR 1A		18
3M2	MOTOR, COMPRESSOR 1B		82
3M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1A		307
3M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A		309
3M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1B		314
3M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B		316
3M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1A		330
3M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1A		327
3M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1B		324
3M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1B		321
3M11~3M25	MOTOR, CONDENSOR FANS, CIRCUIT 1		
4B1	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 2		402
4BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2A		761
4BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 2A		763
4BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 2		757
4BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 2		759
4BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2A		775
4BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2B		781
4BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2B		771
4BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 2B		773
4PT4	OIL TEMPERATURE SENSOR, CIRCUIT 2A		755

3E3	HEATER, OIL SEPARATOR, CIRCUIT 1	26
3K1	MOTOR, EXPANSION VALVE, CIRCUIT 1	771
3K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1A	785
3K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1B	791
3M1	MOTOR, COMPRESSOR 1A	18
3M2	MOTOR, COMPRESSOR 1B	82
3M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1A	307
3M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A	309
3M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1B	314
3M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B	316
3M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1A	330
3M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1A	327
3M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1B	324
3M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1B	321
3M11~3M25	MOTOR, CONDENSOR FANS, CIRCUIT 1	402
4B11	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 2	761
4BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2A	763
4BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 2A	757
4BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 2	759
4BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 2	775
4BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2A	781
4BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2B	771
4BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2B	773
4BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 2B	755
4BT11	OIL TEMPERATURE SENSOR, CIRCUIT 2A	753
4BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2A	751
4BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 2	749
4BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 2	777
4BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2A	783
4BT6	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2B	553
4BT11	OIL TEMPERATURE SENSOR, CIRCUIT 2B	551
4BT12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2B	388
4B2	PRESSURE SWITCH, HIGH PRESSURE CUTOUT, COMPRESSOR 2A	455
4B3	PRESSURE SWITCH, HIGH PRESSURE CUTOUT, COMPRESSOR 2B	385
4E1	HEATER, COMPRESSOR 2A	452
4E2	HEATER, COMPRESSOR 2B	386
4E3	HEATER, OIL SEPARATOR, CIRCUIT 2	765
4K1	MOTOR, EXPANSION VALVE, CIRCUIT 2	729
4K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2A	765
4K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2B	378
4M1	MOTOR, COMPRESSOR 2A	441
4M2	MOTOR, COMPRESSOR 2B	667
4M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 2A	669
4M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2A	674
4M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 2B	676
4M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2B	680
4M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2A	687
4M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2A	684
4M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2B	681
4M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2B	346
4M11~4M25	MOTOR, CONDENSOR FANS, CIRCUIT 2	357
5B5	FLOW SWITCH, CHILLER WATER	346
5K9	RELAY, CUSTOMER PROVIDED, CHILLED WATER PUMP STARTER	357
5K12~5K19	RELAY, UNIT STATUS	330
5K23	RELAY, EXTERNAL INPUT, AUTO/STOP	337
507	FUSED DISCONNECT CUSTOMER SUPPLIED 1 PHASE	749
6BT1	TEMPERATURE SENSOR, OUTDOOR AIR TEMPERATURE	751
6BT2	TEMPERATURE SENSOR, EVAPORATOR LEAVING WATER TEMPERATURE	753
6BT3	TEMPERATURE SENSOR, EVAPORATOR ENTERING WATER TEMPERATURE	352
6BS2	THERMOSTAT, EVAPORATOR WATER HEATER CONTROL	355
6E50-1	SUBMERSION HEATER, EVAPORATOR	355
6E50-2	SUBMERSION HEATER, EVAPORATOR	355
6E50-3	SUBMERSION HEATER, EVAPORATOR	355
6E50-4	SUBMERSION HEATER, EVAPORATOR	355
6E50-5	HEATER TAPE, EVAPORATOR	355
6E50-6	HEATER TAPE, EVAPORATOR	355

1Q12	CONTACTOR, FAN 3M14 START	50
1Q13	CONTACTOR, FAN 3M15 START	57
1Q14	CONTACTOR, FAN 3M16 START	51
1Q15	CONTACTOR, FAN 3M17 START	52
1Q16	CONTACTOR, FAN 3M18 START	57
1Q17	CONTACTOR, FAN 3M19 START	48
1Q18	CONTACTOR, FAN 3M20 START	51
1Q19	CONTACTOR, FAN 3M21 START	54
1Q20	CONTACTOR, FAN 3M22 START	57
1Q21	CONTACTOR, FAN 3M23 START	48
1Q22	CONTACTOR, FAN 3M24 START	51
1Q23	CONTACTOR, FAN 3M25 START	54
1Q24	CONTACTOR, FAN 4M25 START	57
1Q25	CONTACTOR, COMPRESSOR 1B START	105
1Q26	CONTACTOR, COMPRESSOR 1B RUN	102
1Q27	CONTACTOR, COMPRESSOR 1B SHORT	108
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION	111
1R1	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE A	16
1R2	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE B	19
1R3	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE C	22
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A	79
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B	82
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C	85
1T1	TRANSFORMER, CONTROL POWER	18
1T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE	35
1T3	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE A	13
1T4	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE B	18
1T5	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE C	21
1T10	POWER SUPPLY MODULE	734
1T11	POWER SUPPLY MODULE	725
1T13	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE A	78
1T14	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE B	81
1T15	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE C	84
1X1	INPUT POWER TERMINAL	9
1X5	FACTORY CONTROL TERMINAL	
1X8	EVAPORATOR HEATER POWER TERMINAL	
2F1	FUSE, PRIMARY	374
2F2	FUSE, PRIMARY	373
2F3	FUSE, SECONDARY, 115V	382
2F4	FUSE, SECONDARY, 27V	382
2F5	FUSE, SECONDARY, 27V	381
2F10,2F11,2F12	FUSE, 4M11	
2F13,2F14,2F15	FUSE, 4M12	
2F16,2F17,2F18	FUSE, 4M13	
2F19,2F20,2F21	FUSE, 4M14	
2F22,2F23,2F24	FUSE, 4M15	
2F25,2F26,2F27	FUSE, 4M16	
2F28,2F29,2F30	FUSE, 4M17	
2F31,2F32,2F33	FUSE, 4M18	
2F34,2F35,2F36	FUSE, 4M19	
2F37,2F38,2F39	FUSE, 4M20	
2F40,2F41,2F42	FUSE, 4M21	
2F43,2F44,2F45	FUSE, 4M22	
2K3	STARTER MODULE, COMPRESSOR 2A	391
2K9	STARTER MODULE, COMPRESSOR 2B	458
2K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2A	666
2K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2B	673
2K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 2A/COMPRESSOR 2B	680
2K25	QUAD RELAY OUTPUTS, CIRCUIT 2 FANS RUN	
2K26	QUAD RELAY OUTPUTS, CIRCUIT 2 FANS RUN	
2K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOUT,COMPRESSOR 2A&2B	657
2Q1	CIRCUIT BREAKER, POWER DISTRIBUTION	370
2Q2	DISCONNECT SWITCH, POWER DISTRIBUTION	370
2Q5	CONTACTOR, COMPRESSOR 2A START	395
2Q6	CONTACTOR, COMPRESSOR 2A RUN	398
2Q7	CONTACTOR, COMPRESSOR 2A SHORT	401
2Q8	CONTACTOR, COMPRESSOR 2A TRANSITION	404
2Q9	CONTACTOR, FAN 4M11 START	422
2Q10	CONTACTOR, FAN 4M12 START	415
2Q11	CONTACTOR, FAN 4M13 START	419
2Q12	CONTACTOR, FAN 4M14 START	410
2Q13	CONTACTOR, FAN 4M15 START	417
2Q14	CONTACTOR, FAN 4M16 START	489
2Q15	CONTACTOR, FAN 4M17 START	412

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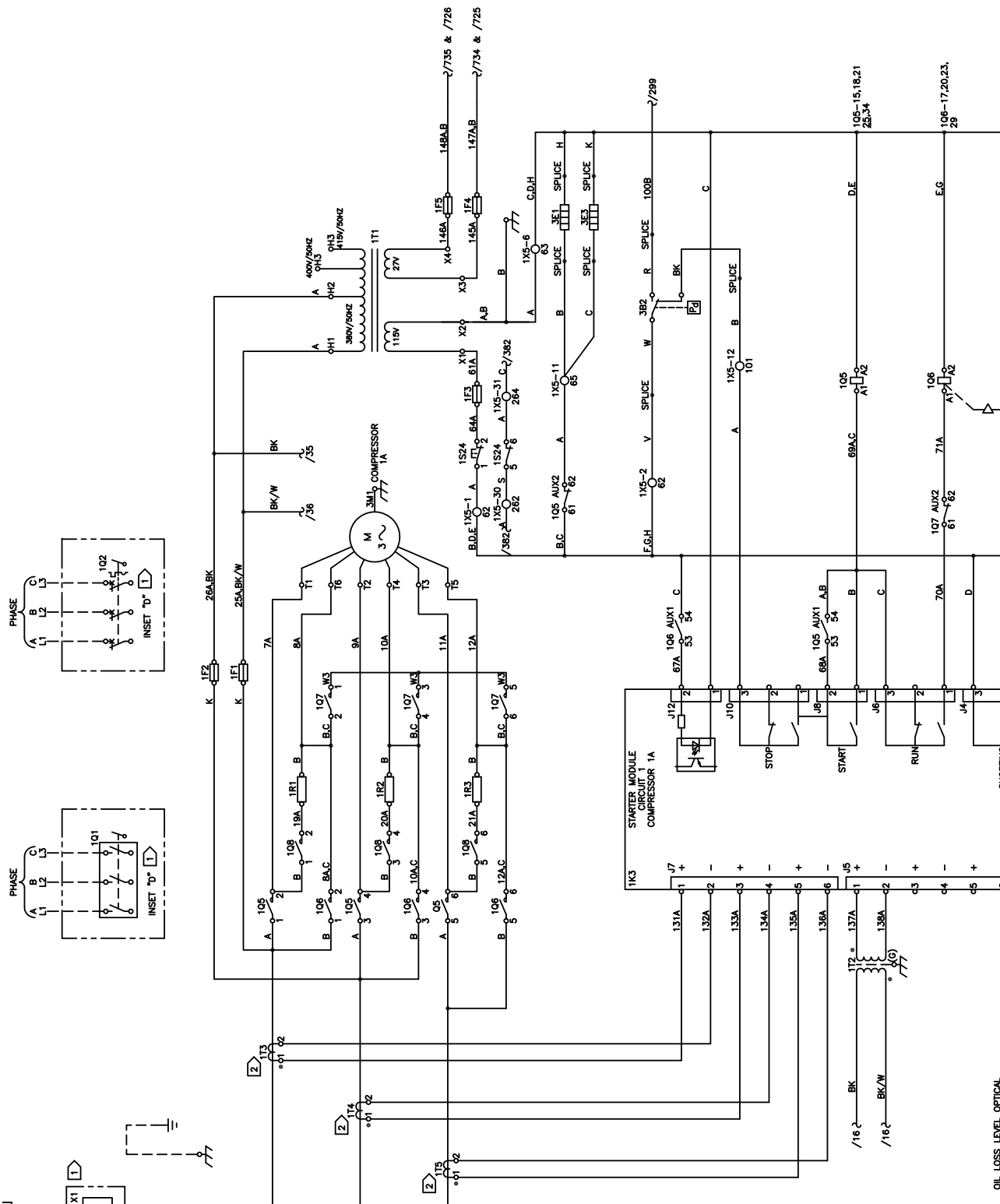
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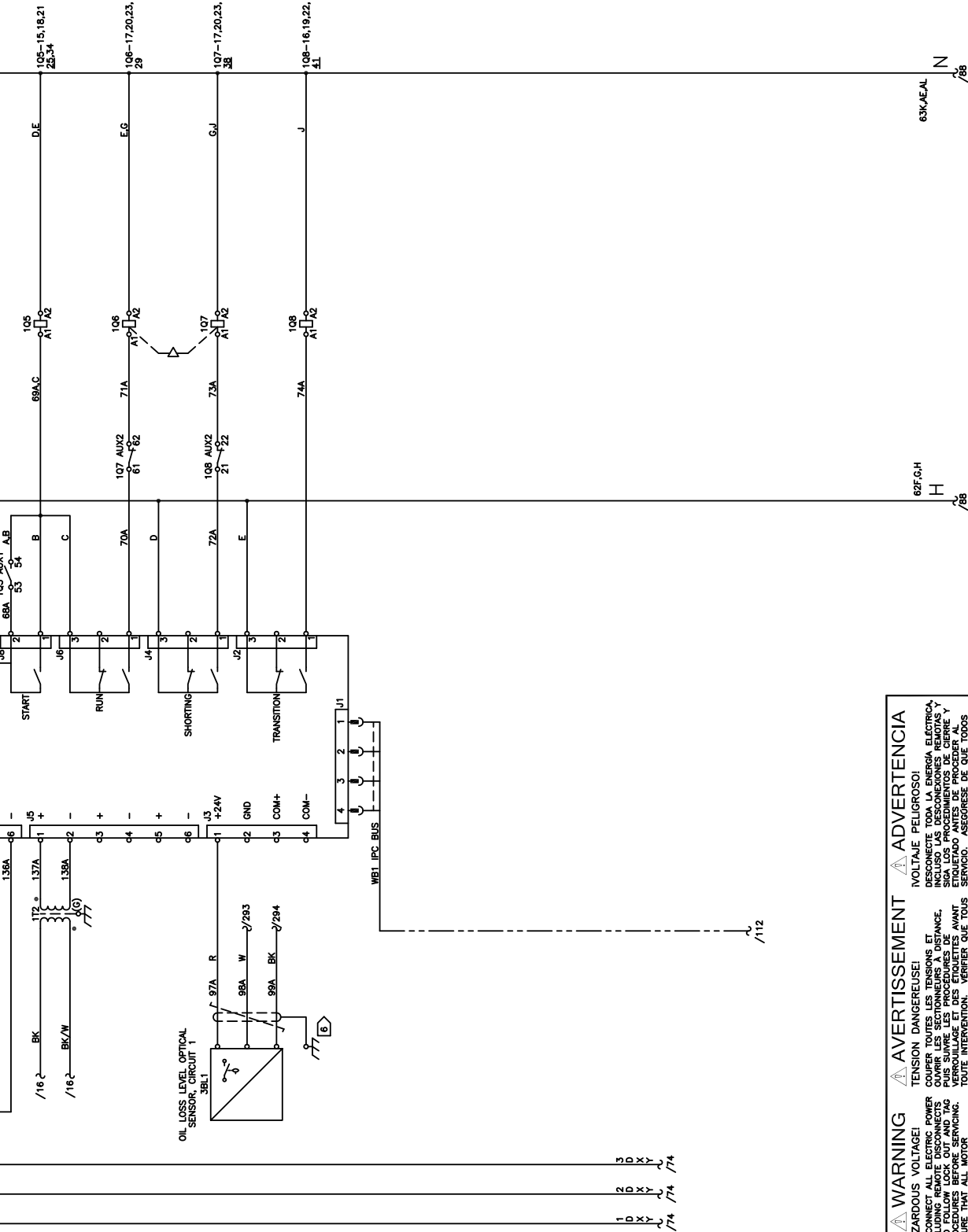
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N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES
POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT
ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE
PROVOCAR DAÑOS EN EL EQUIPO.





WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER BEFORE SERVICING. FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. CAPACITORS HAVE DISCHARGED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE REFER TO THE INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.

AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT DE RÉPARER. LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, RÉFÉRENCEZ-VOUS AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS. UN MANQUEMENT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES BLESSURES GRAVES, MÊME LA MORT.

ADVERTENCIA

VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA ANTES DE REPARAR. SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. LOS CAPACITORES DEL MOTOR LLEVAN VOLTAJE ALMACENADO. PARA LAS UNIDADES CON TRANSMISIÓN DE VELOCIDAD VARIABLE, REFERIRSE A LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. NO REALIZAR LO ANTERIOR PUEDE PROVOCAR LA MUERTE O LESIONES GRAVES.

NOTICE

USE COPPER CONDUCTORS ONLY! UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE! LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS. FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

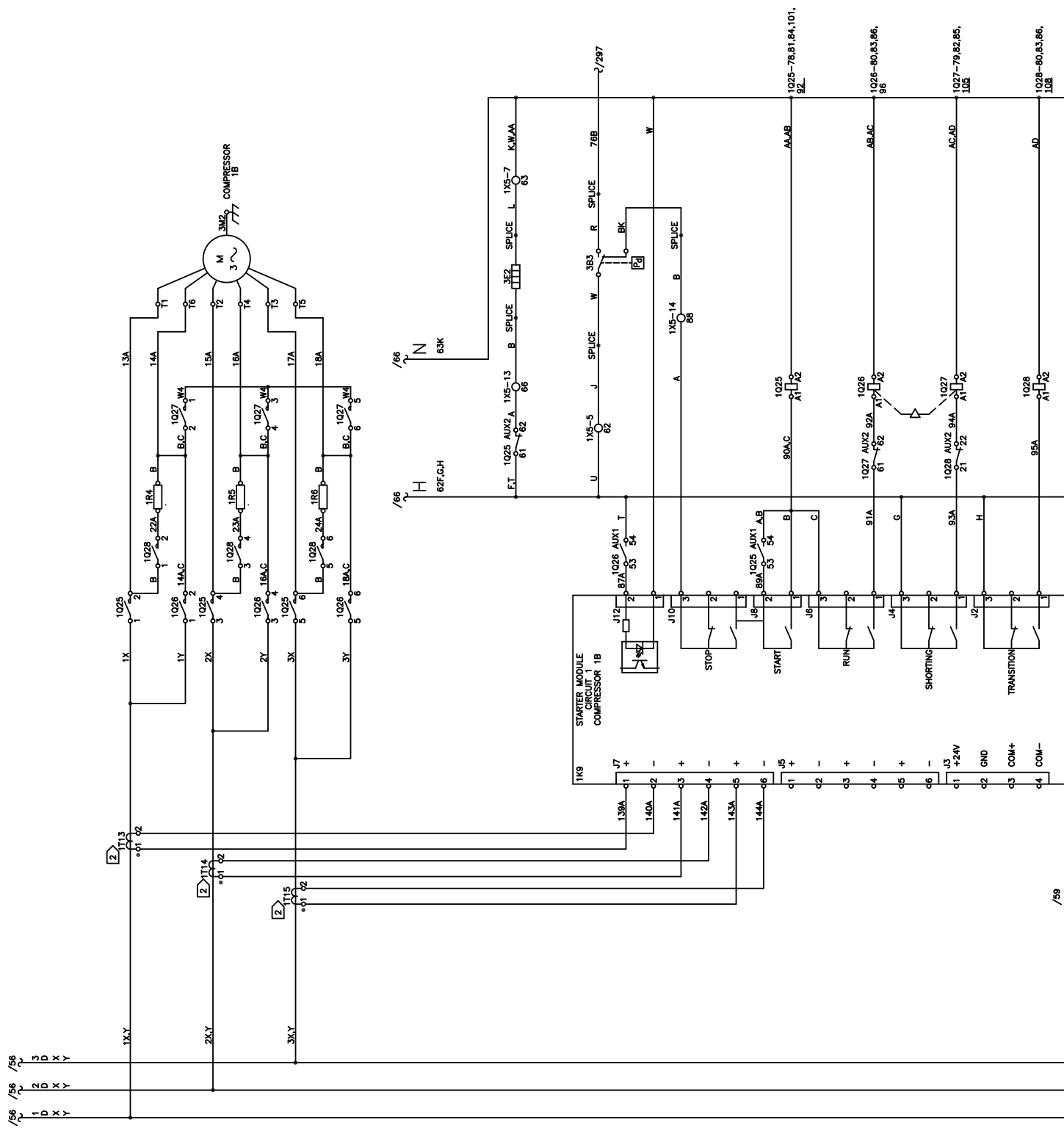
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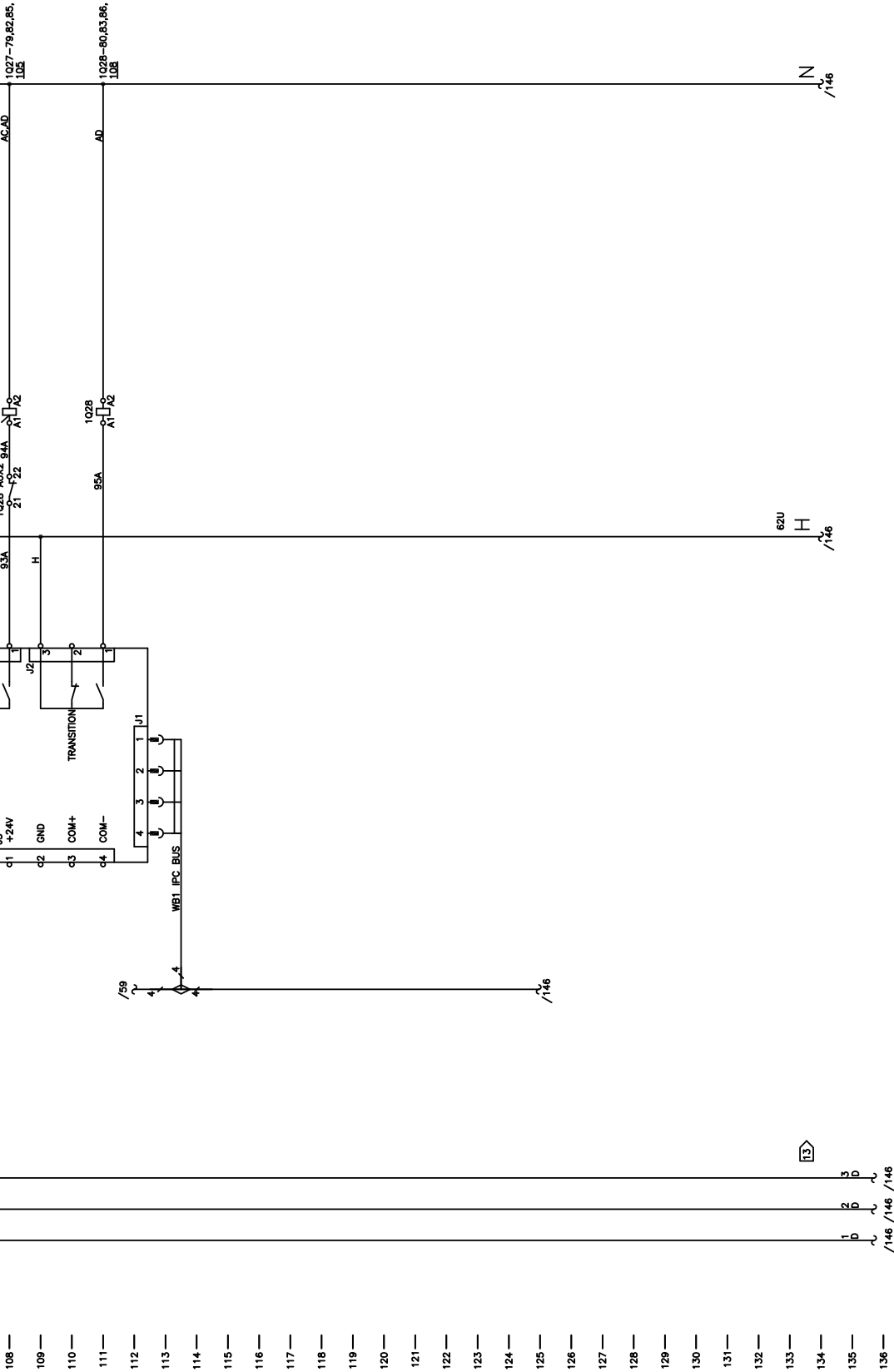
¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE! LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES. NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

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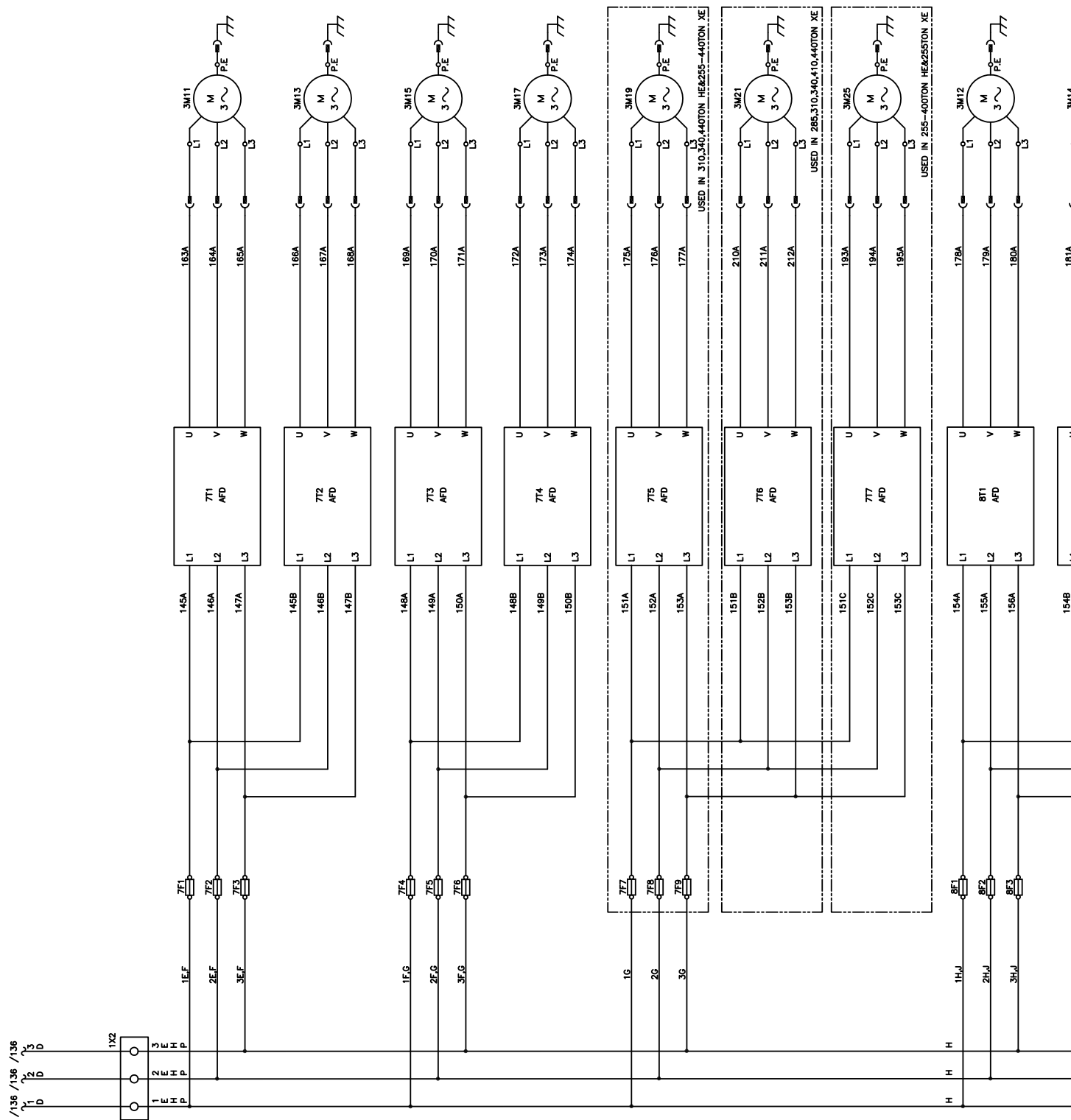
HAZARDOUS VOLTAGE!
DANGER TO LIFE AND LIMB. POWER
INCLUDING REMOTELY DISCONNECTS
AND FOLLOW LOCK OUT AND TAG
PROCEDURES BEFORE SERVICING.
CAPACITORS HAVE DISCHARGED
STORED VOLTAGE. UNITS WITH
VARIABLE SPEED DRIVES ARE NOT
TO DRIVE INSTRUCTIONS FOR
CAPACITOR DISCHARGE.
FAILURE TO DO THE ABOVE
COULD RESULT IN DEATH OR
SERIOUS INJURY.

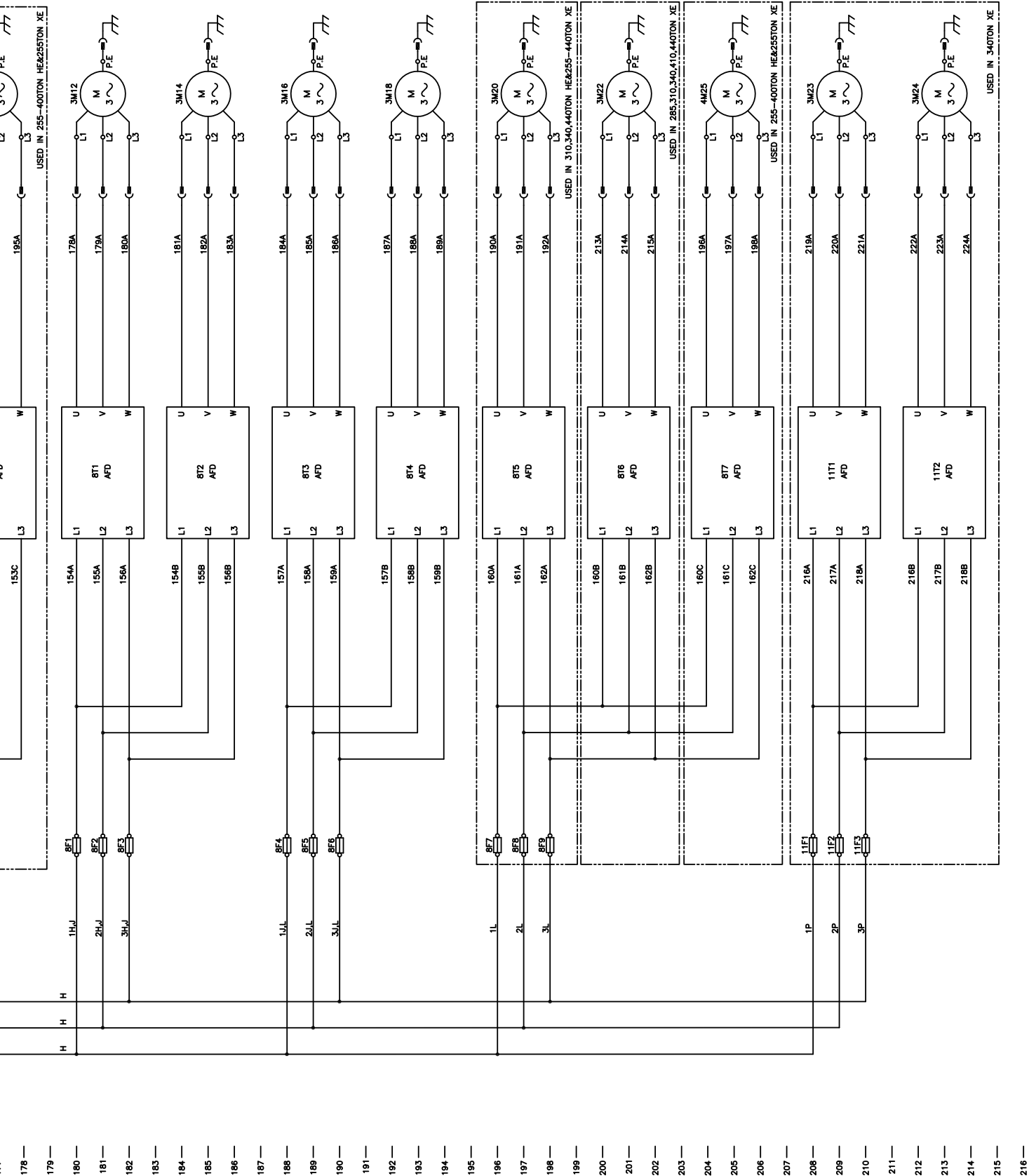
AVERTISSEMENT
TENSION DANGEREUSE!
DANGER POUR LA VIE ET LES MEMBRES ET
OUVRIER LES SECTIONNEURS A DISTANCE.
PLUS SUIVRE LES PROCEDURES DE
VERIFICATION ET DES ETIQUETTES AVANT
Y AVEC UN VERRE DE PROTECTION.
LES CONDENSATEURS DES MOTEURS SONT
DECHARGES. DANS LE CAS D'UNITES
A VITESSE VARIABLE, NE PAS
VITESSE VARIABLE. SE REPORTER AUX
INSTRUCTIONS DE L'ENTRAINEMENT POUR
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UN MANQUEMENT A LA PROCEDURE
POURRAIT ENTRAÎNER LA MORT OU DES
BLESSURES GRAVES, VOIRE LA MORT.

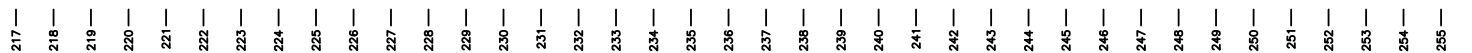
ADVERTENCIA
VOLTAJE PELIGROSO!
DANGER PARA LA VIDA Y PARA LA ESTRUCTURA.
INCLUIDO LAS DESCONEXIONES REMOTAS Y
SIGA LOS PROCEDIMIENTOS DE CIERRE Y
ETIQUETADO ANTES DE PROCEDER.
LOS CONDENSADORES DEL MOTOR HAYAN
DESCARGADO EL VOLTAJE ALMACENADO.
LAS UNIDADES CON CONTROL DE VELOCIDAD
DE VELOCIDAD VARIABLE, CONSULTE LAS
INSTRUCCIONES PARA LA DESCARGA
DEL CONDENSADOR.
NO REALIZAR LO ANTERIOR PUEDE
CAUSAR LA MUERTE O LESIONES
GRAVES.

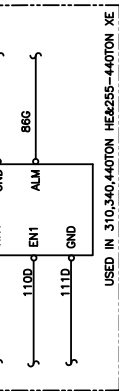
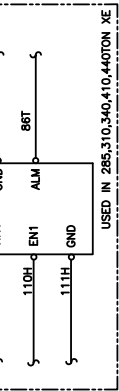
NOTICE	AVIS	AVISO
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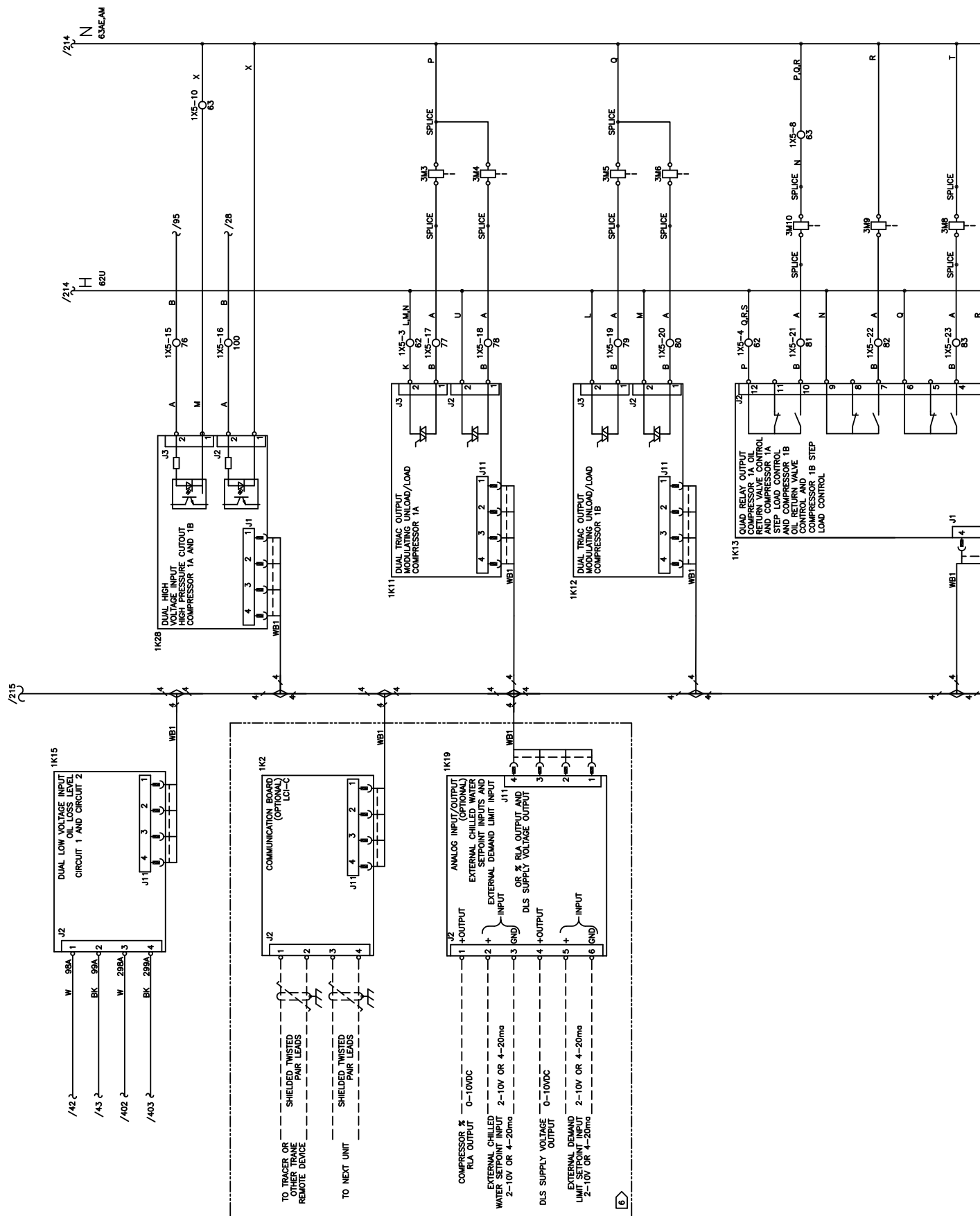








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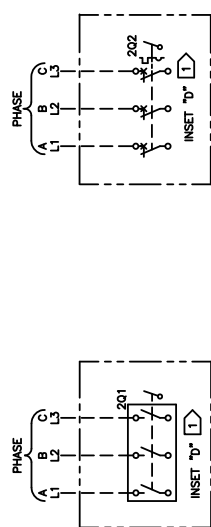
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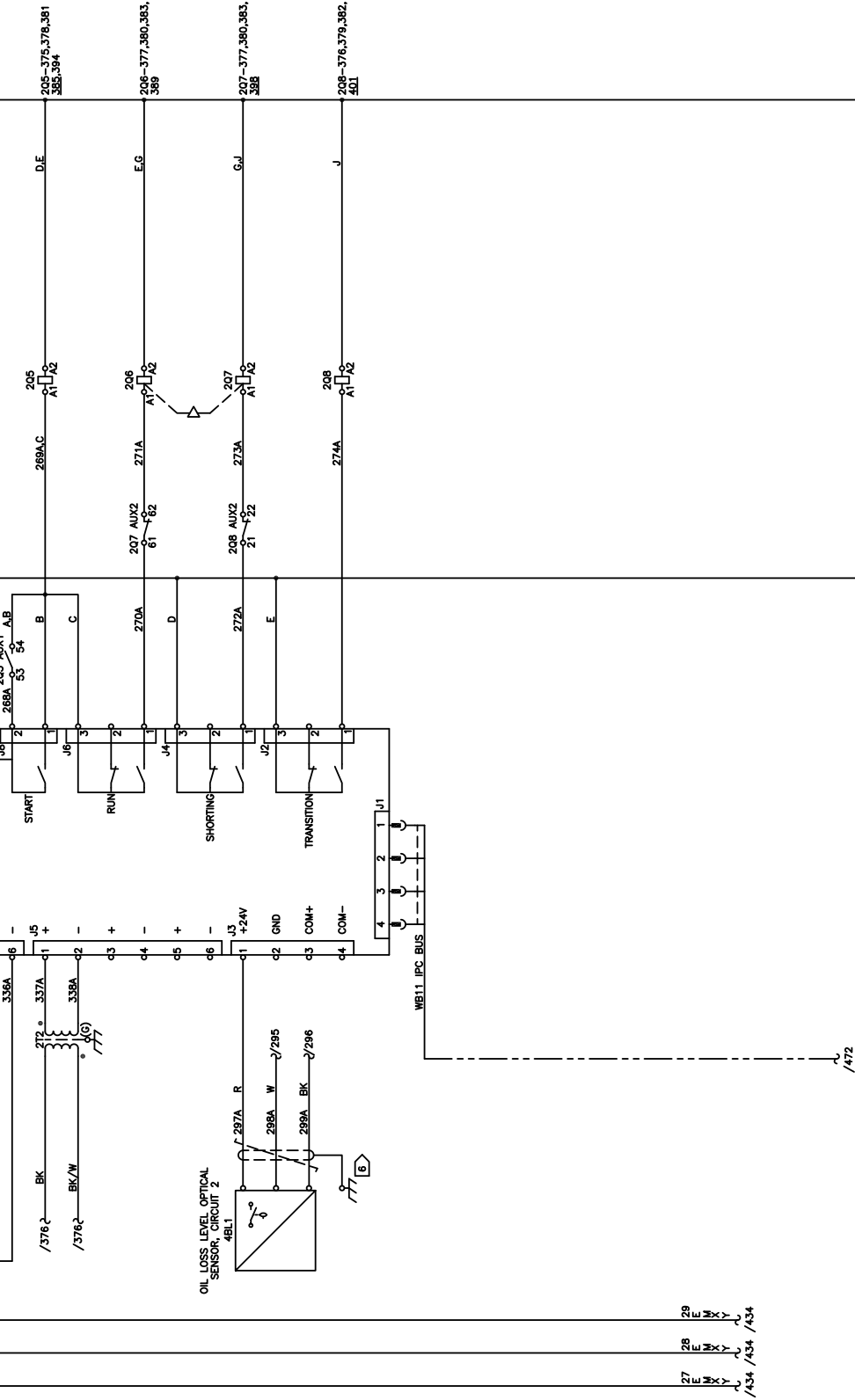
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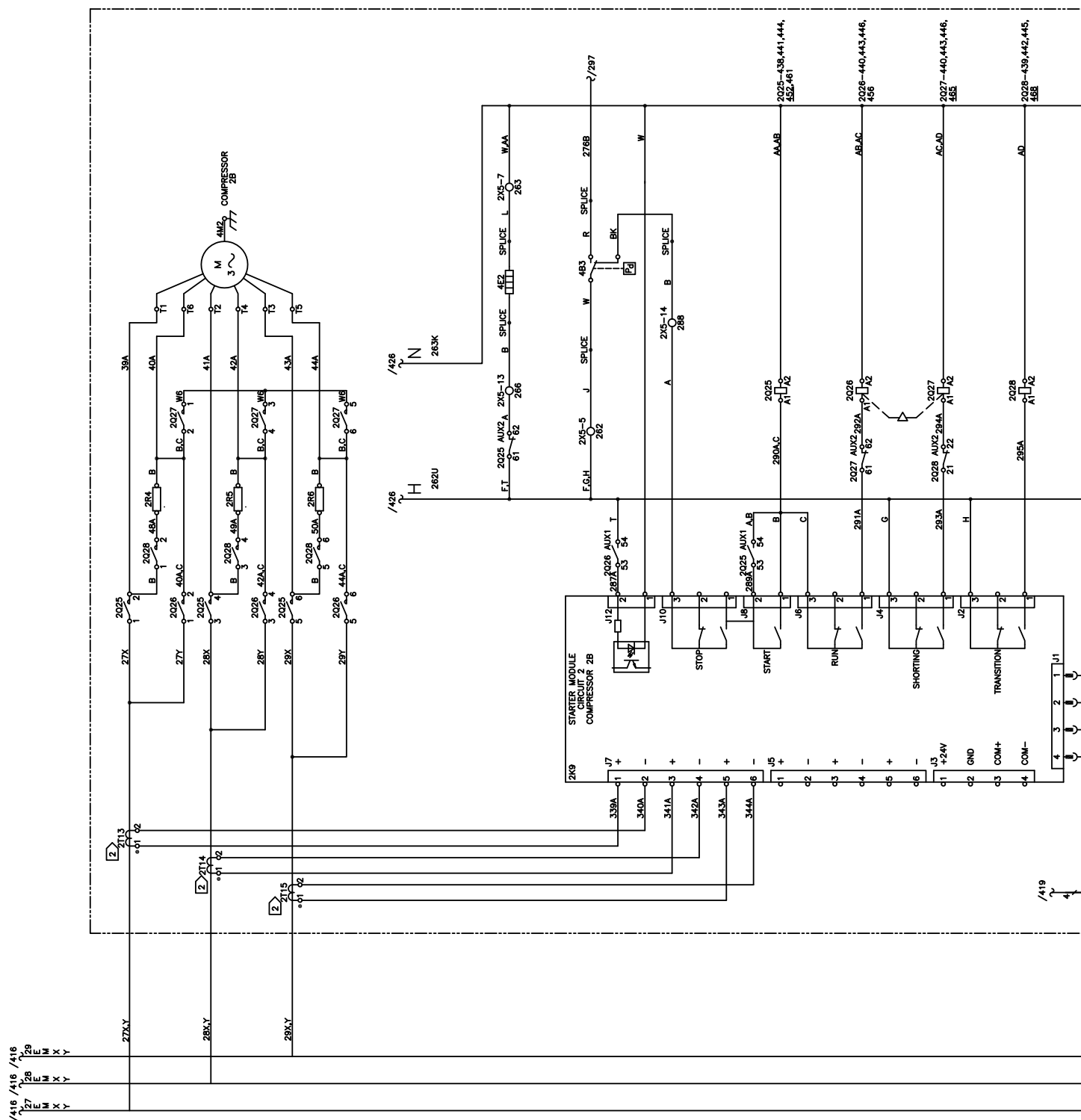
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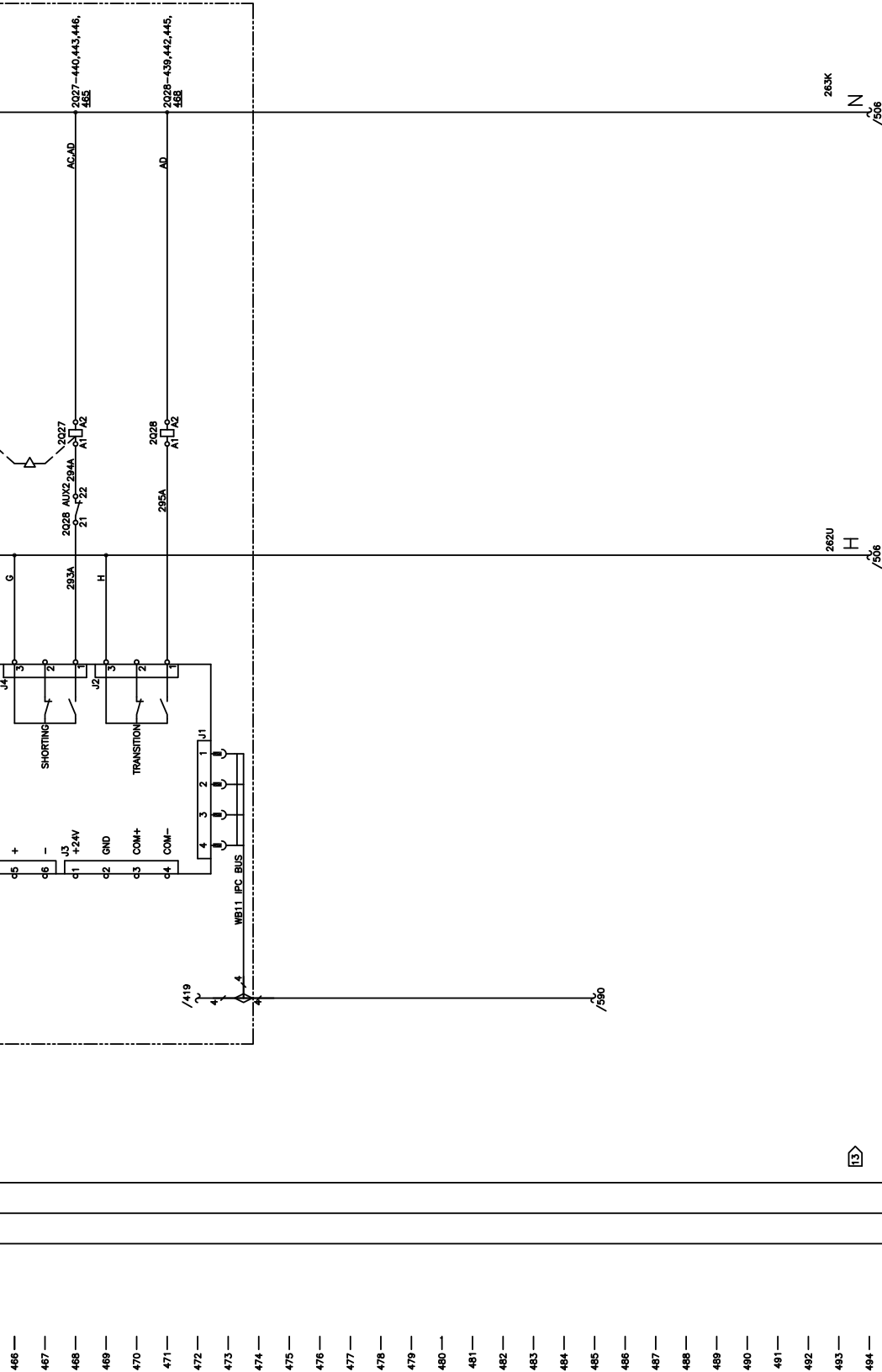




⚠ WARNING HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER BEFORE SERVICING. FOLLOW THE PROCEDURES BEFORE SERVICING. CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE REFER TO THE CAPACITOR DISCHARGE FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.	⚠ AVERTISSEMENT TENSION DANGEREUSE! COUPER TOUTES LES TENSIONS ET SERVIR AVANT LE SERVICE. SUIVRE PLUS SUITE LES PROCEDURES DE VERROUILLAGE ET DES ETIQUETTES AVANT LE SERVICE. LES CONDENSATEURS DES MOTEURS ONT DESCHARGES. DANS LE CAS D'UNITES COMPORTANT DES ENTRAÎNEMENTS A VITESSE VARIABLE, VOUS DEVEZ CONSULTER LES INSTRUCTIONS DE L'ENTRAÎNEMENT POUR UN MANQUEMENT A LA PROCEDURE DE SERVICE PEUT ENTRAÎNER DES BLESSURES GRAVES, VOIRE LA MORT.	⚠ ADVERTENCIA VOLTAJE PELIGROSO! DESCONECTE TODA LA ENERGIA ELECTROICA ANTES DEL SERVICIO. SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. LOS CONDENSADORES DE LOS MOTORES PUEDEN TENER CARGA DE VOLTAJE ALMACENADO. PARA LAS UNIDADES CON TRANSMISION DE VELOCIDAD VARIABLE, REFIERASE A LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. NO REALIZAR LO ANTERIOR PUEDE PROVOCAR LA MUERTE O LESIONES GRAVES.
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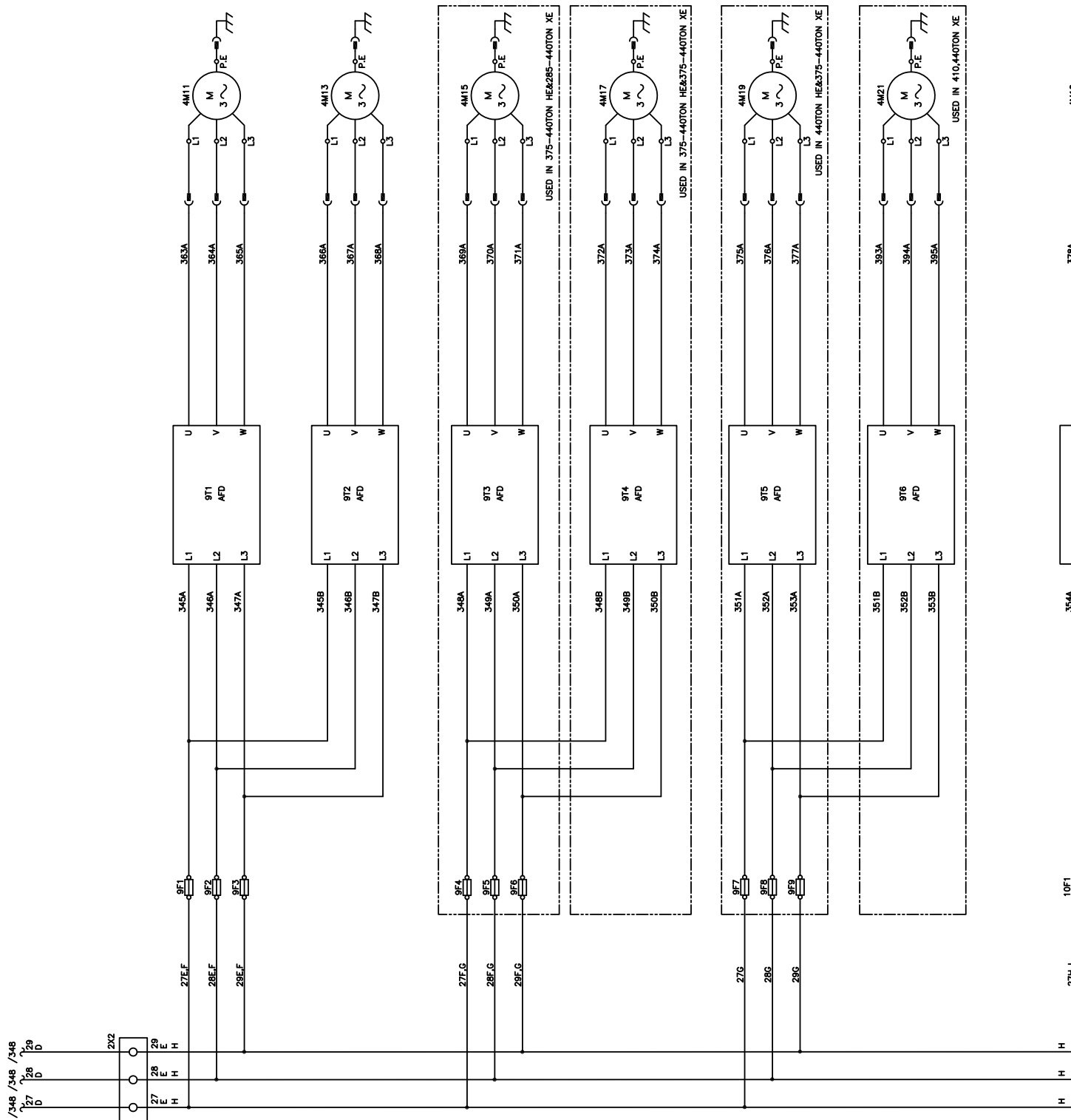


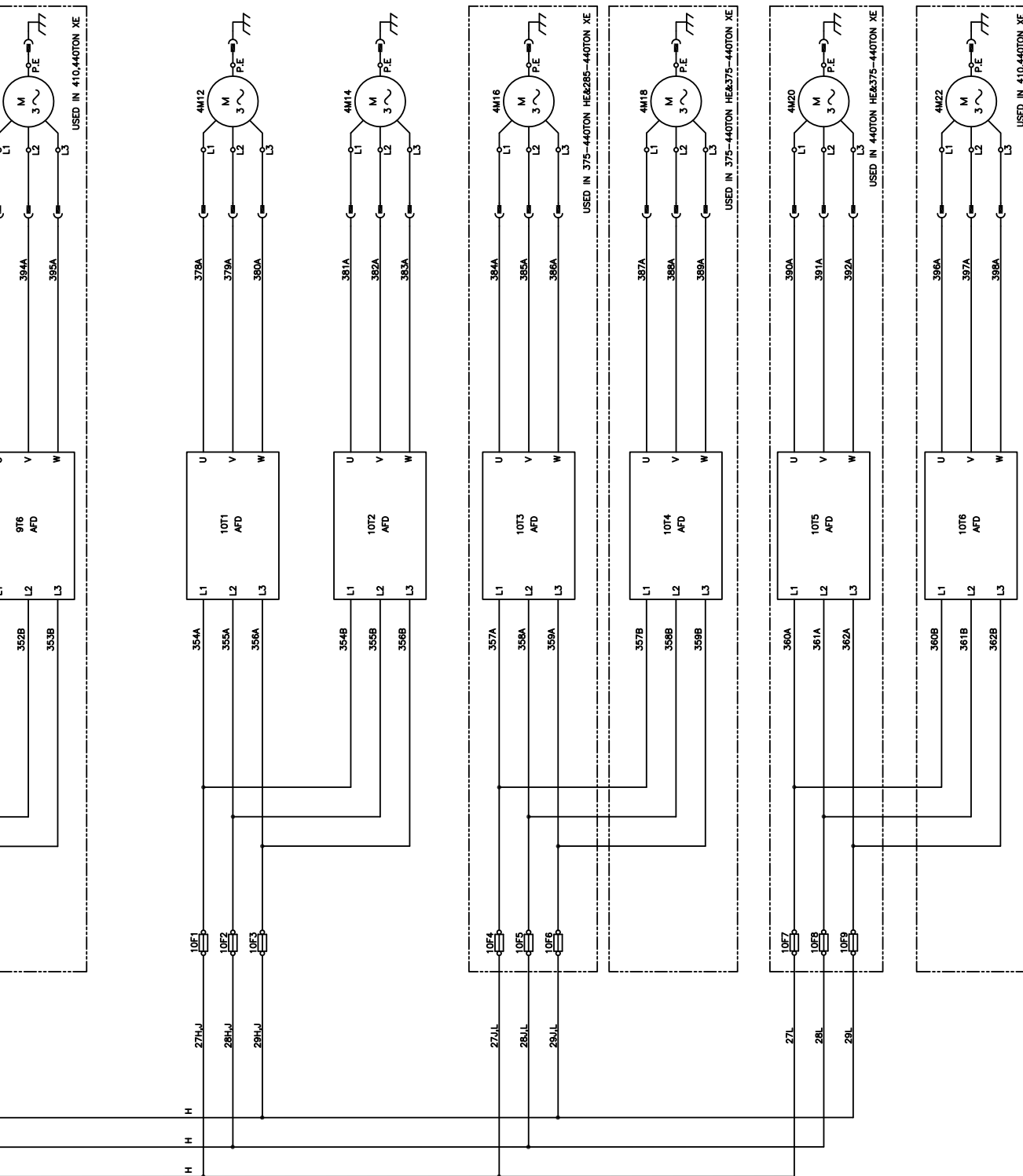


WARNING **AVERTISSEMENT** **ADVERTENCIA**
HAZARDOUS VOLTAGE! TENSION DANGERUSE! VOLTAJE PELIGROSO!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE ANY MAINTENANCE. PUIS SUIVRE LES PROCEDURES DE VERIFICATION AVANT TOUTE INTERVENTION. DESCONDENECTE TODA LA ENERGIA ELECTRICA INCLUIDO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y VERIFICACION ANTES DE COMENZAR EL SERVICIO.
INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED TO DRIVE INSTRUCTIONS FOR VARIABLE SPEED DRIVE. REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE PROCEDURE. UN MANQUEMENT A LA PROCEDURE CI-DESSUS PEUT ENTRAINER DES BLESSURES GRAVES, VOIRE LA MORT.
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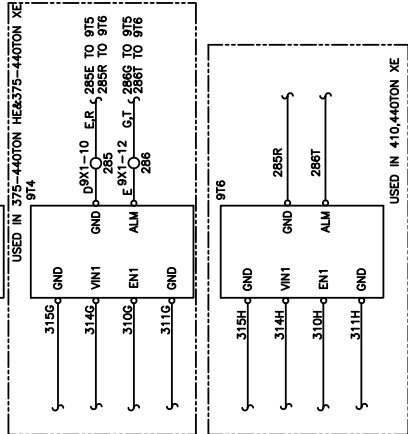
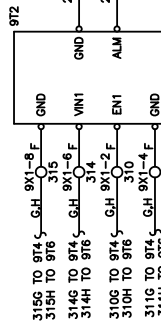
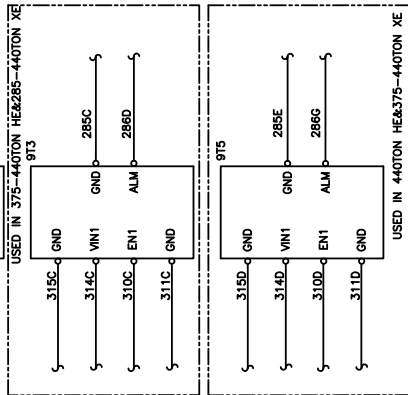
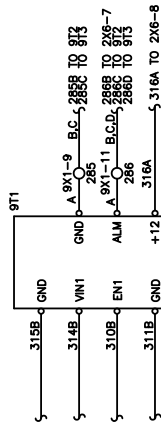
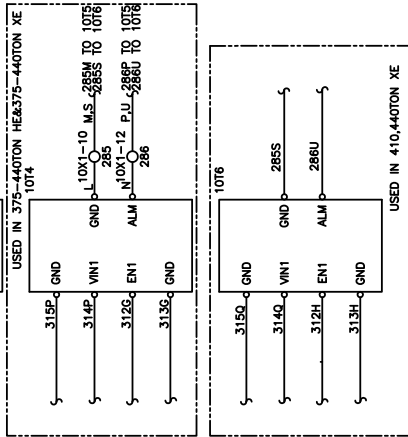
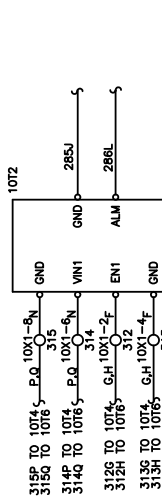
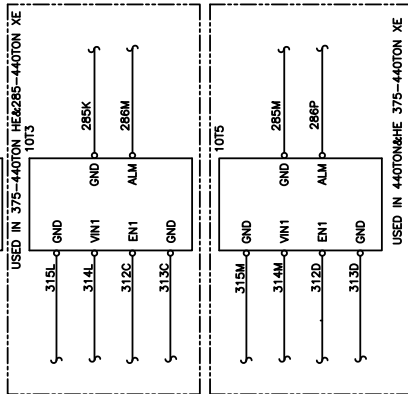
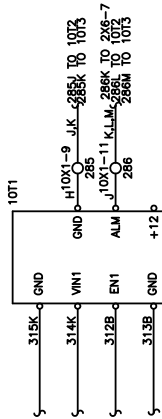
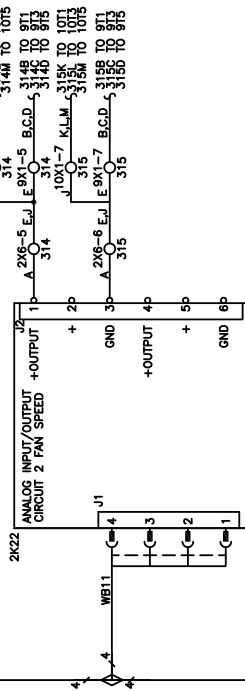
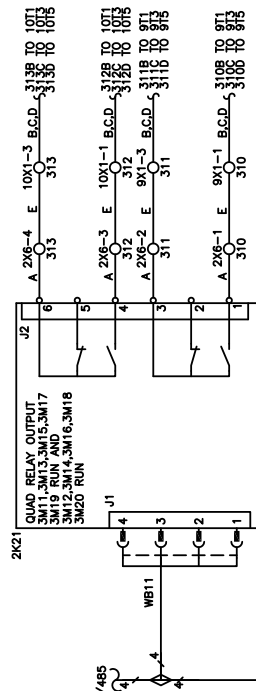
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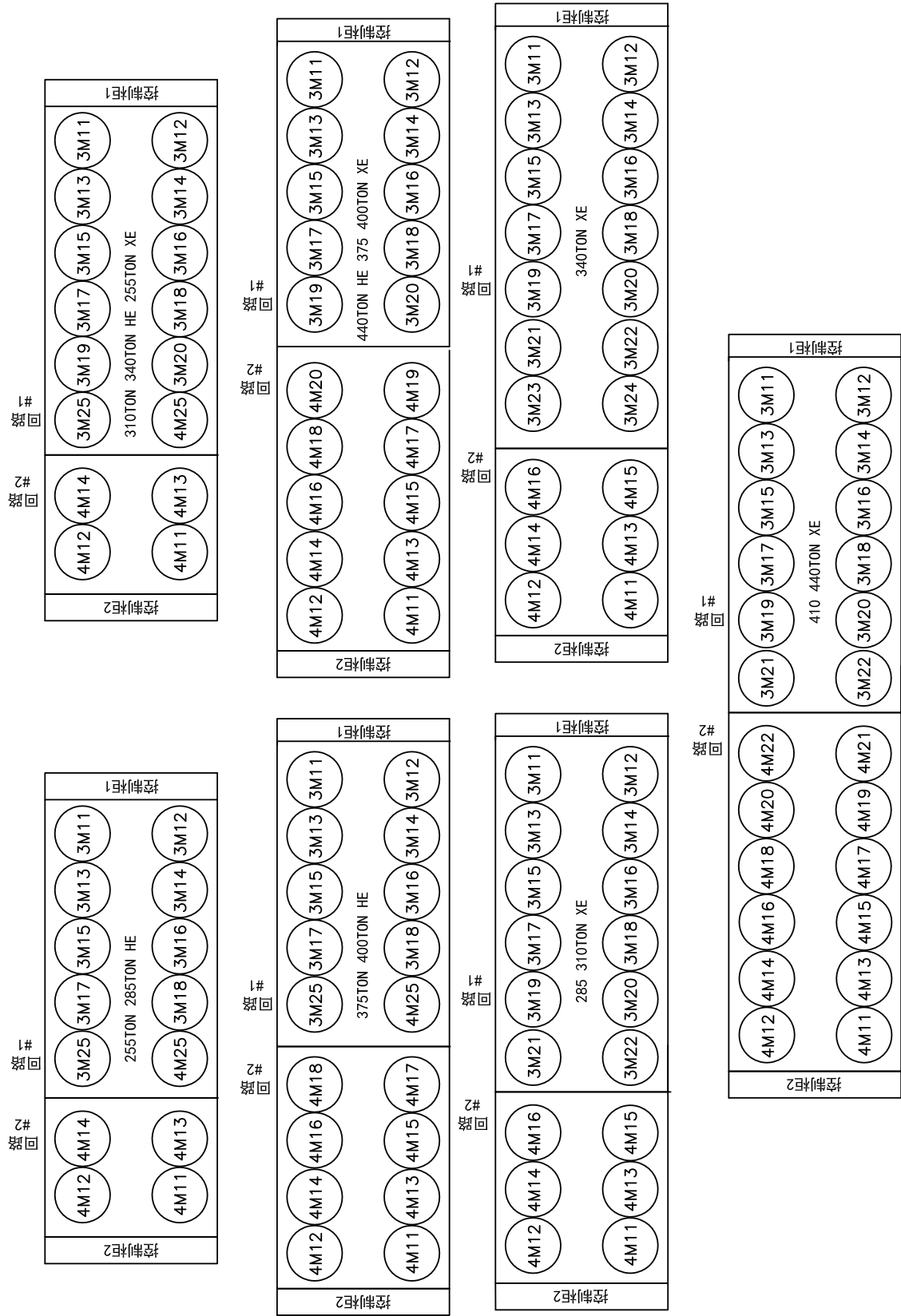
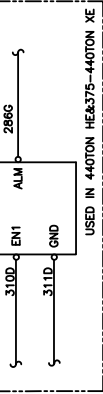
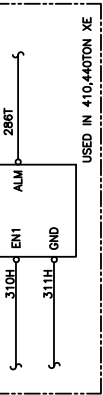
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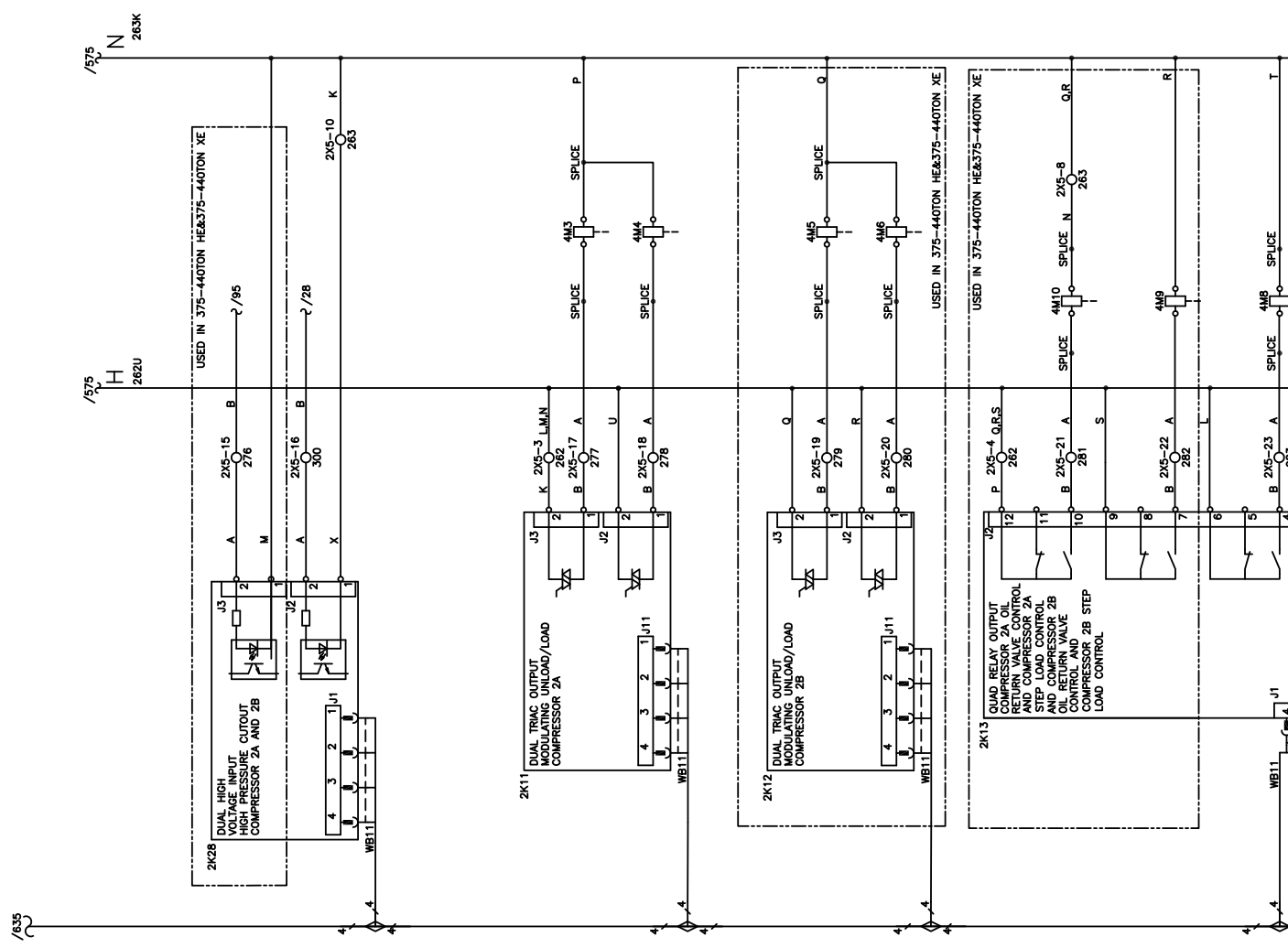




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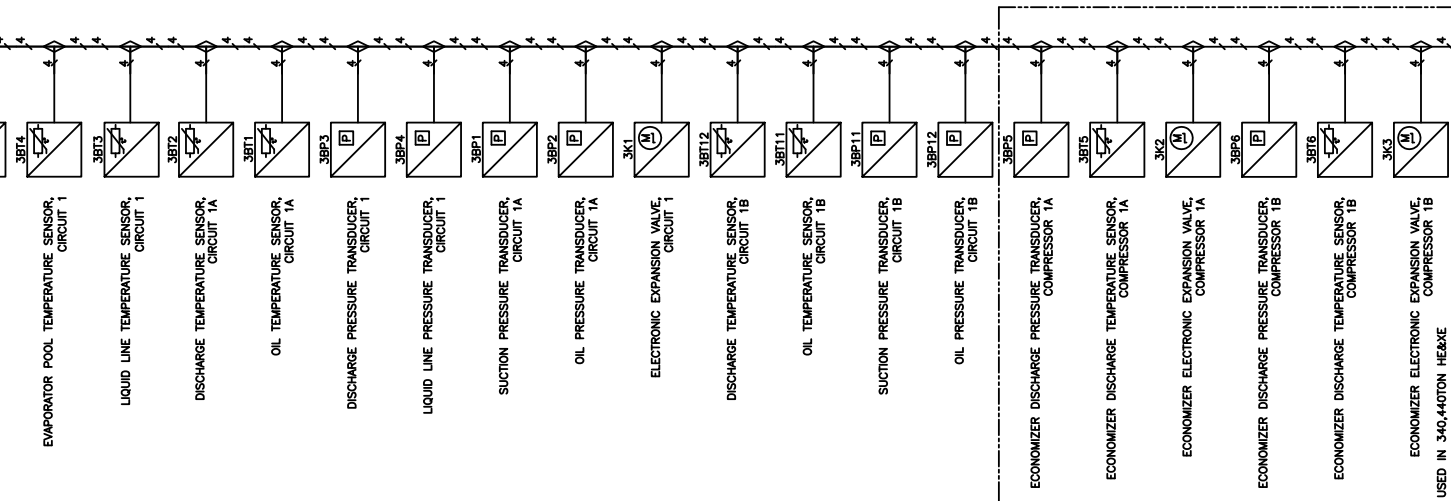
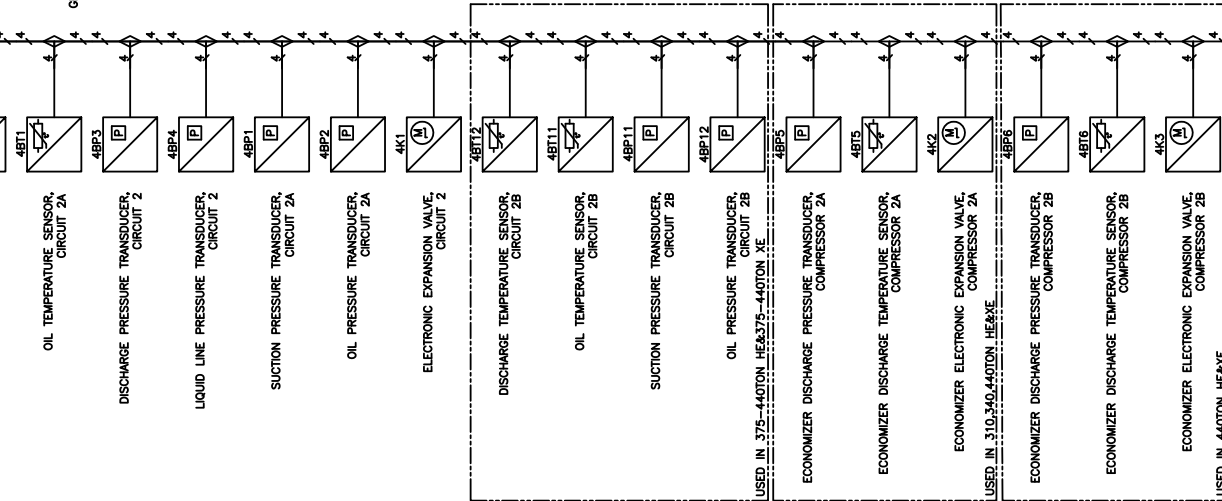
8	EC FAN DRIVES PANEL CIRCUIT 1B
9	EC FAN DRIVES PANEL CIRCUIT 2A
10	EC FAN DRIVES PANEL CIRCUIT 2B
11	EC FAN DRIVES PANEL 3W23&3W2Z

GENERAL NOTES:

- 1 UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F) AT ATMOSPHERIC PRESSURE. AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- 2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- 3 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER. AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
- 4 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
- 5 CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.

NOTES:

- 1 SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS. FIELD CONNECTIONS FOR SINGLE SOURCE POWER ARE MADE TO 1Q1 OR 1Q2.
- 2 CLASS 1 FIELD WIRE MODULE.
- 3 RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC; 5 AMPS GENERAL PURPOSE.
- 4 COMPONENTS (LUIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS (WB3 & WB13) IN THE ORDER SHOWN.
- 5 DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. SHIELD IS ATTACHED INTERNALLY TO METAL WASHER ON SENSOR.
- 6 OPTIONAL MODULE. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
- 7 AUTO STOP CONTACTS ARE JUMPERED AT THE FACTORY BY JUMPER W1 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPER AND CONNECT TO THE DESIRED CONFIGURATION.
- 8 ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION TEMPERATURE RATING OF 90°C AND BE SELECTED AT 75°C RATINGS.
- 9 WIRING FOR 380V/50Hz UNIT SHOWN. FOR 400V/50Hz UNIT, CONNECT H1 AND H3. FOR 415V/50Hz UNIT, CONNECT H1 AND H4.



DEVICE DESIGNATION	DESCRIPTION	LEGEND	LINE NUMBER
1A1	TD7 DISPLAY		744
1S24	EMERGENCY STOP		22
1F1	FUSE, PRIMARY		18
1F2	FUSE, PRIMARY		19
1F3	FUSE, SECONDARY, 115V		32
1F4	FUSE, SECONDARY, 27V		34
1F5	FUSE, SECONDARY, 27V		
1K1	UC800		744
1K2	DUAL LOW VOLTAGE INPUT, LO-C COMMUNICATIONS (ECHELON)		302
1K3	STARTER MODULE, COMPRESSOR 1A		30
1K9	STARTER MODULE, COMPRESSOR 1B		98
1K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1A		307
1K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1B		314
1K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 1A/COMPRESSOR 1B		321
1K14	DUAL HIGH VOLTAGE INPUT, CHILLED WATER FLOW AND INTERLOCK		344
1K15	DUAL LOW VOLTAGE INPUT, OIL LOSS LEVEL, CIRCUIT 1&CIRCUIT 2		293
1K16	DUAL RELAY OUTPUTS, CHILLED WATER PUMP START COMMAND		353
1K17	QUAD RELAY OUTPUTS, UNIT STATUS PROGRAMMABLE RELAYS		341
1K18	DUAL LOW VOLTAGE INPUT, EXTERNAL AUTO STOP AND EMERGENCY STOP INPUTS		331
1K19	ANALOG INPUT/OUTPUT, EXTERNAL CHILLED WATER SETPOINT INPUT AND EXTERNAL DEMAND LIMIT SETPOINT INPUT OR COMPRESSOR % R/A OUTPUT AND DLS SUPPLY VOLTAGE OUTPUT		310
1K21	QUAD RELAY OUTPUTS, CIRCUIT 1 FANS 1 RUN /CIRCUIT 1 FANS 2 RUN		229
1K22	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 1		240
1K23	DUAL RELAY OUTPUTS, 3M25 FAN RUN AND 4M25 FAN RUN		259
1K24	ANALOG INPUT/OUTPUT, SHARED CONDENSER FAN SPEED COMMAND		267
1K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOFF,COMPRESSOR 1A&1B		297
1P1	CIRCUIT 1 FANS ALARM LIGHT		338
1Q1	CIRCUIT BREAKER, POWER DISTRIBUTION		7
1Q2	DISCONNECT SWITCH, POWER DISTRIBUTION		8
1Q5	CONTACTOR, COMPRESSOR 1A START		35
1Q6	CONTACTOR, COMPRESSOR 1A RUN		38
1Q7	CONTACTOR, COMPRESSOR 1A SHORT		41
1Q8	CONTACTOR, COMPRESSOR 1A TRANSITION		44
1Q25	CONTACTOR, COMPRESSOR 1B START		102
1Q26	CONTACTOR, COMPRESSOR 1B RUN		105
1Q27	CONTACTOR, COMPRESSOR 1B SHORT		108
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION		111
1R1	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE A		16
1R2	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE B		19
1R3	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE C		22
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A		79
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B		82
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C		85
1T1	TRANSFORMER, CONTROL POWER		18
1T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE		35
1T3	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE A		15
1T4	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE B		18
1T5	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE C		21
1T10	POWER SUPPLY MODULE		734
1T11	POWER SUPPLY MODULE		725
1T13	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE A		78
1T14	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE B		81
1T15	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE C		84
1X1	INPUT POWER TERMINAL		9
1X2	FANS CABLE POWER TERMINAL		150
1X5	FACTORY CONTROL TERMINAL		
1X8	EVAPORATOR HEATER POWER TERMINAL		
2F1	FUSE, PRIMARY		374
2F2	FUSE, PRIMARY		373
2F3	FUSE, SECONDARY, 115V		382
2F4	FUSE, SECONDARY, 27V		382
2F5	FUSE, SECONDARY, 27V		
2K3	STARTER MODULE, COMPRESSOR 2A		381
2K9	STARTER MODULE, COMPRESSOR 2B		391
2K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2A		458
2K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2B		666
2K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 2A/COMPRESSOR 2B		673
2K21	QUAD RELAY OUTPUTS, CIRCUIT 2 FANS 1 RUN /CIRCUIT 2 FANS 2 RUN		680
2K22	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 2		569
2K26	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOFF,COMPRESSOR 2A&2B		600
2025	CONTACTOR, COMPRESSOR 2B START		462
2026	CONTACTOR, COMPRESSOR 2B RUN		465
2027	CONTACTOR, COMPRESSOR 2B SHORT		468
2028	CONTACTOR, COMPRESSOR 2B TRANSITION		471
2R1	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE A		376
2R2	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE B		379
2R3	RESISTOR, TRANSITION, COMPRESSOR 2A, LINE C		382
2R4	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE A		439
2R5	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE B		442
2R6	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE C		445
2T1	TRANSFORMER, CONTROL POWER		378
2T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE		395
2T3	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE A		375
2T4	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE B		378
2T5	TRANSFORMER, CURRENT, COMPRESSOR 2A, LINE C		381
2T10	POWER SUPPLY MODULE		734
2T11	POWER SUPPLY MODULE		725
2T13	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE A		738
2T14	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE B		441
2T15	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE C		444
2X1	INPUT POWER TERMINAL		369
2X2	FANS CABLE POWER TERMINAL		510
2X5	FACTORY CONTROL TERMINAL		
3B11	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 1		42
3BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1A		767
3BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 1A		769
3BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 1		763
3BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 1		765
3BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1A		781
3BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1B		787
3BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1B		777
3BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 1B		779
3BT1	OIL TEMPERATURE SENSOR, CIRCUIT 1A		761
3BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1A		759
3BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 1		757
3BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 1		755
3BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1A		783
3BT6	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1B		789
3BT11	OIL TEMPERATURE SENSOR, CIRCUIT 1B		775
3BT12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1B		773
3B2	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1A		28
3B3	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1B		95
3E1	HEATER, COMPRESSOR 1A		21
3E2	HEATER, COMPRESSOR 1B		92
3F3	HEATER, OIL SEPARATOR, CIRCUIT 1		26
3K1	MOTOR, EXPANSION VALVE, CIRCUIT 1		771
3K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1A		785
3K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1B		791
3M1	MOTOR, COMPRESSOR 1A		18
3M2	MOTOR, COMPRESSOR 1B		82
3M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1A		307
3M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A		309
3M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1B		314
3M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B		316
3M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1A		330
3M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1A		327
3M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1B		324
3M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1B		321
3M11~3M25	MOTOR, CONDENSOR FANS, CIRCUIT 1		
4B11	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 2		402
4BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2A		761
4BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 2A		763
4BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 2		757
4BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 2		759
4BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2A		775
4BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2B		781
4BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2B		771
4BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 2B		773
4BT1	OIL TEMPERATURE SENSOR, CIRCUIT 2A		755
4BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2A		753
4BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 2		751
4BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 2		749
4BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2A		777

3B12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1A	729
3B13	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 1	757
3B14	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 1	755
3B15	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1A	783
3B16	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1B	789
3B111	OIL TEMPERATURE SENSOR, CIRCUIT 1B	775
3B112	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1B	773
3B2	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1A	28
3B3	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1B	95
3E1	HEATER, COMPRESSOR 1A	21
3E2	HEATER, COMPRESSOR 1B	92
3E3	HEATER, OIL SEPARATOR, CIRCUIT 1	26
3K1	MOTOR, EXPANSION VALVE, CIRCUIT 1	771
3K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1A	785
3K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1B	791
3M1	MOTOR, COMPRESSOR 1A	18
3M2	MOTOR, COMPRESSOR 1B	82
3M3	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A	307
3M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A	309
3M5	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B	314
3M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B	316
3M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1A	330
3M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1A	327
3M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1B	324
3M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1B	321
3M11~3M25	MOTOR, CONDENSOR FANS, CIRCUIT 1	
4B11	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 2	402
4B1P1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2A	761
4B1P2	OIL PRESSURE TRANSDUCER, CIRCUIT 2A	763
4B1P3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 2	757
4B1P4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 2	759
4B1P5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2A	775
4B1P6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2B	781
4B111	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2B	771
4B112	OIL PRESSURE TRANSDUCER, CIRCUIT 2B	773
4B11	OIL TEMPERATURE SENSOR, CIRCUIT 2A	755
4B12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2A	753
4B13	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 2	751
4B14	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 2	749
4B15	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2A	777
4B16	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2B	783
4B111	OIL TEMPERATURE SENSOR, CIRCUIT 2B	553
4B112	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2B	551
4B2	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 2A	388
4B3	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 2B	455
4E1	HEATER, COMPRESSOR 2A	385
4E2	HEATER, COMPRESSOR 2B	452
4E3	HEATER, OIL SEPARATOR, CIRCUIT 2	386
4K1	MOTOR, EXPANSION VALVE, CIRCUIT 2	765
4K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2A	779
4K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2B	785
4M1	MOTOR, COMPRESSOR 2A	378
4M2	MOTOR, COMPRESSOR 2B	441
4M3	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2A	667
4M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2A	669
4M5	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2B	674
4M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2B	676
4M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2A	690
4M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2A	687
4M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2B	684
4M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2B	681
4M11~4M25	MOTOR, CONDENSOR FANS, CIRCUIT 2	
5B5	FLOW SWITCH, CHILLER WATER	346
5K9	RELAY, CUSTOMER PROVIDED, CHILLED WATER PUMP STARTER	357
5K12~5K19	RELAY, UNIT STATUS	
5K23	RELAY, EXTERNAL INPUT, AUTO/STOP	330
5Q7	FUSED DISCONNECT CUSTOMER SUPPLIED 1 PHASE	337
6B11	TEMPERATURE SENSOR, OUTDOOR AIR TEMPERATURE	749
6B12	TEMPERATURE SENSOR, EVAPORATOR LEAVING WATER TEMPERATURE	751
6B13	TEMPERATURE SENSOR, EVAPORATOR ENTERING WATER TEMPERATURE	753
6B52	THERMOSTAT, EVAPORATOR WATER HEATER CONTROL	352
6E50-1	SUBMERSION HEATER, EVAPORATOR	355
6E50-2	SUBMERSION HEATER, EVAPORATOR	355
6E50-3	SUBMERSION HEATER, EVAPORATOR	355
6E50-4	SUBMERSION HEATER, EVAPORATOR	355
6E50-5	HEATER TAPE, EVAPORATOR	355
6E50-6	HEATER TAPE, EVAPORATOR	355

1Q7	CONTACTOR, COMPRESSOR 1A, SHUKI	41
1Q8	CONTACTOR, COMPRESSOR 1A TRANSITION	44
1Q25	CONTACTOR, COMPRESSOR 1B START	102
1Q26	CONTACTOR, COMPRESSOR 1B RUN	105
1Q27	CONTACTOR, COMPRESSOR 1B SHORT	108
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION	111
1R1	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE A	16
1R2	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE B	19
1R3	RESISTOR, TRANSITION, COMPRESSOR 1A, LINE C	22
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A	79
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B	82
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C	85
1T1	TRANSFORMER, CONTROL POWER	18
1T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE	35
1T3	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE A	15
1T4	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE B	18
1T5	TRANSFORMER, CURRENT, COMPRESSOR 1A, LINE C	21
1T10	POWER SUPPLY MODULE	734
1T11	POWER SUPPLY MODULE	725
1T13	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE A	78
1T14	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE B	81
1T15	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE C	84
1X1	INPUT POWER TERMINAL	9
1X2	FANS CABLE POWER TERMINAL	150
1X5	FACTORY CONTROL TERMINAL	
1X8	EVAPORATOR HEATER POWER TERMINAL	
2F1	FUSE, PRIMARY	374
2F2	FUSE, PRIMARY	373
2F3	FUSE, SECONDARY, 115V	382
2F4	FUSE, SECONDARY, 27V	382
2F5	FUSE, SECONDARY, 27V	381
2K3	STARTER MODULE, COMPRESSOR 2A	391
2K9	STARTER MODULE, COMPRESSOR 2B	458
2K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2A	666
2K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2B	673
2K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE,	680
2K21	QUAD RELAY OUTPUTS, CIRCUIT 2 FANS 1 RUN /CIRCUIT 2 FANS 2 RUN	589
2K22	QUAD RELAY OUTPUTS, CIRCUIT 2 FANS 1 RUN /CIRCUIT 2 FANS 2 RUN	600
2K28	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 2	657
2P1	CIRCUIT 2 FANS ALARM LIGHT	695
2Q1	CIRCUIT BREAKER, POWER DISTRIBUTION	370
2Q2	DISCONNECT SWITCH, POWER DISTRIBUTION	370
2Q5	CONTACTOR, COMPRESSOR 2A START	395
2Q6	CONTACTOR, COMPRESSOR 2A RUN	398
2Q7	CONTACTOR, COMPRESSOR 2A SHORT	401
2Q8	CONTACTOR, COMPRESSOR 2A TRANSITION	404
7F1~7F9	FUSE, EC FAN DRIVES PANAL1, CIRCUIT 1	
7T1~7T7	EC FAN DRIVES, CIRCUIT 1 PANAL1	
8F1~8F7	FUSE, EC FAN DRIVES PANAL2, CIRCUIT 1	
8T1~8T7	EC FAN DRIVES, CIRCUIT 1 PANAL2	
9F1~9F9	FUSE, EC FAN DRIVES PANAL1, CIRCUIT 2	
9T1~9T5	EC FAN DRIVES, CIRCUIT 2 PANAL1	
10F1~10F9	FUSE, EC FAN DRIVES PANAL2, CIRCUIT 2	
10T1~10T6	EC FAN DRIVES, CIRCUIT 2 PANAL2	
11F1~11F3	FUSE, EC FAN DRIVES PANAL3, CIRCUIT 1	
11T1~11T2	EC FAN DRIVES, CIRCUIT 1 PANAL3	

NOTICE

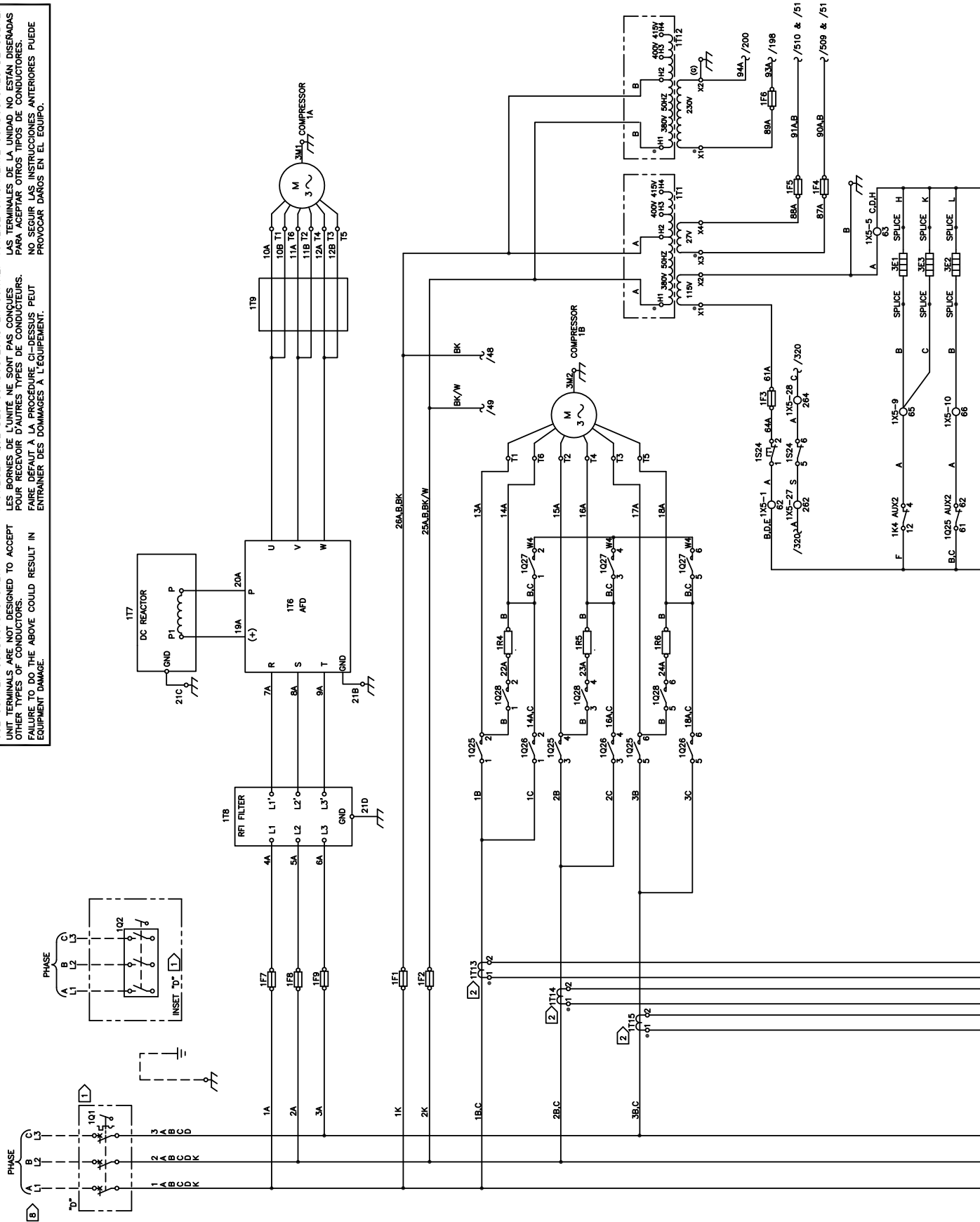
USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT
OTHER TYPES OF CONDUCTORS.
FAILURE TO DO THE ABOVE COULD RESULT IN
EQUIPMENT DAMAGE.

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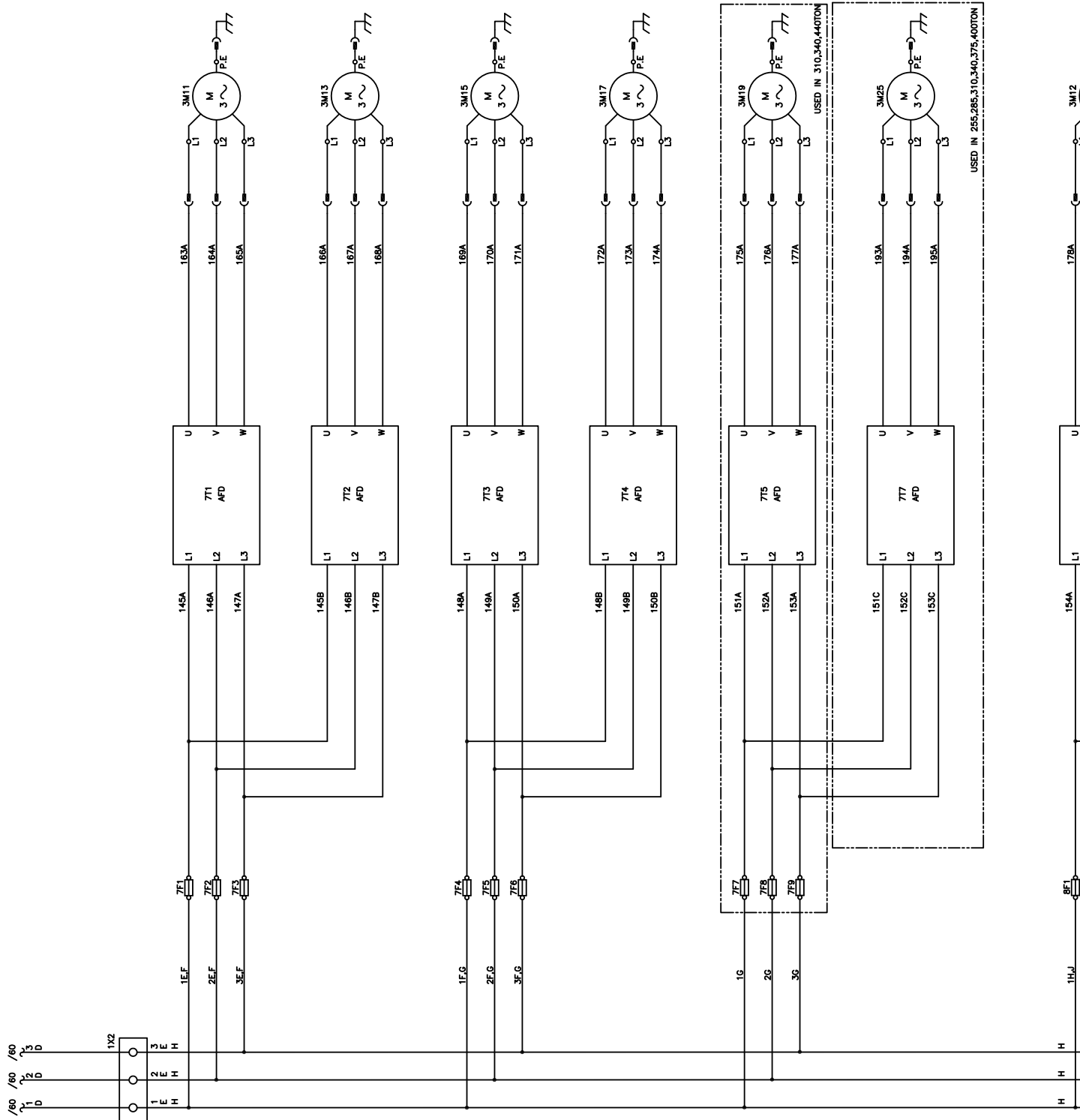
N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES
POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT
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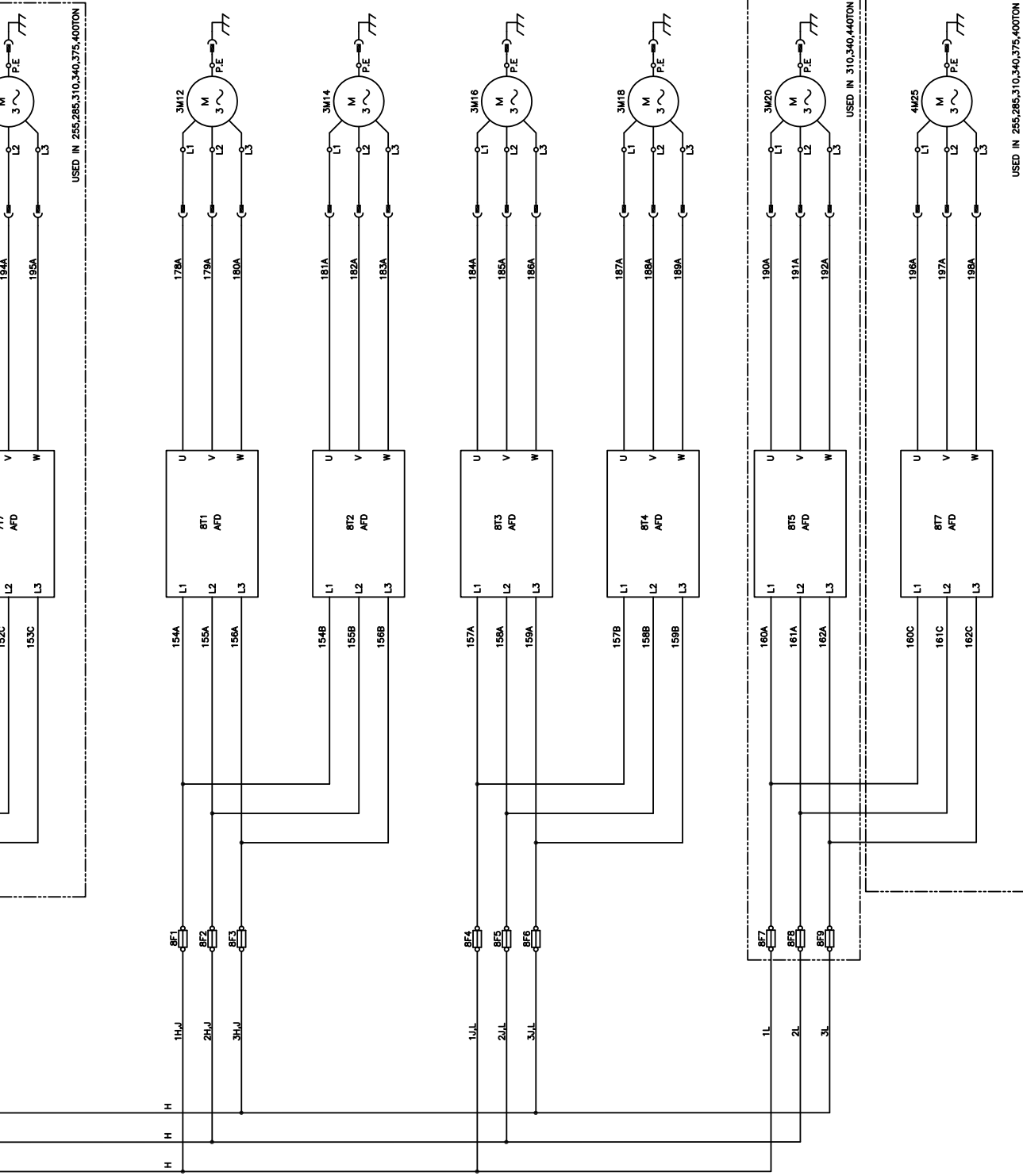
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UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE
PROVOCAR DAÑOS EN EL EQUIPO.



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NOTICE

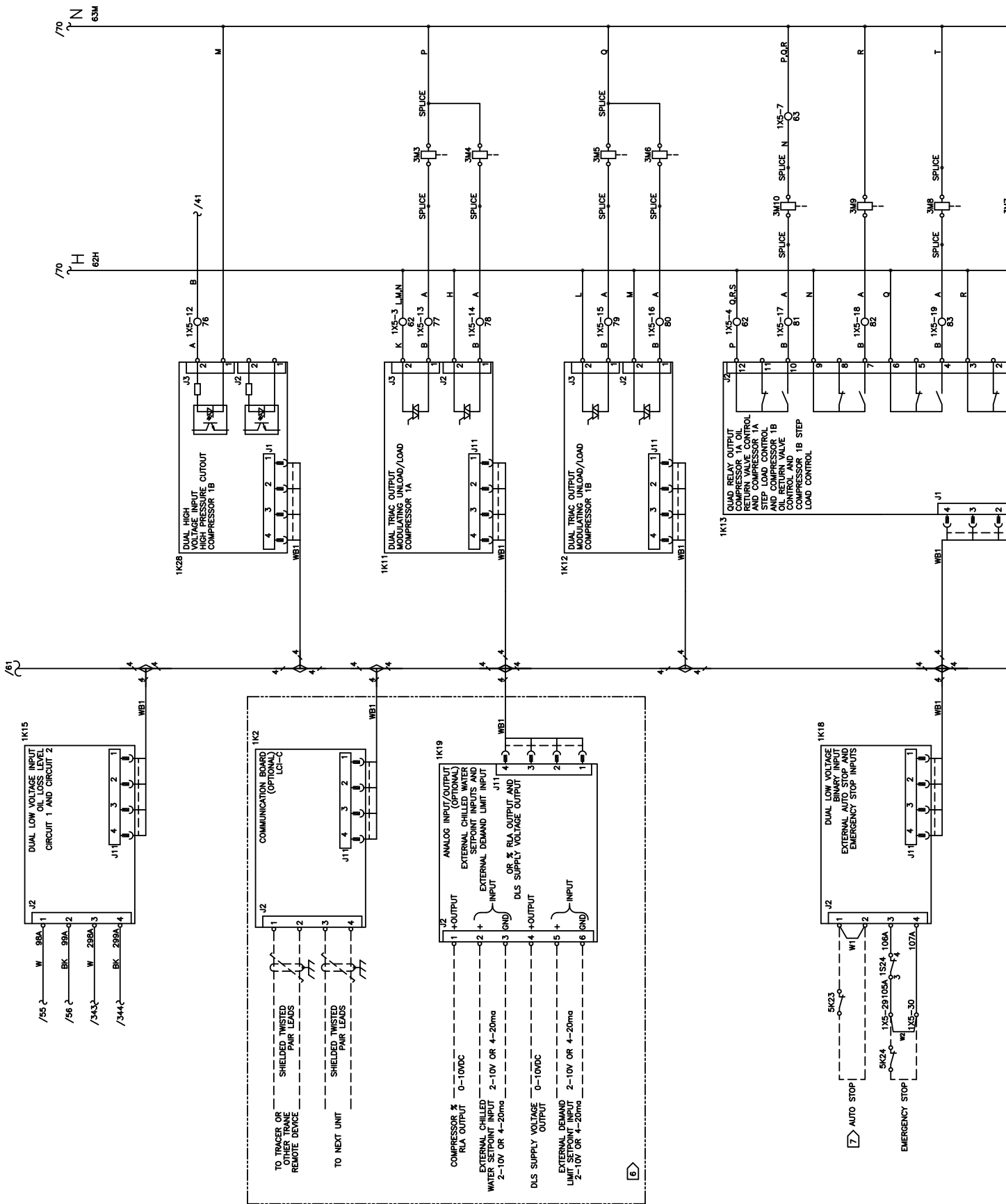
USE COPPER CONDUCTORS ONLY!
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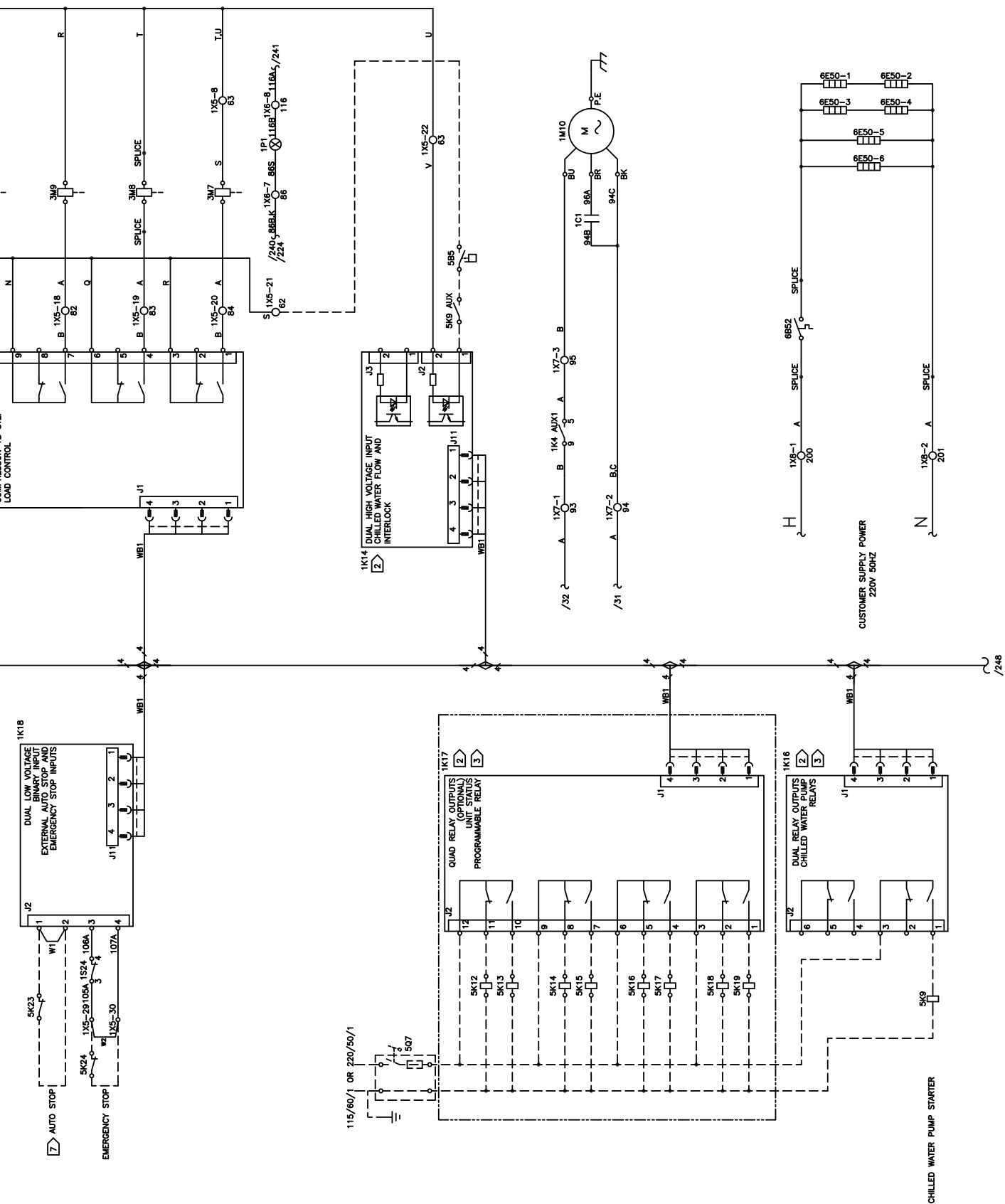
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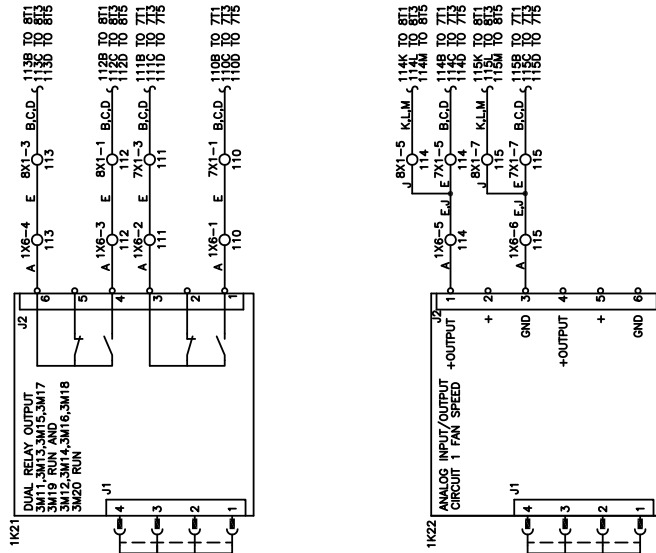
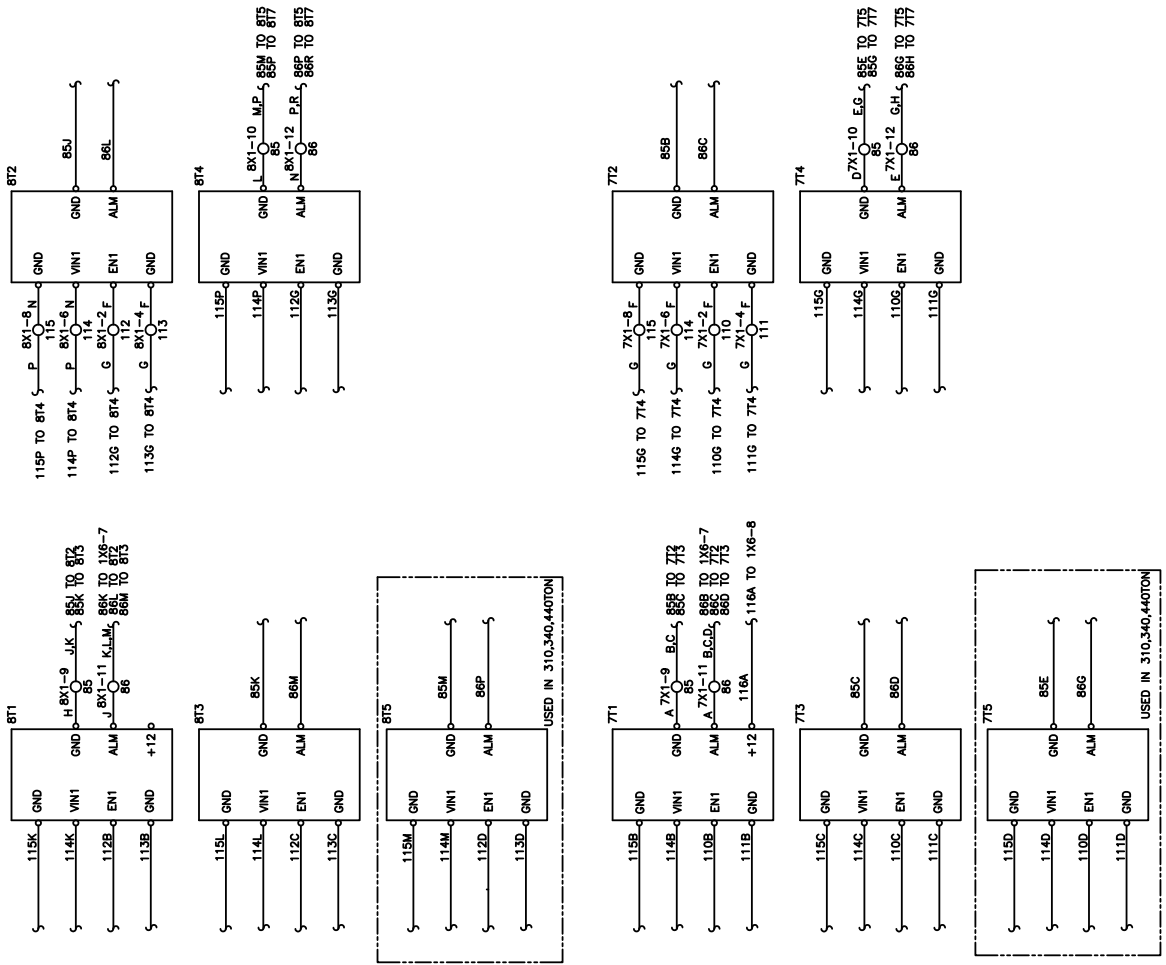
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LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES
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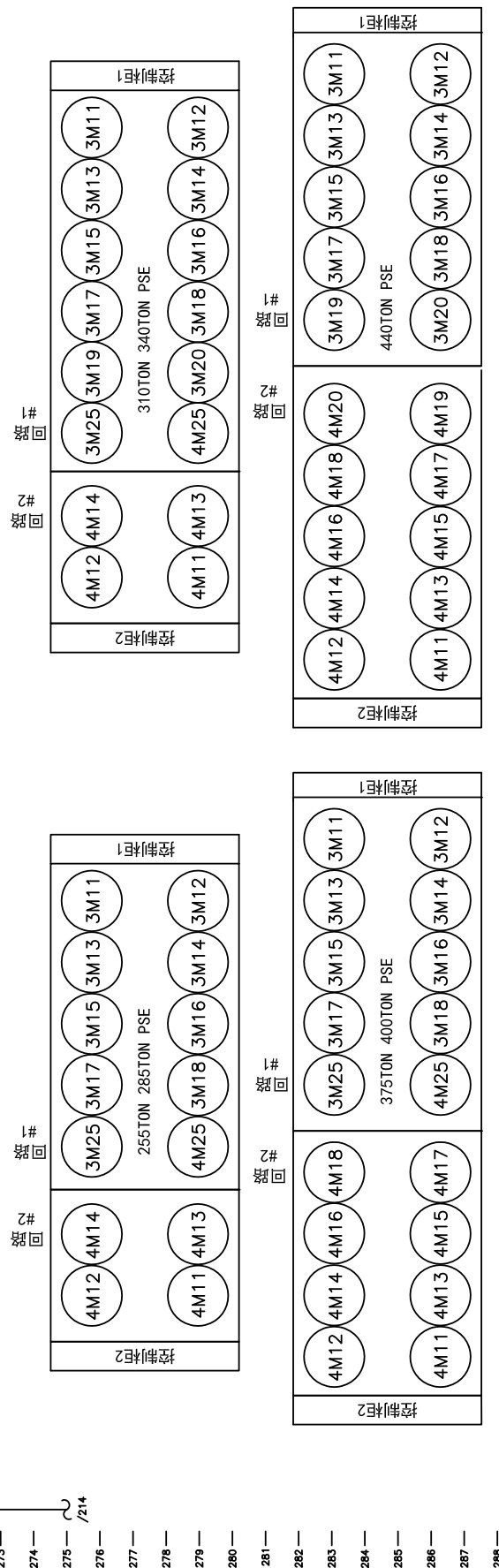
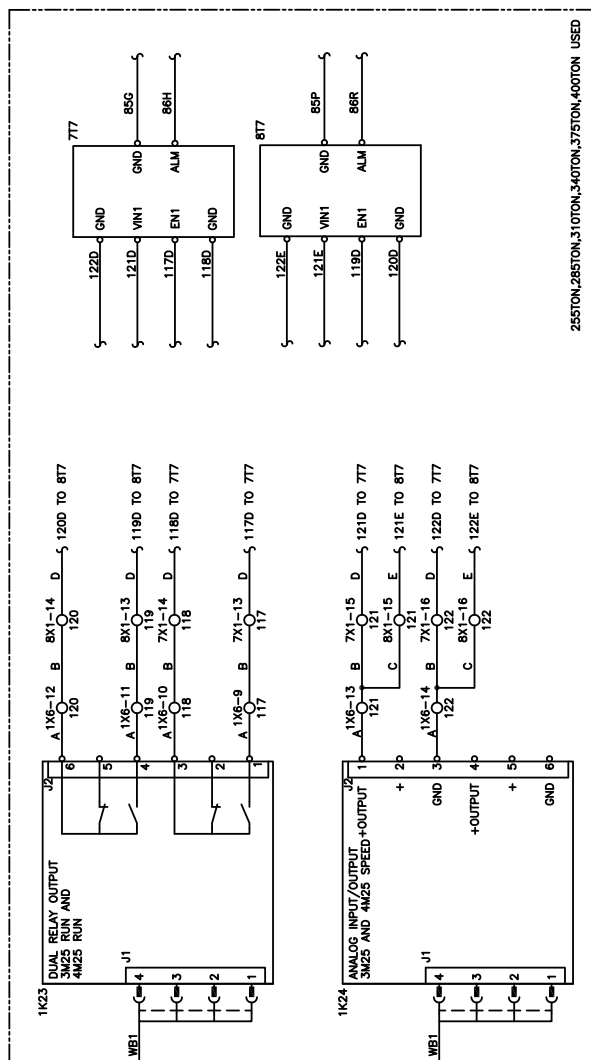
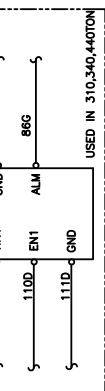
AVISO

UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE
PROVOCAR DAÑOS EN EL EQUIPO.







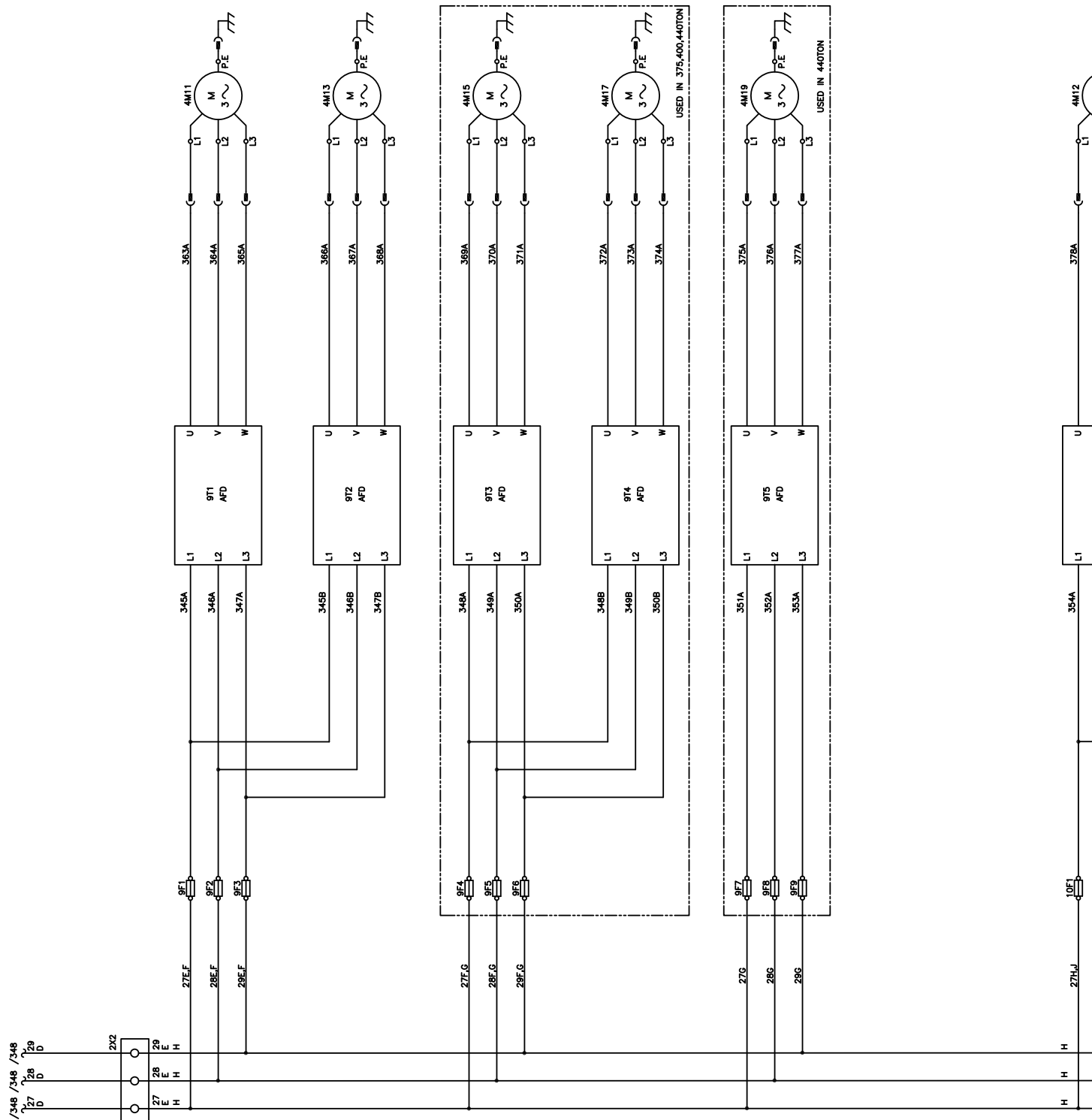


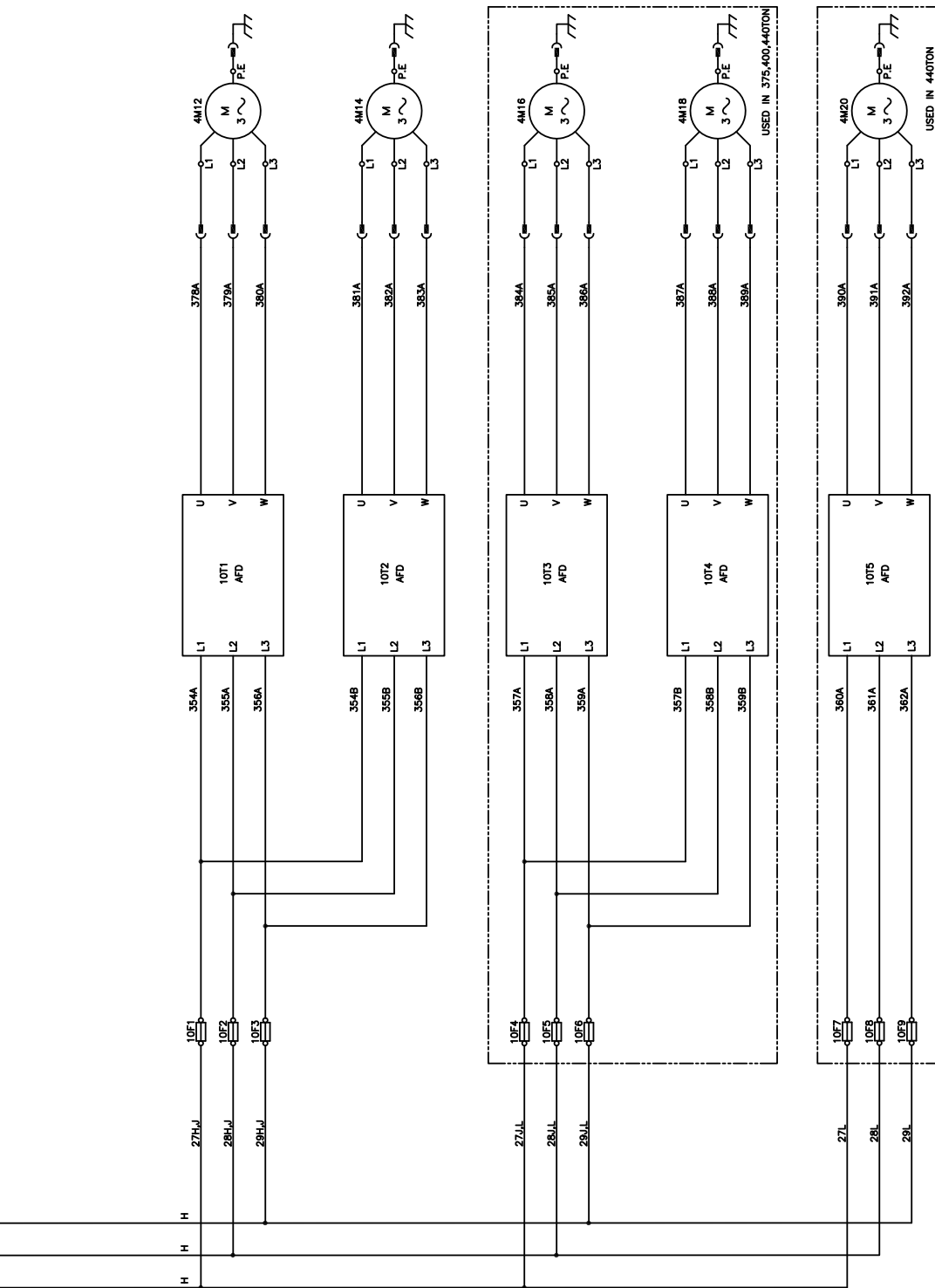
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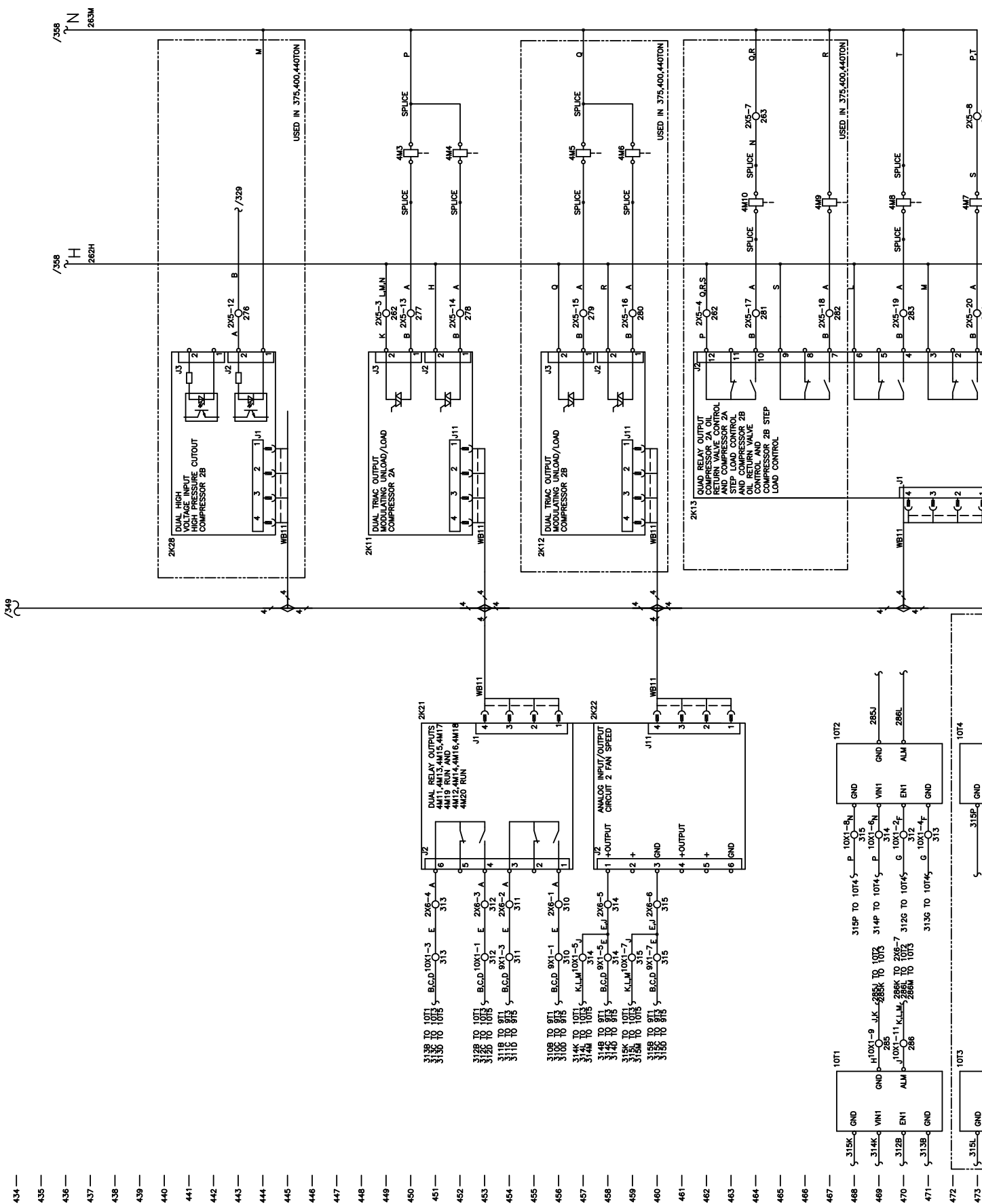


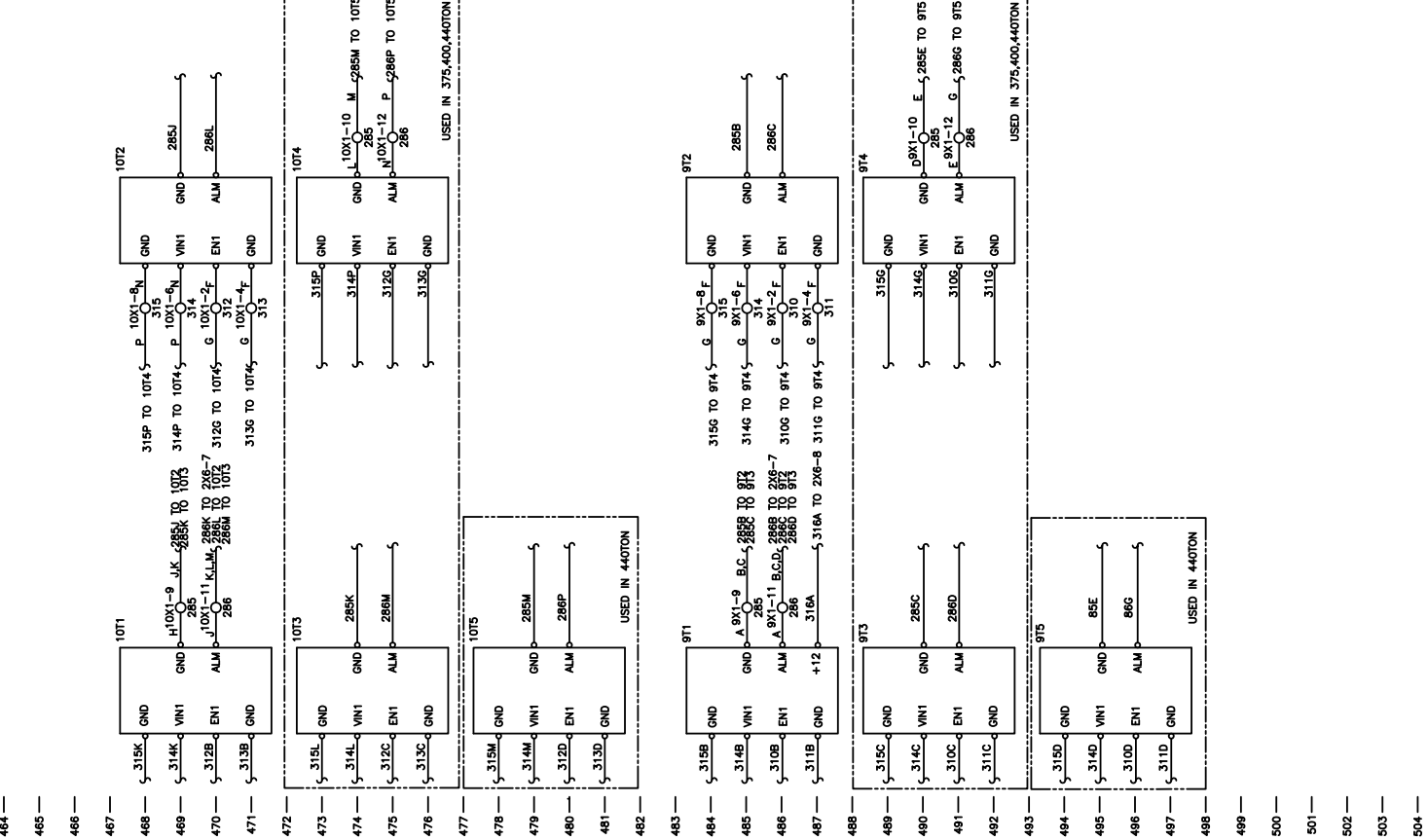
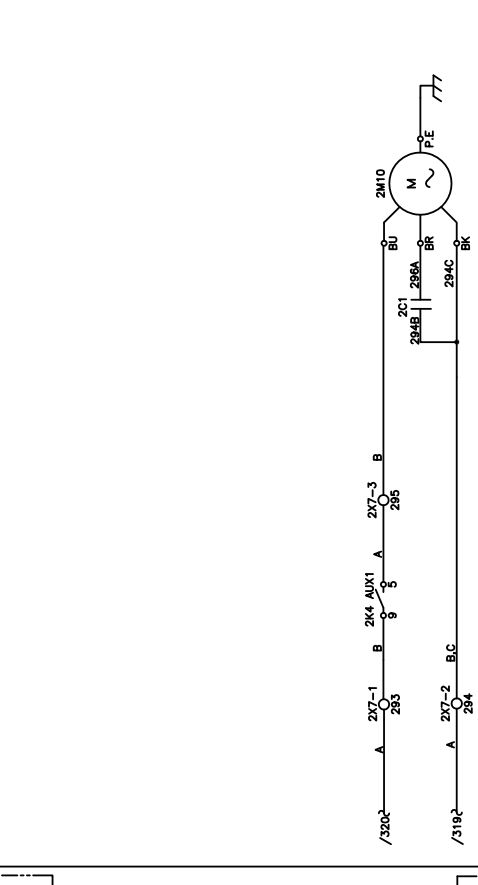
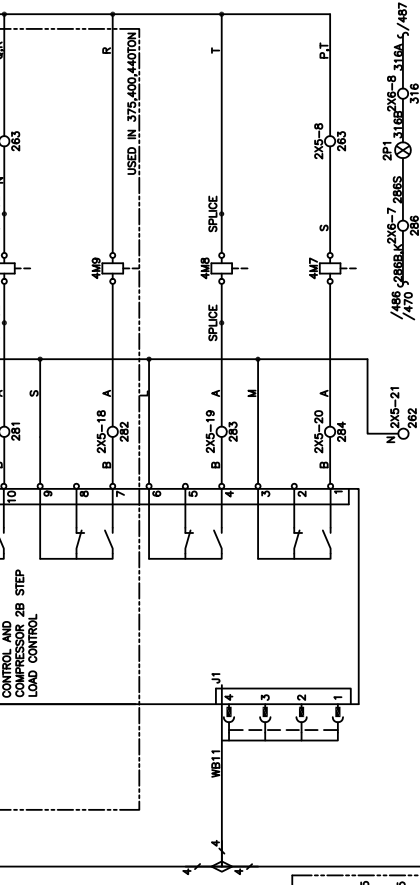


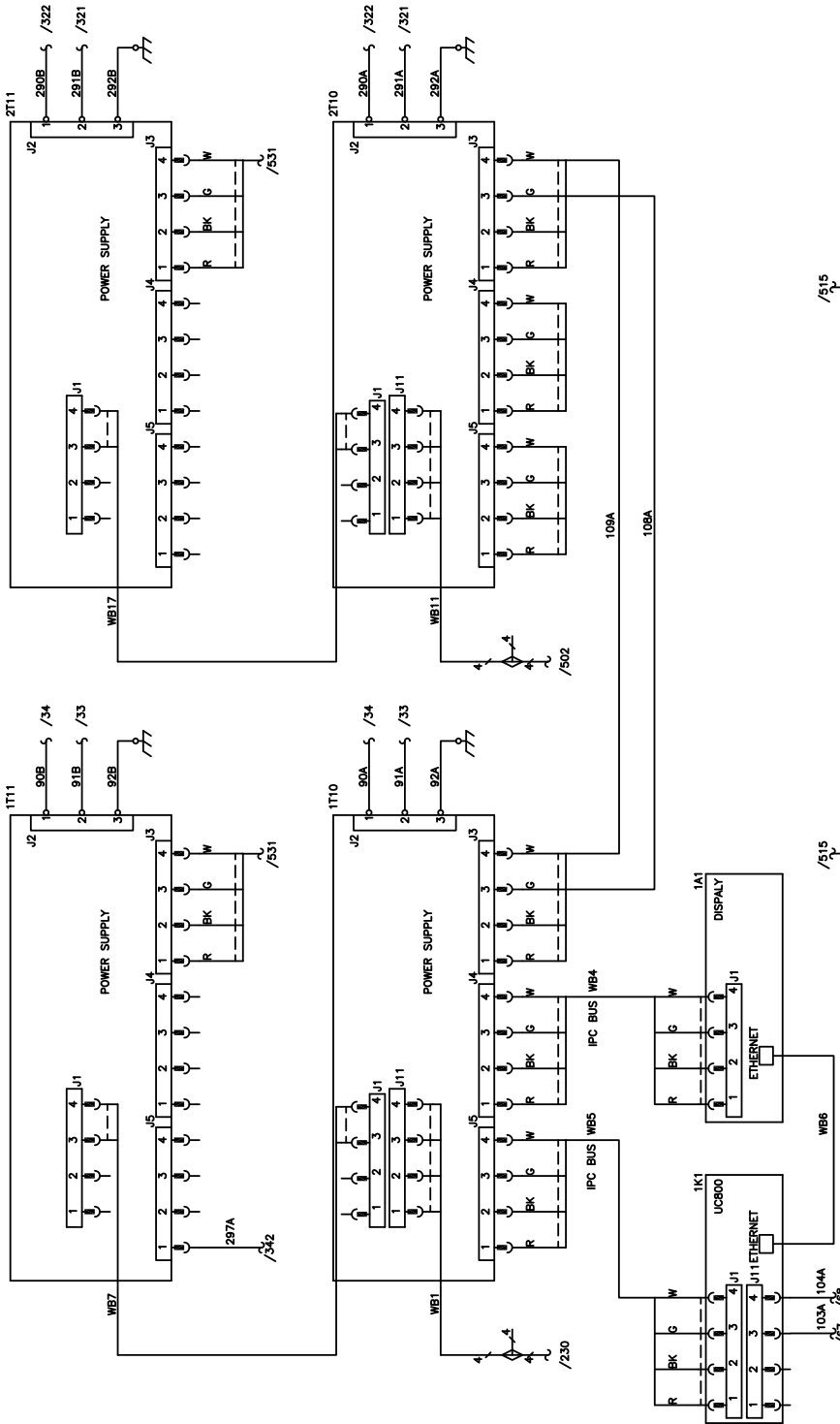
NOTICE
USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT
OTHER TYPES OF CONDUCTORS.
FAILURE TO DO THE ABOVE COULD RESULT IN
EQUIPMENT DAMAGE.

AVISO
N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES
POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT
ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO
¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
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PROVOCAR DAÑOS EN EL EQUIPO.





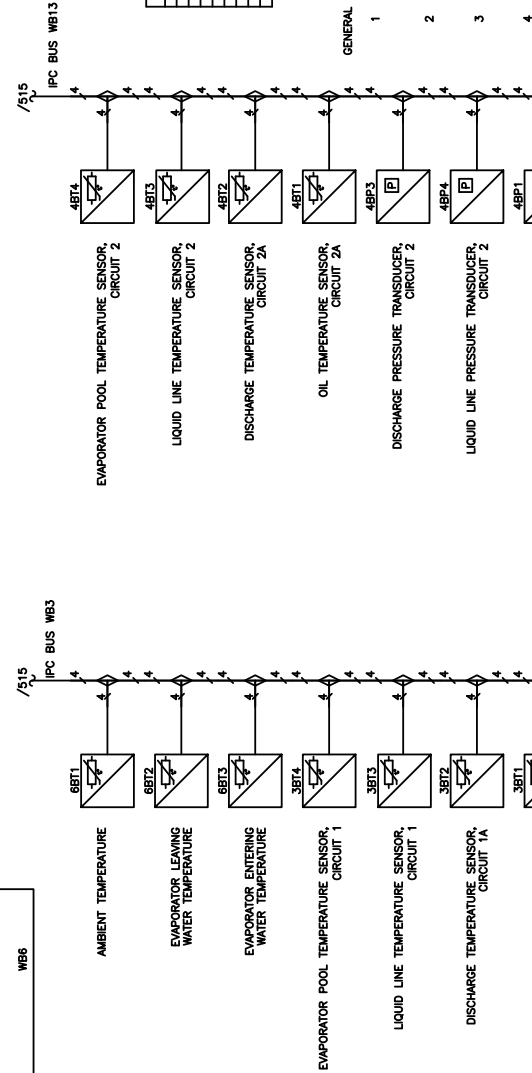


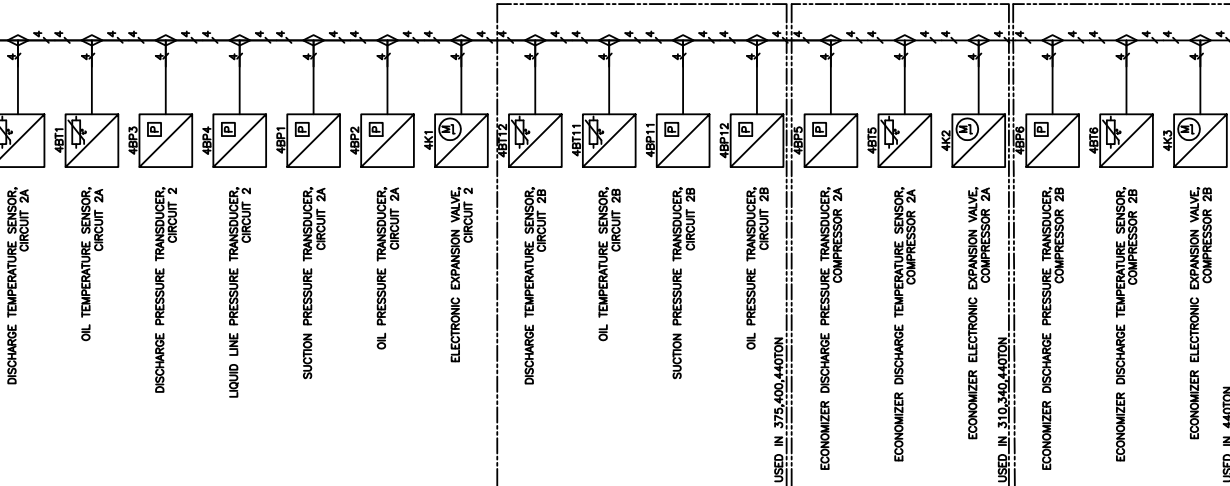
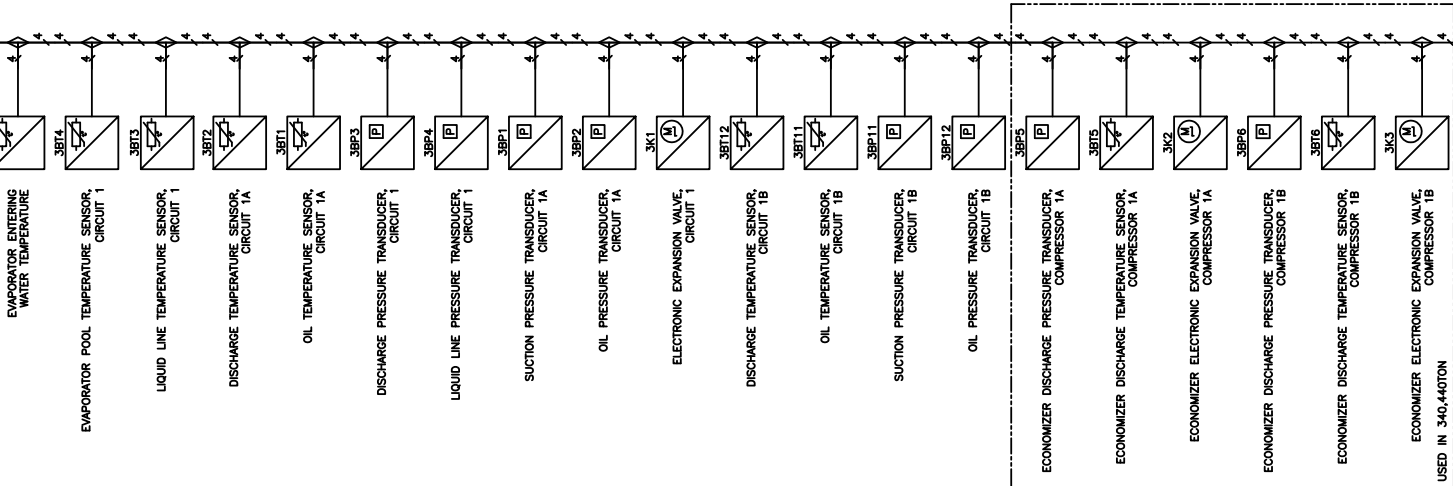
COLOR CODE	
BK	BLACK
BL	BLUE
BR	BROWN
GY	GRAY
RD	RED
GR	GREEN
OR	ORANGE
Y	YELLOW

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	CONTROL PANEL 1
2	CONTROL PANEL 2
3	REFRIGERATION CIRCUIT 1
4	REFRIGERATION CIRCUIT 2
5	CUSTOMER REMOTELY INSTALLED
6	UNIT MOUNTED
7	EC FAN DRIVES PANEL CIRCUIT 1A
8	EC FAN DRIVES PANEL CIRCUIT 1B
9	EC FAN DRIVES PANEL CIRCUIT 2A
10	EC FAN DRIVES PANEL CIRCUIT 2B

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F).
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY FRANE CO.
3. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER, AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
4. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC





5	CUSTOMER REMOTELY INSTALLED
6	UNIT MOUNTED
7	EC FAN DRIVES PANELCIRCUIT 1A
8	EC FAN DRIVES PANELCIRCUIT 1B
9	EC FAN DRIVES PANELCIRCUIT 2A
10	EC FAN DRIVES PANELCIRCUIT 2B

6	GREEN
7	RED
8	YELLOW

GENERAL NOTES:

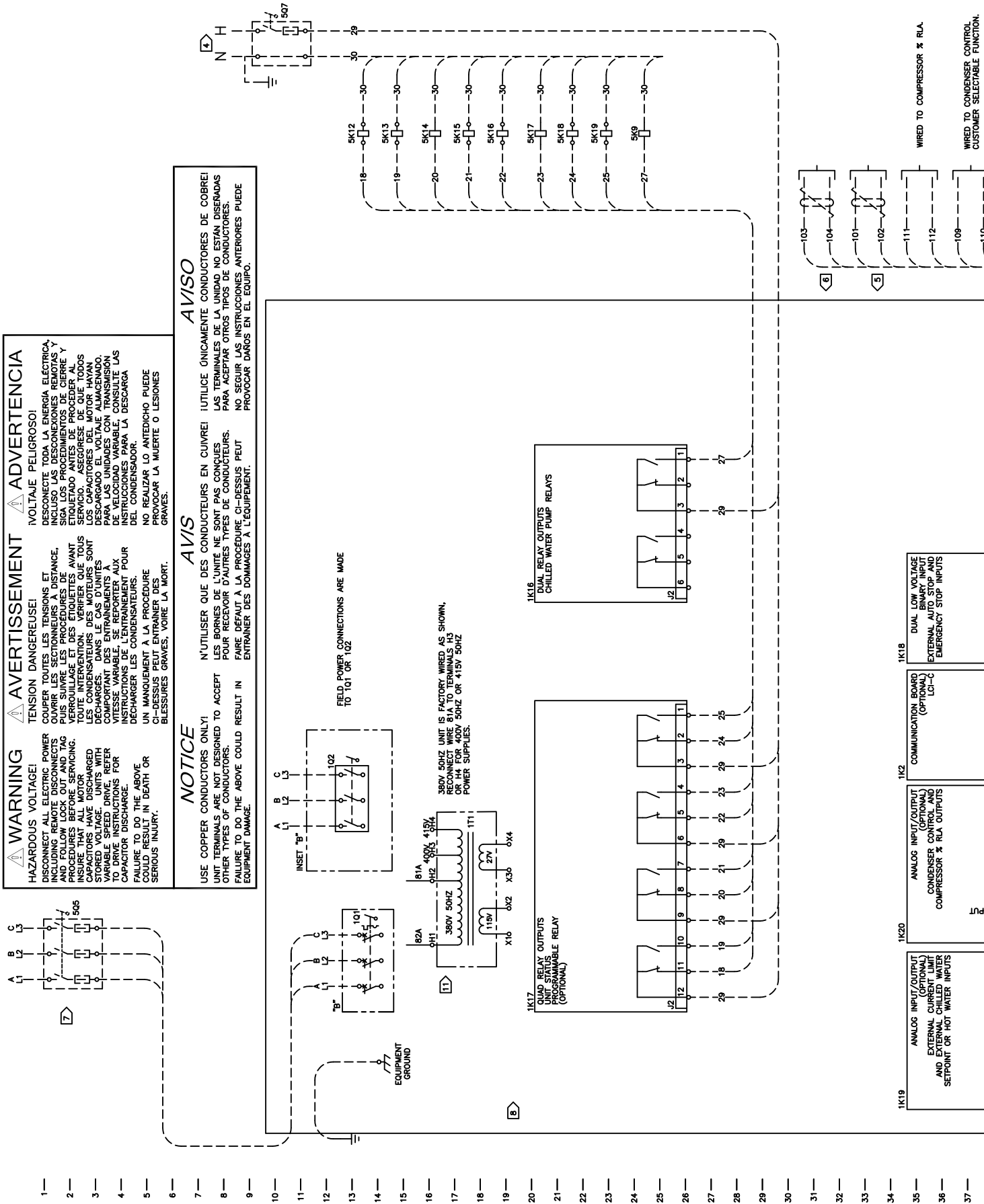
- 1 UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
- 2 DASHED LINES INDICATE RECOMMENDED FIELD WIRING. BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
- 3 NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE TERMINAL NUMBER OF THE FIELD WIRING. AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
- 4 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
- 5 CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.

NOTES:

- 1 SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS. FIELD CONNECTIONS FOR SINGLE SOURCE POWER ARE MADE TO 101 OR 102.
- 2 CLASS 1 FIELD WIRE MODULE.
- 3 RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC; 5 AMPS GENERAL PURPOSE.
- 4 COMPONENTS (LUIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS (WB3 & WB13) IN THE ORDER SHOWN.
- 5 DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. SHIELD IS ATTACHED INTERNALLY TO METAL WASHER ON SENSOR.
- 6 OPTIONAL MODULE. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
- 7 AUTO STOP CONTACTS ARE JUMPERED AT THE FACTORY BY JUMPERS W1 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONFIGURATION.
- 8 ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION TEMPERATURE RATING OF 90°C AND BE SELECTED AT 75°C RATINGS.
- 9 WIRING FOR 380V/50HZ UNIT SHOWN. FOR 400V/50HZ UNIT, CONNECT H1 AND H3. FOR 415V/50HZ UNIT, CONNECT H1 AND H4.

DEVICE DESIGNATION	DESCRIPTION	LEGEND	LINE NUMBER
1A1	TD7 DISPLAY		528
1C1	CAPACITOR FOR VENTILATION FAN 1M10		199
1S24	EMERGENCY STOP		32
1F1	FUSE, PRIMARY		18
1F2	FUSE, PRIMARY		19
1F3	FUSE, SECONDARY, 115V		32
1F4	FUSE, SECONDARY, 27V		34
1F5	FUSE, SECONDARY, 27V		33
1F6	FUSE, SECONDARY, 230V		32
1F7	FUSE, RFI FILTER, CIRCUIT 1		13
1F8	FUSE, RFI FILTER, CIRCUIT 1		14
1F9	FUSE, RFI FILTER, CIRCUIT 1		15
1K1	UC800		528
1K2	DUAL LOW VOLTAGE INPUT, LCI-C COMMUNICATIONS (ECHELON)		157
1K4	RUNNING STATUS CONTROL RELAY, COMPRESSOR 1A		67
1K9	STARTER MODULE, COMPRESSOR 1B		45
1K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1A		161
1K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 1B		168
1K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 1A/COMPRESSOR 1B		175
1K14	DUAL HIGH VOLTAGE INPUT, CHILLED WATER FLOW AND INTERLOCK		191
1K15	DUAL LOW VOLTAGE INPUT, OIL LOSS LEVEL, CIRCUIT 1&CIRCUIT 2		147
1K16	DUAL RELAY OUTPUTS, CHILLED WATER PUMP START COMMAND		207
1K17	QUAD RELAY OUTPUTS, UNIT STATUS PROGRAMMABLE RELAYS		195
1K18	DUAL LOW VOLTAGE INPUT, EXTERNAL AUTO STOP AND EMERGENCY STOP INPUTS		178
1K19	ANALOG INPUT/OUTPUT, EXTERNAL CHILLED WATER SETPOINT INPUT AND EXTERNAL DEMAND LIMIT SETPOINT INPUT		163
1K21	DUAL RELAY OUTPUTS, CIRCUIT 1 FANS 1 RUN /CIRCUIT 1 FANS 2 RUN		229
1K22	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 1		240
1K23	DUAL RELAY OUTPUTS, 3M23 FAN RUN AND 4M25 FAN RUN		259
1K24	ANALOG INPUT/OUTPUT, SHARED CONDENSER FAN SPEED COMMAND		267
1K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOFF COMPRESSOR 1B		153
1M10	VENTILATING FAN1		199
1P1	CIRCUIT 1 FANS ALARM LIGHT		187
1Q1	CIRCUIT BREAKER, POWER DISTRIBUTION		7
1Q2	DISCONNECT SWITCH, POWER DISTRIBUTION		8
1Q25	CONTACTOR, COMPRESSOR 1B START		48
1Q26	CONTACTOR, COMPRESSOR 1B RUN		51
1Q27	CONTACTOR, COMPRESSOR 1B SHORT		54
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION		57
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A		22
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B		25
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C		28
1T1	TRANSFORMER, POTENTIAL POWER		28
1T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE		48
1T6	AFD, COMPRESSOR 1A		14
1T7	DC REACTOR, COMPRESSOR 1A		9
1T8	RFI FILTER, COMPRESSOR 1A		14
1T9	COMMON MODE CHOKE, COMPRESSOR 1A		14
1T10	POWER SUPPLY MODULE		518
1T11	POWER SUPPLY MODULE		510
1T12	TRANSFORMER CONTROL POWER		28
1T13	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE A		21
1T14	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE B		24
1T15	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE C		27
1X2	FANS CABLE POWER TERMINAL		78
1X5	FACTORY CONTROL TERMINAL		
1X6	CONDENSOR FANS CONTROL TERMINAL		
1X7	CONTROL PANEL VENTILATION FANS CONTROL TERMINAL		
1X8	EVAPORATOR HEATER POWER TERMINAL		
2C1	CAPACITOR FOR VENTILATION FAN 2M10		487
2F1	FUSE, PRIMARY		306
2F2	FUSE, PRIMARY		307
2F3	FUSE, SECONDARY, 115V		320
2F4	FUSE, SECONDARY, 27V		322
2F5	FUSE, SECONDARY, 27V		321
2F6	FUSE, SECONDARY, 230V		320
2F7	FUSE, RFI FILTER, CIRCUIT 2		301
2F8	FUSE, RFI FILTER, CIRCUIT 2		302
2F9	FUSE, RFI FILTER, CIRCUIT 2		303
2K4	RUNNING STATUS CONTROL RELAY, COMPRESSOR 2A		355
2K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2A		450
3BL1	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 1		55
3BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1A		551
3BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 1A		553
3BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 1		547
3BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 1		549
3BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1A		565
3BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 1B		571
3BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 1B		561
3BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 1B		563
3BT1	OIL TEMPERATURE SENSOR, CIRCUIT 1A		545
3BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1A		543
3BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 1		541
3BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 1		539
3BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1A		567
3BT6	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 1B		573
3BT11	OIL TEMPERATURE SENSOR, CIRCUIT 1B		559
3BT12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 1B		557
3B2	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1A		65
3B3	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 1B		41
3E1	HEATER, COMPRESSOR 1A		37
3E2	HEATER, COMPRESSOR 1B		39
3E3	HEATER, OIL SEPARATOR, CIRCUIT 1		38
3K1	MOTOR, EXPANSION VALVE, CIRCUIT 1		555
3K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1A		569
3K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 1B		575
3M1	MOTOR, COMPRESSOR 1A		14
3M2	MOTOR, COMPRESSOR 1B		24
3M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1A		162
3M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1A		164
3M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 1B		169
3M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 1B		171
3M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1A		185
3M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1A		182
3M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 1B		179
3M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 1B		176
3M11~3M25	MOTOR, CONDENSOR FANS, CIRCUIT 1		
4BL1	LIQUID LEVEL OPTICAL SENSOR, OIL LOSS CIRCUIT 2		343
4BP1	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2A		545
4BP2	OIL PRESSURE TRANSDUCER, CIRCUIT 2A		547
4BP3	DISCHARGE PRESSURE TRANSDUCER, CIRCUIT 2		541
4BP4	LIQUID LINE PRESSURE TRANSDUCER, CIRCUIT 2		543
4BP5	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2A		559
4BP6	ECONOMIZER DISCHARGE PRESSURE TRANSDUCER, COMPRESSOR 2B		565
4BP11	SUCTION PRESSURE TRANSDUCER, CIRCUIT 2B		555
4BP12	OIL PRESSURE TRANSDUCER, CIRCUIT 2B		557
4BT1	OIL TEMPERATURE SENSOR, CIRCUIT 2A		539
4BT2	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2A		537
4BT3	LIQUID LINE TEMPERATURE SENSOR, CIRCUIT 2		535
4BT4	EVAPORATOR TEMPERATURE SENSOR, CIRCUIT 2		533
4BT5	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2A		561
4BT6	ECONOMIZER DISCHARGE TEMPERATURE SENSOR, COMPRESSOR 2B		567
4BT11	OIL TEMPERATURE SENSOR, CIRCUIT 2B		553
4BT12	DISCHARGE TEMPERATURE SENSOR, CIRCUIT 2B		551
4B2	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 2A		353
4B3	PRESSURE SWITCH, HIGH PRESSURE CUTOFF, COMPRESSOR 2B		329
4E1	HEATER, COMPRESSOR 2A		325
4E2	HEATER, COMPRESSOR 2B		327
4E3	HEATER, OIL SEPARATOR, CIRCUIT 2		326
4K1	MOTOR, EXPANSION VALVE, CIRCUIT 2		549
4K2	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2A		563
4K3	MOTOR, ECONOMIZER EXPANSION VALVE,COMPRESSOR 2B		569
4M1	MOTOR, COMPRESSOR 2A		302
4M2	MOTOR, COMPRESSOR 2B		313
4M3	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 2A		450
4M4	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2A		452
4M5	SOLENOID, PROPORTIONAL LOAD CONTROL, COMPRESSOR 2B		457
4M6	SOLENOID, PROPORTIONAL UNLOAD CONTROL, COMPRESSOR 2B		459
4M7	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2A		473
4M8	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2A		470
4M9	SOLENOID, OIL RETURN CONTROL, COMPRESSOR 2B		467
4M10	SOLENOID, STEP LOAD CONTROL, COMPRESSOR 2B		464
4M11~4M25	MOTOR, CONDENSOR FANS, CIRCUIT 2		
5B5	FLOW SWITCH, CHILLED WATER		194

1K20	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 1	250
1K23	DUAL RELAY OUTPUTS, 3M25 FAN RUN AND 4M25 FAN RUN	259
1K24	ANALOG INPUT/OUTPUT, SHARED CONDENSER FAN SPEED COMMAND	267
1K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOUT,COMPRESSOR 1B	153
1M10	VENTILATING FAN1	199
1P1	CIRCUIT 1 FANS ALARM LIGHT	187
1Q1	CIRCUIT BREAKER, POWER DISTRIBUTION	7
1Q2	DISCONNECT SWITCH, POWER DISTRIBUTION	8
1Q25	CONTACTOR, COMPRESSOR 1B START	48
1Q26	CONTACTOR, COMPRESSOR 1B RUN	51
1Q27	CONTACTOR, COMPRESSOR 1B SHORT	54
1Q28	CONTACTOR, COMPRESSOR 1B TRANSITION	57
1R4	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE A	22
1R5	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE B	25
1R6	RESISTOR, TRANSITION, COMPRESSOR 1B, LINE C	28
1T1	TRANSFORMER, CONTROL POWER	28
1T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE	48
1T6	AFD, COMPRESSOR 1A	14
1T7	DC REACTOR, COMPRESSOR 1A	9
1T8	RFI FILTER, COMPRESSOR 1A	14
1T9	COMMON MODE CHOKE, COMPRESSOR 1A	14
1T10	POWER SUPPLY MODULE	518
1T11	POWER SUPPLY MODULE	510
1T12	TRANSFORMER, CONTROL POWER	28
1T13	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE A	21
1T14	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE B	24
1T15	TRANSFORMER, CURRENT, COMPRESSOR 1B, LINE C	27
1X2	FANS CABLE POWER TERMINAL	78
1X5	FACTORY CONTROL TERMINAL	
1X6	CONDENSOR FANS CONTROL TERMINAL	
1X7	CONTROL PANEL VENTILATION FANS CONTROL TERMINAL	
1X8	EVAPORATOR HEATER POWER TERMINAL	
2C1	CAPACITOR FOR VENTILATION FAN 2M10	487
2F1	FUSE, PRIMARY	306
2F2	FUSE, PRIMARY	307
2F3	FUSE, SECONDARY, 115V	320
2F4	FUSE, SECONDARY, 27V	322
2F5	FUSE, SECONDARY, 27V	321
2F6	FUSE, SECONDARY, 230V	320
2F7	FUSE, RFI FILTER, CIRCUIT 2	301
2F8	FUSE, RFI FILTER, CIRCUIT 2	302
2F9	FUSE, RFI FILTER, CIRCUIT 2	303
2K4	RUNNING STATUS CONTROL RELAY, COMPRESSOR 2A	355
2K11	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2A	450
2K12	DUAL TRIAC OUTPUT, MODULATING UNLOAD AND LOAD COMPRESSOR 2B	457
2K13	QUAD RELAY OUTPUTS, STEP LOAD CONTROL AND OIL RETURN VALVE, COMPRESSOR 2A/COMPRESSOR 2B	463
2K21	DUAL RELAY OUTPUTS, CIRCUIT 2 FANS 1 RUN /CIRCUIT 2 FANS 2 RUN	452
2K22	ANALOG INPUT/OUTPUT, CONDENSER FAN SPEED COMMAND, CIRCUIT 2	459
2K28	DUAL HIGH VOLTAGE INPUT, HIGH PRESSURE CUTOUT,COMPRESSOR 2B	442
2M10	VENTILATING FAN2	487
2P1	CIRCUIT 2 FANS ALARM LIGHT	475
2Q1	CIRCUIT BREAKER, POWER DISTRIBUTION	295
2Q2	DISCONNECT SWITCH, POWER DISTRIBUTION	296
2Q25	CONTACTOR, COMPRESSOR 2B START	336
2Q26	CONTACTOR, COMPRESSOR 2B RUN	339
2Q27	CONTACTOR, COMPRESSOR 2B SHORT	342
2Q28	CONTACTOR, COMPRESSOR 2B TRANSITION	345
2R4	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE A	310
2R5	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE B	313
2R6	RESISTOR, TRANSITION, COMPRESSOR 2B, LINE C	316
2T1	TRANSFORMER, CONTROL POWER	316
2T2	TRANSFORMER, POTENTIAL, UNDER/OVER VOLTAGE	336
2T6	AFD, COMPRESSOR 2A	301
2T7	DC REACTOR, COMPRESSOR 2A	297
2T8	RFI FILTER, COMPRESSOR 2A	301
2T9	COMMON MODE CHOKE, COMPRESSOR 2A	301
2T10	POWER SUPPLY MODULE	518
2T11	POWER SUPPLY MODULE	510
2T12	TRANSFORMER, CONTROL POWER	316
2T13	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE A	309
2T14	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE B	312
2T15	TRANSFORMER, CURRENT, COMPRESSOR 2B, LINE C	315
2X2	FANS CABLE POWER TERMINAL	366
2X5	FACTORY CONTROL TERMINAL	
2X6	CONDENSOR FANS CONTROL TERMINAL	
2X7	CONTROL PANEL VENTILATION FANS CONTROL TERMINAL	



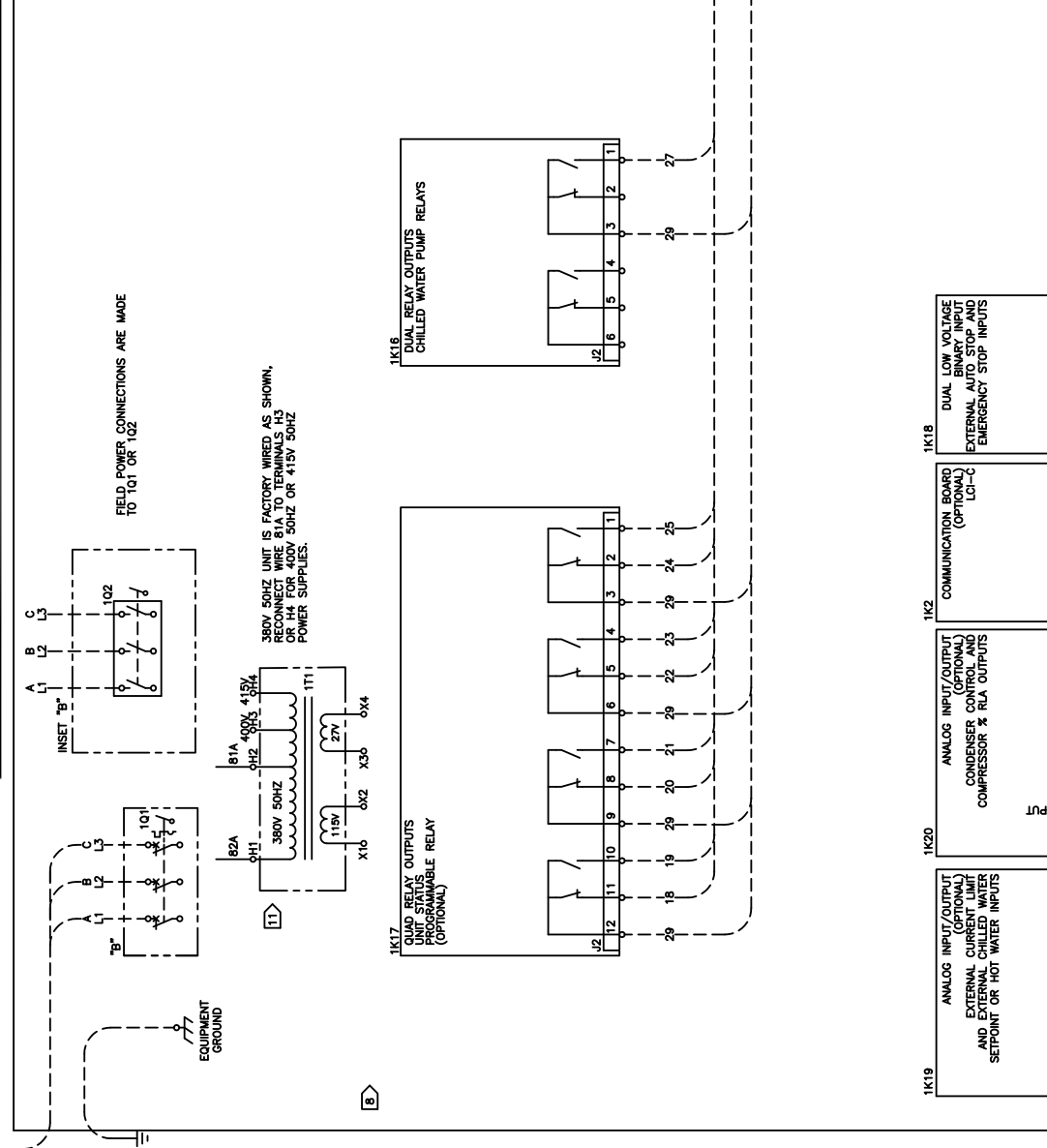
WARNING HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.

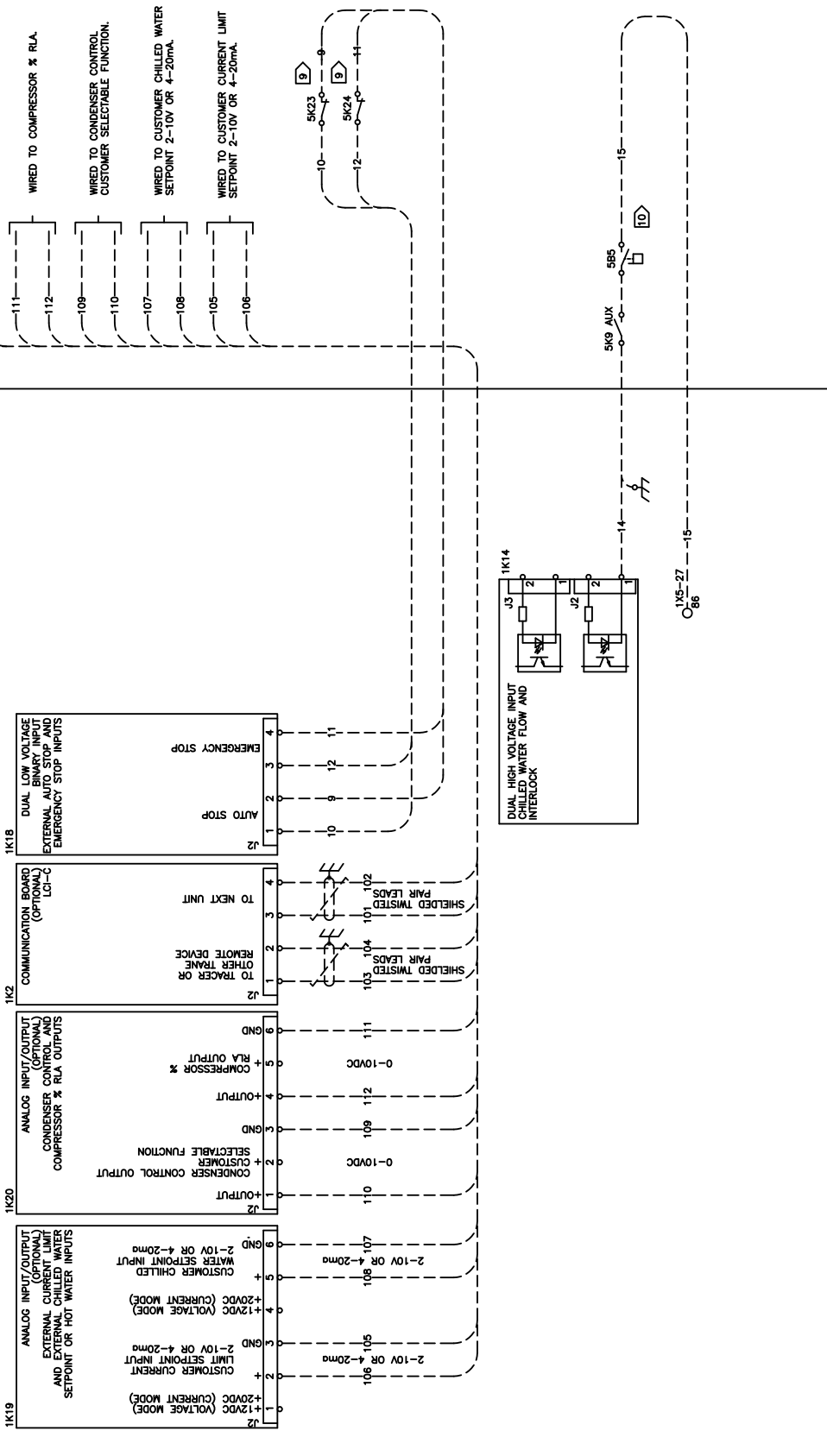
AVERTISSEMENT TENSION DANGEREUSE! COUPER TOUTES LES TENSIONS ET OUVRIRE LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT DE RÉPARER L'ÉQUIPEMENT. LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ÉQUIPEMENT POUR DÉCHARGER LES CONDENSATEURS. UN MANQUEMENT À LA PROCÉDURE POUR DÉCHARGER LES CONDENSATEURS PEUT PROVOQUER LA MORT O LES LÉSIONS GRAVES.

ADVERTENCIA ¡VOLTAJE PELIGROSO! DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUIDO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER A LAS REPARACIONES. LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON TRANSMISIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. NO REALIZAR LO ANTERIOR PUEDE PROVOCAR LA MUERTE O LESIONES GRAVES.

NOTICE USE COPPER CONDUCTORS ONLY! UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVISO ¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE! LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES. NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.





1. REFER TO RTHE ELECTRICAL SCHEMATIC FOR SPECIFIC ELECTRICAL CONNECTION INFORMATION AND NOTES PERTAINING TO WIRING INSTALLATION.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH LOCAL REQUIREMENTS.
3. ALL CUSTOMER CONTROL CIRCUIT WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION RATING OF 300 VOLTS. EXCEPT AS NOTED, ALL CUSTOMER WIRING CONNECTIONS ARE MADE TO CIRCUIT BOARD MOUNTED BOX LUGS WITH A WIRE RANGE OF 14 TO 18 AWG.
4. CUSTOMER SUPPLIED POWER 115/60/1 OR 220/50/1 TO POWER RELAYS. MAX. FUSE SIZE IS 15 AMPS. GROUND ALL CUSTOMER SUPPLIED POWER SUPPLIES AS REQUIRED BY APPLICABLE CODES. GREEN GROUND SCREWS ARE PROVIDED IN UNIT CONTROL PANEL.
5. WIRING TO NEXT UNIT. 22 AWG SHIELDED COMMUNICATION WIRE EQUIVALENT TO HELIX LF22P0014216 RECOMMENDED. THE SUM TOTAL OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 4500 FEET. CONNECTION TOPOLOGY SHOULD BE DASH CHAIN. REFER TO BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATION INSTALLATION LITERATURE FOR END OF LINE TERMINATION RESISTOR REQUIREMENTS.
6. WIRING TO TRACER OR OTHER TRANE REMOTE DEVICE. 22 AWG SHIELDED COMMUNICATION WIRE EQUIVALENT TO HELIX LF22P0014216 RECOMMENDED. THE SUM TOTAL OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 4500 FEET. CONNECTION TOPOLOGY SHOULD BE DASH CHAIN. REFER TO BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATION INSTALLATION LITERATURE FOR END OF LINE TERMINATION RESISTOR REQUIREMENTS.
7. ALL UNIT POWER WIRING MUST BE 600 VOLT COPPER CONDUCTORS ONLY AND HAVE A MINIMUM TEMPERATURE INSULATION RATING OF 75 DEGREE C. REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION DEVICE. PROVIDE AN EQUIPMENT GROUND IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES.
8. UNIT PROVIDED DRY CONTACTS FOR CUSTOMER CONNECTION. RELAYS ARE RATED FOR 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 3/4 HP, 7.2 FLA AT 120 VOLTS 60 HZ. CONTACTS ARE RATED FOR 5 AMPS GENERAL PURPOSE DUTY 240 VOLTS.
9. CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATIBLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 mA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS RECOMMENDED.
10. FLOW SWITCH AND INTERLOCK CONTACTS MUST BE ACCEPTABLE FOR USE IN A 120 VOLT 1 mA CIRCUIT OR A 220 VOLT 2 mA CIRCUIT.
11. 380V/50HZ UNIT IS FACTORY WIRED WITH 81A CONNECTED TO H2 - RECONNECT WIRE 81A TO H3 FOR 400V/50HZ, OR H4 FOR 415V/50HZ.



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